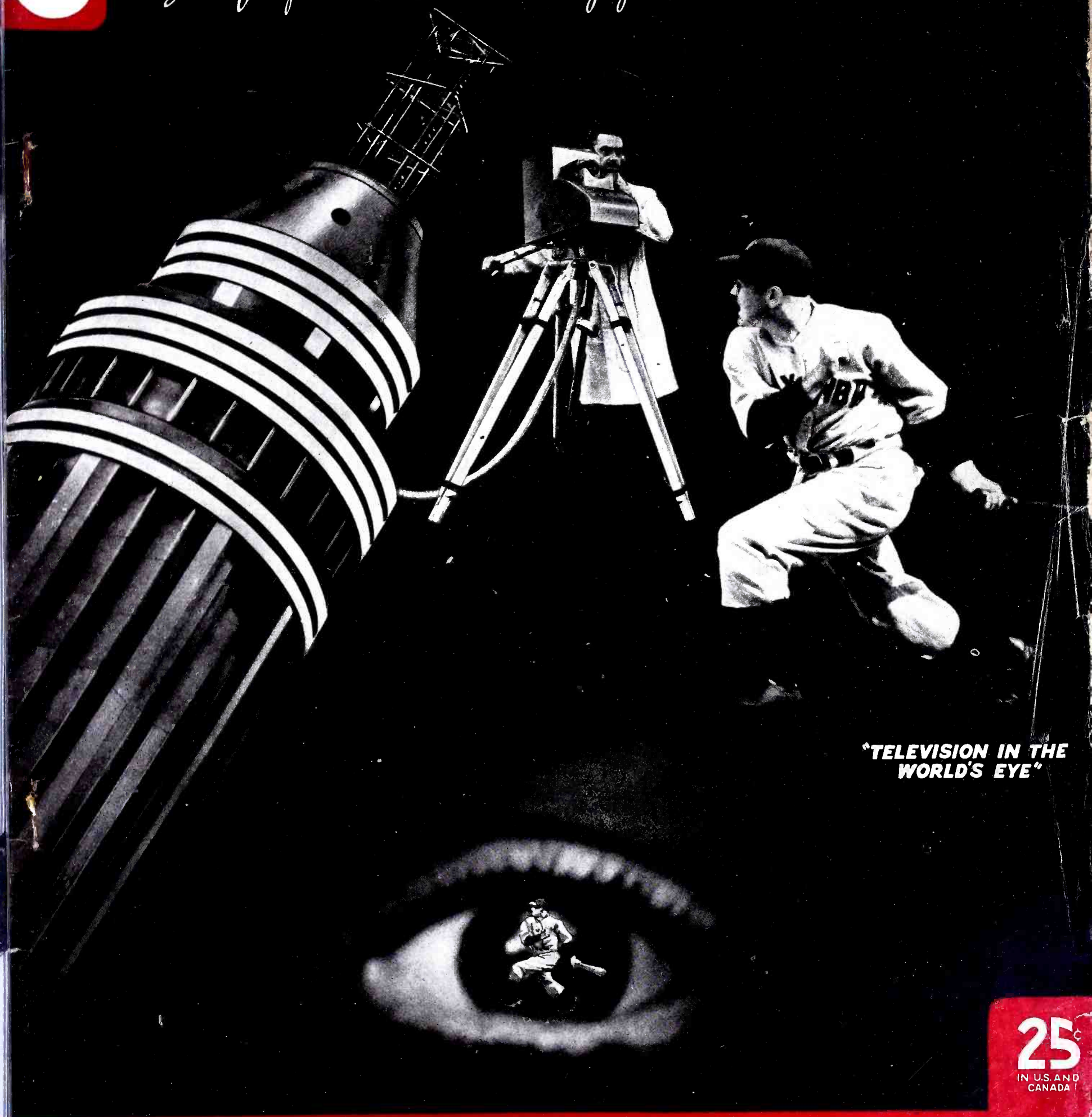
SHORT WAVE & TELEVISION

The Popular Radio Magazine



"TELEVISION IN THE WORLD'S EYE"

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HUGO GERNSBACK
EDITOR

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

MAY 1938

Read What TRI-TOWN RADIO AMATEUR CLUB Says About Its A.T.I. TELEVISION OUTFIT

Here is an actual photo of five leading Chicago amateurs with standard student A. T. I. Television Apparatus furnished with each course of training. This apparatus is identical with the regular A. T. I. Equipment Tri-Town now uses on the air, for their experimental Television Broadcasts.

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A.T.I. Equipment Includes:

Complete television transmitter and receiver, cathode ray tube with large 7" screen, sweep circuits, photo electric cells, gas arcs, 50 watt radio transmitter, super-heterodyne receiver, hi-gain transmission amplifier, projector, Mazdas, lenses, loud speaker, meters, phones, and complete RCA tubes. Large five foot steel rack and panels with separate television receiver. Complete text books and technical manuals. This equipment is sent to you at home, and is yours to keep, and is worth $1,000 to anyone taking this training. You learn by actually doing television work with your own equipment at home under our direction. Television can not be properly learned from texts alone, that's why we give you all this equipment in addition to a full engineering course in Radio, Television and Electronics with final training in our laboratory in Chicago under the direction of internationally famous television engineers. Employment service given to graduates.

You Can Make 350 Experiments . .

With this A.T.I. Equipment, you can make over 350 amazing, interesting Television and Electronic experiments right in your own home. You can produce your own Television program for a local audience . . . . transmitting and receiving the faces of your friends. You can build a complete Television Receiver that picks up any modern 441 line signal . . . . Television Transmission and Reception Systems, Television Amplifiers, Radio Transmitters, Television Pick-ups, Photo-Electric Relays, Light Beam Telephone, Magic Lantern, Grid-Glow Alarms, Sound Amplifiers, Photo-Electric Photometers. You can make hundreds of comparison tests that show you Television and Radio in a quick, simple way . . . . much easier to understand than just mere words in a book. It costs you nothing to thoroughly investigate this opportunity. You cannot afford to pass it up. *Send Coupon Now.*

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Do you want to make more money? 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. Three out of every four homes in the United States have Radio sets which regularly require repairs, servicing, new tubes, etc. Servicemen can earn good commissions 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, service, 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

Almost every neighborhood needs a good spare time serviceman. The day you enroll I start sending you Extra Money Job Sheets. They show you how to do Radio repair jobs, how to cash in quickly. Throughout your training I send you plans and ideas that have made good spare time money—from $200 to $500 a year—for hundreds of fellows. I send you special Radio equipment and show you how to conduct experiments and build circuits which illustrate important Radio principles. My training gives you PRACTICAL EXPERIENCE while learning.

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

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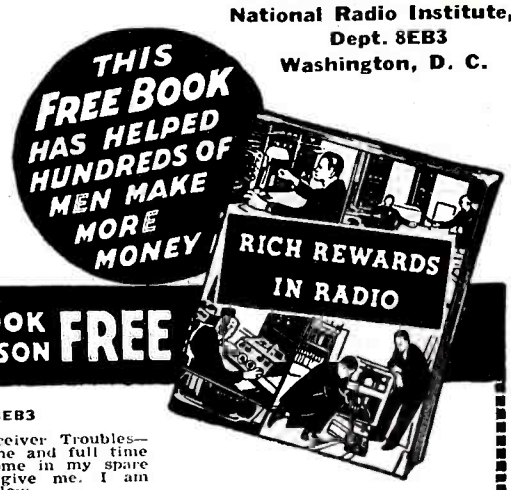

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( ) Spare Time Radio Service Work
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( ) Aviation Radio Operator
( ) Ship Radio Operator
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( ) Auto Radio Installation and Service
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( ) All-around Servicing Expert

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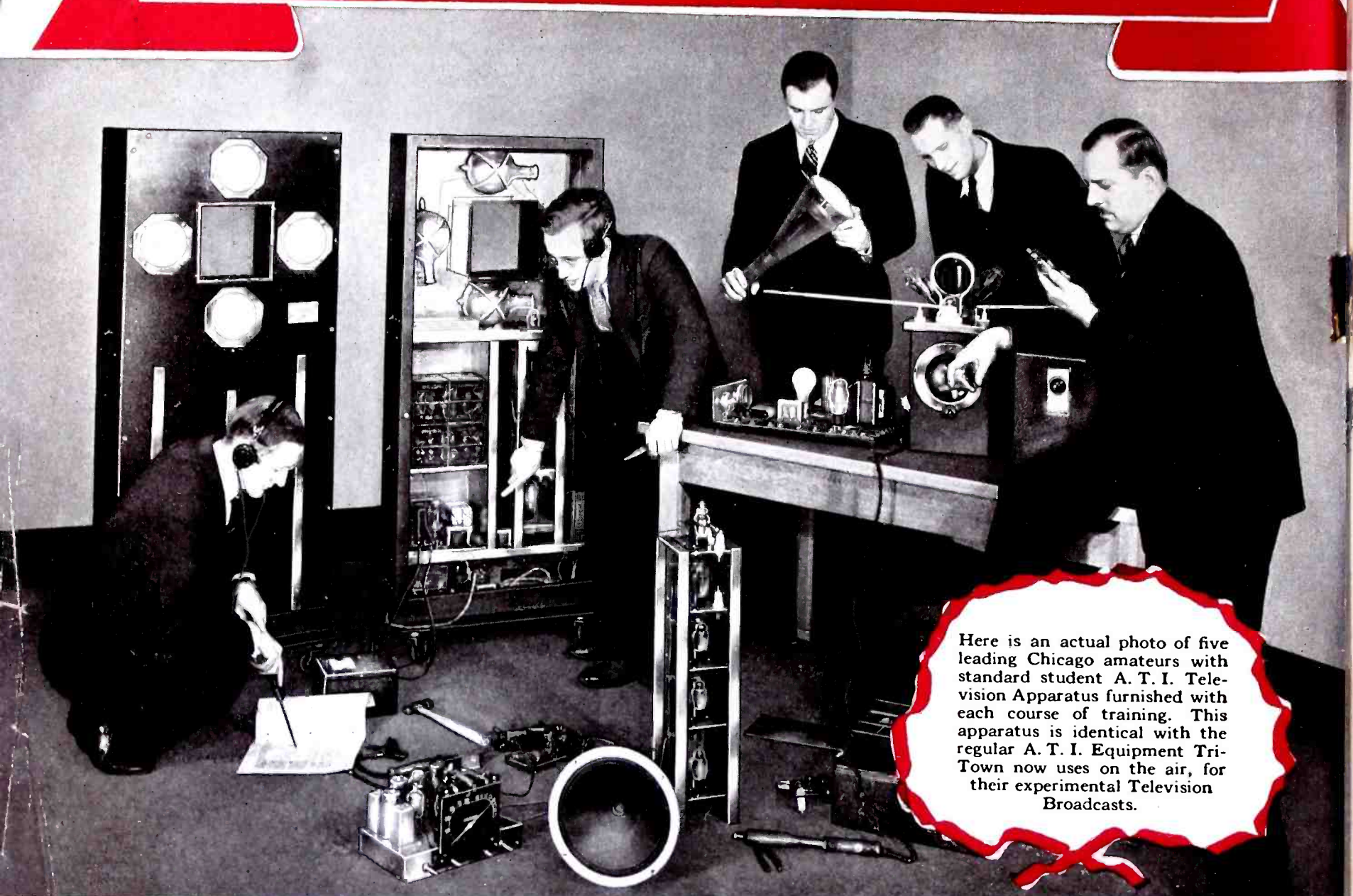

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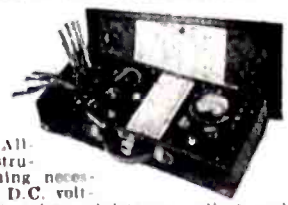

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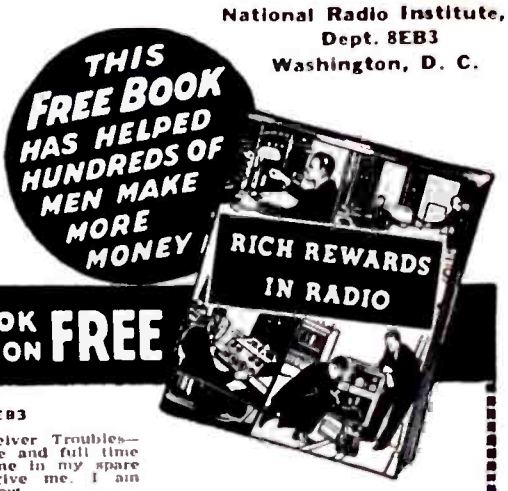

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SHORT WAVE & TELEVISION

The Popular Radio Magazine

MAY — 1938

Vol. IX No. 1

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

In This Issue

NEW DEVELOPMENTS

S-W STATIONS—HOW TO FIND THEM

TELEVISION

CONSTRUCTOR

MISCELLANEOUS

Cover photo composition by H. Gernsback and Arthur MacLean. Red Rolfe, popular New York Yankee baseball star, is featured. Television camera courtesy of B.B.C. and television antenna is that of the N.B.C. station atop the Empire State Building, New York.

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In the June Issue

A Flexible 6 to 9 Tube Short-Wave Superhet; Herman Yellin, W2AJI.

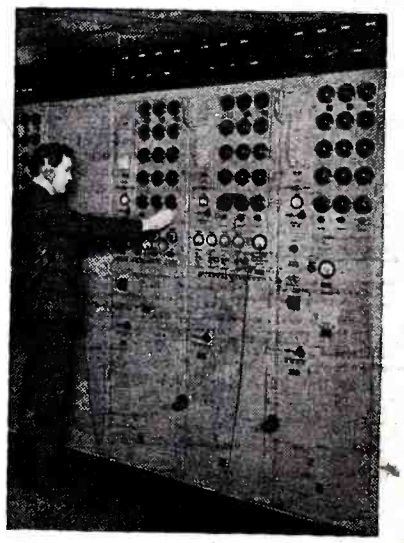
For the Ham—An Improved Class "C" Amplifier, Art Gregor.

A Simple 1-Tube Receiver, Using the Latest Type Tube—For the Beginner.

A-B-C of Television for the Layman, H. Winfield Secor.

The "S.W.&T." 441-Line Television Receiver, Pt. IV, C. W. Palmer, E.E.

Transmitter Relay Control Panel, H. G. McEntee, W2FHP.



Three diversity short-wave receivers for picking up foreign programs at the Riverhead station of RCA Communications. See page 10.

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BY MY QUICK, EASY "LEARN BY DOING" METHOD

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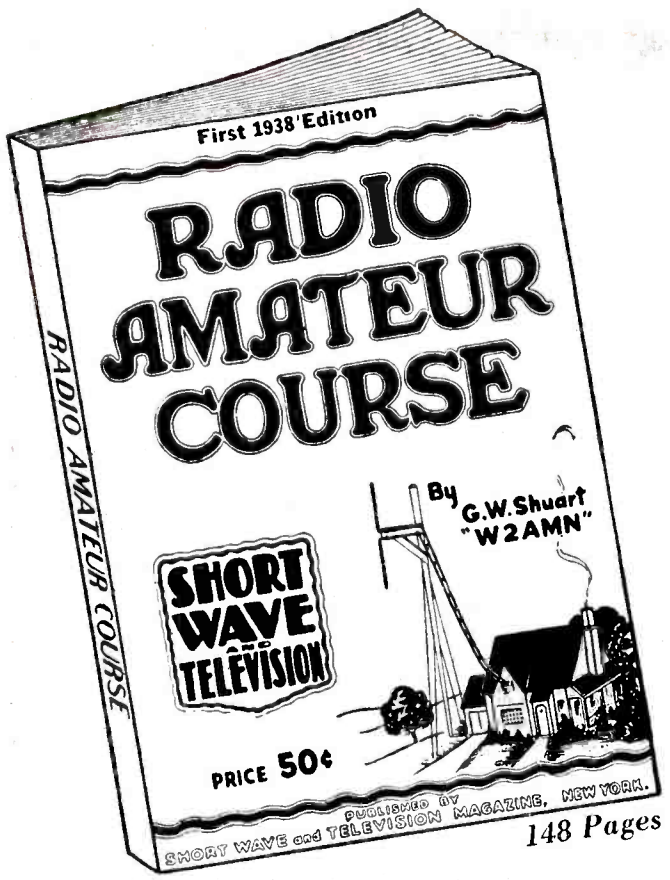

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Greater Boston Distributors,
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H. Jappe Co., 46 Cornhill,
Boston.
Wholesale Radio Service Co., Inc.,
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Springfield Radio Co.,
397 Dwight Street,
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H. Jappe Co., 37 Mechanic Street,
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Rissi Brothers, Inc.,
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Burstein-Applebee Co.,
1012-14 McGee Street,
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Radio Service Laboratory,
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Manchester.

NEW JERSEY

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

NEW YORK

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

OHIO

News Exchange,
51 So. Main Street,
Akron.
Canton Radio & Supply Co.,
1140 Tuscarawas Street, W.,
Canton.
United Radio, Inc.,
1103 Vine Street,
Cincinnati.
The Hughes-Peters Electric Corp.,
178-180 N. Third Street,
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Standard Radio Parts Co.,
135 East Second Street,
Dayton.

OREGON

Portland Radio Supply Co.,
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Portland.

PENNSYLVANIA

Radio Distributing Co.,
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Harrisburg.
M. & H. Sporting Goods Co.,
512 Market Street,
Philadelphia.
Cameradio Co.,
963 Liberty Ave.,
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RHODE ISLAND

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

UTAH

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

WASHINGTON

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

WISCONSIN

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

TEXAS

Amarillo Electric Co.,
111 East 8th Avenue,
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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.,
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Metropolitan News Agency,
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Montreal, Que.

CUBA

The Diamond News Co.,
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Gorringe's American News Agency,
9a, Green Street, Leicester Square,
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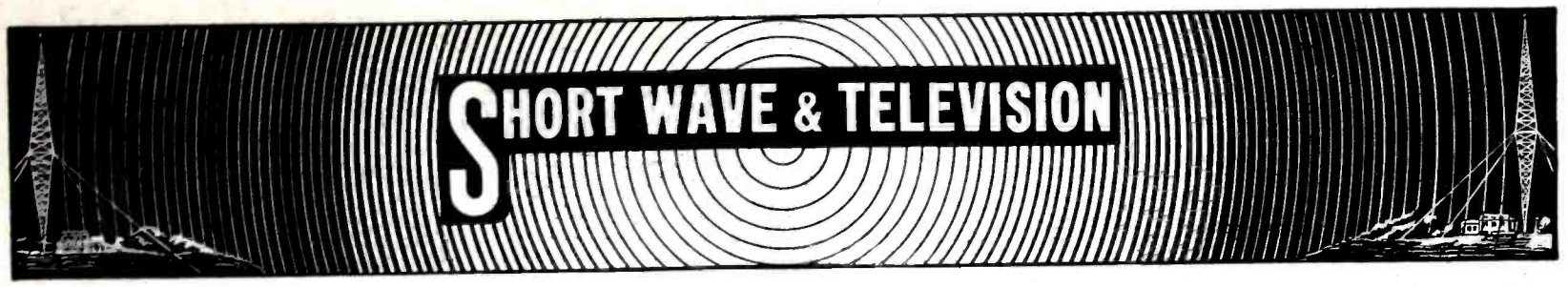
(Send remittance in form of check or money order. If letter contains cash or unused U. S. postage stamps, register it.)



HUGO GERNSBACK, EDITOR

H. WINFIELD SECOR, MANAGING EDITOR

Facsimile Broadcasting

By W. G. H. Finch,
President, Finch Telecommunications Labs., Inc.

W. G. H. Finch, a leader in facsimile field.

● DURING the past few months many pioneering radio broadcasters in many sections of the country inaugurated a new form of radio transmission having vast potentialities for public service and augmented revenue. The name of this new service is *facsimile*, first cousin to television, since it shares with it some of the same basic principles.

Unlike its more glamorous and well-publicized relation, facsimile steps into the broadcasting service from other communications fields in which it already has proved its capabilities, in a quiet but exceedingly effective manner. For facsimile, as most radiomen know, has been in daily use for several years in speeding news photos back and forth across the nation *via telephone circuits*, and across the Atlantic via *short-wave channels*.

In spite of the rapid development and use of everyday wire and radio facsimile service, many are unaware of its greater capabilities as a mass communications medium in the broadcasting field. This is largely because of the fact that facsimile transmissions have been almost entirely employed to handle press photographs for subsequent newspaper reproduction, and in the average layman's mind this is the limitation of the method. Many also confuse television with facsimile and ask the question why television will not ultimately perform the same duty.

For these and similar reasons, the first questions to be answered are, "What is facsimile, how does it differ from television, and how does it fit into the radio broadcasting picture?"

Briefly, in non-technical language, facsimile in its electrical communications sense involves the conversion of illustrations or other such copy as printed material or comics into an electrical signal which can be transmitted over radio or telephone communications circuits. At the receiver the signal is automatically converted back into its visible form, appearing as a recorded replica of the original copy. The received copy is permanent and like a printed page can be handled, observed or read whenever desired. It is somewhat as if an amazingly compact printing press installed at the receiving end or location were to be remotely controlled by the distant transmitter and in the process effected the printing of a duplicate of the copy seen at the transmission point.

Television, like facsimile, involves the conversion of visible aspects of subjects into electrical signals which can be transmitted to distant points. However, the speed of this conversion is such that ordinary telephone circuits or conventional sound broadcasting equipment cannot handle the signal. Costly coaxial cables with associated high-frequency signalling apparatus or special ultra-high frequency radio transmitters and receivers are therefore called in to do this different job.

In addition, there is as much difference in the technique of the two communications mediums as there is between the making of a newspaper and a motion picture. For primarily, where facsimile is concerned only with the transmission and subsequent recording or copies of still subjects such as pictures and printed pages, television deals with moving objects or persons. The image on the screen of a television receiver has the basic qualities of a motion picture. The image moves, it is transitional, and when the show is over the screen is blank. Since nothing has been recorded the images will not be seen unless some one watches the screen when they are received.

Facsimile and television thus perform widely different functions. Each will fit into the communications picture as separate services, having fundamental distinctions as widely divergent as those of the public press and the motion picture.

For those who want to know just how radio facsimile transmission is effected a brief description of the Finch facsimile transmitter now used by 23 major broadcasting stations will probably clarify some points in question.

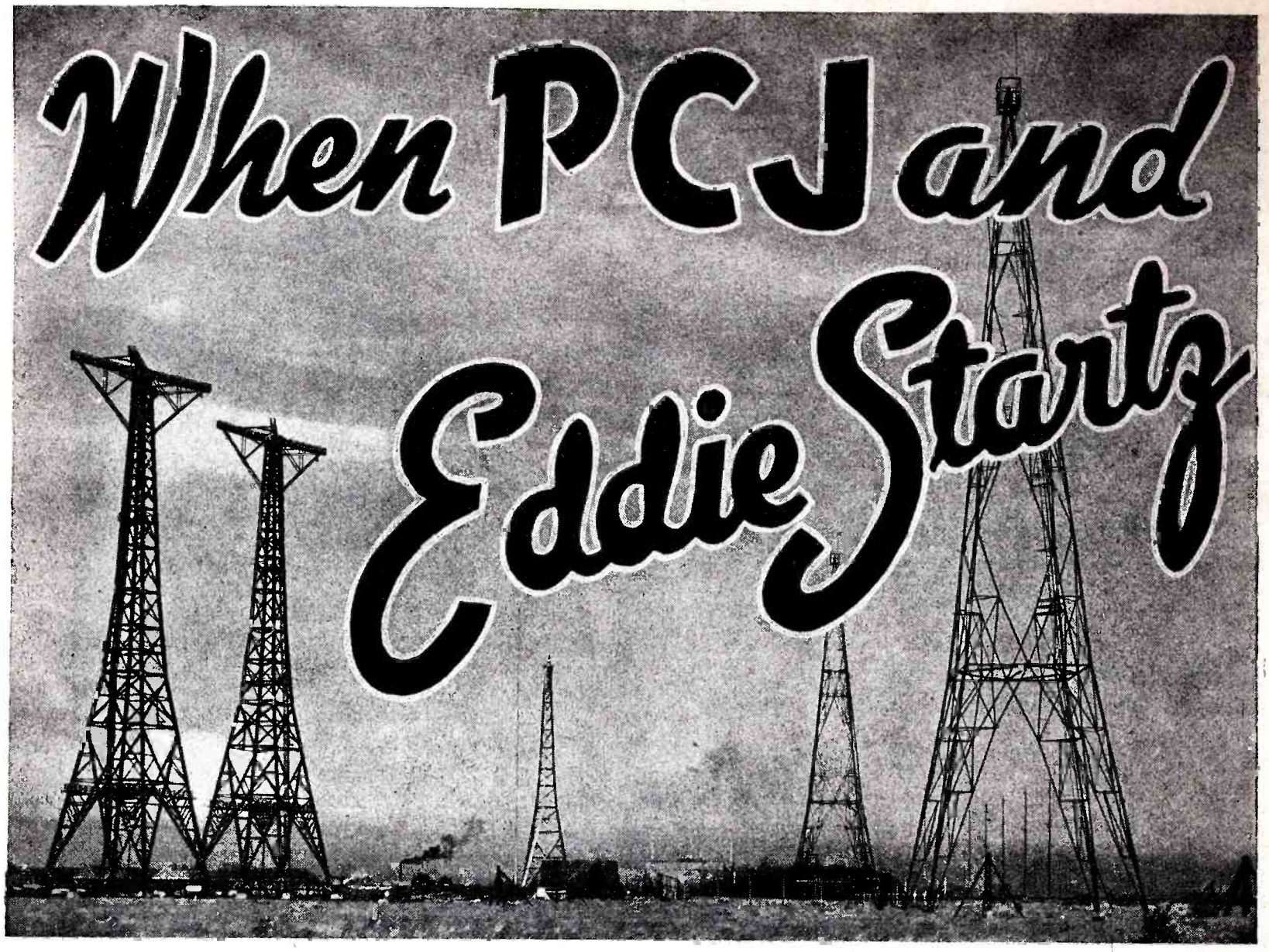
The facsimile transmitter of the type now employed consists of a scanning machine, in which the copy to be sent over the air is inserted in what is termed the *copy head*. This holds and advances the copy in front of a *scanning head*, consisting of a small electric bulb, lens system and photo-cell.

Light from the bulb is focused as a small spot on the surface of the paper carrying the copy, and the reflected light is picked up by the light-sensitive photo-cell. The scanning head is moved from side to side by an electric motor so that the spot of light traces a series of parallel paths across the copy, which is moved upwards through a distance equal to the diameter of the light spot at the end of each scanning stroke. In this manner, the entire surface of the paper is scanned, line by line, the black half-tone and white areas reflecting to the photo-cell varying amounts of light, ranging from minimum to maximum. These variations in reflected light effect a change in the amount of electric current flowing through the photo-cell, which in turn controls the loudness of a high-pitched whistle-like tone. The tone, called the "facsimile carrier," with its rising and falling characteristics is then applied to the or-

(Continued on page 56)

Seventeenth of a Series of "Guest" Editorials

When PCJ and Eddie Startz



The antenna towers of PCJ and PHI, from which the entertaining short-wave programs of Eddie Startz and his associates are hurled around the world. The new merry-go-round rotating antenna, which can be faced toward any part of the world by merely pushing a button, is shown at the left.

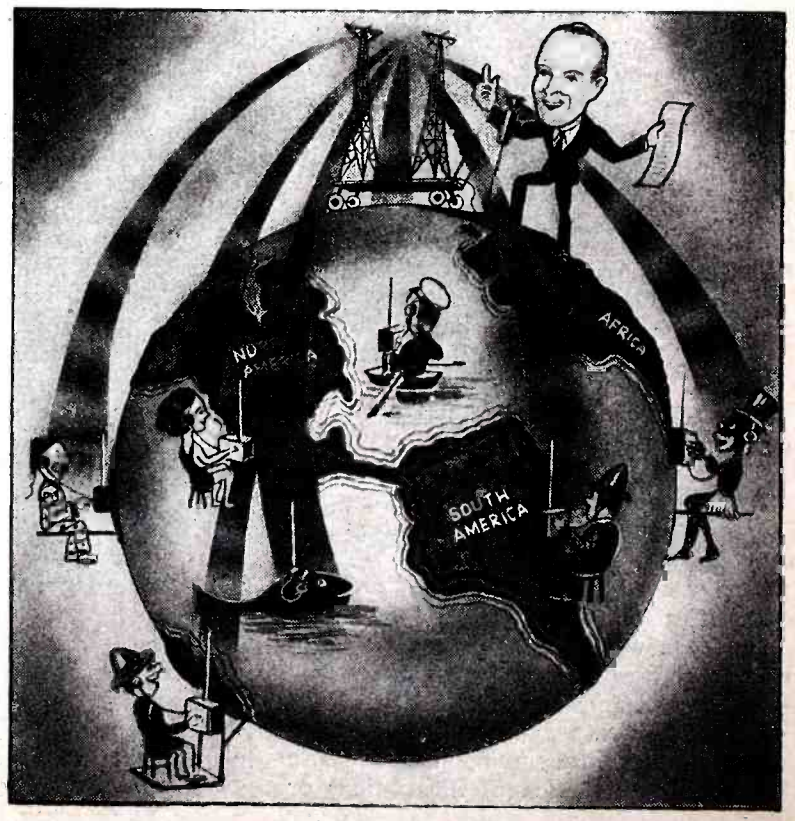
● EDDIE STARTZ, famous announcer of the Holland short-wave broadcast stations, PCJ and PHI, undoubtedly has the greatest following of any announcer in the world. Among the reasons for his popularity, we find that Mr. Startz, ever since he started broadcasting in 1928, has made it a habit to ad lib and inject personal remarks into his programs. He speaks seven languages, and talks to the people in foreign countries in their own tongue. Mr. Startz, further, knows how to mix various features that are entertaining.

When he is talking to the Dutch East Indies, he will probably speak most of the time in Dutch, but every now and then he will make a remark or tell a short story in English. If he is talking to South America, he may tell high spots in the news, mixed with short musical selections, stories, etc., in Spanish, but at times he may break into Portuguese and then again into English.

Why Mr. Startz Is A Popular Announcer

In the interview with Mr. Startz, he gave these reasons for the great popularity of the famous "happy station" located in the interesting old-world city of Hilversum. As the world's most popular short-wave broadcast announcer, the writer was interested in ascertaining just what made Mr. Startz's programs so appealing to people all over the world. The answer is that he has made himself acquainted with many of the national customs and the daily habits of people in various parts of the world, by actually traveling and lecturing there. A few years ago he made a 23,000-mile airplane tour, which extended clear across Asia. He visited Batavia, Java, Bali, the Malay States, Borneo, Sumatra, etc., and delivered numerous lectures. Mr. Startz lived for a number of years in the United States; therefore, he is quite familiar with American customs. He had many interesting experiences while visiting South America and when he addresses Brazilians "over the air," he knows just what they will like.

Thus we see that Mr. Startz worked hard to cultivate the charm which is so characteristic of all his broadcasts. At times he mentions the names of people in various far-away lands,



Tommy Pentz has here caught the spirit of Eddie Startz's world-girdling mike activities.

"Tell the World"

An Interview by H. W. Secor

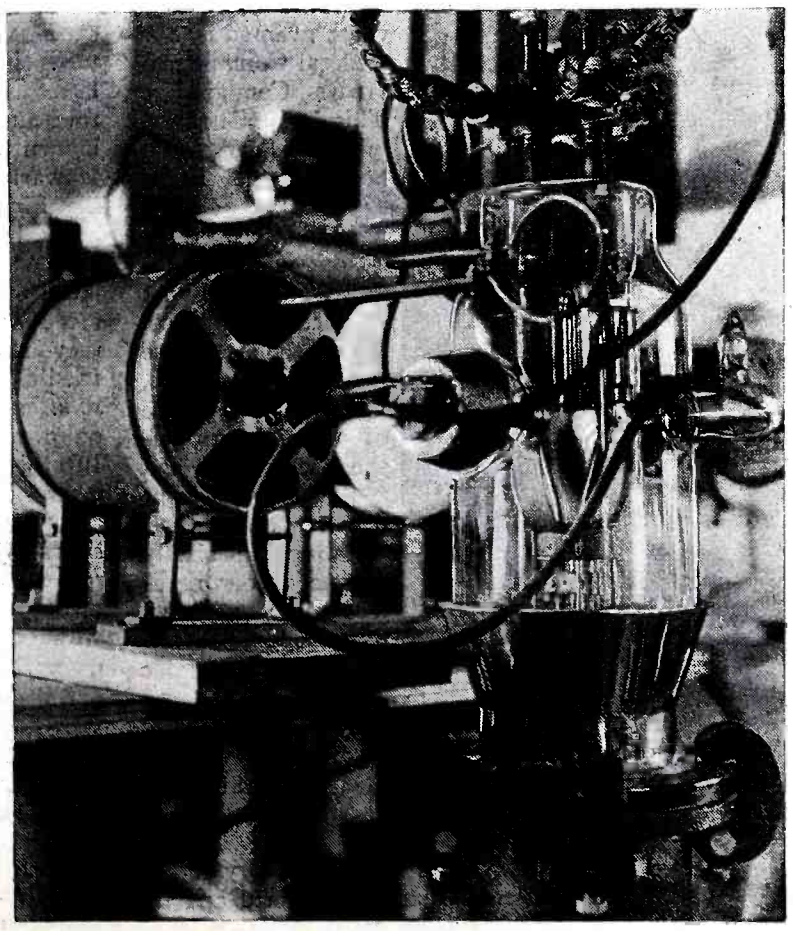
Mr. Startz is undoubtedly the best-known short-wave broadcast announcer we have today. He speaks seven languages and talks to people in many foreign countries in their own language. He has the happy faculty of knowing just how to mix music and other features with world news, plus personal items for those who write him from distant lands—all of which make his programs unusually entertaining.

Eddie Startz, famous seven-language announcer of PCJ and PHI, the well-known Holland short-wave broadcast stations. The transmitter is located at Hilversum. Mr. Startz has traveled thousands of miles and visited many countries, all of which has helped to make his programs of far greater interest and value.

especially those he meets on his travels, and if he receives a letter from a friend or listener he will read it over the air. These personal contacts help to make his broadcasts unusually full of interest. Lots of original stunts, some of them happening on the spur of the moment, have helped to enliven his many short-wave broadcasts for the past ten years.

He Dramatized Airship's Flight

Once Mr. Startz was in the midst of a talk to the Dutch East Indies, when suddenly he heard a great roaring noise overhead. Knowing that the German dirigible *Hindenburg* was making its maiden flight to America, he decided that it must be she, although no such flight over the PCJ station was scheduled. Accordingly, he opened the studio window and by holding the microphone out of the window and talking at intervals, he gave the short-wave listeners in far parts of the world a most thrilling description of the airship flying straight over the station, at a time when the whole world was interested in its first trans-Atlantic flight. The sound of the motors was heard and thus another novel and unexpected feature in an Eddie Startz-PCJ program was a matter of record.



Left—One of the high-power short-wave transmitter tubes used in the PCJ-PHI transmitter at Hilversum, Holland. The tubes of this and other types used in this famous station are the products of Philips, famous makers of tubes and sets in Europe.

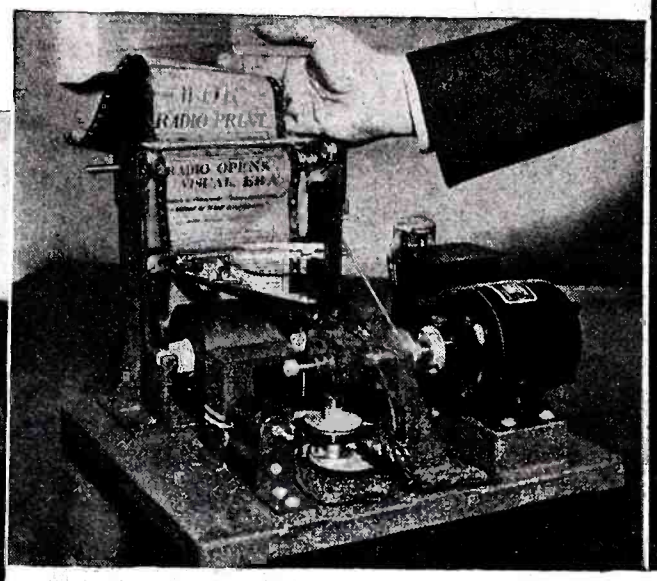
When the "Hams" Turned Detectives

One of the greatest short-wave "spur-of-the-moment" program stunts occurred when Eddie Startz suddenly received a telephone call that the mother of a famous Dutch financier was very ill and near death. Furthermore, the financier was on a world-tour and the puzzle was how to locate him quickly and tell him to come home. In the midst of a busy program, here is what Eddie Startz did. He stopped his regular discourse and suddenly exclaimed: "Attention, short-wave Hams all over the world, you are all friends of PCJ and we have had many pleasant contacts. Here is a little piece of work that will try your mettle. We

(Continued on page 57)

Radio facsimile news bulletins will of necessity be abbreviated, and it is Mr. Finch's opinion that they will supplement regular newspaper service as well as stimulate public interest in current news events. Below, the Finch facsimile recorder and a sample of copy "reproduced" from a radio newscast by WOR. Photos, drawings, etc., are readily reproduced.

W. G. H. Finch, inventor of the radio facsimile system used by a number of radio broadcasting stations. WOR is the first in the East to transmit experimental illustrated "radio news" bulletins.



WOR
RADIO PRINT

WEATHER
Fair—Colder

FACSIMILE
Home Edition

Newark, N. J., Thursday, Feb. 10, 1938

RADIO OPENS VISUAL ERA

Marvels of Facsimile Transmission Are Utilized by WOR Engineers' New Home Radio Service

NEW YORK, Feb. 10 (two a.m.)—A new era in radio history was inaugurated over WOR here early this morning.

Is It For the Home?

Too often the most promising playthings of the research laboratory are widely proclaimed ready for instant use in the homes of the land. But frequently there has been either the bugaboo of expense or the fact that the machine was far too complex for a layman to

Radio To Print

Experimental transmission of facsimile pictures and printed news, now taking place from a number of ultra-short wave and broadcast stations, will determine if it will be a household commonplace tomorrow.

● AS you read this article, radio facsimile signals are probably circulating all around you. At least 23 broadcast stations, some of them high power ones, and a number of short-wave stations are now transmitting experimental facsimile signals under a special license granted by the Federal Communications Commission. This facsimile transmission is carried on between the hours of twelve o'clock midnight and six o'clock in the morning, when most broadcast programs are off the air. These facsimile broadcasts, which, in the course of a few hours, reproduce pictures and a typed news right in your own home, will most probably be one of our regular radio adjuncts tomorrow.

Hugo Gernsback, in the April 1934 issue of RADIO-CRAFT forecast the advent of the "radio newspaper." Here's the front cover illustration of that magazine. Compare it with the pictures on the opposite page!

Each broadcaster has to install fifty receivers in the general vicinity of the station and the results of the reception obtained at these various pick-up stations are to be submitted to the F.C.C. Eventually, if results satisfactory to the Commission are obtained and no interference with regular programs are noted, a regular broadcast license for facsimile transmission may be granted.

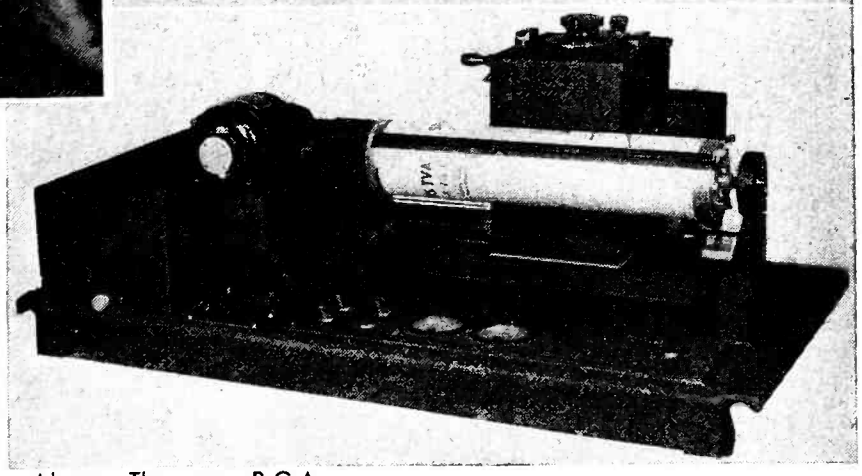
A list of the broadcast and short-wave stations sending out these facsimile pictures is appended herewith. One of the latest stations to transmit facsimile picture and news signals is WOR, the well-known 50,000 watt broadcast station at Newark, N. J. Some of the photos show the Finch facsimile apparatus, which has been highly simplified and particularly adapted to radio transmission. One of the latest and most startling announcements by the Finch engineers is to the effect that they shortly intend to demonstrate the feasibility and desirability of transmitting *sound* as well as *facsimile* program signals on a *single* ultra-high frequency carrier. In other words, if a short-wave station so desires, it may broadcast sound programs, as many of them do at present, *and in addition,* by super-imposing the facsimile signals on the *same* carrier or wave, they can also provide this additional news service without having to use an additional frequency or carrier.

As one of the accompanying pictures shows, *facsimile radio newspapers* which would emerge from your radio receiving cabinet and could be leisurely read at breakfast over your coffee cup, were predicted by Hugo Gernsback in our sister publication *Radio-Craft,* in April, 1934.

Briefly the system of sending and receiving facsimile images is as follows:

The RCA facsimile receiver. All the controls are within the cabinet, so that they may not get out of adjustment. 8½- by 12-inch pages on a continuous roll are printed at the rate of three feet an hour.

Below—Specimen of 100 line reproduction by RCA process, made on the apparatus illustrated.



NEWS *right in your Home*

The photo or other piece of copy, such as news bulletins, is placed in the scanner at the transmitter. At the rate of 100 lines per inch the picture to be transmitted is scanned, and the transmitter sends out periodic impulses which vary in strength with the degree of light or shade on the picture. When these signals are received, by wire or radio, they are passed into a recording stylus. This stylus moves back and forth over a piece of chemically dry-processed paper (the Finch system) and a line, wide or narrow as the case may be, is traced on the paper. Finally there are 100 of these lines per inch (of varying width) recorded on the paper. A facsimile such as that shown in one of the accompanying pictures is obtained, and it thus becomes an easy matter to reproduce printed matter, drawings, photos, etc.

The movements of the pick-up device at the transmitter and the recording stylus at the receiver have to be synchronized. Mr. Finch uses a synchronizing signal. In other systems a synchronous motor is used. In one of the devices illustrated, a very simple arrangement is used whereby synchronizing impulses are transmitted after each scanning line. In this way the receiver may be operated by a D.C. or A.C. motor, or even a battery motor. The motor speed is adjusted so that the movement of the recording stylus is just a trifle ahead of the transmitting pick-up tracing head. When the synchronizing impulses arrive it is a simple matter to cause the speed of the receiving mechanism to be momentarily checked. In other words, after each synchronizing impulse is transmitted and received, the image reproducing machine starts from scratch, and is thus always in step with the scanner and drum at the transmitter.

Many different systems of transmitting and recording devices by facsimile have been tried. The one used by the Finch system employs a special chemically treated paper. When a current passes through the moving stylus needle, the reaction causes a black spot to appear on the paper, the size of the spot at a given point depending upon the strength of the received impulse. At the transmitter the light beam is focused on the picture to be sent and the reflected light falls on a photo-electric cell.

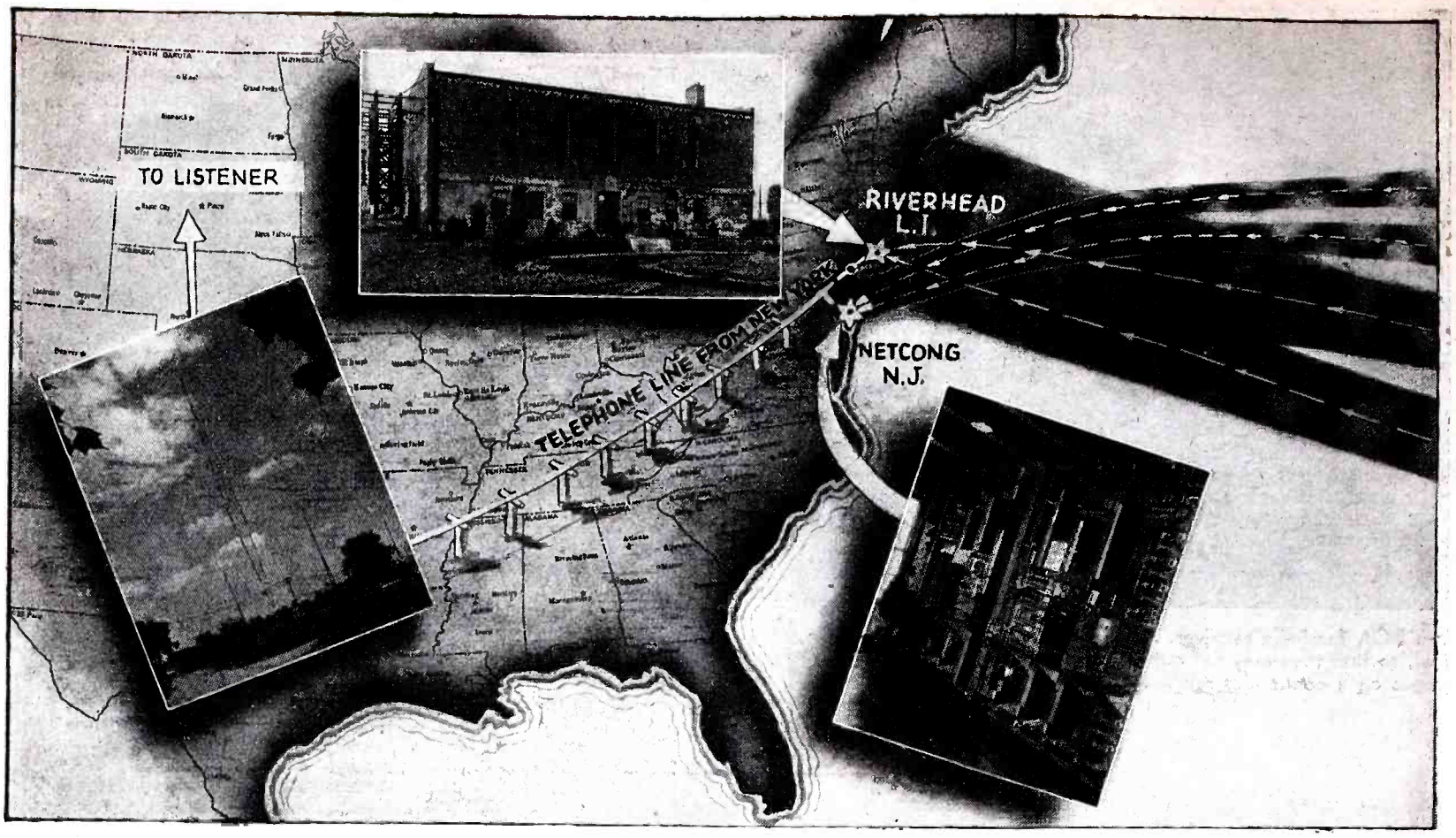
As the strength of the current generated by this cell depends upon the degree of light or dark on the picture, it is at once apparent that the signal at the receiving station will vary in direct accordance with the light and dark parts of the picture just as the photo-electric pick-up eye sees it.

Above—The new RCA facsimile transmitter scanner. Pictures or text are placed directly on the drum, the speed of which is synchronized with the receiver-printer.

Above—Charles J. Young, RCA engineer, with the simplified facsimile receiver-printer with the lid-cover removed. Ordinary white or newsprint paper and carbon paper are utilized for reproduction.

One of the simplest image recording methods utilizes a piece of carbon paper backed up by a sheet of white paper. By employing a simple electro-magnetic recording device, similar to the element used on a reed type cone loudspeaker, the facsimile signals cause varying strengths of line to be recorded on the paper behind the carbon sheet. All we have to do is to cause this magnetic recording head to move back and

(Continued on page 60)



Behind the Scenes of a Rebroadcast from

● "WE now take you to Europe via short waves." How often have you heard this phrase on the radio when listening to your favorite broadcasting station? But have you ever stopped to think of what goes on behind the scenes in the presentation of one of these international relays? The program originates in Europe, and you, sitting in the comfort of your living room somewhere in the United States, are a casual listener. Just what fills the gap between the point where the broadcast originates and your home? This is a story in itself, fully as interesting as the contents of many of these short-wave relays. So let us draw the curtain aside and see what actually goes on behind the scenes.

