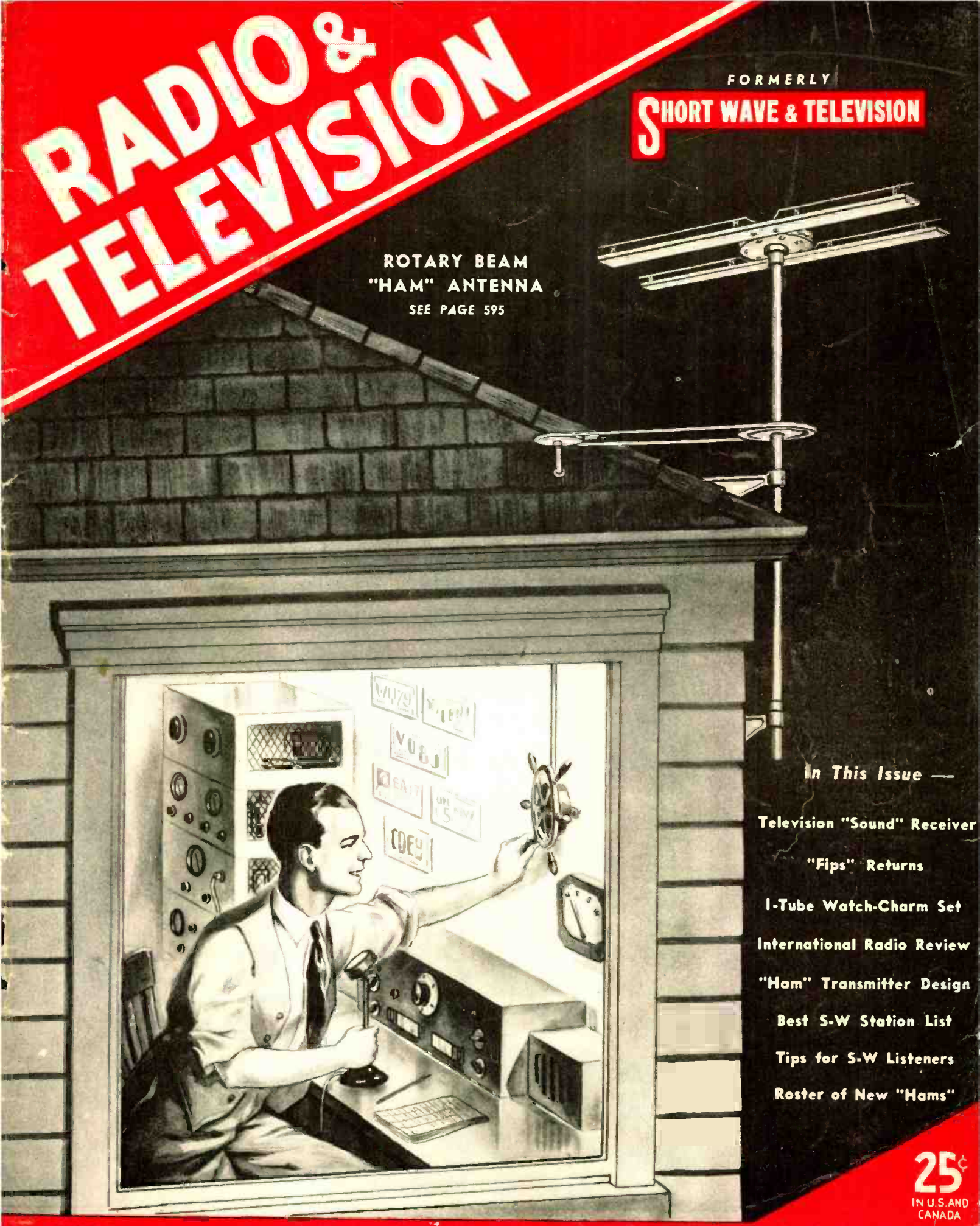
RADIO & TELEVISION

FORMERLY

SHORT WAVE & TELEVISION

ROTARY BEAM
"HAM" ANTENNA
SEE PAGE 595



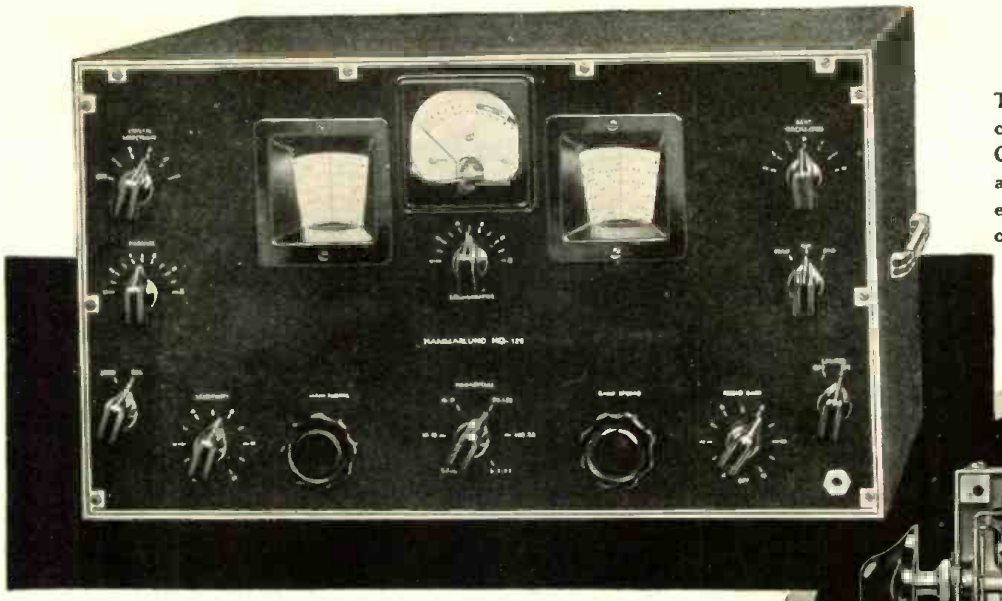
In This Issue —

25¢
IN U.S. AND CANADA

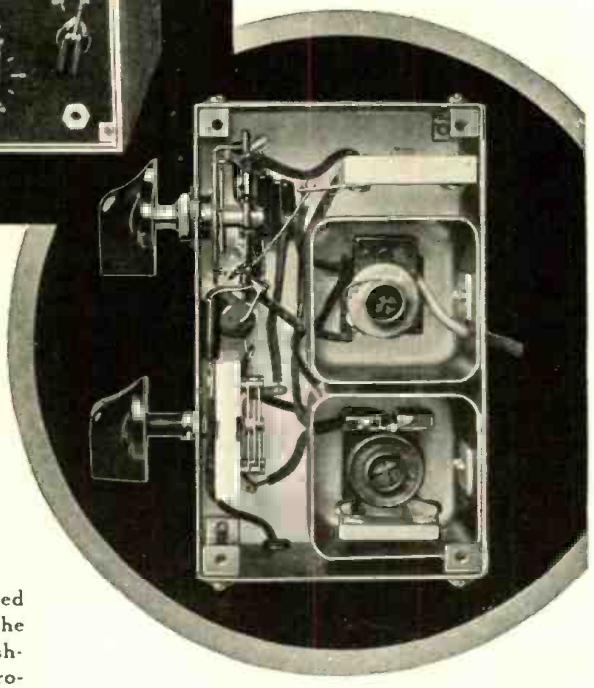
HUGO GERNSBACK
EDITOR

RADIO EXPERIMENTING
AMATEUR RADIO

FEB.
1939



Tuning range: 31—.54 megacycles (9.7—555 meters). Complete with crystal, tubes, and 10" "PM" dynamic speaker at a price well within reach of the Ham and Fan.

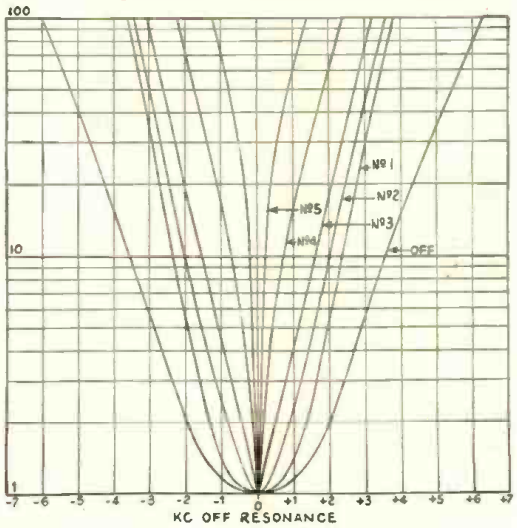


HQ-120 with *Full Range* CRYSTAL FILTER

THE NEW "HQ-120" with its "full range" crystal filter splits crowded phone bands wide open. This exclusive Hammarlund feature solves the age-old problem of interference from heterodynes and side-band splash-over. The selectivity curves shown in the drawing were taken on a production model receiver. Labeling of these curves corresponds to the markings of the selectivity switch on the panel. In practice, curve No. 1 is not only wide enough to permit excellent voice reception, but fairly good quality music as well. Curve No. 2 is intended for voice reception where quality is a consideration even though interference may be very heavy. Number 3 is for extreme conditions of interference where "getting the message through" is more important than quality. Positions No. 4 and No. 5 are for CW code reception. Unlike most crystal filters, the output of this one is uniform throughout its selectivity range, and there is no interlocking of controls.

Special consideration has been given to the R.F. gain of the receiver in order that it will not require a stronger signal on 20 meters than on 80, for example, to read "S-9" on the meter. The "HQ-120" is also equipped with a noise limiter which follows the strength of the incoming signal and takes out automobile ignition interference and similar disturbances. In order to maintain high efficiency with various types of antennas, the "HQ-120" has an antenna compensating control which assures maximum image rejection, maximum signal-to-noise ratio, and perfect circuit alignment at all times. There is a spread of 310 degrees for each amateur band from 80 to 10 meters, and the dial is calibrated in megacycles for these amateur bands. This means you no longer have to guess at the frequency of your own transmitter or of the one at the other end of the QSO.

Curves of I.F. amplifier including 5 positions of the selectivity switch.



Write Dept. RT-2 for 16-page descriptive booklet.

HAMMARLUND MFG. CO., INC.
424-438 WEST 33rd ST., NEW YORK

CANADIAN OFFICE: 41 W. Ave., No. Hamilton, Ont.

I WILL TRAIN YOU

TO START A SPARE TIME OR FULL TIME

RADIO SERVICE BUSINESS

WITHOUT CAPITAL

J. E. SMITH
President
National Radio Institute
Established 1914
The man who has directed the home study training of more men for the Radio Industry than any other man in America.

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

$200 TO $300 A MONTH IN OWN BUSINESS

"For the last 18 months I have been in business for myself, making between $200 and $300 a month. I have N.R.I. to thank for my start in this field."—ARLIE J. FROEHNER, 224 W. Texas Ave., Goose Creek, Texas.

$10 TO $25 A WEEK IN SPARE TIME

"I am making from $10 to $25 a week in spare time while still holding my regular job as a machinist. I owe my success to N. R. I."—WM. F. RUPP, 203 W. Front St., West Conshohocken, Pa.

CHIEF OPERATOR BROADCASTING STATION

"When I completed 20 lessons, I obtained my Radio Broadcast Operator's License and immediately joined Station WMPC, where I am now Chief Operator."—HOLLIS F. HAYES, 85 Madison St., Lapeer, Mich.

EARNINGS TRIPLED BY N.R.I. TRAINING

"I have been doing nicely, thanks to N.R.I. Training. My present earnings are about three times what they were before I took the Course. I consider N.R.I. Training the finest in the world."—BERNARD COSTA, 952 Manhattan Ave., Brooklyn, N. Y.

OVER $1,000 BEFORE GRADUATING

"Before completing half the N.R.I. Course I was servicing sets, and I made $1,000 to $1,200 before graduating. I am doing Radio service work for myself now."—ASHLEY G. ALDRIDGE, 1228 Shepherd St., Petersburg, Va.

Get My LESSON on Radio Servicing Tips FREE

I want to prove my Training gives practical, money-making information, that it is easy to understand—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.

The Tested WAY to BETTER PAY

The world-wide use of Radio has made many opportunities for you to have a spare time or full time Radio service business of your own. Four out of every five homes in the United States have Radio sets which regularly need repairs, new tubes, etc. Servicemen can earn good commissions too, selling new sets to owners of old models. Even if you have no knowledge of Radio or electricity, I will train you at home in your spare time to sell, install, fix, all types of Radio sets; to start your own Radio business and build it up on money you make in your spare time while learning. Mail coupon for my 64-page book. It's Free—it shows what I have done for others—what I am ready to do for you.

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

The day you enroll I start sending Extra Money Job Sheets; show you how to do Radio repair jobs. Throughout your training I send plans and directions that made good spare time money—$200 to $500—for hundreds, while learning. I send you special Radio equipment to conduct experiments and build circuits. This 50-50 method of training makes learning at home interesting, fascinating, practical.

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

Radio is young—yet it's one of our large industries. More than 28,000,000 homes have one or more Radios. There are more Radios than telephones. Every year millions of Radios get out of date and are replaced. Millions more need new tubes, repairs. Over $50,000,000 are spent every year for Radio repairs alone. Over 5,000,000 auto Radios are in use; more are being sold every day, offering more profit-making opportunities for Radio experts. And RADIO IS STILL YOUNG. GROWING, expanding into new fields. The few hundred $30, $50, $75 a week jobs of 20 years ago have grown to thousands. Yes, Radio offers opportunities—now and for the future!

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

Radio broadcasting stations employ engineers, operators, station managers and pay up to $5,000 a year. Fixing Radio sets in spare time pays many $200 to $500 a year—full time jobs with Radio jobbers, manufacturers and dealers as much as $30, $50, $75 a week. Many Radio Experts open full or part time Radio sales and repair businesses. Radio manufacturers and jobbers employ testers, inspectors, foremen, engineers, servicemen, and pay up to $6,000 a year. Automobile, police, aviation, commercial Radio, loud speaker systems are newer fields offering good opportunities now and for the future. Television promises to open many good jobs soon. Men I trained have good jobs in these branches of Radio. Read how they got their jobs. Mail coupon.

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 fixing sets while training.

Save Money—Learn At Home Money Back Agreement Protects You

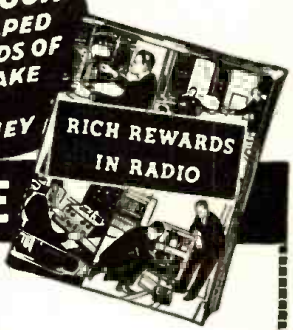
I am so sure I can train you to your satisfaction that I agree in writing to refund every penny you pay me if you are not satisfied with my Lessons and Instruction Service when you finish. A copy of this agreement comes with my Free Book.

Find Out What Radio Offers You

Act Today. Mail the coupon now for Sample Lesson and 64-page book. They're free to any fellow over 16 years old. They point out Radio's spare time and full time opportunities and those coming in Television; tell about my training in Radio and Television; show you letters from men I trained, telling what they are doing and earning. Find out what Radio offers YOU! MAIL COUPON in an envelope, or paste on a postcard—NOW!

J. E. SMITH, President
National Radio Institute
Dept. 9BB3
Washington, D. C.

THIS FREE BOOK HAS HELPED HUNDREDS OF MEN MAKE MORE MONEY



GOOD FOR BOTH 64 PAGE BOOK SAMPLE LESSON FREE

J. E. SMITH, President, National Radio Institute.
Dept. 9BB3, Washington, D. C.

Without obligating me, send your Lesson "Radio Receiver Troubles—Their Cause and Remedy" and free book about spare time and full time Radio opportunities and how I can train for them at home in my spare time—about the N.R.I. Set Servicing Instrument. I am particularly interested in the branch of Radio checked below.

( ) Radio Service Business of My Own
( ) Spare Time Radio Repair Work
( ) Retail Sales of Radio Sets and Equipment
( ) Service Expert for Retail Stores
( ) Broadcasting Station Operator
( ) Aviation Radio Operator
( ) Loud Speaker Systems, Installations and Service
( ) Auto Radio Installation and Service
( ) Television Station Operator
( ) Service Expert with Radio Factory
( ) Commercial Radio Station Operator
( ) All-around Servicing Expert

(If you have not decided which branch you prefer—mail coupon now, for information to help you decide.)

NAME ..... AGE .....

ADDRESS 14X1

RADIO & TELEVISION

The Popular Radio Magazine

FEBRUARY — 1939

Vol. IX No. 10

HUGO GERNSBACK, Editor
H. WINFIELD SECOR, Manag. Editor
ROBERT EICHBERG, Assoc. Editor

FORTUNES IN THE AIR!

See Page 586

In This Issue

GENERAL FEATURES

CONSTRUCTION

CONDENSED FEATURES

INSTRUCTION

TELEVISION

MISCELLANEOUS

Cover composition by Charles Wasseram.
See page 589.

RADIO & 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 Offices—99 Hudson St., New York, N.Y. HUGO GERNSBACK, President; H. W. SECOR, Vice-President; EMIL GROSSMAN, Director of Advertising. European Agents: Atlas Publishing and Distributing Co., Ltd., 18 Bride Lane, Fleet St., London, England; Brentano's—London and Paris. Australian Agents: McGill's Agency, 179 Elizabeth St., Melbourne.

Next Month

S-W's Strengthen America's Defense?

How to Build a Universal Frequency Meter—Herman Yellin, W2AJL

"Switched-Coil 4" Receiver—Raymond P. Adams

Getting Started in Amateur Radio—Part 2—C. W. Palmer, E.E.

An 8-Tube Receiver With Coil-Switching System

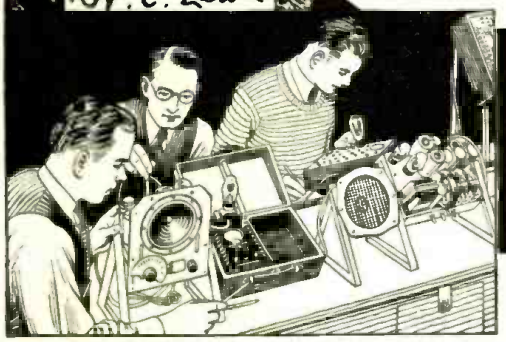
Receive 1-Meter Waves With Ordinary Tubes—N. G. Haas and C. A. Erbacher

Newly Licensed Hams—Antenna Data—Kinks—Question Box—Amateur Set Construction

QUICK, EASIER WAY

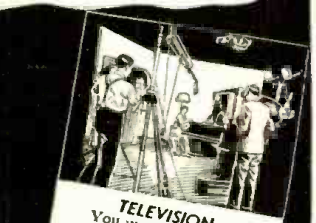
TO TRAIN FOR RADIO

12 Weeks Practical WORK IN MY CHICAGO SHOPS



FIRST—You are told and shown how to do it.

THEN—You do the job yourself.



TELEVISION
You work on actual equipment

SOUND TRUCK
Learn to install Public address systems

"....Everything was just as stated in literature. And by Coyne methods plenty of instructors to take care of everything, easy to learn. I really was satisfied with Coyne Training."
J. Halyk, Canada

"....Coyne has first-class instructors to teach you the simplest things to start with and they have the equipment to show you these things as you advance ...."
Ben Rickman, S. Car.

WANT TO EARN MORE MONEY?

Have you ever dreamed of holding down a **steady, good pay job?** Have you ever dreamed of doing the work you really like in a job that holds promise of a **real future** in the years ahead?

Well, we all know that you can't get the good things in life by just **dreaming** about them. Hundreds of fellows are today holding down mighty fine jobs with prospects of a bright future. They are filling these jobs because they had the foresight to equip themselves with the **right kind of training.** Most of these men were only average fellows a short time ago, but the proper training helped to lift them out of the low pay ranks of unskilled workers. The same opportunity is now offered to **you.**

The great fascinating field of **RADIO** offers a real future to many men and young men who are willing to prepare for a place in this giant industry.

Here at my school in Chicago, the **world's Radio Center,** you can get **12 weeks' Shop Training** in **RADIO AND TELEVISION,** that can help give you your start towards a better job.

You will be trained on actual equipment and machinery and because of our method of training, you **don't need previous experience or a lot of education.** Many of my successful graduates never even completed Grammar School.

PRACTICAL WORK at COYNE in CHICAGO

ACTUAL, PRACTICAL WORK. You build and service radio sets. You get training on Real Broadcasting equipment. You construct Television Receiving Sets and **actually transmit your own Television images over our Television equipment.** You work on **real** Sound equipment. You learn Wireless Operating on Actual Code Practice apparatus. We don't waste time on useless theory. We give you the **practical training** you'll need for your start in Radio, **in 12 short weeks.** If you desire code, this requires additional time for which there is no extra charge. I also include instruction in **Electrical Refrigeration** at no extra cost. Our practical shop methods make it **easier to learn**—**First the instructors tell you how a thing should be done—then they show you how it should be done—then you do the actual work yourself.**

I'LL FINANCE YOUR TRAINING

You can get this training **first**—then **pay for it later in easy monthly payments,** starting **60 days** after your 12 weeks' training period is over—**then you have 12 months** to complete your payments.

If you need **part time work** to help out with expenses while training in my shops, my employment department will help you get it. Then after graduation this department will give you valuable **lifetime employment service.**

Send the coupon today for all details. When I get it I'll send you my big free book containing dozens of pictures of students at work in my shops. I'll also tell you about my **"Pay After Graduation" plan,** how many **earn while learning** and how we help our **students after graduation.** Fill in, clip coupon, **mail it today for your start toward a brighter future.**

MAIL NOW

H. C. LEWIS, President
COYNE ELECTRICAL SCHOOL
RADIO DIVISION
500 S. Paulina St. Dept. 29-2K. **Chicago**

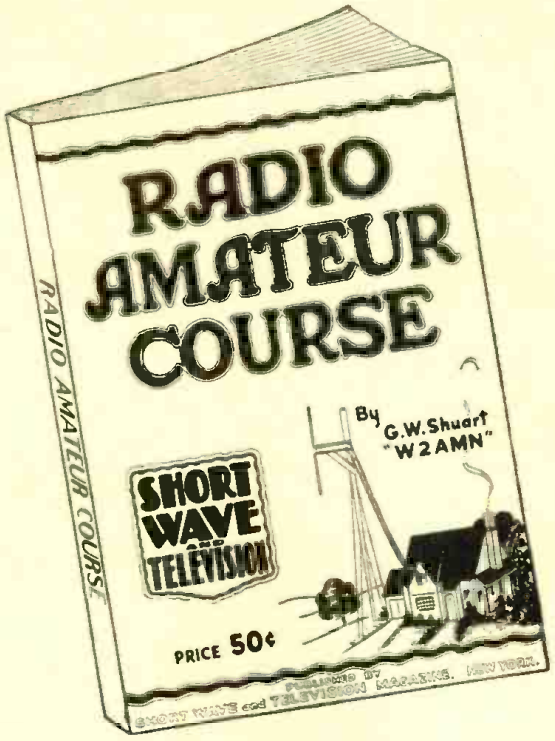
H. C. LEWIS, President
COYNE ELECTRICAL SCHOOL—RADIO DIV.
500 South Paulina Street, Dept. 29-2K, Chicago, Ill.

Dear Sir: Please send me free your big catalog and full particulars of your present offer, also your **"Pay-Tuition-After-Graduation"** Plan.

NAME .....

ADDRESS .....

CITY ..... STATE .....



Your Money Back—

IF THE RADIO AMATEUR COURSE DOES NOT REPRESENT THE GREATEST BOOK VALUE EVER OFFERED TO THE RADIO "FANS" FOR 50c

TO convince you that there isn't a better book buy today, the publishers of the RADIO AMATEUR COURSE make the sensational offer of a money-back guarantee on such a low-priced book. Stop in at any of the many dealers listed at the right and examine this volume. See for yourself if the RADIO AMATEUR COURSE isn't just the book you've always wanted.

Printed on the finest quality paper—well illustrated attractive 4-color cover—complete with radio information you must have. It contains a step-by-step program for obtaining a short-wave radio education.

Written by **George W. Shuart, W2AMN,**
foremost short-wave authority

148 PAGES

6¼ x 9½ INCHES

OVER 150 RADIO DIAGRAMS and TECHNICAL PHOTOGRAPHS

●

RADIO AND TELEVISION
99 Hudson Street, New York, N. Y.

All Prominent RADIO DEALERS Ready to Show You This Big Book!

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.,
237 Asylum Street, Hartford.
Stern Wholesale Parts, Inc.,
210 Chapel St., Hartford.

GEORGIA
Wholesale Radio Service Co., Inc.,
130 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.,
397 Dwight Street, Springfield.
H. Jappe Co.,
37 Mechanic Street, Worcester.

MICHIGAN
Rissi Brothers, Inc.,
5027 Hamilton Ave., Detroit.

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

NEBRASKA
Radio Accessories Company,
2366 Farnam Street, Omaha.

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.
Elan, The Radio Man, Inc.,
64 Dey Street, New York City.
Eagle Radio Co.,
84 Cortlandt Street, New York City.
Federated Purchaser, Inc.,
25 Park Place, New York City.
Harrison Radio Co.,
12 West Broadway, New York City.
Sun Radio Co.,
212 Fulton Street, New York City.
Terminal Radio Corp.,
80 Cortlandt Street, New York City.
Thor Radio Corp.,
60 Dey 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.

NEW HAMPSHIRE
Radio Service Laboratory,
1187 Elm Street, Manchester.

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.

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

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.

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

HOLLAND
Radio Peeters, Van Woystraat, Amsterdam, Z.

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.

If this book is not at your dealer's, send your order directly to us. We will credit your dealer with the sale of this book. To order your copy of RADIO AMATEUR COURSE, fill in coupon below and mail.

RADIO AND TELEVISION, 99 Hudson St., New York, N. Y.

Gentlemen: I enclose herewith my remittance of Fifty Cents (50c) for which please send me POSTPAID, my copy of the RADIO AMATEUR COURSE. (Remit by check or money order; register letter if you send cash or unused U. S. Postage Stamps.)

Name .....

Address .....

City ..... State.....R&T-239

EMERGENCY USES of RADIO

Frank R. McNinch

Chairman,
Federal Communications Commission

● WHEN a hurricane, flood, forest fire or other catastrophe strikes, and electric power and communications lines go out of service, emergency radio telephone stations often help to alleviate distress and to restore community life to normal. Sometimes they are the only means of communication available. They transmit emergency instructions and orders. They may be used, for example, for the interchange of information and instructions leading to the prompt restoration of utility services.

That is one of the uses of special emergency radio telephone stations. There are many more. They help to protect water supply and distribution systems and aid in reporting and combating forest fires.

The public probably is better acquainted with the police emergency service, but even the vast ramifications of this service are not generally known. The first use of radio by the police was in 1916 when the City of New York established a private coastal station for communication with harbor police boats assigned to the task of maintaining order on the New York waterfront. Detroit was the first city to adapt radio for communication with police cars in the manner now used by hundreds of municipalities. In 1931 Michigan installed equipment to provide for communication between state police headquarters and police officers engaged on their assignments. Two-way police communication was first established in 1932 in Bayonne, New Jersey.

Of the many uses to which radio has been put the fastest growing is the *police emergency service*. The last general survey of the extent of this service was made in May, 1935, by means of a questionnaire submitted to the municipalities and states. At that time 215 municipal and 24 state police stations were in operation. Although the questionnaire was not answered by all licensees, the information submitted showed that about 50,000,000 people were then being served by municipal police stations and 27,000,000 people by state police stations. At the present time the number of municipal police stations has grown to 601; consequently there is a great increase in the total population served. State police stations have expanded from 24 to 175!

At the present time, radio is used by municipalities for one-way communication with mobile units and remote police stations and for *two-way* communications with mobile units. It is used by states in the general dispatching of state police units and between states and municipalities for the radiotelegraphic exchange of police information. It is also used by harbor police in connection with the dispatching of harbor police boats and the general policing of shipping.

I have endeavored to point out the extent of the use of police radio through the

Frank R. McNinch, Chairman, Federal Communications Commission.

device of cold statistics. The thrilling story of the use of radio in the apprehension of criminals, the saving of property, the protection of homes, the location of lost persons and the pursuit of the endless tasks of the police, would fill a large volume. It is impossible for me even to touch upon this story.

The public is generally familiar with the part that radio has played in rescues at sea. Radio in the marine service, however, has a wider usefulness. In practical operation other and more frequent emergency communications are carried on from day to day with ships at sea. Medical advice may be obtained from surgeons of the Public Health Service and others with respect to the treatment of persons injured or becoming ill at sea. Weather reports and hydrographic information are constantly disseminated. Persons on vessels at sea and those ashore may communicate with one another concerning the crises of everyday life.

The use of the distress signal has saved many lives endangered by sinking ships. Frequently a vessel in distress may keep afloat for days while help is on its way. In the aviation service the use of radio is principally concerned with the prevention of emergencies.

Without the aid of radio facilities authorized by the Commission, high speed passenger and air mail service would be impracticable. Radio has played a major part in the fine safety record established by the airlines. Although there have been disasters during the past few years, in no case has it been established that failure of the communications system licensed by the Commission was in any way contributory to the conditions resulting in the disaster. To mention a few of the aids to aviation developed in the past few months, there are a transmitter to provide a "glide path" along which an aircraft may be guided to insure a proper descent through the overcast, or area of non-visibility, to the runway; a transmitter to *localize* the runway that also provides a path along which an aircraft may be navigated with the assurance that upon touching the ground the aircraft will be on an established runway; two or more *local* transmitters to advise the pilot of his location and to signal changes in flying procedure; and a transmitter to provide a communication channel between the aircraft and the airport in order that instructions may be given to the pilot.

Research is continually being conducted by various organizations leading to the development of more efficient and reliable equipment. As a result of the activities of the radio engineers of this country, the equipment developed and in use in the United States is unexcelled.

The public has been afforded remarkable object lessons in the use of radio during times of catastrophe. A few fairly recent examples are the New England hurricane,

(Continued on page 622)

Twenty-fourth of a Series of "Guest" Editorials.

HEARD THESE YET?

Glimpses of noted short-wave stations in foreign lands.

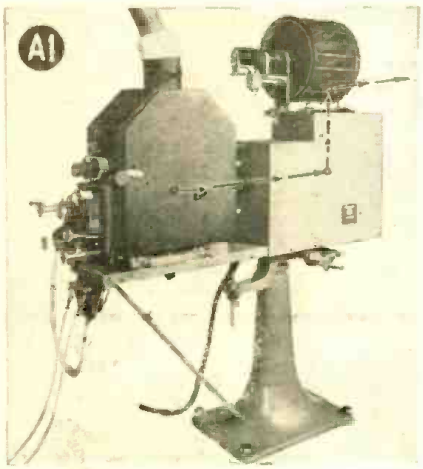
(1) A peek inside the studio of KRO at Hilversum, Holland. This studio is used for broadcasting electrical transcriptions, more than 20,000 of which are in the station's files. (2) This is the main studio of the Hilversum station. The visitor's gallery in the upper portion of the picture seats 80 persons and its acoustic design amplifies their applause ten-fold. The station is known as "Katholieke Radio Omroep."

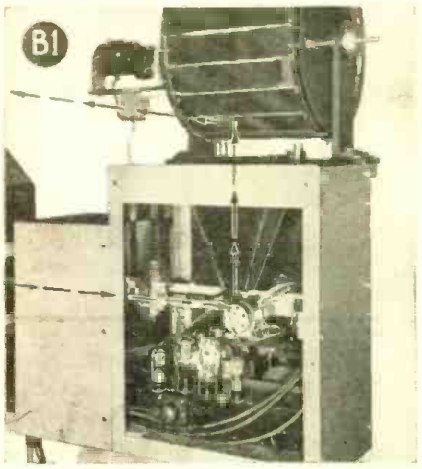
(6) The new Belgian station, INR, which was completed but a few weeks ago. (7) The main power room of this station. (8) The main studio makes use of deflectors in the wall. These are hexagonal in cross-section, each side being made of a different material so that the acoustics of the room can be modified at will.

(3) An external view of Broadcast House in Johannesburg, South Africa. (4) A picture of the main studio, principally used for broadcasting concerts and large dramatic productions.

(5) A separate studio used in the South African station for broadcasting dance music. Notice the highly symbolic mural on the rear wall.

(9) The main entrance to EIAR, the new Italian short-wave center. (10) A view of the transmitting room, showing the two 100,000 watt units. This new Rome station includes three buildings, housing eight separate transmitters. An array of antennas is beamed to cover the entire civilized world.





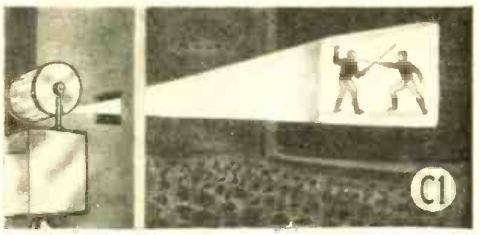


Fig. A1 shows a general view of the Scophony large screen television projector for theatre use. The dotted line indicates the path which the light takes, from the source indicated by the dot inside the housing, through the optical system, to the scanning drum. In Fig. B1 there appears a close-up of the mechanism inside the housing below the scanning drum. The object at which the light makes its right-angle turn is the high speed scanner. The low-speed scanner is the large drum on top of the housing. Fig. C1 shows how the apparatus might be positioned in a theatre projection booth for public entertainment.

Will Britain Invade Our Television Market?

SCOPHONY'S SYSTEM

• THE Scophony television system planned for introduction to America, as described in the adjacent column, differs widely from the *cathode-ray* systems used by most leading American manufacturers. Its differences are both in the results it affords and in the engineering means used to secure them. First, its picture is 20" x 24", black and white, and of considerable brilliance. It has been used successfully in England for the reception of 441-line images.

Unlike the American systems, the Scophony apparatus uses an optico-mechanical system, the heart of which is the new type of light valve. This unit, known as a *supersonic light control*, consists of a container, filled with a liquid, at one end of which is a quartz crystal. When a modulated carrier frequency is impressed upon the quartz crystal, supersonic waves are set up in the liquid. Light is passed through the container in a direction transverse to that of the supersonic waves, and an image of the light cell itself is formed on the screen, its width being equal to one line of the picture and its length determined by the length of the liquid column. When the scanning wheels are rotated at the correct speed, the modulation stored in the supersonic waves becomes visible on the screen. Through this system, 200 picture elements are shown simultaneously instead of one, as in other systems; this accounts for the fact that Scophony pictures are approximately 200 times as bright as those of other systems, according to the manufacturer's engineers.

Solomon Sagall

SCOPHONY'S PLANS

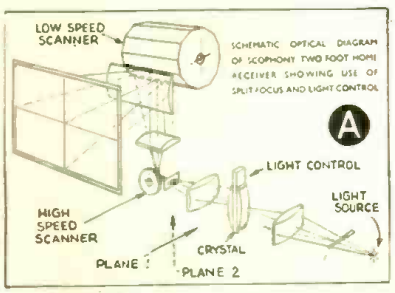
• ACCORDING to Solomon Sagall, president of Scophony, Ltd., one of the leading British television receiver manufacturing companies, the art has reached a high stage of technical perfection in England, but has not attained the commercial success which it merits, due to program difficulties that will not obtain in America.

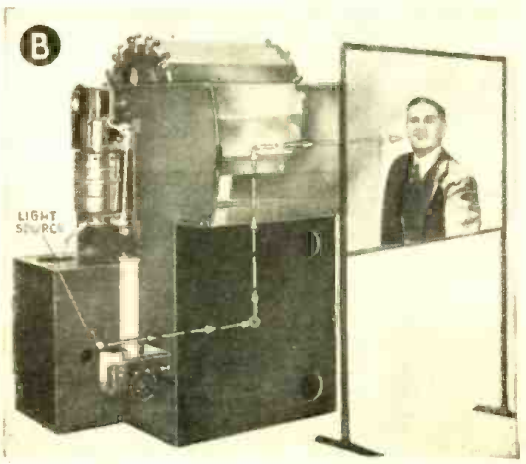
The British Broadcasting Company, in his opinion, is not adept in the entertainment field because it has a monopoly. He points out that in the United States there is competition not only between NBC and CBS, but also between the independent stations, and therefore programs must be brought to peak perfection in order to win and hold audiences, for without audiences the stations cannot live.

The motion picture industry is also centered in the United States; and the vast resources of American producers coupled with their wide experience in visual entertainment will, Mr. Sagall thinks, bring America into the lead in television within a few months after its inception here. However, he realizes that the movie industry is now interested but slightly in television.

A large number of producers here look upon sight entertainment as dangerous competition, while another group thinks that it will be of no particular importance for at least ten to fifteen years. Mr. Sagall, on the other hand, believes that television will help bring crowds to the motion picture theatres almost as soon as

(Continued on page 622)





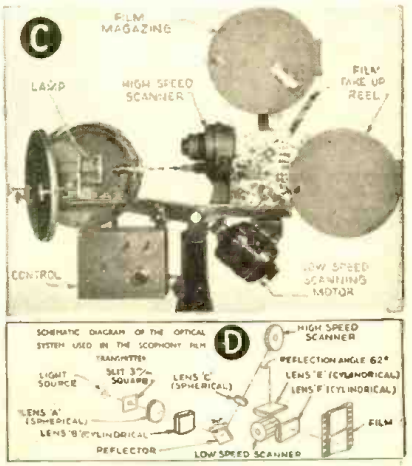


Fig. A explains the optico-mechanical system similar to the theatre apparatus described above. Fig. B shows how the light travels from its source to the high-speed scanner, and thence to the large low-speed scanning drum from which it is reflected to a two-foot screen. This is the largest "home" television thus far successfully demonstrated. Fig. C shows film scanning apparatus at the transmitter; Fig. D explains its optical system.

Antique Radio Station

● WPA workers are about to rebuild the old Smyth tower at Manchester, N. H., and convert it into a headquarters for amateur short-wave radio enthusiasts. The tower is approximately 20 feet in diameter and 38 feet high from basement to roof. The basement will be a storage room and house

the heating facilities. The lobby and reception room will occupy the first floor, while the second floor will be given over to an instrument room for the Hams, and the third floor used for other equipment.

The pictures show the tower as it looks today and an artist's phantom drawing of the way it will be restored.

Hams Get Call Auto Plates

● THE "Powers That Be" in the Michigan auto license bureau must have been Hams once themselves, for they are now issuing license plates bearing amateurs' call

letters. The plates will be available to all licensed Michigan Hams who place their orders before March 31st. They are obtainable only as full-year plates.

The illustration herewith shows B. V. White, W8NNE, proudly displaying his new tag.

Color Television

The original color television equipment built by J. L. Baird, British inventor, has been presented to the Science Museum at South Kensington. The equipment includes a mirror drum which revolves at 6,000 R.P.M., and has twenty mirrors together with a color filter disc. This apparatus was used in some of Mr. Baird's early demonstrations of color television in Great Britain.

Ham Radio Finds Son 4500 Miles Away

● ON a hunting trip in the Alaskan wilderness, Henry L. Walther of Chicago was found by an amateur operator who told him that his mother was critically ill in a Chicago hospital. Mr. Walther made the journey home in 11 days by boat and plane, when it had been estimated that at least a month would be required for the trip, under normal circumstances.

WORLD WIDE

Battery-less Phone System

● A NEW type of magnetic telephone works without batteries and is readily portable.

Sound waves actuate the diaphragm,

which vibrates an armature in the field of a permanent magnet, generating alternating current. Calling current is generated by revolving two discs of magnetic material, the teeth of which cut the field of the phone magnet. Photo courtesy Western Electric Co.

10 KW. Television Station

● AT Indian Ladder, twelve miles outside of Schenectady in the Helderberg Hills, the General Electric Company is constructing a 10 kw. television transmitter.

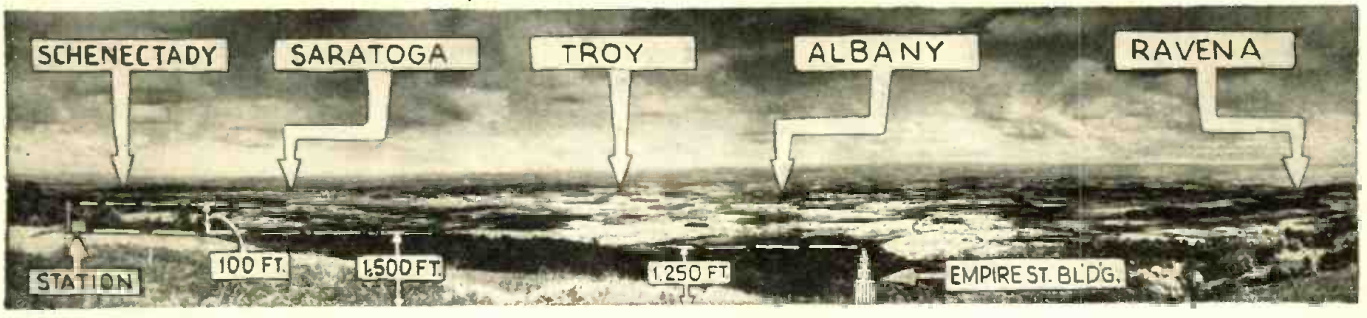
This will be linked with the city's studio by a 1.4 meter ultra-short wave beam. Antenna towers, 100 feet high, are being erected atop a 1500-foot hill, giving the station at least 250 feet more altitude than the Empire State Building. Programs are intended to serve the upstate area.

New Vision Receiver

● G.E. is also going in for television reception, and has announced the results of a series of experiments with high definition equipment.

In the accompanying illustration, Dr. W. R. G. Baker, Chairman of the Management Commission of the company's Radio and Television Division, is seen seated beside a receiver, the development of which he directed. This large console model is one which the company plans to build in limited numbers for the trade this Spring.

In addition to supplying a few sets for such purpose, the company is planning a large exhibit at the New York World's Fair, where visitors will be enabled to see their friends televised and to be televised themselves.



Visual Rays for Television

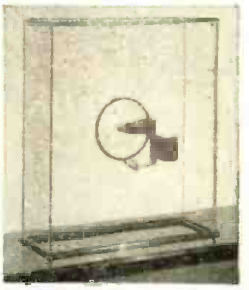
A distance of 9 miles is being spanned by a new British television system which uses light beams instead of the usual electromagnetic waves. While no detailed information on the new system is available as yet, *Television & Short Wave World* announces that pictures have been received and that special towers are being erected at Morecambe Bay and Overton for further experiments.

European Television Tour

● A forecast that the General Electric Company will be going into the television field is shown by the six weeks' tour which Mr. E. H. Vogel, manager of the radio division, is making in England, France and Germany. He will investigate transmitting and receiving equipment in these countries and will discuss commercial television experience and plans with various foreign agencies and G-E affiliates.

Magic Motor Explained

● IN a Bell Telephone Laboratories exhibit, a small disc supported entirely by glass turns continually, without being connected to electrical or mechanical power. Perpetual motion? Of course not! The little glass disc is simply suspended so that its blackened permalloy rim passes between the poles of a permanent magnet. Heat rays are focused from a remote spot to a small point on the rim. The heat causes a loss of permeability which, in turn, unbalances the lines of force from the magnet, causing the disc to revolve at the rate of about 20 r.p.m.



RADIO DIGEST

D—— Clever, These Chinese!

● DESPITE the fact that bombs rained down from the skies above, "China Radio," an all Chinese Ham magazine, is still published. From the latest issue

comes this diagram, reprinted from an issue of RADIO & TELEVISION last Autumn. Although laws of countries may differ, it is comforting to know that Ohm's Law remains completely international—isn't it?

Pickup Theater Stage

● FOR the first time in the history of television, pickup direct from the stage of the theatre has been made, according to the N. Y. *Times*. The scene of this history-making achievement was St. Martin's Theatre in London, England, where a new play, *When We Are Married*, was making its début. Special spotlights were placed around the stage and in the boxes, in order to afford sufficient illumination.

One television camera was set up at about the center of the house, while two others were located on either side for angle shots.

W9XA Takes the Air

● W9XA, an experimental station operated by the Commercial Radio Equipment Company of Kansas City, Mo., has gone on the air with a general broadcast entertainment service in the 25-27 mc. band. Early reports on the station's reception indicate that it is not only serving the Kansas City area with signals which *over-ride* man-made static, but has also reached Rotterdam, Holland; Santo Domingo, D. R.; Kirkland Lake, Canada; Mexico City, Mexico; Sussex, England; ships at sea, and many other distant points.

Experiments will be centered around radiation problems during the first months of operation. Field patterns will be plotted and intensities measured at 1, 2, 3 and 4 mile radii.

The station uses 1000 watts maximum power and employs two type 833 tubes in push-pull in the final stage. The audio frequency range extends to 15,000 c.p.s.

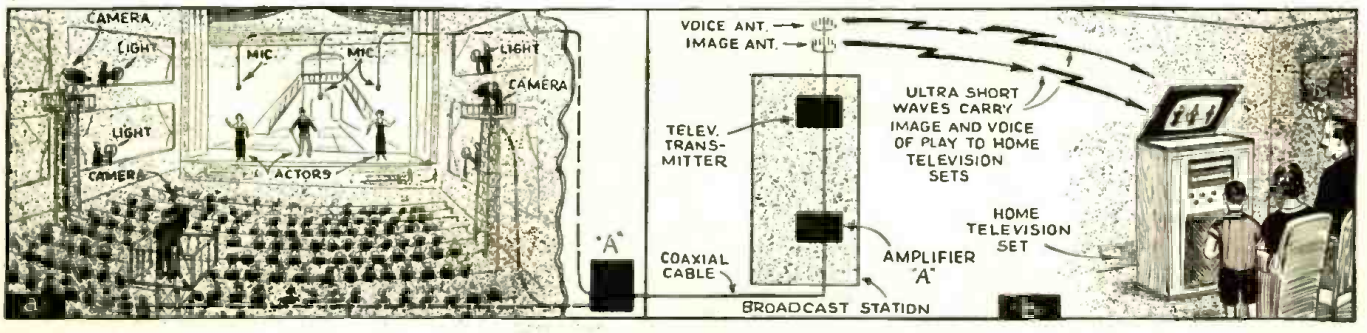
Giant C-R Tube

● A 16-inch cathode-ray tube is the heart of a new Baird television receiver which is now in use at Midland Television, Inc., in the United States.

The set produces a black and white picture 9"x12" in size, and sells for about $425.00. As can be seen in the picture, there are six controls for sight and sound —the latter coming through the grill below the control panel. While the set is designed for 405-line reception, it can be readjusted to operate on the 441-line pictures, which are the American standard.

The receiver uses 19 tubes, in addition to the cathode-ray tube.

Engineer Duncan of the Kansas City school is seen placing the C-R tube into position. It is mounted vertically, its screen being viewed by means of a mirror in the cabinet lid.

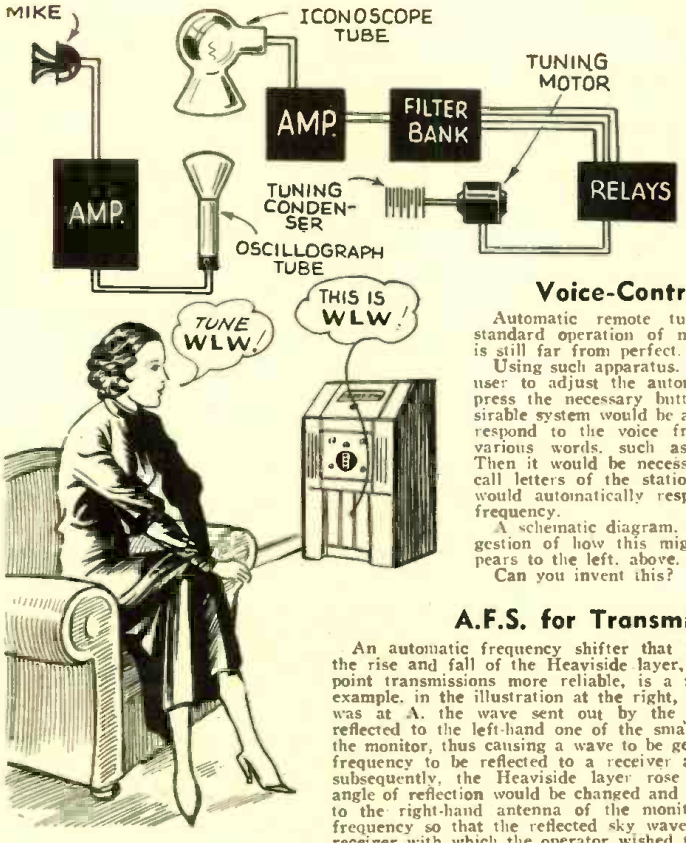


Can YOU Invent These?

● HERETOFORE inventing has been largely a haphazard process. An inventor got an idea and then, perhaps, did something about it. Now RADIO & TELEVISION is taking a step which may help organize inventing. This department will point out needed inventions, and suggests that radio experimenters and designers exercise their ingenuity to solve the problems proposed.

There is a fortune awaiting the man who invents either of the devices shown on this page. Will you be the man to win this fortune?

Readers of RADIO & TELEVISION are invited to send in their suggestions for any inventions which they believe to be needed. The authors of any ideas which are used will be rewarded with an 8 months' subscription to RADIO & TELEVISION.



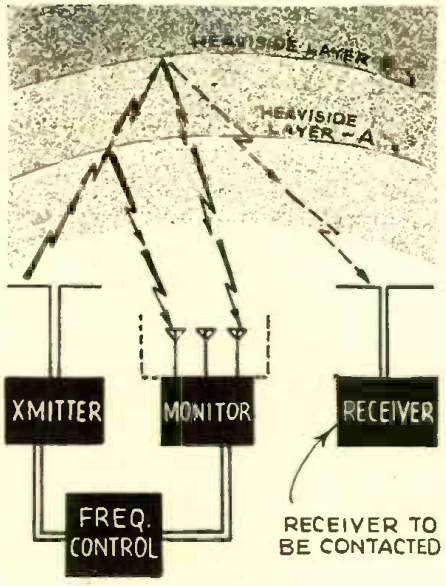
Voice-Control Tuning

Automatic remote tuning has become a standard operation of many receivers but it is still far from perfect.

Using such apparatus, it is necessary for the user to adjust the automatic controls and to press the necessary buttons. A far more desirable system would be apparatus which would respond to the voice frequencies making up various words, such as station call letters. Then it would be necessary only to utter the call letters of the station, whereupon the set would automatically respond to the requested frequency.

A schematic diagram, showing a rough suggestion of how this might be performed, appears to the left, above.

Can you invent this?



A.F.S. for Transmission

An automatic frequency shifter that would compensate for the rise and fall of the Heaviside layer, thus making point-to-point transmissions more reliable, is a needed invention. For example, in the illustration at the right, if the Heaviside layer was at A, the wave sent out by the transmitter would be reflected to the left-hand one of the small receiving aerials on the monitor, thus causing a wave to be generated of the correct frequency to be reflected to a receiver at a remote point. If, subsequently, the Heaviside layer rose to the point B, the angle of reflection would be changed and the wave would reflect to the right-hand antenna of the monitor, thus shifting the frequency so that the reflected sky wave would still reach the receiver with which the operator wished to communicate.

This is a relatively simple problem and should soon be solved by the ingenious experimenter.

Facsimile Newspaper "On the Air"

"Radio Newspaper" facsimile transmitter at St. Louis *Post Dispatch* station.

● STATION W9KSD, operated by the St. Louis *Post Dispatch*, is now on the air with a regular 7-day-a-week schedule of facsimile broadcasts, publishing a miniature edition of the *Post Dispatch*. The first edition consisted of nine pages, 8½" long x 4 newspaper columns (about 8½") wide, using regular newspaper 7-point type (slightly smaller than the type in which this article appears). Specimen below greatly reduced.

Today's News Today

ST. LOUIS POST-DISPATCH

By Radio from Station W9XZY

31.6 Megacycles

VOL I. St. Louis, December 6, 1938

AGITATION MAY GO ON IN ITALY FOR TUNISIA

By the Associated Press.

ROME, Dec. 6—A new series of demonstrations against France led diplomatic circles today to predict that the Italian agitation might continue until Italy obtained "concessions" in French Tunisia.

Exactly what Italy wanted was obscure, but foreigners thought it likely one objective was control over Tunisians of Italian blood, estimated at from 94,000 to 180,000.

Diplomats here, however, were convinced both France and Britain would oppose any Italian attempt to acquire any part of the African possession.

Meanwhile in Paris sources close to Premier Daladier said today that France would fight, if necessary, to defend Tunisia.

Pan-American Conference Opens; to Discuss Defense

By the Associated Press.

