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TELEVISION "SIGHT EFFECTS"

SEE PAGE 710

In This Issue —

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HUGO GERNSBACK EDITOR

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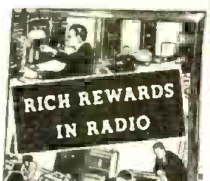

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RADIO & TELEVISION

The Popular Radio Magazine

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

APRIL — 1939
Vol. IX No. 12

FLASH!

Television Sight Effects

See page 710

In This Issue

GENERAL FEATURES

CONSTRUCTION

CONDENSED FEATURES

INSTRUCTION

TELEVISION

MISCELLANEOUS

Next Month

DeLuxe Transmitter—"Beam Power 3"—H. G. McEntee, W2FHP

A High Efficiency 6L6 Exciter—Harry D. Hooton, W8KPX

An Exceptional 4-Tube Receiver—Francis J. Bauer

Push-Button Remote Control Unit for Your Receiver—C. W. Palmer, E.E.

A 2.5, 5 and 10 Meter U.S.W. Converter—Herman Yellin, W2AJL

How To Build A Television Receiver

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Television "Sight Effects" staff at work. Photos courtesy N.B.C.

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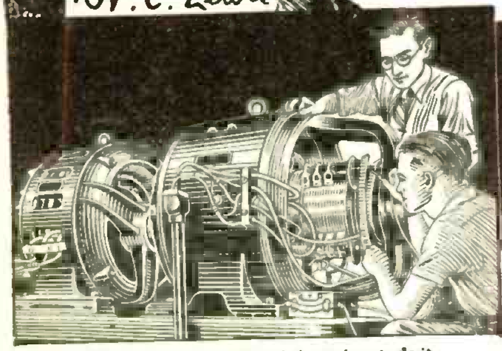
H. C. Lewis



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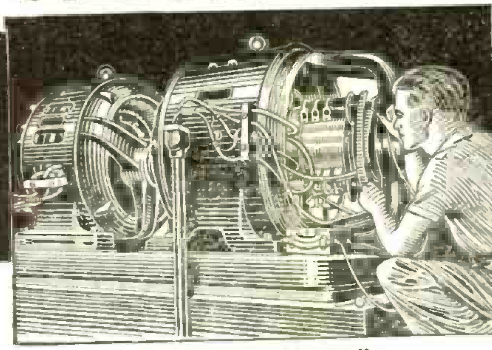

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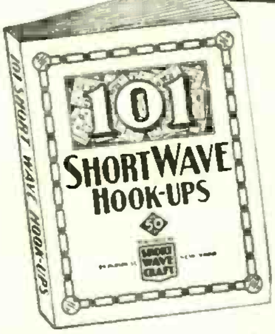

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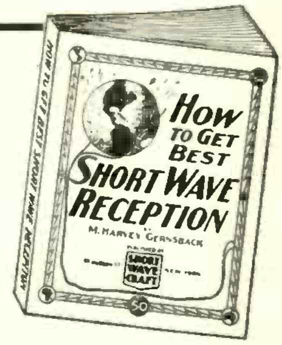

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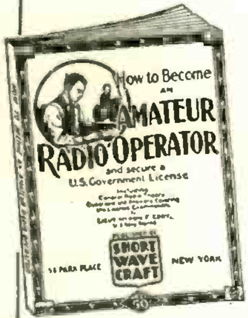

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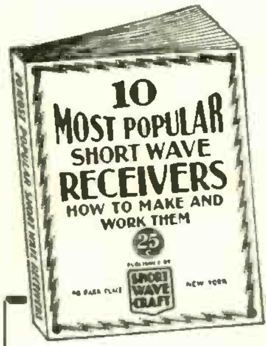

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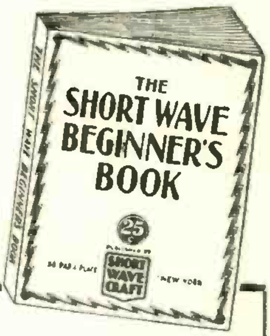

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RADIO & TELEVISION

HUGO GERNSBACK, EDITOR

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ANTENNAS—*Past, Present and Future*

Harold H. Beverage

Chief Research Engineer, R.C.A. Communications, Riverhead, L. I., N. Y.

● MARCONI, during his early work with wireless telegraphy in 1895, used a simple *dipole* oscillator similar to those used by Heinrich Hertz in his classical experiments eight years earlier. Marconi soon discovered that he could greatly increase the range of transmission by connecting one side of the dipole oscillator to earth and the other side to an elevated plate. By using structures of greater and greater elevation to support his antenna, he found that the range of transmission increased. Since the wavelength emitted by this early equipment was a function of the length and size of the antenna, it is evident that Marconi's success quickly set a trend toward the use of longer and longer wavelengths as well as larger and higher antennas. When Marconi had the famed letter "S" transmitted from Poldhu to Newfoundland in 1901, the antenna at Poldhu was supported by masts about 200 feet high, and it is probable that the wavelength was between 2000 and 3000 feet. During the next 20 years, it is not surprising that the trend toward the use of longer wavelengths continued, which in turn called for higher antennas to increase the efficiency of radiation, and antennas of larger area to hold the voltage down to reasonable values when the antennas were energized by the hundreds of kilowatts found necessary for reliable communication over great distances. By 1921, it was not unusual to find some *long wave* transmitting antennas supported by towers 800 feet high, and other types of antennas over a mile long. The Alexanderson multiple tuned antenna is a familiar example of the latter type.

During this period, the bugbear to *long distance* communication was atmospheric disturbances, more commonly known as "static." It was found that static originated mostly over land masses, so that, in general, on transoceanic circuits, the static originated in a direction more or less opposite to the direction from which the signals were arriving over their ocean path. Consequently, it was possible to greatly reduce the effects of static by using *directive reception*. Numerous arrangements were used with varying degrees of success, such as the uni-directional "loop-vertical" combinations of Pickard, the ground wires of A. Hoyt Taylor, and the long antennas supported on poles, such as Weagant's antenna and the "Wave Antenna." The voltages induced in these long antennas traveled at nearly the velocity of light, so that very long antennas could be used effectively, the usual length being 8 to 10 miles for the transoceanic wavelengths in general use at that time.

Harold H. Beverage, well-known for his researches in antenna design.

The Wave Antenna was the first antenna to utilize the *traveling* wave principle, as distinguished from *standing* waves. Its effectiveness was due in large part to its simplicity which eliminated the critical adjustments which were required in its predecessors which depended upon some sort of a balancing arrangement.

The second era of long distance radio communication started with the discovery during the early 1920's, that short waves below 100 meters were useful for long distance communication in the daytime, as well as at night. For these short wavelengths, it was practical to return to the Hertzian dipole as a radiator. It also became feasible to use *directivity* in the transmitting antenna to project a large proportion of the radiated power in the desired direction. It was logical that the first directive antennas should consist of arrays of dipoles with reflectors. Very effective arrays were developed as exemplified by the British Marconi Beam antenna, the German Tannebaum antenna, and the arrays developed in America by the A. T. & T. Company and the RCA. These antennas, however, were relatively expensive to construct and maintain, and as the number of short wave circuits rapidly increased, it was necessary to develop less expensive types of antennas. Economical and effective antennas were devised consisting of wires several wavelengths long orientated in such a way as to concentrate the radiation in the desired direction. Typical antennas of this general classification which have found wide use are the harmonic wire antenna, the V-shaped antenna with reflector, the Rhombic antenna, and the Marconi Series-Phase antenna. The latter two are generally terminated in a dissipative network equivalent to their surge impedance, so that they employ *traveling* waves rather than *standing* waves.

The early short wave receiving antennas were frequently arrays similar to the transmitting arrays, but less costly receiving antennas were eventually developed by the operators of radio communication services. In America, the antennas most generally used for transoceanic services are the Rhombic antenna and the Fishbone antenna, both of which are of the traveling wave type.

The short waves have been very useful as a means for studying the characteristics of the ionosphere and the mechanism of radio transmission in general. This knowledge has been useful in connection with studies of propagation in the broadcasting spectrum. The anti-fading service area of broadcasting stations has been approximately doubled by antennas designed to suppress the radiation at high angles above the horizon.

We are now entering upon the third era of radio communication, the development of the ultra-short waves. These waves do not ordinarily travel via the ionosphere and are limited in their reliable range to distances not greatly in excess of the horizon. This quality is an advantage in many ways since it makes it possible to duplicate the use of these frequencies without interference at points on the order of

(Continued on page 752)

Twenty-sixth of a series of "Guest" Editorials.

H. W. Secor

Television "Sight

● THE *sight effects* expert promises to be a mighty busy man once television has become an everyday entertainment feature—which it is scheduled to do this Spring.

William C. Eddy, a member of the NBC engineering staff, has already developed a number of extremely interesting *sight effects* for television shows. Some of these effects, such as books which turn their own pages, candles which mysteriously extinguish themselves, and "talking frogs," have already been worked out and used in a number of television plays which have been produced for experimental broadcasts during the past few months.

The accompanying pictures show some of the very interesting and unusual sight effects produced by Mr. Eddy and his staff.

In one elaborate marine scene built up especially for television broadcasts, a tank measuring about 12 feet square was filled with water, and the televiewer saw on his receiving screen a parade of warships circling around the harbor of a small seaport. A tugboat with a string of barges puffed along so realistically that the viewer would never dream that this whole scene was being staged with miniature ships built from cork and other odds and ends. The ships were caused to move around a prescribed path, thanks to a circular guide track submerged in the water. The ships were moved by a chain fitted with couplings, all driven by a motor. The puffs of smoke from the stack of the tugboat were produced periodically by squeezing a rubber bulb connected to a smoke tank and a tube leading to the bottom of the tug's stack.

The water in the harbor was colored so as to hide the mechanical devices used for moving the ships. Incidentally, the water was colored by placing some dye on the back of a small turtle and allowing it to swim around in the "harbor."

All the buildings used in these miniature scenes are built from wood and other materials by Mr. Eddy and his staff, and painted in colors to suit the particular scene and locality.

In one television scene it was necessary to build an animated frog, and as one of the pictures shows, the eyes and jaws of the frog were caused to move by means of flexible shafts passing out through the "tail" of the frog. The stomach of the frog was caused to pulsate by means of a rubber bag placed inside it, this bag being connected to a rubber hose and a bulb which was periodically squeezed. The voice of the frog came from a loud speaker.

To cause a candle to extinguish itself while the television camera was focused upon it was a simple trick for Mr. Eddy—he merely placed a metal tube up the rear of the candle and when the candle was to go out, a quick squeeze on a rubber bulb, connected with the metal tube, snuffed out the flame.

In producing television plays, many cut-backs from the main television studio to the *sight effects* laboratory, two floors above, take place. In one of the scenes, a candle suddenly goes out—next, the televiewer sees a pair of hands fumbling with a match. In the next scene the candle refuses to light—but what the viewer does not know is that while a cut-back was made showing the hands fumbling with a match, a candle dipped in a fire-proofing solution was substituted for the original one.

To get the effect of a candle slowly going out, the wick was gradually pulled down inside the previously drilled out candle.

The *flight of time* was one of the effects that Mr. Eddy was asked to produce and a photo shows how this was accomplished. A set of progressive calendar leaves were specially printed for the year in which the scene was to take place. These leaves were then placed on top of a frame so that when a rubber roller was rotated, the leaves slid down a pair of bent wire guides rapidly. The television camera recorded a *flutter of passing dates* with a very artistic effect.

A very ingenious titling machine has been devised by means of which one title can be caused to dissolve slowly into another; in other effects titles appear to be "wiped off" from top to bottom, or bottom to top.

Some of these effects are created by using a lightly silvered sheet of glass placed at an angle so that the first title is seen through the sheet of glass, while the second title is picked up as a reflected image from the surface of the glass. The change from one title to the other is caused by manipulating dimmers so that while one light is being slowly decreased in strength, the light behind the other title is being gradually increased.

The leaves of a large book had to *turn themselves* while the television camera's eye was focused upon the book—this was easily accomplished by attaching a flexible wire shaft to each page so that by turning a knob, each leaf could be turned by the operator who was outside the focus of the camera.

In another scene, a pile of books was supposed to fall on a bottle of acid and upset the bottle. Sounds simple—but suppose that this scene had to be repeated several dozen times? Here's what Mr. Eddy and his staff did. The books were guided in their fall by means of bent wires; the bottle was secured with a hinge so that it would always fall in the same direction when hit by the falling books. The fumes from the acid in the bottle were produced by blowing smoke into the bottle through a rubber tube passing through a hole drilled through the bottom of the glass bottle.

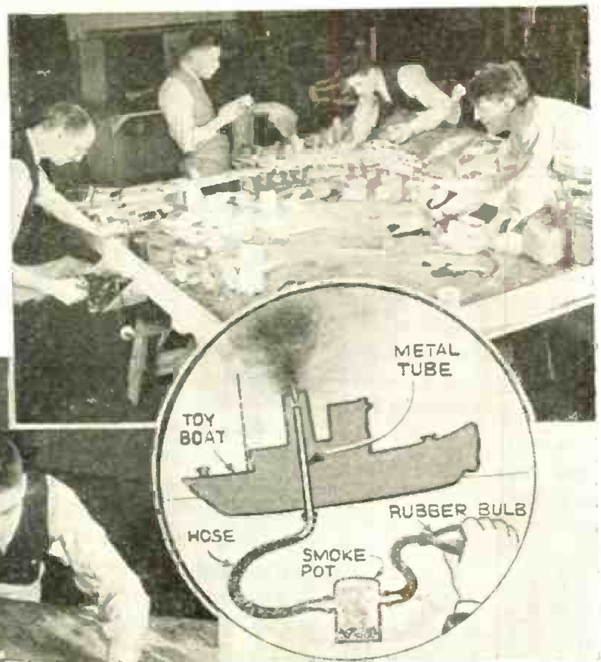
Painting a miniature building for use in a Television scene.

Several of the accompanying pictures show a television miniature scene where the camera moves along a street and picks up images of different signs pertaining to the dramatic story at hand. As the camera nears the end of the street (containing, incidentally, a number of cleverly constructed miniature trees and bushes), the televiewer sees a white picket fence which is used as a cue or connecting link; next the televiewer sees the front of the house shown in the photo. This view is picked up by a second television camera, which is moved in slowly toward the house until the front door appears the same size as does the image of a real *full sized* door being viewed by another television camera. A *live* actor, supposedly a doctor in this case, opens the door and removes letters from the mail box. The switch-over from one television camera to the other is done so adroitly that the viewer never knows that in the first part of this scene he has actually been

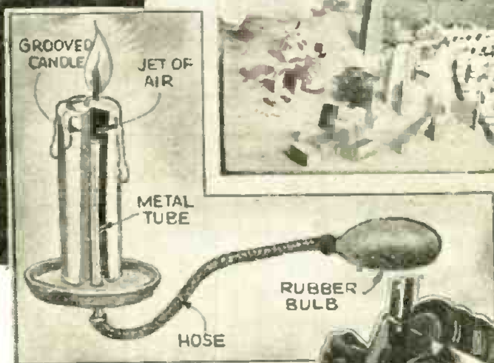
(*Continued on page* 753)

Effects"

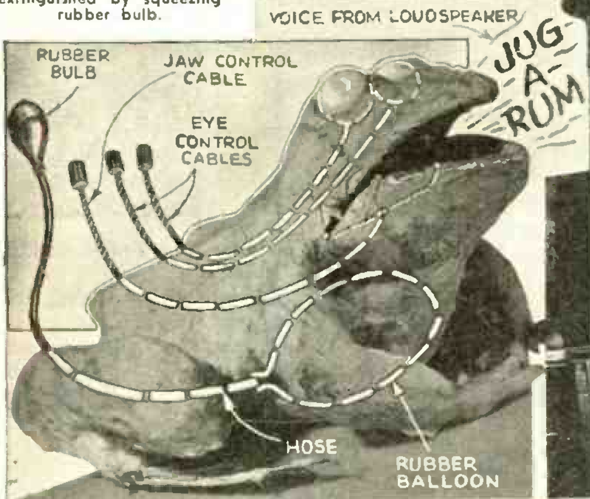
Frogs that talk—books that turn their own pages—spiders that "obey orders"—all these and many others are produced by the television "sight effects" man.

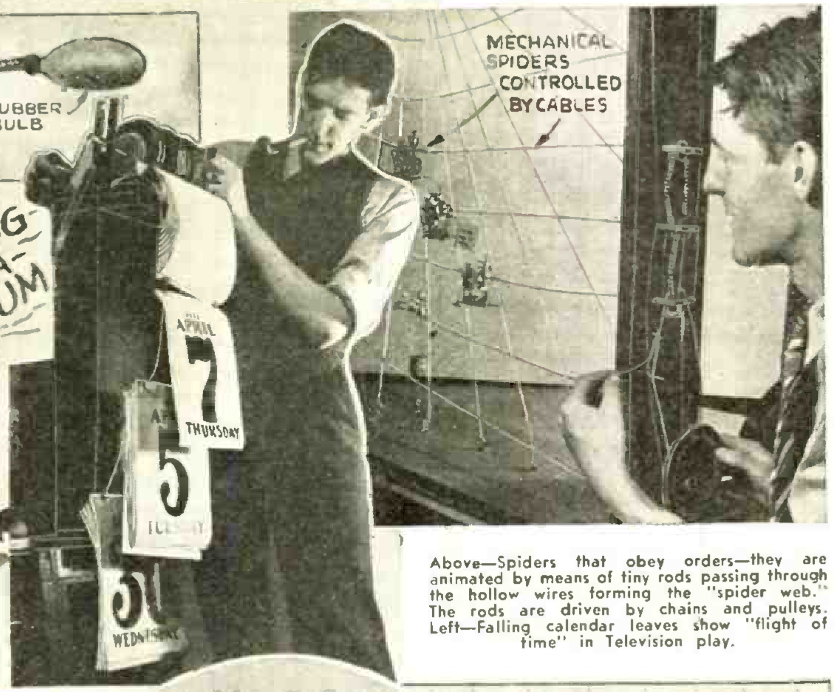


Above—Model ships were maneuvered around model "harbor," by means of a moving chain. Method of pumping smoke out of ship's stack is shown in circle.



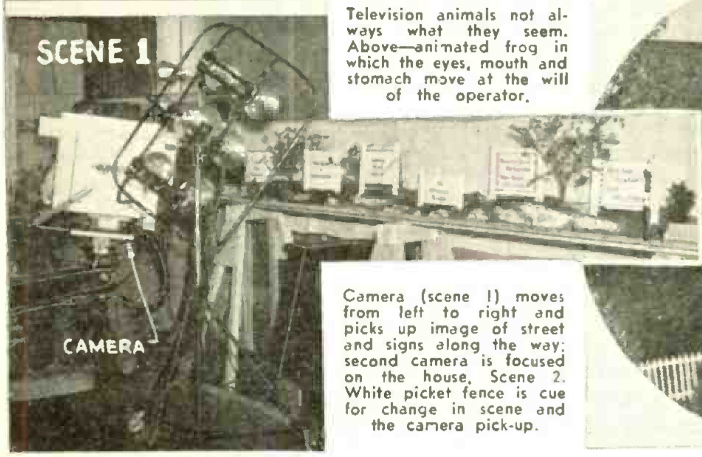
Above—How pages of a book are turned by flexible cables, the operator keeping out of camera range. Right—candle is extinguished by squeezing rubber bulb.

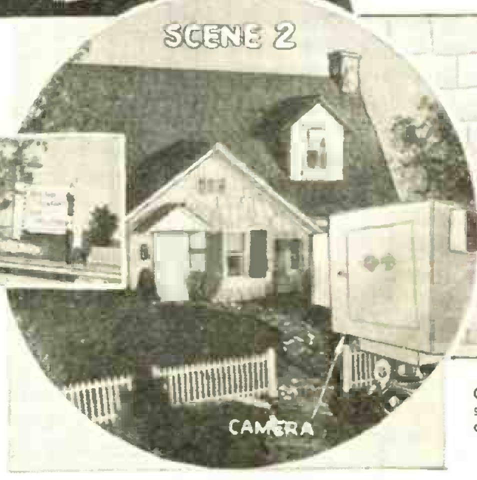


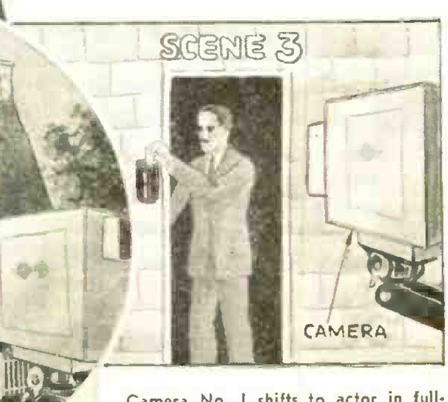


Above—Spiders that obey orders—they are animated by means of tiny rods passing through the hollow wires forming the "spider web." The rods are driven by chains and pulleys. Left—Falling calendar leaves show "flight of time" in Television play.

Television animals not always what they seem. Above—animated frog in which the eyes, mouth and stomach move at the will of the operator.







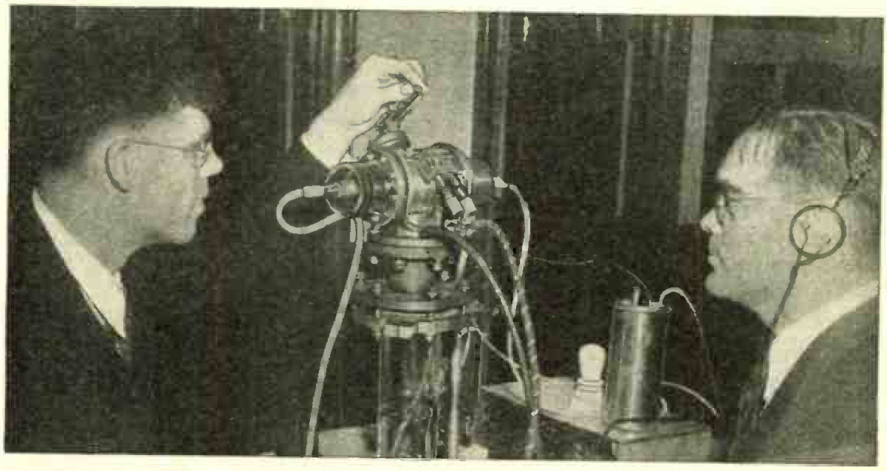
Camera (scene 1) moves from left to right and picks up image of street and signs along the way; second camera is focused on the house, Scene 2. White picket fence is cue for change in scene and the camera pick-up.

Camera No. 1 shifts to actor in full-size door, and takes up action when door image in Scene 2 has been "panned up" to full size.

Electrons "Swing It" in the Rhumbatron

Prof. William W. Hansen tuning the 10 cm. Klystron transmitter in the Physics Laboratory at Stanford University ▲

Russell Varian, credited with the Rhumbatron's invention, inspects his work, with Prof. Hansen. ►



Waves only 10 cm. (4 inches) long may guide airplanes through use of high-power tube using new principle of "dancing electrons".

● EXPLAINING the Rhumbatron and Klystron, R. E. Gillmor, president of the Sperry Gyroscope Company, says:

"The widespread possible application of the *Rhumbatron* and the *Klystron* in the development of new safety devices for aviation was called by the Bureau of Air Commerce to the attention of the various organizations cooperating with it in the development of a blind landing system."

Before continuing with Mr. Gillmor's discussion, pause a moment to study the following editorial item which appeared in the *M. I. T. Technology Review.* This item comments upon an address given by Prof. David L. Webster, head of the Physics Department of Stanford University, before a recent colloquium of M. I. T.'s Department of Electrical Engineering, and says in part:

What is a Rhumbatron? "In the Klystron a beam of electrons representing a constant current is sent through two resonant metal containers known as *Rhumbatrons.* In the first Rhumbatron is an oscillating electric field, parallel to the stream and of such strength as to change the speeds of the electrons by appreciable fractions of their initial speed, accelerating some and slowing down others. After passing this Rhumbatron, the electrons with increasing speeds begin to overtake those with decreased speeds which are ahead of them. This motion groups the electrons into bunches separated by relatively empty spaces. A considerable fraction of the energy of these groups can then be converted into power of high frequency oscillation by passage of the stream through the second Rhumbatron, within which is an oscillating electric field so changing synchronously as to take energy away from the electrons in the bunches.

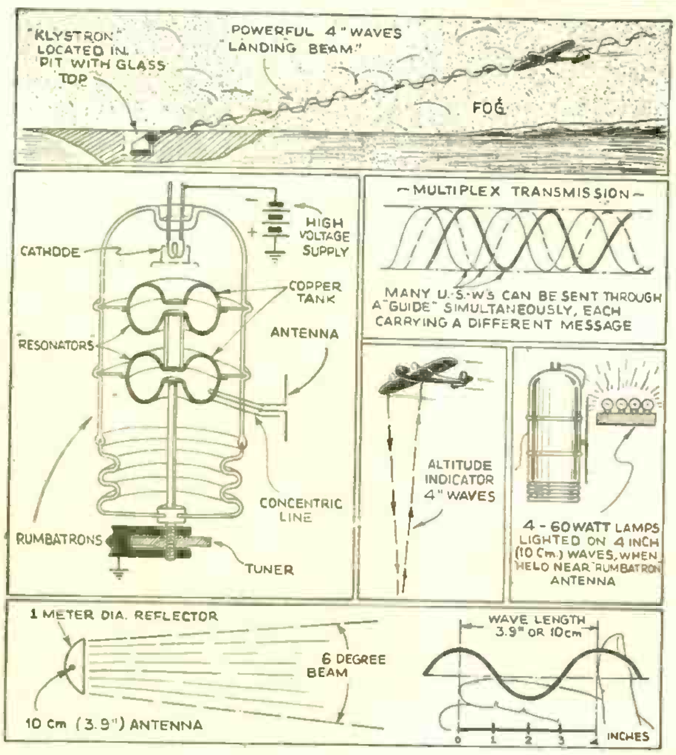
"If the first Rhumbatron (which is called the *buncher*) is driven by an external source of power such as an antenna receiving radiation and the electrons are strong enough to give the second Rhumbatron (which is called the *catcher*) more power than the antenna gives to the buncher, the Klystron is acting as an *amplifier.*

"If the buncher is driven by power received through a coupling loop or otherwise from the catcher, the Klystron is acting as an *oscillator.* And finally, if the buncher is driven by power from both of these sources at once, the Klystron is acting as a *regenerative amplifier.*"

Blind Landing: Continuing with his explanation of the Klystron's purpose, Mr. Gillmor says:

"This new blind landing system (Continued on page 756)

Some sketches to show what the Rhumbatrons in the Klystron will do—and how they do it! ▼



WORLD WIDE RADIO DIGEST

Television's Interference Problem

Interference, due to the ignition systems of motor cars, is becoming a major problem among British television users. "Thermion," feature writer for *Practical and Amateur Wireless*, reports that Government departmental vehicles may soon be equipped with spark suppressors, and that motor manufacturers are rumored soon to make similar use of such devices. He further suggests that everybody engaged in radio and television install suppressors and that they be sold to all purchasers of television equipment. However, "Thermion" has said that nearly five million vehicles are already on the road there and that no legislation is likely to be introduced until television is far more widespread. "Thermion" suggests that the real solution of the problem is to allocate higher wavelengths for television transmissions.

The British writer seems to have overlooked the fact that high frequencies are particularly suited to wide-band transmissions.

WBRK Joins Three Chains

The eight-months-old station, WBRK, Pittsfield, Mass., became affiliated with the Yankee, Colonial and Mutual networks on March 1st.

The station brings the Mutual complement to 110 stations, as of February 15.

To Broadcast Yankee Clipper's First Flight

A shortwave relay broadcasting transmitter and associated equipment are installed on the Pan-American Airway's *Yankee Clipper No. 17*. This apparatus will be used during its initial flight to Europe, the program being broadcast over the Columbia Broadcasting System.

Clyde Houldson, CBS field technician, will act as announcer and operator in the flight. The airplane's station, WCBN, has received an F.C.C. license for eight special frequencies within the 1600 kc. to 23 mc. band, with an output of 100 watts.

The equipment is installed in the lower compartment of the plane's nose and is remote-controlled from the radio room on the upper deck. Its weight is below 1000 pounds, including spare parts, spill-proof batteries and measuring equipment.

A preliminary test of the equipment was given during the plane's test flight from Seattle to Washington. It was completely successful.

Cabaret Televised

Engineers of the National Broadcasting Company took television transmission equipment to the Café Français in Rockefeller Center to pick up the floor show as presented to guests. Among those who performed before the television camera, according to the New York *Times*, were: Sheila Barrett, mimic; Frank Gaby, ventriloquist; Fats Waller, pianist, and several skating acts.

The report further stated that an NBC executive says, "It is not likely that advertisers generally will become interested in television as an advertising medium until there are perhaps 400,000 receivers in this area. There are now only a few hundred television receivers in the same locality."

New Mystery Station

British listeners are reporting the reception of signals from an unlicensed transmitter located in the Ukraine (U.S.S.R.). The station, according to *Practical and Amateur Wireless*, broadcasts propaganda in Polish, Ukrainian and German, daily at G.M.T. 06:45 and 17:00 on channels varying between 28 and 36 meters.

Sixteen Tongues on Italian Stations

Beginning the first of this year, the radio stations of Italy have considerably increased their foreign language broadcasts, particularly on the short waves, according to *Practical and Amateur Wireless*.

The stations now transmit news bulletins and propaganda in 16 languages.

General Electric Answers Questions

Many queries about television are answered in a new booklet, "A Miracle Begins," by Dr. W. G. R. Baker of the General Electric Company.

Among the facts which are brought out is that transmission range is limited to a radius of 40 or 50 miles and that no economical system in interstation linkage is yet feasible. (It has been rumored that the National Broadcasting Company will announce trans-continental television by the end of March.—*Editor*)

Picture sizes, according to Dr. Baker, will range from 2.4 x 1.8 inches to 9.5 x 7 inches. Receivers will probably cost from $150.00 to $1000.00.

HIS HONOR THE MAYOR TALKS WITH HIS HONOR THE MAYOR

Seated in his horse-drawn coach on a London street, Major Sir Frank Henry Bowater, Lord Mayor of London, conversed with Mayor Fiorello H. LaGuardia, Mayor of New York. Their two-way trans-Atlantic telephone conversation was rebroadcast over the National Broadcasting Company network.

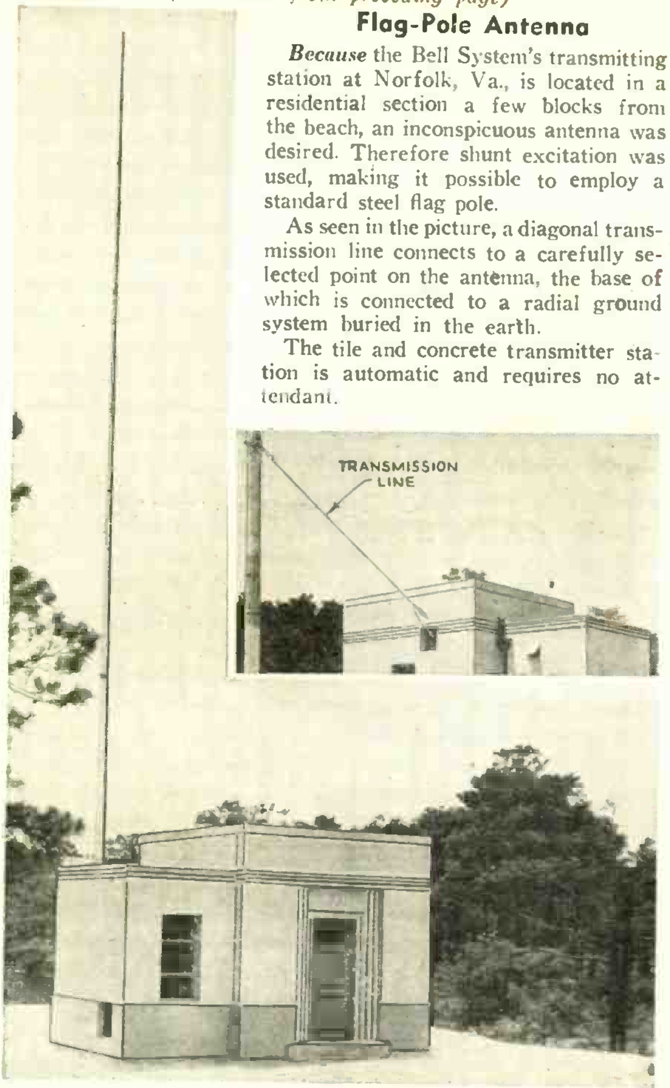
Mayor LaGuardia normally uses his equipment to keep in constant touch with the police and fire departments.