Several S-W Routes for "Foreign Pick-ups"

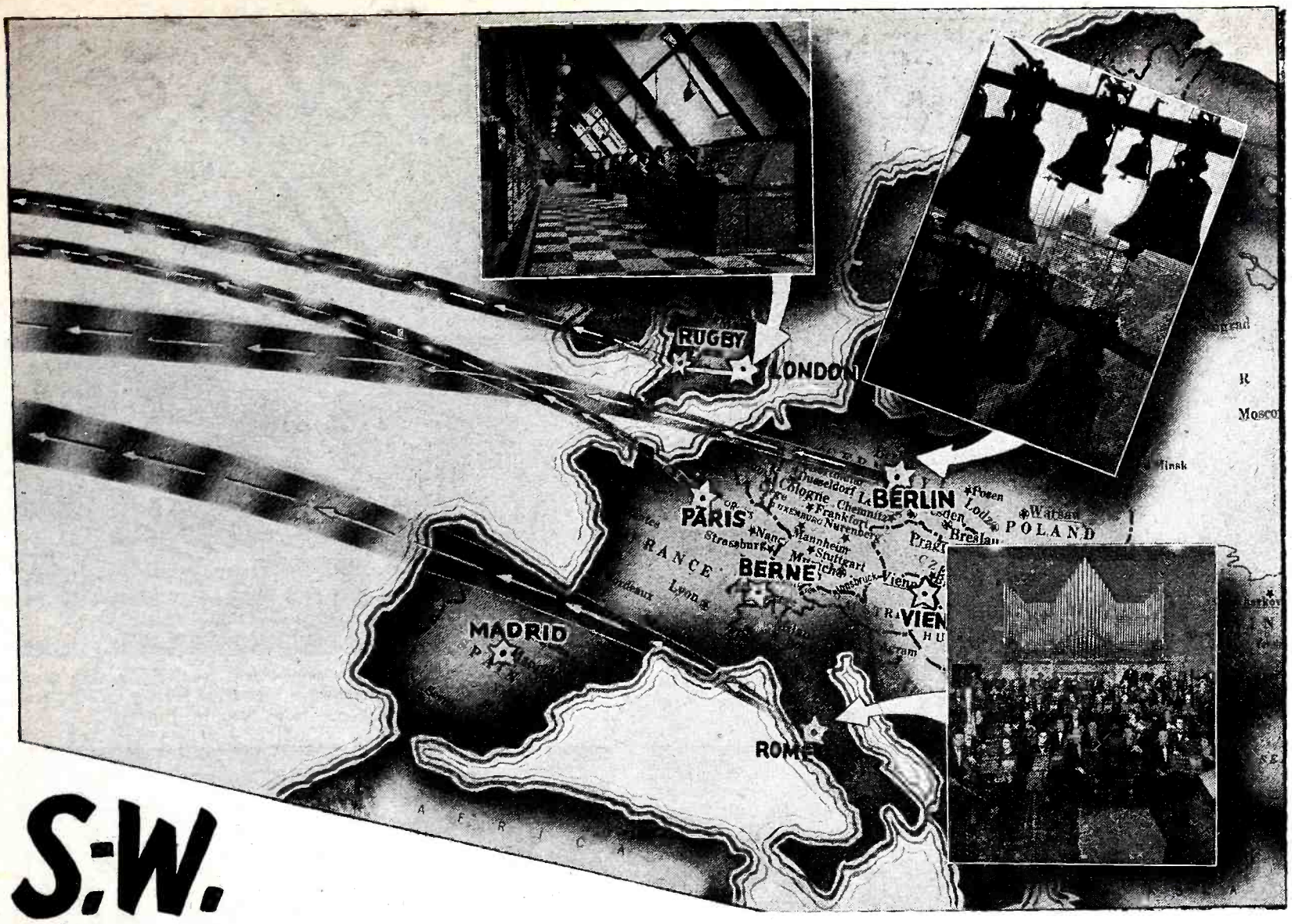
There are several ways generally used for bringing programs to this country from abroad. All of them make use of short-wave radio to bridge the Atlantic. The first method makes use of the trans-Atlantic radio-telephone circuits of the A. T. & T. Co., between London or Paris, and New York. The signals go by short-wave radio from the short-wave transmitting centers at Rugby, England, or Pontoise, France, to the Netcong, New Jersey, receiving station of the A. T. & T. Co. The link between the French or English transmitting centers and the place where the broadcast originates is made by means of an ordinary high-fidelity telephone circuit. Suppose a broadcast originates in Marseilles, France. The microphone is set up at the scene of the annual clambake of the Marseilles Rotary club and is connected to a special telephone line running across France to the transmitting center at Pontoise, where the program is fed into a high power short-wave transmitter and hurled out across the Atlantic, via a beam aerial system concentrating the signal on the coast of New Jersey. The signal is picked up on an elaborate receiving aerial at Netcong and amplified through special short-wave receiving sets. It is then fed into a special telephone line to the long-distance headquarters of the A. T. & T. Co. on Walker St., New York City. From here telephone lines lead to the several broadcasting network headquarters in New York; arriving at the New York studios of the National, Mutual, or Columbia broadcasting networks, the program is routed over the regular wire telephone networks of these systems to stations in all parts of the country, where the broadcast is put on the air over the local broadcaster and you, furtively dropping cigar ashes in your wife's prized Ming vase, lend an appreciative ear to the festivities in far-off Marseilles.

Programs from England

Programs originating in England go by telephone wire to London and then to the Rugby transmitting center, where they are shot out across the Atlantic to New Jersey in the same way as from the French station. Once picked up in New Jersey the programs follow the same paths to your receiver as in the case mentioned above.

A Second Method

The second method of sending a program from Europe to America is somewhat different. In this case the services of any of the powerful short-wave broadcasting stations in the various European countries are employed. A specially arranged program originating in Germany would be sent by telephone to the German short-wave station near Berlin, and put on the air over one of the powerful DJ-stations, using an antenna directed to the U. S. The program in this case is picked up at the elaborate receiving terminal of RCA Communications located at Riverhead, Long Island, about 75 miles from New York City. At Riverhead the signals are fed into a telephone line, which takes them into the



S-W. Europe --

Four alternate routes by which programs may be sent by short-wave from Europe to the United States for rebroadcasting. The two narrow beams show the paths of the trans-Atlantic telephone circuits.

New York headquarters of RCA on Broad St., where they are routed out to the broadcasting networks in the usual manner.

When the RCA circuits are used, several powerful short-wave transmitters at Rocky Point, Long Island, are used for communicating with the *foreign* broadcasting station which is sending the program to this country. This is necessary in order to complete preliminary arrangements about the time at which programs will start, how long they will last, and other technical details.

The short-wave broadcasting stations at Rome, Italy; Geneva, Switzerland; Prague, Czechoslovakia; Huizen, Holland; Paris, France; and Daventry, England, are often used for sending these special programs over the Atlantic to the RCA receiving station.

Sometimes a European short-wave station may be broadcasting a program for its regular short-wave audience, which is of sufficient interest to warrant it being relayed by American broadcasting stations. In this case the RCA receiving station is also used to pick up the signals from Europe for relaying, but the services of a transmitter at Rocky Point, L. I., are not required since no special arrangements are made beforehand. In most cases, programs from abroad are specially arranged exclusively for an American audience and are not broadcast locally in Europe.

Broadcasts Via Canada

A third method by which programs are received from abroad is by way of the short-wave receiving station operated by the Canadian Broadcasting Corporation. This receiving station is used mainly for picking up short-wave broadcasts from abroad for the benefit of Canadian listeners. American networks frequently tie in with the Canadian Broadcasting Corporation to present these foreign relays to listeners in the United States. The Canadian broadcasting authorities pick up the programs from any of the European short-wave broadcasting stations in the same manner as the RCA receiving station on Long Island. Where special programs have been arranged, preliminary arrangements as to tuning, etc., are generally made by trans-Atlantic cable. The European S-W station sending the program comes on the air a few minutes before the program is scheduled to start and at exactly the predetermined time the program commences and is "piped" into the Canadian and United States broadcasting networks and broadcast by your local radio station.

Programs originating in European countries which do not possess powerful short-wave stations are generally sent by telephone lines to the nearest available transmitting center. Programs from Norway and Sweden are generally sent by telephone lines to the Berlin station where they are broadcast to the United States via short-waves.

As in the case of local broadcasts in the United States, these European relays may originate either in the studios of the numerous European broadcasting stations or at some outside point such as a sporting arena or the scene of some important gathering. When the program originates outside the studios of a broadcast station, it is sent by telephone to the nearest studio headquarters for amplifying and regulation of the volume level before being sent to the short-wave transmitting station.

Receiving Equipment Used

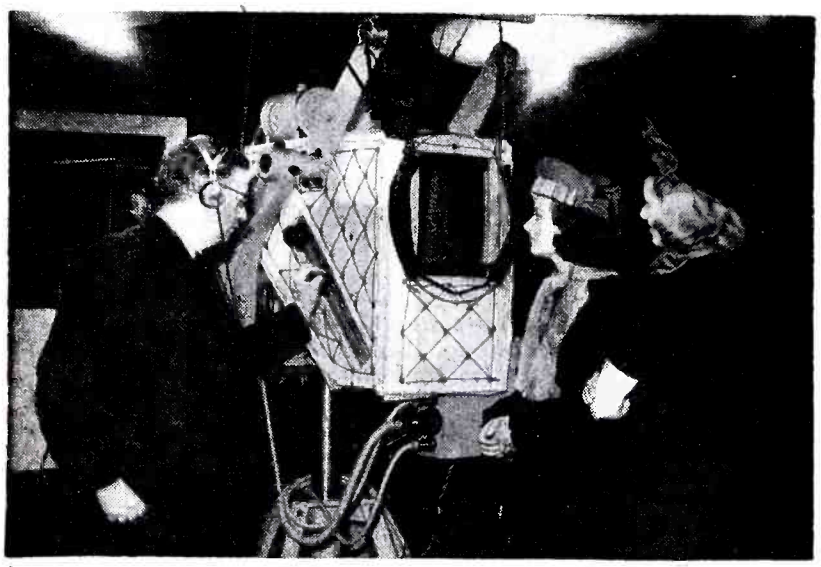
The short-wave receiving equipment at Riverhead, L. I., and Netcong, N. J., is of a very elaborate nature to insure good reception from Europe. At Riverhead the aerial system consists of a large number of antennas which are connected to different receivers. The outputs of these re-

(Continued on page 59)

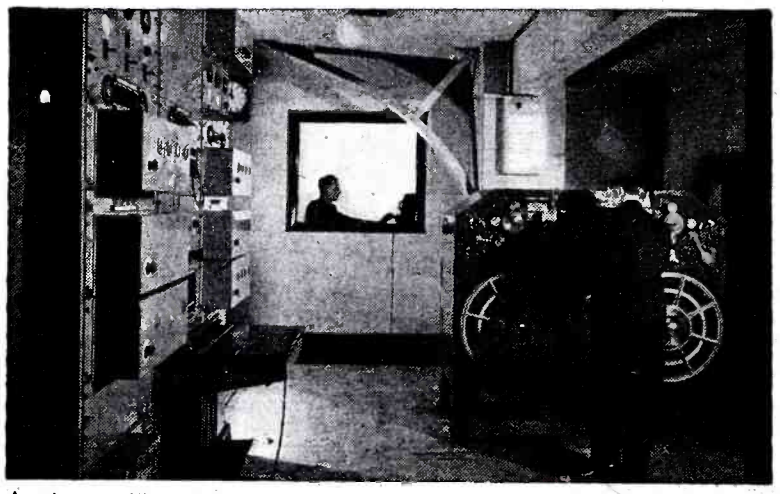
Short Wave *Foto News*

Above—Special large size cathode ray tube built in the RCA television laboratory at Camden, N. J. Aside from the fact that an extra large image is produced on the fluorescent screen, this tube differs from the ordinary one in that it has an automatic pump to maintain a high degree of vacuum within the tube.

A group of actors heard on short-waves from Berlin. The group shown produce a weekly short-wave broadcast feature of a polyglot nature called, "Non-Stop, Tip-Top."

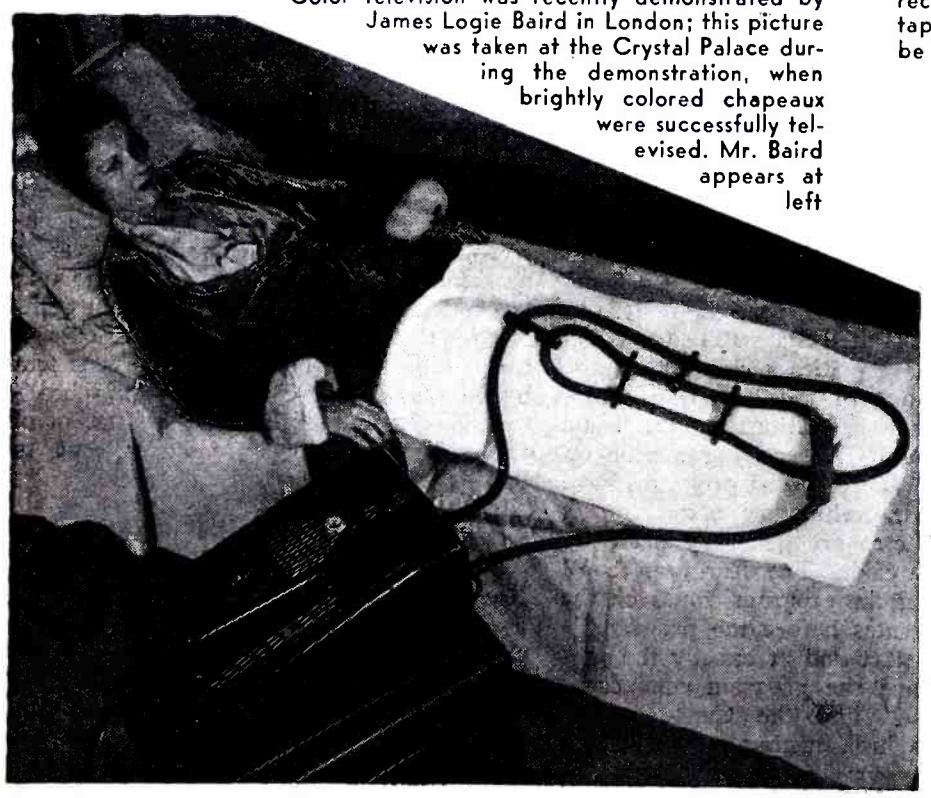


Color television was recently demonstrated by James Logie Baird in London; this picture was taken at the Crystal Palace during the demonstration, when brightly colored chapeaux were successfully televised. Mr. Baird appears at left



Above—The B.B.C. magnetic sound recorder which enables programs to be recorded on a thin steel tape. These programs can be reproduced later at any desired time.

Photo courtesy B.B.C.



Right—No, this is not a new version of Bob Burns' bazooka, but a giant cathode ray television tube used in a recent demonstration by the Bell Telephone Labs.

Photo courtesy Bell Telephone Labs.

Left — New type of short-wave diathermy apparatus. By coiling a heavily insulated rubber cable over the part to be treated, a high frequency current is induced in the body.

Photo courtesy General Electric X-Ray Corp.

Cadet Radio Station
W2KGY, West Point, New York.

W2KGY— West Point— Calling "CQ"

How Ham radio helps to educate Uncle Sam's future army officers.

Henry R. Brewerton

● DA da dit dit da dit da dit da dit dit dit.

This sprinkling of dits and das (dots and dashes) means something to W2KGY. It means maybe "Merry Christmas", or "How are you, old man, everything is fine here," or perhaps "Many happy returns of the day." W2KGY means something also. It means that it is a licensed amateur radio station at West Point and is accepted by the Federal Communications Commission. So we enter the realm of radio "ham-dom" through the doors of a little room in the gymnasium. After entering those doors the far corners of the earth are as close as your next door neighbor. Japan, South Africa, South America, Hawaii, Australia are more easily contacted than a plebe on the fourth floor.

Few people know that a licensed amateur radio station is operated by the cadets at the U. S. Military Academy at West Point, N. Y. The call is W2KGY and QSL cards have been received from fifty-seven different countries.

It all began two years ago when a few radio bugs in the corps got itching fingers to turn legalized dials. General Allison, the then Chief of Signal Corps made it possible for those men to pursue their hobby and the nucleus of Radio Station W2KGY was formed. The radio minded general presented the club with a transmitter and an RCA receiver. A room on the third floor of the old gymnasium was used and the club set to work. A number of the men had been *amateur* operators before their plunge into the military and they acted as the brains of the club. The equipment was set up and the first few *contacts* were made. Each contact, with its call number, is methodically listed in a log book. Anyone interested in taking a world cruise in seven minutes flat needs but to glance over the stations contacted. W2KGY holds a certificate which shows that it has *worked all continents.*

Going on the air however is not quite as easy as it sounds. There are a few yards of red tape that must be stripped away before one can really fall into the radio groove. Before a station is licensed it must have a class A operator. In order to be dubbed "Class A Operator" (sounds surgical but is not) there are certain qualifications that must be filled. The primary requisite is the sending and receiving of code. The operator who aspires to a Class A rating must send and receive a certain number of words per minute. This cannot be done haphazardly for the work must be accurate. He must master the international "Q" signals. These signals compose a language or rather a dialect all by themselves. With radio stretching as far as it does there arises the question of a Japanese talking to a South American. The difference of language question is answered by means of the "Q" signals. So Mr. Ducrot in Utah just dits his key and his dits pour out a profusion of French in Paris, guttural German in Berlin, and sing-song Chinese in Hong Kong. (Radio really is the ideal way to master the French language.) The operator is also required to know the principles of radio in order that he may train other men at his station so that they may also become Class A in time. The lower ranking radio-oids are known as Class C. They probably sweep out the station like plebes on trunk room orderly duty.

The Class C men are trained by the ediphone (phonograph) system. Code is played on a record and the beginner takes the code down in pencil. As the men become more adept the speed of the record is increased until the speed is equal to that required for the Class A rating. Radio is changing and improving every year and the new radio principles as well as the old must be learned by the new men. The qualifications are renewed over scheduled intervals of time and improvements are added to the tests.

The club, however, is not content with merely "da-ing" and "ditting" through the atmosphere. They are pressing on towards greater improvements in their station. At the present time they are building a phone transmitter. The work is being supervised by Captain J. L. Greene of the department of Chemistry and Electricity. Captain Greene acts in an advisory capacity only. The actual work and the experimentation is being carried on by the cadets. In the spring the phone will be completed and then verbal contact can be made. This type of contact packs a thrill for the novice but the older radio men find that

(Continued on page 45)

Just a sample QSL card from W2KGY's collection. The West Point cadet station has worked all continents.

What Do You Think?

S-W listening den of Ernest Jones, McKeller St., Teneriffe N1, Brisbane, Queensland, Australia. This month's prize winner, a year's subscription.

Mr. Fiege, Are You There?!

Editor,

Just who wants to get a report stating (heard you R9 in Static Island, N. Y., while talking to VK9ZL). My friend, do YOU not know all the information a SWL gives? We will grant that such a report as your model one is of no use. But taking it into consideration that from your ignorance of SWL reports you do need new "specs." PLEASE, SOMEBODY, send the poor fellow a SWL card with "specs" enclosed!

Or, maybe you don't get favorable reports (like other fellows do)? Or, perhaps you have never received a foreign SWL card? Or, maybe you lack publicity on the air-waves, so you get it this way (clever)?

Pal, you talk as though you have had plenty of experience at SWL; such as knowing about SWL's always giving R9 reports to other fellows and not to you. Of course, if the QRM has you down, well, too bad, but don't worry, there aren't many fellows who would want to listen to you anyhow.

As for fellows who keep SWL's, I refer you to W9MEL.

Yours for less Fiege, Jr's.
Lawndale S-W Club,
Bob Liggett, Pres.,
Philadelphia, Pa.

He Didn't Like Cover!

Editor,

I just received my January 1938 copy of your once perfect magazine. Here are a few "brickbats" for you. First of all you have spoiled your cover by using a photograph instead of your paintings. Also, your Kink page was much better in 1937, '36, and '35. The line around each of the Kinks made it much easier to read. I do not like the way space is left at the top of each page. It was a much better magazine before in my estimation.

I also agree with other SWL's that you have too much television in your really marvelous magazine. Also give us SWL's more one, two, and three-tube sets, instead of these superhets, as no one builds 9 to 12 tube sets very often.

Don't get me wrong! I really think your magazine is swell, except for these objections mentioned above in your 1938 issue. I hope the February issue is like the old one again! More luck.

Jack Phillips,
Toronto, Ontario, Canada.

(We are quite surprised that you did not like the January cover or the new style employed in some of the page layouts, particularly the S-W Kink page. If you have looked over modern magazines to any great extent, you will note that much more space is used in laying out the head titles of articles and also more freedom is used in laying out cuts. Rules or lines around a lot of cuts—such as those in the Kink department—become very monotonous, we believe, after a little thought on the matter. We have received many letters from readers praising us for the much clearer and more modern style of layout now used in the magazine. We will keep in mind the other suggestions you have made, especially with regard to small set-construction articles. —Editor.)

Hugo Malm, OH3NA, Railway Dept., Lahti, Finland, and his fine Ham station. Just look at those QSL's!

More Bricks!

Editor,

I have been reading *Short Wave & Television* for two years now and it does not seem to make as big an impression to me now as it did when I first started reading it. It seems to me that your magazine is for the radio *beginner* and not for the *advanced* radio fan. I think that instead of having so many written articles you should print more dope on experimental apparatus. When you print an article about a receiver you always print everything *except a "flexible" circuit.* I personally think that you do not live up to the saying on your cover—*"The Radio Experimenter's Magazine."*

Many SWL's, I am sure, would appreciate an article on *"How to Learn the Code."*

Arthur Globman,
751 Gerard Avenue,
Bronx, New York.

(Much obliged, Arthur, and we will try our best to give all the dope possible on circuits published in S.W.&T., hereafter, including kinks showing how to make circuits more flexible. We might mention that in the past we have quite frequently received letters from readers taking us to task because some of the articles and circuit diagrams were too general, that is they showed a circuit with a number of suggestions as to flexibility. The criticism, in this case, was that the design or circuit given should be held to one specific type. But the editors are perfectly open-minded on the matter and we will endeavor whereever possible to give all of these "flexible angles" on circuits.—Editor.)

One Year's Subscription to
SHORT WAVE & TELEVISION
FREE
for Best "Listening Post" Photo

Closing date for each contest—75 days preceding date of issue; April 15 for July 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.

More Television, Says He!

Editor,

On January 1, 1936, I received my first foreign station, 2RO, Rome, Italy, which was verified. From that time I have been an enthusiastic short-wave listener.

I have only a three-tube radio which I built from a kit. This has not given very satisfactory results but it was enough to cause the radio bug to bite me so deeply that I am afraid I shall never recover. I am 17 years old and am finishing my last year in High School. When this is completed I hope to take up the interesting work of the *hams.*

I bought your *Short Wave Listener* monthly until it was no longer published. I was very much pleased with this magazine and am now taking *Short Wave and Television.* I think Joe Miller's column is the best department of the magazine.

Contrary to J. L.'s opinion on the *tele-*

(Continued on page 54)

New Silver Trophy

To be Awarded Monthly for Best HAM Station Photo

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

● TO promote interest and pride among Ham station owners, *Short Wave & Television* magazine offers this handsome silver trophy each month for the best amateur station photo. The photos must be as large as possible, preferably not less than 5" x 7", and should have clear detail.

The general layout of the apparatus in the station as pictured in the photo, also the quality of workmanship exhibited will be judged, as well as the appearance of the photograph itself. Neatness will count a great deal when the judges come to pass on the photos each month, and when you submit a photo of your Ham station, send along a brief description of about 200–300 words, giving the general line-up of the apparatus employed—the size, type and number of tubes, the type of circuit used, name of commercial transmitter, if not home-made, watts rating of the station, whether for C.W. or phone, or both, etc. Also name of receiver.

A few words as to the number of continents worked, number of stations logged, will be of interest and may be given in brief order. Also mention type of aerial system used for transmitting and receiving and what type of break-in relay system, if any, is used.

One more important point—don't forget to send along a photo of yourself, if you do not already appear in the picture of the station.

The beautiful trophy illustrated is a masterpiece of the silversmith's art and we are sure that every Ham in the country will be more than pleased if he should win it. The trophy stands 11¾ inches high and represents the spirit of victory. It was designed by one of the leading silversmiths and is truly a work of art. The name of the winner will be engraved on the silverplate mounted on the bakelite pedestal before the trophy is sent to the successful contestant.

The winner of the first trophy award will be announced in the July issue and the closing date for the first contest is May 10, and thereafter will be the first of the month. The judges in the contest will be the Editors of *Short Wave & Television*, and in the event of a tie, duplicate prizes will be awarded to the contestant so tying.

You don't have to be a reader of this magazine in order to enter the contest. Pack all photos carefully. The Editors and publishers cannot be responsible for photos lost in transit.

(Continued on page 45)

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

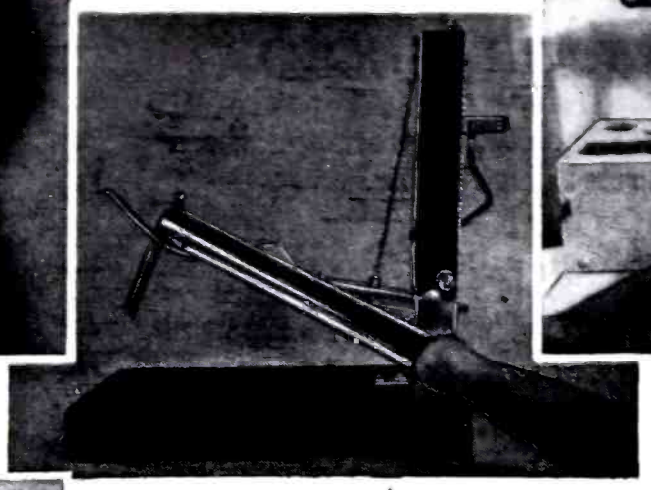
Can You Answer These Radio Questions?

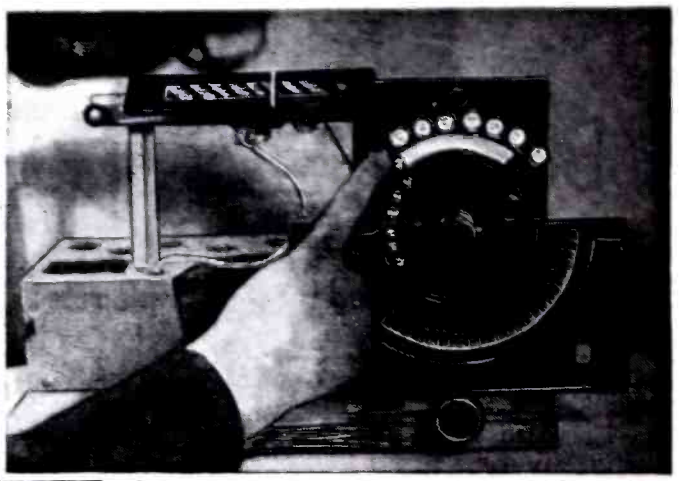
1. What is the difference between facsimile and television? See page 5.
2. Where is station PCJ located and what is one of its principal purposes? See page 6.
3. Will the new facsimile transmit pictures as well as printed letters, and between what hours are these facsimile images being broadcast now? See page 8.
4. Upon what peculiar physiological effect does the action of the *lie detector* depend? See page 14.
5. What is the name of the inventor who recently demonstrated color television? See page 12.
6. What simple device is used to teach code to Uncle Sam's West Point Cadets? See page 13.
7. How is a short-wave program originating in Paris picked-up and rebroadcast to American audiences? See page 10.
8. What is the simplest efficient type of circuit for 5-meter reception? See page 19.
9. Can you name two modern uses for a carborundum crystal detector? See page 29.
10. How is a beat oscillator connected to a superhet receiver? See page 30.
11. What is the advantage of the new type 1851 tube for television receivers? See page 32.
12. What is the simplest method of connecting a doublet antenna to the plate coil of a beginner's Ham transmitter? See page 34.

Latest Radio Styles from Paris

Novel ideas in radio sets were shown at a Paris exhibition, which featured parts and tubes.

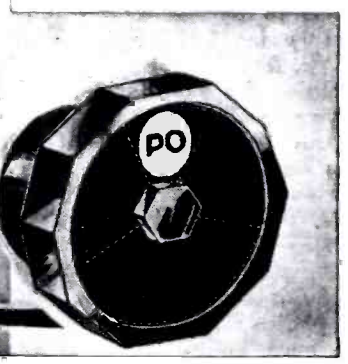
Above—New portable receiver easily carried about by means of the shoulder strap.





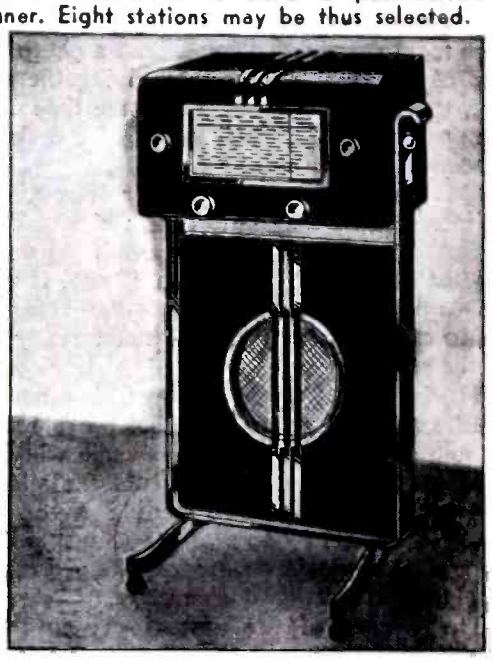
A push-button selector-switch which enables the set-constructor to build a push-button tuner. Eight stations may be thus selected.

Above — An electric soldering iron which will not overheat. When the iron is placed on the support, the mechanism gradually cuts off the current.



Right—The "rolling" receiver can be moved about from room to room with ease. The receiver unit may be moved up or down for convenient tuning. Below the receiver, with its all-wave universal dial, is the loudspeaker.

Left—No, this is not a search-light, but an odd-looking radio receiver. New type control knobs are incorporated in this set. A close-up of one of them appears at the right of the picture. Only the band selected shows on the illuminated knob.



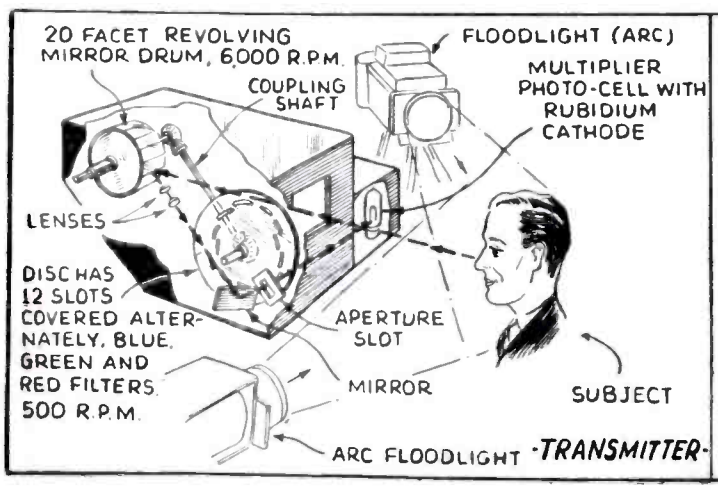
Baird Demonstrates Color Television

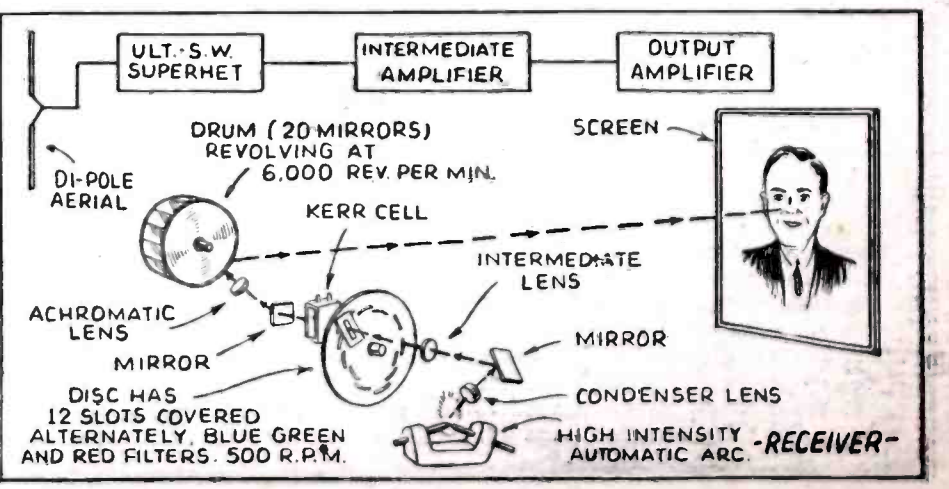
● TELEVISION in color is a little too advanced, perhaps, for the average reader to worry about and we can hear him say—"Give us some good black and white television first." In any event, James Logie Baird recently demonstrated color television to an audience in London.

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

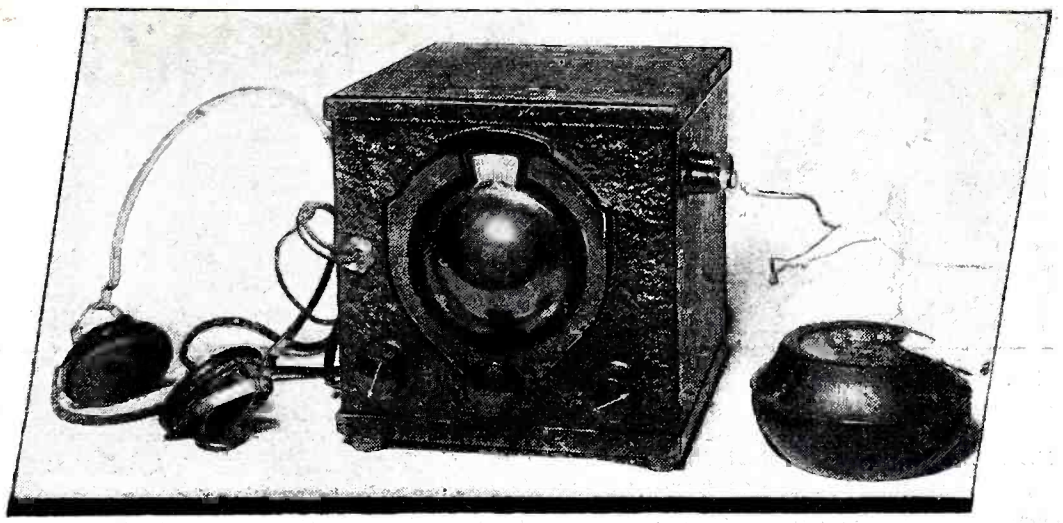
The diagram shows how the color effect was achieved. The size of the screen on which the large size images were projected, measured 9 x 12 feet and the images were

(Continued on page 54)





The author states that W1JFF and W1BVI also use this 5-meter receiver circuit in preference to many others which they had previously tried.

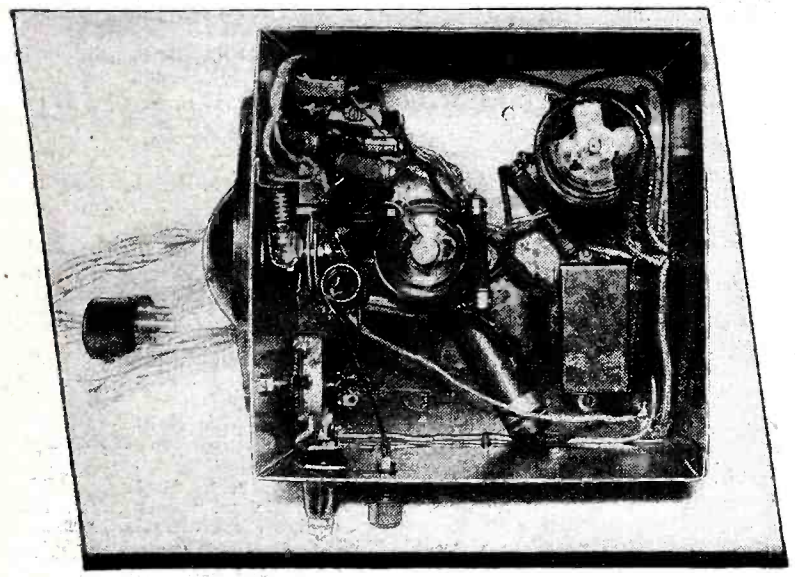


General appearance of the 5 meter receiver —it's in regular service at W1JNO's shack and has proven very reliable. ➤

George W. Brooks, W1JNO

2-Tube Five-Meter Receiver

Using an 89 and a 42



Top view of the 2-tube 5-meter receiver.

● MOST 5-meter receivers use at least three tubes and many of them employ from 5 to 8 tubes or more. Very surprising results have been obtained with this little 2-tuber, using an 89 and a 42. This circuit works as a super-regenerator with a self-quenched oscillator.

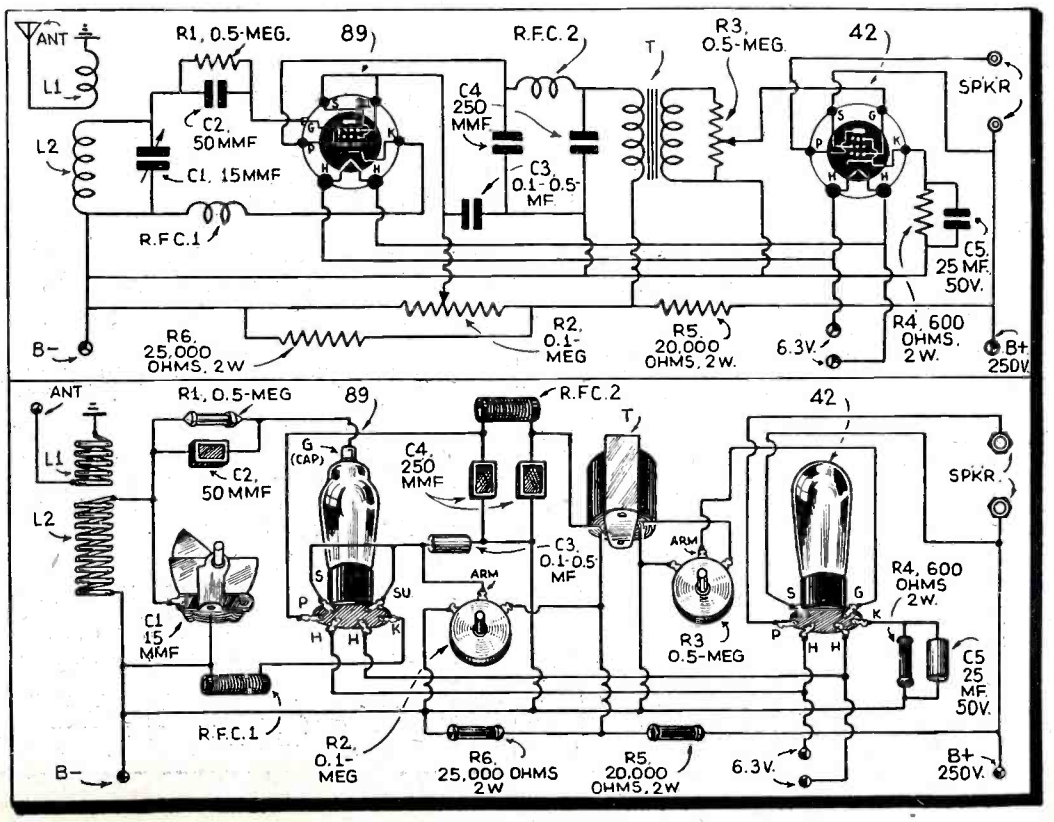
To construct the receiver the parts should be mounted in the cabinet, so that the tuning condenser and coil connections to the grid of the 89 are as short as possible. The rotor of the tuning condenser is grounded to the front panel and condensers C3 and C4, also choke, R.F.C.1, are connected to this *ground* point on the tuning condenser, the leads as short as possible in each case.

The position of the individual parts is not so very important, except that an effort should be made to make all leads as short as possible, especially in the detector grid and tuning circuits. The audio amplifier stage is wired up in the usual way. The inductances L1 and L2 are both wound alike, coil L1 should have the antenna connecting to the side nearest to the grid of coil L2. The ground connection may be made to the ground terminal on the tuning condenser and the wire then led to a good external ground.

A word about the antenna—it seems that a single wire-fed 8 ft. rod, tapped 13¾" off-center on the low side, when mounted vertically, is perhaps the best aerial and it should be mounted as high as possible clear of all other objects. In the author's case the antenna is a piece of No. 14 wire attached to a 35 ft. bamboo fishpole, provided with 2" stand-off insulators mounted on the pole and secured with tape and wire wound around the pole and insulators. The fishpole is attached to the chimney of the house and is about 35 ft. above the roof of the house or between 70 and 75 ft. above the ground. The signals received on this antenna are much stronger than those picked up with lower antennas. With a good antenna and especially with a favorable location, free from steel-frame buildings or other causes of absorption, you can hear signals on the 5-meter bands up to distances of many miles. The 89 tube should not have more than 90 volts applied to its plate. L1 should be coupled very loosely to L2, so that the 89

(Continued on page 45)

Below—Hook-up of the receiver.



World Short Wave Stations

Revised Monthly

Broadcasters' Calls in bold type
Phones' in light type

Reports on station changes are appreciated.

Mc.	Call	
31.600	W3XEY	**BALTIMORE, MD.**, 9.494 m., Relays WFBR 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 12 n-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.
26.400	W9XAZ	**MILWAUKEE, WIS.**, 11.36 m., Addr. The Journal Co. Relays WTMJ from 1 pm.
26.100	W9XJL	**SUPERIOR, WIS.**, 11.49 m. Relays WEBC daily.
26.100	GSK	**DAVENTRY, ENG.**, 11.49 m., Addr. B.B.C., London. Operates irregularly.
25.950	W6XKG	**LOS ANGELES, CAL.**, 11.56 m., Addr. B. S. McGlashan, Wash. Blvd. at Oak St. Relays KGFJ 24 hours daily.
21.550	GST	**DAVENTRY, ENG.**, 13.92 m., Addr. (See 26.100 mc.) Irregular at present.
21.540	W8XK	**PITTSBURGH, PA.**, 13.93 m., Addr. Grant Bldg. Relays KDKA 6.45-9 am. Exc. Sun.
21.530	GSJ	**DAVENTRY, ENG.**, 13.93 m., Addr. (See 26.100 mc.) 5.45 am.-12 n.
21.520	W2XE	**NEW YORK CITY**, 13.94 m., Addr. Col. Broad. Syst., 485 Madison Ave. 7.30-10 am., Sat. and Sun. 8 am.-1 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 26.100 mc.), 5.45 am.-12 n.
21.450	DJS	**BERLIN, GERMANY**, 13.99 m., Addr., Broadcasting House. 12.05-11 am.
21.420	WKK	**LAWRENCEVILLE, N. J.**, 14.01 m., Addr. Amer. Tel. & Tel. Co. Calls S. Amer. 7 am.-7 pm.
21.080	PSA	**RIO DE JANEIRO, BRAZ.**, 14.23 m., Calls WKK daytime.
21.060	WKA	**LAWRENCEVILLE, N. J.**, 14.25 m. Addr. (See 21.420 mc.) Calls England morning and afternoon.
21.020	LSN6	**BUENOS AIRES, ARG.**, 14.27 m., Addr. Cia. Internacional de Radio. Works N.Y.C. 7 am.-7 pm.
20.860	EHY-EDM	**MADRID, SPAIN**, 14.38 m., Addr. Cia Tel. Nacional de Espana. Works S. Amer. mornings.
20.700	LSY	**BUENOS AIRES, ARG.**, 14.49 m., Addr. Transradio Internatl. Tests irregularly.
20.380	GAA	**RUGBY, ENG.**, 14.72 m. Calls Arg., Brazil mornings.
20.040	OPL	**LEOPOLDVILLE, BELGIAN CONGO**, 14.97 m. Works ORG morn.
20.020	DHO	**NAUEN, GERMANY**, 14.99 m., Addr. Reichspostzenstralamt. Works S. Am. mornings.
19.900	LSG	**BUENOS AIRES, ARG.**, 15.08 m., Addr. (See 20.700 mc.) Tests irregularly.
19.820	WKN	**LAWRENCEVILLE, N. J.**, 15.14 m., Addr. A. T. & T. Co. Calls England daytime.
19.680	CEC	**SANTIAGO, CHILE**, 15.24 m., Addr. Cia. Internacional de Radio. Calls Col. and Arg. daytime.
19.650	LSN5	**BUENOS AIRES, ARG.**, 15.27 m., Addr. (See 21.020 mc.) Calls Europe daytime.
19.620	VQG4	**NAIROBI, KENYA**, 15.28 m., Addr. Cable and Wireless, Ltd. Calls London 7.30-8 am.
19.600	LSF	**BUENOS AIRES, ARG.**, 15.31 m., Addr. (See 20.700 mc.) Tests irregularly.
19.480	GAD	**RUGBY, ENG.**, 15.4 m. Calls VQG4 7.30-8 am.
19.355	FTM	**ST. ASSISE, FRANCE**, 15.5 m. Calls S. America mornings.
19.345	PMA	**BANDOENG, JAVA**, 15.51 m. Works Holland 5.30-11 am.
19.260	PPU	**RIO DE JANEIRO, BRAZ.**, 15.58 m., Addr. Cia. Radiotel. Brasileira. Works France mornings.
19.220	WKF	**LAWRENCEVILLE, N. J.**, 15.6 m., Addr. A.T.&T. Co. Calls London and Paris daytime.
19.200	ORG	**RUYSSELEDE, BELGIUM**, 15.62 m. Calls OPL mornings.
19.160	GAP	**RUGBY, ENG.**, 15.66 m. Calls Australia 1-8 am.
19.020	HS8PJ	**BANGKOK, SIAM**, 15.77 m. Mondays 8-10 am.
18.970	GAQ	**RUGBY, ENG.**, 15.81 m. Calls S. Africa mornings.
18.890	ZSS	**KLIPHEUVEL, S. AFRICA**, 15.88 m., Addr. Overseas Comm. of S. Africa, Ltd. Calls GAQ 9-10 am.
18.830	PLE	**BANDOENG, JAVA**, 15.93 m. Calls Holland early am.
18.680	OCI	**LIMA, PERU**, 16.06 m. Tests with Bogota, Col.
18.620	GAU	**RUGBY, ENG.**, 16.11 m. Calls N. Y. daytime.
18.450	HBF	**GENEVA, SWITZERLAND**, 16.26 m., Addr. Radio Nations. Tests irregularly.
18.345	FZS	**SAIGON, INDO-CHINA**, 16.35 m. Works Paris early morning.
18.340	WLA	**LAWRENCEVILLE, N. J.**, 16.36 m., Addr. A.T.&T. Co. Calls England daytime.
18.310	GAS	**RUGBY, ENG.**, 16.38 m. Calls N.Y. daytime.
18.299	YVR	**MARACAY, VENEZ.**, 16.39 m. Works Germany mornings.
18.250	FTO	**ST. ASSISE, FRANCE**, 16.43 m. Works S. America daytime.
18.200	GAW	**RUGBY, ENG.**, 16.48 m. Works N.Y.C. daytime.
18.135	PMC	**BANDOENG, JAVA**, 16.54 m. Works Holland mornings.
18.115	LSY3	**BUENOS AIRES, ARG.**, 16.56 m., Addr. (See 20,700 mc.) Tests irregularly. Broadcasts 5-6 pm. Friday.
18.040	GAB	**RUGBY, ENG.**, 16.83 m. Works Canada morning and afternoon.
17.810	PCV	**KOOTWIJK, HOLLAND**, 16.84 m. Works Java 6-8 am.

16 Met. Broadcast Band

17.800	—	**PARIS, FRANCE**. 16.84 m., Radio Colonial. Testing mornings.
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. 1-3.15 am., 5.45 am.-12 n., 12.20-4 pm.
17.785	JZL	**TOKYO, JAPAN**, 16.87 m. Tests irregularly.
17.780	W3XAL	**BOUND BROOK, N. J.**, 16.87 m., Addr. Natl. Broad. Co. 8.55 am.-6.45 pm.
17.770	PHI	**HUIZEN, HOLLAND**, 16.88 m., Addr. (See PHI, 11.730 mc.) Daily except Wednesday, 8.25-10 am., Sun. 7.25-10.25 am.
17.760	DJE	**BERLIN, GERMANY**, 16.89 m., Addr. Broadcasting House. 12.05-10 am.; also Sun. 11.10 am-12.25 pm.
17.760	W2XE	**NEW YORK, N. Y.**, 16.89 m., Addr. Col. Broad. System, 485 Madison Ave. Irregular.
17.755	ZBW5	**HONGKONG, CHINA**, 16.9 m., Addr. P.O. Box 200. 4-10 am. Irregular.
		End of Broadcast Band
17.741	HSP	**BANGKOK, SIAM**, 16.91 m. Works Germany 3-5 am., 8-9 pm. Works JVE 11 pm.-6 am.
17.650	XGM	**SHANGHAI, CHINA**, 17 m. Works London 7-9 am.
17.520	DFB	**NAUEN, GERMANY**, 17.12 m. Works S. America, near 9.15 am. Works Siam 3-5 am., 8-9 pm.
17.480	VWY2	**KIRKEE, INDIA**, 17.16 m. Works London 7.30-8.15 am.
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.
17.120	WOO	**OCEAN GATE, N. J.**, 17.52 m., Addr. A.T.&T.Co. Works ships irregularly.
17.080	GBC	**RUGBY, ENG.**, 17.56 m. Works ships irregularly.
16.835	ITK	**MOGADISCIO, ITAL. SOMALILAND**, 18.32 m. Calls IAC around 9.30 am.
16.270	WLK	**LAWRENCEVILLE, N. J.**, 18.44 m., Addr. A.T.&T. Co. Works S. Amer. daytime.
16.270	WOG	**OCEAN GATE, N. J.**, 18.44 m., Addr. A.T.&T. Co. Works England late afternoon.
16.240	KTO	**MANILA, P. I.**, 18.47 m., Addr. RCA Comm. Works Japan and U. S. 5-9 pm. irregularly.
16.233	FZR3	**SAIGON, INDO-CHINA**, 18.48 m. Calls Paris early morning.
16.030	KKP	**KAHUKU, HAWAII**, 18.71 m., Addr. RCA Comm. Works Dixon 3-10 pm.
15.880	FTK	**ST. ASSISE, FRANCE**, 18.9 m. Works Saigon 8-11 am.
15.865	CEC	**SANTIAGO, CHILE**, 18.91 m. Calls Peru daytime irregular.
15.810	LSL	**BUENOS AIRES, ARG.**, 18.98 m., Addr. (See 21,020 mc.) Works London mornings and Paris afternoons.
15.660	JVE	**NAZAKI, JAPAN**, 19.16 m. Works Java and Siam 3-5 am.
15.620	JVF	**NAZAKI, JAPAN**, 19.2 m. Works Cal. near 5 am. and 8 pm.
15.550	CO9XX	**TUINICU, ORIENTE, CUBA**, 19.29 m., Addr. Frank Jones, Central Tuinicu, Tuinicu, Santa Clara. Broadcasts irregularly evenings.
15.440	XEBM	**MAZATLAN, SIN., MEX.**, 19.43 m., Addr. Flores 103 Alto. "El Pregonero del Pacifico." Irregularly 7 am.-10 pm.
15.430	IUD	**ADDIS ABABA, ETHIOPIA**, 19.44 m. Works Rome 9.15-10.30 am.
15.415	KWO	**DIXON, CAL.**, 19.46 m., Addr. A. T. & T. Co. Works Hawaii 2-7 pm.
15.370	HAS3	**BUDAPEST, HUNGARY**, 19.52 m., Addr. Radiolabor, Gyali Ut 22. Sun. 9-10 am.
15.360	DZG	**ZEESEN, GERMANY**, 19.53 m., Addr. Reichspostzenstralamt, Tests irregularly.
15.355	KWU	**DIXON, CALIF.**, 19.53 m., Addr. A.T.&T. Co. Phones Pacific Isles and Japan.

