

SHORT WAVE & TELEVISION

The Popular Radio Magazine



SHORT WAVES
"Spot the News"

SEE PAGE 74

25¢
IN U.S. AND
CANADA

HUGO
BERNSBACK
EDITOR

BEST SHORT-WAVE STATION LIST
HOW TO GET OVERSEAS STATIONS
NEWEST RADIO EXPERIMENTS
RADIO QUESTIONS AND ANSWERS

JUNE
1938

THE NEW 1938 ULTRA STRATOSPHERE "10"

2½ to 4000 METER TRANS-RECEIVER (RECEIVES 2½ to 4000 METERS) TRANSMITS 2½ and 5 METERS



- *Ten tubes.
- 1—6K7 Regenerative Tuned R.F. Amplifier.
- 1—6J7 Regenerative Detector.
- 1—6J5G Super Regenerative Detector & Transmitting Osc.
- 2—6C5 P.P. 1st Audio Stage.
- 2—25L6 P.P. Beam power output stage & modulators.
- 2—25Z6 Parallel Rectifiers.
- 1—6G5 Electronic tuning indicator & R meter.
- *Receives from 2½ to 4000 meters.
- *Transmits on 2½ & 5 meters.
- *8" Dynamic Speaker.
- *Calibrated R.F. Gain Control.
- *A.F. Gain Control.
- *Size—17½" x 19½"—16 gauge metal.
- *Tone control.
- *R.F. Resonator control.
- *Separate electrical bandspread.
- *Vernier planetary drives on tuning Cond.
- *Large 8" tuning dials.
- *May be used for I.C.W. and phone (transmission and as a code practice oscillator. Only a key required.
- *Standby switch.
- *Automatic Phone Jack.
- *Built-in A.C. & D.C. Power supply.

Complete kit of parts, including 8" Dynamic Speaker, unwired, less tubes and accessories **\$18.95**

Kit of 10 matched Sylvania tubes.....\$6.95
 Set of 4 coils—2½ to 15 meters..... .30
 Set of 8 coils—15 to 550 meters..... .20
 Set of 4 coils—550 to 4000 meters..... .20
 American S. B. Handmike..... .25
 Wired and tested extra..... .450

Price complete, less mike \$34.90

Shipping weight 36 lbs.

SENSATIONAL ULTRA A. C. + D. C. 2-TUBE TRANS-RECEIVER 2½ to 4000 Meters

TRULY A SENSATION

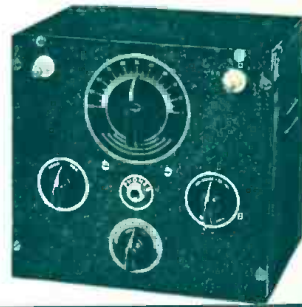
Uses the new 6J5G super triode tube which is the equivalent of acorn types

Never before was a unit of this type available at any price. This compact and self-contained unit will receive from 2½ to 4000 meters with a high degree of excellence. Will receive foreign stations, amateurs, police calls, broadcast, press, airplane and weather reports, time signals, and all ultra high frequency stations. As a 2½ and 5 meter transmitter surprising results will be obtained when calling friends from afar.

- Transmits from 2½ to 5 meters
- Receives from 2½ to 4000 meters (12 bands)
- Separate electrical and mechanical bandspread
- Loud speaker volume
- Automatic super-regeneration, 2½ to 15 meters
- House to house communication
- Plate modulation
- Built in A.C. & D.C. power supply (any cycle)

Complete kit unwired less tubes, coil, cabinet, microphone	\$7.15
Cabinet	5.95
Matched set of tubes (12A7-6J5G)	1.65
Wired and tested	2.00
Set of 4 coils (2½ to 15 meters)	.30
Set of 4 coils (15 to 200 meters)	.95
Set of 8 coils (200 to 4000 meters)	1.75
American SB Hand. mike	2.95
5" Magnetic Speaker	1.25

Battery model same price.



SPECIAL HEAVY DUTY POWER SUPPLY

OUTSTANDING FEATURES

- 6.3 volts at 6 amps.
- 400 volts D.C. at 250 mils.
- Encased in handsome black crackle metal finish cabinet 12¾"x7½"x3¾" overall dimensions.

- Tapped extremely heavy duty power transformer allows operation on any line voltage from 95 to 250 volts, 25 or 60 cycles.
- Ideal for medium powered transmitter or P.P. 6L6 amplifier or modulator.

Complete, wired and tested with Sylvania 523 rectifier tube and cabinet **\$4.95**



ULTRA DUPLEX 6 TUBE MOBILE OR A.C. 2½ to 5 Meters 56 to 120 M.C.)

This unit uses six of the latest 6 volt tubes in a circuit which may be operated from a 6 volt automobile battery or by substituting power supplies from 110 volts A.C. Receiver uses 1-6J5G as a super-regenerative detector, 1-6C5 1st A.F. stage, 1-6F6 output stage. Transmitter consists of 1-6B6 oscillator, 1-6C5 speech amplifier, 1-6L6 class A modulator. Power output of transmitter is 10 watts 100% plate modulator. Separate antennas are used for peak efficiency of both units regardless of frequency settings. Change-over from 6 volt to A.C. operation is extremely simple. All that is necessary is to remove the built in generator and insert the A.C. power supply. Supplied complete with all coils including coil for 10 meter reception.

- 6J5G — 6C5 — 6F6 — 6E6 — 6C5 — 6L6
- Built in 350 volt 150 mil filtered generator
- Built in dynamic speaker
- 10 watts power output
- 100% plate modulation
- Absolutely independent receiver and transmitter
- Negligible receiver radiation
- Automatic phone jack

Ultra 6 tube Duplex complete with built in dynamic speaker, and A.C. power supply, wired and tested, with cabinet, less tubes, mike and antenna **\$28.90**

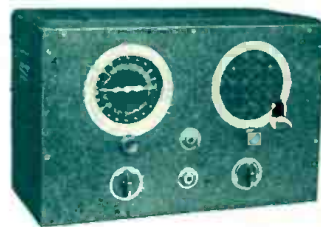
Ultra Duplex complete with built in dynamic speaker, and 150 mil generator, wired and tested, with cabinet, less tubes, mike and antenna **\$38.45**

Set of 6 Sylvania tubes **5.35**
 American SB hand mike **2.95**
 Adjustable 8 ft. antenna **1.60**

Ultra 4A-4-Tube A.C. Operated Transceiver (2½ to 5 Meters)

In the design of the Ultra 4A, A.C. operated transceiver, every tradition of radio value has been incorporated. Built-in dynamic speaker, self contained power supply, Class A 100% modulation are only a few of the outstanding features of this "Ultra High Frequency" product.

The new all metal tubes are used as follows: 6F6, Class A modulator—power amplifier, 6C5, high gain speech amplifier—1st A.F. amplifier, 5Z4, rectifier, 6A6, Oscillator-detector. The Ultra 4A is completely filtered at both R.F. and A.F. levels. Automatic phone jack silences speaker. Tuning range 2½ to 5 meters with 5 watts output. Supplied complete with all coils, including coil for 10 meter reception.



Complete kit of parts including all coils, less cabinet, tubes, microphone, unwired **\$15.95**

Wired and tested.....\$3.60
 Black wrinkle finished cabinet..... .25
 Sylvania 6A6, 6C5, 6F6, 5Z4 matched set of 4 tubes..... .340
 American SB Hand Mike..... .295

ULTRA HIGH FREQUENCY PRODUCTS CO.,

123 LIBERTY STREET
 NEW YORK, N. Y.

FRED, WHERE DID YOU GET THE MONEY TO START YOUR OWN RADIO BUSINESS?



I STARTED WITHOUT CAPITAL, JOAN -- J. E. SMITH SHOWED ME HOW -- I WAS WORKING AT THE FACTORY --

I'M ON PART TIME AGAIN. WONDER WHAT I CAN DO TO MAKE SOME MONEY IN MY SPARE TIME

FACTORY EMPLOYEES ONLY



HERE'S JUST WHAT I NEED. I KNOW SOMETHING ABOUT RADIO. J. E. SMITH SAYS HE TRAINS MEN AT HOME TO MAKE MONEY IN RADIO



THIS N. R. I. COURSE IS GREAT. I'M LEARNING PLENTY I NEVER KNEW ABOUT RADIO AND TELEVISION. I'LL BE READY WHEN TELEVISION NEEDS TRAINED MEN



HERE'S \$6.00. NICE JOB. THE RADIO NEVER SOUNDED BETTER

I'D NEVER BEEN ABLE TO GET THIS RADIO WORK IF J. E. SMITH HADN'T SHOWED ME HOW



I'VE PLENTY OF RADIO WORK NOW. GUESS I'LL GIVE UP MY PART TIME JOB AT THE FACTORY AND START MY OWN BUSINESS



SO JOAN, I STARTED MY OWN RADIO BUSINESS ON THE MONEY I MADE IN SPARE TIME RADIO WORK. J. E. SMITH CERTAINLY TRAINS MEN TO MAKE MONEY IN RADIO

- AND YOU'LL BE READY WHEN TELEVISION ARRIVES, TOO, FRED. THE FUTURE LOOKS SO BRIGHT



Make me prove I can train you at home in spare time for a **GOOD RADIO JOB** and for *Television's coming opportunities*

J. E. SMITH, President National Radio Institute Established 1914

I will prove that I can train you at home in your spare time to be a **RADIO EXPERT**. I will send you a sample lesson **FREE**. Examine it, read it, see how clear and easy it is to understand—how practical I make learning Radio at home. Then you will know why men without a knowledge of Radio or electricity have become Radio Experts and are earning more money than ever as a result of my Training.

Get My Lesson on Radio Servicing Tips FREE I'll prove that my Training gives practical, money-making information, that it is easy to understand—that it is just what you need to master Radio. My sample lesson text, "Radio Receiver Troubles—Their Cause and Remedy," covers a long list of Radio receiver troubles in A.C., D.C., battery, universal, auto, T. R. F., superheterodyne, all-wave, and other types of sets. And a cross reference system gives you the probable cause and a quick way to locate and remedy these set troubles. A special section is devoted to receiver check-up, alignment, balancing, neutralizing, testing. You can get this lesson Free by mailing the coupon.

Many Radio Experts Make \$30, \$50, \$75 a Week

Radio broadcasting stations pay engineers, operators, station managers up to \$5,000 a year. Spare time Radio set

servicing pays as much as \$200 to \$500 a year—full time servicing pays as much as \$30, \$50, \$75 a week. Many Radio Experts operate their own business. Manufacturers and jobbers employ testers, inspectors, foremen, engineers, servicemen, buying up to \$6,000 a year. Automobile, police aviation, commercial Radio, and loud speaker systems are newer fields offering good opportunities now and for the future. Television promises many good jobs soon. Men I trained have good jobs in these branches of Radio.

Many Make \$5, \$10, \$15 a Week Extra in Spare Time While Learning

Almost every neighborhood needs a good spare time serviceman. The day you enroll I start sending Extra Money Job Sheets Showing how to do Radio repair jobs. Throughout your training I send plans and ideas that made good spare time money—as much as \$200 to \$500 a year—for hundreds. I send Special Radio Equipment to conduct experiments, build circuits, get practical experience.

I ALSO GIVE YOU THIS PROFESSIONAL SERVICING INSTRUMENT

Here is the instrument every Radio Expert needs and wants—an All-Wave All-Purpose, Set Servicing Instrument. It contains everything necessary: to measure A.C. and D.C. voltages and current; to test tubes, resistance; adjust and align any set, old or new.



It satisfies your needs for professional servicing after you graduate—can help you make extra money servicing sets while training.

Save Money -- Learn At Home Money Back Agreement Protects You

I am sure I can train you at home successfully. I will agree in writing to refund every penny you pay me if you are not satisfied with my Lessons and Instruction Service when you finish my Course. I'll send you a copy of this agreement with my Book.

Get Sample Lesson and 64-Page Book FREE Mail Coupon

In addition to my Sample Lesson I will send you my 64-page book "Rich Rewards in Radio." Both are FREE to anyone over 16 years old. My book points out Radio's spare time and full time opportunities and those coming in television; my Training in Radio and Television shows you letters from men I trained, telling what they are doing and earning; shows my Money Back Agreement. MAIL THE COUPON in an envelope, or paste it on a penny postcard.

J. E. SMITH, President National Radio Institute, Dept. 8FB3 Washington, D. C.

Mail this Now FREE Get 64-page Book



J. E. SMITH, President National Radio Institute, Dept. 8FB3, Washington, D. C. Without obligation, send me the Sample Lesson and your free book about the spare time and full time Radio opportunities, and how I can train for them at home in spare time. (Please write plainly.)

Name

Address

City State 14X-1

Please say you saw it in SHORT WAVE & TELEVISION

HUGO GERNSBACK, Editor
 H. WINFIELD SECOR, Manag. Editor
 M. HARVEY GERNSBACK, Assoc. Editor

In This Issue

FEATURES

Radio in Japan, S. Okamoto	69
A B C of Television, H. Winfield Secor	70
Short Wave <i>Foto News</i>	72
W3XAL's Short-Wave Voice Reaches Every Clime	73
Spot News-Casting with the "Beer-Mug" Transmitter	74
How The French Televisé	75
The Birth of a Cathode Ray Tube	76
Wedge-Crystal Gives High-Fidelity Tone—Plus Sharp Tuning, W. E. Schrage	77
France and U. S. Combat S-W Propagasters	78

S-W STATIONS—HOW TO FIND THEM

Let's Listen In with Joe Miller	82
World Short Wave Stations	84
When To Listen In, M. Harvey Gernsback	87

TELEVISION

A B C of Television	70
Television in the News	72
How the French Televisé	75
"Seeing" with Electrons, Eric W. Leaver	97
The S.W.&T. 441-Line Television Receiver, C. W. Palmer, E.E.	98

CONSTRUCTOR

Hints for the Facsimile Experimenter	89
I-Tube Duplex—the Beginner's Receiver	93
2AJL Superhet Receiver, Herman Yellin, W2AJL	94
S.W.&T. 441-Line Television Receiver, Part IV, C. W. Palmer, E.E.	98
The HK-54 200 Watt Transmitter, George W. Shuart, W2AMN	100
Push-Button Control Transmitter, H. G. McEntee, W2FHP	102

MISCELLANEOUS

Short Wave <i>Foto News</i>	72
New Silver Trophy for Best "Ham" Station Photo	79
What Do You Think?	80
The Listener Asks	81
Can You Answer These Radio Questions?	83
Short Wave <i>Kinks</i>	85
Short Wave League— <i>When To Listen In</i> , M. Harvey Gernsback	87
Question Box	91
What's New in Short-Wave Apparatus	104

Cover photo composition by H. Gernsback and Arthur MacLean. Spot-news beer-mug transmitter photo courtesy of NBC. Fire scene courtesy Times Wide-World Photos. WEAf tower photo courtesy of NBC.

SHORT WAVE & TELEVISION—Published monthly on the tenth of the month. Entered as second-class matter Feb. 15, 1938, at the post office at Springfield, Mass., under the act of March 3, 1879. Trademarks and copyrights by permission of H. Gernsback. Text and Illustrations are copyright and may not be reproduced without permission. Subscription price \$2.50 a year in the United States and possessions and Canada, \$3.00 in foreign countries. Make all subscription checks payable to Popular Book Corporation.

Published by Popular Book Corporation. Publication Office—29 Worthington St., Springfield, Mass. Editorial and Executive Office—99 Hudson St., New York, N.Y. HUGO GERNSBACK, President; H. W. SECOR, Vice-President; EMIL GROSSMAN, Director of Advertising. European Agents: Goringe's American News Agency, 9A Green St., Leicester Square, London W.C. 2; Brentano's—London and Paris. Australian Agents: McGill's Agency, 179 Elizabeth St., Melbourne.

Copyright 1938 by H. Gernsback

In the July Issue

Talking on a Light Beam!
Cold Waves and Short Waves, Prof. J. Merino y Coronado, TI2JM.
Compact 5-Meter Receiver, Art Gregor.
Using the National SW3 as a Pre-Selector.
W8KPX Beginner's Transmitter, H. D. Hooton.
A. F. Amplifier—for Use with The Average S-W Tuning Unit, H. Yellin, W2AJL.
Self-Powered 4-Tube A.C. Receiver, Harry D. Hooton.
A Rotating Aerial for Your Attic.



Two machines used for recording programs at the German short-wave station in Berlin. The records are broadcast later.



Certified Circuits

When you see this seal on a set it is a guarantee that it has been tested and certified in our laboratories, as well as privately in different parts of the country. Only construction—experimental sets are certified.

You need not hesitate to spend money on parts because the set and circuit are bona fide.

This is the only magazine that renders such a service.

By Doing Actual Jobs—Not Correspondence—On Modern Radio Equipment



View of Students operating our Television Camera and Scanning Unit

TRAIN IN 12 WEEKS

In the Big Chicago Shops of **COYNE**



Students operating our modern Transmitter

TELEVISION

FOR RADIO

TALKING PICTURES

No Advanced Education or Previous Experience Needed to Obtain Coyne Practical Training

"Learn by Doing" methods train you for RADIO, TELEVISION and SOUND EQUIPMENT—NOT A CORRESPONDENCE COURSE—NO BOOK STUDY—YOU DON'T HAVE TO RECITE LESSONS IN A CLASSROOM—you DON'T NEED advanced education or previous Radio Experience. You are trained right in modern, daylight shops on Radio, Sound and Television equipment under the personal supervision of expert instructors on the sort of similar work you will meet out in the field on a real job. That's why Coyne Practical Training is able to prepare you in such a short time. SPEND ONLY 12 WEEKS DOING ACTUAL WORK AT COYNE, and you should be ready for your start to a better job and a real future. Do radio wiring and testing, trouble shooting, repairing and servicing. Work on a wide variety of Superheterodyne sets, oscillators, analyzers and test instruments. Learn how to operate television receiving and transmitting equipment; to install, test and service public address systems and sound picture equipment. Prepare to qualify for a government license examination as Amateur, Broadcast, or Telegraph Radio Operator and to know code and Dept. of Commerce rules.

Amazing Offer!

PAY FOR YOUR TRAINING AFTER YOU GRADUATE in Small Monthly Payments!

Don't let lack of money stop you from sending in the Coupon. Learn how you can get your training first—Then take over one year to pay tuition after you graduate. Make your first payment 60 days after your regular 12 Weeks Training period ends. Then take over a year to pay the

balance in small monthly payments. This plan has enabled hundreds of ambitious fellows to get Coyne Training with very little money. It can do the same for you. Many of our graduates have found their extra earnings more than enough to cover the small monthly payments.

Earn Living Expenses While You Are Training!

If you need part-time work to help pay your living expenses while training, my free employment service will help you get it. The Free Service of our Employment Department has enabled hundreds of deserving students to get part time jobs and earn part or all of their room and board while training in the great Coyne Chicago Shops.

Electric Refrigeration

Training Included Without Extra Cost

This combination Training (Radio and Refrigeration) can be of great value to you. Whether you go into business for yourself or get a job working for a Radio Sales and Service organization, the fact that you are trained in servicing Electric Refrigerators will be profitable to you. Many Radio Manufacturers also make Electric Refrigerators and men with this combination training are much more valuable to these employers. You can NOW get this training without extra cost.

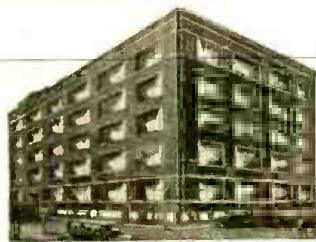


You Get Employment Service After You Graduate

Our Graduate Employment Service will give you employment service as often as you need it. You will also get free consultation service and advice whenever you want it.

Mail The Coupon

Get the new "Coyne Opportunity Book" giving all facts about Coyne Training. Photographs of Shops showing students at work on modern Radio equipment under the personal supervision of Coyne Expert Instructors. Also details of our Part Time Employment Service, Pay After Graduation Plan and Graduate Employment Service. Yours without cost. Simply mail the coupon.



Home of Coyne Shops

This is our fireproof modern building wherein is installed thousands of dollars worth of Radio equipment of all kinds. Every comfort and convenience has been arranged to make you happy and contented during your Training.

COYNE RADIO DIVISION
ELECTRICAL SCHOOL
500 S. Paulina St., Dept. A8-2K, Chicago, Ill.

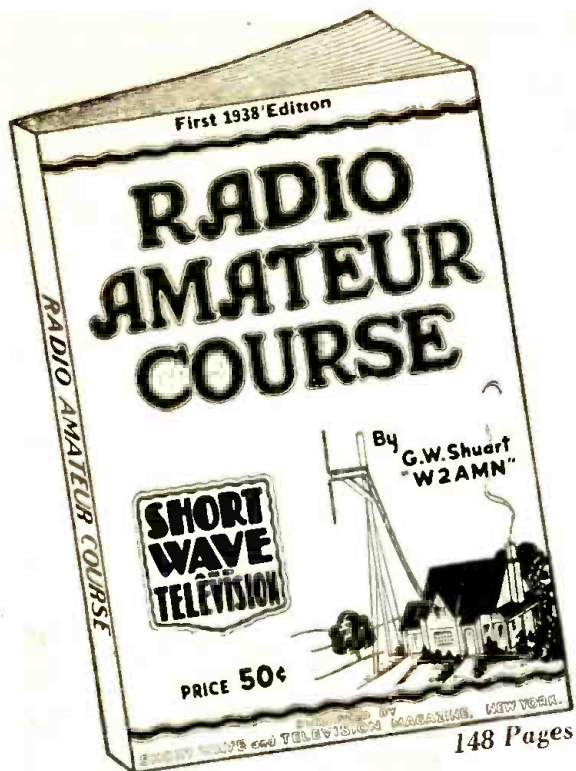
H. C. LEWIS
President

H. C. LEWIS, President—RADIO DIVISION
Coyne Electrical School, Dept. A8-2K,
500 S. Paulina St., Chicago, Ill.

Send me your Big Free Book about Coyne Training and give me all details regarding your Part Time Employment Service and Pay After Graduation Plan of easy, monthly payments.

NAME AGE
ADDRESS
CITY STATE

Mail in envelope or paste on postcard



SEE this remarkable book at your dealer

Glance over its 148 pages containing over 150 diagrams and halftone cuts. Read *step by step* how you can obtain the foundation of a *short wave radio education*

This book represents the biggest value you ever received for 50¢

Written by Geo. W. Shuart, W2AMN—
the authority on short waves

Your library is not complete without it

A new book that will appeal to tens of thousands—
An essential book for all beginners—

ON SALE AT THE FOLLOWING DEALERS

ARIZONA

Sam's Cigar Store,
127 N. First Ave.,
Phoenix.

CALIFORNIA

Scott Wholesale Radio Co.,
344 E. Fourth Street,
Long Beach.
Offenbach Electric Co., Ltd.,
1452 Market Street,
San Francisco.
Zack Radio Supply Co.,
1426 Market Street,
San Francisco.

COLORADO

Auto Equipment Co.,
14th at Lawrence,
Denver.

CONNECTICUT

Radio Inspection Service Co.,
227 Asylum Street,
Hartford.
Stern Wholesale Parts, Inc.,
Stern Bldg., 210 Chapel St.,
Hartford.

GEORGIA

Wholesale Radio Service Co., Inc.,
430 W. Peachtree St., N.W.,
Atlanta.

ILLINOIS

Allied Radio Corporation,
833 West Jackson Blvd.,
Chicago.
Newark Electric Company,
226 W. Madison Street,
Chicago.
Wholesale Radio Service Co., Inc.,
901 W. Jackson Blvd.,
Chicago.

INDIANA

Van Sickle Radio, Inc.,
34 West Ohio Street,
Indianapolis.

MASSACHUSETTS

Greater Boston Distributors,
40 Waltham St.,
Boston.
H. Jappe Co., 46 Cornhill,
Boston.
Wholesale Radio Service Co., Inc.,
110 Federal Street,
Boston.
Springfield Radio Co.,
327 Dwight Street,
Springfield.
H. Jappe Co., 37 Mechanic Street,
Worcester.

MICHIGAN

Rissl Brothers, Inc.,
5027 Hamilton Ave.,
Detroit.

MISSOURI

Modern Radio Company,
469 No. Third Street,
Hannibal.
Burstin-Applebee Co.,
1012-14 McGee Street,
Kansas City.
Van Sickle Radio Co.,
1113 Pine Street,
St. Louis.

NEBRASKA

Radio Accessories Company,
2566 Farnam Street,
Omaha.

NEW HAMPSHIRE

Radio Service Laboratory,
1187 Elm Street,
Manchester.

NEW JERSEY

Arco Radio Co.,
227 Central Avenue,
Newark.
Wholesale Radio Service Co., Inc.,
219 Central Avenue,
Newark.

NEW YORK

Wholesale Radio Service Co., Inc.,
542 E. Fordham Rd.,
Bronx.
Wholesale Radio Service Co., Inc.,
90-08 166th Street,
Jamaica, L. I.
Blair, The Radio Man, Inc.,
64 Dey Street,
New York City.
Eagle Radio Co.,
84 Cortlandt Street,
New York City.
Federated Purchaser, Inc.,
23-25 Park Place,
New York City.
Harrison Radio Co.,
12 West Broadway,
New York City.
Sun Radio Co.,
227 Fulton Street,
New York City.
Terminal Radio Corp.,
80 Cortlandt Street,
New York City.
Thor Radio Corp.,
65 Cortlandt St.,
New York City.
Try-Mo Radio Co., Inc.,
85 Cortlandt Street,
New York City.
Wholesale Radio Service Co., Inc.,
100 Sixth Avenue,
New York City.
Radio Parts & Equipment Co.,
244 Clinton Avenue No.,
Rochester.
M. Schwartz & Son,
710-712 Broadway,
Schenectady.

OHIO

News Exchange,
51 So. Main Street,
Akron.

CANTON RADIO & SUPPLY CO.

1140 Tuscarawas Street, W.,
Canton.
United Radio, Inc.,
1103 Vine Street,
Cincinnati.
The Hughes-Peters Electric Corp.,
178-180 N. Third Street,
Columbus.
Standard Radio Parts Co.,
135 East Second Street,
Dayton.

OREGON

Portland Radio Supply Co.,
1300 W. Burnside Street,
Portland.

PENNSYLVANIA

Radio Distributing Co.,
1124-26 Market Street,
Harrisburg.
M. & H. Sporting Goods Co.,
512 Market Street,
Philadelphia.
Cameradio Co.,
963 Liberty Ave.,
Pittsburgh.

RHODE ISLAND

W. H. Edwards Co.,
32 Broadway,
Providence, R. I.

UTAH

O'Loughlin's Wholesale Radio Supply,
315 South Main Street,
Salt Lake City.
Radio Supply, Inc.,
46 Exchange Place,
Salt Lake City.

WASHINGTON

Spokane Radio Co., Inc.,
611 First Avenue,
Spokane.

WISCONSIN

Radio Parts Co., Inc.,
536-538 W. State Street,
Milwaukee.

TEXAS

Amarillo Electric Co.,
111 East 8th Avenue,
Amarillo.

AUSTRALIA

McGill's Agency,
183-184 Elizabeth Street,
Melbourne.

CANADA

The T. Eaton Co., Ltd.,
Winnipeg,
Manitoba.
Canadian Electrical Supply Co., Limited,
285 Craig Street W.,
Montreal, Que.
Metropolitan News Agency,
1248 Peel Street,
Montreal, Que.

CUBA

The Diamond News Co.,
Palacio Asturiano, Por San Jose,
Habana.

ENGLAND

Gorrings's American News Agency,
9a, Green Street, Leicester Square,
London, W.C.2.

INDIA

Empire Book Mart,
Box 631,
Bombay.

MEXICO

American Book Store, S. A.,
Avenida Madero 25,
Mexico City.
Central De Publicaciones,
Avenida Juarez, 4, Apartado 2430,
Mexico, D. F.

NEW ZEALAND

Te Aro Book Depot, Ltd.,
64 Courtenay Place,
Wellington.

SOUTH AFRICA

Technical Book Co.,
147 Longmarket Street,
Cape Town.

AND WE WILL CREDIT HIM WITH YOUR ORDER. PLEASE FILL OUT IF NOT AT YOUR DEALER'S, PLEASE SEND HIS NAME AND ADDRESS COUPON BELOW.

SHORT WAVE AND TELEVISION, 99 HUDSON STREET, NEW YORK CITY. SW-6-38

Gentlemen: I enclose herewith my remittance for 50c, for which please send me my copy of the "RADIO AMATEUR COURSE" postpaid.

Name

Address

City State

Dealer's Name and Address.....
(Send remittance in form of check or money order. If letter contains cash or unused U. S. postage stamps, register it.)

Be sure to see future copies of *Short Wave & Television* for additional names of dealers handling this book.
SHORT WAVE & TELEVISION, 99 HUDSON ST., NEW YORK CITY



HUGO GERNSBACK, EDITOR

H. WINFIELD SECOR, MANAGING EDITOR

RADIO in JAPAN

— Shigeru Okamoto,

of the International Telecommunications Company, Ltd., of Japan

● IN Japan, or Nippon, as we call it, most radio activities are under government control. All broadcasting activity is handled by the Nippon Hoso Kyokai, or the Broadcasting Corporation of Japan. This is a privately owned monopoly under governmental supervision.

Oversea radio communications were, until recently, the domain of two different companies. The telegraph services were operated by the Japan Wireless Telegraph Company and the short-wave radio phone services were operated by the Kokusai-Denwa Kaisha, Ltd. In March of this year a consolidation was effected so that now these two companies are known as the International Telecommunications Company. The activities of this company are widespread. Direct radiophone service is operated by short-waves from Tokyo to San Francisco; Bandoeng, Java; Manila, P. I.; Saigon, Indo-China; Bangkok, Siam; Shanghai, China; Hsinking, Manchukuo; Berlin, Germany; London, England; Cape Town; Buenos Aires via London; and ship-to-shore telephone service is maintained to two ships, the Chichibu Maru traveling from Yokohama to San Francisco and the Yasukuni Maru traveling between Yokohama and London.

Transmission to the ships and to foreign countries is carried out from the transmitting plant at Nazaki, Japan. Here a large group of short-wave transmitters are located together with directional aerial systems.

Overseas Short-Wave Broadcasting

Short-wave broadcasts for listeners abroad are now sent out daily by cooperation of our company and the Broadcasting Corporation of Japan. Programs originate in the Tokyo studios of the Broadcasting Corporation and are sent out from our short-wave transmitters at Nazaki. At the present time there are several 20 kw. transmitters and one 50 kw. unit at Nazaki. The 50 kw. station was designed for the express purpose of sending short-wave broadcast programs abroad. It is usually operated on JZJ, 11.8 mc. The other channels used for short-wave broadcasting employ any one of the 20 kw. transmitters normally used for radio telephone work.

These short-wave broadcasts are sent out

at various hours during the day, using directive antenna systems to insure proper reception in various parts of the world.

Short-Wave Listening Forbidden

Interesting to Americans no doubt is the fact that *short-wave* listening is forbidden in Japan except by a few hundred licensed amateurs. To get a license from the Ministry of Communications is not so difficult, but amateur activities are not so extensive as in this country. The ordinary listener is not allowed to operate receiving equipment which will tune in *short-waves*; in other words, he must use only *single-band* receivers. However, I believe that this law will be modified in the near future to permit Japanese people to listen to *short-wave* stations as there is considerable interest in this popular hobby.

Television

Television experiments have been going on in Japan for about ten years. Several organizations have done considerable research in this field, the most notable being Waseda University at Tokyo, the Hamamatsu Higher Technical School, the Electrical Laboratory of the Ministry of Communications, Tokyo Electric Company and The Broadcasting Corporation of Japan. The Hamamatsu school was formerly most active in this field.

At present, the Broadcasting Corporation of Japan is doing most of the television experimentation and it is expected that television broadcasting will be put on a public scale in 1940 at the time of the next Olympic games in Tokyo. Television development has followed a pattern similar to that in other countries in that the first work was done with mechanical scanning systems. We now make use of cathode ray systems for transmission and reception; the iconoscope is used for picking up images. At the present time the Japanese Broadcasting Corporation has a small experimental transmitter in operation for use in conducting private field tests. A mobile television station has also been constructed in anticipation of the Olympic games.

The mobile system consists of four

*Eighteenth of a Series of
"Guest" Editorials*

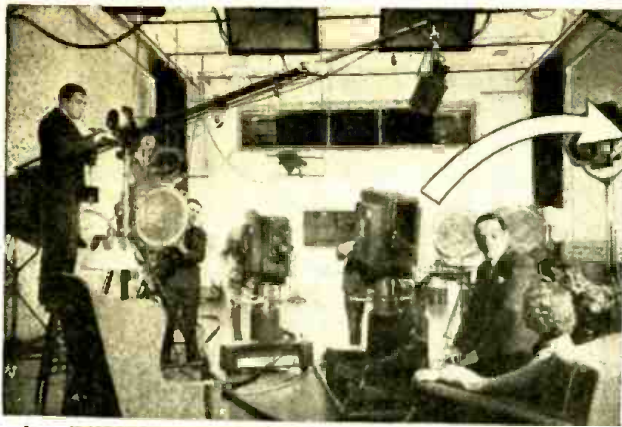


Mr. Okamoto, a member of the I.R.E. and an engineering representative of the International Telecommunications Company of Japan, is spending several years in the United States doing research work.

trucks, one containing the picture transmitting equipment, another the camera and the other two containing voice transmission equipment and voice reception equipment. The camera employs an iconoscope while the transmission system operates on a band 3 mc. wide at a frequency of 58 mc. 441-line definition is achieved with 25 frames per second. In the receiving set a Braun cathode ray tube is used for reproducing images, giving a blue-white picture. The screen of this tube has a diameter of about 12 inches.

Ultra Short-Waves

The Ministry of Communications, which controls all telephone lines in Japan, operates several ultra-short wave radiophone circuits to bridge water gaps between the numerous islands which make up Japan. These systems are automatic in operation, supplementing submarine cables, and in some cases are the *only* means of com-
(Continued on page 128)



A

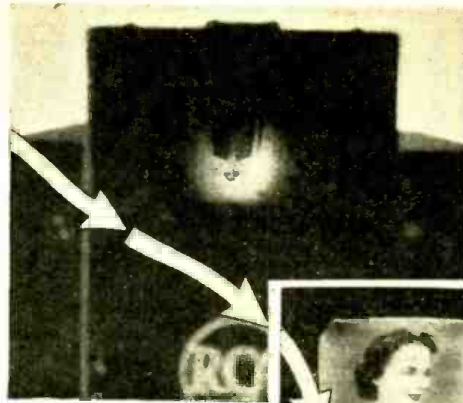


B

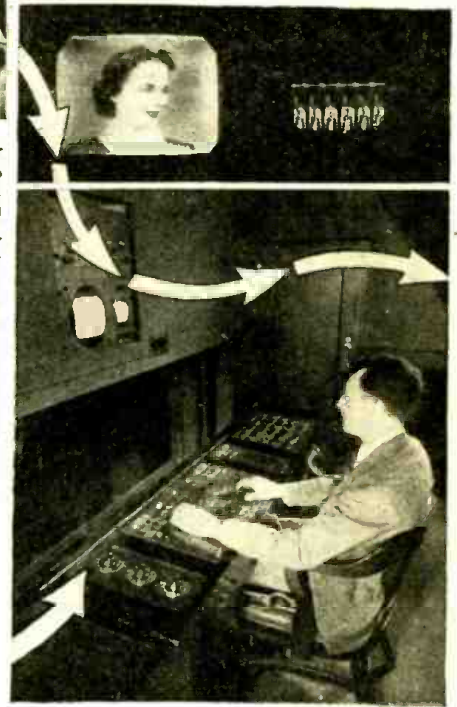


C

The photos above and to the right show three ways in which the television image may be picked up. A—studio pick-up with television cameras; B—movie film pick-up (above); C—spot news pick-up from mobile television truck.

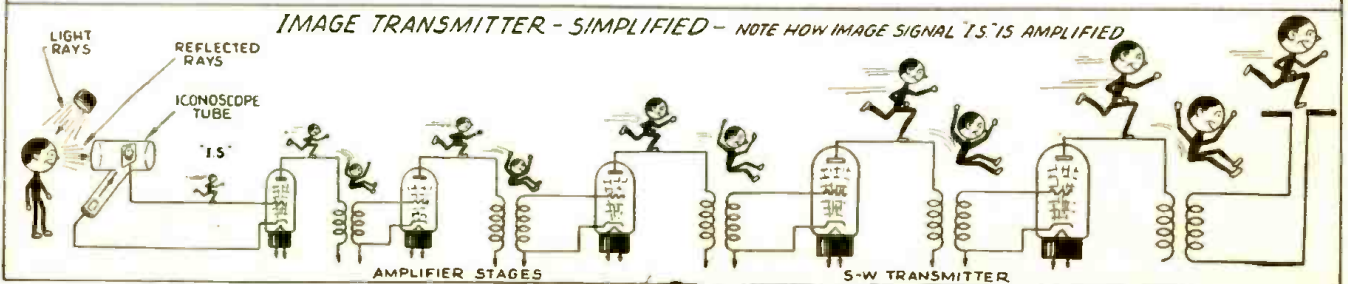
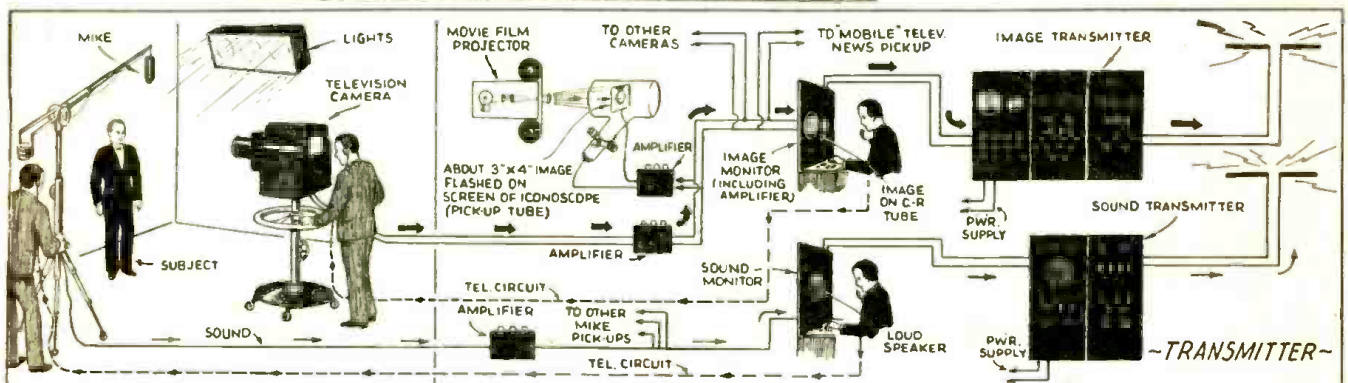


A view in the television control room at the National Broadcasting Co., in Radio City, New York, is shown below. Usually there are three men in the control room; one monitors the sound, the second is the program director and the third checks the image.



Above, we see the rear of a television studio camera and the reversed image on the ground glass, just as the television camera operator sees it. The small picture shows the television image as it appears before the control room operator (right). The wave-like image alongside of the girl's face is the television signal as shown on a cathode ray oscillograph, part of the checking system followed by the control room experts.

A B C



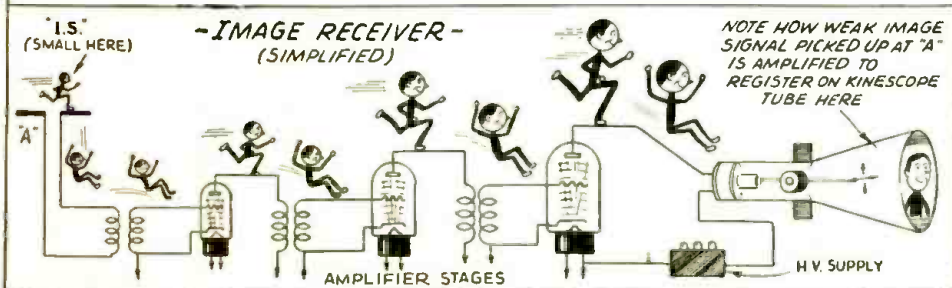
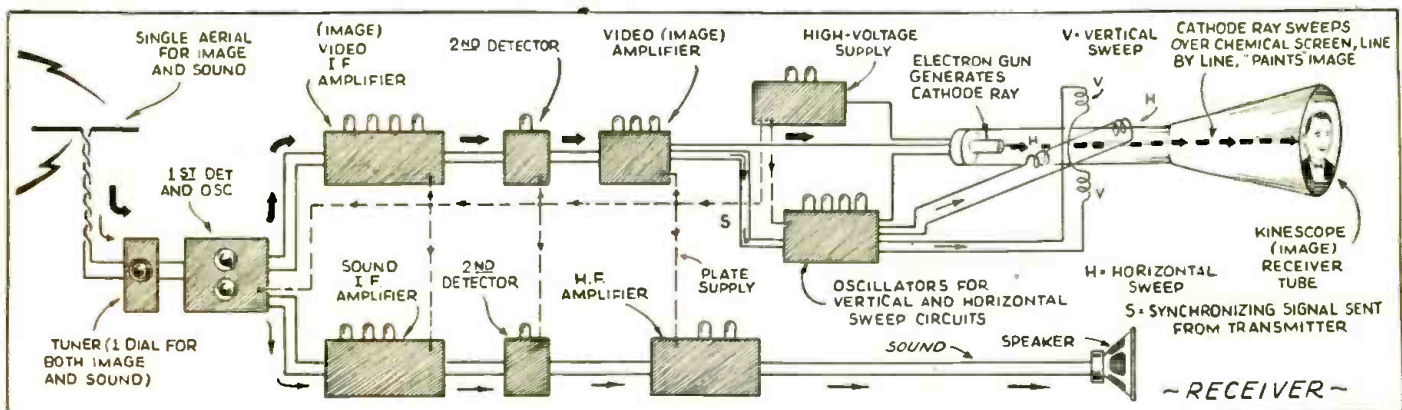
By following the large arrows across the series of pictures, the path of the television image is easily traced. Below, we see the image and sound signals passing through the transmitters located in the Empire State Building. The image is "piped" from the NBC studio in Radio City through a coaxial cable to the Empire State Tower.



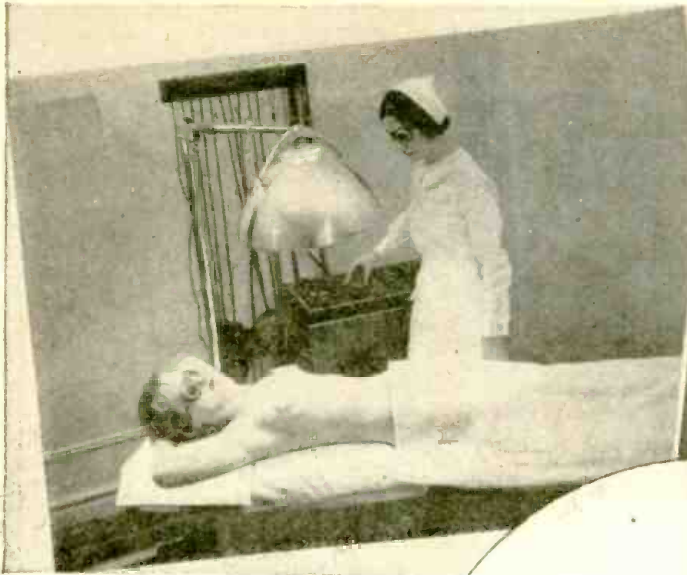
Above—Top picture shows actual photo of modern 441 line television image, while the photos immediately above and to the left show front and rear views of an experimental RCA television receiver. Photos courtesy Nat'l Broadcasting Co.

TELEVISION IS STILL IN THE EXPERIMENTAL STAGE. THIS ARTICLE GIVES THE LATEST TECHNICAL INFORMATION ON THE SUBJECT. HOME TELEVISION WILL NOT BE REALIZED FOR SOME TIME TO COME.

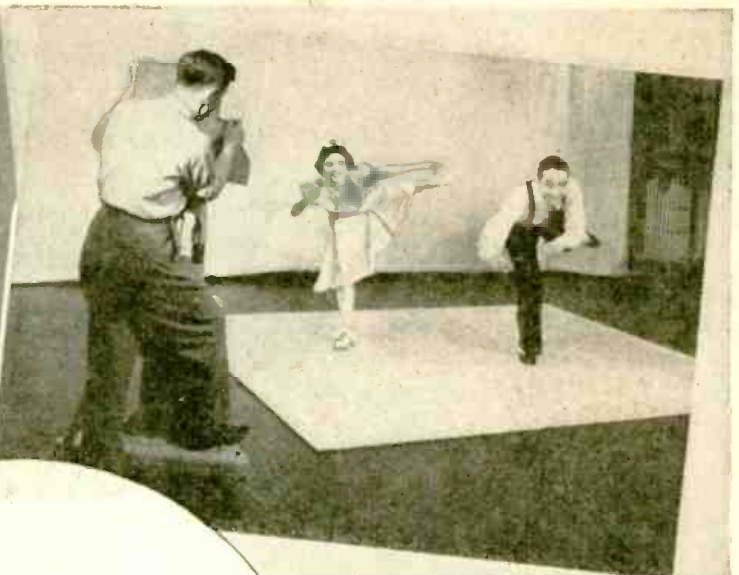
of TELEVISION



The process of picking up, transmitting and receiving the television image, as well as the sound is shown in the diagrams above and to the left. The lower diagram is presented for the general reader who may find it difficult to follow the more technical diagram above. Note how the image, as well as the sound currents, is continuously amplified.



A combination ultra-high frequency, ultra-violet ray machine for medical therapy. UHF currents excite mercury vapor in a quartz tube, causing radiation.
Courtesy of Lepel High Frequency Labs.



Television rehearsal in London. Tap dancing before the BBC television camera.

Below—part of the power-control panel of the new CBS television transmitter, N. Y. C.

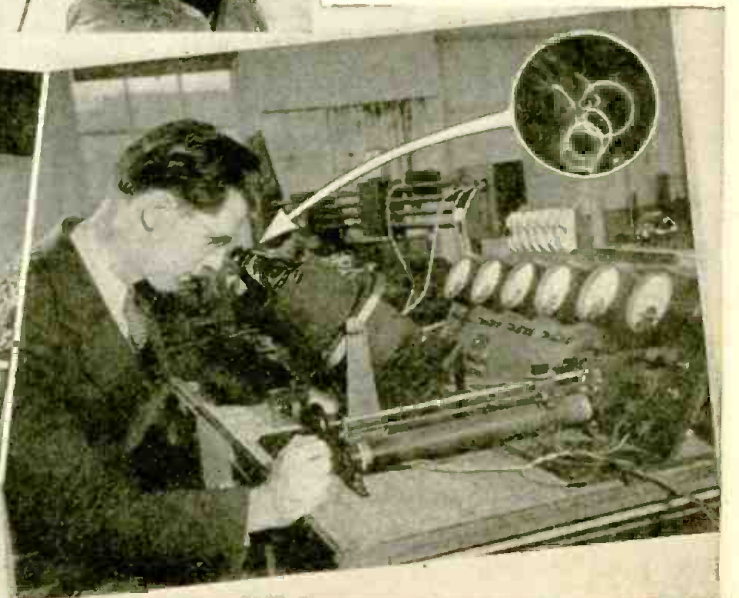
Short Wave FOTO NEWS

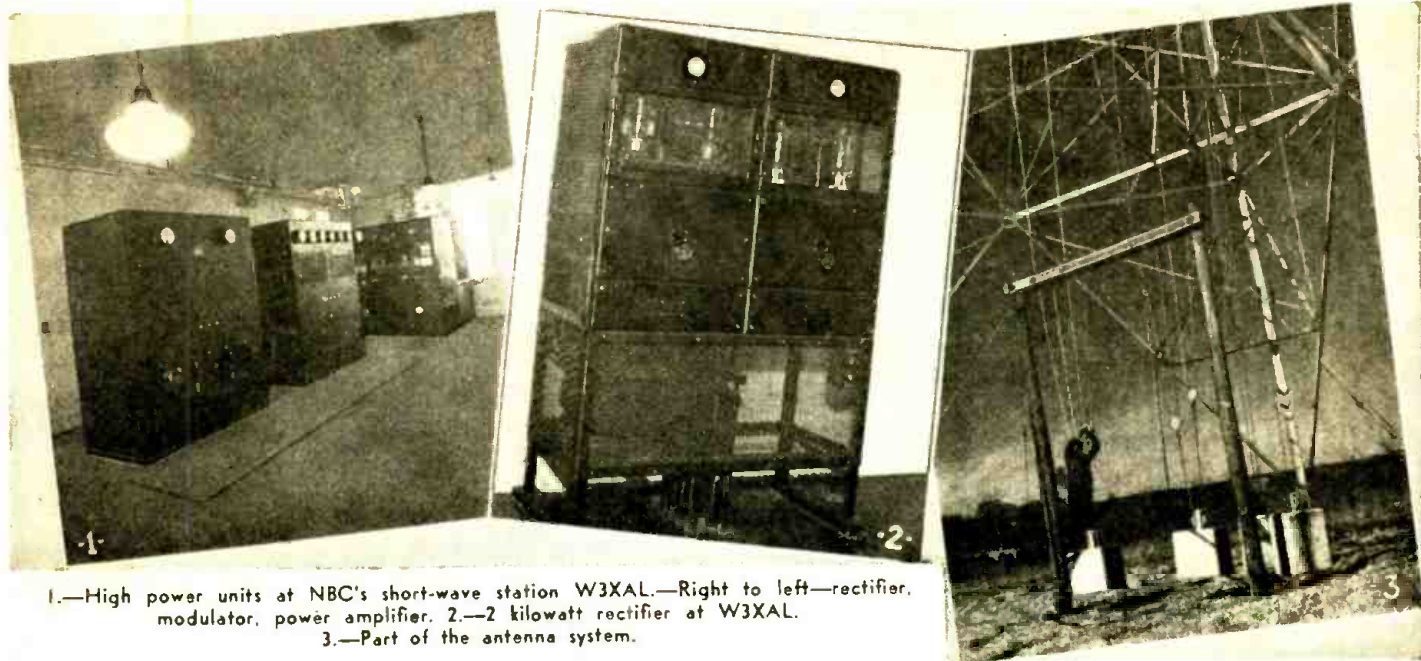


This new U.H.F. tube uses a glass cup as base to which copper terminals are fused.
Courtesy of Westinghouse Elec. Mfg. Co.
Below—NBC televises the Big Apple. A scene from a television production.



Left—portable radiophone equipment used by the Loyalist troops in the Spanish War.
© International News Photo
Below—a machine devised by RCA for studying electrons in motion.





1.—High power units at NBC's short-wave station W3XAL.—Right to left—rectifier, modulator, power amplifier. 2.—2 kilowatt rectifier at W3XAL. 3.—Part of the antenna system.

W3XAL's Short-Wave Voice Reaches Every Clime

● SOMEWHERE in the wilds of Africa, in the Belgian Congo region, a small party of men trudges out of the forest into a clearing. While porters busy themselves at the task of setting up camp, the white leader, an official



of the Colony, drops to the bank of a brook and quenches his thirst. Beads of perspiration drop from his forehead and disturb the smooth surface of the water.

Behind him, in the center of the native village, a tall black unstraps a pack from his back. He sets a small, oblong box on the ground. Two sticks are rammed into the soft earth, and wires are strung. The white leader steps forward and turns a knob on the front of the box, then another, all the while listening intently. Residents of the village stand off at a short distance, awe-struck.

Suddenly, from the box comes a voice! It is French! The white man smiles appreciatively; the blacks roll their eyes in amazement and something akin to fear. The voice from the box says, in French:

"This is Station W3XAL, National Broadcasting Company, a service of the Radio Corporation of America. You are about to hear . . ."

The white man relaxes as he listens to news highlights from all over the world.

Thanks to foreign language announcers on W3XAL's staff, the whole world now listens to American short-wave programs. American jazz is as popular in Timbuctoo as it is in New York.

No longer is he in a remote section of wild Africa. Through the magic of radio, he has come into immediate contact with the important events of the world and his feeling of loneliness is broken. Later, music pours forth from the box on the ground and the faces of the natives light up with pleasure and their bodies sway in rhythm with the tune.



Weeks later, a secretary in the N B C International Division, Radio City, New York, takes up a letter from a large assortment of mail. The letter is postmarked "Maluku, Belgian Congo." It reads, in part: "This day, the 6th of December, I have got reception of your broadcast in the Belgian Congo on the short-wave band . . . you are heard very clearly and the broad-

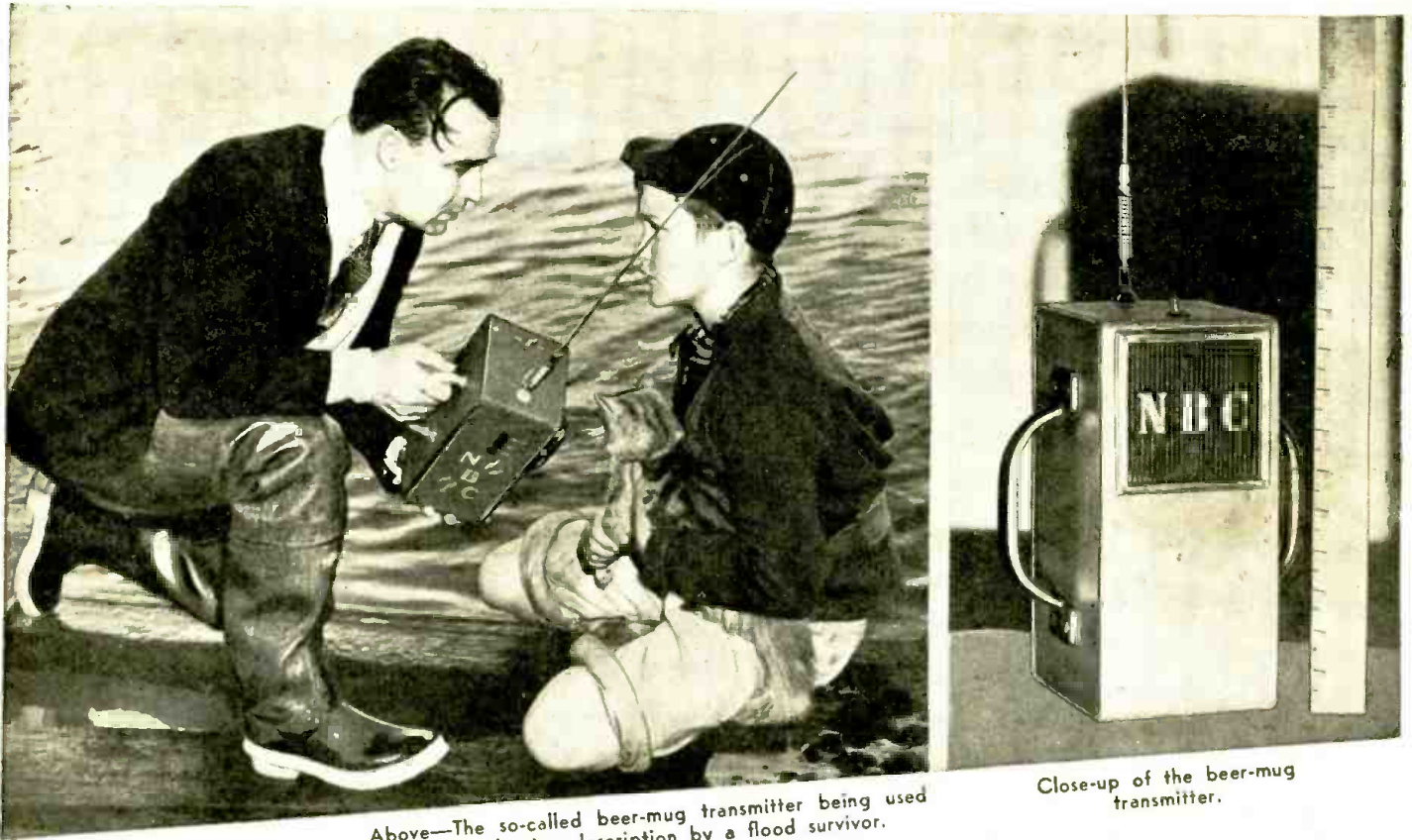
cast in French is understood perfectly. You have a very good announcer.

"I am an official in the Colony and am located in the wilds at about 100 kilometers to the North-East of Leopoldville, the capital of the Belgian Congo. I get reception on an American radio set, with 6-volt battery. I shift places every week and the set is carried on the back of a man. Upon arrival of the caravan in a village two policemen put up the antenna on two sticks and in ten minutes the set is operating . . ."



"On February 14, 1938, I shall be at 300 kms. (180 miles) from Leopoldville, right in the heart of the equatorial forest, and I shall hear your broadcast at 9:00 o'clock in the evening Central European Time."

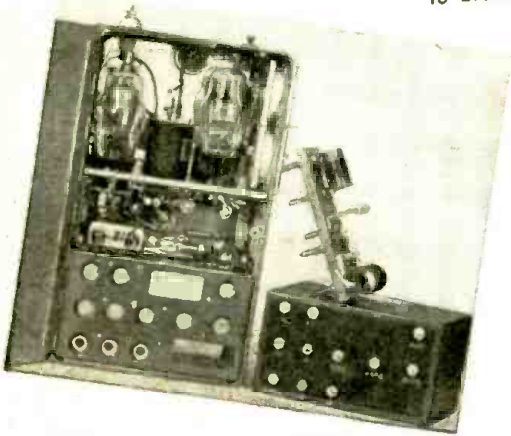
The Belgian Congo official's letter, like hundreds of others, came from a land far-distant from the skyscrapers of Manhattan. During the last six months of 1937, a total of 2,697 letters from seventy-five different countries and possessions was received by W3XAL. They bore postmarks of countries in Europe, Africa, Asia, the Indian Ocean, the South Seas, Australia, and (Continued on page 107)



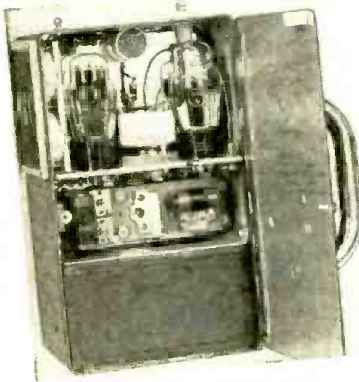
Above—The so-called beer-mug transmitter being used to broadcast a description by a flood survivor.

Close-up of the beer-mug transmitter.

BROADCASTING Spot News With the Beer-Mug Transmitter



Above — Beer-mug transmitter, self-powered by the battery fitting in the bottom of the case.



Left—The opposite side of the transmitter, showing the mike at the left of the instrument.

AS one of the accompanying photos shows, the *beer-mug* transmitter as perfected by the engineers of NBC is a most useful instrument. Weighing less than eight pounds, its tiny case contains a battery-powered transmitter which enables the *spot news* radio reporter to relay his voice to some nearby pick-up station. The range of this miniature transmitter is about one-half mile, and in some cases it has been used over even greater distances. The *beer-mug* transmitter was so named because of its general resemblance in size and shape to the well-known container for the famous beverage, and it is one of the pets of the NBC laboratory engineers.

Spot news-caster in full swing with the 5-meter transmitter. News event is picked up by a relay station and finally broadcast over the NBC network.

Left — Diagram of tiny transmitter recently perfected by the engineers of NBC, through whose courtesy these photos and descriptions were made available.

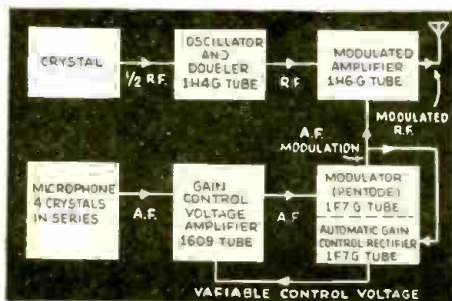


Diagram J. L. Hathaway, NBC Staff.



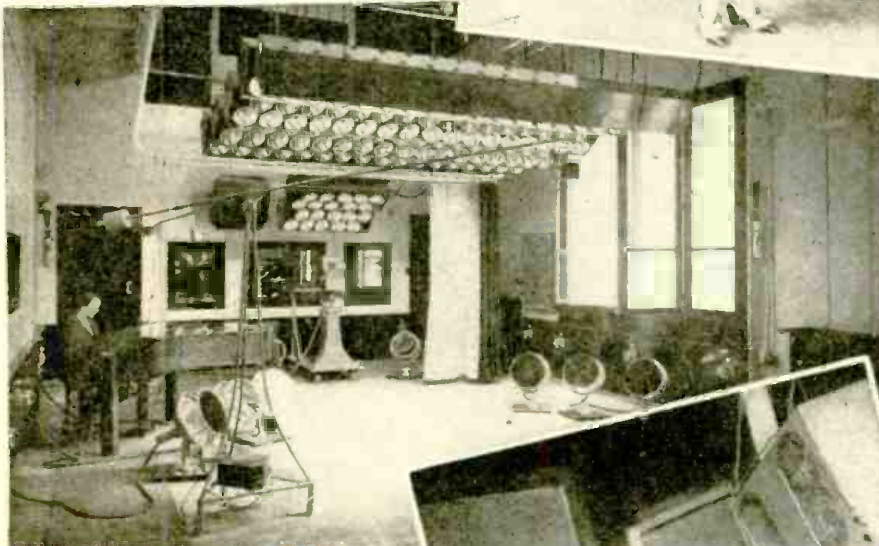
How the FRENCH Televise

TELEVISION IS STILL IN THE EXPERIMENTAL STAGE. THIS ARTICLE GIVES THE LATEST TECHNICAL INFORMATION ON THE SUBJECT. HOME TELEVISION WILL NOT BE REALIZED FOR SOME TIME TO COME.