The major portion of the conversation was on how pleased the two mayors were to be able to talk to each other and to hear each other so clearly. They also exchanged views as to the hours, it being 2:55 p.m. in London and 9:55 a.m. in New York.

Mayor LaGuardia invited the Lord Mayor to attend the N. Y. World's Fair.

(Continued from preceding page)

Flag-Pole Antenna



Because the Bell System's transmitting station at Norfolk, Va., is located in a residential section a few blocks from the beach, an inconspicuous antenna was desired. Therefore shunt excitation was used, making it possible to employ a standard steel flag pole.

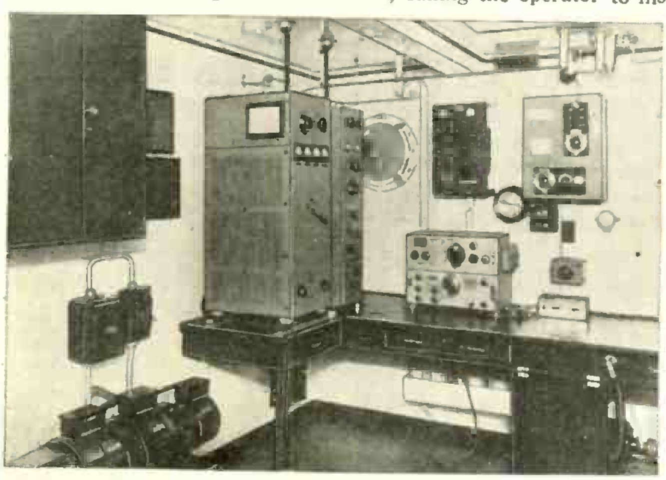
As seen in the picture, a diagonal transmission line connects to a carefully selected point on the antenna, the base of which is connected to a radial ground system buried in the earth.

The tile and concrete transmitter station is automatic and requires no attendant.

Shock of the *Esso Baytown*

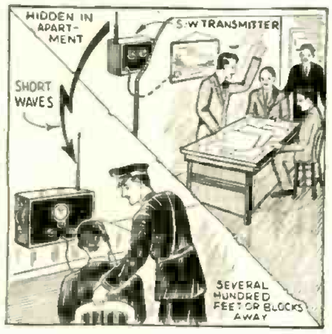
When the New York-Bermuda plane crashed in the Atlantic Ocean, she sent out wireless calls for aid. These were received by shore stations; among them Radiomarine's WSC at Tuckerton. This station, as did others, promptly sent out calls for aid to ships at sea, and it was a call of this sort rather than one direct from the airplane that was received by the *Esso Baytown.*

The operator on the Standard Oil tanker was off duty at the time, but he had recently installed an automatic alarm which rings a bell when SOS signals are received, calling the operator to his shack, a picture of which is printed herewith. The result was that radio had saved ten more lives. On Jan. 1, 1939, there were 1134 U. S. vessels equipped with the alarm system.



WORLD WIDE

S-W to Catch Crooks

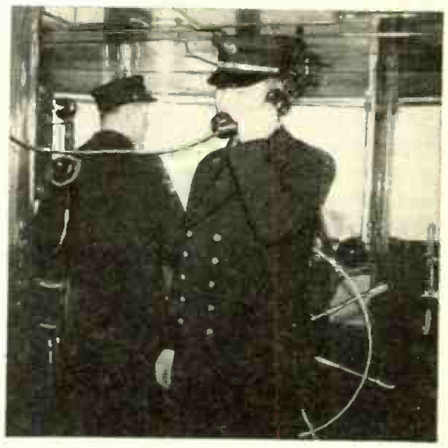


According to General Hugh S. Johnson, writing for Scripps-Howard newspapers, the police are now experimenting with a miniature battery-operated radio transmitter, small enough to be concealed in a brief case.

This outfit, installed in anyone's room or car, will transmit conversations taking place in its vicinity over distances of several hundred feet. Thus, police in a nearby room or following in another car can overhear whispered conversations.

New York's Fireboats Get 2-Way Voice

Two-way communication between ship and shore has been made possible with the installation of General Electric short-wave transmitting and receiving equipment on New York City's ten fireboats, as well as on the mainland. Lt. John H. Reagan is shown here using the handset of the new 50-watt, ultra-high-frequency transmitter recently installed on the *Firefighter,* new $1,000,000 addition to the Fire Department's fleet. The boat's receiver is a medium-high-frequency set tuned to pick up all messages sent from the department's 500-watt transmitter on the mainland.



Regulations in Germany

Those who aspire to become radio artists broadcasting over German stations must pass official examinations. To enter these examinations, they must show at least two years of study in the entertainment field or have had professional experience. Of the 2,478 persons recently examined, only 1,125 passed the stringent tests.

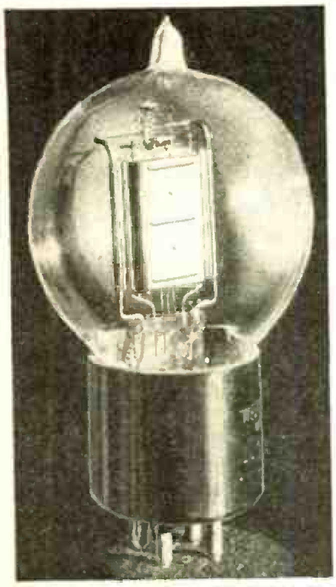
(Wonder if there aren't any amateur hours or quiz programs in the Third Reich?)

New regulations on Government licenses are also expected in Germany. It is believed that the license fee will be reduced to 1 reichsmark for certain classes, and that free licenses will be more liberally issued.

Those who now get free licenses in Germany include the Diplomatic Corps, The Hitler Youth Homes, the Hitler Youth Schools, the Radio Departments of the Youth organization, the offices of the Ministry of Propaganda and of the Post Office and Defence Forces—the latter when the sets are being used in the defence of the nation. This is said to amount to several thousands.

RADIO DIGEST

That 50,000 Hour Tube!



The long-life tube pictured here was developed in the Bell Telephone Laboratories to meet the peculiar needs of telephonic communications. These include low-power consumption, uniformity permitting replacement without readjustment of associated apparatus, reliability against interruption of service, and continuous operation twenty-four hours a day. This tube operates from a battery, the electrons being emitted from a coated filament. It is not adapted to A.C. or D.C. power line use. This, plus the fact that the average radio tube of today lasts about as long as the set, should provide an answer to those who have asked, "Why aren't 50,000 hour tubes used in radio receivers in the home?"

To "Look In" on Next Inauguration

When R.C.A. television was demonstrated in Washington, the *New York Times* reports, Minnesota's Senator Lundeen, appearing before the microphone, asked the announcer whether the Presidential inauguration of 1941 was to be telecast. An NBC official then admitted that plans were on foot to do so.

New Service Suggested

A British writer suggests that in addition to time signals and weather forecasts, it would be a valuable service if radio stations were to broadcast barometric readings. Many homes have barometers which are usually somewhat out of adjustment due to the lack of any available standard with which to calibrate and check.

Fire-Fighting at the Fair

To minimize fire hazards at the 1939 New York World's Fair, a fire chief's car, which will patrol the grounds, is being equipped with two-way radio. In the accompanying illustration, the fire chief is speaking into the handset of the General Electric's 15-watt ultra-high-frequency transmitter. A superhet in the car picks up all messages broadcast from the headquarters station. Appropriately enough, the background in this picture is a Communications Building mural. Note "mikes" at left.

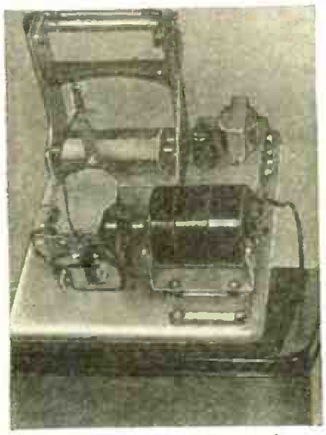
Facsimile Reaches the Public

The Crosley Corporation, long pioneers in various branches of the radio industry, have announced a facsimile receiver for sale to the public. The new receiver, licensed uner Finch patents, reproduces type and pictures on a strip of paper approximately 3⅝" wide (printing space). While the facsimile reproducer can be operated from any standard radio receiving set, the manufacturer suggests the use of a special receiver and a doublet antenna. He also believes that more satisfactory operation will be obtained if an automatic time-switch is used to turn the facsimile equipment on any time during the day when transmissions take place and off at the time they terminate.

Reproducer and special set.

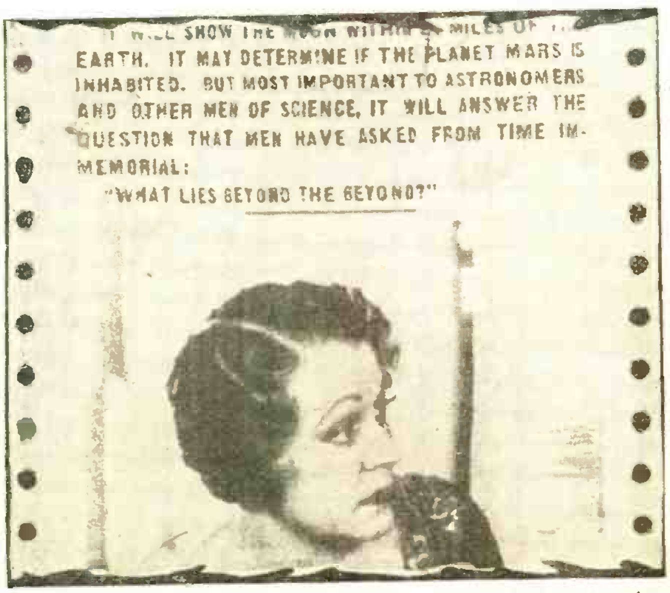
Reproduction is achieved by means of an electrochemical process, current passing through sensitized paper which, incidentally, will be sold at $1.00 per roll! A stylus at the end of a moving arm which sweeps over the sensitized paper, marks each dot to be imprinted when the current passes from the stylus to a roll behind the paper, thus oxidizing the sensitized coating.

Inventor inspects work.



Facsimile chassis exposed.

Transmission is at the rate of approximately three feet of paper per hour. Station WLW is on the air with such transmissions between the hours of 1 A.M. and 6 A.M. Many other stations are likewise sending facsimile material.



SHOW THE MOON WITHIN MILES OF
EARTH. IT MAY DETERMINE IF THE PLANET MARS IS INHABITED. BUT MOST IMPORTANT TO ASTRONOMERS AND OTHER MEN OF SCIENCE, IT WILL ANSWER THE QUESTION THAT MEN HAVE ASKED FROM TIME IMMEMORIAL:

"WHAT LIES BEYOND THE BEYOND?"

Unretouched reproduction of transmission—Actual width is 4 11/16 inches overall. Width of type is 3⅝ inches.

What the Experts Are Saying About Radio and Allied Arts Here and Abroad

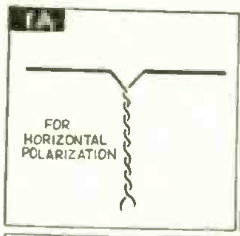
Vertical or Horizontal Television Doublets

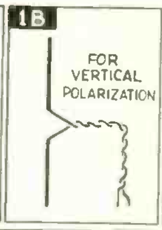
1 H. L. KIRKE, head of the Research Department of the B.B.C., raised the question of the desirability of vertical or horizontal polarization for television aerials, in an address made to the Royal Society of Arts. He said that in England Vertical polarization has been used while in America, horizontal polarization is favored, because interference from automobile ignition systems affects the latter system less.

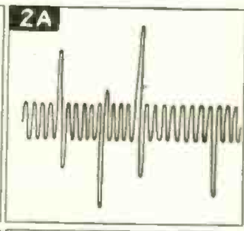
He is quoted by *Wireless World* as saying, "It is probably simpler to design an aerial system with symmetrical radiation in the horizontal plane using vertical polarization. Recent experiments have shown, however, that at any rate, in certain circumstances, a *considerable improvement in signal strength* has been obtained by the use of *horizontal* polarization."

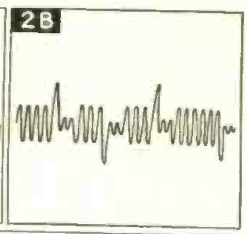
However, a change-over in the British system would necessitate altering all their television receiving antennas (estimated between 2,000 and 10,000) now in use.

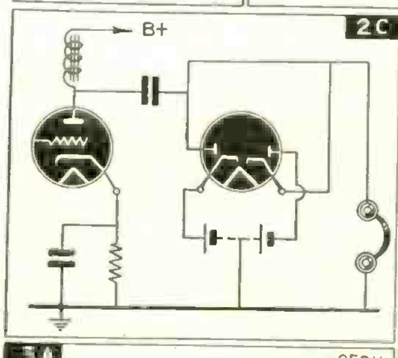
Mr. Kirke concluded his statement saying, "Experiments have shown that for the O.B. radio link, horizontal polarization is considerably the better, and with a suitable design of transmitting and receiving array, a gain of six to twelve decibels in signal strength over the present arrangement is expected, in addition to the improvement obtained by the reduction of general interference from motor cars."

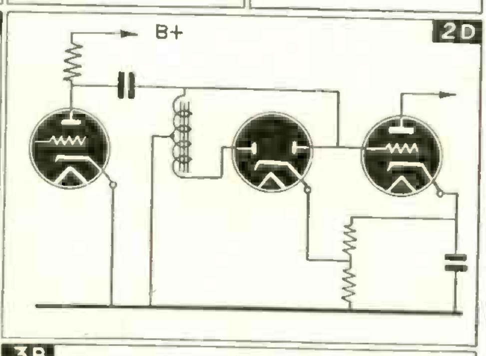


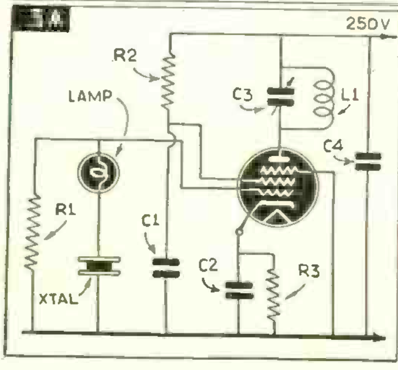


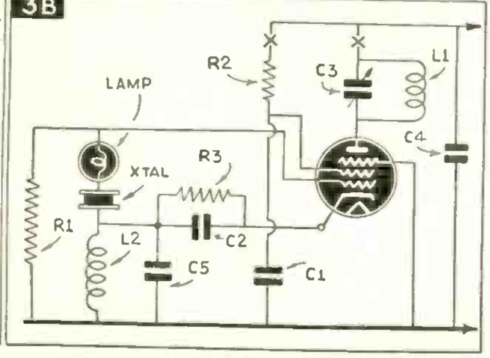












Noise Suppression Circuits

2 AS Fig. 2A shows, a burst of static or other extraneous noise may override a signal greatly, with much distress to the listener. However, if the noise peaks are reduced, as shown in Fig. 2B, it is barely noticeable.

In noise limiters, the noise impulse is rectified and used to supply a negative bias, generally to the I.F. amplifiers. While this is an ideal system for commercially-made sets, it is hard to add to sets which have already been completed, due to time lag factors, etc. However, a noise suppressor circuit of the total cut-off type may easily be added to the A.F. stages of any set. Two such circuits are shown in Figs. 2C and 2D.

In 2C, the suppressor is connected directly in the output of the final tube and it is particularly adapted for headphone operation. The two anodes of the diode are at a potential of 1½ volts negative, this bias being obtained from "C" batteries. When a noise peak occurs, it causes one of the anodes to go positive, thus short-circuiting the phones for the duration of the noise.

Fig. 2D, also taken from *Wireless World*, is a modification, in which the suppressor circuit is inserted in the detector's anode circuit, and the only components required are a center-tapped A.F. choke and a duo-diode tube. Bias may be obtained either from batteries or from the cathode circuit of one of the A.F. stages. A small variable resistor of 50 to 100 ohms in series with the bias resistor of the A.F. cathode will supply the necessary voltage.

Simple Crystal-Controlled Oscillator

3 TWO simple circuits for crystal-controlled oscillators are found in a recent issue of *Wireless World*, a British publication.

Fig. 3A illustrates the simplest form of this type of apparatus. The values in this

circuit are R1—50,000 ohms; R2—5,000 to 10,000 ohms; while the values of C1, C2, C3, C4 and L1 are determined by the frequency of the crystal oscillator.

Fig. 3B uses a few more parts, enabling the operator to make use of harmonics for multi-band operation.

C5 in this diagram is often made variable, but need not be, as once the adjustment has been found, it can be left "set." If the circuit is tuned to resonate at a frequency slightly lower than double that of the crystal, it functions satisfactorily. The points marked "X" indicate connections for a jack into which a milliammeter may be plugged.

Use for Magic Eye

4 A CIRCUIT using a magic eye tube for a *frequency meter* is indicated in Fig. 4. According to the description in *Practical and Amateur Wireless*, this instrument is far more sensitive than one employing a thermo-ammeter, and also tunes more sharply. In addition, indication is instantaneous; the absence of lag being particularly valuable when tuning is subject to rapid fluctuation.

While this apparatus can be added to any existing frequency meter, it will alter original calibration. The addition of a rectifier would increase its sensitivity, but the self-rectifier shown is sufficiently sensitive. Although an external rectifier improves the unit somewhat, it complicates the apparatus and raises its cost.

Electronic Musical Instruments

5 OLD headphone magnets may be utilized to build home-made electronic musical instruments, as described in *Practical and Amateur Wireless*.

Fig. 5A shows the principle. In this arrangement, a single stretched metal "string" vibrates between the poles of the two coils, which should be spaced as close as possible without permitting the string to touch them on its maximum vibration. The coils are in series, their free ends being connected to the input of an amplifier.

Fig. 5B shows how the unit may be assembled with a single stick of wood in order to make a one-string fiddle.

Fig. 5C shows a multiple unit, as designed for a guitar. The unit is mounted on a piece of mahogany and the strings stretched above it, each positioned accurately over its pole-piece. Various notes other than fundamentals are secured by sliding the finger along the string, just as in playing standard instruments.

Overcoming Instability

6 WHEN a radio frequency receiver is used, oscillation or instability is often noticed before maximum volume is obtained. Two simple ideas, illustrated in Fig. 6, were described in *Practical and Amateur Wireless*.

The first idea is to "short" the reaction choke in the detector stage. If this stops the instability, the position of the choke should be changed or a shielded choke used. In some cases, the addition of a fixed condenser across the R.F. choke will prove effective, as shown in the R.F. stage of the diagram.

If neither of these tests prove effective, there is something radically wrong with the layout or wiring of the set, the article concludes.

Separating Video and Audio Signals

7 AS shown in Fig. 7, incoming television signals with their associated sound are applied across the terminals T and T1 to the control grid of a pentode, together with local oscillations from a source "S."

According to a patent recently granted to Ferranti, Ltd., and G. M. Tomlin, if the picture signals are transmitted on a carrier of 45 megacycles and sound on 41.5 megacycles, a local frequency of 32 megacycles is used. In the anode circuit A, the tuning of which is broadened by a shunt resistance R, a difference frequency of 13 megacycles (45–32) is produced and transferred to the I.F. stage A1 of the picture channel.

A second tuned circuit, B, is connected to the screen grid, and is decoupled by a resistance R1 and condenser C. Here the second difference frequency of 9.5 megacycles (41.5-32) appears and is passed

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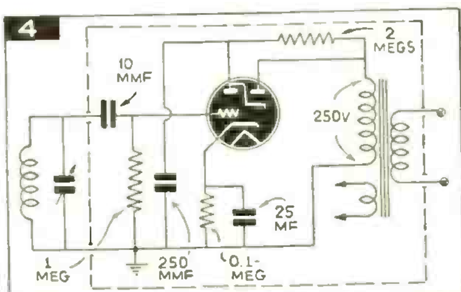
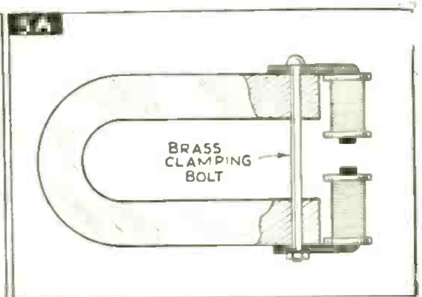
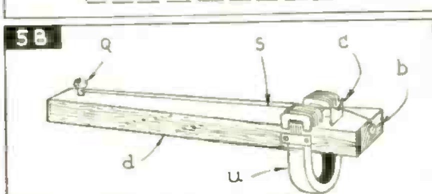
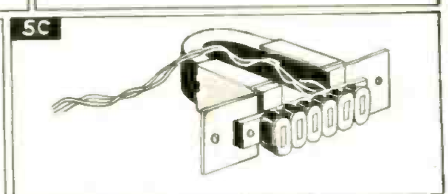
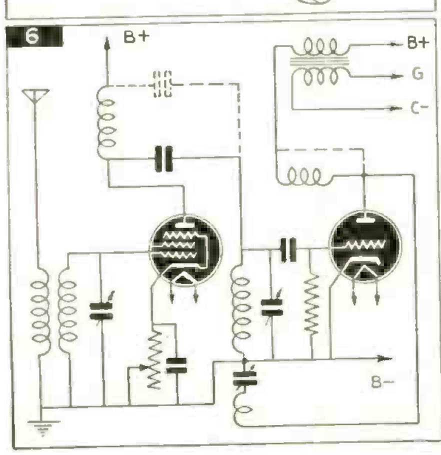
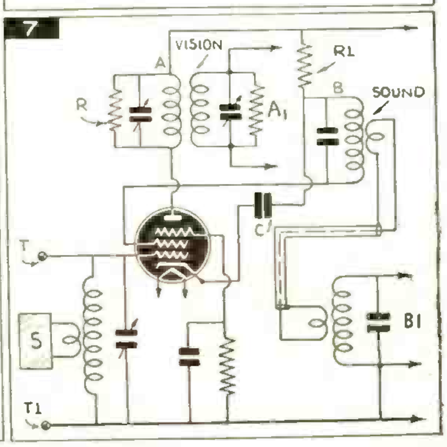












INTERNATIONAL RADIO REVIEW

(Continued from preceding page)

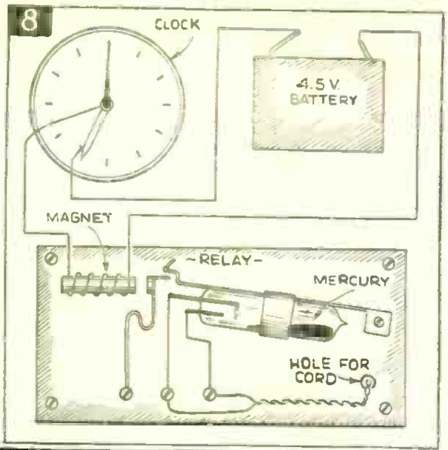
through a separate amplifier, B1, to the sound channel. The arrangement avoids cross-modulation and prevents undue attenuation of either set of frequencies.

Simple Radio Time-Switch

8 A TIME-SWITCH which can be made from a common clock and little other apparatus is described in *Populaer Radio* of Denmark.

As Fig. 8 shows, one contact is made direct to the hour hand of the clock, while the other is made to a contact which may be positioned at any spot on the dial. In series with these two points is an electro-magnet (which may be removed from an ordinary ten-cent store door bell) and a 4½ volt flashlight or "C" battery.

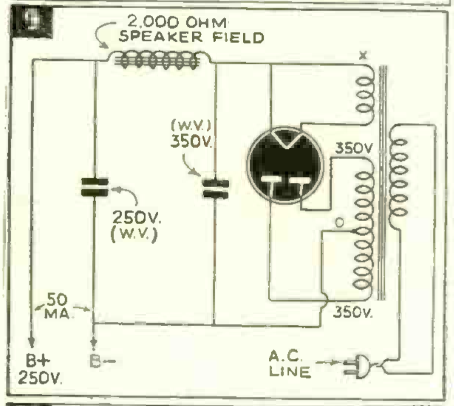
This electro-magnet operates a trigger to trip a switch which is in series with the power line to the set.



Reducing Hum in S.W. Receivers

9 ACCORDING to *Practical and Amateur Wireless*, the simplest way to determine the cause of hum is to check the output of the detector stage, which may be done with a pair of headphones. This stage is most likely the source of the trouble.

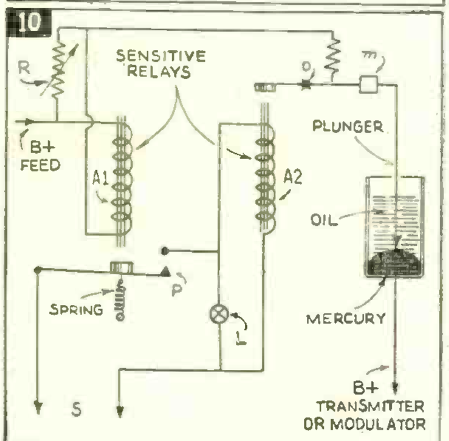
While equipment of adequate size to carry the complete current for the plate of a multi-tube set must be rather heavy and therefore expensive, it is comparatively cheap to supply additional filtering for the detector stage. The diagram in Fig. 9 indicates this, the point from which a separate detector supply may be taken being marked X. A standard audio choke may be connected at this point. Better clarity will be obtained if a condenser network is used with the choke.



Circuit Breakers Protect Transmitter Tubes

10 AN article by Rene Jourdan, F8LO, appearing in *Le Haut Parleur "8"*, describes an interesting means of protecting transmitter tubes by means of simply constructed relays and a mercury switch. The variable resistance R is inserted in the circuit to permit careful adjustment of the relay, A1. When normal current is flowing into this circuit it energizes A1.

This permits the circuit S to be closed. If excess current flows in the circuit S, the relay A2 is actuated, opening the mercury switch. Oil is provided in the switch to prevent arcing.

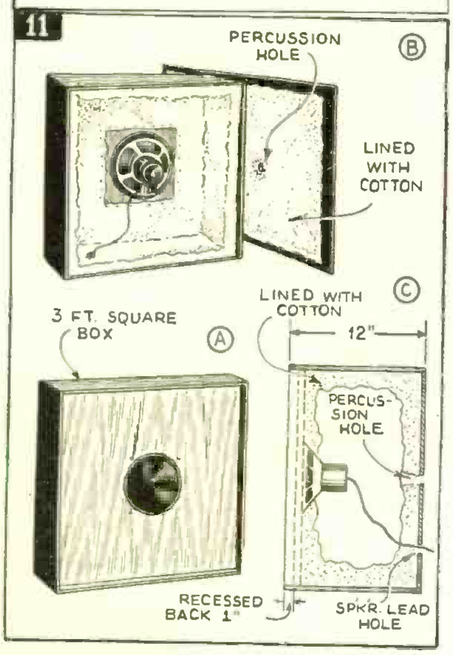


Baffling for High Fidelity

11 AS no speaker can be better than its baffle arrangement, an article by M. McGowan, VK2MZ, in the *Australasian Radio World*, is particularly interesting.

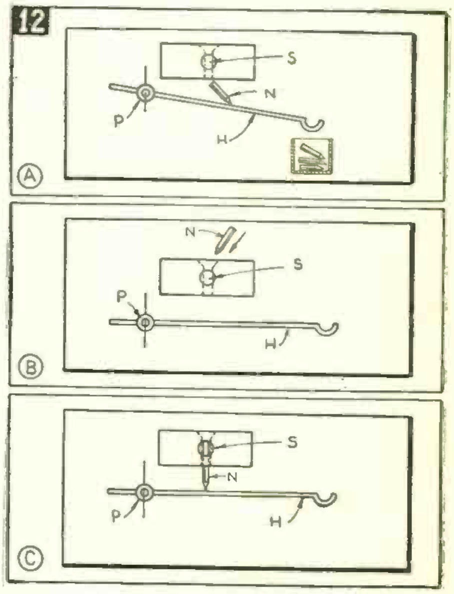
The speaker used had a comparatively flat response from 40 to 9000 cycles. As shown in Fig. 11A, the unit is mounted at the center of a 3-foot panel which forms the front of a box 12 inches deep. The box is lined with cotton batting and a back provided. At the center of the back, a one inch hole was drilled to prevent compression of the imprisoned air. A view showing this is given in Fig. 11B, for a complete plan.

For such readers as may wish to experiment with this type of baffling, further data is given at 11C.



New Pick-Up Feed

12 A NEW and improved Italian pick-up is described in the German publication *Radio Mentor.* The speaker is easier to load and to discard needles from than any other unit hitherto seen. As shown in Fig. 12A, a used needle is discarded merely by loosening the screw S. When the handle H is pulled down, the needle slides along it and falls into the needle container C. The needle is replaced by being inserted from the top, as shown in Fig. 12B.



You will notice the handle, pivoted at B, returns to position so that, as shown in Fig. 12C, it forms a gauge permitting the needle to extend the correct distance and no further.

A Letter from London

In the January issue of Radio & Television, it was stated that the Birmingham-Manchester co-axial cable had been abandoned for television use and would be used for telephone conversations. In reply

(Continued on page 751)

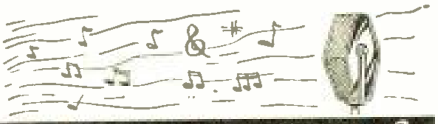
Robert Eichberg's

Radio Test-Quiz

For each question answered fully, count 10 points; half right, 5 points; etc. A perfect score is 170; a good score is 110; below 60 is poor.

1. Radio programs are generally loyal to the theme music, which identifies them year after year—but early in 1939, which of the following changed its theme music?

a. The Good Will Hour.
b. Easy Aces.
c. The Jack Benny Show.
d. The Oak Bucket Boys.



WHICH CHANGED ITS THEME MUSIC?

2. According to the latest complete FCC report (July 1, 1938) there were six broadcast frequencies, each of which had more than 50 stations on it. Match the frequency with the number of stations using it, in the table below.

a. 1200 kc.	*A. 65*
b. 1210 kc.	*B. 51*
c. 1310 kc.	*C. 59*
d. 1370 kc.	*D. 53*
e. 1420 kc.	*E. 61*
f. 1500 kc.	*F. 60*

—

3. The simplest way to make a volume expander is to

a. increase the "B" voltage on the R.F. stages.

b. reduce the "C" voltage on the output stage.

c. connect a pilot light across the loudspeaker voice coil.

d. connect a 110-volt, 60-watt light bulb in series with the negative "B" lead.

—

4. In making recordings—perhaps for veris—on acetate blanks, the proper depth of the cut is

a. 0.015 inch	*d. 0.0025 inch*
b. 0.025 inch	*e. 0.005 inch*
c. 0.0015 inch	*f. 0.0005 inch*

—

5. And the ratio of the depth of cut to width of cut should be

a. 5:1	*d. 1:2*
b. 2:1	*e. 1:5*
c. 1:1	*f. 1:7½*

—

6. Of the following features, introduced some time ago, which is not used as much as formerly in radio receivers?

a. A.F.C.	*d. A.T.C.*
b. A.V.C.	*e. A.V.E.*
c. Q.A.V.C.	*f. P.-B.T.*

7. Since the public learned of "long life" tubes, which give 50,000 hours of operation in telephone service, there has been some discussion as to their availability for broadcast reception. Which of the following has or have been given as reasons why these tubes have not been made available to the public?

a. they cost 15 times as much as ordinary tubes.

b. they would ruin dealers' replacement business.

c. ordinary tubes usually last about as long as average receiving sets.

d. receiving set circuits change too rapidly.

—

8. As this goes to press, motion picture producers are agitating to keep movie stars from broadcasting. Which of the following broadcasters have appeared in motion pictures?

a. Fannie Brice.
b. Walter Winchell.
c. Ben Bernie.
d. Amos 'n' Andy.
e. Robert Benchley.
f. Rudy Vallee.

—

9. Some of the new concentric cable has the space between the inner and outer conductor filled with gas under pressure. The purpose of this is to

a. increase the capacity between the two conductors.

b. keep moisture out.

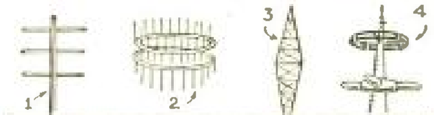
c. provide a method for detecting electrical leaks in the outer conductor.

d. raise the inductance of the cable.

—

10. The aerials used to radiate the NBC television signal from atop the Empire State Building in New York are

a. horizontal rod dipoles.
b. vertical wire dipoles.
c. skeleton masts.
d. torpedo shaped.



WHICH IS THE LATEST TELEV. AERIAL?