(Continued on page 22)

All Schedules Eastern Standard Time

Let's Listen In with *Joe Miller*

Winner of the 30th S.W. Scout Trophy

● CONDITIONS during the past month have been more or less "up and down," some days being very good and other days just fair, but on the whole, February was a good DX month.

We are now entering April and this month heralds the return of Spring conditions, already evident during a few days early in March.

A certain sign of the return of Spring is the reception of Australian amateurs daily, during the early morning hours, and also the rather unusual reception in large quantities of European amateurs, also during the early morning hours, from midnight till 3–4 a.m.

A certain amount of QRN is being noticed also, as we enter the warm seasons ahead, but for the months of March and April QRN will rarely be evident enough to be troublesome.

We do hope something will be done toward allocating more frequencies, and more space in the already far too crowded 20 and 40 meter amateur bands, as the QRN situation, so evident in the last couple of years, especially on these 2 bands, is now so bad that it is becoming well-nigh hopeless for an amateur to effect even a single QSO without having some part of his transmission completely ruined by an interfering station on the same frequency.

This condition, of course, is due to the fact that neither of these bands has sufficient frequency span to hold half of the signals ordinarily heard, at any time of the day, with comfort.

It is ironic to think, too, that it was the amateurs, as a body, who developed the short-wave art, in the main, to its present highly efficient stage. And now, despite the invaluable services which the amateurs have rendered to the short-wave art, this group has been accorded but a mite of the recognition due them by various governments throughout the world. The amateur is usually permitted to operate by the various countries as a sign of tolerance, rather than one of recognition, judging from the begrudging by representatives of a number of nations of even the space the amateurs now hold in the short-wave spectrum! And Japan's representative, for one, during the last Cairo convention, suggested that all amateur allocations be wiped out!

So we do hope that the amateurs win more recognition of their achievements because, as a prominent radio personage has said, "It is to the amateurs, collectively, that we must look for the future of short waves."

Now for DX:

MOZAMBIQUE

CR7BH, 11.718 mc., Lourenco Marques, Portuguese East Africa, is being heard daily, when tuned for, with such a fine signal for a station so distant, that while listening to this signal, we often wonder how it can be heard so well!

The afternoon schedule is from 12:10–4 p.m. weekdays, and 12:10–2 p.m. Sundays.

The best signal is heard from 3–4 p.m., when CR7BH is so well received that if conditions are at all fair, the program is really enjoyable, combining as it does many recent popular American recordings and other fine music, and with none of the American "ad" requests for box-tops (page Zeh Bouck), etc.

Announcements are usually made by a woman, who announces after each number "Portuguese CR7BH," and every quarter-hour gives full announcements, as "Station CR7AA and CR7BH—" A Portuguese announcement is usually made just before the English one. Occasionally a man announces.

To tune CR7BH in, just look for the *very first signal* on the low frequency end of the 25-meter broadcast band. If one hears France on 11.713, which is now on from 6 p.m.–1 a.m., one need only look on the same spot as France is heard for CR7BH.

At present CR7BH is very strong and we hope it will remain so for another month at least, in order that all readers may log this fine DX catch. Indications favor the continuance of their present signal strength through April, though with more QRN, or static.

Reports of CR7BH should be sent to: Station CR7BH, Caixa Postal 594, Lourenco Marques, Mozambique, Port. East Africa.

OE3AH—Austria. An unusual QSL from royalty, the Archduke of Austria!

DUTCH BORNEO AND JAVA

YPC, 9.12 mc., located at Balekpapan, Dutch Borneo, was logged during the second week in March at 6 a.m., a really rare DX catch.

We heard a carrier on 9.12 mc. with distinct Asiatic characteristics and, listening for several minutes for voices to be heard, what was our astonishment but to hear music of native origin, with a mixed chorus, coming through FB!!

However, Javanese stations often send test transmissions with musical recordings, and after the recording ended, YCP resumed their usual radiophone work. YCP is probably not equipped with speech inverters, as they have never been heard using any but clear speech transmissions.

YCP usually works PNI, 8.77 mc., Makassar, Celebes, but PNI was not heard this time, nor could contact station be located.

Look for YCP or any other of the Javanese phones, usually heard between 5:30–6:30 a.m., E.S.T., all with very good signals.

PLP, 11.00 mc., YDC, 15.15 mc., PMN, 10.26 mc., and PMH, 6.72 mc., are all coming through fairly well, with PMH and YDC, surprisingly, coming through best. All Javanese broadcasters will rise in signal strength during *(Turn to page 23)*

19 Met. Broadcast Band

Mc.	Call	
15,340	DJR	BERLIN, GERMANY, 19.56 m., Addr. Br'dcast'g House, 8-9 am., 4.50-10.45 pm.
15,330	W2XAD	SCHENECTADY, N. Y., 19.56 m., Addr. General Electric Co. Relays WGY 12.30-7 pm.
15.320	OLR5B	PRAGUE, CZECHOSLOVAKIA. 19.58 m. Addr. (See 11.840 mc.) Daily exc. Sun. 6.30-7.30, 9.10-9.50 am., Sun. 6.15-7.45 am.
15.310	GSP	DAVENTRY, ENG., 19.6 m., Addr. (See 26.100 mc.) 12.15-1.15, 4.15-6, 6.20-8.30 pm.
15.290	LRU	BUENOS AIRES, ARG., 19.62 m., Addr. El Mundo. Relays LRI, 7-9 am.
15.280	HI3X	CIUDAD TRUJILLO, D. R., 19.63 m. Relays HIX Sun. 7.40-10.40 am. Weekdays 12.10-1.10 pm.
15.280	DJQ	BERLIN, GERMANY, 19.63 m., Addr. Broadcasting House. 12.05-10 am., 4.50-10.45 pm. Also Sun. 11.10 am-12.25 pm.
15.270	W2XE	NEW YORK CITY, 19.65 m., Addr. (See 21.520 mc.) Daily except Sat. and Sun., 1-6 pm., Sat. & Sun. 2.30-6 pm.
15.260	GSI	DAVENTRY, ENG., 19.66 m., Addr. (See 26.100 mc.) 9.20-11.20 pm.
15.252	RIM	TASHKENT, U.S.S.R., 19.67 m. Works RKI near 7 am.
15.250	WIXAL	BOSTON, MASS., 19.67 m., Addr. University Club. Daily 2.15-4 pm., Sun. 10.15 am.-12 n.
15.245	TPA2	PARIS, FRANCE, 19.68 m., Addr. 98 bis. Blvd. Haussmann. "Radio Colonial." 5-10 am.
15.230	HS8PJ	BANGKOK, SIAM, 19.7 m. Irregularly Mon. 8-10 am.
15.230	OLR5A	PRAGUE, CZECHOSLOVAKIA, 19.7 m. Daily exc. Sun. 6.30-7.30, 9.10-9.50 am., Sun. 6.15-7.45 am.
15.220	PCJ	HUIZEN, HOLLAND, 19.71 m., Addr. N. V. Philips' Radio Hilversum. Tues. 3.30-5 am., Wed. 9 am.-12 n.
15.210	W8XK	PITTSBURGH, PA., 19.72 m., Addr. (See 21.540 mc.) 9 am.-7 pm.
15.200	DJB	BERLIN, GERMANY, 19.74 m., Addr. (See 15.280 mc.) 12.05-11 am., 4.50-10.45 pm. Also Sun. 11.10 am.-12.15 pm.
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 26.100 mc.) 1-3.15, 5.45-10 am., 4.15-6, 6.20-8.30 pm.
15.170	TGWA	GUATEMALA CITY, GUAT., 19.77 m., Addr. (See 17.8 mc.) Irregular 11.30 am.-2 pm.
15.160	XEWW	MEXICO CITY, MEXICO, 19.79 m., 12 n.-12 m., irregular.
15.160	JZK	TOKYO, JAPAN, 19.79 m. Irreg.
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., 5.30-10.30 am.
15.140	GSF	DAVENTRY, ENG., 19.82 m., Addr. (See 26.100 mc.) 1-3.15, 5.45 am.-12 n., 4.15-6, 6.20-8.30.
15.130	—	PARIS, FRANCE. 19.83 m., Addr. Radio Colonial, 98 Bis Blvd. Haussmann. Testing morning and afternoon.
15.130	WIXAL	BOSTON, MASS., 19.83 m., Addr. World-Wide B'cast'g. Foundation, University Club. Irregular.
15.120	HVJ	VATICAN CITY, 19.83 m., 10.30-10.45 am., except Sun., Sat. 10-10.45 am.
15.110	DJL	BERLIN, GERMANY, 19.85 m., Addr. (See 15.280 mc.) 12 m.-2, 8-9 am., 10.40 am. to 4.30 pm. Sun. also 6-8 am.
15.080	RKI	MOSCOW, U.S.S.R., 19.87 m. Works Tashkent near 7 am. Broadcasts Sun. 12.15-2.30 pm.

End of Broadcast Band

15.055	WNC	HIALEAH, FLORIDA, 19.92 m., Addr. A.T.&T. Co. Calls Central America daytime.
14.980	KAY	MANILA, P. I., 20.03 m., Addr. RCA Comm. Works Pacific Is.
14.960	PSF	RIO DE JANEIRO, BRAZIL, 20.05 m., Works with Buenos Aires daytime.
14.950	HJB	BOGOTA, COL., 20.07 m. Calls WNC daytime.
14.940	HII	CIUDAD TRUJILLO, D. R., 20.08 m. Phones WNC daytime.
14.940	HJA3	BARRANQUILLA, COL., 20.08 m. Works WNC daytime.
14.920	LZA	SOPHIA, BULGARIA, 20.10 m., Addr. Radio Garata. Mon., Tues., Thurs., Fri. 11.30 am.-2.45 pm., Wed. 11.30 am.-4.45 pm., Sat. 11.30 am.-5 pm., Sun. 2 am.-5 pm. Daily except Sun. 5-6.30 am.
14.845	OCJ2	LIMA, PERU, 20.21 m. Works South America stations daytime.
14.790	ROU	OMSK, SIBERIA, U.S.S.R., 20.28 m. Works Moscow irregularly 7-9 am.
14.730	IQA	ROME, ITALY, 20.37 m. Broadcasts 6-9 pm. irregular.
14.653	GBL	RUGBY, ITALY, 20.47 m. Works JVH 1-7 am.
14.640	TYF	PARIS, FRANCE, 20.49 m. Works Saigon and Cairo 3-7 am, 12 n.-2.30 pm.
14.600	JVH	NAZAKI, JAPAN, 20.55 m. Broadcasts irregularly 5-11.30 pm. Works Europe 4-8 am.
14.590	WMN	LAWRENCEVILLE, N. J., 20.56 m., Addr. A.T.&T. Co. Works England morning and afternoon.
14.535	HBJ	GENEVA, SWITZERLAND, 20.64 m., Addr. Radio Nations. Broadcasts Sat. 6.45-8 pm.
14.530	LSN	BUENOS AIRES, ARG., 20.65 m. Addr. (See 20.020 mc.) Works N. Y. C. afternoons.
14.500	——	ASMARA, ERITREA, AFRICA, 20.69 m. Works Rome and Addis Ababa 6.30-7.30 am.
14.500	LSM2	BUENOS AIRES, ARG., 20.69 m., Addr. (See 21.020 mc.) Works RIO and Europe daytime.
14.485	TIR	CARTAGO, COSTA RICA, 20.71 m. Works Central America and U. S. A. daytime.
14.485	YSL	SAN SALVADOR, SALVADOR, 20.71 m. Irregular.
14.485	HPF	PANAMA CITY, PANAMA, 20.71 m. Works WNC daytime.
14.485	TGF	GUATEMALA CITY, GUATEMALA, 20.71 m. Works WNC daytime.
14.485	YNA	MANAGUA, NICARAGUA, 20.71 m. Works WNC daytime.
14.485	HRL5	NACAOME, HONDURAS, 20.71 m. Works WNC daytime.
14.485	HRF	TEGUCIGALPA, HONDURAS, 20.71 m. Works WNC daytime.
14.470	WMF	LAWRENCEVILLE, N. J., 20.73 m., Addr. A.T.&T. Co. Works London and Paris daytime.
14.460	DZH	ZEESEN, GERMANY, 20.75 m., Addr. (See 15.360 mc.) Irregular.
14.440	—	RADIO MALAGA, SPAIN, 20.78 m. Relays Salamanca. Irreg. afternoons.
14.440	GBW	RUGBY, ENG., 20.78 m. Works U.S.A. afternoons.
14.166	PIIJ	DORDRECHT, HOLLAND, 21.15 m., Addr. (See 7.088 mc.) Sat. 12 n.-12.30 pm.
14.030	EA9AH	TETUAN, SPANISH MOROCCO, 21.4 m. Daily except Sun. 2.15-5. 7 and 9 pm.
13.990	GBA	RUGBY, ENG., 21.44 m. Works Buenos Aires late afternoon.
13.820	SUZ	ABOU ZABAL, EGYPT, 21.71 m. Works with Europe 11 am.-2 pm.
13.690	KKZ	BOLINAS, CALIF., 21.91 m., Addr. RCA Comm. Irregularly.
13.635	SPW	WARSAW, POLAND, 22 m. Daily 6-8 pm. Sat. & Sun. 6-9 pm.
13.585	GBB	RUGBY, ENG., 22.08 m. Works Egypt and Canada afternoons.
13.415	GCJ	RUGBY, ENG., 22.36 m. Works Japan and China early morning.
13.410	YSJ	SAN SALVADOR, SALVADOR, 22.37 m. Works WNC daytime.
13.390	WMA	LAWRENCEVILLE, N. J., 22.4 m., Addr. A.T.&T. Co. Works England morning and afternoon.
13.380	IDU	ASMARA, ERITREA, AFRICA, 22.42 m. Works Rome daytime.
13.345	YVQ	MARACAY, VENEZUELA, 22.48 m. Works WNC daytime.
13.285	CGA3	DRUMMONDVILLE, QUE., CAN., 22.58 m. Works London and ships afternoons.
13.330	IRJ	ROME, ITALY, 22.69 m. Works Tokio 5-9 am. irregularly.
13.075	VPD	SUVA, FIJI ISLANDS, 22.94 m. Irregularly.
12.882	W9XDH	ELGIN, ILL., 23.25 m. Press Wireless, Tests 2-5 pm.
12.840	WOO	OCEAN GATE, N. J., 23.36 m., Addr. A.T.&T. Co. Works with ships irregularly.
12.825	CNR	RABAT, MOROCCO, 23.39 m., Addr. Director General Tele. & Teleg. Stations. Works with Paris irregularly.
12.800	IAC	PISA, ITALY, 23.45 m. Works Italian ships mornings.
12.780	GBC	RUGBY, ENG., 23.47. Works ships irregularly.
12.325	DAF	NORDDEICH, GERMANY, 24.34 m. Works German ships daytime.
12.290	GBU	RUGBY, ENG., 24.41 m. Works N. Y. C. evenings.
12.250	TYB	PARIS, FRANCE, 24.49 m. Irregular.
12.235	TFJ	REYKJAVIK, ICELAND, 24.52 m. Works Europe mornings. Broadcasts Sun. 1.40-2.30 pm.
12.215	TYA	PARIS, FRANCE, 24.56 m. Works French ships in morning and afternoon.
12.150	GBS	RUGBY, ENG., 24.69 m. Works N. Y. C. evenings.
12.130	DZE	ZEESEN, GERMANY, 24.73 m., Addr. (See 15.360 mc.) Tests irregular.
12.120	TPZ2	ALGIERS, ALGERIA, 24.75 m. Calls Paris 12 m.-6.30 am.
12.060	PDV	KOOTWIJK, HOLLAND, 24.88 m. Tests irregularly.
12.060	RNE	MOSCOW, U.S.S.R., 24.88 m. Daily 6-7 am., 12.15-1 pm., 8-9.15, 10-11 pm., also Sun. 6 am.-1 pm.
11.991	FZS2	SAIGON, INDO-CHINA, 25.02 m. Phones Paris mornings.
11.970	H12X	CIUDAD TRUJILLO, D. R., 25.07 m., Addr. La Voz de Hispaniola. Relays HIX Tue. and Fri. 8.10-10.10 pm.
11.955	IUC	ADDIS ABABA, ETHIOPIA, 25.09 m. Works IAC around 12 m.
11.950	KKQ	BOLINAS, CALIF., 25.1 m. Tests irregularly evenings.
11.940	FTA	STE. ASSISE, FRANCE, 25.13 m. Works Morocco mornings and Argentina late afternoon.

25 Met. Broadcast Band

11.910	CD1190	VALDIVA, CHILE, 25.2 m., P. O. Box 642. Relays CB69 10 am.-1 pm., 3-6 pm., 7-10 pm.
11.900	XEWI	MEXICO CITY, MEXICO, 25.21 m., Addr. P. O. Box 2874. Tues. and Thurs. 7.30 pm.-12 m., Fri. 9 pm.-12 m. Sun. 12.30-2 pm.
11.895	HP5I	AGUADULCE, PANAMA, 25.22 m. Addr. La Voz del Interior. 7.30-9.30 pm.
11.880	TPA3	PARIS, FRANCE, 25.23 m., Addr. (See 15.245 mc.) 2-5 am., 12.15-6 pm.
11.870	W8XK	PITTSBURGH, PA., 25.26 m., Addr. (See 21.540 mc.) 7-11 pm.
11.860	YDB	SOERABAJA, JAVA, 25.29 m., Addr. N. I. R. O. M. Sat. 7.30 pm. to 2.30 am., daily 10.30 pm. to 2 am.
11.860	GSE	DAVENTRY, ENG., 25.29 m., Addr. (See 26.100 mc.) Irregular.
11.855	DJP	BERLIN, GERMANY, 25.31 m., Addr. (See 15.280 mc.) Irregular 11.35 am.-4, 7-10.45 pm.
11.845	—	PARIS, FRANCE, 25.34 m. (See 15.245 mc.) Testing 3 pm.-11 pm.
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, 25.35 m., Addr. Czech Shortwave Sta., Praha XII, Fochova 16. Sun. 6.15-8.55 pm., Mon., Tues., Thur., Fri. 8-10.35 p.m. Daily exc. Sun. 9.55-10.50 am.

(Continued on page 24)

All Schedules Eastern Standard Time

April, when this issue will be published, and all S-W fans should avail themselves of the opportunity to add a few new Asiatics to their logs.

All the above stations commence broadcasts at 5:30 a.m. and are best heard from 6:30-7 a.m.

Ashley Walcott, W6, who of late has been so busy with studies at Leland Stanford University that he has done little DXing, reports the following Javanese S-W broadcasters on *low frequencies* heard best in California, listing them in order of signal strength as follows: YDA, 3.04 mc.; YDL2, 4.81 mc.; YDE4, 3.15 mc.; YDL3, 3.45 mc.; YDD2, 2.91 mc.; "R.V.M.J.," unlisted call, on 3.38 mc.; YDL4, 3.41 mc.; YDH4, 3.31 mc.

All of these stations are low-powered, intended mainly for local reception, excepting YDA, which has 10 kw., and may be heard on the East Coast, providing conditions are ideal. Most of the Javanese stations are privately owned. Ralph Gozen reports PLQ, 10.68 mc., at 8 a.m. in contact with YBG, 10.43 mc., Sumatra.

ZT6AU—10 m. South African. A nice card, tan with green letters.

BELGIAN CONGO

OPL, 20.04 mc., that old-time DX favorite located at Leopoldville, was recently logged at 10:25 a.m. while phoning Belgium. OPL had a good signal, easily readable, but using inverted speech. OPL usually is heard around 10–11 a.m. phoning ORG, 19.21 mc., at Brussels, Belgium.

OPM has recently been reported in the afternoons, so look for OPM, 10.14 mc., between 3–5 p.m., phoning ORK, 10.33 mc. OPM at this time has an unusually strong signal, too.

OPM used to be heard excellently between 1–3 a.m., but has not been reported around these times for a long period.

The QRA for OPM-OPL is: Radio Station OPM, OPL, Radio Leopoldville, Leopoldville, Belgian Congo, Africa.

PHILIPPINE ISLANDS

KTO, 16.24 mc., Manila, was recently heard at 6:20 a.m., with a very good signal. Inverted speech used.

KBB, 8.71 mc., Manila, also was heard, at 7 a.m., using inverted speech, excellent signal.

These stations are operated by the Philippine Long Distance Telephone Co., Manila, but we doubt if they verify commercial reports, as they have never answered our reports of KAY, KAX, KAZ.

INDIA

VUD2, the call of the Delhi station on 9.59 mc., is being heard here nightly, except Saturdays, from 9:30 p.m.–11 p.m., when signals fade out.

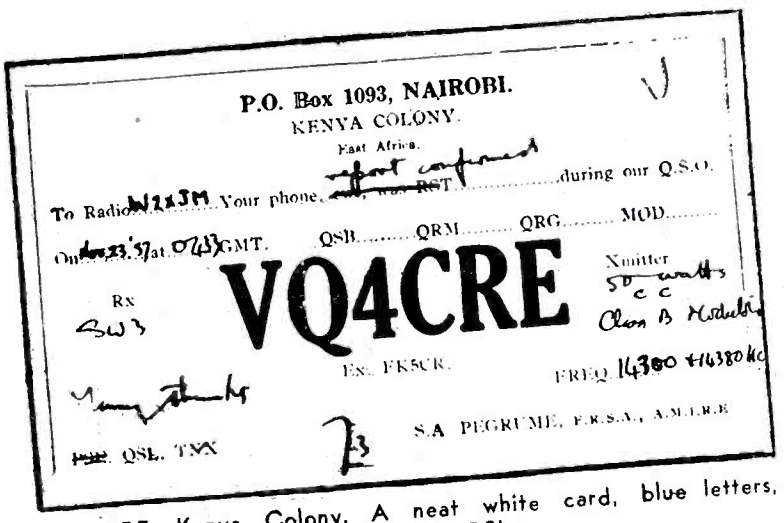
The I.D.A. reports the Indian transmitter using the following calls and frequencies, besides VUD2: VUD4, 15.29 mc.; VUE3, 15.16 mc.; VUD3, 11.87 mc.; VUE, 6.085 mc.

Announcements during the usual native program are in Hindustani, and at 10:40 p.m., English announcements and news are given. DXers who have first heard VUD2 at our DX shack still refuse to believe, at first, that they are actually listening to distant India, so well is this station heard. It is well reported throughout the U. S.

The QRA is: Radio Station VU—, All-India Radio, New Delhi, India.

VVN, Madras, India, verifies our recent reception with an ordinary letter, giving frequency as 13.35 mc., somewhat differing from the listed frequency of 13.26 mc. Time of reception was 7:26 a.m. VVN and VVS, 12.87 mc., Mingaladon, Burma, usually contact each other near 7 a.m.

The QRA of VVN given in the verification is: Chief Radio Officer, Wireless Station, VVN, Fort St. George, Madras, India.



VQ4CRE—Kenya Colony. A neat white card, blue letters, on this rare QSL.

FRENCH SOMALILAND

FZE8, 17.28 mc., at Djibouti, is scheduled to broadcast test transmissions the *first Thursday* of each month, so look for FZE8 on April 7, and May 5, from 8-8:30 a.m. This station has a very strong signal at this time, and, being situated well clear of any other stations on that particular frequency, and, of course, using French, should be easily recognized and heard. All DXers would be proud to have a veri from this DX catch, and it also affords them a new country that they can add to their "log". QRA was given in previous issues.

ASIATIC REVIEW

JVA, 15.86 mc., Nazaki, Japan, was heard with an excellent signal at 6:40 a.m., using inverted speech.

FZS, 18.388 mc., Saigon, French Indo-China, heard at the unusually early time of 6:45 a.m., but not as well heard as during their regular times of operation, near 8:30 a.m. This signal has an unusually rapid Asiatic "flutter".

JDY, 9.925 mc., Kwantung, Manchukuo, is indeed well heard daily, from 7-8 a.m., and all should avail themselves of the opportunity to log and verify this Asiatic, a new country besides. JDY is heard on almost the exact spot on the dial that CSW3, 9.95 mc., Lisbon, occupies, as JDY is now reported to be on 9.94 mc., having shifted slightly from 9.925 mc. QRA given in previous issues.

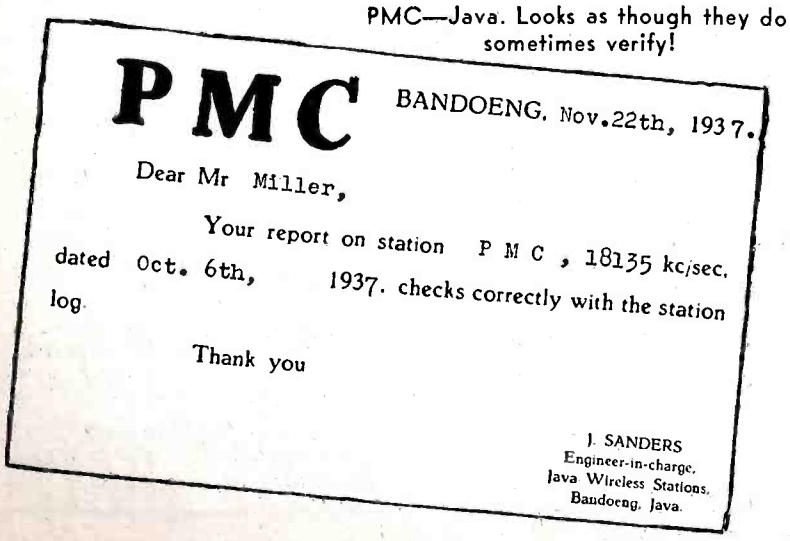
TDE, 10.065 mc., Hsingking. Manchukuo, is still being heard daily, usually phoning JVO, 10.37 mc., Nazaki, around 6-7 a.m. TDE has a very strong signal, uses side-band secrecy for phone transmissions, so that voice is just about audible.

JVH, 14.60 mc., is being heard daily around 7 a.m., good signal.

RV15, 4.27 mc., Khabarovsk, Siberia, U.S.S.R., continues to be well heard, best 6-7 a.m., but lately QRN has been affecting their signals, this low frequency being more or less noise-free during only 2 or 3 months, in the Winter Season.

(Continued on page 41)

PMC—Java. Looks as though they do sometimes verify!



Mc.	Call	
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. 6.30-11 pm.
11.826	XEBR	**HERMOSILLA, SON., MEX.,** 25.37 m., Addr. Box 68. Relays XEBH. 2-4 pm., 9 pm.-12 m.
11.820	GSN	**DAVENTRY, ENG.,** 25.38 m., Addr. (See 26.100 mc.) Irregular.
11.810	2RO	**ROME, ITALY,** 25.4 m., Addr. E.I.A.R., Via Montello 5. Daily 5-8.30 am., 10.30 am.-12.20 pm.
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.
11.800	JZJ	**TOKYO, JAPAN,** 25.42 m., Addr. Broadcasting Co. of Japan, Overseas Division. 12.30-1.30, 7-7.30, 8-9.30 am., 2.30-4, 4.30-5.30, 6-6.30 pm.
11.795	DJO	**BERLIN, GERMANY,** 25.43 m., Addr. (See 15.280 mc.) Irregular. 7-11 pm.
11.790	OER3	**VIENNA, AUSTRIA,** 25.45 m. Daily 10 am.-5 pm. Sat. until 5.30 pm.
11.790	WIXAL	**BOSTON, MASS.,** 25.45 m., Addr. (See 15.250 mc.) Daily 4.45-6.30 pm., Sat. 1.45-5.15, 6-6.30 pm., Sun. 3-6.30 pm.
11.770	DJD	**BERLIN, GERMANY,** 25.49 m., Addr. (See 15.280 mc.) 10.40 am.-4.30 pm., 4.50-11 pm.
11.760	TGWA	**GUATEMALA CITY, GUAT.,** 25.51 m. (See 17.8 mc.) Sun., Tues. and Thurs. 8 pm.-12 m.
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. 1-3.15 am., 12.20-6.00 pm., 6.20-8.30, 9.20-11.20 pm.
11.740	HVJ	**VATICAN CITY,** 25.55 m. Testing irregular.
11.730	——	**SAIGON, INDO CHINA,** 25.57 m., Addr. Radio Philco. 11 pm.-1 am., 5.30-9.30 am.
11.730	PHI	**HUIZEN, HOLLAND,** 25.57 m., Addr. N. V. Philips' Radio.
11.730	WIXAL	**BOSTON, MASS.,** 25.57 m., Addr. World-Wide B'cast'g. Foundation, University Club. Irregular.
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.) 6.15-8.15 pm., 10 pm.-1 am.
11.710	SBP	**MOTALA, SWEDEN,** 25.63 m., 1.20-2.05, 6-9 am., 11 am.-1 pm., Sat. 1.20-2 am., 6 am.-1.30 pm., Sun. 3 am.-1.30 pm.
11.710	YSM	**SAN SALVADOR, EL SALVADOR,** 25.63 m., Addr. (See 7.894 mc.) Irregular 1.30-2.30 pm.
11.700	HP5A	**PANAMA CITY, PAN.,** 25.65 m. Addr. Radio Teatro, Apartado 954. 10 am.-10 pm.
11.700	CB1170	**SANTIAGO, CHILE,** 25.65 m. Relays CB89 6 pm.-12 m.
		End of Broadcast Band
11.680	KIO	**KAHUKU, HAWAII,** 25.68 m., Addr. RCA Comm. Irregularly.
11.595	VRR4	**STONY HILL, JAMAICA, B. W. I.,** 25.87 m. Works WNC daytime.
11.560	VIZ3	**FISKDALE, AUSTRALIA,** 25.95 m., Addr. Amalgamated Wireless of Australasia Ltd. Tests irregularly.
11.530	SPD	**WARSAW, POLAND,** 26 m., Addr. 5 Mazowiecka St. 6-8 pm., Sat. & Sun. 6-9 pm.
11.500	XAM	**MERIDA, YUCATAN,** 26.09 m. Irregular 1-7.30 pm.
11.500	PMK	**BANDOENG, JAVA,** 26.09 m. Tests irregularly.
11.420	COCX	**HAVANA, CUBA,** 26.25 m. P. O. Box 32. 6.55 am.-1 am. Sun. till 12 m. Relays CMX.
11.413	CJA4	**DRUMMONDVILLE, QUE., CAN.,** 26.28 m. Tests irregularly.

Mc.	Call	
11.402	HBO	**GENEVA, SWITZERLAND,** 26.31 m., Addr. Radio Nations. Sat. 6.45-8 pm.
11.040	CSW	**LISBON, PORTUGAL,** 27.17 m., Addr. Nat. Broad. Sta. 1.30-5 pm.
11.005	ZLT4	**WELLINGTON, NEW ZEALAND,** 27.28 m. Works Australia and England early morning.
11.000	PLP	**BANDOENG, JAVA,** 27.27 m. Relays YDB. 6-7.30 p.m., 5.30-10.30 or 11 am. Sat. until 11.30 am.
10.970	OCI	**LIMA, PERU,** 27.35 m. Works Bogota, Col. evenings.
10.960	——	**TANANARIVE, MADAGASCAR,** 27.36 m., Addr. (See 9.53 mc.) 12.30-45, 3.30-4.30, 10-11 am.
10.840	KWV	**DIXON, CALIF.,** 27.68 m., Addr. A.T.&T. Co. Works with Hawaii evenings.
10.770	GBP	**RUGBY, ENGLAND,** 27.85 m. Works Australia early morning.
10.740	JVM	**NAZAKI, JAPAN,** 27.93 m. Works U.S.A. 2-7 am.
10.675	WNB	**LAWRENCEVILLE, N. J.,** 28.1 m., Addr. A.T.&T. Co. Works with Bermuda irregularly.
10.670	CEC	**SANTIAGO, CHILE,** 28.12 m. Irregular.
10.660	JVN	**NAZAKI, JAPAN,** 28.14 m. Broadcasts daily 2-8 am. Works Europe irregularly at other times.
10.600	ZIK2	**BELIZE, BRIT. HONDURAS,** 28.25 m., Tues., Thurs., Sat. 7.30-7.45 pm.
10.550	WOK	**LAWRENCEVILLE, N. J.,** 28.44 m., Addr. A.T.&T. Co. Works S. A. nights.
10.535	JIB	**TAIHOKU, TAIWAN,** 28.48 m. Works Japan around 6.25 am. Broadcasts, relaying JFAK 9-10.25 am., 1-2.30 am. Sun. to 10.15 am.
10.520	VLK	**SYDNEY, AUSTRALIA,** 28.51 m., Addr. Amalgamated Wireless of Australasia Ltd. Works England 1-6 am.
10.430	YBG	**MEDAN, SUMATRA,** 28.76 m. 5.30-6.30 am., 7.30-8.30 pm.
10.420	XGW	**SHANGHAI, CHINA,** 28.79 m. Works Japan 12 m.-3 am.
10.410	PDK	**KOOTWIJK, HOLLAND,** 28.8 m. Works Java 7.30-9.40 am.
10.410	KES	**BOLINAS, CALIF.,** 28.8 m., Addr. RCA Communications. Irregular.
10.370	JVO	**NAZAKI, JAPAN,** 28.93 m. Broadcasts around 5 am.
10.370	EAJ43	**TENERIFFE, CANARY ISLANDS,** 28.93 m. Relays Salamanca, Spain, 2.15-3.15, 6.15-10 pm.
10.350	LSX	**BUENOS AIRES, ARG.,** 28.98 m., Addr. Transradio International. Tests irregularly.
10.330	ORK	**RUYSSELEDE, BELGIUM,** 29.04 m. 2.30-4 pm.
10.300	LSL2	**BUENOS AIRES, ARG.,** 29.13 m., Addr. Cia. Internacional de Radio. Works Europe evenings.
10.290	DZC	**ZEESEN, GERMANY,** 29.16 m., Addr. (See 15.360 mc.) Irregular.
10.260	PMN	**BANDOENG, JAVA,** 29.24 m. Relays YDB 5.30-10.30 or 11 am. Sat to 11.30 am.
10.250	LSK3	**BUENOS AIRES, ARG.,** 29.27 m., Addr. (See 10.310 mc.) Works Europe and U.S.A. afternoons and evenings.
10.230	CED	**ANTOFAGASTAN, CHILE,** 29.33 m. Tests 7-9.30 pm.
10.220	PSH	**RIO DE JANIERO, BRAZIL,** 29.35 m., Addr. Box 709. Broadcasts 6-9 pm.
10.160	RIO	**BAKOU, U.S.S.R.,** 29.5 m. Works Moscow 10 pm.-5 am.
10.140	OPM	**LEOPOLDVILLE, BELGIAN CONGO,** 29.59 m. Works Belgium around 3 am. and from 1-4 pm.
10.080	RIR	**TIFLIS, U.S.S.R.,** 29.76 m. Works Moscow early morning.
10.070	EDM-EHY	**MADRID, SPAIN,** 29.79 m. Works S. A. evenings.
10.065	JZB-TDB	**SHINKYO, MANCHUKUO,** 29.81 m. Works Tokio 6.30-7 am.
10.055	ZFB	**HAMILTON, BERMUDA,** 29.84 m. Works N.Y.C. irregular.
10.055	SUV	**ABOU ZABAL, EGYPT,** 29.84 m. Works Europe 1-6 pm.
10.042	DZB	**ZEESEN, GERMANY,** 29.87 m., Addr. Reichspostzenstralamt. Irregular.
9.990	KAZ	**MANILA, P. I.,** 30.03 m., Addr. RCA Communications. Works Java early morning.

Mc.	Call	
9.980	COBC	**HAVANA, CUBA,** 30.04 m., Addr. P. O. Box 132. Relays CMBC 6:55 a.m.,-12:30 a.m.
9.950	GCU	**RUGBY, ENGLAND,** 30.15 m. Works N.Y.C. night time.
9.940	CSW	**LISBON, PORTUGAL,** 30.18 m. Addr. Nat. Broad. Sta. 5-7 pm.
9.940	JDY	**DAIREN, MANCHUKUO,** 30.18 m. Relays JQAK daily 6.50-8 am.
9.930	HKB	**BOGOTA, COL.,** 30.21 m. Works Rio evenings.
9.890	LSN	**BUENOS AIRES, ARG.,** 30.33 m., Addr. (See 10.300 mc.) Works N.Y.C. evenings.
9.870	WON	**LAWRENCEVILLE, N. J.,** 30.4 m., Addr. A.T.&T. Co. Works England nights.
9.865	COCM	**HAVANA, CUBA,** 30.41 m., Addr. Transradio Columbia, P. O. Box 33. 7 am.-12 m. Relays CMCM.
9.860	EAQ	**MADRID, SPAIN,** 30.43 m., Addr. Post Office Box 951. Irregular.
9.830	IRF	**ROME, ITALY,** 30.52 m. Works Egypt afternoons. Relays 2RO, 6-9 pm.
9.800	XGOX	**NANKING, CHINA,** 30.61 m., Reported off the air.
9.800	LSI	**BUENOS AIRES, ARG.,** 30.61 m., Addr. (See 10.350 mc.) Tests irregularly.
9.790	GCW	**RUGBY, ENGLAND,** 30.64 m., Works N.Y.C. evenings.
9.760	VLJ-VLZ2	**SYDNEY, AUSTRALIA,** 30.74 m., Addr. Amalgamated Wireless of Australasia Ltd. Works Java and New Zealand early morning.
9.750	WOF	**LAWRENCEVILLE, N. J.,** 30.77 m., Addr. A.T.&T. Co. Works London and Paris night time.
9.745	COCQ	**HAVANA, CUBA,** 30.78 m. Addr. 25 No. 445, Vedado, Havana. 6.55 am.-1 am. Sun. till 12 m.
9.710	GCA	**RUGBY, ENGLAND,** 30.9 m. Works S. A. evenings.
9.698	TI4NRH	**HEREDIA, COSTA RICA,** 30.91 m., Addr. Amando C. Marin, Apartado 40. Sun. 7-8.30 am., Irregular evenings.
9.685	TGWA	**GUATEMALA CITY, GUAT.,** 30.96 m. Irregular.
9.680	FZF6	**FORT DE FRANCE, MARTINIQUE,** 30.97 m., Addr. P. O. Box 136. 11.30 am.-12.30 pm., 6.15-7.50 pm.
9.675	DZA	**ZEESEN, GERMANY,** 31.01 m., Addr. (See 10.042 mc.) Irregular.
9.660	LRX	**BUENOS AIRES, ARG.,** 31.06 m., Addr. El Mundo. Relays LRI, 9.30 am.-11.30 pm.
9.650	CS2WA	**LISBON, PORTUGAL,** 31.09 m., Addr. Radio Colonial. Tues., Thurs. and Sat. 4.30-7 pm.
9.650	DGU	**NAUEN, GERMANY,** 31.09 m., Addr. (See 20.020 mc.) Works Egypt afternoons.
9.645	HH3W	**PORT-AU-PRINCE, HAITI,** 31.1 m., Addr. P. O. Box A117. 1-2, 7-8 pm.
9.640	CXA8	**COLONIA, URUGUAY,** 31.12 m., Addr. Belgrano 1841, Buenos Aires, Argentina. Relays LR3, Buenos Aires 7 am.-12 m.
9.635	2RO	**ROME, ITALY,** 31.13 m., Addr. (See 11.810 mc.) Daily 12.30-9 pm.
9.630	HJ7ABD	**BUCARAMANGA, COL.,** 31.14 m. 10 am.-12 n., 4-11 pm.
9.625	JFO	**TAIHOKU, TAIWAN,** 31.16 m. Relays JFAK irreg. 8-10.25 am., 1-2.30 am., Sun. 8-10.15 am.
9.617	HJ1ABP	**CARTAGENA, COL.,** 31.20 m., Addr. P. O. Box 37. 11 am.-1 pm., 5-11 pm., Sun. 10 am.-1 pm., 3-6 pm.
9.615	ZRK	**KLIPHEUVAL, SOUTH AFRICA,** 31.2 m., Addr. P. O. Box 4559, Johannesburg. Daily, exc. Sat. 11.45 pm.-12.40 am. Daily exc. Sun. 3.20-7.20, 9-11.40 am., Sun. 4-5.30, 8-11.40 am.
9.607	HP5J	**PANAMA CITY, PANAMA,** 31.23 m. Addr. Apartado 867. 12 n. to 1.30 pm., 6-10.30 pm.

31 Met. Broadcast Band

9.600	RAN	**MOSCOW, U.S.S.R.,** 31.25 m. Daily 7-9.15 pm.
9.595	HBL	**GENEVA, SWITZERLAND,** 31.27 m., Addr. Radio Nations. Irregular.

(Continued on page 26)

All Schedules Eastern Standard Time

Short Wave Kinks

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

AN ELECTROSTATIC SHIELD

1st Prize

For reducing the effects of man-made static on the short-waves an electrostatic screen placed between the antenna coupling coil and the grid coil of a set's input stage is very effective. This shield prevents any capacitive coupling between the two coils. This screen is in the form of a coil wound on a bakelite tube having an inside diameter about one-half inch greater than that of the plug-in coil. A single layer of No. 26 D.S.C. wire is wound on the bakelite tube. The number of turns should be sufficient to overlap the space occupied by the antenna coupling coil. One end of the screening coil is grounded, the other end left free.—*A. R. Edmonds.*

SOCKET MOUNT

To avoid the necessity of making socket hole cut-outs in a chassis, follow the instructions given in the drawing. Drill several small holes as shown to permit a hack-saw blade to be inserted and then cut out the required slot and bend the cut-outs. All socket leads are then run through the cut-out hole to the under side of the chassis. —*Irving Lyon, Jr.*

BANDSPREADER

A method of adding electrical bandspread to any commercial all-wave set to facilitate the separation of stations in the congested short-wave bands is shown in the sketch. The small 3-plate midget condensers are mounted on the main tuning condenser and are connected in parallel with each of the sections of this condenser. The maximum capacity of the bandspread condensers should be about 15 mmf. each. Of course this added capacity will affect the calibration of the dial on the receiver and for this reason it is advisable to have a switch to disconnect the stator plates of the band-spread unit when it is not in use. —*Walter F. Purkis.*

COMBINATION TOOL

A hacksaw blade and a roll of rubber electrician's tape is all that is necessary for making this tool. As shown, part of the saw tooth edge is ground away to form a knife edge, and one end is similarly ground for use as a screw driver. The remaining saw teeth are used for wire scraping purposes.

From the looks of it, it might be useful to a fisherman, too.—*William Kwas.*

A MIKE STAND

A flexible mike stand for use with a crystal or dynamic mike may be made from a goose neck desk lamp. The stand has the advantage that the microphone may be shifted around the operating desk without moving the stand.—*Frank Cimino, Jr.*

BASS BOOSTER

A useful addition to any high-quality modulator or amplifier is this unit in the plate circuit of a first A.F. pentode. Adjusting R3 controls the amount of amplification of the bass register, while the adjustment of R2 controls the volume level of the higher frequencies. L1 is shunted by a fixed condenser of from .05 to .25 mf. The value of this condenser and the size of L1 determines the frequency at which the combination will resonate.