LIMA, Peru, Dec. 9—Twenty-one nations of the Western Hemisphere opened the eighth Pan-American Conference today to work for peace at home and against foreign aggression but without isolation from the rest of the world.

The delegates gathered in the Peruvian House of Representatives for inauguration of the conference had in mind economic and perhaps political steps against the authoritarian states.

But from the United States Secretary of State Cordell Hull, who headed his delegation came the assurance the Americas did not seek to cut themselves from the rest of the world.

Members of the delegation said the Secretary meant not to turn to turn and face it, with eyes aware

His assurances were seen as directed to Argentina, wishing to retain old world ties and against some agitation that the United States direct all its foreign trade toward Latin America.

It was felt also that President Roosevelt's continental defense plan would not go beyond a resolution declaring the need for such defense and the intention of the 21 republics to defend themselves from outside aggression.

It is believed no formal defense pact would be proposed.

Argentina sources said Dr. Isidoro Ruiz Moreno, chairman of the delegation, in a conference with Secretary Hull last night agreed to some sort of compromise on the United States-inspired defense pact. The Argentine group was to study

"Newspaper" page as reproduced by radio facsimile.

In the RCA facsimile apparatus being used, the original copy is printed on thin paper, then placed on the cylinder of the transmitter, and revolved at 75 r.p.m. A small pin-point of light moves across the page during this process, reflecting from it to a photo-electric cell which controls the current reaching an amplifier. The amplified current is used to modulate a radiated wave, which is sent out in the usual way.

Received on a standard broadcast set, this signal is fed into a facsimile reproducer. It causes the stylus to tap a sheet of carbon paper which is supported over paper placed on a cylinder similar to that at the transmitter, thus a duplicate of the material at the transmitter is reproduced at the receiving end.

Below—Cutting off the pages of facsimile newspaper at the receiving station.

RADIO TEST-QUIZ

Meet Your Professor ROBERT EICHBERG

● **ANOTHER session with the Old Professor (who makes mistakes himself, sometimes) brings a number of new angles to your attention. And how are you doing in your class—are you forging ahead or dropping behind? Well, better luck next time! Figure your grade by crediting yourself with 4 points for each question correctly answered, 2 points for each answer that is half right, etc. The total gives you your percentage. N. H. Lessem, Associate Editor of Radio-Craft scored 82%, taking 22 minutes for the test. If you can get 50% you're fair, if 75% you're good, and if 90% you're a wonder!**

1. Some years ago, an Englishman murdered his wife and fled on a boat with his girl friend. A radio alarm was sent to the ship, and he was the first murderer to be caught by wireless. Find his name in the first column, the lady's name in the second, and the year this occurred, in the third.

a. *H. H. Crippen*
b. *J. C. Armstrong*
c. *Ronald True*
d. *J. J. Watson*

A. Blanche Elsmere	*a. 1895*
B. Vivian Le Grande	*b. 1900*
C. Ethel Le Neve	*c. 1905*
D. Jane Toppan	*d. 1910*

—

2. Your radio receiver suddenly loses volume, and is still faint when the volume control is turned fully up. What is the first thing you will do about it?

a. Tear out the volume control.
b. Inspect the antenna.
c. Test the antenna.
d. Have the tubes tested.

—

3. As far as high definition television is concerned, mechanical scanning is used by

a. Farnsworth	*d. Scophony*
b. Lubcke	*e. Du Mont*
c. Nobody	*f. D'on Ardenne*

—

4. The Marconi Antenna, which is named for the eminent Italian scientist, is an antenna the circuit of which

a. includes no ground.
b. includes a ground as an essential part.
c. makes use of a counterpoise.
d. employs a vertical doublet.

—

5. It is safe to omit fuses in a transmitter

a. when its maximum output is under 750 watts.
b. when circuit-breakers are used.
c. when the rig is in a metal cabinet.
d. at no time whatever.

—

6. You don't have to be a wife-beater in order to know that beat frequency is

a. any heterodyning.
b. the number of times a cop passes his post.
c. the frequency difference between two oscillations.
d. another term for "motorboating."

7. Of the following metals, which, when placed in the field of a coil in an oscillating circuit, will raise the frequency, and which are you convinced will lower it?

a. copper	*d. steel*
b. brass	*e. zinc*
c. iron	*f. lead*

—

8. In broadcasting television sight-and-sound programs, the sound

a. is always on a lower frequency than the image.
b. is always on the same frequency as the image.
c. is always on a higher frequency than the image.
d. is sometimes on a higher frequency and sometimes on a lower frequency than the image.

—

9. Experimenting with television, you wish to make a Kerr cell. What liquid will you use in it?

a. carbon bisulphide
b. carbon tetrachloride
c. nitro-benzol
d. nitro-glycerine

—

10. Class C Amateur Operators' licenses are granted to

a. persons who live more than 125 miles from the nearest point where Class B exams are given at least four times a year.
b. entrants who fail to pass a Class B exam by 10 points or less.
c. persons who are certified physically incapable to appear for exams.
d. persons who are under the age requirements for Class B licenses.

—

11. Impulse microphones are used

a. for high-fidelity studio recording.
b. for voice control of relay circuits.
c. for broadcasting the voices of impulsive young sopranos.
d. not at all, for no such device exists.

12. If you were a studio musician, you might find it easier to match the names of the instruments in the left column with their nicknames in the right column.

a. piano	*A. dog house*
b. bass violin	*B. horse-teeth*
c. saxophone	*C. suitcase*
d. drum	*D. woodpile*
e. trumpet	*E. fog horn*
f. xylophone	*f. horn*

—

13. If you are not a Ham, you may be unaware that a Class B Amateur Operator

a. has the same privileges as a Class A operator, save that he is restricted to the use of lower power.
b. is not permitted to operate during the same hours as a Class A operator.
c. may not use portable transmitters.
d. has the same privileges as a Class A operator, but may not use two specified bands for radiotelephony.
e. may not transmit television or facsimile.

—

14. If you were buying parts for a modern all-wave superhet receiver, which of the following would you be unlikely to include in your shopping list?

a. potentiometer	*d. pentode*
b. variometer	*e. variocoupler*
c. rheostat	*f. grid leak*

—

15. In looking at roof-tops, you have doubtless observed that dipoles are

a. always horizontal.
b. always vertical.
c. always at some angle other than horizontal or vertical.
d. horizontal or vertical or some other angle.

—

16. Conceding that a vertical radiator is an upright antenna, would you say that a constrained radiator is

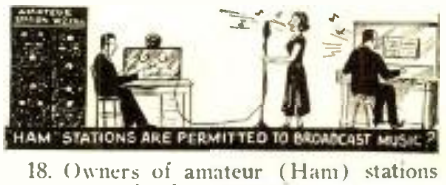
a. a short vertical antenna?
b. a transmitting antenna with limited range?
c. a form of loudspeaker horn?
d. a transmitter using a certain type of shielding?

—

17. No doubt you are familiar with numerous radio abbreviations, but can you translate the following correctly?

a. E.M.F.	*d. P.D.*
b. R.M.S.	*e. Q.A.V.C.*
c. R.M.P.C.	*f. R.N.W.M.P.*

—

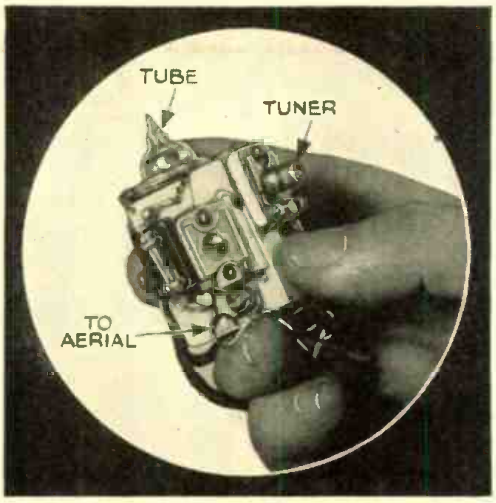


18. Owners of amateur (Ham) stations are not permitted to transmit

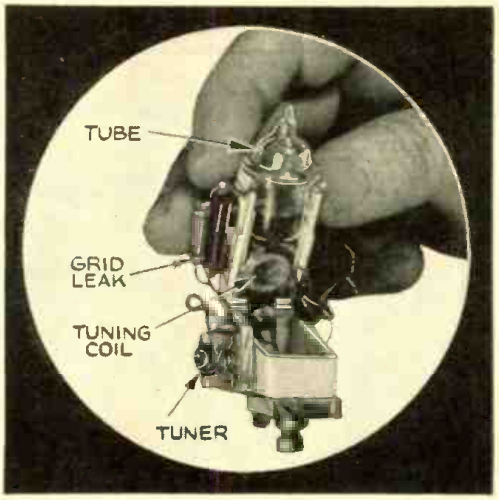
a. instrumental music.
b. vocal music.
c. humorous dramatic sketches.
d. personal messages without charge for people not connected with their stations.
e. paid messages for individuals.
f. paid messages for business houses.

(Continued on page 636)

1-Tube Set Is Watch-Charm Size



The tiny size of the Watch-Charm receiver is shown by this photo.



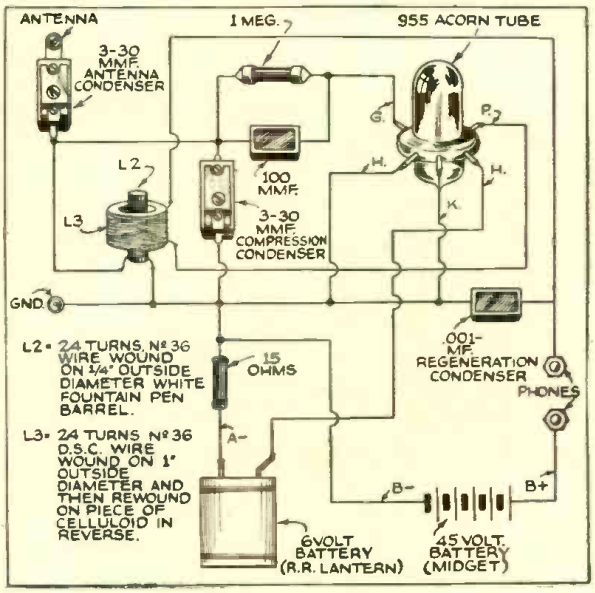
The "innards" of the single Acorn tube receiver built by Mr. Hoover.

L. S. Hoover

● IN December, 1936, this magazine published diagrams and a description of the author's *Tinymite* set. Small as that set was, this new development has produced one still smaller—small enough, in fact, to be worn as a watch charm, even though it is a one-tube super-regenerator, with excellent performance. Including the tube and tuning controls, the set measures but 2-3/16" x 1-7/8" x 1¼" overall. It is not a toy but a good DXer on the 49 to 75 meter band, bringing in airplanes and amateurs with fair headphone volume.

The chassis is a bakelite ring-box, such as jewelers use, and measures 1½" x 1¼" x ⅝" outside dimensions. The front of the top part was sawed away to take a mounting for a 955 Acorn tube. The tube is mounted upside down so that the larger portion of it comes within the box. Beneath the tube is a coil consisting of grid and tickler windings. The grid coil is measured in rather an unusual way. First, 24 turns of No. 36 D.S.C. wire are wound on a one inch form; the wire is cut to this length, then removed from the form and wound on another form having ¼" outside diameter. The author used a piece of fountain pen barrel about ⅝-inch long. The wire for winding the tickler is measured in the same way. It likewise is removed from the one inch form and is jumble-wound in the opposite direction. Its form is a piece of celluloid, of the size in which a styptic pencil is packed. This is the correct size to slip over the grid coil. Both coils are kept in position with fingernail polish, used as a lacquer. The grid coil is a straight solenoid; the jumble-wound tickler is slipped over and adjusted for best volume.

The hook-up of the Watch-Charm receiver—it has a surprising range.



In mounting the terminals for battery connections, you will note that B-, A- and ground are common. The posts are mounted on the end of the chassis which holds the tube. The part which is furthest from the camera in the photograph of the open set is the place where this common post and A+ post are located. The B+ post is just below the thumb in the same picture. Due to the proximity of the A+ and B+ posts, care must be taken not to make a short circuit, which might blow out the tube. In the same picture, the knob in the foreground is the major tuning control operating the trimmer condenser which tunes the grid coil. The antenna lead is brought in to the antenna trimmer

(Continued on page 611)

Can You Answer These Radio Questions?

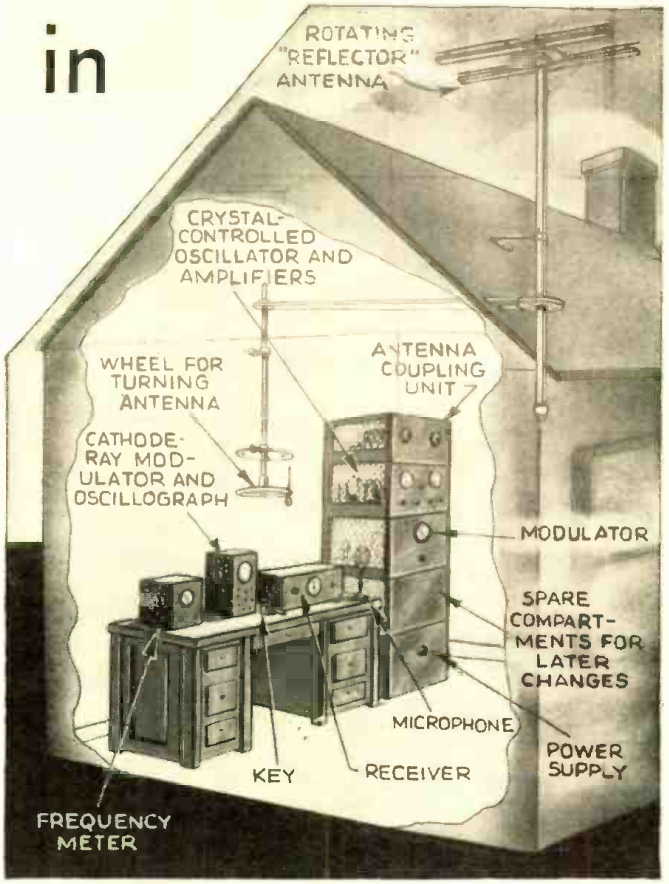
1. Is there a short-wave broadcasting station in South Africa and, if so, in what city is it located? See page 582.
2. How are the images scanned in the Scophony television system? See page 583.
3. In what state are auto license tags issued containing Ham call letters? See page 584.
4. Can you briefly outline a method of constructing a voice-operated tuning system? See page 586.
5. If you wished to make a Kerr cell for television, what liquid would you use in it? See page 610.
6. What frequency bands are open for C.W. and phone, for amateur use? See page 589.
7. What is the advantage of the cardioid directional mike? See page 590.
8. What is the Edison effect and what is its relation to radio amplifiers? See page 597.
9. Where is short-wave broadcasting station VHSU, and is it heard regularly in this country? See page 599.
10. What precaution must be taken in connecting a pair of crystal headphones to the output tube of a receiver? See page 605.
11. How can the television "sound channel" be picked up on an ordinary receiver at slight cost? See page 606.
12. What type of amateur radio transmitter is "outlawed" under the new F.C.C. regulations? See page 608.

Getting Started in Amateur Radio

C. W. Palmer, E. E., Ex.-W2BV

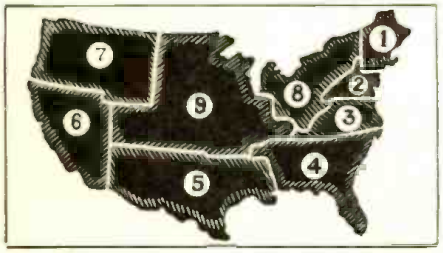
First Article of a New Series

Mr. Palmer here tells how *you* can prepare to enter the HAM game—where to apply for license—what frequency bands are open to amateurs—what apparatus is used in a typical Ham station.



As our cover picture shows, the rotary beam aerial is being widely used by advanced Ham stations.

● AT one time or other every radio fan who has built a set or two and who has listened to the dits and dahs or homey chats of the amateur radio stations spread across the short-wave bands, "gets the bug" and



The numbered "Districts" by which Ham stations are allotted call letters.

cherishes the hope of some day having a station of his own. The "bug" may be just a passing fancy—a building of castles in the air—or it may be a real bite, in which case, the victim will before long be numbered among the ranks of the "hams."

Many a would-be amateur is scared off by the thoughts of such difficulties as learning the code, passing the government license test, learning the intricacies of building and operating a transmitter, and other will-o'-the-wisps. For these poor unfortunates, we wish to say now, right at the beginning, that there is nothing mysterious and nothing particularly difficult in any of these obstacles.

Many thousands of people have mastered the code, and the construction of a transmitter is no more difficult than building a receiver—the same problems are encountered, such as proper location and selection of parts, wiring and adjustment. The differences are easy to learn and can be mastered as you progress, both before and after you have your license.

Many of the thousands of hams heard daily on the air know no more or little more about radio than you — they just have the experience to back them up. And you will soon acquire this experience.

Getting Started

Now that the preliminaries are over, let's get down to business. In this series of instructional and constructional articles, it will be assumed that the reader has built a few radio receivers, has read a book or two on the fundamentals of electricity and radio, and can handle simple tools. For this reason we will dispense with such subjects as the reasons why coils, condensers, tubes, etc., are used and how they work. For those who have not reached the stage of "knowing a little about a lot of things" in radio, it is suggested that the series "The Radio Beginner" started in the November, 1938, issue of RADIO & TELEVISION be followed first, before attempting to build any radio receivers or transmitters.

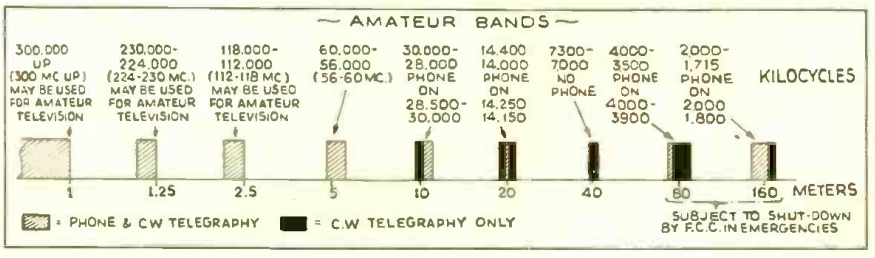
Since every radio operator must pass a government test before he can own and operate an amateur transmitter—whether it is a phone "rig" or one using a key—his first problem is to memorize the code. While this is being done at odd moments through the day and evening, you can start the construction of your first transmitter, and a receiver suitable for use in a Ham station. Take this memorizing job really seriously; when you glance over the evening paper, ride home in the train or bus, eat lunch or during any odd moment between your daily tasks, practice spelling out words—any word your eyes are attracted to—silently, say *dit* for the dots and *dah* for the dashes.

Since a very complete article on learning the code and handling the "key" appears in the January and present issues of RADIO & TELEVISION, the reader is referred to this source of information on this very important part of the task of obtaining amateur licenses — both "station" and "operator's."

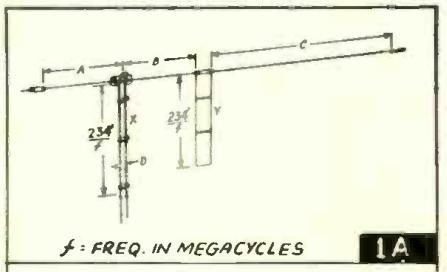
Another essential in obtaining your operator's and station licenses is to acquaint yourself thoroughly with the regulations governing amateur radio activity. A copy of the regulations can be obtained from the district radio inspector in charge of the section of the United States in which you live, and this is also the address of the office at which you must take the examination. Address your letter to the Radio Inspector-in-Charge, at one of the following locations, nearest to your home.

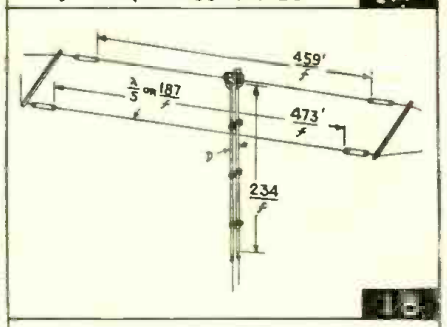
(Continued on page 631)

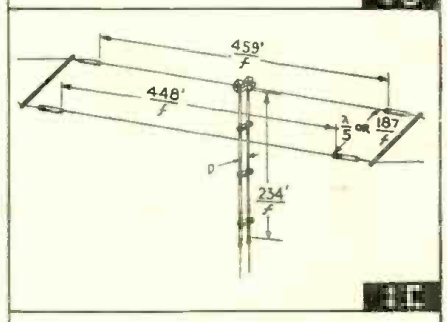
Frequency bands open to radio amateur use.

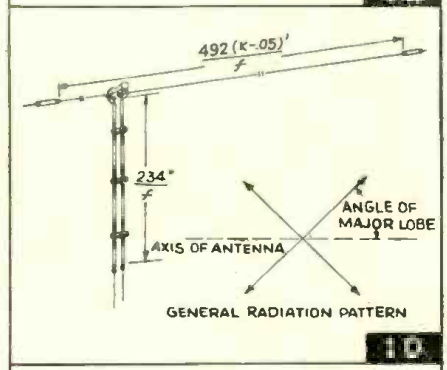


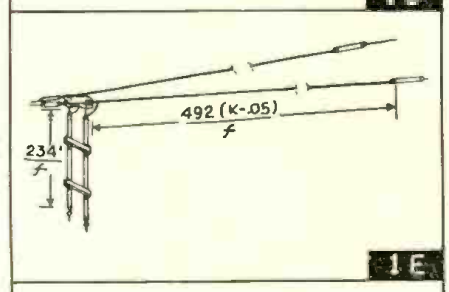
INTERNATIONAL

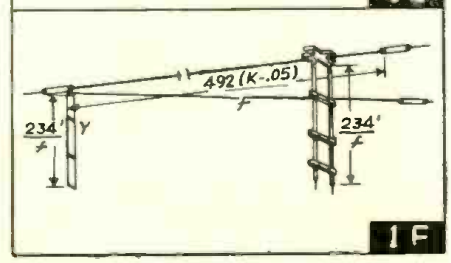












Utilizing Johnson "Q" Matching System

1 THE Johnson "Q" Type matching system can be used to advantage in feeding aerials of many types and not merely *half-wave* radiators, according to *Television and Wireless World*. The simple dipole is most effective, provided the antenna can be matched to the tank coil. Many amateurs have had their doubts as to whether this arrangement can be used in other set-ups than the usual center-fed half-wave aerial.

Figure 1A shows the connection for two half-waves in phase to afford concentrated broadside radiation. The "Q" bars are connected as shown, to afford correct matching. Lengths "A" and "B" are each one-quarter wave; "X" is the usual "Q" quarter-wave matching section, and "Y" is the quarter-wave phasing stub made of No. 14 wire with 6 inch spacing. It is shorted at the bottom to obtain the necessary phase relation between "A," "B" and "C" and is tuned for maximum output by experimenting with the bar which should be soldered after the optimum point is found. The space required between the two bars and the quarter-wave matching section "X" is 3⅝" with a 600-ohm transmission line.

Figure 1B indicates the design of a half-wave radiator with a parasitic reflector. In this circuit, the gain is more than 4 db. over a single half-wave unit. This is particularly interesting for use with rotatable radiators. The formulas given in the figure are used in computing the length and space of the elements. The actual spacing between the two bars in this particular job is one inch.

Figure 1C shows a system which affords slightly less gain but which provides considerably better front-to-back discrimination than the preceding. Our British source suggests that the "Q" bars be fed with a transmission line having an impedance of 600 ohms.

In Fig. 1D, a long wire antenna designed for harmonic operation is illustrated. Simple and inexpensive, it is effective for long distance communications because, although it has somewhat lower gain, its angle of radiation is extremely low. The radiator should be any number of half waves long up to a total of 26. As the number is increased, the gain and directional properties increase similarly. If the aerial is an odd number of half waves long, it can be center-fed through the "Q" system with an odd number of quarter waves from either end; if the entire system is an even number of half waves long, it must be fed with an odd number of quarter waves from one end.

Figure 1E illustrates a "V" beam antenna, vertex fed. This arrangement is highly suited to amateur use, as most of the weight of the Johnson "Q" bars is borne by the pole supporting the point of the "V."

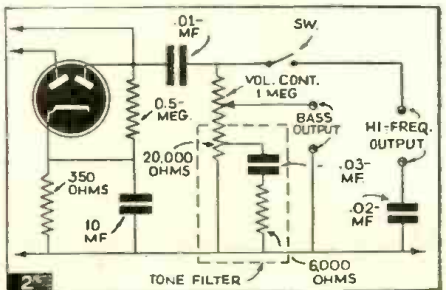
Figure 1F shows a slightly altered arrangement, in which the "V" is fed through one leg.

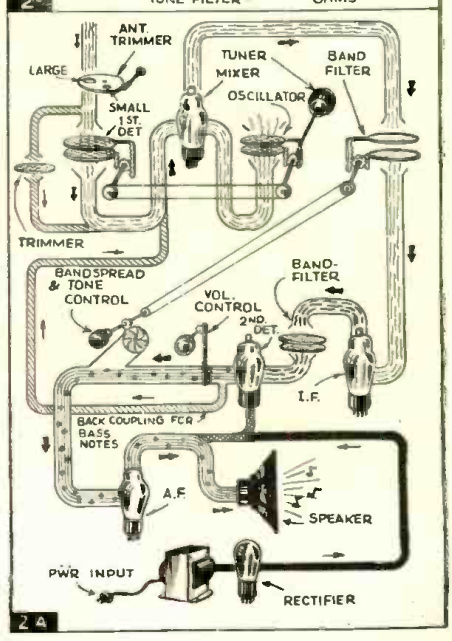
German Explanations

2 TWO interesting diagrams are found in *Unsere Rundfunktechnik* of Germany. Figure 2 is bass booster for amplifiers. By means of the shunt circuit both high and bass notes are obtained.

Figure 2A is a most interesting explanation of what goes on in a superheterodyne. The wave comes down through the lead-in and is tuned by the antenna trimmer. The first detector tuner then controls it in conjunction with the trimmer, if any, after which it is passed on to the mixer tube which also receives the locally generated frequency from the oscillator. From the mixer the signal passes to a selectivity control or band filter, and thence to the intermediate frequency stages. Next it passes through another filter or I.F. transformer and to the second detector. The audio notes then make their appearance and the volume control begins to function. At the same time, the bass feedback is brought into play. A tone control further regulates the signal and this must be ganged to the band filter in order to provide high fidelity, if the circuit includes such a feature. The signal then goes to the last A.F. stages where it is further amplified and fed into the loud speaker.

The power to operate the set is supplied through a transformer, rectifier and filtering apparatus.





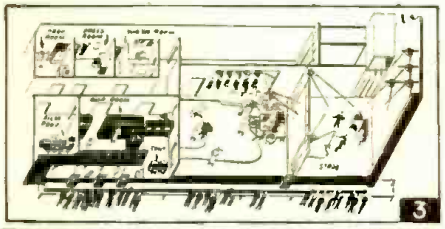
RADIO REVIEW

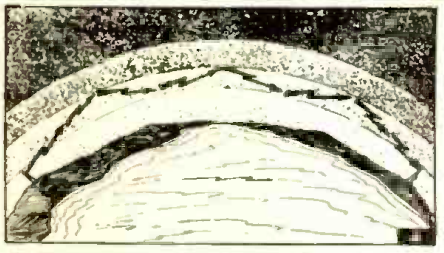
German Television Layout

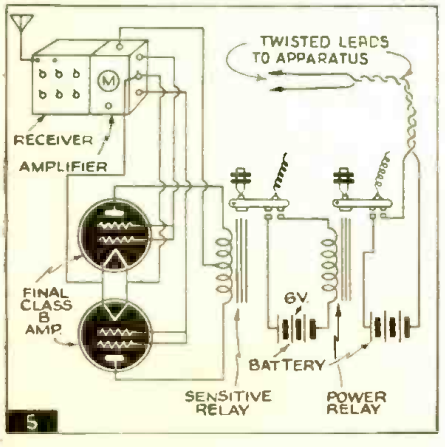
3 AT the Radio Exposition in Berlin, a complete studio was set up. Its layout is shown in Fig. 3. The exhibit, which was prepared by Telefunken, included everything necessary for staging and disseminating a video program. A reference to the figure will show that the installation included a property room, a dressing room and a wash room to take care of costume changes, and make-up and property problems. There was one studio divided by a curtain to form a stage and a technician's room. On the stage the actors went through their performance while technicians, in the room which was placed where the audience would normally be, caught their every word and gesture for the program. The audience was seated where it could see the apparatus at work. Behind the scenes was a control room and an amplifier room to put the program on the air. There was also another studio equipped with a film projector for televising motion pictures.

Deflection of Ultra Short Waves

4 THE fact that ultra short waves are similar to light waves is one reason to which is attributed their ability to bend around the earth's surface. Many years ago Marconi noted such an effect, and at that time, Dr. Paul S. Epstein, of the California Institute of Technology, formulated a mathematical theory to explain it. Now Dr. Epstein and Prof. G. W. Potapenko, of the same Institute, have secured funds from the Carnegie Institution of Washington to construct apparatus and carry on studies along these lines. One opinion is that ultra short waves not only travel in straight lines as light does and are reflected like light, but are refracted when passing through mediums or varying densities in the same manner that light is.


3





5

Remote Power Control

5 A SIMPLIFIED system of controlling motors or other devices by means of radio waves is explained in considerable detail in an article published by *Radio Revista*. The control apparatus consists of a standard receiving circuit with at least two stages of A.F., the final being push-pull in Class B. To this is connected a center-tapped relay which is sufficiently sensitive to operate on the comparatively low output of the amplifier. Such a relay will not be sufficiently rugged to handle much power, so it is used merely to actuate a power relay. The latter is in circuit with the high voltage necessary to operate the apparatus being controlled.

Such devices have been used to switch on flood lights and sirens, to set off blasts, to record code on tape, and for numerous other purposes.

Mike-&-Pick-Up Mixers

6 SEVERAL standard ways of mixing microphone and pick-up inputs for "home broadcasting" use are described in *Practical and Wireless World*. In Fig. 6A, a simple system of controlling the volume of a microphone and pick-up by means of a single fader is shown. The pick-up is connected across one branch of the fader, the microphone across the other, while the arm of the fader and its center-tap are connected to the pick-up terminals of the receiver.

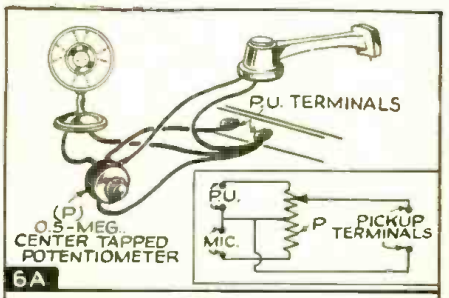
Figure 6B illustrates the use of separate potentiometers to control the volume of the microphone and pick-up. If it is desired to have a musical background for speech, this circuit is considered more desirable, as the faders will afford any desired degree of mixing. This is not obtainable in 6A, for there one unit cuts out completely before the other comes in.

Figure 6C offers a further simplification of the circuit. Both units are "in" all the time, but the proportional output of each is controllable.

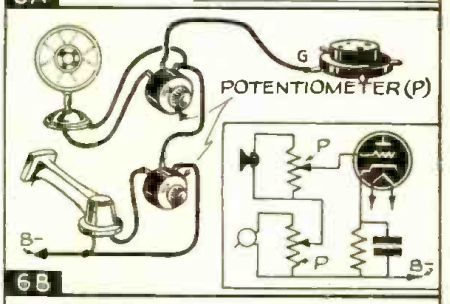
Figure 6D shows the same circuit, but for use with a different type of tube, that in 6C being of the battery-operated type, while that of 6D is the more usual tube employing a heater.

Figure 6E shows the use of a pair of ganged potentiometers used in a circuit similar to that shown in 6A.

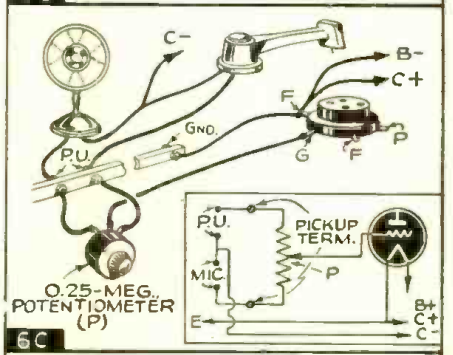
The most simple of all connections is shown in Fig. 6F. This merely consists of connecting the pick-up and microphone in parallel. These must have volume controls.



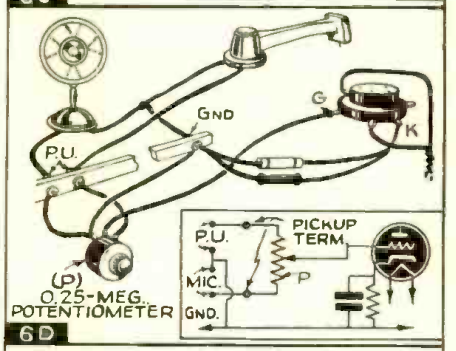
6A



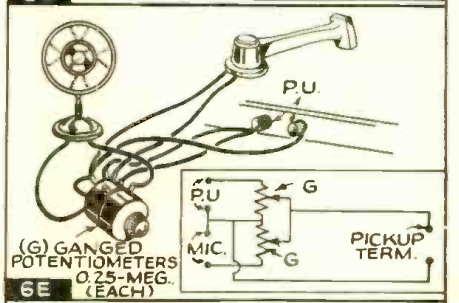
6B



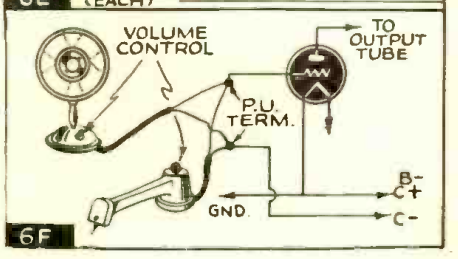
6C



6D



6E



6F

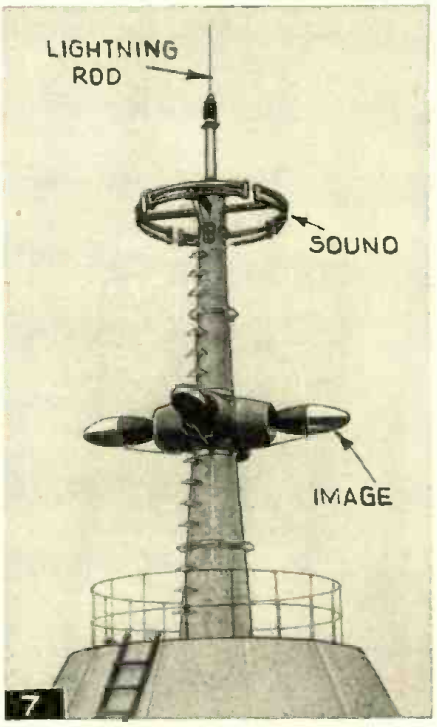
INTERNATIONAL

New Television Aerial

7 A NEW advance in the design of television aerials has been achieved by the engineers of the National Broadcasting Company for the installation on top of New York's Empire State Building from which transmissions are to take place in the early Spring.

One of the problems which has been bothering engineers for several years has been to construct antennas which would handle modulated frequencies high enough to give a relatively flat curve for 441-line definition. The antenna shown in Fig. 7 is said by O. B. Hanson, vice-president in charge of engineering, to have solved the problem.

It will handle 30 million cycles per second without peaking; i.e., it is flat over a 30 mc. band.



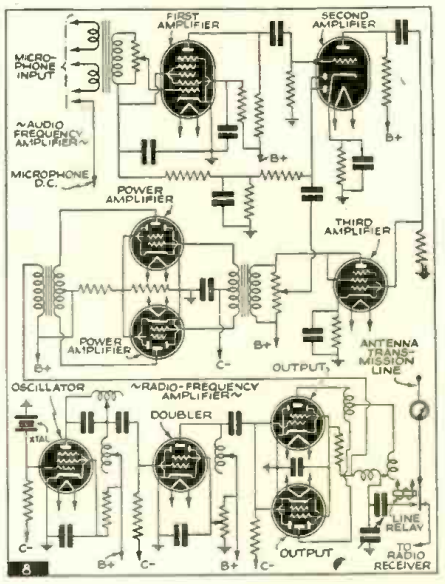
New Communications Transmitter

8 ENGINEERS of the Bell Telephone Company have just made public the design of a new transmitter which delivers 25 watts of carrier power into a co-axial transmission line throughout the frequency band of 30-42 megacycles. Primarily designed for police use, it is adapted to other applications as well. It incorporates a high gain audio amplifier to permit the use of a low-level high-quality dynamic mike. An automatic gain control circuit reduces overmodulation and provides the other usual advantages. A single chassis is used as the foundation for the transmitter and this is divided into three compartments which provide the necessary shielding, and group the apparatus according to its function.

The left-hand compartment contains the power supply; the center compartment, the radio frequency circuits; and the right-hand compartment, the audio frequency equipment. All operating controls are on the front of the chassis and all connections are made through the underside. These may be run through a table top for a neat installation.

The transmission line from the antenna terminates in a junction box directly below the meter.

The audio amplifier has a gain of approximately 100 db. High gain receiver type tubes are used with resistance coupling and a beam power amplifier is in the last stage. This affords sufficient gain to permit the use of a dynamic mike, but a D.C. supply is incorporated so that either a double button or single button carbon mike may be used. Automatic gain control is incorporated in the audio amplifier to reduce the gain when the signal rises to too high a level. A simplified schematic is shown in Fig. 8.



Giant Plug-In Coils

9 AT the short-wave station in Daventry, England, the world's largest plug-in coils are used. So tremendous are these units that they are carried on a miniature railroad, as seen in Fig. 9. The overhanging projection on the assembly comprises the grid tuning circuit and the two large tubular turns constitute the main plate inductance. Between the turns is located the feeder coupling coil.

Four units of this type are used, one for each of the wave bands on which the transmitter normally works. The giant coils are for the final stage of the transmitter, smaller units, mounted on rubber-tired trucks, being used in the earlier stages.

X-Mitter for Frisco Fair

10 THE new 20-kilowatt short-wave transmitter to be installed at the San Francisco 1939 World's Fair, got its final inspection at the G-E, Schenectady, factory before being shipped to the Coast. C. A. Priest, engineer of the company's radio department, and Chester H. Lang, manager of broadcasting, are seen examining one of the inductances, in Fig. 10.

The transmitter will be installed in the Electrical Building at the Fair and will be inaugurated when the exhibit opens in the middle of February. It will operate on the same frequencies as W2XAD and W2XAF, Schenectady, 9530 kilocycles or 31.48 meters, and 15,330 kilocycles or 19.56 meters, and it will share time with them, affording a 24-hour service from the United States to South American and other foreign countries.

German Signal Booster

11 A PRE-AMPLIFIER, to be plugged in ahead of any radio receiver, has been described in a German radio magazine.

The unit is extremely compact, as is seen in Fig. 11B, where it will also be noticed that connections are made to a wafer adapter, so that its output may be plugged into the first stage of the radio receiver. Figure 11A shows the circuit diagram. The filter is merely a trimmer-tuned band-pass filter. The values of the inductances and capacitors depend upon the band or bands to be covered. All other values are indicated in the diagram.

In selecting a choke, the experimenter should use either one with a powdered iron core or with an air core. The rest of the circuit is sufficiently simple to need no further explanation.

The apparatus may be easily and cheaply constructed and will afford fair gain.

Line of Mercury Switches

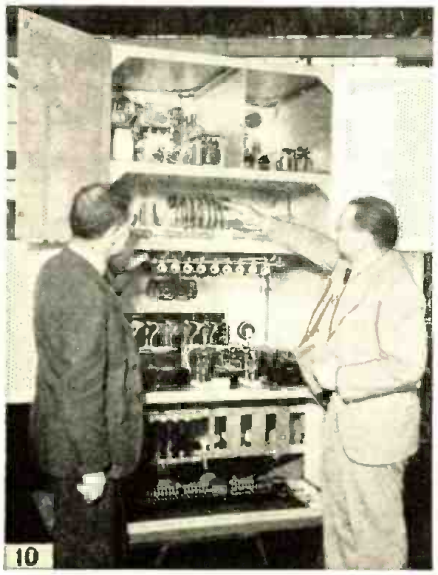
12 OVER in France, according to *Documentez-Vous,* they make mercury switches virtually for any purpose that mechanical switches may serve.

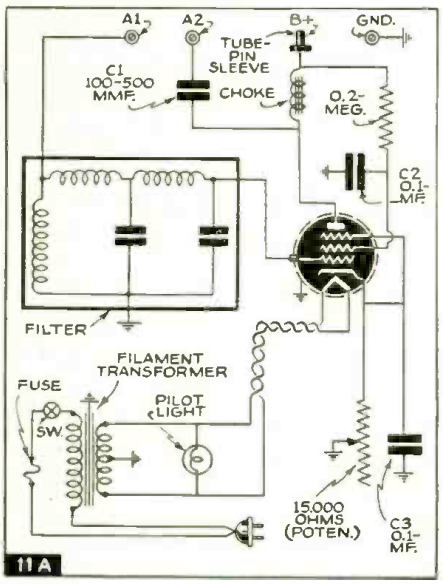
In Fig. 12A, the simplest form of switch —a mere make-and-break—is seen. Tipping the glass shell of the switch (1) in one direction causes the mercury (4) to close the contacts (2 and 3). Tipping the switch in the other direction opens the circuit.

Figure 12B shows a slightly more complex one, in which single-pole, double-throw action is achieved, one circuit opening before the other is completed. This switch is likewise operated by simple tilting.

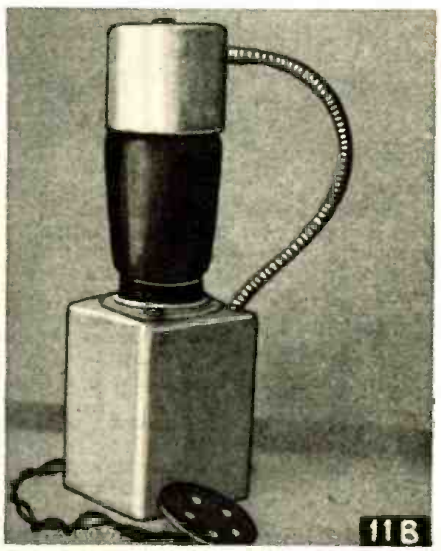
Figure 12C shows a modification of this switch. It is also single-pole, double-throw, but in this case, one circuit is made before the other is broken. It, too, is operated merely by tilting.

RADIO REVIEW


10



11A


11B

A delayed action switch appears in Fig. 12D. In this switch, contact is instantly made with the unit turned to one position, the mercury flowing to the point indicated by the number 1. As the switch is returned to a normal position, the mercury flows slowly through the narrow neck (2), breaking the contact above, after a certain amount of time has elapsed. This permits a cellar light to be turned on, for example, and to turn off automatically after the passage of a few seconds or minutes, depending upon the size of the aperture of the tube.

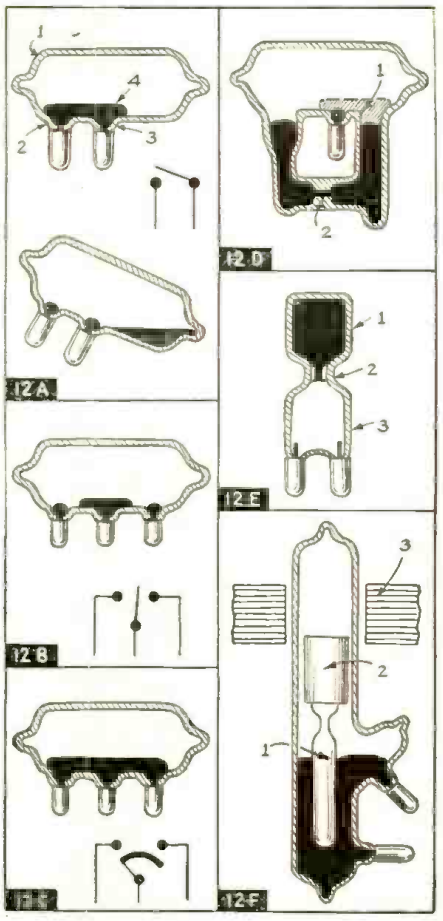
The reverse of this action is seen in the model shown in Fig. 12E. In this case, contact is made slowly as the mercury in chamber 1 flows through the neck (2) into chamber 3. Reversing the position of the switch immediately breaks the contact, after which the mercury flows back into chamber 1 and is ready for another re-setting.

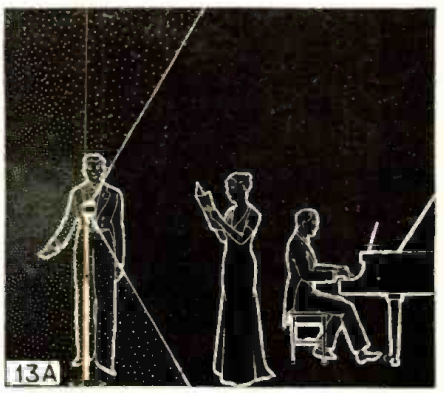
A remote control switch which is practically a mercury-contact relay, is seen in Fig. 12F. When the solenoid winding (3) is energized by the passage of a current from an external source, it attracts the armature (2). This raises the plunger (1) from the mercury, permitting the mercury to fall away from the upper contact. The switch is closed by removing the current from the solenoid.

Various other applications and modifications of these mercury switches have been produced.

Not shown are the mercury relays which close a circuit when the solenoid is energized, and a series of multipolar switches, not unlike the double-throw switches seen in Figs. 12B and 12C.

Double-pole single throw, double-pole double-throw, triple-pole double-throw, and other forms of the more complicated switches are readily assembled by ganging two or more of the simpler types.



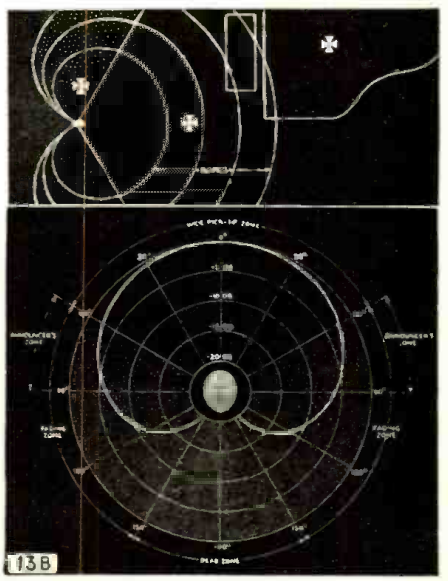

13A

Cardioid Directional Mike

13 DIRECTIONAL properties equally good for lowest bass and highest overtones mark the new "cardioid directional" mike which has just been announced by the Western Electric Co.

The new instrument achieves this by avoiding room reflections, as it gives more prominence to direct sounds and less to reflected ones. The zone at the rear of the microphone is virtually dead, so that it may be placed next to a reflecting surface without harm, or it may have a reasonably noisy audience behind it. Its performance is obtained by combining the outputs of a non-directional pressure unit (i.e., the internal mechanism of the well-known "Eight-ball" mike) with a bi-directional ribbon unit of new design.

Since in the new instrument the pressure and pressure-gradient elements are separated mechanically, the selection of either unit individually, instead of the combination, is made possible by means of a simple switch.


13B

What Do You Think?

Who Said: "SWL PUNKS"!

Editor,

I have been reading many interesting letters from different people in RADIO & TELEVISION. I have something on my chest and I would like to get it off.

I have read a great deal about the amateur radio operator and his work. I happen to know a lot of them and I believe they are all a swell bunch of fellows and have helped radio tremendously.

But the point that I would like to bring out is about our fellow SWL's. Being an SWL (Short Wave Listener) myself, I found out that they are a swell bunch of fellows, too, and should get some credit for the improvement of radio.

Some day we will get our diplomas, and will be working right alongside you Hams. This is a fact, because I know that all my SWL friends are studying hard to get their tickets (Ham licenses).

Our SWL hobby is a very interesting one, too—that is, if you put forth every effort to make it interesting. We have friends from all over the world—at least I know that I have. We get in contact with each other through the mails. But the subject still remains *Radio*. We listen to our big brother Hams "chewing the rag," and it makes us feel as though we were doing the jobs ourselves. Most of all, listening to them teaches us the trade and we can learn just how they handle the traffic.

We stay up until the early hours of the morning listening to DX. We try hard to get all the *foreign* countries into our log books. Then, on our SWL cards, we send reports to all the stations that we heard. Of course, this costs money, and a lot of Hams answer our SWL cards. But *others do not*—and I would like to know why they are in this game of *Radio?*

A lot of the Hams won't give us a break. They look upon us as a lot of *punks!* But they should remember that once they started from the bottom! Anyway, nothing disheartens us. We keep on going in this great field that we love so much. We must love *Radio* or we wouldn't stick to it so close, and some of us spend our last penny on it. So we all march on to our goal, and we know that some day we too will succeed in this interesting subject. If we fail—well, it surely was a great lot of fun anyway.

I first started DXing on a lot of little SW sets that I built myself, and I had some good results on them, too. Then I got an 18-tube Midwest receiver which covers from 19 to 160 meters, and I also built myself a 5-tube receiver to cover 10, 5 and 2½ meters. So now I can enjoy every band that is on the air.

So give us a break, fellows, and we will *all* thank you a lot. I would like to hear from all of you, and I promise to answer all your letters.

I also wish to thank this magazine for all the splendid information that it has given me.

Again, Mr. Editor, I do hope you will help me get this load off my chest and pass the information on to other fellows.

AUSTIN WARDMAN,
832 Linden Avenue,
East Pittsburgh, Pa.

Member:
Short-Wave League,
Radio News O. L. P. O.,
Universal All-Wave League.

That Television Question!

Editor,

I have just finished reading your very "F.B." August issue of your famous magazine and every page is full of information. It is the finest magazine of its kind that I know of and it is much better than most of our British publications.

I like to read about your articles on *television* and in the July issue Mr. Charles A. Picke says that there would be no immediate future for it, because of the high cost of a television receiver. Here I am inclined to differ, because, it is generally accepted that America produces cheaper sets than England and here in England we can get a Television set with an all-wave receiver combined for as low as $140.00; the very best, that is, the last word in receivers, cost $625.00. Vision signals have been picked up at the Ferranti works at Manchester, 200 miles from London, and the B.B.C. are already considering plans for a new Television transmitter in Birmingham and other places.

In Mr. McNicol's article—"Television, How Soon?" he hints that television will have to perform wonders to become popular, but here in England it will be a commonplace thing in a few years time; in fact it is already a great success in the London area.

In conclusion, allow me to congratulate you on your fine magazine. I would also like to correspond or exchange cards with anyone. By the way, Mr. Fiege, I know quite a few hams over here who have S.W.L. cards on their walls and who welcome S.W.L. reports but, of course, there are a lot who don't care to verify. I will now QRT, wishing RADIO & TELEVISION the best of luck.

B. CARTWELL,
Market Place, Garstang,
nr. Polston, Lancashire, England.

Likes "Radio Beginner"

Editor,

I have been an enthusiastic reader of S. W. & T. (now R. & T.) for several years and am very proud to be a member

Elvyn L. Barker, on his Hallicrafter, verified all continents 4 times. He wins this month's prize for best Listening Post photo—1 yr.'s subscription to R. & T.

of the *Short Wave League* and one of Mr. Fuller's *Listening Post Observers.*

I find your articles very interesting as well as extremely helpful. Your antenna article by W8JK (John Kraus) in the December issue is just what I have wished for for a long time. I also find your new series, *The Radio Beginner*, of much value

(Continued on page 618)

S-W Broadcast Should Be Coded

Editor,

Why don't the radio stations soliciting reports give an identifying group of letters or figures with each station identification? Example: "Columbia's International Shortwave Station, W2XE, New York, U.S.A. Will persons wishing verification cards please mention 'code 197' in their reports for today?"

This code number will supplant the usual long winded "Remarks" and will save the broadcasters time in checking the received SWL cards against the log. The code group will, of course, be changed every day. With a 3 figure group it would take 999 [(10^3)—1] cards to the station if you want to get a veri without hearing the station—unless you've got E.S.P. By the way, I'd like to correspond with persons interested in Extra Sensory Perception (mental telepathy). I've got a sure-fire system that works 9 in 10 times.