11. If you are a short wave listener in Chicago, and the time is 8:00 p.m. where you are, what will be the approximate time in the following places whose stations you tune-in?

a. Rio de Janeiro	*A. 3:00 p.m.*
b. Manila	*B. 5:00 p.m.*
c. Rome	*C. 11:00 p.m.*
d. Nome	*D. 7:00 a.m.*
e. Yukon	*E. 3:00 a.m.*
f. Bombay	*F. 10:00 a.m.*

—

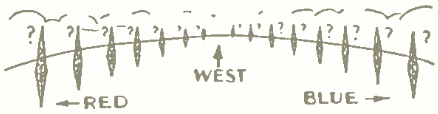
12. The glamorous feminine comedienne of a certain broadcast is called "*Stinky*" by the orchestra leader of the show. Can you find their names in this list?

a. Fannie Brice	*A. Skinney Ennis*
b. Martha Raye	*B. Peter Van Steeden*
c. "Honeychile"	*C. Meredith Wilson*
d. Gracie Allen	*D. Kaye Kyser*

—

13. Of the following stations, one is the farthest west station of the basic Blue network; another the farthest west of the basic Red network. Identify these two stations.

a. San Francisco—KGO—KPO
b. Salt Lake City—KUTA—KDYL
c. Denver—KVOD—KOA
d. Omaha—KOIL—WOW
e. St. Louis—KWK—KSD



RED & BLUE, WHICH ARE FARTHEST WEST?

14. Of all the various bands, which of the following is the highest wavelength allocated to television in the United States?

a. 500 kc.	*d. 50 mc.*
b. 1000 kc.	*e. 70 mc.*
c. 2000 kc.	*f. 100 mc.*

—

15. When hooking up a double-button carbon microphone for "home broadcasting," the best way to connect it is

a. directly across the grid and cathode of the detector tube.

b. directly across the grid and cathode of the first audio amplifier tube.

c. to the grid and cathode of the detector tube through a special coupling transformer.

d. to the grid and cathode of the first audio amplifier tube through a special coupling transformer.

—

16. A line noise filter ordinarily consists of

a. A.F. choke coils.
b. R.F. choke coils.
c. fixed condensers.
d. variable condensers.

—

17. The Purple Network is the name for

a. the Mutual Broadcasting System chain.

b. the Columbia Broadcasting System chain.

c. the combined Red and Blue chains of the National Broadcasting Company.

d. the Intercity Broadcasting System chain. *(See Answers, page 757)*

LATEST INTER-PLANET NEWS

The Martian Flash

MARS-EARTH SPACE TRANSMISSION: COSMICLEAR

No. 3 APRIL, 1939 Price: None

The Martian Flash

An Inter-Stellar Magazine for all Radio Enthusiasts.

Published:—When Interplanetary Conditions Permit.

Interplanetarian Pub. Co., (Very) Ltd.

Fips—*Editor*

Subscription Price for All Planets—Priceless.

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

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

Fips, the Office Boy, who tells us the latest happenings on Mars.

April, 1939

EDITORIAL

● MANY of our readers have written in asking for information as to how the Martians, as illustrated in the previous issues of *The Martian Flash*, got that way. In other words, why the telescope eyes, the barrel chests, the elephantine nose and the web feet?

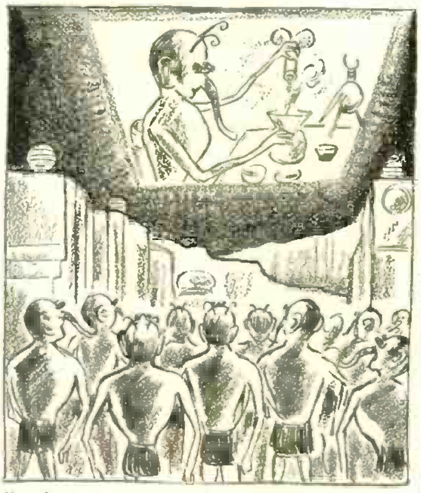
The answer is simple. The atmosphere on Mars is so thin that it actually compares with the tops of the highest mountains on Earth. Mars, being much smaller than the Earth, lost most of its atmosphere through the ages and now has very little left. Indeed, it would not have much at all if the Martians themselves did not replenish it continually by artificial means. When I first came here I had continuous nose-bleeds and I was continually gasping for air. Now I am equipped at all times with a simple pocket apparatus which automatically gives me a sufficient amount of oxygen, without which I could not live at all on Mars.

Down through the ages the Martians had to adjust themselves to the rarefied atmosphere and that is why they must have enormous lungs (which require a large chest) to compensate for the rarefied air.

Scents and smells travel poorly in a rarefied atmosphere. For this reason the Martian nose grew longer and longer so that it could get toward the source of the smell rather than have the smell come to it.

The telescopic eyes are also due to evolution because the Martians, using their eyes continually, found it necessary to grow eyes which could accommodate themselves better to their complex mode of living than fixed eyes. There is nothing new in all of this. Barrel chests are already in existence among certain inhabitants of the South American Andes. Another example is the elephant's nose. The peculiar shape is necessary because its huge bulk hinders it in kneeling down. Therefore the long, flexible nose has been evolved. Pop eyes are not new either. Snails and certain fishes have had them for millions of years, not to speak of Eddie Cantor!

As for the web feet, you know that gravitation on Mars is very low. For instance, my weight on Earth is 160 pounds, but is only 60 pounds on Mars! Consequently, to get a better foothold for the large proportioned body, the web feet were evolved by nature. The antennae on the Martian's forehead are not so new either because your insects on Earth have had them for many millions of years. So, you see, there is nothing new under the sun, and the grotesque—to you—is after all not so grotesque as you imagined.



"—the upper atmosphere served as a sort of mirror screen for television images—"

MARTIAN TELEVISION

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

EVER since my articles have appeared in *The Martian Flash* there seems to be an intense interest among the readers regarding the present status of *television* on the planet Mars.

A close-up of Earth 1,250,000 years ago, showed ape-like beings, but no men.

Let me say that, as you can probably imagine, television has been here for many millions of years and therefore it is somewhat different from what you would expect it to be.

To begin with, at the present time it is quite unnecessary for Martians to have any television receiving apparatus. Like many other things on Mars, all forms of communication have been *personalized* in the Martian himself. At first this was not the case and television was received on screens similarly to yours on Earth. Refinements then brought pocket television receivers and, much later, television receivers which could be strapped to the wrist; still later they got so small that by means of a special lens, you could view excellent images on a small finger ring and get the sound as well. Still later, huge television images were projected into the rarefied upper Martian atmosphere similar in principle to Northern Lights on Earth. These images were so colossal, yet of such excellent quality, that the upper atmosphere served as a sort of mirror screen and standing on the surface of Mars you could enjoy television in full colors any night of the year. As there are practically no clouds on Mars at any time, good television views were always to be had in this manner. These images were from 9 to 15 miles above the surface of Mars and you may imagine how huge these images must have been in order to see them plainly from Mars' surface. While such television exhibitions are still being used, especially for extraordinary occasions, nowadays the television images are received directly on the retina of the Martian's eyes. The reception comes over the Martian's antennae and the special wave motions are conducted directly toward the back of the eye. All one has to do is close one's eyes and see the transmitted television

(Continued on page 762)

More About FREQUENCY MODULATION—

Details of the G. E. 12-Tube Receiver

Left—Dr. W. R. G. Baker (standing), G.E. Co., radio engineer, watching Major E. H. Armstrong demonstrate "frequency modulation" receiver.

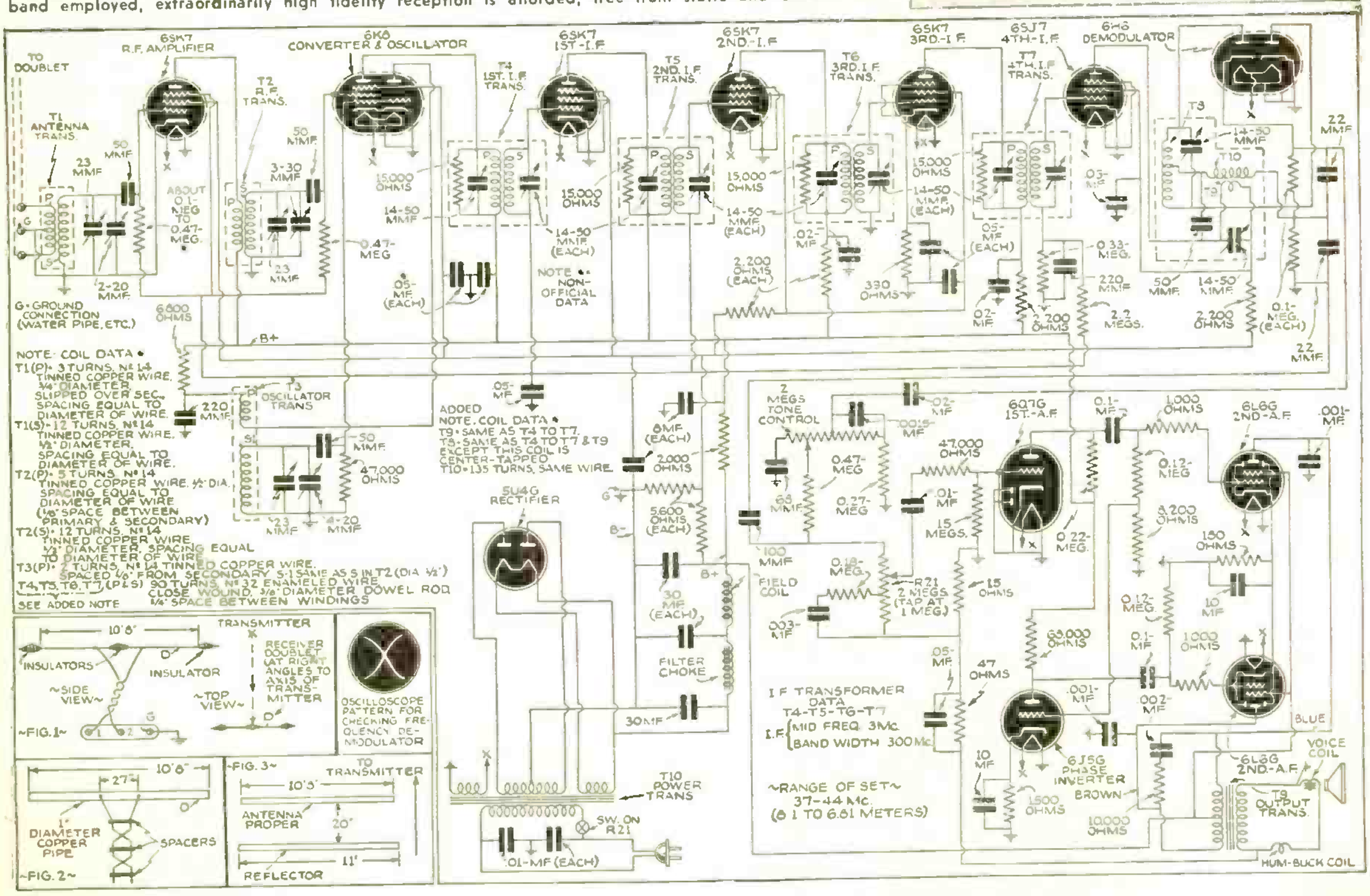
Photo at right shows the appearance of the frequency modulation receiver.

● AS explained in our last number, several transmitting stations designed to utilize the new Armstrong frequency modulation system are being erected, and Professor Armstrong's transmitting station, W2XMN at Alpine, N. J., will be in operation this spring. Arrangements are being made to broadcast the high fidelity programs from station WQXR.

I. R. Weir, G.E. engineer in charge of transmitter development, in a recent report on measurements made of the noise reduction effected by the Armstrong frequency modulation system, compared to the reception on the standard amplitude modulation method, stated, "In some cases this improvement is as high as 20 to 25 decibels (100 to 300 times). This means there is a remarkable freedom from atmospherics and man-made static, such as X-rays, automobile and aircraft engine ignition, electric motor commutator sparking, etc.

"The results show such a marked advantage for frequency modulation in network operation, it is believed that even with the modification which would be required in applying the results to actual *(Continued on page 746)*

Wiring diagram of the new G.E. 12-tube "frequency modulation" receiver. Due to the wide frequency band employed, extraordinarily high fidelity reception is afforded, free from static and other noises.



Ultra-High Frequency Antennas

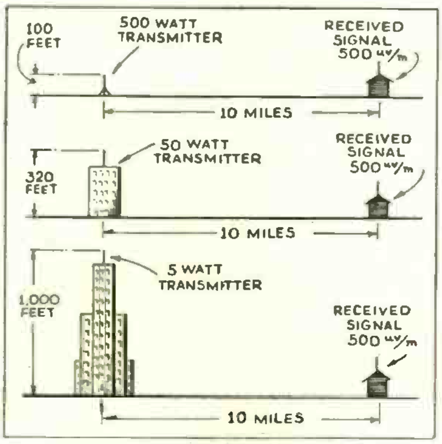


Fig. 1 shows the quantitative importance of the antenna height. In the three cases, the transmitter power is adjusted to give equal signals at a fixed distance for three heights of 100 feet, 320 feet and 1,000 feet. The respective transmitter powers required are 500 watts, 50 watts and 5 watts. In so far as the listener is concerned, the effectiveness of the three stations is the same although there is a great difference in power. Effective power is proportional to the square of the altitude or height.

Coaxial Antenna

● AN ideal antenna for ultra-high frequency applications is one which uniformly radiates the strongest possible signal along the surface of the earth. To attain this objective, it must be mechanically designed for easy mounting at the top of a high pole to take full advantage of height, and further it must be electrically designed to radiate most efficiently in horizontal directions for the greatest utilization of the radio power.

The coaxial antenna (Fig. 2) represents a practical form of this antenna utilizing certain new principles that attain the desired objective. Its slender proportions, short length, light weight and coaxial symmetry enable it to be applied easily to high steel poles of standard construction. Its superior radiating capabilities make it the most modern approach to the idealized radio antenna.

The *ultra-high frequency* radio antenna may be considered as somewhat similar to a beacon light except that it emits polarized radiations of a longer wavelength. It, too, must be placed high above the earth if it is to be effective in transmitting over long distances.

In most practical cases the radio equipment is located at ground level in a building and is connected to the high antenna by means of a transmission line. In this discussion a low-loss concentric type transmission line will be assumed. In this line the useful current at ultra-high frequencies is carried by two paper-thin metallic conducting surfaces; first, the skin surface of the quarter-inch copper inner conductor which may be considered as the outgoing conductor and secondly, the inside skin surface of the seven-eighths inch copper sheath which may be considered as the return conductor.

The outer surface of the seven-eighths inch copper sheath plays no part in this transfer of useful energy in the idealized case.

By reference to Fig. 2 which shows a cross-section of an elementary form of a coaxial antenna a new circuit element is evident. The enclosed sheath of the transmission line acts in conjunction with the inner surface of the larger surrounding tube to form a short-circuited quarter-wave concentric line. The characteristics of this shorted section of line cause an extremely high impedance to be created across points A and B. By simple analogy this is equivalent to a high Q anti-resonant circuit which isolates the pole below point B from the antenna and reduces the stray pole current to a minimum.

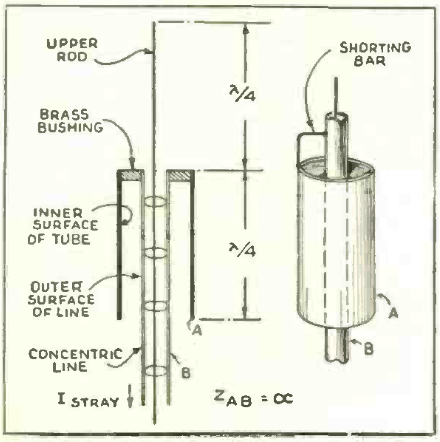
When this antenna is supplied with power, the center of the antenna is at minimum potential, the top is at a high potential and the bottom of the tube is at a high potential. The presence of the high Q anti-resonant circuit element at the bottom of the tube allows this high potential to exist even in the immediate proximity of the transmission line.

The concentric line which feeds the antenna is a standard seven-eighths inch diameter gas tight line and is placed for mechanical strength inside a heavy brass supporting pipe approximately 2 inches in diameter both terminating in a solid brass bushing at the feed point, i.e., center of the antenna. A three-inch diameter coaxial tube is attached solidly to this bushing at the feed point and elsewhere is kept insulated from the 2-inch pipe by internal ring insulators. The quarter-wave rod projects through a sturdy insulator at the feed point and is connected at the feed point to the inner conductor of the transmission line.

Electrically, this coaxial antenna is a center-fed doublet and consequently closely matches the surge impedance of a standard seven-eighths inch concentric line. The doublet or dipole antenna consists of the quarter-wave rod and the outer surface of the three-inch tube which is also one-quarter wave long, making a total active radiator length of one-half wave.

At a frequency of 35.6 megacycles, a coaxial antenna was substituted directly for a "J" type antenna and comparative field intensity measurements of the signals were made in two directions and at two distances away from the station. The measurements in this case showed an 8 db. increase in signal strength in favor of the coaxial antenna for equal power input. To obtain a similar increase in signal strength from a 500 watt station by changing the carrier power alone would require an increase in the power of the station to 3 kilowatts!—*Courtesy "Pick-Ups," Western Electric Co. publication.*

Fig. 2. Method of terminating lower end of coaxial antenna in a very high impedance.



Rotating Beam Loop

For Ham & SWL Use

● SINCE very little seems to have been done (or at any rate published, beyond bare specifications) with folded aerials, these appeared to offer the best field for experiment, and possessed many obvious advantages when it came to considering 56 mc. propagation. Long aerials are clumsy, unless one lives in the depths of the country, and are certainly unsightly.

The problem soon boiled down to one of mechanical difficulties, and it is the simple solution of these that is offered now.

A rotating beam was indicated, as narrow as possible, provided compass points were marked on the dial. The Reinartz double loop is compact, easily pushed up beyond trees or chimney pots, and it seems could be made very light; no small consideration this, when it has to be lifted 40 feet up. Wind resistance could also be reduced to a minimum.

No claim for electrical efficiency is made so far as experiments are being carried out with feeder lines, but it gives an 18 per cent increase over a dipole, and 6-1 ratio from back to front. For reception, car interference with a low dipole is a very serious problem, but is reduced by an amazing amount when using this method.

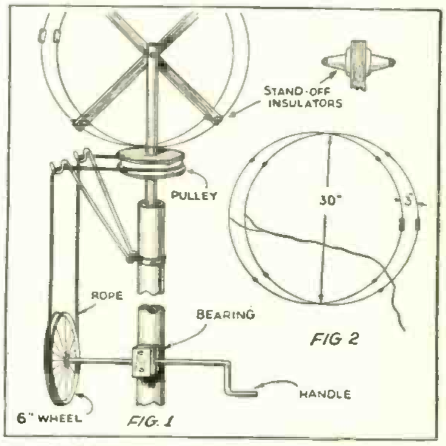


Fig. 1. The construction of the 56 Mc. Rotating Beam.
Fig. 2. The loops used for the 56 Mc. Rotating Beam.

A coaxial cable would solve feeder problems nicely, and several types of such cable are now available on the market.

Construction

A 30-inch cross of 1¼ in. by 1 in. pine was made by halving at the center, and a slot cut in an 18-inch support of 2 in. by 2 in. (Fig. 1). By shaping the bottom of the slot with a file, and pinning at the center, a tight fit with no play was obtained. A half-inch hole 12 in. long was drilled in the bottom to fit over a length of pipe, driven 6 inches into the top of the mast. One metal washer gave a smooth bearing. An old ebonite lead-in tube 18 in. by 2 in. with ½ in. walls was used, but wood is as good for the support.

Three discs of ½ in. wood, one soft 6 in. in diameter and two oak 7½ in. in diameter, were fitted 2 in. from the bottom of the support, with a screw at each end of a diameter to hold it tight. This forms the pulley for a continuous rope to rotate the loops.

(Continued on page 763)

What Do You Think?

A "Ham" Replies to "SWL Punk"

Editor,

I would like to answer Mr. Austin Wardman's very interesting letter in the February issue and give my opinion of the QSL situation from a "Ham's" point of view, which may or may not be representative.

First. I would consider the SWL and Ham hobbies two very interesting but distinctly different ones. To be a successful SWL DXer takes a great amount of time and effort. Hours must be spent identifying new stations well enough to get confirmations. In the end, success is the reward. "Ham" radio, on the other hand, requires much time and effort, but in a different way. I don't think either of these hobbies, to be successful, can spare much time for the other. I'm quite sure Hams almost never have time to listen anywhere but on the particular band they are working; in fact, I have managed to keep very busy on about 100 kc. of the forty meter band for a year and a half.

Many prospective amateurs have in mind to go on fone only when they get their "tickets," and consider code just a "necessary evil." I know because I was that way myself, but now I think that is all wrong and after 1½ years "on the air" I have no desire to go on fone. The fone end is O.K., but a fellow should become a really good c-w operator first, in my opinion. That means to be able to send code and receive accurately at least 25 wpm. and also know correct operating procedure. Mr. Wardman. Ham radio welcomes fellows like that and you will have plenty of contacts.

The prospective Ham should buy, if possible, a really good "communications" type receiver, provided with a beat oscillator, of course. An audio oscillator is not needed if you don't wish to build one for keying practice, as you can place your key in series with the head fones to receiver and use almost any station to key on their beat note. Many short wave commercials have their carrier on the air continuously and WWV (5000 kc.) transmits a 400 cycle note continuously from 4 p.m. to 2 a.m., which is good for keying.

Of course. I won't go into the building of "rigs" as that is always well covered in the magazines. However, I might say that even a single 6L6 and a good antenna with about 25 watts input will give you much pleasure. Many fellows work "all over the world" with a little rig of that type. I used a single 6L6 for some time with very fine results.

The perfection of code technique is a very fascinating game, and I would suggest that Austin become an enthusiastic CWL (continuous wave listener). I'm sure the boys on cw would more readily QSL, as they would consider a fellow interested enough to copy call letters worthy of a card. Most of the SWL's looking for cards from Hams are naturally sending their cards to the boys on 20 meter fone. Many of these boys may have received an initial bunch of cards years ago, used them all and never bought any new ones since. So how could you expect to get a card from them? Then again they may have a few cards but save them for their unusual two-way contacts. I used to get cards from CWL's and was always very happy to send them a card in return but lately, I haven't received one card from CWL's. Guess I'm slipping, hi!

I have had over 1500 two-way contacts in my 1½ years on the air, but as I look over the QSL card situation, I find only about 300 cards there. That has kept me quite busy though, and I fear I would need a secretary here to QSL 100%. I can say that the Hams I have sent cards to have QSL'd practically 100%.

Austin wishes to know why the Hams are in this game anyway. I would say a vast majority are in it to improve their operating technique, and to carry on an interesting conversation on the air, not merely to say, "Pse qsl es cul." Some of the old-timers don't get on the air, for they are afraid of finding "Lids" there, hi!

So all you fellows get on the air and show them—there are some fine operators coming up.

Well, here is wishing all the SWL DXers the best of luck. Incidentally, I could use a little luck here myself as I need a couple of states for W.A.S. and Africa for W.A.C.

So 73, es I'll benu soon "on the air."

RADIO W2KSL,
WM. GORDON,
Apt. 3-C,
3140 Kingsbridge Ave.,
Bronx, N. Y. City.

Herman Ruppert, 226 East 81 St., N. Y. City, is this month's prize winner—1 yr's. subscription to R&T

Amateur station of Otakar Halas, Brno 2, Krizova 44, Czechoslovakia. Call OK2RR.

Honorable mention — six months' subscription, to Domenick Ferrari.

Famous S-W Fan—D.R.D. Wadia, 203 Walkeshwar Rd., Bombay, India. (Pres. of India Radio Amateurs' League.)

He Likes Our Television Articles!

Editor,

I have been a reader of your very FB magazine for four or five years and I can sincerely say that I find it very interesting and helpful in all branches of radio. I am a student of commercial radio and television with the First National Television in Kansas City, Mo. Your articles on *commercial radio* and *television* are very helpful to me; I also like your *International Radio Review* and I never pass over *What Do You Think?* without getting a great "kick" out of it.

My receivers are a Raco Super Clipper and a Doerle five-tuber. I have only a few veris because I spend most of my time experimenting with new receiving circuits, amplifiers, photo-cells and cathode-ray tube circuits. Some of this equipment can be seen in the photo. I am proud to be a member of the *Short Wave League*.

More power to your magazine under its new name. (See photo herewith.)

DOMENICK FERRARI.
617 Smith Ave., N.W.,
Canton, Ohio.

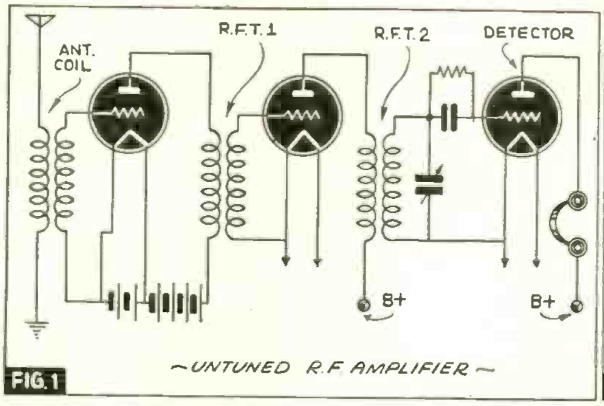


FIG. 1 —UNTUNED R.F AMPLIFIER—

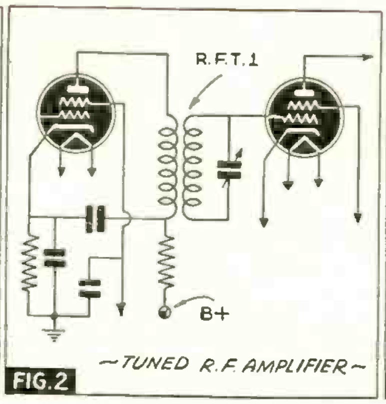


FIG. 2 —TUNED R.F AMPLIFIER—

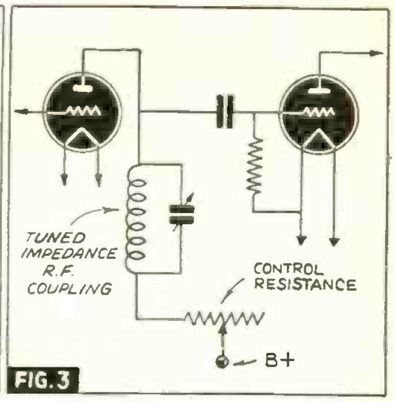


FIG. 3

Diagrams above show untuned R.F. amplifier, tuned R.F. stage and tuned impedance R.F. coupling.

The RADIO BEGINNER

Lesson 6— *Radio Frequency Amplifiers*

Martin Clifford, W2CDV

● WE can, for the sake of convenience, mentally divide a radio receiver into three separate parts. One of these, the section pertaining to *detection*, has already been considered in a previous article. The other two are the *audio frequency* amplifying and the *radio frequency* amplifying sections. It is with this latter part that we are now concerned.

We have already learned, during our consideration of vacuum tube operation, that the detector tube takes oscillations of radio frequency and turns them into direct current impulses. It might be thought that the output of this detector tube would vary in direct proportion to the input voltage applied to the grid. However, as the grid voltage is lowered a certain point, known as *cut off grid voltage*, is reached, below which there will be no effect in the plate circuit of the detector. In other words, the signal supplied by the antenna (that is, the radio frequency oscillations) must be of a certain order of magnitude before a response will be secured from the detector. The use of one or more stages of *radio frequency* amplification enables the signal to be built up to such a value that detector action can definitely be secured. This amplification ahead of the detector tube makes it possible to receive stations which would otherwise be inaudible. When a potential greater than cut-off grid voltage is applied, the output in the plate circuit of the detector increases more rapidly than the square of the input voltage.

Untuned R.F. Amplifier

Figure 1 shows a multiple stage *untuned radio frequency amplifier*. The very small alternating, high frequency wave received by the antenna causes a current (of the same frequency) to flow in the antenna circuit, comprising the antenna itself, the antenna coil, and the ground. The current, flowing through the antenna coil (or the primary) creates a magnetic field which in turn causes a potential of the same frequency to be induced across the secondary of the coil. Note, however, that this secondary is in the grid circuit of the first tube, and hence this potential is impressed on the grid. We recall from our discussion of the vacuum tube that a small potential on the grid can control a comparatively large current in the plate circuit. This current flows through the primary of the radio frequency transformer (marked RFT-1). Once again, as in the antenna coil, we have magnetic action and consequently a voltage induced across the secondary of the coil, and impressed on the grid of the next tube. A sufficient number of radio frequency (abbreviated R.F.) stages can be used until the signal is of such strength that it can be detected.

It should be observed that the voltage amplification is sometimes secured only by means of the tubes. The purpose of the R.F. transformers is to obtain an alternating voltage across the secondary (or on the grid of the tube) from the varying plate current of the preceding tube. We also secure a voltage step-up having the secondary wound with more turns of wire than the primary. There is a tendency in such an inductance for the amplification to increase as the frequency increases. This would mean that the amplification would not be constant over a wide range. Such a coil arrangement would tend to make the circuit unstable, since there would be the possibility of *feedback* through the tube capacity. Where the primary and secondary of an R.F. transformer are of the same size, amplification, although somewhat lower, is fairly constant over a wide range, and with less feedback. By *feedback* we mean that condition whereby a tube begins to act as an oscillator or a generator of radio frequency energy. A tube, designed to act as an R.F. amplifier, and behaving as an oscillator, causes howling, squealing and loss of efficiency in reception.

We have so far considered a type of R.F. amplifier rarely used today. An untuned system of transformer coupling will cover only a very limited range of frequencies and is unsatisfactory. The purpose of an R.F. amplifier should be not only to increase signal strength, but also to increase *selectivity*.

Tuned R.F. Amplifiers

When we deal with an R.F. amplifier, we must handle waves that vary from a few hundred thousand cycles per second to several million cycles. In order to secure greater efficiency from our R.F. transformers, we place *variable condensers* across the secondaries of these coils, thus enabling us to tune in the particular frequency we want. See Figure 2. This type of circuit is known as a *tuned radio frequency amplifier* and

(*Continued on page* 748)

These diagrams show resistance-coupled R.F. stage and band-pass filter or tuner to increase selectivity.