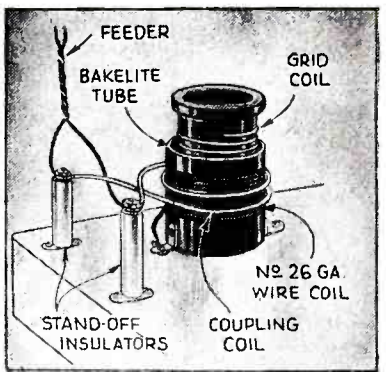
For best results the resonant frequency should be quite low, in the neighborhood of 40-70 cycles. By means of R2 and R3 a wide variation in frequency response may be had from an amplifier.—*H. Summers.*

CODE PRACTICE

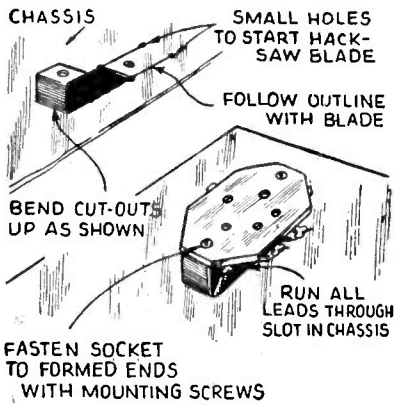
A keyed R.F. oscillator attached to the input of a receiver makes a handy code practice affair. The receiver should be tuned to a steady signal and the oscillator tuned to an adjacent frequency so that it will beat with the incoming signal to produce an audible signal in the loudspeaker of the set. L and C1 should be selected to cover the frequency range to which the receiver is tuned. An ordinary plug-in coil with a tap 1/3 from the end will suffice for L.—*Engelbert Bartosch.*

REPAIR AID

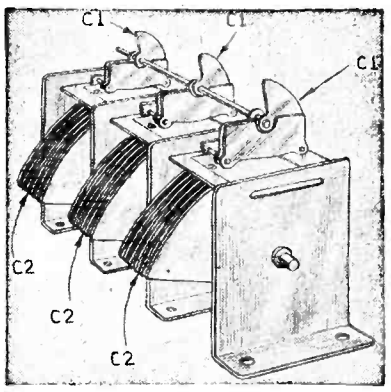
A useful dingbat for spotting trouble in any out-of-the-way place on a chassis is shown in the drawing. An eight inch length of No. 14 soft drawn copper wire is soldered to the short handle of a dental mirror. A piece of spaghetti tubing is then slipped over the wire and the other end of the wire secured to a bakelite handle by a set screw. —*Warren Freeman.*



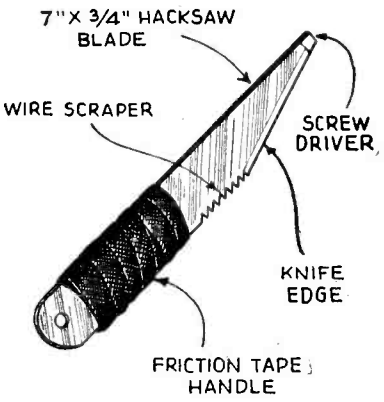
Electrostatic Shield
1st Prize



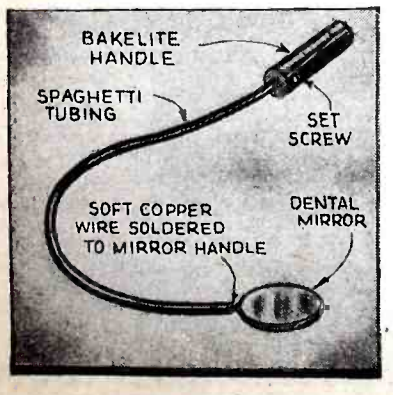
Socket Mount



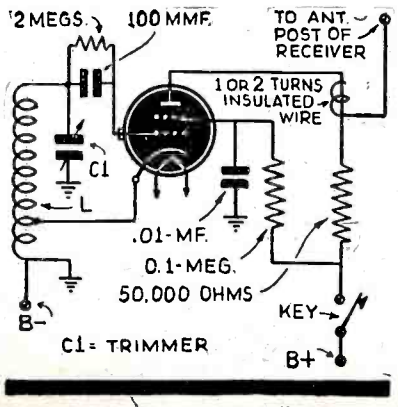
Bandspreader



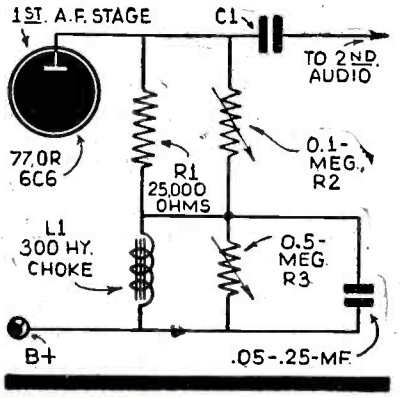
Combination Tool



Repair Aid



Code Practice Oscillator



Bass Booster

Mike Stand

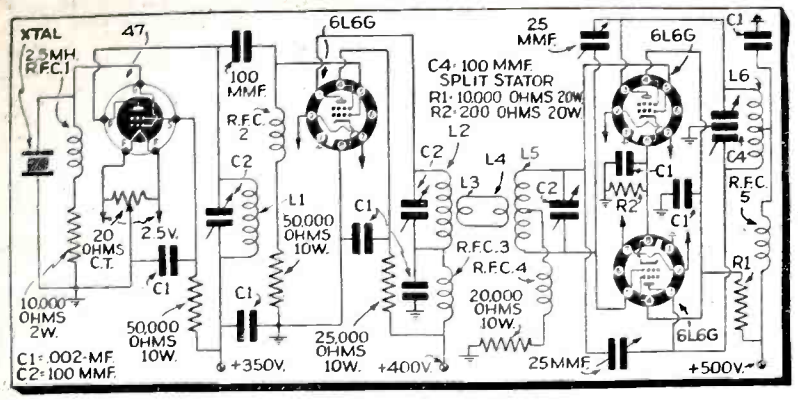
Mc.	Call	
9.590	VUD	DELHI, INDIA, 31.28 m. Addr. All-India Radio, 9.30 pm.-12 m., 2-4 am.
9.590	PCJ	HUIZEN, HOLLAND, 31.28 m., Addr. (See 15.220 mc.) Sun. 2-3, 7-9.15 pm., Tues. 5.30-8 am., 2-3.30 pm., Thurs. 7-8.30, 9-10.30 pm.
9.590	VK6ME	PERTH, W. AUSTRALIA, 31.28 m., Addr. Amalgamated Wireless of Australasia, Ltd. 6-8 am. exc. Sun.
9.590	VK2ME	SYDNEY, AUSTRALIA, 31.28 m., Addr. Amalgamated Wireless of Australasia, Ltd., 47 York St., Sun. 1-3 am., 5-9, 9.30-11.30 am.
9.590	W3XAU	PHILADELPHIA, PA., 31.28 m. Relays WCAU 12 n.-8 pm., 11 pm.-12 m.
9.580	GSC	DAVENTRY, ENGLAND, 31.32 m., Addr. B. B. C., Portland Pl., London, W. 1, 9.20-11.20 pm.
9.580	VLR	MELBOURNE, AUSTRALIA, 31.32 m. Addr. Box 1686, G. P. O. Daily 3.30-8.30 am. (Sat. till 9 am.) Sun. 3-7.30 am. Daily exc. Sat. 9.35 pm.-2.15 am.
9.580	OAX5C	ICA, PERU, 31.32 m. Radio Universal 6-10 pm.
9.570	KZRM	MANILA, P. I., 31.35 m., Addr. Erlanger & Galinger, Box 283. 4.30-6 pm., 5-9 am., Sun 4-10 am.
9.570	WIXK	SPRINGFIELD, MASS., 31.35 m., Addr. Westinghouse Electric & Mfg. Co. Relays WBZ 7 am. to 1 am. Sun. 8 am. to 1 am.
9.560	DJA	BERLIN, GERMANY, 31.38 m., Addr. Broadcasting House. 12.05-11 am., 4.50-10.45 pm.
9.550	W2XAD	SCHENECTADY, N. Y., 31.41 m., General Electric Co., 7.30 pm.-12 m.
9.550	OLR3A	PRAGUE, CZECHOSLOVAKIA, 31.41 m. (See 11.840 mc.) 12.55-4.40 pm.
9.550	—	PARIS, FRANCE, 31.41 m. Addr., (See 15.245 mc.) Testing eve.
9.550	XEFT	VERA CRUZ, MEX., 31.41 m. 11.30 am.-4 pm., 7 pm.-12 m.
9.550	YDB	SOERABAJA, JAVA, 31.41 m., Addr. N.I.R.O.M. Daily exc. Sat. 6-7.30 pm., 5.30 to 10.30 or 11 pm. Sat. 5.30-11.30 am.
9.540	DJN	BERLIN, GERMANY, 31.45 m., Addr. (See 9.560 mc.) 12.05-10 am., 4.50-10.45 pm.
9.540	VPD2	SUVA, FIJI ISLANDS, 31.45 m., Addr. Amalgamated Wireless of Australasia, Ltd. 5.30-7 am.
9.535	JZI	TOKYO, JAPAN, 31.46 m., Addr. (See 11.800, JZJ) 12.30-1.30 am., 2.30-4, 4.30-5.30 pm.
9.535	HB9D	ZURICH, SWITZERLAND, 31.46 m., Addr. Radio Club of Zurich, Post Box Zurich 2. Sun. 9-11 am., Thur. 1-3 pm.
9.530	W2XAF	SCHENECTADY, N. Y., 31.48 m., Addr. General Electric Co. 4 pm.-12 m.
9.530	——	TANANARIVE, MADAGASCAR, 31.48 m., Addr. Le Directeur des PTT, Radio Tananarive, Administration PTT. 12.30-12.45, 3.30-4.30, 10.11 am.
9.526	XEDQ	GUADALAJARA, GAL., MEXICO, 31.49 m. Irregular 7.30 pm. to 12.30 am.
9.525	ZBW3	HONGKONG, CHINA, 31.49 m., Addr. P. O. Box 200. 11.30 pm. to 1 am., 3-10 am.
9.525	LKJ1	JELOY, NORWAY, 31.49 m. 5-8 am.
9.523	ZRH	ROBERTS HEIGHTS, S. AFRICA, 31.5 m., Addr. (See ZRK, 9.606 mc.) Daily exc. Sat. 11.45 pm-12.45 am.; Daily exc. Sun. 5-7.30 am.; Sun. 3 or 3.30 to 4.30 or 5 am.
9.520	HJ6ABH	ARMENIA, COLOMBIA, 31.51 m. 8-11 am., 6-10 pm.
9.520	OZF	SKAMLEBOAEK, DENMARK, 31.51 m., Addr. Statsradiofonien, Copenhagen,. 2-6.40 PM.
9.520	YSH	SAN SALVADOR, EL SALVADOR 31.51 m., Addr. (See 7.894 mc.) Irregular 6-10 pm.
9.510	GSB	DAVENTRY, ENGLAND, 31.55 m., Addr. (See 9.580 mc.—GSC) 1-3.15 am., 12.20-6 pm., 6.20-9, 9.20-11.20 pm.
9.510	HS8PJ	BANGKOK, SIAM, 31.55 m. Thursday, 8-10 am.
9.510	HJU	BUENAVENTURA, COLOMBIA, 31.55 m., Addr. National Railways. Mon., Wed. and Fri. 8-11 pm.
9.500	VK3ME	MELBOURNE, AUSTRALIA, 31.58 m., Addr. Amalgamated Wireless of Australasia, 167 Queen St. Daily except Sun. 4-7 am.
9.500	XEWW	MEXICO CITY, MEX., 31.58 m. Addr. Apart. 2516. Relays XEW. 6 pm.-12 m.
9.500	PRF5	RIO DE JANEIRO, BRAZ., 31.58 m. Irregularly 4.45 to 5.45 pm.
9.488	EAR	MADRID, SPAIN, 31.6 m., Addr. (See 9.860 mc.) 7.30-8.30 pm. Mon., Tues., Thur., Sat. at 9.30 pm. also.
		End of Broadcast Band
9.460	ICK	TRIPOLI, N. AFRICA, 31.71 m. Works Rome, 5.30-7 am.
9.445	HCODA	GUAYAQUIL, ECUADOR, 31.77 m. Irregularly till 10.40 pm.
9.428	COCH	HAVANA, CUBA, 31.8 m., Addr. 2 B St., Vedado. 7 am.-1 am.
9.415	PLV	BANDOENG, JAVA, 31.87 m. Works Holland around 9.45 am. Broadcasts 5.30-9.30 am., 6-6.30 pm.
9.355	HCIETC	QUITO, ECUADOR, 32.05 m., Addr. Teatro Bolivar, Thurs. until 9:30 p.m.
9.345	HBL	GENEVA, SWITZERLAND, 32.08 m., Addr. Radio Nations Fri. 7:15-8:30 p.m., 6:45-8 p.m.
9.330	CGA4	DRUMMONDVILLE, CANADA, 32.15 m. Works England irreg.
9.330	OAX4J	LIMA, PERU, 32.15 m., Addr. Box 1166, "Radio Universal." 12 n.-3 pm., 5 pm.-1 am.
9.290	HIG	CIUDAD TRUJILLO, D. R., 32.29 m. 7.10-8.40 am., 11.40 am.-2.10 pm., 3.40-8.40 pm.
9.280	HC2CW	GUAYAQUIL, ECUADOR, 32.31 m., 11.30 am.-12.30 p.m., 8-11 pm.
9.280	GC8	RUGBY, ENGLAND, 32.33 m. Works Canada and Egypt evenings and afternoons.
9.200	COBX	HAVANA, CUBA, 32.59 m. Addr. San Miguel 194, Altos. Relays CMBX 7 am.-12 m.
9.170	WNA	LAWRENCEVILLE, N. J., 32.72 m. Works England evenings.
9.150	YVR	MARACAY, VENEZUELA, 32.79 m. Works with Europe afternoons.
9.125	HAT4	BUDAPEST, HUNGARY, 32.88 m., Addr. "Radiolabor," Gyali-ut 22. Sun. and Wed. 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.
9.060	TFK	REYKJAVIK, ICELAND, 33.11 m. Works London afternoons.
9.020	COBZ	HAVANA, CUBA, 33.26 m., Radio Salas Addr. P. O. Box 866, 7:45 am.-12.10 am. Irreg. 12.30-2 am. Relays CMBZ.
9.020	GCS	RUGBY, ENG., 33.26 m. Works N. Y. C. evenings.
9.010	KEJ	BOLINAS, CAL., 33.3 m. Relays NBC and CBS programs in evening irregularly.
8.967	VWY	KIRKEE, INDIA, 33.43 m. Works with England in morning.
8.965	COKG	SANTIAGO, CUBA, 33.44 m. Addr. Box 137. 9-10 am., 11.30 am.-1.30 pm., 3-4.30, 5-6, 10-11 pm., 12 m.-2 am.
8.960	TPZ	ALGIERS, ALGERIA, 33.48 m. Works Paris afternoons.
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.
8.775	PNI	MAKASSER, CELEBES, N. I., 34.19 m. Works Java around 4 am.
8.765	DAF	NORDDEICH, GERMANY, 34.23 m. Works German ships irregularly.
8.760	GCQ	RUGBY, ENG., 34.25 m. Works Africa afternoons.
8.750	FZE8	DJIBOUTI, FR. SOMALILAND, AFRICA 34.29 m. Works Paris around 2.30 am.
8.730	GCI	RUGBY, ENG., 34.36 m. Works India 8 am.
8.720	VPD3	SUVA, FIJI ISLES, 34 m., Addr. (See 9.540 mc., VPD2). Irregular.
8.700	HKV	BOGOTA, COLOMBIA, 34.46 m. Tues. and Fri. 7-7.20 pm.
8.860	GBC	RUGBY, ENG., 34.56 m. Works ships irregularly.
8.665	COJK	CAMAGUEY, CUBA, 34.64 m., Addr. Finlay No. 3 Altos. 5.30-6.30, 8-11 pm., daily except Sat. and Sun.
8.665	W2XGB	HICKSVILLE, N. Y., 34.64 m., Addr. Press Wireless, Mon. to Fri. News at 9 am. and 5 pm.
8.580	YNPR	MANAGUA, NICARAGUA, 34.92 m. Radiodifusora Pilot.
8.560	WOO	OCEAN GATE, N. J., 35.05 m. Works ships irregularly.
8.380	IAC	PISA, ITALY, 35.8 m. Works Italian ships irregularly.
8.185	PSK	RIO DE JANEIRO, BRAZIL, 36.65 m. Irregularly.
8.036	CNR	RABAT, MOROCCO, 37.33 m. Sun. 2.30-5 pm. Irregular.
7.901	LSL	BUENOS AIRES, ARGENTINA, 37.97 m. Works Brazil at night.
7.894	YSD	SAN SALVADOR, EL SALVADOR, 37.99 m., Addr. Dir. Genl. Tel. & Tel. 7-11 pm.
7.870	HCIRB	QUITO, ECUADOR, 38.1 m. La Voz de Quito. 9-11 pm.
7.860	SUX	ABOU ZABAL, EGYPT, 38.17 m. Works with Europe, 4-6 pm.
7.854	HC2JSB	GUAYAQUIL, ECUADOR, 38.2 m. Evenings to 11 pm.
7.797	HBP	GENEVA, SWITZERLAND, 38.48 m., Addr. Radio-Nations. Sat. 5.30-6.30 pm.
7.715	KEE	BOLINAS, CAL., 38.89 m. Relays NBC and CBS programs in evening irregularly.
7.626	RIM	TACHKENT, U.S.S.R., 39.34 m. Works with Moscow in early morning.
7.610	KWX	DIXON, CAL., 39.42 m. Works with Hawaii, Philippines, Java and Japan, nights.
7.540	RKI	MOSCOW, U.S.S.R., 39.76 m. Relays RAN 7-9.15 pm. Works RIM early am.
7.520	KKH	KAHUKU, HAWAII, 39.87 m. Works with Dixon and broadcasts irregularly nights.
7.510	JVP	NAZAKI, JAPAN, 39.95 m. Irreg.
7.410	HCJB4	QUITO, ECUADOR, 40.46 m., 7-9.30 pm. irregularly.
7.390	ZLT2	WELLINGTON, N. Z., 40.6 m. Works with Sydney, 3-7 am.
7.38	XECR	MEXICO CITY, MEX., 40.65 m., Addr. Foreign Office. Sun. 6-7 pm.
7.220	HKE	BOGOTA, COL., S. A., 41.55 m. Tues. and Sat. 8-9 pm. Mon. and Thurs. 6.30-7 pm.
7.200	YNAM	MANAGUA, NICARAGUA, 41.67 m. Irregular at 9 pm.
7.100	FO8AA	PAPEETE, TAHITI, 42.25 m., Addr. Radio Club Oceanien. Tues. and Fri. 11 pm.-12.30 am.
7.090	——	GUADALAJARA, JALISCO, MEX., 42.29 m., Addr. Madero 210, La Radiodifusora del Pueblo. 9-11 pm.
7.088	PIIJ	DORDRECHT, HOLLAND, 42.3 m., Addr. Dr. M. Hellingman, Technical College. Sat. 11.10-11.50 am.
6.990	XEME	MERIDA, YUCATAN, 42.89 m., Addr. Calle 59, No. 517, "La Voz de Yucatan desde Merida." Irregular.
6.977	XBA	TACUBAYA, D. F., MEX., 43 m. 9.30 am.-1 pm., 7-8.30 pm.
6.905	GDS	RUGBY, ENG., 43.45 m. Works N.Y.C. evenings irregularly.
6.860	KEL	BOLINAS, CALIF., 43.70 m. Tests irregularly. 11 am.-12n., 6-9 pm.
6.850	XGOX	NANKING, CHINA, 43.8 m. Daily 6.40-8.40 am., Sun. 4.40-6.05 am.
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, DUTCH GUIANA, 44.16 m., Addr. P. O. Box 18. Daily 6.06-8.36 am., Sun. 9.36-11.36 am. Daily 5.36-8.36 pm.
6.775	HIH	SAN PEDRO DE MACORIS, DOM. REP., 44.26 m. 12.10-1.40 pm., 7:30-9 pm. Sun. 3-4 am., 4.15-6 pm., 4.40-7.40 pm.

(Continued on page 28)

All Schedules Eastern Standard Time

Question Box

A fee of 25c (stamps, coin or money order) is charged for letters that are answered by mail. This fee includes only hand-drawn schematics. We cannot furnish full-size working drawings or picture layouts. Letters not accompanied by 25c will be answered on this page. Questions involving considerable research will be quoted upon request. Names and addresses should be clearly printed on each letter.



C.W. transmitter for 40 meters—1122

A 40 METER C.W. TRANSMITTER

I would like you to print the diagram and coil data for a 40 meter transmitter which later could be adapted for phone use. The line-up I want is a 41 or a 47 crystal oscillator; 6L6G buffer and push-pull 6L6G's.—Chester Odell, Detroit, Mich.

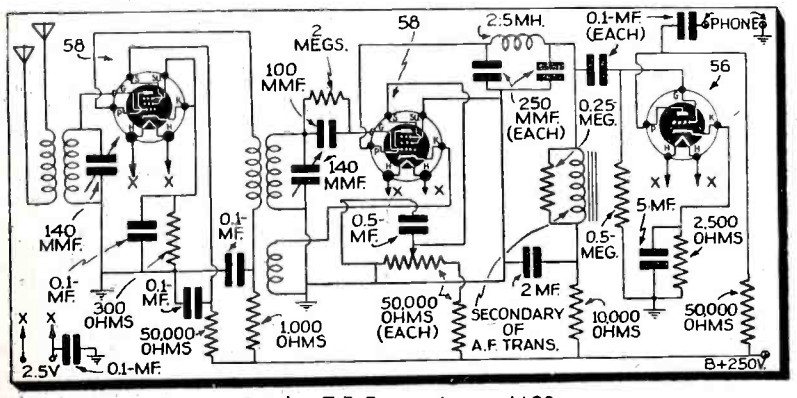
A. We have shown the diagram of the transmitter you requested. The 47 is used as a crystal oscillator and 6L6G's are used for the buffer doubler and final amplifier. Keying should be done in the cathode of the final amplifier stage for C.W. use. Coil data is as follows: L1 (for 3.5 megacycle crystal), 21 turns No. 22 D.S.C. wire close-wound on a 1½" dia. form. L2, 12 turns of No. 22 D.S.C. spaced the diameter of the wire on the same size form. L3, 2 turns of No. 14 or 16 D.S.C. wire wound at one end of L2. L4, 2 turns of No. 14 or 16 wire wound over the center of L5. L5 is the same as L2, except that it is center-tapped. L6 is 18 turns of No. 12 wire, spaced the dia. of the wire on a 2½" form.

The antenna coupling is made to L6 in any conventional manner. Phone operation on the 40 meter band is prohibited in the United States and Canada.

PUSH-PULL AUDIO AMPLIFIER

Will you please print the circuit for an amplifier using 2—2A5's in push-pull and a suitable input tube for use with the crystal mike and phonograph pick-up. The amplifier should also have a tone control.—William Ambry, Jr., Calgary, Alta.

A. We have prepared a diagram using a 57 tube as a microphone pre-amplifier and a 56 as a second audio stage feeding 2—2A5's in push-pull. The 57 is used only with the microphone. Phonograph pick-up feeds directly to the 56 tube. A one megohm fader potentiometer is used to control volume of the microphone and the phonograph. Tone control is in the plate circuit of the 56 tube.



3-tube T.R.F. receiver—1123

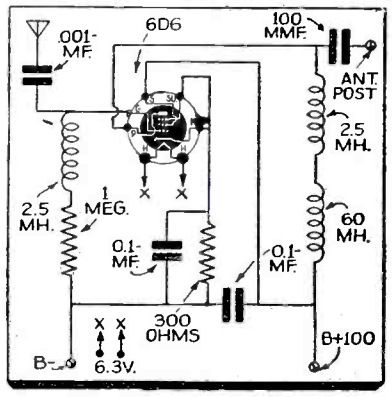
3 TUBE T.R.F. RECEIVER FOR 2.5 VOLTS

Will you please publish the schematic circuit for a T.R.F. short-wave set using a 58 R.F. amplifier, 58 regenerative detector and a 56 audio tube and give the coil data.—Kurt Nelson, Bowling, Ill.

A. You will find the diagram you requested reproduced on this page. A 4 prong plug-in coil is used in the antenna circuit and a 6 prong coil is used in the detector stage. Regeneration is by electron coupling in the cathode of the 58 detector. Regeneration is controlled by variation of the screen potential through a 50,000 ohm potentiometer. The A.F. transformer secondary in the plate of the detector may be any conveniently available. Try using either the secondary alone or connected in series with the primary. If no transformer is available, a 700 henry plate choke should be used in this position. Complete coil data was given in the *Question Box* in the March 1938 issue.

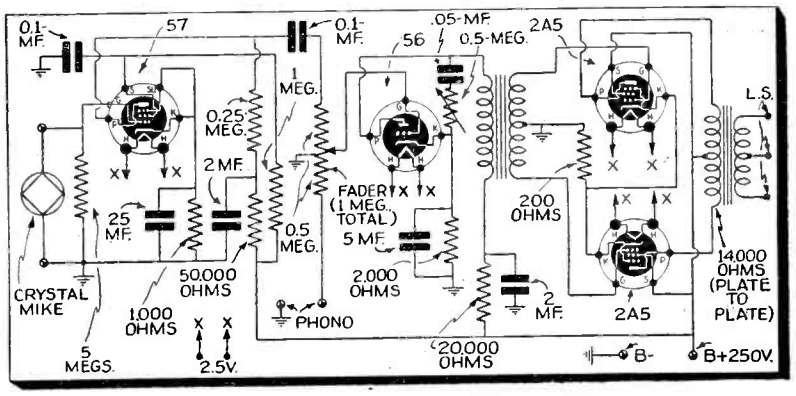
AN UNTUNED R.F. STAGE FOR A.C.-D.C. SET

Please publish the circuit of an untuned R.F. stage to be added to an A.C.-D.C. short-wave receiver, using any tube which you think proper.—James Crouch, Los Angeles, Calif.



An untuned R.F. amplifier—1124

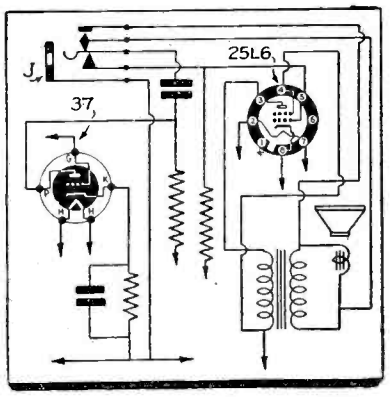
A. We have drawn the circuit you requested employing a 6D6 tube. The 6.3 v. heater terminals to this tube should be connected in series with the heaters of the tubes in your receiver and B– should go to the common return lead of the receiver. B+ should go to the screen-grid terminal on the output tube of your receiver. For best results, the line cord resistor in the old receiver should be replaced with one having a resistance 20 ohms less than now employed, although the receiver will work without this change. If a ballast tube is used instead of the line cord in this set, it may be replaced with one designed for a set using one more 6.3 volt tube.



Push-pull 2A5 A.F. amplifier—1125

ADDING PHONE CONNECTIONS

I have an A.C.-D.C. set using 2—37's, a 25L6 and a 25Z5. Please show how to connect a phone jack in this set which will simultaneously cut off the dynamic speaker. —Yoshito Oda, Honolulu, T.H.



Connecting headphones—1126

A. The method of doing this with a two circuit jack is illustrated. When the phone plug is inserted the signal is transferred from the 25L6 to the phones. At the same time the voice coil of the dynamic speaker is shorted out to prevent hum being heard through the speaker.

The phones are connected automatically to the output of the first A.F. tube. Since there is no D.C. flowing in the phone circuit, crystal type phones may be safely used here. This method is applicable to any receiver employing two or more audio stages.

Mc.	Call	
6.755	WOA	LAWRENCEVILLE, N. J., 44.41 m., Addr. A.T.&T. Co. Works Eng. evenings.
6.750	JVT	NAZAKI, JAPAN, 44.44 m., Addr. Kokusai-Denwa Kaisha, Ltd., Tokio. Irregular.
6.730	HI3C	LA ROMANA, DOM. REP., 44.58 m., Addr. "La Voz de la Feria." 12.30-2 pm., 5-6 pm.
6.720	PMH	BANDOENG, JAVA, 44.64 m. Relays NIROM programs. 5.30-9 am.
6.690	TIEP	SAN JOSE, COSTA RICA, 44.82 m., Addr. Apartado 257, La Voz del Tropico. Daily 7-10 pm.
6.672	—	—— 44.94 m., relays Salamanca, Spain, evenings.
6.672	YVQ	MARACAY, VENEZUELA, 44.95 m. Irregular.
6.650	IAC	PISA, ITALY, 45.11 m. Works ships irregularly.
6.635	HC2RL	GUAYAQUIL, ECUADOR, S. A., 45.18 m., Addr. P. O. Box 759. Sun. 5.45-7.45 pm., Tues. 9.15-11.15 pm.
6.630	HIT	CIUDAD TRUJILLO, D. R., 45.25 m., Addr. "La Voz de la RCA Victor," Apartado 1105. Daily exc. Sun. 12.10-1.40 pm., 5.40-8.40 pm.; also Sat. 10.40 pm.-12.40 am.
6.625	PRADO	RIOBAMBA, ECUADOR, 45.28 m. Thurs. 9-11.45 pm.
6.558	HI4D	CIUDAD TRUJILLO, D. R., 45.74 m. Except Sun. 11.55 am.-1.40 pm.
6.550	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 los Lagos." 8-9 pm.
6.500	HIL	CIUDAD TRUJILLO, D. R., 46.13 m. Addr. Apartado 623. 12.10-1.40 pm., 5.40-7.40 pm.
6.490	HIIL	SANTIAGO DE LOS CABALLEROS, D. R., 46.2 m., Addr. Pres., Trujillo 97, Altos., 5.40-7 pm.
6.470	YNLAT	GRANADA, NICARAGUA, 46.36 m., Addr. Leonidas 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.
6.440	TGQA	QUEZALTENANGO, GUATEMALA, 46.56 m. Mon.-Fri. 9-11 pm., Sat. 9 pm.-1 am., Sun. 1-3 pm.
6.420	HIIS	SANTIAGO, D. R., 46.73 m. 11.40 am.-1.40 pm., 5.40-7.40, 9.40-11.40 pm.
6.416	YV6RC	BOLIVAR, VENEZUELA, 46.73 m. Radio Bolivar.
6.410	TIPG	SAN JOSE, COSTA RICA, 46.8 m., Addr. Apartado 225, "La Voz de la Victor." 12 n.-2 pm., 6-11.30 pm.
6.400	YV5RH	CARACAS, VENEZUELA, 46.88 m. 7-11 pm.
6.388	HI8J	LAS VEGAS, D. R., 46.92 m., Irreg.
6.384	VP2LO	STE. KITTS, B.W.I. 46.96 m. ICA Service Labs, Box 88, Daily 4-4.45 pm., Sun 10-10.45 am. and irreg. at other times.
6.380	YV5RF	CARACAS, VENEZUELA, 46.92 m., Addr. Box 983. 6-10.30 pm.
6.370	TI8WS	PUNTARENAS, COSTA RICA, 47.07 m., Addr. "Ecos Del Pacifico", P. O. Box 75. 6 pm.-12 m.
6.365	YVIRH	MARACAIBO, VENEZUELA, 47.18 m., Addr. "Ondas Del Lago," Apartado de Correos 261. 6-7.30 am., 11 am.-2 pm., 5-11 pm.
6.360	HRPI	SAN PEDRO SULA, HONDURAS, 47.19 m. 7.30-9.30 pm.
6.340	HIIX	CIUDAD TRUJILLO, D. R., 47.32 m. Sun. 7.40-10.40 am., daily 12.10-1.10 pm., Tues. and Fri. 8.10-10.10 pm.
6.335	OAXIA	ICA, PERU, 47.33 m., Addr. La Voz de Chiclayo, Casilla No. 9, 8-11 pm.
6.324	COCW	HAVANA, CUBA, 47.4 m., Addr. La Voz de las Antillas, P. O. Box 130. 6.55 am.-1 am. Sun. 10 am.-10 pm.
6.310	HIZ	CIUDAD TRUJILLO, D. R., 47.52 m. Daily except Sat. and Sun. 11.10 am.-2.25 pm., 5.10-8.40 pm. Sat. 5.10-11.10 pm. Sun. 11.40 am.-1.40 pm.
6.300	YV4RD	MARACAY, VENEZUELA, 47.62 m. 6.30-9.30 pm. exc. Sun.
6.295	OAX4G	LIMA, PERU, 47.63 m., Addr. Apartado 1242. Daily 7-10.30 pm.
6.290	HIG	TRUJILLO CITY, D. R., 47.67 m. 7.10-8.40 am., 11.40 am.-2.10 pm., 3.40-8.40 pm.
6.280	COHB	SANCTI SPIRITUS, CUBA, 47.77 m., Addr. P. O. Box 85. 9-11.30 am., 12.30-1.30, 4-7, 8-11 pm.
6.270	YV5RP	CARACAS, VENEZUELA, 47.79 m., Addr. "La Voz de la Philco." Daily to 10.30 pm.
6.255	YV5RJ	CARACAS, VENEZUELA, 47.18 m.
6.243	HIN	CIUDAD TRUJILLO, D. R., 48 m., Addr. "La Voz del Partido Dominicano." 12 n.-2 pm., 6-10 pm.
6.235	HRD	LA CEIBA, HONDURAS, 48.12 m., Addr. "La Voz de Atlantida," 8-11 pm.; Sat. 8 pm.-1 am.; Sun. 4-6 pm.
6.225	YVIRG	VALERA, VENEZUELA, 48.15 m. 6-9.30 pm.
6.220	——	SAIGON, INDO-CHINA, 48.2 m., Addr. Radio Philco. 4.30 or 5.30-9.30 am.
6.210	TG2	GUATEMALA CITY, GUAT., 48.28 m., Addr. Dir. Genl. of Electr. Commun. Relays TGI Mon.-Fri. 6-11 pm., Sat. 6 pm.-1 am. Sun. 7-11 am., 3-8 pm.
6.205	YV5RI	CORO, VENEZUELA, 48.32 m., Addr. Roger Leyba, care A. Urbina y Cia. Irregular.
6.200	HI8Q	CIUDAD TRUJILLO, D. R., 48.36 m. Irregular.
6.185	HIIA	SANTIAGO, D. R., 48.5 m., Addr. P. O. Box 423. 7 am.-5 pm.
6.171	XEXA	MEXICO CITY, MEX., 48.61 m., Addr. Dept. of Education. 7-11 pm.
6.160	VPB	COLOMBO, CEYLON, 48.7 m. Daily exc. Thurs. and Fri., 6.30 am.-12.30 pm; Sun. 7-11.30 am.
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.

49 Met. Broadcast Band

Mc.	Call	
6.150	ZRD	DURBAN, SOUTH AFRICA, 48.78 m., Addr. (See ZRK, 9.606 mc.) Daily exc. Sat. 11.45 pm.-12.45 am.; Daily exc. Sun. 3.30-7.30 am., 9 am.-3.45 pm.; Sun. 8-11.30 am., 12 n.-3.20 pm.
6.150	CJRO	WINNIPEG, MAN., CANADA, 48.78 m., Addr. (See 11.720 mc.) Daily 6 pm.-12 m., Sun. 5-10 pm.
6.147	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.
6.145	HJ4ABE	MEDELLIN, COL., 48.79 m. 11 am.-12 n., 6-10.30 pm.
6.140	W8XK	PITTSBURGH, PA., 48.86 m., Addr. Westinghouse Electric & Mfg. Co. Relays KDKA 11 pm.-1 am.
6.137	CR7AA	LAURENCO MARQUES, PORT. E. AFRICA, 48.87 m. Daily 12.05-1 4.30-6.30, 9.30-11 am., 12.05-4 pm., Sun. 5-7 am., 10 am.-2 pm.
6.130	VP3BG	GEORGETOWN, BRIT. GUIANA, 48.94 m. From 5 pm. on.
6.130	COCD	HAVANA, CUBA, 48.94 m., Addr. Box 2294. Relays CMCD 7 am.-1 am.
6.130	VE9HX	HALIFAX, N. S., CAN., 48.94 m., Addr. P. O. Box 998. Mon.-Fri. 7 am.-11.15 pm., Sat. 11 am.-11 pm., Sun. 12 n.-11.15 pm. Relays CHNS.
6.130	ZGE	KUALA LUMPUR, FED. MALAY ST., 48.94 m. Sun., Tue. and Fri. 6.40-8.40 am.
6.130	LKL	JELOY, NORWAY, 48.94 m. 11 am.-6 pm.
6.125	CXA4	MONTEVIDEO, URUGUAY, 48.98 m., Addr. Radio Electrico de Montevideo., Mercedes 823. 10 am.-12 n., 2-8 pm.
6.122	HP5H	PANAMA CITY, PAN., 49 m., Addr. Box 58. 12 n.-1 pm., 8-10 pm.
6.120	W2XE	NEW YORK CITY, 49.02 m., Addr. Col. B'cast. System, 485 Madison Ave. 11 pm.-12 m.
6.117	XEUZ	MEXICO CITY, MEX., 49.03 m., Addr. 5 de Mayo 21. Relays XEFO 1-3 am.
6.115	HJ3ABX	BOGOTA, COL., 49.05 m., Addr. La Voz de Col., Apartado 2665. 12 n.-2 pm., 5.30-11 pm.; Sun, 6-11 pm.
6.115	OLR2C	PRAGUE, CZECHOSLOVAKIA, 49.05 m. (See 11.40 mc.)
6.110	XEPW	MEXICO CITY, MEX., 49.1 m., Addr. La Voz de Aguila Azteca desde Mex., Apartado 8403. Relays XEJW 11 pm.-4 am.
6.110	VUC	CALCUTTA, INDIA, 49.1 m. Daily 3-5.30 am., 9.30 am.-12 n.; Sun. 7.30 am.-12 n.
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. 12.45-2.30, 4-8 am., 1-6 pm.
6.100	W3XAL	BOUND BROOK, N. J., 49.18 m., Addr. Natl. Broad. Co. 7 pm.-1 am. Sun. 6 pm.-1 am.
6.100	W9XF	CHICAGO, ILL., 49.18 m., Addr. N.B.C. 4-6.50 pm., 1.05-2 am. Sun. 1-5.50 pm.
6.097	ZRK	KLIPHEUVEL, S. AFRICA, 49.2 m., Daily 12 n.-4 pm., Sun. 12 n.-3.20 pm.
6.097	ZRJ	JOHANNESBURG, S. AFRICA, 49.2 m., Addr. African Broad. Co. Daily exc. Sat. 11.45 pm.-12.40 am.; Daily exc. Sun. 3.15-7.30, 9-11.30 am.
6.095	JZH	TOKYO, JAPAN, 49.22 m., Addr. (See 11.800 mc., JZJ.) Irregular.
6.090	CRCX	TORONTO, CAN., 49.26 m., Addr. Can. Broadcasting Corp. Daily 7.45 am.-5 pm., Sun. 10.30 am.-12 n.
6.090	ZBW2	HONGKONG, CHINA, 49.26 m., Addr. P. O. Box 200. Irregular.
6.085	HJ5ABD	CALI, COLOMBIA, 49.3 m., Addr. La Voz de Valle. 12 n.-1.30 pm., 5.10-9.40 pm.
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	YVIRD	MARACAIBO, VEN., 49.32 m. 6-11 pm.
6.080	ZHJ	PENANG, FED. MALAY STATES, 49.34 m. 6.40-8.40 am., except Sun., also Sat. 11 pm.-1 am.
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. Irregular.
6.077	OAX4Z	LIMA, PERU, 49.35 m. Radio National 7-11 pm.
6.075	VP3MR	GEORGETOWN, BRI. GUIANA, 49.35 m. Sun. 7.45-10.15 am.; Daily 4.45-8.45 pm.
6.073	HJ3ABF	BOGOTA, COL., 49.41 m. 7-11.15 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 1.30-5 pm.
6.060	W8XAL	CINCINNATI, OHIO, 49.5 m., Addr. Crosley Radio Corp. Relays WLW 5.45 am.-8 pm., 11 pm.-2 am.
6.060	W3XAU	PHILADELPHIA, PA., 49.5 m. Relays WCAU 8-11 pm.
6.054	HJ6ABA	PEREIRA, COL., 49.52 m. 9.30 am.-12 n., 6.30-10 pm.

(Continued on page 43)

All Schedules Eastern Standard Time

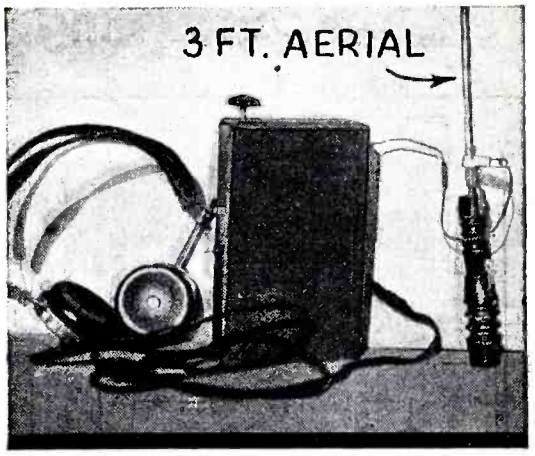
Built 1-Tube Portable

With Great Success

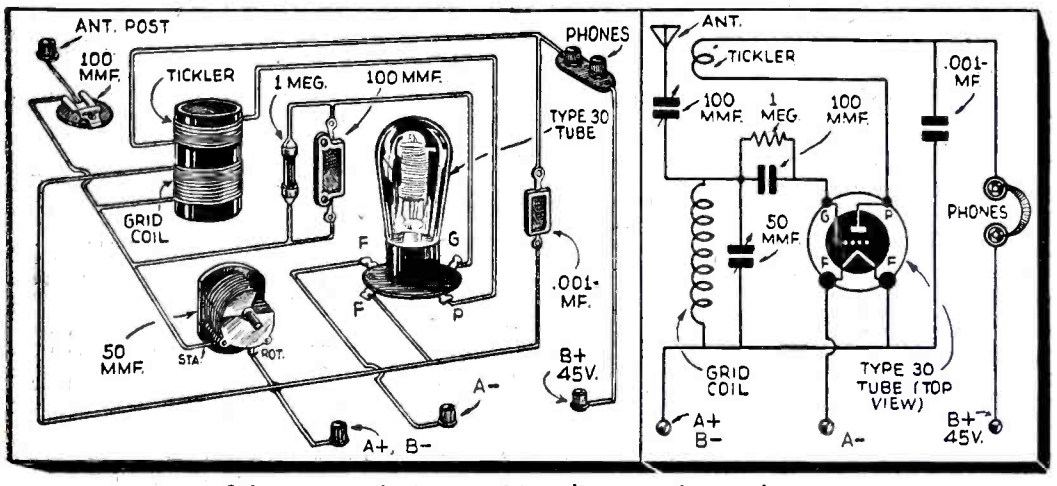
● THE accompanying photos show the very neatly built 1-tube portable which William Locke of Huron, South Dakota, built after the plans published in the December, 1934, issue of *Short Wave Craft*.

The 1-tube circuit is of the super-regenerative type and an antenna wire only 3 ft. long was used. Mr. Locke has heard dozens of amateurs on the 20 meter band, from all parts of the country. He also has heard many foreign short-wave broadcasters, notably the Germans. The box for this pocket-size receiver was made from sheet iron, soldered at the corners. A few changes were made from the original plans, in order to get all of the parts into the small case shown.

The wafer socket was mounted upside down and was secured by a small machine screw passed through the center in place of the original rivet. Two small flashlight cells form the "A" battery, while one of the new midget size 45 volt "B" batteries is used for the plate supply. This very handy short-wave receiver covers a frequency range of approximately 11 to 15¾ mc. The address of Mr. Locke is 101 Third St., S.W., Huron, So. Dakota.



A 1-tube Portable Receiver that fits in your pocket.



Schematic and picture wiring diagrams for 1-tube set.

Data on 1-Tube "Pocket Set" Construction

The main objective is to keep the battery element as light as possible and small enough to fit in another pocket. This little set will operate very nicely with a 22.5 volt block of batteries for the plate supply, and two regular flashlight cells for the filament.

In order to obtain the tremendous amplification necessary in a set of this kind, the tube was made to super-regenerate by supplying its own quenching frequency. It is a well-known fact that if the number of tickler turns are increased over the usual amount necessary to obtain ordinary regeneration, the grid of the tube will "block" at intervals, the frequency of which is more or less controlled by the value of the grid-leak and grid-condenser. In this manner a very sensitive detector will result.

Due to the set covering only the S-W broadcast bands, a small tuning condenser is used. This is a Hammarlund ultra-midget type having a total capacity of 50 mmf. It is very small in size (1"x1½") and allows more room for the other parts in the set than would one of the regular size midgets.

These small condensers are equipped with a very short shaft, intended for screw-driver adjustment and it is necessary to extend it somewhat in order to use the dial. This was done by simply soldering to it a one-half inch length of quarter-inch shaft.

There is no regeneration control provided, but the tickler coil is made just the right size to produce the right amount of feed-back. The size of the grid-leak should be just one megohm, no more or less. A .001 mf. plate by-pass condenser is necessary in order to keep the R.F. out of the phone cords and as an aid in obtaining smooth oscillation. Also, be sure that the grid condenser is of the size indicated in the diagram; if in doubt, use one marked slightly larger than the one shown in order to be on the safe side. The adjustment of the antenna trimmer has quite an effect on smoothing up regeneration, so adjust it for best results. Best action of the detector is obtained when the antenna is adjusted to the point where tighter coupling will cause the tube to stop hissing. The usual hissing sound characteristic of

(Continued on page 64)

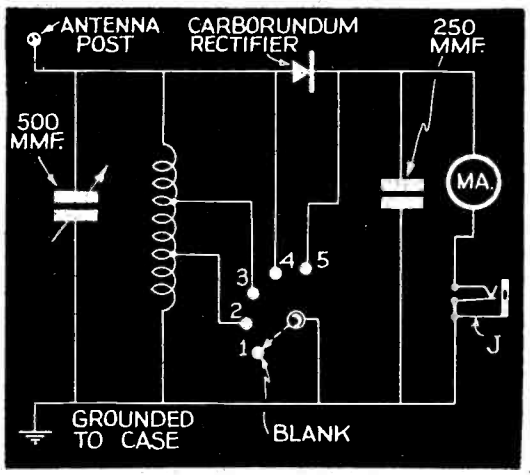
Crystal Rectifier Has Many Uses

Nelson G. Haas and Carl A. Erbacher

● EVERY radio experimenter has use for this simple yet inexpensive crystal rectifier that is universal in application. The advanced experimenter whose laboratory equipment includes a vacuum tube voltmeter naturally has no difficulty in making alternating current readings at audio or radio frequencies. For those not possessing such a device, or for jobs away from the laboratory, this lightweight unit makes a satisfactory substitute.

Not only will it serve as an A.C. voltmeter but it can be used as an output-meter to line up superhets; as a speech-level indicator for public address systems, a visual indicator for Wheatstone bridge measurements and, in emergencies, it may be pressed into service as a *crystal detector receiver*. The transmitting amateur will find additional uses for the instrument as a field strength meter, a phone monitor and hum checker, a carrier shift indicator and as an overmodulation indicator. Many other uses constantly present themselves.

Such a versatile instrument might well appear to be a complicated piece of apparatus to construct as well as requiring many expensive parts. Quite to the contrary, however, it was designed and built in three hours' time; the junkbox being raided for all the parts used, including the milliammeter. The milliammeter was originally a low-range D.C. voltmeter which provided a 16 milliampere scale after the internal resistance coil was removed, connections being made directly to the instrument's movement.

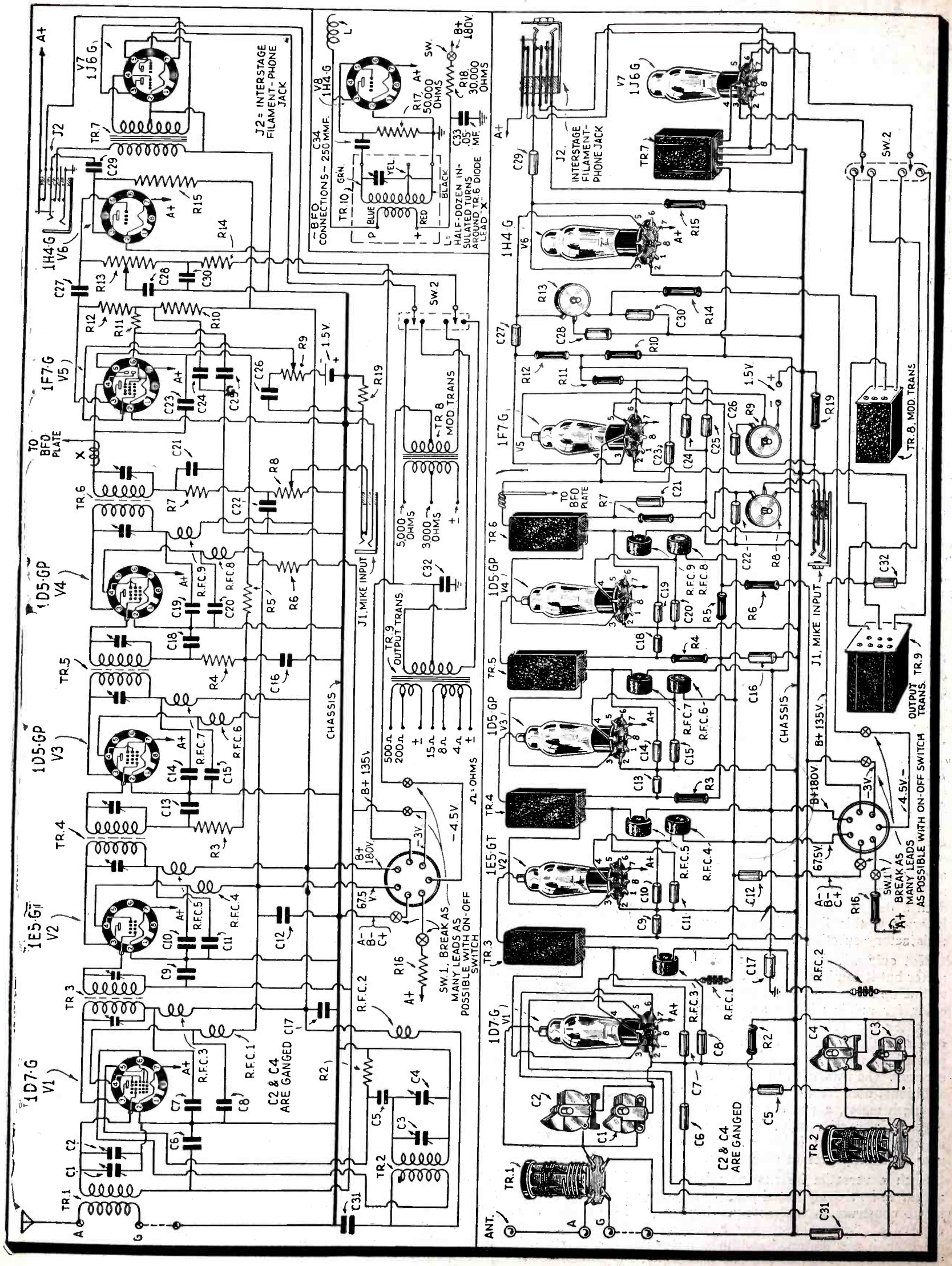


The crystal detector (rectifier) proves valuable for making many measurements, as described in the text.

Later on, when the usefulness of the

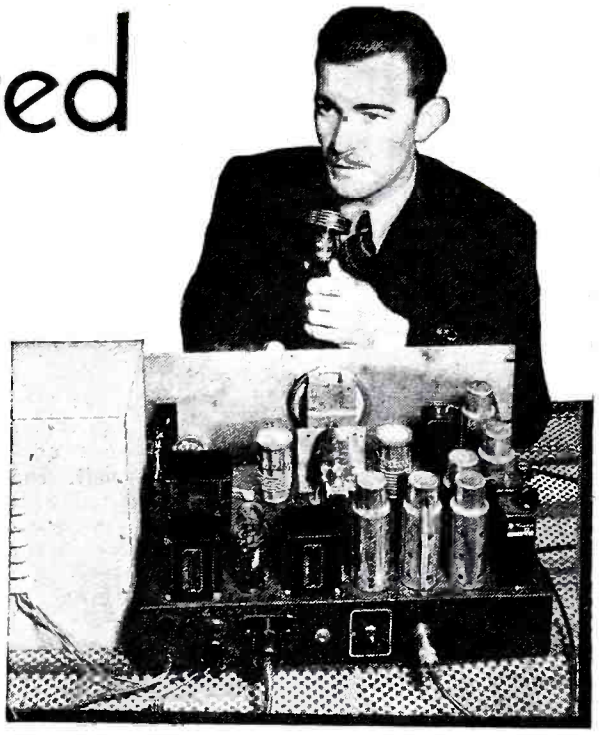
(Continued on page 63)

Wiring Diagram for Battery Superhet



A Battery-Operated S-W SUPER

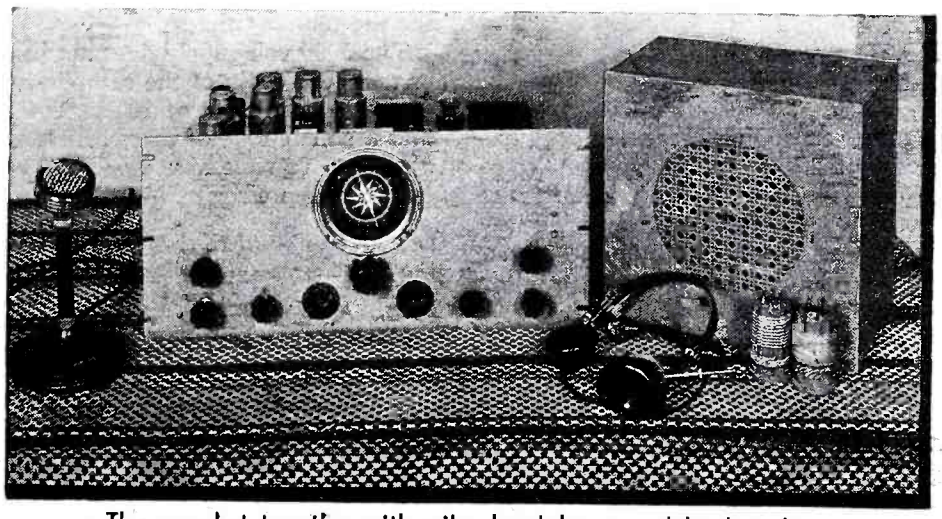
Raymond P. Adams



Tom Baker, rising young screen star, shown with the 8-tube super in use as a modulator for a transmitter.