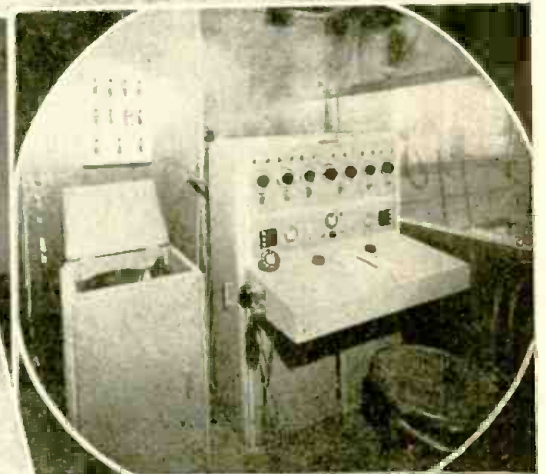
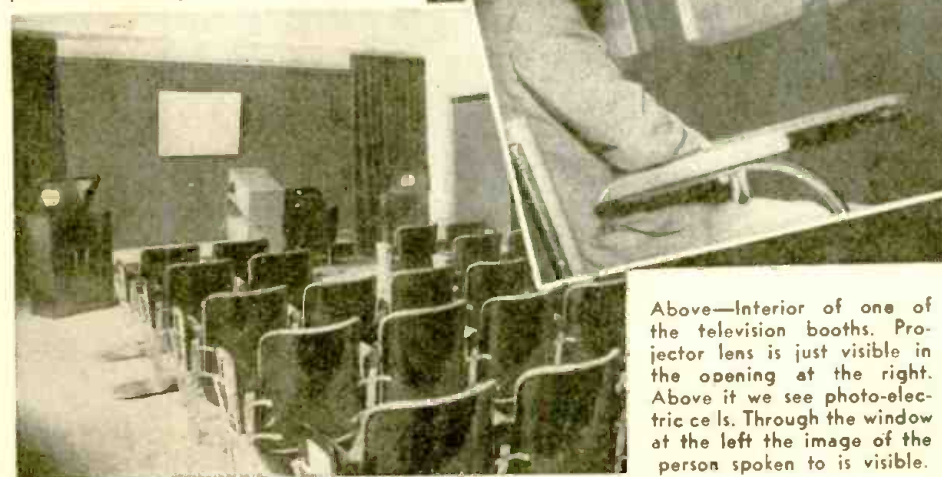
Above—Front of the television pavilion in Paris Exposition where television was demonstrated to the public.

Right—A view in one of the television studios where an iconoscope picks up the image. Note the mike suspended above the speaker.



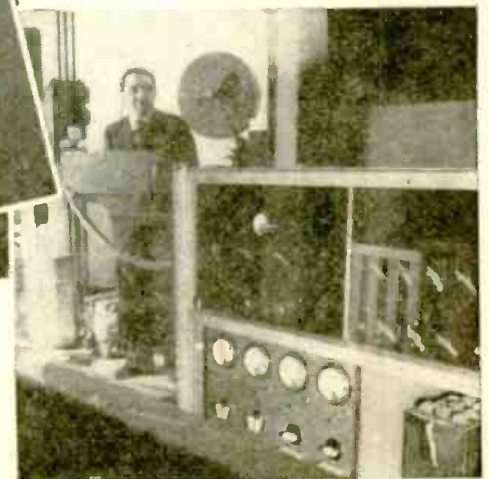
Above—A peek into the television broadcasting studio at Mount Rouge. Note the banks of powerful lights.

Below—Public television demonstration room with large projection tube, which produces an image about 3 ft. square.



Above—Control switchboard for both image and sound.

Below—A corner of the television control room, showing meters, etc., including film transmitter and its transmitter tube mounted in the oblong box at the left.



Above—Interior of one of the television booths. Projector lens is just visible in the opening at the right. Above it we see photo-electric cells. Through the window at the left the image of the person spoken to is visible.

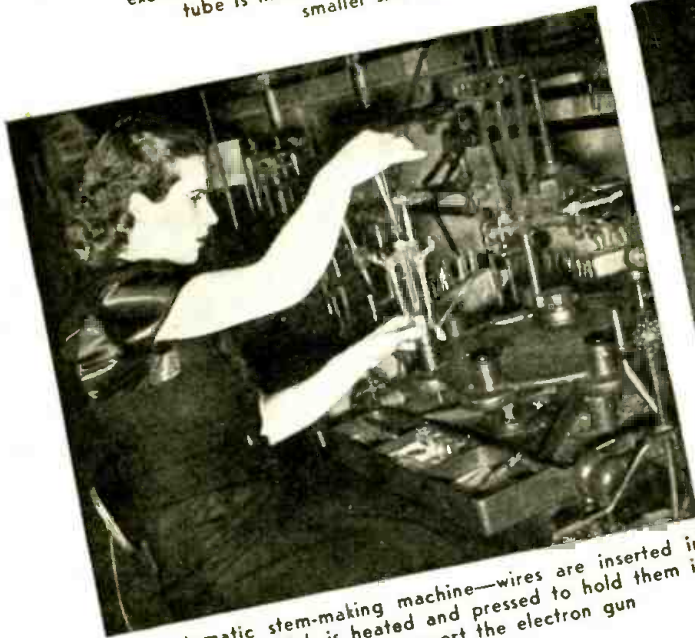
The Birth of a Cathode Ray Tube

These pictures show various stages in the manufacture of a modern cathode ray tube, such as is used for television. These pictures were taken in an American factory.

TELEVISION IS STILL IN THE EXPERIMENTAL STAGE. THIS ARTICLE GIVES THE LATEST TECHNICAL INFORMATION ON THE SUBJECT. MORE TELEVISION WILL NOT BE REALIZED FOR SOME TIME TO COME.



The "Big Bertha" of cathode ray tubes—it measures 13½-inches in diameter. Due to the great pressure exerted by the atmosphere, the head of such a big tube is made rounder than in the case of smaller size tubes.



The automatic stem-making machine—wires are inserted in a glass collar, which is heated and pressed to hold them in place. This unit will support the electron gun and deflection plates.



Examining the C-R tube with a polariscope to detect strains in the glass. Various hues indicate stress or strain in the glass and tell whether a tube should be rejected.



Above—Induction coils heat the C-R tube elements to drive off gases, etc. Right—A skilled workman trims the screen of a tube with apparent ease, but it requires a practiced eye and a sure hand.



Photos courtesy Allen B. Du Mont Labs.

Wedge-Crystal

Gives High-Fidelity Tone— *plus Sharp Tuning*

W. E. Schrage

French invention broadens reception band of radio receivers without sacrificing selectivity.

● IT'S happened to all of us sometime or other. We've tried to "slice" a specific broadcast station from an overcrowded part of the short-wave or broadcast range, and received an awful mixture consisting of the programs of several adjacent stations. In such a case there are generally two ways open to the unlucky short-wave listener. Either to give up at once or, when fishing for a precious and extremely rare station for ver-ifying purposes, "to cut the crystal in." But don't ask about the result. One would receive something which might be termed—in the accommodating language of the fisherman—a *fish without head or tail!* Expressed in radio terms—the crystal would, of course, eliminate the interference from adjacent stations, but another trouble would occur. The high and low tones would be cut off, and thus music and speech would sound terrible.

Nevertheless, there are a few in the vast guild of the SWL's who can decipher

Below (Fig. 8)—How first I.F. transformer of ordinary receiver is modified to take wedge-shaped crystal, effecting a five-fold increase in selectivity.

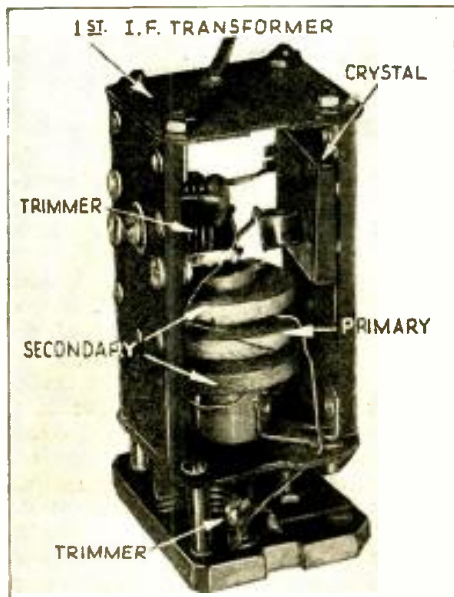
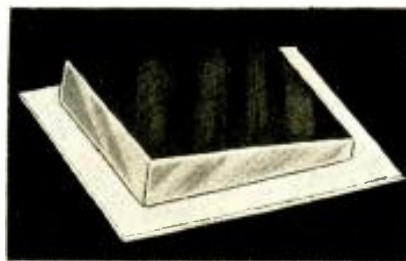
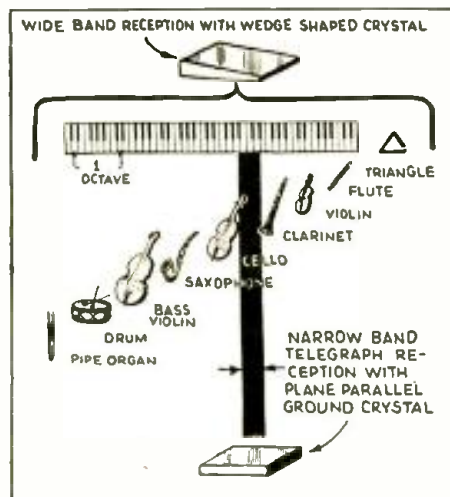


Fig. 1, below, shows great band-width passed by wedge-crystal and how ordinary crystal excludes many desirable notes.



(Fig. 6) Alexis Guerbilsky, of the Paris University Ecole, who invented the wedge-shaped crystal.

Left—(Fig. 5) Close-up of new wedge-shaped crystal.



existence. The Paris engineer, Alexis Guerbilsky, was very much upset by the fact that a considerable percentage of all radio control crystals produced had to be discarded. A few of them could be sold as second or third choice, but as a whole business was not as good as it should have been. The thrifty Monsieur Guerbilsky thought the matter over, then he experimented for a few years, and finally perfected what may indeed become a million dollar invention, which proves again that thrift when combined with ingenuity is still the most desirable prerequisite to becoming a successful inventor.

Guerbilsky tried first to find out why tuning circuits equipped with crystals of not exactly parallel sides could not be made to behave as desired, i.e., to oscillate at one specific frequency. He found no solution for this problem but this ingenious
(Continued on page 113)

what's what from such an awful mess, and land a handsome verification card from Timquaquica, or somewhere else. However, the majority of us, not gifted with a miraculous ear, will give up and wait for better "weather" in the hope of obtaining the desired veri-card at some later time.

So much for the veri-card hunter. The complete loser is the straightforward broadcast or short-wave listener. His main interest centers around the program and its instantaneous entertainment value, because very few programs are repeated. Thanks to a French invention interference of this type will probably be a forgotten trouble in a few years. We shall be able to "slice" from an overcrowded wave-band just the station desired, and interference by adjacent stations will be rejected with ease.

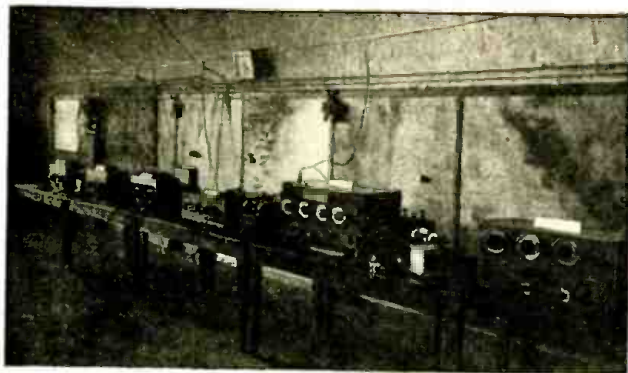
This invention has, like other great inventions, a very human reason for its very

Fig. 7, below—Chassis of standard American 7-tube superhet. fitted with wedge-crystal. Wedge-shaped crystals when available can be installed at slight cost, with great-boost in tone quality and selectivity.



France and U.S. Combat S-W Propagasters

Recent interesting developments in the field of short-wave propaganda broadcasts. For a more complete discussion of this subject, refer to the article on page 666 of the April issue.

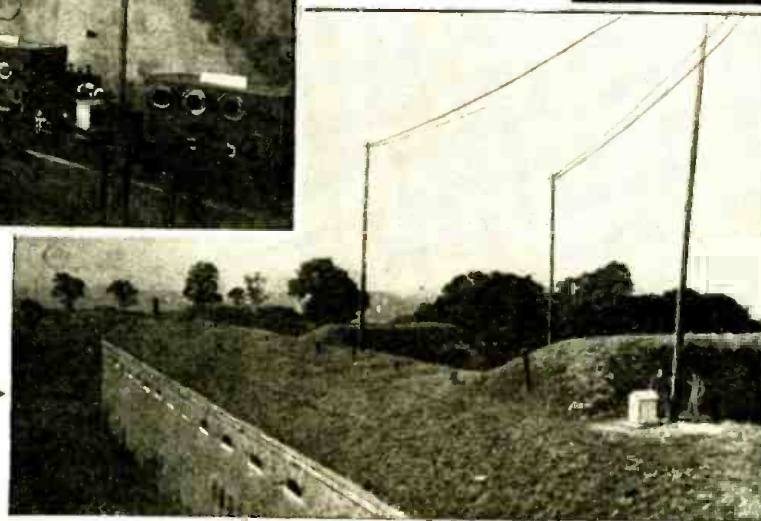


Above—The receiving equipment in the French station at Bicetre which eavesdrops on broadcasts of European stations. Receivers are operated by remote control from Paris.



Linguistic stenographers transcribing broadcasts picked up at Bicetre. Stenographic notes of all political broadcasts are taken. Phonograph records are made of important speeches.

Right—Aerials at the Bicetre receiving station. This building is an old fortification which has been converted into a receiving station.



● THE French government has erected a receiving station near Paris for the purpose of checking on the propaganda broadcasts sent out by foreign countries. The photographs at the top of this page show several views of the plant. A number of specially designed receivers pick up the signals of the principal European

broadcast stations. A corps of special stenographers on twenty-four-hour duty transcribes all broadcasts of a political nature for future reference. This special staff, of course, must understand the numerous languages used in broadcasting in Europe. Important political speeches are generally recorded as a future check.

It is interesting to note that sometimes the versions of speeches by European leaders, as given out to the foreign press by the government censors, are considerably milder in tone than the actual speeches were. The French receiving station has provided a check several times in this connection. A speech broadcast in a foreign country contained remarks which were slurring to France. Although the version of the speech released to the press omitted these remarks, a record of the speech made at the time of the broadcast contained indisputable proof that the remarks had actually been made. As a result of this record, protests were lodged with the government in ques-

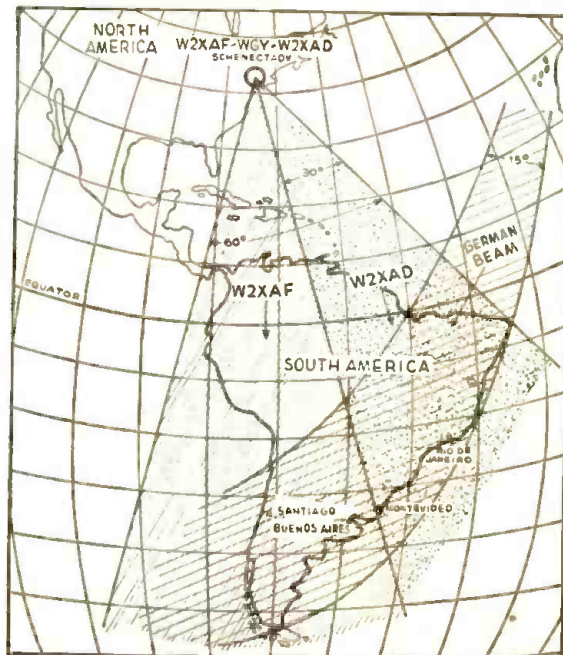
tion. Copies of all transcriptions of this nature are turned over to the French foreign office for investigation.

U. S. Expands Pan-American Broadcasting

As a result of the increasing short-wave propaganda programs

directed at South America by Germany and Italy, the F.C.C. recently made a temporary allocation of four short-wave channels which had previously been reserved for the use of a projected Pan American broadcasting station to be operated by the United States government.

Two of the channels (15.13 and 11.73 mc.) were loaned to station W1XAL at Boston, which as you may know, is operated by the World-Wide Broadcasting Foundation. The other two frequencies (9.55 and 21.5 mc.) were assigned to the General Electric station, W2XAD, at Schenectady, New York. The use of these channels was granted on condition that commercial broadcasts of any type were not to be made. W2XAD has now been put into service with a special beam directed at Brazil and the eastern part of South America and presents special programs in the Portuguese language from 7:30 p.m.-12 m., on 9.55 mc. W2XAF on 9.53 mc. has a new beam which is directed at Argentina (Continued on page 128)



The coverage obtained with the new South American beams of W2XAF-W2XAD. The German station's beam is also shown.

● WOULD you like to win one of these beautiful silver trophies? It is very easy to do—simply send the Editors, a good, clear photograph of your Ham station. If your station photo is selected as the best of those submitted each month, you will be awarded one of these handsome silver trophies with your name engraved on it.

The winner of the first trophy award will be announced in the July issue, and the closing date for the first contest is May 10. The deadline thereafter will be the first of the month.

The judges of the contest will be the Editors of *Short Wave & Television*. In the event of a tie, duplicate prizes shall be awarded to the contestants so tying.

Note these important rules!

The photos must be sharp and clear and preferably not less than 5" x 7".

The pictures will be judged for the general layout of the station, the quality of workmanship exhibited, and the appearance of the photograph itself. The judges will also consider neatness as an important point.

When you submit the photograph of your Ham station, send along a brief description not longer than 300 words, describing the general line-up of the apparatus employed, the size, type and number of tubes, the type of circuit used, name of commercial transmitter—if not home-made, watts rating of the station, whether for C.W. or phone or both, etc., also name of receiver.

Important—Don't forget to send along a good photograph of yourself, if your likeness does not already appear in the picture.

The Editors will not be responsible for photos lost in transit. Do not send small, foggy-looking photos because they cannot be reproduced properly in the magazine. If the picture you have or may take of your station is not thoroughly sharp and clear and at least 5" x 7", it would be best to have a commercial photographer take a picture of your station.

Address all photos and station descriptions to Editor, Ham Station Trophy Contest, c/o Short Wave & Television, 99 Hudson Street, New York, N. Y.



New Silver Trophy

to be
AWARDED MONTHLY
for the
Best
HAM Station
Photo

Hams everywhere are eligible in this monthly contest and the photos will be judged by the simple rules given

This beautiful silver trophy stands 11¾" high and is to be awarded monthly by SHORT WAVE & TELEVISION magazine for the best photo of a Ham station. The silver statue stands on a handsome bakelite base on which is a silver plate. The name of the winner will be engraved on this plate before the trophy is sent to him. The photos for this contest must be as large and clear as possible and the degree of workmanship and the quality of the apparatus in the station will be judged, as well as the clearness of the picture. Come on boys, let's see some good Ham station photos!

First Ham to Talk with Pitcairn Island



Ham station WBCNA first to contact Pitcairn Island.

● RADIO amateur Ferris W. Wolfinger of Binghamton, N. Y., and a house guest, Joseph Phennicie, of Waterloo, Iowa, recently experienced the "thrill of a lifetime."

Mr. Wolfinger, sitting quietly in his home with his friend, Mr. Phennicie, was twirling the dials on his short-wave set; just another "ham"—next minute he became the first person in the outside world to contact the isolated island of Pitcairn in the southern Pacific, by radio.

Pitcairn Island, known only as the little paradise where the mutinous men under the leadership of Fletcher Christian and Edward Young settled with their Polynesian wives in 1790. They found this island after they had set Captain Bligh afloat in a boat and had taken command of the H.M.S. Bounty.

Out of the speaker in Mr. Wolfinger's receiving set a voice suddenly came through repeating the call letters "VR6A—VR6A." Mr. Wolfinger, never having heard this call letter before, immediately consulted his log book. Not finding the station corresponding with these letters, he very quickly responded with his

(Continued on page 124)



Charles Stephens, Randolph, Mass., this month's winner of prize—one year's subscription to S. W. & T. for best "Listening Post" photo.

Wants More Constructive Articles

Editor,

Since I sent the photo of my SWL corner I have received the following cards:

SABC, So. Africa, which comes in just as loud as the *locals*. Amateur ZS2N; HC2RL, YVIRA, COCD, also PCJ, and last but not least—EAR, card which had been opened and censored by the Spanish officials. The photo directly over the S-W Converter on the wall is my Commercial Radiophone License.

I have just made the Power-Supply and the Two-in-One receiver which was described in the May 1936 issue of *Short Wave Craft*. I have read many other magazines and with due respect to them, I can not find any to be compared with *Short Wave & Television*. My only fault to find is: leave out all this baloney about hearing Mars, as I think Dr. Tesla had a nightmare.

Put in more constructive articles and put Doerle back to work. Your best department is run by Joe Miller. *New Experiments with Radio Apparatus* is very good; *Short Wave Kinks* are also very good. Your *What Do You Think Dept.* is just about the *Nerts*. I must close now as it's time to put on the "feed-bag."

CHARLES STEPHENS,
Ex-Amateur UICFJ,
40 meter CW.1925 to 1927.

(Thanks for your suggestions, Charles, and we will endeavor to publish as many construction articles as possible.—Ed.)

He Likes Television Articles

Editor,

May I offer a few suggestions for the improvement of your F.B. magazine.

I experienced keen disappointment in

One Year's Subscription to
SHORT WAVE & TELEVISION
FREE

for Best "Listening Post" Photo

Closing date for each contest—75 days preceding date of issue; May 15 for Aug. 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.

What Do You Think?

your March 1938 issue when viewing the listing in the Short Wave Station List. It is difficult to distinguish between the *broadcasters* and the *commercials* due to irregularity in the boldness of the type. The former method of listing was much better.

Since so many of the DX'ers have dials on their receivers calibrated from 0-100, why couldn't you leave space in a separate column next to the frequency listing in the Station List for us to put the number in which that station appears on our dial. It would facilitate logging immensely. I wish you would consider the above very seriously because there are many who think the same as I.

And now for a few bouquets. Your articles on one, two, and three tubers are sure



Short-Wave Listening post of Otto A. Weiss, 536 State St., Brooklyn, N. Y.

appreciated. I am particularly referring to "The Switch-Band 2" in the February issue. This little radio is "tops" in my estimation and beats those larger sets to pieces.

Keep on printing pictures of the foreign short-wave stations and their antenna systems. By all means, don't slight the *Television side of your magazine*. We always read those articles regarding new developments in television. We always read Joe Miller's department and derive a lot of good from it.

Your new cover certainly shows up the mag. and sure is fine. Keep up the good work and we won't miss an issue.

PAUL E. TRUED,
Tribune, Kansas.

Mr. Fiege Answers

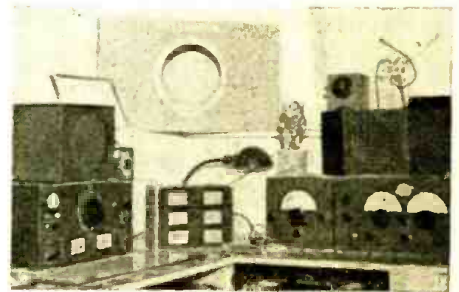
Editor,

Well my SWL friends? Here is the old Ogre of the "Ham" hands back to gobble up a few more smart (?) young squirts. Too bad we are not back in the good old days when the "Hams" used the *W'ouff-*

Hang on the smart squirts, and boiled short-wave bootleggers in transformer oil! But those days and practices are gone forever and QSL-ing is in the same antiquated category. (Speaking of both the Amateur exchanging of QSLs and the SWL-QSL.) In the *spark* days it often took a postal card to complete a *contact*. But now with radio, the most modern means of communication, we can easily obtain more information direct than the other fellow could possibly send on a card. And still, with this modern means of communication at hand, we revert to the most primitive means of communication, a postal card.—We don't talk to Chicago or London on the phone, and then send a post card along to convince the other fellow that we actually talked to him. We don't follow up a telegram with a card. But that is just what we do in Amateur Radio. There are a few occasions where a QSL card is justified, and one of the reasons will not be the mere desire of some SWL QSL card collector seeing how many cards he can gather. The only real use for a QSL card is in confirming a REAL DX contact.

Now for this Irish soldier with the medals, Mr. J. Daugharty. Just what mental process do you use in arriving at the asinine conclusion that my statement re SWL-QSL cards is "keeping many a well-meaning lad from going after a ticket"? Does the SWL, upon applying for a license, exhibit a handful of QSL cards to the Radio Inspector and thereby obtain ten or twenty free points on his license exam? Does the collecting of cards from PHONE stations teach the embryo "Ham" the fundamentals of radio? Does it teach him the code? It is about time that someone wised you up, Mr. Daugharty.

There are only two things necessary to obtain a license. You must be able to copy code at thirteen and a half words per minute. (Code, Mr. Daugharty, is those funny little dots and dashes that annoy you so much when you are looking for phone stations to send cards to.) And you must know elementary radio theory. Well, Irish,
(Continued on page 106)



Here's a swell "listening post"—all fitted up with A-1 receiving apparatus. Note the HRO receiver at the left. Owned and operated by N. R. Thornton, Somerville, Ohio.

The Listener Asks

Questions asked by not-so-technically inclined listeners are answered in this department.

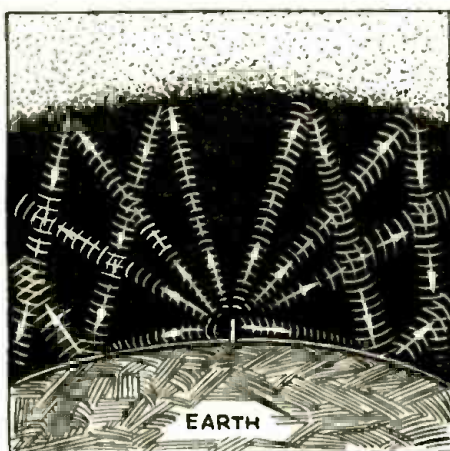
HOW SHORT WAVES TRAVEL

Q. I've noticed in listening to short-wave stations that reception is much more erratic than from broadcast stations. This I am told is quite normal, but I'm curious to know why the short-waves should act in this way. Just how are short-waves supposed to travel from a radio station to a receiver?

A. Radio waves ordinarily follow two routes from the transmitting aerial of a S-W broadcast station. A reference to the illustration will make this clear. One type of radiation is known as the *ground wave* radiation. As its name implies, it is a radiation along the surface of the ground from the transmitting station. This ground wave does not travel any great distance from the station and is absorbed by the surrounding terrain. The actual distance which a ground wave will travel depends upon the operating frequency of the station. The higher the frequency (shorter wavelength) the smaller will be the distance it travels before disappearing. Thus the ground wave is only good for reception within a very short distance from the transmitter.

The second type of radiation is known as the *sky wave*. As reference to the sketch again will show, the sky wave travels up from the aerial of the station until it reaches a radio-wave reflecting layer a good many miles above the earth's surface. This reflecting layer is made up of electrically charged particles which have the peculiar property of reflecting radio waves much as mirrors reflect light. Actually there are several of these layers at different heights above the earth's surface and waves of different lengths are reflected by different layers.

After the waves are reflected by this layer they return to the earth's surface once more and are reflected from the earth back to the reflecting layer again. This bouncing from the earth's surface to the reflecting layers is the way in which waves travel great distances. As the sketch shows, the radiations from the transmitting aerial strike the reflecting layer at many different points, causing a multitude of reflected waves to return to the earth at different points. The reflecting layers sometimes become quite unsteady and move up and down a considerable distance, frequently with great rapidity. When this occurs, the waves reflected to the earth become unsteady, and fading and fluttering of distant signals is the result. At other times, magnetic disturbances will cause the reflecting layers to lose their reflecting power completely and the waves will pass off into space in-



How short-wave signals travel from a transmitting station to your receiver.

stead of being reflected back to the earth's surface. When this occurs, long distance reception becomes impossible.

TYPES OF RECEIVING AERIALS

Q. I have heard many opinions expressed concerning the relative merits of different types of aerials for use with short-wave receivers. Everyone seems to have a different opinion. Could you set me right on the advantages and disadvantages, if any, of the commonly used short-wave receiving aerials?

A. There are several basic types of aerials in general use for short-wave reception by the general public today. First, there is the Marconi type, which has long been used for reception of ordinary broadcasting stations. This generally takes the

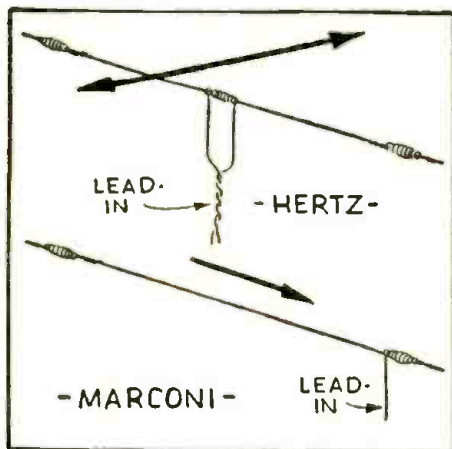


Diagram showing directive characteristics of Marconi and Hertz aerials.

form of a flat top aerial consisting of a single wire from the end of which another single wire called the lead-in goes to the receiver. The receiver is also connected to a good ground connection. This type of aerial is simple to erect and is only slightly directional as reference to the drawing on this page will show, and is not critical as to length.

The lead-in, as well as the flat-top, picks up signal with this type of aerial. So, if there is any electrical interference generated close to the receiver, although it may not be picked up by the flat-top of the aerial, it will undoubtedly be picked up by the lead-in.

To overcome this difficulty, use is frequently made of a lead-in system whose only function is to conduct the signal from the aerial to the receiver. A lead-in of this type will not pick-up any signals by itself. A lead-in of this type may take the form of a twisted pair of wires or two wires running parallel to each other, but separated several inches by means of spreaders and periodically transposed with respect to each other. With this arrangement there is no grounding of one end of the system. This type of antenna system is known as the Hertz.

There are a large number of variants of the Hertzian type, but the most commonly used for short-wave broadcast reception is the half-wave doublet. This type system is highly efficient at one particular frequency and only moderately efficient at all other frequencies. The frequency at which it has its highest efficiency is dependent on the length of the two wires making up the flat-top of this antenna. A doublet antenna is ordinarily made up of a length of wire broken in the exact center by an insulator. Each side of the doublet should have a length of $\frac{1}{4}$ of the wavelength of the signal to be received at maximum efficiency.

For example, if you are interested in receiving a station operating on 31 meters, the length of each half of the doublet should be $\frac{1}{4}$ of 31 meters or about $7\frac{3}{4}$ meters (25½ ft.). This aerial will be efficient for picking up signals of 31 meters wavelength. It will also give good reception of signals at half this wavelength. At all other wavelengths its efficiency will not be very great and, in fact, will be considerably less than the Marconi type.

The two wire lead-in system is connected to the center of the doublet as shown in the drawing. The main advantage of this aerial is that the lead-in does not pick up electrical interference. The doublet is also quite directional and by erecting it in a certain position reception from any desired point can be improved.

Let's Listen In with



XU3FK—An interesting snapshot of this amateur in China.

● HERE we are in mid-April, with DX conditions getting better all the time, this mostly on the amateur 10 and 20 meter bands, where, what with the recent Amateur A.R.R.L. DX Contest, most of our attention has been centered, as with all other DXers interested in improving their VAC and VIC ratings.

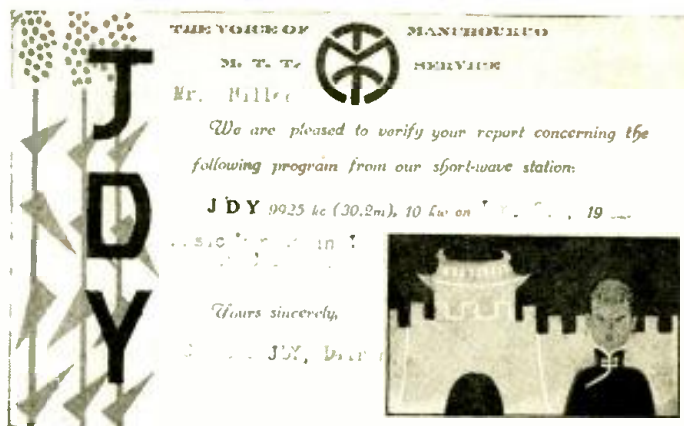
A number of new countries have been logged on 20 meters, also some on 10 meters, and the bands, especially 20 meters, being FB for good long distance reception, some really fine DX catches have been heard during the Amateur Contest.

We have quite some time yet to look for good DX reception, as the Javanese and other Asiatic amateurs will be heard still more consistently than in the last month for the duration of April and most of May. This Asiatic reception, of course, for the hours between 6-8 a.m. with a peak around 6:30-7 a.m. E.S.T. From the latter part of May, Asiatic DX will not be heard quite as well, coming through only on certain days, these conditions continuing until the approach of September.

The inroads of approaching summer conditions in the form of increased QRN on the lower frequencies have made DX on these frequencies unprofitable, continuing thus throughout the summer. This "noisy" range extends, on the S.W., from about 3-8 mc.

Asiatic reception on SW-BC and commercial phone bands has improved lately, with signals that really "pound in" from a number of Oriental countries. Reception of the Javanese SW-BC stations from PLP and PMN down to YDC have improved a good deal, and all should take the opportunity of logging these

JDY—Manchukuo. A very striking card comes from this Oriental in four different colors.



Joe Miller

"DX" Editor

"easy" Asiatics and earning some of those hard-to-get Asiatic QSL's.

Say, fellows! How many of you really tried for CR7BH, as per our tip of last month? We are wondering, as we have received practically no reports on this fine catch, which is still "pounding" in nicely afternoons.

It would seem that some of the tips published in these columns are thought of as too difficult for many fans to hear, and that special DX receivers and beam antennas are necessary to log such stations.

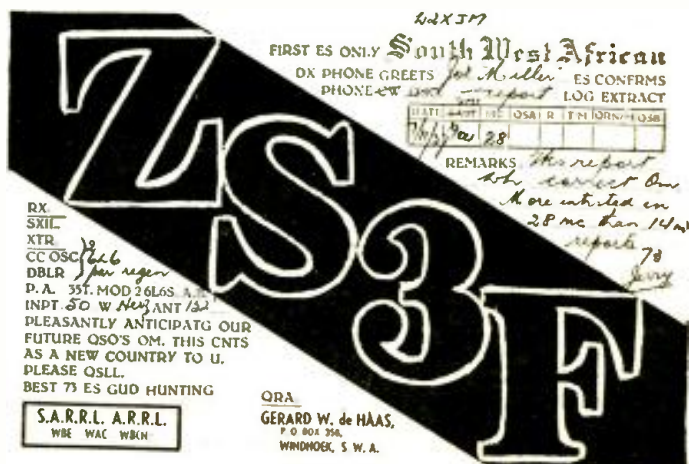
This may be the case with some rarely heard stations, but very few, and certainly not with CR7BH! Quite a number of our friends have tuned in CR7BH with only ordinary receivers, and a length of wire on the roof, so well does this signal penetrate the East Coast.

So take a tip from us, OM's, and do try, and try *hard*, for the stations mentioned monthly in our columns, as most can be heard with a little patience, and the effort will certainly be well worthwhile when a nice QSL arrives in your mail a few months later.

Too much is the trend toward the amateurs, in DXing today, often leaving such FB DX as CR7BH going begging a few mc. away, while ye DXer keeps combing 20 meters.

We can't particularly blame the new DXer for his undivided attention to the "hams," as he couldn't begin to identify the other DX stations to be heard by the hundreds most of the day, but


ZS3F—South West Africa. This is a QSL all should have! Extremely striking, with deep blue letters on orange band.



everyone who has been in the game for some time should pass over 10 and 20 meters once in a while, just to see what he's missing! As it is, though, most all of our reports received here monthly are exclusively *amateur DX*.

It is no small wonder then, that many *amateurs* whose "sigs" are well heard throughout the world, are forced to ignore the hundreds, and often thousands, of reports received upon their transmissions, as it seems that everyone listens to 10 and 20 meters only, when they DX. And these DX amateurs, were they to answer all reports as soon as they could, would have to devote much, if not most of their spare time to just sending out cards, instead of being on the air. One notable example, VQ4CRO, Fred Gilfillan, of Kenya Colony, told us that he was forced to stay off 20 meter phone, due to his being "swamped" with reports, whenever he was on the air! And ZT6Y of South Africa sends us a plea to inform SWL's that if they *must* send him reports, to send him good ones, not of the "I heard you Q5, R9, psc QSL" variety.

Hugh (ZT6Y) outlines his idea of a good, useful report as follows: "Give exact time of report, and date, freq. heard, correct rept. of sigs. (RST), details of *contact* heard, type of receiver and antenna used, and most important, enclose a reply coupon, and an addressed envelope." Hugh suggests that a gummed label with address of listener be enclosed with report, if not an envelope, simplifying the amateur's reply considerably. It must be borne



9
MI

M.V.
KANIMBLA
11,000 Tons

MELBOURNE
KREACHARN
LTD.
Melbourne
Australia

THE FIRST SHIP'S BROADCASTING STATION	
CALL SIGN	VK9MI
FREQUENCY	11710 K.C. (25,619 METRES) 6010 K.C. (49,917)
POWER	50 WATTS AERIAL RATING
TRANSMITTER	A.W.A. HIGH FIDELITY
SCHEDULES	VARIOUS

9MI—Australian ship, "S.S. Kanimbla." A floating DX catch!

just consideration due them when reports are mailed to them.

As mentioned before, the Golden Rule certainly applies here, as much as in any other instance. And now for DX:

CEYLON

VPB, now on 6.11 mc., at Colombo, has been heard, but poorly, several mornings lately. This is a rare DX catch, to be heard only on the best of mornings, and has yet to be reported in the East in '38. Daily sked is 7-9:30 a.m. and on Sundays 6:30-9:30 a.m. QRA is: Radio Club of Ceylon and South India, P.O. Box 282, Colombo, Ceylon.

JAVA

PLQ, 10.68 mc., Bandoeng, is being heard quite frequently of late, usually near 7 a.m., with a really good signal. This station can be easily spotted as they are just to the H.F. side of JVN, 10.66 mc. The usual fare is inverted speech, and when PLQ is on, one may also hear other East Indian islands, such as YBG, PNI, YCP, YBB, etc. YDC, 15.15 mc., PLP, 11.00 mc., and PMX, 10.26 mc., are all being heard well lately and seem to be improving all the time, as summer permits these Orientals to be heard with their best signal strength.

JAPAN

Latest authentic data on the daily broadcasts from Japan, as heard over the air by Harry Honda, our Pacific Coast Japanese correspondent, are as follows:

- Trans. 1—Europe: JZJ, 11.8 mc. and JZ1, 9.535 mc., 2:30-4 p.m.
 - Trans. 2—So. America: JZJ, 11.80 mc., and JZ1, 4.30-5.30 p.m.
 - Trans. 3—No. America: JZJ, 6-6:30 p.m.
 - Trans. 4—No. America (West Coast) and Hawaii, JZJ, 12:30-1:30 a.m.
 - Trans. 5—North America—JZJ, 7-7:30 a.m.
 - Trans. 6—Asia, Australia—JZJ, 8-9:30 a.m.
- JVO, 10.37 mc., Nazaki, heard daily 'phoning TIDE, 10.065 mc., Manchukuo, as early as 3:50 a.m., up to 8 a.m., during past month, though never in clear speech.

(Continued on page 125)

W
A
C
E
R
A
U




ESTONIA, Jaama 8, TAPA.

ES5D

Radio *W2XJM* Date *4. 3. 38* RST _____

Frequency _____ mc. TX CO-FD-PA, 50 WATTS

Psc QSL Tnx *73* K. KALLEMAA.

ES5D—Estonia. A handsome QSL from this FB OM, red letters on light buff card.

in mind that most amateurs have little time to spend answering reports, as ZT6Y, whose station was one of many well heard from South Africa this Fall and Winter, alone received 536 reports from all the world, with 355 from the United States, besides working 1212 DX stations, 890 of them W's. There are 1748 cards to mail, right there! And ZT6Y is only one amateur of many who also faced the task of answering a thousand or more reports and QSO's with their QSL's!

So, DXers, please try to be fair to the amateur, they're all FB OMs, and do their best, but very often do not receive the

Can You Answer These Radio Questions?

1. Is short-wave listening permitted in Japan? See page 69.
2. How does the operator in charge of a television pick-up camera in the studio, know whether he has the image properly framed and focused? See page 70.
3. Why would a French explorer in the heart of the Belgian Congo be interested in listening to the American short-wave station, W3XAL? See page 73.
4. What is the "beer-mug" transmitter and how did it get its name? See page 74.
5. How are strains in the glass of a cathode ray tube easily detected? See page 76.
6. What method is being used by France and the U. S. to combat short-wave propaganda? See page 78.
7. Can you explain how a single quartz crystal can be made to respond to a number of different frequencies? See page 77.
8. What was the outstanding short-wave DX catch last month? See page 82.
9. Can you describe a simple method for recording the facsimile pictures now being broadcast? See page 89.
10. How can one tube be made to perform dual purposes in a receiver? See page 93.
11. What means are used to change the frequency of the scanning for the "S.W.&T." cathode ray television receiver? See page 98.
12. How may one milliammeter be used to measure the plate current in several tubes of a transmitter? See page 100.

World Short Wave Stations

Revised Monthly

Broadcasters' Calls in bold type
Phones' in light type

Reports on station changes are appreciated.

Mc.	Call	Mc.	Call	Mc.	Call
31.600	W3XEY	BALTIMORE, MD., 9.494 m., Relays WFBR 4 pm-12 m.	19.680	CEC	SANTIAGO, CHILE, 15.24 m., Addr. Cia. Internacional de Radio. Calls Col. and Arg. daytime.
31.600	W2XDY	NEW YORK CITY, 9.494 m., Addr. Col. Broad. System, 485 Madison Ave. Daily 5-10 pm.; Sat. and Sun. 12.30-5, 6-9 pm.	19.650	LSN5	BUENOS AIRES, ARG., 15.27 m., Addr. (See 21.020 mc.) Calls Europe daytime.
31.600	W9XHW	MINNEAPOLIS, MINN., 9.494 m., Relays WCCO 9 am.-12 m.	19.620	VQG4	NAIROBI, KENYA, 15.28 m., Addr. Cable and Wireless. Ltd. Calls London 7-8.30 am.
31.600	W3XKA	PHILADELPHIA, PA., 9.494 m., Addr. NBC. Delays KYW 11 am.-9 pm.	19.600	LSF	BUENOS AIRES, ARG., 15.31 m., Addr. (See 20.700 mc.) Tests irregularly.
31.600	W5XAU	OKLAHOMA CITY, 9.494 m., Sun 12 n-1 pm., 6-7 pm. Irregular other times.	19.480	GAD	RUGBY, ENG., 15.4 m. Calls VQG4 7.30-8 am.
31.600	W4XCA	MEMPHIS, TENN., 9.494 m. Addr. Memphis Commercial Appeal. Relays WMC.	19.355	FTM	ST. ASSISE, FRANCE, 15.5 m. Calls S. America mornings.
31.600	W8XAI	ROCHESTER, N. Y., 9.494 m., Addr. Stromberg Carlson Co. Relays WHAM 7.30-12.05 am.	19.345	PMA	BANDOENG, JAVA, 15.51 m. Works Holland 5.30-11 am.
31.600	W8XWJ	DETROIT, MICH., 9.494 m., Addr. Evening News Ass'n. Relays WWJ 6-12.30 am., Sun. 8 am-12 m.	19.260	PPU	RIO DE JANEIRO, BRAZ., 15.58 m., Addr. Cia. Radiotel. Brasileira. Works France mornings.
31.600	W9XPD	ST. LOUIS, MO., 9.494 m., Addr. Pulitzer Pub. Co. Relays KSD.	19.220	WKF	LAWRENCEVILLE, N. J., 15.6 m., Addr. A.T.&T. Co. Calls London and Paris daytime.
26.400	W9XAZ	MILWAUKEE, WIS., 11.36 m., Addr. The Journal Co. Relays WTMJ from 1 pm.	19.200	ORG	RUYSSELEDE, BELGIUM, 15.62 m. Calls OPL mornings.
26.100	W9XJL	SUPERIOR, WIS., 11.49 m. Relays WEBC daily.	19.160	GAP	RUGBY, ENG., 15.66 m. Calls Australia 1-8 am.
26.100	GSK	DAVENTRY, ENG., 11.49 m., Addr. B.B.C., London. Operates irregularly.	19.020	HS8PJ	BANGKOK, SIAM, 15.77 m. Mondays 8-10 am.
25.950	W6XKG	LOS ANGELES, CAL., 11.56 m., Addr. B. S. McGlashan, Wash. Blvd. at Oak St. Relays KGFJ 24 hours daily.	18.970	GAQ	RUGBY, ENG., 15.81 m. Calls S. Africa mornings.
21.550	GST	DAVENTRY, ENG., 13.92 m., Addr. (See 26.100 mc.) Irregular at present.	18.890	ZSS	KLIPHEUVEL, S. AFRICA, 15.88 m., Addr. Overseas Comm. of S. Africa. Ltd. Calls GAU 6.30-7 am.
21.540	W8XK	PITTSBURGH, PA., 13.93 m., Addr. Grant Bldg. Relays KDKA 6.45-9 am. Exc. Sun.	18.830	PLE	BANDOENG, JAVA, 15.93 m. Calls Holland 6-11 am.
21.530	GSJ	DAVENTRY, ENG., 13.93 m., Addr. (See 26.100 mc.) 5.45 am.-12 n.	18.680	OCI	LIMA, PERU, 16.06 m. Tests with Bogota. Col.
21.520	W2XE	NEW YORK CITY, 13.94 m., Addr. Col. Broad. Syst., 485 Madison Ave. 6.30-9 am., Sat. and Sun. 7 am.-12 m.	18.620	GAU	RUGBY, ENG., 16.11 m. Calls N. Y. daytime. Calls ZSS 6.30-7 am.
21.500	W2XAD	SCHENECTADY, N. Y., 13.95 m., General Electric Co., 8 am.-12 n.	18.480	H8H	GENEVA, SWITZERLAND, 16.26 m., Addr. Radio Nations. Sun., 10.45-11.30 am.
21.470	GSH	DAVENTRY, ENG., 13.97 m. (See 26.100 mc.), 5.45 am.-12 n.	18.345	FZS	SAIGON, INDO-CHINA, 16.35 m. Works Paris early morning.
21.450	DJS	BERLIN, GERMANY, 13.99 m., Addr., Broadcasting House. 12.05-11 am.	18.340	WLA	LAWRENCEVILLE, N. J., 16.36 m., Addr. A.T.&T. Co. Calls England daytime.
21.420	WKK	LAWRENCEVILLE, N. J., 14.01 m., Addr. Amer. Tel. & Tel. Co. Calls S. Amer. 7 am.-7 pm.	18.310	GAS	RUGBY, ENG., 16.38 m. Calls N.Y. daytime.
21.080	PSA	RIO DE JANEIRO, BRAZ., 14.23 m., Calls WKK daytime.	18.299	YVR	MARACAY, VENEZ., 16.39 m. Works Germany mornings.
21.060	WKA	LAWRENCEVILLE, N. J., 14.25 m., Addr. (See 21.420 mc.) Calls England morning and afternoon.	18.250	FTO	ST. ASSISE, FRANCE, 16.43 m. Works S. America daytime.
21.020	LSN6	BUENOS AIRES, ARG., 14.27 m., Addr. Cia. Internacional de Radio. Works N.Y.C. 7 am.-7 pm.	18.200	GAW	RUGBY, ENG., 16.48 m. Works N.Y.C. daytime.
20.860	EHY-EDM	MADRID, SPAIN, 14.38 m., Addr. Cia Tel. Nacional de Espana. Works S. Amer. mornings.	18.135	PMC	BANDOENG, JAVA, 16.54 m. Works Holland mornings.
20.700	LSY	BUENOS AIRES, ARG., 14.49 m., Addr. Transradio Internatl. Tests irregularly.	18.115	LSY3	BUENOS AIRES, ARG., 16.56 m., Addr. (See 20.700 mc.) Tests irregularly. Broadcasts 5-6 pm. Friday.
20.380	GAA	RUGBY, ENG., 14.72 m. Calls Arg., Brazil mornings.	18.040	GAB	RUGBY, ENG., 16.83 m. Works Canada morning and afternoon.
20.040	OPL	LEOPOLDVILLE, BELGIAN CONGO, 14.97 m. Works ORG morn.	17.810	PCV	KOOTWIJK, HOLLAND, 16.84 m. Works Java 6-8 am.
20.020	DHO	NAUEN, GERMANY, 14.99 m., Addr. Reichspostzenstralamt. Works S. Am. mornings.	16 Met. Broadcast Band		
19.900	LSG	BUENOS AIRES, ARG., 15.08 m., Addr. (See 20.700 mc.) Tests irregularly.	17.800	TGWA	GUATEMALA CITY, GUAT., 16.84 m., Addr. Ministre De Fomento. Irregular.
19.820	WKN	LAWRENCEVILLE, N. J., 15.14 m., Addr. A. T. & T. Co. Calls England daytime.	17.790	GSG	DAVENTRY, ENG., 16.86 m., Addr. B.B.C., London. 12 m.-2.15 am., 5.45 am.-12 n., 12.20-4 pm.
			17.785	JZL	TOKYO, JAPAN, 16.87 m. Tests irregularly.
			17.780	W3XAL	BOUND BROOK, N. J., 16.87 m., Addr. Natl. Broad. Co. 8 am.-8 pm.
17.770	PHI	HUIZEN, HOLLAND, 16.88 m., Addr. (See PHI, 11.730 mc.) Daily except Wednesday, 7.25-9.30 am., Sun. 6.25-9.30 am.	17.765	TPB3	PARIS, FRANCE, 16.88m. Addr. (See 15.245 mc.) 8.30-10 am.
17.760	DJE	BERLIN, GERMANY, 16.89 m., Addr. Broadcasting House. 12.05-10 am.; also Sun. 11.10 am-12.25 pm.	17.760	W2XE	NEW YORK, N. Y., 16.89 m., Addr. Col. Broad. System, 485 Madison Ave. Irregular.
17.755	Z8W5	HONGKONG, CHINA, 16.9 m., Addr. P.O. Box 200. 4-10 am. Irregular.	End of Broadcast Band		
17.741	HSP	BANGKOK, SIAM, 16.91 m. Works Germany 6-7 am., 8-9 pm. Works JVE 11 pm.-6 am.	17.650	XGM	SHANGHAI, CHINA, 17 m. Works London 7-9 am.
17.520	DF8	NAUEN, GERMANY, 17.12 m. Works S. America, near 9.15 am. Works Siam 6-7 am., 8-9 pm.	17.480	VWY2	KIRKEE, INDIA, 17.16 m. Works London 7.30-8.30 am.
17.310	W2XG8	HICKSVILLE, L. I., N. Y., 17.33 m., Addr. Press Wireless, Box 296. Tests 9.30-11.30 am. except Sat. and Sun.	17.120	WOO	OCEAN GATE, N. J., 17.52 m., Addr. A.T.&T. Co. Works shios irregularly.
17.080	GBC	RUGBY, ENG., 17.56 m. Works ships irregularly.	17.080	GBC	RUGBY, ENG., 17.56 m. Works ships irregularly.
16.835	ITK	MOGADISCIO, ITAL. SOMALI-LAND, 18.32 m. Calls IAC around 9.30 am.	16.270	WLK	LAWRENCEVILLE, N. J., 18.44 m., Addr. A.T.&T. Co. Works S. Amer. daytime.
16.270	WOG	OCEAN GATE, N. J., 18.44 m., Addr. A.T.&T. Co. Works England late afternoon.	16.270	WOG	OCEAN GATE, N. J., 18.44 m., Addr. A.T.&T. Co. Works England late afternoon.
16.240	KTO	MANILA, P. I., 18.47 m., Addr. RCA Comm. Works Japan and U. S. 5-9 pm. and early am. irreg.	16.233	FZ3	SAIGON, INDO-CHINA, 18.48 m. Calls FTK 6-9 am.
16.030	KKP	KAHUKU, HAWAII, 18.71 m., Addr. RCA Comm. Workş Dixon 3-10 pm.	15.880	FTK	ST. ASSISE, FRANCE, 18.9 m. Works Saigon 6-9 am.
15.865	CEC	SANTIAGO, CHILE, 18.91 m. Calls Peru daytime irregular.	15.865	CEC	SANTIAGO, CHILE, 18.91 m. Calls Peru daytime irregular.
15.810	LSL	BUENOS AIRES, ARG., 18.98 m., Addr. (See 21.020 mc.) Works London mornings and Paris afternoons.	15.660	JVE	NAZAKI, JAPAN, 19.16 m. Works Java and Siam early am.
15.620	JVF	NAZAKI, JAPAN, 19.2 m. Works Cal. near 5 am. and 8 pm.	15.550	CO9XX	TUINICU, ORIENTE, CUBA, 19.29 m., Addr. Frank Jones, Central Tuinicu, Tuinicu, Santa Clara. Broadcasts irregularly evenings.
15.440	XEBM	MAZATLAN, SIN., MEX., 19.43 m., Addr. Flores 103 Alto. "El Pregonero del Pacifico." Irregularly 7 am.-10 pm.	15.450	IUG	ADDIS ABABA, ETHIOPIA, 19.44 m. Works Rome 9-10.30 am.
15.415	KWO	DIXON, CAL., 19.46 m., Addr. A. T. & T. Co. Works Hawaii 2-7 pm.	15.370	HAS3	BUDAPEST, HUNGARY, 19.52 m., Addr. Radiolabor, Gyali Ut 22. Sun. 9-10 am.
15.360	DZG	ZEESEN, GERMANY, 19.53 m., Addr. Reichspostzenstralamt. Tests irregularly.	<i>(Continued on page 86)</i>		

All Schedules Eastern Standard Time

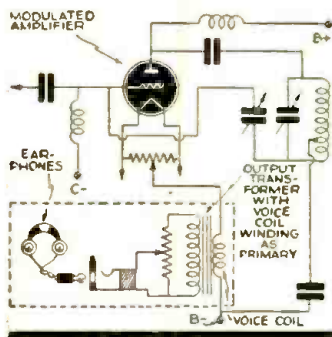
Short Wave Kinks

Each month the Editor will award a 2 year subscription for the best short-wave kink submitted. All other kinks published will be awarded eight months' subscription to **SHORT WAVE & TELEVISION**. Look over these kinks; they will give you some idea of what is wanted. Send a typewritten or ink description, with sketch, of your favorite to the "Kink" Editor.

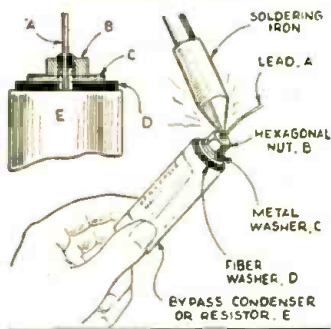
PHONE MONITOR

1st PRIZE

A simplified phone monitor can be made from an old loud-speaker output transformer. The voice coil winding of this transformer is connected in series with the center-tapped filament of the modulated amplifier. A pair of headphones is connected to the secondary of this transformer with a 5,000 ohm potentiometer shunted across the secondary for controlling volume. The arrangement will detect carrier hum, distortion and improper neutralization.—*Carl Ornehaug, W8CDK.*



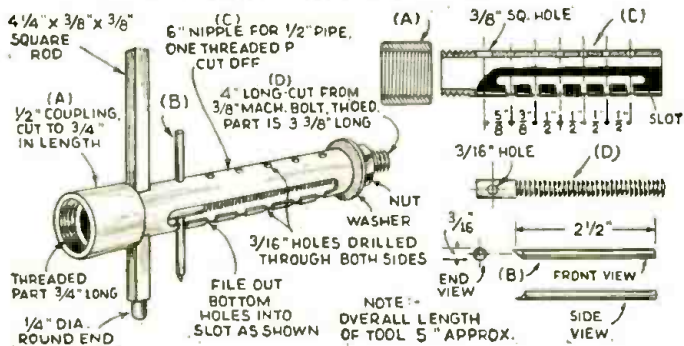
PROTECTING CONDENSERS



How many experimenters have found that after using a pigtail tubular condenser in several circuits the pigtail leads break off flush with the side of the condenser?