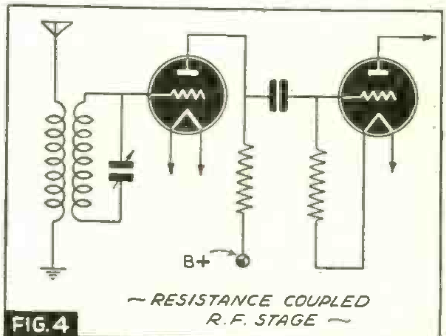


FIG. 4 —RESISTANCE COUPLED R.F. STAGE—

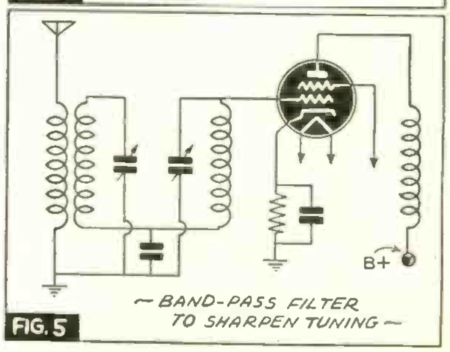


FIG. 5 —BAND-PASS FILTER TO SHARPEN TUNING—

Electronic Television Course

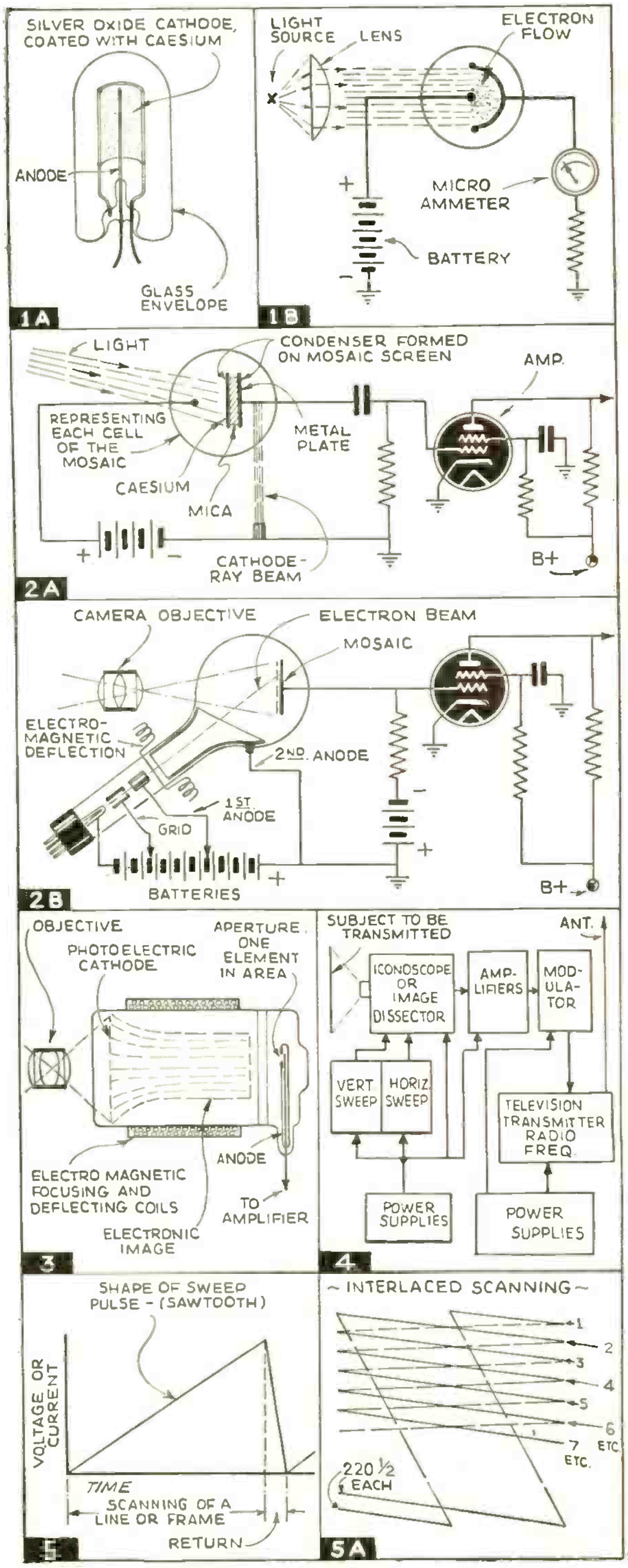
Henry Townsend

Lesson 2—Photo Cells, Iconoscope, Image Dissector

● PHYSICISTS in their experiments with the alkali metals have found that light falling upon these metallic films produced enough energy to dislodge electrons from these surfaces. These electrons were collected by a positively charged electrode and currents of small magnitude were able to be passed through the tube. The alkali metals which show this photo-electric effect are Lithium, Potassium, Sodium, Rubidium and Caesium. Caesium and its compounds, when deposited upon other metallic films, respond to that particular part of the light spectrum which nearly approximates the response (or sensitivity) of the human eye and also shows the greatest *photo-electric* effect for a given amount of visible light of any of the photo-electric metals; consequently it is most commonly used as photo-electric material in television transmitting picture tubes.

A *photo-electric cell* consists of a cathode (coated with a photo-electric material, such as Caesium) and a positive electrode called the *anode*, located in front of the photo-electric surface to collect the electrons which are emitted from the cathode when light is caused to fall on this surface. See Figures 1-A and 1-B.

The Iconoscope (Fig. 2-A) is a cathode-ray tube in combination with a photo-electric screen consisting of millions of tiny photo-electric cells, each cell constituting a condenser. This screen is commonly referred to as a *Mosaic screen*, and when light is caused to strike these tiny photo cells (or Mosaic), in the form of an image, a charge of electrical energy is picked up by the cells where the light of the image strikes. (See Fig. 2-B.) This charge is discharged through the cathode beam as it traverses this Mosaic screen in the process of scanning point by point



The accompanying pictures show at 1-A and 1-B, a photo cell; 2-A—Fundamental action of the Iconoscope; 2-B—Iconoscope pick-up; 3—Image dissector; 4—Typical Television Transmitter Line-up; 5—Form of scanning pulse; 5-A—How interlaced scanning takes place.

and line by line. This discharge is then amplified by a series of amplifiers to a level where it may be transmitted over a co-axial cable and modulate a television transmitter.

The invention of the iconoscope is credited to Dr. Vladimir Zworykin of the RCA Laboratories. Prior to this, Philo T. Farnsworth was the first inventor to show a successful electronic picture tube, which he called the Farnsworth Image Dissector. This image dissector, shown in Figure 3, also incorporates a photo-sensitive cathode at one end, upon which an image is focused, similar to a photographic camera. This image causes a flow of electrons where light strikes it, and some distance away from the cathode we have an image in the form of an electronic stream corresponding to the light and dark portions of the image. This electronic image is then moved past an aperture in both a vertical and horizontal plane and the electrons are collected by a positively charged electrode in the proper sequence, then amplified as in the case of the iconoscope.

Still another type of picture tube used today is called a *monoscope* because it will only transmit or reproduce one image, namely, the image deposited in carbon on a target electrode, usually made of aluminum. This tube operates by virtue of the fact that carbon is a poor emitter of electrons. It consists of an electron gun, focusing electrodes, and electrostatic or electromagnetic means of moving a beam of electrons across this printed image, plus a collecting electrode to collect the secondary electrons which are emitted from that portion of the target which is not covered by the carbon deposit forming the image. This tube has an exceptionally high output and is used chiefly for testing or demonstrating television transmitting and receiving equipment. Various types of images can be printed on the target electrode, such as human figures, test charts, etc. When received, these establish the fidelity of a television transmitter and receiver.

It is presumed that the reader is familiar with the fact that in

(Continued on page 757)

World Short Wave Stations

Revised Monthly

Complete List of SW Broadcast Stations

Reports on station changes are appreciated.

Mc.	Call	
31.600	W1XKA	BOSTON, MASS., 9.494 m., Addr. Westinghouse Co. Daily 6 am.-1 am., Sun. 8 am.-1 am. Relays WBZ.
31.600	W1XKB	SPRINGFIELD, MASS., 9.494 m., Addr. Westinghouse Co. Daily 6 am.-1 am., Sun. 8 am.-1 am. Relays WBZ.
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 9 am.-10 pm.
31.600	W5XAU	OKLAHOMA CITY, 9.494 m., Sun. 12 n.-1 pm., 6-7 pm. Irregular other times.
31.600	W4XCA	MEMPHIS, TENN., 9.494 m. Addr. Memphis Commercial Appeal. Relays WMC.
31.600	W8XAI	ROCHESTER, N. Y., 9.494 m., Addr. Stromberg Carlson Co. Relays WHAM 7.30-12.05 am.
31.600	W8XWJ	DETROIT, MICH., 9.494 m., Addr. Evening News Ass'n. Relays WWJ 6-12.30 am., Sun. 8 am-12 m.
31.600	W9XPD	ST. LOUIS, MO., 9.494 m., Addr. Pulitzer Pub. Co. Relays KSD.
26.550	W2XGU	NEW YORK CITY, 11.3 m. Relays WMCA.
26.450	W9XA	KANSAS CITY, MO., 11.33 m., Addr. Commercial Radio Eqpt. Co. Testing
26.400	W9XAZ	MILWAUKEE, WIS., 11.36 m., Addr. The Journal Co. Relays WTMJ from 1 pm.
26.300	W2XJI	NEW YORK, N. Y., 11.4 m., Addr. Bamberger Broad. Service, 1440 Broadway. Relays WOR 12 n.-6 pm.
26.100	W9XJL	SUPERIOR, WIS., 11.49 m. Relays WEBC daily.
26.050	W9XTC	MINNEAPOLIS, MINN., 11.51 m. Relays WCTN 9 am.-1 pm., 7 pm.-12 m.
26.050	W9XH	SOUTH BEND, IND., 11.51 m. Addr. South Bend Tribune. Relays WSBT-WFAM 2.30-6.30 pm., exc. Sat. and Sun.
25.950	W6XKG	LOS ANGELES, CAL., 11.56 m., Addr. B. S. McGlashan, Wash. Blvd. at Oak St. Relays KGFJ 24 hours daily. DX tips Mon., Wed. and Fri. 2:15 pm.
25.950	W9XUP	ST. PAUL, MINNESOTA. 11.56 m. Relays KSTP evenings.
21.630	W3XAL	BOUND BROOK, N. J., 13.8 m. Addr. N.B.C., N. Y. C. 9 am.-4 pm.
21.570	W2XE	NEW YORK CITY, 13.91 m. (Addr. CBS, 485 Madison Ave., N. Y. C. Daily 7.30-10 am. Sat., Sun. 8 am.-1 pm.
21.565	DJJ	BERLIN, GERMANY, 13.92 m., Addr. Broadcasting House, 6-7.50 am.
21.550	GST	DAVENTRY, ENG., 13.92 m., Addr. (B.B.C., London) Irregular at present.
21.540	W8XK	PITTSBURGH, PA., 13.93 m., Addr. Grant Bldg. Relays KDKA 6.45-9 am. Also Sunday. 6 pm.
21.530	GSJ	DAVENTRY, ENG., 13.93 m., Addr. (See 21.550 mc.) 5.45-8.50 am.
21.520	W3XAU	PHILA., PA., 13.94 m., Addr. Col. Broad. Syst., 485 Madison Ave., N. Y. C. 1-2.30 pm.
21.500	W2XAD	SCHENECTADY, N. Y., 13.95 m., General Electric Co., 8 am.-12 n.
21.470	GSH	DAVENTRY, ENG., 13.97 m. (See 21.550 mc.), 5:45-8:50, 9 am.-noon.
21.450	DJS	BERLIN, GERMANY, 13.99 m., Addr., Broadcasting House. 12.05-5.30 am.
19.020	HS6PJ	BANGKOK, SIAM, 15.77 m. Mondays 8-10 am. See 15.23 mc.
18.480	H8H	GENEVA, SWITZERLAND, 16.23 m., Addr. Radio Nations. Sun., 10.45-11.30 am.

16 Met. Broadcast Band

Mc.	Call	
17.845	HVJ	VATICAN CITY, 16.81 m. Heard 12 n. on Wednesday.
17.840	DJG	BERLIN, GERMANY, 16.82 m., 10.35 am.-1 pm.
17.820	2RO8	ROME, ITALY. 16.84 m., Addr. (See 2RO, 11.81 mc.) 5-7.30 am. Relays 2RO to 6 pm. irregularly.
17.810	GSV	DAVENTRY, ENGLAND, 16.84 m., 5.45-8.50 am., 12.20-4 pm.
17.810	TP83	PARIS, FRANCE, 16.84 m. Addr. (See 15.245 mc.) 9.30-11 am.
17.800	OIH	LAHTI, FINLAND, 16.85 meters, 4-9 am.
17.790	GSG	DAVENTRY, ENG., 16.86 m., Addr. B.B.C., London. 5:45-8:50, 9-10:15 am., 12:20-4 pm.
17.780	W3XL	BOUND BROOK, N. J., 16.87 m., Addr. Natl. Broad. Co., 9 am.-5 pm. to Europe, 5-11 pm. to So. Amer.
17.770	PHI2	HUIZEN, HOLLAND, 16.88 m., Addr. (See PHI, 11.730 mc.) Daily 7:40-9:10 am. Mon & Thurs. 7:40-9 am. Sun. 6:25-9:45 am.
17.760	DJE	BERLIN, GERMANY, 16.89 m. Addr. Broadcasting House. 12.05-5.50, 6-7.50 am.
17.755	ZBW5	HONGKONG, CHINA, 16.9 m., Addr. P.O. Box 200. Dly. 11.30 pm.-1.15 am., 5-10 am., Sun. 9 pm. (Sat.)-1.30 am., 5-9.30 am. Operates irreg.

End of Broadcast Band

Mc.	Call	
17.310	W2XGB	HICKSVILLE, L. I., N. Y., 17.33 m., Addr. Press Wireless, Box 296. Tests 9.30-11.30 am. except Sat. and Sun.
17.280	FZE8	DJIBOUTI, FRENCH SOMALILAND, 17.36 m. Test XMSN 1st Thurs. each month 8-8.30 am. Next B.C. April 6.
15.550	CO9XX	TUINICU, ORIENTE, CUBA, 19.29 m., Addr. Frank Jones, Central Tuinicu, Tuinicu, Santa Clara. Broadcasts irregularly evenings.
15.510	XOZ	CHENGTU, CHINA, 19.34 m. Daily 9.45-10.30 am.
15.370	HAS3	BUDAPEST, HUNGARY, 19.52 m., Addr. Radiolabor, Gyali Ut 22. Sun. 9-10 am.
15.360	DZG	ZEESEN, GERMANY, 19.53 m., Addr. Reichspostzenstralamt. Tests irregularly.
15.360	—	BERNE, SWITZERLAND. 19.53 m. Irreg. 6.45-7.45 pm.

19 Met. Broadcast Band

Mc.	Call	
15.340	DJR	BERLIN, GERMANY, 19.56 m., Addr. Br'dcast'g House, 12.05-11 am.
15.330	W2XAD	SCHENECTADY, N. Y., 19.56 m., Addr. General Electric Co. Relays WGY, 12.15-7 pm.
15.330	W6XBE	SAN FRANCISCO, CALIF., 19.57 m., 3-9 am.
15.320	OLR5B	PRAGUE, CZECHOSLOVAKIA. 19.58 m. Addr. (See 11.840 mc.) Sun., Wed., Sat. 5-5.10 pm.; Mon., Tues., Thurs., Fri. 6.55-9.55 pm.
15.320	OZH	SKAMLEBAK, DENMARK, 19.58 m., Sun. 8 am.-1:30 pm.
15.310	GSP	DAVENTRY, ENG., 19.6 m., Addr. (See 17.79 mc.) 3-5.15 am., 1.45-4 pm.
15.300	YDB	SOERABAJA, JAVA, N. E. I. 19.61 m. Addr. NIROM. 10 pm.-2 am.
15.300	XE8M	MAZATLAN, SIN., MEX., 19.61 m., Addr. Box 78, "El Pregonero del Pacifico." Irregularly 9-10 am., 1-2, 8-10 pm.
15.300	2RO6	ROME, ITALY. 19.61 m., Addr. (See 2RO, 11.81 mc.) 10 am.-2:30 pm.
15.290	VUD4	DELHI, INDIA, 19.62 m., 9:30-11:30 pm.
15.290	LRU	BUENOS AIRES, ARG., 19.62 m., Addr. El Mundo. Relays LR1, 7-9 am.
15.280	DJQ	BERLIN, GERMANY, 19.63 m., Addr. Broadcasting House. 12.05-11 am., 4.50-10.50 pm. Also Sun. 11.10 am.-12.25 pm.
15.270	HI3X	CIUDAD TRUJILLO, D. R., 19.65 m. Relays HIX Sun. 7.40-10.40 am. Tues. and Fri. 8.10-10.10 pm.
15.270	W3XAU	PHILA., PA., 19.65 m. (Addr. See 21.52 mc.) 3-7 pm.
15.270	W2XE	NEW YORK CITY, 19.65 m., Addr. (See 21.570 mc.) 1-3 pm. Sat. & Sun 1.30-2.30 pm.
15.260	GSI	DAVENTRY, ENG., 19.66 m., Addr. (See 17.79 mc.) 3-5.15 am., 12.20-1.30 pm.
15.250	W1XAL	BOSTON, MASS., 19.67 m., Addr. University Club. 2-3:30, or 4 pm., ex. Sat. and Sun.
15.245	TPA2	PARIS, FRANCE, 19.68 m., Addr. 98 Bis. Blvd. Haussmann. "Paris Mondial" 6-11 am.
15.230	HS6PJ	BANGKOK, SIAM, 19.7 m. Irregularly Mon. 8-10 am.
15.230	OLR5A	PRAGUE, CZECHOSLOVAKIA, 19.7 m. Addr. (See OLR4A, 11.84) Mon.-Fri. 7.50-10.55 pm. Sat., and Sun. 5-5.15 pm., Sun. 5.55-8.55 pm., Tues. 4.40-5.15 pm.
15.220	PCJ2	HUIZEN, HOLLAND, 19.71 m., Addr. N. V. Philips' Radio Hilversum, 3-4:30 am. Tues., 9:30-11:30 am. Weds. Daily 7.25-8.25 am.
15.210	W8XK	PITTSBURGH, PA., 19.72 m., Addr. (See 21.540 mc.) 9 am.-1 pm.
15.200	DJB	BERLIN, GERMANY, 19.74 m., Addr. (See 15.280 mc.) 8-9 am., 4.50-10.50 pm. Also Sun. 11.10 am.-12.25 pm.
15.195	TAQ	ANKARA, TURKEY, 19.74 m., 5.30-7 am., 9.30-11 am., Relays 2RO irregularly Afts.
15.190	OIE	LAHTI, FINLAND. 19.75 m. Addr. (See OFD, 9.5 mc) 1:05-4 am, 9 am.-5 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 17.79 mc.) 4.15-6, 6.20-8.30 p.m., 3-5.15 am.
15.175	RV96	MOSCOW, U.S.S.R., 19.76 m. Mon., Tues., Fri., Sat. 2.30-3.30 pm. Daily 3-4 am. Mon., Wed., Thurs. 7-9.15 pm.
15.170	TGWA	GUATEMALA CITY, GUAT., 19.77 m., Addr. Ministre de Fomento. Daily 12.15-1.15 pm.; Sun. 12.45-5.15 pm.

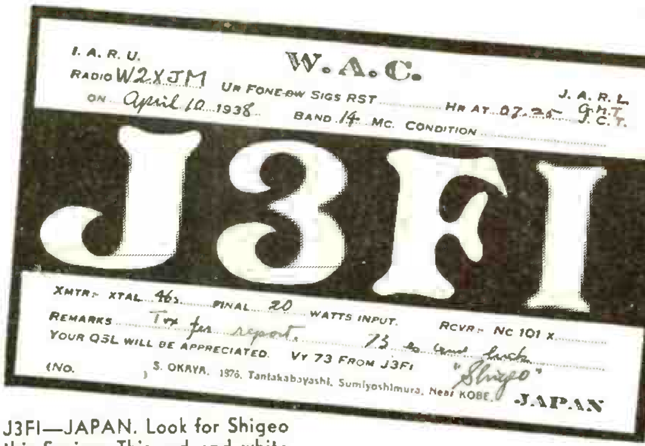
(Continued on page 728)

All Schedules Eastern Standard Time

Let's Listen In with

Joe Miller

"DX" Editor



J3FI—JAPAN. Look for Shigeo this Spring. This red and white QSL is well worth earning!

● SPRING is here, and along with this most welcome of seasons arrives the international amateurs' DX contest, timed to take place when DX conditions for worldwide reception on the amateur bands, especially 20 meters, reach an optimum.

Our interest, and that of most of DXers, will, of course, be centered in the *phone* contest, which is scheduled to begin on March 17, at 7:01 p.m., E.S.T., and end on March 26 at 6:59 p.m., E.S.T. In these 9 days, it will be possible to hear many fine DX catches, as amateurs from all over the world will participate and offer all DXers a grand opportunity to add many fine DX logs to their present total. A note here for C.W. DXers and C.W. Hams is that the code section of the A.R.R.L. Contest begins on March 3rd at 7:01 p.m., E.S.T., and ends March 12th at 6:59 p.m., E.S.T.

Last year we "cleaned up" on a good deal of very fine DX, especially from Asia, using a W8JK beam directed *North* over the Pole to cover the eastern half of Asia, and we do hope that many of you OM's have a similar beam antenna constructed, and measured for 20 meters, as that will be *the* band, and we would like to have everyone ready to take the fullest possible advantage of the wealth of DX to be heard before, during and after the contest.

Further particulars, as to when to tune for best reception from each continent, etc., will be found in our *Ham Stardust* column.

Again we must mention the subject, a rather important one for us SWL's, of QSL cards, and of correct reports. This seems to be a somewhat sore topic for a number of DXers, but the necessity for some sort of a code of ethics for SWL's is becoming more apparent than ever.

There is, for one thing, entirely too much of the *"I heard you, psc QSL"* type of report being sent to amateurs, which tends to give them the impression that most SWL's are ignorant boys who collect cards just for the fun of it, and are not at all interested in giving the "ham" a report of some value to him, as to how well his signals came over, giving him a word-by-word report of his transmission, how good his modulation was, what stations were QRMing him, and every other detail one could ascertain of possible value to the station being reported. The amateurs appreciate such reports very much indeed, and, judging from some of our replies, it would seem that our report, being fully detailed, was considered exceptional, if only because of our pains to make it complete.

So, fellows, let's work together, and do the right thing. If you are making a report to a "ham," do your job as well as it can be done, or don't do it at all. Try to give our brother radio bugs, the *amateurs*, a better impression of us DXers, and your combined efforts should result in more QSL's, as there will be less amateurs "fed up" with the SWL's reports.

A word about postage. If a DXer expects a card for his report, he not only should, he *must* enclose a coupon with his report. Many "hams" have ceased QSLing, due to the many reports sent merely on cards, of course with *no return postage*. Why should an amateur spend many dollars monthly for postage to QSL SWL's when he can use that same money to purchase some much needed equipment?

Dan Malan, ZS4H, a popular amateur in South Africa, whose phone signals are well known in the States, writes us and requests us to publish his plea that SWL's enclose return postage if they wish QSL cards, adding that he's "no millionaire." Certainly, very few amateurs are! Dan has, like the grand fellow he is, been sending his cards to many SWL's who didn't send postage, when he was in no way obligated to do so, not counting the many amateur contacts he had to QSL, all this running into quite some bill.

During the past month conditions have been fair, but by March, DX should be very much better, this month commencing the spring DX peak.

INDIA

VUD4, on 15.29 mc., Delhi, is a new addition to the chain of excellent Asiatic broadcasters in India, and may be heard almost daily between 9:30-11:30 p.m., E.S.T., along with its sister station, VUD3, 15.16 mc., but with different programs on each. Reported by G. C. Gallagher, and I.D.A.

Also Masud Akhtar of New Delhi has been kind enough to send along a late copy of the *"Indian Listener,"* an Indian radio magazine, with the latest data on the 60 meter band VU Broadcasters.

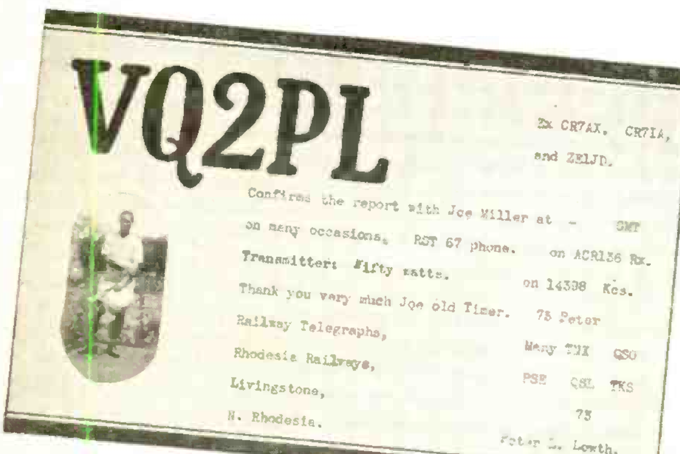
Reallocations place the stations on these new freqs.: VUC2, 4.84; VUB2, 4.88; VUM2, 4.92; and VUD2, 4.96 mc., these changes probably occurring during early December.

Regarding an item here a few months back anent the failure of the Indian stations to QSL reports, which failure we personally experienced along with quite a number of our reporters (but which has evidently been since corrected), OM Masud tells us in his interesting letter that he made a personal call to the offices of *All India Radio* (A.I.R.) and was shown the files of reports from listeners, all of which were marked as answered, fully satisfying Masud that such a condition no longer exists.

Evidently our first reports were received before the station was fully equipped to handle reports, and send confirmations. The Station Director assured Masud that all reports will be answered, but that listeners should send reply postage. Many thanks to you, Masud, for your FB help!

VWY2, 17.51 mc. (taken from veri) Poona, was heard during an inverted speech contact with a Rugby fone at 8:15 a.m. recently.

VUB2, 9.55 mc., Bombay, and VUD3, are reported from 10-10:30 p.m., with FB reception by Daryl Sebastian, W8.



VQ2PL—Here's OM Peter at home in this eternally verdant land.

IRAQ

The station lately reported as YIJG, this call from an English listener, is proven to have the call YI5KG, and was mistakenly heard over the air. YI5KG, on 7.20 mc., with 1 kw., is on the air daily from 7:30 a.m.-3 p.m., one hour earlier than previously reported, all this from an actual veri received from Mr. I. Hassan.

Another transmitter of 400 watts is on 6.90 mc. from 9:30 a.m. onward; closing time not given, but probably also 3 p.m. Another transmitter has been ordered, and will be used as a commercial job.

This complete plant is owned by Iraq royalty, H. R. H. Crown Prince Faisal Ghazi, and the title of the broadcasting center is "Qasr el Zehoor" Broadcasting Station, Baghdad, Iraq. Reports may be sent to this QRA, or to that of the previous one recently given (S.W.M., England).

ETHIOPIA

IABA, 9.65 mc., and known as "Stazione Di Addis Abeba," in that city, is being operated by the Italian Gov't from 11 a.m.-1 p.m. daily, rather a difficult time to log this fine African catch. (I.D.A.)

ALBANIA

ZAA, "Radio Experimental Tirana," at Tirana, is reported as being on from 12:30-2 p.m., E.S.T., on 7.4875 mc., making it rather too early to be heard well, if at all, in the U. S. Another freq., 9.9875 mc., will also be used, both of these freqs. being intended for European reception, and 15.765 mc., no schedule as yet, for America. QRA (address) ZAA, Radio Exp. Tirana, Directorate General of Posts and Telegraphs, Tirana, Albania. (I.D.A.) (S.W.M.)

PHILIPPINES

KZIB, now 9.49 mc., Manila, moved from 9.503 mc. to avoid being QRM'd by VK3ME, and is heard daily 6-9:05 a.m., with good signal. (I.D.A.) The QRA (address) is I. Beck Ind., Crystal Arcade Bldg., P.O. Box 440, Manila, P.I.

KZRM, 9.57 mc., Manila, is reported being operated by a new organization "the Far Eastern Broadcasting Co.," and owned by same, per W. G. Layton, from a recent veri. Schedule is: Mon.-Fri.: 4:30-6 p.m., 5-9 a.m.; Sat.: 4:30-6 p.m., 5-10 a.m., and Sun.: 4-10 a.m. He also reports KZIB.

KZGF, 5.47 mc., Manila, reported phoning KZGH, 5.44 mc., Iloilo, near 9 a.m., often, by Jack Hartley, W2.

CHINA

XGRV, reported on 11.38-11.42 mc., Chungking, the wartime capital being its location, according to a letter received by Jack Wells, W4, from H. K. Tong. Schedule is given as 1-1:35 a.m., when news is given in Chinese and Japanese, and 8-8:35 a.m., when it is given in English and French.

Mr. Tong, who is Chairman of the China Information Committee, P.O. Box 90, Hankow, states that XTJ, replaced by XGRV, has been moved to the interior to avoid damage from war activities. G. C. Gallagher, W6, reports XGRV.

XGRV, 15.19 mc., Chungking, is reported irregular 7-9 p.m. (I.D.A.)

XGAP, 9.56 mc., Peking, is heard 4-9 a.m., daily, and QRA is: S. Yoshimura, Director Peking Central Station, Hsi-chan-an-Chieh, Peking.

(*Continued on page 759*)

Mc.	Call	
15.166	LKC	**OSLO, NORWAY,** 19.78 m. Reported Suns. 10.30 am. on.
15.160	XEWW	**MEXICO CITY, MEXICO,** 19.79 m., 12 n.-12 m., irregular.
15.160	VUD3	**DELHI, INDIA,** 19.79 m., Addr. All India Radio. 1.30-3.30 am., 9.30-11.30 pm.
15.155	SM5SX	**STOCKHOLM, SWEDEN,** 19.79 m., Daily 11 am.-5 pm., Sun. 9 am.-5 pm.
15.150	YDC	**BANDOENG, JAVA,** 19.8 m., Addr. N. I. R. O. M. 6-7.30 pm., 10.30 pm.-2 am., Sat. 7.30 pm.-2 am., daily 4.30-10.30 am.
15.140	GSF	**DAVENTRY, ENG.,** 19.82 m., Addr. (See 17.79 mc.) 3-5.15 am., 5.45-8.50 am., 9 am.-noon.
15.130	TPB6	**PARIS, FRANCE.** 19.83 m., Addr. "Paris Mondial," 98 Bis Blvd. Haussmann, 7-9.15 pm.
15.130	WIXAL	**BOSTON, MASS.,** 19.83 m., Addr. World-Wide B'cast'g Foundation. University Club. 10-11 am., Mon.-Fri. Sun. 10 am.-1 pm.
15.120	SP19	**WARSAW, POLAND,** 19.84 m., 6-9 pm.
15.120	HVJ	**VATICAN CITY,** 19.83 m., 10.30-10.45 am., Tues only. Suns. 1-1.30 pm.
15.110	DJL	**BERLIN, GERMANY,** 19.85 m., Addr. (See 15.280 mc.) 12.05-2, 8-9 am., 10.35 am.-4.25 pm., Sun., 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. Daily 7-9.15 pm.

End of Broadcast Band

Mc.	Call	
14.960	—	**MOSCOW U.S.S.R.,** 20.25 m., 1st of month, 6 pm. Dutch program.
14.940	PSE	**RIO DE JANEIRO, BRAZIL.** 20.08 m., Broadcasts Wed. 3.45-4.15 pm.
14.920	KQH	**KAHUKU, HAWAII,** 20.11 m. Sats. 1-1.30 am., 11-11.30 pm.
14.600	JVH	**NAZAKI, JAPAN,** 20.55 m. Broadcasts irregularly 5-11.30 pm. Works Europe 4-8 am.
14.535	HBJ	**GENEVA, SWITZERLAND,** 20.64 m., Addr. Radio Nations. Broadcasts Sun. 10.45-11.30 am., Mon. 4-4.15 am.
14.440	—	**RADIO MALAGA, SPAIN,** 20.78 m. Relays Salamanca 5.40-8.40 am. Sometimes 2-4 pm.
14.430	HCIJB	**QUITO, ECUADOR,** 20.79 m. 10-10.30 pm. except Mon. 9-9.30 pm. and irreg.
14.166	PIIJ	**DORDRECHT, HOLLAND,** 21.15 m., Addr. (See 7.088 mc.) Sat. 12 n.-12.30 pm.
13.997	EA9AH	**TETUAN, SPANISH MOROCCO,** 21.43 m. Apartado 124. 5.15-6.15 pm., 6.30-7.30 pm., 9-10 pm. Relays Salamanca from 5.40 pm.
13.635	SPW	**WARSAW, POLAND,** 22 m. Daily 6-8 pm. Sat. & Sun. 6-9 pm.
12.862	W9XDH	**ELGIN, ILL.,** 23.32 m. Press Wireless. Tests 2-5 pm.
12.486	HIN	**TRUJILLO CITY, DOM. REP.,** 24.03 m. 7.10-10.10 pm.
12.460	HC2JB	**QUITO, ECUADOR,** 24.08 m. Daily exc. Mon. 8-10.30 pm.
12.235	TFJ	**REYKJAVIK, ICELAND,** 24.52 m. Works Europe mornings. Broadcasts Sun. 1.40-2.30 pm.
12.200	—	**TRUJILLO, PERU,** 25. m., "Rancho Grande." Address Hacienda Chiclin. Irregular.
12.000	RNE	**MOSCOW, U.S.S.R.,** 24.88 m. Daily 6-7 am., 12 n.-2 pm., 3-6, 10.15-11 pm., also Tues., Thurs. 8.30-9 pm., also Sun. 6-10.30 am., 12 n.-5 pm., 6-6.30, 8.30-9, 10.15-11 pm.
11.990	CB1180	**SANTIAGO, CHILE,** 25.02 m. 7-11 pm.
11.970	HI2X	**CIUDAD TRUJILLO, D. R.,** 25.07 m., Addr. La Voz de Hispaniola. Relays HIX Tue. and Fri. 8.10-10.10 pm.