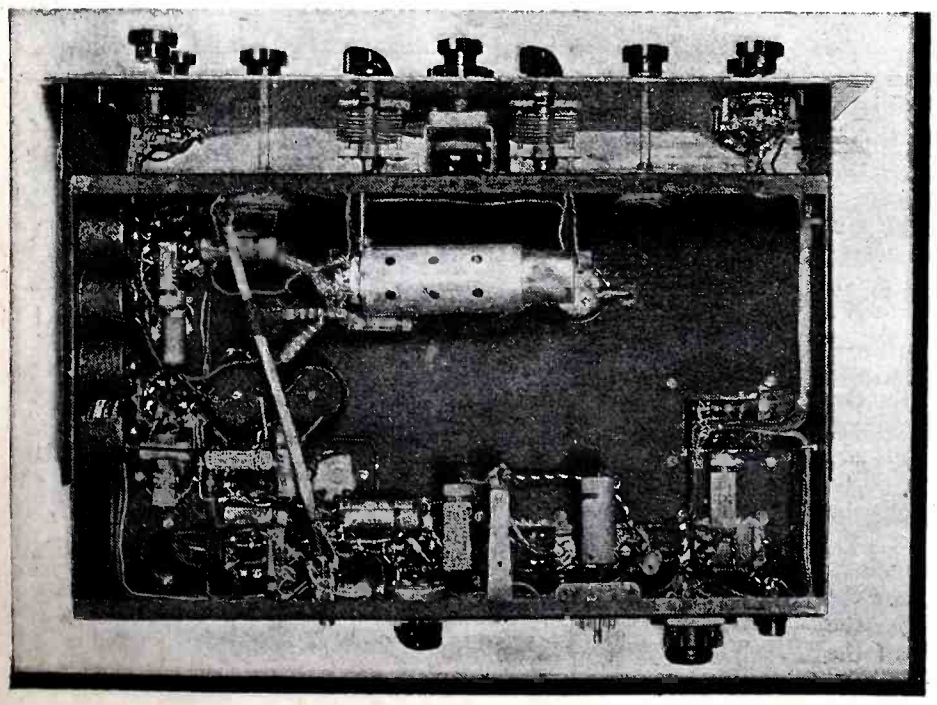
An 8-tube superhet designed to cover the bands between 9 and 80 meters, with plenty of band-spread. A beat-oscillator is provided to help locate those elusive DX stations. Two volt tubes are used.

● THE author's Portable Superhet 4, described in January's *Short Wave & Television*, becomes—perhaps with some minor changes meeting individual service requirements—a more or less ideal job for strictly non-fixed application; that is to say, it is reasonably compact, unusually sensitive and complete, low on battery drain, and easily handled — very definitely a portable assembly. But it does fall somewhat short of perfection as a station receiver for both amateur communications and general short-wave DXing use in communities where line power is not available, and for a number of quite patent reasons: it does not provide for optimum image suppression at input frequencies around 28 mc. (10 meters), it uses a somewhat unorthodox and not too practical second detector and BFO circuits, it is limited in AF output, it affords no automatic volume control (quite necessary on fading 'phone and broadcast) action, and it is physically unsuited to table installation. The writer has therefore designed a second battery job—(distinctly *not* a portable one)—physically and electrically engineered for *fixed* or *station* service. A job, by the way, which though confined in coverage to tunable frequencies between about seven and 80 meters performs as well as if not better than most AC operated assemblies having equivalent input ranges. Using plug-in coils, providing for two watt output, and developed for service either as a communications or general short-wave super, this new receiver—in our humble estimation — bids quite definitely for first place among battery designs of late release.



The superhet together with mike, headphones and loudspeaker.

Below—Bottom view of the super, showing the very neat construction of the receiver.



Objectives and How We Met Them

Instead of simply discussing general design before proceeding to a circuit analysis, we shall point out the objectives we had in mind when working out the receiver, the problems these objectives raised, and the ways and means employed to meet the first and overcome the second.

1. Plug-in coils were called for in order to simplify matters of construction and parts cost, and to provide for maximum short-wave efficiency. We were not interested in coverage below about 3500 kc., but we did want full range from this frequency up to something more than 28,000. We wanted to use as few coils as possible, and as seven or eight were required for detector and HF oscillator circuits alone to achieve desired coverage, the idea of employing an RF stage, with its four more coils, was dropped entirely. One oscillator coil, by the way, was made to do double duty, as analysis of the coil data will indicate.

2. The receiver was to serve as both an amateur communications and general S-W job, separate tank

(Continued on page 49)

Build Your Own Television

S. W. & T. Receiver Covers 441-Line Image and Sound

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

The Power-Supplies Described

Here we see the author hard at work soldering the last connections on the power supply unit. The loudspeaker is mounted at one end of the power chassis.

● THE design of television reception equipment in the past has been very much handicapped by the lack of suitable parts commercially available—which necessitated the use or adaptation of available components to purposes for which they were not ideally suited. For example, some work was done making amateur television receivers using cathode-ray tubes which were designed for oscillographs and similar work. These tubes could be made to produce images—but had inherent characteristics which prevented them from producing undistorted, clear and suitably sized images.

As we explained in the first part of this series, the manufacture of special cathode ray tubes specifically designed for television purposes—tubes which stay in focus with changes in grid voltage produced by signal modulation and have other characteristics which make them well suited to the problems at hand are now available and one such tube is used in this receiver.

Another such case has come up within the past month—a case of substitution of the commercial part which is nearest suited to the problem, yet a part which is not ideal for the purpose. After constructing and describing the tuner chassis last month, a new tube particularly suited to the I.F. stages of television receivers was placed on the market. The 6K7 tubes used in these stages had the highest trans-conductance of any tube on the market in the U. S. However, in Europe, tubes have been available for several years with trans-conductance factors much higher. Because of the high I.F. which must be used for wide-frequency amplification of 441-line images, the amplification per stage and the inter-channel selectivity are rather poor. Naturally the steeper the curve of the plate characteristic, the better will be the possibility of getting *high gain* with good separation of signals (especially the separation of video and sound channels).

The new tubes—known as the type 1851—which have become available since the appearance of our receiver, last month, can be inserted in the receiver by those builders who have not yet made their sets, or who desire the best that can be obtained, and are willing to sacrifice the cost of the tubes and a few other parts. This does not mean that good results cannot be obtained with the 6K7 tubes—they are perfectly satisfactory.

For those who wish to use the 1851 type tubes, the circuit in Fig. 1 is recommended. It will be seen that this is a detail of the circuit presented last month showing one I.F. stage of either the video or sound sections of the receiver. An examination of the circuit shows very little difference from the original. The resistor in series with the screen-grid lead to the tube has been changed from its original value to 60,000 ohms; the suppressor has been shifted from the cathode to ground; and the cathode resistor has been changed so that only a portion of the resistor is by-passed by the .01 mf. mica condenser. The cathode bias resistors are replaced by tapped wire-wound resistors with sliding taps. In the *video* (image) amplifier the first three stages have a value of 175 ohms each, the fourth has a value of 350 ohms and the fifth a value of 750 ohms. The mica condenser is connected to the tap—and this tap is varied on each stage toward the ground end until oscillation ceases. In the *sound* I.F. stage, a 175 ohm tapped resistor should be used.

The characteristics of the 1851 are given at the end of this article.

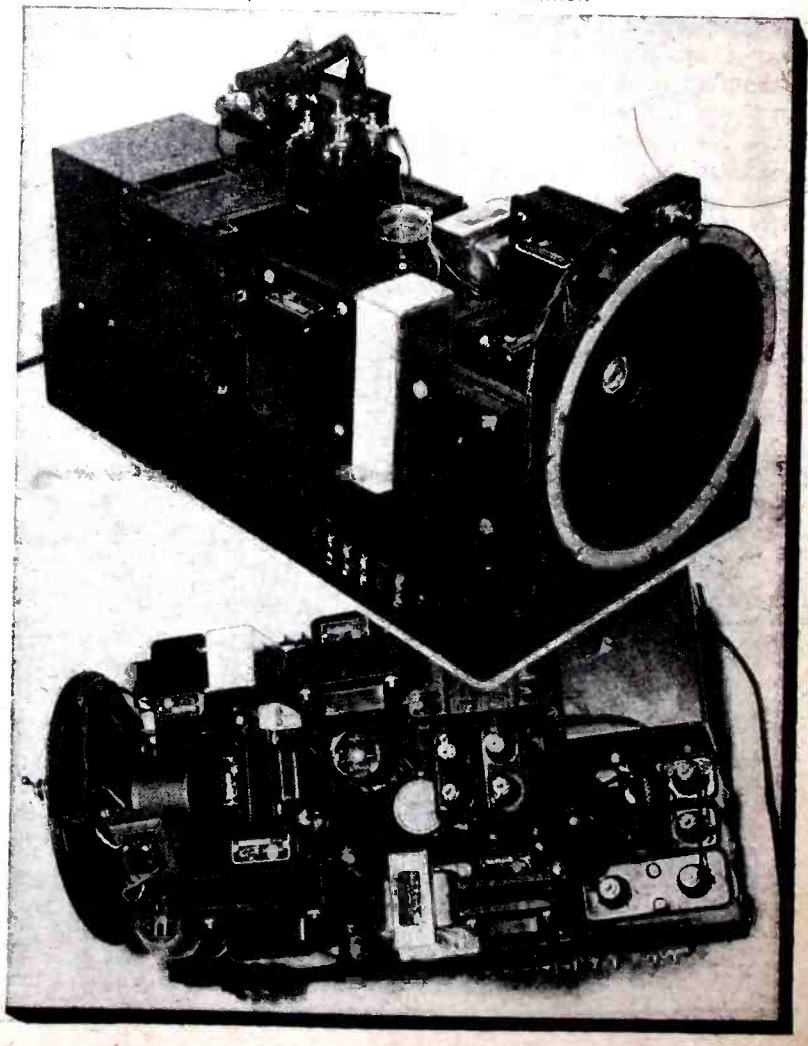
The Power Supply Chassis

The second chassis of our receiver is the power plant which supplies filament and plate power for the entire receiver. This means a voltage of 3000 for the cathode-ray tube, 700 for the sweep circuits, 300 for the receiver, and various filament potentials for the tubes of the set.

The 3000 volt supply does not have to supply very much current as the plate drain of the cathode-ray tube is comparatively small. An over-all current of 10 ma. is ample for this tube. This means that a simple type of filter can be used to smooth out ripples and it is quite feasible to use *half-wave* rectification.

The sweep circuits, however, require 700 volts at about 80 ma.

Below—Front and top views of the power supply chassis, on which all the transformers and filter condensers are mounted; also the loudspeaker for the sound channel.



Receiver

Part III

C. W. Palmer, E. E.

so that ripple filtering will be more difficult and a *full-wave* rectifier is much more suitable than *single pulse* types.

The receiver power supply is quite normal—requiring a *full-wave* rectifier and good filter—capable of supplying about 100 ma. to the tuner chassis.

Peculiarities of the supply systems are the fact that the filament winding for the cathode-ray tube is some 3000 volts negative with respect to the high-voltage winding so that the high-voltage transformer must be made with very good insulation and the filament supply transformer must have equally good insulation. As a matter of fact, all the power transformers must be made unusually well to stand the voltage peaks which may be encountered in the case of "kick-backs."

The power supply chassis contains four transformers—(1) supplying the 2½ volts for the filament of the type 879 high voltage rectifier, the 2400 volts for the high-voltage supply (which is added to the 700 volts of the sweep supply to produce 3000 volts), the 2½ volts for the cathode-ray tube filament and the 2½ volts for the thyratron sweep oscillator tubes; (2) supplies 6.3 volts for the sweep amplifier tubes filaments and 5 volts for the rectifier *tube filament* of the 700 volt power supply; (3) supplies 1500 volts with a center-tap for the sweep system "B" voltage; and (4) supplies 5 volts for the receiver rectifier tube filament, 700 volts center-tapped for the receiver power supply and 6.3 volts for the filaments of the receiver.

The Loud-Speaker

An odd point in the construction of the power supply chassis is the loud-speaker which is mounted on it, apparently without any good reason. However, when it is remembered that any strong magnetic field near the cathode-ray tube will introduce interference fields affecting the cathode stream as well as distorting the images, the reason why all transformers, chokes and magnets (loud-speaker field) were put on the power supply chassis (which it will be remembered from the first part of this series is the bottom chassis in the 3-deck construction) can be understood.

Construction

A study of the photographs will show how the three inter-connecting power supplies are laid out with the 300 volt supply at the front, nearest to the loud-speaker, the 700 volt supply in the center and the 2400 volt unit in the back. The parts are situated in such a way that the shortest possible leads are used.

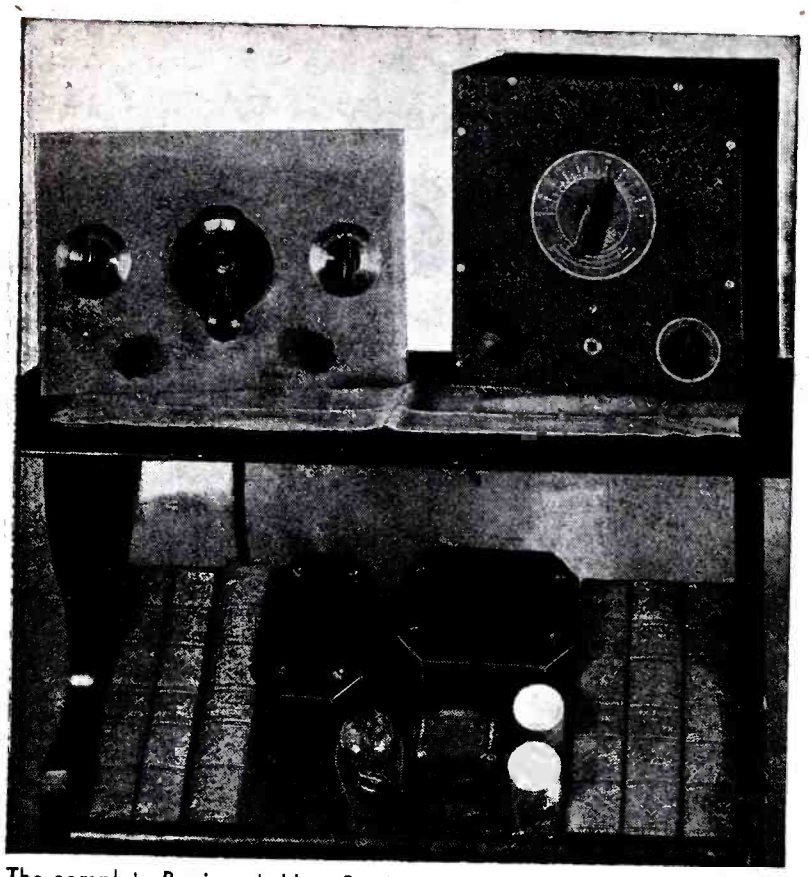
Three separate terminal strips are em-

(Continued on page 46)

The 1938

George B. Hart, Ex-8DK, W8GCR

The author explains in simple style how to build a reliable transmitter and receiver for the Ham beginner. The total cost need not exceed $50.00. Coil data is included to cover all Ham bands. Power-supply data is given.



The complete Beginner's Ham Station mounted on a small library table. The power-supply unit is on the book-shelf at the bottom.

● 1938 amateur operation is demanding more of the Ham and his station than any year in the past. The crowded bands have made single-signal reception a necessity rather than the luxury it once was considered. Unfortunately, beginners and old-timers alike have, in most cases, limited purses with which to enjoy their hobby. Ours is one of these so we decided to make our new rig and receiver do the utmost with the least expenditure.

It was decided at the outset that $50.00 was the most we could afford to spend for a complete station from key to antenna. Yet we wanted single-signal reception and we wanted to work somebody besides the fellow across the street. A modified version of the well-known Jones Super-Gainer was the answer to our receiver problem, while the 6L6 in a tri-tet circuit gives us more than sufficient output on two bands to work plenty of dx. On the fundamental of our crystal we are obtaining 34 watts in the antenna with only 70 watts input to the tube. The arrangement is ideal for the beginner who wants a station that will not only give him the greatest satisfaction for dollar expended, but one that will not be readily antiquated.

Receiver

Although most amateurs still use regenerative receivers, the highest grade receiver for general amateur use is the superheterodyne. It is more selective and less susceptible to overload from local QRM. Unfortunately, it is more expensive to construct than the simple regenerative. However, if you take off some of the fancy gadgets and make each tube work at maximum efficiency, it is possible, as in our receiver, to obtain all the benefits of the super at the ridiculously low cost of $20.93, including tubes and an inexpensive pair of headphones.

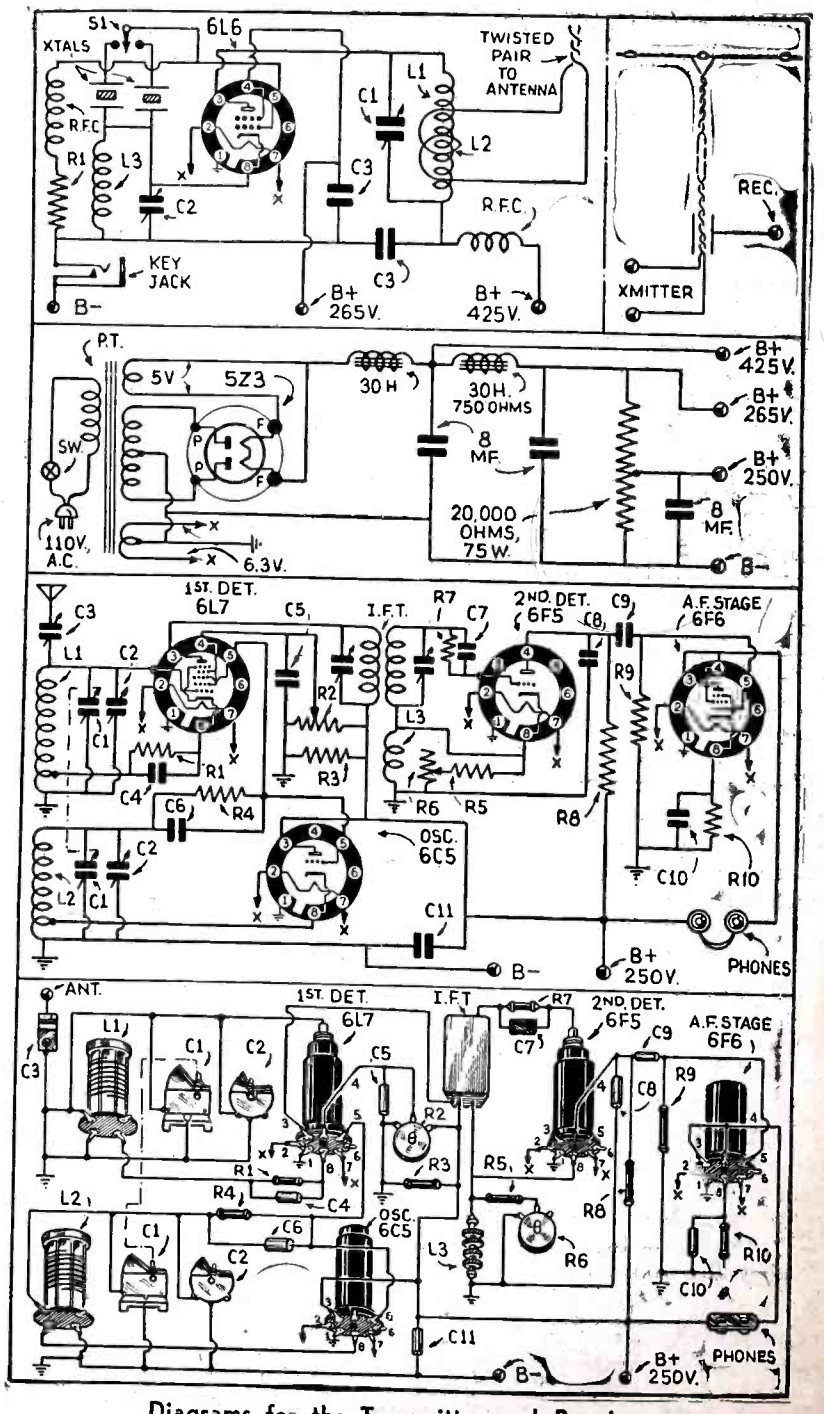
This four-tube super was primarily designed for cw reception, although phone is excellent. It is extremely selective—up to single-signal—and is unusually free of noise. Since the set was primarily designed for cw reception, no a.v.c. was included, and as headphones still seem to be the favorites with cw-men only one audio stage was considered necessary.

The 20 and 40 meter bands can be covered without changing coils if the band-spread condenser is increased to 25 mmf. each section instead of 10 mmf. and the coils juggled a little. Personally we prefer to use 10 mmf. band-spreaders and get three-inch spread on 20 meters and 12 inches on 40. Of course, this size condenser is too small if 80 and 160 meter operation is planned. In any event the coils remain the same since ample overlap was allowed to permit the use of any size band-spread condenser from 10 to 35 mmf.

Regeneration Employed

Regeneration is used in the first detector. It is necessary, therefore, to use very loose coupling to the antenna to secure oscillation without any dead spots due to antenna resonance. This is not a critical point, however, as we have used the receiver on 40 and 20 with a 110 foot antenna and the coupling condenser set at maximum for best results.

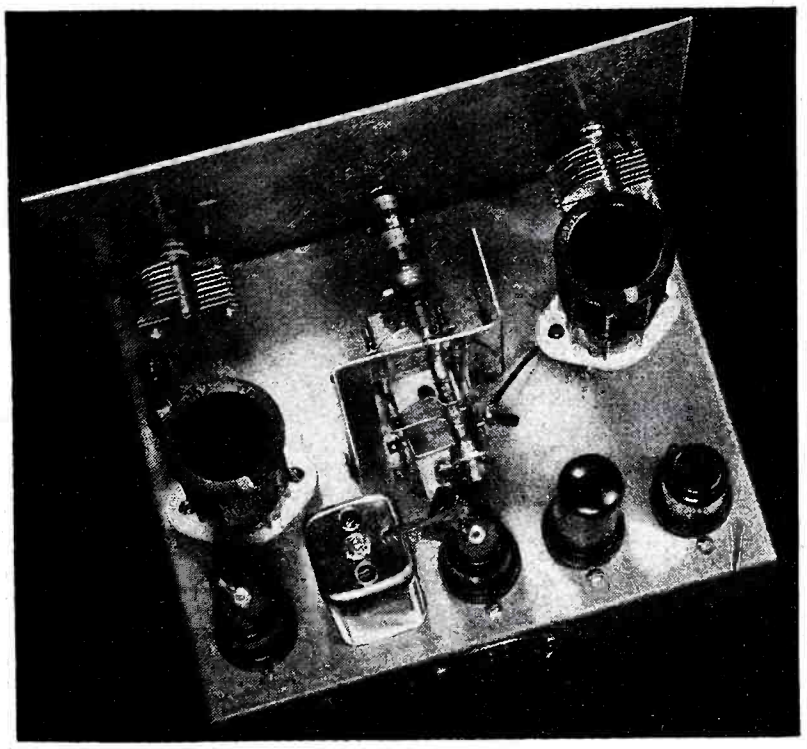
Regeneration in the first detector is obtained by means of a cathode tap on the detector coil which gives a smooth regenerative action. The detector conversion gain is increased many times



Diagrams for the Transmitter and Receiver.

Beginner's "Ham" Outfit

by this means. The use of the 6L7 special mixer tube enables us to obtain a high degree of sensitivity even on 10 meters. The 6L7 also makes a very effective *regenerative first detector* with variable screen-voltage control. The tube is never permitted to oscillate; otherwise it will cause serious image interference.



Rear view of the substantial 4-tube receiver described by Mr. Hart. It fulfills the exacting requirements of the Ham beginner in excellent style.

A stage of r.f. ahead of the detector might at first seem desirable, but it has been found that such a combination only means additional tubes and controls, and does not compare with a super having a regenerative first detector, unless regeneration is used in the r.f. stage.

A 6C5 is used as high-frequency oscillator; oscillation is again supplied by a cathode tap on the coil.

Excellent selectivity is obtained from the use of regeneration in the iron-core intermediate-frequency transformer. It is necessary that the coupling between the two tuned circuits be very loose for stable second detector regeneration. The use of regeneration here eliminates the need of an I.F. amplifier.

The *second detector,* a 6F5 high-mu tube, is the most important component of the receiver. It performs not only as second detector but as BFO (beat frequency oscillator) as well. Cathode regeneration is controlled by a 400 ohm potentiometer in series with a 350 ohm fixed resistor shunted across L3. Be sure to connect the potentiometer to the *ground* side of the cathode coil or poor results will be experienced. This latter unit is *not* a physical part of the 465 kc. tuned circuit. It consists of 100 turns of No. 26 D.S.C. wound on a ⅝" dowel pin.

A triode operated 6F6 is used as the one stage of audio.

A Meissner Ferrocart I.F. transformer was used as it seemed to have good selectivity and high gain. Coupling is easily adjusted for maximum receiver performance.

The *band-setting* condensers are of 100 mmf. while the *band-spreaders* are of only 10 mmf. capacity for maximum spread. They are too small for convenience however on the two lower frequency bands.

The coils are simply made from the data given in the table or they may be purchased. Too many cathode turns on the oscillator coil will generally cause a bad a.c. hum.

The set is assembled on a 7" x 9" x 2" metal chassis with a small "S" shaped shield placed between the coils and the ganged condenser sections to prevent interlock above 10 megacycles. The *band-setting* condensers are mounted to either side of the main tuning condenser on the front panel. The latter is of aluminum 7" x 10" and of 12 gauge stock. A fiber extension and a small coupling unit extends the tuning condenser shaft to the dial on the panel.

A common power supply for both transmitter and receiver was used to cut costs. We mounted it below the transmitter and receiver and ran cables to the sockets mounted in the rear of the receiver and transmitter chassis. Excellent results will be obtained with the receiver using voltages from 135 to 250 volts.

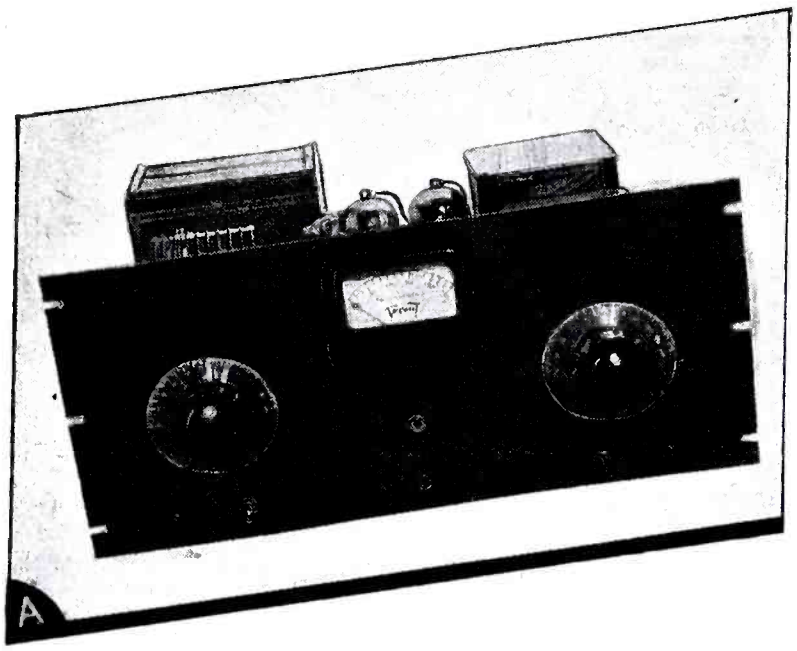
In lining up the receiver, first adjust the I.F. transformer coupling so that the 6F5 oscillates when the 400 ohm variable resistor is adjusted. Oscillation should occur with the first detector regeneration control at zero and the second detector control at about one-quarter open. This will result in smooth control at all times. A little time spent "fiddling" with the I.F. adjustment will be well worth while. Smooth regeneration and the utmost sensitivity will result on all frequencies if this adjustment is exact.

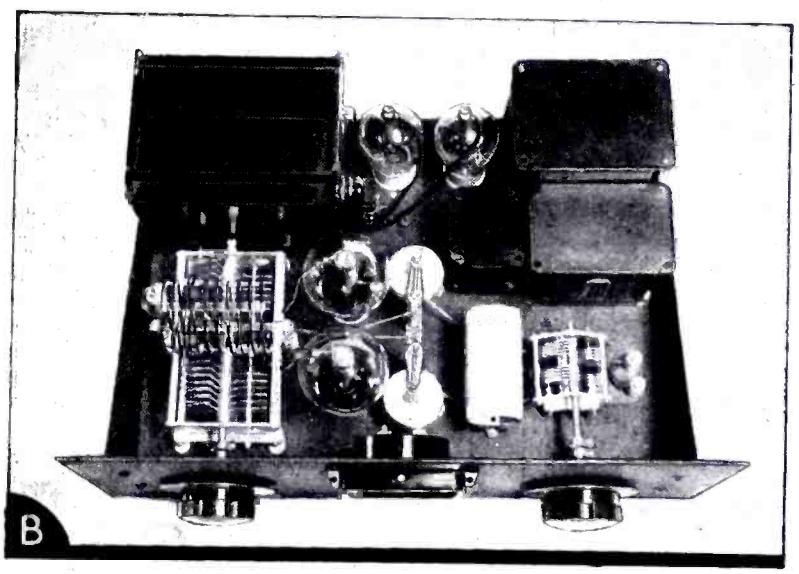
Now couple the antenna to the first detector and adjust the antenna coupling condenser for smoothest first detector regeneration control and maximum signal.

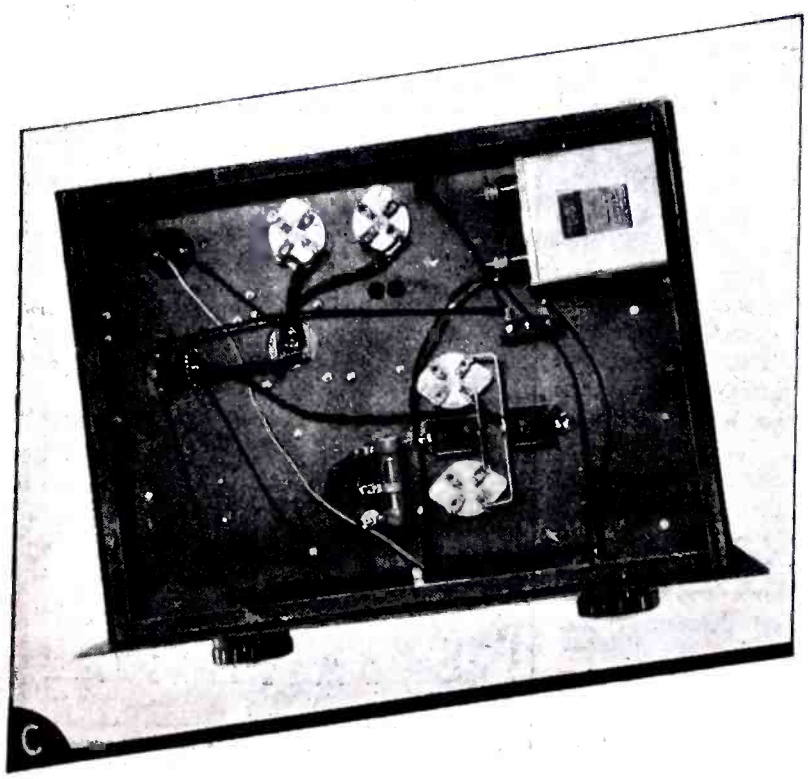
An excellent antenna for both receiver and transmitter is the untuned twisted pair

(Continued on page 47)

Compact 250 Watt Amplifier







The photos at the left show front, rear and bottom views of the 250 watt amplifier. Design is straightforward and the results obtained were very gratifying. This amplifier was tested in a prominent Ham's shack and "stepped out" in great shape!

● THE era of large elaborate transmitters seems to be drawing rapidly to a close. The modern trend is toward more compact and simple transmitters that do not require a "ten-acre lot" as an operating room. After all, the day of large red signs reading "Danger," with skull and cross-bones mounted alongside of a transmitter that resembled a power-house, have long ago been written into amateur history.

Just as foolish as that conspicuous sign alongside of the single '10 transmitter, is the transmitter of today, sadly suffering from elephantiasis.

Why all this waste of space in the shack? For no good reason at all, insofar as efficient amateur radio is concerned; but merely to impress the awe-stricken BCL who happens to be visiting. Now that we've gotten that load off our chest, let's get down to the business of this article.

Uses 808's in Push-Pull

The amplifier, as most have by now suspected, is of compact design. The entire amplifier, as well as its power-supply, is mounted on a chassis measuring 2 x 13 x 17 inches. It consists of a pair of 808's connected in push-pull in a standard circuit. The 808's are exceptionally well suited to a transmitter where the expected output is around 250 watts. They require about 20 watts of driving power for maximum output. Of course the driving amplifier must be capable of greater than 20 watts output in order to provide good regulation. A suitable driver would be a single 807, of the newer type, in a well-designed arrangement. Such a driving unit would be the "40-Watt Switch-Band Exciter," described in the February, 1938, issue by W2AMN. These two units can be mounted in a "two-deck" cabinet and will form a complete 200 watt transmitter of truly modern design and compact enough to be mounted alongside of the receiver on the operating desk. If one desires to operate this combination as a phone transmitter, it is only necessary to add a 150 watt modulator unit which can also be of compact design.

In laying out an amplifier of this sort, the components must be selected for size as well as design. For instance the plate transformer is of such dimension as to fit perfectly into the space available, although it was necessary to lay it flat on its side. Mounted on its end as the manufacturer intended, it would be higher than the panel and would not permit us to use a two-deck cabinet, as mentioned before. Other parts are of such design as to lend themselves readily to the layout.

Layout of Apparatus

Looking at the "rig" from the front, we have the large split-stator tank condenser on the left and the grid tuning condenser on the right. The two 808's are so placed that the neutralizing condensers are between them and the grid coil. The coil for the grid circuit is on the left side of the tuning condenser, in order that the condenser could be so placed as to make a symmetrical panel arrangement of the controls.

In order to conserve space the plate coil is mounted over the tank condenser and at right-angles to it. This arrangement not only is convenient, but provides for very *short* leads. Two tall bar-type insulators are used to support the coil. Small threaded bushings were fastened to the tops of these insulators and also drilled to function as a jack for the coil plugs. The center-tap connection of the coil consists of a five or six inch piece of wire with a plug at the end. This plug is inserted into a jack made the same as those for the ends of the coil. Since the R.F. choke is wound on a bar similar to those used for the coil, it was a simple matter to mount the third jack the same as the others.

for the Ham Station

Art Gregor

Here is a dandy amplifier that will put your station on the map. It uses two high-efficiency 808's in push-pull. Built with high-quality parts, as all transmitters should be, this unit will still be of nominal cost. About 20-watts driving power required for maximum output.

The grid coil is wound on National Isolantite forms, and uses standard bases and plugs. Directly behind this coil, are located the filament transformer and filter choke.

Between the choke and the plate transformer we find the two rectifier tubes. Those shown in the photo are 866's, and serve nicely when 1450 volts are applied to the plates. However the plate transformer has two primary taps permitting 1160 volts on the low tap, and around 1450 volts on the high tap. If we use the low voltage, 866 Jr.'s may be used.

Filter Details

The filter consists of a single heavy-duty choke and a single 2 mf. 2000 volt oil-filled condenser. While this is not what one might call a streamlined filter, it provides just enough filtering action to give us a pure D.C. carrier which is all we need, even for phone operation. This filter condenser is not visible in the photo but is mounted under the chassis. There was not sufficient space above the chassis for a condenser, so we selected the flat type condenser and fastened it to the side of the chassis on the under side. While we're on the subject of the under side of the chassis, we might mention that the other parts mounted there are by-pass condensers and the bleeder.

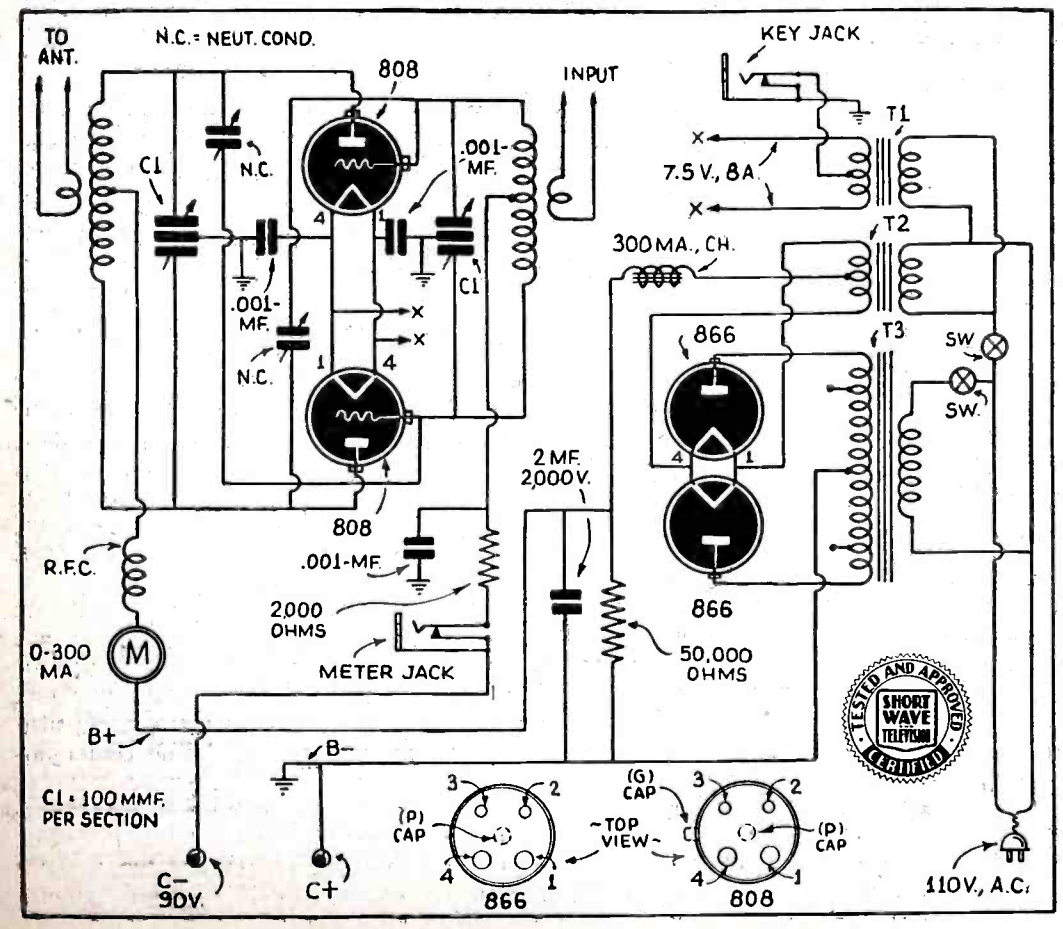
According to the manufacturer of the 808, we should have slightly over 20 watts of excitation in order to obtain maximum efficiency. It is always a good rule to have available at least 50% more excitation in order to permit good regulation in the driver stage. Our suggestion is a 40 or 50 watt driver unit. A single 807 of the newer type will do the job nicely if proper precautions are taken in the design of the circuit. We have successfully used this arrangement in a phone transmitter on the 20 meter band.

With approximately 1250 volts on the plates of the tubes at 250 ma., the output was just 250 watts. The output can be raised slightly by increasing the plate voltage to 1500. However, the recommended voltage for phone operation is 1250.

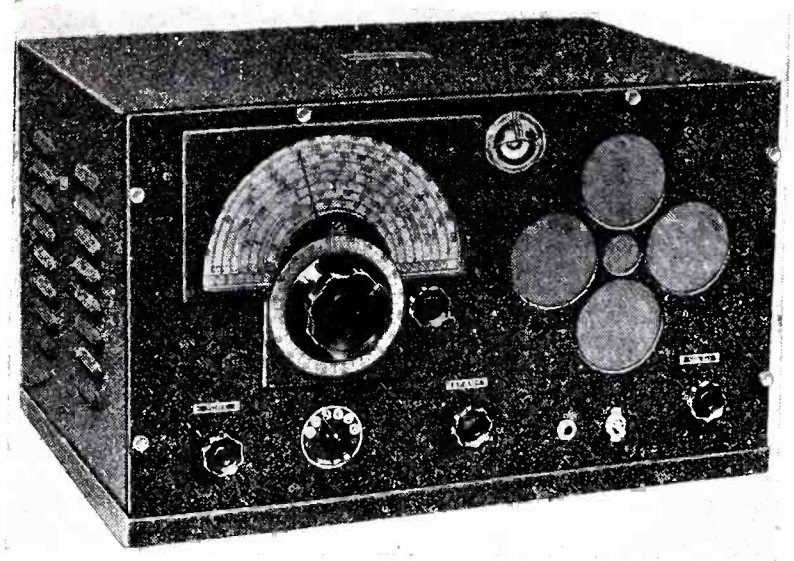
The D.C. grid current depends partly on the type of plate load; between 50 and 65 ma. for the 2 tubes is a normal value.

(Continued on page 42)

Diagram of the 250 watt amplifier, using 2—808's in push-pull. A simple yet very effective power-supply is also shown.



What's New in S-W Apparatus



Above—The new Sargent model 50 marine type receiver. It is of rugged construction and covers the remarkable range of 13-550 and 750-2000 meters. (No. 713)

Universal Marine Type

8-Tube Receiver

Tunes 13-550 and 750-2000 Meters

● THIS receiver is a very interesting new type brought out by Sargent and has the remarkable tuning range of 13-550 meters and 750–2000 meters. This receiver is truly universal and will find many friends, especially among those who go in for yachting and motor-boating.

The receiving range is adequate to provide daily contact with Europe, the Americas and the Orient from any sea location in the world, say its sponsors. The short-wave section of the set is especially designed to provide highest efficiency on the 17, 19, 25, 31 and 49 meter S-W broadcast bands. Four of the six wave bands have been devoted to this purpose. As a result the sensitivity is correspondingly increased on the bands mentioned. Unusually high efficiency is found on the long wave band of 750–2000 meters, with a high degree of selectivity. The receiver noise level is kept very low by careful construction, design and complete shielding. The design engineers have eliminated tube hiss by using properly balanced amplification stages.

A new type of A.C.-D.C. operation has been provided; for A.C. operation the set is built to include regular A.C. equipment, a power transformer, rectifier, etc. By flipping a simple toggle-switch the set may be changed instantly from A.C. to D.C. operation, and with the hook-up provided in this set greater D.C. operating efficiency is claimed as there is no rectifier tube through which the D.C. has to pass.

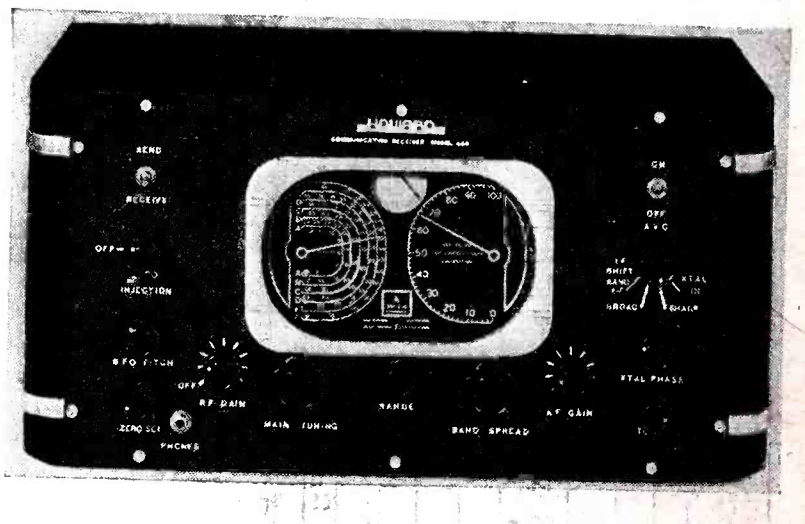
The model 50 receiver—as this set is known, consists of one stage of tuned R.F., detector-oscillator; 2 stages of I.F.; diode detector; pentode first audio stage and push-pull 43 output. A 6E5 tuning indicator "eye" is used and an 80 rectifier is also

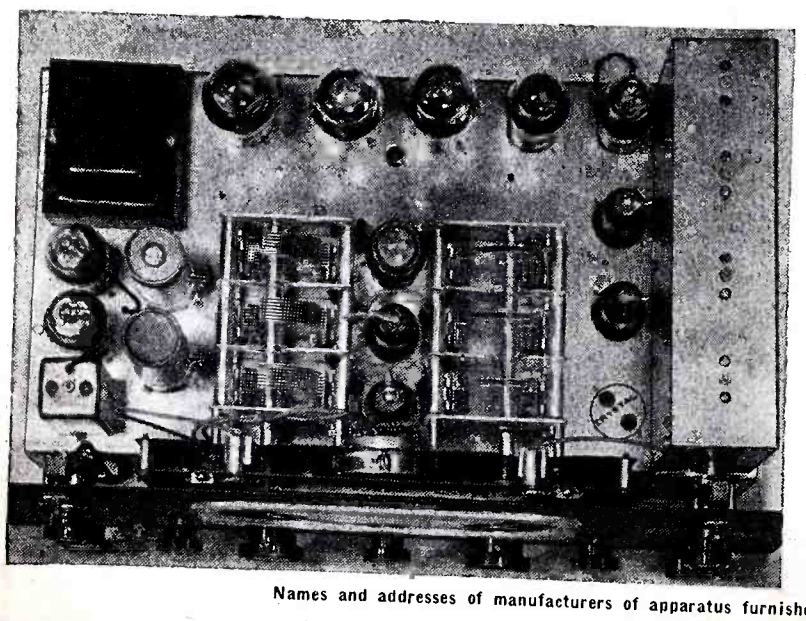
(Continued on page 53)

New 12-Tube Communications Receiver

● THE accompanying photographs show one of the latest communication receivers, known as the model 450. It has a frequency range from 540 kc. to 65 mc. and provides continuous coverage in six bands. The set provides eight watts of undistorted power output; its sensitivity is one microvolt or less on all bands, except the 5-meter band, which is about 10 microvolts for 100 milliwatt output.

Among the special features we find that a dual channel I.F. unit is employed, providing 1560 kc. for the 5 and 10 meter bands and 465 kc. iron-core stages for the other bands. With the same





Above—Front view of the 12-tube receiver. Left—Top view, showing well arranged and highly efficient layout. (No. 714)

switching knob, the I.F. has two other settings, one for *broad* tuning and one for *sharp* tuning. The R.F. coils are built into the band-switch very compactly and thus eliminate secondary leads. The oscillator and R.F. circuits use air-tuned condensers. For the 5-meter band a special terminal is provided for the use of a *separate* antenna. All the bands except that for 5-meters have an R.F. stage.

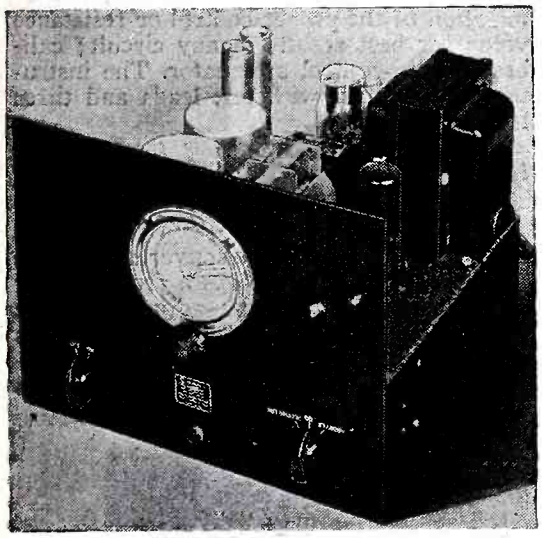
Electric band-spread is furnished with a separate three-gang condenser and a calibrated R meter for measuring the signal strength is a valuable feature found in this receiver. The set is of reasonable size, measuring approximately 21" long by 11" deep by 10½" high and its weight, with loudspeaker, is 50 lbs. The separate permanent-magnet type speaker cabinet measures 11" wide, 6" deep and 10" high.

One outstanding feature of this handsome appearing receiver

(Continued on page 54)

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

A HAM BAND "SIGNAL SHIFTER"



New "Signal Shifter." (No. 715)

● A NEW variable frequency electron coupled exciter unit designed for use with amateur transmitters enables the operator to change the transmission frequency from his operating desk.

This signal shifter is link coupled directly to the final stage of a low or medium powered transmitter, or to the preceding amplifier in a high-power transmitter. Output is more than sufficient to drive a conventional power stage such as an RK20, 802, 807, etc., directly on the operating frequency without further doubling.

Five sets of plug-in coils provide for operation on 10, 20, 40, 80 and 160 meters. The oscillator is a high C electron coupled arrangement fed into a dual buffer stage. A crystal is not used but frequency stability is very good. In operating on any of the Ham bands, the operator may change his frequency within that band by adjusting the vernier tuning dial on the signal shifter without retuning the main transmitter and without a great amount of loss in efficiency. The unit employs a 6F6, a 6L6 and an 80 tube.