J. S. JACKSON, JR.
Smallhouse Pike, Box 76,
Bowling Green, Ky.

He Likes "Television" Articles

Editor,

I wish to say your television articles are very interesting to me. Having spent several years as a cameraman in the Far East on news and travel pictures for an American News Reel Co., over 90% of our negative was recorded with original or natural sound on location. The *television* articles keep me in touch with what is new and it is real service for this new field of pictures.

Your "Barter & Exchange" department is a wonderful service and help to "radio addicts"; I hope you will be amply repaid for the work entailed in conducting it.

W. J. MCINNIS,
30 East Laguna,
Tucson, Arizona.

LATEST INTER-PLANET NEWS

The Martian Flash

MARS-EARTH SPACE TRANSMISSION: CLEAR

No. 1 FEBRUARY, 1939 Price: None

The Martian Flash

An Inter-Stellar Magazine for all Radio Enthusiasts.

Published:—When Interplanetary Conditions Permit.
Interplanetarian Pub. Co., (Very) Ltd.

Fips—Editor

Subscription Price for All Planets—Priceless.

The Editor accepts no contributions of any kind, neither cash nor literary. This entire publication is read at your own risk. The Editor is not responsible for either the contents or anything that goes with it.

Martian Office—
698743209 K K K 9 Street,
Martolus, Mars.

Fips, the Office Boy—after a long absence, hails the earth from the planet Mars.

February, 1939

EDITORIAL

WELL, boys, here we are back on the job once more, after 25 years of absence. Do I hear cries of "Who wants you back, anyway?" Just a minute and you will probably change your mind. If not, see if I care, and if you don't want to read this I should worry, the loss will be entirely yours.

At any event, 25 years ago the Boss built me a Grade A, No. 1 space flyer. As you may well imagine, because I was forced to risk my life and body, to say nothing of my soul, there was no publicity about it.

Unfortunately the space flyer did not prove as navigable as we had hoped. To make a long story diminutive, you may take my word for it that for 25 years I roamed the ether between Earth and Mars but that is quite another story that will have to be told at some other time. It is so fantastic and the adventures are so unbelievable that now I almost doubt the entire thing myself.

My adventures were so hair-raising that I had to have a haircut every other day and if you don't believe that one, I can show you actual photographs taken from day to day and motion pictures which show how fast the hair actually grew.

But, I am back on the job and I am here to do the reporting to you as of old. The main thing is to get started and shoot the news so you will get it quickly.

I have perfected a means whereby, by short-wave transmission the entire issue of the *Martian Flash* is now radioed to Earth once a month. I am not using dots and dashes or just plain phone talk but the entire process is sent by the newly perfected *Radio - Recordo - Electrano-Spaco-Transformo*. By means of this instrument the entire publication is transmitted in a few minutes and received at the publication offices of RADIO & TELEVISION on a single sheet of copper. No revolving drums, no scanners and no Earth-like hocus-pocus is used. I will describe the details of how it is all done in another issue.

So much for the set-up and cutting the Editorial short, I will see you next month with more news.

MARS DISCLOSES RADIO ADVANCES

By *Ulysses Mohammed Fips*
* * Star Reporter * *

It seems futile to try and teach you children on Earth in one breath what is really going on on this beautiful planet. Anyway you would not believe it and it I went into details you probably could not grasp it because you are too far behind in your technical development.

4,500,000 years ago, on Mars, we had radio facsimile news printed on wafer-thin breakfast food!

So, I will have to use Martian kindergarten talk in order that you will know what it is all about and if sometimes it is a way over your heads, then that again shows your own limitations.

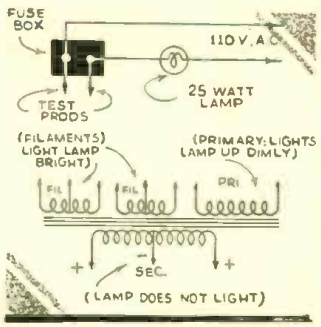
Suppose you wanted to try and explain modern radio to Caesar, or to Cleopatra for that matter, or to both of them. They probably would have had you quartered and stewed in oil in no time. At best they would have thought you were slightly loco, or worse. So with me—(not that I am loco)—I mean that I am so far ahead of you that you will probably think I am slightly off-balance. The Editors of your magazine were good enough to send me some dispatches in order to put me wise to the

A Martian "Scent Virtuoso" playing on the "smell organ." The radio odors are received by the antenna over a nose-clip placed on the nose.

"marvelous" (?) progress which you have made in 25 years. You don't mind if I have a good laugh, do you? Know then that your so-called "advances" are pretty infantile. For instance, I note that you are now experimenting with sending out radio facsimiles, so that the man who owns a radio set can pull a newspaper out of it, freshly printed with all the news, in the morning. We had this on Mars over 4,500,000 years ago and have forgotten all about it. Before they discarded it they printed the news on very thin wafer-like breakfast food, so after you finished reading the news you could eat it! The ink, of course, was such that it gave the breakfast food a good flavor. But that is ancient stuff.

Today Martians have advanced so far that most of these things belong to a by-gone age. When news is transmitted, it is done by a sort of Electronic-Radio-Bombardment, which covers the entire planet in such a manner that the news is immediately received directly by the

(Continued on page 639)

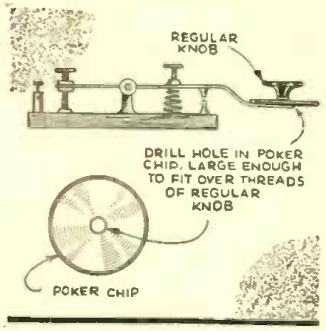


Transformer Analyzer

When one has a power transformer with numerous windings, the leads of which come out of a casing and cannot be visually traced, it is often hard to know which is the filament section, which the primary, and which the secondary. The simple little gadget shown in the accompanying diagram solves the problem. A 25-watt lamp lights quite brightly when put across the filament winding; dimly when across the primary winding; and very dimly or not at all when across the high voltage secondary.—*Jack Wakefield, Jr.*

Navy Type Key

Navy type keys are more pleasant to use than cheap standard keys, and there is little work and no expense in transforming the latter to the former. It is necessary only to unscrew the knob from the standard key. A poker chip (or bakelite disc) is secured and a hole drilled in its center. The key knob is then remounted with the poker chip between it and the metal part of the key. The chip should be somewhat larger than the regular knob and its hole should be large enough to pass the threads of the bolt.—*Geo. Nettifer.*



Radio Kinks

Each month the Editor will award a 2 year subscription for the best kink submitted. All other kinks published will be awarded eight months' subscription to RADIO & 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.

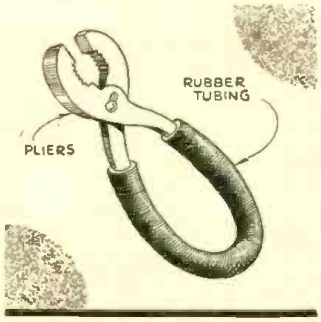
Personalized QSL Cards *(First Prize)*

An extremely distinctive QSL card may be had by impressing one's thumbprint—the most individual signature in the world. This may be embossed and may be of any color which one desires. All that is necessary is

a little mucilage and a bottle of your favorite ink. Mix a small amount of the mucilage and ink; spread a thin coat on your thumb and then make an imprint on your QSL or SWL card. An easy way to ink the thumb evenly is to place a drop of the mixture on a piece of cardboard and press the thumb on that.—*Fred A. Mason.*

Insulated Spring Pliers

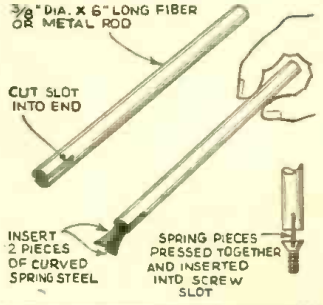
A piece of rubber hose or tubing slipped over the handle of a pair of pliers, as shown in the accompanying drawing, not only serves to insulate the user against electric shocks, but to keep the plier's jaws open. This is very convenient when work-



ing around live wires and also when a number of small parts must be picked up in rapid succession, or when the pliers must be opened and closed frequently, as when screwing a nut tight in a cramped space.—*David Lloyd.*

Hold-Tight Screw-Driver

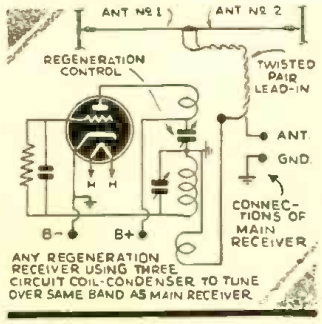
When putting screws into inaccessible parts of a receiver, there is often considerable difficulty in getting them into place and driving them home. I have



often seen suggestions for magnetized screw-drivers, but as the screws used in radio work are usually brass, magnetic screw-drivers do not always work. Therefore, I take a piece of metal or fiber rod and slot the end about ¼" deep. Into this rod I press two pieces of steel, cut from an old clock spring. These pieces are about ¼" wide and about ¾" long. They are turned so that the leaves bend outward when at rest. When they are squeezed together and put into the slot of a small screw they grip it tightly, so that it may be put into position with great ease. They are also sufficiently rigid to serve as a screw-driver. If difficulty is had making the pieces of steel remain in the slot, the assembly may be drilled and a pin put through.—*Edward Albecki.*

Tuned Reflector

The circuit shown in the accompanying diagram, when tested with a receiver using a "Magic-Eye" tuning indicator, brought even the weaker signals up to the full capacity of the re-

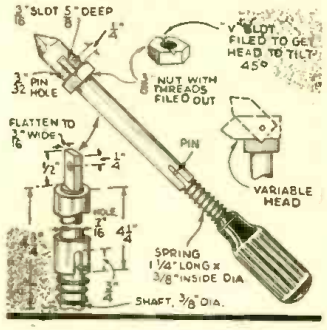


ceiver. It not only increases volume, but sharpens tuning as well. The regenerative receiver should be tuned to the frequency of the desired station and its regeneration control advanced to a point just below oscillation. Even with the power cut off from the regenerative receiver, the improvement in signal strength and sharpness is remarkably noticeable.

I do not know whether the effect is secured by tuning the antenna circuit of the main receiver because of the close coupling between the lead-ins of the main receiver and the regenerative receiver, or whether the antenna circuit of the regenerative receiver acts as a reflector for the antenna circuit of the main receiver. Anyhow, it is worth experimenting with. —*Bernard H. Masters.*

Swivel Head Iron

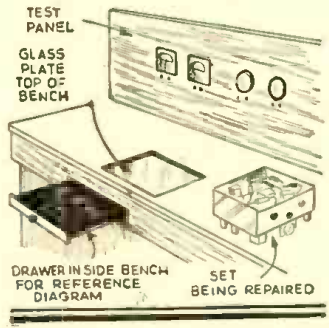
Almost any soldering iron of the type designed to be heated over an open flame can be made into one with a swivel head, suitable for getting into all sorts of tight places and behind tangled wires. As you will see, the head is removed from the



iron and the end of the shaft flattened and drilled to take a small metal pin. A spring is slipped over the shaft, then a piece of metal tubing over that, and finally a nut in which a V slot has been filed. The head is then pivoted to the end of the shaft. As the illustration shows, it may be turned to a number of convenient angles. — *Thomas Horridge.*

Keeping Diagrams Handy

I have devised a unique way to keep the diagram of a set undergoing repair where it can be seen at all times and where it can be referred to readily. The



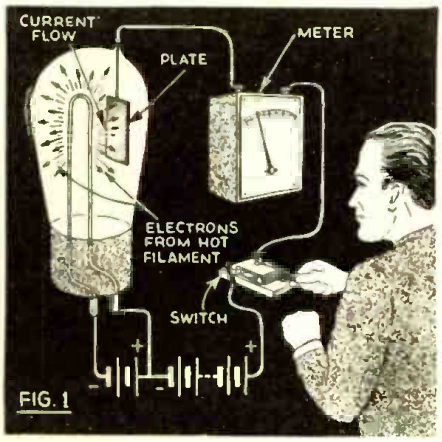
bench is usually littered with tools, solder, etc., and the large service manual would be in the way. Therefore, I have cut a slot in the front of my bench about ½" below the top. Instead of a drawer, I put in here two sheets

(Continued on page 633)

The Radio Beginner—Lesson 4

The Vacuum Tube—
How It Works

Martin Clifford, W2CDV



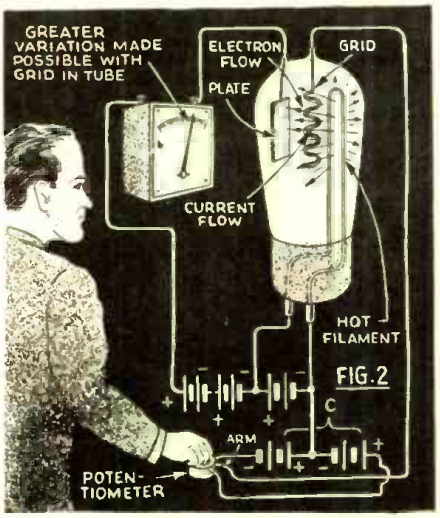
The Edison effect—when the filament is heated, a current passes between it and the cold plate, the electron flow now being considered also the current flow (i.e., passing from fil. to plate).

● THE modern vacuum tube may truly be considered one of the most important pieces of apparatus in radio receiving or transmitting sets, for without this extremely useful invention, radio, as we know it today, could not exist. Therefore, every student of radio must become thoroughly acquainted with the theory and operation of radio tubes, since a complete understanding is absolutely essential for a good working knowledge of the subject. If the radio tube is considered the heart of radio, then like that important organ, its fundamental operations are simple and easy to understand. Actually the theory and function of a radio tube may be completely grasped without any prior knowledge of mathematics or physics, although, of course, these sciences are required for a more advanced study.

The "Edison Effect"

To many of us the radio tube resembles the usual electric light bulb that we use in our homes. There is more than merely a resemblance, however, since the electric light bulb is the direct ancestor of the radio vacuum tube. When back in 1883 Thomas Edison was busy experimenting with his recent invention of the electric lamp he noticed that if he fitted a tiny metal plate inside of one of his lamps and then connected it outside the bulb, through a battery, to one side of the filament, that a slight current was obtained. This phenomenon was called "the Edison effect" but Edison could not explain it, nor did he use it in any way. Had Edison but known it he had in his grasp the basic idea for revolutionizing the transmission of the human voice. Let us see then just what happened during that famous experiment.

First, he took an ordinary electric light bulb. If this bulb is placed in a light socket, the bulb will light up. The reason for this is simple. There is a loop of wire in the bulb which we call the *filament*. If we pass a current of electricity through this filament, the current will meet with resistance. This resistance will manifest itself in the form of both light and heat. Edison knew that if he sent a current of electricity through a wire, the wire would get hot, and finally would glow. It was this knowledge that led him to the invention of the electric light bulb. What he did not know, was that the hot filament gave off not only light and heat, but small "particles of electricity" known as *electrons*.



Adding the grid to a vacuum tube provides an improved effect not obtainable with the ordinary 2-electrode tube.

Let us now consider what Edison did next. He took a small, flat piece of metal which we today call a *plate*, and placed it close to the filament. He then made the connections as shown in Fig. 1. Edison then noted that when he closed the switch, the current indicator would show that there was a current flowing in the circuit. Actually this was surprising because there was no physical connection between the filament and the plate on the inside of the electric light bulb. What happened was this: As soon as the filament became hot, it gave off electrons (which we know are negative). These electrons were then attracted over to the plate which had been made positive by the battery. As long as the filament was kept hot, the negative electrons were given off and attracted over to the positive plate, for the plate was connected to the positive side of the battery.

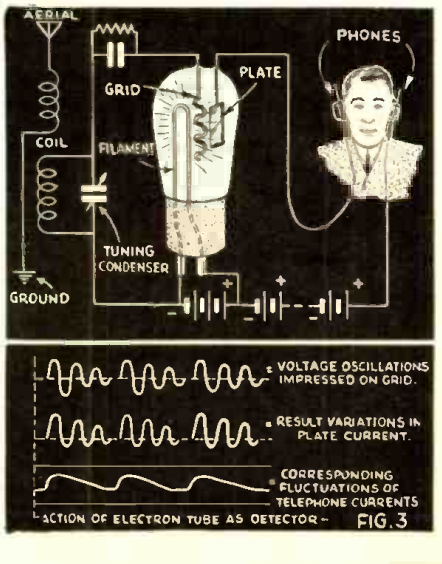
However, this particular arrangement had one slight fault. The flow of electrons from the filament to the plate could not be thoroughly controlled. The situation was similar to an automobile without a steering wheel, or perhaps a radio without a volume control.

De Forest Invents the "Grid"

It was while experimenting with flows of electrons in flames and hot gases that de Forest discovered he could control the strength of flow of these electrons by placing a charged wire mesh in their path. De Forest applied this principle to the vacuum tube and inserted a wire between the filament and plate, right in the path of the stream of electrons. Now we know that like charges of electricity repel each other and that unlike charges attract. The vacuum tube with the additional wire (grid) put in by de Forest is shown in Fig. 2. This additional wire we call a *grid*. Now let us light our tube and start the electrons flowing from the filament to the plate. In their path is now the bit of wire called the grid. If we make the grid positive (and we can very easily do so by the simple expedient of connecting a battery in the proper place in the circuit) we can pull a great many electrons away from the filament. However, we want to get our electrons to the plate, so we make our grid of wire mesh (with plenty of air spaces). The electrons now leave the filament and, pulled by the

(Continued on page 629)

The 3-electrode tube "put to work" in a radio receiving circuit, where it serves both as a rectifier and an amplifier.



World Short Wave Stations

Revised Monthly

Complete List of SW Broadcast Stations

Reports on station changes are appreciated.

Mc.	Call	
31.600	W1XKA	BOSTON, MASS., 9.494 m., Addr. Westinghouse Co. Daily 6 am.-1 am., Sun. 8 am.-1 am. Relays W8Z.
31.600	W1XKB	SPRINGFIELD, MASS., 9.494 m., Addr. Westinghouse Co. Daily 6 am.-1 am., Sun. 8 am.-1 am. Relays W8Z.
31.600	W3XEY	BALTIMORE, MD., 9.494 m., Relays WF8R 4 pm-12 m.
31.600	W2XDV	NEW YORK CITY, 9.494 m., Addr. Col. Broad. System, 485 Madison Ave. Daily 6-11 pm.; Sat. and Sun. 1.30-6, 7-10 pm.
31.600	W9XHW	MINNEAPOLIS, MINN., 9.494 m. Relays WCCO 9 am.-12 m.
31.600	W3XKA	PHILADELPHIA, PA., 9.494 m., Addr. NBC. Relays KYW 9 am.-10 pm.
31.600	W5XAU	OKLAHOMA CITY, 9.494 m., Sun. 12 n-1 pm., 6-7 pm. Irregular other times.
31.600	W4XCA	MEMPHIS, TENN., 9.494 m. Addr. Memphis Commercial Appeal. Relays WMC.
31.600	W8XAI	ROCHESTER, N. Y., 9.494 m., Addr. Stromberg Carlson Co. Relays WHAM 7.30-12.05 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.
31.600	W9XPD	ST. LOUIS, MO., 9.494 m., Addr. Pulitzer Pub. Co. Relays KSD.
26.450	W9XA	KANSAS CITY, MO., 11.33 m., Addr. Commercial Radio Eqpt. Co. Testing
26.400	W9XAZ	MILWAUKEE, WIS., 11.36 m., Addr. The Journal Co. Relays WTMJ from 1 pm.
26.300	W2XJI	NEW YORK, N. Y., 11.4 m., Addr. Bamberger Broad. Service, 1440 Broadway. Relays WOR 12 n.-6 pm.
26.100	W9XJL	SUPERIOR, WIS., 11.49 m. Relays WEBC daily.
26.050	W9XTC	MINNEAPOLIS, MINN., 11.51 m. Relays WCTN 9 am.-1 pm., 7 pm.-12 m.
25.950	W6XKG	LOS ANGELES, CAL., 11.56 m., Addr. B. S. McGlashan. Wash. Blvd. at Oak St. Relays KGFJ 24 hours daily.
25.950	W9XUP	ST. PAUL, MINNESOTA. 11.56 m. Relays KSTP evenings.
21.570	W2XE	NEW YORK CITY, 13.91 m. (Addr. CBS, 485 Madison Ave., N. Y. C. Daily 7.30-10 am. Sat., Sun. 8 am.-1 pm.
21.565	DJJ	BERLIN, GERMANY, 13.92 m., Addr. Broadcasting House, 6-7.50 am.
21.550	GST	DAVENTRY, ENG., 13.92 m., Addr. (B.B.C., London) Irregular at present.
21.540	W8XK	PITTSBURGH, PA., 13.93 m., Addr. Grant Bldg. Relays KDKA 6.45-9 am. Also Sunday. 6 pm.
21.530	GSJ	DAVENTRY, ENG., 13.93 m., Addr. (See 21.550 mc.) 5.45-8.50 am.
21.520	W3XAU	PHILA., PA., 13.94 m., Addr. Col. Broad. Syst., 485 Madison Ave. 1-2.30 pm.
21.500	W2XAD	SCHENECTADY, N. Y., 13.95 m., General Electric Co., 8 am.-12 n.
21.470	GSH	DAVENTRY, ENG., 13.97 m. (See 21.550 mc.), 5.45 am.-12 n.
21.450	DJS	BERLIN, GERMANY, 13.99 m., Addr., Broadcasting House. 12.05-5.30 am.
19.020	HS6PJ	BANGKOK, SIAM, 15.77 m. Mondays 8-10 am. See 15.23 mc.
18.480	H8H	GENEVA, SWITZERLAND, 16.23 m., Addr. Radio Nations. Sun., 10.45-11.30 am.

16 Met. Broadcast Band

Mc.	Call	
17.820	—	ROME, ITALY. 16.84 m., Addr. (See 2RO, 11.81 mc.) Relays 2RO to 6 pm. irregularly.
17.810	TPB3	PARIS, FRANCE, 16.84 m. Addr. (See 15.245 mc.) 9.30-11 am.
17.800	TGWA	GUATEMALA CITY, GUAT., 16.84 m., Addr. Ministre De Fomento. Irregular.
17.790	GSG	DAVENTRY, ENG., 16.86 m., Addr. B.B.C., London. 5.45 am.-10.15 am., 12.20-4 pm.
17.785	JZL	TOKYO, JAPAN, 16.87 m. 8-8.30 pm.
17.780	W3XL	BOUND BROOK, N. J., 16.87 m., Addr. Natl. Broad. Co., 9 am.-5 pm. to Europe, 5-11 pm. to So. Amer.
17.770	PHI2	HUIZEN, HOLLAND, 16.88 m., Addr. (See PHI, 11.730 mc.) Daily 7.25-8.25 am. Tues. and Thurs., 7.25-8.40 am., Sun. 6.25-9.40 am.
17.760	DJE	BERLIN, GERMANY, 16.89 m., Addr. Broadcasting House. 12.05-5.50, 6-7.50 am.
17.755	Z8W5	HONGKONG, CHINA, 16.9 m., Addr. P.O. Box 200. Dly. 11.30 pm.-1.15 am., 5-10 am., Sun. 9 pm. (Sat.)-1.30 am., 5-9.30 am. Operates irreg.

End of Broadcast Band

17.310	W2XGB	HICKSVILLE, L. I., N. Y., 17.33 m., Addr. Press Wireless, Box 296. Tests 9.30-11.30 am. except Sat. and Sun.
17.280	FZE8	DJIBOUTI, FRENCH SOMALILAND, 17.36 m. Test XMSN 1st Thurs. each month 8-8.30 am. Next B.C. Feb. 2.
15.550	CO9XX	TUINICU, ORIENTE, CUBA, 19.29 m., Addr. Frank Jones, Central Tuinicu, Tuinicu, Santa Clara. Broadcasts irregularly evenings.
15.510	XOZ	CHENGTU, CHINA, 19.34 m. Daily 9.45-10.30 am.
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.
15.360	—	BERNE, SWITZERLAND. 19.53 m. Irreg. 6.45-7.45 pm.

19 Met. Broadcast Band

15.340	DJR	BERLIN, GERMANY, 19.56 m., Addr. Br'dcast'g House, 12.05-11 am.
15.330	W2XAD	SCHENECTADY, N. Y., 19.56 m., Addr. General Electric Co. Relays WGY, 12.15-7 pm.
15.320	OLR5B	PRAGUE, CZECHOSLOVAKIA. 19.58 m. Addr. (See 11.840 mc.) Sun., Wed., Sat. 5-5.10 pm.; Mon., Tues., Thurs., Fri. 6.55-9.55 pm.
15.310	GSP	DAVENTRY, ENG., 19.6 m., Addr. (See 17.79 mc.) 3-5.15 am., 1.45-4 pm.
15.300	YDB	SOERABAJA, JAVA, N. E. I. 19.61 m. Addr. NIROM. 7.30 pm.-2 am.
15.300	XEBM	MAZATLAN, SIN., MEX., 19.61 m., Addr. Box 78. "El Pregonero del Pacifico." Irregularly 9-10 am., 1-2, 8-10 pm.
15.300	2RO5	ROME, ITALY. 19.61 m., Addr. (See 2RO, 11.81 mc.) 11:15 am.-12.15, 2-4 pm.
15.290	LRU	BUENOS AIRES, ARG., 19.62 m., Addr. El Mundo. Relays LRI, 7-9 am.

Mc.	Call	
15.280	DJQ	BERLIN, GERMANY, 19.63 m., Addr. Broadcasting House. 12.05-11 am., 4.50-10.50 pm. Also Sun. 11.10 am.-12.25 pm.
15.270	HI3X	CIUDAD TRUJILLO, D. R., 19.65 m. Relays HIX Sun. 7.40-10.40 am. Tues. and Fri. 8.10-10.10 pm.
15.270	W3XAU	PHILA., PA., 19.65 m. (Addr. See 21.52 mc.) 3-7 pm.
15.270	W2XE	NEW YORK CITY, 19.65 m., Addr. (See 21.570 mc.) 1-3 pm. Sat. & Sun 1.30-2.30 pm.
15.260	GSI	DAVENTRY, ENG., 19.66 m., Addr. (See 17.79 mc.) 3-5.15 am., 12.20-1.30 pm.
15.250	W1XAL	BOSTON, MASS., 19.67 m., Addr. University Club. Tues., Thurs. 4.30-6.30 pm.
15.245	TPA2	PARIS, FRANCE, 19.68 m., Addr. 98 Bis. Blvd. Haussmann. "Paris Mondial" 6-11 am.
15.230	HS6PJ	BANGKOK, SIAM, 19.7 m. Irregularly Mon. 8-10 am.
15.230	OLR5A	PRAGUE, CZECHOSLOVAKIA, 19.7 m. Addr. (See OLR4A, 11.84) Mon.-Fri. 7.50-10.55 pm. Sat., and Sun. 5-5.15 pm., Sun. 5.55-8.55 pm., Tues. 4.40-5.15 pm.
15.220	PCJ2	HUIZEN, HOLLAND, 19.71 m., Addr. N. V. Philips' Radio Hilversum. Tues. 2-3.30 am., Wed. 9.30-11.30 am.
15.210	W8XK	PITTSBURGH, PA., 19.72 m., Addr. (See 21.540 mc.) 9 am.-1 pm.
15.200	DJB	BERLIN, GERMANY, 19.74 m., Addr. (See 15.280 mc.) 8-9 am., 4.50-10.50 pm. Also Sun. 11.10 am.-12.25 pm.
15.195	TAQ	ANKARA, TURKEY, 19.74 m., 5.30-7 am., 9.30-11 am., Relays 2RO irregularly Afts.
15.190	—	ROME, ITALY. 19.75 m. Relays 2RO till 6 pm., irreg.
15.190	OFO	LAHTI, FINLAND. 19.75 m. Addr. (See OFO, 9.5 mc.) 1-3 am., 9 am.-n., 12.15-5 pm. Irreg.
15.190	ZBW4	HONGKONG, CHINA, 19.75 m., Addr. P. O. Box 200. Irregular. 11.30 pm. to 1.15 am., 3-10 am.
15.180	GSO	DAVENTRY, ENG., 19.76 m., Addr. (See 17.79 mc.) 4.15-6, 6.20-8.30 p.m., 3-5.15 am.
15.175	RW96	MOSCOW, U.S.S.R., 19.76 m. Mon., Tues., Fri., Sat. 2.30-3.30 pm. Daily 3-4 am. Mon., Wed., Thurs. 7-9.15 pm.
15.170	TGWA	GUATEMALA CITY, GUAT., 19.77 m., Addr. (See 17.8 mc.) Daily 12.15-1.45 pm.; Sun. 12.45-5.15 pm.
15.165	OZH	SKAMLEBAK, DENMARK, 19.78 m., Sun. 8 am.-1.30 pm.
15.160	XEWW	MEXICO CITY, MEXICO, 19.79 m., 12 n.-12 m., irregular.
15.160	JZK	TOKYO, JAPAN, 19.79 m. 12.30-1.30 am., 2.30-4, 4.30-5.30, 8-8.30 pm.
15.160	VUD3	DELHI, INDIA, 19.79 m., Addr. All India Radio. 1.30-3.30 am., 9.30-11.30 pm.
15.155	SM5SX	STOCKHOLM, SWEDEN, 19.79 m., Daily 11 am.-5 pm., Sun. 9 am.-5 pm.
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 4.30-10.30 am.
15.140	GSF	DAVENTRY, ENG., 19.82 m., Addr. (See 17.79 mc.) 3-5.15 am., 5.45 am.-12 n.
15.130	TPB6	PARIS, FRANCE. 19.83 m., Addr. "Paris Mondial," 98 Bis Blvd. Haussmann, 7-9.15 pm.

(Continued on page 600)

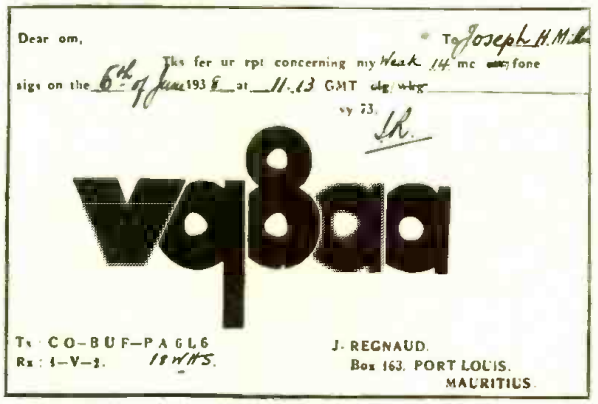
All Schedules Eastern Standard Time

Let's Listen In with

Joe Miller

VQ8AA. The shack of this far-off station has a simple but effective lay-out.

VQ8AA—Mauritius. This catch, off the east coast of Madagascar, QSL's with a neat card, blue on white.



● ON the East Coast, DX conditions have been only fair, and little new has been heard, outside of the ever reliable Hams, and even the Ham bands offered nothing much in new "game," but we hope January will start the New Year right by offering some new interests in the way of DX.

We reiterate that reports on all DX are welcomed here, and appreciated, whether published or not. We would like to hear from some more OM's on their DX results, all letters to reach us by the 5th of each month.

The VAC certificate is proving quite popular with numbers of our DXing readers, and entries have been approved from as far distant as New Zealand and Portugal. All should strive to obtain these handsome prints to "doll up" their DX shack's walls.

We have acquired an RME69 receiver, with a DB20 pre-selector and a noise silencer, and we hope to "go to town" on some *real* DX soon! Look for a complete review on this receiver's capabilities in this magazine in the near future.

Now to DX:

GUADELOUPE

FG8AA, 7.05 mc., at Point-a-Pitre, is being heard daily from 6-7 p.m. At the latter time, an English announ. is made, giving QRA (address) as P.O. Box 125, in above city, "in the French West Indies."

This station is not "real DX" to us in the States, but does count as a new country, and may help many of you OM's striving to reach 100 VIC (Verified Individual Countries), to attain your goal. Some difficulty may be experienced in finding FG8AA, as it is *inside* the 40 meter amateur band, being in reality an amateur turned SW broadcaster, but run your dial back and forth slowly in the vicinity of 7.05 mc., and your efforts may be rewarded with a QSL for a new country! Remember the true DXer's maxim—"*plug at it,*" and never give up trying! In this grand game, that is the only way to pile up those VIC and VAC merits, so good luck, boys! Rog Legge, W2, was 1st to report FG8AA.

MACAO

CR9Y, 6.08 mc., located at Macao, Portuguese China, is reported by James Moore, Jr., W6, who relates hearing this "FB" DX about once a month on approximately 6.08 mc., at 9:20-10:10 a.m. This station reported in England, signing off at 11:15 a.m. Native music is the usual fare, but light Western music is also heard. The Portuguese National Anthem closes the program. No QRA as yet available, but reports may be addressed to: Administration des Postes des Colonies Portugaises, Macao, Portuguese China (this QRA from a veri of old CQN here), as no doubt this station is government-controlled.

BRITISH NEW GUINEA

VHSU, 8.07 mc., now reported at Port Moresby (previously reported as at Salamaua) is being heard regularly, broadcasting programs, probably relays of local broadcast band station on a test basis. Time of transmission was 8-9 a.m. Native music was followed by latest recordings, topped off by *The Lambeth Walk!!*

The station is listed as operating daily from 6:30-9 a.m. and may be heard on either of two other frequencies, 6.54 and 2.6 mc. VHSU s.o. with "*God Save the King,*" and the playing of chimes. Reports may be addressed to VHSU, c/o Government Posts and Telegraph Dept., Port Moresby, Br. New Guinea.

MADAGASCAR

Radio Tananarive, 6.063 mc., has QSL'd to Jack Buitekant for his report of their former 10.95 mc. transmission and, according to this veri, Radio Tananarive is now operating solely on 6 mc., but letter adds that transmissions on the 31 meter band, where this station was logged on 9.38 mc., may soon be made, on a test basis.

Jack reports following data as to schedules: Sun., 2:30-4 a.m.; Mon., 12:30-12:45, 10-11 a.m.; Tues. to Sat., incl., 12:30-12:45, 3:30-4:30, 10-11 a.m., only on 6.063 mc. This schedule will probably be adhered to when 31 meter transmissions are resumed. Full QRA is given from veri: Station Intercoloniale de T.S.F. de Tananarive, a Alarobia, Service Radiodiffusion L'Ingénieur en Chef, Chef de Station. Whew! Quite some QRA! Our luck has always been with us on the Sunday transmissions, where we "cleaned up" this catch on their 3 frequencies, lately receiving our last, also for 10.95 mc.

These cold winter a.m.'s are best for reception of R.T. on 6 mc., but how many DXers will want to arise in the dark hours to try for this rarest of DX catches? Not very many, hi!

merely to Villarica as, being a small city, the station is doubtless well known to postal authorities. Fred Borcheidt, W9, reports ZP14 QSL. FB, OM!

IRAQ

YIJG, 7.20 mc., at Baghdad, in this country, formerly known as Persia, is being reported in England, by A. G. K. Leonard of Maidstone, on a schedule of 8:30 a.m.-3 p.m. daily, using 1 kw. YIJG relays programs of the Baghdad BCB station. Reports should be sent to: I. Hassan, Supervisor Wireless Station, Civil Airport, Baghdad, Iraq. This would be a rare DX catch, judging from the frequency, in the midst of the 40 meter band QRM, and from the time of transmission, very unfavorable for reception in the States. (I.D.A.).

CHINA

XTJ, 11.691 mc., is reported off the air since the fall of Hankow.

XGRV, 11.42 mc., Chungking, is reported on a schedule of 11:35 p.m.-12:05 a.m., and 6:35-7:04 a.m., by Bert Wolfe, W6.

XGSA, exactly 7 mc., Kweiyang, is reported by Bob Sawada, W6, announcing as "Kweiyang Broadcasting Station in Kweichow Province," on a schedule of 8-8:15 a.m. Listed by I.D.A. on a schedule of 1-2, 8-10:10 a.m., 6:30-7:30 p.m. Announcement and news are given in English by woman announcer at 8 a.m. Other fare is Chinese announcements and news, and native music.

XGX, 9.09 mc., Hankow, now off the air, as XTJ, above QSL'd Roy Myers, W6, via airmail. The station director, T. W. Woo, mentioned that an XPSA, 7.14 mc., at Kweiyang would be operating from 7-8 p.m., 1:30-2:30, 7:50-9:50 a.m. This is almost certainly XGSA

(Continued on page 633)

J7CR — Japan. A rust brown print on a light buff card with a portrait of Akira, gives this QSL a distinctive appearance.

PK2AY—Java. QSL's with an outstanding card, blue on yellow, which would enhance any SWL's collection.

PARAGUAY

ZP14, at Villarica, formerly listed on 6.15 mc., is now being heard with excellent volume on approximately 11.725 mc., from 4:45-5:45 p.m. ZP14 announces as "Radio Cultura" between

Mc.	Call	
15.130	WIXAL	BOSTON, MASS., 19.83 m., Addr. World-Wide B'cast'g Foundation. University Club. 10-11 am., Mon.-Fri. Sun. 10 am.-1 pm.
15.120	SPI9	WARSAW, POLAND, 19.84 m., 6-9 pm.
15.120	HVJ	VATICAN CITY, 19.83 m., 10.30-10.45 am., Tues only. Suns. 1-1.30 pm.
15.110	DJL	BERLIN, GERMANY, 19.85 m., Addr. (See 15.280 mc.) 12.05-2, 8-9 am., 10.35 am.-4.25 pm., Sun. 6-8 am.
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.

End of Broadcast Band

14.960	—	MOSCOW U.S.S.R., 20.25 m., 1st of month, 6 pm. Dutch program.
14.940	PSE	RIO DE JANEIRO, BRAZIL. 20.08 m., Broadcasts Wed. 3.45-4.15 pm.
14.600	JVH	NAZAKI, JAPAN, 20.55 m. Broadcasts irregularly 5-11.30 pm. Works Europe 4-8 am.
14.535	HBJ	GENEVA, SWITZERLAND, 20.64 m., Addr. Radio Nations. Broadcasts Sun. 1.45-2.30 pm., Mon. 1.30-1.45 pm.
14.440	—	RADIO MALAGA, SPAIN, 20.78 m. Relays Salamanca 5.40-8.40 am. Sometimes 2-4 pm.
14.430	HCJB	QUITO, ECUADOR, 20.79 m. Sun. 9-9.30 pm. and irreg.
14.166	PIIJ	DORDRECHT, HOLLAND, 21.15 m., Addr. (See 7.088 mc.) Sat. 12 n.-12.30 pm.
14.004	EA9AH	TETUAN, SPANISH MOROCCO, 21.4 m. Apartado 124. News at 4.30 and 7.15 pm. Relays Salamanca from 5.40 pm.
13.635	SPW	WARSAW, POLAND, 22 m. Daily 6-8 pm. Sat. & Sun. 6-9 pm.
12.862	W9XDH	ELGIN, ILL., 23.32 m. Press Wireless, Tests 2-5 pm.
12.460	HC2J8	QUITO, ECUADOR, 24.08 m. Daily exc. Mon. 8-10.30 pm.
12.235	TEJ	REYKJAVIK, ICELAND, 24.52 m. Works Europe mornings. Broadcasts Sun. 1.40-2.30 pm.
12.200	——	TRUJILLO, PERU, 24.58 m., "Rancho Grande." Address Hacienda Chiclin. Irregular.
12.060	RNE	MOSCOW, U.S.S.R., 24.88 m. Daily 6-7 am., 12 n.-2 pm., 3-6, 10.15-11 pm., also Tues., Thurs. 6.30-9 pm., also Sun. 6-10.30 am., 12 n.-5 pm., 6-6.30, 8.30-9, 10.15-11 pm.
11.970	HI2X	CIUDAD TRUJILLO, D. R., 25.07 m., Addr. La Voz de Hispaniola. Relays HIX Tue. and Fri. 8.10-10.10 pm.

25 Met. Broadcast Band

11.928	TI2XD	SAN JOSE, COSTA RICA. 25.15 m. La Voz del Pilot. Apartado 1729. 10 am.-n., 4-10 pm.
11.910	CDI190	VALDIVIA, CHILE, 25.2 m., P. O. Box 642. Relays CB69 10 am.-1 pm., 7-10 pm.
11.900	—	HANOI, FRENCH INDO-CHINA. 25.21 m. "Radio Hanoi", Addr. Radio Club de l'Indochine. 12 m.-2 am., 6-10 am., 150 watts.
11.900	XEWI	MEXICO CITY, MEXICO, 25.21 m., Addr. P. O. Box 2874. Mon., Wed., Fri. 3-4 pm., 9 pm.-12 m. Tues. and Thur. 7.30 pm.-12 m., Sat. 9 pm.-12 m., Sun. 12.30-2 pm.
11.885	TPA3	PARIS, FRANCE, 25.24 m., Addr. (See 15.245 mc.) 2-5 am., 11.15 am.-6 pm., 7-9.15 pm.
11.885	TP87	PARIS, FRANCE, 25.24 m. (See 15.245 mc.) 9.30 pm.-mid., 12.15-2 am. Irregular.
11.880	VLR3	MELBOURNE, AUST., 25.25 m., 3.30-7.15 pm., 9 pm.-3 am. weekdays.
11.870	W8XK	PITTSBURGH, PA., 25.26 m., Addr. (See 21.540 mc.) 1-11 pm.
11.865	——	BERNE, SWITZERLAND. 25.28 m. Irreg. 8-9 pm. to No. Amer.
11.860	GSE	DAVENTRY, ENG., 25.29 m., Addr. (See 11.75 mc.) 3-5.15, 5.45 am.-11 am. 2-2.30 pm., Sun. 1-1.30 pm.
11.855	DJP	BERLIN, GERMANY, 25.31 m., Addr. (See 15.280 mc.) Irregular. 7.15-10.50 pm. for No. Amer.
11.840	KZRM	MANILA, P. I., 25.35 m. Addr. Erlanger & Gallinger, Box 283. 9 pm.-10 am. Irregular.
11.840	CSW	LISBON, PORT., 25.35 m. Nat'l Broad. Station. 11.30 am.-1.30 pm. Irregular.
11.840	OLR4A	PRAGUE, CZECHOSLOVAKIA, 25.34 m., Addr. Czech Shortwave Sta., Praha XII, Fochova 16. Daily 1.55-4.30 pm. Mon. to Fri. 7.55-10.55 pm., Sun. 5.55-8.55 pm.
11.830	W9XAA	CHICAGO, ILL., 25.36 m., Addr. Chicago Federation of Labor. Irregular 7 am.-6 pm.
11.830	W2XE	NEW YORK CITY, 25.36 m., Addr. Col. Broad. System, 485 Madison Av., N.Y.C. Mon.-Fri. 3.30-6, 6.30-10 pm. Sat., Sun. 3-6, 6.30-11 pm.
11.826	XE8R	HERMOSILLA, SON., MEX., 25.37 m., Addr. Box 68. Relays XE8H. 9.30-11 am., 1-4 pm., 9 pm.-12 m.
11.820	GSN	DAVENTRY, ENG., 25.38 m., Addr. (See 11.75 mc.) Irregular.
11.810	2RO4	ROME, ITALY, 25.4 m., Addr. E.I.A.R., Via Montello 5. Daily 4.40-8.45 am., 10 am.-12 n.
11.805	COGF	MATANZAS, CUBA, 25.41 m., Addr. Gen. Betancourt 51. Relays CMGF. 2-3, 4-5, 6-11 pm.
11.805	OZG	SKAMLEBOAEK, DENMARK, 25.41 m. Addr. Statsradiofonien. Irreg.
11.801	DJZ	BERLIN, GERMANY, 25.42 m. 4.50-10.50 pm.
11.800	JZJ	TOKYO, JAPAN, 25.42 m., Addr. Broadcasting Co. of Japan, Overseas Division. 7-7.30, 8-9.30 am., 2.30-4, 4.30-5.30, 8-8.30 pm., 12.30-1.30 am.
11.795	DJO	BERLIN, GERMANY, 25.42 m. 4.50-Addr. (See 15.280 mc.) 11.30 am.-4.28 pm., 4.50-10.50 pm.
11.790	WIXAL	BOSTON, MASS., 25.45 m., Addr. (See 15.250 mc.) Daily 4.55-6.30 pm., Tues., Thur., 4.40-6.30 pm., Sat. 1.45-6 pm., Sun. 5-6.30 pm.
11.780	HP5G	PANAMA CITY, PAN., 25.47 m., Addr. Box 1121. 8-11 pm.
11.780	OFE	LAHTI, FINLAND, 25.47 m, Addr. (See OFE, 9.5 mc.) 1.05-3 am., 5-6.20, 10 am.-12.30 pm.
11.770	DJD	BERLIN, GERMANY, 25.49 m., Addr. (See 15.280 mc.) 11.30 am.-4.28 pm., 4.50-11 pm.
11.760	TGWA	GUATEMALA CITY, GUAT., 25.51 m. (See 17.8 mc.) Irregular 10-11.30 pm. Sun. 6-11.30 pm., irregular.
11.760	XETA	MONTEREY, MEX. 25.51 m., Addr. Box 203. Relays XET, n.-3.30 pm. and evenings.
11.760	OLR4B	PRAGUE, CZECHOSLOVAKIA, 25.51 m., Addr. (See 11.840 mc.) Irregular.
11.750	GSD	DAVENTRY, ENG., 25.53 m., Addr. B.B.C., London, 3-5.15 am., 9 am.-noon. 12.30-6 pm., 6.20-8.30 pm.
11.740	SP25	WARSAW, POLAND, 25.55 m., 6-9 pm.
11.740	COCX	HAVANA, CUBA, 25.55 m. P. O. Box 32. Daily 8 am.-1 am. Sun. 8 am.-12 m. Relays CMX.
11.740	HVJ	VATICAN CITY, 25.55 m. Testing irregular.
11.730	PHI	HUIZEN, HOLLAND, 25.57 m., Addr. N. V. Philips' Radio. Daily 6.15-6.45 pm. Sat. 7.15-7.45 pm.
11.730	WIXAL	BOSTON, MASS., 25.57 m., Addr. World-Wide B'cast'g Foundation, University Club. Daily exc. Sat. and Sun. 9-11 pm.
11.720	CJRX	WINNIPEG, CANADA, 25.6 m., Addr. James Richardson & Sons, Ltd. Daily 6 pm.-12 m., Sun. 5-10 pm.
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.
11.715	TPA4	PARIS, FRANCE, 25.61 m., (See 15.245 mc.) 7-9.15 pm., 9.30 pm.-12 m. to No. America.
11.710	YSM	SAN SALVADOR, EL SALVADOR, 25.63 m., Addr. (See 7.894 mc.) 1-2.30 pm.
11.710	—	SAIGON, FRENCH INDO-CHINA. 25.62 m., Addr. Boy-Landry, 17 Place A' Foray. 7.30-9.15 am.
11.705	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. Wed. and Sat. 8-9 pm.
11.700	HP5A	PANAMA CITY, PAN., 25.65 m. Addr. Radio Teatro, Apartado 954. 10 am.-1 pm., 5-10 pm. Sun. 6-10 pm.
11.700	CB1170	SANTIAGO, CHILE, 25.65 m. Addr. P.O. Box 706. Relays CB89 10 am.-2 pm., 3.30-11 pm.

End of Broadcast Band

11.676	IQY	ROME, ITALY. 25.7 m. Relays 2RO 1.35-2.25, 6-9 pm.
11.535	SPD	WARSAW, POLAND, 26.01 m., Addr. 5 Mazowiecka St. 6-9 pm.
11.402	H8O	GENEVA, SWITZERLAND, 26.31 m., Addr. Radio Nations. Sun. 7-7.45 pm., Mon. 1-1.15 am., 7-8.30 pm.
11.040	CSW2	LISBON, PORTUGAL, 27.17 m., Addr. Nat. Broad. Sta. 9.30 am.-Noon. 2-5.30 pm.
11.000	PLP	BANDOENG, JAVA, 27.27 m. Relays YD8. 6-7.30 pm., 10.30 pm.-2 am., 4.30-10.30 or 11 am. Sat. until 11.30 am.
10.950	——	TANANARIVE, MADAGASCAR, 27.40 m., Addr. (See 9.38 mc.) 12.30-45, 10-11 am., 2.30-4 am., exc. Sun.
10.670	CEC	SANTIAGO, CHILE, 28.12 m. Irregular.
10.660	JVN	NAZAKI, JAPAN, 28.14 m. Broadcasts daily 1.50-7.40 am. Works Europe irregularly at other times.
10.600	ZIK2	BELIZE, BRIT. HONDURAS, 28.30 m., Tue., Thurs., Sat. 1.30-2, 8.30-9 pm.
10.535	JIB	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.
10.400	YSP	SAN SALVADOR, EL SALVADOR, 28.85 m., 1-3, 6.30-11 pm.
10.350	LSX	BUENOS AIRES, ARG., 28.98 m., Addr. Transradio International. Tests irregularly.
10.330	ORK	RUYSSELEDE, BELGIUM, 29.04 m. Broadcasts 12.30-2 pm. Works OPM 1-3 am., 3-5 pm.
10.290	TIEMT	SAN JOSE, COSTA RICA, 29.15 m., 4.30-8 pm.
10.290	DZC	ZEESEN, GERMANY, 29.16 m., Addr. (See 15.360 mc.) Irregular.
10.260	PMN	BANDOENG, JAVA, 29.24 m. Relays YD8 6-7.30 pm., 10.30 pm.-2 am., 4.30-10.30 or 11 am., Sat. to 11.30 am.
10.220	PSH	RIO DE JANEIRO, BRAZIL, 29.35 m., Addr. Box 709. Broadcasts 6-7 pm., Mon. 8-8.30 pm.
10.042	DZB	ZEESEN, GERMANY, 29.87 m., Addr. Reichspostzenstralamt. Irregular.
10.100	——	DEUTSCHE FREIHEITS SENDER, 29.70 m., loc. in Germany, undercover. 4-5 pm.
9.995	COBC	HAVANA, CUBA, 30.02 m., Addr. P. O. Box 132. Relays CMBC 6.55 am.-1 am.
9.920	JDY	DAIREN, MANCHUKUO, 30.24 m. Relays JOAK daily 7-8 am. Works Tokyo occasionally in early am.
9.892	CPI	SUCRE, BOLIVIA, 30.33 m., 11 am.-n., 7-9 pm.
9.860	EAQ	MADRID, SPAIN, 30.43 m., Addr. Post Office Box 951. 7.30-8, 8.40-9 pm.
9.830	IRF	ROME, ITALY, 30.52 m. Works Egypt afternoons. Relays 2RO, 6-9 pm.
9.805	COCM	HAVANA, CUBA, 30.60 m. Addr. Transradio Columbia, P. O. Box 33. 8-1 am. Relays CMCM.
9.760	——	SAIGON, INDO-CHINA, 30.72 m., Addr. 17, Place A. Foray. "Radio Boy-Landry." Heard 6-9.15 am.
9.708	COCQ	HAVANA, CUBA, 30.90 m. Addr. 25 No. 445, Vedado, Havana, 7-1 am. Sun. 6.55 am.-1 am.
9.735	CSW7	LISBON, PORTUGAL, 30.82 m. Addr. Nat. Broad. Sta. n.-2 pm., 6-9 pm. for No. Amer.

(Continued on page 602)

All Schedules Eastern Standard Time

EIGHTH

Silver Trophy

Awarded to

H. LeRoy Vanderford

W2IDQ

Millburn, N. J.

For Best HAM Station photo of the month

H. LeRoy Vanderford, Owner and Operator of W2IDQ.

This beautiful silver trophy stands 11¾" high and is to be awarded monthly by RADIO & 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 accompanying photographs and following data on my amateur radio station, W2IDQ. are respectfully submitted in your Silver Trophy contest.

My interest in amateur radio became renewed in 1935, after some 19 years, for prior to the World War my spark station signed "3MF."

But to describe the station photograph, which incidentally, shows the effect of an extremely wide-angle lens:—

The station occupies a ground floor room intended as the maid's quarters. While small, it has the advantage of being off from the rest of the house and permits easy access for lead-ins and ground connections and permits under-floor cabling.

The transmitter on the left operates on all bands but is used primarily on the 14 mc. phone band. Australia, Africa, Europe and South America can be considered regular contact areas. While the Philippines and Java have been worked on phone, they are, unfortunately, not Asia! So, credit only five continents to date, but just let us hear an Asian phone!

But to return to the transmitter, the extreme left cabinet (both being of brass angle with aluminum panels and side doors) carries the 1250 volt power supply for a Class B stage using 211's. This stage occupies the space behind the two lower filament meters.

The middle section carries a speech amplifier rated at 15 watts. A 500-ohm line connects it with the jack strip on the operating desk. The Du Mont 5-inch oscillograph in the top section monitors the transmitter's carrier with an envelope pattern.