As illustrated, a fibre washer, a metal washer and a hexagonal nut are slipped over each end of the pigtail condenser. The nut is then soldered to the pigtail lead. After the condenser has been used a few times the pigtail lead will break off as usual. However, it is now possible to unsolder the hexagon nut and remove the washers, exposing an unused length of lead.—*A. J. Dembiec, W8PJK.*

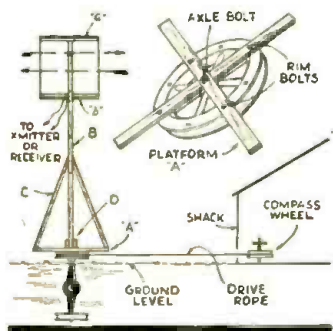
AN ADJUSTABLE HOLE CUTTER



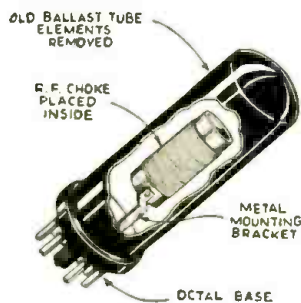
A very useful adjunct to any workbench is this cutting tool for cutting holes of various sizes in metal chassis. It is an improvement over the tool described in the August 1936 issue of *Short Wave Craft*. To adjust the radius of the cutting circle of this tool loosen the nut, pull the cutting tool (B) down through the hole and move it along to the desired position, then insert in the hole at that point and retighten the nut. A drill rod should be used for the cutting tool. The construction of the cutter is clearly shown in the layout above.—*Mitchell Wozniak.*

DIRECTIVE ANTENNA

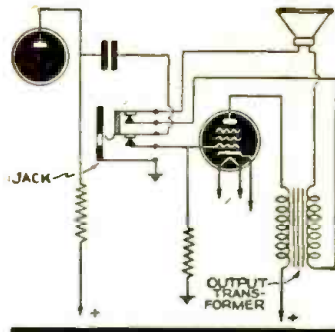
A rotatable antenna mast suitable for ultra-high frequency use in the 5 and 10 meter bands may be constructed from an automobile rear end assembly picked up in a junk yard. The assembly is buried vertically in the ground as shown, with one wheel protruding above the ground level. This wheel should be of the wooden spoke type with detachable rim. The rim should be removed and bolts long enough to firmly secure the platform to the wheel should be substituted for the original bolts. The mast may be of any convenient length. The type of aerial array is left up to the constructor. By mounting a wheel on the floor of the transmitting shack and attaching it by means of a driving rope to the rim of the wheel on the mast, it is possible to turn the array without going out of the shack.—*Charles Culley, W5DOK.*



SHIELDED CHOKE



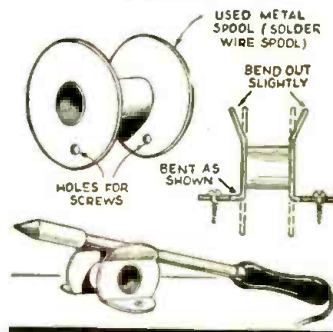
A new use for burnt out metal ballast tubes is to use the metal shield and base as a mounting for a plug-in shielded R.F. choke. Any R.F. choke of small diameter may be mounted within the ballast tube shield after all the burnt out elements have been removed. The leads from the choke are connected to any convenient pins on the base of the tube and the metal shield should be connected to one of the pins for grounding purposes. One precaution should be observed in using a choke in this housing. If the choke diameter is large, so that the windings are less than 1/4-inch away from the metal shell, the choking action will be seriously affected and the choke's action may be completely canceled. The metal ballast tube shells can also be used for housing electrolytic condensers.—*John Ferral.*



HEADPHONE JACK

When using the ordinary headphone jack on a short-wave receiver a considerable hum is sometimes heard from the loud-speaker when headphones are connected. This hum can be disturbing to the listener, or anyone else in the room. By employing a double circuit jack as shown in the sketch, the voice coil of the loudspeaker is opened thus disconnecting the speaker from the receiver and preventing hum from being heard.—*L. F. Schneider.*

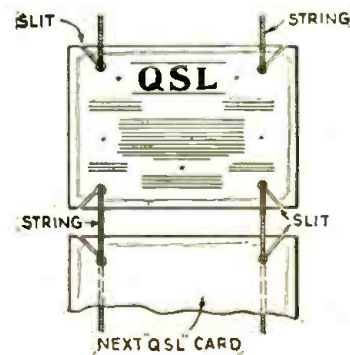
IRON HOLDER



Our old friend, the soldering iron holder, comes under a new guise this month. This holder is made from an empty solder spool. As the illustration shows, the holder may be secured to the work-bench by wood screws.—*Bill Knife.*

CARD MOUNT

A neat way of mounting QSL cards on a wall is sketched. Two parallel pieces of string are run down the wall from the picture moulding to the floor-board. The space between the two strings must be less than the width of the cards. To mount a card, punch four holes in it and cut out four slots as shown.—*W. T. Murray.*



Mc.	Call	Station	Mc.	Call	Station	Mc.	Call	Station
15.355	KWU	DIXON, CALIF., 19.53 m., Addr. A.T.&T. Co. Phones Pacific Isles and Japan.	15.055	WNC	HIALEAH, FLORIDA, 19.92 m., Addr. A.T.&T. Co. Calls Central America daytime.	13.415	GCJ	RUGBY, ENG., 22.36 m. Works Japan and China early morning.
19 Met. Broadcast Band			14.980	KAY	MANILA, P. I., 20.03 m., Addr. RCA Comm. Works Pacific Is. Mornings.	13.410	YSJ	SAN SALVADOR, SALVADOR, 22.37 m. Works WNC daytime.
15.340	DJR	BERLIN, GERMANY, 19.56 m., Addr. Br'dcast'g House, 8-9 am., 4.50-10.45 pm.	14.960	PSF	RIO DE JANEIRO, BRAZIL, 20.05 m., Works with Buenos Aires daytime.	13.390	WMA	LAWRENCEVILLE, N. J., 22.4 m., Addr. A.T.&T. Co. Works England morning and afternoon.
15.330	W2XAD	SCHENECTADY, N. Y., 19.56 m., Addr. General Electric Co. Relays WGY 12.30-7 pm.	14.950	HJB	BOGOTA, COL., 20.07 m. Calls WNC daytime.	13.380	IDU	ASMARA, ERITREA, AFRICA, 22.42 m. Works Rome daytime.
15.320	OLR5B	PRAGUE, CZECHOSLOVAKIA, 19.58 m. Addr. (See 11.840 mc.) Daily exc. Sun. 6.30-7.30, 9.10-9.50 am., Sun. 6.15-7.45 am.	14.940	HII	CIUDAD TRUJILLO, D. R., 20.08 m. Phones WNC daytime.	13.350	VVN	FT. ST. GEORGE, MADRAS, INDIA, 22.46 m. Works VVS, Burma, near 7 am.
15.310	GSP	DAVENTRY, ENG., 19.6 m., Addr. (See 26.100 mc.) 12.15-1.15, 4.15-6, 6.20-8.30 pm.	14.940	HJA3	BARRANQUILLA, COL., 20.08 m. Works WNC daytime.	13.345	YVQ	MARACAY, VENEZUELA, 22.48 m. Works WNC daytime.
15.290	LRU	BUENOS AIRES, ARG., 19.62 m., Addr. El Mundo. Relays LRI, 7-9 am.	14.920	LZA	SOPHIA, BULGARIA, 20.10 m., Addr. Radio Garata. Mon., Tues., Thurs., Fri. 11.30 am.-2.45 pm., Wed. 11.30 am.-4.45 pm., Sat. 11.30 am.-5 pm., Sun. 2 am.-5 pm. Daily except Sun. 5-6.30 am.	13.285	CGA3	DRUMMONDVILLE, QUE., CAN., 22.58 m. Works London and ships afternoons.
15.280	H13X	CIUDAD TRUJILLO, D. R., 19.63 m. Relays HIX Sun. 7.40-10.40 am. Weekdays 12.10-1.10 pm.	14.845	OCJ2	LIMA, PERU, 20.21 m. Works South America stations daytime.	13.330	IRJ	ROME, ITALY, 22.69 m. Works Tokyo 5-9 am., irregularly.
15.280	DJQ	BERLIN, GERMANY, 19.63 m., Addr. Broadcasting House. 12.05-10 am., 4.50-10.45 pm. Also Sun. 11.10 am.-12.25 pm.	14.790	ROU	OMSK, SIBERIA, U.S.S.R., 20.28 m. Works Moscow irregularly 7-9 am.	12.882	W9XDH	ELGIN, ILL., 23.25 m. Press Wireless, Tests 2-5 pm.
15.270	W2XE	NEW YORK CITY, 19.65 m., Addr. (See 21.520 mc.) Daily except Sat. and Sun., 12 n-5 pm., Sat. & Sun. 1.30-5 pm.	14.730	IQA	ROME, ITALY, 20.37 m. Broadcasts 6-9 pm. irregular.	12.870	VVS	MINGALADON, BURMA, 23.30 m. Works ZGB, VVN, and Siam, 6.30-7.30 am.
15.260	GSI	DAVENTRY, ENG., 19.66 m., Addr. (See 26.100 mc.) 9.20-11.20 pm.	14.653	GBL	RUGBY, ITALY, 20.47 m. Works JVH 1-7 am.	12.840	WOO	OCEAN GATE, N. J., 23.36 m., Addr. A.T.&T. Co. Works with ships irregularly.
15.252	RIM	TASHKENT, U.S.S.R., 19.67 m. Works RKI near 7 am.	14.640	TYF	PARIS, FRANCE, 20.49 m. Works Saigon and Cairo 3-7 am, 12 n.-2.30 pm.	12.830	CNR	RABAT, MOROCCO, 23.38 m., Addr. Director General Tele. & Teleg. Stations. Works TYA, Paris 6-7 am., 2.30-4 pm.
15.250	W1XAL	BOSTON, MASS., 19.67 m., Addr. University Club. Daily 12.30-2 pm., Sun. 10.15 am.-12 n.	14.600	JVH	NAZAKI, JAPAN, 20.55 m. Broadcasts irregularly 5-11.30 pm. Works Europe 4-8 am.	12.800	IAC	PISA, ITALY, 23.45 m. Works Italian ships mornings.
15.245	TPA2	PARIS, FRANCE, 19.68 m., Addr. 98 bis. Blvd. Haussmann. "Paris Mondial" 5-10 am.	14.590	WMN	LAWRENCEVILLE, N. J., 20.56 m., Addr. A.T.&T. Co. Works England morning and afternoon.	12.780	GBC	RUGBY, ENG., 23.47. Works ships irregularly.
15.230	HS8PJ	BANGKOK, SIAM, 19.7 m. Irregularly Mon. 8-10 am.	14.535	HBJ	GENEVA, SWITZERLAND, 20.64 m., Addr. Radio Nations. Broadcasts Sun. 1.45-2.30 pm., Mon. 1.30-1.45 am.	12.325	DAF	NORDDEICH, GERMANY, 24.34 m. Works German ships daytime.
15.230	OLR5A	PRAGUE, CZECHOSLOVAKIA, 19.7 m. Daily exc. Sun. 6.30-7.30, 9.10-9.50 am., Sun. 6.15-7.45 am.	14.530	LSN	BUENOS AIRES, ARG., 20.65 m., Addr. (See 20.020 mc.) Works N. Y. C. afternoons.	12.290	GBU	RUGBY, ENG., 24.41 m. Works N. Y. C. evenings.
15.220	PCJ	HUIZEN, HOLLAND, 19.71 m., Addr. N. V. Philips' Radio Hilversum. Tues. 2-3.30 am., Wed. 9.30-11 am.	14.500	LSM2	BUENOS AIRES, ARG., 20.69 m., Addr. (See 21.020 mc.) Works Rio and Europe daytime.	12.250	TYB	PARIS, FRANCE, 24.49 m. Irregular.
15.210	W8XK	PITTSBURGH, PA., 19.72 m., Addr. (See 21.540 mc.) 9 am.-7 pm.	14.485	TIR	CARTAGO, COSTA RICA, 20.71 m. Works Central America and U. S. A. daytime.	12.235	TFJ	REYKJAVIK, ICELAND, 24.52 m. Works Europe mornings. Broadcasts Sun. 1.40-2.30 pm.
15.200	DJB	BERLIN, GERMANY, 19.74 m., Addr. (See 15.280 mc.) 12.05-11 am., 4.50-10.45 pm. Also Sun. 11.10 am.-12.15 pm.	14.485	YSL	SAN SALVADOR, SALVADOR, 20.74 m. Irregular.	12.215	TYA	PARIS, FRANCE, 24.56 m. Works French ships in morning and afternoon.
15.190	ZBW4	HONGKONG, CHINA, 19.75 m., Addr. P. O. Box 200. Irregular. 11.30 pm. to 1.15 am., 3-10 am.	14.485	HPF	PANAMA CITY, PANAMA, 20.71 m. Works WNC daytime.	12.150	GBS	RUGBY, ENG., 24.69 m. Works N. Y. C. evenings.
15.180	GSO	DAVENTRY, ENG., 19.76 m., Addr. (See 26.100 mc.) 12 m.-2.15, 5.45-10 am., 4.15-6, 6.20-8.30 pm.	14.485	TGF	GUATEMALA CITY, GUATEMALA, 20.71 m. Works WNC daytime.	12.130	DZE	ZEESEN, GERMANY, 24.73 m., Addr. (See 15.360 mc.) Tests irregular.
15.170	TGWA	GUATEMALA CITY, GUAT., 19.77 m., Addr. (See 17.8 mc.) Irregular 11.30 am.-2 pm.	14.485	YNA	MANAGUA, NICARAGUA, 20.71 m. Works WNC daytime.	12.120	TPZ	ALGERS, ALGIERS, 24.75 m. Calls Paris near 6 am., and 2.30-4 pm.
15.160	XEWV	MEXICO CITY, MEXICO, 19.79 m., 12 n.-12 m., irregular.	14.485	HRL5	NACAOME, HONDURAS, 20.71 m. Works WNC daytime.	12.060	PDV	KOOTWIJK, HOLLAND, 24.88 m. Tests irregularly.
15.160	JZK	TOKYO, JAPAN, 19.79 m. Irreg.	14.485	HRF	TEGUCIGALPA, HONDURAS, 20.71 m. Works WNC daytime.	12.060	RNE	MOSCOW, U.S.S.R., 24.88 m. Daily 6-7 am., 12.15-1 pm., 8-9.15, 10-11 pm., also Sun. 6 am.-1 pm.
15.155	SM5SX	STOCKHOLM, SWEDEN, 19.79 m., Daily 11 am.-5 pm., Sun. 9 am.-5 pm.	14.48	IBS	ROME, ITALY, 20.7 m. Works Eritrea and Addis Ababa 6.30-7.30 am.	11.991	FZS4	SAIGON, INDO-CHINA, 25.02 m. Phones Paris irregular.
15.150	YDC	BANDOENG, JAVA, 19.8 m., Addr. N. I. R. O. M. 6-7.30 pm., 10.30 pm.-2 am., Sat. 7.30 pm.-2 am., daily 5.30-10.30 am.	14.470	WMF	LAWRENCEVILLE, N. J., 20.73 m., Addr. A.T.&T. Co. Works London and Paris daytime.	11.970	H12X	CIUDAD TRUJILLO, D. R., 25.07 m., Addr. La Voz de Hispaniola. Relays HIX Tue. and Fri. 8.10-10.10 pm.
15.140	G5F	DAVENTRY, ENG., 19.82 m., Addr. (See 26.100 mc.) 12 m.-2.15, 5.45 am.-12 n., 4.15-6, 6.20-8.30.	14.460	DZH	ZEESEN, GERMANY, 20.75 m., Addr. (See 15.360 mc.) Irregular.	11.955	IUC	ADDIS ABABA, ETHIOPIA, 25.07 m. Works IAC around 12 m.
15.130	TPB6	PARIS, FRANCE, 19.83 m., Addr. "Paris Mondial" 98 Bis Blvd. Haussmann. 6-8.15 pm.	14.440	---	RADIO MALAGA, SPAIN, 20.78 m. Relays Salamanca. Irreg. afternoons.	11.950	KKQ	BOLINAS, CALIF., 25.1 m. Tests irregularly evenings.
15.130	W1XAL	BOSTON, MASS., 19.83 m., Addr. World-Wide B'cast'g. Foundation. University Club. 10-11 am., Mon.-Fri.	14.440	G8W	RUGBY, ENG., 20.78 m. Works U.S.A. afternoons.	11.940	FTA	STE. ASSISE, FRANCE, 25.13 m. Works Morocco mornings and Argentina late afternoon.
15.120	HVJ	VATICAN CITY, 19.83 m., 10.30-10.45 am., except Sun., Sat. 10-10.45 am.	14.440	P11J	DORDRECHT, HOLLAND, 21.15 m., Addr. (See 7.089 mc.) Sat. 12 n.-12.30 pm.	25 Met. Broadcast Band		
15.110	DJL	BERLIN, GERMANY, 19.85 m., Addr. (See 15.280 mc.) 12 m.-2, 8-9 am., 10.40 am. to 4.30 pm. Sun. also 6-8 am.	14.004	EA9AH	TETUAN, SPANISH MOROCCO, 21.4 m. Daily except Sun. 2.15-5.7 and 9 pm.	11.910	CD1190	VALDIVIA, CHILE, 25.2 m., P. O. Box 642. Relays CB69 10 am.-1 pm., 3-6 pm., 7-10 pm.
15.080	RKI	MOSCOW, U.S.S.R., 19.87 m. Works Tashkent near 7 am. Broadcasts Sun. 12.15-2.30 pm. Daily 7-9.15 pm.	13.990	G8A	RUGBY, ENG., 21.44 m. Works Buenos Aires late afternoon.	11.900	TPA3	PARIS, FRANCE, 25.21 m., Addr. (See 15.245 mc.) 1-4 am., 10.15 am.-5 pm.
End of Broadcast Band			13.820	SUZ	ABOU ZABAL, EGYPT, 21.71 m. Works with Europe 11 am.-2 pm. Works GBB daily at 11 am.	11.900	XEW1	MEXICO CITY, MEXICO, 25.21 m., Addr. P. O. Box 2874. Tues. and Thurs. 7.30 pm.-12 m., Fri. 9 pm.-12 m. Sun. 12.30-2 pm.
			13.690	KKZ	BOLINAS, CALIF., 21.91 m., Addr. RCA Comm. Irregularly.	11.895	HP51	AGUADULCE, PANAMA, 25.22 m. Addr. La Voz del Interior. 7.30-9.30 pm.
			13.635	SPW	WARSAW, POLAND, 22 m. Daily 6-8 pm. Sat. & Sun. 6-9 pm.	11.885	TPB7	PARIS, FRANCE, 25.24 m. (See 15.245 mc.) 8.30-11 pm.
			13.63	ZGB	KUALA LUMPUR, F.M.S. 22 m. Works Java and VVS, VVN and Siam, 6.30-8 am.	11.870	W8XK	PITTSBURGH, PA., 25.26 m., Addr. (See 21.540 mc.) 7-11 pm.
			13.585	GBB	RUGBY, ENG., 22.08 m. Works Canada afternoons. Works SUZ at 11 am.	11.860	YDB	SOERABAJA, JAVA, 25.29 m., Addr. N. I. R. O. M. Sat. 7.30 pm. to 2.30 am., daily 10.30 pm. to 2 am.

(Continued on page 88)

All Schedules Eastern Standard Time

Short Wave League

HONORARY MEMBERS

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

When to Listen In

M. Harvey Gernsback
All schedules in Eastern Standard Time



A special certificate sent to SWLs sending a reception report to T14NRH during May. This one was sent to the executive secretary of the League.

DAYLIGHT SAVING TIME . . . During April, daylight saving time went into effect in many cities in the United States and Canada and in the whole of France and England. In this country, the schedules of many stations were advanced one hour because of this. Most Canadian stations were also similarly affected. The English station at Daventry sticks to a fixed schedule all year around, however. The French station made a wholesale revision of its schedule as noted in the item below. Listeners residing in zones where daylight saving time is not used should expect to hear most U.S. and Canadian short-wave stations one hour earlier than before, while listeners observing daylight time will find these stations on the same schedule as they have been, but all other stations of the world will be heard one hour later. All station schedules published in *Short Wave & Television* are in Eastern Standard Time throughout the year. Therefore, listeners must make any necessary corrections if they use Daylight time. This is done by adding one hour to the time shown in the schedules.

BOSTON . . . The revised schedule of W1XAL, Boston, is, Monday to Friday: 15.13 mc.—10 to 11 a.m.; 15.25 mc.—12:30-2 p.m.; 11:70 mc.—3:15 to 5:30 p.m.; 6.04 mc.—6 to 7:45 p.m.; 11.73 mc.—8 to 10 p.m. On Monday, the 6.04 mc. schedule is 6 to 8 p.m., and the 11.73 mc. schedule 8:30 to 10:30 p.m. Saturday the station operates only from 5-5:30 p.m. on 11.79 mc. On Sundays on 15.25 mc. from 10 to 11 a.m., and on 11.79 mc. from 12 n. to 5:30 p.m.

PARIS . . . The new French short-wave station has gone into regular operation and there has been a complete upheaval in its schedules, call letters, name and frequency. It is no longer known as *Radio Colonial*.

The new name for the station is *Paris Mondial* and the following frequencies, call letters and schedules are now in effect. TPB3 on 17.765 mc. operates from 8:30-10 a.m., directed to Asia. TPA2, 15.243 mc., operates from 5-10 a.m., also for Asia. TPB6, 15.13 mc., and TPA4, 11.715 mc., operate from 6 to 8:15 p.m., for South America. TPA3, 11.9 mc., and TPB11, 9.57 mc., operate from 1-4 a.m., and from 10:15 a.m.-5 p.m., from Africa. TPA4 11.715 mc., and TPB7, 11.885 mc., operate from 8:30-11 p.m. for North and Central America.

The TPB stations are the new 50 kw. station at Essarts, France, while the TPA stations are the old transmitters.

SWITZERLAND . . . Radio Nations at Geneva is now on a spring schedule. Sunday programs for North America are sent out on HBO, 11.402 mc., from 7-7:45 p.m.,



Amando Cespedes Marin, founder and director of NRH.

and for India from 10:45-11:30 a.m., on HBH, 18.48 mc. A program for South Africa is heard from 1:45-2:30 p.m., on HBJ, 14.535 mc., and HBQ, 6.675 mc. Finally a program for Australians and New Zealand is broadcast on Monday from 1-1:15 a.m., on HBO and from 1:30-1:45 a.m., on HBJ.

ROME . . . A new station is heard replacing ZRO until 6 p.m., on about 17.81 mc. ZRO now operates on 11.81 mc. for practically all of its transmissions.

T14NRH's Tenth Birthday . . . One of the real old-timers among short-wave broadcasting stations is celebrating its tenth birthday during the month of May. T14NRH, *The Voice of Costa Rica*, Heredia, is operated by our old friend, Amando Cespedes Marin. During the month of May he is having a gala celebration on the station with thirty-one special programs dedicated to various short-wave organizations of the world and to various individuals in the short-wave fraternity. These programs will be broadcast from 9-10 p.m. each night during the month on 9.67 mc. On May 12, the program is to be dedicated to the *Short Wave League*, and to Hugo Gernsback, the Editor of *Short Wave & Television*.

To all listeners reporting and commenting upon these special broadcasts a beautiful three-colored lithographed diploma 14" x 12" will be sent. We have reproduced this diploma at the top of this page. A special medal will be awarded to those who participate in a special contest, details

(Continued on page 121)

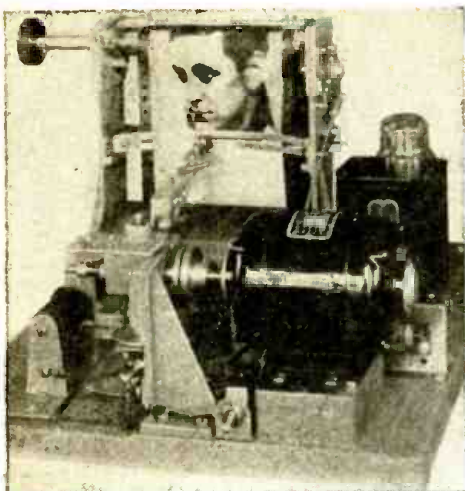
Mc.	Call		Mc.	Call		Mc.	Call	
11.860	GSE	DAVENTRY, ENG., 25.29 m., Addr. (See 26.100 mc.) Irregular.	11.680	KIO	KAHUKU, HAWAII, 25.68 m., Addr. RCA Comm. Irregularly.	10.220	PSH	RIO DE JANEIRO, BRAZIL, 29.35 m., Addr. Box 709. Broadcasts 6-9 pm.
11.855	DJP	BERLIN, GERMANY, 25.31 m., Addr. (See 15.280 mc.) Irregular 11.35 am.-4, 7-10.45 pm.	11.595	VRR4	STONY HILL, JAMAICA, B. W. I., 25.87 m. Works WNC daytime.	10.160	RIO	BAKOU, U.S.S.R., 29.5 m. Works Moscow 10 pm.-7.30 am.
11.840	KZRM	MANILA, P. I., 25.35 m. Addr. Erlanger & Gallinger, Box 283. 9 pm.-10 am. Irregular.	11.560	VIZ3	FISKDALE, AUSTRALIA, 25.95 m., Addr. Amalgamated Wireless of Australasia Ltd. Tests irregularly.	10.140	OPM	LEOPOLDVILLE, BELGIAN CONGO, 29.59 m., Works Belgium 1-3 am. and 3-5 pm.
11.840	CSW	LISBON, PORT., 25.35 m. Nat'l Broad. Station. 11.30 am.-1.30 pm. Irregular.	11.530	SPD	WARSAW, POLAND, 26 m., Addr. 5 Mazowiecka St. 6-8 pm., Sat. & Sun. 6-9 pm.	10.080	RIR	TIFLIS, U.S.S.R., 29.76 m. Works Moscow 12 m.-8 am.
11.840	OLR4A	PRAGUE, CZECHOSLOVAKIA, 25.35 m., Addr. Czech Shortwave Sta., Praha XII, Fochova 16. Sun. 6.15-8.55 pm., Mon., Tues., Thur., Fri. 8-10.35 pm. Daily exc. Sun. 9.55-10.50 am.	11.500	XAM	MERIDA, YUCATAN, 26.09 m. Irregular 1-7.30 pm.	10.065	TDE	SHINKYO, MANCHUKUO, 29.81 m. Works JVO 3-8 am.
11.830	W9XAA	CHICAGO, ILL., 25.36 m., Addr. Chicago Federation of Labor. Irregular 7 am.-6 pm.	11.500	PMK	BANDOENG, JAVA, 26.09 m. Tests irregularly.	10.055	ZF3	HAMILTON, BERMUDA, 29.84 m. Works N.Y.C. Irregular.
11.830	W2XE	NEW YORK CITY, 25.36 m., Addr. Col. Broad. System, 485 Madison Av., N.Y.C. 5.30-10 pm.	11.420	COCX	HAVANA, CUBA, 26.25 m. P. O. Box 32. 6.55 am.-1 am. Sun. till 12 m. Relays CMX.	10.055	SUV	ABOU ZABAL, EGYPT, 29.84 m. Works Europe 1-6 pm.
11.826	XEBR	HERMOSILLA, SON., MEX., 25.37 m., Addr. Box 68. Relays XEBH. 2-4 pm., 9 pm.-12 m.	11.413	CJA4	DRUMMONDVILLE, QUE., CAN., 26.28 m. Tests irregularly.	10.042	DZB	ZEESEN, GERMANY, 29.87 m., Addr. Reichspostzentramt, Irregular.
11.820	GSN	DAVENTRY, ENG., 25.38 m., Addr. (See 26.100 mc.) Irregular.	11.402	HBO	GENEVA, SWITZERLAND, 26.31 m., Addr. Radio Nations. Sun. 7-7.45 pm., Mon. 1-1.15 am.	9.990	KAZ	MANILA, P. I., 30.03 m., Addr. RCA Communications. Works Java early morning.
11.810	ZRO	ROME, ITALY, 25.4 m., Addr. E.I.A.R., Via Montello 5. Daily 5-8.30 am., 10.30 am.-9 pm.	11.050	ZLT4	WELLINGTON, NEW ZEALAND, 27.15 m. Works Australia and England early morning.	9.980	COBC	HAVANA, CUBA, 30.04 m., Addr. P. O. Box 132. Relays CMBC 6:55 a.m.-12:30 a.m.
11.805	COGF	MATANZAS, CUBA, 25.41 m., Addr. Gen. Betancourt 51. Relays CMGF. 2-3, 4-5, 6-11 pm.	11.040	CSW	LISBON, PORTUGAL, 27.17 m., Addr. Nat. Broad. Sta. 1.30-5 pm.	9.950	GCU	RUGBY, ENGLAND, 30.15 m. Works N.Y.C. night time.
11.805	OZG	SKAMLEBOAEK, DENMARK, 25.41 m., Addr. Statsradiofonien. Irreg.	11.000	PLP	BANDOENG, JAVA, 27.27 m. Relays YDB. 6-7.30 p.m., 5.30-10.30 or 11 am. Sat. until 11.30 am.	9.940	CSW	LISBON, PORTUGAL, 30.18 m. Addr. Nat. Broad. Sta. 5-7 pm.
11.800	JZJ	TOKYO, JAPAN, 25.42 m., Addr. Broadcasting Co. of Japan, Overseas Division. 12.30-1.30, 7-7.30, 8-9.30 am., 2.30-4, 4.30-5.30, 6-6.30 pm.	10.970	OCI	LIMA, PERU, 27.35 m. Works Bogota. Col. evenings.	9.940	JDY	DAIREN, MANCHUKUO, 30.18 m. Relays JQAK daily 7-8 am. Works Tokyo occasionally in early am.
11.795	DJO	BERLIN, GERMANY, 25.43 m., Addr. (See 15.280 mc.) Irregular. 7-11 pm.	10.960	—	TANANARIVE, MADAGASCAR, 27.36 m., Addr. (See 9.53 mc.) 12.30-45, 3.30-4.30, 10-11 am.	9.930	HK3	BOGOTA, COL., 30.21 m. Works Rio evenings.
11.790	OER3	VIENNA, AUSTRIA, 25.45 m. Daily 10 am.-5 pm. Sat. until 5.30 pm.	10.910	KTR	MANILA, P. I. 27.41 m. Phones ships 6-10 am.	9.890	LSN	BUENOS AIRES, ARG., 30.33 m., Addr. (See 10.300 mc.) Works N.Y.C. evenings.
11.790	WIXAL	BOSTON, MASS., 25.45 m., Addr. (See 15.250 mc.) Daily 3.15-5.30 pm., Sat. 5-5.30 pm., Sun. 12 n.-5.30 pm.	10.840	KWV	DIXON, CALIF., 27.68 m., Addr. A.T.&T. Co. Works with Hawaii evenings.	9.870	WON	LAWRENCEVILLE, N. J., 30.4 m., Addr. A.T.&T. Co. Works England nights.
11.770	DJD	BERLIN, GERMANY, 25.49 m., Addr. (See 15.290 mc.) 10.40 am.-4.30 pm., 4.50-11 pm.	10.770	G8P	RUGBY, ENGLAND, 27.85 m. Works Australia early morning.	9.865	COCM	HAVANA, CUBA, 30.41 m., Addr. Transradio Columbia, P.O. Box 33. 7 am.-12 m. Relays CMCM.
11.760	TGWA	GUATEMALA CITY, GUAT., 25.51 m. (See 17.8 mc.) Sun. Tues. and Thurs. 8 pm.-12 m.	10.740	JVM	NAZAKI, JAPAN, 27.93 m. Works U.S.A. 2-7 am.	9.860	EAQ	MADRID, SPAIN, 30.43 m., Addr. Post Office Box 951. Irregular.
11.760	OLR4B	PRAGUE, CZECHOSLOVAKIA, 25.51 m., Addr. (See 11.840 mc.) Irregular.	10.680	PLQ	BANDOENG, JAVA, 28.09 m. Works Javanese Isles and other Asiatic phones 6-8.30 am.	9.830	IRF	ROME, ITALY, 30.52 m. Works Egypt afternoons. Relays ZRO. 6-9 pm.
11.750	GSD	DAVENTRY, ENG., 25.53 m., Addr. B.B.C., London. 12 m.-2.15 am., 12.20-6.00 pm., 6.20-8.30, 9.20-11.20 pm.	10.675	WNB	LAWRENCEVILLE, N. J., 28.1 m., Addr. A.T.&T. Co. Works with Bermuda irregularly.	9.800	LSI	BUENOS AIRES, ARG., 30.61 m., Addr. (See 10.350 mc.) Tests irregularly.
11.740	HVJ	VATICAN CITY, 25.55 m. Testing irregular.	10.670	CEC	SANTIAGO, CHILE, 28.12 m. Irregular.	9.790	GCW	RUGBY, ENGLAND, 30.64 m., Works N.Y.C. evenings.
11.730	—	SAIGON, INDO CHINA, 25.57 m., Addr. Radio Philco. 11 pm.-1 am., 5.30-9.30 am.	10.660	JVN	NAZAKI, JAPAN, 28.14 m. Broadcasts daily 2-8 am. Works Europe irregularly at other times.	9.760	VLZ-VLK	SYDNEY, AUSTRALIA, 30.74 m., Addr. Amalgamated Wireless of Australasia Ltd. Works Java and New Zealand early morning.
11.730	PHI	HUIZEN, HOLLAND, 25.57 m., Addr. N. V. Philips' Radio.	10.600	ZIK2	BELIZE, BRIT. HONDURAS, 28.25 m., Tues., Thurs., Sat. 7.30-7.45 pm.	9.750	WOF	LAWRENCEVILLE, N. J., 30.77 m., Addr. A.T.&T. Co. Works London and Paris night time.
11.730	WIXAL	BOSTON, MASS., 25.57 m., Addr. World-Wide B'cast'g. Foundation, University Club. 8.30-10.30 pm. Mon., 8-10 pm. Tues.-Fri.	10.550	WOK	LAWRENCEVILLE, N. J., 28.44 m., Addr. A.T.&T. Co. Works S. A. nights.	9.745	COCQ	HAVANA, CUBA, 30.78 m. Addr. 25 No. 445, Vedado, Havana. 6.55 am.-1 am. Sun. till 12 m.
11.720	CJRX	WINNIPEG, CANADA, 25.6 m., Addr. James Richardson & Sons, Ltd. Daily 6 pm.-12 m., Sun. 5-10 pm.	10.535	J18	TAIHOKU, TAIWAN, 28.48 m. Works Japan around 6.25 am. Broadcasts, relaying JFAK 9.05-10 am., 1-2.30 am. Sun. to 10.15 am.	9.710	GCA	RUGBY, ENGLAND, 30.9 m. Works S. A. evenings.
11.718	CR7BH	LAURENCO MARQUES, PORTUGUESE E. AFRICA, 25.6 m. Daily 12.05-1, 4.30-6.30, 9.30-11 am., 12.05-4 pm., Sun. 5-7 am., 10 am.-2 pm.	10.520	VLK	SYDNEY, AUSTRALIA, 28.51 m., Addr. Amalgamated Wireless of Australasia Ltd. Works England 1-6 am.	9.698	T14NRH	HEREDIA, COSTA RICA, 30.91 m., Addr. Amando C. Marin, Apartado 40. Sun. 7-8.30 am. Daily 9-10 pm.
11.715	TPA4	PARIS, FRANCE, 25.61 m., (See 15.245 mc.) 6-8.15 pm., 8.30-11 pm.	10.430	Y8G	MEDAN, SUMATRA, 28.76 m. Calls Java 5.30-6.30 am.	9.685	TGWA	GUATEMALA CITY, GUAT., 30.96 m. Irregular.
11.710	SBP	MOTALA, SWEDEN, 25.63 m., 1.20-2.05, 6-9 am., 11 am.-1 pm., Sat. 1.20-2 am., 6 am.-1.30 pm., Sun. 3 am.-1.30 pm.	10.410	PDK	KOOTWIJK, HOLLAND, 28.8 m. Works Java 7.30-9.40 am.	9.680	FZF6	FORT DE FRANCE, MARTINIQUE, 30.97 m., Addr. P. O. Box 136. 11.30 am.-12.30 pm., 6.15-7.50 pm.
11.710	YSM	SAN SALVADOR, EL SALVADOR, 25.63 m., Addr. (See 7.894 mc.) Irregular 1.30-2.30 pm.	10.410	KES	BOLINAS, CALIF., 28.8 m., Addr. RCA Communications. Irregular.	9.675	DZA	ZEESEN, GERMANY, 31.01 m., Addr. (See 10.042 mc.) Irregular.
11.700	HP5A	PANAMA CITY, PAN., 25.65 m., Addr. Radio Teatro, Apartado 954. 10 am.-10 pm.	10.370	JVO	NAZAKI, JAPAN, 28.93 m. Works TDE 3-8 am.	9.660	LRX	BUENOS AIRES, ARG., 31.06 m., Addr. El Mundo. Relays LRI, 9.30 am.-11.30 pm.
11.700	CB1170	SANTIAGO, CHILE, 25.65 m. Relays CB89 6 pm.-12 m.	10.370	EAJ43	TENERIFFE, CANARY ISLANDS, 28.93 m. Relays Salamanca, Spain. 2.15-3.15, 6.15-10 pm.	9.650	CS2WA	LISBON, PORTUGAL, 31.09 m., Addr. Radio Colonial. Tues., Thurs. and Sat. 4.30-7 pm.
			10.330	ORK	RUYSSELEDE, BELGIUM, 29.04 m. Broadcasts 1.30-3 pm. Works OPM 1-3 am., 3-5 pm.	9.650	DGU	NAUEN, GERMANY, 31.09 m., Addr. (See 20.020 mc.) Works Egypt afternoons.
			10.300	LSL2	BUENOS AIRES, ARG., 29.13 m., Addr. Cia. Internacional de Radio. Works Europe evenings.	9.645	HH3W	PORT-AU-PRINCE, HAITI, 31.1 m., Addr. P. O. Box A117. 1-2, 7-8 pm.
			10.290	DZC	ZEESEN, GERMANY, 29.16 m., Addr. (See 15.360 mc.) Irregular.	9.640	CXAB	COLONIA, URUGUAY, 31.12 m., Addr. Belgrano 1841, Buenos Aires, Argentina. Relays LR3, Buenos Aires 7 am.-12 m.
			10.260	PMN	BANDOENG, JAVA, 29.24 m. Relays YDB 5.30-10.30 or 11 am., Sat to 11.30 am.	9.635	ZRO	ROME, ITALY, 31.13 m., Addr. (See 11.810 mc.) Daily 12.30-9 pm.
			10.250	LSK3	BUENOS AIRES, ARG., 29.27 m., Addr. (See 10.310 mc.) Works Europe and U.S.A. afternoons and evenings.	9.630	HJ7ABD	BUCARAMANGA, COL., 31.14 m. 10 am.-12 n., 4-11 pm.
			10.230	CED	ANTOFAGASTAN, CHILE, 29.33 m. Tests 7-9.30 pm.	9.625	JFO	TAIHOKU, TAIWAN, 31.16 m. Relays JFAK irreg. 4-10 am.

End of Broadcast Band

(Continued on page 90)

All Schedules Eastern Standard Time

HINTS for the FACSIMILE Experimenter



Finch home-type facsimile receiver. The motor causes the stylus arm to sweep across the paper, line by line, and record the image. After each sweep the paper moves up a line automatically.

● FACSIMILE pictures are being broadcast between midnight and six a.m. in various sections of the country by some of our leading broadcast stations. While the receiving apparatus for reconstructing the facsimile pictures is not being sold to the public just yet, many experimenters no doubt would like to try their skill at picking up some of these images.

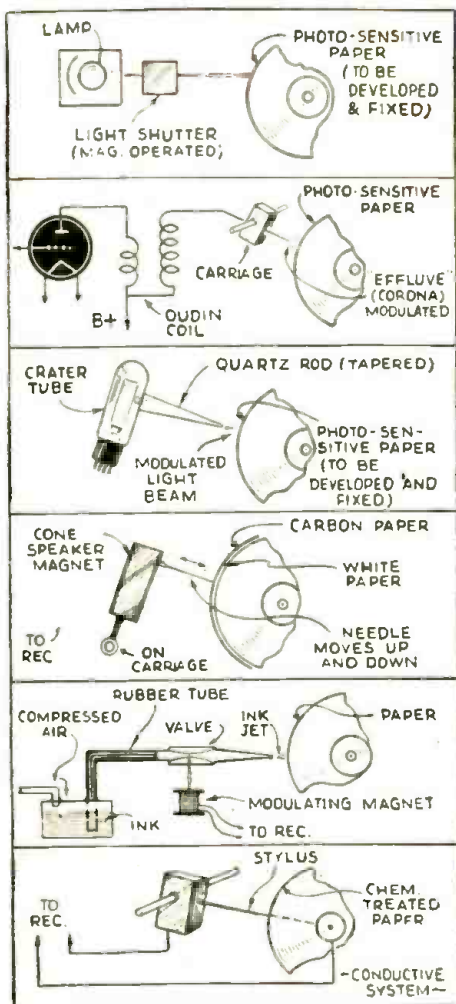
The accompanying pictures and explanations will help the experimenter who possesses a little ingenuity of his own and who may have a phonograph or other apparatus which can be pressed into service for the purpose.

As explained in the last issue, in the article on facsimile, the Finch system of recording the image utilizes a dry chemically-treated paper, through which an electric current is passed to cause a line to be registered. As the various lights and shadows are traversed by the photo-electric cell at the transmitter line by line, the modulated current in the Finch receiver causes the recorded line to vary in width. With 100 lines to the inch it is easy to see that a very excellent facsimile reproduction of a drawing or photo can thus be reproduced. One of the older methods of causing fluctuations in the voltage of the recording current was to use a moist chemically-treated paper such as litmus. The trouble with the moist paper method is that the lines tend to spread and merge into one another and the sharpness of the image is thus spoiled.

One of the simplest modern methods of recording the facsimile message is that used in the RCA system; here the vibrating stylus needle is caused to press with more or less strength against a piece of paper backed up with a carbon sheet. When the signal is strong a darker impression is left from the carbon paper and when the signal is weaker, only a slight impression is left on the paper.

One of the accompanying drawings shows several methods which have been tried and which may whet the appetite of the experimenter to the extent that he may like to try some of them.

The A.T.&T.Co. system of recording facsimile images utilizes a piece of photo-



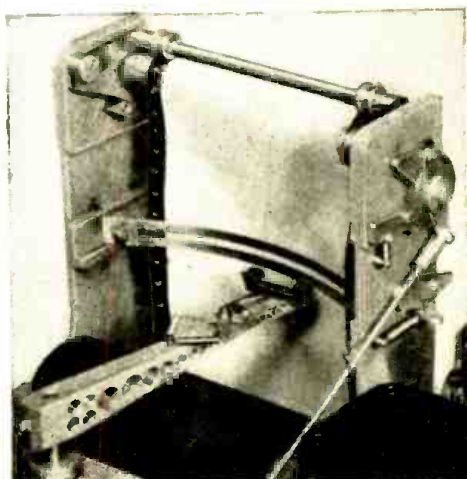
Various methods of recording the facsimile image are illustrated above. The final one, the conductive system, is employed by Finch. RCA uses the carbon-paper method.

sensitive paper. A delicate magnetically-operated light shutter or "light valve," is placed in the path of a light beam from an ordinary projection lamp. As the fluctuating facsimile current is received, the light shutter opens and closes and causes a line of fluctuating width to be recorded on the photo-sensitive paper. Either the cylinder on which the photo paper is wrapped, or else the light shutter and its projection lamp element may be moved so that as many as 100 lines to the inch are traversed. In any event, the speed of the revolving cylinder or moving paper strip must be kept

in perfect step with that at the transmitter.

About ten years ago there were several thousand facsimile machines built and interesting demonstrations given of a picture transmission system in which the image was recorded on photo-sensitive paper by modulating a high frequency corona (spark) discharge. One of the diagrams herewith shows how fluctuations in the grid and plate currents of the last stage of a radio receiver caused the high frequency discharge from an Oudin coil to be modulated. The apparatus was adjusted so that the effluvia or corona glow discharge from the end of a needle on the moving carriage, caused a line of varying width to be recorded on the rotating photo-print paper. The travelling carriage with its corona electrode (which was spaced a short distance above the surface of the photo paper) was placed in a small light-proof box. The beauty of this system lies in the fact that the Oudin coil discharge is unipolar in character and proceeds to discharge from the single wire as the diagram shows. No return circuit is required and the experimenter does not have to worry about moist paper and blurred images. The new dry processed (chemically-treated) paper such as used in the Finch system, is not yet available to the public. With this paper a regular conductive system such as shown in one of the accompanying diagrams (Continued on page 111)

Close-up of the Finch recording head. Note the curved guide over which the stylus arm sweeps. The stylus holder is shown turned sidewise. The paper rests against a curved backplate.



Mc.	Call	Location	Time
9.617	HJIABP	CARTAGENA, COL., 31.20 m., Addr. P. O. Box 37. 11 am.-1 pm., 5-11 pm., Sun. 10 am.-1 pm., 3- 6 pm.	
9.615	ZRK	KLIPHEUVAL, SOUTH AFRICA, 31.2 m., Addr. P. O. Box 4559, Johannesburg. Daily, exc. Sat. 11.45 pm.-12.40 am. Daily exc. Sun. 3.20-7.20, 9-11.40 am., Sun. 4-5.30, 8-11.40 am.	
9.607	HP5J	PANAMA CITY, PANAMA, 31.23 m., Addr. Apartado 867. 12 n. to 1.30 pm., 6-10.30 pm.	

31 Met. Broadcast Band

9.600	RAN	MOSCOW, U.S.S.R., 31.25 m. Daily 7-9.15 pm.
9.595	H8L	GENEVA, SWITZERLAND, 31.27 m., Addr. Radio Nations. Irregular.
9.590	VUD2	DELHI, INDIA, 31.28 m. Addr. All-India Radio, 8.30-10.30 pm., 1.30-3.30 am.
9.590	PCJ	HUIZEN, HOLLAND, 31.28 m., Addr. (See 15.220 mc.) Sun. 2-3, 7.15-9.25 pm., Mon. 8.15-9.45 pm., Tues. 1.45-2.40, 7-10.15 pm., Wed. 7.15-8.15 pm.
9.590	VK6ME	PERTH, W. AUSTRALIA, 31.28 m., Addr. Amalgamated Wireless of Australasia, Ltd. 6-8 am. exc. Sun.
9.590	VK2ME	SYDNEY, AUSTRALIA, 31.28 m., Addr. Amalgamated Wireless of Australasia, Ltd. 47 York St., Sun. 1-3 am., 5-9, 9.30-11.30 am.
9.590	W3XAU	PHILADELPHIA, PA., 31.28 m. Re- lays WCAU 11 am.-7 pm., 10-11 pm.
9.580	GSC	DAVENTRY, ENGLAND, 31.32 m., Addr. B. B. C., Portland Pl., London, W. 1, 9.20-11.20 pm.
9.580	VLR	MELBOURNE, AUSTRALIA, 31.32 m., Addr. Box 1686, G. P. O., Daily 3.30-8.30 am. (Sat. till 9 am.) Sun. 3-7.30 am. Daily exc. Sat. 9.35 pm.-2.15 am.
9.580	OAX5C	ICA, PERU, 31.32 m. Radio Uni- versal 6-10 pm.
9.570	KZRM	MANILA, P. I., 31.35 m., Addr. Erlanger & Galinger, Box 283, 4.30-6 pm., 5-9 am., Sun 4-10 am.
9.570	W1XK	SPRINGFIELD, MASS., 31.35 m., Addr. Westinghouse Electric & Mfg. Co. Relays WBZ 6 am. to 12 m. Sun. 7 am.-12 m.
9.570	TP811	PARIS, FRANCE, 31.35 m. Addr. (See 15.245 mc.) 1-3 am., 10.15 am.-5 pm.
9.560	DJA	BERLIN, GERMANY, 31.38 m., Addr. Broadcasting House. 12.05- 11 am., 4.50-10.45 pm.
9.550	W2XAD	SCHENECTADY, N. Y., 31.41 m., General Electric Co., 7.30 pm.- 12 m.
9.550	OLR3A	PRAGUE, CZECHOSLOVAKIA, 31.41 m. (See 11.840 mc.) 12.55- 4.40 pm.
9.550	XEFT	VERA CRUZ, MEX., 31.41 m. 11.30 am.-4 pm., 7 pm.-12 m.
9.550	YDB	SOERABAJA, JAVA, 31.41 m., Addr. N.I.R.O.M. Daily exc. Sat. 6-7.30 pm., 5.30 to 10 am. Sat. 5.30-11.30 am.
9.540	DJN	BERLIN, GERMANY, 31.45 m., Addr. (See 9.560 mc.) 12.05-10 am., 4.50-10.45 pm.
9.540	VPD2	SUVA, FIJI ISLANDS, 31.45 m., Addr. Amalgamated Wireless of Australasia, Ltd. 5.30-7 am.
9.535	JZ1	TOKYO, JAPAN, 31.46 m., Addr. (See 11.800 JZJ) 12.30-1.30 am., 2.30-4, 4.30-5.30 pm.
9.535	H89D	ZURICH, SWITZERLAND, 31.46 m., Addr. Radio Club of Zurich, Post Box Zurich 2. Sun. 9-11 am., Thur. 1-3 pm.
9.530	W2XAF	SCHENECTADY, N. Y., 31.48 m., Addr. General Electric Co. 4 pm.-12 m.
9.526	XEDQ	GUADALAJARA, GAL., MEXICO, 31.49 m. Irregular 7.30 pm. to 12.30 am.
9.526	ZBW3	HONGKONG, CHINA, 31.49 m., Addr. P. O. Box 200. 11.30 pm. to 1 am., 3-10 am.
9.525	LKJ1	JELOY, NORWAY, 31.49 m. 5-8 am.

Mc.	Call	Location	Time
9.523	ZRH	ROBERTS HEIGHTS, S. AFRICA. 31.5 m., Addr. (See ZRK, 9.606 mc.) Daily exc. Sat. 11.45 pm.- 12.45 am.; Daily exc. Sun. 5-7.30 am.; Sun. 3 or 3.30 to 4.30 or 5 am.	
9.520	HJ6ABH	ARMENIA, COLOMBIA, 31.51 m. 8-11 am., 6-10 pm.	
9.520	OZF	SKAMLEBOAEK, DENMARK, 31.51 m., Addr. Statsradiofonien, Co- penhagen., 2-6.40 pm.	
9.520	YSH	SAN SALVADOR, EL SALVADOR 31.51 m., Addr. (See 7.894 mc.) Irregular 6-10 pm.	
9.510	G5B	DAVENTRY, ENGLAND, 31.55 m., Addr. (See 9.580 mc.—G5C) 12 m.-2.15 am., 12.20-6 pm., 9.20- 11.20 pm.	
9.510	HJU	BUENAVENTURA, COLOMBIA, 31.55 m., Addr. National Rail- ways. Mon., Wed. and Fri. 8- 11 pm.	
9.500	VK3ME	MELBOURNE, AUSTRALIA, 31.58 m., Addr. Amalgamated Wireless of Australasia, 167 Queen St. Daily except Sun. 4-7 am.	
9.500	XEWV	MEXICO CITY, MEX., 31.58 m. Addr. Apart. 2516. Relays XEW. 6 pm.-12 m.	
9.500	H58PJ	BANGKOK, SIAM, 31.58 m. Thurs- day, 8-10 am.	
9.500	PRF5	RIO DE JANEIRO, BRAZ., 31.58 m. Irregularly 4.45 to 5.45 pm.	
9.488	EAR	MADRID, SPAIN, 31.6 m., Addr. (See 9.860 mc.) 7.30-8.30 pm. Mon., Tues., Thur., Sat. at 9.30 pm. also.	

— End of Broadcast Band —

9.460	ICK	TRIPOLI, N. AFRICA, 31.71 m. Works Rome, 5.30-7 am.
9.445	HCODA	GUAYAQUIL, ECUADOR, 31.77 m. Irregularly till 10.40 pm.
9.428	COCH	HAVANA, CUBA, 31.8 m., Addr. 2 B St., Vedado, 7 am.-1 am.
9.415	PLV	BANDOENG, JAVA, 31.87 m. Works Holland 5.30-9 am.
9.380	—	TANANARIVE, MADAGASCAR, 31.48 m., Addr. Le Directeur des PTT, Radio Tananarive, Adminis- tration PTT. 12.30-12.45, 3.30-4.30, 10.11 am.
9.355	HCIETC	QUITO, ECUADOR, 32.05 m., Addr. Teatro Bolivar, Thurs. un- til 9.30 p.m.
9.345	H8L	GENEVA, SWITZERLAND, 32.08 m., Addr. Radio Nations Fri. 7:15- 8:30 p.m., 6:45-8 p.m.
9.330	CGA4	DRUMMONDVILLE, CANADA, 32.15 m. Works England irreg.
9.330	OAX4J	LIMA, PERU, 32.15 m., Addr. Box 1166, "Radio Universal." 12 n.- 3 pm., 5 pm.-1 am.
9.290	HIG	CIUDAD TRUJILLO, D. R., 32.29 m. 7.10-8.40 am., 11.40 am.-2.10 pm., 3.40-8.40 pm.
9.280	HC2CW	GUAYAQUIL, ECUADOR, 32.31 m., 11.30 am.-12.30 p.m., 8-11 pm.
9.280	GCB	RUGBY, ENGLAND, 32.33 m. Works Canada and Egypt eve- nings and afternoons.
9.200	COBX	HAVANA, CUBA, 32.59 m. Addr. San Miguel 194, Altos. Relays CMBX 7 am.-12 m.
9.180	ZSR	KLIPHEUVEL, SOUTH AFRICA. 32.66 m. Phones London late afternoon.
9.170	WNA	LAWRENCEVILLE, N. J., 32.72 m. Works England evenings.
9.150	YVR	MARACAY, VENEZUELA, 32.79 m. Works with Europe afternoons.
9.125	HAT4	BUDAPEST, HUNGARY, 32.88 m., Addr. "Radiolabor," Gyalui-ut, 22. Sun. and Wed. 7-8 pm., Sat. 6-7 pm.
9.120	YCP	BALIKPAPAN, DUTCH BORNEO. 32.88 m. Phones Bandoeng 5.30- 7.30 am.
9.100	COCA	HAVANA, CUBA, 32.95 m., Addr. Galiano No. 102. Relays CMCA 9 am.-12 m.
9.060	TFK	REYKJAVIK, ICELAND, 33.11 m. Works London afternoons.
9.030	TYA2	PARIS, FRANCE, 33.2 m. Works TPZ2 near 2 am. and 4.5 pm.
9.020	COBZ	HAVANA, CUBA, 33.26 m., Radio Salas Addr. P. O. Box 866, 7:45 am.-12.10 am. Irreg. 12.30-2 am. Relays CMBZ.

Mc.	Call	Location	Time
9.020	GCS	RUGBY, ENG., 33.26 m. Works N. Y. C. evenings.	
9.010	KEJ	BOLINAS, CAL., 33.3 m. Relays NBC and CBS programs in eve- ning irregularly.	
8.967	VWY	KIRKEE, INDIA, 33.43 m. Works with England 1.30-3 am.	
8.965	COKG	SANTIAGO, CUBA, 33.44 m. Addr. Box 137. 9-10 am., 11.30 am.-1.30 pm., 3-4.30, 5-6, 10-11 pm., 12 m.-2 am.	
8.960	TPZ2	ALGIERS, ALGERIA, 33.48 m. Works TYA2, near 2 am. and 4-5 pm.	
8.841	HCJB	QUITO, ECUADOR, 33.5 m., 7-8.30 am., 11.45 am.-2.30 pm., 5-10 pm., except Mon. Sun. 12 n.- 1.30 pm., 5.30-10 pm.	
8.840	ZMBJ	S.S. AWATEA, 33.92 m. Steamer out of New Zealand. Saturday at 11 pm. Phones Australia early am. irregularly.	
8.775	PNI	MAKASSER, CELEBES, N.E.I., 34.19 m. Works Java around 4 am.	
8.765	DAF	NORDDEICH, GERMANY, 34.23 m. Works German ships irregularly.	
8.760	GCQ	RUGBY, ENG., 34.25 m. Works Africa afternoons.	
8.730	GCI	RUGBY, ENG., 34.36 m. Works India 8 am.	
8.700	HKV	BOGOTA, COLOMBIA, 34.46 m. Tues. and Fri. 7-7.20 pm.	
8.860	G8C	RUGBY, ENG., 34.56 m. Works ships irregularly.	
8.665	COJK	CAMAGUEY, CUBA, 34.64 m., Addr. Finlay No. 3 Altos. 5.30- 6.30, 8-11 pm., daily except Sat. and Sun.	
8.665	W2XGB	HICKSVILLE, N. Y., 34.64 m., Addr. Press Wireless, Mon. to Fri. News at 9 am. and 5 pm.	
8.580	YNPR	MANAGUA, NICARAGUA, 34.92 m. Radiodifusora Pilot.	
8.560	WOO	OCEAN GATE, N. J., 35.05 m. Works ships irregularly.	
8.380	IAC	PISA, ITALY, 35.8 m. Works Italian ships irregularly.	
8.185	PSK	RIO DE JANEIRO, BRAZIL, 36.65 m. Irregularly.	
8.036	CNR	RABAT, MOROCCO, 37.33 m. Works Paris irreg. in afternoons.	
7.901	LSL	BUENOS AIRES, ARGENTINA, 37.97 m. Works Brazil at night.	
7.894	YSD	SAN SALVADOR, EL SALVADOR, 37.99 m., Addr. Dir. Genl. Tel. & Tel. 7-11 pm.	
7.870	HCIRB	QUITO, ECUADOR, 38.1 m. La Voz de Quito. 9-11 pm.	
7.860	SUX	ABOU ZABAL, EGYPT, 38.17 m. Works with Europe, 4-6 pm.	
7.854	HC2JSB	GUAYAQUIL, ECUADOR, 38.2 m. Evenings to 11 pm.	
7.797	HBP	GENEVA, SWITZERLAND, 38.48 m., Addr. Radio-Nations. Sat. 5.30- 6.30 pm.	
7.780	PSZ	RIO DE JANEIRO, BRAZIL, 38.54 m. Phones 6-11 pm. irregularly.	
7.715	KEE	BOLINAS, CAL., 38.89 m. Relays NBC and CBS programs in eve- ning irregularly.	
7.680	YBZ	MENADO, CELEBES, N.E.I. 39.04 m. Phones PNI and Bandoeng. 5.30-7 am.	
7.626	RIM	TACHKENT, U.S.S.R., 39.34 m. Works with Moscow in early morning.	
7.610	KWX	DIXON, CAL., 39.42 m. Works with Hawaii, Philippines, Java and Japan, nights.	
7.560	FZE9	DJIBOUTI, FRENCH SOMALI- LAND. 39.66 m. Phones Paris early am.	
7.540	RK1	MOSCOW, U.S.S.R., 39.76 m. Re- lays RAN 7-9.15 pm. Works RIM early am.	
7.520	KKH	KAHUKU, HAWAII, 39.87 m. Works with Dixon and broadcasts irregularly nights.	
7.510	JVP	NAZAKI, JAPAN, 39.95 m. Irreg.	
7.410	HCJ84	QUITO, ECUADOR, 40.46 m., 7- 9.30 pm. irregularly.	
7.390	ZLT2	WELLINGTON, N. Z., 40.6 m. Works with VLZ near 4 am.	
7.380	XECR	MEXICO CITY, MEX., 40.65 m., Addr. Foreign Office. Sun. 6-7 pm.	
7.220	HKE	BOGOTA, COL., S. A., 41.55 m. Tues. and Sat. 8-9 pm. Mon. and Thurs. 6.30-7 pm.	

(Continued on page 92)

Mc.	Call	Station	Time
7.200	YNAM	MANAGUA, NICARAGUA, 41.67 m. Irregular at 9 pm.	
7.177	CR6AA	LOBITA, ANGOLA, PORT. WEST AFRICA. 41.75 m. Wednesday and Saturday 2.45-4.30 pm.	
7.100	FO8AA	PAPEETE, TAHITI, 42.25 m., Addr. Radio Club Oceanien. Tues. and Fri. 11 pm.-12.30 am.	
7.100	—	GUADALAJARA, JALISCO, MEX., 42.25 m., Addr. Madero 210, La Radiodifusora del Pueblo. 9-11 pm.	
7.088	PIIJ	DORDRECHT, HOLLAND, 42.3 m., Addr. Dr. M. Hellingman, Technical College. Sat. 11.10-11.50 am.	
6.990	XEME	MERIDA, YUCATAN, 42.89 m., Addr. Calle 59, No. 517, "La Voz de Yucatan desde Merida." Irregular.	
6.980	KZGG	CEBU ISLAND, P. I., 42.95 m. Phones Manila near 4 am.	
6.977	XBA	TACUBAYA, D. F., MEX., 43 m. 9.30 am.-1 pm., 7-8.30 pm.	
6.905	GDS	RUGBY, ENG., 43.45 m. Works N.Y.C. evenings irregularly.	
6.860	KEL	BOLINAS, CALIF., 43.70 m. Tests irregularly, 11 am.-12 n., 6-9 pm.	
6.805	HI7P	CIUDAD TRUJILLO, DOM. REP., 44.06 m., Addr. Emisoría Diaria de Comercio. Daily exc. Sat. and Sun. 12.40-1.40, 6.40-8.40 pm. Sat. 12.40-1.40 pm. Sun. 10.40 am.-11.40 am.	
6.790	PZH	PARAMIRABO, DUTCH GUIANA, 44.16 m., Addr. P. O. Box 18. Daily 6.06-8.36 am., Sun. 9.36-11.36 am. Daily 5.36-8.36 pm.	
6.775	HIH	SAN PEDRO DE MACORIS, DOM. REP., 44.26 m. 12.10-1.40 pm., 7:30-9 pm. Sun. 3-4 am., 4:15-6 pm., 4:40-7.40 pm.	
6.755	WOA	LAWRENCEVILLE, N. J., 44.41 m., Addr. A.T.&T. Co. Works Eng. evenings.	
6.750	JVT	NAZAKI, JAPAN, 44.44 m., Addr. Kokusai-Denwa Kaisha, Ltd., Tokyo. Irregular.	
6.730	HI3C	LA ROMANA, DOM. REP., 44.58 m., Addr. "La Voz de la Feria." 12.30-2 pm., 5-6 pm.	
6.720	PMH	BANDOENG, JAVA, 44.64 m. Relays NIROM programs. 5.30-9 am.	
6.690	TIEP	SAN JOSE, COSTA RICA, 44.82 m., Addr. Apartado 257, La Voz del Tropico. Daily 7-10 pm.	
6.672	—	44.94 m., relays Salamanca, Spain, evenings.	
6.672	YVQ	MARACAY, VENEZUELA, 44.95 m. Irregular.	
6.650	IAC	PISA, ITALY, 45.11 m. Works ships irregularly.	
6.635	HC2RL	GUAYAQUIL, ECUADOR, S. A., 45.18 m., Addr. P. O. Box 759. Sun. 5.45-7.45 pm., Tues. 9.15-11.15 pm.	
6.630	HIT	CIUDAD TRUJILLO, D. R., 45.25 m., Addr. "La Voz de la RCA Victor." Apartado 1105. Daily exc. Sun. 12.10-1.40 pm., 5.40-8.40 pm.; also Sat. 10.40 pm.-12.40 am.	
6.625	PRADO	RIOBAMBA, ECUADOR, 45.28 m. Thurs. 9-11.45 pm.	
6.558	HI4D	CIUDAD TRUJILLO, D. R., 45.74 m. Except Sun. 11.55 am.-1.40 pm.	
6.550	X8C	VERA CRUZ, MEX., 45.8 m. 8.15-9 am.	
6.550	TIRCC	SAN JOSE, COSTA RICA, 45.8 m., Addr. Radioemisora Católica Costarricense. Sun. 11 am.-2 pm., 6-7, 8-9 pm. Daily 12 n.-2 pm., 6-7 pm., Thurs. 6-11 pm.	
6.545	YV6RB	BOLIVAR, VENEZUELA, 45.84 m., Addr. "Ecos de Orinoco." 6-10.30 pm.	
6.520	YV4RB	VALENCIA, VENEZUELA, 45.98 m. 11 am.-2 pm., 5-10 pm.	
6.516	YNIGG	MANAGUA, NICARAGUA, 46.02 m., Addr. "La Voz de los Lagos." 8-9 pm.	
6.500	HIL	CIUDAD TRUJILLO, D. R., 46.13 m., Addr. Apartado 623. 12.10-1.40 pm., 5.40-7.40 pm.	
6.490	HIIL	SANTIAGO DE LOS CABALLEROS, D. R., 46.2 m., Addr. Pres., Trujillo 97, Altos. 5.40-7 pm.	
6.470	YNLAT	GRANADA, NICARAGUA, 46.36 m., Addr. Leonidas Tenorio, "La Voz del Mombacho." Irregular.	
6.465	YV3RD	BARQUISIMETO, VENEZUELA, 46.37 m. Radio Barquisimeto, irregular.	