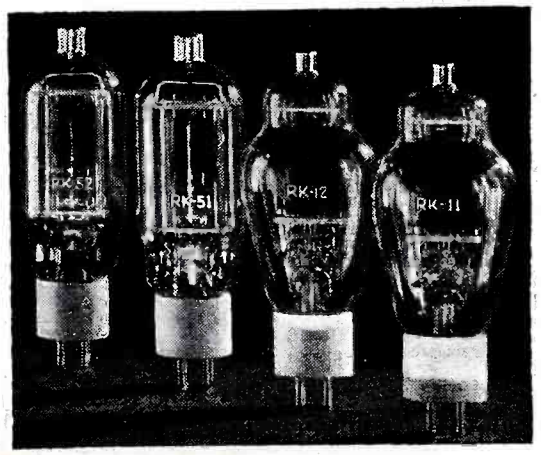
This article has been prepared from data supplied by the courtesy of the Meissner Mfg. Co.

NEW AMATEUR TUBES

● FOUR new RK tubes are now available to amateurs. All of them are low cost triodes, employing heavy thoriated filaments.

The RK11 is a triode power amplifier for use as a power amplifier oscillator or frequency multiplier. It has a mu of 20.

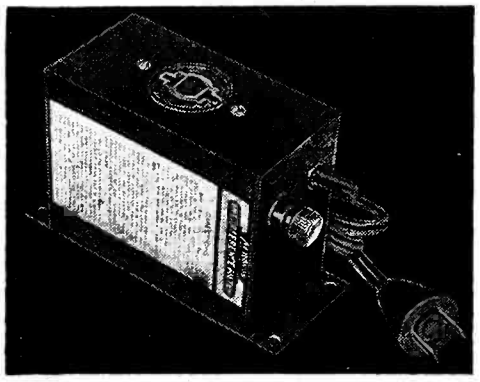
The RK12 is a zero bias modulator tube capable of delivering 100 watts with very low distortion in class B push-pull. This tube is particularly suited to buffer amplifier applications. The RK11 and RK12 have power outputs of 55 watts each.



The RK51 is a triode power amplifier oscillator or frequency multiplier with an output of 170 watts and a mu of 20. This tube has a carbon plate and an Isolantite base. The RK52 is a high mu zero bias triode with a low idling current. It may be used as a power amplifier modulator or frequency multiplier. The power output is 135 watts. This tube also has a carbon plate and Isolantite base.

All of these tubes are particularly suited to R.F. applications. (No. 697.)

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



LINE NOISE ELIMINATORS

● FIVE plug-in devices are now available for attachment to the line-cord of all-wave receivers for reducing interference coming in through the light lines. A sixth unit is available in a rectangular case and provided with an attachment plug, a receptacle and a grounding post for use where interference is exceptionally severe. The units consist of a combination of inductance and capacity. (No. 706.)

This article has been prepared from data supplied by courtesy of the Aerovox Corp.

COMPACT VELOCITY MICROPHONE

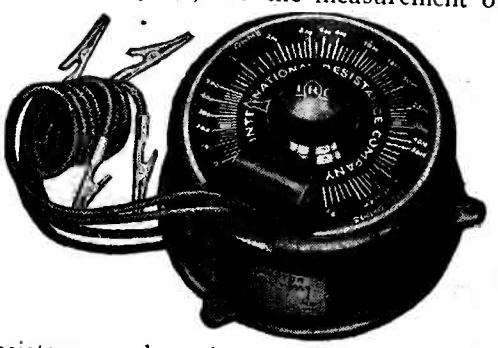
● A NEW velocity mike of compact size has a head size of only 1¼" x 2⅜" x 1⅜". Although it weighs but 1 lb. it is complete with an output transformer, cable connecter and switch. The case is of molded rubber trimmed with chrome. It may be used as a hand mike as well as for stand mounting. The output is –70 db. into an open line. Frequency response is ±2 db. from 60 to 7500 cycles.

The mike is available in high or low impedance with 25 ft. of cable. (No. 711.)

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

A NEW RESISTANCE INDICATOR

● A DIRECT-READING resistance analyzer and indicator has many uses. A direct reading calibrated dial covers the range from 0-1 megohm. Some of the item's many uses are: resistance or volume control analyzer; for the measurement of



resistance values by substitution; determination of the proper control or resistance value for best results in any circuit; calibrated gain-control attenuator. The instrument is supplied with test leads and three fuses. (No. 703.)

This article has been prepared from data supplied by the courtesy of the I.R.C.

POLICE BAND ADAPTER

● A NEW police band converter for use with auto radios employs a preset tuning condenser which may be adjusted in the range from 1500-2500 kc. Two metal tubes are used in the converter, a pentagrid converter and a pentode. The pentode provides

a stage of preselection ahead of the mixer. The output I.F. of the converter is variable from 600-700 kc. (No. 710.)

This data has been supplied by the courtesy of the ABC Radio Laboratories.

OTHER DX

VP2LO, 6.38 mc., St. Kitts, B. W. I., verifies very promptly, and in a letter received from the station engineer, gives following data: VP2LO is testing each day from 4-4:45 p.m., E.S.T., and using 100 watts during test. Full power is 500 watts.

QSL cards are now being printed, and will soon be sent to all reporting VP2LO. The engineer adds that VP2LO is the first transmitter of the newly inaugurated Caribbean Broadcasting Service.

VP2LO's QRA: ICA Radio Sales & Service, P. O. Box 88, St. Kitts, B. W. I.

RADIO TANANARIVE, 10.95 mc., in Madagascar, reported at noon, during Feb., by G. C. Gallagher, W6. F.B. OM!

HAM STARDUST

Regarding our Special program from CN8AJ on 20 and 40 meters, we wonder how many DXers tried for CN8AJ? All those who did were no doubt astounded by the terrific signal "OM" Rene poured into the U.S.A., especially on 40 meters! We have heard some good DX on 40 meters, but never have we heard anything like the signal CN8AJ put into New York, and most likely, the whole U.S.A.!! R99++ would be only a fair rating, as when we heard Rene, and then our former Brooklyn resident, and friend, Jack Bohana speaking, the signal actually hurt our ears to listen to, and with no fading whatever on 40, was about the most perfect "sig." we've ever heard from Africa on 40 meter phone!!

We wish to add that we certainly did get a thrill to hear Jack announcing our name over the air, all the way from Morocco, and Jack adds in a letter just

Let's Listen In with Joe Miller

(Continued from page 23)

received that English DXers reported CN8AJ's signals were well received.

On 20 meters, CN8AJ hit R9 peaks, but faded badly in surges, conditions not being very good for 20 meters from Africa, at 1 a.m., but altogether, the special was a grand success, and enabled many to "log" their first 40 meter African phone.

David Styles, W2, reports a FB catch in J2NS, Japan, which OM Dave heard at 12:37 a.m. on 14290, while J2NS was in QSO with VE5OT, Vancouver. An ace, OM, congrats!

AFRICA

CN8AH, 14100; CN8AM, 14100, also 14075; CN8AV, 14105; CN8MN, 14110; CN8MU, 14105, in Morocco, heard afternoons, 2:30-5 p.m.

ZS6AJ, 14100; ZS3F, 14310; ZS6EF, 14385; ZS5M, 14015; ZU5Z, 14120; ZU5M, 14110; ZS6S, 14120; ZS6AA, 14350; ZS6AJ, 14070; ZS2X, 14050; ZS5CA, 14115, all in South Africa heard during Feb.

OQ5AA, 14080, Belgian Congo, 11-12 p.m.; SU1RD, 14340; SU1RK, 14045, in Egypt. 1RD at midnight; 1RK at 4:15 p.m.

In Europe, reception was very good for a week or two during Feb., from 1-3:30 a.m. on 20 meters, the following being heard during 2 nights. ES5D, 14060, Esthonia, R9 solid; LA2G, 14100, LA8C, 14130, Norway; HB9BL, 14500, Switzerland; ON4AJ, 14140, Belgium; SM7YA, 14040, Sweden.

Ralph Gozen also submits, *besides* these reported, I1IY, 14330, Italy; HB9CL, 14040; HB9AY, 14120, Switzerland, in the early a.m.'s. Ralph also heard HB9BL, 14500, 7 p.m., HB9BG, 14120, 6 p.m. In Africa, Ralph ran into CN8MT, 14070; CN8MU, 14100, in early a.m.'s, and CN8MI, 14100, CN8MA, 14100, afternoons.

Murray Buitekant, W2, reports ES5D, ZS5M, CN8AU, 14020, FB!

VP1DM, 14120, British Honduras, heard at 1:20 a.m. and, as ZIK2 probably won't QSL, as reported, we will depend upon verifying British Honduras through VP1DM. Ralph Gozen already reports QSL, a rather plain one, *but it counts!*

Mario Bruscia, W2, reports LA1F, SM7YA, ES5D and PAOMQ.

By the way, you fellows who don't tune for G's, did you know that G6IA and G8MF are two separate countries, apart from the British Isles? Yes, indeed! G6IA is located on the Isle of Man, in English waters, as is G8MF, located in the Channel Islands. Both islands are a part of Great Britain, but the I.D.A., and QST say they are new countries, so they are! Both are frequently heard on 20, and G6IA recently heard on 10 at 9 a.m.

As we write this, at 2 a.m. we decided to try for VR6A, and sat down to the dials of the FB *Super Skyrider*, and in 10 minutes had located, and obtained a good "log" on VR6A! Just like that, hi! So we add a new country to our long list!

Aside from Gs, Fs, etc., we have heard ZS6T, 28200, ZS6S, 28200, So. Africa, CN8MA, 28200, CN8AV, 28200, Morocco.

Ralph Gozen reports ES5D on 28050, and I1IT, 28000, 8-10 a.m.

The Africans heard were on later, near noon, E.S.T., though CN8AV was heard also at 9 a.m.

BOOK REVIEW

MATHEMATICAL TABLES—Fifth Edition, compiled by Charles D. Hodgman, M.S. Stiff leatherette covers; size 5½" x 8"; 312 pages, published by The Chemical Rubber Publishing Co., Cleveland, Ohio.

Every reader interested in electrical or mechanical design or mathematical studies in general, will find this book of tables extremely valuable. They are printed in large, clear, readable type on good quality paper. The useful tables of anti-logarithms, five-place logarithms, and logs of trigonometric functions are given. These tables are followed by those giving natural trigonometric functions, natural logarithms, hyperbolic functions, squares, cubes and roots. Later we find tables of factors and primes, an elaborate set of interest tables and commutation columns.

The closing sections of the book deal with the calculus, with numerous examples of different formulas; then comes a section on algebra and the mathematics of statistics.

AIR-COOLED TRANSMITTING TUBES—Technical Manual TT3, published by the RCA Mfg. Co., Harrison, N. J.

Every licensed amateur and embryo amateur who is thinking of building a transmitter and getting started in the Ham game, should have a copy of this valuable book on transmitting tubes.

How transmitting tubes operate and why different types of tubes are necessary, is explained in this booklet which contains pictures and technical data on all of the RCA air-cooled transmitting tubes, including hints on their installation and application. The book contains a considerable number of useful formulas, and also has a section describing the different types of amplifiers; how to neutralize tubes; interstage coupling; parasitic oscillations; calculating the size of condensers and coils for tuned circuits; grid bias; how transmitting tubes are rated and why; table showing tube ratings versus operating frequency.

Twenty-two diagrams, covering all types of oscillators, amplifiers, and modulators are given, with values of all the condensers and resistors in the circuits.

A New Transmitter Guide

● AN unusually well edited book illustrating and describing a wide range of transmitters has just been issued by Thordarson.

The book consists of 48 pages, 8½ x 11", printed on heavy coated paper. There are 95 photos illustrating Transmitters, Power Amplifiers, Buffers, Exciter Units, Modulators, Power Supplies; also 15 working diagrams with parts lists, coil data and other technical information.

Large size graphs with complete data on "Determination of Correct Driver Transformer Ratio" and "Multi-Match Modulation Transformer Ratios" will be found instructive.

This book was prepared by six engineers, all of them licensed Hams. The following size transmitters are described in complete diagrams. 100, 150, 250, 400, 500, 600, and 1,000 watt units. A 5 and 10 meter transmitter is also described. A great deal of technical data is included, covering class A and B calculations, bias supply circuits, and many other subjects of interest to every Ham or anyone studying to become one.

This valuable guide will be supplied at the nominal cost of fifteen cents prepaid. Ask for book No. 107A, Readers' Technical Service Department, Short Wave & Television, 99 Hudson St., New York, New York.

Compact 250 Watt Amplifier for the Ham Station

(Continued from page 37)

List of Parts

NATIONAL

1—100 mmf. split stator condenser (TMC)
1—100 mmf. condenser (TMC)
2—N-800 neutralizing condensers
1—Coil socket (XB5)
3—Forms (XR13)
3—Plugs (PB5)
1—R.F. choke (154-U)
4—4 prong sockets
4—Large grid clips
2—Small grid clips

TRANSFORMERS*

1—7.5 V. 8 A. fil. transformer
1—2.5 V. 10 A. fil. transformer
1—300 ma. swinging choke
1—1500-1250 V. plate transformer

I.R.C.

1—50,000 ohm 75 W. resistor
1—2000 ohm 20 W. resistor

CORNELL-DUBILIER

1—.001 mf. 1000 V. mica condenser
1—2 mf. 2000 V. oil-filled condenser

R.C.A.

2—866 tubes
2—808 tubes

PAR-METAL

1—19 x 8¾" panel
1—2 x 17 x 13" chassis

TRIPLETT

1—300 ma. milliammeter

*Most radio mail order houses can supply these items, if properly identified as to title of article, issue (month and year) of SHORT WAVE & TELEVISION.

Coil Data (Plate)

80 M. 30 turns No. 12, dia. 2½ in. length winding 3⅝ in.
40 M. 20 turns No. 12, dia. 2¼ in. length winding 3 in.
20 M. 10 turns No. 12, dia. 2¼ in. length winding 3¼ in.

All link coils for the grid are two turns. The links for the plate are of the number of turns to provide proper load, if a low impedance antenna feeder-system is used.

Grid Coils

Band	*Turns*	*Wire*
80 m.	40	No. 18 tinned
40 m.	24	No. 16 tinned
20 m.	16	No. 16 tinned

Wound full length on XR13 form.

World S-W Stations

(Continued from page 28)

Mc.	Call	
6.050	HP5F	COLON, PAN., 49.59 m., Addr. Carlton Hotel. Irregular.
6.045	XETW	TAMPICO, MEXICO, 49.6 m. Irregular 7-11 pm.
6.042	HJ1ABG	BARRANQUILLA, COL., 49.65 m., Addr. Emisora Atlantico. 11 am.-11 pm.; Sun. 11 am.-8 pm.
6.040	W4XB	MIAMI BEACH, FLA., 49.65 m. Off the air temporarily.
6.040	WIXAL	BOSTON, MASS., 49.65 m., Addr. University Club. Exc. Sat. 7-9 pm.
6.040	YDA	TANDJONGPRIOK, JAVA, 49.65 m., Addr. N.I.R.O.M., Batavia, 10.30 pm.-2 am.; Sat. 7.30 pm.-2 am.
6.033	HP5B	PANAMA CITY, PAN., 49.75 m., Addr. P. O. Box 910. 12 n.-1 pm., 7-10.30 pm.
6.030	VE9CA	CALGARY, ALTA, CAN., 49.75 m. Thur. 9 am.-1 am.; Sun. 12 n.-12 m.
6.030	OLR2B	PRAGUE, CZECHOSLOVAKIA, 49.75 m. (See 11.875 mc.) 4.40-5 pm. Mon., Tues., Thur., Fri.
6.023	XEUW	VERA CRUZ, MEX., 49.82 m., Addr. Av. Independencia 98. 8 pm.-12.30 am.
6.020	DJC	BERLIN, GERMANY, 49.83 m., Addr. (See 6.079 mc.) 10.40 am.-4.30 pm.
6.018	ZHI	SINGAPORE, MALAYA, 49.84 m., Addr. Radio Service Co., 2 Orchard Rd. Mon., Wed. and Thurs. 5.40-8 am., Sat. 10.40 pm.-1.10 am.
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, 6-9 pm.
6.010	OLR2A	PRAGUE, CZECHOSLOVAKIA. 49.92 m., Addr. (See OLR, 11.84 mc.) 4.40-5 pm. Mon., Tue., Thur., Fri.
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	9MI	S. S. KANIMBLA, 49.92 m. (Travels between Australia and New Zealand). Sun. around 7 am.
6.010	CJCX	SYDNEY, NOVA SCOTIA, 49.92 m. Relays CJCB 7 am.-1 pm., 4-8 pm.
6.007	ZRH	ROBERTS HEIGHTS, S. AFRICA, 49.94 m., Addr. (See ZRK, 9.606 mc.) Daily exc. Sun. 10 am.-4 pm., Sat. till 4.45 pm.; Sun. 8 am.-12 n., 12.15-3.15 pm.
6.005	HP5K	COLON, PAN., 49.96 m., Addr. Box 33. 7-9 am., 11.30 am.-1 pm., 6-11 pm.
6.005	CFCX	MONTREAL, CAN., 49.96 m., Can. Marconi Co. Relays CFCF 7.45 am.-1 am.; Sun. 9 am.-11.15 pm.
6.005	VE9DN	DRUMMONDVILLE, QUE., CAN., 49.96 m., Addr. Canadian Marconi Co. Sat. 11.30 pm.-2 am.
6.004	RV59	MOSCOW, U.S.S.R., 49.97 m. Irregular. 3-6 pm.
6.002	CXA2	MONTEVIDEO, URUGUAY, 49.98 m. Addr. Rio Negro 1631. Relays LS2, Radio Prieto, Buenos Aires. 11.30 am.-11.30 pm.
6.000	ZEA	SALISBURY, RHODESIA, S. AFRICA, 50 m. (See 6.147 mc., ZEB.) Also Sun. 3.30-5 am.
6.000	XE8T	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.
5.968	HVJ	VATICAN CITY, 50.27 m. 2-2.15 pm. daily; Sun. 5-5.30 am.
5.940	TG2X	GUATEMALA CITY, GUAT., 50.47 m. 4-6, 9-11 pm.; Sun. 2-5 am.
5.940	PJC1	CURACAO, DUTCH W. INDIES, 50.47 m., 6.36-8.36 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.
5.913	YV4RP	VALENCIA, VEN., 50.71 m. Irreg.
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.
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.
5.892	HH2S	PORT-AU-PRINCE, HAITI, 50.89 m., Addr. P. O. Box A103. 7-9.45 pm.
5.890	JIC	TAIHOKU FORMOSA, 50.9 m. Works Tokio 6-9 am.
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.
5.853	WOB	LAWRENCEVILLE, N. J., 51.26 m., Addr. A.T.&T. Co. Works Bermuda nights.
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.
5.830	TDD	SHINKYO, MANCHUKUO, 51.46 m. Works Tokio 6-9 am.
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.
5.800	YV5RC	CARACAS, VEN., 51.72 m., Addr. Radio Caracas. Sun. 8.30 am.-10.30 pm. Daily 7-8 am., 10.30 am.-1.45 pm., 3.45-9.30 pm.
5.790	JVU	NAZAKI, JAPAN, 51.81 m. Irreg.
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.
5.740	TGS	GUATEMALA CITY, GUAT., 52.23 m. Irregular.
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.) 5.15-5.30 pm. Wed. & Sat.
5.145	PMY	BANDOENG, JAVA, 58.31 m. 5.30-11 am.
5.077	WCN	LAWRENCEVILLE, N. J., 59.03 m. Addr. A.T.&T.Co. Works England late at night irregularly.
5.025	ZFA	HAMILTON, BERMUDA, 59.65 m. Works N.Y.C. irregularly at night.

(Continued on page 59)

Short Wave Scouts

The Forty-Ninth Trophy Presented to

SHORT WAVE SCOUT

ARTHUR NUGENT
R. 1,
Flat Rock, Ind.

Honorable Mention

H. SEIXAS
Brooklyn, N. Y.

●

Final contest won with 79 cards

● THIS month's winner submitted a list of 102 stations, 85 of which were from foreign countries. Only 79 of the cards were allowed after examination, so Mr. Nugent wins the trophy with 79 verifications. The runner-up submitted 36 cards.

The receiver was an 18-tube Midwest, together with a Midwest doublet antenna. To Mr. Nugent goes the honor of being the winner of the last of the long series of trophies.

●

THIS IS THE LAST TROPHY CONTEST

Because the Editors believe the original purpose of these contests (that is, the popularizing of long-distance short-wave reception) has been fulfilled, we have decided to discontinue the award effective with this month's contest, which closed February 24.

However, the editors would welcome comments on this step from readers. If sufficient and widespread interest in the trophy award seems evident it is possible that the contests will be resumed.

2-Tube Five-Meter Receiver

(Continued from page 19)

will oscillate or super-regenerate with only a moderately loud rushing noise when heard on a speaker with R3 "wide open," and R2 set about half scale.

After adjusting the number of turns on L2 to locate the band, most signals will come in loud and clear.

On a night when the transmission conditions are favorable, 5-meter stations in the 2nd district are heard clearly and sometimes we pick up stations in the 3rd district, which frequently come in with a strength of R7 and better. As the antenna is only about 90 ft. above sea level, we consider this reception excellent. Here are a few of the stations heard on this set:

W2DKJ—Long Island—R6 to R8
W1FHN—Eastern, Conn.—R7 to R9
W1IJ—Madison, Conn.—R8
W1BCR—Scituate, R. I.—Too loud!
W1FZU, W1GDJ, W1IYS—Fall River, Mass.—R9+ —R9 —R8—9
W1KCS—Providence, R. I.—R9
W1KNH—Cranston, R. I.—R8
W1HRZ—Edgewood, R. I.—R9 to 9+
W1ZE—Cape Cod, Mass.—R9+++

All these stations are over 35 miles distant, with the exception of the Fall River stations, which are about 15 miles away, air-line, but some 250 to 300 foot-hills lie between them and Newport.

Enter this Interesting Contest!

Writing ADVERTISING is not only FASCINATING but PROFITABLE.

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

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

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

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

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

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

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

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

Checks will be promptly mailed to all prize winners by

EMIL GROSSMAN, *Director of Advertising*
SHORT WAVE & TELEVISION
99 Hudson Street, New York, N. Y.

Parts List

SOCKETS*

1—6 prong isolantite socket (89)
1—6 prong bakelite socket (42)

RESISTORS*

R1—500,000 ohm ½ watt resistor
R2—100,000 ohm potentiometer (variable)
R3—½ megohm variable potentiometer
R4—600 ohm 2 watt resistor
R5—20,000 ohm 2 watt resistor
R6—25,000 ohm 2 watt resistor

CONDENSERS*

C1—.000015 mf. midget variable condenser (isolantite insulation)
C2—.000050 mf. postage-stamp size fixed condenser
C4—.00025 mf. fixed condensers
C3—.1 to .5 mf. paper or tubular by-pass condenser
C5—25 mf. 40 volt electrolytic condenser

R.C.A. (Tubes)

1—89 tube
1—42 tube

TRIMM

1—Pair "Featherweight" phones

MISCELLANEOUS*

RFC1—RFC2—60 turns of No. 30 D.C.C. or D.S.C. on ¼" dia. dowel close-wound
1—Audio transformer 2 to 1—(T)
L1—6 turns No. 14 wire, ½" dia. coil
L2—9 turns No. 14 wire, ½" dia. coil
Steel cabinets—6" x 6" x 6"

**Most radio mail order houses can supply these items if properly identified as to title of article, issue (month) of SHORT WAVE & TELEVISION and year.*

W2KGY—Calling "CQ"

(Continued from page 13)

they can get better results with the da-dit (code) system.

The primary reason for the club was to instill in the cadets an interest in the Signal Corps branch of the army. This year quite a number of men have taken the Signal Corps for their branch. At present there are approximately sixteen operators at the U. S. Military Academy. Six of these men are Class A operators and the other ten are Class C. They will proudly show you their QSL cards and you can see for yourself what strides the club has made since its birth. A QSL card is exchanged between stations when contact has been made. W2KGY has cards from fifty-seven different countries.

Courtesy The Pointer, official organ of the U. S. Military Academy, West Point, N. Y.—Photo by Spicer.

New Silver Trophy

(Continued from page 17)

If the picture you have, or may take of your station is not sharp or clear, or at least 5" x 7" in size, it would be best to have a commercial photographer take a picture of the station, or else have a friend who owns a good camera take it.

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

Build Your Own Television Receiver

(Continued from page 33)

ployed. The first, for the loud-speaker, is on the right-hand side looking from the front. It contains 2 terminals. The second at the rear right-hand side has 8 terminals and is for the 700 volt supply, the two 2½ volt supplies and the 6.3 volt supply of the sweep system. The third, having 4 terminals, is for the 300 volt supply and the 6.3 volt filament source for the receiver chassis and is located on the left side of the chassis.

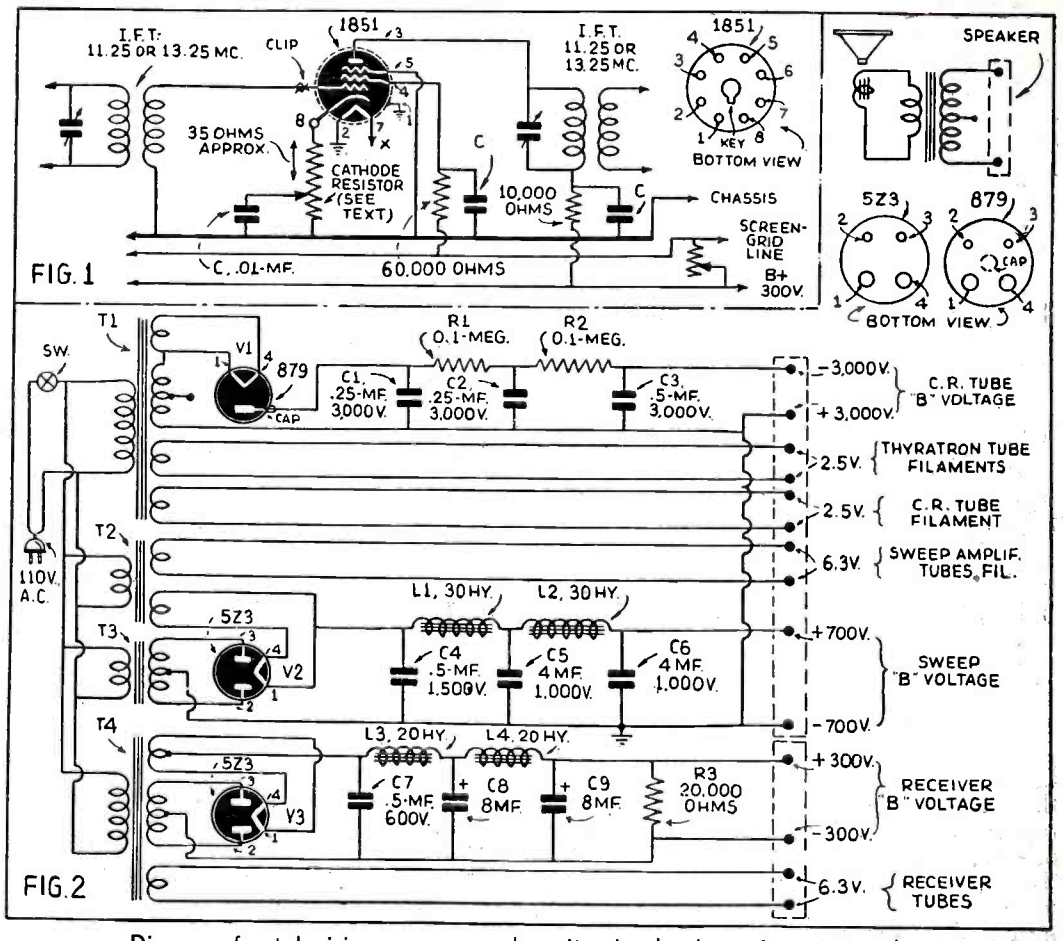


Diagram for television power supply unit; also hook-up for 1851 tube.

The output of the 2400 volt supply is taken directly from the terminals on the ½-mf. high-voltage condenser at the output of the filter located at the rear right-hand side looking from the front. This eliminates the need for special terminals or stand-off insulators which are both bulky and awkward to mount on the already crowded chassis.

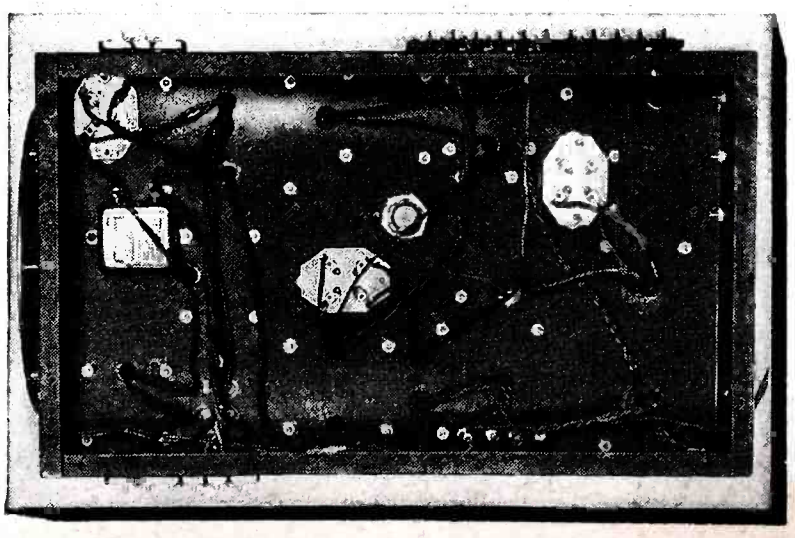
The wiring of the high-voltage supply lines of both 700 and 2400 volt systems is done with special-insulated wire which will safely withstand the high voltage.

It is necessary to provide insulating grommets at the points where high-voltage wires pass through the chassis. This includes any filament wires which are separated from the chassis by a high "B" voltage, such as the C.R. tube filament. As a matter of fact it is well to use grommets at every point where wires must pass through the chassis to prevent chafing of the insulation.

When all the wiring is completed, the power supply for the receiver chassis can be connected to the receiver and final adjustments made on the receiver. However, since there is no load provided on the power supply chassis for the 700 and 2400 volt supplies, these two units should not be connected to the line until the cathode-ray and sweep circuit chassis is constructed. The 110 volt leads from the transformers for these two units should be left disconnected until that time.

List of Parts

PAR-METAL
1—chassis 10" x 17" x 3", black crackle finish



Bottom view of the power supply unit for the television sight and sound receiver—note the simple wiring and also the substantial construction of the chassis.

A. B. Du MONT LABS. (Transf.)
1—type 148 transformer—2400 volts, T1

STANCOR (Transf., Chokes)
1—type 3699 transformer—1500 volts, center-tapped, T3
1—type P5009 filament transformer, T2
1—type P4080 transformer—700 volt, center-tapped with filament windings, T4
2—filter chokes, type C1420, 30 henries, L1 and L2
2—filter chokes, type C1410, 20 henries, L3 and L4

SOLAR (Cond.)
2—.25 mf. 3000 volt Transoil condensers, type XL-30-025, C1, C2
1—.5 mf. 3000 volt Transoil condenser, type XL-30-05, C3
1—.5 mf. 1500 volt oil-filled condenser, type XC-155, C4
2—4. mf. 1000 volt oil-filled condensers, type XL-10-4, C5 and C6
1—.5 mf. 600 volt oil-filled condenser, type XD-65, C7
1—dual 8. mf. dry electrolytic condenser, type DK-705, C8 and C9

I.R.C. (Resistors)
1—type AB resistor, 20,000 ohms, 10 watts, R3
2—type DG resistors, 100,000 ohms, 20 watts, R1 and R2

HAMMARLUND
3—Isolantite 4 prong sockets

RCA
1—type 879 tube, V1
2—type 5Z3 tubes, V2 and V3

WRIGHT-DeCOSTER
1—permanent magnet dynamic speaker, type NST900

MISCEL.*
1—power switch—220 volt, 10 amps.
1—2 terminal—terminal strip
1—8 terminal—terminal strip
1—4 terminal—terminal strip
Ten feet heavily insulated wire for H.V. leads
Miscellaneous grommets, screws, nuts, washers, etc.

RCA 1851 TUBE CHARACTERISTICS

Heater Voltage (A.C. or D.C.)	6.3	Volts
Heater Current	.45	Amp.
Direct Interelectrode Capacitances:°		
Grid to Plate	.02 max.	mmf.
Input	11.5	mmf.
Output	5.2	mmf.
Cap	Pin Cap	
Base	Small Wafer Octal 7-Pin	

TYPICAL OPERATING CONDITIONS

	*Condition I**	*Condition II** (see circuit Fig. 1)*	
Plate Voltage	300 max.	300 max.	Volts
Suppressor Voltage	0	0	Volts
Screen-Supply Voltage†	150	300	Volts
Screen Series Resistor	—	60000	Ohms
Cathode-Bias Resistor‡	160	160 *min.*	Ohms
Amplification Factor (Approx.)	6750	6750	
Plate Resistance (Approx.)	.75	.75	Megohm
Transconductance	9000	9000	Micromhos
Plate Current	10	10	ma.
Screen Current	2.5	2.5	ma.

° With shell connected to cathode.
* Condition I with fixed screen supply gives a sharp cut-off characteristic.
** Condition II with series screen resistor gives an extended cut-off characteristic for applications where gain is controlled by variation of grid bias.
† Screen-supply voltages in excess of 150 volts require use of a series dropping resistor to limit the voltage at the screen to 150 volts when the plate current is at its normal value of 10 milliamperes.
‡ The d-c resistance of the grid circuit should not exceed 0.25 megohm.

**Most radio mail order houses can supply this item if properly identified as to title of article, issue (month) of* SHORT WAVE & TELEVISION *and year.*

The 1938 Beginner's "Ham" Outfit

(Continued from page 35)

feed system to the center of a half wave antenna. The twisted pairs are brought to the transmitter, and the receiver is coupled to the line through a six inch piece of tin or lead foil wrapped around the feeders. This will not unbalance the line and the amount of r.f. present is too small to be measurable. We are using it with excellent results. In fact we do not even turn the receiver off when transmitting unless the frequency being received is less than 10 kc. separated from our own transmitter frequency.

Make all adjustments on 20 meters, or the highest frequency upon which operation is desired, and single-signal results with sensitivity the equal of most of the high-priced communication receivers will result. From a very poor location in a large apartment house we are enjoying remarkable results.

Receiver Coil Data

All Coils Wound with 1½" Diameter Forms

Band L1
160—60 turns No. 28 dsc tapped at 1½ turns.
80—30 turns No. 22 dsc tapped at 1 turn.
40—10 turns No. 22 dsc space wound to cover 2", tapped at ½ turn.
20—6 turns No. 22 dsc wound to cover 1", tapped at ¼ turn.
10—3½ turns No. 22 dsc wound to cover 1", tapped at ¼ turn.

Band L2
160—53 turns No. 28 dsc tapped at 7 turns.
80—27 turns No. 22 dsc tapped at 4½ turns.
40—9 turns No. 22 dsc space wound to cover 1" space, tapped at 2½ turns.
20—6 turns No. 22 dsc wound to cover 1", tapped at 1½ turns.
10—3½ turns No. 22 dsc wound to cover 1", tapped at 1 turn.
L3—100 turns of No. 26 dsc wire on a ⅝" dowel pin.

Power Supply

Little need be said of the power supply as it is quite orthodox, except the 8 mfd. filter condenser across the low voltage input to the receiver should be included as it materially reduces a.c. hum in the receiver. All components are UTC except the second choke which was chosen for its high resistance (750 ohms). It is primarily used to reduce the high voltage to a reasonable one for the receiver.

The use of a single high-quality supply for both receiver and transmitter operation materially reduces the cost of the station, and at the same time it is capable of further use later on when the station expands.

The 6L6 Transmitter

The 6L6 has performed admirably. It possesses high power sensitivity and large output, with low plate and screen voltages. It performs especially well in the tri-tet circuit. On the 40 meter fundamental of the crystal, and with a plate voltage of 425, screen voltage of 285 and a plate current of 165 milliamperes, 34 watts of r.f. power were measured in a dummy antenna. This dropped to 21 watts on the second harmonic of the crystal. Even on 10 meters we were able to measure 5 watts! We believe this power to be approximately 3 watts in our normal antenna system.

The antenna should be link coupled to the plate tank with a three turn coil (L2) wrapped around the center of the coil. No tuning is necessary and excellent results may be expected.

This particular type antenna, however, is only efficient on one band. If multiple band operation is planned some other antenna system, such as an end-fed Hertz, must be adopted.

Two crystals are used with a switching device to QSY when the QRM builds up on one frequency. This feature is well worth the slight additional cost of the extra crystal and holder. Having used it once we have decided never to be without it again.

For 40 meter operation use an antenna 33 feet long each side of center. A similar antenna should be 16 feet each side for 20 meters. The "V" shown at the center should be 12" x 12" x 12", i.e., each side of the "V" should be 12", and the insulator in the center of the antenna should either be 12 inches long or composed of enough small ones to total this measurement.

(Continued on following page)

The 1938 Beginner's "Ham" Outfit

(Continued from preceding page)

Transmitter Coil Data

All Coils on 1½ Inch Forms

Band	L1	L3
160	70 turns No. 22 dsc close wound.	Same.
80	35 turns, No. 22 dsc close wound.	Same.
40	10 turns No. 16 enameled wire space wound one diameter.	Same.
20	6 turns No. 16 enameled wire spaced one diameter.	Same.

L2 is a 3 turn coil of No. 12 rubber covered wire space wound over center of L1.

Receiver Parts

7" x 10" aluminum panel*
7" x 9" x 2" aluminum chassis*
3" x 5½" aluminum piece for "S" shield*
Two rivet-head screws to hold "S" shield to chassis*
1—Set of 4-prong coil forms, 1½" diameter*

HAMMARLUND
1—10 mmf. dual variable condenser (C1)
2—100 mmf. variable condensers (C2)
1—30 mmf. ant. condenser (C3)
4—Octal sockets
1—4-prong socket
2—4-prong isolantite sockets for coils

CORNELL-DUBILIER
C4—.01 mf. fixed condenser
C5—.1 mf. fixed condenser
C6—.001 mf. fixed condenser
C7—.0001 mf. fixed condenser
C8—.004 mf. fixed condenser
C9—.01 mf. fixed condenser
C10—10 mf. 25 V. electrolytic condenser
C11—.01 mf. fixed condenser

I.R.C.
R1—500 ohms, ½ watt resistor
R2—50,000 ohms potentiometer
R3—100,000 ohms 5 watts resistor
R4—50,000 ohms ½ watt resistor
R5—350 ohms 1 watt resistor
R6—400 ohms potentiometer
R7—2 megohm ½ watt resistor
R8—10,000 ohms 2 watts resistor
R9—100,000 ohms 1 watt resistor
R10—400 ohms 1 watt resistor

MEISSNER
1—Iron core I.F. transformer 465 kc.

R.C.A.
1—6L7 tube
1—6C5 tube
1—6F5 tube
1—6F6 tube

MISCELLANEOUS*
2—phone tip jacks
1—three-inch dial
2—silvered dials and knobs
2—grid caps
1—antenna ground post

Power Supply Parts

U.T.C.
1—Power transformer, 450 V. D.C. output when filtered, 6.3 V. filament supply, 2.5 V. filament supply (not used), and 5 V. supply
1—30 henry—250 ma. henry choke
1—30 henry 250 ma. choke, 750 ohms resistance

CORNELL-DUBILIER
3—8 mf. 475 V. filter condensers

I.R.C.
1—20,000 ohm, 75 watt bleeder

MISCELLANEOUS*
1—chassis 8" x 9" x 2"
1—power cord
1—spst switch, S.W.
2—4-prong tube sockets
2—4-prong male plugs
2—5-prong male plugs
1—5-prong socket
1—2 ft. 4 wire cable
1—2 ft. 5 wire cable

Transmitter Parts

1—8½" x 8" aluminum panel*
1—2½" x 6" x 5½" chassis*
6—No. 8 self-tapping machine screws*
1—metal cabinet 8½" x 8" x 6½"*

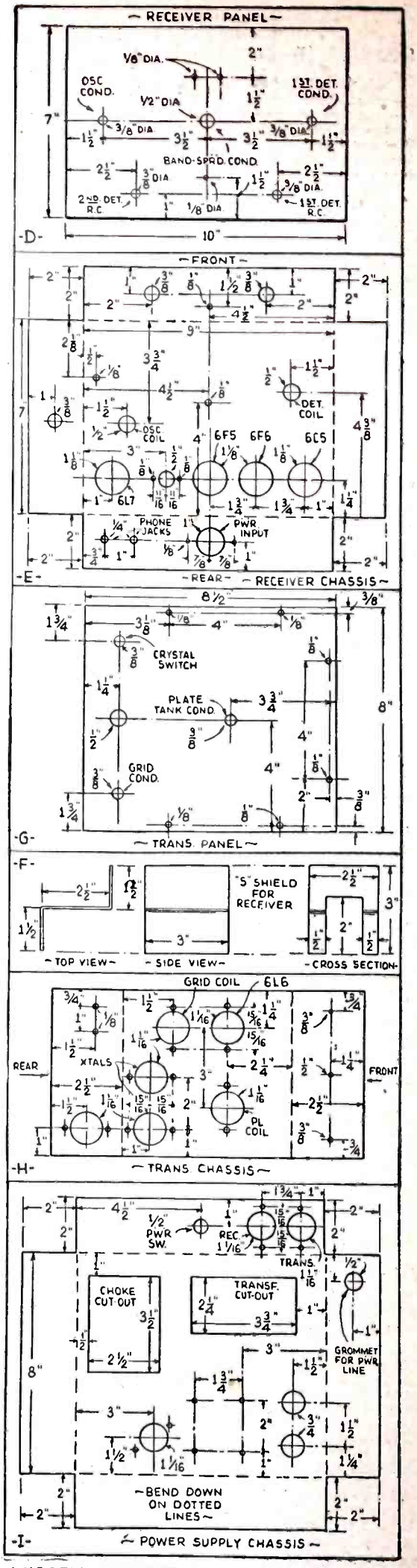
CORNELL-DUBILIER
2—.001 mf. fixed condensers (C3)

HAMMARLUND
2—100 mmf. variable condensers, C1 and C2
1—set of 4-prong coil forms; 1½" diameter
1—octal socket
1—5-prong socket
2—R.F. chokes (2.1 henry)

I.R.C.
1—150,000 ohms, 1 watt resistor, R1

BLILEY
2—crystals for each band desired (10, 20, 40, 80 or 160 meters)

R.C.A.
1—6L6 tube



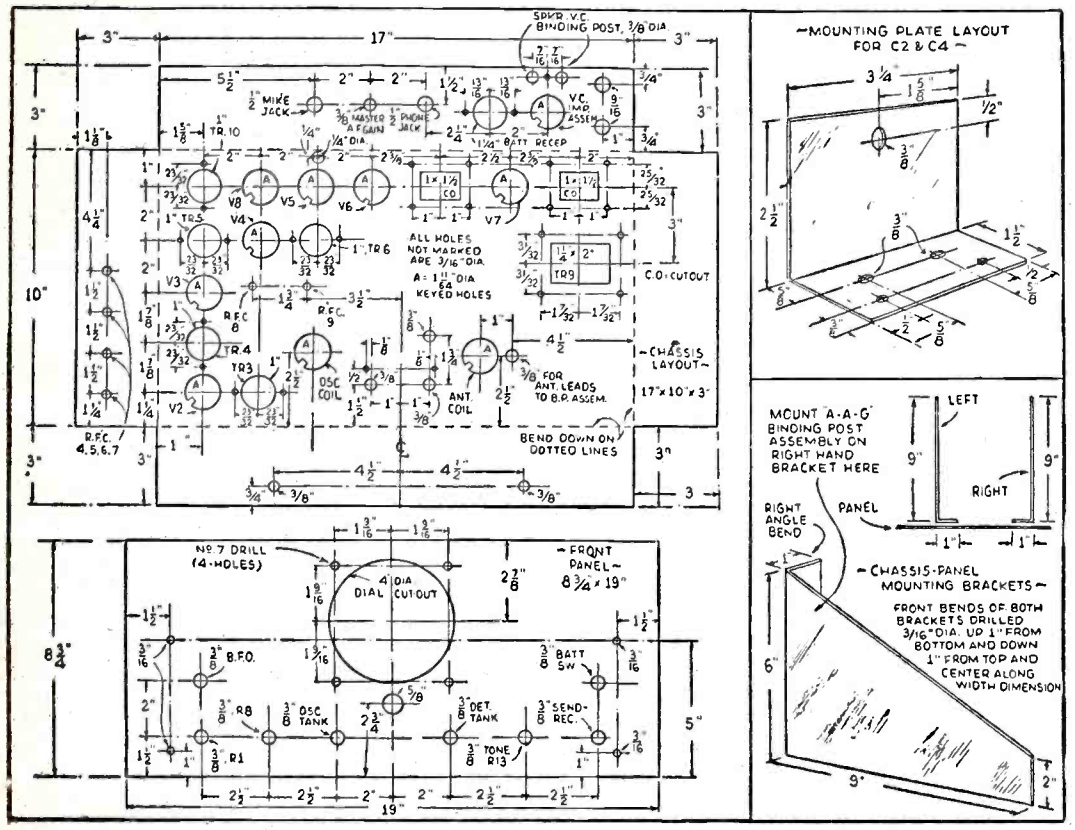
MISCELLANEOUS*
1—S.P.D.T. low-loss switch for the crystals (S1)
2—stand-off insulators
2—4-prong sockets
2—5-prong sockets
1—single closed-contact jack

**Most radio mail order houses can supply this item, if properly identified as to title of article, issue (month) of SHORT WAVE & TELEVISION and year.*

A Battery-Operated S-W Super

(Continued from page 31)

condensers permitting band spotting, with a two-gang trimmer employed for band spread. To keep coverage as wide as possible and the number of required coils to a minimum, however, particularly when using the 1500 kc. I.F. which we shall presently discuss, we were called upon to use a band spreader dial with dual pointers and scales, working with a ganged condenser assembly of unusually high (for a band-spreading set-up) maximum capacity. In set operation the tanks actually need not be changed much except with a change of coils, the main dial providing for both full or near-full coil coverage *and* automatic band spread.



Drilling layout for sub-panel and panel of receiver.

4. Use of a 1500 kc. I.F. brought up the problem of achieving maximum usable gain and maximum selectivity in the I.F. channel. We frankly wanted every inch of gain and selectivity of a high-efficiency AC powered single-stage affair using 456 kc., and iron cored transformers. Considerable experiment along this line finally proved that to provide this desired condition, with our second detector a diode acting as a low resistance across the secondary of the last or output transformer, we would have to use three iron-core stages at 1500 kc.

5. We at first desired infinite impedance detection—and AVC as well, but as the use of both would call for two tubes in a line-up which already looked to be pretty extensive, the infinite impedance idea was finally discarded and a typical diode-pentode second detector decided upon to provide for signal voltage rectification, AVC voltage rectification, and AF high gain amplification.

6. The receiver was to properly energize a speaker, and at least 2 watts of audio power were called for. As available single section pentodes promised nothing much more than 300 milliwatts in normal operation and 700 milliwatts under pressure, as the 1E7G double pentode offered simply 1 watt, and as the idea of push-pull or paralleled tubes didn't at all recommend itself because of the rather severe 'B' drains involved, we selected a type 1J6G (the equivalent of the older type '19, and a Class B job with desired output and a nominal plate drain of 10 Ma.), driving it with a single triode.

7. To extend the utility value of the receiver to maximum for communications use, we desired to provide for input and output changeover in the overall audio amplifier—the one from radio to crystal mike feed into the AF section of the diode-pentode, the other from speaker transformer to modulation transformer connection to the Class B power output plates. The refinement, indicated in lab. model illustrations and circuit drawing, may of course be conveniently eliminated by the individual builder who has no transmitter to modulate, or may be slightly changed so that the AF channel may be used for call service between the operations desk and some outlying point (such as the barn).

8. The receiver was to look like any standard communications job and was to involve no great costs of construction nor unusual battery drain. The photographs clearly illustrate how well we met the first of these objectives; and as for the second and third, an estimation of the total price

(Continued on following page)

A Battery-Operated S-W Super

(Continued from preceding page)

for all listed required components and a reference to drain figures of 31 Ma. max. on the "B" and .66 amp. on the "A" batteries, should suggest the low first and operating costs involved in the construction and use of this very modern and complete job.

The Tubes

All tubes are glass octals. And it might be stressed at this point that proper performance depends upon the use of the exact kind of tube specified for service in each stage's circuits. This is particularly true for the I.F. layout, which you will note employs two distinctly different types—a 1E5GT *screen grid* affair (sharp cutoff) in the first stage, and 1D5GP remote cut-off or super control pentode jobs in the second and third stages. The laboratory model was designed to incorporate, and duplications should similarly use, tubes of these and other *exact* type number.

The Circuit

The *front end* employs a 1D7G pentagrid converter, which initial experimental work proved to be a very efficient mixer when self-excited (no separate HF oscillator) down to and through wavelengths as low as 7 meters. As we have previously explained, no RF stage is used, the antenna coupling directly into the first detector tuned circuit. Separate tanks for detector and oscillator circuits have a maximum C each of .100 mmf. with the two gang main tuning condenser of .140 mmf. capacity to effect maximum coverage with any one set of four prong plug-in coils in place. Wiring here is quite familiar, following recognized and standard pentagrid connection practice. Detector stage grid bias is fixed at minus 3 volts to provide for maximum input sensitivity at all times. AVC is not extended to control this stage.

The first I.F. stage, employing the 1E5GT, is similarly free from automatic volume control and similarly provided with fixed –3 volt grid bias. Use of this particular tube, with the adjustment set for maximum conductance, increases the input sensitivity of the I.F. channel to weaker signal voltages.