The right-hand cabinet is the R.F. unit with a 2500-volt and 600-volt supply in the lower section. The higher aluminum compartments house a 6L6 Tri-tet oscillator with push-button 5-crystal switching; parallel 807's as a buffer driving a T 200 to 600 watts input on phone. An inductively coupled "Collins Network" feeds the transmission line. Interlocking relays control all equipment from the desk.

Ward Leonard antenna relays above the window select either an 8JK beam to Europe and Australia or a 99-foot center-fed antenna used on 75 as well as 20 meters.

The operating desk carries a W.E. 59A speech amplifier and R.M.E. 69 receiver. Patch cords permit the use of either speech amplifier with either transmitter and various combinations of speakers, phonograph C.Q. records, etc. A Western Electric condenser microphone is used.

The right-hand transmitter is a low-powered portable rig with a 6L6 Tri-tet oscillator, 802's in the buffer driving a W.E. 276A power amplifier to 150 watts on phone. The Class "B" stage employs

(Continued on page 618)

All the equipment is controlled from the desk through the use of interlocking relays.

31 Met. Broadcast Band

Mc.	Call	
9.705	——	FORT DE FRANCE, MARTINIQUE, 30.92 m., Addr. P. O. Box 136.
9.690	TI4NRH	HEREDIA, COSTA RICA, 30.94 m., Addr. Amando C. Marin. Apartado 40. Sun. 7-9 am., Tues., Thurs., Sat. 9-10 pm.
9.690	LRA	BUENOS AIRES, ARG., 30.94 m., 6-9 pm.
9.685	TGWA	GUATEMALA CITY, GUAT., 30.96 m. Daily 10-11.30 pm.; Sun. 7-10.45 pm.
9.680	ZHP	SINGAPORE, MALAYA. 30.98 m. Sun. 5.40-9.40 am., Wed. 12.40-1.40 am., Mon.-Fri. 4.40-9.40 am., Sat. 12.25-1.40 am., 4.40-9.40 am., 10.40 pm.-1.10 am. (Sun.).
9.675	DJX	BERLIN, GERMANY, 31.01 m., Addr. (DJD, 11.77 mc.) 10.35 am.-4.25 pm.
9.670	—	ROME, ITALY. 31.03 m. Relays 2RO 12 n.-6, 7.30-9 pm.
9.670	W3XAL	BOUND BROOK, N. J., 31.03 m. Addr. NBC, N. Y. C. 5 pm.-1 am.
9.660	LRX	BUENOS AIRES, ARG., 31.06 m., Addr. El Mundo. Relays LRI, 6-6.45 am, 9.15 am.-10.05 pm.
9.650	W2XE	NEW YORK CITY, 31.09 m. (See 21.570 mc. for addr.) 10.30-11.30 pm. exc. Sat. and Sun.
9.650	CS2WA	LISBON, PORTUGAL, 31.09 m., Addr. Radio Colonial. Tues., Thurs. and Sat. 4-7 pm.
9.645	HH3W	PORT-AU-PRINCE, HAITI, 31.1 m., Addr. P. O. Box A117. 1-2, 7-9 pm.
9.640	CXA8	COLONIA, URUGUAY, 31.12 m., Addr. Belgrano 1841, Buenos Aires, Argentina. Relays LR3, Buenos Aires 7 am.-m., Sat. to 2.15 am.
9.635	2RO	ROME, ITALY, 31.13 m., Addr. (See 11.810 mc.) 12.05-9 pm.
9.630	HJ7ABD	BUCARAMANGA, COL., 31.14 m. 5.45-6.30, 11.30 am.-1 pm., 6-11 pm.
9.636	JFO	TAIHOKU, TAIWAN, 31.13 m. Relays JFAK irreg. 4-10.30 am.
9.618	HJ1ABP	CARTAGENA, COL., 31.20 m., Addr. P. O. Box 37. Daily 9 am.-1.30 pm., 4.30-10.15 pm., Sun. 4.30-9 pm.
9.615	ZRK	KLIPHEUVAL, SOUTH AFRICA, 31.2 m., Addr. P. O. Box 4559, Johannesburg. Daily, exc. Sat. 11.45 pm.-12.50 am. Daily exc. Sun. 3.20-7.20, 9-11.45 am., Sun. 3.30-4.30 or 4-5, 5.30-7, 9-11.45 am.
9.607	HP5J	PANAMA CITY, PANAMA, 31.23 m. Addr. Apartado 867. 12 n. to 1.30 pm., 6-10.30 pm.
9.600	RAN	MOSCOW, U.S.S.R., 31.25 m. Daily exc. Sun. 6-10 pm. Sun. 6-7, 9.15-10 pm.
9.595	HBL	GENEVA, SWITZERLAND, 31.27 m., Addr. Radio Nations. Irregular.
9.590	VUD2	DELHI, INDIA, 31.28 m. Addr. All India Radio, 1.30-3.30 am., 7.30 am.-12.30 pm., 8.30-10.30 pm.
9.590	PCJ	HUIZEN, HOLLAND, 31.28 m., Addr. (See 15.220 mc.) Sun. 2-3, 7-9.25 pm. Tues. 1.45-3.40, 7.15-8.45, 9-10.30 pm., Wed. 7.15-8.30 pm., Fri. 8-9 pm.
9.590	VK6ME	PERTH, W. AUSTRALIA, 31.28 m., Addr. Amalgamated Wireless of Australasia, Ltd. 6-9 am. exc. Sun.
9.590	VK2ME	SYDNEY, AUSTRALIA, 31.28 m., Addr. Amalgamated Wireless of Australasia, Ltd., 47 York St., Sun. 1-3 am.; 5-11 am.
9.590	W3XAU	PHILADELPHIA, PA., 31.28 m. (Addr. See 21.52 mc.) Mon. and Thurs. 7.30-11.30 pm. Sat. 7.30-10.45 pm.
9.580	GSC	DAVENTRY, ENGLAND, 31.32 m., Addr. B. B. C., Portland Pl., London, W. 1, 12.20-1.15, 4.15-6, 6.20-8.30, 9.20-11.25 pm.
9.590	VLR	MELBOURNE, AUSTRALIA, 31.32 m. Addr. Box 1686, G. P. O. Daily 3.30-8.30 am. (Sat. till 9 am.) Sun. 12.01-7.30 am. Also daily exc. Sat. 9.25 pm.-2 or 2.15 am, Sat. 5-10.30 pm.
9.570	KZRM	MANILA, P. I., 31.35 m., Addr. Erlanger & Galinger, Box 283. Sun. 3-10 am. Daily exc. Sat. 4.30-7 pm., 11.15 pm.-12.15 am. Daily exc. Sun. 4-10 am.
9.570	WIXK	SPRINGFIELD, MASS., 31.35 m., Addr. Westinghouse Electric & Mfg. Co. 7 am. to 1 am. Sun. 8 am.-1 am.
9.560	XGAP	PEKING, CHINA, 31.38 m., 9 am.-2 pm.
9.560	DJA	BERLIN, GERMANY, 31.38 m., Addr. Broadcasting House. 12.05-11 am., 4.50-10.50 pm.
9.550	HVJ	VATICAN CITY, 31.41 m., Sun. 5-5.30 am.
9.550	TP8II	PARIS, FRANCE, 31.41 m. Addr. (See 15.245 mc.) 2-5 am., 11.15 am.-6 pm.
9.550	W2XAD	SCHENECTADY, N. Y., 31.41 m., General Electric Co., 7:15-10 pm. to So. Amer.
9.550	OLR3A	PRAGUE, CZECHOSLOVAKIA, 31.41 m. (See 11.840 mc.) Mon. 4.40-5.10 pm.
9.550	XEFT	VERA CRUZ, MEX., 31.41 m. 10.30 am.-4.30 pm., 10.30 pm.-12.30 am.
9.550	YD8	SOERABAJA, JAVA, 31.41 m. Addr. N.I.R.O.M. Daily exc. Sat. 6-7.30 pm., 4.30 to 10.30 am. Sat. 4.30-11.30 am.
9.550	VU8Z	BOMBAY, INDIA. 31.41 m., Addr. All India Radio. 9.30-10.30 pm., 1-3.30 am.
9.540	DJN	BERLIN, GERMANY, 31.45 m., Addr. (See 9.560 mc.) 12.05-11 am. 4.50-10.50 pm. to So. Amer.
9.540	HJ5ABD	CALI, COLOMBIA, 31.45 m., Addr. La Voz de Valle. 12 n.-1.30 pm., 5:10-9.40 pm.
9.538	VPD2	SUVA, FIJI ISLANDS, 31.46 m., Addr. Amalgamated Wireless of Australasia, Ltd. 5.30-7 am., exc. Sun.
9.535	JZI	TOKYO, JAPAN, 31.46 m., Addr. (See 11.800, JZJ) 2.30-4, 4.30-5.30 pm. 8-9.30 am.
9.535	—	BERNE, SWITZERLAND, 31.46 m., 1-2 pm. exc. Mon. and Tues.
9.530	W2XAF	SCHENECTADY, N. Y., 31.48 m., Addr. General Electric Co. 4 pm.-12 m. Sat. 1 pm.-12 m.
9.530	VUC2	CALCUTTA, INDIA. 31.48 m. Addr. All India Radio. 2.06-4.06 am.
9.526	XEDQ	GUADALAJARA, GAL., MEXICO, 31.49 m., n.-4.30 pm., 8-11.30 pm.
9.526	ZBW3	HONGKONG, CHINA, 31.49 m., Addr. P. O. Box 200. 11.30 pm. to 1 am., 3-10 am.
9.525	LKC	JELOY, NORWAY, 31.49 m., 4.30-10.30 am., Sun. 2.30-10.30 am.
9.523	ZRH	ROBERTS HEIGHTS, S. AFRICA. 31.5 m., Addr. (See ZRK, 9.606 mc.) Daily exc. Sun. 5-7.30 am.; Sun. 5.30-7 am.
9.520	OZF	SKAMLEBOAEK, DENMARK, 31.51 m., Addr. Statsradiofonien, Heibergsgade 7, Copenhagen, 8-9.30, 9.30-11 pm. to No. Amer.
9.520	YSH	SAN SALVADOR, EL SALVADOR 31.51 m., Addr. (See 7.894 mc.) Irregular 6-10 pm.
9.510	GSB	DAVENTRY, ENGLAND, 31.55 m., Addr. (See 9.580 mc.—GSC) 1.30-4, 4.15-6, 6.20-8.30, 9.20-11.25 pm.
9.510	HJU	BUENAVENTURA, COLOMBIA, 31.55 m., Addr. National Railways. Mon., Wed. and Fri. 8-11 pm.
9.510	HS6PJ	BANGKOK, SIAM, 31.55 m. Thursday, 8-10 am.
9.510	—	HANOI, FRENCH INDO-CHINA. 31.55 m. "Radio Hanoi", Addr. Radio Club de L'Indochine. 12 m.-2 am., 6-10 am. 15 watts.
9.500	VK3ME	MELBOURNE, AUSTRALIA, 31.58 m., Addr. Amalgamated Wireless of Australasia, 167 Queen St. Daily except Sun. 4-7 am.
9.503	KZIB	MANILA, PHIL. ISL., 31.57 m., 7-9.05 am.
9.503	XEWW	MEXICO CITY, MEX., 31.57 m. Addr. Apart. 2516. Relays XEW. 9 am.-12.30 am.
9.500	OFD	LAHTI, FINLAND, 31.58 m., Addr. Finnish Brcst. Co., Helsinki. 12.15-5 pm.
9.490	OAX5C	ICA, PERU, 31.61 m., Radio Universal, 8-11.30 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

Mc.	Call	
9.465	TAP	ANKARA, TURKEY, 31.70 m., 1.20-5 pm. Irreg.
9.445	HCODA	GUAYAQUIL, ECUADOR, 31.77 m., 8.15-10.15 pm., exc. Sun.
9.437	COCH	HAVANA, CUBA, 31.8 m., Addr. 2 B St., Vedado. 8 am.-9.30 pm. Sun. 8 am.-12 m.
9.380	—	TANANARIVE, MADAGASCAR, 31.96 m. Addr. Le Directeur des PTT, Radio Tananarive, Administration PTT. 12.30-12.45, 10-11 am., 2.30-4 am., exc. Sun.
9.370	XOY	CHENGTU, CHINA, 32.02 m., 9.45-10.30 am.
9.355	HCIETC	QUITO, ECUADOR, 32.05 m., Addr. Teatro Bolivar, Thurs. until 9.30 pm. 8-11 pm. Sats.
9.350	COCD	HAVANA, CUBA, 32.08 m., Addr. Box 2294. Relays CMCD 10 a.m.-11.30 pm. Sun. 10 am.-9 pm.
9.345	H8L	GENEVA, SWITZERLAND, 32.11 m., Addr. Radio Nations. Sun. 8-8.45 am., Mon. 6.45-8.30 pm.
9.340	OAX4J	LIMA, PERU, 32.12 m., Addr. Box 1166, "Radio Universal." 12 n.-3 pm., 5 pm.-1 am.
9.300	XGX	SHANGHAI, CHINA, 32.26 m., 8-9.05 am. Varies between 9.180-9.300.
9.300	HIG	CIUDAD TRUJILLO, D. R., 32.28 m. 7.10-9.40 am., 11.40 am.-2.10 pm., 3.40-9.40 pm.
9.200	COBX	HAVANA, CUBA, 32.59 m. Addr. San Miguel 194, Altos. Relays CMBX 7 am.-12 m.
9.165	HC2CW	GUAYAQUIL, ECUADOR, 32.74 m., 7-11.30 pm., Sun. 3.30-6 pm.
9.125	HAT4	BUDAPEST, HUNGARY, 32.88 m., Addr. "Radiolabor," Gyali-ut, 22. Daily 7-8 pm., Sat., 6-7 pm.
9.100	COCA	HAVANA, CUBA, 32.95 m., Addr. Galiano No. 102. Relays CMCA 9 am.-12 m.
9.091	PJC2	CURACAO, D. W. INDIES, 33 m., 6.36-8.36 pm., Sun. 10.36 am.-12.36 pm.
9.030	COBZ	HAVANA, CUBA, 33.32 m., Radio Salas Addr. P. O. Box 866. 7.45 am.-1.15 am. Sun. 7.45 am.-12 m. Relays CMBZ.
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.
8.841	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.
8.700	HKV	BOGOTA, COLOMBIA, 34.46 m. Tues. and Fri. 7-7.20 pm.
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.
7.894	YSD	SAN SALVADOR, EL SALVADOR, 37.99 m., Addr. Dir. Genl. Tel. & Tel. 7-10.30 pm.
7.870	HCIRB	QUITO, ECUADOR, 38.1 m. La Voz de Quito. 8.30-11.30 pm.
7.854	HC2JSB	GUAYAQUIL, ECUADOR, 38.2 m. Evenings to 11 pm.
7.797	HBP	GENEVA, SWITZERLAND, 38.48 m., Addr. Radio-Nations.
7.614	CR6AA	LOBITO, ANGOLA, 39.39 m., Mon., Wed., Sats. 2.45-4.30 pm. Also 7.177.
7.510	JVP	NAZAKI, JAPAN, 39.95 m., 8-9.30 am.
7.450	TI2R3	SAN JOSE, COSTA RICA, 40.27 m. "Radioemisora Athena". 9.30-11 pm., exc. Sun.
7.410	HCJB4	QUITO, ECUADOR, 40.46 m., 7-9.30 pm. irregularly.
7.410	YDA	TANDJONGPRIOK, JAVA. 40.46 m., Addr. N.I.R.O.M., Batavia, 10.30 pm.-2 am.; Sat. 7.30 pm.-2 am.
7.380	XECR	MEXICO CITY, MEX., 40.65 m., Addr. Foreign Office. Sun. 7-8 pm.
7.220	HKE	BOGOTA, COL., S. A., 41.55 m. Tues. and Sat. 8-9 pm. Mon. and Thurs. 6.30-7 pm.
7.200	YNAM	MANAGUA, NICARAGUA, 41.67 m. Irregular at 9 pm.

(Continued on page 604)

All Schedules Eastern Standard Time

The Short Wave League

On the Ham Bands

(with the "Listening Post" Observers)

Edited by Elmer R. Fuller

Amateur station of Gertrude and Eric Bleo, Port-Au-Prince, Haiti. This QSL card was sent to Mr. Fuller by Gertrude Bleo, who says, "Our station is on every night —listen for us."

● REPORTS for November were more complete and contained a lot more real good DX than they had for several months. Conditions, however, were not very good during this month. The 20-meter band went dead almost every night from nine on to the daylight hours. This band could be worked until midnight but on only a few occasions.

If you are going to send a report to VR6AY do not enclose an International Reply Coupon, but send either United States or New Zealand stamps. I. R. C.'s cannot be used on this island as they do not have a local post office. All reply coupons which they receive must be returned to the United States before they can be cashed. This causes considerable delay and expense.

Your editor would like information regarding the QRA (address) of CR7AF. As far as could be determined from his conversation, he is on an island in the Mozambique channel between Mozambique and Madagascar. Reports have it that cards sent to him have been returned stating that his location was not known. Any information regarding this station would be greatly appreciated.

From official observers we have reports for November from the following: —

Barker, Elvyn L.	Maine
Carling, Len M.	Illinois
Clarke, Stanley	Canada
Davenport, E. H.	Vermont
Fitzpatrick, John	New Jersey
Fuller, C. H.	Special Observer for the Editor
Fuller, Lester	Arizona
Halliday, Ray	South Carolina
Hartzell, Clarence	Pennsylvania
Hegler, Burns E.	Kansas
Herzog, W. F.	New York
Jordan, Tom	Pennsylvania
Kemp, Howard G.	Connecticut
Lang, Ernest W.	Washington
Noyes, William Dean	Nebraska
Patterson, Pat	Georgia
Robinson, Hugh	Oklahoma
Slaughter, Edward C.	Texas
Taglauer, Bob	Kentucky
Wallen, Dan T.	Colorado
Wells, Jack	Alabama
Trueman, Elwood C.	Oregon
Sibbin, J. C.	New Zealand
Versfeld, John	South Africa

Now for the stations reported. From Asia this month we have but two:-

Call	Frcq. mc.	R	S	Observer
J7CB	14.090	5	6	Lang
XZ2DY	14.070	4	5	L. Fuller

Africa accounted for a major part of our reports for the past month and several were reported, most of them on the 20-meter band:-

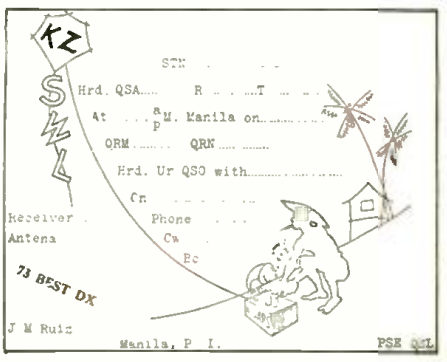
ZS1BV	14.230	4	7	Herzog, Noyes
ZS1BL	14.235	4	6	Herzog
ZS1BD	14.060	5	8	Fitzpatrick
ZS2AF	14.100	5	6	Lang
ZS2X	14.06	5	6-9	Wells, Fitzpatrick
	14.35			
ZS2N	14.025	4	6-9	Fitzpatrick, Noyes
	14.000			
ZS2BB	14.068	3	4	Carling
ZS3F	14.105	5	6-9	Lang, Carling, Wells, Trueman, Slaughter
	14.095			
ZS3T	28.040	5	7	Taglauer
ZS4H	14.080	5	4-9	Slaughter, Carling, Robinson, Lang, L. Fuller, Fitzpatrick, Trueman, Wells, Herzog, Noyes
ZS5CL	14.120	5	7-8	Robinson, Wells, Taglauer, Carling, Slaughter
ZS5T	14.05	4	5	Wells
ZS5PA	14.100	5	6-9	Fitzpatrick, Taglauer
ZS5S	14.015	5	9	Fitzpatrick
ZS5CO	14.385	5	8	Taglauer
ZS5J	14.07	3	5	Noyes
ZS6DW	14.07	4-5	6-8	Jordan, Hegler, Carling, Lang, L. Fuller, Robinson, Fitzpatrick, Slaughter
	28.060	5	6-7	Hegler
ZS6DY	14.080	5	6-7	Fitzpatrick, Slaughter, Carling, Noyes
	28.110	5	7	Halliday
ZS6A	14.040	4-5	5-6	L. Fuller, Noyes
ZS6DK	14.025	5	7	Fitzpatrick
ZS6J	14.015	5	8	Fitzpatrick
ZS6CL	14.085	4	7	Fitzpatrick
ZS6EF	14.120	4-5	6-8	Fitzpatrick, Taglauer, Robinson
ZS6P	14.060	5	9	Fitzpatrick
ZS6BR	14.035	4-5	6-7	Taglauer, Carling, Jordan, Noyes
ZS6BY	14.060	5	5	Taglauer
ZS6BW	14.040	4-5	6-9	Taglauer, Jordan, Noyes
ZS6ED	14.045	3	4	Carling, Robinson
ZS6EA	14.12	–	–	Robinson
ZS6EJ	14.13	–	–	Robinson
ZS6EY	14.08	–	–	Robinson
ZS6DL	14.06	4	6	Noyes
ZS6DX	14.05	3	5	Noyes
ZS6H	14.03	4	6	Noyes
ZE1JH	14.030	5	5	Taglauer
ZE1JX	14.030	5	7	Slaughter
ZL2BE	28.5	5	5	Trueman
ZL2BI	28.4	5	6	Trueman
ZL3KZ	28.4	5	8	Trueman
ZL3AY	28.10	3	5	Noyes
CN1AF	14.300	5	8	Hegler, Carling, Noyes, Wells, Fitzpatrick, Barker, Slaughter, C. Fuller
CN8AA	14.000	4	9	Fitzpatrick
CN8AM	14.09	4	6	Davenport
CN8BA	14.07	5	8	Wells, Fitzpatrick
CN8MU	14.300	4	8	Herzog, Fitzpatrick
CR7AF	14.300	2	5	Herzog, Yours truly
SU1AX	14.025	4	5	Fitzpatrick
SU1RH	14.027	3	5	Kemp
SU1NW	28.100	4	6	Fitzpatrick, Taglauer
	28.440			
SU1JM	14.130	4	7	Fitzpatrick
SU1MW	28.200	5	9	Jordan
VQ4KTB	14.100	4	6	Herzog

Due to the large number of stations reported, we will not list the North and South Americans this month, as they are very easily pulled in when the bands are open at all. Therefore, we will skip to the Europeans, of which we have a large number. They seem to predominate in the reports for November.

Call	Frcq. mc.	R	S	Observer
G1BR	28.200	5	6	Halliday
G2MY	28.260	5	8	Taglauer
G2BY	28.380	5	7	Taglauer
G2CG	28.	5	7	Jordan
G2DV	14.130	4	6	Lang, Fitzpatrick, Hegler
G2PU	28.400	5	7	Halliday, Fitzpatrick, Taglauer
	28.115			
G2MF	14.03	5	6	Davenport, Robinson
	28.305	5	8	Halliday, Fitzpatrick
G2HA	14.19	5	7	Davenport
G2IS	28.130	4	3-9	Kemp, Fitzpatrick, Taglauer
G2VG	28.130	4	6-8	Fitzpatrick, Taglauer
G2ZV	28.160	3	5	Fitzpatrick
G2AV	14.055	5	8	Fitzpatrick
G2TR	14.110	5	7	Fitzpatrick
G2UT	14.100	5	7	Fitzpatrick, Noyes
G2XN	14.210	4	8	Fitzpatrick
G2AK	14.095	5	7	Fitzpatrick
G2WD	14.035	5	8	Fitzpatrick
G3DO	14.030	5	5	Lang
G3DM	28.	3	4	Kemp
G3BM	14.115	5	9	Fitzpatrick
G3OT	14.070	4	9	Fitzpatrick
G5PP	28.170	5	8	Taglauer
G5ZT	28.150	5	7	Taglauer
G5QI	28.340	5	7	Taglauer
G5BU	14.145	4	7	Hegler
G5QA	28.21	5	8	Noyes
G5LJ	28.19	4	7	Noyes
G5BJ	14.140	4	5	Lang, Fitzpatrick
G5ML	14.115	5	8	Lang, Patterson, Barker, Carling, Fitzpatrick
G5VM	14.030	5	6	Lang
	28.400	5	5	Halliday
G5SA	28.150	4-5	5-8	Taglauer, Halliday, Kemp, Fitzpatrick
	28.405			
G5BM	28.180	5	9	Fitzpatrick, Taglauer
G5GS	28.115	5	9	Fitzpatrick
G5LY	28.140	4	8	Fitzpatrick
G5GI	28.190	4	7	Fitzpatrick
G5JO	14.085	5	9	Fitzpatrick, Robinson
G5LU	14.100	5	9	Fitzpatrick
G5BM	14.035	5	8	Fitzpatrick
G5DR	14.010	4	7	Fitzpatrick
G6LK	28.220	5	6-8	Trueman, Taglauer
G6GO	28.045	5	5	Taglauer
	29.940			
G6GS	28.38	5	7	Taglauer, Noyes
G6BH	28.100	4	5	Taglauer
G6DL	28.230	5	8	Taglauer
G6WU	28.310	5	9	Taglauer
G6DH	28.04	5	7	Noyes

(Continued on page 627)

Handsome QSL card from J. M. Ruiz, Manila, P. I.



Mc.	Call	
7.177	CR6AA	LOBITA, ANGOLA, PORT. WEST AFRICA. 41.75 m., Mon., Wed., and Sats. 2.45-4.30 pm. Also see 7.614 mc.
7.100	FO8AA	PAPEETE, TAHITI, 42.25 m., Addr. Radio Club Oceanien. Tues. and Fri. 11 pm.-12.30 am.
7.088	PIIJ	DORDRECHT, HOLLAND, 42.3 m., Addr. Dr. M. Hellingman, Technical College. Sat. 11.10-11.50 am.
7.050	FG8AA	POINT-A-PITRE GUADELOUPE, F.W.I., 42.55 m., 6-7 pm., also 9-10.30 pm. Irregular. P.O. Box 125.
6.990	XEME	MERIDA, YUCATAN, 42.89 m., Addr. Calle 59, No. 517. "La Voz de Yucatan desde Merida." Irregular.
6.977	XBA	TACUBAYA, D. F., MEX., 43 m. 9.30 am.-1 pm., 7-8.30 pm.
6.805	HI7P	CIUDAD TRUJILLO, DOM. REP., 44.06 m., Addr. Emisoria Diaria de Commercio. 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, SURINAM. 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.
6.750	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 N.I.R.O.M. programs. 4.30-11 or 11.30 am. Also Sat. 9.30 pm.-1.30 am.
6.690	TIEP	SAN JOSE, COSTA RICA, 44.82 m., Addr. Apartado 257, La Voz del Tropico. Daily 7-11 pm.
6.675	HBQ	GENEVA, SWITZERLAND, 44.94 m. Addr. Radio-Nations. Off the air at present.
6.672	—	—— 44.94 m., relays Salamanca, Spain, 7-9.45 pm.
6.672	YVQ	MARACAY, VENEZUELA, 44.95 m. Irregular.
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.
6.610	YNLG	MANAGUA, NICARAGUA. 45.39 m. Emisora Ruben Dario. 1.30-2.30, 6-10.15 pm.
6.558	HI4D	CIUDAD TRUJILLO, D. R., 45.74 m. Except Sun. 11.55 am.-1.40 pm.
6.550	XBC	VERA CRUZ, MEX., 45.8 m. 8.15-9 am.
6.550	TIRCC	SAN JOSE, COSTA RICA, 45.8 m., Addr. Radioemisora Catolica 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 las Lagos." 1-2.20, 8-10 pm. Except Sundays.
6.500	HIL	CIUDAD TRUJILLO, D. R., 46.13 m. Addr. Apartado 623. 12.10-1.40 pm., 5.40-7.40 pm.
6.480	HIIL	SANTIAGO DE LOS CABALLEROS, D. R., 46.28 m., Addr. Box 356. 9.40-11.40 am., 7.40-9.40 pm.
6.470	YNLAT	GRANADA, NICARAGUA, 46.36 m., Addr. Leonidas Tenoria, "La Voz del Mombacho." Irregular.
6.465	YV3RD	BARQUISIMETO, VENEZUELA, 46.37 m. Radio Barquisimeto, irregular.
6.450	HI4V	SAN FRANCISCO DE MACORIS, D. R., 46.48 m. 11.40 am.-1.40 pm., 5.10-9.40 pm.
6.400	TGQA	QUEZALTENANGO, GUATEMALA, 46.88 m., Mon.-Fri. 9-11 pm. Sat. 10 pm.-1 am. Sun. 1-3 pm.
6.384	ZIZ	BASSETERRE, ST. KITTS, W. INDIES, 46.99 m. 4-4.45 pm. Wed. 7-7.30 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	OAX1A	ICA, PERU, 47.33 m., Addr. La Voz de Chiclayo, Casilla No. 9. 8-11 pm.
6.324	COCW	HAVANA, CUBA, 47.4 m., Addr. La Voz del Radio Philco, P. O. Box 130. 6.55 am.-12 m. Sun. 9.55 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.
6.280	HIG	TRUJILLO CITY, D. R., 47.77 m. 7.10-9.40 am., 11.40 am.-2.10 pm., 3.40-9.40 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. 5.30-8 pm.
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	YV1RG	VALERA, VENEZUELA, 48.15 m. 6-9.30 pm.
6.210	——	SAIGON, INDO-CHINA, 48.28 m., Addr. Radio Boy-Landry, 17 Place A. Foray. 4.30 or 5.30-9.15 am.
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.
6.190	TG2	GUATEMALA CITY, GUAT., 48.4 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.
6.185	HIIA	SANTIAGO, D. R., 48.5 m., Addr. P. O. Box 423. 7 am.-5 pm.
6.170	W2XE	NEW YORK CITY, 48.62 m., Addr. Col. B'cast System, 485 Madison Ave. Mon., Fri. 12 m.-1 am. Sat. & Sun. 11.30 pm., 1 am.

49 Met. Broadcast Band

6.156	YV5RD	CARACAS, VENEZUELA, 48.71 m. 11 am.-2 pm., 4-10.40 pm.
6.153	HI5N	MOCA CITY, D. R., 48.75 m. 6.40-9.10 pm.
6.150	VP8	COLOMBO, CEYLON, 48.78 m., 7-11 am.
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, 48.78 m. 4-6 pm.
6.147	ZRD	DURBAN, SOUTH AFRICA, 48.8 m., Addr. (See ZRK, 9.606 mc.) Daily exc. Sat. 11.45 pm.-12.50 am.; Daily exc. Sun. 3.30-7.30 am., 9 am.-3.45 pm.; Sun. 5.30-7, 9-11.30 am., 12 n.-3.20 pm. Also 4-5 am., 3rd Sun. of month.
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	HJ4ABG	MEDELLIN, COL., 48.79 m. 11 am.-12 n., 6-10.30 pm.
6.140	W8XK	PITTSBURGH, PA., 48.83 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.
6.133	XEXA	MEXICO CITY, MEX., 48.93 m., Addr. Dept of Education. Daily 8-11 am., 2.30-4 pm., 7.30 pm.-12.45 am. Sun. 1.30 pm.-12.45 am.
6.130	VP3BG	GEORGETOWN, BRIT. GUIANA. 48.94 m. 9-10 am., 2.15-6.30 pm., Sun. 5.30-11.30 am., 3-5 pm.
6.130	TIEM	SAN JOSE, COSTA RICA. 48.94 m. "El Mundo", Apartado 1049. 11 am.-11 pm., Sun. 10 am.-6 pm.
6.130	CHNX	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. 8 am.-Noon. 2-10 pm.
6.122	HJ3ABX	BOGOTA, COL., 49. m., Addr. La Voz de Col., Apartado 26-65. 12 n.-2 pm., 5.30-11 pm.; Sun. 6-11 pm.
6.122	HP5H	PANAMA CITY, PAN., 49 m., Addr. Box 1045. 10 am.-1 pm., 5-11 pm.
6.122	FK8AA	NOUMEA, NEW CALEDONIA, 49.00 m., Radio Noumea, Addr. Charles Gaveau, 44 Rue de l'Alma., Wed. & Sats. 2.30-3.30 am.
6.117	XEUZ	MEXICO CITY, MEX., 49.03 m., Addr. 5 de Mayo 21. Relays XEFO 9 am.-1 pm., 7 pm.-2 am.
6.115	OLR2C	PRAGUE, CZECHOSLOVAKIA, 49.05 m. (See 11.40 mc.)
6.110	GSL	DAVENTRY, ENGLAND, 49.1 m., 6.20-8.30, 9.20-11.20 pm.
6.110	XEGW	MEXICO CITY, MEX., 49.1 m., Addr. La Voz de Aguila Azteca desde Mex., Apartado 8403. Relays XEJW 11 pm.-1 am.
6.108	HJ6ABB	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. 1-3, 6.30-8.30 am., Noon-6.30 pm.
6.100	W3XAL	BOUND BROOK, N. J., 49.18 m., Addr. Natl. Broad. Co.
6.097	ZRK	KLIPHEUVEL, S. AFRICA, 49.2 m., Addr. S. African Broad. Co., Johannesburg. Daily 12 n.-4 pm., Sun. 12 n.-3.20 pm.
6.097	ZRJ	JOHANNESBURG, S. AFRICA, 49.2 m. Addr. S. African Broad. Co. Daily exc. Sat. 11.45 pm.-12.50 am.; Daily exc. Sun. 3.15-7.30, 9-11.30 am. (Sat. 8.30-11.30 am.) Sun. 3.30-4.30 or 4-5 am., 5.30-7, 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.
6.083	VQ7LO	NAIROBI, KENYA, AFRICA, 49.31 m., Addr. Cable and Wireless, Ltd. Mon., Fri. 5.30-6 am., 11.15 am.-2.15 pm., also Tues. and Thurs. 8.15-9.15 am.; Sat. 11.15 am.-3.15 pm.; Sun. 10.45 am.-1.45 pm.
6.081	YV1RD	MARACAIBO, VEN., 49.32 m. 6-11 pm.
6.080	W9XAA	CHICAGO, ILL., 49.34 m., Addr. Chicago Fed. of Labor. Relays WCFL irregular.
6.079	DJM	BERLIN, GERMANY, 49.34 m., Addr., Broadcasting House. 4.50-10.45 pm.
6.077	OAX4Z	LIMA, PERU, 49.35 m. Radio National 7 pm.-1.30 am. Except Sun.
6.075	VP3MR	GEORGETOWN, BRI. GUIANA, 49.35 m. Sun. 7.45-10.15 am.; Daily 4.45-8.45 pm.
6.070	CFRX	TORONTO, CAN., 49.42 m. Relays CFRB 7.30 am.-12 m., Sun. 10 am.-12 m.
6.070	VE9CS	VANCOUVER, B. C., CAN., 49.42 m. Sun. 1.45-9 pm., 10.30 pm.-1 am.; Tues. 6-7.30 pm., 11.30 pm.-1.30 am. Daily 6-7.30 pm.
6.069	——	TANANARIVE, MADAGASCAR, 49.42 m., Addr. (See 9.53 mc.) 12.30-12.45, 3.30-4.30, 10-11 am., Sun 2.30-4.30 am.
6.065	SBO	MOTALA, SWEDEN, 49.46 m. Relays Stockholm 4.15-5 pm.
6.060	—	TANANARIVE, MADAGASCAR. 49.5 m., 12.30-12.45, 3.30-4.30, 10-11 am.

(Continued on page 632)

All Schedules Eastern Standard Time

"ECONOMY 3" Uses New 1.4 Volt Tubes

Harry D. Hooton, W8KPX

The 3-tube short-wave receiver described here was specially designed for use with the new 1.4 volt tubes. The design provides a tuned r.f. amplifier, a regenerative detector and a resistance-coupled a.f. amplifier.

● ALWAYS on the alert for new developments in economical radio operation, the rural short wave experimenter undoubtedly will be interested in the possibilities offered by the latest 1.4 volt battery-type tubes, recently released. Operating from only a single 1.5 volt dry cell and two 45 volt "B" batteries, never before has such extremely low cost of upkeep been possible. At the time of this writing, only five types are available—a pentagrid converter, a diode-triode, two output pentodes and one R.F. pentode. Other types, no doubt, will be released shortly.

Rear view of the "Economy 3" Receiver—an extremely smooth-working set using the new 1.4 volt battery tubes. The 3 tubes will operate on a single dry cell "A" battery.

"A" Battery Drain Only 0.15 Ampere

The three-tube short-wave set to be described here is designed especially for these new tubes. As the schematic diagram, Fig. 1, shows, a 1N5-G is used as a tuned R.F. amplifier, another 1N5-G as a regenerative detector and a 1A5-G as a resistance-capacity coupled A.F. amplifier. The total drain on the 1.5 volt battery is only 0.15 ampere; the combined plate and screen current is only about 8 or 9 milliamperes. The coils are of the plug-in type, wound on standard 6-prong forms, five pairs being required to cover the full range from 9.5 to 200 meters. Regeneration is controlled by varying the 1N5-G detector screen voltage with the usual 50,000 ohm potentiometer connected across the "B" voltage supply. Because of the high amplification factor of the 1A5-G output tube, almost as much volume can be obtained from the single pentode as would be produced by two tubes such as the type 30 or 1H4-G. If a sensitive, high-impedance speaker is used, most of the more powerful stations can be brought in with fairly good volume. However, the receiver, as shown here, is designed for headphones rather than a speaker.

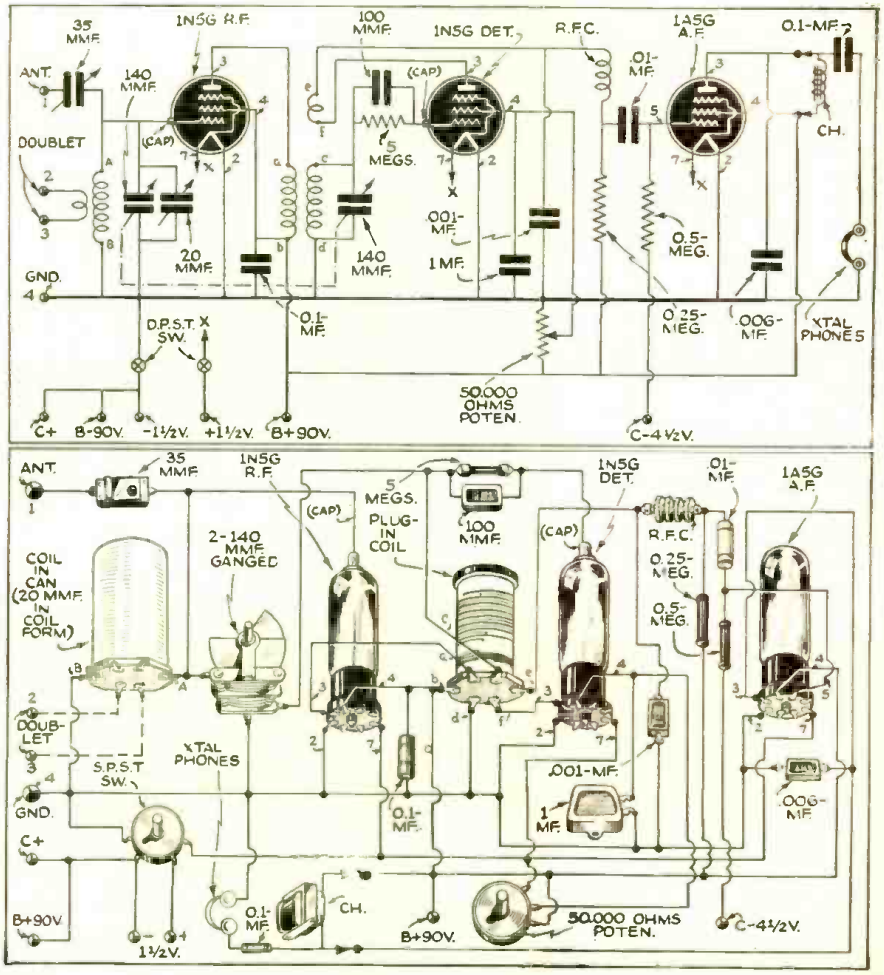
The set, as the photographs and drawings show, is built on a 7 x 9 x 2 inch steel chassis and a 7 x 10 inch front panel. The layout illustrated at the left was selected only after very much changing and shifting of the parts on a cardboard *dummy* chassis in order to find the arrangement best suited to this particular circuit. Any changes in the mechanical construction of the receiver, therefore, are not to be recommended.

Construction Simple

The actual job of constructing the set is not at all difficult. Work slowly and carefully, drilling and cutting all of the holes before any of the parts are mounted on the chassis. Make certain that the holes for the

(Continued on page 619)

Fig. 1. Diagram of 3-tube receiver.



How to Hear the

Television Sound Channel

Henry Townsend

● WITH the television receiver completed, the constructor has one of three channels open to him for the construction of a receiver for the sound accompanying the television program.

Many of the all-wave broadcast receivers manufactured for the past few years are capable of receiving frequencies between 60 and 30 megacycles. Should one be in possession of this type of broadcast receiver, the problem of a sound channel will be solved without any further work or expense on the part of the constructor. However, for those not so fortunate, the second and third recourse will be described in this article.

The second method is to build a converter for use with a broadcast receiver of the all-wave type that is capable of tuning to 9.75 megacycles, as this is the intermediate frequency chosen for the converter.

Briefly, the operation of a converter is as follows: The antenna is coupled to a tuned circuit which in turn is tuned to the frequency of the sound channel to be received, thence to the grid of a mixer where a second frequency is encountered. This second frequency is generated by an oscillator tuned to a frequency higher than that of the carrier by a difference of the intermediate frequency to be amplified by the all-wave broadcast receiver. These two frequencies, when mixed, produce this new intermediate one with all of the modulation as transmitted by the sound station.

In order to simplify the explanation, consider a specific case such as the television and sound station of the NBC in New York City. The vision is transmitted on a carrier frequency of 46.5 MC.; the sound, on 49.75 MC.

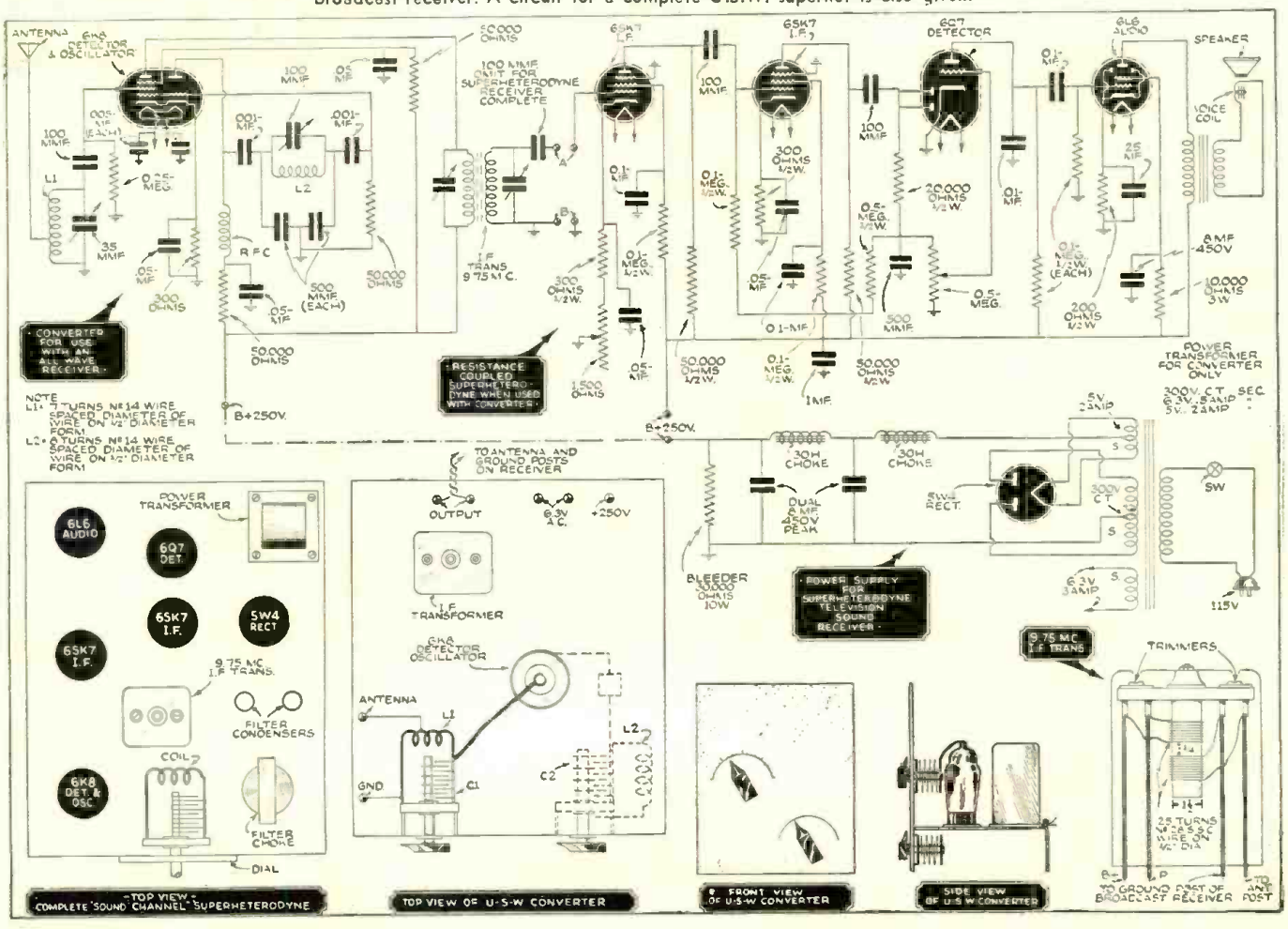
In this case the antenna circuit is tuned to the carrier of the sound; namely, 49.75 MC., and the oscillator to 40 MC., giving us a new frequency of 9.75 MC. to which the all-wave broadcast receiver is tuned.

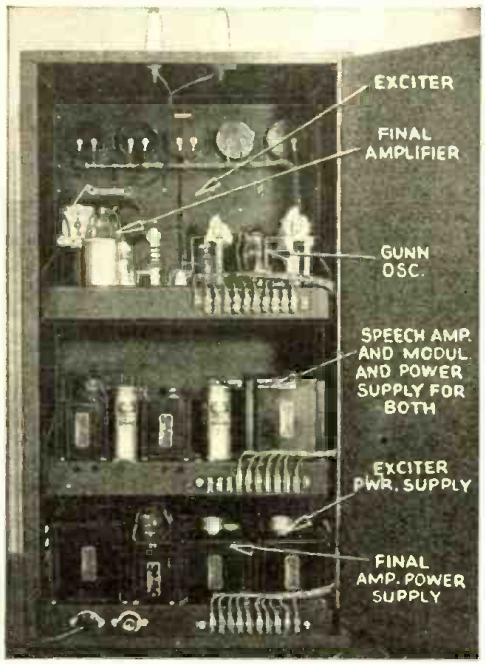
No difficulty should be experienced in building a converter of this type, with the possible exception of making the oscillator track with the antenna circuit, but a little experimenting with different size coils or condensers comprising the oscillator circuit should yield satisfactory results.

As no manufacturer produces a transformer tuned to the intermediate frequency of 9.75 MC. one will have to be made. Procure an old type of intermediate transformer, preferably one with a powdered iron core and of the double tuned type. Remove the coils, and wind as shown in detail. To tune this transformer to the approximate frequency, disconnect the antenna wire from the all-wave broadcast receiver and insert the primary in series with the antenna and the antenna terminal of the receiver. Tune the receiver to some station near 9.75 MC., then adjust the trimmer until the station disappears, showing that the tuned circuit is resonating at that frequency. Proceed and do identically the same with the secondary of the transformer. This procedure is not as good as if a signal generator is used, as it does not take into consideration the tube and other capacities

(Continued on page 621)

The diagram herewith shows how to build a simple ultra-shortwave converter, which will bring in the television sound channels on your present broadcast receiver. A circuit for a complete U.S.W. superhet is also given.





Rear view of the desk type transmitter.

A De Luxe Desk Transmitter

Alvin Abrams, W2DTT

Part 2—Conclusion

Part 1, in last issue, described R. F. sections of this 13-tube transmitter, which uses the new Gunn oscillator. Wavelength range, 10 and 20 meters.

● *Power Supplies:* Three power supplies are used in the transmitter, one for the exciter, which delivers 325 volts at 100 milliamperes, one for the final amplifier, which delivers either 500 or 600 volts at 250 milliamperes, and one for the modulator, which delivers 400 volts at 165 milliamperes.

A double-pole, double-throw switch is used to change the voltage on the final amplifier, and is so connected that when phone is to be used the modulator primary voltage is turned on and the primary tap on the final amplifier power supply transformer is connected to the low side to provide 500 volts. When code is used the double-pole, double-throw switch automatically disconnects the modulator power supply and connects the primary tap to the high side so that the voltage is increased to 600 volts.

Determining Ripple Percentage: The ripple percentage of a 2-section filter can be determined from the following formula:—

$$\frac{650}{L1L2\,(C1+C2)^2}$$

When figured out, the percentage of ripple in the power supplies is well under .25% (one-quarter of 1 per cent), insuring "hum-free" operation in the transmitter. The voltage regulation (i.e., decrease in terminal voltage from the no-load value to the value at which the power supply is to be worked) is exceptionally good. The percentage of all power supplies is approximately 5% for each.

Modulator Power Supply: The B negative should not be grounded to the chassis, in the modulator power supply, because the bias for the 6L6's is obtained from the voltage drop through the resistor. The total current of the tubes flows through the cathode side of the resistor to the ground side. The ground tap should be made near the cathode side of the resistor; a few hundred ohms is sufficient for a rough adjustment. The cathode bias should

(Continued on page 620)

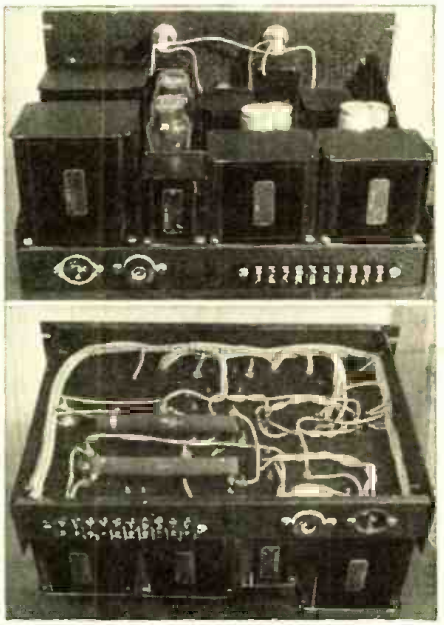
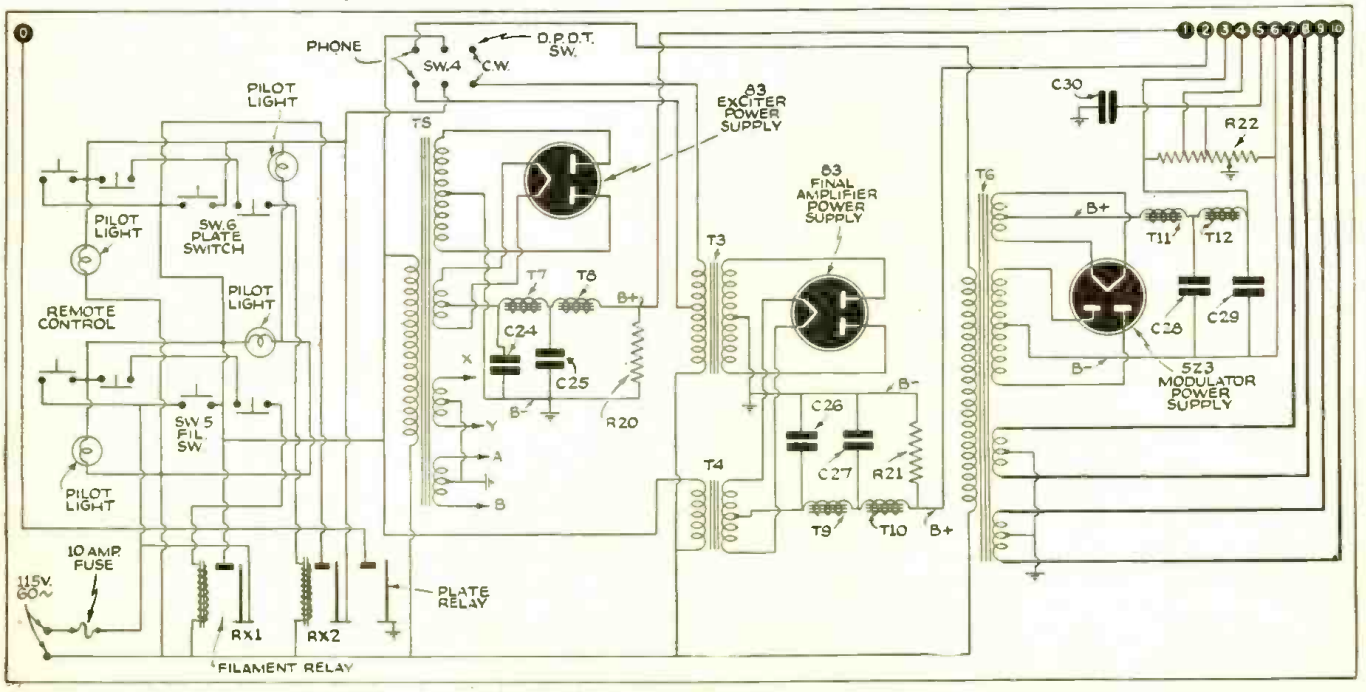
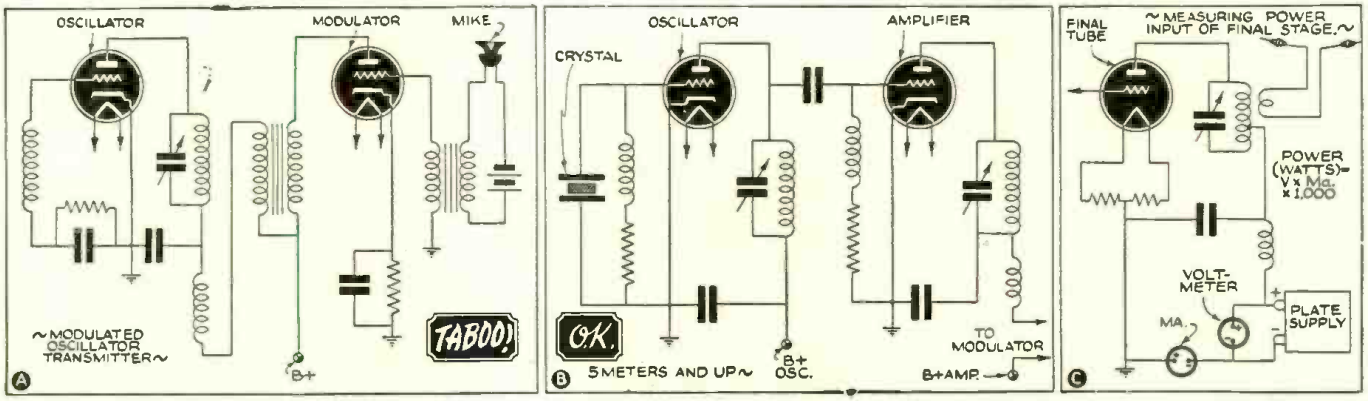

Top—Rear view of power supply. Lower view shows under side of same.