Mc.	Call	Station	Time
6.450	HI4V	SAN FRANCISCO DE MACORIS, D. R., 46.48 m. 11.40 am.-1.40 pm., 5.10-9.40 pm.	
6.440	TGQA	QUEZALTENANGO, GUATEMALA, 46.56 m. Mon.-Fri. 9-11 pm., Sat. 9 pm.-1 am., Sun. 1-3 pm.	
6.420	HIIS	SANTIAGO, D. R., 46.73 m. 11.40 am.-1.40 pm., 5.40-7.40, 9.40-11.40 pm.	
6.416	YV6RC	BOLIVAR, VENEZUELA, 46.73 m. Radio Bolivar.	
6.410	TIPG	SAN JOSE, COSTA RICA, 46.8 m., Addr. Apartado 225, "La Voz de la Victor." 12 n.-2 pm., 6-11.30 pm.	
6.400	YVSRH	CARACAS, VENEZUELA, 46.88 m. 7-11 pm.	
6.388	HI8J	LAS VEGAS, D. R., 46.92 m., Irreg.	
6.384	VP2LO	STE. KITTS, B.W.I. 46.96 m. ICA Service Labs, Box 88, Daily 4-4.45 pm., Sun. 10-10.45 am. and irreg. at other times.	
6.380	YVSRF	CARACAS, VENEZUELA, 46.92 m., Addr. Box 983. 6-10.30 pm.	
6.370	TI8WS	PUNTARENAS, COSTA RICA, 47.07 m., Addr. "Ecos Del Pacifico", P. O. Box 75. 6 pm.-12 m.	
6.365	YVIRH	MARACAIBO, VENEZUELA, 47.18 m., Addr. "Ondas Del Lago." Apartado de Correos 261. 6-7.30 am., 11 am.-2 pm., 5-11 pm.	
6.360	HRPI	SAN PEDRO SULA, HONDURAS, 47.19 m. 7.30-9.30 pm.	
6.350	JZG	NAZAKI, JAPAN, 47.22 m. Relays Tokyo 5-7.30 am. irreg. Phones ships early am.	
6.340	HIIX	CIUDAD TRUJILLO, D. R., 47.32 m. Sun. 7.40-10.40 am., daily 12.10-1.10 pm., Tues. and Fri. 8.10-10.10 pm.	
6.335	OAXIA	ICA, PERU, 47.33 m., Addr. La Voz de Chiclayo, Casilla No. 9. 8-11 pm.	
6.324	COCW	HAYANA, CUBA, 47.4 m., Addr. La Voz de las Antillas, P. O. Box 130. 6.55 am.-1 am. Sun. 10 am.-10 pm.	
6.310	HIZ	CIUDAD TRUJILLO, D. R., 47.52 m. Daily except Sat. and Sun. 11.10 am.-2.25 pm., 5.10-8.40 pm. Sat. 5.10-11.10 pm. Sun. 11.40 am.-1.40 pm.	
6.300	YV4RD	MARACAY, VENEZUELA, 47.62 m. 6.30-9.30 pm. exc. Sun.	
6.295	OAX4G	LIMA, PERU, 47.63 m., Addr. Apartado 1242, Daily 7-10.30 pm.	
6.290	HIG	TRUJILLO CITY, D. R., 47.67 m. 7.10-8.40 am., 11.40 am.-2.10 pm., 3.40-8.40 pm.	
6.280	COH8	SANCTI SPIRITUS, CUBA, 47.77 m., Addr. P. O. Box 85. 9-11.30 am., 12.30-1.30, 4-7, 8-11 pm.	
6.270	YV5RP	CARACAS, VENEZUELA, 47.79 m., Addr. "La Voz de la Philco." Daily to 10.30 pm.	
6.255	YV5RJ	CARACAS, VENEZUELA, 47.18 m.	
6.243	HIN	CIUDAD TRUJILLO, D. R., 48 m., Addr. "La Voz del Partido Dominicano." 12 n.-2 pm., 6-10 pm.	
6.235	HRD	LA CEIBA, HONDURAS, 48.12 m., Addr. "La Voz de Atlantida." 8-11 pm.; Sat. 8 pm.-1 am.; Sun. 4-6 pm.	
6.225	YVIRG	VALERA, VENEZUELA, 48.15 m. 6-9.30 pm.	
6.220	—	SAIGON, INDO-CHINA, 48.2 m., Addr. Radio Philco. 4.30 or 5.30-9.30 am.	
6.210	TG2	GUATEMALA CITY, GUAT., 48.28 m., Addr. Dir. Genl. of Electr. Commun. Relays TGI Mon.-Fri. 6-11 pm., Sat. 6 pm.-1 am. Sun. 7-11 am., 3-8 pm.	
6.205	YV5RI	CORO, VENEZUELA, 48.32 m., Addr. Roger Leyba, care A. Urbina y Cia. Irregular.	
6.200	HI8Q	CIUDAD TRUJILLO, D. R., 48.36 m. Irregular.	
6.200	ZGE	KUALA LUMPUR, FED. MALAY ST., 48.36 m. Sun., Tue. and Fri. 6.40-8.40 am.	
6.185	HIIA	SANTIAGO, D. R., 48.5 m., Addr. P. O. Box 423, 7 am.-5 pm.	
6.171	XEXA	MEXICO CITY, MEX., 48.61 m., Addr. Dept. of Education. 7-11 pm.	
6.156	YV5RD	CARACAS, VENEZUELA, 48.71 m. 11 am.-2 pm., 4-10.40 pm.	
6.153	HISN	MOCA CITY, D. R., 48.75 m. 6.40-9.10 pm.	

49 Met. Broadcast Band

Mc.	Call	Station	Time
6.150	ZRD	DURBAN, SOUTH AFRICA, 48.78 m., Addr. (See ZRK, 9.606 mc.) Daily exc. Sat. 11.45 pm.-12.45 am.; Daily exc. Sun. 3.30-7.30 am., 9 am.-3.45 pm.; Sun. 8-11.30 am., 12 n.-3.20 pm.	
6.150	CJRO	WINNIPEG, MAN., CANADA, 48.78 m., Addr. (See 11.720 mc.) Daily 6 pm.-12 m., Sun. 5-10 pm.	
6.150	ZP14	VILLARRICA, PARAGUAY, 48.75 m. 5-6 pm.	
6.147	ZEB	BULAWAYO, RHODESIA, S. AFRICA, 48.8 m. Mon., Wed. and Fri. 1.15-3.15 pm.; Tues. 11 am.-12 n.; Thurs. 10 am.-12 n. Sun. 3.30-5 am.	
6.145	HJ4ABE	MEDELLIN, COL., 48.79 m. 11 am.-12 n., 6-10.30 pm.	
6.140	W8XK	PITTSBURGH, PA., 48.86 m., Addr. Westinghouse Electric & Mfg. Co. Relays KDKA 11 pm.-12 m.	
6.137	CR7AA	LAURENCO MARQUES, PORT. E. AFRICA, 48.87 m. Daily 12.05-1, 4.30-6.30, 9.30-11 am., 12.05-4 pm., Sun. 5-7 am., 10 am.-2 pm.	
6.130	VP3BG	GEORGETOWN, BRIT. GUIANA, 48.94 m. From 5 pm. on.	
6.130	COCD	HAYANA, CUBA, 48.94 m., Addr. Box 2294. Relays CMCD 7 am.-1 am.	
6.130	VE9HX	HALIFAX, N. S., CAN., 48.94 m., Addr. P. O. Box 998. Mon.-Fri. 7 am.-11.15 pm., Sat. 11 am.-11 pm., Sun. 12 n.-11.15 pm. Relays CHNS.	
6.130	LKL	JELOY, NORWAY, 48.94 m. 11 am.-6 pm.	
6.125	CXA4	MONTEVIDEO, URUGUAY, 48.98 m., Addr. Radio Electrico de Montevideo., Mercedes 823. 10 am.-12 n., 2-8 pm.	
6.122	HP5H	PANAMA CITY, PAN., 49 m., Addr. Box 58. 12 n.-1 pm., 8-10 pm.	
6.120	W2XE	NEW YORK CITY, 49.02 m., Addr. Col. B'cast. System, 485 Madison Ave. 10-11 pm.	
6.117	XEUZ	MEXICO CITY, MEX., 49.03 m., Addr. 5 de Mayo 21. Relays XEFO 1-3 am.	
6.115	HJ3ABX	BOGOTA, COL., 49.05 m., Addr. La Voz de Col., Apartado 2665. 12 n.-2 pm., 5.30-11 pm.; Sun. 6-11 pm.	
6.115	OLR2C	PRAGUE, CZECHOSLOVAKIA, 49.05 m. (See 11.40 mc.)	
6.110	XEPW	MEXICO CITY, MEX., 49.1 m., Addr. La Voz de Aguila Azteca desde Mex., Apartado 8403. Relays XEJW 11 pm.-1 am.	
6.110	VUC	CALCUTTA, INDIA, 49.1 m. Daily 2.06-4.36 am., 7.06 am.-12.06 pm., Sat. 10.06 pm.-2.06 am., Sun. 7.06 am.-12.36 pm.	
6.110	VP8	COLOMBO, CEYLON, 49.1 m. Daily 7-9.30 am., Sun. 6.30-9.30 am.	
6.108	HJ6A88	MANIZALES, COL., 49.14 m., Addr. P. O. Box 175. Mon.-Fri. 12.15-1 pm.; Tue. and Fri. 7.30-10 pm.; Sun. 2.30-5 pm.	
6.100	YUA	BELGRADE, JUGOSLAVIA, 49.18 m. 12.45-2.30, 4-8 am., 1-6 pm.	
6.100	W3XAL	BOUND BROOK, N. J., 49.18 m., Addr. Natl. Broad. Co. 8.25 pm.-12 m.	
6.100	W9XF	CHICAGO, ILL., 49.18 m., Addr. N.B.C. 4-6.50 pm., 1.05-2 am. Sun. 1-5.50 pm.	
6.097	ZRK	KLIPHEUVEL, S. AFRICA, 49.2 m., Daily 12 n.-4 pm., Sun. 12 n.-3.20 pm.	
6.097	ZRJ	JOHANNESBURG, S. AFRICA, 49.2 m., Addr. African Broad. Co. Daily exc. Sat. 11.45 pm.-12.40 am.; Daily exc. Sun. 3.15-7.30, 9-11.30 am.	
6.095	JZH	TOKYO, JAPAN, 49.22 m., Addr. (See 11.800 mc., JZJ.) Irregular.	
6.090	CRCX	TORONTO, CAN., 49.26 m., Addr. Can. Broadcasting Corp. Daily 7.45 am.-5 pm., Sun. 10.30 am.-12 n.	
6.090	ZBW2	HONGKONG, CHINA, 49.26 m., Addr. P. O. Box 200. Irregular.	
6.085	HJ5ABD	CALI, COLOMBIA, 49.3 m., Addr. La Voz de Valle. 12 n.-1.30 pm., 5.10-9.40 pm.	

(Continued on page 123)

1-Tube Duplex— A Sure-fire Beginner's Receiver

One tube acts as detector and audio amplifier in this set. Band-switch and dry cell operation are features.

● SHORT-WAVE receivers for the beginner have generally used plug-in coils rather than a system of coil-switching. The reasons for this were twofold: it was simpler to wire up only a coil socket and where several coils are close together, only one of which is in use, *dead-spots* caused by absorption appear on the tuning control. The latter is the more important. Recently, however, a special coil-shortening switch has been made available to the home constructor. This switch *shorts out* the unused lower frequency coils. When the lowest frequency coil is being used none of the other coils are shorted out. As higher frequency bands are switched in, the lower frequency coils are successively *shorted*, thus reducing absorption effects caused by the lower frequency coils. Around this switch has been built a rather novel one-tube receiver.

1 Tube Does 2 Things

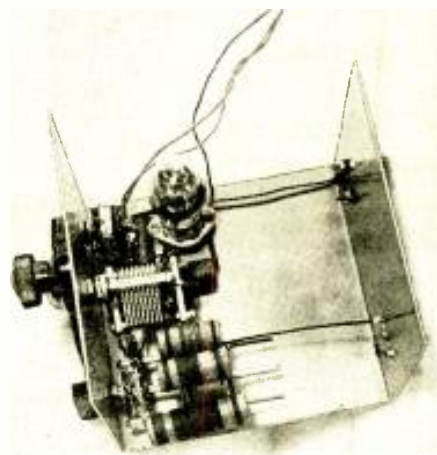
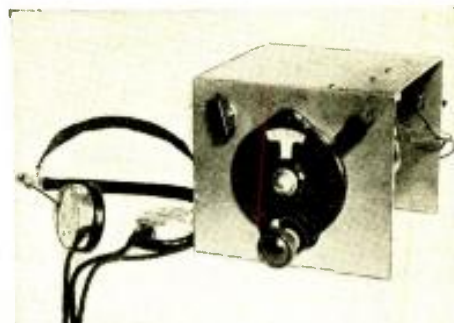
Only one tube is used, but this is a 1E7G, one of the newer 2 volt tubes. This tube is a dual pentode type. One section is used as a *regenerative detector* and the other section as a stage of resistance-coupled *audio amplification*. The detector is the old standby. Regeneration is controlled by a 50,000 ohm potentiometer, giving very smooth control.

In order to make construction as simple as possible, the front panel, rear panel and top was made of a single piece of aluminum.

This was bent to form a "U" shape as shown in the drawing.

The heart of the receiver is the special band-switch. A three-gang switch was used, switching one side each of the antenna coil, the grid coil and the tickler coil. The three windings of each band are all wound on one form. Three bands are used, giving a wavelength range of 180 meters to 25 meters. Although only one side of each coil is being switched, it is necessary to bring the common or unswitched terminal of each coil back to the switch. A separate terminal is provided on each deck for this connection, enabling the unused lower frequency coils to be *shorted out*. The adjustable stop on the switch should be set for only three positions. All three coils are wound on three-quarter inch bakelite tubing with number 30 d.s.c. wire. With one exception all coils are close wound. The highest frequency grid coil is space-wound to occupy $\frac{5}{8}$ inch. The tickler coils are spaced $\frac{1}{8}$ inch from the grid coils. The antenna coils are spaced $\frac{3}{16}$ inch from the grid coil. Coil sizes and connections are given in Fig. 3. All coils should be wound in the *same* direction.

Three pieces of No. 12 bus-bar were bent in a semi-circular shape and each fastened between the common shorting terminal of each deck and an unused terminal on the deck. The coils are then placed on these buses and the common connections soldered to the bus, drawing these leads taut; the



Front and rear of unique 1-tuber.

other ends of the coils are soldered to the switch terminals. Perhaps a better method would be to rivet tiny eyelets to the coil form, fastening the coil ends thereto and using small lengths of bus-bar as rigid connectors between the coil and switch.

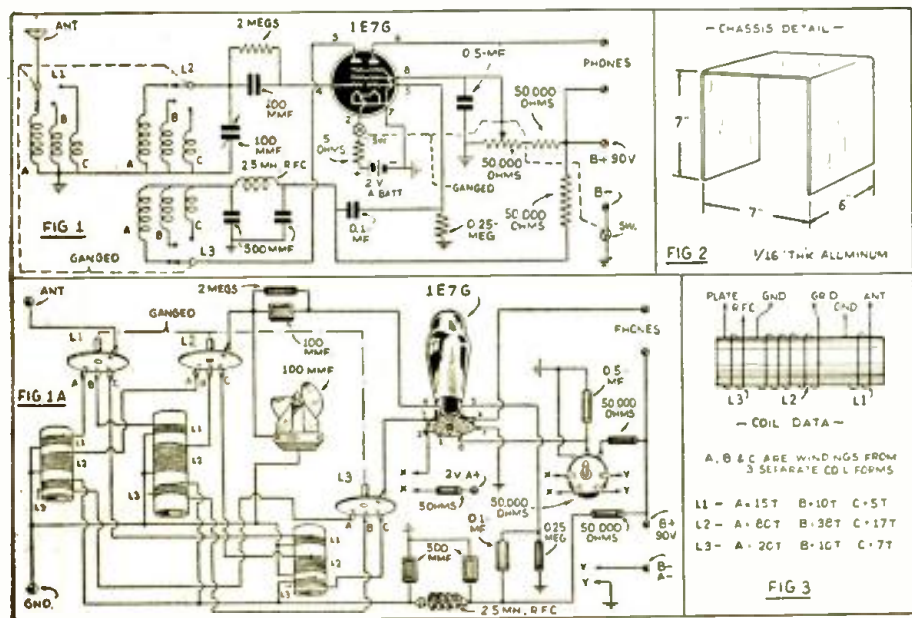
For all-around work, a single-wire antenna about 100 feet long will give the best results. A number of *foreign* broadcasting stations were received with good volume, besides numerous amateur CW-telegraph and phone stations. Careful handling and skill, acquired with just a little practice, should enable anyone to get the same results. Tuning is comparatively simple, there being only one tuning control. The regeneration control in the upper right hand corner has a double-pole switch incorporated in it, thus allowing both "A" and "B" batteries to be disconnected when the receiver is not in use. The regeneration direction is advanced in a clockwise direction until a faint plop is heard in the phones. This indicates that the receiver is oscillating. As the tuning control is varied, squeals will be heard, indicating that a station is being tuned in. Turn the regeneration control counter-clockwise slightly so that the detector stops oscillating and the station, if phone, will be heard clearly. If the station is a CW-telegraph station, the detector must be kept oscillating.

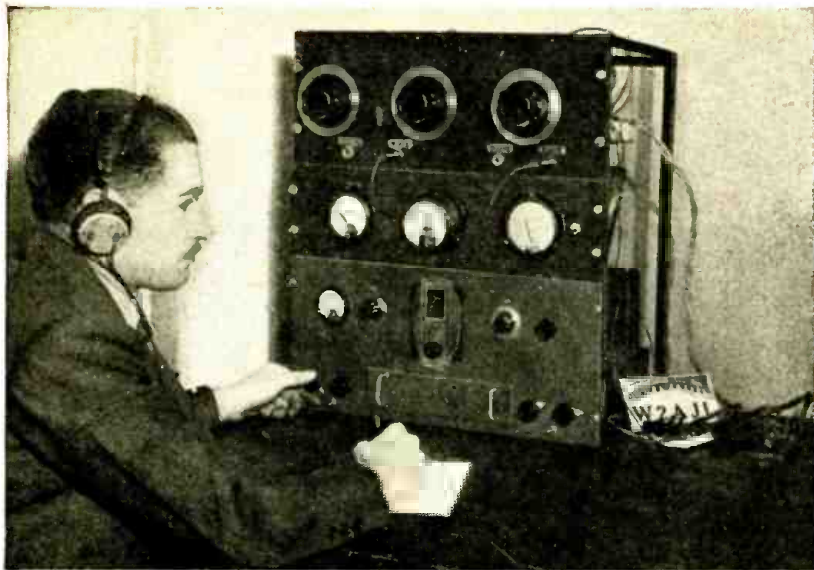
Connections to the batteries are by means of flexible leads. There is sufficient space at the back of the receiver to house the "A" and "B" batteries, thus making the receiver quite portable. For optimum results 90 volts of "B" battery should be used, although 45 volts can be used with a little loss in volume.

Although no regular band-spread has been incorporated, the excellent vernier dial provides ease in tuning. As a protection

(Continued on page 112)

Hook-up for 1-tube receiver.





Presenting Herman Yellin in person at the controls of his de luxe superhet receiver. Actual tests have shown that this set delivers the goods, not only for high selectivity and comfortable band-spread, but also for fine DX!

Herman Yellin, W2AJL

The 2AJL

Flexible Design

● IN recent years the amateur bands have become so crowded that it is hopeless to attempt to consistently pull in distant stations with the ordinary type of short-wave receiver. The necessity for a more efficient and effective receiver has given birth to the communications type of receiver. Many such receivers have been described in magazines and numerous others have been offered to the public by radio companies specializing in this field. Lately the writer decided that a new receiver was a necessity, if it was desired to continue amateur operation. Because it was considered more in keeping with amateur traditions to construct one than to buy one ready made, plans were at once started for a communications receiver that would gibe with our own ideas on the subject.

Features of the Receiver

Our model would have a stage of R.F. with provision for using either a doublet antenna or a single wire antenna. The high frequency oscillator would be a 6J7 as an electron coupled oscillator injected into the No. 3 grid of a 6L7 first detector tube. A quartz crystal filter would of necessity be used in the I.F. stage. This then calls for the use of two stages of I.F. and since more gain than is ordinarily available was desired, it was decided to use one iron core transformer, the others being regular air core units. All iron core units would undoubtedly have given enough gain to make the I.F. amplifier too critical. The transformers would be air tuned for greater stability of course. Another *must* is a noise limiter and this was to be of the new simplified type using a single 6H6 tube as second detector, AVC and noise limiter; all in one small envelope. Besides a separate beat frequency oscillator using a 6J7, and a 6C5 first audio, it was decided to use a 6N6 second audio stage. This allows loudspeaker operation on even the weakest signals. Provision was to be made for using either a magnetic speaker or a dynamic speaker. An "R" meter was also incorporated. This operates through the AVC, recording the strength of signals and facilitating the tuning in of phone signals. The receiver was to be mounted on a standard metal chassis 17" x 11" x 3" with a grey rack panel 8 3/4" high.

As to results, well, it completely came up to our expectations. In the recent ARRL DX contest, despite the terrific interference from American stations, numerous foreign stations were heard and could be easily copied. This is due to the receiver's extreme selectivity and sensitivity. Although no quantitative measurements were made, in the opinion of a number of visitors to the shack, the receiver was the equal, if not the superior of many commercially built communications receivers.

3 Plug-in Coils Handled as a Unit

Unquestionably plug-in coils are more efficient than any type of coil switching available to the home con-

structor. This fact and the remembrance of the length of time necessary to change three coils and replace their shields when changing from one band to another determined the type of coil changing. This was to have the coils plug-in from the front panel and the three coils ganged together so that they could be handled as a unit. A description of this system will be found later on in this article.

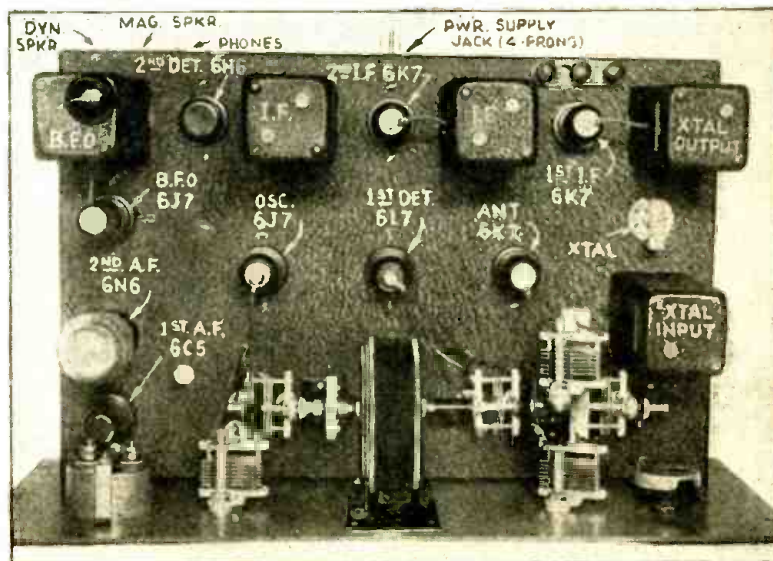
The method of band-spreading is not new, having been used many times before. It consists of 100 mmf.

band-setting condensers (C2, C8, C32) across each tuning coil and 35 mmf. tuning condensers (C1, C7, C31) across a part of each coil. This provides excellent band spread, the 14 mc. band covering 70 percent of the condenser rotation. The three tuning condensers are ganged and controlled by one vernier dial. The oscillator band-setting condenser is controlled from the panel, while the Detector and R.F. stage band-setting condensers are ganged together. In practice, the oscillator band setter is set so that the desired frequency range can be handled by the main tuning condenser after the R.F. and detector ganged band-setting condensers are brought into resonance with the oscillator control. This is indicated by maximum signal or a maximum rushing noise in the output. A little practice and experience will soon make one quite adept. If the constructor is interested only in the amateur bands and is indifferent to the intervening frequencies, air padding condensers can be placed in each coil. These condensers will replace the band-setting condensers on the panel. They should be set so that each band occupies the center portion of the tuning dial scale with a little extra dial scale at each end of the band. This makes band-changing quite simple and very rapid, besides simplifying construction.

Crystal Filter Optional

Incidentally, if one does not care for a quartz crystal I.F. filter, it can be omitted, at the same time omitting one of the I.F. stages. In this case, it will be well to use all iron core I.F. transformers. For the strictly phone man or the SWL, the receiver

Top view of the superhet receiver with beat frequency oscillator built in.



Fans and Hams alike will be pleased with this very flexible superhet design. It may be built with as low as seven tubes if the beat oscillator and crystal filter are dispensed with.

Superhet Receiver

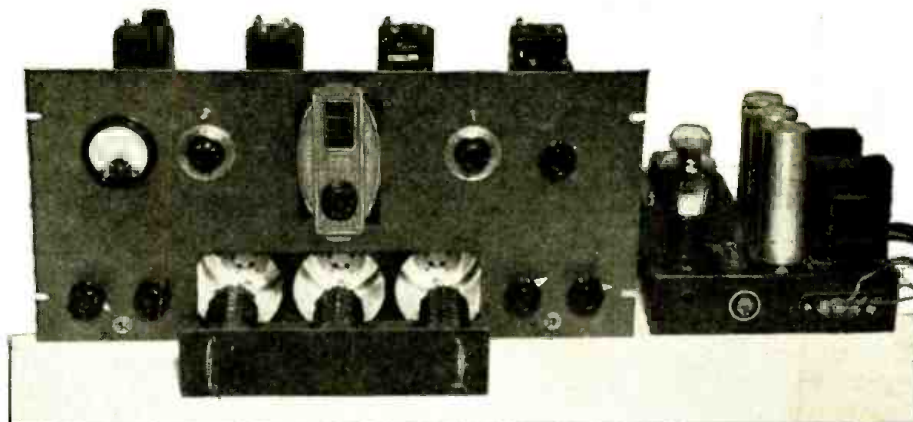
Permits Building Set with 7 to 9 Tubes

could do without the beat-frequency oscillator, although its inclusion will facilitate locating distant stations. More than sufficient volume is available with only the 6C5 audio stage, so if loudspeaker volume is not required the 6N6 can be omitted, too. In fact, most stations can be heard on a small loudspeaker connected in the 6C5 plate circuit. After reading these generalities, the reader will probably be interested in the constructional details.

Coil Assembly

To start with, the most important, and probably the most interesting, section is the coil assembly unit. As mentioned before, the R.F. detector and oscillator coils for each frequency range are plugged in simultaneously from the front of the panel. As can be seen in the photos, there are three coil shields, $3\frac{3}{4}$ " high by 3" in diameter, mounted inside the chassis, with their openings at the front of the chassis. On the front of the chassis there are three $2\frac{1}{2}$ " holes, behind which these coil shields are mounted. The three shields are bolted together with one-quarter inch spacers between them and the three shield unit mounted on the chassis. This makes a very rigid assembly. A five-prong isolantite socket is mounted inside each shield. Use the $\frac{9}{16}$ " brass spacers that come with the sockets. The leads from these sockets are passed through small holes drilled in the shields. Use either very small grommets or protect the wire insulation with pieces of spaghetti where it passes through the holes. In order for the coils to be plugged into the coil sockets, it will be necessary to cut a rectangular hole in the panel. This opening should be $2\frac{5}{16}$ " by 9". This is not very difficult. First mark out the $9" \times 2\frac{5}{16}"$ opening, placing it in the lower center of the panel, coinciding, of course, with the $2\frac{1}{2}"$ holes in the chassis. Now drill a series of small holes inside the opening so that there is about $\frac{1}{16}$ " clearance between the holes and the future opening. Using a cold chisel or fine saw cut out this opening along the holes. The final step consists of filing out the surplus metal so that the rectangular opening is of the required size.

The method of fastening the coils to the coil-holder is both simple and effective. Procure some round wooden plugs, $1\frac{1}{2}"$ in diameter and about $\frac{3}{4}"$ long. Place one in each completed coil form so that the top of this plug is flush with the top of the coil form. Three small

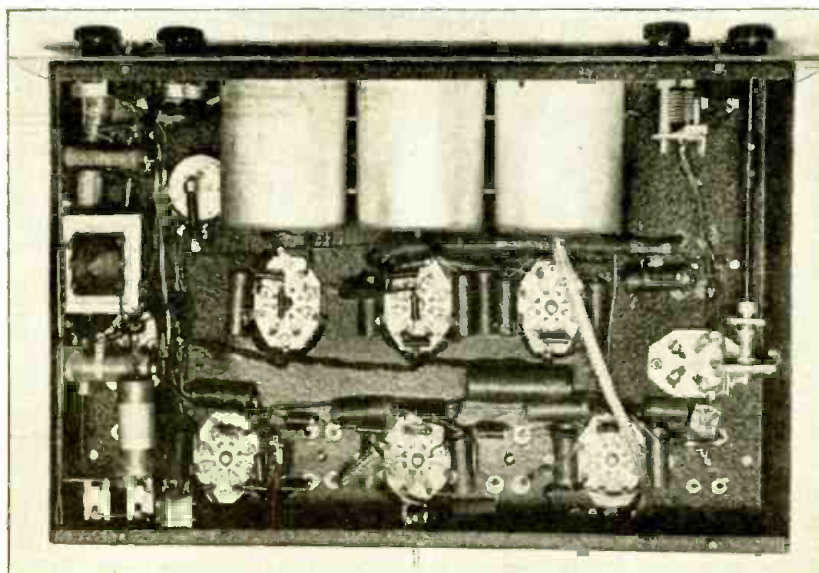


Mr. Yellin's superhet viewed from the front. "R" meter at left and main tuning dial at top center. Ganged plug-in coil is shown about to be placed in position. Power-supply unit appears at extreme right.

wood screws are used to hold the plug firmly in the coil form. The set of 3 coils is then placed in the coil sockets. The rectangular coil-holder, $9" \times 2\frac{5}{16}"$, when placed in the panel opening, will just touch the top of the coil plugs. It previously should have been determined approximately where the plugs will touch the coil-holder and then, opposite each coil plug, 3 small holes are drilled in the coil-holder. Now, with the coils in their sockets and the holder placed over the panel opening, small guide holes are drilled in the coil plugs and the coil-holder fastened down to the plugs with small No. 4 wood screws. Either special handles or small round drawer pulls should be placed at each end of the coil-holder. Figure 2 gives the dimensions for the handles used by us. If desired, a small graph chart can be placed on each coil-holder to carry the coil calibration. This gives the receiver quite a professional look.

As can be seen in the photos, the R.F., Detector and high frequency Oscillator tube sockets are mounted right in back of the three coil shields. This makes the coil leads very short, a necessity for successful ten-meter operation. The tuning condensers are ganged together and mounted on the chassis above the coil shields. The shafts

Bottom view of the receiver showing the three coil shields.

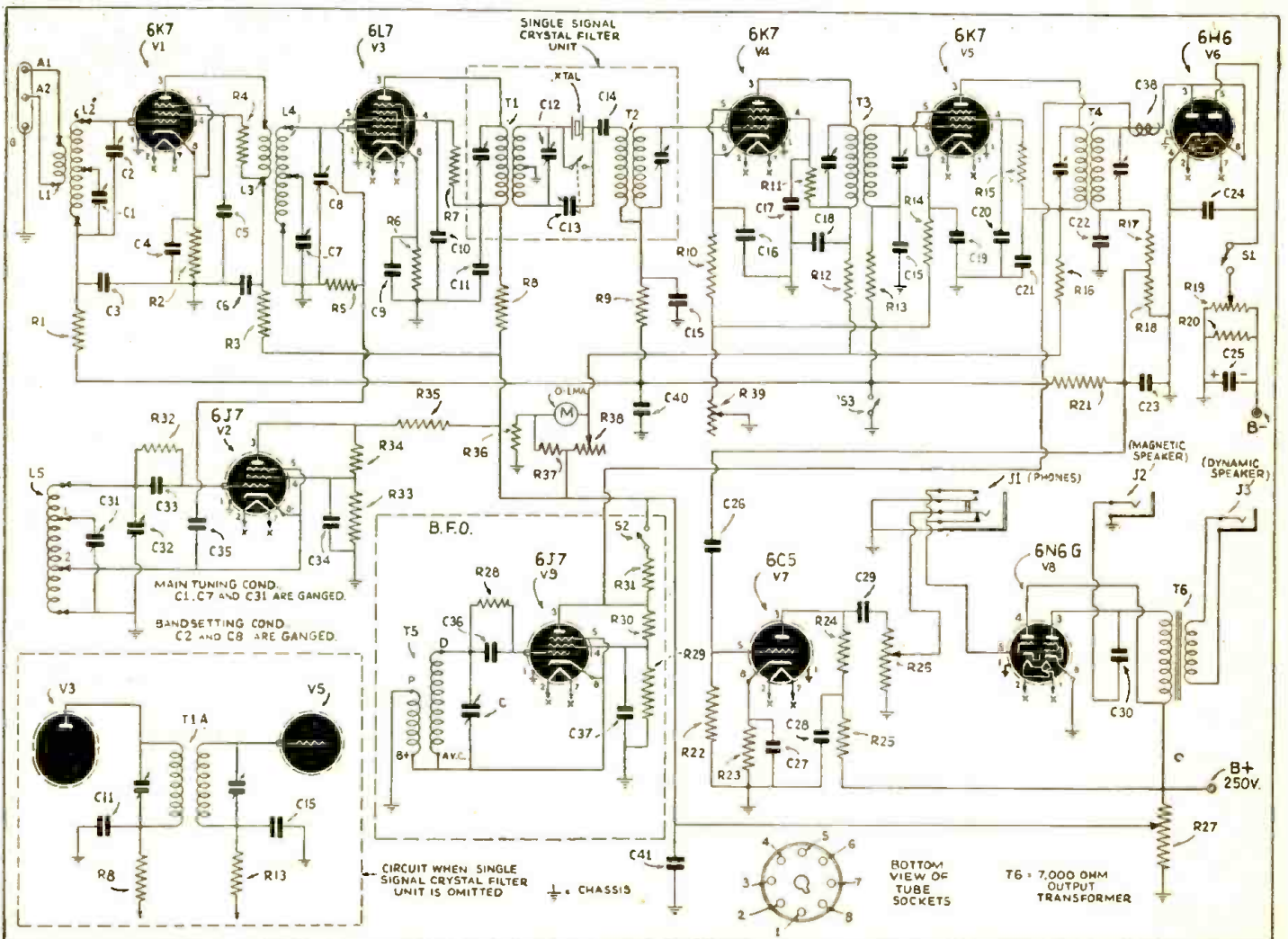
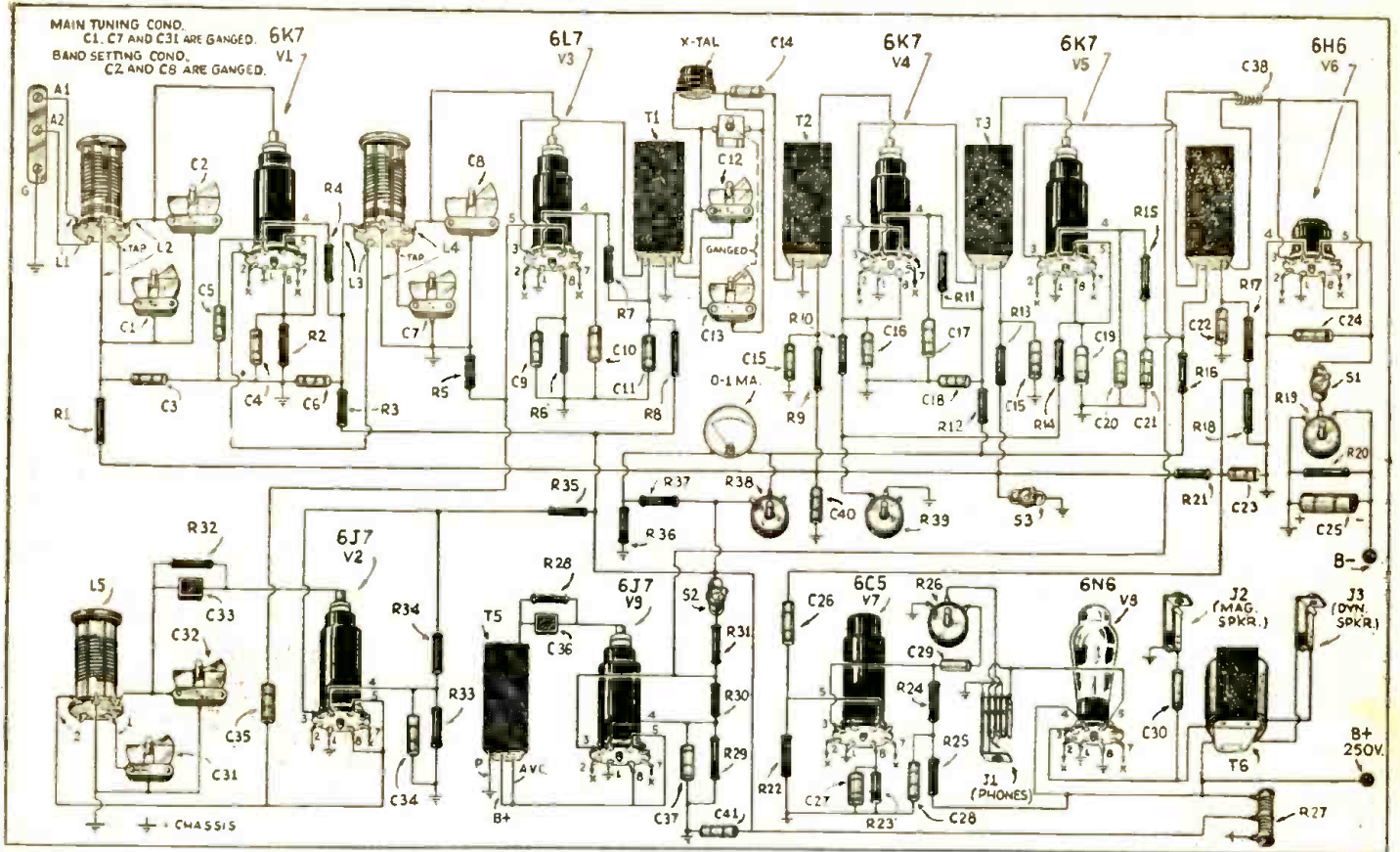


Turn Page for Wiring Diagram

of the condensers are parallel to the panel. Each condenser is mounted on a bracket $2"$ wide by $2\frac{1}{4}"$ high which also serves as a shield between the condensers.

(Continued on page 117)

Wiring Diagram for the 2AJL Superhet Receiver



"Seeing" with Electrons

Eric W. Leaver

Television Stepping-Stones

● SEVERAL years ago, De Broglie published a theory which stated that matter is fundamentally wave-like in nature. The wave-like nature of the electron is now an established fact due to the researches of Davisson, Germer, G. P. Thomson and others. It has been found that electrons can be reflected, refracted, and diffracted just as light can, although their wavelengths are many times smaller than that of light. In fact, the wavelength of an electron which has been accelerated by a potential of 150 volts is one hundred millionth of a centimeter or about one thousandth that of visible light. The wavelength of an electron decreases enormously as its velocity increases. For example, the wavelength of the electrons in a high voltage cathode-ray tube may be one ten thousandth that of visible light.

How Electrons Are Refracted

Just as light is refracted when it passes through a region having a high refractive index, so electrons are refracted when they pass through a region of varying electrostatic or magnetic fields. In fact, electrode systems can be easily constructed which diverge or converge beams of electrons just as lenses diverge or converge beams of light. The exact action of an electrode system depends upon its arrangement and upon the potentials that are applied to its various components. For example, if a beam of electrons passes through a small aperture in a large disc, it will be converged if the electrostatic field on the emergent side of the aperture is more positive than the electrostatic field on the incident side, while the beam will be diverged if the field is less intense or negative. Systems of rings or cylinders or a magnetic field such as that formed by a coil carrying direct current which is placed about the beam, act as converging lenses always, irrespective of the potentials applied or, in the case of the magnetic field, the direction of current flow.

Just as optical lenses form optical images of a source of light, so electron optical lenses form electron images of a source of electrons. This electron image can be converted into an optical image by placing a fluorescent screen in the image plane. The electron optical images may be many times smaller or many times larger than the source of electrons. Magnifications have been obtained by Kuska, which are as large as 12,000 times, while a magnification of 250 is quite easy to realize.

Distortion in Electron Optical Systems

The parallel between the two systems can be still further extended. The various aberrations such as spherical aberration, coma, astigmatism and distortion have exact counterparts in electron optical systems. Up to the present time, however, we

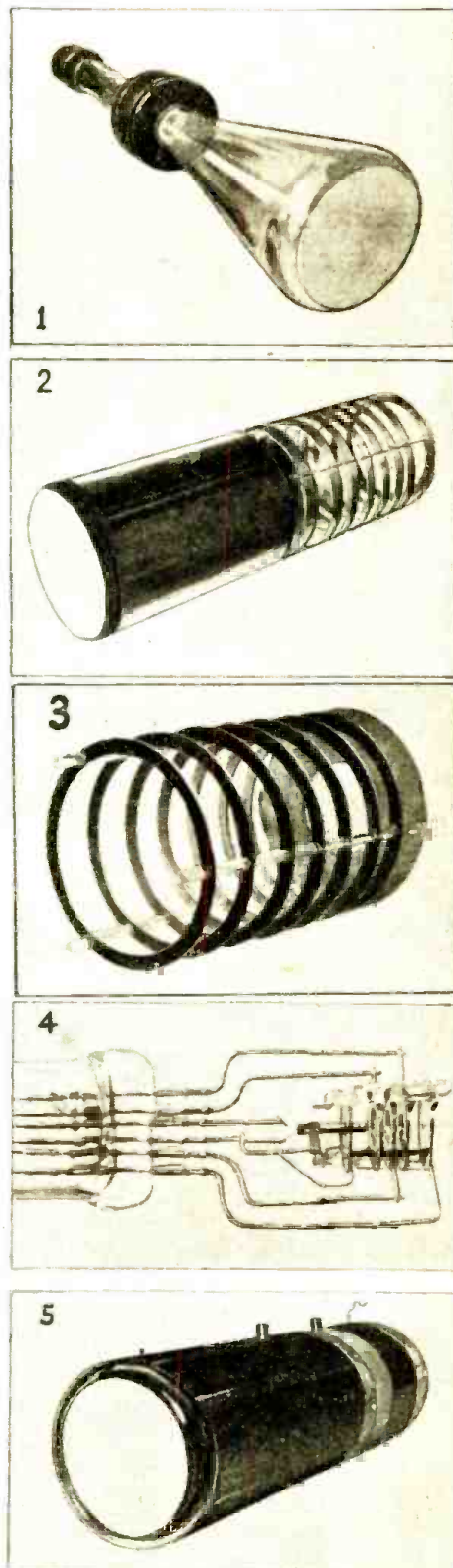
have not become as adept at compensating for these aberrations in electron optical systems as in the conventional optical device. Like the designer of optical equipment, the designer of electron optical systems tries to minimize the aberrations as much as possible and then uses a stop or diaphragm to limit the aperture of the lens. Our present knowledge only allows the design of electron lenses with comparatively small usable portions.

There is one aberration, however, which occurs in electron optical systems which has no counterpart in optics. Rays of light act independently of one another, but electrons are negatively charged, and so mutually repel each other. The aberration due to space charge or an accumulation of electrons increases with the number of electrons and their closeness to one another. For this reason, electron lenses are usually of the accelerating type, so that the electrons are removed as fast as possible and space charge density is kept low.

In spite of the present day limitations of electron optical systems, they possess fundamental advantages, great advantages that far outweigh the limitations and which encourage earnest and untiring development. One of the most obvious of these advantages is that due to the almost infinitesimal wavelength of the electron. As you may know, the resolving power of an optical system is inversely proportional to the wavelength of the radiation which it uses. Thus, theoretically at least, an electron optical system is capable of distinguishing the separate nature of two objects one thousand times closer together than if an ordinary optical system were used. Already these new systems have demonstrated a resolving power many times that of any conventional system. Thus, the structure of metals can be examined to a degree impossible by any other means. The metal can be caused to emit electrons or reflect electrons which can then be refracted by an electron lens and an optical image formed on the fluorescent screen.

Probably the greatest advantage possessed by an electron optical system is the fact that the electron intensity or image brightness can be amplified. The utilization of *secondary emission multiplication* allows the amplification of a weak optical image into a brilliant one, which may or may not be of the same size. This property obviates the fundamental necessity of a light amplifier. Not only this, however, it can act as a *frequency converter* as well. For example, if a photo-electrically sensitive surface is used as the source of the electron image, then either infra-red visible, or ultra-violet light can be used to cause the emission. The color or the light emitted at the fluorescent screen depends upon the screen material and so can be

(Continued on page 109)



Beginning with top photo—television cathode ray tube using magnetic focusing; experimental electron image tube; electrode system of electro-statically focused image tube; condensing electron lens system; experimental electron gun for use with magnetic focusing.

Receiver

Sweep Circuits

fact the entire basic video chassis was designed by Mr. G. R. Mezger of the Du Mont Laboratories, Inc. Certain fundamental changes have been made to adapt this circuit to the particular tube which we are using and the video receiver which we have ready for use.

The vertical and horizontal sweep oscillators and amplifiers are almost identical, except for the values of certain condensers, and thus it will be necessary to describe the action of only one. The use of push-pull amplification will permit twice the deflecting voltage obtainable from a single-ended amplifier for a given plate voltage, and in addition, both deflecting plates of the C.R. tube will vary reciprocally in potential keeping the average potential of both plates constant. This is a distinct advantage over the single-ended amplifier which causes one plate to vary above and below the other plate which is tied to ground.

The output of the gas discharge type 885 tube is fed to the grid of V2 through a resistance-capacity network which provides voltage control for V1 and input control to V2. The output of V2 is fed to one of a pair of deflecting plates of the C.R. tube. A portion of the output voltage of this tube is also fed through a resistance-capacity voltage divider, which provides the 180 degree phase shift necessary for push-pull action. This odd phase shifter also reduces the output signal of V2 by a proportion 1/mu to feed a signal of opposite phase and equal voltage to tube V3. The output of V3 is then fed to the second of the pair of deflecting plates mentioned. By varying the capacity and resistance of the phase shifter, the proper proportion of high and low frequency voltages can be obtained.

A balanced centering arrangement is used to permit the fluorescent spot to be shifted and to center the "raster" on the screen of the C.R. tube. This balanced circuit provides a double action, similar to the push-pull action of the sweep amplifier.

Synchronizing Circuit

The *synchronizing circuit* consists of a diode tube which is biased to operate only on the synchronizing peaks of the transmitted signal and a triode (76) to reverse the phase of the peaks for positive signal synchronization or discharge of the thyatron oscillators.

In order that this synchronizer may be used with any phase of synchronizing impulse which may be transmitted, the input to the synchronizer is taken from the same signal that is fed to the grid of the cathode-ray tube. Since in all systems in use to date, the synchronizing signal must be negative at the grid of the C.R. tube in order to blank out the return trace, a signal of this phase

(Continued on page 115)

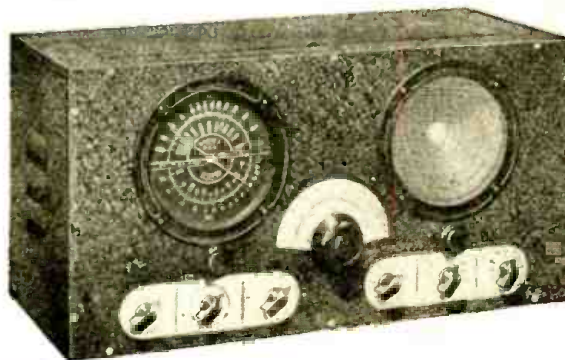
The SUPER-CLIPPER!

An Outstanding Sensation with DXers!

New

7 Tubes! Bands!

Receiver with
**BUILT-IN SIGNAL
BOOSTER AND
PRESELECTOR**



THE SUPER-CLIPPER HAS BEEN DESIGNED FOR DX HUNTERS—IT HAS ALL THE FEATURES YOU HAVE EVER ASKED FOR BUILT INTO A SINGLE, BIG RECEIVER WITH EVERY USEFUL CONTROL AT YOUR FINGER-TIPS.

UNUSUAL DX RECEPTION

The SUPER-CLIPPER guarantees you consistent foreign reception, and goes further; you can expect the unusual in long-distance reception with this big record-breaking receiver. Big?—Yes, big in size and bigger in performance—10 inches wide, 10 inches high and 9 inches deep! No crowding of parts on its large, well-designed chassis. Efficiency dictated the mechanical and electrical layout of this superb set. The SUPER-CLIPPER circuit utilizes both regeneration and super-regeneration combined with radio-frequency amplification. The tube line-up is: 6K7 R.F. Booster, 6K7 R.F., 6K7 Ultra-high R.F. (separate channel), 6J5G Detector, 6J5G 1st audio, 6L6G Power output, 80 Rectifier.

A Few of Many Features

Built-in Signal Booster and Preselector which permits foreign stations to be separated and weak ones built up to loudspeaker volume. Covers some range as main tuner, and is tuned automatically with it but

may be switched out of circuit for stand-by tuning and local high fidelity reception. Calibrated reduction drive tuning dial covering from 22 to .54 megacycles (13 to 555 meters) in four overlapping bands controlled by handswitch (NOT plug-in coils). Both mechanical and electric bandspread entirely eliminating critical tuning on weakest foreign stations. A separate unispread and ultra-high frequency condenser is used. Two stages of powerful audio amplification with 6L6 beam power output. Separate ultra-high frequency R.F. channel (3 to 12 meters) using air-wound coils and 6K7 R.F. amplifier. Separate antenna connection is provided for maximum efficiency. Six one-half inch dynamic speaker; Noise and Tone Control; Earphone jack, etc. The SUPER-CLIPPER has every worthwhile feature that you would like to have in your personal receiver.

The New 1938 Super-Clipper

complete with 7 tubes, ready to plug in to any 110 v. A.C. line and operate **\$29.75**

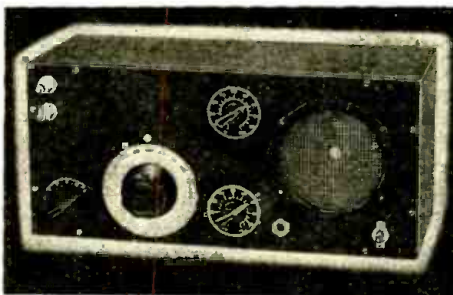
Shipping weight 30 lbs.

NOT SOLD IN KIT FORM

The New U.H.F. CRUISER

Designed exclusively for RACO
by A. J. Haynes

A SENSATIONAL NEW RE-CEIVER FOR ULTRA HIGH FREQUENCY BANDS



RECEIVES:

- Television signals
- Long Distance 10 meter band
- Two way police
- The new 40 M.C. broadcast band
- Five meter amateur band
- News service spot broadcasting, etc.

Efficient hand-switching without plug-in coils, for the first time, over a tremendous ultra-high frequency tuning range. Covers from 27 to 80 megacycles in 5 bands, with no skips.

NEW 5 TUBE A.C. CIRCUIT

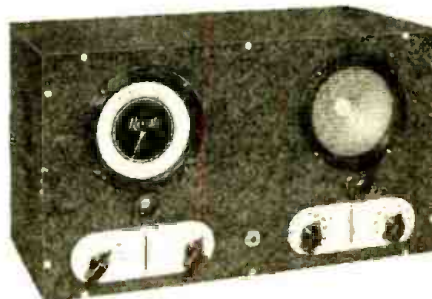
This new super-regenerative circuit combines sensitivity with smooth tuning control and unusually great amplification. Uses 6K7 R.F. amplifier, 6J5 super-regenerative detector, 6J5 first stage audio-amplifier, and a transformer-coupled 6V6 beam power output tube. The rectifier is a 80Z5B operating from a high voltage transformer giving full A.C. operation.

The Cruiser is a surprisingly compact set measuring only 14" x 6 1/2" x 3 1/4", yet it is entirely self contained, including 5 inch dynamic speaker, complete A.C. power supply, stand-by switch, phone-jack (on output tube enabling use of larger external speaker if desired), single dial tuning, utilizing electrical bandspread only, and other desirable features developed during Mr. Haynes' long experience in the ultra-high frequency field.

U.H.F. CRUISER complete with 5 tubes, ready to plug into any 110 V. A.C. line and operate (shpg. wgt. 14 lbs.) Price **\$19.95**

UNIVERSAL CLIPPER

A Low Priced DX Receiver that
Pulls in Stations from All Over
the Globe



Uses the new 25L6 low voltage beam power tube which makes possible high power output with an inexpensive A.C.-D.C. power supply, operating from any type of 110-volt current. Here is the famous CLIPPER circuit, incorporated in an inexpensive receiver without sacrificing its distance getting ability. The same smooth, non-critical tuning; combined regeneration and super-regeneration; separate bandspread and ultra-high frequency tuning condenser; handswitch control; seven separate tuning bands; noise and tone control; 5 inch dynamic speaker; 3 to 555 meter tuning range; automatic earphone jack; in fact, all of the splendid features which make the CLIPPER circuit a tremendous success.

ASK THE MAN WHO OWNS A CLIPPER—
LOOK AT HIS LOG!

COMPLETE KIT WITH ALL PARTS ASSEMBLED and wiring diagram; less only tubes and cabinet. **\$12.40** unshipped

Black crackle finish cabinet 1.80
Matched set of five tubes 3.20
Wiring 2.90
UNIVERSAL CLIPPER; complete, with black crackle cabinet, 20" x 10" x 9"; five tubes; 6K7, 2-6J5G, 25L6, 25Z6G; ready to operate, and one-year **\$19.50** guarantee. Special Complete Price

**FREE
CATALOG**

QUOTES DIRECT-FROM-FACTORY PRICES

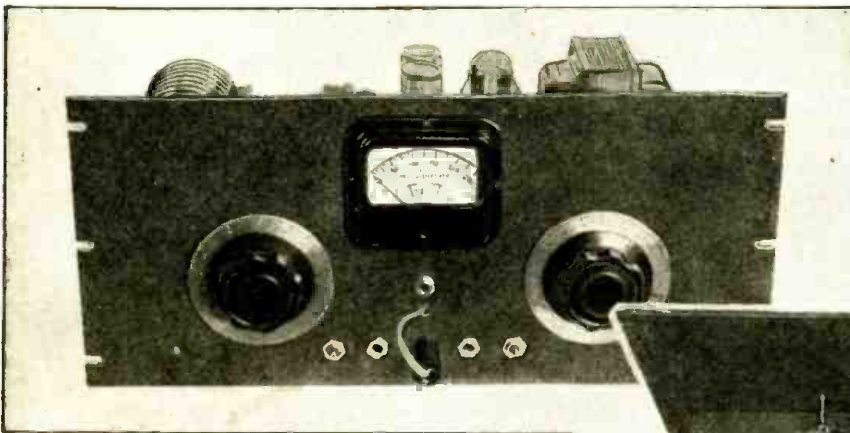
Kits, receivers, converters, valuable antenna information—everything you'd expect to find in a complete short-wave catalog—at prices astoundingly low. Write today for RACO'S LATEST SHORT-WAVE CATALOG—illustrations and technically describing RACO'S complete line of long distance receivers. Address Dept. SWT-638.

RACO **RADIO CONSTRUCTORS LABORATORIES**
136 LIBERTY ST. Dept. SWT-638 NEW YORK, N. Y.



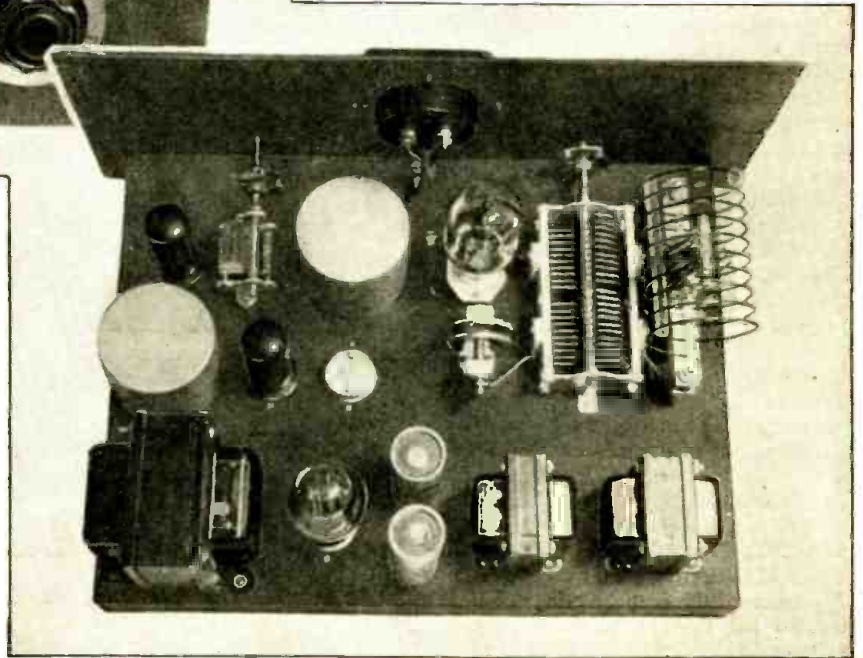
The HK-54 200 Watt

George W.



used 6L6 beam tubes in the exciter stages. We also have kept the number of stages down to a minimum, knowing that it is just as economical to buy crystals as the other components, and it is a lot easier.

Note the "prof." appearance of this transmitter. Tests "on the air" proved that this job can step out and roll up some real DX. A top view is shown at the right.

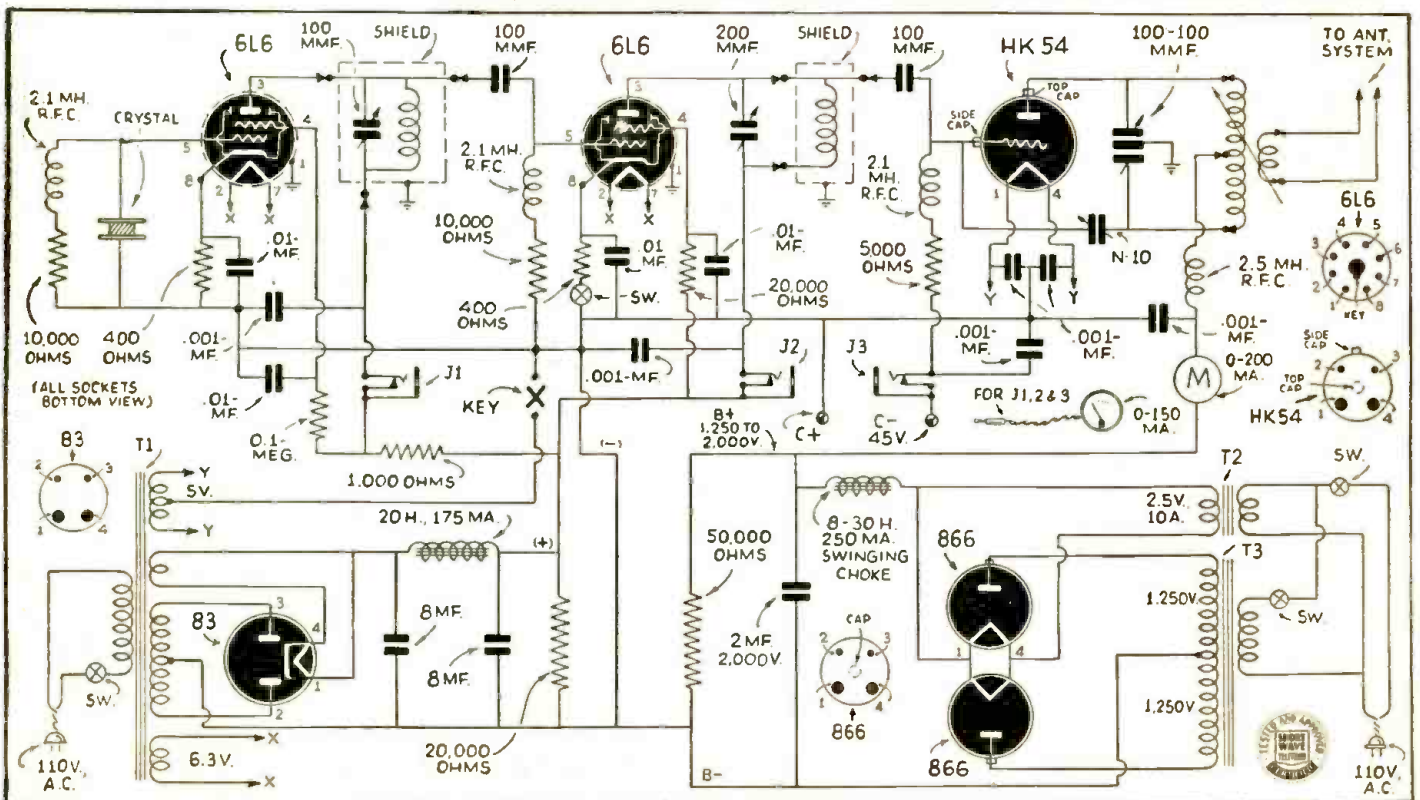


● NOT so long ago it required a 2 quart bottle to pack 250 watts of R.F. Lately it seems that the "bottle" is getting smaller and the contents getting more powerful. At the moment we have a tube not much larger than the old 201A and capable of over 200 watts output. This tube is the new HK-54, a swell tube for the medium-power transmitter. The entire transmitter featured in this story was built around the new tube.

We have tried to keep the rig simple so that the "hero" of our project wouldn't be lost in a maze of apparatus.

Due to popular demand and economy, we have

The hook-up for the 200 watt transmitter, using the HK-54 in the final amplifier, is shown below and can be followed by any Ham.



Transmitter

Shuart, W2AMN

This snappy transmitter should prove a delight to the Ham looking for a reasonably priced rig that can really step out. It uses an HK-54 tube in the final amplifier and a 6L6 crystal control exciter. Power-supply data is included.

Straight Tetrode Crystal Oscillator

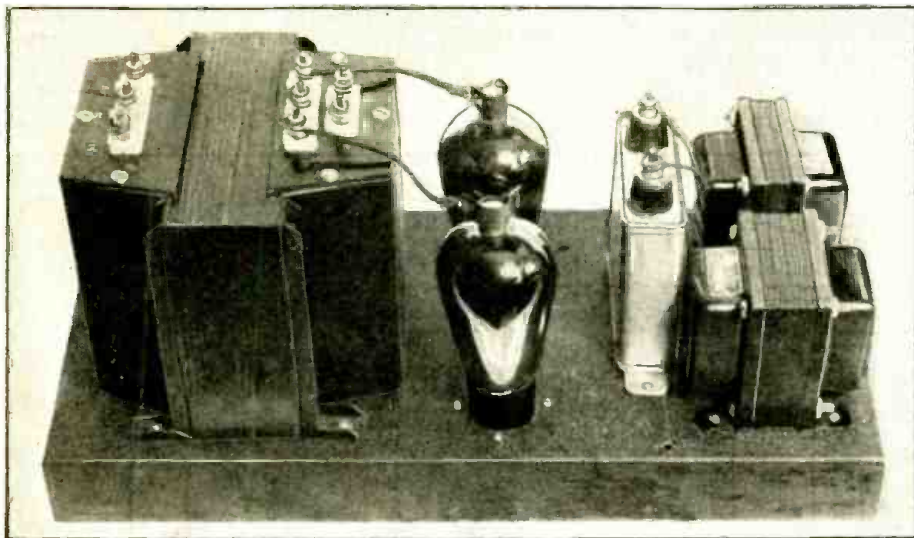
Starting with the diagram we find a straight tetrode crystal oscillator with no "fixings." This is followed by another beam tetrode buffer-multiplier, which drives the HK-54 final amplifier, and we mean "drive it." There is more than sufficient power to drive the final, not so much because of the great power output of the driver, but because of the really modest driving requirements of the 54.