25 Met. Broadcast Band

Mc.	Call	
11.935	TI2XD	**SAN JOSE, COSTA RICA,** 25.12 m. La Voz del Pilot. Apartado 1729. 10 am.-n., 4-10 pm.
11.910	CD1190	**VALDIVIA, CHILE,** 25.2 m., P. O. Box 642. Relays CB69 10 am.-1 pm., 7-10 pm.
11.900	—	**HANOI, FRENCH INDO-CHINA.** 25.21 m. "Radio Hanoi", Addr. Radio Club de l'Indochine. 3.45-4.15 am., 7-9.30 am., 150 watts.
11.900	XEWI	**MEXICO CITY, MEXICO,** 25.21 m., Addr. P. O. Box 2874. Mon., Wed., Fri. 3-4 pm., 9 pm.-12 m. Tues. and Thur. 7.30 pm.-12 m., Sat. 9 pm.-12 m., Sun. 12.30-2 pm.
11.885	TPA3	**PARIS, FRANCE,** 25.24 m., Addr. (See 15.245 mc.) 2-5 am., 11.15 pm.-6 pm.
11.885	TPB7	**PARIS, FRANCE,** 25.24 m. (See 15.245 mc.) 9.30 pm.-mid., 12.15-2 am. Irregular.
11.880	VLR3	**MELBOURNE, AUST.,** 25.25 m., 3.30-7.15 pm., 9 pm.-3 am. weekdays. Suns. mid.-3 am.
11.870	W8XK	**PITTSBURGH, PA.,** 25.26 m., Addr. (See 21.540 mc.) 1-11 pm.
11.865	—	**BERNE, SWITZERLAND.** 25.28 m. Irreg. 8-9 pm. to No. Amer.
11.860	GSE	**DAVENTRY, ENG.,** 25.30 m., Addr. (See 11.75 mc.) 3-5.15, 5.45 am.-10.30 am. Sun. 1-1.30 pm.
11.855	DJP	**BERLIN, GERMANY,** 25.31 m., Addr. (See 15.280 mc.) Irregular. 7.15-10.50 pm. for No. Amer.
11.850	CB1185	**SANTIAGO, CHILE,** 25.32 m. Sat. 6-11 pm. and irreg.
11.850	OAX2A	**TRUJILLO, PERU,** 25.32 m. Testing on this freq. (See 12.200).
11.840	KZRM	**MANILA, P. I.,** 25.35 m. Addr. Erlanger & Gallinger, Box 283. 9 pm.-10 am. Irregular.
11.840	CSW	**LISBON, PORT.,** 25.35 m. Nat'l Broad. Station. 11.30 am.-1.30 pm. Irregular.
11.840	OLR4A	**PRAGUE, CZECHOSLOVAKIA,** 25.34 m., Addr. Czech Shortwave Sta., Praha XII, Fochova 16. Daily 1.55-4.30 pm. Mon. to Fri. 7.55-10.55 pm., Sun. 5.55-8.55 pm.
11.830	W9XAA	**CHICAGO, ILL.,** 25.36 m., Addr. Chicago Federation of Labor. Irregular 7 am.-6 pm.
11.830	W2XE	**NEW YORK CITY,** 25.36 m., Addr. Col. Broad. System, 485 Madison Av., N.Y.C. Mon.-Fri. 3.30-6, 6.30-10 pm. Sat., Sun. 3-6, 6.30-11 pm.
11.826	XEBR	**HERMOSILLA, SON., MEX.,** 25.37 m., Addr. Box 68. Relays XEBH. 9.30-11 am., 1-4 pm., 9 pm.-12 m.
11.820	GSN	**DAVENTRY, ENG.,** 25.38 m., Addr. (See 11.75 mc.) Irregular.
11.810	2RO4	**ROME, ITALY,** 25.4 m., Addr. E.I.A.R., Via Montello 5. Daily 4.40-8.45 am., 10 am.-12 n.
11.805	OZG	**SKAMLEBAK, DENMARK,** 25.41 m. Addr. Statsradiofonien. Irreg.
11.801	DJZ	**BERLIN, GERMANY,** 25.42 m. 4.50-10.50 pm.
11.800	COGF	**MATANZAS, CUBA,** 25.42 m., Addr. Gen. Betancourt 51. Relays CMGF. 2-3, 4-5, 6 pm.-Mid.
11.800	JZJ	**TOKYO, JAPAN,** 25.42 m., Addr. Broadcasting Co. of Japan, Overseas Division. 7-7.30, 8-9.30 am., 2.30-4, 4.30-5.30, 8-8.30 pm., 12.30-1.30 am.
11.795	DJO	**BERLIN, GERMANY,** 25.42 m. 4.50-Addr. (See 15.280 mc.) 11.30 am.-4.25 pm., 4.50-10.50 pm. Irregular.
11.790	WIXAL	**BOSTON, MASS.,** 25.45 m., Addr. (See 15.250 mc.) Daily 4.55-6.30 pm., Tues., Thur., 4.40-6.30 pm., Sat. 1.45-6 pm., Sun. 5-6.30 pm.
11.780	HP5G	**PANAMA CITY, PAN.,** 25.47 m., Addr. Box 1121. 6-10 pm.
11.780	OFE	**LAHTI, FINLAND.** 25.47 m. Addr. (See OFE, 9.5 mc.) 1.05-3 am., 5-6.20, 10 am.-12.30 pm.
11.770	DJD	**BERLIN, GERMANY,** 25.49 m., Addr. (See 15.280 mc.) 11.30 am.-4.25 pm., 4.50-11 pm.
11.760	TGWA	**GUATEMALA CITY, GUAT.,** 25.51 m. (See 17.8 mc.) Irregular 10-11.30 pm. Sun. 6-11.30 pm., irregular.
11.760	XETA	**MONTEREY, MEX.** 25.51 m., Addr. Box 203. Relays XET. n.-3.30 pm. and evenings.
11.760	OLR4B	**PRAGUE, CZECHOSLOVAKIA,** 25.51 m., Addr. (See 11.840 mc.) Irregular.
11.750	GSD	**DAVENTRY, ENG.,** 25.53 m., Addr. B.B.C., London. 3-5.15 am., 9 am.-noon. 12.30-6 pm., 6.20-8.30 pm., 9.20-11.20 pm.
11.740	SP25	**WARSAW, POLAND,** 25.55 m., 6-9 pm.
11.740	COCX	**HAVANA, CUBA.** 25.55 m. P. O. Box 32. Daily 8 am.-1 am. Sun. 8 am.-12 m. Relays CMX.
11.740	HVJ	**VATICAN CITY,** 25.55 m. Testing irregular. Wed. 2.30-3 pm.
11.730	PHI	**HUIZEN, HOLLAND,** 25.57 m., Addr. N. V. Philips' Radio. Daily 6.15-6.45 pm. Sat. 7.15-7.45 pm.
11.730	WIXAL	**BOSTON, MASS.,** 25.57 m., Addr. World-Wide B'cast'g Foundation, University Club. Daily exc. Sat. and Sun. 9-11 pm.
11.730	LKQ	**OSLO, NORWAY,** 25.58 m. 4.30-9 am., Suns. 2.30-9 am.
11.720	CJRX	**WINNIPEG, CANADA,** 25.6 m., Addr. James Richardson & Sons, Ltd. Daily 6 pm.-12 m., Sat. 6 pm.-Sun. 4 am.
11.720	ZP14	**VILLARICA, PARAGUAY,** 25.60 m. 7.07-9.07 pm.
11.718	CR7BH	**LAURENCO MARQUES, PORTUGUESE E. AFRICA,** 25.6 m. Daily 12.05-1, 4.30-6.30, 9.30-11 am., 12.05-4 pm., Sun. 5-7 am., 10 am.-2 pm.
11.715	TPA4	**PARIS, FRANCE,** 25.61 m., (See 15.245 mc.) 7-9.15 pm., 9.30 pm.-12 m. to No. America.
11.710	YSM	**SAN SALVADOR, EL SALVADOR,** 25.63 m., Addr. (See 7.894 mc.) 1-2.30 pm.
11.710	—	**SAIGON, FRENCH INDO-CHINA.** 25.62 m., Addr. Boy-Landry, 17 Place A Foray. 7.30-9.15 am.
11.705	SBP	**MOTALA, SWEDEN,** 25.63 m., 1.20-2.05, 6-9 am., 11 am.-1 pm., Sat. 1.20-2 am., 6 am.-1.30 pm., Sun. 3 am.-1.30 pm. Wed. and Sat. 8-9 pm.
11.700	HP5A	**PANAMA CITY, PAN.,** 25.65 m. Addr. Radio Teatro, Apartado 954. 10 am.-1 pm., 5-10 pm. Sun. 6-10 pm.
11.700	CB1170	**SANTIAGO, CHILE,** 25.65 m. Addr. P.O. Box 706. Relays CB89 10 am.-2 pm., 3.30-11 pm.

End of Broadcast Band

Mc.	Call	
11.676	IQY	**ROME, ITALY,** 25.7 m. Relays 2RO 1.35-2.25, 6-9 pm.
11.535	SPD	**WARSAW, POLAND,** 26.01 m., Addr. 5 Mazowiecka St. 6-9 pm.
11.402	HBO	**GENEVA, SWITZERLAND,** 26.31 m., Addr. Radio Nations. Sun. 7-7.45 pm., Mon. 1-1.15 am., 7-8.30 pm.
11.040	CSW2	**LISBON, PORTUGAL,** 27.17 m., Addr. Nat. Broad. Sta. 9.30 am.-Noon. 2-5.30 pm.
11.000	PLP	**BANDOENG, JAVA,** 27.27 m. Relays YDB. 6-7.30 pm., 10.30 pm.-2 am., 4.30-10.30 or 11 am. Sat. until 11.30 am.
10.950	—	**TANANARIVE, MADAGASCAR,** 27.40 m., Addr. (See 9.38 mc.) 12.30-45, 10-11 am., 2.30-4 am., exc. Sun.
10.670	CEC	**SANTIAGO, CHILE,** 28.12 m. Irregular.
10.660	JVN	**NAZAKI, JAPAN,** 28.14 m. Broadcasts daily 1.50-7.40 am. Works Europe irregularly at other times.
10.600	ZIK2	**BELIZE, BRIT. HONDURAS,** 28.30 m., Tue., Thurs., Sat. 1.30-2, 8.30-9 pm.
10.535	JIB	**TAIHOKU, TAIWAN,** 28.48 m. Works Japan around 6.25 am. Broadcasts, relaying JFAK 9.05-10 am., 1-2.30 am. Sun. to 10.15 am.
10.400	YSP	**SAN SALVADOR, EL SALVADOR,** 28.85 m., 1-3, 6.30-11 pm.
10.350	LSX	**BUENOS AIRES, ARG.,** 28.98 m., Addr. Transradio International. Tests irregularly.
10.330	ORK	**RUYSSELEDE, BELGIUM,** 29.04 m. Broadcasts 12.30-2 pm. Works OPM 1-3 am., 3-5 pm.
10.290	TIEMT	**SAN JOSE, COSTA RICA,** 29.15 m., 4.30-8 pm.
10.290	DZC	**ZEESEN, GERMANY,** 29.16 m., Addr. (See 15.360 mc.) Irregular.
10.260	PMN	**BANDOENG, JAVA,** 29.24 m. Relays YDB 6-7.30 pm., 10.30 pm.-2 am., 4.30-10.30 or 11 am., Sat. to 11.30 am.
10.220	PSH	**RIO DE JANEIRO, BRAZIL,** 29.35 m., Addr. Box 709. Broadcasts 6-7 pm., Mon. 8-8.30 pm.

(Continued on page 730)

All Schedules Eastern Standard Time

Tenth SILVER TROPHY *Award*

For Best HAM Station Photo of the Month

Awarded to *L. W. "Bud" Preston*, W9VXL

Savanna, Ill.

HEREWITH is a photo of myself and station for your contest. My transmitter is a Collins 30FXB with some alterations of my own. The receiver is a Patterson PR15.

I built a new R.4 unit and a new power supply for the final stage. I run either 250 or 400 watts phone and prefer the ten meter band. The tube lineup in the new R.F. unit is a 42 oscillator, 807 doubler. 809 buffer and a T125 final.

The speech lineup is a Shure 701A mike into the standard Collins 7C speech amplifier, driving a pair of ZB120's Class "B." The remote control box on the desk contains the filament, plate, stand-by and push-to-talk switches. The switches on the transmitter panel provide a means of applying plate voltage to each stage individually when tuning up. The antenna used for ten is a rotatable Johnson Q and reflector. The control wheel may be seen on the left-hand corner of the desk. An antenna change-over relay shifts the beam from the transmitter to the receiver, which is a PR15.

The room measures eleven by twelve feet and is built into one end of the attic. It is constructed of heavy celotex and has double walls to provide a dead air space. The floor is covered with an insulating material under the carpet. The room is perfectly sound-proof and DX contacts may be held at any time of day or night.

Thirty-nine countries have been "worked" in the six months I have been on the ten meter band.

In closing, let me congratulate and thank you for a very fine magazine. I have every issue from 1934 and refer to them many times.

Sincerely yours,
L. W. "BUD" PRESTON, W9VXL,
Savanna, Ill.

This beautiful silver trophy stands 11¾" high and one is awarded monthly by RADIO & TELEVISION magazine for the best photo of a Ham station. The silver statue stands on a handsome bakelite base on which is a silver plate. The name of the winner will be engraved on this plate before the trophy is sent to him.

Silver Trophy Award

Note These Important Rules

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

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

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

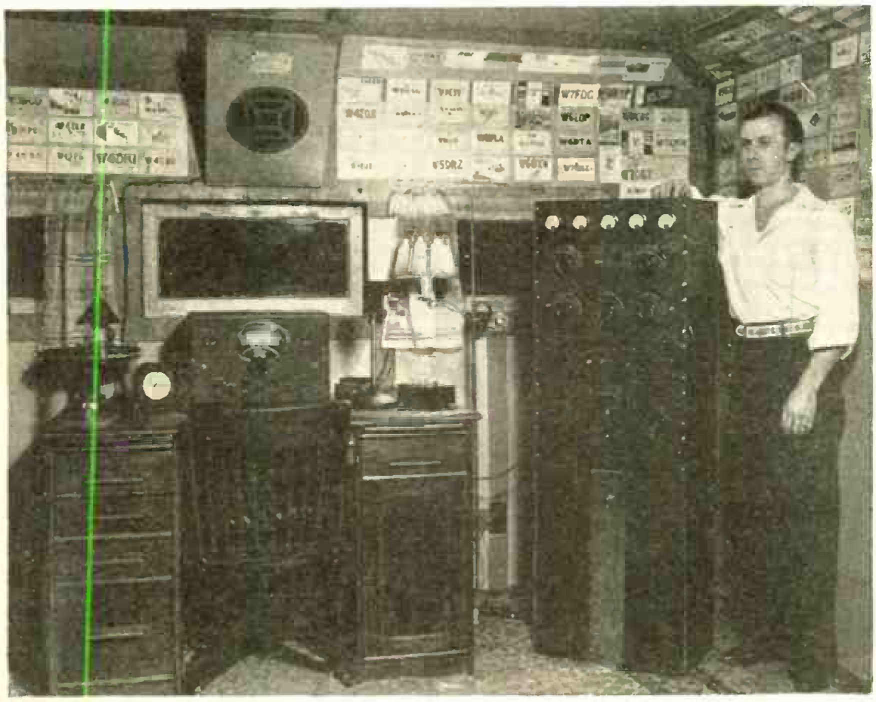
State briefly the number of continents worked, the total number of stations logged or contacted, and any other features regarding the station which you think will be of general interest to the reader. Mention the type of aerial system used, especially any unique or new features about it, and which type of aerial you use for transmitting and receiving; also what type of break-in relay system, if any, is used.

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

Note that you do not have to be a reader of RADIO & TELEVISION in order to enter the contest. Pack all photographs carefully and the description had best be mailed in the same package with the photos. The Editors will not be responsible for photos lost in transit.

Do not send small, foggy-looking photos because they cannot be reproduced properly in the magazine. If the picture you have or may take of your station is not thoroughly sharp and clear and at least 5" x 7", it would be best to have a commercial photographer take a picture of your station. If you cannot do this, you most probably have a friend who owns a good camera and who can arrange to take the photograph. You are not limited to one picture, but may submit as many different views as you like.

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



Prize-Winning "Ham" Station this month—L. W. Preston, Savanna, Ill.

Mc.	Call	
10.100	—	**DEUTSCHE FREIHEITS SENDER,** 29.70 m., loc. in Germany, undercover. 4-5 pm.
10.042	DZB	**ZEESEN, GERMANY,** 29.87 m., Addr. Reichspostzenstralamt. Irregular.
9.995	COBC	**HAVANA, CUBA,** 30.02 m., Addr. P. O. Box 132. Relays CMBC 6.55 am.-1 am.
9.920	JDY	**DAIREN, MANCHUKUO,** 30.24 m. Relays JQAK daily 7-8 am. Works Tokyo occasionally in early am.
9.892	CPI	**SUCRE, BOLIVIA,** 30.33 m., 11 am.-n., 7-9 pm.
9.860	EAQ	**MADRID, SPAIN,** 30.43 m., Addr. Post Office Box 951. 7.30-8, 8.40-9 pm.
9.830	IRF	**ROME, ITALY,** 30.52 m. Works Egypt afternoons. Relays 2RO, 6-9 pm.
9.805	COCM	**HAVANA, CUBA,** 30.60 m. Addr. Transradio Columbia, P. O. Box 33. 8-1 am. Relays CMCM.
9.760	—	**SAIGON, INDO-CHINA,** 30.72 m., Addr. 17, Place A. Foray. "Radio Boy-Landry." Heard 6-9.15 am.
9.753	ZRD	**DURBAN, SOUTH AFRICA,** 30.75 m. Addr. S. A. Broadcasting Corp., P. O. Box 4559, Johannesburg. Daily exc. Sat. 11.45 pm.-12.50 am. Daily exc. Sun. 3.30-7.30, 9-11.45 am., Sun. 5.30-7, 9-11.30 am., also 4-5 am. on 3rd Sun. of month.
9.735	CSW7	**LISBON, PORTUGAL,** 30.82 m. Addr. Nat. Broad. Sta. n.-2 pm., 6-9 pm. for No. Amer.
9.708	COCQ	**HAVANA, CUBA,** 30.90 m. Addr. 25 No. 445, Vedado, Havana, 7-1 am. Sun. 6.55 am.-1 am.

31 Met. Broadcast Band

Mc.	Call	
9.705	—	**FORT DE FRANCE, MARTINIQUE,** 30.92 m., Addr. P. O. Box 136.
9.690	TI4NRH	**HEREDIA, COSTA RICA,** 30.94 m., Addr. Amando C. Marin, Apartado 40. Sun. 7-9 am., Tues., Thurs., Sat. 9-10 pm.
9.690	LRA	**BUENOS AIRES, ARG.,** 30.94 m., 6-9 pm.
9.685	TGWA	**GUATEMALA CITY, GUAT.,** 30.96 m. Daily 10-11.30 pm.; Sun. 7-10.45 pm.
9.680	ZHP	**SINGAPORE, MALAYA.** 30.98 m. Sun. 5.40-9.40 am., Wed. 12.40-1.40 am., Mon.-Fri. 4.40-9.40 am., Sat. 12.25-1.40 am., 4.40-9.40 am., 10.40 pm.-1.10 am. (Sun.)
9.675	DJX	**BERLIN, GERMANY,** 31.01 m., Addr. (DJD, 11.77 mc.) 10.35 am.-4.25 pm.
9.670	W3XAL	**BOUND BROOK, N. J.,** 31.03 m. Addr. NBC, N. Y. C. 5 pm.-1 am.
9.665	—	**ROME, ITALY.** 31.04 m. Relays 2RO 12 n.-6, 7.30-9 pm.
9.660	LRX	**BUENOS AIRES, ARG.,** 31.06 m., Addr. El Mundo. Relays LRI, 6-6.45 am, 9.15 am.-10.05 pm.
9.650	W2XE	**NEW YORK CITY,** 31.09 m. (See 21.570 mc. for addr.) 10.30-11.30 pm. exc. Sat. and Sun.
9.650	CS2WA	**LISBON, PORTUGAL,** 31.09 m., Addr. Radio Colonial. Tues., Thurs. and Sat. 4-7 pm.
9.645	HH3W	**PORT-AU-PRINCE, HAITI,** 31.1 m., Addr. P. O. Box A117. 1-2, 7-9 pm.
9.640	CXA8	**COLONIA, URUGUAY,** 31.12 m., Addr. Belgrano 1841, Buenos Aires, Argentina. Relays LR3, Buenos Aires 7 am.-m., Sat. to 2.15 am.
9.636	JFO	**TAIHOKU, TAIWAN,** 31.13 m. Relays JFAK irreg. 4-10.30 am.
9.635	2RO	**ROME, ITALY,** 31.13 m., Addr. (See 11.810 mc.) 12.05-9 pm.
9.630	HJ7ABD	**BUCARAMANGA, COL.,** 31.14 m. 5.45-6.30, 11.30 am.-1 pm., 6-11 pm.
9.618	HJ1ABP	**CARTAGENA, COL.,** 31.20 m., Addr. P. O. Box 37. Daily 9 am.-1.30 pm., 4.30-10.15 pm. Sun. 4.30-9 pm.
9.615	ZRK	**KLIPHEUVAL, SOUTH AFRICA,** 31.2 m., Addr. P. O. Box 4559, Johannesburg. Daily. exc. Sat. 11.45 pm.-12.50 am. Daily exc. Sun. 3.20-7.20, 9-11.45 am., Sun. 3.30-4.30 or 4-5, 5.30-7, 9-11.45 am.
9.607	HP5J	**PANAMA CITY, PANAMA,** 31.23 m. Addr. Apartado 867. 12 n. to 1.30 pm., 6-10.30 pm.
9.600	RAN	**MOSCOW, U.S.S.R.,** 31.25 m. Daily exc. Sun. 6-10 pm. Sun. 6-7, 9.15-10 pm.
9.595	HBL	**GENEVA, SWITZERLAND,** 31.27 m., Addr. Radio Nations. Irregular.
9.590	VUD2	**DELHI, INDIA,** 31.28 m. Addr. All India Radio, 1.30-3.30 am., 7.30 am.-12.30 pm., 8.30-10.30 pm.
9.590	PCJ	**HUIZEN, HOLLAND,** 31.28 m., Addr. (See 15.220 mc.) Sun. 2-3, 7-9.25 pm. Tues. 1.45-3.40, 7.15-8.45, 9-10.30 pm., Wed. 7.15-8.30 pm., Fri. 8-9 pm.
9.590	VK6ME	**PERTH, W. AUSTRALIA,** 31.28 m., Addr. Amalgamated Wireless of Australasia, Ltd. 6-9 am. exc. Sun.
9.590	VK2ME	**SYDNEY, AUSTRALIA,** 31.28 m., Addr. Amalgamated Wireless of Australasia, Ltd., 47 York St., Sun. 1-3 am.; 5-11 am.
9.590	W3XAU	**PHILADELPHIA, PA.,** 31.28 m. (Addr. See 21.52 mc.) Mon. and Thurs. 7.30-11.30 pm. Sat. 7.30-10.45 pm.
9.580	GSC	**DAVENTRY, ENGLAND,** 31.32 m., Addr. B. B. C., Portland Pl., London, W. 1, 12.20-1.15, 4.15-6, 6.20-8.30, 9.20-11.25 pm.
9.580	VLR	**MELBOURNE, AUSTRALIA,** 31.32 m. Addr. Box 1686, G. P. O. Daily 3.30-8.30 am. (Sat. till 9 am.) Sun. 12.01-7.30 am. Also daily exc. Sat. 9.25 pm.-2 or 2.15 am. Sat. 5-10.30 pm.
9.570	KZRM	**MANILA, P. I.,** 31.35 m., Addr. Erlanger & Galinger, Box 283. Sun. 3-10 am. Daily exc. Sat. 4.30-7 pm., 11.15 pm.-12.15 am. Daily exc. Sun. 4-10 am.
9.570	WIXK	**BOSTON, MASS.,** 31.35 m., Addr. Westinghouse Electric & Mfg. Co. 7 am. to 1 am. Sun. 8 am.-1 am.
9.560	XGAP	**PEKING, CHINA,** 31.38 m., 9 am.-2 pm.
9.560	DJA	**BERLIN, GERMANY,** 31.38 m., Addr. Broadcasting House. 12.05-11 am., 4.50-10.50 pm.
9.550	HVJ	**VATICAN CITY,** 31.41 m., Sun. 5-5.30 am.
9.550	TPB11	**PARIS, FRANCE,** 31.41 m. Addr. (See 15.245 mc.) 2-5 am., 11.15 am.-6 pm.
9.550	W2XAD	**SCHENECTADY, N. Y.,** 31.41 m., General Electric Co., 7.15-10 pm. to So. Amer.
9.550	OLR3A	**PRAGUE, CZECHOSLOVAKIA,** 31.41 m. (See 11.840 mc.) Mon. 4.40-5.10 pm.
9.550	XEFT	**VERA CRUZ, MEX.,** 31.41 m. 10.30 am.-4.30 pm., 10.30 pm.-12.30 am.
9.550	YDB	**SOERABAJA, JAVA,** 31.41 m., Addr. N.I.R.O.M. Daily exc. Sat. 6-7.30 pm., 4.30 to 10.30 am. Sat. 4.30-11.30 am.
9.550	VUB2	**BOMBAY, INDIA,** 31.41 m., Addr. All India Radio. 9.30-10.30 pm., 1-3.30 am.
9.540	DJN	**BERLIN, GERMANY,** 31.45 m., Addr. (See 9.560 mc.) 12.05-11 am. 4.50-10.50 pm. to So. Amer.
9.540	HJ5ABD	**CALI, COLOMBIA,** 31.45 m., Addr. La Voz de Valle. 12 n.-1.30 pm., 5.10-9.40 pm.
9.538	VPD2	**SUVA, FIJI ISLANDS,** 31.46 m., Addr. Amalgamated Wireless of Australasia, Ltd. 5.30-7 am., exc. Sun.
9.535	JZI	**TOKYO, JAPAN,** 31.46 m., Addr. (See 11.800, JZJ) 2.30-4, 4.30-5.30 pm. 8-9.30 am.
9.535	—	**BERNE, SWITZERLAND,** 31.46 m., 1-2 pm. exc. Mon. and Tues.
9.530	W2XAF	**SCHENECTADY, N. Y.,** 31.48 m., Addr. General Electric Co. 4 pm.-12 m. Sat. 1 pm.-12 m.
9.530	VUC2	**CALCUTTA, INDIA.** 31.48 m. Addr. All India Radio. 2.06-4.06 am.
9.526	XEDQ	**GUADALAJARA, GAL., MEXICO,** 31.49 m., n.-4.30 pm., 8-11.30 pm.
9.526	ZBW3	**HONGKONG, CHINA,** 31.49 m., Addr. P. O. Box 200. 11.30 pm. to 1 am., 3-10 am.
9.525	LKC	**JELOY, NORWAY,** 31.49 m., 4.30-10.30 am., Sun. 2.30-10.30 am.
9.523	ZRH	**ROBERTS HEIGHTS, S. AFRICA.** 31.5 m., Addr. (See ZRK, 9.606 mc.) Daily exc. Sun. 5-7.30 am.; Sun. 5.30-7 am.
9.520	OZF	**SKAMLEBOAEK, DENMARK,** 31.51 m., Addr. Statsradiofonien, Heibergsgade 7, Copenhagen, 8-9.30, 9.30-11 pm. to No. Amer.
9.520	YSH	**SAN SALVADOR, EL SALVADOR** 31.51 m., Addr. (See 7.894 mc.) Irregular 6-10 pm.
9.510	GSB	**DAVENTRY, ENGLAND,** 31.55 m., Addr. (See 9.580 mc.—GSC) 10.30 am.-12 n., 1.30-4, 4.15-6, 6.20-8.30, 9.20-11.25 pm.
9.510	HJU	**BUENAVENTURA, COLOMBIA,** 31.55 m., Addr. National Railways. Mon., Wed. and Fri. 8-11 pm.
9.510	HS6PJ	**BANGKOK, SIAM,** 31.55 m. Thursday, 8-10 am.
9.510	—	**HANOI, FRENCH INDO-CHINA.** 31.55 m. "Radio Hanoi", Addr. Radio Club de L'Indochine. 12 m.-2 am., 6-10 am. 15 watts.
9.503	KZI8	**MANILA, PHIL. ISL.,** 31.57 m., 7-9.05 am.
9.503	XEWW	**MEXICO CITY, MEX.,** 31.57 m. Addr. Apart. 2516. Relays XEW. 9 am.-12.30 am.
9.500	VK3ME	**MELBOURNE, AUSTRALIA,** 31.58 m., Addr. Amalgamated Wireless of Australasia, 167 Queen St. Daily except Sun. 4-7 am.
9.500	OFD	**LAHTI, FINLAND,** 31.58 m., Addr. Finnish Brcst. Co., Helsinki. 12.15-5 pm.
9.490	OAX5C	**ICA, PERU,** 31.61 m., Radio Universal, 8-11.30 pm.
9.488	EAR	**MADRID, SPAIN,** 31.6 m., Addr. (See 9.860 mc.) 7.30-8.30 pm. Mon., Tues., Thur., Sat. at 9.30 pm. also.

End of Broadcast Band

Mc.	Call	
9.465	TAP	**ANKARA, TURKEY,** 31.70 m., 1.20-5 pm. Irreg.
9.445	HCODA	**GUAYAQUIL, ECUADOR,** 31.77 m., 8.15-10.15 pm., exc. Sun.
9.437	COCH	**HAVANA, CUBA,** 31.8 m., Addr. 2 B St., Vedado. 8 am.-9.30 pm. Sun. 8 am.-12 m.
9.380	—	**TANANARIVE, MADAGASCAR,** 31.96 m. Addr. Le Directeur des PTT, Radio Tananarive, Administration PTT. 12.30-12.45, 10-11 am., 2.30-4 am., exc. Sun.
9.370	XOY	**CHENGTU, CHINA,** 32.02 m., 9.45-10.30 am.
9.355	HCIETC	**QUITO, ECUADOR,** 32.05 m., Addr. Teatro Bolivar, Thurs. until 9.30 pm. 8-11 pm. Sats.
9.350	COCD	**HAVANA, CUBA,** 32.08 m., Addr. Box 2294. Relays CMCD 10 a.m.-11.30 pm. Sun. 10 am.-9 pm.
9.345	HBL	**GENEVA, SWITZERLAND,** 32.11 m., Addr. Radio Nations. Sun. 8-8.45 am., Mon. 6.45-8.30 pm.
9.340	OAX4J	**LIMA, PERU,** 32.12 m., Addr. Box 1166, "Radio Universal." 12 n.-3 pm., 5 pm.-1 am.
9.300	XGX	**SHANGHAI, CHINA,** 32.26 m., 8-9.05 am. Varies between 9.180-9.300.
9.300	HIG	**CIUDAD TRUJILLO, D. R.,** 32.28 m. 7.10-9.40 am., 11.40 am.-2.10 pm., 3.40-9.40 pm.
9.200	COBX	**HAVANA, CUBA,** 32.59 m. Addr. San Miguel 194, Altos. Relays CMBX 7 am.-12 m.
9.165	HC2CW	**GUAYAQUIL, ECUADOR,** 32.74 m., 7-11.30 pm., Sun. 3.30-6 pm.
9.125	HAT4	**BUDAPEST, HUNGARY,** 32.88 m., Addr. "Radiolabor." Gyali-ut, 22. Daily 7-8 pm., Sat., 6-7 pm.
9.100	COCA	**HAVANA, CUBA,** 32.95 m., Addr. Galiano No. 102. Relays CMCA 9 am.-12 m.
9.091	PJC2	**CURACAO, D. W. INDIES,** 33 m., 6.36-8.36 pm., Sun. 10.36 am.-12.36 pm.
9.030	COBZ	**HAVANA, CUBA,** 33.32 m., Radio Salas Addr. P. O. Box 866. 7.45 am.-1.15 am. Sun. 7.45 am.-12 m. Relays CMBZ.
8.965	COKG	**SANTIAGO, CUBA,** 33.44 m. Addr. Box 137. 9-10 am., 11.30 am.-1.30 pm., 3-4.30, 5-6, 10-11 pm., 12 m.-2 am.
8.841	HCJB	**QUITO, ECUADOR,** 33.5 m. 7-8.30 am., 11.45 am.-2.30 pm., 5-10 pm., except Mon. Sun. 12 n.-1.30 pm., 5.30-10 pm.

(Continued on page 732)

All Schedules Eastern Standard Time

Antenna Systems for HAMS

Herman Yellin, W2AJL

1. Half-Wave Hertz Single-wire Untuned Feeder

● IT IS generally realized that a good antenna requires much lower transmitter power than a poor antenna for equal effectiveness; effectiveness being measured in signal strength at a distant point. Therefore, a series of articles has been prepared, of which the following is the first, describing amateur antennas and containing constructional data and tuning hints.