Diagram for the power supplies used with the 13-tube De Luxe Desk Xmitter.



Things YOU Can and Cannot Do Under new HAM "Regs."

Herman Yellin, W2AJL



● THE Federal Communications Commission has drawn up a new set of regulations governing amateur stations, effective as of December 1, 1938. They clarify old regulations and include many changes, raising the standards of amateur operation.

The death knell of the popular 5 meter *transceiver* has been sounded with the extension to 60,000 kilocycles of all the lower frequency regulations governing broad signals, frequency modulation, spurious harmonics, D.C. power supplies and stable signals. Hereafter transmitters operating on frequencies up to 60,000 kc. (5 meters) must be free from frequency modulation, spurious harmonics (including key-clicks and parasitics), use adequately filtered *direct current* power supplies and have a sharp signal and a frequency as stable as the state of the art permits. *Modulated oscillators* are definitely out! Thus at one fell swoop, about 50% of the 5-meter hams must scrap their *transceivers* and rebuild, using the oscillator-modulated amplifier type of transmitter. The oscillator need not be of the crystal-controlled type, but may be a self-controlled type, if one can be made to operate stably. A self-controlled oscillator should have a buffer amplifier to isolate it from the modulated amplifier. Separate power supplies for the oscillator and amplifier will also help reduce interaction between the two stages. For simplicity of operation, the use of a crystal-controlled oscillator is greatly to be preferred.

Checking Frequency: Another provision of far-reaching importance is the requirement for regularly *checking* the transmitter frequency. Since the measurement must be made by means independent of the transmitter frequency control, the use of a

(Continued on opposite page)

Transmitter Measurements With A DUMMY Antenna

Appearance of the extremely compact Dummy Antenna. It greatly simplifies Transmitter power measurements.

Bernard A. Stratmoen

● A SIMPLE, direct method of accurately measuring transmitter output and checking the effect of changes in excitation, bias and tuning on output and efficiency has recently been made available to the amateur. The most convenient method of measuring transmitter output is that involving the use of a non-radiating Dummy Antenna—that is, a resistor having sufficient capacity to radiate the transmitter output in the form of heat. Incandescent lamps have been extensively used as Dummy Antennas. However, the resistance may reduce to one-half of the full load value while dissipating low wattages. Output must be judged from a comparison of the brilliancy obtained to that of a similar lamp operating in a 115 volt socket. To make an accurate comparison a calibrated light meter is required, since it is impossible for the average human eye to accurately gauge differences even as much as two to one in the brilliancy of incandescent lamps.

The new type Ohmite dummy antenna resistor shown in the photograph has a non-inductive, space wound resistance element of unique design which is mounted in an evacuated gas-filled glass envelope. A four-prong steatite tube base reduces losses and conveniently mounts in a standard socket. The design makes possible such a low value of inductance that the impedance changes less than 10% with frequencies as high as 15 megacycles, while the high frequency resistance remains essentially constant.

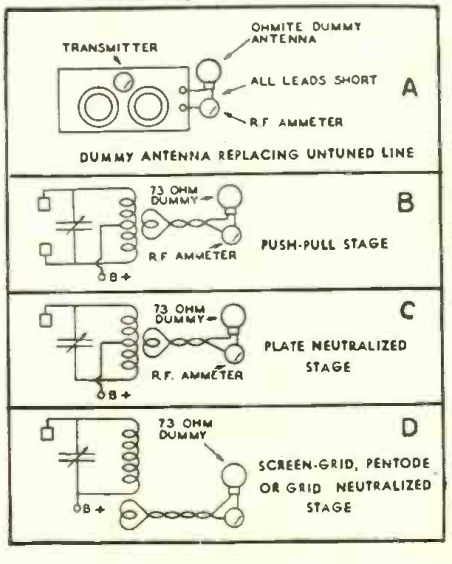
These practically constant frequency and load characteristics make it possible to interchange the Dummy Antenna with untuned transmission lines with a minimum of transmitter readjustment. Available in resistance values of 73 and 600 ohms, it will match in resistance the surge impedance of the more popular twisted pair, concentric, and open wire transmission lines. Correct impedance match is assured at all loads and frequencies, and output may be directly calculated from Ohm's Law.

Since properly terminated untuned transmission lines present a pure resistance load, a non-inductive Dummy Antenna may be interchanged with the feeders if its resistance matches the surge impedance of the line. The transmitter output with the Dummy Antenna will be identical to that obtained with the actual Antenna. Fig. A shows the method of connecting a Dummy Antenna and Radio Frequency ammeter to a transmitter which normally operates into an untuned line. No additional impedance matching equipment is required since the pick-up coil or antenna network for the line will also correctly couple the Dummy, provided a 73 ohm Dummy is used to replace a concentric or twisted pair line and a 600 ohm Dummy to replace an open wire line.

With the Dummy connected as shown,

(Continued on page 628)

Various Hook-ups of Dummy Antenna.



New HAM "Regs."

(Continued from opposite page)

crystal in itself will not be acceptable as assurance that the transmitter frequency is within the band used. Many of the cheaper crystals will oscillate at *two frequencies*, often erratically jumping from one frequency to the other, sometimes outside the band. For operation anywhere except at the edges of the bands, an accurately calibrated receiver will be adequate, while those who wish to skirt the very edge of the band will require *accurate frequency meters*. The ham without any frequency checking apparatus can arrange with some one else to check his frequency, since actual ownership of a frequency meter is not required. It should be borne in mind that the primary purpose is to prevent the transmitter frequency from straying *outside* the band. The receiver can be calibrated from the standard frequency transmissions of W6XK and W9XAN. Calibration points outside the band can be obtained by using commercial stations as markers. Incidentally, frequency checks may be obtained from commercial frequency measuring services for quite nominal fees.

Emergency Operation: During periods of widespread emergency resulting in the inadequacy of ordinary communications services, the Commission may restrict amateur operations in these areas to the handling of strictly relief work within the 1715-2000 kc. and 3500-4000 kc. bands. The frequencies 1975-2000, 3500-3525 and 3975-4000 kc. will be reserved for emergency *calling* channels and, after contact has been established, stations must shift to other frequencies for carrying on communications. Five minute listening periods are prescribed for the first five minutes of each hour throughout the entire 160 and 80 meter bands in order to intercept initial calls of major importance.

No Music to Be Transmitted: Amateur phone stations are no longer allowed to transmit music for the alleged purpose of testing. Single audio tones may be used for tests of *brief* duration. Phone stations are not to emit an unmodulated carrier. This means that the carrier must be removed from the air while receiving. Duplex operation must provide for the removal of the carrier while receiving. The 80 and 20 meter phone bands may be used only if the station owner has a Class "A" license. In the past the station could be operated on these bands provided any Class "A" operator was at the transmitter. In actual practice, once the transmitter was tuned and initially used by the Class "A" operator in the restricted bands, continued operation was indulged in by the station owner who was not licensed to use such frequencies. Regulations still allow an unlicensed person to speak into the microphone provided a licensed operator turns the carrier on and off.

High Power. Of interest to the *high-power* man is the stipulation that stations using an input to the final tube exceeding 900 watts must have accurate instruments for measuring this input power. Using a milliammeter in series with the power supply and a voltmeter across the high voltage supply, the following formula will serve to interpret the meter readings—

POWER (WATTS) = MILLIAMPERES X VOLTS X 1000

Maximum input remains at one thousand watts.

Applicants for amateur licenses who have physical disabilities preventing them from writing, may typewrite or dictate their answers; if they are unable to draw a diagram, they may give a detailed equivalent description. However, code requirements are not waived. Persons failing the examination need wait only 60 days before applying for re-examination instead of 3 months.

Penalties for Violations: When an amateur is cited a second time within a year for violation of the technical standards, such as *off-band* operation, phone operation in the c.w. band or in restricted phone band, having side-bands outside the band or poor signals, quiet hours of from 6 p.m. to 10.30 p.m. will be imposed and the amateur must within 15 days make tests to determine whether his station's defects have been corrected.

For a third citation within a year the drastic quiet hours of from 8 a.m. to 12 midnight will be applied. A test will be arranged with an F.C.C. monitoring station to observe if the defect has been corrected and the Commission may suspend the operator's license and revoke the station license.

New Bands: In addition to the older frequency bands, the bands between 112-118 megacycles and 224-230 mc. have been added. Amateurs may also use any frequency above 300 mc. with any type of emission. Television and frequency modulation transmissions may be used in the 112, 224 and 400 mc. bands. In addition, facsimile may be used in the 1.7, 56, 112, 224 and 400 mc. bands. I.C.W. may be used on all frequencies above 56 megacycles.

Amateur stations may use any frequency in the bands specified. Individual spot frequencies will not be specified.

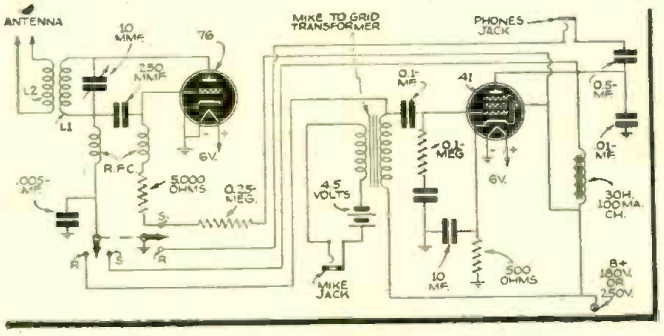
Portable and Portable-Mobile (operation while transmitter is in motion) is allowed without advance notice above 28 mc. Below 28 mc., advance notice to the Radio Inspector is necessary for portable operation, while mobile operation is still not permitted.

Question Box

2½ Meter Transceiver

I would like to construct a 2½ meter transceiver using type 76 and 41 tubes or their equivalents. Please show by diagram how this can be accomplished, giving complete coil data. I intend to use "B" batteries for the plate supply.—Paul Lennon, Chicago, Ill.

A. Here is a diagram of such a transceiver. It consists of a 76 and a 41 used in a conventional circuit. The 76 acts as a super-regenerator detector, coupled to the 41 pentode power tube when in the receiving position. When in the transmitting position, the



Circuit for 2½ meter Transceiver. No. 1168.

76 acts as an oscillator, and is modulated by the 41, in which case it serves as an amplifier for a single-button mike. A 4½ volt battery is connected in the mike circuit as shown in order to simplify the power supply. This separate mike battery makes it possible to use A.C. on the tube heaters when the unit is used as a fixed station. The coil winding data is as follows: L1—4 turns No. 14 on a ½ inch diameter coil, ½ inch long for 2½ meters. L2—1 turn of hook-up wire wound over the center of L1.

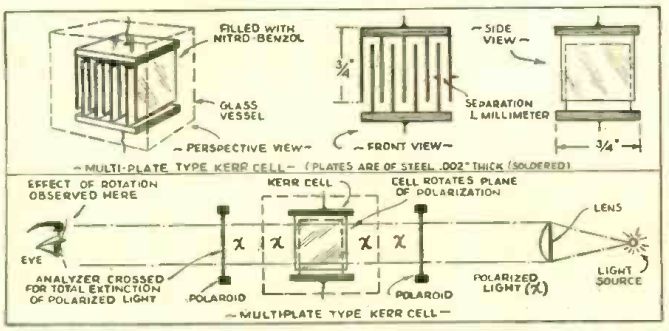
The RFC coils can be made by winding 100 turns of No. 32 DSC wire on a ½ inch bakelite or other insulating rod.

Kerr Cell for Television

Please show the construction of a Kerr cell or light valve to be used in modulating a beam of light for television receivers. The source of the light may be an arc or a concentrated filament incandescent lamp of high candle-power.—J. Henry Troup, Harrisburg, Pa.

A. Herewith is a description of a Kerr cell, of the multi-plate type.

The assembly is to be immersed in chemically pure nitro-benzol free from moisture.



Construction and line-up of Kerr cell (light valve). No. 1169.

Polarized light is passed between the plates. The plane of polarization is to be at an angle of 45 degrees to the plates of the cell. and then the emergent beam of light is analyzed by a second Nicol prism. Two pieces of Polaroid may be used for polarizing and analyzing of the light beam, but a great deal of light is lost as compared to the Nicol prisms.

The cell when first made has a low resistance but after it is used for about two hours the resistance increases to a very high value. It then passes a good deal of light. Once the cell attains its maximum resistance, it will remain stable until the nitro-benzol is changed. For this reason it would be better if the whole assembly were made in a glass enclosed vessel and the entire unit evacuated, similar to a radio tube. Then the longer the cell is used the better it becomes from the standpoint of light transmission.

Caution:—Nitro-benzol fumes are *very poisonous* and utmost care must be exercised when open vessels are used. The liquid is not explosive unless a great amount of moisture is present and then only to a very small degree.

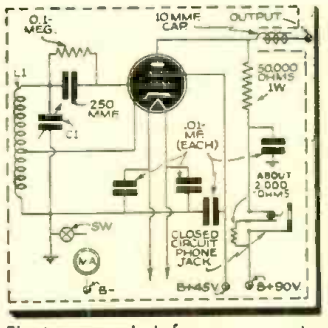
New "Ham" Regulations

I am informed that some new FCC "ham" regulations went into effect recently. If possible could you publish some of the high lights of some of the more important changes?—Lester Brooks, Springfield, Illinois.

A. The FCC has adopted a complete new set of regulations governing Amateur radio, effective December 1, 1938. There are scores of alterations, and some of considerable importance. Some of the high lights are published elsewhere in this issue.

E-C Frequency Meter Circuit

I would like to construct a frequency meter of the electron-coupled type and one using the heater type screen-grid tubes. Could you publish a diagram of such a meter with complete list of parts?—Harold Johnson, Bismarck, North Dakota.



Electron-coupled frequency meter hook-up.

A. One of the most stable oscillator circuits and therefore one of the most suitable for a frequency meter is the electron-coupled circuit which is shown herewith. The oscillation frequency is practically independent of moderate variations in supply voltages, provided the plate and screen voltages are properly proportioned. One feature that stands out is that the strong harmonics generated in its plate circuit make the meter useful over an extremely wide band of frequencies. In constructing the instrument, mount everything solidly, make connections with stiff wire, and place all leads so that they cannot be moved in the course of ordinary handling. L1 and C1 depend upon the frequencies to be covered.

High Frequency Glow Discharge in Glass Tubes

Can you give me some information regarding the factors which control the degree of a glow discharge in evacuated glass tubes when high frequency currents are applied to them? Can I use a 25-watt 20 mc. oscillator to excite such a tube and obtain a glow discharge? Is such a glow discharge in a vacuum tube a function of the frequency, of the current or of the voltage?—Ralph Orkin, Los Angeles, Calif.

A. The frequency of the exciting current upon gas discharge tubes has very little effect upon the intensity or spectral quality of the light emitted.

The intensity and spectral qualities are dependent on the following factors: The gas, gases or vapors used, the diameter of the discharge column, the pressure of the gas, gases or vapors and the current density in the discharge column.

The highest intensities obtained from glow discharge tubes are from mercury vapor under high pressure in constricted tubing about .5 mm. in diameter. Quartz is employed throughout.

Recently both General Electric Co. and Westinghouse Electric & Mfg. Co. announced a tube similar in construction, cooled by running water through a jacket surrounding the lamp. It is claimed that intensities per square millimeter approximating one fifth that of the sun's surface are obtained with an input of one kilowatt at a commercial frequency.

This type of tube can be energized with a high frequency source by placing it directly in the high frequency field of the plate tank circuit of an oscillator, having an output of the order of 1 kw.

1-Tube Set Is Watch-Charm Size

(Continued from page 588)

condenser which is seen facing you in the photograph of the side view of the set. The set will operate on as little as a 3-inch antenna or the body capacity of the person using it. It will, however, produce better results with a longer aerial—a 50-ft. antenna worked excellently. The antenna trimmer, however, must be varied when the antenna is changed. A 45-volt midget B battery supplies the plate current, while a railroad 6-volt lantern battery works well for the A. The center post on this battery is negative; the end post, positive. A 15-ohm resistor should be inserted in the A– lead to the filament.

The set may be carried on the watch chain as a charm, with a small wire running down the trouser's leg and a nail attached. The nail may be carried in the trouser's cuff, and pressed in the ground for a ground connection.

This little set operates extremely well. When tried out for DX in a rowboat with aerial and ground wires both thrown in the water, it worked well and brought in signals from several airplanes. Planes 9,000 feet up and airplane stations all over the map were heard in this and other tests. Station 3VHK5 (or CVHK5) was heard talking about the Catholic population of some country. The writer would like to hear from CVHK5 (or 3VHK5). On another occasion, the airplane dispatcher was heard giving messages to several airport stations at once: Newark, N. J.; Raleigh, N. C.; Baltimore, Md.; Washington, D. C., and a few others. All these stations were heard to O. K. the message. This test was made in East Liverpool, Ohio. In a test at Tionesta, Pa., using a 50-foot aerial, W1CEI, Cape Cod, was heard talking to an amateur in Chicago; others heard were W3LW, W3HGA, W1GEY, W9CLW, W1IEF, CLW, W3EAB, WWDW talking to WWHF (the lighthouse tender near Philadelphia), W4XR, W8LR, W1BF, W2KXH, Atlanta, Ga.; Washington, D. C.; Raleigh, N. C.; Newark, N. J., and several other airports with pilots 9,000 feet up answering their calls. Camden, N. J., airport and a plane above this port were also heard.

The set, as you can see from the foregoing, functions well. It is inexpensive and easy to make. Not only will it afford the experimenter much interesting reception, but makes a novelty which arouses comment everywhere it is seen.

Parts List—Watch-Charm Set

HAMMARLUND
2—trimmers (midget) 3-30 mmf.

AEROVOX
1—.0001 mf. condenser (midget)
1—.001 condenser (midget)

RCA
1—955 tube

I.R.C.
1—1 meg. resistor (midget)

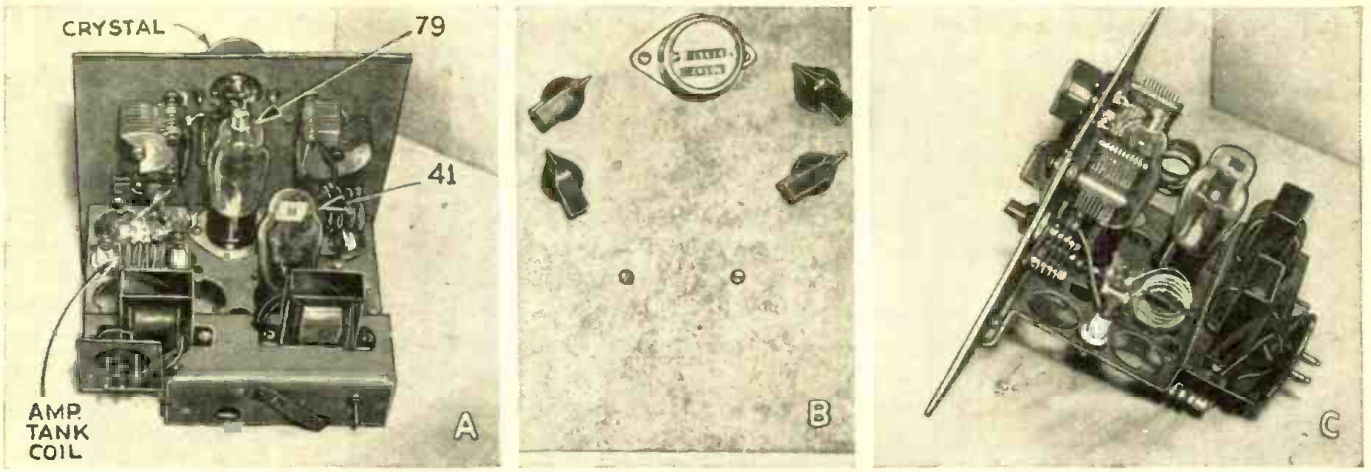
RATHBUN MFG. CO.
1—bakelite ring box (for chassis)

MISCELLANEOUS
Wire, mounting screws, etc.

Additional Coil Data for Watch-Charm Set

Band (Meters)	*Secondary Turns*	*Tickler Turns*
5-10	6	6
20-31	12	12
25-48	18	12
48-75	24	24

Wire should be No. 38, d.s.c.



The Inside Story: Left, back view; Center, the panel, showing controls and crystal; Right, side view.

A Mobile 5-Meter Xmitter

Harry J. Mills

This easily built Transmitter fits every car and every purse.

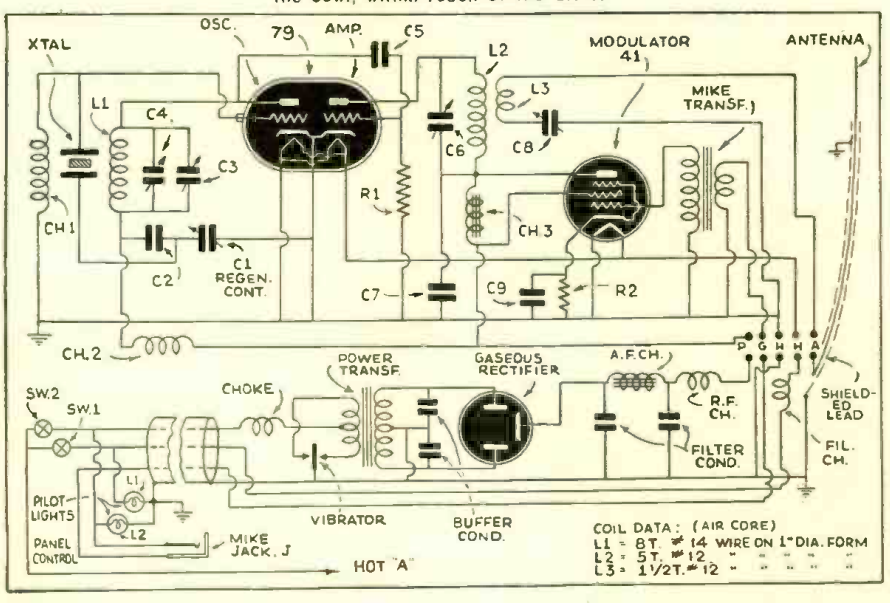
● THE first requirement of mobile equipment is the use of separate transmitter and receiver circuits, if not individual units. While many satisfactory combination units have been made, in which a common audio system is switched from one circuit to the other, the flexibility allowed with separation of the functions is of distinct advantage. New developments in either transmitter or receiver technique can be adapted to present equipment much more readily if each is complete in itself. The *transceiver* which found much favor in the early days is, of course, extinct except for use on two and one-half meters or below.

The second requirement is for a crystal-controlled transmitter. Modern receiver construction and the need for maintaining operation *within-the-band* dictate this essential. The resulting *sharp* carrier will prove more effective than a modulated oscillator of several times the carrier strength. Advent of the 10-meter crystal has made such design relatively simple.

Economy of battery consumption limits the amount of power which is available in the average passenger car, and too often transmitters have been installed which made constant need for recharging, and run-down batteries, the rule—rather than the exception.

Simplicity of construction and low initial cost are other items too often overlooked in designs which have been made with operation other than for the amateur in mind. All these items have been taken into account in the present equipment.

In this schematic, note that pilot lights, switches, and mike jack are all to be mounted on the cowl, within reach of the driver.



Circuit

Reference to the accompanying schematic diagram will disclose the simple circuit employed in the transmitter. In the R.F. end will be seen a type 79 dual triode which acts as crystal oscillator and doubling modulated amplifier. Excitation was found to drop off with slight changes in constants in an early model and the present design uses a *regenerative* oscillator. Fairly high C is used in the oscillator plate circuit; no bias is used in this circuit.

The amplifier has a grid-leak for bias and is conventional in design. No neutralizing is needed since this stage *doubles* at all times. If ten meter operation is anticipated, it would be advisable to use a twenty-meter crystal and change both tank coils.

Plate voltage to the amplifier is fed through the midget output transformer which loads the modulator tube. This stage is the standard pentode audio amplifier circuit, and is fed directly from the high output single-button microphone. The earlier set employed a triode speech amplifier ahead of the modulator but was found to require a gain control and gave no better results.

A single turn pickup coil coupled to the amplifier tank is used to feed the antenna. A series tuning condenser serves to match the feeder to the tank.

Any source of voltage will serve for the plate supply as long as it exceeds 150 volts, but potentials from 200 to 250 will be needed to give adequately great output power.

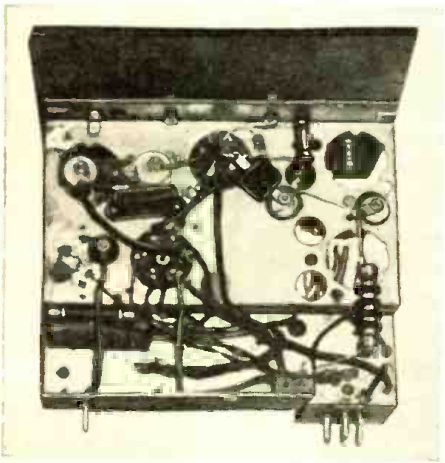
The control circuits allow the unit to be mounted at a distance from the operating position, such as in the rear trunk, and provide for standby with heaters connected and application of plate and microphone

voltage only when desired. Voice currents are fed via the same cable to the modulator. Lights indicate the condition of the switch-operated circuits.

Mechanical Construction

The secret of best fulfilling the last requirement of low cost and simplicity of construction is in the use of a discarded auto radio as a basis for the transmitter. A Motorola with plug-in power-supply and chassis was employed in the one shown, but any set which has a power-supply capable of giving the required voltage at a drain of about 60 ma. will do. The actual mounting of the parts will depend on the type chassis used, but the number of components is so small that no problem should arise which a little thought will not solve.

The rear view of the set shows the placement of most of the parts. The audio transformers are along the back, just inside the edge from which extend the plugs which fit into jacks in the box. In front of the input transformer is the type 41 modulator. To the left is the oscillator coil with trimmer connected across it. On the panel can be seen the two variable condensers comprising regeneration and tank control for that circuit. In the middle of the front of the chassis is the 79 tube; the crystal can be seen near the top grid terminal. To the right are the amplifier condenser and antenna coupling control. Just behind these are the feed-through insulators which support the amplifier tank coil.



Bottom view of transmitter.

The side view shows the placement of the coils and condensers. The feed-through insulators of the oscillator tank are also visible. There are but few parts under the deck, and these are connected point-to-point in order to keep all leads at a minimum. There is very little wire in the set except for the coils and power leads.

The 4-prong plug contains the connections to the power supply and control unit. The single prong on the other side of the chassis is for connection to the antenna feeder.

Adjustment and Operation

The tuning of a transmitter of this type is somewhat different from that of a high-powered set or a low-frequency outfit. No provision for metering has been provided, since once in the car it is of little use, but during the preliminary adjustment it is well to connect a meter of proper value in the positive high voltage lead. This done, the current should rise to a reasonable value, say 25 ma., when the modulator tube is plugged in.

At this point it will be well to check the audio system by putting a speaker across the voice coil terminals (otherwise not used). A good signal should result if the microphone is spoken into.

Now plug in the oscillator-amplifier tube and with the regeneration condenser at full capacity, swing the plate condenser to see if oscillation ensues. If not, decrease the capacity of the regeneration condenser and repeat. At some point oscillation will begin and this is just about the right setting for best results. Less capacity in the regeneration condenser will give greater output but permit oscillation at other than the crystal frequency.

The plate current will increase to 40 or 50 ma. when oscillations begin, and drop slightly when the amplifier is resonated. Coupling the ant. will load the power-supply up to 60 ma. If the voltage is much over 200, or the power-supply capable of higher current output, more power can be expected and all readings will be correspondingly higher.

Once in the car the best way to adjust the "rig" is with a sensitive "field-strength" meter and a receiver loosely coupled to a short antenna. The field-strength meter will indicate maximum output and the receiver will give a check on frequency and modulation. If desired, a meter can be incorporated —or an additional pair of wires will permit one to be installed on the control panel.

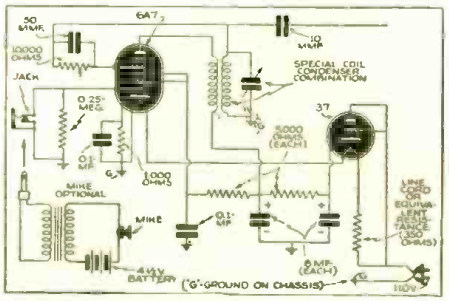
Parts List

T1—Midget S.B. Mike Transformer
(Power supply components not given. Will depend on set used as foundation)
S1 and S2—Toggles
J—Mike jack, pilot lights
X—10 meter crystal
C1—140 mmf. variable
C2—250 mmf. mica
C3—3-30 mmf. trimmer
C4—25 mmf. variable
C5—.0001 mf. mica
C6—25 mmf. variable
C7—.002 mf. mica
C8—140 mmf. variable
C9—.5 mf. paper
R1—½ watt. 50,000 ohms
R2—1 watt. 500 ohms
Ch1 and Ch2—2.5 mh. R.F. chokes
Ch3—Midget Pentode Output Trans. (with sec. open)

Radio Phonograph Control

● THE remote phono unit designed by Eagle Radio Co. engineers makes it possible to operate a phonograph pick-up or microphone through your radio without making a single connection.

Two tubes are used in the unit. The control grid and plate elements of the 6A7 are arranged as an oscillator and the input of the pick-up, connected to the No. 1 grid, varies the electron stream within the tube, thus modulating the output. A 37 tube, with its plate and grid tied together, is connected as a half-wave rectifier and with a resistance-capacity filter serves to furnish the voltage for the oscillator.

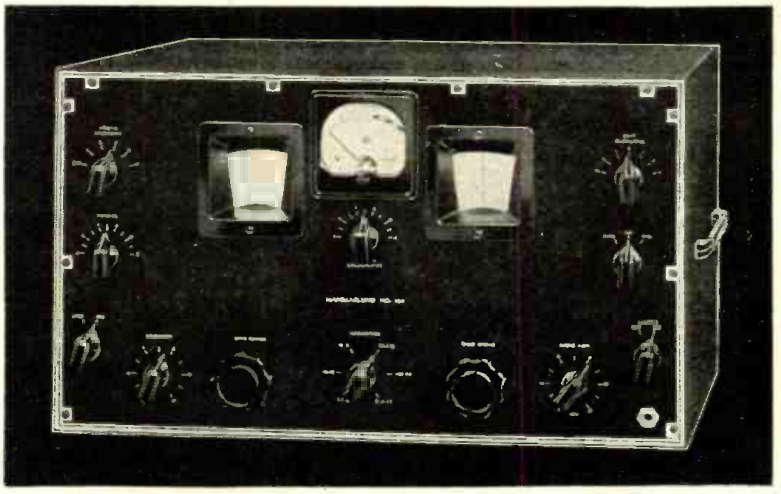


The pick-up is plugged into the jack provided for it and the radio tuned to the low-frequency end of the dial (around 600 kc.) where no station is heard and the turntable is then started. The condenser is varied by turning the adjusting screw until the record is heard through the loud-speaker with the volume control well up.

HQ-120

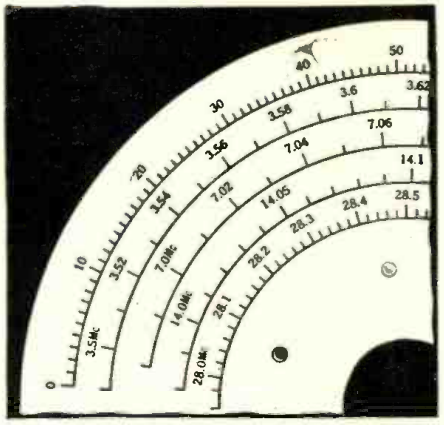
A New Receiver

for Fans and Hams



Front view of new HQ-120 Receiver. Band-spread dial calibrated in MC. serves as frequency monitor.

New crystal filter circuit useful on phone as well as C. W. Signal strength meter accurate throughout tuning range——31 to .54 mc. (9.7 to 555 meters). Liberal band-spread in Ham bands. Calibrated B-S dial serves as freq. meter. Noise Limiter included.



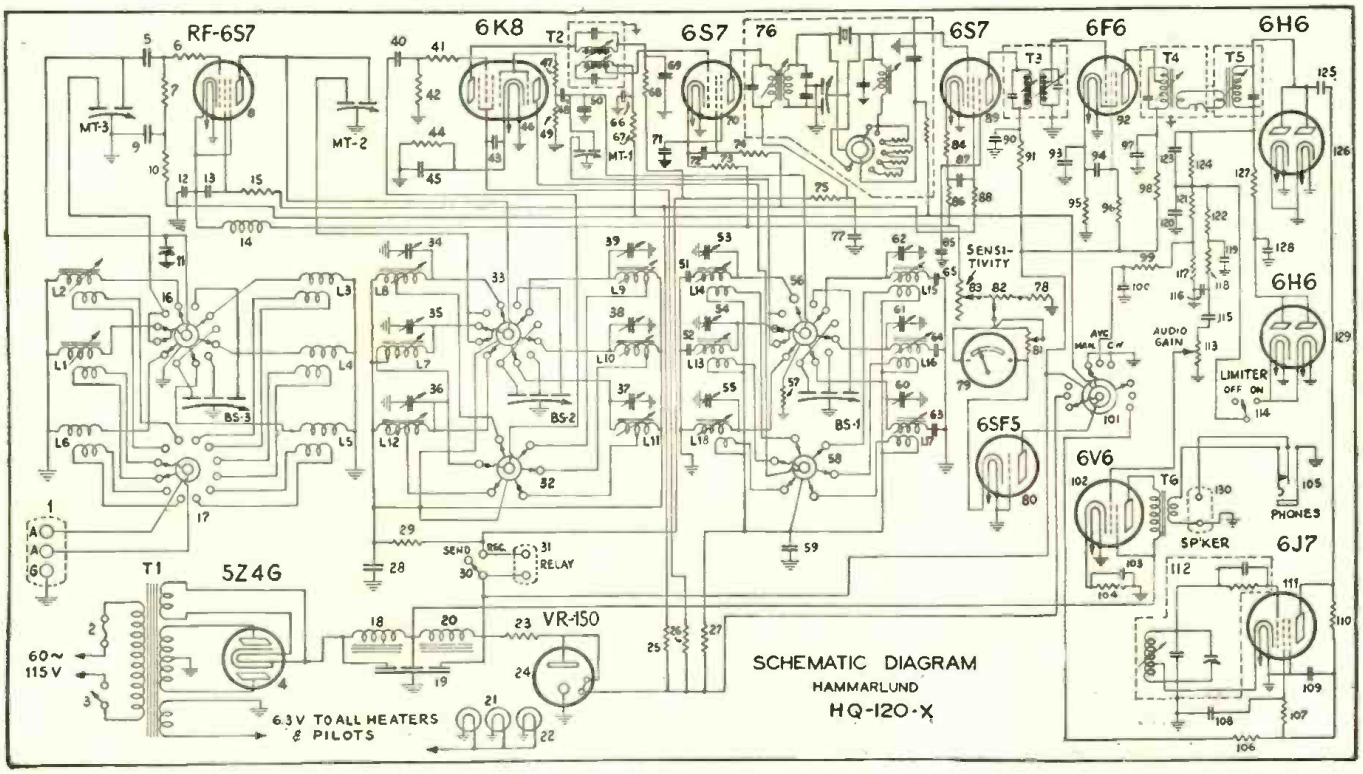
Close-up view of B-S dial, showing accurate MC. graduations.

● TWO courses are open to the designer of a communications receiver for amateur and commercial operation. One is to modify a standard broadcast receiver; the other is to design a receiver especially for communication work. While the latter is more costly, requiring original engineering work and precision parts, it is preferable from the standpoint of efficiency. It is to this class that the New Hammarlund HQ-120-X belongs. According to the manufacturer's engineers, its functional design has been carried even further than those of usual commercial communications receivers.

This new set includes various special features, among which is a novel type of crystal filter of which it is said to make exclusive use. While the conventional crystal filter is excellent for "single-signal" C.W. reception in the crowded Ham bands, it is of no particular use to the short wave listener or the S-W phone fan. However, the crystal filter which Hammarlund engineers have produced has a complete range, its selectivity being variable from the set's maximum band width to the usual "razor-edge." Its range is divided into six steps including "Off," the first two or three being suitable for phone use. No. 1 position,

(Continued on page 623)

Diagram of the new HQ-120-X receiver for Fans and Hams.



New HAM Licenses

COMPILED FROM THE LATEST RECORDS OF THE FEDERAL COMMUNICATIONS COMMISSION

THERE are now approximately 50,000 licensed radio amateurs in this country. And hundreds of new amateurs are being licensed every month.

Heretofore no publication has listed the names and addresses of the new licensees as issued. RADIO & TELEVISION Magazine now provides this unique service, and publishes a list of newcomers in every issue. Check the names carefully so that you will be able to get in touch, not only with those amateurs in your neighborhood and vicinity, but also with those distant amateurs whom you wish to contact either by mail or by radio.

This month's list contains names of more than 300 newly licensed amateurs. The names of YL's and XYL's appear in blackface type.

K6QOF Albert Burns, 1249 16th Ave., Honolulu, T. H.
K6QPG Richard La Bagh Kile, 585 John Rodgers Airport Rd., Damon Tract, Honolulu, T.H.
K6QPI Alfred Voigt, Bldg., 3016, Radio Sec. Room, 11th Signal Co. Schofield Barracks, T.H.
K7HDZ Harold Adams, 640 Water, Ketchikan, Alaska.
K7HEU Roy Preston, 9th & F., Anchorage, Alaska.
K7HFI O. C. Pinney Connelly, Savoonga, Alaska.
K7HFL Otis A. Cunningham, 1st Ave., Nome, Alaska.
K7HFQ Douglas W. Matthews, ½ mi. W. of Nat'l Cemetery, Sitka, Alaska.
WIDZM Bernard K. Kellon, 40 Jefferson, Bangor, Maine.
WILQZ Marshall Potter, Co. M, 104th Inf. M.N.G. State Armory, Park St., Adams, Mass.
WILRA Eugene Bosworth, 9 Avery, Westfield, Mass.
WILRB George E. McDonald, 34 Ash, Waltham, Mass.
WILRC William Richard, 382 Chelsea St., East Boston, Mass.
WILRD Walter F. Sheridan, Morse Rd., Wayland, Mass.
WILRE Charles Thayer, Northwood St., Feeding Hills, Mass.
WILRG George S. Russell, 167 3rd St., Bangor, Me.
WILRI Charles McLeod, 29 Atwood, Newington, Conn.
WILRJ George Libby, Jr., 8 Hathaway St., Waterville, Me.
WILRK Phillip Rand, 11 Henry St., Saugus, Mass.
WILRM William Smith, 769 Lake Ave., Manchester, N. H.
WILRN Ranson H. Willard, Trustee, Hi-Q Radio Club, 11 Chase Rd., Lynn, Mass.
WILRO Joaquim T. Russe, 120 Commercial St., Provincetown, Mass.
WILRP Ames Millett, 37 Morning, Portland, Maine.
WILRQ Gerald Wood, East Baldwin, Maine.
WILRS Harvey Karp, 2947 Main, Springfield, Mass.
WILRV Michael Calabrese, Jr., 16 Sanger St., Medford, Mass.
WILRW Andrew Gura, 210 Fairchild Ave., Fairfield, Conn.
WILRX Fred F. Hagner, 327 School St., Berlin, N. H.
WILRZ Wm. D. Truland, 13 Gerry Ave., S. Portland, Maine.
WILSA Earl C. Batchelder, 537 N. Washington St., N. Attleboro, Mass.
WILSB Elmer G. Friberg, 44 Mountain Ave., Melrose, Mass.
WILSH Samuel Shaw, 529 Chestnut, Arlington, N. J.
W2BRR Thomas Buzalski, 113 So. Union Ave., Cranford, N. J.
W2DZU Konstantin Woloschak, 11 Broadway Terrace, New York, N. Y.
W2GUE Edward Gorleski, 105 Ames Ave., Leonia, N. J.
W2HGZ Jack C. Stewart, 517 McDonald Ave., Brooklyn, N. Y.
W2HWU Conrad R. Kuhn, 330 Indiana St., Union, N. J.
W2JIV Stephen Gutleber, 426 Union Ave., Paterson, N. J.
W2LRR Morton Brody, 1824 E. 26th St., Brooklyn, N. Y.
W2LRS Wm. Bache, 26 Carty Ave., Ft. Monmouth, N. J.
W2LRT Lewis C. Bohn, 139 Sagamore Rd., Maplewood, N. J.
W2LRU Wm. Campanelli, 5414 7th Ave., Brooklyn, N. Y.
W2LRV Daniel P. Murray, 151 Sickles Ave., New Rochelle, N. Y.
W2LRW Marcel Reeds, Ghent, N. Y.
W2LRX Jose Santos, 562 W. 148th St., New York City.
W2LSD Nils P. Michaelsen, 55 Temple, Harrison, N. Y.
W2LSE Gerald Illenberg, 222 Wickham Ave., Middletown, N. Y.
W2LSF Arnold Karton, 69-34 Almeda Ave., Arverne, N. Y.
W2LSG Chester Knowles, Jr., 21 Seaview Ave., New Rochelle, N. Y.
W2LSI Rudoph Schwenker, 8037 87 Ave., Woodhaven, N. Y.
W2LSJ Eben Pitman, 70 Gates Ave., Montclair, N. J.
W2LSK Frederick Alden, 194 New St., Belleville, N. J.
W2LSL George Bailey, 1065 Summit Ave., N. Y. C.
W2LSM Angelo E. Frodella, 196 Mercer, Jersey City, N. J.
W2LSN Frederick Galla, 4331 Park Ave., N. Y. C.
W2LSO Douglas Martin, 26 Wilson, Hartsdale, N. Y.
W2LSP Frank Orrico, 437 Wayne St., Jersey City, N. J.
W2LSQ Alfred Schmalfuhs, 131 Passaic Ave., Hawthorne, N. J.
W2LSR John Palkowetz, 207 Lexington Ave., Maplewood, N. J.
W2LST Henry Ferrari, 232 Jackson St., Hoboken, N. J.
W2LSU Albert Cahill, 287 W. 150 St., New York, N. Y.
W2LSV John Zieger, 181 Waldo Place, Englewood, N. J.
W2LSW Henry Weiss, 1970 Vyse Ave., New York, N. Y.
W2LSX Marvin D. Hall, Jr., 227 Orchard, Cranford, N. J.
W2LTA Guy Leon Ottinger, 4 Chester Place, Tompkinsville, N. Y.
W2LTB Patrick McDonnell, 434 W. 164th St., N. Y. C.
W2LTC Fred J. Lambert, 66 Llewellyn Ave., Hawthorne, N. J.
W2LTE Vincent Sullivan, 5008 Broadway, New York, N. Y.
W2LTF Arthur W. Smith, 8017 12th Ave., Brooklyn, N. Y.
W2LTG Theodore W. Rau, 588 Van Buren St., Brooklyn, N. Y.
W2LTH Harry Gibson, 184 Lockwood Ave., Yonkers, N. Y.
W2LTI Frederick Gichner, 73 Devon St., North Arlington, N. J.
W2LTK Walter J. Kooker, 4214 Snyder Ave., Brooklyn, N. Y.
W2LTL Richard P. Slade, 100 Argyle Ave., New Rochelle, N. Y.
W2LTM Peter Sanicola, 372 Elton St., New York, N. Y.
W2LTN Leon H. Wicoff, 78 W. 105th St., New York, N. Y.
W2LTO Joseph J. Stahl, 68 Washington Ave., Garden City, N. Y.
W3DPK William Harris, Jonestown, Pa.
W3EAI Charles R. Eason, 1704 Charleston Ave., Portsmouth, Va.
W3HVT Charles B. Lamm, 3131 N. 13th St., Phila., Pa.
W3HVU Stafford North, 813 Fourth St., Portsmouth, Va.
W3HWB James L. Carter, 1054 Rivermont Terrace, Lynchburg, Va.
W3HWC John Schroeder, 9 East Narberth, Collinswood, N. J.
W3HWD Edgar Ailes, 1207 S. Peach St., Phila., Pa.
W3HWE Fred Boyer, 550 Newcomb St., S.E., Washington, D. C.
W3HWF Willis Moss, 906 C St., N.E., Washington, D. C.
W3HWG Joseph Petranek, Hickory, Va.
W3HWH Wm. B. Bangs, 3410 Kenyon Ave., Baltimore, Md.
W3HWI Leslie Arvay, Jr., 519 Normandy St., Allentown, Pa.
W3HWK Fred Liebrecht, Jr., 3138 Natrona, Phila., Pa.
W3HWL Joseph F. Falabella, 4422 Georgia Ave., Washington, D. C.
W3HWM Vernon Lee Ferguson, 4804 47th St., N.W., Washington, D. C.
W3HWN Paul H. Hertzler, 126 N. 28, Penbrook, Penna.
W3HWO Robert A. Worley, 607 Rutherford Ave., Trenton, N. J.
W3HWP Joseph E. Joy, 42 W. Linden Ave., Collingswood, N. J.
W3HWQ Rudolph E. Stefanucci, 238 Chestnut St., W. Reading, Pa.
W3HWR James R. Coale, 2913 Grindon Ave., Baltimore, Md.