Back to the oscillator—the plate circuit is tuned with a plug-in, tuned tank circuit.

tapped plug-in coil. For convenience and simplicity manufactured air-wound plate inductors are used. These are of excellent design and have a built-in variable link of just the right proportions. To vary the coupling it is only necessary to "probe" the link around to the proper position.

Chassis Layout Includes Power-Supply

In order to keep the size of the rig within the demands of a small shack we have included the low-voltage power-supply and the filament transformer of the 54 on the



The high voltage power-supply unit is illustrated above. It utilizes 2—866 rectifier tubes.

This consists of a 4-prong coil form and a small padder mounted inside, both are thoroughly shielded as can be seen in the photo. There is a complete tuned tank circuit for each crystal used.

The buffer-doubler plate coil is also shielded but the tuning condenser is mounted outside with a panel control. This is done so that two bands can be covered with a single coil. The condenser is large enough (200-mmf.) so that it is only necessary to swing it from near maximum to near minimum capacity to effect the change.

In order to further simplify construction we have employed capacity coupling between the driver and the final.

While some may disapprove of this method, it serves the purpose with no hitches. The final is conventional; it employs a split-stator condenser and a center

same chassis with the entire R.F. portion. The chassis is 17 x 13 x 2 inches and just the right size. Laying out the parts requires care; proper placement results in good stability. The power-supply components are, of course, along the rear edge of the chassis. Then in the "center aisle" we have, from left to right, the crystal, the oscillator tube and last, the oscillator plug-in tank unit. Along the front we have, right to left, the buffer 6L6, buffer tuning condenser, the shielded buffer coil and the rest is the final which is clearly shown in the photo.

The low-voltage power-supply delivers around 400 volts to the two 6L6 plates. This voltage is lowered in the case of the oscillator because the oscillator is capable of many times the required power output necessary to drive the second 6L6. Even with the 1000 ohm voltage-dropping re-

(Continued on page 108)



SERVICE HINT



... for hundreds OF RESISTOR REPLACEMENTS

... up to 10 Watts

... No need to keep complete stocks of 1/4, 1/3, 1/2, 1, 2 or 3 watt resistors! No lost time or lost motion! Just carry a few IRC 10-watt fixed and adjustable Cement Coated Power Wire Wounds and you'll be prepared for hundreds of replacements—almost anything up to 10 watts. A small stock of IRC Type ABA Adjustable units gives you dozens of ranges. Simply set the adjustable slider on the exposed track of wire to tap off any desired resistance value up to the maximum range of the unit. Additional taps can be used to make one resistor do the work of two or more.

FREE! Write for the new IRC Resistor and Volume Control Catalog listing the complete IRC line for radio service, amateur, engineering and "lab" work.

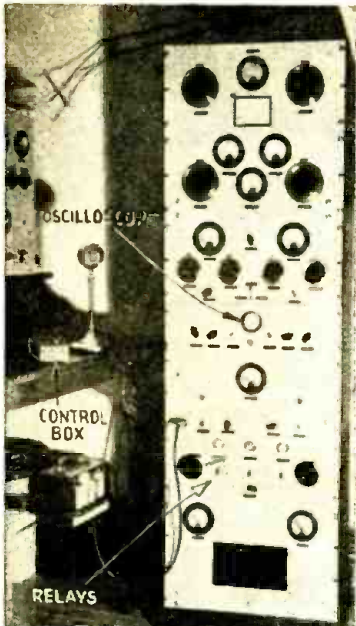
"They Stay Put"



INTERNATIONAL RESISTANCE COMPANY

401 N. Broad St., Philadelphia, Pa.
In Canada, 187 Duchess St., Toronto, Ont.

Push- Control for



Complete transmitter at station W2FHP, fitted with remote push-button control.

Every Ham dreams of building a remote control for his transmitter. Here is an effective one using a few push-buttons and relays. Incidentally it protects the rectifier tubes until they are warmed up.

● THIS concluding article will describe construction of a complete remote control system and an oscilloscope for use with the medium power transmitter.

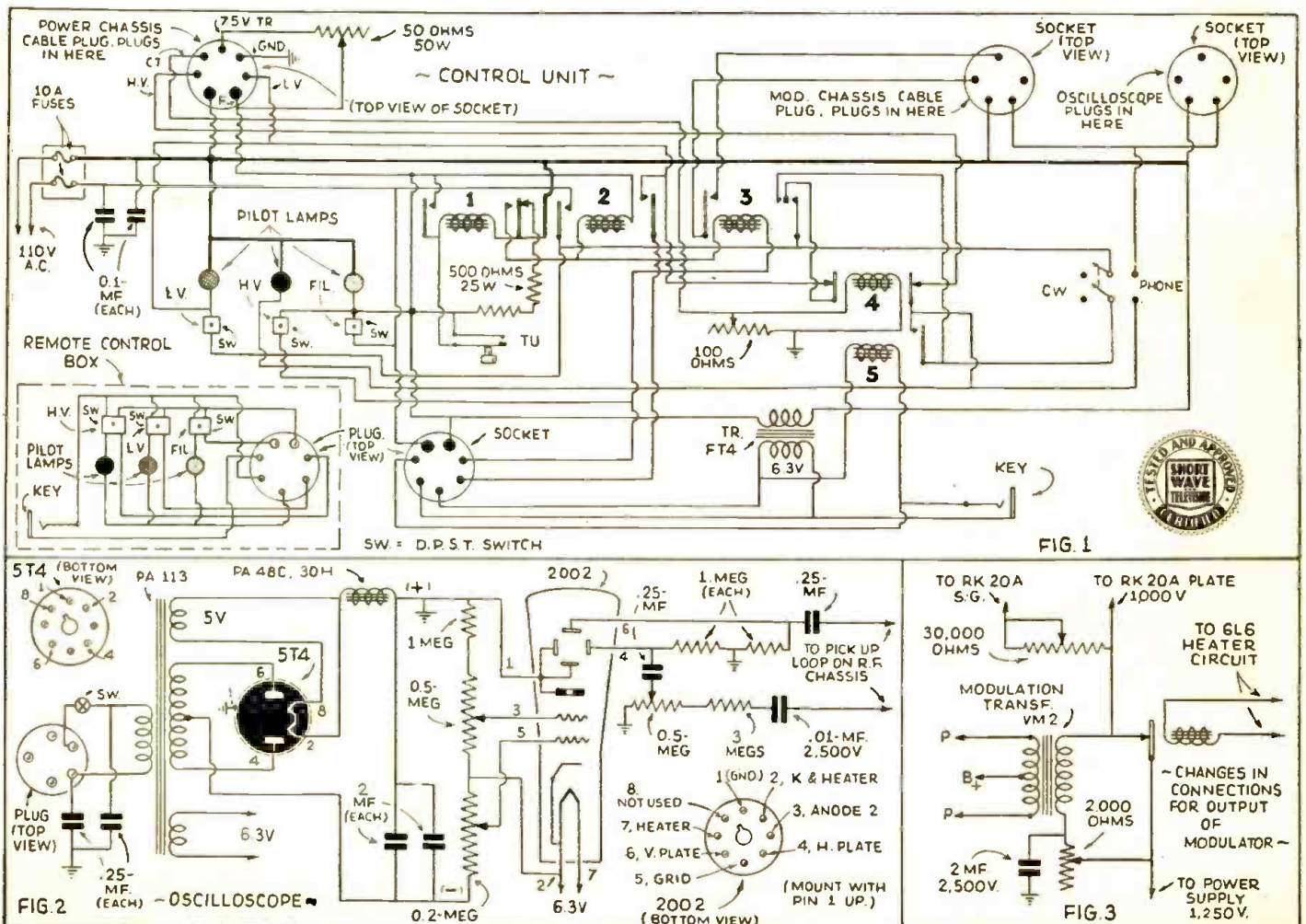
The control system uses the same control panel that was shown in the last article. However, many additions must be made. The relays are all mounted on a bakelite panel 6½ in. x 16 in. which is held to the steel front panel by means of strips of aluminum. The two are separated seven inches.

Before proceeding with construction details, it will doubtless be best to describe the function of the various parts of the control unit. Neglecting, for the moment, the remote control box, let us see what takes place in the circuit. The first switch to be

operated is that marked "FIL" which of course lights all filaments in the transmitter. The yellow lamp comes on at the same time. Until this switch is operated no current can flow in any part of the transmitter. Along with the filaments, the heater element of "TU" which is the thermal delay unit, warms up. It is still impossible to operate any of the power transformers, even if the switches are closed. However, after an interval of 30 seconds or so, which gives the mercury rectifiers time to heat up, "TU" closes its contacts which in turn operate relays 1 and 2. The heater of "TU" immediately cools off so that should the power circuit be opened for any reason, high voltage cannot be applied until the heating cycle is repeated. This gives complete protection to the rectifiers.

As soon as 1 and 2 have closed, the transmitter is ready for immediate operation. Closing of the "HV" switch puts the rig on the air as both the high and low voltage transformers are energized when relay 3 operates. The red pilot light indicates this condition.

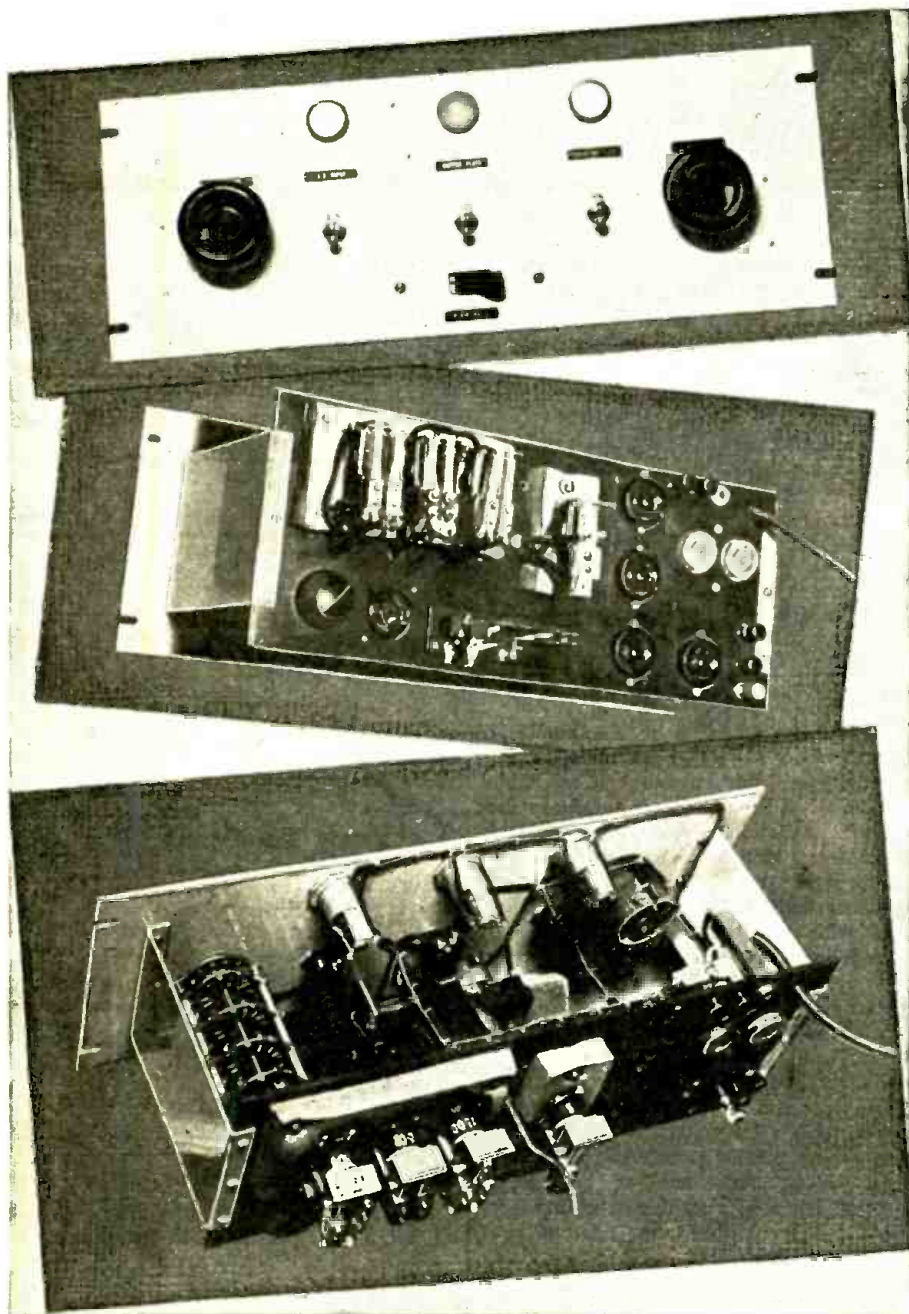
Wiring diagram of push-button control applied to medium-power transmitter described in the March issue.



Button Transmitter

Part III

H. G. McEntee, W2FHP



Above—Front and rear views of relay rack unit built by the author. The diagram is given on the opposite page.

If it is desired to operate only the exciter, the "LV" switch is operated, which activates only the low voltage transformer. This condition is signaled by the green pilot lamp. This lamp, of course, is also

lighted when the "HV" switch is turned on.

Although center tap keying was shown in the original article on this transmitter. (Continued on page 119)

**You'll LEARN EASIER
... MAKE MONEY FASTER**

with

SPRAYBERRY'S

**PERSONAL
HOME TRAINING**

IN RADIO



I'LL PROVE IT!..

I Actually Set You Up For A Profitable Business

Here's the greatest opportunity you've ever had to enter the fast moving Radio Industry. Tremendous money making possibilities exist for properly trained men. If you are an ambitious fellow, I can train you for a good paying full time or part time job . . . with a big future ahead. My training is distinctly new and different. It not only teaches all phases of Radio . . . it equips you fully for an actual start in your own Radio business.



Professional Outfit Given

Positively the finest equipment offered with any Radio Course is available to every Sprayberry student. Consists of All-Wave, All-Purpose Analyzer, Rider Manuals (7,076 pages), Tool Kit, Electric Eye Outfit, Experimental Apparatus.

**No Experience Needed
Earn While You Learn**



Sprayberry lessons are intensely interesting and easy to understand. . . thoroughly cover all branches and phases of Radio. Right at the beginning of your training, I show you how to get profitable spare time Radio service work. . . through the course you learn how to do these jobs efficiently. Thus you gain real practical experience and add easy cash to your bank account while you're learning.

**Don't "Wish" For More Money
Train For It Now!**

Wouldn't you like to be your own Boss . . . with a regular cash income? Why envy those fellows who have good paying jobs . . . who are building toward future security? They are no smarter than you. All that it takes is initiative.

Iron-Clad Money Back Agreement

You must be satisfied that my Course is exactly as represented . . . or it will cost you nothing. Why not cash in now on the spare time or full time jobs waiting for properly trained men? Hundreds of fellows have made good. I cannot urge you too strongly to get started immediately in Radio.

THESE FELLOWS Made Good . . . So Can You!

Cleared \$150 in Spare Time
"Since enrolling I have cleared a net profit of more than \$150 in spare time alone . . . And I am not one-half through the course yet. Honestly, I cannot understand how you can give so much 'done' for so little money." A. H. Lanole, Northbridge, Mass.

Earns \$25 Monthly Spare Time
"I am now doing spare time service work as a result of your training. Make around \$25 per month installing a set in Radio receivers." George Herrington, B. C., Canada.

Mahoney Gets Job With Sears
"I found that after three months of study I was able to service sets in a much more professional manner. Business certainly showed an increase. I recently received an offer from Sears Roebuck which I could not have accepted without having had your training." Joseph Mahoney, Rhode Island.

SPECIAL SERVICEMAN'S COURSE

. . . Of an advanced nature for men already in Radio work. Explains newest methods, circuits and short cuts. Terms low as \$3.00 per month.

MORE MONEY IN RADIO

GET THE FACTS!

Mail Coupon Now

Sprayberry Academy of Radio,
F. L. Sprayberry, Pres.,
145-F University Place, N. W.,
Washington, D. C.

Dear Sir:
Please send me free copy of "More Money In Radio."

Name Age

Address

City State

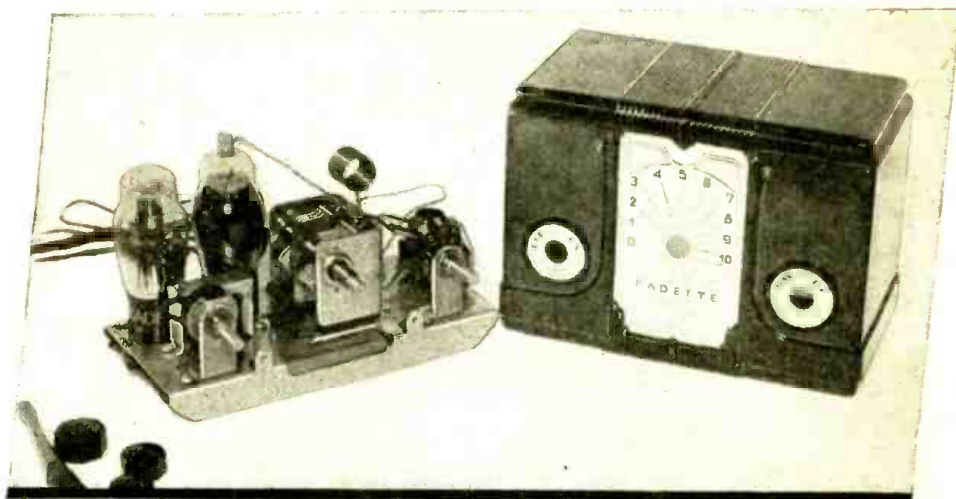
Mail in envelope or paste coupon on postcard.
If interested in Service Course only, check here ().

What's New in S-W Apparatus

A.C.-D.C. Ultra-S.W. Converter

• **COMPACTNESS** is the keynote of this new converter. Using but two tubes, a 6J8G triode—heptode frequency converter, and a 25Z5 rectifier, it will tune in the bands from about 5 to 8 meters. The 6J8G is a new tube which combines the functions of a pentagrid and a separate triode oscillator in one tube. The converter has three controls, an on-off power switch, main tuning dial which is of the reduction type, and a switch for transferring the aerial from the converter to the broadcast receiver to which the unit must be attached.

The converter is placed in operation by connecting the aerial lead of any broadcast receiver which will tune to 1520 kc. to the output lead of the converter. The grounding lead of the converter is connected to the ground on the receiver. The aerial is then connected to the aerial lead on the converter.



A view of the converter chassis beside its diminutive cabinet. (715)

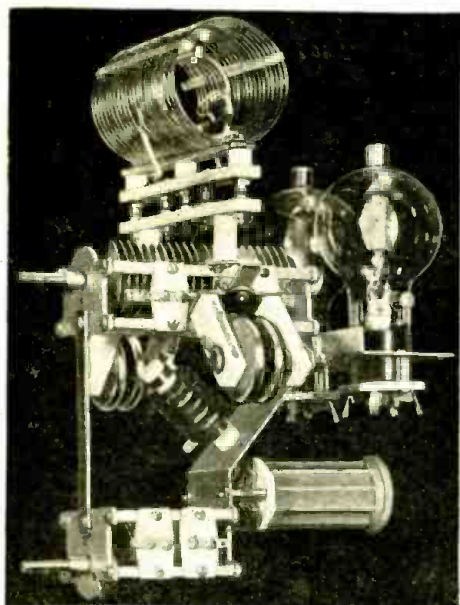
To operate the converter, the broadcast receiver is tuned to the above mentioned frequency, the converter turned on and the selector switch set to the short-wave position. All tuning is then done by the converter tuning dial. The receiver volume control is used to control volume.

The tuning of the unit is not particularly critical and on test in New York City broadcast programs from the two Radio City ultra short-wave transmitters of the National Broadcasting Co. were picked up

with good volume. To listen to regular broadcast stations, the converter is turned off and the selector turned to the broadcast position which automatically connects the aerial to the receiver input. The receiver is then tuned in normal fashion.

The converter is housed in a molded case measuring $7\frac{1}{2}'' \times 3\frac{3}{4}'' \times 5\frac{1}{2}''$.

Our information bureau will gladly supply manufacturers' names and addresses of any items mentioned in Short Wave & Television.



Appearance of new Hammarlund transmitter unit. (No. 716)

• **ALL** amateurs do not have available the tools and machinery necessary to make the fancy brackets and oddly shaped pieces of metal necessary for modern type xmitters. All of these constructional difficulties have been eliminated in the unit shown, which is a push-pull radio-frequency power amplifier, designed to use any of the popular triode tubes having ratings of from 100 to 300 watts output per pair.

Ham Xmitter Built Easily with New Unit

All parts associated with the amplifier proper are joined together with brackets of various shapes. This hardware is available in kit form and the only tools necessary for assembling and wiring are a screw-driver and soldering iron. When finished, it is a self-supporting unit which can be bolted to a panel with the mounting screws furnished with the variable condenser; no chassis is necessary.

Mounted on the two side bars of the large variable condenser, an MTCD-100-B, are two brackets which support the plug-in plate coil and the two N-10 neutralizing condensers. The lower condenser (MTCD-100-C), for tuning the grid circuit, is fastened to the large condenser with an angular shaped back plate. At the top of this plate we find another horizontal bracket which serves as the mounting for the two tubes. At the lower edge of the back plate is mounted the plug-in grid coil. This plate is also drilled for mounting the radio frequency choke (CH-500) and the two filament by-pass condensers, together with the grid biasing resistor. All brackets are completely drilled and machined and have a silver-like finish.

The entire arrangement is constructed to permit short, direct wiring leads. The tubes shown in the unit are RCA 808's. Other triodes may be used, depending

entirely upon power output desired. The overall dimensions are 13" high, $8\frac{1}{2}''$ wide and 8" deep.

List of Parts

- 1—MTCD-100-B (Variable condenser)
- 1—MTCD-100-C (Variable condenser)
- 2—N-10 (Neutralizing condensers)
- 1—CH-500
- 2—S-4 (sockets)
- 1—S-5 (socket)
- Plug-in plate coil
- SWF coil forms for plug-in grid coils (5 prongs)
- 1—Complete set of hardware, including brackets and screws

This article has been prepared from data supplied by courtesy of Hammarlund Mfg. Co.

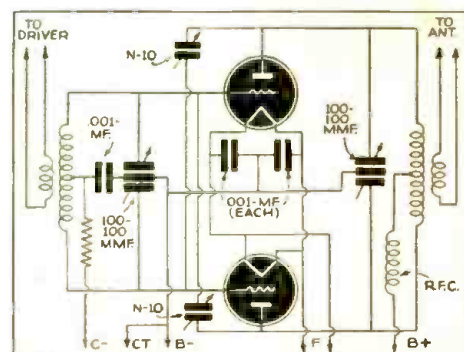


Diagram of new transmitter unit.

Names and addresses of manufacturers of apparatus furnished upon receipt of postcard request; mention No. of article.

NEW ELECTROLYTICS

• A TUBULAR dry electrolytic condenser of considerably smaller physical size than heretofore available has been introduced. These condensers are her-



metically sealed in metal cans with pig-tail leads and are available in 100, 350 and 450 volt ratings. (No. 708.)

This article has been prepared from data supplied by the courtesy of the Solar Mfg. Co.

PRECISION MICA CONDENSERS

• A NEW series of bakelite encased mica condensers, employing silver-plated mica, has been introduced. The new method of construction permits a capacity tolerance



within 3% and an extremely high Q. Condensers are available in sizes from 10 to 1100 mmf. (No. 705.)

This article has been prepared from data supplied by courtesy of Cornell-Dubilier.

BALLAST TUBE FOR A.C.-D.C. SETS

• A NEW series of helium filled, iron wire ballast tubes, which will serve as replacements for a multitude of older type ballast tubes, is now available. One of these new tubes can handle a wide variation in the number of tubes used in a receiver, because it functions as a true ballast device, whereas some of the older tubes were merely straight resistors. Four of these tubes will replace 90% of the older type tubes. (No. 702.)

This article has been prepared from data supplied by the courtesy of the Amperite Co.

EXPERIMENTAL TELEVISION AMPLIFIER PENTODE



• THE 1851, a new pentode with unusual characteristics, has been developed for use by the amateur and experimenter in experimental television receivers. It is especially designed for use in the R.F. and I.F. stages of a television receiver employing a high I.F. It may also be used in the first stages of a video amplifier, particularly noteworthy is the amplification factor of 6750 and the trans-conductance of 9000 micromhos. The 1851

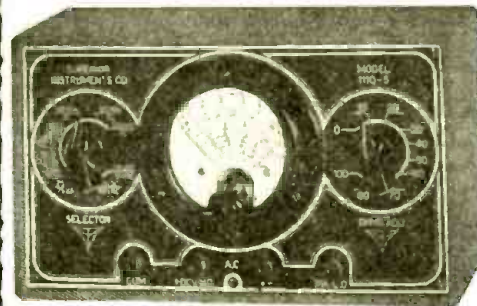
is an octal based metal tube. As the photo shows, however, the grid cap is smaller than usual. See page 47, May issue, for technical data. (No. 696.)

This article has been prepared from data supplied by courtesy of the RCA Mfg. Co.

NEW DEFLECTING YOKE AND TRANSFORMERS FOR TELEVISION

• THIS new deflecting yoke is designed for use with cathode ray tubes of the electromagnetic deflection type.

2 AMAZING NEW INSTRUMENTS FROM THE 1938 SUPERIOR 1100 SERIES LINE!



Model 110-S supplied complete with batteries, test leads and instructions. Size 8 1/2" x 5" x 3 1/4". Shipping weight 3 1/2 pounds. Our net price.....

AC-DC VOLT-OHM MILLIAMMETER 1100-S

A Midget in Size . . . a Giant in Performance! Here, without doubt is the lowest priced, full service instrument ever offered. Permits every possible measurement with absolute accuracy and simplicity of operation. 2% accurate 3 1/2" d'Arsonval type 0-1 meter. Precision resistors. Attractive etched panel. Modern fabricoid case.

SPECIFICATIONS

DC Voltage—0-1.5; 0-15; 0-25; 0-75; 0-500.
AC Voltage—0-15; 0-10; 0-75; 0-200; 0-1200.
DC Current—0-1; 0-10; 0-100; 0-500 ma.
Resistance Ranges—0-500 and 500-500000 ohms, low ohms read to 1 ohm.

\$7.85

MODEL 1120-S OSCILLATOR

Truly the greatest value ever offered! An All-wave, direct-reading Oscillator in portable size. Compares favorably with instruments selling at 3 times its price! Housed in a black, crystalline cabinet with carrying handle.

SPECIFICATIONS

- Covers 110 kc. to 22 mc. all on fundamentals, with ranges selected by front panel band switch, and frequencies in those ranges by dial manipulation.
- Dial is direct reading in frequencies, with band switch settings identified both by letters "A, B, C, D, E," and by frequencies, with the corresponding identifications on the dial scale.
- R.F. and A.F. outputs obtainable independently.
- Accuracy 1 percent on I.F. and broadcast bands, 2 percent on the short waves.
- Separate posts for testing shorts, opens and leakage, including the leakage of electrolytic and other condensers. Thus even very high resistance circuits may be tested for continuity.
- Planetary Turnkey drive, with 4-1 vernier.
- Operates on 90-120 volts AC or DC. Moreover AC may be of any commercial frequency, 25, 40, 50, 60 cycles, etc.

Model 1120-S supplied complete with tubes, leads and instructions. Shipping weight 3 1/2 pounds. Size 10" x 7" x 4 1/2". Our net price.....

\$8.85



SUPERIOR INSTRUMENTS CO. 136 LIBERTY STREET Dept. SW-638 NEW YORK, N. Y.

Special care is taken in the winding and placement of coils in the yoke to reduce to a minimum any distortion which may occur due to unbalanced magnetic flux or non-uniform fields. By means of proper construction, coupling between high and low frequency coils has been reduced to a negligible value. An internal shield is effective in reducing the effects of external fields on the image to be projected.

The low frequency coils are so constructed that a low impedance line may be run to them from the new output transformers. This helps to minimize pick-up and eliminate coupling condensers.



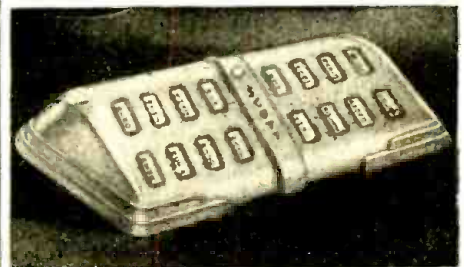
Television Magnetic Sweep Yoke.

More than ample deflection with negligible distortion is obtained from the yoke on nine-inch tubes at a plate voltage of 6000.

The new type high frequency sweep output transformer, also marketed by the same company, is wound with low capacity coils in order to effectively pass the higher harmonics of 13,200 cycles necessary for the production of a linear deflection. (No. 709.)

Our information bureau will gladly supply manufacturers' names and addresses of any items mentioned in SHORT WAVE & TELEVISION.

NEW SCOTT TELEMATIC



An entirely new kind of musical instrument, for there are no dials, knobs, switches. A compact Keyboard controls your selection of broadcasts, recorded music, and volume. Or, if you wish, entertainment for the entire day may be selected in advance! Tunes in every program automatically at the exact time it goes on the air. Removes needle scratch from records, and resulting music is so perfect that your guests cannot tell whether they are hearing radio or records! Get all the facts today! NOT SOLD THRU STORES! MAIL COUPON.

E. H. SCOTT RADIO LABORATORIES, INC.
4470 Ravenswood Ave., Dept. 28KB, Chicago, Ill.

Send all facts on new SCOTT Telematic. No obligation.
Name.....
Address.....
City..... State.....

ALL ELECTRIC AIR SCOUT 3 Tube Set

A well-designed sensitive set. Holds wonderful records for distance reception and MARVELOUS FOREIGN RECEPTION. Owners will practice able to bring in police calls, amateur, code, Transatlantic phone and broadcast entertainment. Works from any A.C. or D.C. house current. Easiest set to build. Employs newest metal ballast tube as one of the tubes. Speaker mounts an attractive panel. Range 0 1/2 to 610 meters or to 1500 meters with special long wave coil.

MODEL 3A-E
AUXILIARIES: 9 1/2 to 20 meter coil (Foreign), 25c; 15 to 45 meter coil (Foreign), 25c; 40 to 80 meter coil (Foreign), 25c; Set of Matched Tubes, \$1.35; Long Wave Unit and Coil, \$1; Band Spread Attachment, 75c; Double Earphones, \$1.50; 5" Find-All Loud Speaker, \$1; Wired Extra, \$1.
Send for circular.

\$3.20
WITH PHONE

H. G. CISH, CHIEF ENGINEER
Allied Engineering Institute, Dept. S-48 Less Tubes
98 Park Place, New York, N. Y. Unwired

FREE!

GREAT NEW RADIO AND CAMERA CATALOG

VISIT OUR NEW BARGAIN COUNTERS! SCORES OF UNLISTED DAILY SPECIALS

PAGE after page of amazing values—70 1938 Lafayette Radio models, nationally known parts, tubes, equipment—complete line of advanced Public Address—lowest prices anywhere. Get this free guide to real "buys" in radio and cameras.

NEW CAMERA DEPARTMENT

Famous cameras, film and supplies you've read about, wanted, all here now at tremendous savings for you. Liberal exchange service. **FREE** Trial. Write now.

10 DAY FREE TRIAL

BUY AT ANY ONE OF OUR 7 BRANCHES

MAIL COUPON NOW!

WHOLESALE RADIO SERVICE CO. INC.

NEW YORK, N.Y. • CHICAGO, ILL. • ATLANTA, GA.
 100 112TH AVENUE • 901 W. JACKSON BLVD. • 305 PEACOCK STREET
 BOSTON, MASS. • BRONX, N.Y. • NEWARK, N.J. • JAMAICA, L.I.

100 SIXTH AVENUE, NEW YORK, N. Y.

RUSH FREE CATALOG No. 71-4FB

NAME _____

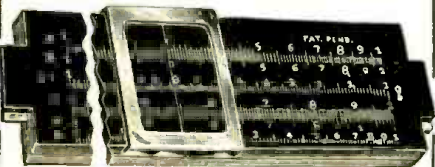
ADDRESS _____

CITY _____ STATE _____

PASTE COUPON ON PENNY POST CARD

An Accurate, Eight Inch White Wood SLIDE RULE

With A, B, C, D, C1 and K Scales



Features

Nickel Silver Framed in- tions of primary operation springs. back side of rule for ready reference or teaching.

Scales calibrated directly on well-seasoned wood ing. Each rule in a durable will retain accuracy re- gardless of temperature or humidity changes. Each rule in a durable pocket carrying case for convenience and protection. Instructions and illustration.

The extremely low price of these slide rules and their absolute accuracy makes them ideal for the student as well as the working man who has always wanted to learn to use a slide rule.

Price postpaid anywhere **50c** each

3 for \$1.00. 12 for \$3.60

20 Page Book of Instructions for using a slide rule. 10c each


GOLD SHIELD PRODUCTS

Dept. S6 350 Greenwich St. New York

A SMALL BUSINESS of YOUR OWN

Men and women don't waste your life slaving for others. Get a copy of a **SMALL BUSINESS OF YOUR OWN** by W. A. Brooks, a 150 page book containing 1000 practical plans on how to start a profitable business in spare time without capital investment. Send \$1 for this gold mine of practical information. Money back guaranteed. Dept. SW. UNIVERSITY PRESS, 305 E. 45th St., N. Y. C.

WE HAVE The RADIO YOU WANT



How would you like to save up to 50% on Nationally advertised Radios, such as Stromberg Carlson, Philco, RCA, Zenith, G. E. etc., etc. for home, farm and auto, over 400 models to choose from. Also hundreds of electric appliance items for the home. Write today for the new 1938 giant catalog **FREE**.

MODELL'S Dept. 60 Cortlandt St., N. Y. C.

NEW CRYSTAL MICROPHONE

● A **SMALL**, lightweight, crystal microphone, with good response and high output has made its bow. It is semi-directional and free from feed-back. This unit has a wide range of applications, enhanced by the available accessories. The device is singular in that it is equipped with a plug at the microphone, thus making cable replacement a simple operation. It is chrome finished and comes complete with plug and 8 ft. cable. (No. 712.)



This article has been prepared from data supplied by the courtesy of the American Microphone Co., Inc.



100 VOLT A.C.—6 VOLT D.C. RECEIVER

● AN all-wave receiver especially designed for rural communities where there is a possibility that electric power lines will be erected in the future, is now available. It is a 5-tube superhet table model, which

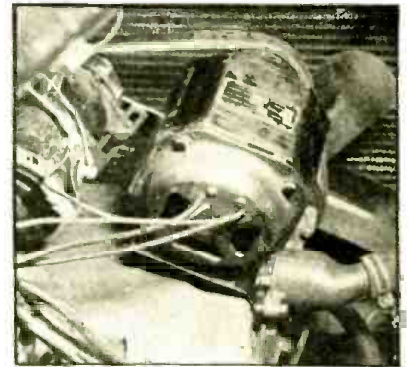
may be operated from a 110 volt A.C. line or a 6 volt storage battery. Change-over from one current to another is automatic; the battery cord is disconnected and the electric plug placed in the power socket. Frequency coverage is 540-1720 kc., and 5.8 to 18 mc. (No. 699.)

This article has been prepared from data supplied by courtesy of the RCA Mfg. Co.

A MOBILE GENERATOR

● A **NEW** A.C. generator supplying 110 volts is available for operation from an auto engine for mobile "ham" applications. The generator bolts onto the engine block with two head bolts and is driven from the fan belt. The unit will deliver 110 volts regardless of the running speed of the engine, provided the current load is maintained constant. (No. 701.)

This article has been prepared from data supplied by courtesy of the Lejay Mfg. Co.



A 110 volt A.C. generator for mobile use.

What Do You Think?

(Continued from page 80)

you believe yourself capable of telling me the answers to the above, and how the suppressing of the SWL-QSL card nuisance keeps the SWL from getting a ticket? For the information of Mr. Daugharty and the rest of the SWLs the only things I have against the SWL are the foolish QSL card racket, and bootlegging on five meters. I have spent many an hour giving code practice and theory to SWLs, two of them have obtained their license some years ago—W2AON and W2IVR. At present I am teaching two more, one of them is ready for his exam right now, the other not so far advanced. Does that look as though I was trying to "Keep many a poor lad from getting his ticker", Mr. Daugharty?

This Carey W. Sullivan's letter isn't worth a comment. I gather from his attitude on Law Breaking that he is probably just another five meter bootlegger. Though I might reply to Sullivan that I am not 100% for S.W.&T. because of the magazine printing too many circuits of cheap five meter outfits which are an incentive to bootlegging.

To Mr. M. W. Soplop—I agree with you absolutely, and the fact that the Amateurs didn't reply, even though you sent postage, must surely prove to you that the cards were undesirable. So I will reiterate—Send cards to the Short Wave Broadcast stations where they will be appreciated.

Norman W. Hastings, the boy with the high blood pressure and the receiver which brings in all signals R9, states that he hopes he has pleaded his case to an acquittal. My lad, you have convicted yourself and are found guilty of being very foolish. You

emphasize the statement the call formation W2SWL, etc., is not a violation of the Radio Act of 1934. Mr. Hastings, you had better look up the regulations regarding call letters, before you make any such brash statements. And get the idea right out of your head that the FCC does not issue the calls W2SWL, etc., because you SWLs use them. Borrow a call book from some "Ham" and look up the call W9SWL, and then go dig a hole and crawl into it!

In my letter to the editor of this magazine I furnished proof, with a letter from the Federal Communications Commission, stating that there is no occasion for SWLs to print cards bearing the calls W2SWL, etc.

N2DDV, CHARLES FIEGE, JR., CRM, USNR.

A Bouquet

Editor,

Let me add my word of praise to your great magazine. Although a new subscriber, I was very much pleased by the information it contained in my first copy, particularly the article in the March issue entitled—"Simple Laboratory Practices for Beginners," by Jim Kirk, W6DEG.

I have gained much knowledge from this article and believe others have likewise. I think it would be a very good idea to publish it as a regular monthly feature in your magazine.

JOSEPH J. BARRY,
 37 Camp St.,
 Newark, N. J.

W3XAL's Short-Wave Voice

(Continued from page 73)

Central America—world-wide coverage!

Programs in French, German and Italian

Announcements and programs in French, German and Italian were started on W3XAL in July, 1937. For practically a year before this, the same service was being rendered in both Spanish and Portuguese. In the beginning, the special service of the NBC International Division was limited to South and Central America. Today, the Division operates from 9:00 a.m. to 1:00 a.m., EST, with an hour and a half of special programs for German-speaking listeners, two hours for the French, and one hour for the Italian. From 5:00 p.m. to 1:00 a.m., EST, programs in English, Spanish and Portuguese are broadcast, with one hour of Spanish especially for the Argentine and one hour in Portuguese especially for Brazil.

Reunion Enjoys American Music

In one instance, word came to NBC from a Prince on the Ile Reunion in the Indian Ocean by way of an amateur radio operator in Scranton, Penn. According to the Pennsylvanian, Prince Vinh San, who lives in the city of St. Denis, Ile Reunion, enjoys NBC's short-waved programs of popular American music. The Prince communicated this message by means of his own amateur broadcasting station.

Another communication, this one direct, came from a planter near Port Vila, New Hebrides, Oceania. "I listen to your broadcasts right straight along, which are heard well-nigh every day with perfect clarity," he wrote. "Your programs are very interesting . . ."

Germans Like W3XAL

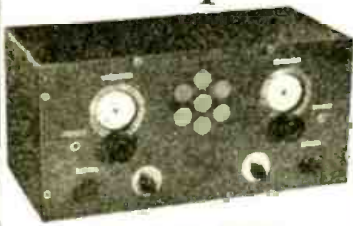
Each period of special broadcasts has brought its response. The German period has inspired letters from listeners in and close to the Fatherland and from Germans in the colonies of Africa. A writer in Oldenburg, Germany, said: "... your broadcasts are making friends and, speaking for myself, I derive great pleasure from your broadcasts and am particularly fond of American rhythm . . ." A young man, writing from Wiesbaden, Germany, said that he not only had been improving his English by listening to W3XAL, but also was deriving great pleasure from "your dance music, particularly the new dance, 'Big Apple.'"

French Enjoy American Programs

The French also are voluble in their appreciation of the special programs broadcast to them in Europe and many out-of-the-way places of the world. A listener in Diego-Suarez, Madagascar, wrote: "I hereby address you to convey the expression of my warmest congratulations upon the quality of your broadcasts, which are very clearly heard here." He also pointed out that he had just been listening to the six-day bicycle races "in which a crashing spill of the Dutch rider Couval has been mentioned."

From Beirut, Syria, a Frenchman wrote that "all in all your broadcast is perfect and I thank you therefor." And from Rabat, Morocco, came a communication which read: "I hasten to add that twice a day I listen in with real satisfaction and tenfold pleasure, since hearing is so distinct, something never believed by me heretofore." Conakry, French Guinea, is the point from which another enthusiastic

Radio Operators!—Don't Miss This One—



Sargent Model 11

Tuned R.F. with regeneration—still the best circuit in the opinion of many experienced operators in position to know. Engineered to 1938 standards with coil switching, band spread, calibrated dial, break-in switch, all other important features. No tube hiss, no "images." World-wide range, C.W. and voice. Gets those weak C. W. signals that are lost in tube noise on many large receivers. Read the letter in the next column, from a Radio Operator who is using a 110 volt D.C. Model 11, covering 9.5 to 20,000 meters. This is only one of many that we have received. Model 11 is available in all A.C., D.C. and battery voltages. A pleasant receiver to operate, ruggedly built from best obtainable parts, good tone, easy to tune, flexible, sensitive, selective. Available in 3 tuning ranges.

Net Prices—A.C. Models

Model 11 A.A. 9.5-550 meters... \$52.00
Model 11 M.A. 9.5-3750 meters... \$57.00
Model 11 U.A. 9.5-20,000 meters... \$77.00
Immediate Delivery. Prices include power supply, speaker and RCA tubes.

E. M. SARGENT CO.

212 9th St. Oakland, Calif.

SS Nils Moller
Aberdeen, Wash.
Mar. 4th 1938

Mr. E. M. Sargent

Dear Sir:

I wish to thank you for the prompt service in forwarding my Model 11-UD receiver to Portland, and to advise you that I received it in perfect condition on my arrival.

I have given it an exacting and thorough test, and can honestly say I have never handled a better receiver. As no doubt you know, I've had it for nearly a fortnight now, and during that time, although short wave conditions have at times been very bad, I have had no difficulty in locating and bringing in at full volume, London, at any time this station is on the air.

On the long wave, GBR, Rugby, has come through at fair to good volume on each broadcast of traffic lists and messages. This I believe is extremely good work for any type of receiver.

In use on 600 meters and other ship bands, the receiver excels in both volume and selectivity when these are required. Also I find the trimmer a good control for varying selectivity so as to broaden signals, facilitating watch keeping on 600 meters.

Once again thank you for your service, and congratulating you on the receiver's performance, I remain

Yours sincerely,

J. B. Moller
Wireless Operator.

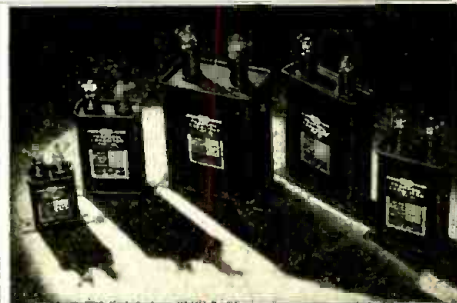
listener wrote: "My friends who also have sets identical with mine are all in accord in finding your broadcasts to their liking and the pleasure is all the more enhanced by the fact that the language you use is impeccable, since it is always a pleasure for a Frenchman to hear his native tongue." Letters along much the same lines have been received from Izmir, Turkey; Port Louis, Mauritius Island, Indian Ocean; Mexico City, Mexico; Canpulong, Muscel, Rumania; Dakar, Senegal, French West Africa; St. Tome, Portuguese West Africa; Koulhuba, French Soudan, and Brazzaville, French Equatorial Africa.

Typical of letters from France, itself, is one addressed from Heris les Bains, in which the writer avers: "It is hardly necessary to emphasize the pleasure derived in listening to a voice in French coming from 6,000 kilometers away and I am grateful to W3XAL for devoting two hours a day to broadcasts in our language."

A listener in Para, Brazil, has written his appreciation of increased service to Latin America. He says: "Now with the Brazil hour my interest has redoubled, since the scope of the program has been broadened, both in regard to news reports and in regard to cultural entertainment. The broadcasts of W3XAL are heard here very distinctly, and with a power greater than that of any other American station."

Others of NBC's listeners in South and Central America write from the Republic of Panama, Cuba, the Cape Verde Islands, Porto Rico, Mexico, Ecuador, Chile, Paraguay, Argentine, Uruguay, and many more places. Portuguese in Portuguese West Africa and Spaniards in Spain also hear the broadcasts and write their commendations to NBC.

In addition to a radiator antenna, W3XAL operates two directional beam antennae, one for Europe and the other for South and Central America. The directional antennae concentrate the power behind the wave upon the region for which the broadcasts have been prepared. The best sustaining programs of both the NBC-Red and the NBC-Blue Networks in the United States, as well as specially prepared programs, are broadcast by the short-wave station.



TRANSOIL

for transmitting

**HIGHEST QUALITY
OIL CAPACITORS**

Ask for new complete
Transmitting Catalog
describing

TRANSOIL—SOLAR—TRANSMICA

SOLAR MFG. CORP.  599 BROADWAY
NEW YORK CITY



New Model T-3 MICROPHONE Makes Decided Hit

Admired for beauty and praised for performance everywhere. Tilting head permits directional or non-directional position. Complete with interchangeable plug and socket connector.

List Price \$25.00

**ASTATIC MICROPHONE
LABORATORY, INC.**

Dept. J-8, Youngstown, O.

Licensed Under Brush Development Co. Patents

DON'T BUY!!

Radio Tubes, Parts or Equipment

until you have sent for our new confidential Wholesale Catalog. Lowest prices. To prove that, send for our latest fall bulletin and compare prices.

"One of America's Fastest Growing Mail Order Houses"

UNITED RADIO CO., 58-C MARKET ST.,
NEWARK, N. J.



Tractor Light



Camp Light



Barn Yard Lighting



Auto, Truck & Trailer Camp



U. S. ARMY SIGNAL CORPS LAMP

Cost Uncle Sam about \$25.00. (Shipping weight \$250)
Your cost complete for only \$2.50 (18 lbs.)
F. O. B. N. Y.

The Lamp of 100 uses—for tractors, trailer camps, night sports, police emergency trucks, day and night scout signalling, farm-yard lighting, window lighting, night club spotlights, etc.

Has a day range of 1 to 6 kilometers and a night range of 3 to 10 kilometers (Note: a kilometer is equivalent to 3,281 feet or 3/5 of a mile).

May be quickly and easily set up for use. May be operated from four dry cell batteries or from a six volt storage battery or from a small bell ringing transformer, or may be plugged into any radio set using 6.3 tubes.

Finished in Army Olive Drab Enamel. Has a 12" genuine silver plated reflector. Packed in a portable wooden carrying case 22 1/4" long, 12" high and 13 1/2" wide, with hinged cover, hasp and metal carrying handles. Every case contains weatherproof extension cord and plug, 4 extra bulbs, telegraph signalling key (valued at over \$1.00) and 16 page U.S. Army illustrated Instruction Manual.

Write for 8-page catalog describing many other BIG VALUES

GOLD SHIELD PRODUCTS
350 Greenwich St., Dept. S-6 New York City



Scouts Signalling



Night Bowling Alleys



Trailer Lamp



Night Motor Boat Races

The HK-54 200 Watt Xmitter

(Continued from page 101)

sistor we are over-driving the buffer-doubler. If desired a smaller tube such as the 6F6 or the 41 may be used in place of the 6L6 oscillator. Or the grid tap on the oscillator tank may be taken off at the lower end of the coil (nearer the B plus end) in order to reduce output.

Screen voltages are obtained with dropping resistors, 100,000 ohms for the oscillator and 20,000 for the buffer-doubler.

Bias Considerations

Bias for the first two stages is a combination of cathode and grid resistors. This combination is logical because there is less danger of damaging the tubes during tune-up; the plate current falls to a safe value when excitation is removed. In the final amplifier we have also used a combination bias arrangement. Fixed bias is supplied by the 45 volt battery and the automatic bias by the 5,000 ohm grid resistor. The 54 has high enough amplification factor to permit 45 volts to bring the plate current to a very low value when excitation is removed. If the buffer-doubler is keyed, instead of the final, the battery bias should be increased to the point of plate current cut-off.

Only one meter is used for all stages. Jacks are provided on the panel for each circuit that requires metering. If this system is followed be sure that the final plate jack is well insulated because it has full plate voltage on it and the panel is grounded. Also keep your fingers away from the jack, because you are only flirting with the angels if you touch it!

High voltage is obtained from a separate unit which can be placed in back of the R.F. chassis. Built on an 8x17x2 inch chassis this unit includes the plate transformer, the filter choke, filter condenser and the 866's, with their filament transformer. The high voltage transformer delivers 1250 volts at 250 mls. This is low voltage for the 54 but results in 150 watts output. Voltages up to 2000 may be safely applied to the 54 with a great increase in power output. It is a cinch to make this little 54 give up 210 watts with no sign of strain. If the higher voltage is employed we suggest all tuning-up be done at lower voltage. These little tubes will take it, but when a maladjustment is made if for only a moment, with 2000 volts on the plate, it is almost a certainty that the momentary input, which is nearly all dissipated by the plate, will run up to a half kw. and over. This is too much for even the largest tubes to stand, much less the little ones.

10 to 80 Meter Range

This transmitter will operate with good efficiency on all bands from 80 to 10 meters. The output, of course, depends on the plate voltage of the final amplifier. For four-band operation, three crystals are necessary—one for each of the three lowest frequency bands. This allows the choice of two frequencies in all but the highest frequency band.

As for antennas we suggest that the reader refer to past articles for there is not space enough for complete details. We might say though, that the doublet is about the best for general operation.

List of Parts

- HAMMARLUND (Condensers, Chokes, etc.)
- 1—100 mmf. APC-100 for mounting in oscillator coil form
- 1—200-mmf. MC-200-M variable cond.
- 1—100-mmf. split-stator cond. MTC-100-B

(Continued on page 121)

My Creed . . .

To give you specialized personal service of genuine value that is not available from other jobbers.

To finance all my time sales myself so that I can sell all receivers, transmitters, and parts to you on terms arranged to suit you with less interest cost.

To take your equipment in trade at a fair value. To allow you to try any receiver for ten days without obligation and to cooperate with you in every way I can to see that you are entirely satisfied.

Compare Bob Henry's Terms with Others

Model and Receiver	Cash Price	Down 12 Monthly Payments	Monthly Payments
NC80X and NC81X	\$99.00	\$19.80	\$6.99
NC101X	129.00	25.80	9.11
RME-69	151.20	30.24	10.69
Brethling 14AX	99.00	19.80	6.99
The NEW Sky Buddy	29.50	5.90	2.08
Sky Champion	49.50	9.90	3.49
Sky Challenger III	77.00	15.40	5.44
Super Skyrider	99.00	19.80	6.99

Also Super Pro, ACR-111, PR15, HRO, others.

Similar terms on Harcey, RCA, RME, Tecoco transmitters and Progressive, Utah, Stancor, All Star kits.

All orders and inquiries attended to by Bob Henry, W9AKA, active amateur for fourteen years; graduate E.F. from M.I.T.; owner of Henry Radio Shop selling amateur supplies for ten years. Your inquiries invited.

HENRY RADIO SHOP

211 North Main Street, Butler, Missouri

HOTEL DRAKE

SOUTH CAROLINA AVENUE
AT PACIFIC
ATLANTIC CITY,
NEW JERSEY

European Plan Hotel — Moderate Rates • 150 Outside Rooms Beautifully Furnished • Convenient to Piers, Theaters and Churches • Also Bus and Railroad Depot • Garage Accommodations.

For Literature and Rates, Address
W. GRAHAM FERRY, Mgr.

CHASSIS — CABINETS PANELS & CANS

STANDARD SIZES ON HAND
SPECIAL SIZES MADE TO ORDER
KORROL RADIO PRODUCTS CO.

350 Greenwich St. Dept. S-6 New York City



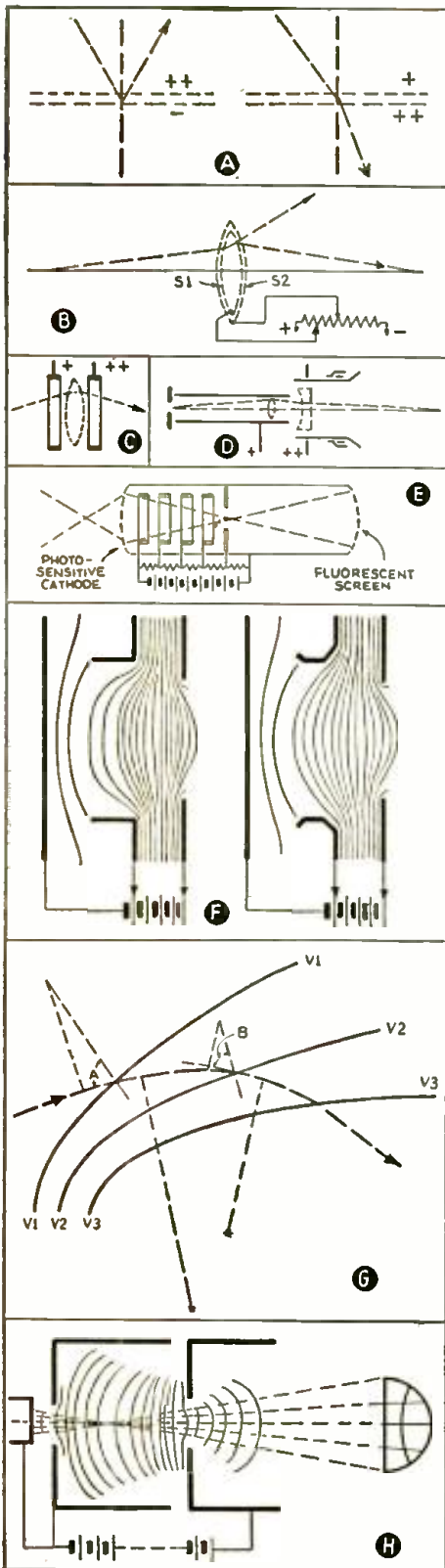
A 2 FT. SLIDE RULE!

Big Divisions: Easy to Read: Accurate! Features of the new APEX slide rule. Dia. of Circular Metal Slide Rule is 8 1/4". C scale is 25" long, insuring high accuracy readings. See large clear scale opposite. Price, with instructions, prepaid \$5.00. Satisfaction guaranteed. 4" Dia. Midget metal slide rule, special price \$2.00, inc. case and instructions.

DATAPRINT CO.
Box 322a, Ramsey, N. J.

"Seeing" with Electrons

(Continued from page 97)



A, reflection and refraction of electron beams by charged screens. B, wire screen electron lens; with S-1 positive, lens will converge ray, if S-1 is negative, ray is diverged. C, converging electron lens constructed of two ring electrodes. D, electron lens as used in oscilloscopes. E, electron image tube using electrostatic focusing. F, modification of electrodes in second electron lens and consequent change in field. G, how path of an electron through a series of equipotential lines is plotted. H, electron image forming system.

varied over wide limits. If an infra-red image is used to illuminate the photo-sensitive surface, then a visible image corresponding in every way to the original one is formed at the screen. The ability of infra-red rays to penetrate fog and smoke is well known and so the applications of such an electron optical system will be obvious.

It has been known for many years that electrons will penetrate thin films of metal and, in fact, tubes have been constructed in which the electrons have been projected through a foil window into the outside air. It may be feasible to use such an arrangement in conjunction with an electron optical system, to examine materials which could not stand the low pressure within a vacuum tube. Due to the magnifying and resolving power of such a device, it seems reasonable to suppose that it would be of value in the study of small bodies, such as germs.

Modern Television Systems Use Electron Optics

Apart from these future developments, electron optical systems are of great value at the present time. Almost every modern television system uses electron optical devices at the transmitter and at the receiver. In the receiving tube, where a small but intense spot of light must be formed, electron lenses are used to form an image of an aperture illuminated with electrons emitted by a heated cathode. In one type of transmitting tube, an *electron image* of an optical image is formed. In the former device, electrostatic and magnetic lenses are both extensively used, while in the latter, a magnetic lens is preferred. The electron lenses in a receiver tube are designed to produce a spot at the screen as small as, if not smaller than, the object. In most practical cases it is the aberrations of the system rather than the refractive power of the lens which limits the size of the spot.

In an effort to reduce the aberrations of the systems, arrangements of electrodes are used so that electrostatic lines of force passing from one electrode to the next are nearly parallel to the axis of the system. Furthermore, these lines of force do not change their direction abruptly; but rather "flow" in gradual curves. In practice, it can be assumed that the electrons are refracted by a series of spherical surfaces. The index of refraction of the electron lens varies continuously along a considerable distance. The velocity of an electron is a function of the square root of the potential existing at any point in its path, and so the refractive index of an electron lens is proportional to the ratio of the square roots of the potentials applied to the electrodes of the system.

Before the properties of an electron lens can be computed, it is necessary to know the distribution of the electrostatic field. It is exceedingly difficult to derive an expression showing this distribution by theoretical means. Therefore, experimental methods are always used to obtain what is known as an equi-potential line plot of the system. An equi-potential line is one which joins all points in the lens space which have the same potential with respect to electrodes. Actually, of course, the distribution can be better expressed in the form of equi-potential surfaces, but as the systems are always symmetric, then a cross-section of the surface or equi-potential line is satisfactory. If an electron lens is to be

(Continued on page 110)

★ A REAL P. A. TUNER

—Designed for the Job!



COMPLETE KIT
(Lean Tubes)
Nothing Else to Buy

SUPER-HET PERFORMANCE TRF SIMPLICITY AND TONE

HERE'S a practical, super-sensitive Public Address Tuner you can build yourself easily and quickly . . . one that will give you high fidelity reproduction of broadcast programs . . . an outfit that will bring in distant stations clearly as your customers want them. Here's a chance to make more money in the P.A. business!

With this kit you can build high grade P.A. Systems into schools and other public gathering places — with the assurance of trouble-free performance and complete satisfaction. Ideal for temporary jobs, too — it delivers the stations you want without audio distortion from image interference or side band cutting.

Four Tuned Circuits using Ferrocart (Iron Core) Shielded R.F. Transformers. Hi-Q Coils provide enormous gain and selectivity. Four gang precision condenser with low minimum capacity each section. Full automatic volume control prevents variation in output level on fading signals. Compact — 8 $\frac{3}{4}$ x 12 $\frac{1}{2}$ x 8 $\frac{3}{4}$. Two tuners may be mounted side by side on one panel of a standard relay rack.

Power supply operates directly from 110 volt, 60 cycle lines. Requires three 6K7, one 6H6, one 6F8G and one 5Z4 Tubes.

By all means, see the Meissner P.A. Tuner Kit at your jobbers today. And write direct for more information.

ANOTHER *Meissner* IDEA

MEISSNER MANUFACTURING CO.
121 Belmont Ave., Mt. Carmel, Ill.

Listen Comfortably with
BRUSH "Hushatone"
(pillow speaker)

Put this radio accessory under your pillow and listen to your favorite programs. Write for details.

The BRUSH DEVELOPMENT Co.
3326 Perkins Ave., CLEVELAND, OHIO

New 10c Publications!
See Page 114

MIDGET POCKET RADIO \$1.00
 Listen to Music and Sports Everywhere You Go
 Good reception with beautiful clear tones. The amazing midget pocket radio gives you all the excitement of a radio wherever you are—in the country, in bed, at camp, office, etc., etc. ANYWHERE and EVERYWHERE. Size of a cigarette package, yet it operates perfectly. Beautiful, clear tone. Simple, no tubes, no crystals to adjust. Just one moving part to locate stations. New sensitive receiver. Best regular aerial.
 Price Postpaid \$1.00. Colophone, BPC.

ALL WAVE WORLD WIDE RADIOS
 Remarkable results—simple operation—range 12 to 500 meters. Gets police calls, foreign stations anywhere, code book for foreign and domestic broadcasts, etc. with remarkable volume and efficiency. Only set complete without tube, volume or aerial.
ONE TUBE BATTERY KIT \$1.55
 Wired, ready to operate, \$2.30.
SUPER TWO TUBE BATTERY SET
 Gives better volume & reception. Complete kit, \$2.00.
 Wired, ready to operate, \$2.75.
ELECTRIC TWO TUBE Operates on house current. See an illustration. Powerful sensitive, kit \$3.00 wired, ready to operate, \$3.75.

BROADCAST thru your radio TALK - SING - PLAY
 BROADCAST your voice on programs coming through your own radio set—make announcements from any part of the house—insert wise cracks, josh and mystify friends, imitate radio stars, practice crooning, singing, radio acting, etc. Do a "Ben Bernie" or a "Studdy Vale".

World Mike
 Made especially for home use, attached in a jiffy without tools. Not a toy. Put on your own program at home, parties, club affairs, etc. Barrels of fun! Easy to operate.
Price Postpaid 25c

DELUXE MIKE
 Large, substantial, all-metal mike. Practice radio singing, broadcasting, etc. through your own radio. Reproduces voice in loud clear tone without distortion. Regular table model—can be held in hand. Guaranteed. Easily attached. Price \$1.00.