One of the simplest antennas is the half-wave Hertz with a single wire untuned feeder. For greatest efficiency, the antenna should be used on only one amateur band and should be cut for a half wavelength. If operation is desired on only one frequency, the antenna should be cut for that frequency, whereas if operation is desired over the entire band, the antenna should be cut for the center of that band. The following formula will determine the antenna length:—

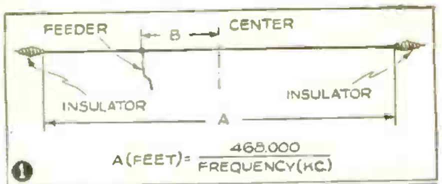
$$\text{LENGTH (feet)} = \frac{468{,}000}{\textit{frequency}\ (\text{KC.})}$$

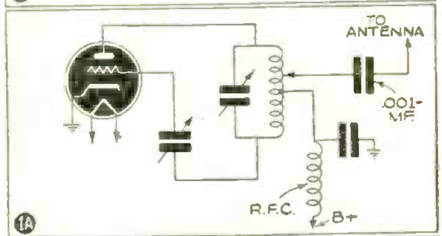
All untuned transmission lines or feeders have a definite surge impedance determined by the feeder's mechanical characteristics. If the feeder is terminated at the antenna in an impedance equal to its surge impedance, there will be no reflections from the antenna and no standing waves along the line to cause radiation from the line. A single wire line has an impedance of between 500 and 600 ohms. The impedance of a half-wave Hertz antenna varies from about 70 ohms at its center to about 2000 ohms at its extremities. At a distance from the center equal to 1/7 the length of the antenna, this antenna has a 500-600 ohm impedance, and so if the single wire feeder is coupled to the antenna at this point, no standing waves will occur. For best results, a little experimenting should be done by varying the position of the feeder tap. The correct position will be indicated by a constant value of R.F. current along the line which may be any length up to several hundred feet. An R.F. ammeter can be placed at several points along the line, or several neon bulbs placed along the line, and the antenna tap adjusted until the current is the same at all points along the line. When tapped at the correct point, there will be minimum or no detuning of the final amplifier tank when the feeder is clipped thereon, and this is a simple method of adjustment. On long lines there will be a slight but steady diminution of current. The feeder should be at right-angles to the antenna for a distance equal to about 1/3 the length of the antenna to prevent interaction between antenna and feeder.

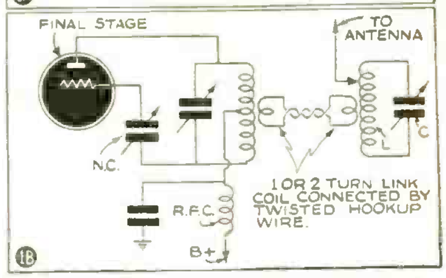
Coupling the feeder to the transmitter can be simply accomplished by clipping the feeder onto the final plate coil, starting at the point of minimum R.F. potential (ground) and going up the coil until the tube draws the desired plate current. If direct current is flowing through the coil a fixed condenser of .001 mf. or more should be placed in series with the feeder to keep D.C. out of the antenna. Otherwise, if the antenna were accidentally grounded, the power supply would be shorted. Also unfortunate accidents may result if some unsuspecting neighbor should come in contact with the antenna.

A more desirable method of coupling, resulting in elimination of any harmonics, is shown in Fig. 1b. The LC circuit should tune to the transmitter frequency while the feeder is adjusted on the coil in the same manner as before.

When this type of system is operated on a harmonic, the feeder will have standing waves along it and will radiate. However, where it is impossible to erect more than one antenna and multi-band operation is desired, the antenna should be cut for the lowest operating frequency. The feeder should be tapped on the antenna so that distance "B" on the diagram is 1/6 the length of the antenna. Although not a perfect match on the highest wave band, a better match is afforded on the lower wave bands. Better results will be had with this multi-band antenna if the feeder is a multiple of a quarter wavelength long.







The half-wave Hertz Antenna, with single wire untuned feeder, showing different methods of coupling.

NEXT MONTH—*Half-wave doublet with twisted pair feeders.*

Ultra-High Frequency Antennas

● BRITISH radio listeners have had far more experience with the problems of ultra-high frequency reception than has the average American experimenter, for television has become part of the Briton's daily life. In this article, two engineers of the British branch of General Electric Co. discuss their findings.

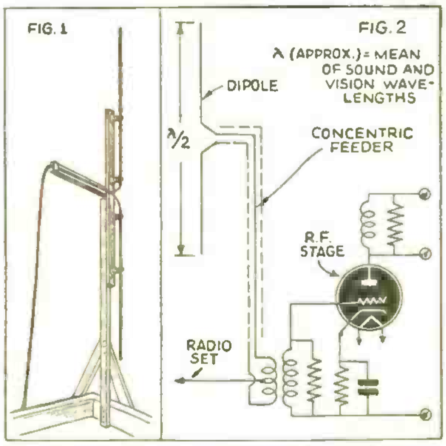
Television Aerial and Input Circuit

Owing to the relatively high level of radiated interference in the region of 7 meters it is an advantage in almost all cases to use a frequency selective aerial fed by a correctly matched low impedance line to the receiver input.

The interference is thereby substantially limited to the frequency range necessary for reception, and as the aerial is of relatively small dimensions it can be situated in a position of minimum interference.

The most satisfactory aerial of this type is the center-fed dipole, shown in Figs. 1 and 2, tuned by adjustment of its length to the mean sound and vision wavelengths.

The impedance of this varies from a maximum of several thousand ohms at its ends to about 80–100 ohms at the center. Transmission lines of this characteristic impedance can easily be obtained of compact construction in the form of a concentric feeder, using a minimum of low-loss insulating material.



Center-fed dipole aerial used in England to pick up television and sound signals.

The feeder used for this purpose is shown in Fig. 1. It has an overall diameter of about ½ inch, and is protected externally from climatic conditions by a layer of insulating material. The characteristic impedance is approximately 90 ohms, with attenuation at 45 mc. of approximately 1.0 db. per meter.

In positions of very weak signal strength, it is therefore possible to obtain improvement by using a higher aerial position, provided the vertical signal strength gradient is greater than about 1.0 per cent per meter.

At the receiver end, the line is terminated in a step-up transformer to match it to the input circuit of the first tube. This transformer also serves the purpose of reducing the effect of any direct pick-up on the feeder.

Since the aerial is used to receive both sound and vision signals, the secondary is tuned to 44 mc. by the grid-ground capacity of the R.F. amplifier tube (pentode) and damped by a terminating resistance to cover the necessary band-width of both the sound and vision channels. In the case of the combined television and broadcast receiver, the aerial coil is center tapped and connected to the aerial terminal of the broadcast receiver without the use of any switches. The feeder line is thereby used directly as an aerial for the broadcast receiver without modification, see Fig. 2.—*Excerpt from article "Television Receivers," by Espley and Edwards, in the Journal of the Television Society, London.*

Mc.	Call	
8.700	HKV	**BOGOTA, COLOMBIA,** 34.46 m. Tues. and Fri. 7-7.20 pm.
8.665	COJK	**CAMAGUEY, CUBA,** 34.64 m., Addr. Finlay No. 3 Altos. 5.30-6.30, 8-11 pm., daily except Sat. and Sun.
8.665	W2XGB	**HICKSVILLE, N. Y.,** 34.64 m., Addr. Press Wireless, Mon. to Fri. News at 9 am. and 5 pm.
8.580	YNPR	**MANAGUA, NICARAGUA,** 34.92 m. Radiodifusora Pilot.
7.894	YSD	**SAN SALVADOR, EL SALVADOR,** 37.99 m., Addr. Dir. Genl. Tel. & Tel. 7-10.30 pm.
7.870	HCIRB	**QUITO, ECUADOR,** 38.1 m. La Voz de Quito. 8.30-11.30 pm.
7.854	HC2JSB	**GUAYAQUIL, ECUADOR,** 38.2 m. Evenings to 11 pm.
7.797	HBP	**GENEVA, SWITZERLAND,** 38.48 m., Addr. Radio-Nations.
7.614	CR6AA	**LOBITO, ANGOLA,** 39.39 m., Mon., Wed., Sats. 2.45-4.30 pm. Also 7.177.
7.510	JVP	**NAZAKI, JAPAN,** 39.95 m., 8-9.30 am.
7.450	TI2R3	**SAN JOSE, COSTA RICA,** 40.27 m. "Radioemisora Athena", 9.30-11 pm., exc. Sun.
7.410	HCJB4	**QUITO, ECUADOR,** 40.46 m., 7-9.30 pm. irregularly.
7.410	YDA	**TANDJONGPRIOK, JAVA,** 40.46 m., Addr. N.I.R.O.M., Batavia, 10.30 pm.-2 am.; Sat. 7.30 pm.-2 am.
7.380	XECR	**MEXICO CITY, MEX.,** 40.65 m., Addr. Foreign Office. Sun. 7-8 pm.
7.220	HKE	**BOGOTA, COL., S. A.,** 41.55 m. Tues. and Sat. 8-9 pm. Mon. and Thurs. 6.30-7 pm.
7.200	YNAM	**MANAGUA, NICARAGUA,** 41.67 m. Irregular at 9 pm.
7.177	CR6AA	**LOBITA, ANGOLA, PORT. WEST AFRICA,** 41.75 m., Mon., Wed., and Sats. 2.45-4.30 pm. Also see 7.614 mc.
7.100	FO8AA	**PAPEETE, TAHITI,** 42.25 m., Addr. Radio Club Oceanien. Tues. and Fri. 11 pm.-12.30 am.
7.088	PI1J	**DORDRECHT, HOLLAND,** 42.3 m., Addr. Dr. M. Hellingman, Technical College. Sat. 11.10-11.50 am.
7.050	FG8AA	**POINT-A-PITRE GUADELOUPE, F.W.I.,** 42.55 m., 6-7 pm., also 9-10.30 pm. Irregular. P.O. Box 125.
6.990	XEME	**MERIDA, YUCATAN,** 42.89 m., Addr. Calle 59, No. 517, "La Voz de Yucatan desde Merida." Irregular.
6.977	XBA	**TACUBAYA, D. F., MEX.,** 43 m. 9.30 am.-1 pm., 7-8.30 pm.
6.805	HI7P	**CIUDAD TRUJILLO, DOM. REP.,** 44.06 m., Addr. Emisoria Diaria de Commercio. Daily exc. Sat. and Sun. 12.40-1.40, 6.40-8.40 pm. Sat. 12.40-1.40 pm. Sun. 10.40 am.-11.40 am.
6.790	PZH	**PARAMIRABO, SURINAM,** 44.16 m., Addr. P. O. Box 18. Daily 6.06-8.36 am., Sun. 9.36-11.36 am. Daily 5.36-8.36 pm.
6.775	HIH	**SAN PEDRO DE MACORIS, DOM. REP.,** 44.26 m. 12.10-1.40 pm., 7:30-9 pm. Sun. 3-4 am., 4.15-6 pm., 4.40-7.40 pm.
6.750	JVT	**NAZAKI, JAPAN,** 44.44 m., Addr. Kokusai-Denwa Kaisha, Ltd., Tokyo. Irregular.
6,730	HI3C	**LA ROMANA, DOM. REP.,** 44.58 m., Addr. "La Voz de la Feria." 12.30-2 pm., 5-6 pm.
6.720	PMH	**BANDOENG, JAVA,** 44.64 m. Relays N.I.R.O.M. programs. 4.30-11 or 11.30 am. Also Sat. 9.30 pm.-1.30 am.
6.690	TIEP	**SAN JOSE, COSTA RICA,** 44.82 m., Addr. Apartado 257, La Voz del Tropico. Daily 7-11 pm.
6.675	HBQ	**GENEVA, SWITZERLAND,** 44.94 m. Addr. Radio-Nations. Off the air at present.
6.672	—	——— 44.94 m., relays Salamanca, Spain, 7-9.45 pm.
6.672	YVQ	**MARACAY, VENEZUELA,** 44.95 m. Irregular.
6.635	HC2RL	**GUAYAQUIL, ECUADOR, S. A.,** 45.18 m., Addr. P. O. Box 759. Sun. 5.45-7.45 pm., Tues. 9.15-11.15 pm.

Mc.	Call	
6.630	HIT	**CIUDAD TRUJILLO, D. R.,** 45.25 m., Addr. "La Voz de la RCA Victor," Apartado 1105. Daily exc. Sun. 12.10-1.40 pm., 5.40-8.40 pm.; also Sat. 10.40 pm.-12.40 am.
6.625	PRADO	**RIOBAMBA, ECUADOR,** 45.28 m. Thurs. 9-11.45 pm.
6.610	YNLG	**MANAGUA, NICARAGUA,** 45.39 m. Emisora Ruben Dario. 1.30-2.30, 6-10.15 pm.
6.558	HI4D	**CIUDAD TRUJILLO, D. R.,** 45.74 m. Except Sun. 11.55 am.-1.40 pm.
6.550	XBC	**VERA CRUZ, MEX.,** 45.8 m. 8.15-9 am.
6.550	TIRCC	**SAN JOSE, COSTA RICA,** 45.8 m., Addr. Radioemisora Catolica Costarricense. Sun. 11 am.-2 pm., 6-7, 8-9 pm. Daily 12 n.-2 pm., 6-7 pm., Thurs. 6-11 pm.
6.545	YV6RB	**BOLIVAR, VENEZUELA,** 45.84 m., Addr. "Ecos de Orinoco." 6-10.30 pm.
6.520	YV4RB	**VALENCIA, VENEZUELA,** 45.98 m. 11 am.-2 pm., 5-10 pm.
6.516	YNIGG	**MANAGUA, NICARAGUA,** 46.02 m., Addr. "La Voz de las Lagos." 1-2.20, 8-10 pm. Except Sundays.
6.500	HIL	**CIUDAD TRUJILLO, D. R.,** 46.13 m. Addr. Apartado 623. 12.10-1.40 pm., 5.40-7.40 pm.
6.480	HIIL	**SANTIAGO DE LOS CABALLEROS, D. R.,** 46.28 m., Addr. Box 356. 9.40-11.40 am., 7.40-9.40 pm.
6.470	YNLAT	**GRANADA, NICARAGUA,** 46.36 m., Addr. Leonidas Tenoria, "La Voz del Mombacho." Irregular.
6.465	YV3RD	**BARQUISIMETO, VENEZUELA,** 46.37 m. Radio Barquisimeto, irregular.
6.450	HI4V	**SAN FRANCISCO DE MACORIS, D. R.,** 46.48 m. 11.40 am.-1.40 pm., 5.10-9.40 pm.
6.400	TGQA	**QUEZALTENANGO, GUATEMALA,** 46.88 m., Mon.-Fri. 9-11 pm. Sat. 10 pm.-1 am. Sun. 1-3 pm.
6.384	ZIZ	**BASSETERRE, ST. KITTS, W. INDIES,** 46.99 m. 4-4.45 pm. Wed. 7-7.30 am.
6.340	HIIX	**CIUDAD TRUJILLO, D. R.,** 47.32 m. Sun. 7.40-10.40 am., daily 12.10-1.10 pm., Tues. and Fri. 8.10-10.10 pm.
6.335	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 del Radio Philco, P. O. Box 130. 6.55 am.-12 m. Sun. 9.55 am.-10 pm.
6.310	HIZ	**CIUDAD TRUJILLO, D. R.,** 47.52 m. Daily except Sat. and Sun. 11.10 am.-2.25 pm., 5.10-8.40 pm. Sat. 5.10-11.10 pm. Sun. 11.40 am.-1.40 pm.
6.300	YV4RD	**MARACAY, VENEZUELA,** 47.62 m. 6.30-9.30 pm. exc. Sun.
6.295	OAX4G	**LIMA, PERU,** 47.63 m., Addr. Apartado 1242. Daily 7-10.30 pm.
6.280	HIG	**TRUJILLO CITY, D. R.,** 47.77 m. 7.10-9.40 am., 11.40 am.-2.10 pm., 3.40-9.40 pm.
6.270	YV5RP	**CARACAS, VENEZUELA,** 47.79 m., Addr. "La Voz de la Philco." Daily to 10.30 pm.
6.255	YV5RJ	**CARACAS, VENEZUELA,** 47.18 m. 5.30-8 pm.
6.243	HIN	**CIUDAD TRUJILLO, D. R.,** 48 m., Addr. "La Voz del Partido Dominicano." 12 n.-2 pm., 6-10 pm.
6.235	HRD	**LA CEIBA, HONDURAS,** 48.12 m., Addr. "La Voz de Atlantida." 8-11 pm.; Sat. 8 pm.-1 am.; Sun. 4-6 pm.
6.225	YVIRG	**VALERA, VENEZUELA,** 48.15 m. 6-9.30 pm.
6.210	——	**SAIGON, INDO-CHINA,** 48.28 m., Addr. Radio Boy-Landry, 17 Place A. Foray. 4.30 or 5.30-9.15 am.
6.205	YV5RI	**CORO, VENEZUELA,** 48.32 m., Addr. Roger Leyba, care A. Urbina y Cia. Irregular.
6.200	HI8Q	**CIUDAD TRUJILLO, D. R.,** 48.36 m. Irregular.
6.190	TG2	**GUATEMALA CITY, GUAT.,** 48.4. m., Addr. Dir. Genl. of Electr. Commun. Relays TGI Mon.-Fri. 6-11 pm., Sat. 6 pm.-1 am. Sun. 7-11 am., 3-8 pm.
6.185	HIIA	**SANTIAGO, D. R.,** 48.5 m., Addr. P. O. Box 423. 7 am.-5 pm.

Mc.	Call	
6.170	W2XE	**NEW YORK CITY,** 48.62 m., Addr. Col. B'cast System, 485 Madison Ave. Mon., Fri. 12 m.-1 am. Sat. & Sun. 11.30 pm., 1 am.

49 Met. Broadcast Band

Mc.	Call	
6.156	YV5RD	**CARACAS, VENEZUELA,** 48.71 m. 11 am.-2 pm., 4-10.40 pm.
6.153	HI5N	**MOCA CITY, D. R.,** 48.75 m. 6.40-9.10 pm.
6.150	VPB	**COLOMBO, CEYLON,** 48.78 m., 7-11 am.
6.150	CJRO	**WINNIPEG, MAN., CANADA,** 48.78 m., Addr. (See 11.720 mc.) Daily 6 pm.-12 m., Sun. 5-10 pm.
6.150	ZPI4	**VILLARRICA, PARAGUAY,** 48.78 m. 4-6 pm.
6.147	ZEB	**BULAWAYO, RHODESIA, S. AFRICA,** 48.8 m. Mon., Wed., and Fri. 1.15-3.15 pm.; Tues. 11 am.-12 n.; Thurs. 10 am.-12 n. Sun. 3.30-5 am.
6.145	HJ4ABG	**MEDELLIN, COL.,** 48.79 m. 11 am.-12 n., 6-10.30 pm.
6.140	W8XK	**PITTSBURGH, PA.,** 48.83 m., Addr. Westinghouse Electric & Mfg. Co. Relays KDKA 11 pm.-12 m.
6.137	CR7AA	**LAURENCO MARQUES, PORT. E. AFRICA,** 48.87 m. Daily 12.05-1, 4.30-6.30, 9.30-11 am., 12.05-4 pm., Sun. 5-7 am., 10 am.-2 pm.
6.133	XEXA	**MEXICO CITY, MEX.,** 48.93 m., Addr. Dept of Education. Daily 8-11 am., 2.30-4 pm., 7.30 pm.-12.45 am. Sun. 1.30 pm.-12.45 am.
6.130	VP3BG	**GEORGETOWN, BRIT. GUIANA,** 48.94 m. 9-10 am., 2.15-6.30 pm., Sun. 5.30-11.30 am., 3-5 pm.
6.130	TIEM	**SAN JOSE, COSTA RICA,** 48.94 m. "El Mundo", Apartado 1049. 11 am.-11 pm., Sun. 10 am.-6 pm.
6.130	CHNX	**HALIFAX, N. S., CAN.,** 48.94 m., Addr. P. O. Box 998. Mon.-Fri. 7 am.-11.15 pm., Sat. 11 am.-11 pm., Sun. 12 n.-11.15 pm. Relays CHNS.
6.130	LKL	**JELOY, NORWAY,** 48.94 m. 11 am.-6 pm.
6.125	CXA4	**MONTEVIDEO, URUGUAY,** 48.98 m., Addr. Radio Electrico de Montevideo, Mercedes 823. 8 am.-Noon. 2-10 pm.
6.122	HJ3ABX	**BOGOTA, COL.,** 49. m., Addr. La Voz de Col., Apartado 26-65. 12 n.-2 pm., 5.30-11 pm.; Sun. 6-11 pm.
6.122	HP5H	**PANAMA CITY, PAN.,** 49 m., Addr. Box 1045. 10 am.-1 pm., 5-11 pm.
6.122	FK8AA	**NOUMEA, NEW CALEDONIA,** 49.00 m., Radio Noumea, Addr. Charles Gaveau, 44 Rue de l'Alma., Wed. & Sats. 2.30-3.30 am.
6.117	XEUZ	**MEXICO CITY, MEX.,** 49.03 m., Addr. 5 de Mayo 21. Relays XEFO 9 am.-1 pm., 7 pm.-2 am.
6.115	OLR2C	**PRAGUE, CZECHOSLOVAKIA,** 49.05 m. (See 11.40 mc.)
6.110	GSL	**DAVENTRY, ENGLAND,** 49.1 m., 6.20-8.30, 9.20-11.20 pm.
6.110	XEGW	**MEXICO CITY, MEX.,** 49.1 m., Addr. La Voz de Aguila Azteca desde Mex., Apartado 8403. Relays XEJW 11 pm.-1 am.
6.108	HJ6ABB	**MANIZALES, COL.,** 49.14 m., Addr. P. O. Box 175. Mon.-Fri. 12.15-1 pm.; Tue. and Fri. 7.30-10 pm.; Sun. 2.30-5 pm.
6.100	YUA	**BELGRADE, JUGOSLAVIA,** 49.18 m. 1-3, 6.30-8.30 am., Noon-6.30 pm.
6.100	W3XAL	**BOUND BROOK, N. J.,** 49.18 m., Addr. Natl. Broad. Co.
6.097	ZRK	**KLIPHEUVEL, S. AFRICA,** 49.2 m., Addr. S. African Broad. Co., Johannesburg. Daily 12 n.-4 pm., Sun. 12 n.-3.20 pm.
6.097	ZRJ	**JOHANNESBURG, S. AFRICA,** 49.2 m. Addr. S. African Broad. Co. Daily exc. Sat. 11.45 pm.-12.50 am.; Daily exc. Sun. 3.15-7.30, 9-11.30 am. (Sat. 8.30-11.30 am.) Sun. 3.30-4.30 or 4-5 am., 5.30-7, 9-11.30 am.
6.095	JZH	**TOKYO, JAPAN,** 49.22 m., Addr. (See 11.800 mc., JZJ.) Irregular.

(Continued on page 758)

All Schedules Eastern Standard Time

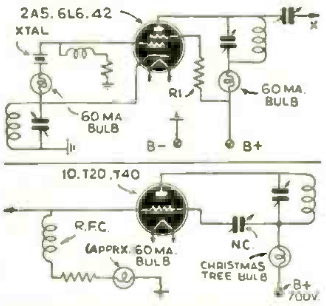
Radio Kinks

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

First Prize Winner

Pilot Lights Replace Meters

Visitors to Ham shacks often fool around with the variable transmitter settings. Then, when the transmitter is put into operation, the buffer or amplifier stage draws excessive current which damages the tube unless battery bias is used. My rig at W8QKA has cheap meters which cannot

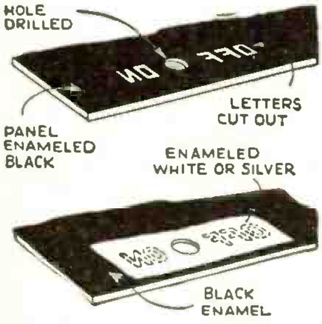


be used in circuit while the rig is in operation. Purchasing pilot light mountings fitted with colored jewel windows, I mounted these on the panel. I inserted one in the crystal circuit of the oscillator with a 60 ma. bulb in its socket. This enables me to watch the crystal current at all times for overheating. I wired another in series with the B positive lead to the final stage and put a Xmas tree bulb in the socket. When the amplifier is tuned, the bulb barely glows, but if excitation fails or the tank is detuned, etc., the bulb glows brightly and attracts the eye immediately.

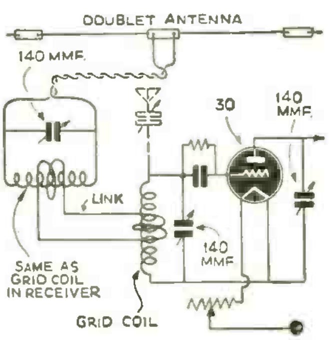
Recently, I put a bulb into each stage, which makes tuning of individual stages easier and more precise. A Xmas tree bulb is the correct size for such tubes as 10's, 801's and their equivalents.—*Operator, W8QKA.*

Fancy Glass Panel

A neat and attractive panel may be made by taking a sheet of double-strength window glass the required size and drilling the



necessary holes in it. If a mixture of camphor and turpentine is used, the glass will drill easily. Drills may be made from old three-cornered files ground down to a three-cornered point on a grinding wheel. After drilling the holes, clean the glass thoroughly and apply a coat of black enamel to the back of the panel. Allow this to dry, then scrape the paint off the back of the panel with a razor blade where the lettering (such as AVC, ON, OFF, etc.) is to appear. Paint over the back in white or silver where the lettering was cut out. The finished job has a mirror-like appearance and will improve the looks of your receiver or transmitter. —*Wayne Hawley.*



Doublet Coupling

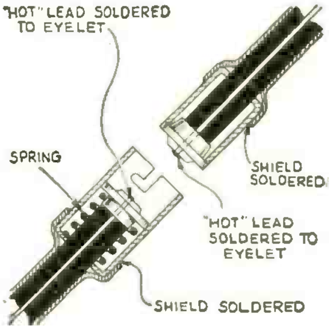
Here is a method of increasing the sensitivity of a small radio receiver.

Procure a coil form the same size as that used in the first stage of the set and wind a coil on it of the same size wire and number of turns as the grid coil of the set. Remove the antenna trimmer condenser, connect the coil, as shown in the accompanying diagram. Coupling to the grid coil of the set, is made with two single turn coils of ordinary hook-up wire. The condenser used to tune the coil you have wound should be of the same value as the main tuning condenser in the set. In the diagram the dotted line represents the original antenna connection, which has been removed.

I find a doublet works better than an inverted L to pull in weak signals.—*Frank Smith, Jr.*

Shielded Cable Connector

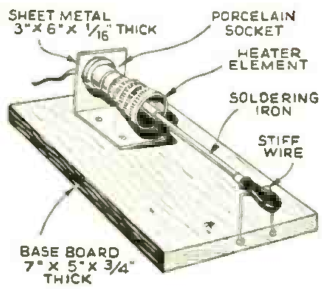
Connections between long sections of one-wire shielded cable,



for microphone or phonograph pick-up, can be easily and quickly made with male and female parts of an auto antenna connector. The wires are soldered to the insulated plugs. The shield is soldered to the case of the units. —*Raymond T. Stephens.*

Electric Heater For Soldering Iron

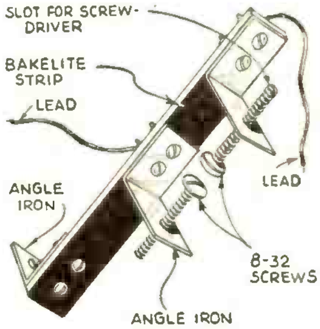
An electric heater, that brings any cheap soldering iron to operating temperature and maintains it at working heat, can be made from parts bought at the 10-cent store. The base of this iron heater is a piece of wood about 5"x7"x¾". To this I screwed a



piece of 1/16" metal, the dimensions of which are shown in the sketch. On this metal I mounted a porcelain socket to hold an electric heating element in a horizontal position, and opposite the opening of the heating element I mounted a piece of stiff wire to serve as a rest for the handle of the iron. The head of the iron is inserted into the heating element and the current switched on to bring the iron to working temperature. The foot of the sheet metal must be mounted so that it comes between the heater and the wooden base in order to prevent scorching.—*Carvil Mason.*

Improvised Neutralizing Condenser

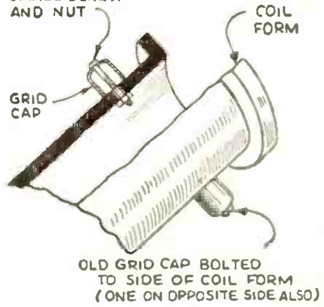
A simple neutralizing condenser, convenient for neutralizing a 6L6 beam power tube, is



easily constructed from workshop scrap. The essentials are: two 8/32 screws, two small angle irons and a strip of bakelite. One hole in each of the angle irons is threaded to take the screws. The irons are then mounted on a bakelite strip, as shown in the diagram, and are thus insulated from each other. The screws are then mounted as shown and a slot cut into the end of the upper one, so that it may be adjusted by a screwdriver. Lock nuts may be used on the screws to prevent their shifting, if desired. If the unit is to be baseboard mounted, a third angle iron can be used at one end of the bakelite strip, as shown.—*Charles Allen.*

Tank Coil Terminals

In low-powered transmitters, tank coils are usually wound on standard coil forms. The following kink has been used to provide a way to connect antenna feeders neatly to the coupling coil. Two grid caps from a pair of defunct tubes were obtained and drilled out to pass small bolts. They were then bolted to opposite sides of a standard coil form. The ends of the coupling coil were connected to the grid caps on the inside of



OLD GRID CAP BOLTED TO SIDE OF COIL FORM (ONE ON OPPOSITE SIDE ALSO)

the coil. All that is necessary when changing coils is to pull the feeders, which are terminated in insulated grip cap connectors, yank the coils and substitute the new ones. — *Richard L. Kile, K6QPG.*

A 6-Tube, 1.4 Volt *for the "Ham"*

This economical 6-tube superhet, which will appeal to Hams and Fans alike, will operate a loud speaker.

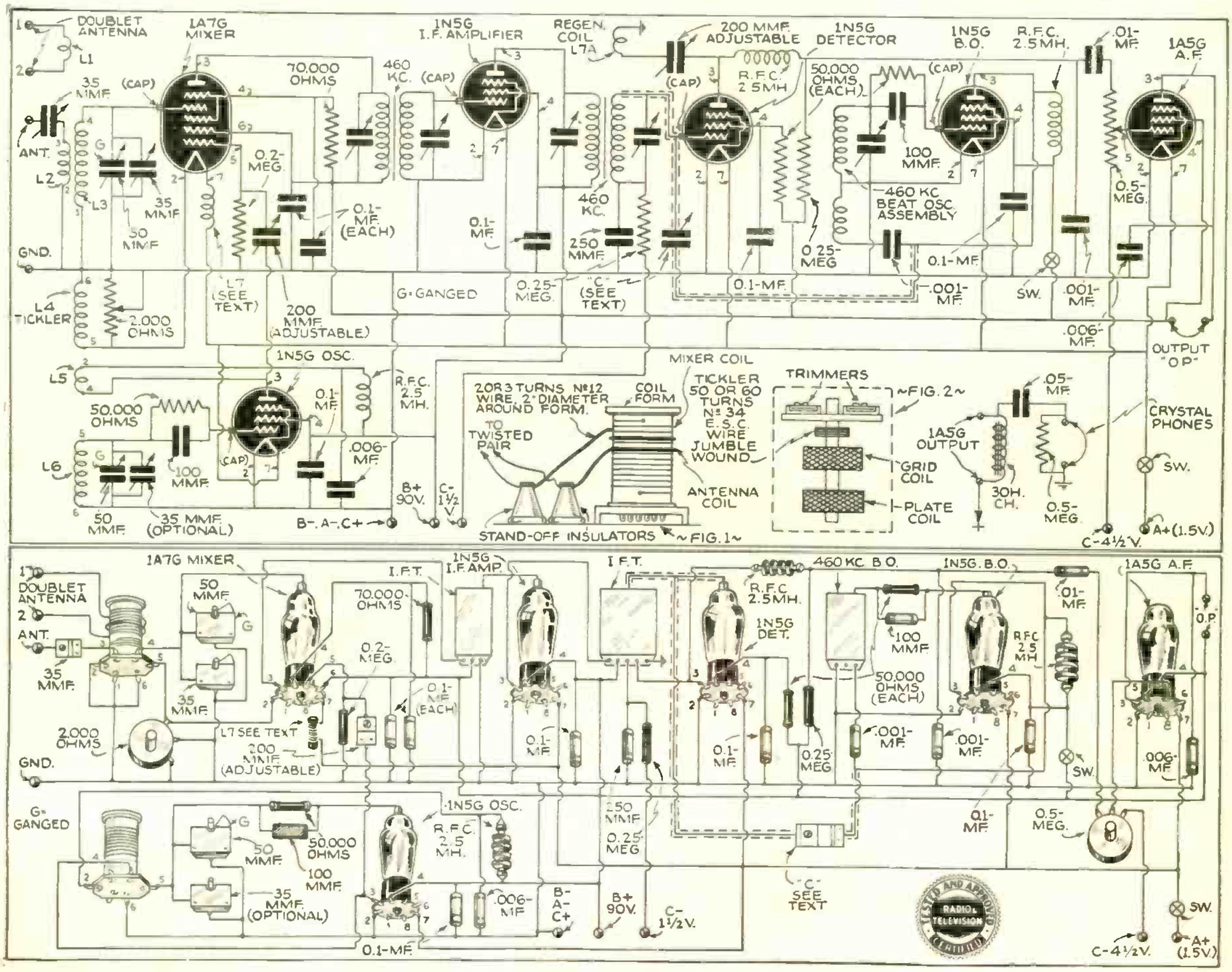
This battery-operated 6-tube super has surprising sensitivity and selectivity. The circuit employs a regenerative mixer, an oscillator, I.F. amplifier, regenerative detector, B.F. oscillator and A.F. output tube. Operation is very economical, the total filament drain being only .3 ampere.