(Continued on following page)

New HAM Licenses

(Continued from preceding page)

W4RD Isadore Goldwasser, 1501 S. Hull, Montgomery, Ala.
W4BVE Alan Hinshelwood, Cannon Hall, Univ. of South, Sewanee, Tenn.
W4BWW Carson Y. Jones, Mims, Florida.
W4CJR Samuel C. Long, 228 N. 9th St., Gainesville, Fla.
W4DOH Hugh Dickinson, 235 Boulevard, Monroe, Ga.
W4FSQ Louis Gossett, Jr., Stable Area, Hdq. Btry., 4th F.A., Ft. Bragg, N. C.
W4FSW Herbert Arnold, 2426 29th, Birmingham, Ala.
W4FSX Thomas Bigelow, CCC Co. 5419, Star Route, Awendaw, S. C.
W4FSY Lotis Lee Darlington, A Masonic St., Miller, Ga.
W4FSZ Thomas Brown, 54 Geneva St., Opelika, Ala.
W4FTA Robert Herrin, District Radio School Qtrs., Moultrieville, S. C.
W4FTC Earle Rebik, 1378 Ridgeway, Memphis, Tenn.
W4FTD Louis Bouton, Hdq. Co. 29th Inf., Ft. Benning, Ga.
W4FTE Ervin Cathcart, Quarters District "I", Signal Detachment, Moultrieville, S. C.
W4FTF David Walker, CCC Co. 4474, Gaffney, S. C.
W4FTG Raymond J. Ford, 221 N. Barcelona St., Pensacola, Fla.
W4FTH Floyd D. Woolum, 233 Washington St., Roanoke, N. C.
W4FTI Frank Rowe, 843 N. Washington, Gainesville, Fla.
W4FTJ Wm. B. Fonda, 325 11th St., West Palm Beach, Fla.
W4FTM Edwin Pullen, Damascus, Ga.
W4FTN Howard S. McIntyre, 2017 Union Ave., Memphis, Tenn.
W4FTP Chadwick M. Baker, Jr., 2525 Highland Ave., Apt. H-5, Birmingham, Ala.
W5BNF Glen H. Byars, 413 East Elm, Hillsboro, Texas.
W5CPI Jack M. Harkins, 3145 N.W. 26th, Oakland City, Okla.
W5CXS Wm. Basden, 1022 N.W. St. Francis, Brownsville, Texas.
W5EJG Harry H. Tompkins, Jr., 440 Hickory St., Abilene, Texas.
W5EJJ Robert Tosch, College Station, Texas.
W5HNS Douglas Watson, 609½ S. El Paso, El Paso, Texas.
W5HOH Thomas Cook, Jr., 1414 Cleburne, Houston, Texas.
W5HOI Louis Bastian, 2525 O'Reilly St., New Orleans, La.
W5HOJ Walter Bahn, R.F.D. No. 1, Elgin, Texas.
W5HOK John Bahn, R.F.D. No. 1, Elgin, Texas.
W5HOL Charles Woodman, 4012 Purdue St., Dallas, Texas.
W5HOM Ralph G. Hersey, 183 Hancock Rd., Ft. Sam Houston, Texas.
W5HON Jewell Sharp, Robinsonville, Miss.
W5HOO Emile Serpas, 2535 N. Miro, New Orleans, La.
W5HOP Francis L. Ready, Bldg. No. 38, Hq. Troop 8th Cavalry, Ft. Bliss, Texas.
W5HOQ Carl B. Cahill, 1826 Procter St., Port Arthur, Texas.
W5HOS Ervin Pringle, 1108 N. 3rd St., West Monroe, La.
W5HOU Robert J. Evans, U. S. Eng. Reservation, Harvey, La.
W5HOW Marion Hill, 2403 Bagby, Houston, Texas.
W5HOX Howard M. Robinson, 1417 Harrison, Amarillo, Texas.
W5HOY Vincent M. Smith, 619 S. Edith, Albuquerque, N. Mex.
W5HOZ Wm. Sizemore, 320 N. 7th St., Aubuquerque, N. Mex.
W5HPA Alvie Almon, 1625 St. Augustine Ave., Port Arthur, Texas.
W5HPB Roy M. Brougher, 1705 State St., Houston, Texas.
W5HPC James Loofbourrow, 2958 Russel, Abilene, Texas.
W5HPD James Norton, 209 South, Haynesville, La.
W5HPE John Van Dornick, Jr., 2043 Kelly St., Alexandria, La.
W5HPF John E. Traver, Barkdale Tourist Cottages, No. L., Barkdale Blvd., Bossier City, La.
W5HPG Edward C. Stephenson, 607 W. Adams St., Brownwood, Texas.
W5HPH Gerald C. Seaman, House No. 82 Pan American Refinery, Destrehan, La.
W5HPJ Thomas K. Dixon, Jr., 3602 Main St., Houston, Texas.
W5HPL Cressey E. Gregary, 2900 Emrich, Ft. Smith, Ark.
W5HPM Eddie J. Wren, Jr., 767 Heard St., Baton Rouge, La.
W6AWN Albert Moorhead, Jr., 1369 Hyde, San Francisco, Calif.
W6CFI Walter Olsen, 84 17th St., Hermosa Beach, Calif.
W6COB Robert H. Tewell, 1634 H St., Napa, Calif.
W6CZB Frank Robertson, 760 S. Arizona Ave., Los Angeles, Calif.
W6EHH Oliver Lekola, 335 Earl Ave., Roseville, Calif.
W6FAQ Frederick Tenhunen, Jr., 8714 Birch St., Oakland, Calif.
W6GJQ Clifford C. Gryst, Pt. Reyes Stn., Calif.
W6KLW Harold Dahman, U. S. Geological Survey Stream Gaging Station near Picacho, Imperial Co., Calif.
W6LSS Seishi Yasunaga, 3706 Emerald St., Torrance, Calif.
W6LVH Don Harris, 136 Georgia, San Bruno, Calif.
W6QNN Percy Morgan, Jr., R.F.D. No. 10, Phoenix, Ariz.
W6QNO Tom M. Ase, 16 East Elm Ave., Flagstaff, Ariz.
W6QNP Clifford Beresford, 4855 Fountain St., Los Angeles Calif.
W6QNR Joseph Marks, 1015 W. 9th St., San Pedro, Calif.
W6QNY Margaret Moon, 4203 Griffin Ave., Los Angeles, Calif.
W6QOD Nancy Hampton, Riverside Drive, Truckee, Calif.
W6QOE Walter Alverez, 316 N. Bixel, Los Angeles, Calif.
W6QOG Helen Leonard, 1205 S. Edris Ave., Los Angeles, Calif.
W6QOJ Claude Bullen, 918 E. 5th St., National City, Calif.
W6QOM Clarence Martin, Jr., Route 2, Dinuba, Calif.
W6QON Stephen Weber, 4873 Turner St., Fresno, Calif.
W6QOO Bruce Isenberg, 1806 Arthur, Fresno, Calif.
W6QOP Harry Kaklikian, 3239 Townsend, Fresno, Calif.
W6QOQ Arthur Ives, 3531 Mountain View Dr., San Diego, Calif.
W6QOR Louis T. Haigh, 465 Magnolia Ave., Larkspur, Calif.
W6QOS Frederick Bertland, Route No. 3, Fresno, Calif.
W6QOT George Richins, 4845 E. 6th., Long Beach, Calif.
W6QOW Ignacio Vasquez, 4601 Cantinella, Venice, Calif.
W6QOX Robert Fawsett, 335 E, Salt Lake City, Utah.
W6QOY Robert A. Eisen, 113 Dwight Rd., Burlingame, Calif.
W6QOZ Maurice Wall, 1970 Holt Ave., Los Angeles, Calif.
W6QPB Deming Perdew, 1673 Archibald, Alta Loma, Calif.
W6QPC Kenneth Owen, 2211 California St., San Francisco, Calif.
W6QPE Carl F. Rubin, 1½ mi. North of Holtville, Calif.
W6QPF Robert Serles, 455 E. Front St., Ventura, Calif.
W6QPJ Howard E. Vancil, 1930 N. Whitley St., Hollywood, Calif.
W6QPK Ralph Moore, Unit 4 NCR, 250 12th St., Richmond, Calif.
W6QPL John McDonald, Jr., Goldarres Mine, Beowawe, Nevada.
W6QPM Frederic Streib, 755 54th St., Oakland, Calif.
W6QPO Donald Iacoboni, 205 Oceano Ave., Santa Barbara, Calif.
W6QPP Andrew L. Johnson, Jr., 4157 Park Blvd., Oakland, Calif.
W6QPQ George Miller, 481 Huron, San Francisco, Calif.
W6QPS Louis A. Beer, 6339 Calif. St., San Francisco, Calif.
W6QPT Dorothea M. Taylor, 1714 East 22nd St., Oakland, Calif.
W6QPX Nathan R. Silk, 3423½ Brooklyn Ave., Los Angeles, Calif.
W6QPY John J. Ruthowski, 1066 E. 7th St., Long Beach, Calif.
W6QPZ Rolland A. Truman, 1045 E. Arkansas, Bellflower, Calif.
W6QQA Russel A. Warner, 443 E. Merle Ct., San Leandro, Calif.
W6QQB Frederick M. Winchel, 636 Ave. M, Boulder City, Nev.
W6QQD Kenneth H. Bollinger, 1521 Yale Ave., Salt Lake City, Utah.
W6QUO Frank Berberich, Jr., 1241 W. 31 St., Los Angeles, Calif.
W7BEV Roland Smith, 1619 Westpoint Rd., Spokane, Wash.
W7CGL Joe H. Schobert, 501½ 31st St., Billings, Mont.
W7HEA Chester O. Bishop, Zillah, Wash.
W7HEQ Clarence Kane, 3637 E. 1, Tacoma, Wash.
W7HER Marjory Allingham, Between Mile-Posts 10-11, Highway 99, Tigard, Ore.
W7HES Dwight E. Lindstrom. Camp Zig Zag, Zig Zag, Oregon.
W7HET Wilmont Tagg, 5958 35th Ave., S.W. Seattle, Wash.
W7HEV Neil Arnett, 6522 30th Ave., N.E. Seattle, Wash.
W7HEW Peter Eitelberg Jr., 2441 1st. Ave., Seattle, Wash.
W7HEX Richard Stammerjohan, W. 1714 Shannon St., Spokane, Wash.
W7HEZ Milton Overmire, 3020 28 W., Seattle, Wash.
W7HFA Kenneth Lund, 1414 Second Ave., N. Great Falls, Mont.
W7HFB Philip Johnson, 7714 Bagley Ave., Seattle, Wash.

W7HFC Richard Swapp, 6757 10th St., N.W. Seattle, Wash.
W7HFD Lloyd Graham, 2514 Argyle St., Butte, Mont.
W7HFE Mrs. John C. Turner, Triangle X Ranch, Grovont, Wyo.
W7HFF Clyde R. Tipton, 1031 Logan St., Helena, Mont.
W7HFG Wm. C. Robinson, 906 Sheridan Ave., Sheridan, Wyo.
W7HFH Berkeley Brandt, Jr., 1617 East 47th St., Seattle, Wash.
W7HFK Lloyd E. Taylor, 944 Leslie St., Salem, Oregon.
W8ALB John Stasiak, 139 Washington St., Lorain, Ohio.
W8FWV Fred Wagner, 2841 John R. St., Detroit, Mich.
W8FZJ Dana M. Bailey, 35 Liberty, Newton Falls, Ohio.
W8KKE Harry Rapien, Jr., 430 Schuyler Ave., Elmira, N. Y.
W8LGG Oliver H. Gibson, Hq. Co. 116 Inf., O.N.G., 38 Greenwood Ave., Columbus, Ohio.
W8LIZ Louis G. Ward, R.F.D. No. 1, Kent, Ohio.
W8SPO Steve Vancea, 3218 Helen St., Detroit, Mich.
W8SPY Charles Seibert, Electrical Engineering Dept., U. of W. Va., Mechanical Hall, Morgantown, W. Va.
W8SPZ Lino Bertcotti, 215 Patterson Ave., Bridgeville, Pa.
W8SQD Oliver H. Gibson, Hq. Co. 166 Inf. Armory, Marietta, Ohio.
W8SQF Leo Ernest Oderkirk, 320 N. Main, Medina, N. Y.
W8SQG Robert Collinson, 16617 Wildemere, Detroit, Mich.
W8SQH Charles Akers, 1495 Rydalmount Rd., Cleveland Heights, Ohio.
W8SQI Harry Darata, 3434 Ashby Rd., Shaker Heights, Ohio.
W8SQJ Stanley Beaver, 1317 Scott Ave., Cambridge, Ohio.
W8SQK Robert W. Dorn, 633 Deuber S.W., Canton, Ohio.
W8SQL Gerald H. Fitzgerald, 419 Beech, Lansing, Mich.
W8SQM David Gnessin, 1317 Scott Ave., Cambridge, Ohio.
W8SQN Charles Minder, 219 LaSalle Ave., Buffalo, N. Y.
W8SQO Harold Tutt, 300 Gunnison Ave., S.W., Grand Rapids, Mich.
W8SQP LaVerne W. Wilson, Cobleskill, N. Y.
W8SQQ Robert J. Rowan, 926 Reed Pl., Detroit, Mich.
W8SQS Taras N. Schmidt, 4211 Newark Ave., Cleveland, Ohio.
W8SQT Phillip Schmidt, 1618 Lakefront, East Cleveland, Ohio.
W8SQU Charles Schaefer, 3907 Albertly Ave., Parma, Ohio.
W8SQV Louis Thompson, 14533 Lake Ave., Cleveland, Ohio.
W8SQW Donald Volzer, 1233 Cleveland Ave., N.W., Canton, Ohio.
W8SQX William Taylor, R.F.D. 2, Louisville, Ohio.
W8SQY Carl A. Swarthout, 2024 Mars Ave., Lakewood, Ohio.
W8SRA Ernest Hanscom, 1706 Strathmore, East Cleveland, Ohio.
W8SRB Raymond Harter, 1320 Milan Rd., Sandusky, Ohio.
W8SRC Howard Hilberg, 7516 Lawn Ave., Cleveland, Ohio.
W8SRD Paul Hudson, 70 Shadyside Dr., Youngstown, Ohio.
W8SRE Richard Jamison, 1571 Rydalmount Heights, Ohio.
W8SRF George Kish, 7414 Liberty Ave., Parma, Ohio.
W8SRG John Bailey, 7550 Hanover, Detroit, Mich.
W8SRI Jerry Mason, 304 Bedford N.W., Canton, Ohio.
W8SRJ Donald Miller, 501 Madison, Conneaut, Ohio.
W8SRK Steven Theil, Denton Plan, Rochester, Pa.
W8SRM Clem M. Misavage, 144 Main, Glen Lyon, Penna.
W8SRN Charles A. Link, 28341 Rollcrest Rd., R.F.D. 1, Farmington, Mich.
W8SRO Tauno Alanen, Trustee. Fairport Recreation Radio Club, 3rd. & Eagle, Fairport, Ohio.
W8SRP Carlton Tyson, 201 East S., Olivet, Mich.
W8SRS Glenn L. Dallas, 345 W. Elyo, Alliance, Ohio.
W8SRU James B. Rowe, 833½ Main St., Conneaut, Ohio.
W8SRX Kenneth L. Wheeler, 211 West Main St., Fremont, Mich.
W9ART John Foeller, 1036 S. Webster Ave., Green Bay, Wisc.
W9BXV Eugene Helsel, 2739 Spruce St., Kansas City, Mo.
W9DNV Homer F. Anshutz, 313 N. Langdon, Mitchell, S. Dak.
W9EIP Charles Price, 620 S. Burchard, Freeport, Ill.
W9ELY William Raatz, 15 Scott St., Oshkosh, Wisc.
W9FOE Charles Warriner, 107 E. M St., McCook, Nebr.
W9GAN Earl Hartman, 1083 14th, Boulder, Colo.
W9GGN Ed. C. Bartling, Ackley, Iowa.
W9GLD Ernest Blum, 4649 Leona, St. Louis, Mo.
W9HLZ Leo Born, 304 Second, S.E., Mason City, Ia.
W9JRQ Martin Carl, 1514 High St., Fort Wayne, Ind.
W9LLZ George Wm. Carson, Jr., 7918 Marquette Ave., Chicago, Ill.
W9LMI Ilmar Wm. Lillvis, Bessemer, Mich.
W9LNZ John Nikkila, R.R. 1, Mass., Mich.
W9LPD Frank Giszewski, 112 S. Cherry, South Bend, Ind.
W9LPM John H. Crowl, 1640 S. Mosley, Wichita, Kansas.
W9LPO Rollin Franklin, DG-2-C Co. 806 C.C.C. Camp, R.F.D. 1, Grand Junction, Colo.
W9LPU Melvin Andrew, 3 mi. S.W. of Brownville, Nebr.
W9LQI Paul McDonald, 5148 15th Ave. S., Minneapolis, Minn.
W9LQJ Thomas L. Meade, East Broadway, Oxford Jct., Iowa.
W9LTB Geoffrey Stoltz, 359 Ellis St., Wichita, Kansas.
W9LUR Robert Whiteley, 1022 W. 5th Ave., Des Moines, Iowa.
W9LVB George Koller, 301 Kansas Ave., Carthage, Mo.
W9LVU Otto A. Kohl, Jr., 1730 3rd Ave., S.E., Cedar Rapids, Iowa.
W9MAM Carl E. Shaw, St. Charles Rock Rd., Pattonville, Mo.
W9MAO John Ambrozich, U.S. Com. Reserve, Unit 5, Sec. 7, 316 W. Lake, Chisholm, Minn.
W9MCJ Arthur Godfrey Bauernfeind, 903 18th., Racine, Wisc.
W9MCV Bjarne Omdal, 632 1st Ave., N. Fargo, N. D.
W9MDR Wayne Trichler, R.F.D. 1, Altoona, Kansas.
W9MDS Harold Culver, New Haven, Ind.
W9MEE Robert Erickson, Glen Flora, Wis.
W9MEG Marvin E. Fetzer, 1020 Court Ave., Marengo, Iowa.
W9MEI Floyd Rinehart, Sec. 8, Lincoln Twp., Victor, Iowa.
W9MEM Frank Mann, 5318 Neosho Lane, Kansas City, Kansas.
W9MEO Lowell R. Riley, Glen Flora, Wis.
W9MET Jack Pollard, 1455 Que St., Lincoln, Nebr.
W9MFD Elmer O. Shull, R.F.D. No. 3, Warsaw, Ind.
W9MFE Peter Butkus, 562-E 155th Pl., Harvey, Ill.
W9MFI Albert Albertine, 5237 Harper Ave., Chicago, Ill.
W9MFJ John Arends, 326 N. Court St., Rockford, Ill.
W9MFP Walter Balcom, 5119 W. Crystal, Chicago, Ill.
W9MFR Paul Grove, 1107 Oak Way, Madison, Wis.
W9MFS John Hargraves, 446 Austin, Chicago, Ill.
W9MGD Arthur W. Jennrich, Buana Terrace, Antioch, Ill.
W9MGE Harry Faulker, 903 W. Grimes St., Fairfield, Iowa.
W9MGH John E. Trinko, 2114 W. 23 Pl., Chicago, Ill.
W9MIH Stephen Verbonich, 1703 W. Jackson Blvd., Chicago, Ill.
W9MIX John McFarland, 752 Grove St., Aurora, Ill.
W9MJD Stanton Mitterer, Lawn Hill, Iowa.
W9MKA Samuel Mundell, Air Corps Tech. School, Chanute Field, Rantoul, Ill.
W9MLC Henry Ohlendorf, 519 12th, Waverly, Iowa.
W9MLN James Stultz, CCC Co. 1596, Camp SCS-4, Brookville, Ind.
W9MMB William Lewis, 555 E. 4th St., Russel, Kansas.
W9MMS Charles F. Makowsky, 1020 9th Ave., E., Duluth, Minn.
W9MMT Elvin E. White, Greenfield, Iowa.
W9MMV Robert G. Terveen, 835 N. Long Ave., Chicago, Ill.
W9MNO Thomas J. Casey, 1103 6th St., Rapid City, S. Dak.
W9MQO Tyree F. Wilson, 223 Cherry St., Pineville, Ky.
W9MRN Jack C. Webb, 1020 Rawson Ave., So. Milwaukee, Wis.
W9MSI David A. Jones, Route 2, Norwalk, Wis.
W9MSO Claude C. Hale, 1929 Fairview, Wichita, Kansas.
W9MVY Ernest D. Rowe, 404 East 1st. St., Canton, S. Dak.
W9MYA Russell Barrows, Case Beer Heights, Waterloo, Iowa.
W9MYD Eugene R. Zobel, Fessenden, N. Dak.

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 ¾ 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.

Eighth Silver Trophy Award

(Continued from page 601)

210's. This rig is also used on 20 and 75 for local work.

Phone operation has brought the total countries worked to more than fifty, with fine reports. While interest in motion pictures, recording and private flying has shortened the hours on the air, I know of no other hobby that continues to hold interest and provide the incentive for continued study and improvement. The transmitters, incidentally, are of course "home-built."

With best wishes for the continued success of your fine magazine under its new name of RADIO & TELEVISION, I remain

Very truly yours,
H. LEROY VANDERFORD,
523 Wyoming Avenue,
South Mountain Estates,
Millburn, New Jersey.

Rules for Trophy Contestants

● WOULD you like to win one of these beautiful Silver Trophies? It is very easy to do so—simply send the Editors a description and 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 Trophy stands nearly 12" high and is a fine example of the silversmith's art. We are sure that any Ham in the country would be tickled to win it. The Silver Trophy represents the spirit of victory and was designed by one of the leading silversmiths. The name of the winner each month will be engraved on a silver plate mounted on the black bakelite pedestal before the trophy is sent to the successful contestant.

The next award will be announced in the March issue; the closing date for that contest is January 10.

The judges of the contest are the Editors of RADIO & TELEVISION. In the event of a tie, duplicate prizes will be awarded to the contestants so tying.

What Do You Think?

(Continued from page 594)

as I am studying for a "Ham" ticket. Above all please continue your fine articles on the latest improvements in the field of *Television*.

I am enclosing a photo of yours truly and the listening post to be entered in your "Best Listening Post Contest." I have verified all continents *four times* on short waves. Some of my better veris include ZBW3, VPD2, VK2ME, 3ME, 6ME, VLR, KZEM, JZJ, JZL, JVN, PLP, PMN, ZRH, ZRK, EAJ43, SPD, SPW and many others. I have heard 73 countries and verified 43 of them with many reports out. My receiver is a Hallicrafter.

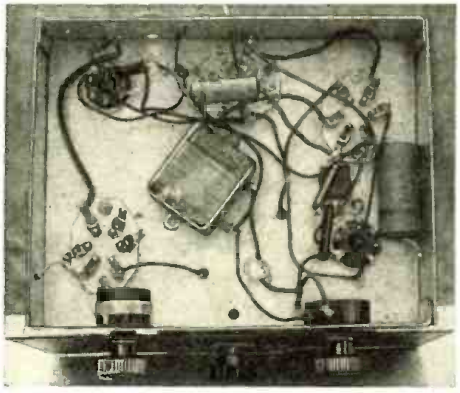
Radiospectfully yours,
ELVYN L. BARKER,
27 Riverview Street,
Portland, Maine.

Send that PHOTO!
It May Win
One Year's Subscription to
SHORT WAVE & TELEVISION
FREE
for Best "Listening Post" Photo

Closing date Feb. 15 for April 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.

"Economy 3"

(Continued from page 605)



Bottom view.

tube and coil sockets are large enough so that the rivets will not short-circuit against the metal chassis and the coil prongs will not touch when these are being changed. Keep the leads, especially the "hot" R.F. wiring from the plates and grids of the 1N5-G tubes to the coil sockets and tuning condensers, as short and direct as possible; solder each joint carefully with a clean, hot and well-tinned iron and rosin-core solder, using just enough solder to make a good electrical connection. Use either the stranded or solid hook-up wire for connecting the various parts together, preferably size No. 18.

Test Circuits First

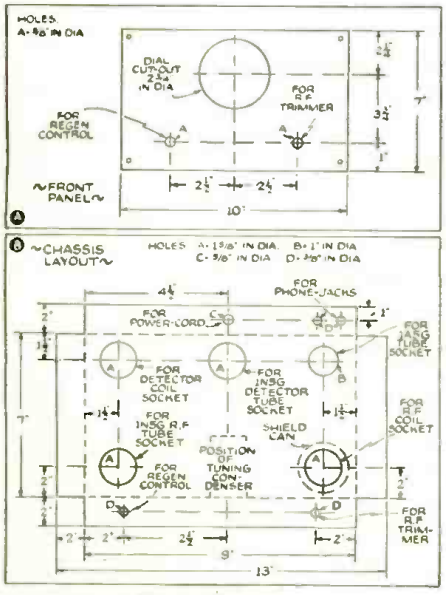
After the wiring has been completed, *go over each circuit carefully*, referring to Fig. 1 or the picture diagram, in order to make sure that all the connections are correct. It is always a good policy to test from each "B" plus lead to the chassis in order to determine whether any short-circuits are in existence, *before applying the plate and screen voltages!*

Putting the Set on the Air

If everything appears to be correct, connect the "A" and "B" batteries as shown in Fig. 1. It is not absolutely necessary to use a rheostat in series with the filament circuit; the tubes may be operated directly from the 1.5 volt battery. Attach an antenna and ground and turn up the regeneration control slowly until a hissing sound is heard in the phones. Rotate the dial for a signal, adjusting the R.F. trimmer condenser for maximum sensitivity. Set the regeneration control *just below* the point where oscillations begin for broadcast and phone reception and just above for CW signals. No audio volume control has been provided; however, the volume on strong stations can be reduced by turning down the regeneration control.

For best results a high-impedance speaker or phones should be used. As Fig. 1 and the photographs show, the author used crystal phones which have an impedance of approximately 50,000 ohms. If crystal phones are used, be sure to couple the phones to the 1A5-G plate through a small 30 henry, 15 ma. choke and a 0.1 mf., 600 volt condenser as shown. The condenser must be of good quality because only a very little D.C. current leakage will damage the crystal phone elements beyond repair.

During a week of testing this little receiver on the air, practically all of the usual "local" foreign and domestic stations have been received with plenty of volume on the phones. Two antennas were used during this period, one an "all-wave" doublet and the other a plain single wire 60 feet long and 25 feet high. Very little difference was noticed when changing from one to the other.



Chassis dimensions.

Parts List for "Economy 3"

HAMMARLUND (Condensers and Chokes)

1—Dual-section tuning condenser, 140 mmf. per section
1—Single-section tuning condenser, 20 mmf.
2—Sets (10 coils) SWK-6 plug-in coils, 6-prong type
1—Midget R.F. choke, 2.5 mh.
2—Isolantite sockets, 8-prong type
2—Isolantite sockets, 6-prong type
1—Mica trimmer condenser, 35 mmf.
2—Aluminum tube shields

SOLAR (Condensers)

1—Tubular paper condenser, 1 mf., 400 volts
2—Tubular paper condensers, 0.1 mf., 600 volts
1—Tubular paper condenser, 0.01 mf., 600 volts
1—Mica condenser, 0.0001 mf.
1—Mica condenser, 0.001 mf.
1—Mica condenser, 0.006 mf.

I.R.C. (Resistors)

1—Fixed resistor, 5 megohms, 1 watt
1—Fixed resistor, ¼ megohm, 1 watt
1—Fixed resistor, ½ megohm, 1 watt
1—Volume control potentiometer, 50,000 ohms, with DPST switch

R.C.A. (Tubes)

1—1A5-G tube
2—1N5-G tubes

CUD

1—7 x 10 x 8 inch steel cabinet, type 999
1—7 x 9 x 2 inch steel chassis
1—7 x 10 steel panel

BRUSH

1—pr. high impedance crystal headphones (or speaker)

Miscellaneous

1—Dial, 270 degree rotation for counter-clockwise condenser
1—Filter choke, 30 henries, 10 ma.
1—1.5 volt dry cell "A" battery
2—45 volt "B" batteries

Coil Data

No. of Turns—Enameled Magnet Wire

Meters	Grid	Tickler	Primary	Winding	Wire—B. & S.
135-270	82	16	55	1⅞"	No. 28
66-150	38	11	23	1⅝"	No. 26
33-75	18	6	13	1¼"	No. 24
17-41	9	5	6	1¼"	No. 16
9-20	3½	3	2½	1¼"	No. 14

All coils wound on 1¼" diameter forms. Space between *cold end* of grid coil and tickler is ¼". Winding is *length of winding*. Primary is wound between turns of the grid coil. All ticklers are wound with No. 30 D.S.C. wire. Antenna coupling coil, 4 to 5 turns No. 26 or 28 enam. wire, close wound, and spaced ¼" from "cold" end of R.F. grid coil.

De Luxe Desk Transmitter

(Continued from page 607)

then be adjusted to 25 volts for correct operation, by connecting a high resistance voltmeter between cathode and ground, and sliding the tap back and forth until the correct voltage is reached. When moving the slider, the power should be shut off; otherwise the current which is of a high value will arc to the wire and burn it. The resistor is of a low value and tends to minimize bias voltage fluctuation even though grid current flows. The screen voltage should be adjusted to 300 volts.

Relays are used to control the filament and plate voltages because the transmitter may occasionally be required to operate from a remote point.

Keying is accomplished by breaking the cathode circuit of the final amplifier and produces a clean-cut note. If, however, trouble from key clicks results, a simple way to remedy the condition is to insert a choke having a value of a few henries in series with the key. A 1-mf. condenser may be connected in series with a variable resistor of a few hundred ohms across the key to increase or decrease the impedance.

Antenna: A 70-ohm variable link is built into the final amplifier coil and provides the simplest method of coupling to the antenna. Twisted pair may be used, but should preferably be of the low-loss type. The length may be as long as necessary and the antenna one-half wavelength long. For 20 meters, each section should be approximately 17 feet long. The transmission line should be fanned out at the connection to the antenna for a short distance, approximately 18", to secure a better match.

The plate current of the 6A6 should run about 35 milliamperes when loaded and the plate of 6L6 will be about 40 milliamperes when amplifying. If any trace of parasitic oscillations is noticeable in the final, a 15 or 20 ohm non-inductive resistor in series with each plate will usually suppress them. It is important to have all grounds at one point, particularly when operating the final amplifier at 10 meters. The coupling condensers for the grids of the 807's should be tapped on the 6L6 plate coil as near as possible to the center tap.

The load resistance for the modulator can be determined by dividing the direct current plate voltage on the 807's by the sum of the plate and screen currents. The 807's should be loaded up to 186 milliamperes. The correct taps on the secondary can then be selected.

BARKER & WILLIAMSON (Coils)

1—20 B
1—10 B
1—TV Base Assembly
1—20 TVL
1—10 TVL

CUTLER HAMMER

2—No. 1025 OH 56A Push Button Switches (S5), (S6)—2 additional switches and pilot lights required for remote operation.

DRAKE MANUFACTURING CO.

2—No. 75 Amber Pilot Lights

KENYON TRANSFORMER CO. (Transformers)

1—T244 (T6)
2—T154 (T11) (T12)
1—T206 (T5)
2—T153 (T7) (T8)
1—T655 (T3)
2—T151 (T9) (T10)
1—T354 (T4)
1—T494 (T2)
1—T255 (T1)

WARD LEONARD ELECTRIC CO. (Relays)

1—Type 507-518 (Class 52) RX1
1—Type 507-511 (Class 52) RX2

Television Sound Channel Receiver

(Continued from page 606)

when the transformer is connected into the circuit. However, it will give the constructor some idea as to the tuning range of the new coil with its associated condenser. Should difficulty be experienced in tuning out a station as described in the foregoing, turns should be removed until the desired results are obtained.

The secondary of the transformer is connected to the antenna and the ground terminals of the all-wave broadcast receiver and the receiver is tuned to the intermediate frequency of 9.75 MC. A separate rectifier and filament supply should be built to power the converter.

The converter, a diagram of which appears herewith, can be assembled on a chassis pan 5 x 7 inches, with the antenna coil and condenser mounted on the upper part and the oscillator coil and condenser beneath. The wiring must be as *short* as possible and all by-pass condensers should be near the socket terminals while still making a good mechanical assembly. A suggested layout is shown.

A power-supply can be mounted on the same chassis if the pan selected is larger, say 5 x 12 inches. This will make the converter self-powered and a complete unit capable of being used on any receiver tuning to 9.75 MC. The cut shows how the power-pack is wired, the note giving the transformer data. The same circuit is wired whether the pack is used with the converter or in a short-wave set.

The third alternative is to build a complete receiver of the superheterodyne type, with its power-supply. The first section of this receiver is very similar to the converter described, but to it is added an intermediate amplifier which differs from the usual type in that resistance coupling is employed instead of the usual transformer coupling. This makes for lower cost and simplicity. A diode-triode is used as the second detector and first audio stage, followed by a beam power tube feeding the speaker. Diagram of such a receiver is shown.

In the construction of the superheterodyne receiver the writer selected the simplest circuits both from the standpoint of cost as well as ease of construction. The superhet. receiver incorporates a total of six tubes and serves satisfactorily for the reception of the *sound* accompanying the television programs. The tubes used are as follows:

1—6K8 first detector, oscillator and mixer
2—6SK7 intermediate frequency amplifier
1—6Q7 second detector and first audio amplifier
1—6L6 second audio amplifier
1—5W4 rectifier for plate supply

The first detector oscillator and mixer of the receiver is very similar to the converter described in the preceding paragraphs, this is coupled by the 9.75 MC. transformer to the intermediate frequency amplifier consisting of the two 6SK7 tubes; the circuits used are of the *resistance-capacity* coupled type. This eliminates the necessity of alignment of intermediate transformers and while some gain is sacrificed by this type of amplifier, the total gain of the receiver will be more than adequate, the cost will be lower and it is easier to construct.

The diode section of the 6Q7 is used as the second detector and the triode section of this tube, being the first audio amplifier, this in turn is followed by the final audio amplifier, a 6L6 beam power tube. No provision is made for A.V.C. because the receiver will be used within a fairly close proximity to the television transmitter and no fading should be experienced.

The entire unit, including the power-supply, can be constructed on a chassis measuring 7" by 10" by 3" in size. With the exception of the antenna and oscillator coils no additional shielding will be required.

This type of receiver can also be used for the reception of amateur transmission on the 60-56 MC. bands and performs in a much better and more satisfactory manner than the receivers of the super-regenerative type. When completed the receiver will be free of the "hugs" usually encountered in ultra-short wave reception.

Parts for CONVERTER

I.R.C. (Resistors)—½ Watt
1—300 ohms
1—250,000 ohms
3—50,000 ohms

BUD (Variable Condensers)
1—35 mmf.
1—100 mmf.

SOLAR (Fixed Condensers)
2—.0005 mf. mica
3—.05 mf. paper
2—.0001 mf. mica
2—.001 mf. mica

HAMMARLUND (Chokes)
1—2.5 mh. RFC

R.C.A. (Tubes)
1—6K8

Transformers
1—9.75 MC. I.F. (Special—See text)

Extra Parts for SUPERHET.

R.C.A. (Tubes)
2—6SK7
1—6Q7
1—6L6

I.R.C. (Fixed Resistors)
All ½ watt unless marked otherwise
5—100,000 ohms
1—500,000 ohms
2—300 ohms
2—50,000 ohms
1—200 ohms—2 watts
1—10,000 ohms—3 watts
1—20,000 ohms

Variable RESISTORS
1—1,500 ohm
1—500,000 ohms (pot.)

SOLAR (Fixed Condensers)
2—.05 mf. paper
2—.0001 mf. mica
3—.1 mf. paper
1—.005 mf. mica
1—.01 mf. paper
1—25 mf. 50 volt. electrolytic
1—8. mf.—450 volts
1—1. mf.

TRANSFORMERS
1—Output

POWER SUPPLY
I.R.C. (Resistor)
1—Bleeder—35,000 ohms

SOLAR (Condenser)
1—Dual 8 mf.—450 v. peak

JEFFERSON (Chokes)
2—30 henry A.F. type—or 1 choke, plus speaker field

JEFFERSON (Transformer—for Superhet.)
1—115 v. A.C.—300 v. C.T.—6.3 v., 3 amp. 5 v., 2 amp.

or

JEFFERSON (Transformer—for Converter)
1—115 v. A.C.—300 v. C.T.—6.3 v., 3 amp. 5 v., 2 amp.

Switch
1—Power—toggle type

R.C.A. (Tube)
1—5W4

Miscellaneous
1—Loudspeaker
1—Dial
2—Knobs

Will Britain Invade Our Television Market?

(Continued from page 583)

SCOPHONY'S PLANS

the first broadcasts are started on a commercial basis on theater screens.

Another fertile source of entertainment, seen by the British financier, is that television will enable vast audiences to witness important openings, such as the annual opening of the Metropolitan opera.

"I am planning to open a Scophony Company in the United States in the near future," said Mr. Sagall, "and I believe that I have come to this country at the right time, for television, I am sure, will swing into instant popularity after its start in the coming Spring.

"Our system has been technically successful in Britain, for our patented supersonic light control permits 200 times as much light to reach the screen as is possible with any other optical-mechanical scanning system. Not one element is projected at one time—but 200!

"Our standard set produces pictures 20" x 24", with 441-line definition. We have also produced 8-foot pictures for theatre use and we are now working on 16-foot pictures with equally high definition.

"The home receivers which we have made in Britain have sold for approximately $1000 each, but these were laboratory models, hand-made. If we can produce them in quantities of 5000 they will retail for $300.00 or less. And I believe that that quantity will seem small within the next five years for the American television market may absorb as much as thirty million television sets in that period.

"The company's plans for America," says Mr. Sagall, "includes manufacturing and selling receiving apparatus; the licensing of other manufacturers to produce apparatus under Scophony patents; the establishment of television service for motion picture theatres; commercial television broadcasting; and—this is most important—the establishment and maintenance of technical laboratories.

"We are planning a ten-million-dollar corporation for the United States.

"We own about 200 patents in England and about 40 in the United States, so our system is thoroughly protected in your country as well as at home."

Mr. Sagall points with considerable pride to the fact that his system was one of the two ordered by the Russian government for its Moscow station for exhibitive tests; the other was an American system.

Emergency Uses of Radio

Frank R. McNinch

(Continued from page 581)

the Ohio flood and the Los Angeles flood. In all of these emergencies radio has played a major part in rendering aid and in alleviating suffering. Not one particular service, but all radio services have been called upon to perform their specific missions. Not the least of these is radio-broadcasting.

I desire to point out especially, however, the remarkable aid afforded by the radio *amateurs*. At the present time there are outstanding approximately 50,000 amateur licenses. Many of the amateur stations are affiliated with the Naval Communications Reserves and the Army Amateur Reserve Corps and regularly engage in practice drills requiring the use of established naval and military operating procedure. There have been organized communication networks of amateur stations offering communication facilities to practically all parts of the United States.

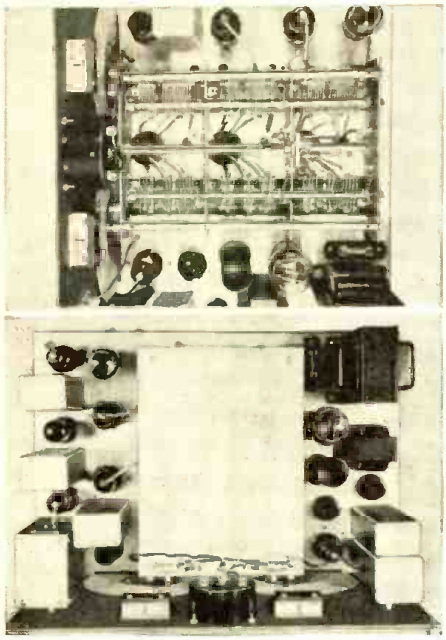
A number of stations have associated themselves with scientific expeditions and furnish the means of communication between the expeditions and their sponsors in the United States.

So important has been the work of amateurs in providing communications from areas affected by catastrophes and the outside world, that the Commission has recently adopted rules providing for operation in such emergencies. In brief, in the event of widespread emergency conditions affecting domestic communication facilities, the Commission may declare a state of emergency and order the discontinuance of operation on amateur frequencies below 4000 kilocycles. Opportunity will be afforded isolated amateur stations and key amateur network stations to carry on with relief communications without confusion or frustration.

As I have said before, to me the glory of amateur radio lies in the dedication of time and talent to the public service.

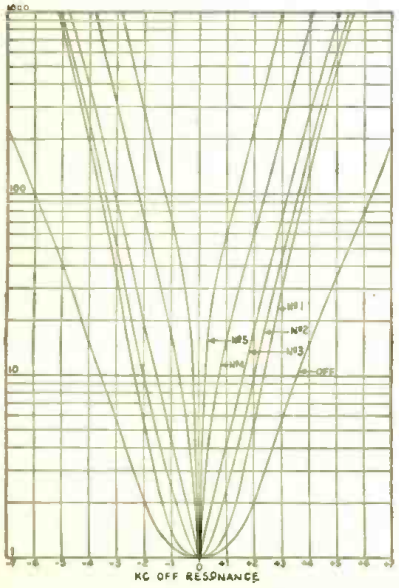
The HQ-120 Receiver

(Continued from page 614)



Above—Close-up of "double" tuning condenser units. Lower view shows top "shot" of receiver.

in fact, affords sufficient band width to admit reasonably good quality on musical renditions, while the No. 2 position is satisfactory for voice reception. Of course, such band width does not afford sufficient selectivity for crowded channels, but the operator may employ a panel-mounted phasing control to neutralize or phase out heterodynes and any other disturbances. In other words, the band width of the receiver may be adjusted to cope with any other conditions. Positions Nos. 4 and 5 on the filter switch are for C.W. or code reception exclusively, the latter affording maximum selectivity. The curves shown illustrate the actual overall response of the receiver and the filter. The degrees of selectivity shown in this chart remain unchanged, regardless of the position of the phasing control because there is no interlocking and the filter's output remains relatively uniform over the entire range. Attenuation is not manifest when switching from the "Off" position to any other point; the crystal has no effect on the output level of the signal.



Resonance curves for new HQ-120 receiver.

Another unusual feature of this receiver is the tuning condenser arrangement, which includes both the main tuning condenser gang and the bandspread condenser gang. Notice that there are six individual sections in the main tuning condenser and nine in the bandspread. This design has been adopted as necessary to provide uniform gain and uniform bandspread throughout the receiver's range.

The antenna compensator is shown between the two large condenser gangs. It permits compensation for various antennas and affords maximum efficiency, image rejection, sensitivity, and signal-to-noise ratio, regardless of the type of antenna employed.

The "S" meter has also been brought to a high point of perfection, for it maintains its accuracy throughout the receiver's range. This has been done by treating the R.F. portion of the set in such a way as to maintain constant gain in all bands.

The constant output level of the crystal filter also aids in maintaining the accuracy of the "S" meter, which is calibrated in units from 1 to 9 and up to 40 db. above "S-9."

Adjustments on the rear of the chassis are provided to correct the vacuum tube voltmeter circuit employed with this meter, to compensate for shifts in line voltages.

A noise limiter is also included in this receiver. It automatically follows the level of the incoming signal but cuts automobile ignition interference and similar QRM without affecting the quality of the incoming signal in any band.

Special construction of the tuning condenser and dial spread each amateur band over 310 degrees. Not only has the dial an arbitrary scale from 0 to 200, but there are also four other scales calibrated directly in megacycles, for each of the four amateur bands from 80 to 10 meters, inclusive. This is valuable in view of recent FCC regulations regarding monitoring in amateur stations. It was only the excellent stability of the receiver that made such calibration possible. Stability was secured, first by careful design of high frequency circuits and, second, by providing control of the power supply for the H.F. oscillator. This automatically maintains a constant voltage on both the H.F.O. and the "S" meter tubes, so that variations in line voltage affect neither the calibration of the receiver nor the accuracy of the oscillator. The main tuning dial is calibrated in megacycles for the entire range from 31 to 54 mc. or 9.7 to 555 meters.

Other features of the set include A.V.C., beat oscillator, phone jack, and relay terminal connections. A study of the diagram shows all these details.

It is interesting to note that the panel design plays no part in the mechanical setup of the receiver, and because it supports no critical components, pressure on it does not cause detuning.

Part Numbers and Values Corresponding to Diagram

Part. No.	*Value*
5-40	600 mmf.
41-6	25. ohm
7	500,000 ohm
9-12-13-43-59 } 66-69-72-77 }	.02 mf.
87-90-97	
10-67-106	10,000 ohm

(Continued on following page)

Part No.	Value
15-29-68-74 / 75-88-91-98	2,000 ohm
19	16-8-16 mf.
23	3.000 ohm
25	6.000 ohm
26	-7,000 ohm
27	5,000 ohm
28	.005 mf. mica cond.
44	230 ohm
45-71-85-94 / 100-108-109	.05
47	15 ohm
48	50. mmf.
50	5.5 mmf.

The HQ-120 Receiver

(Continued from preceding page)

Part No.	Value
51	673 mmf.
52	300 mmf.
57	10. ohm
63	.002 mf.
64	.0015 mf.
65	.001 mf.
73	700 ohm
78	50. ohm
83	10,000 ohms

Part No.	Value
84	400 ohm
86	300. ohm
93-128	.1 mf.
95	600 ohm
96	50.000 ohm
99-127	1,000,000 ohm
103	40 mf.
104	350 ohm
107-110	100.000 ohm
115	.01 mf.
116-119-120	100 mmf.
123	1000 mmf.
125	10 mmf.
42-49-117-118 / 121-122-124	50.000 ohm

Part II

LEARNING THE CODE

By E. L. Dillard & F. Collins

Phonetic Groups Represent Letters

At first you will necessarily have to memorize each letter, number or punctuation mark as a certain combination of dots and dashes, but after sufficient practice you will learn to identify each *phonetic combination* of these dots and dashes, just the same as you have unconsciously accustomed yourself to recalling a certain letter to mind when you see the written symbol that represents it on paper. Thus, later on, the letter "A" in your mind will not be thought of as a combination of a dot followed by a dash, but instead, every time you hear the combination of sounds which make up this letter, you will instantly recognize the *phonetic grouping* of these sounds as the letter itself.

The speed of transmitting and receiving code which you will acquire later on, after considerable practice, will be dependent almost entirely upon how readily and quickly you are able to accustom yourself to thinking of letters, numbers, and punctuation marks as sound combinations of dots and dashes rather than as the individual dots and dashes which go to make up any particular symbol.

Send Slowly at First

Start out slowly at first, and as your wrist becomes more easily controlled gradually speed up. Don't hurry when learning to send. It is far better to make good letters slowly than to make poor ones rapidly.

The key should be adjusted so as to have a gap of not more than 3/32". The gap must be wide enough to permit clean-cut makes and breaks of dots and dashes. Spring tension of the key may be adjusted to suit the individual. A little too much spring tension is better than too little.

Code should have a definite rhythm to it. Each dot should be the same length as all other dots, each dash should last just as long as all other dashes, and should be three times as long as each dot. The space between dots and dashes should be equal to the length of a dot. The space between letters should be equal to the length of a dash. Words will be spaced by an even greater length of time.

Learn to *send* code at the same time you are learning to *receive* code. One helps the other.

Always write down the code. It is a very bad practice to learn to copy in your head, as later on it is very difficult to get the necessary coordination between mind and hand when the speed is increased.

After you have learned the alphabet it is well to listen to code wherever and whenever you can find it. Never mind if it is too fast for you to receive perfectly. Concentrate on it and gradually you will find that you can pick out a letter here and there.

Accuracy

The one absolute requisite of a good code operator is his ability to copy accurately what has been sent. Therefore, at all times concentrate on getting what copy you are able to receive just as accurately as possible. A sure-fire method of learning the code is to acquire accuracy first and speed later

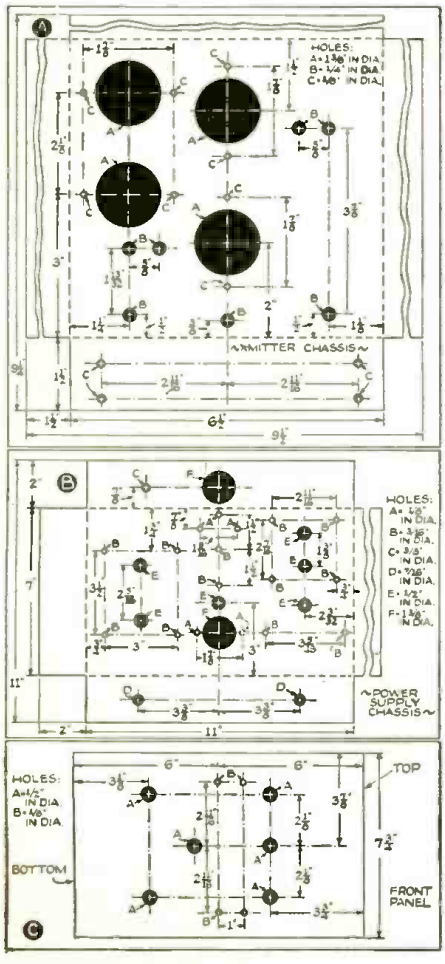
Part III, which will appear in an early issue, describes code practice oscillators and other aids to the student.

2-Tube Portable Transmitter

(Concluded from January issue)

Oscillator Simple and Rugged

The oscillator is of the simple triode type, so that no difficulty need be experienced in getting it to operate. This will be especially appreciated under the trying conditions of emergency operation. Although there was sufficient space on top of the chassis to mount the oscillator plate coil, it was mounted beneath the chassis. In this way, the chassis itself serves as a *shield* between the oscillator and amplifier coils. The isolantite coil socket is fastened to the underside of the chassis and under the oscillator tube socket by stand-off bushings and long 6/32 screws. Before mounting this coil socket, the entire transmitter should be wired. Both oscillator and amplifier plate tuning condensers are mounted above the chassis by means of small extruded bakelite washers. The tapped holes in the condenser frame, which are used for mounting the condenser, are part of the rotor bearing assembly, which accounts for the necessity of insulating the condenser from the chassis. A soldering lug placed under the head of the condenser mounting screw will furnish a means of connection to the rotor of the condenser. Since the oscillator tube is supplied with only 250 volts with either power-supply, a receiving type midget condenser is suitable for plate tuning. The amplifier plate tuning condenser requires a double-spaced condenser because of the higher plate voltage used with the external power supply. If the transmitter is used exclusively with the vibrapack or if the external A.C. power supply will furnish only about 300 volts, then a single-space condenser, such as is used in the oscillator, will be adequate. Incidentally, all the fixed condensers are of the medium sized transmitting type, so as to stand up under the 600 volts. These can also be of the postage stamp receiving type if the plate voltage will not exceed 300 volts.



Shield Obviates Neutralizing

It will be noticed that a shield encloses the lower half of the RK39. This shield should extend at least to the lower edge of the tube plate. Use of the shield results in complete shielding between stages so that neutralizing is unnecessary, thereby greatly adding to ease of operation. Because of the height of the vibrapack there is a limited amount of clearance above the chassis. This necessitated mounting the RK39 tube socket ⅝ of an inch below the chassis. The metal bushings supplied with the socket were used for this purpose. Parenthetically, it might be well to warn those Hams unfamiliar with mounting isolantite sockets. Always use the fiber washers furnished with the socket by placing these washers next to the socket on *both* sides of the socket mounting holes. This minimizes any chance of socket breakage due to tightening the mounting screws.

Keying the cathode of the RK39 was found to be entirely satisfactory, so a jack, insulated from the panel, was mounted on the front panel immediately above the milliammeter. The 1-milliampere meter is connected across either one of the cathode shunt resistors. In the 6L5G cathode is a 25 milliampere shunt, while the RK39 cathode has a 150 milliampere shunt. These shunts are permanently wired in their respective circuits, directly at the cathodes of the tubes, and leads are brought out from the cathodes to the meter switch. Using a single meter to read such widely different currents as are found in the oscillator and amplifier circuits dictates the use of separate shunts for each circuit, thus giving us the effect of having two meters of the required ranges.

A new type of rectifier tube capable of standing 750 volts on each plate and having the plate leads brought out through the top of the glass envelope was used. This is the new RK-60 tube and through its use it is no longer necessary to use receiving type rectifiers with their frequent replacement, necessitated by overloading them.

Since the plate caps of the RK-60 have quite a high potential between them, it is advisable to use *insulated* plate clips. Similarly, it might be well to place an insulating cover over the filter condenser terminals. Alternatively the condenser could be mounted in an inverted position with the terminals underneath the chassis. These precautions will amply repay the constructor in greater safety. Remember, 600 volts D.C. or 1,400 volts of A.C. is capable of inflicting fatal injuries. Only recently one of the country's best known amateurs was electrocuted while conducting experiments on a new transmitter—and he had years of experience with high voltage equipment.

Tuning the Transmitter

Tuning the transmitter involves the same procedure no matter which power-supply is used. Besides changing the cable plug from either the vibrapack or the A.C. power supply, the tap on the voltage divider is adjusted so that 250 volts is applied to the oscillator plate and the RK39 screen. Never move the slider while current is flowing through the divider, as this will cause arcing between the resistance wire and the slider, resulting in corrosion and perhaps burning out the resistance wire.

Why Go on the Air?

By John G. Hart

Director, American Radio Institute

● THE two most frequently asked questions are: "Who are these people who wish to obtain an amateur license?" and "Why do they want to go on the air?" The individuals are almost as varied as their reasons.

Aside from the special and private reasons which most individuals proclaim we may classify the Hams in a few different groups.

The first, and probably the greatest numerically, is the "joiner" type, the man who likes to meet others. Through amateur radio he gathers hundreds of acquaintances, is a Rotarian or Kiwanis, on first-name speaking terms with hundreds, sometimes thousands, of others. He assiduously attends Ham fests, and his radio shack is plastered with "Official Appointments" from radio leagues, clubs, etc. He usually is the proud owner of a number of certificates, testifying that he has worked a certain number of countries or continents, and can, and does show you thousands of QSL cards. This is the most aggressive type, the type who gets things done by organizing clubs, get-togethers, etc. His equipment in its heyday resembles a powerful commercial station, he is constantly broke buying new equipment to reach out to some corner of the earth which he could not reach before, in order to call some one in Timbuctoo by his first name and thus enlarge his circle of acquaintances.

To the second group belongs the code enthusiast, the man who likes to handle a key. He experiences the supreme thrill when he feels the surge of power through his transmitting key, knowing that he is splitting the surrounding ether wide open and may be heard thousands of miles away. The fact that he never really bothered about acquiring the rudiments of proper keying does not deter him. In fact, the less time he has spent in acquiring code rhythm, the more enthusiastic he is in a rag chew with a palpitating correspondent thousands of miles distant.

This man in the Ham vernacular is a "lid," a lid denoting a Ham who through lack of proper training, or through sheer laziness has a bad "fist," is hard to read when he does his code transmitting.

The more mature type of amateur, not necessarily mature in years but mature in behavior, goes at it in a different way. After obtaining his ticket, if he feels telephonically inclined, he spends his probation year on the 5 meter band, gets acquainted with a few of the men in his neighborhood and gradually goes over to the better bands. Sometimes he stays on the 5 meter band. As one of them explained to me: "If I like the fellow I talk to, I can always invite him over for a drink and then, when I like him after meeting him face to face, I can continue the acquaintanceship."

We need only touch on the professionals. Engineers, radio men, etc., who meet problems in their daily work and try to improve them over their own pet stations. The real work done by these men would deserve them a band of frequencies of their own, where they would not be hindered.

However, taking it all together, amateur radio is one of the greatest of all hobbies. The fact that each year it is taken up by more and more adults, where in prior years the youngsters predominated, gives us hope that sanity eventually will prevail.

Eventually the beginners will be given a corner by themselves, where they can wade before being allowed in deeper water; where only very low powered rigs will be allowed. And eventually calling frequencies will be established where Hams can do their calling and at the moment of contact, switch over to a different frequency. This has been successful in commercial practice for years and might well be followed by Ham radio. And the CQ hound who calls CQ fifty times in succession, will be outlawed. Why an amateur cannot follow commercial procedure and call three times CQ or whatever station he is calling, give his own call three times and continue in this way has always been a mystery.

Let us start cleaning the Augean stable before it is cleaned for us. We have enough technical men in the amateur ranks who can draw up zoning, power and frequency regulations with a view of clearing up the terrific QRM now existing on all bands. It will never be entirely cleared up, such an ideal is impossible with perhaps 15,000 active amateurs using the bands. But a start could be made. Up to the present time nothing worthwhile has been accomplished.

When I think back on the conditions I found on a recent jaunt to Central Europe where flea power stations are predominant and where the 1000 watts allowed here is looked at with awe, bordering on incredulity, where all telephone and telegraph traffic is government monopoly and where private traffic is considered so impossible that it is beyond the pale of discussion, where the majority of these stations are dependent for their continuity upon the whim of a single individual, it really seems worthwhile to preserve our present favorable status with a little self-regulation.

The game is worth it. Therefore, let us start the ball rolling!