CRYSTAL RADIO 25c
 This is a radio in itself as it is possible to see reception with it alone within 25 miles of a station for up to 100 miles under good conditions. All you need is an aerial and ear phone. Completely assembled & wired with super-sensitive crystal cup, arm with spring, ready to use. Single Earphone, BPC. Aerial Kit, BPC.

ONE TUBE POCKET RADIO
 Tube Pocket Radio with built-in phone. MUSIC DIRECT FROM RADIO. Beautiful Cathedral tone. Complete in one unit with batteries. Tube, switch, fits in pocket. Listen anywhere. Powerful, 100 mile reception. Easy ordinary flashlight dry cell. Last several months. \$1.49.
 Price Postpaid \$1.49

Send 3c for our 600 page catalog of tricks, radio merchandise, etc
 Send all Orders to Johnson Smith & Co. Dep. 474 Detroit, Mich.

WIRELESS TRANSMITTER
 Transmit messages by wireless that can be picked up on a suitable radio receiver. A complete transmitting set. Uses 2 tubes. Rechargeable. Fits in any house current, 110 volts. AC. Contains condenser, coil, tube socket, etc. Key, wiring, arm, lamp socket, complete code, etc., etc. with instruction diagrams that make it easy to assemble. Set you can communicate with anyone. Only \$3.00 plus 10c postage. Tubes, 50c each.

mathematician and physicist combined with the knowledge and dexterity of the experimentalist. Unlike many other branches of science, the end is just as interesting and absorbing as the means. The ways in which electron optical systems may eventually be used are almost unlimited.

In the preceding paragraphs we have mentioned that infra-red rays can pass easily through fog and smoke and also that these rays can be converted into electron images and amplified and then transformed into visible light. What a wonderful aid to navigation this device could be! Rock salt lenses could be used to focus an infrared image on the photo-sensitive surface and the amplification could be so large that obstacles could be detected from considerable distances. Such a system might even be used in the art of communication, perhaps infra-red rays will be the eventual television carrier.

Future Opportunities for Electron Optics

The magnifying, amplifying and resolving power of electron optical instruments presage their wide-spread use in astronomical fields. Their ability to convert infra-red and ultra-violet light into visible light will be invaluable in the study of the stars. No longer need photographic plates be exposed for hours to detect far distant suns. Gone will be the practice of staring into eye pieces for a faintly luminous dot in a black sky.

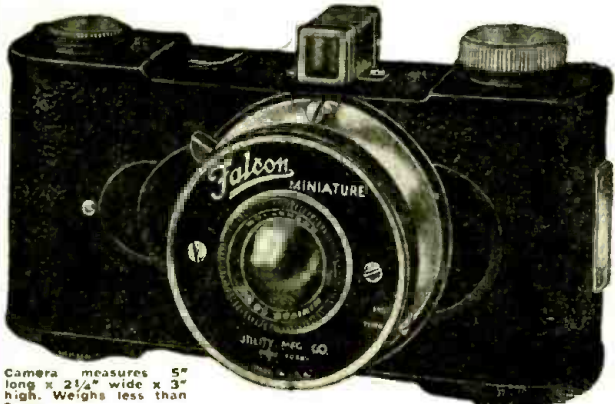
In the field of microscopy, electron microscopes will open new worlds which are far beyond the reach of conventional instruments. Already a great deal has been learned about the structure of emitting surfaces, such as the cathodes employed in the construction of radio tubes. Information such as this can be obtained in no other way. The same methods can be applied to the study of the surface structure of various materials and the "electron pictures" of these surfaces are invaluable. It is only reasonable to suppose that the electron optical examination of materials will be still further extended and we can expect much from the knowledge so gained in the fields of metallurgy and physical chemistry. It would seem that modified electron microscopes can be invaluable to medicine. The magnification and resolving power of the instrument may be put to good account in the search for new drugs and medicines, and for the fundamental secrets of disease. Even the secrets of life itself may be revealed by the use of an instrument which is basically capable of probing the structure of the chromosomes and the genes.

The amplifying ability of the electron image tube may be turned to good uses in many fields. For instance, one of the tubes might be used in conjunction with a motion picture camera. The intense image formed by the tube would make the huge lights now used on motion picture sets unnecessary.

The uses of electron optical principles are by no means all in the future, however. We have already mentioned the fact that present-day television systems utilize electron optical devices. The application of these principles can be broadened still further. They can be used in the design of radio tubes, both amplifiers and oscillators. One of the more familiar of the former types is the well known beam power tube which ably demonstrates the advantages of such design. Tubes having negative resistance characteristics have been constructed and are remarkable for their efficiency and stability.

Courtesy American Television Institute, Inc.

Action! Thrills! Sights! Fun!
In Every CANDID CAMERA Shot!



Camera measures 5" long x 2 1/2" wide x 3" high. Weighs less than 9 oz.

THE country's new craze—CANDID CAMERA shooting. Everyone from north to south—east to west is using a minicam. Anywhere you go—day or night, there's thrills and excitement taking CANDID CAMERA pictures. In a flash you catch your subject—a popular golfer, a screen or radio star, a ball player, your children, a racing scene—anything you want. This minicam, popularly priced at \$3.98, takes 16 pictures—1 1/2" x 1 1/4" in size—takes instantaneous or time exposures. Equipped with Wollensak 50 mm. lens, speed shutter and "spy glass" view-finder. Fixed focus assures sharp pictures. Has special compartment to carry extra film roll and tripod socket for mounting when desired. Sturdy bakelite case finished in ebony black. Uses Kodak 127 or Agfa A8 film. Extremely inexpensive to use. Shipped POST-PAID in U.S.A. with guarantee of safe delivery. **\$3.98**

HUDSON SPECIALTY COMPANY • 40-T WEST BROADWAY • NEW YORK, N. Y.

300 WAYS TO MAKE MONEY

SPECIAL INTRODUCTORY OFFER
 Good Only For A Short Time
10c PER COPY



68 PAGES
CASH IN!
 A Brand New Book 1938 Copyright
 In "CASH IN" you will find all the real money-makers—dozens of profitable tested mail order plans, confidential business secrets, dozens of practical tested formulas, successful, and honest tested schemes—many actual experiences of men who have started on the proverbial shoestring—with less than \$10 capital. "CASH IN" contains 68 pages of tested ideas covering every type of full-or spare-time enterprise—it is really a "masterpiece" in business ventures—OVER 40,000 WORDS IN THE TEXT.
 Special Introductory Offer—**10 CENTS per copy. (Regular Price 25c).** Sent POSTPAID anywhere in U. S. upon receipt of ten cents in stamps or coin.
NATIONAL PLANS INSTITUTE
 246-T FIFTH AVENUE NEW YORK, N. Y.

FRAD SERVICE MEN EXPERIMENTORS

SCHEMATIC DIAGRAM—ANY RADIO .50
 ANY SINGLE TECHNICAL RADIO QUESTION ANSWERED .25
 BUILDERS PLANS ANY TYPE RADIO \$1.00
 Write for information of Valuable Services
RADIO RESEARCH LABORATORIES
 Dept. 2, 415-417 Deardrick St. Knoxville, Tenn.

"Seeing" with Electrons
 (Continued from page 109)

completely determined, many hundreds of these lines must be found. The lines of force are at right-angles to the equipotential lines, and so the electrons are accelerated at right-angles to the direction of the equipotential lines. The force exerted by the field is proportional to the voltage, while centrifugal force will tend to prevent the deflection of the electrons by the field. The path of the electrons through the whole electron lens can be computed step by step in terms of the deflection at each equipotential line. Other means, however, have been developed which are shorter and more convenient for the various types of systems, although of course, the more complex method must be resorted to in many cases.

In general, the design of electron optical systems is one of the most fascinating subjects that one can imagine. The art is a blend of the science and skill of the

Hints for the Facsimile Experimenter

(Continued from page 89)

grams—can be readily used; the fluctuations in the plate voltage of an audio amplifier output tube in a receiver (50 to 200 volts) being sufficient to record satisfactorily.

Another system of interest to the facsimile experimenter employs a neon crater tube as one of the diagrams shows, this tube being modulated by the picture signal. The fluctuations in the light beam from the crater tube are passed through a tapered quartz rod. The tube and its stylus rod is moved along on a carriage so as to

jet unit are mounted on a carriage propelled across the paper by a threaded rod or shaft driven by motor and gear. The paper is moved up the proper distance, about 1/60 to 1/100 of an inch per second, after each passage of the ink jet across it.

A wiring diagram is suggested herewith in which the corona type recorder is shown connected with a high-frequency oscillator. The synchronizing impulses which occur at the end of each line cause the sensitive relay to close the circuit to the release magnet and the cylinder starts rotating

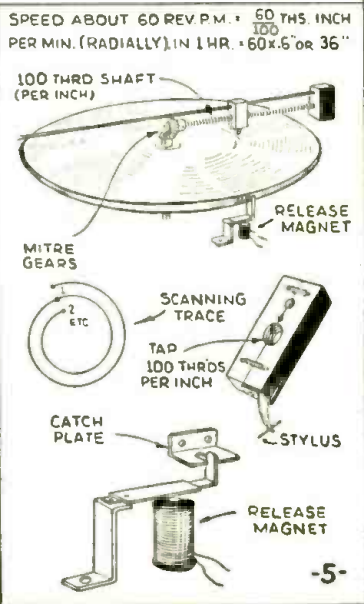
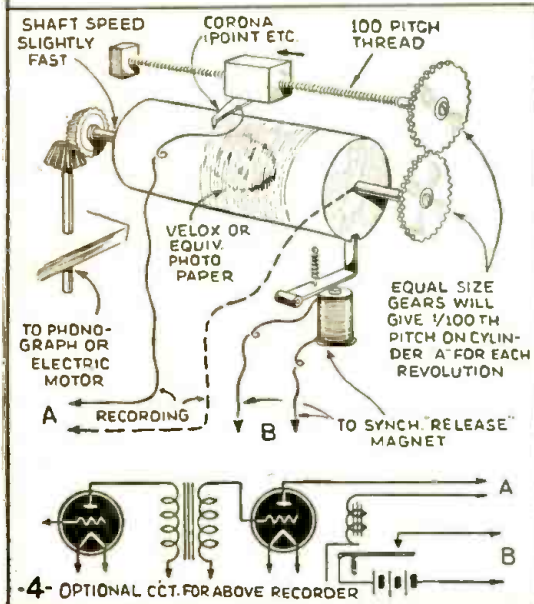
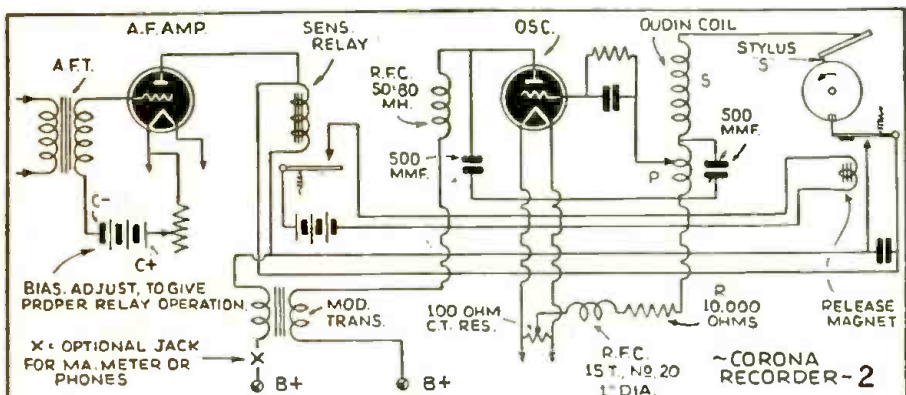


Diagram for corona type recorder shown at top. Below—recording on photo-sensitive paper with corona stylus and at 5, method of recording on flat turn-table.

give 60 to 100 lines per inch definition on a rotating cylinder covered with photo-sensitive paper such as Velox or Azo.

One of the systems developed by Captain Ranger is also shown and here a jet of vaporized ink is modulated by a magnetically operated valve as the drawing shows. In one of these systems, an ordinary paper is used and the ink jet causes a line of fluctuating width to be recorded on the moving paper. An ordinary throat spray atomizer might be improvised for this purpose by the experimenter, so as to spray a modulated ink vapor line on the moving paper. In one of the commercial types of recorders utilizing this system a piece of rubber tube connects the atomizer with the magnetic valve and ink jet. The valve and

again. The speed of the recording cylinder has to be experimented with and an old phonograph is a good piece of apparatus to start you off, as the speed of these machines can be regulated quite accurately. In any event, the speed of the recording cylinder (or paper) should be slightly faster than the speed of the transmitter. In this way, the recording device is always ready to trace just before the transmitter and it is likewise then always ready for the synchronizing impulse, which pulls down the magnet armature and releases the cylinder. Looking at the diagram we see that the modulation current is caused to modulate the high frequency corona discharge coming from the Oudin coil, by means of a modula-

(Continued on page 112)

EVERYTHING IN RADIO AT LOWEST PRICES



NEW KITS



Dealers! Service Men! Sound Men! Amateurs! Set Builders! ALLIED'S big, new Spring-and-Summer Catalog brings you everything in Radio—at sensationally low prices! Over 12,000 parts; revolutionary new P.A. Systems for every purpose—10 to 70 watts—portable, mobile, permanent; all types of latest test equipment; new Amateur Gear; Kits; books, tools, etc.—and 56 new, supervalue KNIGHT Radios with Push-Button Tuning, etc.—at amazing low prices.

Radio men everywhere say: "ALLIED'S catalog saves you time and money!" Send coupon now for Spring-and-Summer Issue—IT'S FREE! **FREE! RADIO BUILDER LISTS** We supply Free Parts Lists of matched kits for building any circuit described in this or any other magazine. Just specify where seen.

FREE CATALOG



ALLIED RADIO CORP. 833 Jackson Blvd. Chicago, Ill. Dept. 3-F-8

Send me your new Spring-and-Summer catalog—FREE.

Name
Address

SHORT WAVE CONVERTERS for CAR RADIOS



Can be attached to any car radio. **MODEL 600** covers 40-31-25-20-19 and 16 meter bands. Designed for American and Foreign short wave broadcast. Distance range 5000 to 10000 miles. List Price\$24.95 **MODEL 700** long wave covers 135 to 410 kc. Receives gov. weather reports, etc. List Price\$24.95

POLICE UNITS **MODEL 100** with fixed condensers, covers 1000 to 2000 kilocycles. List Price\$11.95 **MODEL 800** Super sensitive police converter with fixed condenser. Covers 1500 to 2600 kc. Two metal tubes, exceptional distance range. List Price\$15.95 **MODEL 200** with variable condenser, covers 1350 to 6000 kilocycles. List Price\$17.95 **MODEL 500** with variable condenser and illuminated dial. Very sensitive, has two metal tubes. Exceptional distance range. List Price\$21.95

Jobbers and Dealers wanted
ABC RADIO LABORATORIES 3334 N. New Jersey St., Dept. S-6, Indianapolis, Ind., U.S.A.

TAYLOR TUBES

MORE WATTS PER DOLLAR

FOR YOUR RADIO TRANSMITTER

EVERY TYPE IN STOCK FOR RUSH SHIPMENT

CAMERADIO

963 LIBERTY AVE. PITTSBURGH, PA. 30 TWELFTH ST. WHEELING, W. VA. Established 1919

BLILEY CRYSTALS

10-20-40-80-160 Meter Bands Now \$3.35 up. Bliley Electric Co., Erie, Pa.

RADIO INSTRUCTION

THE FIRST STEP TO CODE SUCCESS!

SEND FOR
FREE
BOOK OF FACTS
TODAY!



READ HOW CODE CHAMPIONS AND EXPERTS ACQUIRED THEIR AMAZING SPEED!

Let the world's greatest ops tell you the secrets of their success! Whether you are just learning code or trying for your commercial license, you should have this FREE book. Gives you the new F.C.C. requirements, typical exam questions and tips on how to practice effectively—dozens of pointers for beginners and advanced operators. Write for your FREE copy today! No obligation.

CANDLER SYSTEM COMPANY

Dept. S-6 ASHEVILLE, NORTH CAROLINA

RADIO ENGINEERING TRI-STATE COLLEGE DEGREE IN 2 YEARS.

Complete Radio Engineering Course in 96 weeks. Bachelor of Science Degree. Radio (television, talking pictures and the vast electronic field) offers unusual opportunities for trained radio engineers. Courses also in Civil, Electrical, Mechanical, Chemical, Aeronautical Engineering; Business Administration and Accounting. Low tuition, low living costs. World famous for technical two-year courses. Those who lack high school may make up work. Students from all parts of the world. Enter September, January, March, June. Write for catalog, 2568 College Ave., Angola, Ind.

LEARN CODE RIGHT

It's easy and practical to learn or improve your radio or Morse code, any speed. Senior model with 10 tapes and Book of Instructions—\$20.25. (Rented at low cost.) Junior model with 5 tapes and Book of Instructions—\$12.00. (Not rented.) Complete oscillator equipment, less battery, \$6.50. Send for details today to—

INSTRUTOGRAPH CO.
Dept. SW-6

912 Lakeside Place, Chicago



Canadian Representative: Radio College of Canada, 863 Bay St., Toronto
BUY ON CASH OR TERMS: HALLICRAFTER and R.M.E. SHORT-WAVE RECEIVERS, SPEED-X and VIBROPLEXES

RADIO COURSES

RADIO OPERATING: Prepare for Gov't License Exam. ● **RADIO SERVICING:** Including Short Wave ● **AMATEUR CODE** ● **ELECTRONICS** ● **TELEVISION:** Day and Evening Classes. Booklet Upon Request.

New York YMCA Schools
6 W. 64th Street, New York City

DO YOU LIKE RADIO & TELEVISION

If you want to know employment opportunities and requirements in radio and related industries, get National's book of facts. Send for YOUR FREE COPY TODAY
Dept. SW-C-6 4000 S. Figueroa

NATIONAL SCHOOLS
Los Angeles

Hints for the Facsimile Experimenter

(Continued from page 111)

tion transformer connected in the plate circuit of the oscillator tube. The values of the R.F. chokes and the resistors shown in the diagrams of the oscillator tube can vary over a wide range, and they will vary also with the type of tube used. The Oudin coil may be an ordinary broadcast tuning inductance, or preferably one having more turns of secondary wire on it than the usual broadcast coil. The primary of the coil is tuned by a variable condenser to get maximum corona at the stylus point. (A phonograph needle will serve.)

When the armature is attracted it incidentally closes a circuit (including a condenser) across the winding of the sensitive relay in the audio output tube of the receiver (to absorb any inductive surge).

The facsimile images are now being sent out on the regular broadcast frequencies and an ordinary broadcast type receiver can be used for this purpose, the recording device being connected in the place of the loudspeaker. The facsimile signal sounds like a low frequency note of fluctuating pitch if listened to on a speaker or a pair of phones.

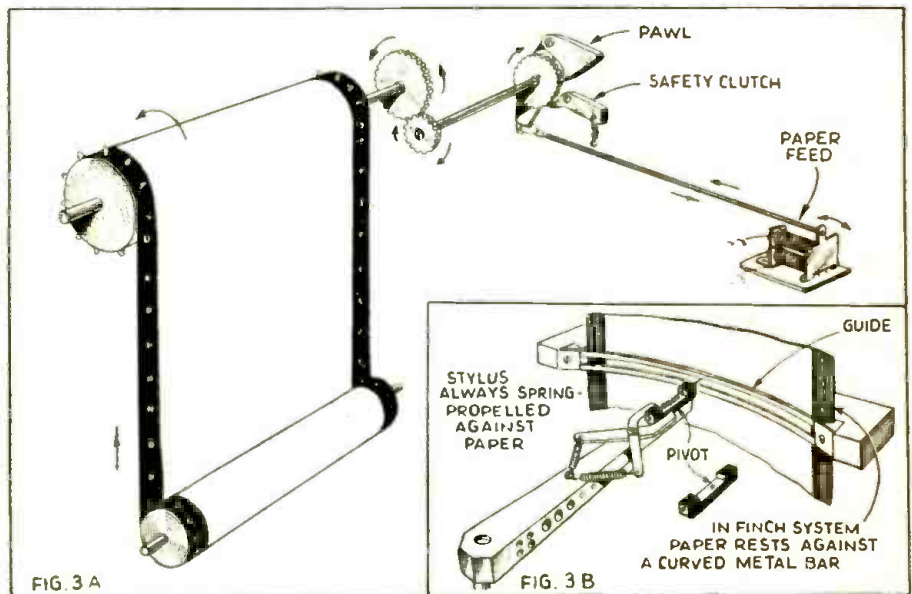
Some experimenters may want to try the recording of facsimile images with an ordinary disc-type phonograph, and one of the sketches shows an idea of how to rig such a set-up. The synchronizing impulses

(using a primary sensitive type relay) cause the release magnet to release the turntable each time such a pulse is received from the transmitter. As mentioned before, the speed of the turntable is regulated to be slightly faster than the required speed, so that the turntable is always ready for the synchronizing signal and ready to start on its next revolution. The carriage carrying the stylus, of whatever type you determine to try, may be carried across the turntable by means of a 100 thread to the inch shaft, rotated by mitre gears as shown in the picture.

This threaded shaft could also be rotated by a small motor if desired. It is a good idea to slit the stylus block as shown, arranging a hinge at one end or else simply mounting springs on the split block, which will enable the operator to quickly release the block from the threaded shaft and slide it back to the starting position.

CORRECTION NOTICE

With regard to the article entitled—"A 3 for 5 Receiver," appearing on page 688 of the April issue, the condenser used for bypassing the R.F. choke in the power supply, "C-10," should have a value of about .002 to .001 mf.



One method of feeding paper roll, line by line, is shown at Fig. 3A. 3B shows how stylus is arranged in Finch recorder.

1-Tube Duplex

(Continued from page 93)

against moisture, the coils should be coated with coil dope.

- 1—250,000 ohm ½ W. fixed resistor
- 1—50,000 ohm potentiometer with D.P.S.T. switch

CORNELL-DUBILIER (Condensers)

- 1—.5 mf. tubular condenser
- 1—.1 mf. tubular condenser
- 1—.0001 mf. mica condenser
- 2—.0005 mf. mica condensers

MEISSNER

- 1—Coil-shorting rotary switch, type 19203

RAYTHEON

- 1—1E7G tube

BLAN

- 1—Chassis as per specifications in drawing

Parts List

NATIONAL

- 1—100 mmf. tuning condenser, SE100
- 1—2½ mh. R.F. choke
- 1—Isolantite octal wafer socket
- 1—Velvet Vernier Dial type B
- 2—Small HRO dials

IRC (Resistors)

- 1—2 meg. ½ W. fixed resistor
- 2—50,000 ohm ½ W. fixed resistors

RADIO INSTRUCTION

MATH TABLES



\$1.25

Only \$1.25 for a complete set of practical, widely used mathematical tables containing four and five place logarithms, squares, cubes, roots of numbers, differentials, integrals, algebraic and trigonometric formulae, trigonometric functions and their logarithms, interest tables, areas and circumferences of circles, and many others. Convenient pocket size, 5 1/2 by 7 3/4 inches. 320 pages bound in flexible Fabrikoid. For students, teachers, engineers, draftsmen and others. Moneyback guarantee.

CHEMICAL RUBBER PUBLISHING CO.
1534 W. 112th St., Cleveland, Ohio

BE A RADIO SERVICE EXPERT



Modern receivers require men with modern training for service work. **LEARN AT HOME**

Our home instruction method and service equipment offer starts you earning money almost at once. Up to \$3 an hour easy in a short time. Write for free book.

Radio Training Ass'n of America
Dept. SW-86
4525 Ravenswood Ave., Chicago

RADIO POSITIONS

There are good positions waiting for well-trained men in radio. There are excellent opportunities with fine futures—but an advanced theoretical training and a COMPLETE PRACTICAL TRAINING are essential. Free Bulletin on Positions, Futures & Training.

LECTURERS

FRANK C. JONES Author "RADIO HANDBOOK" Author "Cath. Ray & Tel."
ARTHUR HALLORAN Author "Cath. Ray & Tel."
PACIFIC RADIO SCHOOL
Dept. C. 735 Larkin Street, San Francisco, Calif.

Wedge-Shaped Crystal

(Continued from page 77)

Frenchman discovered something else. He found that tuning circuits equipped with "cockeyed" crystals, or more precisely described, with crystals of wedge shape, retain their selective properties. The sides of their selectivity curve are as steep as customary, but instead of producing a very sharp and narrow pass-band, a remarkable broad pass-band results. Despite the extreme selectivity the lowest pipe of the organ as well as the highest soprano voice is reproduced by the radio receiver (see Fig. 1).

The whole trick consists of the discovery that wedge-shaped crystals do not resonate at a single sharply-defined frequency, but at a band of a great many closely related frequencies. See Fig. 2. Or said in other words; wedge-shaped crystals operate like a great number of separate crystals. Such a crystal resonates, as demonstrated in Fig. 2, on a great number of inter-related frequencies, and as result a resonance-curve is obtained which is broad on its head (see Fig. 3), but has steep sides, which reject the most powerful station on an adjacent channel.

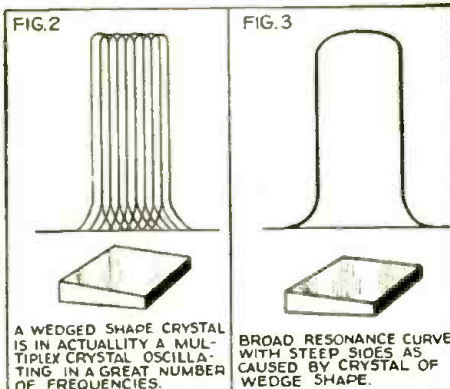
And now something else of interest. The width of this head—or more precisely described—of the pass-band obtained, depends on the thickness at both ends of the crystal. What this involves is demonstrated in Fig. 4. If the thickness of the crystal on side "A," is the determining factor for the oscillation-frequency F1, and the thickness of the crystal on side "B" is the determining factor for the frequency of oscillation F2, then the crystal oscillates at all frequencies between F1 and F2, as shown in detail in Fig. 2 (or in outline in Fig. 3). Thus by choice of suitable crystals of wedge-shape one can produce a pass-band of any width desired. In our case a bandwidth of 10 kc. (10,000 cycles) should be sufficient to satisfy the average demand

for faithful reproduction of any short-wave or broadcast program received.

How such a crystal looks is shown in Fig. 5. This crystal is of exaggerated wedge-shape for demonstration. In actuality this wedge-shape is less pronounced, and is hardly visible at a superficial inspection.

Mr. Guerbilsky is seen holding a wedge-shaped crystal in Fig. 6; it is shown in a conventionally designed American super-het, in Fig. 7. How the installation of the crystal was executed is shown in detail in Fig. 8. The power of rejecting unwanted stations is increased 5-fold.

The alterations consist mainly of rewiring the first I.F. transformer, as shown in Fig. 9, into a circuit as presented in Fig. 10.



A WEDGED SHAPE CRYSTAL IS IN ACTUALITY A MULTIPLE CRYSTAL OSCILLATING IN A GREAT NUMBER OF FREQUENCIES.

BROAD RESONANCE CURVE WITH STEEP SIDES AS CAUSED BY CRYSTAL OF WEDGE SHAPE.



THE THICKNESS OF THE CRYSTAL IS THE DETERMINING FACTOR FOR THE FINAL RESONANCE FREQUENCY. IF OF WEDGE SHAPE, CRYSTAL RESONATES IN ALL FREQUENCIES BETWEEN F1 AND F2.

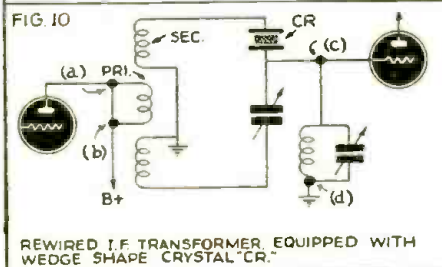
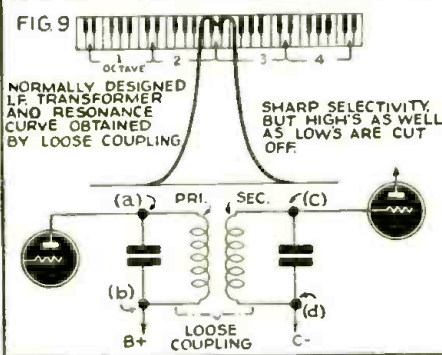
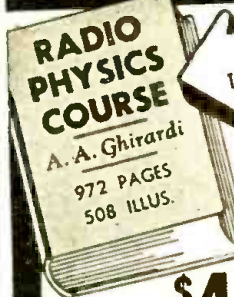


Fig. 2—How overlapping frequencies are selected as one band by wedge-crystal. 3—Broad resonance curve of wedge-shaped crystal. 4—Values of two extreme dimensions of crystal determines frequency band passed. 9—Resonance curve for average I.F. transformer—note sharpness which cuts off many desirable high and low frequency components of music. 10—New I.F. circuit with wedge-shaped crystal.

RADIO made EASY



THIS 1 BOOK TEACHES YOU EVERYTHING

The many exclusive features and plain, understandable language of Ghirardi's world-famous RADIO PHYSICS COURSE enable even beginners to master radio and television quickly, easily and almost without effort. That's why it is used by more radio schools and students than any other radio book in the world.

only \$4

HERE'S WHAT YOU GET:

Sound—Electrical Theory and Principles—Electric Currents—Electromagnetism—Transformers—Inductance—Condensers—Measuring Instruments—Radioactivity—Broadcasting—Receiving—Vacuum Tubes—Amplification—Superhets—Cathodes—Speakers—Receivers of all types—Short-Wave—Auto-Radio—Aircraft Radio—Public Address—Photoelectric Cells—Cathode-Ray Tubes—Television—Testing and Servicing—Sound Motion Pictures—Reference Tables—856 Review Questions for Self-Study—and DOZENS of other subjects!

TRY IT!

With this one book you'll teach yourself the whole science of Radio easily—no previous training necessary. Get started right now—write your name and address on this ad, and send it in with \$4 today (\$4.50 foreign) for your copy. Every penny of your money back if not satisfied! Free Circular—no obligation. Write at once!

RADIO & TECHNICAL PUBLISHING CO.
45 Astor Place, New York Dept. SW-68

with this 1 BIG BOOK!

HOW TO LEARN CODE

Whether you wish to enter radio as a career or merely add another valuable and fascinating accomplishment to your achievements, the All Electric Master Telex Code Teaching Machine will show you how.



Telex records your sending in visible dots and dashes on a specially prepared waxed paper tape and then sends back to you at any speed you desire. It does not merely show you code. It is code. No experience needed. Beginners, amateurs, experienced ops get ahead faster this better way. While not designated as standard equipment, Telex is used at many U. S. Army Posts, Naval Training Stations as well as the American Telephone & Telegraph Co. Also by practically every private school in the U. S. teaching the code; and many foreign governments. We furnish you complete course, including practice messages, the All Electric Master Telex, plus a personal service on a MONEY BACK GUARANTEE. Low cost. Easy terms. Without obligation write for booklet "88."

72-76 Cortlandt St., New York City

RADIO ENGINEERING

RCA Institutes offer an intensive course of high standard embracing all phases of Radio and Television. Practical training with modern equipment at New York and Chicago schools. Also specialized courses and Home Study Courses under "No obligation" plan. Catalog Dept. SW-38.

RCA INSTITUTES, Inc.
A Radio Corporation of America Service
75 Varick St., New York. 1154 Merchandise Mart, Chicago

JOBS in RADIO-TELEVISION

If you are seriously ambitious to make this fascinating, well-paying field your life work—if you have fair ability and are willing to train for success—write us. We'll tell you how we train men—how we fit them for good jobs, and help them get the jobs—how we qualify them to take exams for two Gov't. Licenses—how we prepare them for the glamorous future of television. A home-experiment course—with equipment furnished by us—followed by experience-training in our modern laboratories. The only independent school with 441-line electronic television equipment. Affiliated with Columbia basic network station W2WBC. Address MIDLAND TELEVISION, INC., 112-F Power & Light Bldg., Kansas City, Mo.

RADIO ENGINEERING,

broadcasting, aviation and police radio, servicing, marine radio telegraphy and telephony, Morse telegraphy and railway accounting taught thoroughly. Engineering course of nine months' duration equivalent to three years of college radio work. All expenses low. Catalog free. School established 1874.

Dodge's Institute, Turner St., Valparaiso, Ind.



BUILD IT YOURSELF!



The Publishers of Short Wave & Television Present
fifty 10¢ publications featuring construction
 of the most popular short-wave receivers and transmitters

THESE publications are large printed sheets which average in size about 11"x17", the majority of them printed on both sides. All have photographic reproductions of the complete project, as well as detail illustrations. In addition, there are complete wiring diagrams and various technical details to assist the experimenter and builder in constructing the set.
 Full parts lists are always given, and the printed text runs anywhere from 500 to 3,000 words, depending on the complexity of the radio receiver.
ALL RECEIVERS AND TRANSMITTERS ARE STRICTLY UP-TO-DATE; THERE ARE NO ANTIQUES OR OUT-OF-DATE PUBLICATIONS IN THIS LIST. These projects are particularly valuable to the experimenter and constructor who builds "his own". Indeed, the 50 publications shown on this page represent the cream of recent radio construction by the master radio builders

of America. Designs of this kind usually are sold for 25c to \$1.00 apiece, and frequently you do not get half the technical information we give you.
 Remember, for the ridiculously low price of 10c you can now buy a complete radio design with photographic reproductions, wiring diagrams, and full technical description making it possible to build each radio project in question.
 Please order each project by its serial number, and use the special coupon on this page. We accept money orders, cash, checks or new U.S. stamps (no foreign stamps or currency accepted.) If you send cash or stamps register your letter against possible loss.
THE PUBLISHERS OF "SHORT WAVE & TELEVISION" WILL REFUND YOUR MONEY INSTANTLY IF YOU ARE NOT FULLY SATISFIED WITH ANY ONE OF THE PROJECTS.

SPECIAL OFFER: IF YOU ORDER 12 OF THESE PUBLICATIONS AT ONE TIME THE PRICE WILL BE \$1.00, A SAVING OF 20c.

COMPLETE LIST OF 10c PUBLICATIONS

- HOW TO BUILD THE SWITCH BAND-2 RECEIVER.** A low-cost receiver for 6 volt battery or A.C. operation which enables the short-wave fan to hear stations in all parts of the world. No. 1
- HOW TO MAKE A 2-TUBE RECEIVER FOR THE BEGINNER.** This receiver consists of detector and two audio stages. A double purpose tube is used to secure the 2 audio stages. Tubes are for 1½ volt battery operation. No. 2
- HOW TO MAKE THE PORTABLE SUPERHET 4.** An ace all-wave superhet for battery operation. This receiver features band-spread and has a built-in beat oscillator. No. 3
- HOW TO BUILD A 4-BAND 3-TUBE SUPERHET.** A 3-tube receiver giving 4-tube results. Back and panel type construction is employed. It has a regenerative second detector. No. 4
- HOW TO MAKE A FIXED-BAND 8-TUBE SUPERHET.** This short-wave "fan" receiver tunes over a wide band of frequencies without coil switching or changing. It's a real performer. It operates directly from 110 V. A.C. and has band-spread. No. 5
- HOW TO BUILD A 5-TUBE SUPERHET FOR FAN AND HAM.** A sure-fire receiver for all short-wave enthusiasts. It uses plug-in coils and iron core I.F. transformers which assure plenty of gain. No. 6
- HOW TO MAKE A TWIN-PENTODE RECEIVER.** This receiver, especially designed for the beginner, employs but one dual purpose tube which gives results equivalent to a 2-tube receiver. It is for 2-volt battery operation with headphones. No. 7
- HOW TO BUILD AN EFFECTIVE SHORT WAVE PRESELECTOR.** A signal-booster that will greatly improve reception on any short-wave super. It employs two 6K7 tubes in parallel in a highly efficient circuit in which both input and output are tuned. No. 8
- HOW TO BUILD A REGENERATIVE 2-TUBER.** This unusual receiver has the tickler coil in the screen grid circuit of the detector. The receiver tunes from 9.5 to 12 meters. band-spread is included; metal or glass tubes may be employed. No. 9
- HOW TO MAKE THE S.W.&T. COMMUNICATIONS RECEIVER.** An unusually fine receiver for the critical Ham and Fan, incorporating many exceptional features. Regeneration is employed in the first detector stage which makes use of an acorn tube. The receiver also incorporates a noise-control circuit, variable selectivity control and a tuning meter. No. 10
- HOW TO MAKE A BAND-SWITCHING 2-VOLT RECEIVER.** This fine receiver for battery operation employs a band-switching arrangement, enabling the builder to tune from 18-550 meters by flipping a switch. No. 11
- HOW TO BUILD THE MULTI-BAND 2 RECEIVER.** A receiver for the short-wave beginner. It has a remarkable tuning range of 2½-270 meters with band-spread on all bands. Plug-in coils are used and complete data for an A.C. power supply is given. No. 12
- HOW TO MAKE THE VS-5 METAL TUBE SUPERHET.** This complete all-wave receiver boasts, among other things, variable selectivity, metal tubes, AVC and band-spread. The tuning range is from 17-550 meters. No. 13
- HOW TO BUILD A BEGINNERS 2-TUBE SUPER.** A simplified superhet using 2 volt battery tubes which is just the thing for the beginner. It employs plug-in coils which cover a tuning range from 15-200 meters. No. 14
- HOW TO MAKE A T.R.F.-3 FAN RECEIVER.** This is an all-around receiver employing 2 volt tubes. A T.R.F. stage ahead of the regenerative detector insures good selectivity and sensitivity. Band-spread is provided by a two-speed dial. No. 15
- HOW TO BUILD THE FORTY-NINER—A RECEIVER FOR LEAN PURSES.** This novel receiver features a space-charge detector and requires only 12 volts of B battery. It uses 2-49 tubes which may be operated from any 2 volt A battery. No. 16
- HOW TO MAKE A REAL 5-METER SUPERHET.** This carefully designed receiver for ultra-short wave reception employs a straightforward circuit. Careful placement and high quality parts insure fine results. No. 17
- HOW TO BUILD THE 2-VOLT SUPER DX-4.** This superhet, though small in size, is big in performance. Using battery type tubes, it features continuous band-spread, and automatic volume control, which may be cut in or out as desired. No. 18
- HOW TO MAKE THE ULTRA-HIGH FREQUENCY WIZARD-6.** This is a first-class 5-meter super-regenerative receiver, using acorn tubes in the R.F. and detector stages. The other tubes are of the metal type. The use of the acorn tubes insures exceptionally fine results. No. 19
- HOW TO BUILD A HIGH-GAIN METAL-TUBE RECEIVER.** This little receiver is a real performer, tuning from 10-200 meters. Continuous band-spread is provided. No. 20
- HOW TO BUILD THE WORLD-WIDE 10-METER CONVERTER.** Many enthusiastic reports have been received from the builders of this unit, which may be attached to your present receiver for picking up 10 meter signals from all parts of the world. Only 2-tubes are used. No. 21
- HOW TO BUILD A DE LUXE 3-TUBER.** This is the receiver for the Ham or Fan who wants a really high class receiver of simple design. It employs an unusual band-spreading dial. The circuit, employing metal tubes, has a stage of T.R.F. followed by a regenerative detector and a stage of audio. No. 22
- HOW TO BUILD THE OCTODE METAL TUBE-3.** This receiver is capable of excellent performance on the short waves. It requires only one plug-in coil for each band as a stage of untuned R.F. precedes the detector. It also has an A.F. stage for boosting the volume to comfortable headphone level. No. 23
- HOW TO MAKE THE 3-IN-1 REFLEX SET.** A 2-tube giving 3-tube performance. This receiver which does its work with a minimum of tubes. A 6BT is used as a combined I.F. amplifier, detector and first audio stage; a 6T5 is used as second audio stage. No. 24
- HOW TO BUILD THE 100 WATT QRM DODGER—A COMPACT 6-METER TRANSMITTER.** This M.O.P.A. rig puts out a hefty signal and by use of a calibrated vernier oscillator control will overcome the QRM problem on 5 meters. No. 25
- HOW TO BUILD A DE LUXE 5-METER MOBILE STATION.** A really fine M.O.P.A. mobile transmitter which will work real DX on portable location. It employs five metal tubes. No. 26
- HOW TO BUILD THE H-G-M MEDIUM POWER TRANSMITTER.** A crystal control set with an output of 90 watts. Band-switching is employed for operation on the 80, 40, 20 and 10 meter Ham bands. It gave excellent results under test. No. 27
- HOW TO MAKE THE 806 ALL-BAND TRANSMITTER.** An unusual transmitter delivering 400 watts output from an 806 final amplifier. A crystal pen-tet oscillator is used, followed by a driver stage. Real DX has been worked on 10, 20, 40 and 80 meters with this smooth working job. No. 28
- HOW TO BUILD A 125-WATT MODULATOR USING 35T's.** This is an ideal unit for the amateur and will modulate any transmitter with a power input up to about 400 watts. A total of 10 tubes are used including the power supply unit. No. 29
- HOW TO BUILD THE C-O-M 150 WATT TRANSMITTER.** An unusual crystal oscillator, multiplier with but one tuned circuit. It uses a pair of 8K3T's in parallel with a RK39 driver. The crystal oscillator circuit uses a 6L6. No. 30
- A LONG-LINES TRANSMITTER FOR 1-METER TRANSMISSION, AND A COMPANION RECEIVER.** A really special job for the seriously minded experimenter. This outfit permits short distance contacts in this interesting band. No. 31
- HOW TO BUILD A 200 WATT XMITTER WITH PEN-TET EXCITER.** This transmitter will really go to town. The use of the Pen-Tet crystal oscillator and frequency multiplier circuit eliminates many headaches from cracked crystals. No. 32
- HOW TO BUILD A 10 AND 20 METER TRANSMITTER.** A 200 watt transmitter which worked worldwide DX on test. Although compact, it is highly efficient in the 10 and 20 meter bands. Five tubes are used. No. 33
- HOW TO MAKE THE WIZARD 1-TUBE 50-WATT TRANSMITTER.** An amateur, crystal-controlled c.w. transmitter using the RK20 screen grid pentode. In tests, it compares with 250-watters. No. 34
- HOW TO MAKE THE "OSCILLODYNE" 1 TUBE WONDER SET.** One of the most sensitive short-wave sets designed, employing a really new circuit for the first time. Battery operated. No. 35
- HOW TO MAKE THE "19" TWINPLEX (ONE TUBE PERFORMS AS TWO) RECEIVER.** One of the most sensitive 1-tube sets ever designed and very popular. No. 36
- HOW TO MAKE THE IMPROVED 3-TUBE DOERLE SET FOR BATTERY OPERATION.** One of the finest of the Doerle series, by the famous short-wave inventor. No. 37
- HOW TO MAKE THE "GO-GET'EM 2" RECEIVER FOR THE BEGINNER.** This unusual 2-tube circuit gives 3-tube results. Battery operated. Excellent for beginners. No. 38
- HOW TO MAKE THE 1-TUBE ALL-ELECTRIC OSCILLODYNE.** This is the famous electrified short-wave receiver. Easy to build for little money. Operates on A.C. and D.C. No. 39
- HOW TO MAKE THE 2 TO 5 METER TWO-TUBE LOUDSPEAKER SET.** This receiver may be used with batteries or with an A.C. power pack. Packs a bit wallop. No. 40
- HOW TO MAKE THE 3-TUBE BATTERY SHORT-WAVE RECEIVER.** This receiver was a Prize winner in SHORT WAVE CRAFT. An unusual short-wave receiver, easy to build. No. 41
- THE BRIEF-CASE SHORT-WAVE RECEIVER AND HOW TO BUILD IT.** So small that the entire set, batteries, head set, aerial and everything, goes into a briefcase. Stations from Europe are often received. By Hugo Gernsback and Clifford E. Denton. No. 42
- HOW TO BUILD THE POCKET SHORT-WAVE RECEIVER.** One of the smallest, pocket-size, battery receivers ever designed by Hugo Gernsback and Clifford E. Denton. A marvelous set that brings in European stations. No. 43
- HOW TO BUILD THE CIGAR-BOX 1-TUBE "CATCH ALL" RECEIVER.** An effective short-wave battery set which fits into a small cigar box, insuring high portability yet great efficiency. No. 44
- HOW TO BUILD THE "DUAL-WAVE" SHORT-WAVE BATTERY RECEIVER.** With this set, you can hear both ends of radiophone talk, on one set of phones. In other words, you can listen to a ship at sea and the land station communicating with it, simultaneously, by means of this double receiver. No. 45
- HOW TO BUILD THE 1-TUBE "19" TWINPLEX RECEIVER.** The twinplex, although it has only one tube, works as if it had two. Marvellous in efficiency. Uses either batteries or A.C. power pack for "B" supply. No. 46
- HOW TO BUILD THE PORTABLE MINIDYNE SHORT-WAVE BATTERY SET.** Uses no aerial, no ground. The total weight is 3½ lbs. and measures 5x3x6 inches. Self-contained batteries, tube, condensers, and loop. Highly sensitive circuit. No. 47
- HOW TO BUILD THE HAM-BAND "PEE-WEE" 2-TUBER.** A dandy receiver with high efficiency and band-spread tuning. Works a loudspeaker. Yet the entire receiver is no larger than your hand. Works with either batteries or an A.C. power pack. No. 48
- HOW TO BUILD THE DUO-AMPLIDYNE.** The ideal 1-tube set for the beginner. One of the finest 1-tube sets; it really gives 2-tube performance. Made for battery operation. With only ten-foot antenna brings in the good European stations. No. 49
- HOW TO BUILD THE "MONO-COIL 2".** No more "plug in" coils. This set eliminates bothersome coils and is made to cover short-wave bands. Works with either batteries or A.C. power pack. No. 50

SHORT WAVE & TELEVISION, 99 Hudson Street, New York, N. Y.

I enclose \$..... for the publications listed by number at right at 10c each (\$1.00 for 12). You are to send all publications to me postpaid. I have drawn a line through each number that I wish.

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15
16	17	18	19	20
21	22	23	24	25
26	27	28	29	30
31	32	33	34	35
36	37	38	39	40
41	42	43	44	45
46	47	48	49	50

Name

Address

City State SWT-6

SHORT WAVE & TELEVISION
 99 HUDSON STREET
 NEW YORK, N. Y.

S. W. & T. 441-Line Television Receiver

(Continued from page 99)

will always be available, regardless of the type of transmission which is received.

The synchronizing signal separator diode operates directly from the output of the diode detector of the receiver, in order to eliminate all coupling condensers in this circuit. It has been found that such condensers invariably assume a charge in proportion to the varying average image modulation. This in turn causes the vertical sides of the image to vary in shape as the transmitted signal varies.

The diode tube is biased by the voltage across the cathode resistor of the triode, which makes the plate of the diode negative so that no signal is passed until the cathode reaches the negative peak of the synchronizing signal. At this voltage, a signal is passed to the triode, changed in phase and then fed to a network which separates the high and low components of the synchronizing pulse. A small inductance blocks the high frequency impulses and a condenser in series with the inductance bypasses surges from the grid circuit. The high frequency

ohm potentiometers were removed, this disconnected the metal covers from ground and greatly reduced the capacity of the resistance elements to the chassis. It is recommended that this change be made.

The layout of the parts can be seen in the photos. The input leads enter from the side, near the large end of the C.R. tube (the front end of the chassis). The 6H6G diode synchronizing rectifier and the 76 triode phase inverter are located alongside of each other, directly opposite this input point. The output of the triode feeds to the two type 885 tubes, which are on the sides of the chassis at the front end. One side of the chassis running from front to back is the high-frequency sweep side, and the other is the low-frequency side.

After the 885 tubes are the two control resistors which control the plate voltages on the thyatron (885) and the input to the push-pull amplifier. Next comes the first type 41 tube and between this and the second 41 of the P.P. amplifier is the resistance-capacity network which reverses the phase and reduces the input to the second 41 to 1/10th of the plate signal of the first 41. On the inside, between the second type 41 tubes of the high and low sweep circuits, are the dual potentiometers of the balanced centering circuits.

Right in the center of the chassis with the socket mounted on a U-shaped strip of aluminum, is the cathode-ray television receiving tube—a type 54-9-T. The front end of this tube rests in a cradle having a 5 inch semi-circular cut-out and a tape strap to hold the tube in place.

Under the chassis are the various condensers and resistors and the 1/2 hy. choke. These may be seen in the photo.

The leads which carry high voltage, the positive side of the 700 volt supply and the negative side of the 2400 volt supply are passed through heavy rubber grommets which aid the insulation of the wire and prevent chafing where the wires pass through the metal.

This chassis (the video chassis) is made of aluminum instead of the sheet iron which was used for the other two chassis.

Controls Are Simple

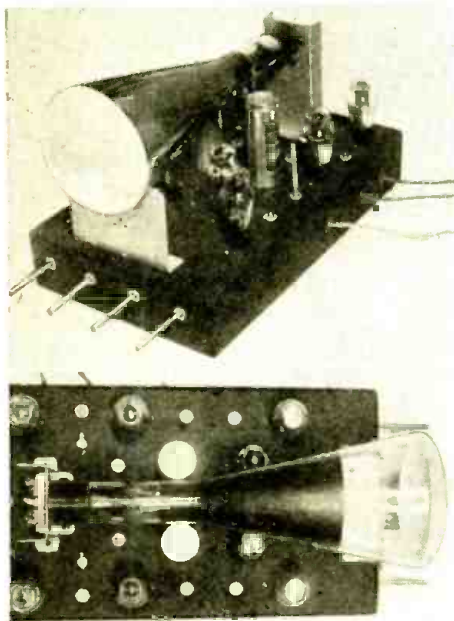
The controls which appear on the front of the chassis are the bias control of the type 6H6G synchronizing tube, the input potentiometers of the type 885 tubes and the 0.5 meg. focusing potentiometer of the voltage divider for the C.R. tube.

The .0006 mf. condenser and the 0.1 mf. condenser which are connected between the plate and cathode of the type 885 tubes control the frequency of the sweeps for high and low frequency scanning, respectively. These two condensers are correct for the standard 441 line images, 30 frames, interlaced, which are now being transmitted. If the receiver is to be used for other picture definitions or a different number of frames, these condensers will have to be changed accordingly.

Operation of the Set

Do not connect the input to the receiver, yet, and before turning on the current, set the sliders on all the control resistors to the center of their scales. Next, remove the two 885 tubes from their sockets and turn on the power. After a minute a greenish spot should appear on the end of the C.R. tube. Adjust this by means of the various controls on the front and top of the chassis to a small half-brilliant dot and center it by means of the centering controls.

(Continued on following page)

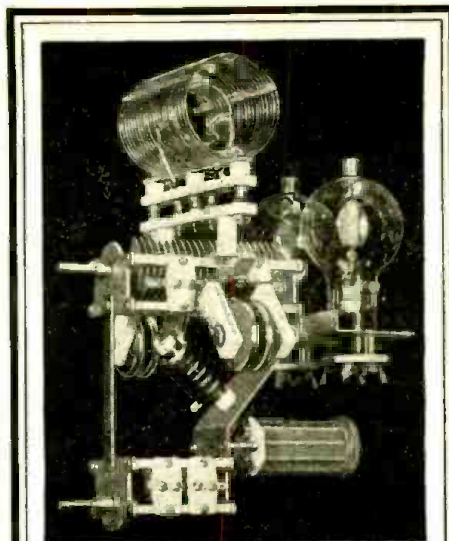


Front and top views of sweep circuit—cathode-ray tube chassis.

pulses are taken from the plate of the triode, while the low frequency pulses are taken from the remote side of the 1/2-hy. choke. Difficulty was encountered in obtaining a 1/2 hy. choke for the model and a 1 hy. unit had to be taken and half the core laminations removed to lower the inductance. The same procedure can be used by other builders.

It must be remembered that a voltage of some 3,000 is used on the cathode-ray tube and this voltage is dangerous! Turn off the current before making any adjustments or changes. Remember that the insulation at all points must be adequate to prevent breakdown with the full supply voltage. This is especially true of those portions of the circuit at or near the cathode of the C.R. tube.

Secondly, the input to the 885 tubes must of necessity be a high impedance circuit and all precautions must be taken to keep the capacity of wires and resistors in these input circuits at a minimum. It was found that if the metal front plates of the 15,000



FOUNDATION KITS

HAMMARLUND "foundation kits" provide a new method of set building. No drilling, compact, economical, and more efficient. Each kit contains all the necessary hardware for modern construction. Send for details on this 100 to 300 watt amplifier.

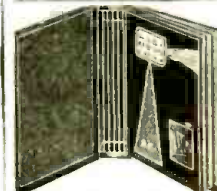
HAMMARLUND MFG. CO. SWT-6
424 West 33 St., N. Y. City

() Send data on "foundation kits"

Name _____
Address _____
City _____ State _____



HAMMARLUND



STURDY BINDERS

for any size magazines. Covered with black corrugated fabricoid. Has two stamped metal ends with 12 Spring Wire separators. Magazines can be inserted and removed in a jiffy. 12 1/2"x9 1/2" fits S.W.&T. Radio News, etc. . . . 60c
10 3/4"x7" fits Popular Mechanics, etc. . . . 70c
8 3/4"x5 1/2" fits Readers Digest, etc. . . . 60c

STOPPANI COMPASS

A Precision Instrument made in Belgium. Purchased by the U. S. Government at more than \$30.00 each. Ideal for Radio Experimenters Laboratory, also may be used as a Galvanometer for detecting electric currents in radio circuits. Ruby jeweled, solid bronze, 4 inches square, fitted in a hardwood case. Also used by hunters and surveyors.

Our price prepaid \$4.50 each

GOLD SHIELD PRODUCTS
Dept. 5-6, 350 Greenwich St.
New York City



WORLD'S GREATEST all around ELECTRIC TOOL

DRILLS • GRINDS • SANDS • SAWS
POLISHES • SHARPENS • CARVES

The new WHIZ ELECTRIC TOOL is the handiest, most useful power tool ever made. Not a delicate instrument but a real rugged tool, equally effective for both power and precision work. Drills through 1 1/2 inch plate in 42 seconds or engraves intricate designs on jewelry. Handles any material: Metals—Woods—Alloys—Plastics—Glass—Steel—etc. Saves time. Eliminates tedious labor. Plug into any socket AC or DC, 110 volts. Chuck 1/2 inch capacity. Ball bearing thrust. Powerful, triple-gear motor. "Worth its weight in Gold," to a mechanic or handy man. STANDARD MODEL with normal speed (uses 30 different accessories, instantly interchangeable). Special Introductory Price for limited time, only \$6.95.

FREE Accessory outfit (Value \$2) includes set of drills, wheels, mounted brush, polishing wheel, carving bur, etc. FREE with each outfit ordered NOW. We pay postage on all shipments. Will send C.O.D. if desired.

10-DAY TRIAL—MONEY BACK GUARANTEE
Special "2-SPEED" MODEL combines Normal Speed and High Speed in one outfit (uses 200 accessories) only \$8.95 complete, with same accessory outfit (value \$2) FREE.

PARAMOUNT PROD. CO.
Dept. 6-5W, 48 W. 48th St., New York

All about 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:

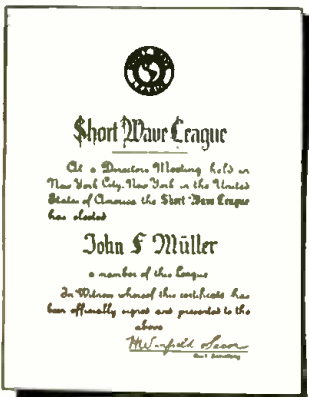
Dr. Lee de Forest, John L. Reinartz, D. E. Replogle, Hollis Baird, E. T. Somerset, Baron Manfred von Ardenne, Hugo Gernsback, Executive Secretary.

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.

FREE MEMBERSHIP CERTIFICATE

As soon as you are enrolled as a member, a beautiful certificate with the **LEAGUE'S** seal will be sent to you, provided 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.



If you wish your name engraved on the Free membership certificate, as illustrated above, please send 25c to cover cost.

SHORT WAVE ESSENTIALS LISTED IN OPPOSITE COLUMN 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 below (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.

Application for Membership SHORT WAVE LEAGUE

SHORT WAVE LEAGUE, 6-38
99-101 Hudson Street, New York, N. Y.

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

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

Transmitting
Call Letters
Receiving
Name
Address
City and State
Country

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

Next insert the 885 tubes, which should cause the dot of light to become an oblong of green on the end of the tube. Further adjust this until the length is about 1/4 longer than the height; recenter the oblong and adjust the brilliance to about half its full value. Do not make the raster too bright as the tube may be burned and the images will not be well modulated.

Finally connect the input of the video chassis to the video receiver. A note at this point is necessary. Since the lower terminal on the video chassis input is not connected to the chassis, the video chassis must not be connected to the receiver chassis. These two chassis must be insulated from each other.

Do not become careless—use all precautions to avoid touching high voltage wires, terminals or units.

List of Parts

Du MONT LABS., INC.

- 1—Type 54-9-T tube
- 2—Type 885 tubes

RAYTHEON

- 1—Type 6H6G tube
- 1—Type 7c tube
- 4—Type 41 tubes

HAMMARLUND

- 3—5-prong Isolantite sockets
- 1—8-prong octal Isolantite socket
- 1—7-prong Isolantite socket
- 2—Type APC-50 3-50 mmf. midget variable condensers—screwdriver control
- 4—6-prong bakelite sockets

UNITED TRANSFORMER CORP.

- 1—1 henry choke, type PC-8

I.R.C. (Resistors)

- 1—Type CS potentiometer, 0.4 meg. screwdriver control
- 2—Type 14-118 potentiometers, 15,000 ohms (with front plate removed, per description)
- 2—Type CS potentiometers, 4 meg. screwdriver control
- 2—Type CS potentiometers, 4 meg. with shafts for knobs
- 2—Type CS potentiometers, 0.5 meg. screwdriver control
- 1—Type 11-133 potentiometer, 0.5 meg. with shaft for knob
- 1—Type 11-114 potentiometer 5,000 ohms screwdriver control
- 2—Type CD-CS dual potentiometers, 4 meg. screwdriver control
- 1—Resistor, 10,000 ohms, 1 watt
- 1—Resistor, 25,000 ohms, 1 watt
- 2—Resistors, 0.25 meg., 1 watt
- 2—Resistors, 0.1 meg., 1 watt
- 2—Resistors, 1 meg., 2 watts
- 4—Resistors, 50,000 ohms, 2 watts
- 2—Resistors, 1 meg., 1 watt
- 1—Resistor, 15,000 ohms, 1 watt
- 4—Resistors, 5 meg., 1 watt
- 2—Resistors, 0.2 meg., 1 watt
- 4—Resistors, 2,000 ohms, 2 watts
- 1—Resistor, 6,000 ohms, 1 watt
- 2—Resistors, 0.5 meg., 2 watt
- 1—Resistor, 3,000 ohms, 2 watt
- 4—Resistors, 400 ohms, 20 watts
- 4—Resistors, 8,000 ohms, 20 watts
- 4—Resistors, 24,000 ohms, 20 watts
- 4—Resistors, 20,000 ohms, 20 watt

SOLAR (Condensers)

- 1—Oil-filled condenser, .25 mf., 3000 volts, XL-30-025
- 13—Paper condensers, 0.1 mf., 600 V., S-240
- 2—Dual 8-8 mf. electrolytic condensers, 500 V., D-820
- 2—Mica condensers, .0001 mf., 1000 V., XB-1-31
- 6—Mica condensers, .025 mf., 1000 V., XB-1-125
- 1—Mica condenser, .001 mf., 1000 V., XB-1-21
- 1—Mica condenser, .01 mf., 1000 V., XB-1-11
- 1—Paper condenser, .5 mf., 600 V., S-0265
- 1—Mica condenser, .0006 mf., 1000 V. (5% tolerance), XB-special

AEROVOX

- 2—.025 mf. mica condensers, 1400 V.

PAR-METAL

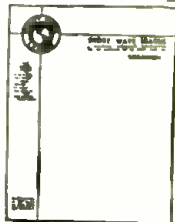
- 1—Aluminum chassis, crackle finish—10"x17"x3"

MISCELLANEOUS

- 25—3/4" rubber grommets
- 1—Roll No. 20 heavy insulated hook-up wire
- 1—Roll No. 16 heavy insulated hook-up wire
- Miscellaneous pieces of sheet aluminum, screws, bolts, nuts, lock washers, etc.

Accessories for Members of the
SHORT WAVE LEAGUE

Every member of the **SHORT WAVE LEAGUE** wants to identify himself in some way. For your convenience the League directors have prepared suitable letterheads, label buttons, stickers, etc. In addition there are many short-wave accessories, such as maps, globes, etc., which the League offers only to members at special prices. Take your choice from this advertisement. **THESE ESSENTIALS ARE SOLD ONLY TO LEAGUE MEMBERS.**



LEAGUE LETTERHEADS

A beautiful official letterhead has been designed for members' correspondence. The letterhead is invaluable when it becomes necessary to deal with the radio industry, mail order houses and radio manufacturers, as many houses offer members of the **LEAGUE** 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, 50c per 100

WORLD GLOBE

This 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 foreign stations. The base is of solid walnut, and the semi-meridian of a nickel-like 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 89c
..... Prepaid
D—89c each

SHORT WAVE MAP OF THE WORLD

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



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

WORLD RADIO MAP 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

LEAGUE LAPEL BUTTON



E—35c each

This beautiful button is made of 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.

G—15c for 25
E—**SHORT WAVE LEAGUE** lapel button 35c
..... Prepaid

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

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

SHORT WAVE LEAGUE, 6-38
99-101 Hudson Street, New York, N. Y.

gentlemen:
 I am a member of the **SHORT WAVE LEAGUE**
 Please send me application for membership in the **SHORT WAVE LEAGUE**
Please send me the following short wave essentials as listed in this advertisement:

.....
for which I enclose \$..... herewith.
Name
Address
City and State
Country
(The **LEAGUE** accepts money order, cash or new U. S. stamps in any denomination. Register cash and stamps.)