● THE fine results obtained with the 1.4 volt "Economy Three" T.R.F. receiver described in the February issue induced the writer to try out the new tubes in a superheterodyne circuit. The results far exceeded his expectations and the six-tube receiver to be described here. So far as *sensitivity* and *selectivity* are concerned, is the equal of many standard A.C. "communications" type receivers using the same number of tubes.

The circuit, as is shown below, consists of a 1A7-G regenerative mixer, a 1N5-G oscillator, a 1N5-G 460 kc. I.F. amplifier, a 1N5-G regenerative detector, a 1N5-G beat-frequency oscillator and a 1A5-G audio output amplifier. The tubes used are all of the new economical 1.4 volt type, the total filament drain being only 0.30 ampere and the *measured* "B" drain less than 0.02 ampere at 90 volts. The R.F. gain (sensitivity) in the 1A7-G circuit is tremendously increased by making the mixer regenerative. The method of introducing feed-back is novel but extremely simple

●

Wiring diagrams, both schematic and pictorial, for the superhet are given below.

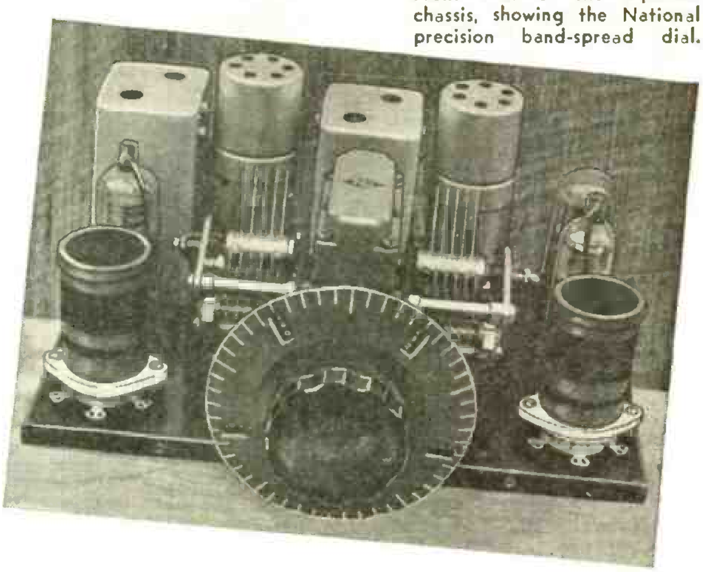


SUPER-HET

or S-W Fan

Harry D. Hooton,
W8KPX

Front view of the superhet chassis, showing the National precision band-spread dial.

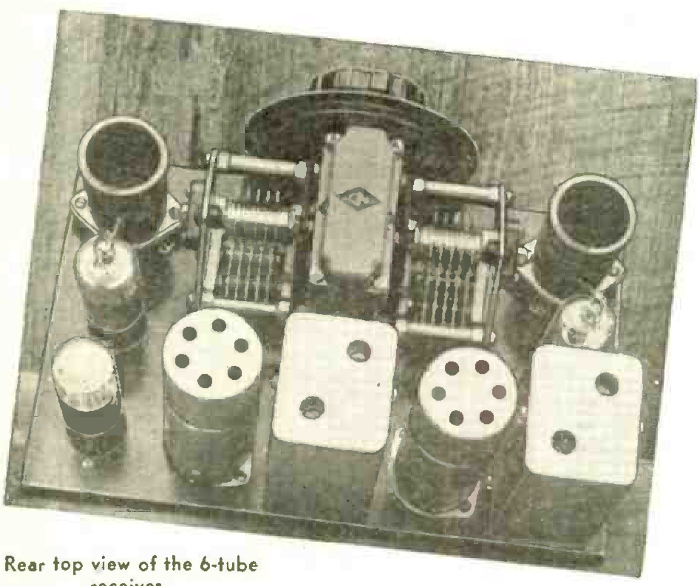


and effective—a small home-made R.F. choke (L7) consisting of about 25 to 30 turns of No. 26 enameled wire is wound on an old broadcast R.F. choke spool (one-half inch diameter) and inserted in the positive leg of the 1A7-G filament return, close to the tube socket, as shown in the diagram. The other (negative) filament lead is returned to ground through the tickler winding, L4. A 2,000 ohm potentiometer shunted across L4 permits the feed-back to be varied over a considerable range. The oscillator is of the conventional type, the R.F. output being taken from the plate of the tube through a small adjustable coupling condenser. Although better screening between the oscillator coupling grid, G1, and the mixer elements could be obtained by returning the anode grid, G2, to ground, it has been connected to the positive 90 volt plate return, in order to take advantage of the higher conversion gain thus made possible.

The I.F. transformers are of the iron-core, air-trimmed type which gives the maximum gain in this circuit. The tickler winding in the detector circuit, L7A, consists of about 50 or 60 turns of No. 34 E.S.C. wire jumble wound on the I.F. transformer core, about one-fourth inch from the grid coil, as shown in the drawing. The direction of the winding is not important as the leads can be reversed until oscillation is obtained. It should be emphasized at this point that the detector *is not permitted to oscillate;* the feed-back condenser, in series with the tickler coil, is adjusted so that the 1N5-G is operating *just below the point of oscillation* at all times. A separate beat oscillator is used for the reception of C.W. code signals when this is desired. This method of operation greatly facilitates the reception of the weaker signals, which would be lost in the noise if the detector circuit was allowed to oscillate. However, if a great increase in I.F. *selectivity* is desired, or if the set is to be used for C.W. code reception only, the detector can be permitted to oscillate and the output I.F. transformer adjusted to cut off one sideband, giving the effect of *"single signal"* reception. Alignment details will be found farther on in this article.

The mechanical construction of the receiver is not at all complicated or difficult. As the photos and drawings show, the various parts are mounted in the National "C-One-Ten" steel cabinet, no separate chassis being used. The dial and tuning condenser assembly is the National "PW-2" type, which spreads the tuning scale over 500 degrees on the dial. The photograph of the sub-base assembly, taken before the receiver was wired, shows how the tuning condensers, the I.F. transformers, the coils and the tubes are placed. For exact dimensions, refer to Fig. 3.

In wiring the circuit, keep the "hot" grid and plate leads as short and direct as possible. Place these leads right against the metal sub-base in order to limit their external fields; it may be necessary to shield the plate and grid leads from the I.F. transformers and the 1A7-G and 1N5-G mixer and I.F. tubes to eliminate oscillation at the I.F. level. Place the bypass condensers right on the socket terminals themselves in order to obtain a short, low-impedance path to ground for the R.F. and I.F. currents. Use solid No. 14 tinned copper bus wire for making the *(Continued on page 754)*



Rear top view of the 6-tube receiver.

Parts List, 1.4 Volt Super

NATIONAL CO.
1—PW-2 tuning unit (50 mmf. per section, double-spaced)
2—Iron-core I.F. transformers, 450-550 kc.
1—"C-One-Ten" cabinet, with panel and sub-base
1—R-201 R.F. choke, 12 mh.
1—R-100 R.F. choke, 2.5 mh.
1—Set XR-5 coil forms (see text)
2—5-prong isolantite sockets
4—8-prong isolantite sockets
2—UM-35 tuning condensers (35 mmf.)
3—No. 8 grid clips
1—Beat-frequency oscillator transformer, 450-550 kc.
1—M-30 padding condenser (30 mmf. max. capacity)

HAMMARLUND
2—Adjustable padding condensers, 220 mmf. max. capacity
2—Aluminum tube shields

SPRAGUE
6—Paper dielectric tubular condensers, 0.1 mf., 600 volts
2—Mica condensers, 0.006 mf.
2—Mica condensers, 0.0001 mf.
2—Mica condensers, 0.001 mf.
1—Mica condenser, 0.00025 mf.
1—Mica condenser, 0.01 mf.

I.R.C. (Resistors)
1—Fixed resistor, 200,000 ohms, ½ watt
3—Fixed resistors, 50,000 ohms, 1 watt
2—Fixed resistors, 250,000 ohms, 1 watt
1—Fixed resistor, 70,000 ohms, 1 watt

(Volume controls)
1—Volume control, 2,000 ohms, with DPST switch (regeneration)
1—Volume control, 500,000 ohms (audio volume)

BRUSH
1—Pair crystal headphones, or loudspeaker

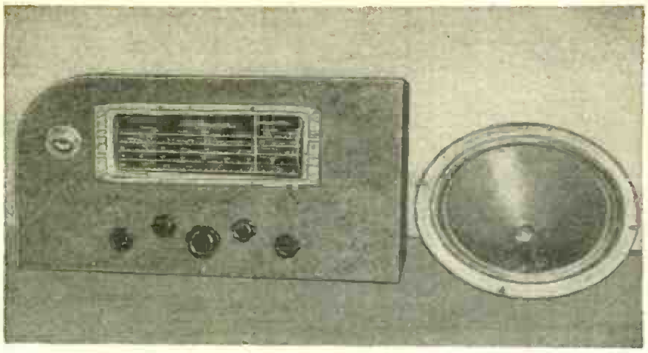
RAYTHEON (Tubes)
1—1A7-G tube
4—1N5-G tubes
1—1A5-G tube

CROWE
4—Pointer knobs

WRIGHT DECOSTER
1—Permanent magnet dynamic speaker with universal transformer

EVEREADY (Batteries)
2—No. 386 "B" batteries
1—4½ volt "C" battery
1—1½ volt dry cell or 1½ volt "A" pack

MISCELLANEOUS
Hook-up wire, solder, machine screws, etc.



Front View of All-Wave 8-tube Super-het receiver.

How to Build

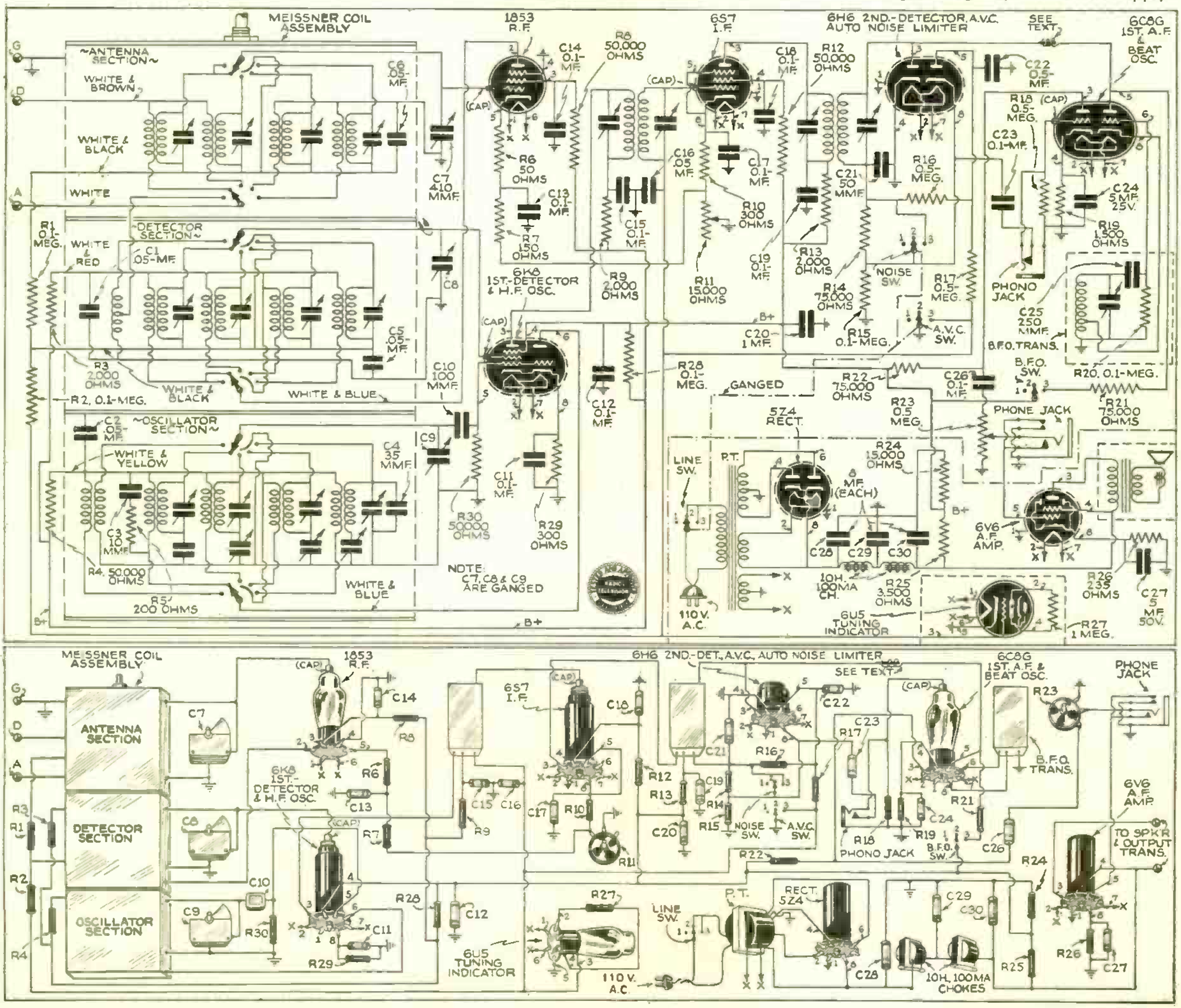
An All-Wave 8-Tube

This unusual 5-band super-het, with range of 7 to 2,306 meters, employing 8 tubes for loud-speaker reception, can be built with 5 tubes for head-phone use. It has band-change switch, beat oscillator, noise-limiter and built-in power-supply.

● MANY Hams and SWL's would like a receiver covering not only the complete *short-wave* spectrum, but the *broadcast* band and the *long* waves as well. A receiver covering such a wide range presents rather impressive difficulties in the coil arrangement. Naturally one must have *coil switching,* but this presents quite a problem in designing the necessary coils and still greater difficulty in getting the coils for each band to "track" properly. Fortunately the problem has been solved by the availability of an efficient multi-wave coil assembly designed by the Meissner company. This coil assembly covers the frequency spectrum between 132 kc. and 42.5 megacycles in five bands. Designed to be used with a 3-gang, 410 mmf. tuning condenser, the coil assembly comes already aligned at the factory so that only slight readjustment is necessary for efficient operation.

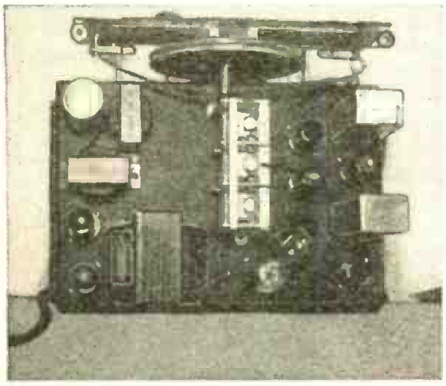
The set built around this coil unit by the writer contains a

Hook-up of 5-band 8-tube receiver: it can be built with 5 tubes for head-phones, eliminating power A.F. stage, "magic-eye", and "B" supply.



Herman Yellin
W2AJL

Receiver



Top view of 8-tube super-het.

total of eight tubes, but the constructor can easily omit the power audio stage, the rectifier and power supply, and the "magic-eye" tuning indicator. Thus if the builder already has a power supply and amplifier, only *five tubes* need be used.

The complete receiver was assembled on a chassis factory-punched with the necessary holes, so that only a few small holes had to be drilled. Construction is thereby greatly facilitated. Incidentally, the large slide-rule type dial should be supported at its ends by a pair of simple brackets which can be obtained with the dial.

For the R.F. stage, the new variable-mu high frequency pentode, the 1853, was employed. Even on the lower frequencies, the increased gain over the standard 6K7 was noted. On the high frequencies, of course, the increase was more marked. Unfortunately, when using such a large value of tuning condenser, the use of an R.F. stage results in an actual loss instead of a gain on the very highest frequency band, so that on this band the R.F. stage is omitted. The sensitivity on this band is still adequate, however. It will be noted that only a portion of the 1853 cathode resistor is bypassed. This is done in order to minimize changes in input capacitance and input conductance with changes in plate current. Also note that the suppressor is connected directly to ground and *not* to the cathode.

Combination 1st Det. & H.F. Oscillator

A 6K8 tube is used as a combination first detector and high-frequency oscillator. This tube is equivalent to a 6L7-6C5 combination and has a much higher conversion efficiency than the old converter tubes. In the single I.F. stage is a 6S7 which is somewhat like a 6K7 except for its higher amplification and lower screen voltage. Its filament current is only 0.15 ampere. Following the 6S7 is a 6H6 which performs a multitude of functions. First, it operates as the second detector; second, it provides AVC; and third,

(Continued on page 743)

This Universal Test Meter

This test meter can be built at nominal cost. It has A.C. and D.C. ranges of 0-10, 50, 250, 1000 and 2500 volts. Current ranges are 1, 10, 50, 250 ma. Three *resistance ranges* are incorporated. Special scale to fit standard meter accompanies this article.

Owing to the fact that a switch quickly converts the meter for the different ranges, tests of many kinds may be made rapidly with this instrument.

● WHILE the necessity for a universal type of test meter is agreed upon by all experimenters, the form which it is to take is a matter of wide disagreement. Practically everyone will agree as to the desirability of having as great a meter sensitivity as practicable. However, the greater the meter sensitivity, the larger the size of the multipliers for a given range and so the higher the cost.

There is one school of technicians that leans toward the use of carbon or metallized resistors as multipliers, thereby greatly reducing the cost. However, carbon resistors tend to undergo changes in resistance with age and also have a tendency to change in value when subjected to overload. Therefore, an instrument which reads accurately when new may become quite inaccurate after being in use for some time. Unless checked with a reliably accurate instrument, the owner will remain blissfully unaware of any errors in his cheap test meter.

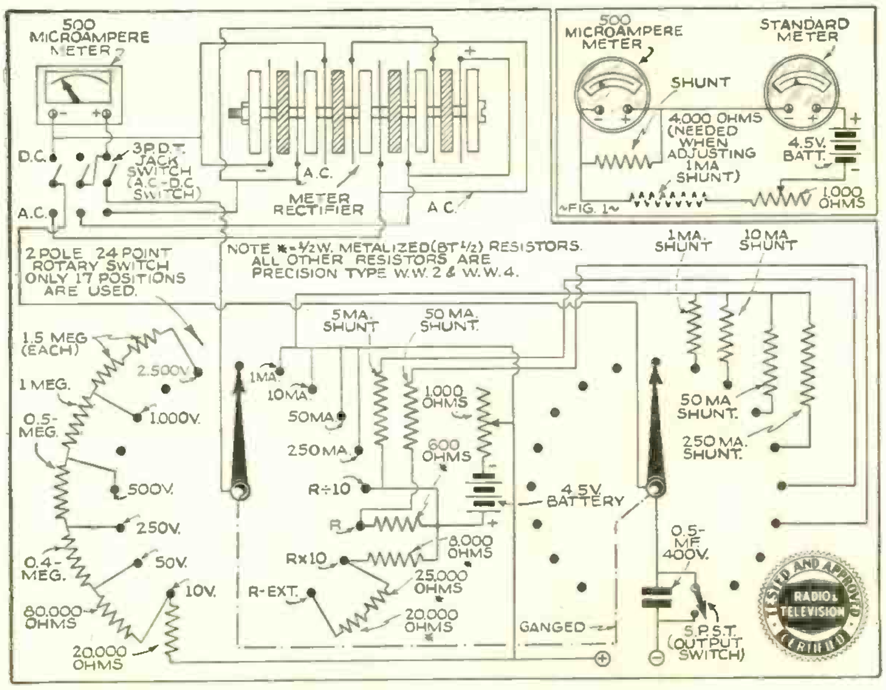
Medium Priced Meter Used

The writer is of the opinion that an instrument having a resistance of 2000 ohms per volt is of sufficient sensitivity for all ordinary purposes, and at the same time will result in multiplier resistor values which are economically feasible.

The universal test meter described herein was built around a 4" Triplett 500 microampere meter. One reason for the choice of the 500 microampere unit was that this was about the lowest current meter which would operate satisfactorily with a meter rectifier for reading voltages. If a meter with a lower maximum current reading were used, it would be necessary to shunt the meter for A.C. and use separate sets of multipliers for direct and alternating current.

Front view of the handsome test meter described in this article.

Wiring diagram for the all-around test meter, which, with its rectifier, permits A.C. and D.C. tests.



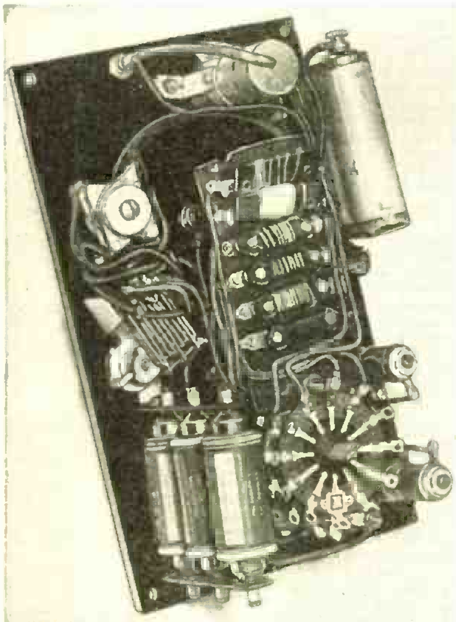
Measures Both A.C. and D.C.

This meter has both A.C. and D.C. ranges of 0 to 10, 50, 250, 1000 and 2500 volts at a sensitivity of 2000 ohms per volt. Current ranges are 1, 10, 50 and 250 milliamperes D.C. Three resistance ranges are incorporated in the instrument using a built-in 4½ volt battery and provision has been made for connecting an external 22½ volt battery for reading very high resistance values. All these values can be read directly from the meter scale.

New Meter Scale Provided

Since no ready-made scale was available, it was necessary to have one drawn especially for this instrument. A full size facsimile is reproduced and can be cut out and pasted over the regular metal scale. When removing the regular metal scale, be extremely careful not to bend the meter pointer. Paste the new scale over the metal scale, being careful not to have any wrinkles in it and replace in the meter. This operation should be performed some place where there are no air currents, as a little dust in the meter movement will cause some stickiness.

Easily and cheaply built by anyone



Rear view of the test meter, showing the resistance units.

The panel size shown in the drawing is about the minimum possible and need not be strictly adhered to. If a cabinet of different dimensions is already available, use a panel to fit it and re-arrange the parts to make a well balanced layout.

Not Necessary to Change Test Leads

As reference to the diagram will show, there are only two tip jacks, obviating the necessity of moving test leads to different jacks when it is desired to change from voltage to current or to output or to ohms. The two small switches under the meter are an A.C.-D.C. three-pole, double-throw jack switch used for connecting in the meter rectifier for reading A.C. voltages and the single-pole, single-throw jack switch which shorts out the built-in .5 mf. condenser used in measuring receiver output voltages. Between these two switches is the *zero ohms adjuster*. Incidentally, the resistors in the ohmmeter circuit are of the ½ watt metallized type, since they are not required to maintain the rated resistance values. The *ohms adjuster* takes care of any deviation from the correct and needed value. The main selector switch is a special Mallory 2-pole, 24-point rotary switch, not all of whose contacts are used, leaving several for any additional ranges to be added at some future time.

Reference to the photos will show the method of mounting the various components. The .5 mf. condenser and the 4½ volt battery are fastened down by means of large size fuse clips or Mallory FPM-14

(*Continued on page* 745)

See Pages 752, 758 and 766 for Interesting Subscription Offers!

Question Box

Vertical Antenna

? *Unfortunately, I have moved into a new location where I find it impossible to erect an outside antenna. Can one of the new type vertical antennas be employed?—Larry Hamsley, Hoboken, N. J.*

A. There is no reason why such an antenna cannot be used. In fact, a prominent radio manufacturer has recently brought out a vertical antenna for home use. It consists of a 12-foot vertical rod. Attached to one end are two special insulators and metal straps. The straps are so constructed that they may be easily strapped or clamped around the roof top vent pipe or any similar protrusion. Also it is possible to mount the clamps on the outside of the building.

A single wire connected to the vertical connects it to the radio receiver and lightning arrestor. Connection to the radio receiver is made through a 2000 mmf. condenser in order to isolate any charge picked up by the vertical. At the same time it allows radio frequencies to pass freely to the receiver. The arrestor and coupler are shown.

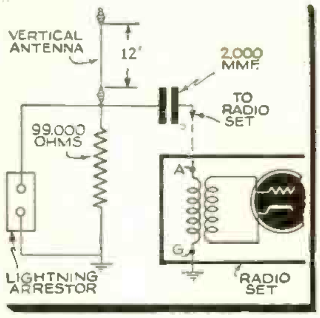


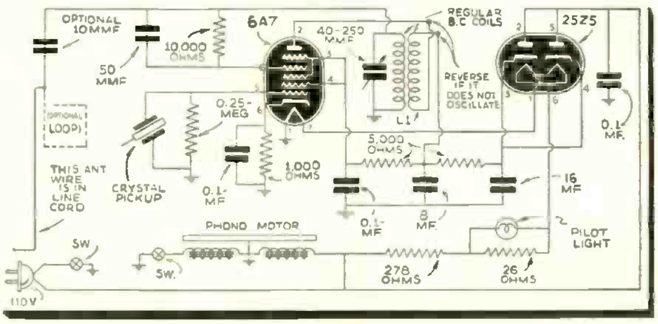
Diagram for Vertical antenna, No. 1174.

The 99,000 ohm resistor acts as a leak for any static charge which might build up on the antenna and lead-in. The value of the resistance is sufficiently high so as not to affect signals picked up by the antenna proper. A gap-type arrestor connected across the resistor discharges the antenna on large static charges to ground.

Remote Record Player

? *Is it possible for you to print a diagram for a remote record player? This player should have a crystal pickup and at least one tube as amplifier.—Harold Morgan, Saginaw, Michigan.*

A. A schematic of such a player unit is shown here. A crystal pickup feeds its audio output into the Number 1 grid of a 6A7. Grid Number 2 has a positive voltage applied to it through a 5000 ohm resistor. The remaining elements are so arranged as to become an oscillator, operating in the range from 540 to 740 kc. The coils L1 are used to determine the frequency of oscillation, tuning being accomplished by a 40-250 mmf. trimmer. Contained



Hook-up for remote "record player", No. 1175.

in the line cord is a length of wire which extends from the cord a few inches from the plug end. The other end of the wire is coupled to the grid of the oscillator circuit through a 10 mmf. condenser. This wire serves to radiate energy generated by the oscillator.

A 25Z5 is used to supply power to the 6A7. The rectified voltage is capacity-resistor filtered. The phono-motor is shown at the lower left.

To operate the unit, tune any receiver to 540 kc. With the unit in operation, carefully adjust the 40-250 mmf. condenser until the record being played is heard through the receiver. This adjustment should be made carefully so that the oscillator is exactly in tune with the receiver. In cases where the receiver cannot tune to 540 kc., any other clear channel up to 740 kc. may be used.

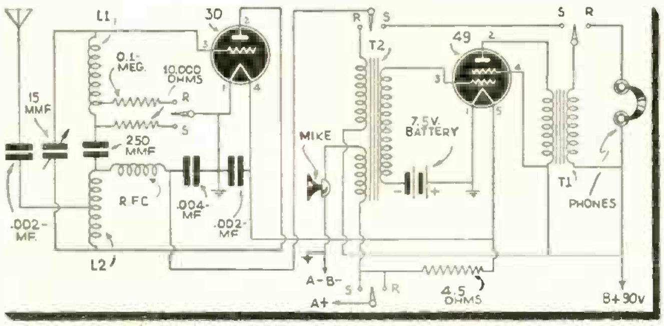
Where sufficient signal is not received at the receiver, due to undue static or stormy weather, couple an insulated wire from the set antenna post to the free lead on the record player line cord. Do not make positive contact with this line cord wire, merely twist the two insulated leads together.

2 1-2 Meter Transceiver

? *Will you please publish a diagram of a 2½ meter transceiver, one using the two volt type tubes namely, a 30 and a 49. The transceiver should be for battery operation and should show all the necessary parts needed.—Walter Maaken, Winnipeg, Manitoba, Canada.*

A. Here is a diagram of a 2½ meter transceiver. It can be built into a compact carrying case. Miniature dry batteries can be used and in spite of their small size they should give approximately 8 hours continuous service. A 4-pole double-throw anti-capacity switch changes the circuit from SEND to RECEIVE.

Two-volt type tubes are used: a type 30 and a 49. The circuit diagram shows the values of the parts needed. From the circuit diagram it is seen that the 30 type tube is used as a super-regenerative detector in the receiving position or as a modulated



Transceiver for 2.5 meter communication, No. 1176.

oscillator in the transmitting position. The 49 tube serves as a tetrode audio amplifier for receiving and a modulator tube for transmitting purposes. Transformer T1 serves as a modulation transformer for transmitting and an output transformer for receiving. The R.F. choke is the 2½ meter conventional type. The tuning coils needed are L1 and L2. L1 consists of 4 turns of number 12 wire tapped at turn 1. L2 consists of 4 turns number 12 wire and tapped at the center.

Veri Cards

? *How does one go about getting "veri" cards from foreign stations?—L. J. Hanos, Brooklyn, N. Y.*

A. Merely make a note of the time, date and character of the program received. This, together with an International Postal Reply coupon should be sent to the station, together with a request for verification.

Response Range of Hi-Fi Set

? *Can you inform one of your ardent readers what is the response range of a so-called* high-fidelity *receiver?—M. K. Laboting, St. Louis, Mo.*

A. A high-fidelity radio receiver should be capable of reproducing frequencies from about 30 to 8000 cycles or higher. The RMA defines such a receiver as one that has a frequency range of from 50 to 7500 kilocycles, with not more than 5% harmonic distortion.

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.

New HAM Licenses

COMPILED FROM THE LATEST RECORDS OF THE FEDERAL COMMUNICATIONS COMMISSION

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

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

This list contains 85 names of newly licensed amateurs. YLs' names appear in blackface type.