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:

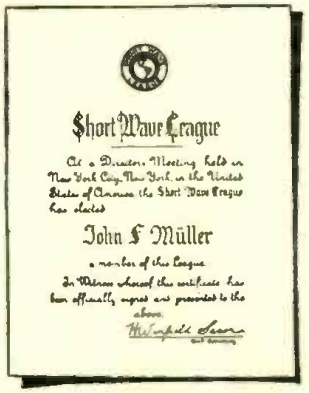
Dr. Lee de Forest, John L. Reinartz, D. E. Replogle, Hollis Baird, E. T. Somerset, Baron Manfred von Ardenne, Hugo Gernsback, Executive Secretary.

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.



Short Wave League

At a Director 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 the League.

In witness thereof the certificate has been officially signed and provided to the above.

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 2-39
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 Ware Fan ☐ Radio Engineer ☐ Student ☐

I own the following radio equipment:

Transmitting .....

Call Letters .....

Receiving .....

Name .....

Address .....

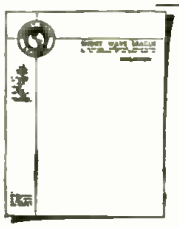
City and State .....

Country .....

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

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, lapel 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.



A—50c per 100

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, per 100 ..... **50c**

WORLD GLOBE

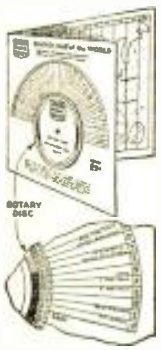
This important essential is an ornament for every den or study. It is a globe, 6 in. in diameter, printed in fifteen colors, glazed in such a way that it can be washed. This globe helps you to intelligently log foreign stations. The base is of solid walnut, and the semi-meridian of a nickel-like metal. 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 ..... Prepaid **89c**

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**

C—25c each

LEAGUE LAPEL BUTTON

E—35c each

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

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

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

LEAGUE SEALS

G—15c for 25

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

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

SHORT WAVE LEAGUE
99-101 Hudson St.,
New York, N. Y.

SHORT WAVE LEAGUE 2-39
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.)

S. W. League

(Continued from page 603)

Call	Freq. mc.	R	S	Observer
G6PY	28.01	5	8	Noyes
G6TL	28.20	4	7	Noyes
G6DT	28.375	5	5	Halliday
	14.195	5	9	Fitzpatrick, Noyes
G6GF	14.20	5	7	Davenport, Fitzpatrick
	28.120	5	7	Taglauer
G6CL	14.046	5	5	Davenport
G6WT	28.135	5	6-9	Fitzpatrick, Taglauer
	28.425			
G6CU	28.115	3	6	Fitzpatrick
G6BW	28.125	5	8	Fitzpatrick, Taglauer, Noyes
G6BL	28.130	4	7	Fitzpatrick
G6AG	28.145	5	5	Fitzpatrick
G6AN	14.000	4	9	Fitzpatrick
G6OX	14.130	5	9	Fitzpatrick
G6VK	14.075	5	8	Fitzpatrick
G6WY	14.035	4	7-9	Fitzpatrick, Noyes
	28.370	5	8	Taglauer
G6GA	14.120	5	8	Fitzpatrick
G6MK	14.115	4	7	Fitzpatrick
G8KL	28.070	5	6	Taglauer
G8JV	28.200	5	6	Taglauer
G8SA	28.130	5	5-7	Taglauer, Jordan, Noyes, Kemp
G8KD	28.155	5	6-9	Taglauer, Jordan
G8OO	28.310	5	8	Taglauer
G8DM	28.170	4	6	Taglauer
G8MU	28.420	5	8	Taglauer
G8HX	28.450	5	7	Halliday
G8QX	28.175	4-5	7	Halliday, Fitzpatrick
	28.130			
G8MX	28.110	4-5	6-9	Halliday, Fitzpatrick,
	28.350			Taglauer
	28.475			Noyes
G8DT	28.450	4	7	Halliday
G8BM	28.400	4	6	Halliday, Taglauer
G8GX	14.113	4	7	Kemp, Fitzpatrick
G8TR	28.	3	5	Kemp
G8TD	28.125	4	5-8	Kemp, Fitzpatrick
G8MA	28.105	5	7	Fitzpatrick
G8CL	14.320	5	8	Fitzpatrick
G8IG	14.055	4	8	Fitzpatrick
	28.240	4	5	Taglauer
G8NY	14.095	5	9	Fitzpatrick
G8SB	14.125	5	9	Fitzpatrick
G8UJ	14.020	4	8	Fitzpatrick
GM6RG	14.250	5	9	Barker
	28.115	3-5	6-9	Taglauer, Jordan,
	28.170			Barker, Hegler,
	29.010			Noyes, L. Fuller,
	29.430			Kemp, Fitzpatrick
GI8UW	14.080	3-5	5-9	Kemp, Fitzpatrick
EI2G	14.075	4	8	Fitzpatrick
EI9J	28.20	5	9	Noyes
HB9DE	14.200	3	6	Fitzpatrick
HB9J	14.355	4	6	Fitzpatrick
F3CP	14.15	5	5	Davenport
F3MX	14.005	5	9	Fitzpatrick
F3HM	14.100	4	6	Fitzpatrick
F3NM	14.115	5	9	Fitzpatrick
F3LE	14.035	4	9	Fitzpatrick
F3OX	14.135	4	6-8	Fitzpatrick, Noyes
F3OO	14.050	5	7	Fitzpatrick
F3DI	14.100	4	8	Fitzpatrick
F8RR	28.220	4-5	7-8	Taglauer, Noyes
	28.29			
F8XT	14.110	5	6-8	Lang, Fitzpatrick
F8NR	28.	4	4	Kemp
F8KI	14.080	5	9	Fitzpatrick
F8LX	14.095	4	6	Fitzpatrick
F8FC	14.065	4	9	Fitzpatrick
F8VC	14.110	4	7	Fitzpatrick
F8AG	14.035	4	8	Fitzpatrick
ON4ZA	28.156			Jordan
ON4PA	28.82	5	7	Noyes
SV1CA	14.081	4	6-8	Carling
IIMI	14.035	4	5	Carling
LA1K	28.33	4	7	Noyes
LA1T	28.125	4	7	Fitzpatrick
SM5WZ	14.110	4	4	Fitzpatrick
PA0WN	14.265	5	9	Fitzpatrick
PA0EO	14.13	5	7	Davenport, Robinson
	14.17			
CT1QA	14.310	4	6	Barker
CT1RM	14.087	3	6	Kemp, Fitzpatrick
CT1OX	14.107	4	6	Kemp, Fitzpatrick
	14.085			
CT1AX	14.140	4	9	Fitzpatrick
CT1DA	14.010	4	7	Fitzpatrick
CT1AY	14.030	4-5	6-9	Fitzpatrick, Hegler
	14.110			
CT1PW	14.120	5	6	Fitzpatrick

This is the end of the long list of Europeans which were reported for the month of November. Now we come to our old friends, the "Aussies," once more. They did not do quite so well last month as they did in the previous month. However, a few did get their signals through.

VK2ACL	14.20	5	4	Davenport
VK2AF	14.000	4	6	Fitzpatrick
VK2AZ	14.025	3	7	Fitzpatrick
VK2GU	28.30	5	9	Noyes
VK2OR	14.02	4	7	Noyes
VK2MH	14.015	4	7	Fitzpatrick
VK2UC	14.08	5	8	Noyes
VK3XJ	14.050	5	8	L. Fuller, Noyes
	14.11			

(Continued on following page)

S. W. League

(Continued from preceding page)

Call	Freq. mc.	R	S	Observer
VK3WI	14.000	4	6	L. Fuller
VK3XX	14.095	4	6	Kemp
VK3VV	14.087	3	4	Kemp
VK3KQ	14.240	4	5	Barker
VK3NC	14.220	4	6	Barker
VK3YJ	14.236	4	6	Barker
VK3TR	14.05	4	7	Noyes
VK3XP	28.22	4	6	Noyes
VK4AD	14.10	4	5	Davenport
VK4PF	14.010	4	9	Fitzpatrick
VK7AB	13.98	4	7	Noyes
VR6AY	14.355	3-5	5-9	Herzog, Fitzpatrick, Trueman, C. Fuller, Slaughter
PK6XX	14.020	4	5-6	Davenport, Herzog
PK4JD	14.320	4	5-7	Herzog
KA1ME	14.230	5	7	Hegler
KA7EF	14.140	4-5	6-7	Lang, L. Fuller
K6OJI	14.154	5	5	Lang
K6BJJ	14.245	5	6	Lang
K6PPR	14.185	5	7	Lang
K6BXR	14.160	5	6	Lang
K6ILW	14.190	4	5	Lang
K6OQE	14.246	5	7	Lang
K6ICL	28.30	5	7-9	L. Fuller, Trueman
	29.115			
K6MVX	28.050	5	9	L. Fuller
K6LGB	29.035	5	9	L. Fuller
K6AGR	14.350	3	8	Fitzpatrick
K6AJR	14.310	5	7	Fitzpatrick
K6DTT	14.300	4	8	Fitzpatrick
K6LKN	14.300	5	6	Trueman
K6PAS	28.20	5	7	Trueman
K6LPW	28.25	5	6	Trueman
K6MVV	28.930	5	8	Taglauer
K6OJU	14.280	5	7	Barker
K6LEJ	14.233	4	5-8	Carling

Transmitter Measurements

(Continued from page 608)

the excitation, bias, tuning and coupling should be adjusted for maximum output as indicated by the maximum ammeter reading. To obtain the output in watts, simply substitute the ammeter reading for I and the Dummy resistance for R into the equation I^2R=Watts.

Figs. B, C and D show a 73 ohm Dummy Antenna and a Radio Frequency ammeter properly coupled to three general types of amplifier circuits. The regular feeders are disconnected and if parallel antenna tuning is used the condenser must also be disconnected. The method of coupling to either a push-pull or a plate neutralized amplifier is shown in Figs. B and C with the coupling coil placed around the center of the tank. The circuit shown in Fig. D illustrates the method of coupling to screen grid, pentode or grid neutralized amplifiers. In all cases the coupling coil is placed at a point of low radio frequency voltage (at the point where the plate supply is connected). With the Dummy coupled as shown, the transmitter is adjusted for maximum output as indicated by the ammeter. Output in watts is obtained from Ohm's Law for power, as previously stated.

For higher wattages, several Dummy Antennas should be operated in series-parallel to maintain proper resistance and increase capacity.

Efficiency is determined by dividing the output in watts (as obtained by the method described) by the input obtained by multiplying the plate voltage by the plate current in amperes. Maximum plate efficiency will result when large driving power, high bias and load impedance are used.

A convenient assembly consists of a 73 ohm Dummy Antenna mounted directly on a radio frequency ammeter, which insures short leads and proper impedance match.

A Dummy Antenna also enables the operator to measure untuned transmission line losses, using a 73 ohm unit for concentric and twisted pair lines and a 600 ohm Dummy for open wire transmission lines. Disconnect the feeders and connect across the antenna terminals a Dummy in series with an R.F. ammeter. The antenna coupling should be adjusted to the lowest possible value which will give an accurate indication on the meter. The transmitter should be carefully adjusted for maximum output as indicated by the ammeter and the output calculated from Ohm's Law.

A second reading is then taken with the line connected to the transmitter and the Dummy and R.F. ammeter connected across the end of the line with the regular antenna disconnected. The reading of the R.F. ammeter is taken with excitation, bias, input and coupling maintained the same as in the first reading; and the output again calculated from Ohm's Law. The difference between the output measured at the transmitter end to that measured at the antenna end of the line will equal its loss in watts.

Electrical Characteristics

Model	Watts	Ohms	Induct. mh.	Distr. Cap. mmf.
D-100	100	73	0.33± .03	5
D-100	100	600	1.1± .10	5

The Vacuum Tube—How It Works

(Continued from page 597)

positive grid, rush over to the plate. If we should reverse our little battery (marked "C" in Fig. 2) so that we make our grid negative, we would stop electrons from flowing to the plate. Since the grid is so close to the filament, it takes only a very tiny voltage for us to get complete control of the electron flow.

Now suppose that we were to change the amount of voltage on the grid continuously. The minute we did that the filament-to-plate electron flow would also vary in exactly the same manner. One way of doing this would be to connect the grid to an aerial.

Vacuum Tube as an Amplifier

First, we will need some device to tune in a particular radio station. For this we can use a coil and condenser. Next, in place of the "C" battery we can put a grid-leak. This is nothing more than a piece of high resistance wire placed across a fixed condenser. The grid condenser is used to supply the incoming charges to the grid of the tube, and the grid-leak resistance wire is used to prevent negative charges from accumulating on the grid in such large quantities that the tube will stop operating. Our radio circuit will then look like the one shown in Fig. 3. As we tune our set, we will receive the very feeble radio impulses on the aerial and from there transfer them to the grid. However, these weak impulses will control the large flow of electrons inside the vacuum tube, and since this large flow of electrons will vary in exactly the same way as our incoming radio signal, we will have *magnified* the radio signals.

So far, however, we have actually only considered the amplifying action of the radio tube. Before we can hear signals in our earphones, the radio tube must perform another function—that of detection. Detection is necessary through the use of vacuum tubes, since our ear cannot hear vibrations with a frequency of much over 20,000 per second.

If we were able to put the radio signal of our aerials directly through the windings of our earphones, there would be no effect, for this reason: While the R.F. current is flowing in one direction it tries to pull the diaphragm toward the magnet, and when the current has reversed, the opposite force will be exerted on the diaphragm.

How Signals Are Made Audible

But we can make these currents move the diaphragm if we make the pushes stronger than the pulls, or vice versa, i.e., rectify the wave. The vacuum tube accomplishes this. The alternating currents in the antenna circuit produce alternating voltages on the grid, which may be considered as electric pushes and pulls following each other rapidly. However, let us place a voltage on the grid (through the use of a "C" battery, or through the use of a grid leak) before we start receiving signals on our aerial. Therefore, when the alternating current radio signal reaches the grid, it will go more in one direction than the other. In other words, we have secured a method of getting large pushes and weak pulls. Or, to use more technical language, we have made the alternating voltage on our grid move strongly in one direction, and weakly in another. Thus, as the lower frequency audio waves which modulate the R.F. carrier come through with the rectified half of the wave, the phone diaphragm is caused to vibrate at an audible frequency.

FREE—FIFTEEN 10¢ PUBLICATIONS

featuring construction of the most popular short-wave receivers and transmitters

with a One-Year's Subscription to Radio & Television

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.

When mailing us your subscription, use the special coupon on this page. Select your 15 projects by their serial numbers. 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.

THESE 15 PROJECTS, IF BOUGHT SINGLY, WOULD HAVE COST YOU $1.50. YOU CAN NOW GET THEM *ABSOLUTELY FREE!*

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. Rack 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 9-270 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 16-550 meters by flipping a switch. No. 11

HOW TO BUILT 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-tuber giving 4-tube performance is this receiver which does its work with a minimum of tubes. A 6F7 is used as a combined R.F. amplifier, detector and first audio stage; a 6C5 is used as second audio stage.....No. 24

HOW TO BUILD THE 160 WATT QRM DODGER—A COMPACT 5-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 RK37'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 world-wide 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 "GD-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 big 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 brief-case. 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 "53" TWINPLEX RECEIVER. The twinplex, although it has only one tube, works as if it had two. Marvelous 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 3¼ lbs. and measures 5x5x6 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 OUO-AMPLIOYNE. 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

RADIO & TELEVISION, 99 Hudson Street, New York, N. Y.

Gentlemen: Enclosed you will find my remittance of $2.50 for which enter my subscription to RADIO AND TELEVISION for One Year (12 issues). Send me promptly, absolutely FREE, and POSTPAID, the 15 publications I have circled at the right. (CANADA AND FOREIGN $3.15.)

☐ NEW SUBSCRIBER ☐ EXTEND PRESENT SUBSCRIPTION

Name .....

Address .....

City ..... State ..... R&T-2-39

Send remittance by check or money order. Register letter if you send cash or unused U. S. Postage Stamps.

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

RADIO & TELEVISION
99 HUDSON STREET
NEW YORK, N. Y.

Getting Started in Amateur Radio

(Continued from page 589)

District No.	Address
1	Custom House, Boston, Mass.
2	Federal Building, 641 Washington St., New York City
3	Room 1200, Customs House, Second and Chestnut Sts., Philadelphia, Pa.
4	Fort McHenry, Baltimore, Md.
5	402 New Post Office Building, Norfolk, Va.
6	411 New Post Office Building, Atlanta, Ga.
7	P. O. Box 150, Miami, Florida
8	Customs House, New Orleans, La.
9	209 Prudential Building, Galveston, Texas
10	464 Federal Building, Dallas, Texas
11	1105 Rives-Strong Building, Los Angeles, Calif.
12	Customs House, San Francisco, Calif.
13	207 New U. S. Court House Bldg., Portland, Ore.
14	808 Federal Office Building, Seattle, Ore.
15	538 Customs House, Denver, Colo.
16	927 New Post Office Bldg., St. Paul, Minn.
17	410 Federal Building, Kansas City, Mo.
18	2022 Engineering Bldg., Chicago, Ill.
19	10th Floor, New Federal Bldg., Detroit, Mich.
20	514 Federal Bldg., Buffalo, N. Y.
21	Aloha Tower, Honolulu, T. H.

Another aid to passing the government regulations is a booklet published by the A.R.R.L., and also the book *How to Become an Amateur Radio Operator*, by Lt. Myron F. Eddy.

The Amateur Bands

In tuning across the *short wave* bands, with their horde of different code, voice and broadcast signals, it is noticed that the amateur bands, with their many closely crowded stations, are found at regular intervals. As a matter of fact, they are so spaced that they are approximately in harmonic relation to one another (one band double the frequency of the next one). A glance at the sketch here will show this relation, as well as the band width and number of bands open to amateur activity.

Each of the bands has some definite use for long distance (DX) communication, for consistent day-time contacts, to avoid interference due to the number of stations on the air, and several other reasons. With this in view, most modern amateur stations are arranged in such a way that any of several of the amateur bands can be chosen at will. And because of the strict supervision of the bands by government agencies (and the possibility of getting a pink warning ticket from the District Inspector) quartz crystals are used almost always to keep the station within the desired band, as well as to prevent frequency drift while making a contact with some other ham.

The following listing will give in general an idea of the usefulness of the various bands:

1715-2000 KC. This band is popular mostly for phone stations and it is here that the "practice" transmissions for beginners will be found. Many beginners start out on this band and it is really the best for such purpose.

3500-4000 KC. This band is considered by many hams as the most consistent one for DX 2-way contacts—especially at night when the skip distance comes into play and makes low-power transmissions over long distances possible. It is also a popular band among Aussies (Australian stations) and South African amateurs and is thus attractive for those who go in for long-range conversations (or contacts as they are usually called).

7000-7300 KC. This band is also a popular one for DX contacts. However, it is more crowded than the lower frequency bands and the beginner will find some difficulty in "getting through" during the evening hours.

14000-14400 KC. This band has the best characteristics for daytime work. It is also useful for the early evening.

28000-30000 KC. (28 to 30 MC.) Ordinarily this is considered an "experimental" band as it is not as consistent as the 14 megacycle band, but displays many of the characteristics of the 56 MC. (5 meter) band.

56000-60000 KC. (56 to 60 MC.) Although usually considered a "local" band, some remarkable transmissions over hundreds of miles have been re-

(Continued on following page)

corded on the 5 meter wavelengths. A good deal of experimenting is done on the 5 meter band as well as the higher experimental band. Many hams build equipment for these bands as additional units to experiment with.

112,000—118.000 KC. (112 to 118 MC.)
224.000—230,000 KC. (224 to 230 MC.)
300,000—up (300 MC. up)

The outposts of those amateurs who like to do the exploration work have invaded the frequencies above 112 MC. These frequencies have just been separated into the three bands shown above and on each of these bands, any type of transmitter authorized for amateur transmission may be used. These are the only bands now available for amateur television transmission and for transmitters using unfiltered plate supply systems. Also, these are the only bands on which unregulated or directly modulated oscillators may be used. These are truly the "experimental" bands.

The Amateur Station

Let us now take a cross-section through a typical modern amateur station. The transmitter has developed by stages from the first simple self-excited oscillator with a much overloaded oscillator tube (which, incidentally is now banned except on the bands higher in frequency than 60 megacycles) feeding directly into the antenna circuit through a coupled tuning coil (called a *tank coil*) and powered by a home-made power transformer through an electrolytic rectifier made from aluminum plates immersed in jars filled with a borax solution, to a modern panel type unit, quite business-like in appearance and incorporating a crystal-controlled oscillator of low power, feeding into several amplifier tubes with intervening tuning circuits, and indirectly coupled to a *rotating beam antenna*.

The receiver has advanced from a single tube regenerative set (which is remarkably efficient, as a matter of fact) to a super-

Getting Started in Amateur Radio

(Continued from preceding page)

heterodyne having a quartz crystal in the I.F. amplifier, for the purpose of producing the razor-like selectivity sometimes needed to separate one code station from another on the crowded Ham bands.

In addition, the station boasts a *cathode-ray* monitor for watching the quality of the phone transmissions, a *frequency meter* for checking the transmission frequency (to make sure it does not drift out of the Ham band for some unaccountable reason), and other refinements which have been added as time and the "bankroll" permitted.

What we are trying to say is that *every* amateur station goes through a series of never-ending stages of evolution. The writer does not know of any ham station which the owner would call finished. Each is continually being changed, improved, torn apart and rebuilt, only to be torn down again in a short time.

That is the "fun" in amateur radio—— building a new transmitter or receiver and then finding out what it will do, in distance, quality of voice transmission, purity of tone on C.W. (continuous wave telegraphy) and stability. It is a fascinating game and a hobby that will never be regretted!

Next month, we will continue this series of articles. In the mean time, get started with that code practice. It will take some time, but it is well worth it. And remember, the code is a necessary evil of amateur radio, even if you never intend to operate a C.W. (continuous wave code) station, because you must pass a code test before you can get your license, regardless of the type of transmitter you intend to use.

World S-W Stations

(Continued from page 604)

Mc.	Call	
6.060	W8XAL	CINCINNATI, OHIO, 49.5 m., Addr. Crosley Radio Corp. Relays WLW Tues., Fri., Sun. 5.45 am.-12 n., 11 pm.-2 am.; Wed. 5.45 am.-12 n., 9 pm.-2 am.; Mon., Thurs., Sat. 5.45 am.-2 am.
6.060	W3XAU	PHILADELPHIA, PA., 49.5 m. Relays WCAU Tues., Fri., Sun. 1 pm.-Mid. Wed. 1-10 pm.
6.057	ZHJ	PENANG, FED. MALAY STATES, 49.51 m. 6.40-8.40 am., except Sun., also Sat. 11 pm.-1 am.
6.054	HJ6ABA	PEREIRA, COL., 49.52 m. 9.30 am.-12 n., 6.30-10 pm.
6.050	GSA	DAVENTRY, ENGLAND, 49.59 m., 11 am.-12 n., 12.20-4, 4.15-6 pm.
6.050	HJ1ABG	BARRANQUILLA, COL., 49.65 m., Addr. Emisora Atlantico. 11 am.-11 pm.; Sun. 11 am.-8 pm.
6.050	HP5F	COLON, PAN., 49.59 m., Addr. Carlton Hotel. Irregular.
6.045	RV15	KHABAROVSK, U.S.S.R., 49.63 m. 2-11 am.
6.045	XETW	TAMPICO, MEXICO, 49.6 m. Irregular 7-11 pm.
6.040	W4XB	MIAMI BEACH, FLA., 49.65 m. 1-3 pm., 9 pm.-12 m. Relays WIOD.
6.040	W1XAL	BOSTON, MASS., 49.65 m., Addr. University Club. Irregular.
6.033	HP5B	PANAMA CITY, PAN., 49.75 m., Addr. P. O. Box 910. 10.30 am.-2, 6-10 pm.

(Continued on page 634)

Let's Listen In with Joe Miller

(Continued from page 599)

reported above, the data comparing too closely as to call, times and frequency to be another station. However, the times and frequency given for XGSA are to be depended upon, being derived from actual reception, though call *may be* XPSA.

XUD, 9.56 mc., Peking, is the S.W. call of XGAP, reported here last month, but now on a schedule of 4-9 a.m. Reported by Bert Wolfe, W6, who adds that KZRM and W1XK "snow him under."

U.S.S.R.

RV15, Khabarovsk, Siberia, on the Pacific Coast above China, formerly on 4.27 mc., is now being reported by West Coast DXers with excellent strength, on 6.045 mc., with a schedule of 2-11 a.m. daily. Excellent programs are broadcast from this famous DX station.

During the early a.m.'s. DXers may often run across powerful signals, usually with a definite Asiatic "flutter" and with voices invariably *shouting*, in clear speech, on many parts of the dial.

These are usually Soviet fone stations, and may be given up as hopeless, as the U.S.S.R. no longer QSL's reports on these fones. We wonder why the shouting, when these stations come in here so well and must be terrific over there, hi!

DX REVIEW

PHILIPPINES—KZIB, 9.503 mc., Manila, is being well heard in U. S. on a daily schedule of 7-9:05 a.m. Bert Wolfe, W6, reports this one.

MANCHUKUO—TDE, 10.065 mc., has QSL'd Rog Legge, W2, direct, one of few QSL's reported direct from Hsinking. The regular Jap fone QRA sometimes obliges in QSLing TDE, also known as JZB, but not very often. Rog gives QRA as: N. Maeda, Manchuria Tel. and Tel. Co., 601 Daido-Taigai, Hsinking, Manchukuo. We recently reported a signal on or near TDE's frequency and back came a veri from JMP2. Figger that one out! We've never heard such an odd call before, but we've got the veri, hi! Also, along with JMP2, came separate QSL's (as requested) for JVK, JVI, JVA and JZE! This from the Tokio QRA. TDE lately heard at 1:30 a.m.

JAPAN—JZE, 13.02 mc., was heard once at 7 a.m. contacting and working JVK, 13.60 mc., both with FB sigs.

BECHUANALAND—ZOK, 7.80 mc., 40 watts, is another station added to this country's chain of transmitters for radiofone. It is located at Francistown. ZOK and other stations, mentioned in an article some months ago, contact ZNB, at Mafeking, 5.90 mc., when any calls are to be made. ZNB is being heard occasionally on their 6-7 a.m. transmission, ex. Suns., when they broadcast recordings. Power of ZNB is 200 watts. QSL, a handsome one, reproduced here previously.

SIAM—HS6PJ, 19.02 mc., Bangkok, is again being reported well heard on their Monday transmissions of 8-10 a.m. All DXers should try for this fine catch, which is situated well in the clear, and easy to "spot."

FRENCH INDO-CHINA—FZR, 16.20 mc., Saigon, was well heard recently in contact with FTK, 15.88 mc., St. Assise, France, at 7:20 a.m. Watch for this catch, which, before actual contact, sends a series of musical notes repeated over and over, making it easy to recognize. Upon contact, after having called, "Allo, allo, Paris, ici Saigon," till FTK replied. FZR reverted to scrambled speech. A rapid "flutter" type of fading is noticed on FZR's carrier, and with all this data, quite a number of our friends have succeeded in landing FZR! There is also FZS, 18.35 mc., which may also work France. Both FZS and FZR may be heard anywhere between 6-9 a.m., so watch for them!

DX NOTES—PZH and PZ1AA are both verified for Rog Legge, W2, from this QRA, after a long wait— Gouvernments Radio Dienst, Paramaribo, Dutch Guiana, FB, OM!

YCP, 9.12 mc., Balikpapan, Dutch Borneo, has QSL'd the report of Fred Borcheidt, W9. A nice catch!

All-India Radio sends us a letter requesting that listeners be advised that a more detailed report than most send, is necessary, in order for them to verify. Report at least a half hour of a transmission. Veris of VUD and VUD2 here.

HAM STARDUST

Regardless of any other activity, or lack of activity on the short waves, there is always plenty of action on the ham bands, even when conditions are not the best, as was generally the case during the last half of November and the first half of December. However, we definitely expect to notice an improvement in DX conditions, and results, during January.

Asiatics may be heard on good days, on East

(Continued on following page)

Kinks

(Continued from page 596)

Keeping Diagrams Handy

of glass between which I slip the diagram removed from the service manual. A hole is cut in the top of the bench so that the diagram is readily visible. Of course, a piece of glass is set into this hole to prevent tools and small parts from falling on the diagram.—*Lucien Guitard.*

Credit

In the one-tube receiver described by Mr. Yellin in the January issue, page 544, the headphones used with the set and shown in the picture should have been credited to the Trimm Radio Manufacturing Co.

COMMERCIAL NOTICES 10¢ A WORD

Under this heading only advertisements of a commercial nature are accepted. Remittance of 10c 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

300% PROFIT SELLING GOLD Leaf Letters for Store Windows; Free samples. Metallic Co., 416 North Clark, Chicago.

CORRESPONDENCE COURSES

CORRESPONDENCE COURSES and educational books, slightly used. Sold, Rented, Exchanged. All subjects. Satisfaction guaranteed. Cash paid for used courses. Complete details and bargain catalog free. Send name. Nelson Company, 3489 Manhattan Building, Chicago.

INSTRUCTION

RADIO ENGINEERING, BROADcasting, aviation and police radio, servicing, marine and Morse telegraphy taught thoroughly. All expenses low. Catalog free. Dodge's Institute, Coli St., Valparaiso, Ind.

MISCELLANEOUS

7 MILLIAMMETER, HEAVY RUBber insulation, high voltage lacquered cable, suitable for transmitter, 2c per foot. Gold Shield Products, 350 Greenwich St., New York City.

PATENT ATTORNEYS

INVENTORS—PROTECT YOUR rights before disclosing your invention to anyone. Form "Evidence of Conception"; "Schedule of Government and Attorneys' Fees" and instructions sent free. Lancaster, Allwine & Rommel, 436 Bowen Building, Washington, D. C.

QSL—CARDS—SWL

QSL'S, SWL'S CARDS, TWO COLors, 75c hundred. W3DEE, Maple Shade, N. J.

SHORT WAVE RECEIVERS

USED DOERLE'S, D-38, BS-5, 7C, reconditioned by factory, 40% off. See January, 1938 Short Wave & Television for description. Kusterman, 68 Barclay St., New York.

PLANS 18 DISTANCE CRYSTAL Sets—SW record 4250 miles, with "Radiobuilder" year—25c. Laboratories, 7700-A East 14th, Oakland, Calif.

TEST EQUIPMENT

YOUR OLD TEST EQUIPMENT is worth money. Write now, telling us what you have and we will send our cash offer. We can supply any Rider Manual circuit for 25c per page. Reo Radio Co., 178 Greenwich St., New York.

FOR SALE (NON COMMERCIAL) 3¢ A WORD

Under this heading we accept advertisements only when goods are offered for sale without profit. Remittance of 3c 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 RADIO & TELEVIsion Institute Course (Text only, less Expt. Equipment). Best offer within two weeks from date of publication gets it. Harold Hough, East Linden Street, Lancaster, Wisconsin.

FOR SALE U.T.C. SX80 TRANSmitter complete also equipment to modulate above. Also one Astatic D-2 crystal mike, one S-1 Amperite Velocity mike, one American double button mike and misc. equipment. Gordon Taftner, Warren, Minn.

BEST OFFER TAKES NINE tube, all band amateur super. Has noise silencer. W9IWN, Auburn, Ind.

SKYBUDDY RECEIVER, $15; Electro-Voice mike and transformer; 5 tube amateur bands superheterodyne, $12. Wise, W9VCF, Auburn, Ind.

SUPER-CLIPPER $14.00. FB7 $19.00. Comet Pro complete $39.00. W9ARA, Butler, Missouri.

SKY BUDDY FINE CONDITION, best offer accepted. Write for details. Wieland, R.2, Kingston, N.Y.

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, who wish to buy or exchange radios, parts, phonographs, cameras, bicycles, sporting goods, books, magazines, etc. As we receive no money for these announcements, we cannot accept responsibility for any statements made by the renders.

Use these columns freely. Only one advertisement can be accepted from any reader in any one 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.

Copy should reach us not later than the 10th of the month for the second following month's issue.

WANTED: TWO TUBE "6F7", "12A7", all electric S.W. set, minus speaker, tubes. Does not need to work. Have "B" and "A" supplies. S.W. receiving parts, radio mags., tubes. H. Heffernan, 36-15 168th St., Flushing, N. Y.

WANT PHONOGRAPH RECORDS of Boswell Sisters, Andrews Sisters, Helen Ward, Edythe Wright, Bea Wain and Martha Tilton. For them, I have radios, parts, books, stamps, magazines, real hot swing records. Walter McIntosh, Summer, Melrose, Mass.

HAVE 9 MODERN MECHANIX, 11 Popular Mech., 16 Pop. Science, 3 Radio Craft, 8 S.W. Craft, and good earphones. Want revr., practice key, preselector, oscillator, or what have you? William Rasins, 6611 S. Rockwell Street, Chicago, Illinois.

HAVE AMPERITE MIKE, CAMera, projector, electric shaver, typewriter, sporting goods, books. What have you? M. Epstein, 2953 Ruckle, Indianapolis, Ind.

BARTER CRYSTAL POCKET RAdio, mimeograph, violet ray, fiction books, correspondence courses, stamps, philatelic covers. Want useful items, auto burglar alarm, printing, stamps, coins, razor blades. Exchange swap lists. Rudolph Zak, 2509 East 89th, Cleveland, Ohio.

WILL TRADE Pit. RCA 852'S, 12 Jewell meters, 1 Weston thermocouple meter, Cardwells, Thord. 1200 V. e.t. 300 Md., and others for ham equipment. Write W9IMJ, 616 N. Central, Chicago.

HAVE A LATEST MODEL FORester Bros. model plane engine used about 5 hrs. Will exchange for 110 gauge model railroad track, engine, or "O" gauge track. George Morris, 225 E. Park Ave., Libertyville, Illinois.

WANT PHONOGRAPH RECORDS, Dance, band, organ, novelty, etc. Must be late, electrically recorded, in perfect condition. Will trade new or used tubes. What have you, what do you need? C. M. Miller, Gresham, Nebr.

WANTED—GOOD SW RECEIVER, 5-6 tube. Have 4x5 folding Seneca camera, 1 film pack and adapter, F.8-128—double extension in excellent shape. W. Barnhart, 307 E. Lawrence St., Montpelier, Ohio.

TRADE QST'S, SW&T, ALL Wave Radio magazines. Need a Triplett meter 0-300 or what have you. Write for list. Richard Laplander, W9BAC, Hubbell, Mich.

WILL TRADE NEW BOOK "FINger Print Instructor" by Kuhne, also book entitled "Cash from Your Camera", for camera. Samuel Schlecker, 326 East 46th St., Brooklyn, N. Y.

HAVE MECHANICAL DRAWING, Keuffel & Esser set, practically new, worth $12., and over 2,000 different stamps with thousands of duplicates. Will swap for typewriter, radio, or what? William Owen, Zeta Psi House, Tufts College, Massachusetts.

TRADE FOR WHAT HAVE YOU: 1 h.p. gasoline engine, ½ h.p. gasoline engine with 250 watt generator 6 volts, both Briggs & Stratton. Good condition. All letters answered. James Curtis, Lafayette, Sussex Co., N. J.

WANTED CORRESPONDENCE and pictures, especially, with foreign readers. Interested greatly in Television. Swap stamps and postcards or anything else. All foreign letters answered. Franklin O. Pease, 136 West Ninth Street, Chadron, Nebraska, U. S. A.

WILL TRADE "BUSINESS Training Course", cost $24.00, for Pee Wee transmitter or good 22 repeating rifle or Syncro Ace gas model engine. Arthur Simmons, Jr., 33 S. 16th St., Harrisburg, Pa.

WANTED: AIRCOOLED GASOline motor ½ horse power or over, 1 or 2 cylinders. Model airplane or motorcycle motor will do. Have radios, parts, books, magazines, cash. Terrence Genes, Fort Lawn, S. C.

AM INTERESTED IN BUYING portable 160 mtr. phone transmitter as well as 5 and 10 mtr. mobile units. Have Zenith 3 bnd. revr. and 2 auto revrs. Phil Presson, Box 2535, Tulsa, Okla.

TRADE—CODE PRACTICE SET, headfone adptr. 38 auto. handbook, few radio mags., parts, cowboy songbooks, cash for folding camera, .22 rifle or shotgun. M. Bolcean, R.F.D. 2, Mt. Clemens, Michigan.

HAVE $10.00 CASH AND RADIO parts. Want a good receiver such as DX-4. Fred C. Stuckert, 6021 N. Kent Ave., Milwaukee, Wisconsin.

WANT HUNTING PERMIT stamps. Have radio magazines, used parts, etc. Ward E. Williams, 1414 10th Ave., Lake Charles, La.

SWAP! WEST-O-GRAPH DUPLIcator cost $85 when new. Uses regular 4 hole stencils, automatic paper feed and prints up to 250 sheets by just turning crank. Want radios, cameras, etc. Harry Bovair, Wayland, Mich.

HAVE NILSON & HORNING'S Radio Telegraphy, and Operating Questions and Answers; 2 volt portable radio; Candler code course. Want 2 volt S.W.3, or 2 volt Doerle. L. M. Funk, 5303 Bradford, Dallas, Texas.

WANTED A STEWART WARNER converter (301A). I have plenty of f.b. stamps from all over the globe to exchange for it. J. WEISS, 547 E. 105 St., Cleveland, Ohio.

TRADE: ABOUT 10,000 STAMPS, about 5,000 mounted and rest loose. Want a good receiver. Also will do developing, printing and enlarging for radio or transmitter parts. Stanley Rozek, 715 Windsor Terr., Schenectady, N. Y.

WANTED A COMMUNICATION superhet (must receive broadcast), three inch oscilloscope, signal generator and wobbulator, 6, 7, 8, and 9 Rider manuals, capacitor analyzer. All inquiries ans. James Finney, 45 River St., Cambridge, Mass.

INSTRUCTOGRAPH CODE course, good as new, complete with ten tapes. Will exchange for tube tester or set analyzer, good shape. W. W. Parker, R.F.D. 2, Rome, Ga.

HAVE RECORDING AND P.A. equipment, recording head and two-speed motor, 30 watt amplifier, crystal mike, piano-pickup, speaker, etc. Want radio servicing equipment, manuals, books, auto radio. H. M. Hopner, Herrick, Ill.

WANTED: Teleplex or Instructograph with tapes, also transmitting parts. Have 3 tube s.w. receiver and 8 m.m. Univex movie camera. Marvin Sen's, 940 15th St., Augusta, Ga.

HAVE 48 COPIES S.W.C., '35 through '38; two speakers, 8" Rola dynamic, 8" Peerless magnetic, (cases); $7.50, Lincoln loop antenna; all A-1. Want good TRF super-gainer. W. King, 427 Meridian St., Anderson, Indiana.

(Continued on opposite page)

Let's Listen In with Joe Miller

(Continued from preceding page)

Coast, at just about the times the Aussies, now noticeably absent, begin to weaken, or from about 7-8 a.m. On January 5, 1938, we ran into VS7GJ and FI8AC at 7:30 and 8:30 a.m., with fine sigs on both.

AFRICA

This continent predominates the DX news during the winter months with the seasonal return of the South African ham fones, which are heard on the East Coast, usually with fine sigs, from 10:30 p.m. to 12:30 a.m., and often, from 2-5 p.m. On West Coast, they are generally best heard at 7 a.m. P.S.T.

Here's a list of So. Africans: ZS4H, 14060; ZS5CO, 14150, 14385; ZS5CL, 14120; ZS5CA, 14105; ZS6BR, 14035, 14060; ZS6ED, 14045; ZS6DY, 14080; ZS6DW, 14070; ZS6EF, 14110; ZS2BB, 14068; ZS1AX, 14075.

Southwest Africa—ZS3F, 14095.

Southern Rhodesia—ZE1JH, 14030; ZE1JX, 14025, 14300.

Tangiers—CN1AF, 14000, 14100.

Madagascar—FB8AH, 14340, at 9:45-10 p.m., by Tom Jordan, W8.

The above Africans were contributed by Len Carling, W9, Bob Taglauer, W9, Gail T. Beyer, W9, Ted Bottema, W8, Mike Soplop, es Y.T.

Morocco: CN8AF, L.F., and CN8MU, H.F., 20 meters, also on 14070, by Gail and Ted.

Kenya—VQ4KTB, 14020, reported by an unnamed DXer in W Va.

Northern Rhodesia—Mike Soplop, W8, reports VQ2PL, 14415, at 11 p.m., as well as VQ4KTB at 3 p.m., FB! VQ2HC, 14312, 10 a.m., by W. Va. DXer.

Nigeria—ZD2H, H.F. side of 20 m., reported by Roy Myers, W6, nice DX!

Mauritius—VQ8AA, Port Louis, operated by J. Regnaud, wishes us to publish a notice that some "pirate" is using his call, and that he has received over 50 reports on "his" signals, which were not his own, but that of some unscrupulous amateur using his call in order to experience more contacts when he called CQ from such a far away DX country. VQ8AA regrets he cannot answer these reports, many of which came from the States. OM Regnaud adds that he came back on the air in September with more power, and that DXers should look for him. VQ8AE is the other ham fone there.

World S-W Stations

(Continued from page 632)

Mc.	Call	
6.030	VE9CA	CALGARY, ALTA, CAN., 49.75 m. Thur. 9 am.-1 am.; Sun. 12 n.-12 m.
6.030	RV59	MOSCOW, U.S.S.R., 49.75 m. 5-6, 10-11 pm. Irregular.
6.030	OLR2B	PRAGUE, CZECHOSLOVAKIA, 49.75 m. (See 11.875 mc.) Off the air at present.
6.023	XEUW	VERA CRUZ, MEX., 49.82 m., Addr. Av., Independencia 98. 10 pm.-1 am.
6.020	DJC	BERLIN, GERMANY, 49.83 m., Addr. (See 6.079 mc.) 1-4.30 pm.
6.017	HI3U	SANTIAGO DE LOS CABALLEROS D. R., 49.85 m. 7.30-9 am., 12 n.-2 pm., 5-7 pm., 8-9.30 pm.; Sun. 12.30-2, 5-6 pm.
6.015	PRA8	PERNAMBUCO, BRAZIL, 49.84 m., Radio Club of Pernambuco, 4-9 pm.
6.010	OLR2A	PRAGUE, CZECHOSLOVAKIA, 49.92 m., Addr. (See OLR, 11.84 mc.) Wed., Thurs., 4.40-5.10 pm.
6.010	COCO	HAVANA, CUBA, 49.92 m., Addr. P. O. Box 98. Daily 7.55 am.-12 m., Sun. until 11 pm.
6.010	VK9MI	S. S. KANIMBLA, 49.92 m. (Travels between Australia and New Zealand). Sun., Wed., Thurs. 6.55-7.30 am.
6.010	CJCX	SYDNEY, NOVA SCOTIA, 49.92 m. Relays CJCB 7 am.-1 pm., 4-8 pm. 1.30 pm. 8.30 pm.
6.007	ZRH	ROBERTS HEIGHTS, S. AFRICA, 49.94 m., Addr. (See ZRK, 9.606 mc.) Daily exc. Sun. 10 am.-3.30 pm.; Sun. 9 am.-12 n., 12.15-3.15 pm. Daily exc. Sat. 11.45 pm.-12.50 am.
6.007	ZRJ	JOHANNESBURG, S. AFRICA, 49.94 m., Addr. S. African Broadcast. Co., 3.30-4 pm. exc. Sun.
6.005	HP5K	COLON, PAN., 49.96 m., Addr. Box 33, La Voz de la Victor. 7-9 am., 10.30 am.-1 pm., 5-11 pm.

Mc.	Call	
6.005	CFCX	MONTREAL, CAN., 49.96 m., Can. Marconi Co. Relays CFCF 6.45 am.-12 m.; Sun. 8 am.-10.15 pm.
6.005	VE9DN	DRUMMONDVILLE, QUE., CAN., 49.96 m., Addr. Canadian Marconi Co.
6.002	CXA2	MONTEVIDEO, URUGUAY, 49.98 m. Addr. Rio Negro 1631. Relays LS2, Radio Prieto, Buenos Aires. 7.30-10.30 pm.
6.000	ZEA	SALISBURY, RHODESIA, S. AFRICA, 50 m. (See 6.147 mc., ZEB.) Also Sun. 3.30-5 am.
6.000	XEBT	MEXICO CITY, MEX., 50 m., Addr. P. O. Box 79.44. 8 am.-1 am.

End of Broadcast Band

5.977	CS2WD	LISBON, PORTUGAL, 50.15 m., Addr. Rua Capelo 5. 3.30-6 pm.
5.975	OAX4P	HUANCAYO, PERU, 50.16 m. La Voz del Centro del Peru. 8 pm. on.
5.970	YV5RC	CARACAS, VEN., 50.26 m., Addr. Radio Caracas. Sun. 7 am.-10 pm. Daily 7-8 am., 1-1.45 pm., 4-9.30 or 10 pm.
5.968	HVJ	VATICAN CITY, 50.27 m. Off the air at present.
5.950	HH2S	PORT-AU-PRINCE, HAITI, 50.37 m., Addr. P. O. Box A103. 7-9.45 pm.
5.935	YV1RL	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.
5.920	YV4RH	VALENCIA, VEN., 50.68 m. 5-9.30 pm.
5.900	ZNB	MAFEKING, BRI. BECHUANALAND S. AFRICA, 50.84 m. Addr. The Govt. Engineer, P. O. Box 106. 6-7 am. 1-2.30 pm. Ex. Suns.
5.900	TILS	SAN JOSE, COSTA RICA, 50.85 m. 6-10 pm.
5.898	YV3RA	BARQUISIMETO, VEN., 50.86 m., Addr. La Voz de Lara, 12 n.-1 pm., 6-10 pm.
5.885	HI9B	SANTIAGO, D. R., 50.95 m. Irregular 6-11 pm.
5.875	HRN	TEGUCIGALPA, HONDURAS, 51.06 m. 1.15-2.16, 8.30-10 pm.; Sun. 3.30-5.30. 8.30-9.30 pm.
5.855	HI1J	SAN PEDRO DE MACORIS, D. R., 51.25 m., Addr. Box 204. 12 n.-2 pm., 6.30-9 pm.
5.845	YV1RB	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.
5.825	TIGPH	SAN JOSE, COSTA RICA, 51.5 m., Addr. Alma Tica, Apartado 800. 11 am.-1 pm., 6-10 pm. Relays TIX 9-10 pm.
5.813	TIGPH2	SAN JOSE, COSTA RICA, 51.59 m., Addr. Senor Gonzalo Pinto, H.
5.790	TGS	GUATEMALA CITY, GUAT., 51.75 m. Casa Preidencial, Senor J. M. Caballeroz. Irregular.
5.758	YNOP	MANAGUA, NICARAGUA, 52.11 m. 8-9.30 pm.
5.740	YV2RA	SAN CRISTOBAL, VENEZUELA, 52.23 m., Addr. La Voz de Tachira. 11.30 am.-12 n., 5.30-9 pm., Sun. till 10 pm.
5.735	HCIPM	QUITO, ECUADOR, 52.28 m. Irregular 10 pm.-12 m.
5.145	OKIMPT	PRAGUE, CZECHOSLOVAKIA, 58.31 m., Addr. (See OLR, 11.84 mc.) Fri. 4.45-5.10 pm.; Sat. 5.15-5.40 pm.
5.145	PMY	BANDOENG, JAVA, 58.31 m. 5.30-11 am.
4.995	VUD2	DELHI, INDIA, 60.06 m., Addr. All India Radio. 7.30 am.-12.30 pm.
4.950	VUM2	MADRAS, INDIA, 60.61 m. Addr. All India Radio. 7 am.-12 n.
4.905	VUB2	BOMBAY, INDIA, 61.16 m. Addr. All India Radio, 7 am.-12.30 pm.
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	VUC2	CALCUTTA, INDIA, 61.48 m. Addr. All India Radio. 6.36 am.-12.06 pm.
4.880	HJ4ABP	MEDELLIN, COL., 61.44 m. 8-11 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.

BARTER and EXCHANGE FREE ADS (continued)

4 TUBE AC-DC, 5 tube AC, 1 tube, 5 tube battery radios, parts. Universal motor, audio oscillator. I want a short wave receiver. Albert Hartman, 5713 5th Ave., Brooklyn, N. Y.

HAVE NEW MOUNTED BILLEY BC3 crystal frequency 3724 kcs. Will swap for a 40 meter xtal preferably between 7250 to 7300 kcs. or what have you? Andrew Barberelis, 11 Kimball St., Haverhill, Mass.

SWAP 2 TUBE AC & DC SHORT-wave receiver with coils. Would like radio service instruments, such as analyzers, oscillators, meters, etc. Paul Martin, 703 Madison Street, Brooklyn, N. Y.

TRADE 65 COPIES RADIO & television, 28 copies All Wave Radio and 11 copies of Radio for camera or photographic equipment. Louis B. Booth, 75 Campfield Ave., Hartford, Conn.

WILL SWAP $110 AUTOMOBILE trunk complete with 3 suitcases and hat box used three times for radio books or courses, short wave receiver. What have you. Fred Clinton, 137 Union Ave., Peekskill, N. Y.

CHARLES ATLAS COURSE (DY namic Tension) for code course, goo pickup, recording apparatus, books or what have you, especially radio. Wm. Robinson, General Delivery, Cobourg, Ontario, Canada.

SWAP: THORDARDSON 7506-M amplifier, with Tung-Sol 6J7-G 6J7-G, 2—6F6-G (h.p.) 5Y3-G input; grid, 200 ohms, carbon, condenser, xtal mikes. Output: 1-8-15-500 ohms. Built-in or 2 external 2500 ohm fields. W9TME, 2901 N. Kilbourn Ave., Chicago, Illinois.

WANTED FIVE OR SIX TUBE S.W. receiver, have AC-DC motor, microscope, code practice oscillator and radio parts. Or what have you? Milton Goldberg, 978 Freeman St., Bronx, N. Y.

VE3AMO HAS REBUILT THE RIG and has some real hot bargains on radio and xmitting parts. What have you to trade. Rienhold Obenbach, Iola, Alberta, Canada.

OFFER 1/5 HORSE MIDGET GAS motor, 5 meter transceiver for gas motor for midget automobile. Harr Campbell, Jr., 28 Coyle St., Portland, Maine.

SWAP UNIVEX 8MM MOVIE camera and 0 gauge electric train equipment. Want low power transmitter and carbon mike. Anything in radio wanted. Swap S.W.L. J. G. Manchester, 6806 Meadow Lane, Chevy Chase, Maryland.

WANTED: COMPLETE N.R.I. Radio course. Will trade 6L6G xtal oscillator, racing systems, etc. Joseph McGuire, 5022 So. 38th St., Omaha, Nebraska.

WANT RIDER MANUALS 1-2-3, ham transmitter and receiver parts, all kinds of meters. Have lots o parts, all kinds. Send for list an describe your trade. Edwin Nuttall, Box 52, Overton, Texas.

SWAP VIOLINS, BAND INSTRU ments, used radios, radio parts, tes equipment, Riders manuals, xmit e parts, etc., for sporting goods, rifles, outboard motors or what have you. J. G. Cheatham, 1106 County Ave., Texarkana, Ark.

FIELD GLASS, NEW (COND $20.00 val. Trade for good Kodak camera (folding) with fast len F.4.5, etc. H. Linna, 731 Snow St., Negaunee, Mich.

SWAP: RARE EDITION WORKS of Shakespeare published 1879, boys books by Coolins, French course in 2 volumes and other books, for S.W. receiver, radio parts. Paul E. Brassard, 16 Cumberland St., Brunswick, Me.

ENGLISH JUBILEE, ½d, 1d,1½d and coronation stamps used from fo 3c unused pictorials for postage. Will swap stamp collection, 400 mounted and many swaps. What offers? Send for details. Chard 9a Berwick Rd. Shrewsbury, England.

TRADE U.S. SHORT WAVE mags. for foreign ones, also want foreign pen pals, QRA Milton Benson, 1 No. Main St., So. Hadley Falls, Mass., U.S.A.

TRADE: ROWAL PORTABLE typewriter. Value $15.00 for candid camera, prefer Argus, also want enlarger, pipe organ recordings. Will correspond with organists, pianists, and sound recording fans. Robert C. Jones, 116 N. 26th Ave., Yakima Washington.

AM INTERESTED IN USED Candler Junior course. Have almost anything to swap. Steve Varga, Jr., 2338 Riverview Ave., Dayton, O.