The 2AJL Superhet Receiver

(Continued from page 95)

The oscillator band-setting condenser is mounted directly on the panel near the oscillator tuning condenser. This condenser is controlled by the dial between the "R" meter and the main tuning dial in the photo. The R.F. and Detector band-setting condensers are ganged together by mounting both condensers on a piece of mycalex 4 1/4" x 5/8". The two shafts were coupled by a bakelite coupling. This effectively insulated their rotors from each other, since the R.F. stage condenser must be insulated due to the use of AVC. This 2-unit gang is mounted on the front panel with the detector condenser next to the panel. Its dial is just to the right of the tuning dial.

Beat Frequency Oscillator

In designing this receiver, it was decided against using a panel control for varying the beat note when using the BFO. Once set by the control on the BFO can, the beat note will remain the same indefinitely. Naturally, this requires an electron-coupled oscillator for extremely good frequency stability. The Meissner BFO unit will require a slight change for this purpose. As supplied by the manufacturer, the BFO unit has all its terminals brought out to the bottom. The grid-leak and condenser (C36, R28) are mounted inside the can. A quarter-inch hole is drilled about 2 3/4" up the side of the can. Through this hole is passed a piece of shielded wire, one end of which goes to a grid cap and the other end goes to the grid-leak and condenser. The other end of the grid-leak and condenser goes to the terminal marked "D" on the BFO transformer. The two terminals marked "AVC" and "B+" are connected together internally and only one terminal brought out; this goes to the cathode of the 6J7. The "P" terminal is grounded. The oscillator is coupled to the second detector by wrapping a lead (insulated wire) from the plate of the oscillator tube around the wire going to the plate of the 6H6. About 5 or 6 turns will be sufficient.

Crystal I.F. Filter

The crystal I.F. stage is quite standard. A special switch is used to cut out the crystal. This switch is mounted on the phasing condenser C13. It consists of a small piece of brass angle fastened to one of the empty holes in the isolantite end plate. When the plates are turned all the way in, the rotor touches the brass stop and thus shorts out the crystal. This type of switch introduces practically no additional capacity in the circuit. This phasing condenser is mounted on small brackets just over the crystal socket. An insulating shaft allows it to be varied from the front panel. The 100 mmf. band width condenser C11 is also insulated from ground.

Tuning up the receiver is not very difficult. Either use a calibrated oscillator, or better still, use the crystal in a special external oscillator. Place the phasing condenser so that the crystal is shorted out. The output of the oscillator is connected to the control grid of the first detector. Using an output meter, each I.F. transformer is aligned for maximum output. After disconnecting the external oscillator from the 1st detector the band-setting condensers are set for the frequency range desired and signals tuned in. The phasing condenser is kept in the mid-scale position. If a station interferes with the signal being received, vary the phasing condenser until the interfering station is eliminated or

markedly reduced in intensity. The band width condenser can be varied so that the I.F. selectivity is varied from a few hundred cycles to about two thousand cycles.

The "R" meter is operated by the AVC. With the BFO turned off the R.F. gain control, R35, is turned for maximum volume, the "R" meter control, R36, which is mounted in back of the meter on the chassis is then varied until the meter reads zero with no signal input. Thereafter it is merely necessary to turn the BFO off by S2 and AVC on by S3 to determine the strength of the received signals. The meter is a special Triplett 2" 1 ma. milliammeter with a special "R" scale and movement.

Noise Limiter

The noise limiter action is controlled by switch S1 mounted on the back of R19. When R19 is turned clockwise S1 is turned on. R19 is varied until the signal rides over the noise level. The noise limiter will work only when the noise level is higher than the desired signal level. Both the BFO and AVC are controlled by SPST toggle switches on the front panel.

Coil Data

L1 and L2 are wound with 34 SCC wire at the bottom of the coil 1/8" from L2 or L3. All coils are wound with No. 18 enamel wire on 1 1/2" Hammarlund forms, spaced to a length of 2" except for the 14 and 28 mc. coils which have a winding 1 1/2" long.

	3.5 mc.	7 mc.	14 mc.	28 mc.
L1	6 turns	5 t.	5 t.	3 t.
L2	28 1/2 t.	14.6 t.	6.5 t.	3.5 t.
Tap	none	at 9.5 t.	at 3.4 t.	at 2.4 t.
L3	20 t.	9 t.	5 t.	3 t.
L4	28.5 t.	14.6 t.	6.5 t.	3.5 t.
Tap	none	at 9.5 t.	at 3.4 t.	at 2.4 t.
L5	25.5 t.	13.5 t.	6.5 t.	3.5 t.
Tap 1	at 22 t.	at 8.1 t.	at 3.3 t.	at 3.4 t.
Tap 2	at 8.4 t.	at 4.4 t.	at 2.4 t.	at 1 t.

Parts List

HAMMARLUND

12—SWF5 coil forms
C1—C7—C31—35 mmf.—MC35S
C2—C8—C32—100 mmf. MC100M
C12—100 mmf. MC100S
C13—15 mmf. HF15
7—S8 isolantite octal sockets
1—S-5 isolantite socket

MEISSNER

T1, T2—matched crystal I.F. transformer units 465 kc. No. 7458
T3—iron core I.F. transformers 465 kc. No. 6123 Alignaire
T4—air core I.F. transformers 465 Alignaire No. 6644
T5—Alignaire BFO transformer No. 6779

I.R.C. (Resistors)

R1, R9, R13—.25 meg. 1/2 watt fixed resistors
R4, R7, R11, R15, R17, R30, R29, R33, R34, R32, R5, R36—50,000 ohm 1/2 watt fixed resistors
R2, R10, R14—350 ohm 1/2 watt fixed resistors
R6—500 ohm 1/2 watt fixed resistor
R3, R8, R12, R16, R23—3000 ohm 1/2 watt fixed resistors
R37—1000 ohm 1/2 watt fixed resistor
R28, R24—100,000 ohm 1/2 watt fixed resistors
R31—10,000 ohm 1/2 watt fixed resistor
R21—1 meg. 1/2 watt fixed resistor
R18, R22—5 meg. 1/2 watt fixed resistors
R25—25,000 ohm 1/2 watt fixed resistor
R39—10,000 ohm potentiometer
R37—1000 ohm potentiometer
R20—350 ohm 20 watt wire wound resistor
R27—20,000 ohm 25 watt semi-variable wire wound resistor
R19—10,000 ohm potentiometer with switch
R26—.5 meg. potentiometer

CORNELL-DUBILIER (Condensers)

C4, C5, C6, C9, C10, C11, C16, C17, C18, C19, C20, C21, C24, C26, C29, C39, C34, C37—.1 mf. 400 V. paper condensers
C3, C15, C40—.01 mf. 400 V. paper condensers
C30—.5 mf. 400 V. paper condenser

(Continued on page 118)



ONLY
\$29.95

Now . . . A Brand-New RCA AC
Oscillator At Lowest Price Ever

Stock No. 153, complete with RCA Metal Tubes

GIANT DIAL! Completely AC operated. Wide frequency range—100 to 30,000 kcs. Harmonics of last band

ONE-VOLT OUTPUT! may be used for ultra-high frequency testing, 6 bands. Dial scale length over 50 inches. Calibration accuracy of 2%.

RCA METAL TUBES! Three attenuator taps plus fine control give continuous control of output from zero to 0.25 volts. Maximum output 1 volt
Internal modulation—30% at approximately 400 cycles. Jack provided for external amplitude modulation.

External frequency modulation jack provided. 400 cycle output at approximately 8 volts provided for audio circuit testing.

Attractive blue-gray wrinkle finish case with snap handle.

RCA Parts FOR PROFIT
RCA Manufacturing Co., Inc., Camden, N. J.
A Service of Radio Corporation of America

SWAP & SELL 10 CENTS
The Nation's Market Place

FREE SWAP ADS PERIOD

SWAP & SELL

is the great, big, new magazine that shows you how to get more than 1000 different articles, such as cameras, rifles, books, magazines, clothing, tools, pets, etc., "without having to buy them!"
It runs YOUR OWN swap ad free!
It prints letters from men and women who SEEK NEW FRIENDS!
It publishes TRUE EXPERIENCES from real life!
It tells you how to swap and HOW TO MAKE MONEY!
It helps you get all the things you've always longed for, yet never could afford!

You NEED a copy to help you get more out of life!

NOT SOLD ON NEWSSTANDS

Send only 10c for sample copy, or get all twelve big issues for the coming year—only \$1.00 if you order at once!

SWAP & SELL, 99T Hudson Street, New York, N.Y.

RADIO IN ITS ENTIRETY!

"B.A." serves the trade with every need in radio—complete 160-page catalog of nationally known radio receivers, public address, parts, supplies and equipment. Orders shipped same day received.

COMPLETE CATALOG AVAILABLE

BURSTEIN-APPLEBEE CO. 3012-11 McGEE ST. KANSAS CITY, MO.



FOUR NEW 10¢ RADIO BOOKS

RADIO FANS EVERYWHERE—these little ten cent text books give you an excellent foundation for the study of radio. They are clearly written, profusely illustrated and contain over 15,000 words in each book. You'll be amazed at the wealth of information these volumes have. They are handy for review or reference books.

NO. 5—BEGINNERS' RADIO DICTIONARY

Are you puzzled by radio language? Can you define frequency? Kilocycle? Tetrole? Screen grid? Iamle? If you cannot define these very common radio words and dozens of other, more technical, terms used in all radio magazines and instruction books, you need this book in your library. It's as modern as tomorrow—right up to the minute. It tells you in simple language just what the words that puzzle you really mean. You cannot fully understand the articles you read unless you know what radio terms mean. This is the book that explains the meanings to you. Can you afford to be without it, even one day longer?

NO. 6—HOW TO HAVE FUN WITH RADIO

Stunts for parties, practical jokes, scientific experiments and other amusements which can be done with your radio set are explained in this fascinating volume. It tells how to make a newspaper talk—how to produce silent music for dances—how to make visible music—how to make a "silent radio" unit, usable by the deafened—how to make toys which dance to radio music—sixteen clever and amusing stunts in all. Any of these can be done by the novice, and most of them require no more equipment than can be found in the average home. Endless hours of added entertainment will be yours if you follow the instructions given in this lavishly illustrated book.

NO. 7—HOW TO READ RADIO DIAGRAMS

All of the symbols commonly used in radio diagrams are presented in this book, together with pictures of the apparatus they represent and explanations giving an easy method to memorize them. This book, by Robert Eichberg, the well-known radio writer and member of the editorial staff of RADIO-CRAFT magazine, also contains two dozen picture wiring diagrams and two dozen schematic diagrams of simple radio sets that you can build. Every diagram is completely explained in language which is easily understood by the radio beginner. More advanced radio men will be interested in learning the derivation of diagrams, and the many other interesting facts which this book contains.

NO. 8—RADIO FOR BEGINNERS

Hugo Gernsback, the internationally famous radio pioneer, author and editor, whose magazines, SHORT WAVE & TELEVISION and RADIO-CRAFT are read by millions, scores another triumph with this new book. Any beginner who reads it will get a thorough ground work in radio theory, clearly explained in simple language, and through the use of many illustrations. Analogies are used to make the mysteries of radio as clear as "2+2 is 4". It also contains diagrams and instructions for building simple radio sets, suitable for the novice. If you want to know how transmitters and receivers work, how radio waves traverse space, and dozens of other interesting facts about this most modern means of communication, this is the book for you!

Other Titles in This Series!

- Four other volumes in this ten-cent radio book series—each on a popular subject—are available. The titles are:
- No. 1—HOW TO BUILD 4 DOERLE SHORT-WAVE SETS
 - No. 2—HOW TO MAKE THE MOST POPULAR ALL-WAVE 1- AND 2-TUBE RECEIVERS
 - No. 3—ALTERNATING CURRENT FOR BEGINNERS
 - No. 4—ALL ABOUT AERIALS

BOOKS ARE ALL UNIFORM

Every book in the GERNSBACK EDUCATIONAL LIBRARY has 32 pages—with illustrations varying from 30 to 66 in number. Each title volume contains over 15,000 words. Positively radio's greatest book buys! If you do not think these books worth the price asked, return them in 24 hours and your money will be instantly refunded.

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

The 2AJL Superhet Receiver

(Continued from page 117)

C27, C25—5 mf. 50 Volt electrolytic condensers
C28, C41—1 mf. 450 V. electrolytic condensers
C35—0.0005 mf. mica condenser
C33, C22, C23—0.001 mf. mica condensers
C36—0.0025 mf. mica condenser
C38—see text

BUD
1—17" x 11" x 3" chassis
1—bottom plate
2—1 1/2" dials 0-100°

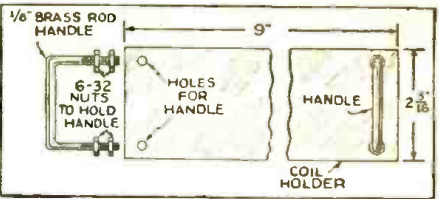
RAYTHEON (Tubes)
2—6J7
1—6L7
3—6K7
1—6H6
1—6C5
1—6N6G

PAR-METAL
1 panel 8 3/4" x 17" rack type grey mounting

BLILEY
1—465 kc. crystal type CP1

TRIPLETT
1—2" special R meter, 1 ma.

MISCELLANEOUS
S2—S3—SPST toggle switches



Detail of "coil drawer."

MAIL COUPON TODAY!!

RADIO PUBLICATIONS, Dept. SWT-6-38
101 HUDSON STREET, NEW YORK, N. Y.

Gentlemen: Please send immediately. POSTPAID, the book numbers circled below. I am enclosing.....cents—each book being 10c.

1 2 3 4 5 6 7 8

Send FREE listing of 48 new 10c publications.

Name

Address

City State

Remit by check or money order—reklster letter if you send cash or unused U. S. postage stamps.

Enter this Interesting Contest!

Writing ADVERTISING is not only FASCINATING but PROFITABLE.

Many men who showed ability to write FORCEFUL copy were promoted to the position of SALES MANAGER or highly paid EXECUTIVE.

To encourage our readers to enter the contest, we offer the following prizes:

For best worded piece of advertising copy submitted, together with layout:

First prize \$5.00
Second prize \$3.00
Third prize \$2.00

You may write as many pieces of copy and for as many firms as you desire. Manufacturers will gladly supply you with catalogs or folders describing their products in order to guide you in writing copy. Illustrations in the ROUGH are desirable.

The names of the winners will be published in SHORT WAVE & TELEVISION in the next issue after the prizes have been won.

All contests close on the 1st of each month for the issue of the 2nd following month.

The judges will be Emil Grossman and the Editors of this magazine and their opinions will be final.

Cheeks will be promptly mailed to all prize winners by
EMIL GROSSMAN, Director of Advertising
SHORT WAVE & TELEVISION
99 Hudson Street, New York, N. Y.



HEY FELLOWS! 6 BACK NUMBERS OF SHORT WAVE AND TELEVISION SENT ANYWHERE IN U.S. FOR 70¢

For a limited time only, and as long as they last, we will send you six back numbers of SHORT WAVE & TELEVISION assorted, your choice, for 70 cents.

The usual price for six copies would be \$1.50, and most publishers charge a higher price for back numbers over one year old.

We can supply only the following back numbers: Dec., 1930; Feb., April, June, Sept., Oct., 1931; July, Aug., Oct., 1932; Jan., April, Oct., Nov., Dec., 1933; Jan., Feb., Mar., April, May, Aug., Sept., 1934; 1935—All issues except January, February and March; 1936—All issues; 1937—All issues; 1938—All issues to date.

If you do not specify copies, we will send assorted numbers to fill your order. Note, we cannot exchange the copies for ones that have been sent to you.

Every copy of SHORT WAVE & TELEVISION contains information which you should have. Here is a chance to get those copies.

As only a small supply of back numbers on hand, this offer will be withdrawn as soon as they have been sold.

We accept U. S. stamps, U. S. coin, or money order. Rush your order today.

SHORT WAVE & TELEVISION 6-38
99-101 Hudson Street, New York, N. Y.

Gentlemen: I enclose herewith 70c, for which you are to send me six back number copies of SHORT WAVE & TELEVISION as follows:.....

Name

Address

City State

Here's Your Button

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

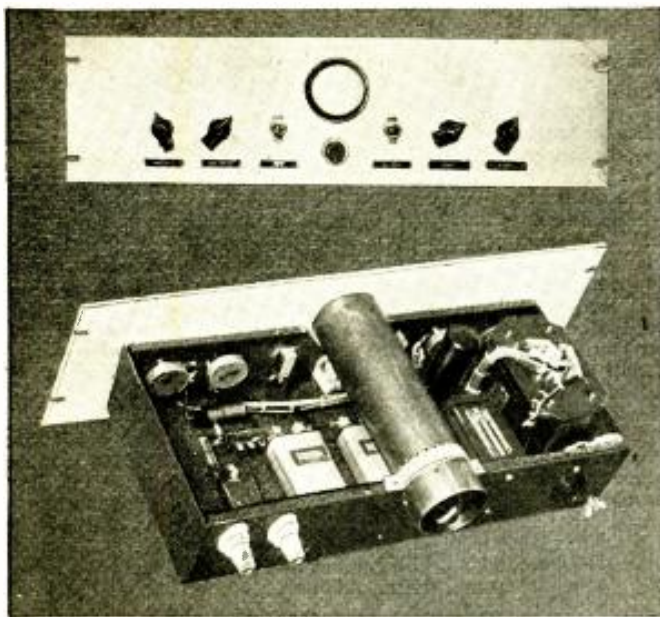
The button measures 3/4 inch in diameter and is inlaid in enamel—3 colors—red, white and blue. The requirements for joining the League are explained in a booklet, copies of which will be mailed upon request.



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, 99-101 Hudson St., New York.

Push-Button Control for Transmitter

(Continued from page 103)



Front and top views of cathode ray oscillograph as built up for "rack" mounting by Mr. McEntee. It is very compact and forms a useful and handy adjunct to any complete Ham transmitter.

screen-grid gets its voltage from a different source than originally.

The socket marked "POWER" corresponds to that at the extreme lower right in the March issue. All 7 prongs are now used, however. That marked "CT" goes to the center tap of the high volt-

age transformer (T5). "GND" is ground and "7.5 V Tr." goes to one side of the primary of the filament transformer (T3) for the RK20A. This change puts the 50 ohm rheostat in series with T3's primary. It should be mentioned that sockets are used on all chassis all connecting cables having plugs on both ends.

The same switches and pilot lights (110 V. type) as shown in the March article are used, although the wiring must be completely revamped. The changes will be more readily understood if the circuits from both articles are compared.

The 50 ohm, 50 watt rheostat is in series with the lead to the transformer which lights the RK20A. This transformer, as mentioned in the last article, has 3 windings which when connected in series total 10 volts. The rheostat then allows the voltage to the RK20A to be set at exactly 7.5 V., no matter what the line voltage may be. Measurement should be made at the socket with an external meter. Then the A.C. voltmeter on the power panel can be set at the proper value to give 7.5 V. at the tube socket. This latter meter will probably read around 9 V., due to the potential drop in the cable leads.

Changing from Phone to C.W. Tubes

The only other control on the panel is for change from phone to C.W. Only two contact pairs are required, one for shorting the keying relay and the other which turns on the modulator power transformer. Thus as soon as this switch is turned to the phone side the modulator filaments are lighted. The center-tap of the power supply runs through contacts on relay No. 3 so that no high voltage flows in the modulator until this relay operates. As soon as the modulator power transformer is energized, a relay (6) in the modulator operates and removes a short on the modulation transformer secondary and a series resistor. This resistor is used to drop the plate voltage of the RK20A to 1,000 volts for phone use, from the higher value of 1250 V. used on C.W. The resistor should be adjusted so that at rated current the voltage to the RK20A is 1,000 V. The relay always oper-

(Continued on page 120)

primary keying is now employed. With the use of this type of keying the final amplifier power supply does no work until the key is depressed, even though the "HV" switch has been closed. The keying relay (5) is operated on low voltage, about 6.5 V. to be exact, so that contact with the key or its leads will cause no inconvenience.

Remote Control Unit

The remote control box has three switches and lights which, in effect, duplicate those on the control panel, although the "LV" switch is connected slightly differently. The outlet for the key obviates the necessity for another control lead to the transmitter. A jack on the back of the control panel enables the operator to plug a key in if desired.

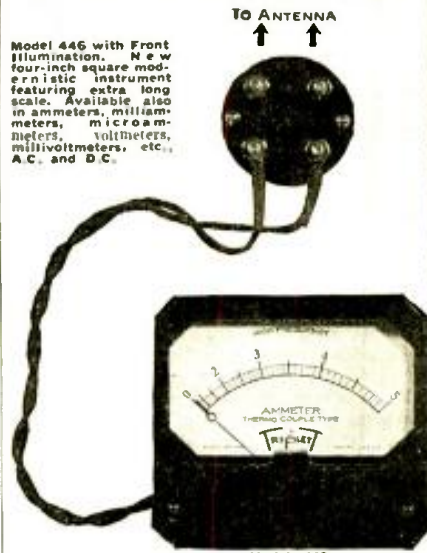
The only relay remaining on the control panel, No. 4, is an overload relay. It may be set to open at any desired current by means of the 100 ohm control connected across its coil. This relay is sensitive only to overload in the high voltage power supply, although when it opens both high and low voltage power supplies are rendered inoperative.

The overload relay was originally made for use on a fractional horsepower motor, which of course draws rather high current. The winding was removed, and the spool rewound with all the No. 34 enamelled wire it would hold. This winding in connection with the 100 ohm rheostat gives a range of operation from about 15 ma. upward. This relay naturally remains open, once it has operated, and must be manually reset, the lever at the lower center of the panel performing this service. Overload relays may be bought ready-made if so desired.

It will be seen from reference to the circuits published in the March issue, that considerable rewiring of the power-supply chassis cable is required to enable complete control of all functions from the expanded control panel described herein. No changes are required in the cable from power supply to exciter unit, but a few changes must be made in the high voltage to the final amplifier chassis. These are shown in the small detail drawing (Fig. 3) accompanying this article. It will be seen that the

NEW TRIPLET ILLUMINATED THERMO-AMMETERS

Model 446 with Front Illumination. New four-inch square modernistic instrument featuring extra long scale. Available also in ammeters, milliammeters, microammeters, voltmeters, millivoltmeters, etc., A.C. and D.C.



Model 446

PRICES GREATLY REDUCED

Write for Catalog.

The Triplet Electrical Instrument Co.
286 Harmon Dr., Bluffton, Ohio

.....Please send me more information on Model 446; I am also interested in.....

Name

Address

City State

FLASH!

JUST OFF THE PRESS!

SEND FOR OUR NEW CATALOG containing CIRCUIT DIAGRAMS, and complete information on over 25 different types of short wave receivers and transmitters from \$2.50 and up.

This catalog is chock full of schematic and picture diagrams, hook ups and short wave information. A book in itself. Well worth the dime, which will be refunded with your first order.

OSCAR B. KUSTERMAN

68 Barclay Street, New York City



Taking the Country by Storm—**RADIO-CRAFT**

RADIO-CRAFT is devoted to all phases of radio—servicing, set construction, electronics, facsimile, etc. Brings you short-cuts that lead you out of difficult problems. Features such departments as—Latest in Radio—New Tubes—International Radio Review—Data Sheets—Television—Operating Notes—plus many additional departments. Edited by HUGO GERNSBACK.

Over 175 Illustrations in Each Issue!

SPECIAL OFFER!—FREE copy of the 1938 RADIO REFERENCE ANNUAL—a valuable 64 page book—plus Seven Months Subscription to RADIO-CRAFT for \$1.00.

RADIO-CRAFT

99T HUDSON ST. NEW YORK, N. Y.

Push-Button Control for Transmitter

(Continued from page 119)

ates as soon as the switch on the control panel is turned to the "phone" side.

The power-supply on the modulator as originally shown had no connection cable and socket. With the new control panel a 5 prong plug and socket connection is used, with the 110 V. A.C. leads connected to the socket terminals are usually employed for heater connections. The other two leads shown on this socket simply are connected in parallel with the modulator high voltage switch so that the modulator may be relay-controlled by relay No. 3 as described.

In this connection it should be noted that the screen-grid of the RK20A is fed its 300 V. through a 30,000 ohm resistor from the H.V. lead. Connections are shown on the drawing. This makes it possible to use a simple modulation circuit to get 100% modulation. The variable taps on the modulation transformer are connected for 3800 ohm plate to plate primary and 8200 ohm secondary load.

This completes the discussion of the control system except for the remote switch box. This simply has three D.P.S.T. switches, three pilot bulbs and a key jack. While the pilot lamps in the control panel are of 110 V. type, those in the control unit are of 6.3 V. size and are supplied by the small transformer in the control unit. A

heavy weight should be put in the control box to keep it from sliding on the table.

Remarks Concerning Relays

The relays on the control unit are mounted on $\frac{1}{2}$ " thick sponge rubber to quiet them, and the keying relay is surrounded by a box lined with the same material.

Also mounted on the relay panel are all sockets for cables to all the other units. A double block holds two line fuses.

All the relays are used as received except No. 3 which must be slightly altered. As seen on the diagram, one side of this relay has three contacts, one of which moves with the armature, and two that are fixed. The extra contact can be removed from one of the other relays as all the contacts are not needed. If a relay was readily available with single-throw, triple-throw, it would do as well, but such a unit must usually be specially ordered, while those used here are all standard types. Still another set of contacts might be put on this same relay to cut out the receiver when transmitting.

The thermal unit is made from two thermal strips which are obtainable from scientific supply companies. They are mounted on a block of bakelite separated by about $\frac{3}{8}$ ". One strip has a thin layer of

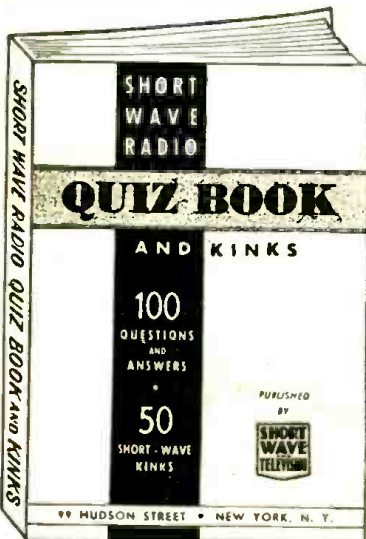
asbestos or mica over which is wound resistance wire taken from a 110 V. type cigar lighter. An adjusting screw against the other strip enables change in the delay period which should be no less than 30 seconds.

Oscilloscope

The oscilloscope is of a simple type, and produces the trapezoid type of figure when used to measure modulation. A small one-turn loop at the ground end of the plate tank coil enables R.F. to be transferred to one set of plates in the oscilloscope, while audio is taken from the output transformer through a high voltage condenser. The A.F. voltage is controlled by the potentiometer on the oscilloscope panel, while the R.F. amplitude is varied by moving the pickup coil in relation to the final plate tank.

The oscilloscope chassis is inverted and the parts mounted inside for compactness. The tube itself is shielded in a steel tube $2\frac{3}{8}$ " inside diameter as protection from stray fields. Its socket is mounted inside the tubing by means of two angle brackets.

Room has been left in the chassis and space and controls provided on the panel for a built-in *sawtooth* sweep circuit, which may be added at any time. This type of sweep is not as convenient, however, as



WE HAVE NEVER MADE SUCH AN OUTSTANDING OFFER TO OUR READERS!

HERE is a brand new book—with an unusually interesting content. The text—prepared by the Editorial Staff of SHORT WAVE AND TELEVISION, contains a variety of material which only experts could select and incorporate in such an excellent volume. "SHORT WAVE RADIO QUIZ BOOK AND KINKS" cannot be bought—it is sent to you absolutely FREE with your subscription to SHORT WAVE AND TELEVISION at the Special Rate of Seven Months for One Dollar. (Old subscribers may get this book by extending their subscription.) The book contains 64 pages with a heavy flexible colored cover. It measures $5\frac{1}{2} \times 8\frac{1}{2}$ inches, and includes hundreds of photographs and diagrams. The contents are outlined below.

- Questions and Answers Covering S-W Transmitters.
- Questions and Answers Covering S-W Receivers.
- Ultra-Short-Wave Transmitters and Receivers.
- S-W "Kinks"—Short-cuts and Practical Wrinkles, Coil Winding Data.
- How to Add an Audio Amplifier to a Small

- S-W Receiver.
- How to Connect an R.F. Stage Ahead of Your Present Receiver.
- Dozens of Novel New Hook-Ups for the S-W Experimenters.
- Clear diagrams showing how to connect the latest type tubes in place of your old tubes, so as to obtain greater DX.

HOW TO "HOOK UP"—

- S-W Converters
- Noise Silencers
- Power supplies
- Modulators
- Beat Oscillators
- Antennas
- Pre-selectors
- 5-YORK receivers

SHORT WAVE AND TELEVISION • 99 Hudson Street • NEW YORK, N. Y.

SHORT WAVE AND TELEVISION, 99 Hudson Street, New York, N. Y.

Gentlemen: Enclosed you will find my remittance of \$..... for which enter my subscription to SHORT WAVE AND TELEVISION for

- 7 months—\$1.00—choice of any one of three (3) books. (Canadian and foreign—\$1.30)
- 14 months—\$2.00—choice of any two (2) of the three (3) books. (Canadian and foreign—\$2.60)
- 21 months—\$3.00—all three books (Canadian and foreign—\$3.90)

If you are a subscriber now, we will extend your present subscription.

- Books are to be mailed POSTPAID.
- New subscriber
- Old subscriber

Name..... Address.....
City..... State.....

Send your remittance by check or money order. If you send cash or unused U.S. postage stamps, please be sure to register your letter for your own protection.

SWT-638

2 Other FREE Books

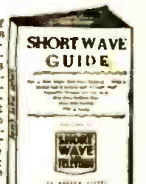
ABC OF TELEVISION



Contains latest material on Television developments. It covers theory of scanning; simple television receiver; how the eye sees; the photo-electric cell; neon lamps; need for broad channel width in transmission of high-fidelity television signals; cathode ray tube and television receivers; Farnsworth system of television transmission, and other important features.

SHORT WAVE GUIDE

Covers hundreds of Short-Wave questions and answers; illustrates popular Short-Wave kinks; gives instructions for building a simple Short-Wave receiver; instruction on the best type of antenna to use; diagram and construction details for building a simple "ham" transmitter; practical hints on Short-Wave tuning.



to use the audio supply of the transmitter for this purpose.

A 2,000 V. D.C. meter was shown on the diagram of the power supply unit (2nd article: see March issue). This unit was made from an ordinary 15 ma. meter in series with fixed resistors, the latter not being shown on the diagram. There are five 25,000 ohm, one 15,000 ohm, and one 10,000 ohm units, all in series. The first six are of the fixed type, while the last is variable and serves to set the meter accurately. All are of the 10 watt wire-wound type, and are mounted on a small bakelite panel near the meter.

This completes the description of a transmitter well worth owning and using. Operation is smooth and rapid and it is certainly convenient to have all controls on the front panel. The remote control unit makes operating a pleasure and is well worth the extra expense and time needed for construction.

List of Parts—Relay Control Panel

GUARDIAN

- 3—DPDT 110 V. A.C. relays (1500 type coil)
- 2—SPST 6 V. A.C. relays

BUD

- 1—5" x 19" steel panel with rack section to match
- 1—Bakelite box with cover
- 1—Chassis 7" x 14" x 3" deep
- 4—DPST toggle switches
- 1—SPST toggle switch
- 2—Jacks
- 6—Jack type insulators
- 6—Name plates

The HK-54 200 Watt Xmitter

(Continued from page 108)

- 1—N-10 neutralizing cond.
- 2—8-prong Isolantite sockets
- 5—4-prong Isolantite sockets
- 1—5-prong Isolantite socket
- 2—2.1 mh RF choke receiving type CHX
- 1—2.1 mh RF choke transmitting type CH-500
- 7—4-prong coil forms
- 2—coil shields type CS

CORNELL-DUBILIER (Condensers)

- 4—.01 tubular conds. 400 volt
- 2—.0001-mf. mica conds. 1000 V.
- 4—.001-mf. mica conds. 1000 V.
- 1—.001-mf. mica cond. 5000 V.
- 2—8 mf. electrolytic conds. 500 V.
- 1—2 mf. oil cond. 2000 V. for 1250 V. power supply

I.R.C. (Resistors)

- 2—10,000 ohm 10 Watt
- 1—100,000 ohm 10 Watt
- 2—400 ohm 10 Watt
- 1—1000 ohm 25 Watt
- 1—20,000 ohm 10 Watt
- 1—5000 ohm 25 Watt
- 1—20,000 ohm 35 Watt voltage divider
- 1—50,000 ohm 100 Watt bleeder

STANCOR (Transformers)

- 1—low voltage plate-filament trans. 400 V. (P-4081)
- 1—high voltage plate-filament transformer 1250 V. (P-5051)
- 1—filter choke (C-1402)
- 1—filter choke (C-1412)
- 1—5 V. fil. trans. for HK-54 (P-5000)
- 1—2.5 V. fil. trans. for 866's (P-3025)

PAR-METAL (Panel and Chassis)

- 1—8 1/4 x 19 panel
- 1—2 x 17 x 13 chassis
- 1—2 x 8 x 17 chassis

TRIPLETT (Meters)

- 1—0-250 ma. square meter

TUBES *See note above, center column.

- 1—HK-54
- 2—866's
- 2—6L6's
- 1—83

COTO-COIL

- 1—80 met. coil (CI-80BTVL)
- 1—40 met. coil (CI-40BTVL)
- 1—20 met. coil (CI-20BTVL)
- 1—10 met. coil (CI-10BTVL)
- 1—jack base for above (CI-6BTLM)

- 2—Octal bakelite sockets
- 2—3-prong plugs
- 1—5" bakelite socket

TUBES

- 1—5T4 rectifier
- 1—2002 oscilloscope tube

U.T.C.

- 1—PA 913 power transformer
- 1—PA 48 C choke
- 1—FT4 filament transformer

CORNELL-DUBILIER

- 2—2 mf. 1000 V. condensers
- 4—.25 mf. 600 V. tubular condensers
- 1—.01 mf. 2500 V. mica condenser
- 1—2 mf. 2000 V. condenser
- 2—.1 mf. 600 V. tubular paper condensers

I.R.C.

- 1—500 ohm DHA resistor
- 1—30,000 ohm HAA resistor
- 1—1 meg. 2 W. resistor
- 2—1 meg. 1/2 W. resistors
- 1—3 meg. 1 W. resistor
- 2—5 meg. variable resistors
- 1—2 meg. variable resistor
- 1—2000 ohm HOA resistor

MISCELLANEOUS PARTS*

- 1—50 ohm 50 W. rheostat
- 2—Thermal strips
- 4—Pilot lamps (6.3 V.)
- 1—Overload relay (see text)
- 1—100 ohm rheostat
- 1—Double fuse block
- 1—DPST rotary switch
- Knobs, hardware, etc.

*Most radio mail order houses can supply these items if properly identified as to title of article and issue (month and year) of SHORT WAVE & TELEVISION.

Coil Data

OSCILLATOR

- Band
- 80 m. 25 turns No. 20 DCC
- 40 m. 12 turns No. 20 DCC
- 20 m. 7 turns No. 20 DCC

BUFFER-DOUBLER

- Band
- 80-40 m. 18 turns No. 20 DCC
- 20 m. 7 turns No. 20 DCC
- 10 m. 4 turns No. 20 DCC

Coils wound on Hammarlund SWF coil forms, 1/2" dia. spaced to length of 1 1/2" long.

FINAL STAGE

- Band
- 80—34 turns No. 14 DCC
- 40—22 turns No. 14 DCC
- 20—10 turns No. 14 DCC
- 10—6 turns No. 14 DCC

Final coils 4" long—2 3/4" dia.

New Log Book

● BUD RADIO, INC., has published an "Amateur Station Log and Data Book" with 30 pages of log. The book also contains such data as Signal Reporting Systems, Information as to Keeping of a Station Log, Coil Winding Data, Inductance Calculations and Examples, Metric Equivalents, Winding Turns per Linear Inch, Useful Antenna Data, Frequency-Wavelength Conversion, Drill Chart, and International Q-Signals.

This book has been prepared from data supplied by courtesy of Bud Radio, Inc.

When to Listen In

(Continued from page 87)

of which will be announced in the broadcasts.

We offer our congratulations to little NRH and Señor Marin for their successful efforts in the field of short-wave broadcasting.



THIS IS NEWS!

Just off the press comes BUD'S new 60 page Station Log and Data Book —just the thing for your records! In addition to 30 pages of log, this book contains:



- Q Signals
- International Prefixes
- Signal Reporting System
- Inductance Calculations with chart
- L/C Requirements with chart
- RMA Resistor and Condenser Color Code
- Ohm's Law
- Power Calculations
- Winding Turn Chart
- Conversion Tables

Metric and Common Fractions
Hints on Working Sheet Metal
Antennae Calculations and Charts
Frequency Conversion Calculations and other valuable information

Best of all—it costs only a dime!

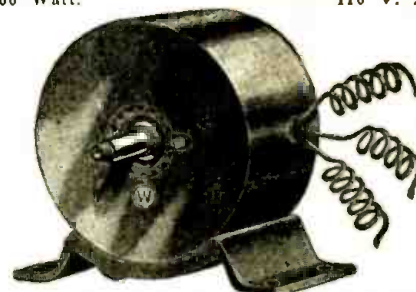
Every ham needs this book.

Get your copy at your jobbers now, or send 10c in coin or stamps direct to

BUD RADIO, INC.
CLEVELAND, OHIO

Westinghouse Power Generator

Manufactured for U. S. Signal Corps
200 Watt. 110 V. AC



A. C. ELECTRICAL POWER

from a Windmill, from available Waterpower, from your Automobile, from your Motorcycle, from your Bicycle, Foot-pedals or Handcrank (for transportable Radio Transmitters, Strong Floodlights, Advertising Signs); do you want to operate AC Radio sets from 32 V. DC farm light systems; operate two generators in series to get 200 V. AC; obtain two phase and three phase AC, etc., etc.

There Are Over 25 Applications

Some of which are:
A.C. Dynamo lighting from eight to ten 20 Watt 110 Volt lamps. Short Wave Transmitter supplying 110 Volts AC for operating "Ham" transmitter. Operating 110 V. AC 60 Cycle Radio Receiver in DC districts. Motor Generator. Public Address Systems. Electric Sirens on motor boats, yachts, etc. Camp Lighting. Short Wave artificial "fever" apparatus. Television. Pelton Waterwheel for lighting or other purposes. Airplane: for lighting strong searchlights or electric signs. Laboratory work, etc., etc. 1/4 to 1/2 H.P. needed to run generator.

BLUE-PRINT 22 x 28 in. and Four-Page 8 1/2 x 12 in. INSTRUCTION SHEETS FREE with Generator.

Generator, as described, including four replacement carbon brushes. Blue-print and instructions

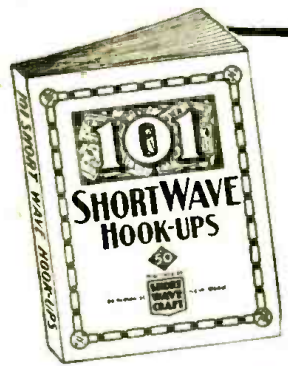
\$7.90

Send \$2.00 deposit, balance C.O.D. Shipping weight 18 lbs. (Replacement carbon brushes bought separate \$1.50 per set of four. Set of instructions bought separate \$1.00.) MONEY-BACK GUARANTEE

WELLWORTH TRADING COMPANY
560 West Washington Blvd. Dept. SW-638 Chicago, Ill.

. . . . THESE OUTSTANDING SHORT WAVE BOOKS ARE *Now Available* AT YOUR DEALER!

YOU buy parts, tubes, kits, accessories from your local radio dealer—that's what countless thousands of short-wave fans do. Now through a nation-wide distribution service our numerous books are available at your favorite radio dealer—right where you buy other radio equipment. It's more convenient, saves time and you can inspect the books before you buy. *Ask your dealer to show you all the books advertised on this page—they're always in stock.*

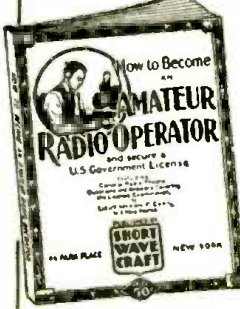
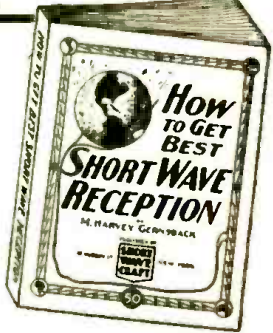


101 SHORT WAVE HOOK-UPS
Compiled by the Editors of **SHORT WAVE and TELEVISION**
Here is a worthwhile book that every short wave listener, every short wave fan, and every short wave amateur has wanted for a long time. It gives you the 101 best short wave hook-ups which have appeared heretofore.
100 Illustrations **50c**
72 Pages

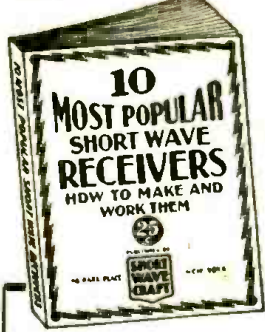
HOW TO BUILD AND OPERATE SHORT WAVE RECEIVERS
This is the best and most up-to-date book on the subject. It is edited and prepared by the editors of **SHORT WAVE and TELEVISION** and contains a wealth of material on the building and operation, not only of typical short wave receivers, but short wave converters as well.
150 Illustrations
72 Pages **50c**



HOW TO GET BEST SHORT WAVE RECEPTION
M. HARVEY GERNSBACK tells you everything you have ever wanted to know about short wave reception. The author, a professional radio listener and radio fan for many years, gives you his long experience in radio reception and all that goes with it.
40 Illustrations **50c**
72 Pages

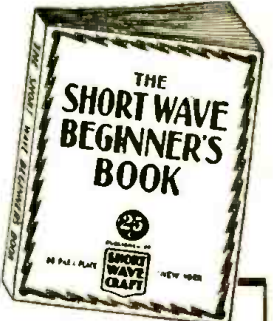


HOW TO BECOME AN AMATEUR RADIO OPERATOR
By Lieut. Myron F. Eddy, whose experience in the amateur field has made him pre-eminent in this line.
If you intend to become a licensed code operator, if you wish to take up phone work eventually—this is the book you must get.
150 Illustrations **50c**
72 Pages



TEN MOST POPULAR SHORT WAVE RECEIVERS
HOW TO MAKE AND WORK THEM
The editors of **SHORT WAVE and TELEVISION** 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, hook-up and all worthwhile specifications.
75 Illustrations **25c**
40 Pages

THE SHORT WAVE BEGINNER'S BOOK
Here is a book that solves 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.
75 Illustrations **25c**
40 Pages



LOOK FOR YOUR NEAREST DEALER
For convenience the publishers list below dealers in all parts of the world where our books are available. On your next shopping trip be certain to examine these volumes. You're sure to want them for your technical library.

- | | | |
|---|--|---|
| <p>ALABAMA
Walther Bros., Montgomery</p> <p>ARIZONA
Sam's Cigar Store, Phoenix</p> <p>CALIFORNIA
Electric Supply Co., Oakland
Radio Supply Company, Los Angeles
Radio Television Supply Co., Los Angeles
Pacific Radio Exchange, Inc., Los Angeles
Western Auto Supply, Los Angeles
Zack Radio Supply Co., Los Angeles
Vroman's Book Store, Pasadena
Western Radio & Elec. Co., San Diego
Offenbach Electric Co., San Francisco
Technical Book Co., San Francisco
Zack Radio Supply Co., San Francisco
Radio Specialties Co., San Jose</p> <p>COLORADO
Auto Equipment Co., Denver
Interstate Radio Supply, Denver</p> <p>CONNECTICUT
The Edward P. Judd Co., New Haven</p> <p>DELAWARE
Wilmington Elec. Spec. Co., Inc., Wilmington</p> <p>FLORIDA
Radio Accessories Co., Orlando</p> <p>GEORGIA
Wholesale Radio Service Co., Inc., Atlanta</p> <p>ILLINOIS
Allied Radio Corporation, Chicago
Walter C. Braun, Inc., Chicago
Chicago Radio Apparatus Co., Chicago
A. C. McClurg & Co., Chicago
Midwest Radio Mart, Chicago
Newark Electric Co., Chicago
Sears, Roebuck & Co., Chicago
Nix Stein & Co., Chicago
Montgomery Ward & Co., Chicago
Wholesale Radio Service Co., Inc., Chicago</p> | <p>INDIANA
Van Sickle Radio, Indianapolis</p> <p>MASSACHUSETTS
DeWolfe & Flske Co., Boston
The Personal Book Shop, Boston
Wholesale Radio Service Co., Inc., Boston
Library Book House, Springfield
Tremont Elec. Supply Co., Boston</p> <p>MICHIGAN
Rissi Brothers, Detroit</p> <p>MINNESOTA
St. Paul Book & Stat. Co., St. Paul</p> <p>MISSOURI
Burslein-Applebee Co., Kansas City
Radio Labs., Kansas City
Walter Ashe Radio Co., St. Louis
Van Sickle Radio Co., St. Louis</p> <p>NEW JERSEY
Radio Apparatus Co., Newark
United Radio Co., Newark
Wholesale Radio Service Co., Inc., Newark</p> <p>NEW YORK
Fort Orange Radio Dist. Co., Albany
Wholesale Radio Service Co., Inc., Bronx
Wholesale Radio Service Co., Inc., Jamaica L. I.
American News Co., New York City
Baker & Taylor Co., New York City
Blum, the Radio Man, New York City
David Bogen & Co., New York City
Federated Purchaser, Inc., New York City
Harrison Radio Co., New York City
Radio Circular Co., New York City
G. E. Stecher & Co., New York City
The Steiner Co., New York City
Sun Radio Co., New York City
Thor Radio Corp., New York City
Try-Mo Radio Co., New York City
Van Riemsdyck Book Stores, New York City
Wholesale Radio Service Co., Inc., New York City
H. W. Wilson Co., New York City
Radio Parts & Equipment Co., Rochester
M. Schwartz & Son, Scienceteady</p> | <p>OHIO
College Book Exchange, Toledo</p> <p>OREGON
J. K. Gill Co., Portland</p> <p>PENNSYLVANIA
Radio Electric Service Co., Philadelphia
Cameradio Co., Pittsburgh</p> <p>WASHINGTON
Seattle Radio Supply Co., Seattle
Wedel Co., Inc., Seattle
Spokane Radio Co., Spokane</p> <p>WISCONSIN
Radio Parts Co., Milwaukee
Radio Revista, Buenos Aires</p> <p>AUSTRALIA
McGill's Authorized Agency, Melbourne</p> <p>BELGIUM
Emil Arens, Brussels</p> <p>CANADA
T. Eaton & Co., Winnipeg, Man.
Electrical Supplies, Ltd., Winnipeg, Man.
Wholesale Radio Supply, Winnipeg, Man.
Canadian Electrical Supply Co., Ltd., Toronto, Ont.
Radio Trade Supply Co., Ltd., Toronto, Ont.
Canadian Electrical Supply Co., Ltd., Montreal, P. Q.</p> <p>BRAZIL
Agencia Soave, Sao Paulo</p> <p>CHINA
China News Co., Shanghai
International Booksellers, Ltd., Shanghai</p> <p>CUBA
Diamond News Co., Havana</p> <p>ENGLAND
Goringe's Amer. News Agency, London</p> <p>FRANCE
Toute La Radio, Paris</p> <p>GERMANY
Rehr G.M.B.H., SW 15, Berlin NW No. 7</p> <p>INDIA
Empire Book Mart, Bombay</p> <p>MEXICO
American Book Store, Mexico, D. F.
Central De Publicaciones, S. A., Mexico, D. F.
Jacques Salvó, Mexico, D. F.</p> <p>NEW ZEALAND
Johns, Ltd., Auckland
James Johnston, Ltd., Dunedin
Te Aro Book Depot, Ltd., Wellington</p> <p>SOUTH AFRICA
Technical Book Co., Cape Town
Central News Agency, Johannesburg
International House, Johannesburg
South African Radio Publications, Johannesburg</p> |
|---|--|---|

IF YOUR DEALER DOES NOT CARRY THESE BOOKS, ORDER DIRECT FROM US. FILL OUT COUPON BELOW. SHIPMENT WILL BE MADE IMMEDIATELY.

POPULAR BOOK CORPORATION SW-6
99 Hudson Street, New York City.

Gentlemen: I enclose herewith my remittance for for which please send me the following books:

.....

.....

Name

Address

City

State

(Send remittance in form of check or money order. If letter contains cash or unused U. S. postage stamps, register it.)

POPULAR BOOK CORPORATION • Publishers • 99 HUDSON STREET • NEW YORK, N. Y.

World Short Wave Stations

(Continued from page 92)

Mc.	Call	Mc.	Call
6.083	VQ7LO	6.007	ZRH
6.081	YVIRD	6.005	HP5K
6.080	W9XAA	6.005	CFCX
6.079	DJM	6.005	VE9DN
6.077	OAX4Z	6.004	RV59
6.075	VP3MR	6.002	CXA2
6.073	HJ3ABF	6.000	ZEA
6.070	CFRX	6.000	XEBT
6.070	VE9CS	End of Broadcast Band	
6.069	—	5.977	CS2WD
6.065	S80	5.975	OAX4P
6.060	—	5.968	HVJ
6.060	W8XAL	5.940	TG2X
6.060	W3XAU	5.940	PJCI
6.057	ZHJ	5.935	YVIRL
6.054	HJ6ABA	5.913	YV4RP
6.050	HP5F	5.900	ZNB
6.045	XETW	5.900	TILS
6.042	HJ1ABG	5.898	YV3RA
6.040	W4XB	5.892	HH2S
6.040	W1XAL	5.890	JIC
6.040	YDA	5.885	HI9B
6.033	HP5B	5.875	HRN
6.030	VE9CA	5.855	H11J
6.030	OLR2B	5.853	WOB
6.023	XEUW	5.845	YVIRB
6.020	DJC	5.830	TDD
6.017	H13U	5.825	TIGPH
6.015	PRA8	5.813	TIGPH2
6.010	OLR2A	5.800	YV5RC
6.010	COCO	5.790	JVU
6.010	VK9MI	5.758	YNOP
6.010	CJXC	5.740	YV2RA
		5.740	TGS
		5.735	HCIPM
		(Continued on page 124)	
		ROBERTS HEIGHTS, S. AFRICA, 49.94 m., Addr. (See ZRK, 9.606 mc.) Daily exc. Sun. 10 am.-4 pm., Sat. till 4.45 pm.; Sun. 8 am.-12 n., 12.15-3.15 pm.	
		COLON, PAN., 49.96 m., Addr. Box 33. 7-9 am., 11.30 am.-1 pm., 6-11 pm.	
		MONTREAL, CAN., 49.96 m. Can. Marconi Co. Relays CFCF 6.45 am.-12 m.; Sun. 8 am.-10.15 pm.	
		DRUMMONDVILLE, QUE., CAN., 49.96 m., Addr. Canadian Marconi Co.	
		MOSCOW, U.S.S.R., 49.97 m. Irregular. 3-6 pm.	
		MONTEVIDEO, URUGUAY, 49.98 m. Addr. Rio Negro 1631. Relays LS2, Radio Prieto, Buenos Aires. 11.30 am.-11.30 pm.	
		SALISBURY, RHODESIA, S. AFRICA, 50 m. (See 6.147 mc., ZEB.) Also Sun. 3.30-5 am.	
		MEXICO CITY, MEX., 50 m., Addr. P. O. Box 79.44. 8 am.-1 am.	
		LISBON, PORTUGAL, 50.15 m., Addr. Rua Capelo 5. 3.30-6 pm.	
		HUANCAYO, PERU, 50.16 m. La Voz del Centro del Peru. 8 pm. on.	
		VATICAN CITY, 50.27 m. 2-2.15 pm. daily; Sun. 5-5.30 am.	
		GUATEMALA CITY, GUAT., 50.47 m. 4-6, 9-11 pm.; Sun. 2-5 am.	
		CURACAO, DUTCH W. INDIES, 50.47 m., Mon., Wed., Fri. 6.36-8.36 pm., Sun. 10.36 am.-12.36 pm.	
		MARACAIBO, VEN., 50.52 m., Addr. Radio Popular, Jose A. Higuera M. P. O. Box 247. Daily 11.43 am.-1.43 pm., 5.13-10.13 pm.; Sun. 9.13 am.-3.13 pm.	
		VALENCIA, VEN., 50.71 m. Irreg.	
		MAFEKING, BRI. BECHUANALAND S. AFRICA, 50.84 m. Addr. The Govt. Engineer, P. O. Box 106. 6-7 am. 1-2.30 pm.	
		SAN JOSE, COSTA RICA, 50.85 m. 6-10 pm.	
		BARQUISIMETO, VEN., 50.86 m., Addr. La Voz de Lara, 12 n.-1 pm., 6-10 pm.	
		PORT-AU-PRINCE, HAITI, 50.89 m., Addr. P. O. Box A103. 7-9.45 pm.	
		TAIHOKU FORMOSA, 50.9 m. Works Tokio 5-10 am. irregular.	
		SANTIAGO, D. R., 50.95 m. Irregular 6-11 pm.	
		TEGUCIGALPA, HONDURAS, 51.06 m. 1.15-2.16, 8.30-10 pm.; Sun. 3.30-5.30, 8.30-9.30 pm.	
		SAN PEDRO DE MACORIS, D. R., 51.25 m., Addr. Box 204. 12 n.-2 pm., 6.30-9 pm.	
		LAWRENCEVILLE, N. J., 51.26 m., Addr. A.T.&T. Co. Works Bermuda nights.	
		MARACAIBO, VEN., 51.3 m., Addr. Apartado 214. 8.45-9.45 am., 11.15 am.-12.15 pm., 4.45-9.45 pm.; Sun. 11.45 am.-12.45 pm.	
		SHINKYO, MANCHUKUO, 51.46 m. Works Tokio 5-10 am., irreg.	
		SAN JOSE, COSTA RICA, 51.5 m., Addr. Alma Tica, Apartado 800. 11 am.-1 pm., 6-10 pm. Relays TIX 9.10 pm.	
		SAN JOSE, COSTA RICA, 51.59 m., Addr. Senor Gonzalo Pinto, H.	
		CARACAS, VEN., 51.72 m., Addr. Radio Caracas, Sun. 8.30 am.-10.30 pm. Daily 7-8 am., 10.30 am.-1.45 pm., 3.45-9.30 pm.	
		NAZAKI, JAPAN, 51.81 m. Works JIC and TDD irregular.	
		MANAGUA, NICARAGUA, 52.11 m. 8-9.30 pm.	
		SAN CRISTOBAL, VENEZUELA, 52.23 m., Addr. La Voz de Tachira. 11.30 am.-12 n., 5.30-9 pm., Sun. till 10 pm.	
		GUATEMALA CITY, GUAT., 52.23 m. Irregular.	
		QUITO, ECUADOR, 52.28 m. Irregular 10 pm.-12 m.	

They're
ULTRA-COMPACT!



SUITABLE FOR EVERY SERVICE NEED

Cornell-Dubilier type BR dry electrolytic (illustration actual size) are the last word in efficient compact filter capacitors. Hermetically sealed in aluminum containers, these condensers are completely protected against heat and humidity. Size is fully 1/5 that of corresponding types. Available in single sections only, in capacities 4, 8, 12, 16, 20 and 40 mfd., 150 Volts D.C. and up to 8 mfd., 450 Volts D.C.

Ask your local distributor to show you a handy carton of ten "BEAVERS" NOW AT EXCEPTIONALLY ATTRACTIVE PRICES

Complete details in catalog flyer No. 155A. Write TODAY to: 1027 Hamilton Blvd., So. Plainfield, N. J.

Cable Address "CORDU"

CORNELL - DUBILIER
ELECTRIC CORPORATION
South Plainfield, New Jersey

PYRO PANTAGRAPH



Size of Box: 12½ x 8½ inches

\$2.75

VOGUE Shipping weight, 3 lbs.

THIS electrical outfit is especially designed for burning designs permanently on materials such as Leather, Wood, Cork, Bakelite, etc. Plug the Pyro-electric pencil in any 110 volt AC or DC outlet and it is ready to be used. Plug and cord furnished.

By the use of the Pantagraph included in the outfit, any design may be reproduced either in original, reduced or enlarged form.

Outfit consists of: one Pyro-electric Pencil; one Pantagraph; three hardwood plaques; one bottle of Varnish; one Brush; one tracing tip and four-page instruction sheet.

Size of box: 12½ x 8½ inches.

Outfit will be forwarded by Express Collect if not sufficient postage included with your order.

WELLWORTH TRADING CO.
558 W. Washington Blvd. Dept. SWT-638 Chicago, Ill.

COMMERCIAL NOTICES 10¢ A WORD

Under this heading only advertisements of a commercial nature are accepted. Remittance of 10¢ per word should accompany all orders. Copy should reach us not later than the 10th of the month for the second following month's issue.

AGENTS WANTED

500% PROFIT SELLING GOLD Leaf Letters for Store Windows. Free Samples. Metallic Co., 446 North Clark, Chicago.

CORRESPONDENCE COURSES

500,000 USED CORRESPONDENCE Courses and Educational Books. Sold, Revised, Exchanged. All subjects. Satisfaction guaranteed. Cash paid for used courses. Complete details and bargain catalog free. Send name. Nelson Company, 3279 Manhattan Building, Chicago.

MISCELLANEOUS

3/4 INCH TR. 0-125 VT. A.C. Voltmeter, 0-10 A.C. Ammeter, \$2.75 each. Weston D.C. 0-7 and 0-140 Voltmeter, 2 1/2" with 9 D.P. Switch \$2.75. Nat'l. MB27-4. Stg. T.R.F. chassis and Thornd. 45 P.P. Pack \$7.50. 10" MUTER DYN. SPKR. \$3.00 Victor 7" III-F1 Orthophonic Horn. Mag. and Acoustic Pick-ups, \$10.00, plus express. \$100.00 RCA battery

Superhet—\$25.00. Harry Ackerson, Ramsey, N. J.

WE ORIGINALLY HAD FIVE thousand Stoppani Compasses for which the U.S. Government paid over \$30.00 each. We sold all but a very few. We cannot obtain more to sell at three times our present price. Send in your order before they are all sold at \$4.50 each, postage paid. Gold Shield Products, 350 Greenwich St., New York City.

PATENT ATTORNEYS

INVENTORS, ALL PATENT AND trademark cases submitted given personal attention by members of the firm. Form "Evidence of Conception" and instructions free. Lancaster, Allwine & Rommel, 436 Bowen Building, Washington, D. C.

QSL-CARDS-SWL

100 NEAT SWL CARDS PRINTED with your name and address sent postpaid for \$1. Bunch of samples and IRT Chart for five cents in stamps. WIBEF, 16 Stockbridge Ave., Lowell, Mass.

SPECIAL OFFER: 150 NEAT, ATTRACTIVE two color short wave listener's, amateurs. QSLs. \$1.00, 200—\$1.75. Samples (Stamps). W-8-E-S-N, 1827 Cone, Toledo, Ohio.

QSL SWL CARDS, NEAT, ATTRACTIVE, reasonably priced, samples free. Miller, Printer, Ambler, Pa.

SONG POEMS WANTED

WANTED ORIGINAL POEMS, songs for immediate consideration. Send poems to Columbian Music Publishers, Ltd., Dept. R-19, Toronto, Can.

TELEVISION

TELEVISION EQUIPMENT SINCE 1927. Arthur Pohl, 2123 Hubbard, Detroit, Mich.

FOR SALE (NON COMMERCIAL) 3¢ A WORD

Under this heading we accept advertisements only when goods are offered for sale without profit. Remittance of 3¢ per word should accompany all orders. Copy should reach us not later than the 10th of the month for the second following month's issue.

FOR SALE: GROSS SHORT WAVE three tube metal cabinet battery receiver needless cabinet speaker ready to operate; also Crosley metal cabinet four tube broadcast receiver less tubes and batteries; also about twenty five other valuable items all at a bargain. Send for complete list. Carl Jensen, 211 East 200 St., New York, N.Y.

AMPLIFIER 6 TUBES, CASE, Mike, 50 feet cable, rebuilt for AC DC. Used 2 months \$40.00 or swap for good AC-DC receiver, NCRON or what have you? Dermoutz, 138 W. 62nd, New York.

FOR SALE: GUITAR, CAMERAS, string musical instruments, watches, chronometer or trade for 5 tube short wave receiver A.C. Gerhold, 113-18 Atlantic Ave., Richmond Hill, N.Y.

TRIPLETT 1910A TUBE TESTER \$14.50; Tube RF 2 line filter \$1.50; Astatic 8-8 pick-up \$3.50; Meissner phonograph oscillator \$5.00; very slightly used; all A-1. J. F. Close, 164 Ohio Ave., Wadsworth, O.

SELL CHEAP: MODERN RADIO course, three tube allwave electric receiver. Write for details. Rehbein, Larsen, Wis.

1937 MIDWEST EIGHTEEN TUBE Super Het. Complete with tubes and speaker. No cabinet. Guaranteed perfect condition throughout. Used six months. Phone Jack. DN-23 countries. First \$15 takes. Bill Edelhoff, Frazier, Minnesota.

FOR SALE: SUPREME AAA1 Diagonometer, excellent condition, two Weston meters, A.C. Oscillator, tube checker and set analyzer. Weighs 26 lbs. Cost \$160 sell for \$25. J. Dubinsky, 9404 Astoria Blvd., Jackson Heights, Queens, N.Y.C.

BARTER AND EXCHANGE — FREE!