Second and third I.F. stages, using the 1D5GP super-control pentodes, are gain controlled automatically—with manual control an optional feature (see fig. 2) provided through the use of a 7.5 or 22.5 volt C battery bridged by a bias-selecting potentiometer (R1). AVC on these stages becomes entirely sufficient for our purposes, leaving, as we have previously noted, converter and first I.F. stages wide open for weak-signal amplification.

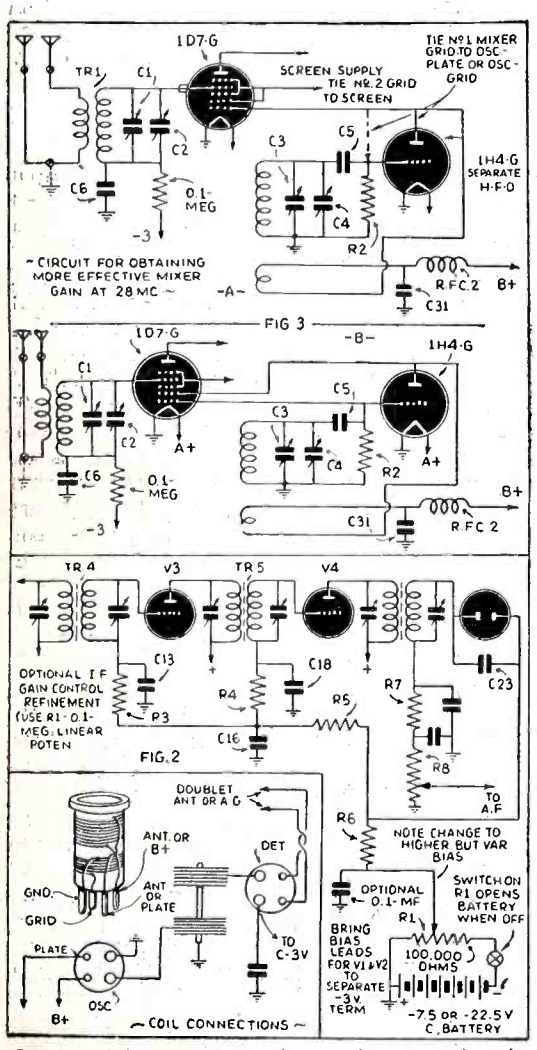
The second detector, strictly speaking, is one diode section of the duplex-diode—pentode 1F7G. The AF diode load resistor combination is the usual 50,000 limiting item (which may be omitted where modulation capability is not held important or where increased detector output to the AF channel is in order) and .5 meg. audio input level potentiometer. The remaining diode, RF fed through the small mica capacity C23, is used as AVC rectifier, the AVC load resistor (R6) returning not directly to chassis-ground but to the –3 volt bias for I.F. and first detector stages (in the case of fixed bias throughout) or to the optional potentiometer controlled voltage (Fig. 2) manually adjusting bias for the V3 and V4 grids.

The pentode section of the 1F7G is em-

ployed as high gain first audio stage. Note that in its grid circuit there is a second audio gain control—one which determines working level for the overall AF channel when microphone-fed for modulation purposes. The microphone—which must be the high output job specified if proper service is to be expected of it without additional voltage amplification through an extra stage—plugs into a two circuit jack, and when it is so plugged in, radio input to the AF channel is automatically disconnected. Bias for the pentode section of V5, by the way, is provided by a small 1.5 volt flashlight dry-cell.

V6, the driver triode, is a 1H4G transformer coupled to the 1J6G Class B output tube. TR8 is the modulation transformer, designed for 3,000 or 5,000 ohm loads (50 Ma. maximum secondary current); TR9 is the speaker output transformer; and SW2 permits quick changeover from the one to the other unit for 'send' or 'receive.'

An interstage jack permits headphone



Circuits of interest to those who may decide to build Mr. Adams' receiver, showing modified mixer hook-up and optional I.F. gain control.

output from V4. Plugging in the phones automatically opens the output stage filament connection so as to conserve on battery power where and when the speaker is not used; use of phones here does not conveniently permit *receive-send* changeover, however, as analysis of the circuit clearly shows. The circuit should use R15 and C29, by the way, if the recommended crystal headset is employed, as such a headset *must* be isolated from DC.

The beat oscillator circuit uses a second 1H4G, is quite familiar, and is more or less self-explanatory.

Layout—'Upstairs'

The chassis layout drawing and our photographs clearly illustrate socket, tuning condenser, and transformer placement. Note that the antenna coil socket is placed at the right, near the TR9 output component, while the HF oscillator coil socket lines up on the opposite side of the C2-C4 gang and near the input I.F. transformer TR3. TR10 and V8 placement for the BFO is at the left rear.

The mike jack, master AF gain control (R9), phone jack, battery cable receptacle, voice coil impedance matching unit (a brand new feature), speaker V.C. binding posts, and the two chassis connectors for 200-500 ohm line and modulation output line up along the rear chassis wall, as indicated. C1 and C3, the detector tank condensers, are the only items supported by the front chassis wall, all other knob controlled items (optional R1, radio output R8, tone R13, *send-receive* switch, and battery switch) being assembled on the panel.

Layout—'Downstairs'

Not much discussion of below chassis layout is required. V1, the converter, is mounted horizontally, with its socket toward the oscillator circuit tank and the TR3 input I.F. component so as to provide for short, direct leads to all associated coil and tuning components. Most of the shielded I.F. chokes line up along the side wall of the chassis, positioned for short plate and screen leads to the V2, and V3 sockets, with RFC8 and 9 for the last stage hanging from the base near V4's socket and the TR6 output I.F. transformer. Long leads across the width of the chassis from the output changeover switch to the two output transformers, and from R8 to V5 are run through low capacity shielding, and the leads from R13 to V6 should be held to be similarly screened, though this is not indicated in the under-chassis photograph.

Construction

It will be wise policy to secure specified items and to drill and cut the chassis and panel to precise layout drawing requirements. This will save much time, do away with anything like trial and error parts placement, and make possible a physical and electrical set-up of proven practicality.

With chassis, panel, C2-C4 mounting plate, and the panel-to-chassis mounting brackets formed and drilled to these layout specifications, and with the various required components on hand, it should not be difficult business to complete physical construction in short order. Simply study the circuit, drawings, and photographs carefully and position all major parts exactly as indicated, remembering that in the wiring-up of these parts all leads except those carrying DC should and are to be as short as possible and that associated components are to be grouped together.

On the right hand bracket, mount the antenna-ground binding post assembly, and drill both brackets and chassis side drops so that with brackets and R1, R8, R13, and switch components assembled on the front panel, various panel parts will clear the chassis *front* drop. The idea, of course, is simply to support the chassis by means of the panel brackets, with this clearance obtained, and with the whole assembly made definitely rigid and secure; bottom levels for both panel and brackets should be flush, by the way, so as to facilitate table mounting—but the chassis itself should be raised about half an inch from panel-bracket bottom level so as to permit a proper line-up of dial hub and C2-C4 shaft.

Wiring

The usual wiring precautions should be observed. They have been given so much attention in articles describing the construction of short-wave apparatus that they

(Continued on following page)

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:

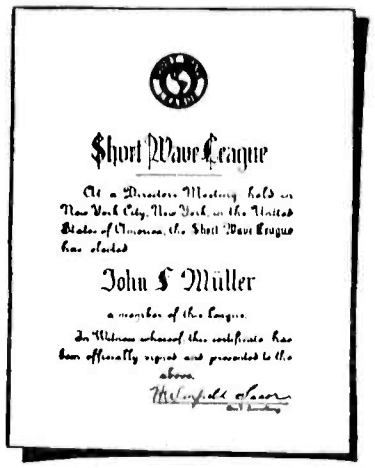
Dr. Lee de Forest, John L. Reinartz, D. E. Replogle, Hollis Baird, E. T. Somerset, Baron Manfred von Ardenne, Hugo Gernsback, Executive Secretary.

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, providing 10c in stamps or coin is sent for mailing charges.

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



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, 5-38
99-101 Hudson Street, New York, N. Y.

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

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

I own the following radio equipment:

Transmitting .....

Call Letters .....

Receiving .....

Name .....

Address .....

City and State .....

Country .....

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

A Battery-Operated S-W Super

(Continued from preceding page)

need not be again detailed here. The main idea is to keep all RF and AF leads short and direct, as we have previously observed, and to tie all by-pass and other returns to one convenient chassis point for each stage—preferably the grounded filament terminal of the associated tube socket.

Adjustment and Operation

Here are a few closing pointers regarding proper adjustment and operation.

1. Connect a three volt A battery temporarily to the filaments (no B battery "on"), remove any phones from the phone jack, plug in the various tubes, adjust R16 (a 2 ohm rheostat or simply an adjustable wire wound Truvolt) until the voltage at the filaments measures exactly *2* volts, then make definitely sure that points of plate, screen, general B plus, and bias potential do not short, or show low resistance reading, to the common A plus line.

2. With mike "out," connect up the "B" and "C" supply and make these measurements: all R.F. and I.F. plates 180 volts; R.F.-I.F. screens 67.5 volts; V5, HF oscillator, and BF oscillator plates about 100 volts; V6 plate 180 volts; Class B plates 135 volts; bias readings of –3 for V1-V2, variable or –3 fixed for V3 and V4, –1.5 for V5 pentode section, –4.5 for the driver tube.

3. Turn the *send-receive* switch to *receive* position for speaker output, plug in the microphone, and note if the AF system is properly working and provides room volume on mike speech.

4. Remove the mike, and with no R.F. coils in place, adjust the I.F. transformers to exactly 1500 kc. In the lab. model we have tied the no. *2* socket terminals for all pentode tubes to chassis—(B minus, A minus, C plus), connecting no. 7 terminals together for common A plus feed; this places the tube *suppressor* elements, which are internally connected to the no. 7 terminals, at a positive potential (with respect to ground) of two volts; and if, with the I.F. sharply peaked, there is a low frequency oscillation experienced, the common suppressor, or A plus, line should be bypassed to chassis by a filter condenser of sufficient capacity to prevent this effect—or the filament connection for one, two or all three I.F. tubes should be reversed, no. 7 terminals being grounded, no. *2* terminals being connected together for A plus.

5. Plug in one set of wound coils (referring to coil data for proper construction), connect in the antenna, and tune for signals (again referring to the coil data sheet for proper tank condenser settings with various inductances). If the TR2 circuit does not oscillate, reverse the plate winding leads, add turns or couple the winding more closely to the tuned grid one. When signals are heard, other coils should be tried and adjusted for proper coverage, HF oscillation, and maximum input efficiency.

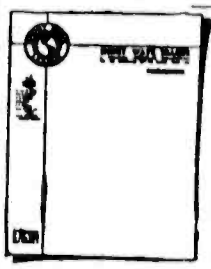
6. The BFO circuit is now tuned up until with the BFO switch 'on', a slight hiss or rushing sound is in evidence. The receiver is now completely ready for service.

On *send*, the audio system is used to plate modulate a low power transmitter or grid or suppressor modulate a medium power assembly. (On low power, plate modulation is definitely recommended due to its relatively high efficiency.) 2 watts of AF will 100% plate modulate 4 watts (plate input) of RF—or will modulate 6

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.



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**

A—50c per 100

WORLD GLOBE

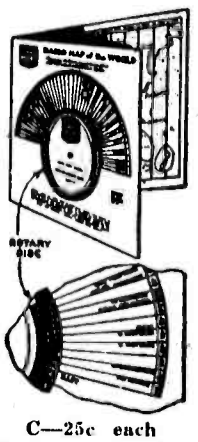
This important essential is an ornament for every den or study. It is a globe, 6 in. in diameter, printed in fifteen colors, glazed in such a way that it can be washed. This globe helps you to intelligently log foreign stations. The base is of solid walnut, and the semi-meridian of a nickel-like metal.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

D—Globe of the World ..... 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, 5-38
99-101 Hudson Street, New York, N. Y.
Gentlemen.

☐ I am a member of the SHORT WAVE LEAGUE
☐ Please send me application for membership in the SHORT WAVE LEAGUE

Please send me the following short wave essentials as listed in this advertisement:

.....
.....
.....
.....
.....

for which I enclose $...../. herewith.

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

(The LEAGUE accepts money order, cash or new U. S. Stamps in any denomination. Register cash and stamps.)

watts at 80%. The maximum DC flowing through the TR8 secondary should not exceed 50 Ma.

Coil Data

WIRE USED FOR ALL COILS—SPECIAL R.F. PUSH-BACK. *(This is a low-loss wire, the nearest possible thing to bare conductor).

COIL A—ANTENNA, TR1—9 to 21 meters, approx., det. tank setting variable.
Secondary (tuned) winding—3¼ turns spaced to ¾ inch of form length.
Antenna winding—approx. 4 turns, close wound.

COIL B—OSCILLATOR, TR2—9 to 21 meters, approx., osc. tank setting at zero.
Secondary (tuned winding) 3 turns, spaced similarly to A.
Plate winding 3½ turns, interwound with secondary.

COIL C—ANTENNA, TR1—19 to 31 meters, approx., with det. tank setting variable.
Tuned secondary—6¼ turns, spaced to one inch of form length.
Antenna winding—4½ turns, close wound.

COIL D—ANTENNA, TR1—31 to 45 meters, approx., with det. tank setting variable.
Tuned secondary—10¾ turns, spaced to 1½ inch of form length.
Antenna winding—4½ turns, close wound.

COILS CD—OSCILLATOR, TR2—19 to 45 meters, approx., with range 19 to 31 meters when used with Coil C and with oscillator tank setting at zero, and range from 31 to 45 meters, approx., when used with Coil D and with osc. tank setting at 100. Tuned winding—6¼ turns, spaced to 1 inch. Plate —4½ turns, close wound.

COIL E—ANTENNA, TR1—40 to 80 meters, with variable det. tank setting.
Tuned secondary—20 turns, approx., close wound.
Antenna winding—8 turns, close wound.

COIL E—OSCILLATOR, TR2—40 to 80 meters, with variable osc. tank setting.
Tuned winding—13 turns, close wound.
Plate winding—8 turns, close wound.

NOTES:
1. All plate or antenna winding spaced approx. ¼ inch from ground end of tuned windings to minimize capacitative coupling effects. (Except for 10 meter osc. coil.)
2. Reverse connections of plate windings if oscillation is not had, or increase number of turns.
3. Range figures are approximate. Individual coils should be trimmed down or up to maximum frequency limits as given or to other limits as required.
4. For strictly amateur work, where maximum bandspread must be obtained, use five prong coil forms and sockets, connecting the extra prong down on the tuned winding and to the main tuning condenser stator lugs until the desired spread is obtained. Spot with tank condensers. Do not expect above ranges to hold under such circumstances, however.

List of Parts

AEROVOX
Type 284 tubular
C6, 9, 10, 11, 8, 13, 14, 15, 7, 16, 19, 20, 26, 27, 33, 18 .05 mf. 200 V.
C24, 25, 30, 31—.1 mf. 200 V.
C12, 17, 29, 32—.25 mfs. 200 V.
C28—.002 mf.
Type 1468 mica
C5, 21, 22, 23—.0001 mf.
C34—.00025 mf.

HAMMARLUND
C1, C3—MC-100-M, or smaller tank condensers
C2, C4—dual gang type MCD-140-S
RFC1 and RFC2—CH-X RF chokes
SWF-4 and SWF-5 coil forms, as required

MEISSNER
TR3—1500 KC i-f trans, type 8091 input
TR4 and TR5—ditto, type 8095 interstage
TR6—ditto, type 8095 output
TR10—ditto, type 8175 BFO
RFC 3, 4, 5, 6, 7, 8, 9—shielded type 5582 RF chokes
SW1—type 18263 switch, adjusted for 4 P.D.T.

KENYON
TR7—type T-252 Class B driver trans. for 1J6G
TR8—type T-452 Class B output trans. for modulation of xmitter (out. imp. 3000 and 5000 ohms)
TR9—type T-302 Class B output for 200-500 ohm line and voice coils

I.R.C.
R7, 17, 2—50,000 ohm half watt insulated
R15, R18—30,000 ohm half watt insulated
R10, R14—100,000 ohm ½ W. insulated
R3, 4, 6, 12—250,000 ohms ½ W. insulated
R5, 11—500,000 ohms ½ W. insulated
R19—4 megs. ½ W. insulated
R1—100,000 ohms potent. (Optional, see fig. 2)
R8—.5 meg. radio af level control
R9—1 meg. master AF gain control
R13—1 meg. tone control
R16—2 or 3 ohms wire wound, to be shorted down to proper R, or 2 or 3 ohms rheostat

MISCELL.*
J1—double circuit jack
J2—interstage filament control and phone jack
Battery cable plug receptacle
SW2—D.P.D.T. switch
Phone plug
Microphone plug
One 4, one 5, one 8 prong steatite sockets
All other sockets—8 prong moulded octal
7 tube shields—type TSB-1 complete
Output line receptacle—No. S-3 with 70-3 plug
Mod. output receptacle—with matching plug
Matching speaker selector assembly—S7VD with PM61 plug
3 post antenna assembly (A-A-G)
2 post insulated speaker assembly
1—Dial Micromaster, type 401
2—Tank dial plates
1—Master AF gain control plate
3—Pointer knobs

TUBES*
1—1D7G
1—1E5-GT
2—1D5GP
1—1F7G
2—1H4G
1—1J6G

METAL PARTS
1—Panel standard size—19 x 8¾ inches
1—Chassis—10 x 17 x 3 inches
2—Chassis support brackets, approximately 9 inches long, 6 inches high. See text.
1—Speaker case (optional)

LENZ ELECTRIC
25—Feet, special low-loss RF conductor for winding coils.

ACCESSORY ITEMS*
5—Small grid caps
3—Small rubber grommets
Mounting plate for C2-C4 dual tuning condenser (see text).
1—Crystal microphone

WRIGHT-DeCOSTER
1—8" Nokoil speaker, less output transformer

BRUSH
1—Pair high impedance crystal headphones

**Most radio mail order houses can supply these items, if properly identified as to title of article, issue (month) of SHORT WAVE & TELEVISION and year.*

What's New In S-W Apparatus

Universal Marine Type 8-Tube Receiver

(Continued from page 38)

employed. AVC is included and also an input signal control as well as controls for audio volume and tone regulation. A special feature of this set is that it is ruggedly built for hard use and no electrolytic condensers are employed. The filtering condensers are of the permanent paper type. Both the positive and negative D.C. power lines are well filtered against line noise.

This receiver, although using but 8 tubes, is practically the equivalent of an 11-tube receiver, as 3 of the tubes perform more than one function. An eight-inch full-range loudspeaker is built into the cabinet and all of the parts are vibration proof. By-pass condensers and other parts are of the moisture-proof type, as are also the resistors.

This article has been prepared from data supplied by courtesy of the E. M. Sargent Co.

What Do You Think?

(Continued from page 16)

vision articles, I like them very much. Although I never expect to take up this work, still I like to read of the progress and latest inventions in television. I am sure many other readers will agree with me on this.

Congratulating you again on the fine work your magazine is doing in advancing radio, I will say 73.

DALE GILLASPIE,
716 Bradshaw Ave.,
East Liverpool, Ohio.

Baird Demonstrates Color Television

(Continued from page 18)

transmitted from the South Tower of the Crystal Palace television station in London, on a wavelength of 8.3 meters.

Mechanical 120-line scanning was employed at both transmitter and receiver. A mirror drum with 20 mirrors, revolving at 6,000 revolutions per minute was used at the transmitter. The light beam reflected from the revolving mirror drum, was in turn reflected through a rotating disc containing twelve concentric slots, each of the slots being covered with blue, green and red filters, respectively, the colors being received in regular sequence at both transmitter and receiver.

The receiving device for color television also employed a drum containing 20 mirrors each staggered at a slightly different angle and revolving synchronously at 6,000 r.p.m. The output of the television receiving set is connected to a light valve (Kerr cell) as the diagram shows; the light ray from an arc or other powerful source of illumination is modulated to correspond with the lights and shadows in the picture. Scanning is accomplished in the usual manner by means of the 500 r.p.m. rotating slotted disc covering alternately with blue, green and red filters.

Courtesy of *Television and Short-Wave World (London).*

(Editor's Note—Color television was demonstrated with small size images about 10 years ago by Baird. About the same time color television was also shown in this country by the Bell Telephone Laboratories.)

New 12-Tube Communications Receiver

(Continued from page 38)

is the dial arrangement. A fully illuminated easy-to-read glass scale dial is a prominent feature, with plainly marked scales covering all the important frequency channels. The tuning controls have the flywheel feature, for both the main tuning and the band-spread controls. A *band-in-use* indicator is built into the dial.

The entire I.F. system with its associated multi-gang switch is built into a separate copper-plated unit. One of the special features of this new receiver is that special care has been taken in the design for 5-meter reception. By using a special set of I.F. circuits tuned to 1560 kc. and designed to have a *flat top* response characteristic and wide band-pass, together with a special antenna connection, the 5-meter signals are given every chance to be heard with maximum efficiency. A push-pull beam power output stage is employed.

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

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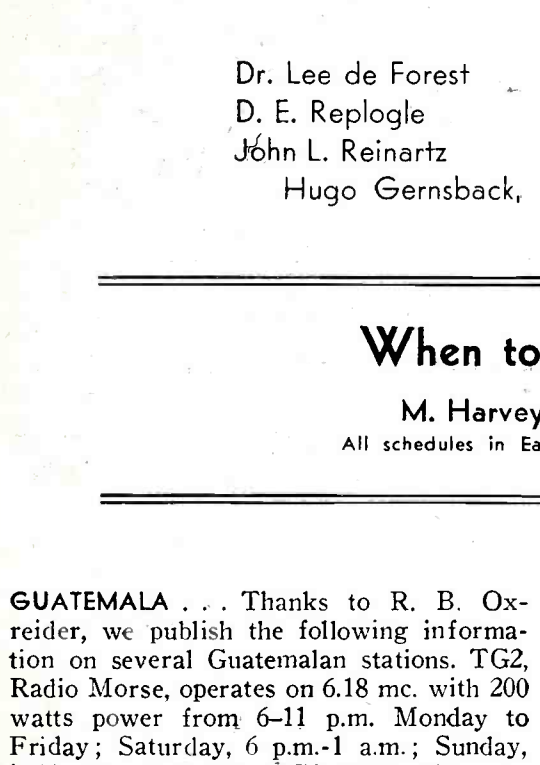
All schedules in Eastern Standard Time

GUATEMALA . . . Thanks to R. B. Oxreider, we publish the following information on several Guatemalan stations. TG2, Radio Morse, operates on 6.18 mc. with 200 watts power from 6–11 p.m. Monday to Friday; Saturday, 6 p.m.-1 a.m.; Sunday, 7–11 a.m., 3–8 p.m. TG2 relays the programs of long waver TG1.

TGQA at Quezaltenango, La Voz de Quezaltenango, operates on 6.4 mc. with 200 watts power and relays long wave station TGQ. Schedule is 9–11 p.m. Monday to Friday; 9 p.m.–1 a.m. Saturday; and 1–3 p.m. Sunday. Reports to both of these stations should be addressed to the Director General of Electrical Communications at Guatemala City. TG2 is actually operating on 6.21 mc., although they announce 6.18 and TGQA is actually on 6.44, although they announce 6.4. TGQA is the same station as former TG1X, which was the call used when testing.



This handsome certificate is presented FREE to all members of the SHORT WAVE LEAGUE. The full size is 7¼" x 9½". (See page 52)

PAN AMERICAN STATIONS . . . The Federal Communications Commission recently loaned four frequencies previously reserved for a projected government short-wave broadcasting station to W2XAD at Schenectady, New York, and W1XAL at Boston. These frequencies are to be used exclusively for broadcasting non-commercial Pan American programs. W2XAD was assigned 9.55 and 21.5 mc. As mentioned last month, W2XAD operates on 21.5 mc. from 8 a.m.–12 n. and on 9.55 mc. from 7:30 p.m. to 12 m. Aerials directed at South America are used on both of these. W2XAD on 15.33 mc. continues on the same schedule as heretofore, 11 a.m.–9 p.m., using an aerial directed toward Europe. W2XAF on 9.53 mc. operates from 4 p.m.–12 m., using an aerial directed to the western part of South America and broadcasts programs in Spanish; while W2XAD on 9.55 mc. broadcasts on a beam directed toward Brazil with programs in Portuguese. W1XAL in Boston was assigned the 11.73 and 15.13 mc. channels for Pan American use. We have not received information as to the exact schedule of operations on these new frequencies, but they *are* being used at present.

The 9.55 channel of W2XAD is also used by OLR3A at Prague, Czechoslovakia, and by the new French Radio Colonial station. Considerable interference has been noted between W2XAD and OL3RA during the evening hours when both are operating simultaneously. The 15.13 mc. channel of W1XAL is also used by the new Radio Colonial station and it is possible that there will be interference between these two stations.

ENGLAND . . . Daventry began sending out special programs in Spanish and Portuguese for South American listeners early in March. These programs are broadcast on GSB, 9.51 mc., using two different transmitters and two different directional antennas, one for Central and one for South America. Schedule is 8:30-9 p.m.

GSP, 15.31 mc., is now used from 4:15–6 p.m. and from 6:20–8:30 p.m. for North American listeners. *(Continued on page 62)*

Facsimile Broadcasting

(Continued from page 5)

dinary broadcast amplifiers. These deliver it to the radio transmitter in the same manner in which sound broadcast signals are handled. Any conventional broadcast receiver tuned to the frequency of the transmitter then will be able to pick up the signals.

In order for the broadcast listener to utilize these signals he must have a recording machine to convert them back into their visible equivalents on paper.

The Finch home facsimile recorder is used for this purpose. The recording machine in many ways is similar to the scanning instrument. What is termed a *receiving copy head* holds the *dry* recording electro-chemical paper, which is fed as a continuous strip from a roll carried in the lower part of the machine. A recording stylus then is moved, by a small electric motor, from side to side across the surface of the paper, forming marks on the paper corresponding in position and quality to the elements of the copy at the transmitter. When the incoming signal is loudest the line traced is darkest, when it is weakest no trace is formed. At the end of each of these recording strokes the paper is moved upward by an amount equal to that of the width of each line element. By means of extremely short low-tone impulses sent out by the transmitter, just before the start of each recording stroke, and by the use of a small motor turning over at a predetermined speed, the recording stylus moves across the paper *in step* with the "scanning head" of the transmitter, recording copy in its proper position. In this manner the recorded copy is built up line by line to appear as a duplicate of the original.

The actual *home recording* machine is small enough to be housed as a complete unit in a small cabinet, approximately a foot square or about the size of a typewriter. It may be connected without auxiliary amplifying equipment to the output circuit of any broadcast receiver having a power rating of over three watts. A switch in the loud-speaker circuit is then employed to cut the speaker off during the recording of facsimile broadcasts. The broadcasting station from which facsimile signals are sent is tuned in as would be the case if regular sound programs were to be received. The facsimile recorder is then switched on and the volume control of the receiver is turned to the point where copy has the desired contrast. The actual recording operation is wholly automatic and requires no attention whatever.

The simple statement that recording is automatic may seem relatively unimportant to the average reader, but it is largely the solution of the automatic recording problem, that has made it possible for our laboratory to pioneer in its present work in opening up the *home* facsimile field. For until the development of the automatic machine and inexpensive *dry* processed paper of wide latitude, the adaptation of facsimile recording methods to *home* service seemed rather remote. The machine holds a roll of paper enough for a week's supply.

The obvious questions at this point are "When will facsimile broadcasts occur, and what stations, if any, will handle them?"

During the experimental period and probably thereafter, facsimile broadcasts destined for home consumption will take place between midnight and 6 a.m., when sound broadcasting facilities are ordinarily idle. Time-clocks will turn the radio receiver and facsimile recorder on and off at specific hours.

The leading broadcasters of the country already have been granted F.C.C. facsimile licenses to inaugurate such a service, using regular broadcasting frequencies between midnight and 6 a.m. in experimental transmissions in order to get public reaction and to obtain basic engineering data for future facsimile services. Stations now licensed on this basis and using Finch facsimile equipment are WLW, Cincinnati; KSTP, St. Paul; WSM, Nashville; WHO, Des Moines; WOR, Newark; WHK, Cleveland; WWJ, Detroit; WGN, Chicago; WGH, Newport News; W8XAL, Cincinnati; W8XWJ, Detroit, and W8XNU and W8XIR, both in Cincinnati. In addition, other important stations have applied to the F.C.C. for similar permits and are planning to use this equipment.

When PCJ and Eddie Startz "Tell the World"

(Continued from page 7)

must find Mr. . . . . , an important citizen of Holland, whose mother is very ill and near death. He is on a world tour and we do not know his exact location, but we surmise that he might be on the steamer . . . . . which left Hongkong yesterday. You Hams who hear this message get busy and by contacting other stations see if you can get in touch with the captain of the steamship . . . . . and deliver to Mr. . . . . this message."

Did the Hams locate Mr. . . . . .? You bet they did, and as luck would have it, he was on the ship whose name was suggested to the Hams for their search via the ether waves. Three weeks later the pleased financier walked into the office of PCJ and personally congratulated Mr. Startz. Thanks to Ham radio and PCJ's quick-witted announcer, he had arrived home several days before the death of his mother.

A Message to American Short-Wave Broadcast Stations

American broadcast stations which have short-wave auxiliary transmitters have made quite a step forward within the last year or two, by putting special foreign-speaking announcers on their staff to handle programs intended for South America, etc. After talking with Mr. Startz with regard to how Europeans enjoy American programs, we learned that all is not quite as it should be. The reaction of Europeans to special programs which are *short-waved* to Europe and other parts of the world by the American short-wave broadcast stations is this— "Yes, these are very nice programs they are sending us, but they are not America! What we want to hear are programs like those of George Jessel, Al Jolson, or concerts by your famous symphonic orchestras."

The reason why Europeans cannot enjoy some of our programs, which entertain millions of American daily, is that they would probably arrive when our friends abroad were sound asleep. The remedy for this seems simple—Mr. Startz suggests that these programs be recorded and broadcast later by short-wave to Europe. In this way our European friends may enjoy these radio programs when they are awake and ready to be entertained.

New Sound-Recorder Used at PCJ

When particularly important programs are recorded, for rebroadcasts to different time-zones or different radio-beam areas, the Philips stations use a recently perfected system of recording programs, known as the Philips-Miller Sound System. The music or speech is recorded on a thin tape covered with a black emulsion. When the sound currents pass through, they cause a small chisel-shaped sapphire needle to engrave a zig-zag line in the emulsion. Next a beam of light passes through this recorded path on the moving tape and falls on a photo-electric cell. The currents from the cell are passed through an amplifier and then on to a loudspeaker or a transmission line. An interesting feature of this system is that the voice or music may be reproduced immediately after it is recorded. The British Broadcasting Corporation also has employed this new system for a year in commercial operation.

Procedure in World-Wide Broadcasting by PCJ and PHI

At PCJ and PHI, under the supervision of Mr. Startz, important programs are recorded in the manner described and then repeated as many as seven times. For instance, at noon the program may be sent out with the new rotary antenna flashing its beam toward the Dutch East Indies. At 1 a.m., the program may be repeated with the antenna beamed toward South America, etc. The technical operator in charge can rotate the antenna by merely pushing a button and a tell-tale device tells him in which direction the aerial is beamed.

Mr. Startz has had his greatest enjoyment and thrills in short-wave broadcasting through his pet station, PCJ, and he has made all sorts of experiments in the type of programs he has sent out over that station. At times he has broadcast for six hours at a stretch! Speaking as many as seven different languages and constantly switching from one to another, Mr. Startz has proven himself extremely versatile. In this way, he explained, the interest of the short-wave listener is kept at fever heat; if the listener does not understand one language he cannot tell at what moment Eddie may switch to the language of his native country and tell a crackerjack story. Or again he may flash the news and perhaps a personal bit of interest to the listener, whether he resides in San Francisco, New York or Singapore. For instance, he may be talking on the beam which covers California and, having received a letter from Mr. Smith, suddenly ask Mr. Smith how the oranges are. So it begins to dawn on us why Edward Startz's programs are indeed quite out of the ordinary. It has long been the contention that our radio programs in general have become too stiff and formal.

Americans Heard in Holland

I asked Mr. Startz what stations were heard best in Holland. He explained that the newer type sets sold in Holland receive both the broadcast and short-wave bands, and that American programs are heard from such short-wave stations as W3XAL, W2XAD, W2XE and W8XK. I asked him if the American broadcast stations, particularly the ultra-powerful WLW at Cincinnati with its 500 kw., was ever picked up direct in Holland, but he said that stations in the regular broadcast channel of 200–500 meters were not heard, except possibly by an experimenter now and then sitting up at all hours of the night.

Another odd point about the broadcasting of news flashes was brought out in the conversation with Mr. Startz. For instance, when a "hot" news flash such as the burning of the airship *Hindenburg* over Lakehurst comes through, in Holland the broadcast stations would probably not stop to give this news to the listening public. This news would be broadcast only at 8 or 11 p.m. when the regular *news bulletin* was given. As there is about a five-hour time difference between the United States and Holland, when the *Hindenburg* burned over Lakehurst, the Dutch broadcast stations were off the air, as it was about 1 a.m. in the morning; so no word of the disaster was heard by the public until they saw their morning newspapers or heard the early morning broadcast. Quite a contrast to some of our American stations which have frequently stayed on the air when a great disaster has occurred, broadcasting news to those interested until all hours of the morning.

Mr. Startz has indeed the happy faculty of providing plenty of variety in all his programs.

BUILD IT YOURSELF!

SHORT WAVE AND TELEVISION *presents*

fifty 10¢ *publications featuring construction of short-wave receivers and transmitters*—

THESE publications are large printed sheets which average in size about 11"x17", the majority of them printed on both sides. All have photographic reproductions of the complete project, as well as detail illustrations. In addition, there are complete wiring diagrams and various technical details to assist the experimenter and builder in constructing the set.

Full parts lists are always given, and the printed text runs anywhere from 500 to 3,000 words, depending on the complexity of the radio receiver.

ALL RECEIVERS AND TRANSMITTERS ARE STRICTLY UP-TO-DATE; THERE ARE NO ANTIQUES OR OUT-OF-DATE PUBLICATIONS IN THIS LIST. These projects are particularly valuable to the experimenter and constructor who builds "his own". Indeed, the 50 publications shown on this page represent the cream of recent radio construction by the master radio builders of America. Designs of this kind usually are sold for 25c to $1.00 apiece, and frequently you do not get half the technical information we give you.

Remember, for the ridiculously low price of 10c you can now buy a complete radio design with photographic reproductions, wiring diagrams, and full technical description making it possible to build each radio project in question.

Please order each project by its serial number, and use the special coupon on this page. We accept money orders, cash, checks or new U.S. stamps (no foreign stamps or currency accepted.) If you send cash or stamps register your letter against possible loss.

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

COMPLETE LIST OF 10c PUBLICATIONS

HOW TO BUILD THE SWITCH BAND-2 RECEIVER. A low-cost receiver for 6 volt battery or A.C. operation which enables the short-wave fan to hear stations in all parts of the world.....**No. 1**

HOW TO MAKE A 2-TUBE RECEIVER FOR THE BEGINNER. This receiver consists of detector and two audio stages. A double purpose tube is used to secure the 2 audio stages. Tubes are for 1½ volt battery operation.....**No. 2**

HOW TO MAKE THE PORTABLE SUPERHET 4. An ace all-wave superhet for battery operation. This receiver features band-spread and has a built-in beat oscillator.....**No. 3**

HOW TO BUILD A 4-BAND 3-TUBE SUPERHET. A 3-tube receiver giving 4-tube results. 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 100 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 25-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 "GO-GET'EM 2" RECEIVER FOR THE BEGINNER. This unusual 2-tube circuit gives 3-tube results. Battery operated. Excellent for beginners.....**No. 38**

HOW TO MAKE THE 1-TUBE ALL-ELECTRIC OSCILLODYNE. This is the famous electrified short-wave receiver. Easy to build for little money. Operates on A.C. and D.C.....**No. 39**

HOW TO MAKE THE 2 TO 5 METER TWO-TUBE LOUDSPEAKER SET. This receiver may be used with batteries or with an A.C. power pack. Packs a 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 DUO-AMPLIDYNE. The ideal 1-tube set for the beginner. One of the finest 1-tube sets; it really gives 2-tube performance. Made for battery operation. With only ten-foot antenna brings in the good European stations.....**No. 49**

HOW TO BUILD THE "MONO-COIL 2". No more "plug in" coils. This set eliminates bothersome coils and is made to cover short-wave bands. Works with either batteries or A.C. power pack.....**No. 50**

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

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

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

Name .....

Address .....

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

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

Behind the Scenes of a Short-Wave Rebroadcast from Europe

(Continued from page 11)

ceivers are combined before the program is sent to New York. (This is known as the *diversity* receiving system.) The idea behind this arrangement is that if the signal fades out on one of the receivers, a receiver connected to an adjacent aerial may be getting a strong signal at that moment. By combining the outputs of several receivers a steadier signal results than when using a single aerial and a single receiver. At Netcong, N. J., the A. T. & T. Co. picks up the trans-Atlantic radio telephone signals on one receiver and one aerial. However, the aerial is quite an elaborate affair which was designed to give maximum efficiency at the particular frequency employed by the transmitter at the other end of the circuit in Europe. This, of course, means that a separate aerial is required for every different frequency employed by the European transmitter. There are about ten different receiving aerials directed toward Europe at this receiving station, each tuned to a specific frequency. The Riverhead, L. I., aerial system is not as critical as this, one aerial may be used for receiving signals over a considerable frequency range. The receivers in use at both places employ a large number of tubes.

Frequently two or more transmitters operating on different frequencies are put into operation to carry a program from Europe over the A. T. & T. Co. system and a corresponding number of receivers are used at the New Jersey end to pick up the signals. If the program is not being well received from one transmitter the signal from one of the other transmitters may be more satisfactory. The best signal at any one moment is selected by the operator in charge at the receiving station.

The next time you listen to a program from abroad give a thought to the elaborate arrangements which have to be made to bring it successfully to your home and to the fact that there are probably hundreds of men engaged in checking to insure its successful arrival.

World S-W Stations

(Continued from page 43)

Mc.	Call	
5.000	TFL	REYKJAVIK, ICELAND, 60 m. Works Europe night time irreg.
4.975	GBC	RUGBY, ENG., 60.3 m. Works ships Irregularly.
4.900	HJ3ABH	BOGOTA, COL., 61.19 m., Addr. Apartado 565. 12 n.-2 pm., 6-11 pm.; Sun. 12 n.-2 pm., 4-11 pm.
4.880	HJ4ABP	MEDELLIN, COL., 61.44 m. 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.
4.820	GDW	RUGBY, ENG., 62.24 m. Works N.Y.C. night time irregularly.
4.807	HJ1ABB	BARRANQUILLA, COL., 62.39 m., La Voz de Barranquilla, Addr. P. O. Box 715. 11.30 am. to 1 pm., 4.30-6 pm.
4.780	HJ1ABB	BARRANQUILLA, COL., 62.72 m. Addr. P. O. Box 715. 11.30 am.-1 pm., 4.30-10 pm.
4.772	HJ1ABJ	SANTA MARTA, COL., 62.85 m. 11.30 am.-2 pm., 5.30-10.30 pm. except Wed.
4.752	WOO	OCEAN GATE, N. J., 63.1 m., Addr. A. T. & T. Co. Works ships irregularly.
4.740	HJ6ABC	IBAGUE, COL., 63.25 m. 7 pm.-12 m.
4.272	WOO	OCEAN GATE, N. J., 70.22 m. Addr. A.T.&T. Co. Works ships irregularly.
4.250	RV15	KHABAROVSK SIBERIA, U.S.S.R., 70.42 m. 1-10 am.
4.107	HCJB	QUITO, ECUADOR, 72.99 m. 7-8.30 am., 11.45 am.-2.30 pm., except Monday. Sunday 12 noon-1.30 pm., 5.30-10 pm.

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.

New Television Society

● A GROUP of students aspiring to become television engineers recently organized a society called the *American Television Engineers' Association.* This organization was formed for the purpose of educating its members in television and the directors hope to organize groups in every major city in the United States. All inquiries regarding membership are welcomed. When writing, mention *Short Wave & Television* and a personal answer will be received from Alfred W. Harris, Chairman, Board of Directors, American Television Engineering Association, 408 Cortland Ave., San Francisco, Calif.

Tube Data

DATABOOK OF RADIO RECEIVING TUBES, size 4½" x 9"; heavy cardboard cover; published by the Raytheon Production Corp.

This is an unusually complete book on modern receiving tubes listing all of the glass, metal and octal based tubes now available. Complete characteristic data and design information is given for a large number of tubes and, in addition, curve information for all but the older type replacement tubes is furnished.

The first 34 pages of the book are devoted to technical information on the construction of tubes, functions of various type tubes and fundamental characteristics. Further, there are numerous circuit diagrams showing typical operating conditions in radio receiving circuits. Information on the computation of power output, harmonic distortion, and efficiency of triodes, tetrodes and pentodes is given for different classes of operation.

Several diagrams show the operation of automatic frequency control circuits.

Some very useful information which the editors have not seen published in a book of this type before on the design of A.V.C. circuits for multi-stage receivers is presented.

Design curves for resistance coupled amplifiers fill two pages of the book and supply data for the design of this type amplifier around virtually any receiving tube available. Another set of very useful curves is that for computing the change in power output, grid bias, load resistance and plate or screen currents which occur when the plate or screen voltages on a tube are altered. There is also a section on resistor ballast tubes for A.C.-D.C. receivers with tabulation of the voltage drop in each type and the proper combination of receiving tubes to be used with them.

All in all, this book should make a valuable addition to the library of any radio experimenter or Ham.

NEW CATALOG

● A 164-PAGE catalog has just been released by the Allied Radio Corp., describing a line of radio sets, service equipment, replacement parts and amateur equipment. A post-card to the Readers' Technical Service Dept., 99 Hudson St., New York, N. Y., will be sufficient to obtain a copy of this catalog. Ask for bulletin No. 106A.

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 5th of the month for the second following month's issue.

AGENTS WANTED

500% PROFIT SELLING GOLD Leaf Letters for Store Windows. Free Samples. Metallic Co., 446 North Clark, Chicago.

CORRESPONDENCE COURSES

500,000 USED CORRESPONDENCE Courses and Educational Books. Sold. Rented. Exchanged. All subjects. Satisfaction guaranteed. Cash paid for used courses. Complete details and bargain catalog free. Send name. Nelson Company, 3278 Manhattan Building, Chicago.

MISCELLANEOUS

3½ INCH TR. 0-125 VT. A.C. Voltmeter, 0-10 A.C. Ammeter, $2.75 each, Weston D.C. 0-7 and 0-140 Voltmeter, 2¼" with 9 pt. D.P. Switch $2.75. Nat'l. MB27-4 Stg. T.R.F. chassis and Thord. 45 P.P. Pack. $7.50. 10" MUTER DYN. SPKR. $3.00 Victor 72" Hi-Fi Orthophonic Horn, Mag. and Acoustic Pick-ups, $10.00, plus express. $400.00 RCA battery Superhet—$25.00. Harry Ackerson, Ramsey, N. J.

WE ORIGINALLY HAD FIVE thousand Stoppani Compasses for which the U.S. Government paid over $30.00 each. We sold all but a very few. We cannot obtain more to sell at three times our present price. Send in your order before they are all sold at $4.50 each, postage paid. Gold Shield Products, 98 Morningside Avenue, New York City.

TYPEWRITERS, AMERICAN Flyer, $3.55. Postpaid, Short Wave Kits, etc. Bargain list. 10c. Howard H. Brown, R.-4, Box-20, Edgerton, Wisconsin.

PATENT ATTORNEYS

INVENTORS, ALL PATENT AND trademark cases submitted given personal attention by members of the firm. Form "Evidence of Conception" and instructions free. Lancaster, Allwine & Rommel, 436 Bowen Building, Washington, D. C.

QSL—CARDS—SWL

100 NEAT SWL CARDS PRINTED with your name and address sent postpaid for $1. Bunch of samples and RST Chart for five cents in stamps. W1BEF, 16 Stockbridge Ave., Lowell, Mass.

QSL, SWL CARDS, NEAT, ATtractive, reasonably priced, samples free. Miller, Printer, Ambler, Pa.

SONG POEMS WANTED

WANTED ORIGINAL POEMS, songs for immediate consideration. Send poems to Columbian Music Publishers, Ltd., Dept. K49, Toronto, Can.

TELEVISION

TELEVISION EQUIPMENT SINCE 1927. Arthur Pohl, 2123 Hubbard, Detroit, Mich.

FOR SALE (NON COMMERCIAL) 3¢ A WORD

Under this heading we accept advertisements only when goods are offered for sale without profit. Remittance of 3c per word should accompany all orders. Copy should reach us not later than the 5th of the month for the second following month's issue.

WILL SELL MASTER TELEPLEX for $30.00 or make an offer, also an Ultra Do-All De-Luxe Receiver for $15.00. Stanley Stone, Sussex, Wisc.

SUPERB U. S. COMMEMORAtives. Lowest Prices. M. Stabin, 5501—14th Ave., Brooklyn.

SELL: ALL STAR SR., $20.00. Clarence Morman, Coon Rapids, Iowa.

SACRIFICE FOR $11.50, 1938 Eilen Model 7C Receiver, A1 condition, original price $16.50. Gordon Freeman, 635 Wellington Street, Sault Ste. Marie, Ontario, Canada.

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 readers.
Use these columns freely. Only one advertisement can be accepted from any reader in any issue. All dealings MUST be above board. Remember you are using the U. S. mail in all these transactions and therefore you are bound by the U. S. Postal Laws. Describe anything you offer accurately and without exaggeration. Treat your fellow men the way you wish to be treated.
We welcome suggestions that will help to make this department interesting and helpful to our readers.

Copy should reach us not later than the 5th of the month for the second following month's issue.

TRADE FOR GOOD CAMERA AN FB7X amateur receiver less than 1 year old with tubes, coils, power unit and speaker. Must have fast lens and shutter. N. C. Thornton, Somerville, O.

WILL SWAP ONE 350 MMF. variable condenser and three circuit tuning coil to match for two 140 mmf. variable condensers. Write Warren H. Wilson, Glen Ullin, N. Dak.

WANTED TO BUY: COILS FOR National FB-7 receiver. Will pay cash. What have you? Dr. Rolf Eslinger, Corseaux (Vaud), Switzerland.

SWAP NEW 212-D W.E. RUN 8 hours. Tube ideal Class A modulator or one half K.W. self excited job. Base included. Cost $100.00 new. Want a superhet receiver. Write for complete dope. W5EWS, Reydon, Oklahoma.

HAVE TELESCOPE, 160 POWER microscope with slides good shape, 160 M xtal, radio parts. Will do swapping on A.C. 16MM movie projector or test equipment. S. J. Zuchora, 2748 Meade St., Detroit, Mich.

WILL TRADE: CHEMICAL LABoratory including $25 set worth $50, for transmitter, transceiver, radio parts or what have you. Edward Grof, 2660 E. 128 St., Cleveland, Ohio.

WANTED—A PAIR OF TRIMM or Brush xtal headfones. Used, will trade parts or buy outright. Howard McCall, 1207 3rd St., S.E., Canton, Ohio.

REMINGTON MODEL 21 12 gauge pump gun new, unused. Also used Marlin 32-20 carbine. Want Ultra Stratosphere receiver, transceiver or? No junk offered or wanted. W8JZT, Alfred, N.Y.

WANTED: GOOD SUPER REceiver. Will pay cash. Give full details and price. Am in market for parts. Will swap Kodak 620 Camera F6.3 lens 100 sec. J. Picz, 98 Calhoun St., Torrington, Conn.

WANTED: USED CANDLER course "complete". Late edition only. E. H. Hahn, 403 Main St., Indianola, Miss.

TRADE—A SPRINGFIELD 30-30 rifle, several blocks of wet Edison "B" Batteries and 40 issues of QST. Wanted—ham receiver, 0-1 milliammeter or what have you? Tom Smyth, Jr., W9BAW, Beloit, Kansas.

ATTENTION CHICAGOANS! OR anyone within 200 mile radius of Moline, Illinois. Will make cash deal in person at your location for RCA 155, Hallicrafters, National, or similar type receiver. Warren Hoegner, 230-38 St., Moline, Illinois.

SWAP YOUR DUPLICATES: Send me 20 or more diff. stamps, cataloging 3c or more each. Will send you back equal amount, plus special extra stamps free. Ceaser, 54 Willett St., N.Y.C.

WANTED TO BUY:—A TELEplex or Instructograph. Must be in A-1 condition. State price. A. F. Sokoloski, 1123rd Co., C.C.C., Laconia, N. H.

TWO "ZENITH" POWER PACKS "A" supply puts out 15 V. 60 Ma., and other is for model 27 receiver. Will swap for radio parts or mike. I. Munson, Grand Island, Nebr.

WILL TRADE ELECTRIC HEATer; $15 chemistry set, 200 ft. range G and E flood light with mirror reflector and bulb for 6 or 10 tube commercial receiver. M. Norton, Linden Rd., Rochester, N. Y.

HAVE A DAISY 60 SHOT PUMP action air rifle with sundial and compass 6 months old, good condition. Will trade for small short wave set. Write Jack Lansing, Pine Bluff Ave., Point Pleasant, N. J.

EXCHANGE FOR STAMPS 32 S. W. Craft & Tel., 15 All Wave Radio, 28 Radio News, 63 Radio Index, and others. 1 set of Mark Twain's books, 1 set O'Henry's books. Stanley Nevin, 3 Oconnor Avenue, Holyoke, Massachusetts.