CORRESPONDENCE WANTED, all foreign countries. Will swap post cards and stamps. All letters answered. Steve Finnegan, 723 S. Federal, Mason City, Iowa.

HOBBY FANS, NOTICE, I CAN furnish you with most everything in the hobby line. Please send your list. I trade anything. Roy Harding, Burlington, Kans.

EXCH. POST CARD VIEW FOLDers from all parts of the country for N. Y. World's Fair views. Wanted, good magnetic speaker, pair phones, amateur call book. C. Holstein, 216 E. 148th St., Bronx, N. Y.

WANT LOW PRICED COM. RE-ceiver. Will swap Cook Electrical course, radio service books and mags., plies of spare parts and equipment, etc. All mail answered. State what you want. R. Winslow, Wykoff, Minn.

ATTENTION CANADIANS, SWAP Gernsback Service Manuals 1931-2-3 and 4. Rider Manuals 1931, for all wave communication super-het or small outboard. L. S. Donkersley, Box 511, Powell River, B. C., Canada.

TRADE "HAMMARLUND SHORT WAVE MANUAL" 1938, "Instruction Sheet for All-Star Jr. All-Wave Superhet", Philmore noise and aerial eliminator. Want radio books, phones or what have you. Alexander Podstepny, 217 Pine St., Phila., Penna.

SWAP — REMINGTON TYPE-writer, trained rabbit and bheasan, hound, large grease gun, five foot archery bow, house door hinges, new door locks. Wanted—Radio, outboard motor, kodak, tent, rifles, cocker spaniels, Bust Spink, Route 50, Muskegon, Michigan.

WILL SWAP COLUMBIA PORTable 5 tubes phono-radio and Packard electric razor for good transceiver, S.W. receiver or transmitter. A. D. Hunter, 331 Main St., Warren, Ohio.

WANTED: To rent or buy beginners radio course or books. Must be reasonable. Will exchange postcard for our Q.S.L. Have stamps also. Sincere pen pals interested in radio welcomed. Write: Mrs. Lucy Jennings, Gladys, Va.

SWAP: CORONA PORTABLE with case, Frosteo saltwater rod, Ocean City reel, Want 16 mm projector, 110v A.C., Riders Manuals, or what have you. H. Peyton, 510 West 150 St., New York City.

SWAP — TRANSMITTER, 6L6 xtal osc., pr. T-20's final, 800 volt power supply, wood rack, complete four tube super gainer receiver, complete (metal case), power supply. Want good candid camera, supplies. John Smith, 928 Main St., Reynoldsville, Pa.

WANTED: USED TELEPLEX OR Instructograph with tapes. Will pay cash or trade. Want tube tester and T-55's, RK-20's. All letters answered. Wm. D. Coggin, Conyers, Ga.

TRADE: SW3 AND THREE SETS bandspread coils covering 20, 75, 160, power supply, speaker, and eleven tube, dual band, table model Kadette. Want: NC-44, Sky Champion, Sargent 39, QRA: Hue Diament, Perkiomen School, Pennsburg, Pa.

TO TRADE: A NEW WATCH, gold chain, or rings for any electric Parts or any chemicals or chemical glassware. Dean Reis, 2142 Edward St., Berkeley, Calif.

HAVE 700 V.C.T. AT 70 MA., 2½V, 5W, transformer, one 8" dynamic speaker, six 2A5 tubes for a crystal and holder whose frequency is between 7,125 and 7,200 kc. Jack Wakefield, 1612 22nd Street, Galveston, Texas.

SWAP — STAMP COLLECTION, 2,200, 400 U.S. No. breeancels, Doerle 6 tube short wave set, Shiraud "Modern Radio Servicing", Wan good quality camera, Speed Graphi or similar, Good condition, H. J. Hollingsworth, Santa Fe, New Mex.

SWAP: $30.00 PAIR OF 20 POWer Binoculars. Very good condition, with case. 3A Kodak camera F.6.3 lens. Write: Charles Wiggin, 11 Cottage Ave., Nashua, N. H.

HAVE TYPEWRITERS, RADIO parts, drill press, etc. Want small lathe, A.C. motors, or? B. Tracy, 314 W. 31st St., New York, N. Y.

HAVE UNION HARDWARE 10½ clamp on skates, Kodak developing outfit (less Hypol, print roller, Ferro type plate and tongs. Want standard radio parts or what have you. B. W. Marcus, 6201 22 Ave., Brooklyn, N. Y.

WANTED—PAIR OF CRYSTAL phones, in good condition. State price C. Ducy, 311 N. 7th St., Phila., Pa.

NEED TUBETESTER, SERVICE equipment for parts? cash? Send complete descriptions. State price. Just Mueller, 1883 So. Blvd., Apt. 1C Bronx, N. Y.

HAVE BATTERY AMPLIFIER with tubes, 5 tube 3 band AC superreceiving tubes, speakers, mike, LL power, audio trans. All A-1. Want analyzer, photo enlarger, camera. Or? W8QKU, 2748 Meade, Detroit, Mich.

WILL TRADE: A GOOD CAMERA tripod worth $1.00. Want model airplane parts and kits—wood, tissue etc. Write—Bob Tuttle, 15 S. Fifth Ave., Hinsdale, N. Y.

WILL EXCHANGE LATHE, JIG saw or treadle for power back, line powered transmitter, or 5 meter transceiver or what have you? Leonard Brueckner, 738 Park Avenue, Pekin, Illinois.

WANTED: BACK ISSUES R. Craft, Service, R. Retailing. Trade microphones, xmitting ham parts, meters, all wave receiver, radio books, etc. For complete list, write: S. J. Niecwiez, 79 Church St., Broad Brook, Conn.

TRADE 6 PHONO MOTORS AND turntables, 110 volts 60 cycles A.C. variable speed for xmitting equipment, tubes, meters or good S.W. receiver in good condition. Pauline White, Pittsville, Maryland.

TRADE 211, WRIGHT-DECOSTER 8" dynamic, 6 watt amplifier and double button mike, 4 tube S.W. receiver, many 6.3 volt tubes, for Sky Buddy or what? Bob Diehl, 2564 N. Lake Drive, Milwaukee, Wisconsin.

WANTED — HALLICRAFTERS, RCA or NC short wave receiver 10 to 550 meters. Give best cash price and description. Prefer to deal in Michigan. Wm. Fuller, 709 Fenton St., Lansing, Mich.

SWAP — RCA-VICTOR SYNCH. phono-motor and turntable, Ubco magnetic pickup, "Radio Service Business Methods" by Rider, for Short Wave Craft before Sept. 1935 and Jules Verne books, Your list, or? Don Yocom, Bettsville, Ohio.

HAVE 2—5 AND 10 RECEIVERS, using 76-76-12A7 tubes, 3 tubes giving 4 tube results, and 3 tube 15-550 receiver. Want S.W. equipment. Shelton Radio Club, 202 So. 2nd St., B'klyn, N. Y.

HAVE 2 SETS PLUG-IN COILS 15-200 meters, RCA type 800 tube; and RCA transformer 1600 v at 200 mills. Want auto radio "B" power supply and 40 meter crystal. John Zubas, Irvington, N. Y.

HAVE 2 BUTTON KELLOGG broadcast mike with transformer, G.E. motor turntable and S.M. power transformer with high volt and 2—7.5 volt secondaries. Want photographic equipment, or? A. B. Schuldt, Wellwood Ave., No. Lindenhurst, L. I., N. Y.

HAVE $150 WORTH OF HIGH grade chemical glassware and C.P. chemicals. Will guarantee satisfaction. Wanted radio parts and manuals or good signal generator. Harold Smith, 133 Empress St., North Sacramento, California.

WANTED — GOOD TYPEWRITER or preselector in exchange for Sky Buddy. Have also 50 assorted radio magazines, swap for what have you. Frank Sekach, 7871 Klein, Detroit, Mich.

HAVE GOOD RCA RADIOLA power Pack and AK power pack. Single stage audio amp. using 84. Numerous radio parts. Will trade for radio books, meters, or what have you. Robert Ward, 181 Saxton St., Lockport, N. Y.

SWAP — QST'S, JAN. '22 TO date; some to 1919. R/9's; Radio's, Sterlings Radio Manual, 1st edition. Misc. radio parts. Want transmitter or receiver or what have you? J. Wm. Anderson, 221 Theodore St., Banning, Calif.

I WILL MAKE YOUR CASTINGS of iron, copper, brass or aluminum up to fourteen pounds for transmitter parts, test equipment or what have you. Ernest L. Hardy, Rte. 1, Rockport, Ind.

SWAP RADIO TRANSFORMER (new), 2 grid leaks slightly used, 1 book entitled "Radio" value $7.00, for microscope. Kodak Sofus Andersen, Lankin, N. D.

HAVE CANDID AND MOVIE cameras, electric shaver, books, stamps, 1st day covers, etc. Also do developing and printing. Want photographic equipment and enlarger or most anything of value. Michael Gianfrocco, 604 Union Ave., Prov., R. I.

HAVE ONE 500 V. AND 7.5 V. combined D.C. motor generator. Operates on 110 v. A.C. 60 cycles. Trade for 4-5 tube S.W. set or what have you? George Smith, 79 Sewell St., Augusta, Me.

SIGNAL GENERATOR WANTED type A.C. Must be in A-1 shape and cheap, send full details in first letter, such as condition and make, etc. Tom Killeen, 567 Walnut St., Elizabeth, N. J.

TRADE — RCA FREQUENCY modulator unused, sealed carton or unused RCA Aero Dynamic mike, bi-lops for an all wave signal generator or late tube checker. Nick Decaro, 81-48 102nd Ave., Ozone Park, N. Y.

TRADE: BOY MECHANIC NO 1 (new), large quantity of radio parts, tubes, etc. for 0-1 Ma. test equipment or what have you? B. L. McCarter, Chilliwack, B. C., Canada.

WANTED TO BUY: INDIAN head pennies. Must have plain dates. State price. Write: "The Owl Reporter", P.O. Box 186, Jeannette, Penna.

WILL TRADE TEST EQUIPment and parts for s.w. set, small gasoline engine, small doughnut tires or what have you? Billy Epps, Mineola, Texas.

(Continued on following page)

BARTER and EXCHANGE FREE ADS (continued)

WANT CODE MACHINE. CONdensers and coils or what have you? Have motion picture projector, S.W.T., Radio Craft, and Pop. Mechs. magazines, erector set, electric train, Jewell meters, Cook's electrical course, dials, etc. D. Phelps, Sidney, N. Y.

CAMERA, FIELD GLASSES, 18" magnetic speaker, auto safety lighter, sharp tuner dial, postmarks, 2 tuber S.W. dc radio complete with amplifier and speaker unit. State trade offer. R. Lewis, Griffithville, Ark.

HAVE RADIOS, PARTS, PHONOGRAPH amplifier, motor, 22 rifle, radio course, Want code machine, amateur radio, ham transmitter or what have you? 100% Q.S.L. Evertie Smith, Spindale, N. C.

FOUR TUBE AC-DC RECEIVER. World War censored covers, coins, stamps, government postals to trade for first day covers, Indian Head cents and Liberty Head nickels. Mervyn H. Reynolds, Southwest Harbor, Maine.

TRADE: 1937 HAYNES CLIPPER, P.P. transformers for 45's or 2A3's, 14 inch high quality speaker, Candler code course, for iron core i.f. trans., good variable condensers, radio parts. Max Welton, 31 E. 21th St., Holland, Mich.

TRADE RADIO PARTS, TUBES, B eliminator, detective magazines, coins, stamps, albums, books, etc., for small short wave set, antiques, or what have you? Russell B. Gunderson, Hawley, Minnesota.

WANTED: RADIO COURSE, RECord changer, radio books, late Call Book, electric guitar, candid camera, code machine. Have B-eliminator, radio parts, 300 phonograph records (late), trumpet, famous night club book matches. Bill Godden, Emmetsburg, Iowa.

TRADE: ONE SIX INCH DYNAMic speaker taken from Universal receiver. I want one type 32 and one type 33 tube in good condition. Donald Schmidt, Route 2, Box 174, Wittenberg, Wisconsin.

TRADE: 6L6G, 6F6 TRANSMITter, crystal, meter 20/40 coils, tubes, mike, 2 tube 15-550 receiver, also $5.00 cash all for good Ultra Stratosphere 10, with 2½ to 550 coils. Hover, Box W, Lemon Grove, California.

WILL TRADE: 102 U.S. AND 875 foreign stamps in Scott Modern album, piano course, roller skates, books, for: 35mm enlarger, printer or other photographic equipment. Ned Roback, 411 Ridge Ave., Lakewood, N. J.

SWAP ONE MOTOROLA, ONE Mantola all wave midgets 1938 models, Philco converter, two tube Denton short wave set, stamp album with 200 American stamps. Want typewriter, printing equipment or National SW3. Harry Dishmon, Hammond, Indiana.

HAVE 7 TUBE RACO SUPER Clipper and Hallicrafters Super Seven communication receivers, in perfect condition. Want 10 meter superhet receiver, transmitting equipment or what have you? Fred Galla (W2LSN), 4331 Park Avenue, New York, N. Y.

HAVE OXFORD DYNAMIC speaker, 0-8 Weston voltmeter, 5 meter receiver using 38-41, Atwater Kent model 42, radio magazines, John H. Walker, 97-34 Alstyne Ave., Corona, L. I., N. Y.

WANT ANY FREQUENCY 40 meter xtal—lowest price, or we have swap material, radio parts, etc. W1LDD, 64 Zeigler St., Roxbury, Mass.

SWAP 4 TUBE AC-DC MIDGET radio, 8 tube Crosley Show-Box. Both complete with tubes. Have small metal turning lathe (for turning armatures for small motors). Bernard Hines, 4012 W. 10th Ave., Gary, Indiana.

SWAP—TRANSMITTING TUBES, 851's, 852's, 860's, 212-D's, 212-E. SpeedX Bug, RTL dlve meter rig and revr in rack. Want communication revr, small fone rig, or? Jos. Caracciolo, Apt. 408, 1915 K. St. N. W., Wash., D. C.

ANY TRADE OFFER—FOR A power supply, 1500 volts each side, 400 mills, 2-866s, etc., 203A tube (RCA) transformer 30 pounds. Want low power equipment. Miss Ciccrello-8NAL, 548 Geiger Ave., Massillon, O.

SWAP:—A.K. 3 BAND RCVR. No. 207, late 10" dance records. Audak pick-up. Crowe Airplane dial. Want—test equip., code machine. SW3 or? Charles Steiner, 634 Delaware St., Harrisburg, Pa.

WANTED, FONE CW TRANSmitter, also ham parts. Send details, make, wattage, etc. Swap for radio parts. All letters answered. Also swap QSL-SWL cards. 1 QSL 100%. R. E. Murphy, 7311 Georgetown Rd., Bethesda, Maryland.

OFFER CHARLES ATLAS $35 Dynamic Tension muscular course. Want 5x8 Kelsey printing press and outfit or Sky Buddy in first class condition. Write first. Robert J. Grzeskowiak, 302 Adams Street, Alpena, Michigan.

WILL SWAP MY LOCAL NEWSpaper or comic for yours, view for yours, view for your paper if you like, will correspond on any other exchange idea. George Blowers, 74 Commodore Road, Oulton Broad, Lowestoft, Eng.

WANTED PARTS FOR THREE or four tube s.w. rec., A.C.-D.C. or complete A.C.-D.C., rec. tubes and coils not necessary. What do you want? S. E. Probst, 26½A North Ave., Sanford, Me.

WANTED — ENLARGER AND photographic supplies. Developing and printing done. James Aharonyan, 278 Broadway, Cambridge, Mass.

WANTED: SHORT WAVE RECeiver T.R.F. or S. Het., 4 or 5 tubes. Trade 1/6 H.P. motor or 56-2A5 mod. and five m. receiver. Answer all letters. Surrain Arakelian, 665 Park Ave., Union City, N. J.

WANTED: 3 OR 4 TUBE BATtery operated short wave radio, have radio parts and back numbers of Radio Craft. Harry A. Rodd, Harrington, P.E. Island, Canada.

WILL TRADE 11 JEWELL AND Weston meters, Bradley Radiostats, RCA 852's, 5 tube T.R.F., Cardwell condensers. Want Candler code course and ham equipment. Write: E. Kammerling, 616 N. Central, Chicago, Ill.

TRADE KILLARK BATTERY charger, 110V.P. 38 V.S. for 6 batteries commercial charging ampere meter 0.8 amp. for s.w. receiver in good condition. Robert Rivers, 98 Putnam St., Orange, Mass.

OFFER AMPLIFIER, ELECTRIC phono. equipment, radio phonograph, almost any radio part, electric drill, and many other electric tools. Wanted: test equipment, Rider Manuals or? Send your list for mine. Harry Parker, Sylva, N.C.

350 COPIES OF SHEET MUSIC 60, 35 years old; should have collector value. Want anything of value to an amateur photographer. Make an offer. Send swap list. George Homer, 1305 W. Harrison St., Chicago, Ill.

HAVE 1,000 GOOD STAMPS IN album, Minute Man 5 meter receiver, power supplies, microphones, speakers, photo supplies, 200 tubes. Want test equipment, transmitter. Also have Sky Buddy. Larry Quinlan, 128—34th Street, Union City, New Jersey.

SWAP INDIAN CENTS, OLD nickels, dimes, half dimes, quarters, half dollars, foreign coins for power woodworking tools or what? Vern Scharf, St. Rexis Falls, New York.

WANT SUPER SKYRIDER 35T. 100 mmfd. var. cond. 3000 V., Sprayberry or N.R.I. servicing course. Have typewriter, Superior Allmeter test instrument, Sky Buddy, H. G. Gwinn, Box 55, Anderson, Ind.

HAVE HUNDREDS OF NEW AND used radio parts to trade. Wot have U nr wot do U want? QRA, L. K. Sharon, 501 So. Adams St., Marion, Ind.

ARE YOU INTERESTED IN amateur home recording? Will exchange experimental findings, results. Also will swap microphone, radio, parts, for ham equipment. Let's hear from you, recording enthusiasts. Robert M. Goforth, Jr., 530 Addison St., Chicago.

TRADE 1925 MODEL T PANEL truck; perfect; Inspected; deliver twenty miles for Sky Buddy, Howard or? Also have three tube National U.H.F. receiver. Don Hutchins, Jr., 822 Boul. East, Weehawken, N. J.

WOULD LIKE TO BUY FOR cash a good cw transmitter of about 35 watts and power supply or parts suitable for unit of this type. Dean Cooper, 17 So. 17th St., Fort Dodge, Iowa.

SWAP: NEW TUBES 2—32, 2—33, 2—30, 10 and 31 for xmitting xtal. Regenerative preselector coverage 10-550 meters. Less tube. Stig Hanson, 159 Baldwin Ave., Jersey City, New Jersey.

SWAP SW3 A.C., A1 WITH SUPply B8 coils 160, 80, 40, for class B mod and supply, or good set analyzer. Must be in A1 shape. M. R. Geddes, VE4A8, Larcer, Sask., Canada.

HAVE POPULAR SCIENCE MAGazines and other magazines. Want candid camera, etc. L. Bernstein, 1071 Elder Ave., Bronx, N. Y.

SWAP 500 POWER MICROSCOPE set and four tube short wave receiver with coils and tubes, less power supply and speaker for 400 volt 110 ma. power supply. Arthur Hames, 2108 W. Oakdale St., Philadelphia, Pa.

TRADE: FEDERAL ENLARGER model 120, 35mm tank, Argus camera, Aladdin I.F.T., power transformers and other radio parts. Want Howard receiver, test instruments, transmitting parts. Stanley Royek, 715 Windsor Terr., Schenectady, N. Y.

HAVE 10 NEW VICTOR TRAPS suitable for muskrat, etc., pair of size 9 rubber boots, books on trapping. Want code course, but will trade for short wave set. Ben Rhett, Jr., 2208 Byrd St., Raleigh, N. C.

TRADE SUPERWASP SHORT wave set. What have you? R. B. Clark, 11958 Mayfield Ave., West Los Angeles, Cal.

HAVE ALL-WAVE RADIO MAGazines dating 1935-1938. Also assortment 130 Practical and Amateur Wireless, short-wave magazines (British). Want SW receiver (A.C.-D.C.) covering 10 meters. Magazines in 89 shape. Warren H. Stark, 2117 North 62nd St., Wauwatosa, Wis.

WANTED A GOOD HALLIcrafter receiver, either a Sky-Champion or Sky-Rider or Sky-Challenger or Super-Clipper. State price and condition. All letters answered. S. Febles, 189 Third Ave., New York City.

TRADE SENIOR ALL-STAR short wave receiver for T20, T220, crystal microphone, or what have you? A. Kimeldorf, 874 Stuyvesant Ave., Irvington, N. J.

WILL SWAP 6 INCH REFLECTing mirror telescope with 3 eyepieces of 75, 150, 300, power for Leica, Contax or similar camera of candid type. Public Radio Service, 37½ St. Marks Place, New York City.

ONE HUNDRED DOLLAR UNused International Correspondence School Course for U. S. mint stamps, or what have you in U. S. stamps? Laura H. Jacke, 706 S. East St., Bloomington, Ill.

EXCHANGE ONE HUNDRED dollar unused International Correspondence School Course for U. S. mint stamps, or what have you in U. S. stamps? Laura H. Jacke, 706 S. East St., Bloomington, Ill.

HAVE TATTOOING OUTFIT, 2 banjos, 3 guitars, 15 and 7 jewel mens' wrist watches, 16-gauge shotgun, 7 tube cabinet radio. What's offered in trade? Chic Estabrook, 1003 E. 4th St., Ladysmith, Wisc.

WILL TRADE NEW SYLVANIA 825, new T20, a Sylvania 510, also many good ham parts, for 807's or sum class B transformers capable of about 50 watts audio. W9RXW, 2119—12th St., Moline, Ill.

WANTED LOW POWER, TEN meter phone transmitter. Write W2LFI, Curtis Purdy, 50 Cleveland St., White Plains, N. Y.

HAVE 1937 ZENITH 5 TUBE, 3 band table model in beautiful cabinet. Bought new in April 1938 at $31.50. Will trade it for Doerle D-38 complete. George Province, 3427 Olive, Kansas City, Mo.

HAVE TWO MEN'S WALTHAM wrist watches, 15 jeweled ladies watch, Oliver typewriter, ¼ h.p. motor, electroplating outfit, postcard camera, duplicator, stapling machine, 15,000 staples. What have you? Hartman, 728 E. 9th St., New York City.

HAVE CHAIN HOIST, ELGIN watch, mimeograph machine, 1/3 h.p. A. C. motor, LaSalle Law course, I.C.S. business course, speed drill. Want radio parts, meters and books, S.W. receiver. Dick Stanley, 3517 Hennepin, Minneapolis, Minn.

HAVE ONE AND TWO TUBE radios, radio parts, sign painters letter patterns. Want radio parts, or what. John Haynes, Doe Run, Missouri.

WANTED ARMY, NAVY BADGES, insignias, any country. Have U.S. and foreign stamps, covers, obsolete cartridges, war relics. F. G. Carnes, Yoakum, Texas.

TRADE PARTS FROM U.S. machine-gun mount ready-cut to make a precision microtome with directions for Maxim or Leudi exposure meter. F. P. Pratt, Salisbury, N. C.

HAVE EASTMAN KODAK No. 3A folding pocket Kodak, Model C. Will exchange for short wave receiver, S. Nagel, 169 Beach 33 St., Far Rockaway, Long Island, New York.

WANT TO PURCHASE AN RCA spider-Web antenna in new or good condition, or will give equivalent value in other merchandise. Herman Fischer, 181 Park Place, Brooklyn, N. Y.

HAVE ONE 12 VOLT, NORTH east starter generator, in good mechanical condition. Weight 45 pounds. Original cost $75.00. Will exchange for Underwood typewriter, which is in good mechanical condition. Hugh McNabb, Green City, Missouri.

WANT USED CANDLER CODE course, Instructograph, or what have you? Alan Hale, St. Peter, Minn.

ANSLEY PORTABLE RADIO AND phone comb. A.C.-D.C. Crosley portable battery model 51, using two WD11's, Philco 20 & 90, snowshoes. Want small phone x'mitter, test equip., B.F.O., parts or? J. Kubik, 37 Pine St., Gt. Barrington, Mass.

AMATEUR SHUT-INS, ATTENtion. Shut-in beginner would like to hear from shut-ins within two or three hundred miles radius with view to friendly communication of 160 or 80 meters. Please write Ernest Barker, VE3AWI, Goderich, Ontario, Canada.

(Continued on opposite page)

RADIO Test-Quiz???

(Continued from page 587)

19. If your Aunt Tillie in Oshkosh wired that she was sending you a "bug," would you

a. call the exterminator?
b. use it for sending code?
c. get a strait-jacket ready?
d. take your set-tester off the shelf?

—

20. If you were a radio inspector and were told to apply the Corkscrew Rule, you would

a. clamp down on Hams who operated their transmitters while under the influence of liquor.
b. use it to measure radio waves which rotate on an axis as they progress through space.
c. use it to calculate the lines of force in a current-carrying conductor.
d. use it to measure a corkscrew.

—

21. When a broadcasting station is presenting phonograph records or electrical transcriptions, the standard technique is to

a. feed the output of the pick-up directly into the mixer panel.
b. put the output of the pick-up through a high fidelity amplifier and speaker, the sound of which is picked up by a standard microphone.
c. use a method similar to (b) above, but to employ a scratch filter cutting off all frequencies above 4000 cycles.
d. reflect a light beam from the sound track to a P-E cell in order to avoid needle noise.

—

22. Antennas to provide television programs for the New York area have been erected atop the

a. Woolworth Building
b. Chrysler Building
c. Perisphere at the World's Fair
d. Empire State Building
e. Singer Building
f. Flatiron Building

—

23. If you were told to use the word "Lambert" correctly in a sentence, you would be most likely to say

a. "Marlene Dietrich has sure got a swell pair of Lamberts."
b. "Have you heard Benny Goodman's band broadcasting the Lambert Walk?"
c. "My set has a sensitivity:selectivity ratio of one Lambert."
d. "My C-R tube has a brilliance of one Lambert."

—

24. Modern receivers employ output transformers

a. to match the relatively high impedance of the output tube or tubes to the low impedance of the voice coil in the speaker.
b. to step up the output voltage, in order to increase volume.
c. to keep direct currents out of the speaker field.
d. to transform the A.C. component of the tube's output to pulsating D.C.

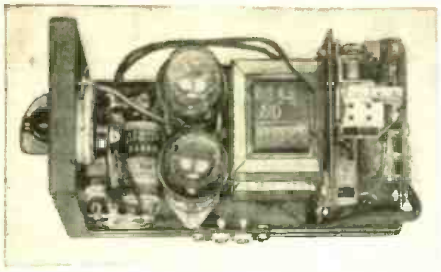
—

25. You cannot obtain a Class B Amateur Operator's license unless you

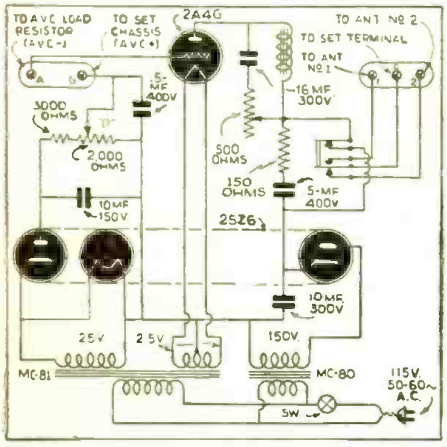
a. are a native-born citizen of the United States.
b. have your First Citizenship Papers, if you are not a native American.
c. are a citizen of the United States, whether native or naturalized.
d. are more than 21 years old.

See answers on page 640

Diversity Coupler



Interior of "Diversity Coupler": Hook-up below.



Hook-up of Coupler.

● McMURDO SILVER has designed an automatic diversity coupler for the Ham and experimenter. This coupler is fundamentally a very sensitive single-pole-double-throw switch. Connected to the a.v.c. load resistor of any good communication or broadcast receiver, it causes the a.v.c. voltage which varies in sympathy with received signal strength to automatically disconnect the antenna when the signal fades downward, and instantaneously connect in its place a second antenna in which the same signal is fading upward.

A.v.c. voltage from the receiver, varying in sympathy with the received signal, is added to local bias voltage applied to the grid of the 2A4G Thyratron gas-triode tube. When the total bias so obtained falls below a value set by sensitivity potentiometer P, the 2A4G "ignites," or ionizes, and passes a large plate current. This actuates the magnet coil of the ratchet relay or switch, and throws the S.P.D.T. switch from antenna No. 1 to antenna No. 2. When the signal in No. 2 antenna in turn fades down, the above cycle recurs.

It is essential that only the parts specified below or their exact equivalent be used.

GUTHMAN
1—No. D.C. chassis-panel, shield partition and cover
1—150 volt plate transformer
1—Grid-filament transformer
1—Sensitivity escutcheon plate
4—¾" x ¼" socket spacer dowels
1—6 ft. A.C. cord and plug

AEROVOX
2—No. 484, .5 mfd., 400 v. tubular paper cond.

I.R.C.
1—No. BT½, 150 ohm, ½ watt resistor
1—No. BT½, 3000 ohm, ½ watt resistor

GUARDIAN
1—No. D100 magnetic "Diversity" switch

MALLORY
1—No. BB22, 10 mfd., 150 volt tubular dry electrolytic cond.
1—No. BB42, 10 mfd., 300 volt tubular dry electrolytic cond.
1—No. BB44, 16 mfd., 300 volt tubular dry electrolytic cond.

AMPHENOL
2—No. MIP8 octal sockets with mounting plates
6—No. UX800 pure gum rubber bushings

CARTER-UTAH
1—No. MR500, 500 ohm potentiometer with short slotted shaft
1—No. RCS2000, 2000 ohm potentiometer with switch and insulating washers

KURZ-KASCH
1—No. 292 1¼" black bar pointer knob

BARTER and EXCHANGE FREE ADS (continued)

HAVE 30 TUBE SMALL CHASSIS and panel, 4" dial, battery cable, 20 stamp magazines, phone jack. Want small 1 tube set. Murray Shainis, 99 Featherbed Lane, Bronx, N. Y.

WILL SWAP ¼ h.p. motor, folding camera, records, speaker; for battery sets, radio parts, guitar, or what have you. Michael Fostar, R.D. 1, Salina, Pa.

WANT TO BUY COPY OF "Modern Radio Servicing" "Radio Physics Course", or similar book. Louis J. Levine, Company C-2, Clemson College, S. C.

WANTED HALLICRAFTER SUPER Skyrider SX17. Will swap Ultra Stratosphere 10 transreceiver, 2½ to 4,000 meters. Have coils 2½—550 meters, some cash. Want Riders Manuals 1 to 9. C. M. Jensen, 211 East 200 St., Bronx, New York.

WILL SWAP COMPLETE PUBLIC address system for service equipment. Servicing instruments preferred. Public address system has 18 watts output, is complete with mike and two speakers. James Dolan, Box 655, Woonsocket, R. I.

SWL EXCHANGE

TO ALL S.W.L.'S. LET'S SWAP cards. I have a very nice card. All replies answered promptly on receipt of card. QRA:— Edward C. Witton, 14 Smart Street, Waratah, N.S.W., Australia.

ALL SWL'S, LET'S SWAP OUR cards. Send me yours, will send you mine. 100% QRA. Maurice Wynne, 210 Hector, Metairie Branch, New Orleans, La., U.S.A.

SHORT WAVE LISTENERS IN U.S.A. and foreign countries. Would like to exchange my SWL card for yours. Also swap "shack" fotos. I QSL 100%. Edmund Brummer, 34-21, 89th Street, Jackson Heights, Long Island, New York, U.S.A.

WOULD LIKE TO EXCHANGE SWL cards with any SWL or Ham in U.S. or foreign countries. All cards received here will be answered with our card. QRA John L. Ballin, 40 East 66 St., New York, N. Y.

I WOULD LIKE TO EXCHANGE cards with SWL's and Hams. Both foreign and domestic. I promise to answer all. Austin Wardman, 832 Linden Avenue, East Pittsburgh, Pennsylvania, U.S.A.

ATTENTION SWL'S ALL OVER the world. I will swap cards 100% with anyone. You send yours, I'll send mine. J. A. Dusinberre, New Baden, Illinois.

ATTENTION SWL'S ALL OVER the world. I will swap SWL cards 100% with everyone. My QRA is Oscar Corwin, 334 N. Sims St., Frankford, Ind., Clinton Co.

SWL'S, HAMS, YL'S, ANYwhere. Will swap my SWL card for yours. I QSL 100%. Trade radio parts for or buy SW3, SW5, or similar receiver. QRA Harry Benis, 334 College Road, Riverdale, New York.

I WILL EXCHANGE SWL CARDS with any person in the U.S.A. and foreign countries. I will reply promptly. Bill Lewis, 2047 Llewellyn Ave., Baltimore, Md.

SWL'S AND HAMS: LET'S SWAP QSL's. Sourenir to first 3 cards received from Colorado, Idaho, Louisiana, Montana, Nebraska, Nevada, N. Mexico, or any foreign country. Ray Bintliff, 229 Stacy St., Burlington, N.J., U.S.A.

I WISH TO EXCHANGE SWL cards and/or correspond with YL's in U.S.A. and foreign countries. All letters received will be promptly answered. QRA: Bob Greenough, 46 Chapel St., Shirley, Mass.

WOULD LIKE TO SWAP SWL cards, stamps, picture postcards, correspondence with anybody in the world. All cards, and correspondence answered 100%. Bob Larson, 618 N. June Street, Los Angeles, California, U.S.A.

SWL'S—LET'S SWAP CARDS and post card views and photos of broadcast stations, transmitter, building and aerial. I QSL 100%. QRA Robert Mais, 132 East 8th St., Mishawaka, Indiana, U.S.A.

WOULD LIKE TO SWAP SWL cards with SWL's all over the world, esbecially in Europe, Asia and S. Am. Have new printed cards and QSL 100%. Gerald B. Cape, P.O. Box 163, Desloge, Mo., U.S.A.

ATTENTION SHORT WAVE LISteners in U.S.A. and all foreign countries. How about an exchange on QSL cards, views or photos 100% QSL here. What say, OM? Robert Woods, 1914 Arrow Ave., Indianapolis, Indiana, U.S.A.

WOULD LIKE TO SWAP SWL cards with SWL's in Europe, Asia, and S. Am. Have new printed cards and QSL 100%. Forrest L. Nelms, Main St., Desloge, Missouri.

SHORT WAVE LISTENERS IN all countries. Would like to exchange SWL cards, post cards and would like to correspond with anyone. I QSL 100%. Forrest E. Campbell, Jr., 405 E. 4th St., Berwick, Pa., U.S.A.

HI, SWL'ers IN ALL COUNTRIES! Will have 100% QSO with anyone who sends his SWL card. My SWL card will be quickly sent to you. K. Norman E. Whiton, 76 Green St., Greenwood, Mass., U.S.A.

SWL'S AND HAMS ALL OVER the world. Let's swap cards. I QSL 100%. QRA: Custer C. Edwards, 18 Wellman St., Beverly, Mass., U.S.A.

I WILL SWAP SWL CARDS with any American or foreign person. (W3) George V. Harvey, 307 N. High St., Blackstone, Va.

YO-SWL WILL EXCHANGE cards anywhere and stamps some countries. 100% QSL guaranteed. QRA: R. E. J. White, P.O. Box 493, St. John's, Newfoundland.

ATTENTION SWL'S IN U.S.A. and foreign countries. Would like to exchange SWL cards with anyone. All cards received answered 100%. QRA—Roy Schuckhart, 4342 N. James Ave., Minneapolis, Minnesota, U.S.A.

SWL'S OF THE WORLD, WUD like to swap QSL's, post cards and fotos with anyone. All mail acknowledged. Frank Gregor, W9LYK, 1921 W. 14 Ave., Gary, Ind.

WILL EXCHANGE SWL'S WITH anyone, everywhere. John P. McLaughlin, 32 Gould Street, Wakefield, Mass.

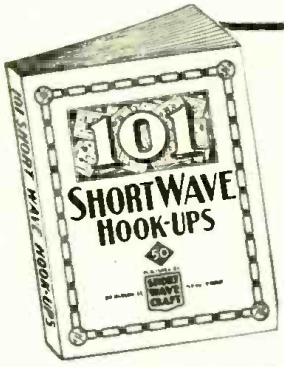
WILL EXCHANGE SWL'S WITH anyone, everywhere. Fred J. White, 34 Gould Street, Wakefield, Mass.

I WILL QSL 100% TO ANYONE in the U.S., Canada and foreign countries who will send me his or her postal cards. No two alike please. Helen Spanos, 340 Market Street, Lowell, Mass.

SWL'S, LET'S SWAP OUR cards. I QSL 100%. Come on OM. QRA Maurice Wynne, 210 Hector, Metairie Branch, New Orleans, La., U.S.A.

. . . . 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 RADIO & TELEVISION

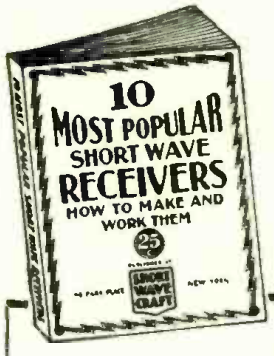
Here is a worthwhile book that every short wave listener, every short wave fan, and every short wave amateur has wanted for a long time. It gives you the 101 best short wave hook-ups which have appeared heretofore.

100 Illustrations
72 Pages
50c

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 RADIO & 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



TEN MOST POPULAR SHORT WAVE RECEIVERS

HOW TO MAKE AND WORK THEM

The editors of RADIO & 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.

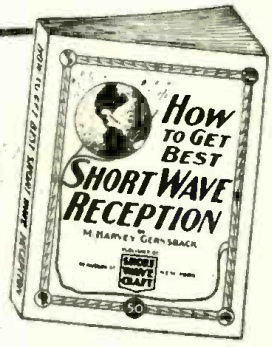
75 Illustrations
40 Pages
25c

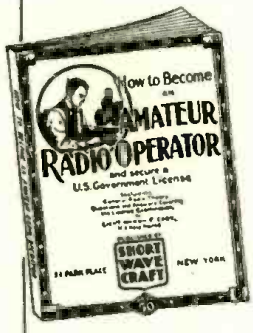
HOW TO GET BEST SHORT WAVE RECEPTION

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
72 Pages
50c



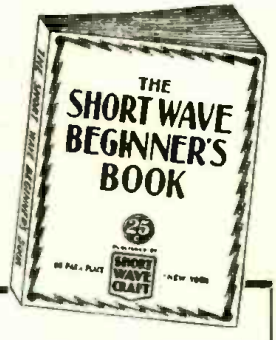


HOW TO BECOME AN AMATEUR RADIO OPERATOR

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
72 Pages
50c



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
40 Pages
25c

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.

ALABAMA
Walther Bros., Montgomery

ARIZONA
Sam's Cigar Store, Phoenix

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

COLORADO
Auto Equipment Co., Denver
Interstate Radio Supply, Denver

CONNECTICUT
The Edward P. Judd Co., New Haven

DELAWARE
Wilmington Elec. Spec. Co., Inc., Wilmington

FLORIDA
Radio Accessories Co., Orlando

GEORGIA
Wholesale Radio Service Co., Inc., Atlanta

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
Max Stein & Co., Chicago
Montgomery Ward & Co., Chicago
Wholesale Radio Service Co., Inc., Chicago

INDIANA
Van Sickle Radio, Indianapolis

MASSACHUSETTS
DeWolfe & Fiske Co., Boston
The Personal Book Shop, Boston
Wholesale Radio Service Co., Inc., Boston
Library Book House, Springfield
Tremont Elec. Supply Co., Boston

MICHIGAN
Rissi Brothers, Detroit

MINNESOTA
St. Paul Book & Stat. Co., St. Paul

MISSOURI
Burstein-Applebee Co., Kansas City
Radio Labs., Kansas City
Walter Ashe Radio Co., St. Louis
Van Sickle Radio Co., St. Louis

NEW JERSEY
Radio Apparatus Co., Newark
United Radio Co., Newark
Wholesale Radio Service Co., Inc., Newark

NEW YORK
Fort Orange Radio Dist. Co., Albany
Wholesale Radio Service Co., Inc., Bronx
Wholesale Radio Service Co., Inc., City
Harrison Radio Co., New York City
Jamaica, L. I.
American News Co., New York City
Baker & Taylor Co., New York City
Blan, the Radio Man, New York City
David Bogen & Co., New York City
Federated Purchaser, Inc., New York
Radio Circular Co., New York City
G. E. Stechert & Co., New York City
The Steiger 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, Schenectady

OHIO
College Book Exchange, Toledo

OREGON
J. K. Gill Co., Portland

PENNSYLVANIA
Radio Electric Service Co., Philadelphia
Cameradio Co., Pittsburgh

WASHINGTON
Seattle Radio Supply Co., Seattle
Wedel Co., Inc., Seattle
Spokane Radio Co., Spokane

WISCONSIN
Radio Parts Co., Milwaukee

ARGENTINA
Radio Revista, Buenos Aires

AUSTRALIA
McGill's Authorized Agency, Melbourne

BELGIUM
Emil Arens, Brussels

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.

BRAZIL
Agencia Soave, Sao Paulo

CHINA
China News Co., Shanghai
International Booksellers, Ltd., Shanghai

CUBA
Diamond News Co., Havana

ENGLAND
Gorringe's Amer. News Agency, London

FRANCE
Toute La Radio, Paris

GERMANY
Rehr G.M.B.H. SW15, Berlin NW No. 7

HOLLAND
Radio Peeters, Amsterdam, Z.

INDIA
Empire Book Mart, Bombay

MEXICO
American Book Store, Mexico, D. F.
Central De Publicaciones, S. A., Mexico, D. F.
Jaques Salvo, Mexico, D. F.

NEW ZEALAND
Johns, Ltd., Auckland
James Johnson, Ltd., Dunedin
Te Aro Book Depot, Ltd., Wellington

SOUTH AFRICA
Technical Book Co., Cape Town
Central News Agency, Johannesburg
International House, Johannesburg
South African Radio Publications, Johannesburg

IF YOUR DEALER DOES NOT CARRY THESE BOOKS, ORDER DIRECT FROM US. FILL OUT COUPON BELOW. SHIPMENT WILL BE MADE IMMEDIATELY.

POPULAR BOOK CORP. R&T-2-39
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.

New Communications Receiver

● THE accompanying picture shows one of the newest communications receivers—the new Howard model 438. This receiver employs eight tubes and features R.F. amplification on all bands. It uses ceramic coil forms and micalex insulated tuning condensers. Other features include electric band-spread and a crystal filter. The frequency coverage is complete from 540 kc. to 43 mc. in four bands.

The Martian Flash

(Continued from page 595)

brain. The Martians have developed in such a manner that certain parts of their brains will receive only such transmissions. Now do not jump to a conclusion and think that this is *telepathy*. It is nothing of the kind: it is really a sort of radio transmission, only different transmitting means are used. The entire planet knows instantly what news there is, so why should they have newspapers and read them? That would be considered silly here and a waste of time.

No receiving apparatus of any kind is necessary, as Martians wear a sort of cap, which is divided into two parts. By means of metallic-like cloth this division is made. We put on the cap and this acts both as an antenna and counterpoise and makes reception easy. As the caps are worn both day and night the news transmissions are received in the night time, too. Not only news but other entertainment as well is received, and as the brain never sleeps, when we wake up in the morning we remember all that was sent to us during the night time.

Of course, you all know by this time that there is practically no air on this planet and that air is the most highly prized single article on Mars. Food is of little interest on Mars inasmuch as every Martian takes a shot of special *life-giving* Bio-fluid once in a Martian month, which keeps him going for 60 Earth-days; eating and drinking is then not required.

But in order to enjoy life there are *Electronic Smells*. To explain this to you it should be understood that scents and smells are produced by extremely small particles, which, when they hit our olfactory nerves are transformed into something either pleasurable or otherwise. Now then, Martians enjoy nothing better than a dash of Epicurean Scents, which mean more to them than eating or drinking. Moreover, these smells are broadcast by one huge central broadcasting agency. The best talent is ransacked every day and *Scent Virtuosos* now abound on Mars. They play *scent organs*, which places the average Martian in a rapture. This has only come about lately and it threatens to become as big a nuisance as when radio sets first got popular on your own Earth. In order to obtain these scents you put a nose-piece onto the long elephantine-like Martian nose; a short wire extends from this which collects the electronic scent emissions. A sort of multiple short-wave ray is used upon which the electronic scent is modulated and this in turn lets loose another scent of Beta-electronic vibrations, which are then received as scents in our olfactory organ.

The odor virtuosos have become so adept that they can set the entire population wild with enthusiasm on the received powerful Bacchanalian odors.

Before closing, however, I must speak of a sad occurrence. One of the virtuosos, LL 15 K 95 P, was "atominced" only two weeks ago. By some mistake in the middle of a marvelous odoriferous sonata he suddenly made a mistake and sent out an odor about 50 times more penetrating and vile, but otherwise similar in smell to a good old-fashioned American skunk. The entire population went into convulsions and did not get over the bad effects for days. By Martian law the unhappy virtuoso was puffed into atoms—"atominced," as we call it—by the Auto-Science-Mech-Ultra Tribunal and he is now roaming outer space to condone for his sin. Needless to say, all the other virtuosos are now extremely careful that no such thing shall happen again.

FREE CATALOGS and INFORMATION

By carefully reading the advertising columns, you will find many offers to furnish literature containing valuable technical information that will help you in your work. Use this list freely.

Firm	*Business*	*Offer*	*No.*	*Cost*	*Adv. Page*
Aerovox Corporation	Parts Mfr.	Catalog		Free	640
Allied Engineering Inst.	Kit Mfr.	Circulars		Free	616
Allied Radio Corp.	Mail Order	1939 Catalog		Free	611
American Radio Institute	Radio School	Booklet		Free	622
Bliley Electric Co.	Parts Mfr.	Engineering Bulletin	E-6	10c	629
		Circular	A-6	Free	
Brush Development Co.	Parts Mfr.	Catalog		Free	609
Bud Radio, Inc.	Parts Mfr.	Catalog		Free	625
		Station Log & Data Bk.	RT39	10c	
Burstein-Applebee Co.	Mail Order	Catalog		Free	627
Cameradio Co.	Mail Order	Information		Free	627
Candler System Co.	Code Course	Book of Facts		Free	622
Cannon, C. F., Co.	Parts Mfr.	Folder	T-2	Free	611
Capitol Radio Eng. Inst.	Radio School	Illustrated Booklet		Free	623
Cornell-Dubilier Elec. Corp.	Parts Mfr.	Catalog	166A	Free	618
Coyne Electrical School	Trade School	Electrical Catalog		Free	579
		Radio Catalog		Free	
Dodge's Institute	Radio School	Catalog		Free	622
Eagle Radio Co.	Kit Mfr.	S. W. Diagrams		Free	631
Eastern Mfg. Co.	Mfr.	Circular		Free	626
Gold Shield Products	Mail Order	Catalog		Free	631
Hammarlund Mfg. Co.	Set & Parts Mfr.	1939 Catalog		Free	I.F.C.
		16 page Booklet		Free	
Harrison Radio Co.	Mail Order	Information		Free	629
Henry, Bob	Mail Order	List		Free	626
Howard Radio Company	Set Mfr.	Technical Information		Free	621
Instructograph Company	Code Machine	Information		Free	622
International Corres. Schools	Corres. School	Booklet		Free	640
International Resistance Co.	Parts Mfr.	Literature		Free	617
Korrol Radio Products Co.	Parts Mfr.	Catalog		Free	618
Mass. Radio School	Radio School	52-page Catalog		Free	622
Midwest Radio Corp.	Set Mfr.	1939 Catalog		Free	626
Million Radio & Tel. Labs.	Test Equipment	Circular		Free	618
National Company, Inc.	Set & Parts Mfr.	Catalog		Free	I.B.C.
National Radio Institute	Radio School	64-page Book		Free	577
National Schools	Radio School	Radio & Television Bklt.		Free	622
New York YMCA Schools	Trade School	Booklet		Free	622
Par-Metal Products Corp.	Parts Mfr.	Catalog		Free	627
Radio & Technical Publ. Co.	Radio Textbooks	Circulars on each Book		Free	623
Radio Corp. of America	Radio	Literature		Free	B. C.
Radio Train. Assn. of Amer.	Radio School	Book		Free	622
RCA Institutes, Inc.	Radio School	Catalog		Free	622
RCA Mfg. Co., Inc.	Set & Parts Mfr.	Literature		Free	619
Solar Mfg. Corp.	Parts Mfr.	General Parts Catalog	9S	Free	611
		Transmitting Catalog	2X	Free	
		Condenser Testers Cat.	CBCC-1	Free	
Sprague Products Co.	Parts Mfr.	Catalog		Free	627
Sprayberry Acad. of Radio	Radio School	52-page Book		Free	615
Teleplex Co.	Code Machine	Folder	S-2	Free	622
Triplett Electrical Inst. Co.	Parts Mfr.	Catalog		Free	618
Turner Co., The	Parts Mfr.	Catalog		Free	629
Ward, Montgomery, & Co.	Mail Order	1939 Radio Catalog		Free	625
Wholesale Radio Co., Ltd.	Mail Order	1939 Catalog		Free	629
Wholesale Radio Service Co.	Mail Order	1939 Radio Catalog	73	Free	613
X. L. Radio Laboratories	Parts Mfr.	Information		Free	633

Andrea Television Receiver

● ONE of radio's most famous pioneers in set and kit manufacturing has entered the television field on a similar basis. F. A. D. Andrea will be manufacturing and merchandising television receivers, in assembled and kit form, about the time NBC and CBS start their New York broadcasts, in April. The line will include a kit to sell well below $100.00 *without* tubes, or at slightly more than $100.00 *with* tubes—as well as table models and consoles.

The kit includes a 5-inch tube only 12⅝" in length. At the front of the set are six controls to regulate sound tone, sound volume, picture brilliance, focus, station tuning and contrast. The sixteen tubes in the receiver not only provide video programs, but their audio accompaniment as well.

Arrangements have been made by RADIO & TELEVISION to secure one of the F. A. D. Andrea kits. This will be assembled and put into operation well before the general release of television, and readers of this magazine will be given a full report on the construction and operation of this television receiver.

Front and rear views of new television receiver.

Answers to QUIZ on page 636

1. a, C, *d*
2. Best procedure is b, then d, then c, if antenna is used; if not, c. Take easier steps first.
3. d
4. b
5. b
6. a & c
7. a, b, e & f raise; c & d lower
8. c
9. a or c
10. a & c
11. b
12. aB, bA, cE, dC, eF, fD
13. d
14. b, c, e & f
15. d
16. c
17. a, electromotive force; b, root mean square; c, radio motor patrol cruiser; d, potential difference (or potential drop); e, quiet automatic volume control; f, has no radio significance—it's the Mounties.
18. a, b, c, e & f
19. b
20. c
21. a
22. b & d
23. d
24. a
25. c

Index to Advertisers

(While every precaution is taken to insure accuracy, we cannot guarantee against the possibility of an occasional change or omission in the preparation of this index.)

NATIONAL PARTS

These are a few of the parts that make National Receivers so fine, and give National Transmitters such outstanding performance. Throughout the National Quality Line, from relay racks to acorn sockets, each part is designed to perform its special duty superbly well. Their reputation for long-lived high performance is equalled only by the fame of the transmitters and receivers to which they contribute so much. NATIONAL COMPANY, INC., Malden, Mass.

RCA . . . the name symbolizing creation, progress, achievement in radio! RCA . . . Radio Corporation of America . . . a family of doers writing history with sound in the sky!

Makers of instruments for radio transmission and reception of sound, code messages and facsimile reproduction. Makers of instruments for the recording of sound on records and on motion picture film. Creators of countless radio devices vital to science, industry, medicine, telephony, and public safety.

RCA . . . creator of a nation-wide broadcasting service, The National Broadcasting Co.

RCA . . . creator of a world-wide radio communications system with direct circuits between the United States and 43 foreign countries, and with ships at sea . . . a message service with the speed of lightning.

RCA . . . pioneer in research in radio, sound and television.

RCA . . . truly American, owned by a quarter of a million stockholders in 48 states.

RCA . . . 19 years a name across the sky . . . 19 years of service to all the world.

Listen to the "MAGIC KEY" every Sunday, 2 to 3 P. M., E. S. T., on the NBC Blue Network.

Radio Corporation of America

RADIO CITY, N. Y.

RCA Manufacturing Co., Inc. Radiomarine Corporation of America
RCA Institutes, Inc. National Broadcasting Company R.C.A. Communications, Inc.