NO ADVERTISEMENT TO EXCEED 35 WORDS, INCLUDING NAME AND ADDRESS

Space in this department is not sold. It is intended solely for the benefit of our readers, for exchanging radios, parts, phonographs, sporting goods, books, magazines, etc. As we receive no money for these announcements, we can not accept responsibility for any statements made by the readers. Use these columns freely. Only one advertisement can be copied should reach us not later than the 10th of the month for the second following month's issue.

accepted from any reader in any issue. All dealings MUST be above board. Remember you are using the U. S. mail in all these transactions and therefore you are bound by the U. S. Postal Laws. Describe anything you offer accurately and without exaggeration. Treat your fellow men the way you wish to be treated. We welcome suggestions that will help to make this department interesting and helpful to our readers.

I WANT TO TRADE AN FTBX complete with power supply, tubes and xtal for a good camera, enlarger or fine pair of binoculars. N. R. Thornton, Somerville, Ohio.

HAVE 4-210 TUBES GOOD used condition. Want transmitting parts. Have 30 back numbers Radio magazines, including old type QST —exchange for what have you. W. S. Crooks, W81VQ, Box 15, Stow, Ohio.

SWAP USED W.E.242A AND W.E.242B perfect condition; photo electric cell, new; National S.W.3 with National power supply and 8mm art photos (motion picture) for what have you? David Jashoff, W2HAP, 1132 Forest Avenue, Far Rockaway, N.Y.

HAVE HUNDREDS OF U.S. AND foreign commemorative stamps to exchange for art photos, 8mm movies and radio parts. W.M. McDonald, 271 Pearl Street, Cambridge, Mass.

HAVE \$32.50 MAJESTIC B POWER supply. Operates on 110 A.C., providing up to 200 D.C. Also hundreds of radio parts, cabinets, etc. Want small transceiver or what have you? Wallace Freeman, Box 466, Barre, Mass.

WILL SWAP S.W.L. CARDS with any SWL in foreign countries and will answer all correspondence. (QRA): George M. Fleming, 301 South Cherry Street, Cameron, Missouri, U.S.A.

AM INTERESTED IN JOINING American and foreign radio clubs, would like to join at least one in every continent. Would like to get your SWL and QSL card also. Bob Kelly, Box 98, Minoa, N. Y.

WILL TRADE MCGRAW-HILL radio book, good condition. Back copies of Boy's Life, American Boy and Modern Mechanix magazines. Foreign stamps for one tube battery radio. Address Marion Deskin, Archer City, Texas.

WANTED: 2 TUBE TRANSCEIVER 2 1/2-4000 meters ready to go on air or good superhet shortwave receiver. Have complete R.T.I. course and Frank Holten carnet. R. J. Racine, Box 274, Danielson, Conn.

TRADE—STOP WATCH; HAND Mike, with 4' cord; 8" Keuffel & Esser Slide Rule. All items excellent condition. Want small SW receiver, radio books or what have you. W. H. Coburn, Box 685, Keystone, W. Va.

WOULD LIKE TO EXCHANGE SWL cards with any SWL in U.S. or foreign countries. All cards received will be answered with my card. Charles Wall, 921 Lake Blvd., Albert Lea, Minn.

SWAP—REMINGTON MODEL 33 22 caliber rifle—excellent—250 cartridges. Ice skates size 11 1/2. No. 3A pocket koolak like new. K. B. Dienst 8 power field glasses. What have you? W. MacMurray, 98 Hart St., Brooklyn, N.Y.

WOULD LIKE TO SWAP SWL cards with any other SWL. All mail will be answered promptly. George Chaffield, Box 93, Wolcott, N.Y.

WILL SWAP 22 CAL. REMINGTON 16 shot autoloading automatic rifle. In good condition (deep sights), for good Remington or Underwood standard typewriter. If interested, correspond with Bradford Jamerson, 2205 Howard St., St. Louis, Missouri.

SHORT WAVE LISTENERS IN U.S.A. and especially foreign countries. Would like to exchange SWL cards and/or correspond with you. 100% answer guaranteed. Joe R. Cahill, Box No. 35, Georgetown, Ohio, U.S.A.

HAVE 14 INCH SPEAKER, 4-tube radio, 5 tube battery radio, 100 watt speaker, batteries, Majestic 5 tube, 4700 ohms speaker, other parts. Swap for 110 volt SW receiver. Herb Kownski, 418 Fifth St., Green Bay, Wis.

WILL TRADE OLD ISSUES OF Radio News in good condition, 48 copies from Jan. 1931 to December 1937, for all wave signal generator or tube tester. R. A. Martin, Jr., 1402 Chestnut St., Lampasas, Texas.

WILL TRADE —MAGNETIC pick-up, electric turntable and 1/100 h.p. A.C. motor for or on low power 40 or 80 meter unit, or what have you? Ralph Hilsman, 600 S. Boston St., Gallon, Ohio.

WANTED—USED BATTERY OPERATED code machine, with or without tapes. Must be cheap, or at least not beyond repair. Send particulars to Thomas D. Grant, Lumby, B. C., Canada.

WILL TRADE GOOD 5 TUBE A.C.-D.C. Kadette rec., range 1520 to 17.5 mcs. phone jacks and speaker, for good, accurate all-wave oscillator, complete. Jack Doherty, 1828 W. 11, Des Moines, Ia.

TRADE, 150 WATT, 110 VOLT Powerack auto generator complete, slightly used, also about 30 radio tubes; prefer late model auto radio. What have you? Beans Crumpler, 2511 Santee Ave., Columbia, S.C.

HAVE TWO "WILEY POST" stratosphere flight covers; one set German Olympic stamps affixed to official sheet Olympic stationery, canceled by P.O. in Berlin. Want: photographic equipment. M. Stark, Box 462, Waseo, California.

WANTED GOOD PRESELECTOR or Sky Buddy. Have typewriter, complete Ivory Mah Jongg set, cost \$33, also Erector set with reversible motor. All letters answered. Daniel Platek, 225 Division Ave., Brooklyn, N.Y.

TRADE 50 BACK ISSUES OF S.W.C. other magazines, American and foreign stamps, radio parts, DX 1 slightly used. Want American stamps or radio equipment. Fred Humphrey, Mohonk Ave., New Paltz, N.Y. (Continued on following page)

World S-W Stations

(Continued from page 123)

- Mc. Call
- 5.145 OKIMPT PRAGUE, CZECHOSLOVAKIA, 58.31 m., Addr. (See OLR, 11.84 mc.) 5.15-5.30 pm. Wed. & Sat.
- 5.145 PMY BANDOENG, JAVA, 58.31 m. 5.30-11 am.
- 5.077 WCN LAWRENCEVILLE, N. J., 59.03 m. Addr. A.T.&T.Co. Works England late at night irregularly.
- 5.025 ZFA HAMILTON, BERMUDA, 59.65 m. Works N.Y.C. irregularly at night.
- 5.000 TFL REYKJAVIK, ICELAND, 60 m. Works Europe night time irreg.
- 4.975 GBC RUGBY, ENG., 60.3 m. Works ships irregularly.
- 4.900 HJ3ABH BOGOTA, COL., 61.19 m. Addr. Apartado 565. 12 n.-2 pm., 6-11 pm.; Sun. 12 n.-2 pm., 4-11 pm.
- 4.880 HJ4ABP MEDELLIN, COL., 61.44 m. 6-11 pm.
- 4.842 HJ3ABD BOGOTA, COL., 61.95 m., Addr. La Nueva Granada, Box 509. 12 n.-2 pm., 7-11 pm., Sun. 5-9 pm.
- 4.820 GDW RUGBY, ENG., 62.24 m. Works N.Y.C. night time irregularly
- 4.807 HJ1ABB BARRANQUILLA, COL., 62.39 m. La Voz de Barranquilla, Addr. P. O. Box 715. 11.30 am. to 1 pm., 4.30-6 pm.
- 4.780 HJ1ABB BARRANQUILLA, COL., 62.72 m. Addr. P. O. Box 715. 11.30 am.-1 pm., 4.30-10 pm.
- 4.772 HJ1ABJ SANTA MARTA, COL., 62.85 m. 11.30 am.-2 pm., 5.30-10.30 pm. except Wed.
- 4.752 WOO OCEAN GATE, N. J., 63.1 m. Addr. A. T. & T. Co. Works ships irregularly.
- 4.740 HJ6ABC IBAGUE, COL., 63.25 m. 7 pm.-12 m.
- 4.272 WOO OCEAN GATE, N. J., 70.22 m. Addr. A.T.&T. Co. Works ships irregularly.
- 4.250 RVIS KHABAROVSK SIBERIA, U.S.S.R., 70.42 m. 1-10 am.
- 4.107 HCJB QUITO, ECUADOR, 72.99 m. 7-8.30 am., 11.45 am.-2.30 pm., except Monday, Sunday 12 noon-1.30 pm., 5.30-10 pm.

First Ham to Talk with Pitcairn Island

(Continued from page 79)

own call "W8CNA." The voice exclaimed, "You are to be congratulated. You are the first person in the world to talk by radio with Pitcairn Island."

Early Saturday morning March 5, 1938 at 1:30, the Binghamtonian and his guest held the invisible link with Pitcairn Island 6000 miles away and talked with the two Americans who had been sent there to set up this station.

The two Americans Lew Bellam and Lindley Granville of Providence, R. I., began the 6000 mile trip several weeks ago. No word had been heard from them until Mr. Bellam contacted the Binghamton operator. Mr. Bellam said, "We arrived in a windstorm Tuesday. A New Zealand ship brought us within two miles of the island, from there the natives piloted us through treacherous rocks, and hoisted us and our 4 tons of equipment up a sheer cliff to the island."

Mr. Wolfinger was asked by Mr. Bellam to relay a message to his mother in Providence, R. I. He did so immediately. He picked up the phone on his table and got Mrs. Bellam on the wire. Mrs. Bellam refused to believe that her son was actually talking with America until Mr. Wolfinger held the telephone receiver against the loud speaker and let her hear her son's voice telling her that he was safe and well.

The conversation started at 1:30 a.m. Saturday lasting until nearly 4:00 a.m. at this time the band began to fade.

Mr. Phemicie is also a "ham," W9ODQ Waterloo, Iowa.

Mr. Wolfinger has had many experiences with short wave but this Pitcairn Island incident tops them all.—F. W. Breese.

Let's Listen In with Joe Miller

(Continued from page 83)

MANCHUKUO

JDY, now on 9.94 mc., QSLs our SW-BC report at last, though ignoring our 3 commercial phone reports. The QSL, as can be seen, is well worth getting, and a letter is also enclosed giving following data: Schedule daily 7-8 a.m., power 10 kw., broadcasts commencing July 16, 1937. JDY carries the programs of JQAK, the BCB station in Dairen. Letter is signed by Isao Sugiyama, director. QRA from letter: Dairen Broadcasting Station JDY, Shotokugai 3, Dairen, Kwantung, Manchukuo. JDY QSLs all reports in about 3 months.

NEW CALEDONIA

"Radio Noumea," 6.12 mc., a new DX catch to go after, is located in the South Pacific Ocean, and may be heard if one really tries hard for it. Operated by the French government, in New Caledonia, owned by France. QRA is: Radio Noumea, 44 Rue de L'Alma, New Caledonia, Pacific Islands. This station signs on and off with the Marseillaise. Schedule is Tuesdays and Saturdays, 3 to 4:30 a.m.

VATICAN CITY

HVJ, 15.12 mc., counted as a separate country apart from Italy, is being heard with a fine signal, and has a schedule of 10:30-10:45 a.m., but occasionally reported to 11 a.m. HVJ now has a new Xmtr, and should be easily heard by all. QRA: Stazione Radio HVJ, Citta del Vaticano, Vatican City, Italy. A beautiful postal card size view of some Vatican City scenery is the QSL card that verifies ones report.

ASIATIC REVIEW

VVS, 12.87 mc., Mingaladon, Burma, heard last at 6:35 a.m.
JVE, 15.66 mc., Nazaki, Japan, heard at 7:15 a.m., fine signal.
RV15, 4.27 mc., Khabarovsk, Siberia, reported by Harry Honda, W6, with a good signal, 8-9 a.m., West Coast.

INDIA

VUD2, 9.59 mc., New Delhi, India, is still well heard and reported by many. Chris D. Jaffe, Va., reports hearing Bombay, 9.565 mc., at 9:30 p.m. Any other reports on this one?

From Masud Akhtar of New Delhi, comes following data:

VUB, Bombay, operates on 9.55 mc., from 1-3:30 a.m. and on 3.305 mc. from 7 a.m. to 12:30 p.m.

VUD2, New Delhi, operates on 9.59 mc. from 8:30 p.m.-10:30 p.m., and 1:30-3:30 a.m. And on 4.905 mc. from 7:30 a.m.-12:30 p.m.

Revised schedule of VUC, Calcutta, as follows: 6:109 mc., weekdays, 2:06-4:36 a.m., and 7:06 a.m.-12:06 p.m. Sats., 10:06 p.m.-2:06 a.m., on Suns., 7:06 a.m.-12:36 p.m. Bombay and Delhi have 10 kw., while Calcutta still uses the old low-powered Xmtr. A new station for Calcutta is now under construction. Thank you, Mr. Akhtar!

Martin Garvey, W2, already has received a veri in the form of a letter, from VUD2. The QRA is correct as given in last issue, All-India Radio, New Delhi, India.

YBB, 7.87 mc., Palembang, Sumatra, has been verified by Roger Legge, W2, and

(Continued on page 126)

BARTER and EXCHANGE FREE ADS (continued)

WILL TRADE PRECISION MULTIMETER series 830. It is new. For SW-3 receiver with coils. Must be for A.C. Howard Goodie, 2510 Lincoln St., Saginaw S.S., Mich.

WILL SWAP 8 ISSUES OF MODERN MECHANICS and *Inventions* in good condition for \$66 tube. QTH: Warren Arnett, Rt 104 Box 187, Jonesboro, Indiana.

TRADE 1938 HOWARD RADIO. Exide storage battery, radio tubes, signal generator, all new. Interested in television equipment, phone amplifier, crystal amplifier, and technical books. Clyde D. Klebach, 1429 Moss, Reading, Penna.

WANTED—8"-10" ASTATIC (OR Piezo) Hi-Impedance crystal phonograph pickup in good condition. Buy or swap for excellent Gordon magnet pickup with fine volume control. S. B. Zuckerman, 2230 Gr. Concourse, Bronx, New York City.

WANTED—SAMPLES OF QSL AND SWL cards from any printing; want to get different prices on cards. Luther Schlake, 1608 Campbell Ave., Des Plaines, Ill.

SWAP CLASS "B" TRANSFORMERS '46 or '59 to 5,000 or 10,000 ohm load. High quality DB carbon microphone. Want IIF bottle about 40 watts, candle camera. Arnold Schwenn, 421-7th St., Clarkston, Wash.

I WOULD LIKE TO BUY A large number of radio magazines of various kinds to use as a reference library with an index in a small filing cabinet. (3"x5" cards.) Howard Chandler, R.R.1, Ravenna, O.

WILL SWAP GOOD UKULELE, folding camera, set of Hammarlund six prong plug in coils for use used 807, double button mike, 160 meter crystal, or what have you? Arthur Luntz, 609 Monona Street, Boone, Iowa.

WILL SWAP EAR PHONES, small camera, radios and parts, .410 gauge shot gun. Am interested in motorcycle, ride larger than .22 or what have you? Will exchange swap lists. Lawrence Miller, Healy, Kansas.

WILL SWAP EMERSON DYNAMOTOR output 180 volts at 30 Ma. from six volt battery at 2.5 amp. Never used. Will swap for S.W. radio parts or what have you. Jos. Haquin, P.O. Box 118, Gillespie, Ill.

EXCHANGE: CANDLE HIGH SPEED Cycle Course, complete 3x5 hand press, ship's wheel electric clocks, Conn E flat alto sax and case. Perfect condition. W.H.Z., Mendon, Massachusetts.

HAVE ONE AND TWO TUBE radios, crystal sets. Want radio parts. Send list. John Haynes, Doe Run, Missouri.

HAVE CRYSTAL RADIOS, ONE and two tube radios to trade for cameras, picture developing and printing outfit, hectograph, binoculars, high power microscope, brush crystal headphones, or what have you? William Hlecha, Pawnee City, Nebraska.

WILL TRADE A FINE MAHOOGANY steel guitar and case for a code machine with full line of tapes. Satisfaction or return on both ends. Must be in good condition. K. Summers, Port Burwell, Ont., Canada.

TRADE: 20 HAND MTD ORE Radio crystals; 5 oz. unmd unused tested galena, pure; 3 unmd var. condensers; 300 μ voltmeter; 2 unused slide buttons; protected short wave coil invention. L. B. Johnson, Box 816, Spokane, Wash.

WANT SHORT WAVE RECEIVER in exchange for Kolster amplifier and power pack, pair hubspul transformers Pilot. Also code practice records. All letters answered. Wm. E. Speidel, Jr., 546 So. Broad St., Elizabeth, N. J.

WANTED—ALL VOLUMES Riders Manuals, state price, condition. Swap rides, telescope, text-books, N.R.I. Natrometer, code records, photo electric cell, new AT2051, Jewell 0-10 volt A.C. meter. John M. Thompson, 529 N. Main St., Canandaigua, N.Y.

HAVE GOOD USED 16 MM movie projector and used electric train; also radio parts for trade. What have you and what do you offer? Harry Wood, Route 1, Waverly, Washington.

WILL TRADE—ONE 30 POWER telescope, slightly worn. Also bunch of old phonograph records. Will send title list on request. Want set of SWK-4 or SWK-6 coils. Al Comperda, 4808 S. Seeley Ave., Chicago, Illinois.

WANTED TO BUY: 1 OR 2 TUBE short wave receiver in fair condition and reasonable cost. Victor Delso, Jr., 422 High St., Monongahela, Penna.

HAVE PREHISTORIC STONE Age relics from the ruins of Arizona to trade for S.W. 2 tube electric receiver or what have you. Photo if interested. Geo. W. Parsons, 302 S. Granite St., Prescott, Arizona.

WILL TRADE 16 BACK ISSUES of SWC and SWAT; also other mags., for an Aial on any amateur band. Chas. Ammerman, 355 Ridge St., Honesdale, Pa.

TRADE KIT OF TRANSFORMERS and T pads for four channel mixer, pickup, meters, six P.A. trumpets, two button carbon mike. Want ribbon mike or what have you. C. Crandall, Fairfield, Iowa.

WILL SWAP PAN-AMERICAN silver plated, gold bell valve trombone, perfect playing condition, with case; for radio equipment, service manuals, or A.C. short wave receivers. Write: Roy B. Faulk, 210 Oak St., Crowley, La.

WANTED TO BUY AN INSTRUC- TOGRAPH, Teletex code machine or a Chandler System. Robert Stellmaker, Atkin, Minnesota.

WILL SWAP 28" BIKE RCA CAR radio for short wave apparatus, camera or code help. J. B. Clooney, Jr., 310 Columbia St., Houston, Texas.

TRADE RCA VICTOR MODEL R33-A record player, Weaver model 320-S3 rifle telescope for 16-20 Ga. double barrel shotgun or radio. John Baierwick, Box 67, Simsbury, Conn.

WANTED TO BUY OR TRADE public address apparatus, sound motion picture apparatus and recording apparatus. Must be of nationally known makes. Danny Munroe, WIND, Gary, Ind.

WILL EXCHANGE 1 SET AUEL's Electric Library new condition value \$15.00 for a well filled stamp album. H. Hawarth, 1144 Decatur St., Brooklyn, N.Y.

HAVE WINCHESTER 38-55, Knight transceiver, original 30 transceiver, DX'er receiver, many radio parts and large stamp collection. Want cheap code machine, 8 or 16mm movie camera and projector. W. F. Russell, Ashland, Maine.

SWAP MODEL 251 WESTON voltmeter (0-15-150 volts) in 9 1/2" case and two Western Electric 21E tubes (used). Need a good multimeter. Rupert Lepke, 3026 S. St. Louis Ave., Chicago, Ill.

TRADE: \$60 WORTH OF RADIO science mags., \$100 worth "hot" phonograph records. Six tube 1936 auto radio. Want good receiver, transmitter, and/or test equipment. T. E. Mott, neff, 2715 Lincoln Way, Ames, Iowa.

HERE'S YOUR CHANCE, WILL trade 160 different radio magazines, Radio News, Craft, etc. for Weston or Jewell meters, etc. Write H. Nelson, 60 West 75 Street, New York City.

HAVE CHROMIUM PLATED "Bug" practically new. What am I offered in exchange. All letters answered. Clyde A. Dalton, Det. Q.M. Corps, Mitchell Field, N.Y.

WANTED SWL'S FROM ALL short wave listeners in the United States. All mail acknowledged. Lewis Neuman, Box 8363, Pittsburgh (18), Pa.

TRADE H. N. WHITE SLIDE trombone, cost \$85. Virtuoso trombone course, cost \$65. Also numerous instruction books, music, etc. Dealie short wave set, equipment, etc. Best offer takes all. Lewis S. Parker, Middle River, Md.

WANT BROWNING ".35" SKY Buddy, etc., have All-Star, Jr., complete with all coils 13-565 meters. metal cabinet (16x12x8) less speaker good condition. Will settle difference if any. Elwood Brooks, 1636 E. 38, Cleveland, O.

WOULD LIKE TO EXCHANGE some radio parts such as receivers, 7 meter trans., etc., for a 4.5 or 6.3 camera. Send or list of parts. Thomas Evans, 5226 Chester Ave., Philadelphia, Pa.

SWL'S WE SWAP SWL'S, ATEN'S, correspondence. You send your card—we'll send ours. All mail answered by return. B. W. T. Coekeroft, "Siegaby", Falkland Drive, Onchan, Isle of Man, British Isles.

HAVE 125 FICTION MAGAZINES (Western, Detective, etc.) to swap. Want typewriter, short wave receiver, radio magazines and books, radio parts, servicing instruments or what am I offered. QRA: Harold Howard, R.F.D. No. 4, Wapakoneta, Ohio.

WANTED FBNA OR SIMILAR receiver; have good tenor banjo with sound board; 1936 Healdrite 3mm generator; \$150 or 300 mil transformer. Will buy or trade. Ray LaForce, Warren, Ohio.

WILL TRADE CAMERA, TENNIS racket and U.S. and foreign stamps. Other articles too numerous to mention. Want any kind of radio parts. Send for list of swaps. George P. (Jose) Joy, Ill.

WILL TRADE AN "EILEN 3B" three tube battery receiver. In good condition, for a 2-tube "Doerle" such as 1935 "Prof Doerle" or 12,500 mile "Doerle" battery receivers. Alexander Polsteony, 217 Pine St., Phila., Pa.

HAVE 5 TUBE EILEN RADIO complete with coils. Good condition. Will trade for battery set. Duane Sheller, RDL, Ashland, Ohio.

WANTED USED DOERLE D38 OR Super-Clipper 7 tubes offers must be reasonable. Carl M. Jensen, 211 East 200 St., Bronx, N.Y.

ABOUT 250 STAMPS, MANY countries, junior collections; trading also a few radio, etc., magazines; would like in trade an H. G. Chain's Air Scout, Jr., receiver, or what have you? Geo. Seath, Leamington, Ontario.

WILL TRADE A WURLITZER violin, Stradivarius copy, in good condition for trumpet, or clarinet—or what have you? Write—C. O. Nunery, 557 Willowbrook Ave., Rock Hill, S. C.

TRADE FOR WHAT HAVE YOU—Readrite model 245A tester in the condition. F. Vleweger, 1411 S. 17th St., Mantowoc, Wis.

SHORT WAVE LISTENERS IN all countries. Would like to exchange SWL cards with anyone. Will answer all SWL cards. QRA—Howard A. Schultz, 3519 East 104 Street, Cleveland, Ohio, U.S.A.

FOR TRADE RADIO PARTS ALL kinds meters and mike, will trade for cameras, public address system. What have you? Would like to trade SWL cards. Lewis Johns, Lake St., Nicholasville, Ky.

SHORT WAVE LISTENERS IN 48 states and all foreign countries. I QSL 100%. Want to swap cards? QRA: Vincent C. Stassen, 5317 Priscilla St., Phila., Pa., U.S.A.

BUNDLE UP YOUR OLD OR new postcard views and send to me. For each one I'll forward one piece old Mexican money. (Not spendable now.) No two cards alike please. Harold Manias, Colorado, Texas.

WILL TRADE TUBE BASES 4-5-6-7-8 prong, can be used for plug-in coil forms and many other things, for radio parts. Any offer accepted. Paul Bahr, Marlon, Ind.

I HAVE AN INSTRUCOGRAPH Junior Code Teaching set, five tapes. All condition, to trade for used 5"x7" or 8"x10" view camera or photographic apparatus. What have you? Lost Helsingher, 818 North Alamo, San Antonio, Texas.

SWAP: NEW PHILCO ALL WAVE Antenna, list \$5.00, for small short wave receiver worth same. Give details. Eugene Johnson, 698 Edmund St., St. Paul, Minnesota.

WANTED 10 AND 12 INCH Recordings, all kinds, will pay cash or swap, send want list with list of records, will pay for shipping charges. Alfred B. Shenton, Box 218, East Liverpool, Ohio.

ELECTRIC SHAVERS: First person sending me \$12.99 worth of merchandise will receive prepaid electric shaver, or a new Packard ther a new Schick, or a new Jackson, Jr., RD3, Box 76, Bowling Green, Kentucky.

WANTED—NATIONAL SW-3 complete power supply and coils, tubes, Iave Hallcrafters Sky Buddy used two months. C. Whiter, 31 John Street, Iilon, N.Y.

WANT—HIGH QUALITY TELE- scope sign and clock mounts, also 30-06 tool, Swap 1933 McMurdo super receiver, also CW and fine transmitter and parts. George Harold, 1218 Philippine Street, Mantowoc, Wisconsin.

WILL SWAP ONE TRIPLETT model 1180 Tester, used one year, one 8 watt A.C.A. Amplifier new, \$70 clearnet almost new. Popular Mechanics Magazines. Want Rider Manuals or what have you? Raymond Wenman, Cottonwood, Idaho.

WILL TRADE—SCALECRAFT Hudson type locomotive 0 gauge and 4 freight cars and 3 passenger cars worth \$200, for Model G Leica camera or a good medical microscope. Max Havleuek, 939 Hockaway Ave., Brooklyn, N.Y.

WANTED: METERS AND TEST equipment, service manuals, microphones. Will buy or trade for. Send complete description, price and what you might want in exchange. Bill S. Byers, 416 Walnut St., Ironton, Ohio.

WANTED—USED IP501A OR similar type receiver. Would like to have second hand SW3. Both must be cheap. D. F. Stell, 508 Buchanan Rd., Durham, N. C.

WILL SWAP POWER TRANS- former with 110-120 V. pri. 700V, 70 ma. C.T., 5 V.2A., 2.5V, 3.75A, and 6.3V, 4A, secondaries for any radio parts. Ralph Freyberger, Fleetwood, No. 1, Penna.

TO TRADE COMPLETE SET OF Hawkins Electrical Guide and other books on electricity and radio for candle camera, other books, radio parts or what have you? Rob Rice, Flandreau, S. Dak.

(Continued on page 126)

BARTER and EXCHANGE FREE ADS (continued)

WILL TRADE 50 WATT TRANSMITTER complete with power supply, but less crystal for late NRI radio course complete with all text books and experimental equipment. James H. White, c/o Simpson & White, Coleman, Texas.

WANTED: LATE EDITION RADIO Engineering books by Terman, Nilson and Horning, Moyer and Wustrel, Gibrardi, Everitt, Henney, or others. Must be in fair condition and reasonable. Miss E. Burks, Route 5, West Tulsa, Okla.

WANTED: ONE FILTER CHOKE, 15 henries, 250 ma power transformer, 600 volts each side et. and 7.5 and 5 volt windings. A reliable 40 meter crystal. Robert Alexander, 5 Arnold St., Richmond Hill, Ont., Can.

WILL BUY 2 NATIONAL 500-KC. air-tuned I.F. transformers, a National 500-ke. B.O. assembly, a National H. dial, and universal b.p. output transformer. Name price. Ray McIntosh, 87 E. Wyoming Ave., Melrose, Mass.

HAVE JEWELL 2 METER BATTERY tube type tester, Triplett No. 1150 Oscillator in good shape, meters, speakers, P.P. trans., many other items from radio junk box. What have you. J. K. Reed, 2178 W. 3 Ave., Durango, Colo.

HAVE PIANOLIN (COMBINED violin and guitar) with music and instructions and over 800 different stamps. Will trade for radio parts, courses, books or magazines. Maurice Fowler, Blairsburg, Iowa.

WANTED—SHORT WAVE RECEIVER, no junk. Must be complete and compact. Also oscillator for code practice. All letters answered. Leo Blattner, Jr., 1105 Junilia St., N.S., Pittsburgh, Pa.

TRADE: COMPLETE MOTION-GRAPH 35 M.M. projector, 15,000 volt transformer and large variety of stamps. Want a good communication receiver, transceivers, transmitter able to work phone. Stanley Boyek, 715 Windsor Terr., Schenectady, N. Y.

TRADE: NEW C.W. TRANSMITTER and power supply, K&E Poly-phase slide rule, K&E Mannheim slide rule, 4 electric pants generators, Want Peak Pre-selector and Argus camera. Fred A. Cook, Dutch Neck, N. J.

WANTED: NEW OR USED RE-CORDING mechanisms for home use, such as "Presto", "Universal", etc. Will pay cash. Send all particulars to R. P. Schell, 515 Grand St., Troy, New York.

SWAP—39 ISSUES NATIONAL Geographic Magazine, good condition, from Jan. 1935 to May 1938 except Oct. 1936, July 1937, for good 2 or 3 tube five meter receiver and 5 meter transmitter. Frank A. Scolaro, 11, 6049 Huxley Ave., Bronx, N.Y.

HAVE BRONZE MOLDS: 4 1/2 x 1 plate camera; generators; radio parts; radio and mechanical magazines. Want S.W. radio parts, typewriters, motors, lathes, H. Tracy, 611 So. 5th Ave., Mount Vernon, New York.

75 WATT TRANSMITTER COMPLETE power supplies, tubes, coils, 47 crystal, 46 buffer—2 lbs in final, 6 meters. Have speech equipment to modulate it. Swap for P.A. system, 30 watts. L. B. Holtz, 553 Carrol St., Apt. 2, Akron, Ohio.

WHAT HAVE YOU TO OFFER for eight general coverage coils (2 sets) tuning from 16-200 meters, and eight handwound coils for the amateur bands. Made by Meissner, all have five prongs. G. Black, 12 Lambert Rd., Belmont, Mass.

WANTED, USED CANDLE code course cheap for cash. Sean O'Neill, BR3 3163, Worcester College, Oxford University, Oxford, England.

S.W.'s WISHING TO EXCHANGE cards please mail yours and get mine in return. Win. Basins, 7007 S. Maplewood, Chicago, Illinois, U.S.A.

TRADE: VAN HOHN-FLEWELLING (Using No. 506 Weston M.A.) and Sterling No. R-511 tube checkers; Grebe P.C. 3 tube, CR-18 Special S.W. Receiver. Wanted: Typewriter or girl's bicycle. L. G. Saunders, Bowling Green, Ohio.

WANTED: 6 VOLT SHORT WAVE equipment for use in car. State lowest price or what you will trade for. Louis B. Booth, 6 Longworth Ave., Middletown, Conn.

WANT TO BUY OR RENT for a short time Candler Junior Course. Will pay cash. Write: Louis Kronberg, 1905 Eglin, Houston, Texas.

WANT TO BUY FOR CASH: Used issues of Hiders Manuals and mint U.S. stamps. Send condition of article and price you want. Reinheim, Larsen, Wis.

SWAP: EGERT VISUAL RESONANCE Oscilloscope, contains sweep circuit, amplifier, detector, and oscillator 100 kc. to 25 megacycles. Cost \$150, excellent condition. For V.T. Voltmeter, Grid Dip Oscillator, etc. George Holir, 67 Thorne St., Jersey City, N. J.

TRADE NATIONAL FBTA TYPE receiver complete, want Riders six, seven and eight. Solar condenser checker oscilloscope, Weston 20,000 ohms analyzer, write for details. W3IAJ, W. L. Cornelius, Maquoketa, Iowa.

WILL TRADE 21 ISSUES OF S.W.C. MAG. for used chemical apparatus. What have you got. Don't Please Write to J. Grady, 165 Park Row Ave., North, Hamilton, Ontario, Canada.

"HAMS," SWLs, WOULD LIKE to receive letters from "Hams" or SWL's in Ala., Africa, South America, or Europe. Please write OSFs. All letters answered. QRA—Ronney Miller, 43 1/2 Elm Street, Newport, R. I., U. S. A.

WANTED: KADMETTE TWO-TUBE AC-DC compact radio. Uses 6F7, 12A7 Bakelite cabinet. Need not be in operating condition. State price. All quotations answered. Raymond Campbell, 311 East 2nd St., Monticello, Iowa.

SWAP: A CHROMIUM FINISHED B flat clarinet in excellent condition with case for a two tube R.F. Pre-selector in good condition. Write, Franklin McCutchen, 260 Julian Ave., E. St. Louis, Ill.

SWAP FOR GOOD S.W. SET: Radio equipment, 31 issues Radio News ('35 to '37), 5" auto dynamite, Cooke Electrical Engineering course, microphone, etc. What an I offered in swap? Robert Winslow, Box 152, Wyckoff, Minn.

TRADE: MODEL 930 COLUMBIA Kolster amplifier and pickup for transmitter and microphone or other short wave equipment. Write Charles Eisenberg, 832 Concord St., N.S., Pittsburgh, Pa.

Let's Listen In with Joe Miller

(Continued from page 125)

QRA for this DX catch is: Chief Engineer of the 4th Telegraph and Telephone District, Palembang, Sumatra, Neth. E. Indies.

DENMARK

OZF, at Copenhagen, is now reported on 15.165 mc., by Edward Petersen, W2. Reported on Sunday, may be operating daily at this time. QRA: Stats Radiofonen, Heibergsgade, Copenhagen, Denmark.

** HAM STARDUST **

The *Amateur Contest* certainly started the Amateur DX season for '38 with one big bang! Stations from every corner of the world were logged, and the impetus of the Contest has impelled many a CW ham to give 'phone more of his attention, as fine conditions through most of the contest made long distance QSOs a not too rare occurrence on 10 and 20 meter 'phone.

We have often tuned over the 20 meter band on week-ends, during the afternoon, and turned off our receiver with the expression, "Whew! What a mess!"

Right now, best reception from Europe is between 12:30-3 a.m., when these stations are heard with remarkable strength and but little QRM, with the VKs joining the parade as early as 1 a.m., continuing usually to 8 a.m. or so, without a break. Africa is also heard on 20 throughout the afternoons, and at same times as Europeans in early a.m.'s, of course. Europeans are heard every afternoon till around 7 p.m. and Asiatics being heard at 1 a.m., 3:30-4:30 a.m., and 7-8 a.m. Js and KAs are heard at 3:30-4:30 a.m. and an occasional J 'phone at 1 a.m. or so.

ASIA

The following are reported from the Orient: XZ2DY, 14120; XZ2DX, 14040; XZ2EZ, 14350, in Burma; XU8RB, 14080, China; F18AC, 14035, 14265, lately on 14265, French Indo-China; VU2LL, 14340, India; J2MI, 14080, 14300; J2NF, 14295; J2NG, 14300; J7CR, 14290; J7CB, 14310, Japan.

KA1HS, 14270; KA1BH, 14130; KA1MB, 14040; KA7EF, 14180; KA1AF, 14150; KA1MG, 14310; KA1ZL, 14255; KA1ME, 14265, in the Philippines. Also KA2OV, 14270.

HS1BJ, 14070, Siam; VS6AG, 14084, Hongkong; PG1GL, 14260; PK2WL, 14080; PK1PK, 14030; PK1VX, 14070; PK1GB, 14320; PK1RL, 14030; PK1ZZ, 14280; PK2JN, 14320; PK1DB, 14300; PK4DG, 14340; PK4AU, 14380; PK4JD, 14100, all in Java, with PK4s in Sumatra, reported.

AFRICA

Reported from Morocco: CN8AU, 14130; CN8AR, 14275; CN8MV, 14100; CN8AV, 14085; CN8AJ, 14100; CN8MB, 14145; CN8AM, 14090.

From So. Africa: ZS1B, 14080; ZS2AF, 14255; ZS2AH, 14400; ZS2AL, 14110; ZS1BL, 14350; ZS6CZ, 14350; ZS6CT, 14280; ZS6AJ, 14050; ZS3F, 14040, 14070.

From Egypt: SU1RD, 14070, 14100, 14340; SU1AM, 14270; SU1KG, 14090; SU1RK, 14330; SU1CH, 14390.

Algeria: FA8CC, 14120, 3 a.m.; FA3HC, 14280, 2 a.m.; FA8BG, 14300.

Kenya: VQ4KT, 14145.

EUROPE

DX from Europe had its greatest season ever, with many FB DX hams heard from

AMERICA'S MOST POPULAR RADIO BOOKS

We herewith present a selected collection of recent important radio books. We have selected these volumes because they represent the foremost radio books of their kind in print today. We publish no catalog. Order direct from this page. Prompt shipments will be made to you. Remit by money order or certified check. Register all letters containing cash.

- RADIO ENGINEERING HAND BOOK**, 850 pages, latest..... **\$4.90**
- PRACTICAL TELEVISION**, 223 pages, 127 illus..... **\$3.69**
- ELEMENTS OF RADIO COMMUNICATION**, 286 pages, 241 illus..... **\$2.98**
- RADIO PHYSICS COURSE**, 992 pages, 510 illus..... **\$4.00**
- THE RADIO AMATEUR'S HANDBOOK**, 448 pages, 126 illus..... **\$1.97**
- MODERN RADIO ESSENTIALS**, over 200 pages, and over 100 illus..... **\$1.95**
- FOUNDATIONS OF RADIO**, 246 pages, 145 illus..... **\$2.47**
- PHOTOCELLS AND THEIR APPLICATION**, 332 pages, 180 illus..... **\$2.88**
- ELECTRONICS**, 134 pages, 45 illus..... **\$1.95**
- SHORT WAVE RADIO HAND BOOK**, 128 pages, 150 illus..... **\$1.00**
- PRINCIPLES OF RADIO**, 478 pages, 306 illus..... **\$3.46**
- EXPERIMENTAL RADIO**, 256 pages, 168 illus, Prepaid..... **\$2.69**
- MODERN RADIO SERVICING**, 1300 pages, over 700 illus..... **\$4.00**
- FIELD SERVICE DATA AND ANSWER BOOK**, 436 pages..... **\$2.50**
- Both Books..... **\$6.00**
- DRAKE'S CYCLOPEDIA OF RADIO AND ELECTRONICS**, 1050 pages, 1178 illus..... **\$4.88**

- FUNDAMENTALS OF RADIO**, 426 pages, 114 illus, Prepaid..... **\$3.46**
- ELECTRICITY AT HIGH PRESSURES AND FREQUENCIES**, 248 pages, 141 illus, Prepaid..... **\$1.89**
- RADIO CONSTRUCTION AND REPAIRING**, 444 pages, illustrated..... **\$2.50**
- THEORY OF VACUUM TUBE CIRCUITS**, 226 pages, 226 illus..... **\$3.00**
- PRINCIPLES OF RADIO COMMUNICATION**, 988 pages, profusely illus..... **\$7.35**
- RADIO ENGINEERING**, 813 pages, 475 illus..... **\$5.50**
- EXPERIMENTAL RADIO ENGINEERING**, 346 pages, 250 illus..... **\$3.46**
- RADIO OPERATING QUESTIONS AND ANSWERS**, 427 pages, 106 illus..... **\$2.50**
- OFFICIAL RADIO SERVICE HANDBOOK**, over 1,000 pages, over 1,000 illus, Prepaid..... **\$3.92**
- OFFICIAL SHORT-WAVE RADIO MANUAL**, 240 pages, many illustrations, Vol. 1 (1934) Prepaid..... **\$2.00**
- Vol. 2 (1935) Prepaid..... **\$2.50**
- OFFICIAL RADIO SERVICE MANUAL**, Volume 4, 2,000 illus., over 400 pages, Prepaid..... **\$3.43**
- OFFICIAL RADIO SERVICE MANUAL**, Volume 5, over 3,000 illus., over 1,000 pages, Prepaid..... **\$6.86**
- OFFICIAL RADIO SERVICE MANUAL**, Volume 6, over 1,200 pages, over 2,500 illus., Prepaid..... **\$6.86**

15 HANDY—POCKET-SIZE RADIO BOOKS

Here are 15 up-to-date books on radio and air conditioning. Modern in every sense. ALL BOOKS UNIFORM—they contain 64 pages, 50 to 120 illustrations. All books written by well-known authors. Order by Number.

2. MODERN VACUUM TUBES
 3. THE SUPERHETERODYNE BOOK
 5. HOW TO BECOME A SERVICE MAN
 6. BRINGING ELECTRIC SETS UP TO DATE
 8. RADIO QUESTIONS AND ANSWERS
 9. AUTOMOBILE RADIO AND SERVICING
 10. HOME RECORDING AND ALL ABOUT IT
 12. PUBLIC ADDRESS INSTALLATION AND SERVICE
 13. ABC OF AIR CONDITIONING
 14. POCKET RADIO GUIDE
 15. ABC OF REFRIGERATION
 16. PRACTICAL RADIO CIRCUITS
 17. SERVICING WITH SET ANALYZERS
 18. POINT-TO-POINT RESISTANCE ANALYSIS
 19. PRACTICAL RADIO KINKS AND SHORT CUTS
- PRICE PREPAID EACH BOOK..... **50c**

HOW TO ORDER
No C.O.D. orders. Our prices are net, as shown. Some of the books sent prepaid (in U.S. only). Those that are not thus listed are shipped collect if sufficient postage is not sent. Add 7% of price for postage.

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

nearly every country. Heard were:
 Roumania: YR5AA, 14070, 14260;
 YR5KW, 14120; YR5CF, 14010, 14400.
 Sweden: SM5SD, 14270; SM6WL,
 14320; SM7YA, 14080; SM7UC, 14340.
 Denmark: OZ3U, 14340; OZ5BW,
 14400; OZ9Q, 14100; OZ9R, 14130; OZ5G,
 14300.
 Italy: I1KN, 14360; I1IT, 14000, 14040,
 14350.
 Switzerland: HB9BR, 14030; HB9J,
 14350, 14110; HB9CL, 14025.
 Norway: LA1F, 14260; LA3B, 14080;
 LA5H, 14100; LA8C, 14125; LA1G, 14150.
 From Lithuania: LY1J, 14390; LY1HB,
 14075.
 Poland: SP1CC, 14340; SP1DC, 14360;
 SP2HH, 14025.
 Esthonia: ES5D, 14300.
 Greece: SV1KE, 14000, 14300.
 Albania: ZA1CC, a new 'phone has been
 reported in American fone band, early
 a.m., working a G.

PITCAIRN ISLAND

VR6AY, 14346, formerly VR6A, oper-
 ated by Andrew Young, a direct descendant
 of the world famous mutineers who settled



Short Wave League

At a Directors Meeting held in
 New York City, New York, in the United
 States of America, the Short Wave League
 has elected

John F. Müller

a member of this League.

In Witness whereof, this certificate has
 been officially signed and presented to the
 above.

H. W. Infield Secor
 Club Secretary

This handsome certificate is presented FREE to all
 members of the SHORT WAVE LEAGUE. The full
 size is 7/4" x 9 1/2". (See page 116)

on this lonely isle many years ago, is being
 heard with a very strong signal during
 early morning hours and occasionally re-
 ported as early as 8:30 p.m. Usually,
 VR6AY can be heard with best strength
 from 1:30 a.m. on.

Reports to VR6AY should be accom-
 panied with reply coupons, and addressed to:
 Mr. Andrew Young, Station VR6AY,
 Pitcairn Island, South Pacific Ocean.

Regarding the "Special" from FR8VX,
 it was not heard on Sat. or Sun., but on
 Monday, March 21, FR8VX was logged
 by Ronney Miller, W2.

The HS1BJ "Special" did not come
 through, much to our disappointment.
 However, it is very well heard on the
 West Coast, so if we really want to hear
 it, we'll have to move out West, hi!

10 METERS

Keep watch on 10 every morning and
 early afternoon, as you never can tell!

From Africa is reported: ZE1JR, 28.2,
 Southern Rhodesia; ZS6T, 28.2; ZS6AJ,
 28.0; ZS6DW, 28.35; ZS6AJ, 28. mc., So.
 Africa.

A recent QSL from CN8MA, Morocco,

RADIO'S MANY NEW BOOKS HAVE BEEN ADDED TO MOST COMPLETE LOW-PRICED TECHNICAL LIBRARY



THE RADIO-CRAFT LIBRARY SERIES (each volume fifty cents)—a most
 complete and authentic set of Volumes—treats individually, important
 divisions of radio, refrigeration and air conditioning. Each book has been
 designed to give you the opportunity to learn one or more branches of the
 fields mentioned. The authors of the books are well-known to everyone. Each
 is an expert—an authority on the subject—each is thoroughly familiar with
 the field which he represents.

ALL BOOKS ARE UNIFORM—The volumes in the RADIO-CRAFT LIBRARY SERIES
 measure 6 x 9 inches. Each book contains on an average of 50 to 120 illustrations. The
 books are printed on an excellent grade of paper which makes the type easy reading.

Here Are the Titles - - -

- | | | |
|---|---|---|
| No. 2. MODERN VAC-
UUM TUBES | No. 12. PUBLIC ADDRESS
INSTALLATION AND
SERVICE | No. 17. SERVICING
WITH SET ANALYZERS |
| No. 3. THE SUPER-
HETERODYNE BOOK | No. 13. ABC OF AIR
CONDITIONING | No. 18. POINT-TO-
POINT RESISTANCE
ANALYSIS |
| No. 4. BRINGING ELEC-
TRIC SETS UP-TO-DATE | No. 14. POCKET RADIO
GUIDE | No. 20. THE CATHODE-
RAY OSCILLOSCOPE |
| No. 9. AUTOMOBILE
RADIO AND SER-
VICING | No. 15. ABC OF RE-
FRIGERATION | No. 21. BREAKING INTO
RADIO SERVICING |
| No. 10. HOME RECORD-
ING AND ALL ABOUT
IT | No. 16. PRACTICAL RA-
DIO CIRCUITS | |

RADIO PUBLICATIONS • SWT 6-38 • 99T Hudson Street, • New York, N. Y.

I have circled below the numbers of books in the RADIO-CRAFT LIBRARY SERIES which you are to send me.
 I have included my remittance in full, at the price of 50c each. (Stamps, checks or money orders accepted).

2 3 6 9 10 12 13 14 15 16 17 18 20 21

Name Address

City State

All books are sent postage prepaid

ELEMENTARY MATHEMATICS

For the Technician and Craftsman

CONTENTS OF BOOK

I. ARITHMETIC: Addition, Multiplication, Division, II. Factoring and Cancellation, Fractions, Decimals, Percentages, Ratio, and Proportions. III. The Metric System. IV. How to Measure Surfaces and Capacity (Geometry). V. POWERS: Involution—ROOTS: Evolution. VI. Mathematics for the Manual and Technical Craftsman. Thermometer Conversions, Graphs or Curve-Plotting, Logarithms, Use of the Slide-Rule. VII. Special Mathematics for the Radio Technician. VIII. Commercial Calculations. Shortcut Arithmetic, Interest, Discounts. IX. Weights and Measures, Useful Tables.

PRICE
50c
POSTPAID

TECHNIFAX

Division SWT-638
 558 W. Washington Blvd. Chicago, Illinois

for 10 meter reception informs us that
 8MA was on 20 fone at the time, and that
 we heard his 10 meter harmonic! He's
 never been on 10!

From Asia: J2MI, 28.16 mc., J2KN,
 28.32; J2NF, 28.29 mc. Japan, VU2CQ,
 28.4, India.

New Zealand: ZL4AO, 28.; ZL3DJ,
 28.2 mc.

SP2HH, 28.05 mc., Poland. OK1FF,
 28.05 mc., Czecho-Slovakia. I1KN, I1IT,
 both 28. mc., Italy. ES5D, 28.1 mc., Es-
 thonia. YR5AA, 28.0. Roumania.

Also reported: SU1CH, 28.8 mc., Egypt,
 and VK2GU, 28.16, Australia, also VK2IQ,
 28.17; VK3YP, 28.19; VK2UC, 28.3 mc.

The Europeans and Africans are heard
 between 8 a.m.-5 p.m., peak around noon.
 VU2CQ in India has also been heard at
 11 a.m. and 1 p.m.

Australians and Japs are heard between
 4-7 p.m. on East Coast.

We wish to express our sincere gratitude
 to all those who reported their DX to us,
 and ask that all reports be mailed to reach
 us by the first of each month at 2559 E.
 28th St., Brooklyn, New York.

(Continued on page 128)

DATAPRINTS

Only 33 1/3c each
 At New Low Price—3 for \$1

BUILD YOUR OWN—SAVE MONEY!



RADIO CONTROL FOR
 MODEL BOATS, PLANES,
 ETC.

Circuit data 50c

20 ELECTRIC LODGE &
 PARTY TRICKS. Fun
 Galore!



"How to Do 'Em" Data 50c



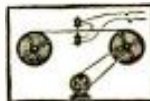
S-W DIATHERMY
 (Artificial Fever)

Dataprint giving Constructional
 data for Small, Medium and
 Large size ADD. (All 3)....50c



Induction PIPE &
 ORE LOCATOR

Construction Data..... 50c



RECORD PROGRAMS
 on Steel Wire!

Telephone Data, for
 Voice or Code..... 50c

TESLA COIL DATA:

Data print—drawings and data for
 building 36-inch spark Tesla... 50c
 Exciter—1 K.W. 20,000 Vt. Transf. 50c
 3" Sp'k. Tesla Coil. Works on Ford
 Coil 50c
 3" Sp'k. Oudin Coil. Works on 110
 A.C. 50c
 20 "Tricks" with Teslas & Oudins
 50c
 8" Sp'k. Tesla Coil. 50c
 Exciter—1/4 K.W. 15,000 Volt
 Transf. 50c
 Violetta—1" Sp'k. Oudin. Vibrator
 type. Operate Oudins from V. 7
 Osc. 50c



More DATAPRINTS You Need!

Water Turbines	"Rewinding" Armatures
Water Wheels	Induction Balance
100 Mechanical Movements	Telautograph
Motor Circuits (20)	Einthoven String Galva- nometer
Telephone Hookups (20)	Magnets and Solenoids— Get our list
Polarized Relay. Ultra- sensitive	Wheatstone Bridge
Ring & bells on 2 wires	Induction Coils—1 to 12 inch Sp'k data
20 Simple Bell Hook-ups	Electric Pipe Thawer
Electric Chime Binker fits any clock	
Welding Trf. 2 K.W. 110 V. Prim. 18 V. Sec. 50c	

Any 5 prints \$1.50 or 10 for \$2.00

The DATAPRINT Co.

Lock Box 322 RAMSEY, N. J.



Tiny, but . . .

- ★ It's a genuine hermetically-sealed metal can electrolytic with insulating jacket.
- ★ In capacities of 4, 8, 12, 16, 24, 30 and 40 mfd. Working voltages of 150, 250, 350 and 450 D.C. working.
- ★ Insulating jacket edges spun over can ends. Leads can't short on can. Red and black end disks indicate polarity.
- ★ Logical choice where space, and cost-saving are paramount.

Ask Your Jobber to show you these Dandees. Ask him for literature—or write us direct.



A restorative VACATION

SALT AWAY next winter's strength; spend this vacation in the salt air and salt water on the sun-swept beach in front of your comfortable hotel room at the Hotel Knickerbocker. Live affordably and conveniently on the famous boardwalk. Restful beds, zestful meals—



Hotel KNICKERBOCKER
C. H. LANDOW
MANAGER
European and American Plan

All private baths with hot and cold sea water. Bathing from hotel. Convenient to all piers, theatres and amusements.

ATLANTIC CITY, N. J.

You need our 1938 Catalog
It illustrates and describes our complete line of

RACKS • PANELS • CABINETS
Write for your Free Copy Today!
PAR-METAL PRODUCTS CORP.
3529 41st St., Long Island City, N. Y.

Let's Listen In with Joe Miller

(Continued from page 127)

Those who contributed this month are: Ashley Walcott, Chris D. Jaffe, Murray Buitekant, Martin Garvey, Roy Myers, Warren Mayes, Mel Edwards, Cyrus Will, Harry Kentzel, Ralph Gozen, Roger Legge, Harry Honda, Romney Miller, Walter B. Roetter, Robt. Truhlar, Bert Wolfe, J. O. Faris, Jr., Leo Herz, Eli Powers, Pedro Rodriguez, David Styles, Max Fisher, Theodore Bottema, G. C. Gallagher, Jim Lonyon, Gail Beyer, Joe Hellmann.

Radio in Japan SHIGERU OKAMOTO

(Continued from page 69)

munication between islands. Experiments with ultra-short wave two-way police radio have been conducted also, although there are not many radio-equipped police cars in Japan. The commercial aviation companies of Japan maintain two-way radio phone communications from planes to ground by short-waves as is the case in this country.

Facsimile

While wire facsimile has been in use for several years for transmitting news photos to various cities of the Empire, tests of radio facsimile were made to the United States last spring and this trans-Pacific service will probably be put into regular operation in a few years. Tests to several European countries also were made. No work has been done in the field of a home facsimile service for the general public, such as that now being evolved in the United States.

Receiving Equipment

The most popular type of radio in Japan is the T.R.F. receiver with a regenerative detector. Superheterodynes have never become very popular because the extreme selectivity of the superheterodyne is unnecessary where there are not a great many broadcast stations. Each of the principal cities of Japan has one or two broadcast stations. Four- or five-tube receivers for A.C. operation are most generally used. Alternating current electric lines are used exclusively in Japan, so there are no A.C.-D.C. receivers. Japanese receiving tubes are of the American type rather than the European type, but they are manufactured in Japan. The average four- or five-tube table model radio costs about \$12 to \$15. Very little set building is done by Japanese radio fans any more, although a few years ago most receivers were home-made.

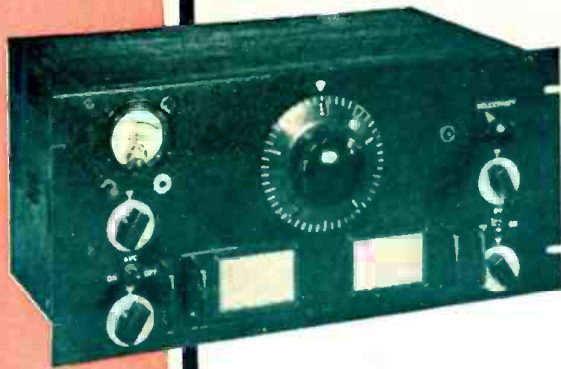
France and U. S. Combat S-W Propagasters

(Continued from page 78)

and the western part of South America. This station broadcasts programs in Spanish. As a result of this change, South America is insured of superior reception of programs from this country. Strenuous efforts will be made to cultivate the good will of our southern neighbors via these broadcasts. It was emphasized that these allocations were conditional and the government might at some future time go into the field of short wave broadcasting to South America through a government-operated Pan American station. However, if W2XAD and W1XAL provide adequate service for South America, they will probably be granted unlimited use of these frequencies.

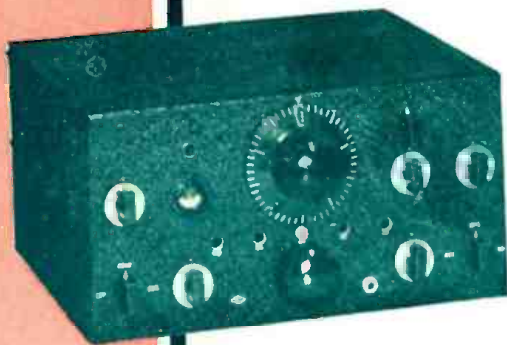
Index to Advertisers

A	
ABC Radio Laboratories	111
Aerovox Corporation	128
Allied Engineering Institute	105
Allied Radio Corporation	111
Astatic Microphone Laboratory, Inc.	107
B	
Barter & Exchange Free Ads	124, 125, 126
Bliley Electric Co.	111
Brush Development Co., The	109
Bud Radio, Inc.	121
Burstein-Applebee Co.	117
C	
Camradio Co.	111
Candler System Co.	112
Chemical Rubber Publishing Co.	113
Commercial Notices	124
Cornell-Dubilier Electric Corp.	123
Coyne Electrical School	67
D	
Dataprint Company	108, 127
Dodge's Institute	113
Drake Hotel	108
F	
For Sale Ads	124
G	
Gold Shield Products	106, 108, 115
H	
Hallicrafters, Inc., The	Back Cover
Hammarlund Manufacturing Co., Inc.	115
Henry Radio Shop	108
Hudson Specialty Company	110
I	
Instructograph Company	112
International Resistance Company	101
K	
Knickerbocker Hotel	128
Korrol Radio Products Co.	108
Kusterman, Oscar B.	119
M	
Meissner Manufacturing Co.	109
Midland Television, Inc.	113
Modell's	106
N	
National Company, Inc.	Inside Back Cover
National Plans Institute	110
National Radio Institute	65
National Schools	112
New York YMCA Schools	112
P	
Pacific Radio School	113
Paramount Prod. Co.	115
Par-Metal Products Corporation	128
R	
Radio Amateur Course	68
Radio & Technical Publ. Co.	113
Radio Constructors Laboratories	99
Radio-Craft	119
Radio Publications	118, 126, 127
Radio Research Laboratories	110
Radio Training Assn. of America	113
RCA Institutes, Inc.	113
RCA Manufacturing Company, Inc.	117
S	
Sargent, E. M., Co.	107
Scott, E. H., Radio Laboratories, Inc.	105
Short Wave League	116
Smith, Johnson & Co.	110
Solar Mig. Corp.	107
Sprayberry Academy of Radio	103
Superior Instruments Company	105
Swap & Sell	117
T	
Technifax	127
Teleplex Co.	113
Triplet Electrical Instrument Co.	119
Tri-State College	112
U	
Ultra High Frequency Products Co.	Inside Front Cover
United Radio Co.	107
University Press	106
W	
Wellworth Trading Company	121, 123
Wholesale Radio Service Co., Inc.	106
<p>(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.)</p>	



HRO

Designed with cost secondary to performance, with the one idea of obtaining the maximum of effectiveness in difficult communications work, the HRO Receiver has won a unique reputation for outstanding capability.



NC-101X

Somewhat lower in price than the HRO, and equipped with the added convenience of knob-controlled coil shifting, receivers of the NC-100 series have a consistently high performance that make them favorites in amateur stations throughout the world.



NC-81X

Offering the maximum of performance possible at a low price the NC-80 series are true Communication Receivers, capable, long-lived, and efficient. They provide extremely good performance-per-dollar value.



ONE-TEN

A special purpose receiver, the 1-10 Receiver covers the range from one to eleven meters, and is intended solely for work at ultra-high frequencies. It fills the need of the experimenter for an adequate receiver to cover this wide and increasingly valuable field.

A FINE RECEIVER FOR EVERY PURPOSE

NATIONAL COMPANY, INC., MALDEN, MASS.



Introducing

the SKY BUDDY



**2 NEW
Hallicrafters
Receivers . .**

ONLY AN ORGANIZATION with the facilities, experience and resources of the Hallicrafters could build a practical communications receiver to sell at this low price.

The 1938 SKY BUDDY covers everything on the air from 18.5 MC to 545 KC, including the 20, 40, 80 and 160 meter amateur bands, regular broadcast, police, aviation, foreign short wave, and government services. It's an amateur's and short wave listener's receiver in every respect—an AC set of conventional power transformer construction, and built of highest quality material and parts throughout. Sensitivity and selectivity are comparable only to receivers selling at many times its modest price. Any amateur or critical short wave listener will be delighted by its fine performance—it has all the painstaking, careful engineering of the better Hallicrafters receivers. See the New 1938 SKY BUDDY at your Hallicrafters dealer today.

AT NO TIME PREVIOUSLY has the Amateur or Short Wave Listener with a limited purse been offered so much in a communications receiver for so little in price. The SKY CHAMPION is an 8-Tube, AC superheterodyne with Pre-Selection, complete coverage from 44 MC (6.8 meters) to the top of the broadcast band. Built-in Speaker, every essential control for amateur receptions and a Band Spread better than A.R.R.L. Handbook recommendations. In Sensitivity, Selectivity and all around performance, the SKY CHAMPION equals and betters receivers selling at double its price. It's a true Hallicrafters receiver—incorporating only the finest of parts, and the most careful and painstaking engineering and workmanship.

See the New Sky Champion at your Hallicrafters dealer today, or write for complete information.

- 5 Tubes
- 3 Bands
- Complete Coverage 18.5 MC to 545 KC
- Built-In Speaker
- Separate Band Spread Dial
- Easily adapted for battery operation
- All necessary controls

Amateur's Net Price (Including Speaker and Tubes)

29⁵⁰

and the SKY CHAMPION

- 8 Tubes
- Complete Coverage 44 MC to 545 KC
- For AC and Battery Operation
- 4 Bands
- Separate Band Spread Dial
- Built-In Speaker
- Individual Coils for each band
- Every essential control for efficient amateur reception

Amateur's Net Price Including Speaker and Tubes

49⁵⁰

A champion endorses the SKY CHAMPION. Mr. T. R. McElroy, famous World's Champion Code Operator, says:

"Congratulations on the SKY CHAMPION! It's hot performance you can't get for twice the money elsewhere!"



ALL HALLICRAFTERS RECEIVERS AVAILABLE ON LIBERAL TIME PAYMENTS

the hallicrafters inc.

2601 Indiana Avenue, Chicago, U. S. A.

Cable Address: "Hallicraft" Chicago

WORLD'S LARGEST BUILDERS OF AMATEUR COMMUNICATIONS RECEIVERS