SHORT WAVE LISTENERS IN all countries. Would like to exchange SWL cards with anyone. Have new SWL cards printed in new style and setting. QRA Meredith M. Stroh, 172 Queen St., N., Kitchener, Ont., Canada.

WANTED AMERICAN CODE reader with one roll of tape. Will pay cash or swap for Majestic B eliminator. Larry Kaczmarczyk, 511 West Pine St., Mahanoy City, Pa.

CODE PRACTICE MACHINE, good condition wanted. I will pay cash or trade short wave sets or radio parts. Drop me a card and give me all dope. Bob Yeager, 30 North Third Street, Madison, Wisconsin.

WILL SWAP LAFAYETTE EB17 auto radio for tube tester or Rider's Manuals. Write Jack's Electric & Radio Service, 319 Peshine Ave., Newark, N. J.

18 TUBE MIDWEST CHASSIS complete with tubes and speaker in good condition. Trade for Hallicrafter or late model Doerle, or what have you? J. P. Gallegor, 628 White, Grand Junction, Colo.

FOR TRADE, FACTORY BUILT power supply, 135 v. at 35 ma. Trade for "bug", good 3-tube batt. receiver with bandspread, coils, and in metal cabinet, or anything. Write to Bill Nance, Winters, Texas.

TRADE EILEN 7C, 8½-625 METers, 5 new tubes, guaranteed to perform as new set, for 5 or 6 tube, 16 to 550 meter A.C. superhet set, or complete kit. Ernest W. Cape, Box 163, Desloge, Mo.

HAVE—ANALYZERS, CHECKers, qualitative balance, microscope, Quartz sun lamp, converter, oscillator, 10 manuals, meters, movie outfit, cash; Want—Hard rubber, bakelite sheet, rod, H. V. transformers, lathe, drill press, midget condensers, Denmark, 81 W. 172 St., New York.

WANT A CHANGE. WILL SWAP HRO Senior with power supply and speaker for RME69 in first class condition. H. S. Oringer, 450 Ocean Parkway, Brooklyn, N. Y.

STAMPS—SEND 30 LARGE U.S. commemoratives, receive 100 different foreign. Send 100-1000 foreign, receive same quantity in return. Will also trade higher valued stamps according to catalog prices. John Szlucha, R. D. One, Owego, N. Y.

SHORT WAVE LISTENERS. I would like to correspond with SWL's and SWL's who are members of BSA. I QSL 100%. Ray Bintliff, 229 Stacy St., Burlington, N. J.

CODE MACHINE WITH TAPES, wooden case, built in oscillator, works O.K. Trade for transmitting parts, or T.R.F. receiver, or what say. W. S. Crooks, W8LVG, Box 15, Stow, Ohio.

HAVE A MODEL 5—1934 PHILCO auto radio, 5 tube superhet. Will be glad to exchange for a good S.W. receiver. Walter Bruder, 3068 W. 115 St., Cleveland, Ohio.

(Continued on following page)

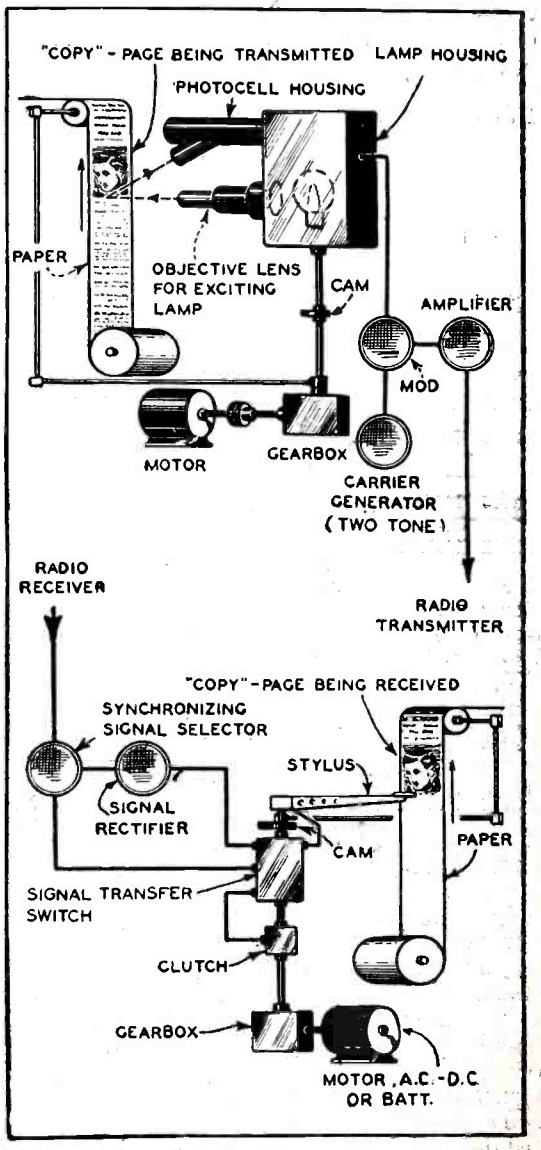
Radio to Print News Right in Your Home

(Continued from page 9)

forth over the carbon-backed sheet in perfect synchronism, with the "pick-up" eye at the facsimile transmitter, and the result is a reproduction of the image in the manner here illustrated.

Experimenters will undoubtedly want to try their hand at picking up these facsimile images and if a threaded rod having 100 threads to the inch is available, it should be a fairly simple matter for the ingenious minded reader to attempt building a receiving apparatus.

Some experimenting will have to be done in connection with the adjustment of the output stage of the radio receiver and the recording mechanism, so that the proper strength of signal is obtained for properly recording the picture.



Arrangement of Finch facsimile apparatus.

Transmission of Sound and Facsimile on One Wave

Among the public benefits to be derived from a dual sound and facsimile service, are: economy in the use of one communications channel instead of two for the separate services; the use of a single receiver to provide aural programs and a facsimile service and economies for the broadcaster in the use of a single transmitter in providing two public services, which otherwise would require duplication of costly radio frequency circuits.

The program now planned by Finch engineers, on the issuance of this license, calls for the complete installation of a 1

kilowatt ultra-high frequency transmitter operating in the 35.6 megacycle band with call letters W2XBF.

The transmitter will be provided with means for simultaneous modulation from two separate audio-frequency channels, carrying aural and facsimile services respectively; also simultaneous frequency modulation by wave energy from two audio channels. One of these channels will provide frequencies extending from 40 to 10,000 cycles for high fidelity aural programs, with the other channel providing a facsimile carrier and facsimile side bands on frequencies above 10,000 cycles.

LICENSED "FACSIMILE" STATIONS

Station	*Location*	*Frequency in Kilocycles*
WWJ	Detroit, Mich.	750
KSD	St. Louis, Mo.	500
KMJ	Fresno, Cal.	580
WCLE	Cleveland, Ohio	610
WSM	Nashville, Tenn.	650
WOR	Newark, N. J.	710
WGN	Chicago, Ill.	720
WHO	Des Moines, Ia.	1,000
WHG	Newport News, Va.	1,310
KSTP	St. Paul, Minn.	1,460
KFBK	Sacramento, Cal.	1,490
	SHORT-WAVE STATIONS	
W9XAF	Milwaukee, Wisc.	41,000
W9XAG	Milwaukee, Wisc.	1,614
		2,398
		3,492.5
		4,797.5
		6,425
		8,655
W7XBD	Portland, Ore.	1,614
		2,398
		3,492.5
W2XR	Long Island City, N. Y.	1,614
		2,012
		2,398
		23,100
		41,000
		86,000-400,000
W1XMX	Quincy, Mass.	41,000

The "Lie Detector"—How to Build One

(Continued from page 15)

ness of any statement. However at parties and clubs it might afford considerable amusement.

By measuring the change in potential across the subject (effected by the change in resistance of the subject due to emotional reaction) with a vacuum tube voltmeter an amplified indication can be obtained. A vacuum tube voltmeter was used instead of a high resistance voltmeter because of its increased sensitivity.

By using a vacuum tube as a diode current regulator, the current passing through the subject is held within limits allowing a change in potential to take place. If the plate current of a vacuum tube diode is passed through the subject by means of connecting electrodes attached to the subject, a potential drop will occur across the body resistance of the subject. If the resistance of the body becomes less with emotional excitement, then due to the regulated current the current change will be minimized and the voltage drop will be more pronounced.

The indication, however, was still insufficient to give satisfactory results so a direct current amplifier was added. Direct current amplifications requires direct coupling between the stages. This is necessary since the change in potential is very slow. Ordinary resistance-condenser coupling will not work. In order to impress this slow D.C. voltage change on the grid of the amplifier, it is necessary to connect the grid directly to the point of potential change. This makes the use of high bias voltage necessary. This

(Continued on following page)

BARTER and EXCHANGE FREE ADS (continued)

R-T-L- 5 METER DUPLEX transmitter & 4 tube super-regeneration Rcvr xmitter Type 6A6 also S1 used 849-450 Watts, 50 watters, 16MM. camera. Looking for good superhet Rcvr. W2KXL, 517 Ferry St., Newark, N. J.

WHAT AM I OFFERED FOR 1,000 different stamps (not more than 20 Germans). Most of the lot are scarcities. Also a lot of radio parts. If interested, drop me a line. F. Frantz, Coplay, Penna.

WILL EXCHANGE 6 MONTHS old Sky-Buddy and some cash for a 1937 or 1938 console. Fulton Fong, 187 10th Street, Oakland, California.

WANTED GOOD USED HRO JR. or NC101X or Super Pro 10 meter job for cash. W. P. Baldwin, 1740 Frances Ave., Modesto, California.

WILL EXCHANGE 14 MODERN glass radio tubes R.C.A., Raytheon, excellent condition, and new Insuline headphone adaptor, for R.C.A. Spider Web antenna. Herman Fischer, 181 Park Place, Brooklyn, N. Y.

I WANT A 5 OR 6 TUBE BATTERY radio that uses 6 volt battery and two 45 volt B batteries. Geo. Hudalla, 1028 Arcade Str., St. Paul, Minn.

WANTED, A PRESELECTOR IN good condition. Have Oliver No. 9 typewriter in perfect condition. Also Fada A/C & D/C Midget radio, 5 tubes. Also want short wave rcvr. Daniel Platek, 225 Division Ave., Brooklyn, N. Y.

WANTED TO BUY, A USED Junior Candler Course. Earle Drew, Corning, Iowa.

WANT TO SWAP: CLERK—CARrier course; W.U. Telegraph sounder and Key; Popular Science; Modern Mechanix, and Radio News back issues. What offers have you? Anthony Guide, 15 Wolcott Street, Malden, Mass.

SWAP 1 50V AND 1 100V MOtors. New. Suitable for fans, etc. Also 1 slightly used 230/250v 5000 RPM 1/3 H.P. for good short wave receiver. E. G. Blackman, 194 Southend Lane, Catford, London, England.

WILL SWAP UNIVEX FOLDING camera for pair head phones 2,000 ohms or more. Also want Philmore "Blackbird" crystal set, 3 or 4 tube loud speaker set (Broadcast band). M. Konon, 48 Edwards St., Patchogue, N. Y.

MANY FOREIGN STAMPS TO exchange for old U.S. and recent commemoratives in quantity. Lawrence Wood, 287 Custer Ave., Youngstown, Ohio.

LET'S GET ACQUAINTED—S.W.L. cards wanted by me from U.S.A. and foreign countries—replies answered promptly. Stuart D. Kreisher, 710 Walnut Street, Reading, Pa., U.S.A.

WANTED, ONE OF THE BETTER all-wave receivers, late model, reasonable. Write giving all particulars. C. Holstein, 246 East 148 St., Bronx, N. Y.

WANTED A GOOD USED 30-60 watt xmitter. Please give all particulars. S. Stone, W9QVR, Sussex, Wisc.

WILL EXCHANGE PRINTING for 5 meter xmitter or receiver, or other articles of value. What have you? C. F. Derwich, 3382 Frederick St., Detroit, Mich.

CALLING POSTCARD COLLECtors! Want to swap Michigan State Capitol views for views of your state capitol. Also swap local views with anyone, anywhere. Jay Rose, 1218 First, Jackson, Mich. U.S.A.

WANTED: RADIO EQUIPMENT. High voltage filter condensers. Variable transmitting condensers. Large filter chokes. 22 caliber rifle. Will exchange: Large transmitting tubes; 250 watts. Other radio equipment. Joseph Caracciolo, 3406 Reservoir Rd. N.W., Washington, D. C.

SWAP DAYRAD MODEL 325 tube tester, Set Analyzer Readrite Model 710, I.R.C. Dual Resistance Indicator, all good shape. Want A.C. Generators 110V-60C, electric phonograph, typewriter, cameras, or? Wallace Grove, 6959 East End Ave., Chicago, Ill.

HAVE TYPEWRITER RIBBONS, 6" Magnetic Weston Volt Milliammeter, Boy Mechanic Book 4; Short Wave & Television 1937-38 issues—Want 5 meter transceiver. Adam Mazon, R.D. 4, Box 75-A, Latrobe, Pa.

WILL SWAP AMERICAN CODE reader and tape for Peak or DB 20 preselector. Cash to boot for the DB 20. Satterthwaite, 544 Colonial Ct., Toledo, O.

WANT TO BUY MIDWEST RAdio 18 or 20 tubes 1936 or 37. State price and condition. Stanley T. Galaski, 5212—6 Ave., Brooklyn, N. Y.

SHORT-WAVE LISTENERS IN foreign countries and U. S. A. Let's trade SWL cards. I'll QSL 100%. How about it? QRA—Raymond Poulin, 446 West 50 Street, New York, N. Y.

TRADE: ONE BOY SCOUT Hand-book and set of 3 books describing the "Birds of America" (Vest pocket size). Will trade for 2 350 mfd. variable condensers. Al Comperda, 4808 S. Seeley Ave., Chicago, Illinois.

WANTED: ANY STANDARD amateur receiver such as Sky Buddy or S.W.3 State age, description and what is wanted in trade or cash price. Gene Gray, 440 Floral Ave., Ithaca, N. Y.

WANT ULTRA STRATOSPHERE "10" or good 10 meter receiver. Have Knight 4 metal tube Supergainer and split 6A6 transceiver (6A6-76-42) to trade or will buy. Also would like communications receiver. Willis Davis, Wilton, N. H.

WANTED BOOKS AND LITERAture about Africa. Will send whatever you want in trade or cash. Write Vincent Salerno, 2009 Woodlynne Ave., Camden, N. J.

HAVE EDISON ELECTRIC GRIDdle, hotel and restaurant model, 6 K.W. 220 V. Top 18x36 inch. WANT Astatic crystal mike type D-104. Will trade radio parts, etc. Max Springer, Robinson, Illinois.

TRADE: GOOD FIVE METER equipment for good factory built receiver. All letters answered. C. R. Moreland, Compton, Calif.

WILL TRADE FINE VIOLIN outfit, or silverplated Conn-make, C-tenor saxophone with special tuner or Underwood typewriter for only short-wave set with loud-speaker well able to get Hungary. Bartos, 1610 Pine St., Norristown, Pa.

TRADE FOR ANYTHING USAble: 20 hand mtd. ore radio crystals; 5 oz. unmtd unused tested galena, pure; 3 midget var. condensers; 300 V voltmeter; 2 unused skind. buttons; protected S.W. coil invention. L. B. Johnson, Box 816, Spokane, Wash.

CASH FOR USED 20 TO 40 watt public address system, prefer standard make, late model. Give type, condition, price. Also need dynamic mike, A.C. phone turntable and pick-up unit. C. M. Miller, Gresham, Nebr.

WANTED OLD TYPE 201 OR 301 tubes with Brass-base. E. Heintz, 237 W. 20 St., New York.

WILL EXCHANGE TRUMPET, practically new, for Radio or Photographic equipment of value. Those interested please write Anton Monte, 3278—Fulton, Cleveland, Ohio.

WANTED—WILL TRADE RADIO parts for old mikes, similar to those in the Jubilee Souvenir Number of Radio Craft. Robert Duncan, 228 W. Kentucky St., Floydada, Texas.

WOULD LIKE TO BUY USED films (50 ft. or 100 ft.) for 16mm moving picture projector. Preferably action films. Write J. Stella, 44 Broad St. Pl., Weymouth, Mass.

SHORT WAVE LISTENERS IN foreign countries: Swap my S.W.L. card for yours. Q.S.L. 100%. Correspond with anyone wishing to swap magazines, etc., of theirs for U. S. articles. Charles Smejkal, 1607 First Avenue, New York, N. Y.

GENEMOTOR, 18" MAGNETIC speaker, kodak, photograph equipment, 3 tube B.C. kit, 2 books. "Hypnotism" and "Card Game Rules", banjo-uke, postmarks, slogan buttons. Want transceiver, kodak, or? R. Lewis, Griffithville, Ark.

SHORT WAVE LISTENERS. Would like to swap my S.W.L. card for one of yours. I will Q.S.L. 100% by return mail. Lafayette Paster, Route No. 4, The Dalles, Oregon.

WANTED CRYSTAL, 456 kc—Will trade for new 465 kc Valpey with holder. W. Marquis, 98 Merrimac Avenue, Buffalo, N. Y.

AM INTERESTED IN HAVING YLs (young ladies) correspondence. Hope to receive photos of their transmitter and Q.S.L. cards and if possible their own photos. Address: Jose E. Mesorana, 62 de Diego St., Aguadilla, P. R. (U. S. A.)

HAVE 2,200 STAMPS, FROM 162 countries, with some unused U. S. stamps in album. Have been collecting 6 years. Want small preselector or radio, short wave or what have you? Barry Poisal, Fullerton P. O., Carney, Maryland.

I WILL SWAP A 16MM MODEL E-32 Keystone picture machine for a carbon or dynamic microphone with stand. Must be in good condition. Write for details. Richard Kershaw, 846 University St., Springfield, Mo.

WILL TRADE .22 RIFLE (WESTern Field) in good condition for stamps, or what have you? All inquiries answered. Oliver Nivison, 208 Taylor Place, Ithaca, N.Y.

TRADE 1000 DIFFERENT stamps from 90 countries for radio goods. Best offer accepted. Many beautiful and distinctive foreign and old U. S. stamps. Inquiries appreciated. Charles Wieland, Route 2, Kingston, N. Y.

WANTED—60 LINE TELEVISION Lens Disc. Also Oct. 1932 Television News. Merlin Berrie, 1434 N. W. 29, Oklahoma City, Okla.

TO ALL S.W.L.'S, LET'S SWAP cards. I will send mine at once on receipt of yours. Q.R.A.—Bernard Roberts, 41 Reed Pond Walk, Gidea Park, Essex, England.

WANT—ALL-WAVE OSCILLAtor, Hickok Statiktester, Rider's Manuals 4,5,6,7, 0-1 Milliammeters, for cash or swap R.C.A. Code Machine and Tapes, United Motors Auto Radio. Mitchell Dohmlo, 1333 W. North Ave., Pittsburgh, Pa.

I WANT SOME REAL-OLD AUtomobile license plates from everywhere, especially Mexico, Central and South America. What do you want in exchange for them? Please write. Anthony Shupienus, Newport, N. J.

WILL EXCHANGE SUPERB U. S. commemoratives for mimeograph machine in perfect condition. M. Stabin, 5501—14th Ave., Brooklyn, N. Y.

THREE WEEKS OLD R.C.A. VICtor. Has 7 tubes including electric eye, Cost $51. Will trade for any of Hallicrafter's sets, including Sky Buddy, if in good condition. Kenneth Bollinger, 1521 Yale Ave., Salt Lake City, Utah.

HAVE MEMORY COURSE, OTHer books, foreign coins, magazines, Trilobites, other fossils, arrowheads, Indian head cents for dollar size silver coins, foreign sea shells, H. Rider Haggard books. E. C. Beam, Route 1, Mt. Oral, Ohio.

WANTED: CAMERAS, PREFERably small, folding. Also case of 2¼-x3¼ folding camera (without bellows). Will trade old issues of Popular Mechanics and Collier's. Answer all letters. Edward Wooten, Varita Court, Apt. F, Wilson, N.C.

WANT RIDER MANUALS. HAVE combination Audio and Radio Frequency Oscillator, condenser tester output meter, Roller Smith ohmmeter, 5-meter receiver and transmitter, and plenty of radio parts. E. L. Brandmeier, 821 Monocacy St., Bethlehem, Pa.

TRADE SARGENT 20 M.A. 9 Tubes 110 V. A.C. T.R.F. All bands 15-1500 meters B.F.O. etc. Used very little and trouble free. What have you? D. Anderson, 2015 Humboldt Blvd., Chicago, Ill.

SWAP: RADIO BOOKS, DYNAMic speakers, Philco high efficiency noise reducing doublet systems. A. C. Ma. meter (0-250) 1937 Call Book, 2000 ohms phones. Want meters or test equipment. A. Nutkis, 1439—52nd, Brooklyn, N. Y.

WANTED USED INSTRUCTOgraph or Teleplex, with Continental tapes. Will pay cash for best offer. Henry J. Kosin, 2010 Ash Street, Erie, Penna.

STAMP SWAPPERS: FOR 100 large U. S. Commemoratives or 200 Precancels I'll send 1 lb. U. S. Mixture (4000 stamps). For foreign stamps, I'll send equal quantity U. S. Commemoratives or other foreign. Frank Schmid, 111 West 43rd, New York.

SWL'S! I WILL EXCHANGE SWL cards with anyone in the world. Pat Toomey, 1012 Woodburton Rd., New Kensington, Pa., U. S. A.

HAVE 60 COPIES SHORT WAVE Craft & Television, including first issue, also manual. Want Mac-Key, portable noiseless typewriter, or 1000V 750-500V 300 mil transformer or? W9VRO, D. F. Richardson, 5002 No. 30 St., Omaha, Nebr.

TRADE: SIXTY COPIES OF S. W. C.; thirty dollars worth of radio parts; King Cole "A" Eliminator. Trade for almost anything except stamps or magazines. Arthur Hiller, Manito, Ill.

SWAP A ONE TUBE RECEIVER, a one tube transceiver. Also a microscope. Information on request. Weston G. Schwarze, Route 1, Idaho Falls, Ida.

HAVE BOOKS, CLARINET, ETC. to trade. Henry Priebe, Box 115, Kent, Ohio.

WANTED—TEST EQUIPMENT, Manual, Ham parts of all types, swap or cash. D. Oehlson, 69, W. 23, Chattanooga, Tenn.

SWAP—MICROSCOPE KIT, 150 power; Rider's Radio "Service Business Methods" (new) list $3; stamp album, over 500 good stamps; all for simple xmitter; want old call book, Jim O'Rourke, 2019 S. Nicollet St., Sioux City, Iowa.

TRADE: FIVE TUBE A.C. REceiver in good condition, using regeneration; for almost any SW or PA equipment. Walter E. Birner, Hendricks, Minn.

WANTED 4 OR 5 TUBE SHORT wave receiver in perfect shape. Will trade 150 watt 110 volt A.C. autonator generator. Fred G. Icke, 407 E. Goodwin Ave., Victoria, Texas.

(Continued on following page)

BARTER and EXCHANGE FREE ADS (continued)

WILL SWAP LASALLE COMplete Accounting course, Columbia complete Algebra course, F&W Practical Standard Dictionary, 12" world globe, and late world atlas. Can use phono amplifier, 16mm movie films, etc. John Winkler, 62 Bergen Ave., Clifton, N. J.

WANTED WELL KNOWN, USED photo-electric exposure meter, for still pictures. What do you want in exchange? Robert R. Irwin, 4212 S. Oakenwald Ave., Chicago, Illinois.

SWAP SUPREME MASTER DIagnometer A-1 condition, also Philco all purpose tester, model 048 for what have you? Preferably swap for short wave amateur equipment. Write for details. David Bentley, Coudersport, Pa.

SWAP NEW SHORT WAVE RECeiver housed in metal cabinet, complete with dynamic speaker, new tubes, for portable typewriter, good condition. Write giving full description, name, model number. John J. Vilkas, 1515 South 49th Court, Cicero, Illinois.

HAVE CRYSTAL SETS, ONE tuber, two tubers, and three tubers to swap for typewriter, code practice machine's small printing press, Candler course or what have you? All letters answered. William Blecha, Pawnee City, Nebraska.

WILL SWAP KODAK FOLDING camera and Lou Gehrig professional model first baseman's glove, for Raco Ranger short wave radio or what have you. A. Michalec, 441 Washington St., West Warwick, Rhode Island.

WILL TRADE COMPLETE National Radio Institute course for an Eastman or Bell and Hawell 16 MM movie camera or projector. R. A. Martin, Jr., 1402 Chestnut St., Lampasas, Texas.

WANTED: 16 MM MOVIE CAMera or other photography equipment. Will trade Readrite 0-20, 60, 300, 600 D.C. Voltmeter, R.C.A. electric phonograph motor and pickup, or other radio parts. Dee Umberson, Dimitt, Texas.

SWAP LATE CANDLER COURSE complete—interested in A.C. D.C. S.W. receiver, bug, camera, guns, fishing gear, etc. What have you? C. Shaw, SS Naeco, Penn Shipping Co., 260 South Broad St., Philadelphia, Penna.

WILL EXCHANGE RECENT ULtra Stratosphere 10 complete transceiver, 2½ to 560 meter coils, for used Sky Chief, or fairly recent Sky Buddy, or good multi-meter analyzer. Lawrence C. Middlekamp, 315 Franklin Street, Cumberland, Maryland.

WANTED: BRETING 12 FOR FBXA, Patterson Preselector, power pack, 10, 20, 75 B.S. coils, tubes, A-1 shape. Have 4 tube TRF 20-160M, for a Shure 70H crystal mike. Elmer Saxe, 1932 Faye Road, Akron, Ohio.

WILL SWAP, ELECTRIC CLOCK, 3000 foreign stamps and practically new chemistry set for radio parts, radio books or old issues of radio magazines. Every letter answered. Prescott Robbins, Box 302, Troy, New Hampshire.

JENKINS TELEVISOR AND RECeiver 60 line lens disc and Synchronous Motor. Trade for 16mm. movie equipment, as Projector Movie Camera, films. If interested will send photographs, details. David Gross, 2145 Ocean Ave., Brooklyn, N. Y.

ATTENTION! S.W.L.'S OR PICture postcard collectors. Will swap my S.W.L. or picture postcard or both for one or both of yours. Write names and addresses plainly. Bertram McFadden, 8949 Atlantic, South Gate, Calif., U. S. A.

WANT BACK ISSUE SHORT Wave Craft for Jan.-Feb., '32, Mar.-Apr. '32, May '32. Will exchange some later copy for same, A-1 magazines. Also want illustrated Science & Mechanics. H. A. Whittler, No. 147 R.F.D., Mansfield, Mass.

S.W.L.'S IN THE WORLD, LET'S exchange cards. I will Q.S.L. 100% by return mail. Q.R.A.—Robert Cooper, 231 Grove St., Tonawanda, N. Y., U. S. A.

TRADE .38 REPEATING RIFLE, woman's diamond ring and electric street sign for phone set. J. H. Bennett, Tuscola, Ill.

HAVE BURROWES FOLDING pool table, 3½x6 feet, complete equipment, will trade for standard S.W. receiver or broadcast-foreign table model radio. J. C. Erney, 2625 Shaker Road, Cleveland Heights, Ohio.

WANTED: 160 METER COILS (band spread) for National FB-7. Write stating price and condition to, WSGHQ, Panama, N. Y.

TO TRADE, BUESCHER E FLAT alto sax in silver finish, perfect condition for 110V. D.C. complete recording outfit for recording on blanks, or for Leica or Contax camera. Lee Elkan, 903 Carnegie Hall, N. Y. C.

FOR TRADE: FAMOUS A.C.-4 less speaker. One year old; in fair condition. 2½ to 550 meters. What have you to offer in trade? Desire radio or workshop equipment. Vincent Poll, 1201 Wood St., Dubuque, Iowa.

HAVE A DX4 4 TUBE SHORT wave receiver only three months old, bought for eighteen dollars brand new. Will swap for outboard engine or what. Paul Wisuri, 10 Railroad St., Maynard, Mass.

WILL TRADE ANSCO MEMO camera 6.3 lens 50 pictures on a roll for test oscillator, volt-ohm-ma meter, or what have you? Want Rider manuals. Arthur Glenn, Clymer, Pa.

WILL TRADE A "B" FLAT trumpet for a S.W. receiver or a 5 mtr. transceiver. Trumpet originally cost $36.50, used about a month. Harold Kinnie, Otter St. Alexandria Bay, 1000 Islands, N. Y.

BUNDLE UP YOUR OLD OR new post card views and send to me. For each one I'll forward one piece old Mexican money. (Not spendable now.) No two cards alike please. Harold Maniss, Colorado, Texas.

WILL BUY, PAY POSTAGE ON out of print book, "The Girl from Hollywood" by Burroughs. Must be in good condition as I am completing set. Please write giving price wanted. Donald Boardman, Celoron Park, New York.

WANTED ULTRA HIGH STRATosphere Transceivers, two complete units with all necessary accessories for mobile use. Also Sargent or Hallicrafter latest model communication receiver. State lowest cash price. G. Moral, C. Alvaro Obregon, Tabasco, Mexico.

WILL DEVELOP, PRINT ANY size films and trade various chemicals for radio and photography equipment. Correspondence welcome. Will answer all letters. What have you? Theodore Okon, 1009-10th Ave., Beaver Falls, Pa.

WANTED—TWO HAMMARLUND or National Isolantite insulated, 140 mf. midline tuning condensers with coupling. Isolantite sockets, 4, 6, 8 prongs; power transformer for 6-volt tubes; power filter chokes. H. B. Scarborough, Physics Bldg., Duke University, Durham, N. C.

SHORT WAVE LISTENERS. Send me ham QSL's from your country and I will send you equal amount from mine. Al Gunther, 1843 Lincoln, Peoria, Ill., U. S. A.

SWAP U.S. STAMP COLLECTION, used, unused (Scott catalog value $400.00) for new type short wave set as Hallicrafters, National, McMurdo Silver, Scott, Hammarlund. Details of collection sent upon request. Frederick I. VanLeuven, 58 St. John Street, Goshen, N. Y.

WANTED—110 VOLT A.C. LIGHT plant 300 watts or over (gas engine driven), good code machine. P. Kirkouskas, 419 N. Delaware Ave., Minersville, Pa.

HAVE USED R.T.I. RADIO Course complete with answers. Cost $97.50. Also Sprayberry Course in Radio. Want a 16 M.M. movie camera and projector. Morris E. Skidmore, Patterson, New York.

SHORT WAVE LISTENERS IN U.S.A. and foreign countries. Would like to exchange my S.W.L. cards for one of yours. I will Q.S.L. 100% by return mail. Vernon Wendt, 227 East 79th Street, Los Angeles, Cal.

WANTED — HAMMARLUND 4 prong coils to cover 10-560M, must be cheap, not rewound. SWL's send me your card. I'll send you mine. QRA Elliott Layden, R.F.D. 2, Box 21, Hertford, N. C.

CALLING YOU DX HOUNDS. How about dropping an ole SWL one of ur QSL's? We QSL 100% here. Come on QSL you nite-owls. QRA: Richard Noel, Gow School, South Wales, N. Y., U.S.A.

HAVE AN INSTRUCTOGRAPH, Senior model, complete with 10 tapes and key, also 65 lessons of a R.T.I. course, complete with Modulated Oscillator and Audio Oscillator. What have you? John Arndt, Box 305, Port Angeles, Wash.

WANTED: BACK ISSUES OF radio magazines to 1925 for reference library. State titles, dates, condition and price. Howard Chandler, R.R. 1, Ravenna, Ohio.

TRADE—APPROXIMATELY 2,500 U.S. and foreign stamps for code machine or what have you in radio line. Best offer takes them. F. Engstrom, 316 Bailey St., Camden, N. J.

SWAP CARTER 6 VOLT D.C. genemotor output 300 V. 80 mils, general coil kit with 3 gang condenser, band switch, coverage 540 kc.-1800 mc., 1.8 mc.-5.55 mc., 5.75 mc.-16.8 mc., Weston meters. Want microphone, miniature camera, typewriter. M. Simon, Box 441, Gary, Indiana.

TRADE—B-FLAT TENOR SAXOphone, guaranteed excellent condition. Little used; brass; cost $175.00. Want good used s.w. receiver. Prefer Hallicrafters Commercial. What have you? Ben Wilson, Bay Shore Drive, Tawas City, Mich.

WANTED TRIPLETT ANALYZER Model 1601 or 1181A or equivalent. Also Riders Manuals of all volumes. State cash price and condition in reply. Modern Radio Shop, Middle Valley, N. J.

WANTED — ACTUAL PHOTOgraphs of Amateur, Commercial, Broadcast Stations, with call, description. Also antenna systems, special technical equipment. Will give radio parts, stamps, souvenirs. Send them along. State your wants. E. Antoine, Rose Valley, Sask., Canada.

I HAVE 7 SHOT RANGER AUTOmatic rifle 22 cal. Used about 1½ years, swap for good S.W. set or what have you. Robert Perlich, 3635 So. Wood St., Chicago, Ill.

TRADE: TUBE TESTER, VOLTohm-meter, Buddy II, with coils for earphones. Official Radio Service Handbook, Short Wave book, 1937 Mag. S.W.T. Want: "Sky-Chief", "Sky-Buddy" or what have you? John Basta, 31 Lake St., Brooklyn, N. Y.

When to Listen In

(Continued from page 55)

GERMANY . . . The German station has added a new frequency to its string. This is DJS on 21.45 mc. This station is in operation daily from 12:05–11 a.m. with an aerial directed to Asia. For North America, programs are now broadcast on DJL, 15.11 mc. from 8–9 a.m. and on DJB 15.2 and DJD 11.77 from 4:50 to about 11 p.m. DJO, 11.795, and DJP, 11.855, are also used irregularly for broadcasts to North America from 7:30 to 11 p.m. On Sundays a program is broadcast from 11:10 a.m.–12:25 p.m. on DJB. DJC on 6.02 is no longer used in the evening hours.

FRANCE . . . The new French station is making quite a name for itself with the phenomenally strong signals it is putting across the Atlantic. Directional aerials for North America are used on 15.13 mc. during the morning and early afternoon hours and from about 4 p.m. until midnight or later another station on 11.84, and sometimes 11.88 mc., comes into operation, using an aerial directed toward North America. These frequencies are much stronger and steadier than either Germany or England, the old standbys.

The "Lie Detector"—How to Build One

(Continued from preceding page)

amplified voltage is passed on to the third tube, which acts as a *direct-current* vacuum tube voltmeter. All this sounds complicated but the action is not hard to follow if a study is made of the diagram of the completed instrument. It is of greatest importance that the voltages be exactly as indicated in the diagram. Because of the great sensitiveness of this circuit, even slight deviations from the indicated values will spoil the action and possibly damage the indicating meters.

The Completed Instrument

The instrument as actually used is shown in the photograph. It consists of a type 30 current regulator, a 32 direct current amplifier, and a direct current vacuum-tube voltmeter using another type 30. The instrument is completely battery-operated. Battery operation is dictated because it simplifies design, is compact, portable and completely eliminates undesirable effects due to line voltage fluctuations. This last is most important. If you think you are getting 115 volts from your A.C. line, just measure it with a good voltmeter and observe the fluctuations over a period of a few minutes. The batteries used gave excellent results.

The entire unit is built in a hardwood case measuring 10 ins. x 16 ins. x 6¼ ins. The panel slopes eight inches from one end at an angle of 30° and supports the two meters and the controls. The flexible connector cord extends from the end directly below the front edge of the cabinet. The electrodes are connected to the ends of this cord. The cabinet contains all the apparatus including the batteries and can be conveniently carried from place to place when necessary. Besides the tubes and batteries the only other parts in the cabinet are the tube sockets, connecting wires, on-off switch, a 30 ohm rheostat, a ¼ megohm potentiometer and a 50,000 ohm resistor. The device should offer no special problems to the constructor. The only precaution to be observed in the wiring is to be sure of good connections and freedom from solder paste smears which cause leakage. For meter protection a 1/200 ampere (5 ma.) meter fuse was incorporated in series with the indicating meter. It can be seen in the photographs just between the two meters. The on-off switch has three positions on it. They are: *"Off" "On Bias" and "On."* It is necessary to apply the bias voltage before the other voltages and also to remove the plate and filament voltages before the bias to protect the indicating meter from damage every time the set is turned on or off. Thermal inertia of the filaments allows plate current to flow momentarily, even after the switch is turned off. Without the bias this spells a blown fuse or meter damage.

Adjustment of the Apparatus

The adjustment for operation of this instrument is somewhat critical. After attaching the electrodes to the subject, the control dial below the 0-500 microampere meter is turned all the way to the right, to be sure of maximum bias in the voltmeter tube. Then turn the *on-off* switch two positions to the right. Next turn the thirty-ohm rheostat to the right until the plate current in the regulator tube reads 0.2 milliamperes. Allow a few minutes for *warming up,* then turn the right-hand dial counter clockwise until the plate current on the 30 indicator meter reads 100 microamperes. The current may creep at first. Follow it by keeping it "on scale" by careful adjust-

ment of the ¼ meg. ohm bias control. Then by keeping the needle about half-scale *emotional reaction* is indicated by a deflection of the meter. A *time delay* of about two seconds occurs in the body of the subject. After each deflection the needle should return to its original position. However if it does not, it indicates prolonged emotional reaction and the meter can be brought back to position by its control. So much for the technical operation of this instrument.

Parts List for Electronic Psychoanalyzer

RAYTHEON (Tubes)
2—30 type
1—32 type

IRC (Resistors)
1—50,000 ohm resistor
1—¼ meg. potentiometer

TRIPLETT
1—Type 524 0-500 D.C. microammeter
1—Type 524 0-1 D.C. milliammeter

NATIONAL CARBON CO. (Batteries)
3—Compact type 45 Volt "B" batteries
1—2-1½ Volt "A" batteries
1—22½ Volt "B" battery
1—3 Volt "C" battery

MISCELLANEOUS
1—3 point switch
1—30-ohm filament rheostat
1—cabinet (home-made from wood or metal)

(Meters having similar scale ratings or approximately those specified above, but of smaller diameter may be used; the meters specified, being of large size and much easier to read, are particularly desirable for such an instrument as this, if it is to be used for any sort of professional work.)

Crystal Rectifier Has Many Uses

(Continued from page 29)

instrument became apparent, a 0 to 1 milliammeter was substituted. Such a meter of standard type can be purchased for several dollars. The original meter used is almost as satisfactory, though it may not show full scale deflection in all applications.

Circuit Easily Understood

A brief study of the accompanying circuit diagram shows the simplicity of the instrument. It is built around a fixed crystal detector, preferably of the carborundum type, and a discarded broadcast coil tapped to cover all useful wavelengths with the variable condenser used. The coil and condenser combination of the value shown allows plenty of overlap so the placing of the taps is not at all critical.

A single-pole five-position switch, a phone jack, a small mica condenser and the antenna binding post complete the unit, which is built into a metal box for protection in carrying it around, since shielding is not essential. Binding posts can replace the phone jack to permit easier connections to be made, if the builder so desires.

A word about the fixed detector. The carborundum type used by the writers will pass in excess of 20 mils without damage. However, the ordinary type of fixed galena is limited to 5 mils or less—which is plenty if the meter used in conjunction with it will give a full scale reading at that current flow.

How It Works

Once wired up according to the diagram its operation is extremely simple. Positions 1, 2 and 3 on the switch, along with the tuning condenser, are used for field strength readings in the immediate vicinity of the transmitter. Position 4 connects the crystal rectifier in series with the milliammeter, adapting it to the measuring of alternating current voltages at practically all frequencies. Position 5 permits the milliammeter to be used in external circuits. The phone jack is used to introduce circuits to be measured as well as the place to plug in with a pair of phones when using the instrument as a monitor or receiver.

Having become acquainted with the circuit and the use of the controls it is an easy matter to put the instrument to work.

Audio Frequencies Measurements

Snapping the switch to position 4 a pair of leads are brought out from the phone plug and connected to the audio output of a receiver. After the receiver has been tuned to a station the audio gain is turned up until the meter shows a reasonable deflection. The varying amounts of modulation on the station carrier are reflected in the swinging of the meter pointer. So used with an automobile radio a satisfactory noise-level indicator for tracing down interference is had. Simply tune in the noise by ear until it is loudest, plug in the meter and, when riding around the suspected neighborhood, the meter will swing to maximum at the point closest to the source of interference.

The same hook-up is employed when using it, in conjunction with a modulated oscillator, to line up a super-het receiver as it directly measures the audio output of the receiver.

A slightly different application of its use as an output meter is had when connected as a *speech-level indicator* for public address systems. One of the leads from the instrument is connected in series with an .0005 mf. mica condenser. Then the leads are connected to either side of the voice coil of the public address system. Upon talking into the microphone the meter will swing accordingly. If a greater deflection is desired, a larger condenser, .006 mf. or so, should be used.

Once the maximum output of the system is determined, note is taken of the meter deflection and, thereafter, monitoring of the volume output can be accomplished by varying the audio gain so as to keep the meter deflection within the pre-determined range.

An A.C. Voltmeter

For uses as an A.C. voltmeter the switch is left in position 4, external resistors are connected in series with one of the leads

(Continued on following page)

Crystal Rectifier Has Many Uses

(Continued from preceding page)

and the meter is checked against a known standard for calibration. This method of calibration is necessary as no crystal-type rectifier is exactly linear, the resistance of the rectifier varying as the voltage across it changes. Once calibrated it will be as accurate as the standard against which it was checked.

Other Uses

Yet another use of the carborundum rectifier—milliammeter combination is its use as a visual indicator to replace earphones in Wheatstone bridge measurements. In this connection it is feasible to tap the audio output of a receiver to feed the bridge net; the meter will show deflection until the values are balanced out, much the same as is done with earphones.

With an antenna of 2 or 3 feet connected to the antenna post and the switch in position 1, 2 or 3, according to the frequency of the transmitter, *field strength* readings can be obtained without other external connections. A headset plugged in will permit *monitoring* signals. For broadcast reception up to distances of 10 to 20 miles a longer antenna is required and the switch should be at position 1.

Set up in the immediate vicinity of the transmitter carrier shift is readily detected by a downward wobble of the meter pointer on modulation peaks. If calibrated against a standard it can also be used to determine *modulation percentages,* as the pointer will rise on modulation peaks, varying according to the heaviness of the modulation of the carrier.

Countless other uses can be found for it at the test bench and, since this handy, inexpensive instrument has been available, it has proved itself almost indispensable. Try it for yourself!

Built 1-Tube Portable With Great Success

(Continued from page 29)

super-regenerative receivers is present, although it will completely disappear when a moderately strong station is tuned in. Thus it is not the least bit annoying while listening to a station.

The antenna can be anywhere from 5 to 100 feet long. Best results were obtained with an antenna only several feet long and with the antenna condenser adjusted to maximum capacity. The filament battery has three volts and it is advisable to insert a resistor having approximately 16 ohms in series with it in order to insure long tube life. This can be either a fixed wire-wound affair or in the form of a 20-ohm variable rheostat mounted on the battery.

Coil Data

Band	*Grid*	*Tickler*
6 mc.	18 Turns	18 Turns
9-12 mc.	10 Turns	10 Turns
15 mc.	5 Turns	5 Turns

All coils close-wound with No. 26 D.S.C. wire on a 1-inch tube; spacing between tickler and grid coils ⅛ inch.

Parts List for Pocket Set

HAMMARLUND
1—50 mmf. tuning condenser
1—100 mmf. antenna trimmer

AEROVOX
1—100 mmf. mica condenser
1—.001 mf. mica condenser
1—1 meg. ½ watt resistor
1—4 prong wafer socket
1—Phone binding post strip
1—Antenna binding post
1—Bakelite (or other) Case

RCA
1—Type 30 tube

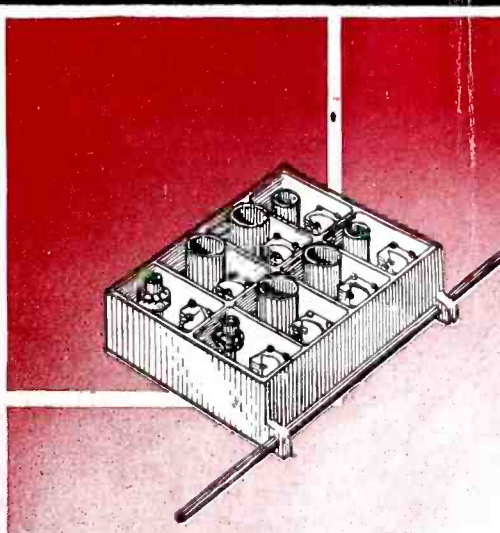
Index to Advertisers

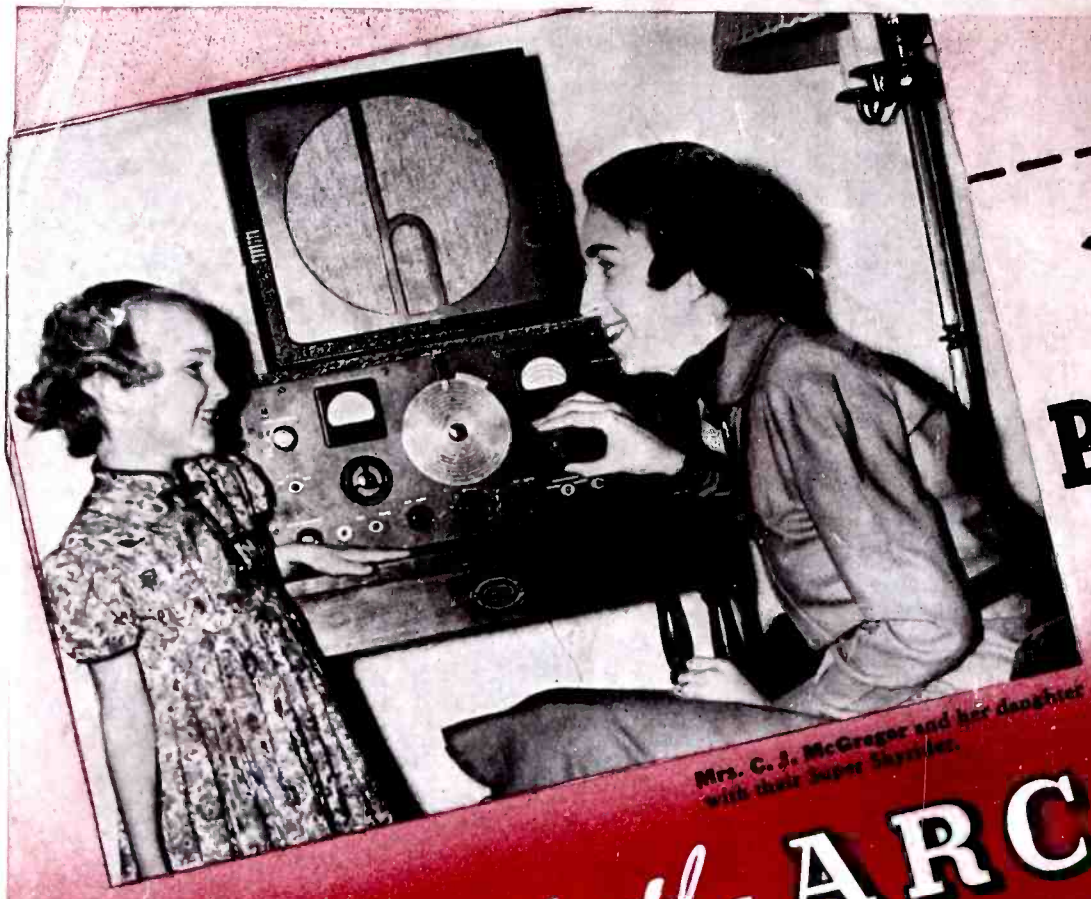
(While every precaution is taken to insure accuracy, we cannot guarantee against the possibility of an occasional change or omission in the preparation of this index.)

In these few short months the NC-80X has become part of the National tradition. Their advanced circuit details, including the wide-range crystal filter and high IF frequency for image rejection, have brought a new standard of performance to the low priced field. Their thorobred construction keeps that performance consistently high. And their convenience makes operation swift, accurate, and tireless.

NATIONAL NC-80X

NATIONAL COMPANY, INC.
Malden, Mass.





Mrs. C. J. McGregor and her daughter with their Super Skyrider.

From Philadelphia to the ARCTIC

HALLICRAFTERS RECEIVERS WITH THE McGREGORS IN THE ARCTIC AND AT HOME

Capt. C. J. McGregor of the McGregor Arctic Expedition.

The Sam. A. W. Crosby, the McGregor ship, which is supplies.

The Hallicrafter Expedition QSL card, with W. A. C. Crosby, ship operator for the expedition.

O At home, with the head of the family locked in the frozen wastes of the Arctic, Mrs. C. J. McGregor and her daughter are entertained by his voice as it comes through the speaker of their Super Skyrider. And in the far North, Captain McGregor and the members of the McGregor Arctic Expedition keep in daily touch with the world through another Hallicrafters receiver.

Thus the scientific expeditions to the far places of the world, the research laboratories in the great universities, and hundreds of other stations where dependable short wave reception is not only desirable but imperative, are selecting Hallicrafters receivers for their fine performance under all conditions of service.

This same high standard of performance is the factor that is influencing thousands of amateurs and short wave listeners in their selection of Hallicrafters receivers.

ATTENTION!

There's a NEW Super Skyrider—a SPECIAL MODEL with TWO stages of pre-selection and a NEW AUTOMATIC NOISE LIMITER. A number of these receivers, known as MODEL SX17, are being used by amateurs throughout the world. Listen on the amateur phone bands any time—hear for yourself what its owners think of the SX17.

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