K7FAK Victor B. Ross, Coliseum Apts., Apt. M, Juneau, Alaska.
W1LSC Leonard Rubin, 16 Almont St., Malden, Mass.
W1LSD Wm. A. True, 97 Myrtle St., Waltham, Mass.
W1LSE Harvey J. Jacobson, 35 Homestead St., Roxbury, Mass.
W1LSF Joseph W. Sheehan, 436 Sea St., Quincy, Mass.
W2BEC John A. Friel, 134-03 95th Ave., Richmond Hill, L. I., N. Y.
W2LUC Wm. Weingart, 201 Allen St., New York, N. Y.
W2LUD Gideon Van W. Stivers, West Main St., Riverhead, N. Y.
W2LTW Sylvester Montecuollo, 97 St. Pauls Ave., Jersey City, N. J.
W3HWX Howard M. Shade, 7 Russell Rd., Alexandria, Va.
W3HWY Calder C. Murlatt, Jr., 2008 Swatara, Harrisburg, Pa.
W3HXA Norman Tuip, 7025 Clinton Rd., Upper Darby, Pa.
W3HXB Joseph H. Snyder, Elm Ave., East Millstone, N. J.
W3HXE George E. Schellhas, 726 Grantley St., Baltimore, Md.
W4ACO Robert Van Sleen, 221 S. Marietta St., Gastonia, N. C.
W4FUB Jones C. Tipton, 809 Lamar Ave., Charlotte, N. C.
W4FUD John H. Turner, 254 Church St., Macon, Ga.
W4FUE George Wentz, R.F.D. No. 3, Hickory, N. C.
W4SY Samuel Sayler, 10 S. 3rd St., Fernandina, Fla.
W5HPO Earl E. Ordway, Unit 3, Sec. 8, U.S.N.R. c/o Nat'l Guard Armory, Ardmore, Okla.
W5HPQ Walter M. Mayer, 2106 Frio City Rd., San Antonio, Texas.
W5HPS Clarence Scott, 131 S. St. Patrick St., New Orleans, La.
W5HQA Clarence Traylor, Kemah, Texas.
W6EJD Kenneth M. Curtis, 27-13th St., National City, Calif.
W6GKR Clifford L. Johnson, Oakland Way, Emerald Lake, near Redwood City, Calif.
W6LYL Jay D. B. Lattin, Signal Corps Unit, New Men's Gym, Univ. of Calif., Berkeley, Calif.
W6QQM Walter Nestler, 2055 Del Mar Ave., San Marino, Calif.
W6QQN Stanley C. Hall, Trustee, Mission Radio Club, 1394 Villa St., Mountain View, Calif.
W6QQP Hubert Woods, 2625 Carlton Place, Riverside, Calif.
W6QQQ Edwin S. Reiten, 1947 W. 43rd St., Los Angeles, Calif.
W6QQR Leonard F. Melsha, 8416 San Carlos, South Gate, Calif.
W6QQX Rexford R. Haslam, 1071 N. Angeleno Ave., Burbank, Calif.
W6QQY Charles W. Worman, 140 N. Louise St., Glendale, Calif.
W6QUA William Sharp, 731 S. Chapel St., Alhambra, Calif.
W6QUB Robert Ullery, Rt. 1, Neal Rd., Paradise, Calif.
W6QUC Francis D. Wells, 340 Hayes St., San Francisco, Calif.
W6QUE Lon M. Hildebrand, 682 N. Central Ave., Stockton, Calif.
W6QUF LeRoy W. Jillson, 811 East F St., Colton, Calif.
W6QUG Richard E. Fricks, 4534 Idaho St., San Diego, Calif.
W6QUT* Freeman F. Gosden, 900 N. Alpine Dr., Beverly Hills, Calif.
W7AAQ Jack W. Worley, 5616 N. Wall St., Spokane, Wash.
W7HS Oscar A. Schwartz, S. 3010 Lamont, Spokane, Wash.
W8IPO Joe H. Van Wie, 5534 Marlborough, Detroit, Mich.
W8JZH John F. O'Shea, 1057 Albert, Toledo, Ohio.
W8SRL George M. Hudimar, 1597 Hopkins Ave., Lakewood, Ohio.
W8SSE Ernest Oney, 617 Herrick Ave., Wellington, Ohio.
W8SSM John E. Kimar, 2060 W. 41, Cleveland, Ohio.
W8SSN Stephen A. Hoynos, 848 Dana St., Warren, Ohio.
W8SSP George Reinhart, 210 Main St., Stroudsburg, Pa.
W8SSQ James B. Sackrider, 529 Clark Ave., Owosso, Mich.
W8SSR Gregory W. Sawmiller, 121 E. Corning Ave., Syracuse, N. Y.
W8SSS John J. Schueler, 32 Worcester Pl., Buffalo, N. Y.
W8SST Thaddeus F. Dudek, 6722 Fullerton, Cleveland, Ohio.
W8SSU Russell E. Geiger, R.F.D. No. 4, Youngstown, Ohio.
W8SSW Ralph L. Archbold, 1195 E. 146th St., Cleveland, Ohio.
W8SSX George Weinrich, 306 W. McClellan, Flint, Mich.
W8SSY Corby Stone, 518 Rawlins St., Port Huron, Mich.
W8SSZ Kenneth Huggett, 22 Reading Ave., Hillsdale, Mich.
W8STA Herbert F. Keith, Wanakena, N. Y.
W8STB Ralph F. Studt, 4927 Dearborn St., Pittsburgh, Pa.
W8STC Windsor F. Hemenway, 130 N. Erie, Mercer, Pa.
W9AAP Jesse W. Foster, 6834 Roberts, University City, St. Louis, Mo.
W9BMY James W. Justice, 5803 A Michigan, St. Louis, Mo.
W9EBD Elliot D. Full, 529 Hawthorne Lane, Winnetka, Ill.
W9ESB Homer C. Cutler, 818 S. Marion St., Carbondale, Ill.
W9JPF Charles F. Pippen, 15 W. 12th St., Anderson, Ind.
W9JZH Clifford E. Johnson, 1409 5th Ave., Des Moines, Ia.
W9NOQ Carl M. Leidholdt, Trustee, Chippewa Q.R.R. Club, 10½ Jefferson Ave., Chippewa Falls, Wisc.
W9NPK Anthony T. Maruca, 4827 18th Ave., Kenosha, Wisc.
W9NQU Roland R. Petersen, Iota 9&10, Block 3, Flaxton, N. Dak.
W9NRC Vernon E. Rardin, 212 Lombard Ave., Muscatine, Iowa.
W9NRL H. Louis Robinson, 1306 Waverly Ave., Kansas City, Kans.
W9NVU Robert H. Oberman, 1303 San Pedro, Trinidad, Colo.
W9NWY Clarence Rasmussen, 656 Utica St., Waukegan, Ill.
W9NXB Peter P. Viezbicke, 111 11th St., So., Virginia, Minnesota.
W9OAV Robert Wm. Yeager, 30 N. 3rd. St., Madison, Wisc.
W9OBP Edwin P. Westbrook, N. W. corner 2nd S & Swift Sts., Winnebago, Ill.
W9OBZ Chester D. Walters, 701 Prospect Ave., Wausau, Wisc.
W9OCF Cyril Strehlon, 499 Grotto, St. Paul, Minn.
W9ODC Robert J. Spellman, 2586 Crown Point, Omaha, Nebr.
W9ODM Bennett L. Jackson, C.C.C. Co. 3541 Camp S.C.S. 5, Walton, Ky.
W9OEZ George Zurian, 13641 Chatham St., Blue Island, Ill.
W9OGR Clifford F. Susag, 415 7th Ave., East Alexandria, Minn.
W9OPX **Helen M. Kolar, 59th & Marion, R.F.D. No. 2, Downers Grove, Ill.**
W9OQZ Wm. C. Haggard, Jr., 1605 Joesting, Alton, Ill.

* Freeman Gosden (W6QUT) is known to millions of radio listeners as the "Amos" of "Amos 'n' Andy".

CORRECTION NOTICE

The call of F. V. Frost, 4548 47th Ave., Seattle, Wash., was incorrectly given as W7HCO in the March issue of R & T. Mr. Frost's call should have been listed as W7HCU.

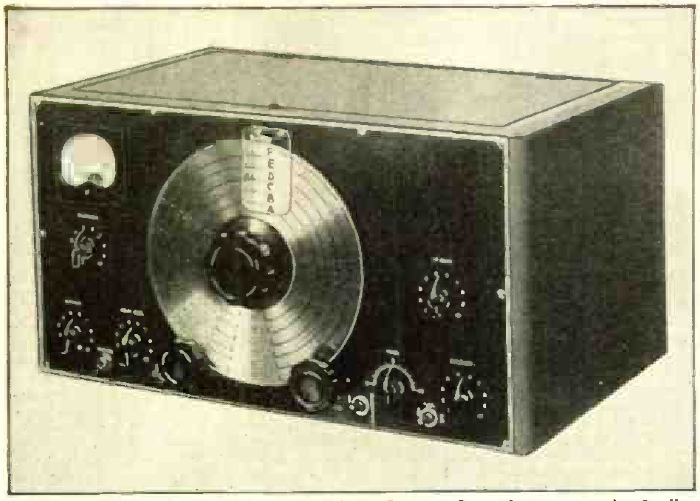


Fig. 1. Panel view of the new Silver Super. Complete control of all functions is provided.

Fig. 2. Top of Chassis. Points to note include attractive layout and geared tuner.

A New Type of COMMUNICATIONS Receiver

McMurdo Silver

Built from standard parts, or wired from a factory-assembled kit, this receiver introduces many new features.

● THIS new communications receiver follows closely the designs prescribed by the A.R.R.L. as the means of providing the maximum of results at a minimum cost. It goes considerably beyond these earlier designs in that it includes a new *noise limiter* which is as effective as it is simple, covers the full range of 5 through 550 meters with sensitivity of about 1 microvolt absolute throughout, has the highest signal-to-noise ratio of any receiver the writer has ever operated, is completely free of "warm-up" drift, is both "portable" (battery operated) and "permanent" (A.C. operated) in the same unit, can be expanded into anti-fading dual-diversity reception at no increase in size, yet can be built to "battleship" ruggedness by even a novice to use from three to eight tubes with maximum complete chassis cost below $50.00. Capable of being built from standard parts, it is also available as a completely assembled 8 tube kit, requiring only a couple of hours to wire and test. It can be aligned and tested without any service gear whatsoever, although a test oscillator (borrowable from, or usable at, any local service shop) makes the task most easy and sure-fire.

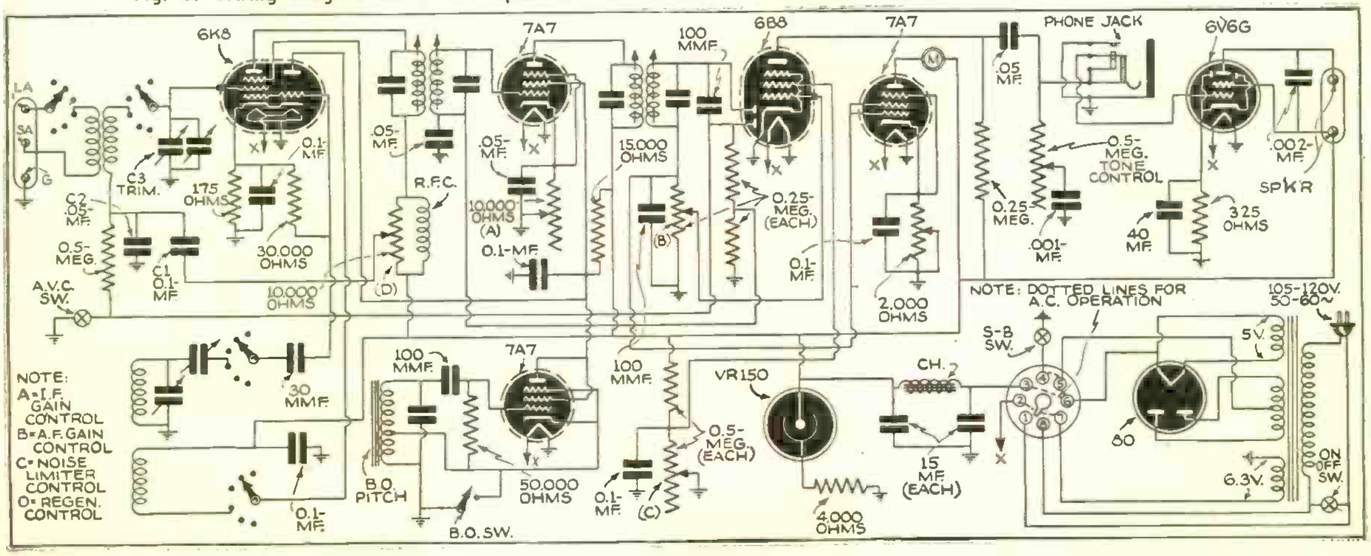
When this receiver also has A.V.C., six low-C tuning bands, uses the newest all-glass "Loctal" tubes, has nearly twenty-two inches of effective dial length per band readable to one part in 5000—which can be stretched to eleven feet per band at slight extra cost—selectivity continuously variable from 12 kc. "high-fidelity" right up to sharper than the 1 kc. necessary to single-signal c.w. reception, 4.25 watts undistorted power output, and appearance and controllability which are outstanding even among very expensive communications receivers, it comes close to being the ideal. Yet this is what numerous Chicago amateurs, young and old, who have tested the new "Silver Super," have found it to be.

Regeneration Put to Work

All of this is made possible through regeneration, amazingly neglected considering its tremendous benefits by factory-built

(Continued on page 749)

Fig. 3. Wiring diagram of Silver Super. It can also be assembled as a "3-tube set", as described herewith.



All-Wave 8-Tube Receiver

(Continued from page 737)

half of the tube acts as an automatic *noise-limiter* of the modified Dickert type. This type of noise limiting is very effective on noise pulses whose amplitude is greater than the desired carrier signal. Two degrees of noise limiting have been made available; one for use in copying CW (telegraph) signals and the other for listening to phone signals. This is switched in automatically when operating the combination AVC-BFO switch, about which more later.

1 Tube Acts as 1st Audio and B.O.

A 6C8G dual triode is used as a first audio stage and as a *beat oscillator* to enable the listener to copy CW telegraph signals and to facilitate locating weak DX stations. The BFO transformer comes complete with a built-in grid condenser and resistor. The condenser shown coupling the plate of the BFO half of the 6C8G to the plate of the 6H6 detector is made by merely wrapping about five or six turns of hookup wire around the lead running from the I.F. transformer to the 6H6 plate.

Getting back to the rather unusual method of AVC-BFO switching: a single 4-pole, 3-position rotary switch is used for controlling all the various features of the receiver. the 110 volt A.C., the AVC. BFO, and the degree of noise suppression. As the diagram shows, in position 1 the receiver is disconnected from the 110 volt line; in position 2 the set is connected to the line, AVC is switched in, BFO switched off and the *noise-limiter* adjusted for action on voice signals. In position 3 the AVC is cut off, the BFO turned on and the noise-limiter adjusted for its greater limiting action for use on CW (telegraph) signals.

Head-phone and Phono Jacks Provided

The 15,000 ohm potentiometer simultaneously controls the *gain* of the 1853 and the 6S7 tubes, providing effective control against overloading the detector by any strong "local" signals. A phono jack has been incorporated so that the audio section of the receiver can be used with a phonograph pickup. A half megohm "pot." permits complete variation of audio power. When a pickup is plugged into the phono jack, the R.F. section is automatically disconnected from the audio. Another jack located on the rear of the chassis permits the listener to use headphones. The 6V6 audio power tube is automatically disconnected when listening-in with phones.

The I.F. transformers are of a rather unconventional type. Instead of the trimmer condensers being adjustable, the transformers have fixed condensers and *adjustable inductance* coils. This is an extremely valuable feature for the ordinary type of adjustable mica trimmer varies in capacity with temperature, humidity and vibration. By varying the position of the Polyiron cores in the coils. the inductance is adjusted to the proper value and, once set, the I.F.'s will remain permanently aligned.

Switch Coil Assembly

All the R.F. coils, mounted on a six gang, 5-band switch. are adjusted to exactly the proper value of inductance at the factory and the trimmer condensers are adjusted for correct "tracking" in the receiver. However, a little readjustment will be necessary in the individual receiver. Although complete coil information is given in the chart, it is inadvisable for the constructor to attempt to make these coils himself, because of the great difficulty in getting the coils for each band to have the proper inductance to "track" properly. So the purchase of the complete coil assembly is strongly advised. Incidentally, the small variable trimmer condensers shown in the diagram across each coil are of 12 mmf. maximum value. Between the antenna and R.F. sections and between the R.F. and oscillator coil sections a metal shield is placed.

Aligning the Receiver

Lining-up the receiver is not particularly difficult, even without a signal generator. First. the two I.F. transformers must be aligned to 456 kc. Without touching any of the trimmers on the R.F. coil assembly, tune in a station emitting a signal of approximately constant amplitude; an aviation

(Continued on following page)

COIL CHART

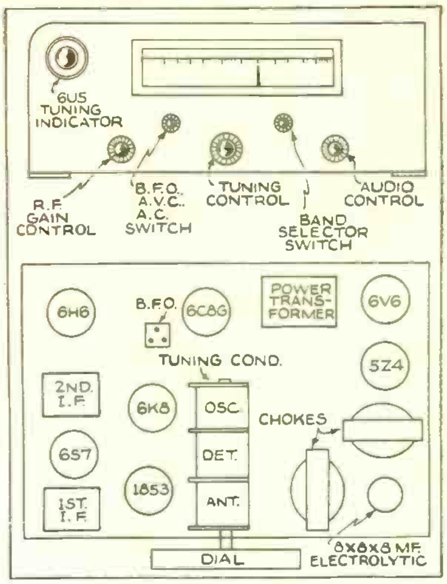
Band	*Antenna*	*Detector*	*Oscillator*
13.5-42.5 mc. (22.2 to 7 meters)	None	3½ t. No. 14 spaced to ½" length on ½" dia. (air wound) t=turns	grid coil 3½ t. No. 14 spaced to 7/16" plate coil 4 turns No. 36 SSE interwound with grid coil coils ½" dia.
5.85-18.2 mc. (51 to 16.4 meters)	prim. 3½ t. No. 36 DSC interwound at ground end of sec. secondary 10⅝ turns No. 18 spaced ¾" ¾" diam. form.	sec. 10⅝ t. No. 18 spaced to ⅝" prim. 7½ t. No. 36 DSC interwound at ground end of secondary ¾" dia. form	grid coil 10¾ t. No. 18 spaced to ¾" plate coil 6 turns No. 36 DSC at grid end of grid coil
1.74-6.45 mc. (172 to 46.48 meters)	prim. 10½ t. No. 36 SSE sec. 34½ t. No. 28 both coils close wound and separated by ⅛" wound on ¾" dia.	prim. 15½ t. No. 36 SSE sec. 34½ t. No. 28 enamel ¾" dia. form	grid coil 30½ t. No. 28 enamel plate coil 10½ t. No. 36 SSE. both close wound ¾" dia. form
530-1800 kc. (565 to 166.6 meters)	prim. 254t No. 38 SSE sec. 91 t. 3 5/44 SSE universal wound on ¾" dia. form	prim. 528 t. No. 38 SSE sec. 93 t. No. 3 5/44 SSE coils spaced 3/16" wound on ¾" dia. form	grid 62 t. No. 32 SSE 3/32" wide plate 30 t. No. 32 SSE 3/32" wide both coils close together universal wound on ¾" dia.
132-405 kc. (2306 to 740 meters)	sec. 492 t. No. 3-41 SSE prim. 715 t. No. 38 SSE each coil ¼" wide wound on ½" dia form universal wound	prim. 1305 t. No. 38 SSE 3/16" wide sec. 492 t. No. 3-41 SSE ¼" wide coils spaced 5/16" apart universal wound on ½" dia.	grid 217 t. No. 32 SSE 3/16" wide plate 69 t. No. 32 SSE 3/16" wide coils close together universal wound on ½" dia.

NOTE: No. 3-41 SSE and 3 5/44 SSE wire is Litz (stranded) wire.

All-Wave 8-Tube Receiver

(Continued from preceding page)

beacon station is ideal. Then merely adjust the I.F. coils until the signal is at a maximum. To line up the front-end of the set, start with the lowest frequency band. Tune in a signal at the high frequency end of the band, preferably a signal of known frequency, and adjust the oscillator alignaire (trimmer) so that the frequency of the signal corresponds to the frequency printed on the dial scale. Adjust the antenna and detector coil trimmers for maximum response. Then tune in a signal at the low frequency end of the band and adjust the oscillator padding condenser while rocking the tuning condenser to obtain maximum response. The oscillator padder is the condenser in series with each oscillator coil. The above procedure should be repeated for each band. On the highest frequency band there are no aligning or padding condensers, the coils being adjusted by spacing the end turn to give the desired amount of inductance for *tracking*.



Layout of panel and sub-base.

Parts List

INTERNATIONAL RESISTANCE CO.
1—15,000 ohm potentiometer, type 14-118
1—500,000 ohm potentiometer, type 11-133
3—500,000 ohm, ½ watt BT½
5—100,000 ohm, ½ watt BT½
3—75,000 ohm, ½ watt BT½
4—50,000 ohm, ½ watt BT½
3—2,000 ohm, ½ watt BT½
1—1,500 ohm, ½ watt BT½
1—235 ohm, 10 watt type AB
1—3,500 ohms, 20 watts
1—15,000 ohm, 20 watts
2—300 ohm, ½ watt BT½
1—150 ohm, ½ watt BT½
1—50 ohm, ½ watt BT½

RCA RADIOTRONS
1—1853
1—6K8
1—6S7
1—6H6
1—6C8G
1—6V6
1—5Z4
1—6U5

SPRAGUE PRODUCTS COMPANY
10—.1 mf. 600 volt paper condensers type TC-1
1—.05 mf. 600 volt TC-15
1—.5 mf. 600 volt TC-5
1—8 x 8 x 8 mf. electrolytic PLS-888
1—5 mf. 50 volt electrolytic TA-55
1—5 mf. 25 volt electrolytic HC-5
1—1 mf. 450 volt electrolytic RE-1
1—.0001 mf. mica 1FM-31
1—.00005 mf. mica 1FM-45

MEISSNER COMPANY
1—All-wave coil assembly 13-7600
1—3 gang tuning condenser 410 mmf. No. 21-5141B
1—9" Slide-Rule dial with brackets No. 23-8206
1—Standard chassis No. 11-8226
1—Panel No. 11-8221
1—Cabinet No. 11-8221
4—Ceramic octal sockets No. 25-8437
3—Bakelite octal sockets No. 25-8209
4—1⅛" knobs No. 25-8224
1—1⅝" knob No. 25-8225
1—Magic eye socket assembly No. 19285

ALADDIN RADIO INDUSTRIES
1—465 kc. I.F. transformer type P-101
1—465 kc. I.F. transformer type P-200
1—BFO transformer, 465 kc. type C-350

CINAUDAGRAPH CORPORATION
1—10" P.M. speaker type NZ10-10 (with 5000 ohm output transformer)

P. R. MALLORY
1—4-pole, 3-position rotary switch shorting type No. 3143J
1—2 circuit midget jack type A-2A
1—2 circuit jack type No. 15

JEFFERSON TRANSFORMER CO.
1—350-350 volt transformer No. 463-431
2—10 henry 100 ma. chokes No. 466-410

I COVER THE PACIFIC COAST!

This column has been added as a new service to readers of RADIO & TELEVISION. Cooperation of Pacific coast listeners and any reports of reception will be greatly appreciated. Please address any reports or other correspondence to Lyle M. Nelson, RADIO & TELEVISION, 99 Hudson Street, New York, N. Y.

(All time is Pacific Standard)

● INCREASED activity among short-wave stations in the far East has been reported from all parts of the Pacific Coast during the last few months. Stations in Asia and Oceania have always, particularly during this time of the year, occupied the major part of Pacific Coast DXing.

A New Zealand station has been reported testing on 6.95 mc. by many listeners. According to these reports the call letters are ZL2ZB and the address is announced as: Hope Gibbons Building, Dixon Street, Wellington, C1, New Zealand. The station is heard in the early morning hours with best reception near 3 a.m.

According to W. T. Choppen of Timaru, New Zealand, new transmitters to be installed at Wellington will be ZLT1 on 6.085 mc., ZLT2 on 9.54 mc., ZLT3 on 11.78 mc., ZLT4 on 15.28 mc., ZLT5 on 17.77 mc., and ZLT6 on 25.91 mc.

The mysterious Chinese station on 11.40 has finally been identified as XGRV of Chungking. This popular broadcaster is very well received every morning from 4 to 4:30 and sometimes later.

Two other new Chinese stations to appear on the air during the last month are XGXA on 6.98 mc. and XGXB (possibly XGXG) on 7.02 mc. Both stations come through to the Pacific Coast with good volume. XGXA is on the air from 6 to 7:20 a.m. daily. Occasionally it has been reported as early as 4 a.m. XGXB (or G), although heard very well, is rather irregular in schedule. It can usually be picked up in the mornings from 5 to 7.

Portable transmitters located somewhere in the jungles of Belgian Congo and New Guinea have been reported on the 20 meter amateur band during the mornings and late evenings by George Goehring of Oakland, California.

A new station in Siam has been putting a fair signal through to the coast. The station works on 6.11 mc. from 5:10 to 7 a.m. on Wednesday. It has also been reported broadcasting irregularly on other weekdays. According to word from Siam the call of HS8PJ has been changed to HS6PJ.

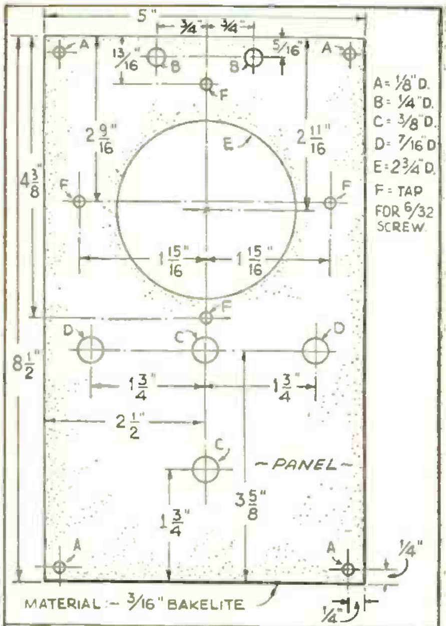
Application has been made by "Radio Burma" of Rangoon for permission to use the call letters XYZ and XZZ on 6.012 and 3.79 mcs., according to John Cavanaugh of Oregon City. The latest schedule for "Radio Burma" is from 2:45 to 5:30 a.m. and from 5:30 to 7 p.m. with best reception during the morning broadcast, he reports.

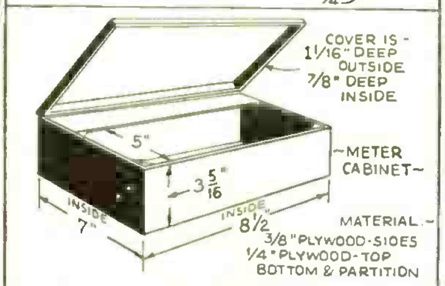
Station RV15 of Khabarovsk, U.S.S.R., is back on 4.27 mcs. after various reports had placed it on 6.05 and 6.82 mcs. Latest developments seem to indicate that the stations heard on the latter frequencies were new stations and not RV15 as believed.

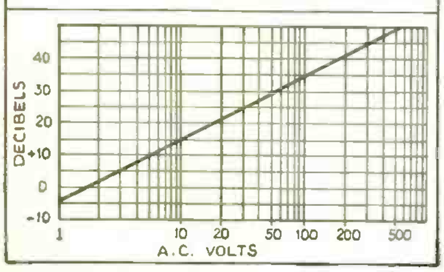
ROUND 'N' ABOUT—from listeners' reports. VPD of Suva has added a number of new frequencies. It can now operate on 15.16, 11.89 and 6.13 mcs. with a power up to 10,000 watts. . . . "Radio Hanoi" is using additional frequency of 11.91 mc. from 10 p.m. to 4 a.m. Station still very weak on 9.51 mc. . . . New station TAQ of Ankara, Turkey, coming through weakly on 15.20 mc. from 2:30 to 4 p.m. . . . New TAP on 9.465 also reported on the air during afternoons. . . . Prague is now on 11.84 mc. from 4 p.m. to 6:15 with good volume. . . . New Spanish Loyalist station "Radio Norte," EA4RM, on 9.49 after 6 p.m. with weak signal on coast. ZBW on 9.53 mc. is still very well received from 5 to 7 a.m. . . . PCJ coming through very well on 9.59 mc. during evenings.

This Universal Test Meter

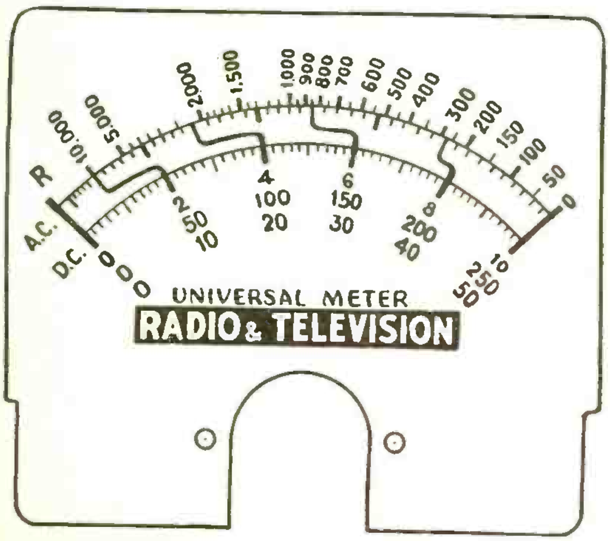
(Continued from page 739)







Above—Chassis and cabinet details. Below—Full size template for meter dial: cut this one out for your meter or copy it.



mounting clips. The battery can thus be readily replaced. The holes in the panel for fastening the meter should preferably be tapped for 6/32 screws—this will greatly facilitate mounting the meter.

Shunts May Be Home-made

The shunts used for the four current ranges and the two low ohm ranges can be purchased ready made, or easily made by the experimenter, if one has access to another milliammeter of the necessary range. Shunts can be made from the resistance wire procured from old rheostats or from regular No. 24 or No. 28 resistance wire. Fig. 1 shows the method of hooking up the standard meter in series with our 500 microampere meter, which is to be shunted with the home-made shunt. These two meters must be hooked up in series with a battery (the 4½ volt battery will do) and a variable current-limiting resistor. The 1000 ohm zero adjuster can be used for the low current ranges; for the 100 ma. and 250 ma. ranges a 100 ohm variable resistor should be used. Adjust the length of wire used for the shunt until the 500 microampere meter reads the same amount of current as the standard meter. Always use the maximum amount of series resistor until the shunt has assumed its approximate final resistance value.

To measure A.C. or D.C. voltages, turn the A.C.-D.C. switch to either A.C. or D.C. and rotate the selector switch to the desired range. **If in doubt** as to the magnitude of voltage, **play safe** and use the **highest** range! With the A.C.-D.C. switch in the D.C. position, current can be measured by rotating the selector switch to the required range.

TO MEASURE OHMS, have the A.C.-D.C. switch on D.C. and rotate the selector switch to one of the resistance ranges. For measuring very high values turn the selector switch to R-ext. and connect a 22½ volt battery in series with the test leads. Scale readings should be multiplied by 60 since the meter scale reads 900 ohms at the center of scale. When the switch is turned to the position "R ÷ 10," merely divide the scale readings by 10 and similarly when using the "R x 10" range, multiply the scale readings by 10. For each range, the ohms adjuster rheostat should be adjusted so that with the two test prods shorted together, the meter will read zero ohms. On the R ÷ 10 range, this adjustment is somewhat critical and care should be taken not to turn the rheostat to its zero resistance position. If it is expected to use the external battery quite frequently, it might be advisable to include as part of the 45,000 ohm resistor a 10,000 ohm variable rheostat to serve as a more effective zero adjuster for this high resistance range. Parenthetically, it might be mentioned that the 45,000 ohm resistor consists of a 20,000 and a 25,000 ohm resistors in series.

OUTPUT—Since the output of a radio receiver consists of an alternating voltage, and since fre-

(Cont. on following page)

This Universal Test Meter

(Continued from preceding page)

quently the point at which this voltage is measured also contains direct current, it is necessary to use a .5 mf. condenser to block out the D.C. component. The SPST jack switch shorts out this condenser for all measurements except for *output* measurements.

DECIBELS—It is not generally known that a decibel meter is merely an A.C. voltmeter. A chart has been prepared which can be fastened inside the meter case cover and which gives the number of decibels corresponding to the A.C. voltage measured across a 500 ohm line. For measurements across any other impedance line use the following formula:—

$$DB. = 10 \log \frac{E^2}{.006\ R}$$

E=Measured A.C. voltage

R=Line impedance

$$\text{Also WATTS} = \frac{E^2}{R}$$

Parts List

INTERNATIONAL RESISTANCE CO.

1 each—20,000, 80,000, 400,000, 500,000 ohms—type WW-4
1—1 meg., type WW-2
2—1.5 meg., type WW-2
1 each—600 ohms, 8000 ohms, 20,000 ohms, 25,000 ohms, ½ watt, type BT-½

TRIPLETT ELECTRICAL INSTRUMENT CO.

1—500 microampere 4" meter, type 421
1 each following shunts—1 ma., 5 ma., 10 ma., 250 ma.
2—50 ma. shunts
1—Full-wave meter rectifier, type C-4

P. R. MALLORY & COMPANY

1—1000 ohm potentiometer, type C1MP
1—Special 2-pole, 24-point tap switch No. 13124
1—S.P.S.T. jack switch, type No. 10
1—3-pole, 2-throw jack switch, type 763
1—Pair (1 black and 1 red) insulated tip jacks, type No. 523

CUSTOM AUTO TRUNK CO.

1—Special meter cabinet

MISCELLANEOUS

1—5" x 8½" bakelite panel
1—4.5 volt battery
(Engraving optional). Lines can be scratched in bakelite and filled with China white.

More About Frequency Modulation

(Continued from page 721)

conditions, frequency modulation is the only system which is worthy of consideration."

Some of the critics of the new Armstrong modulation system have stated that ordinary transmission by amplitude modulation on the ultra short waves is so static and noise-free that it compares favorably with the Armstrong method, but in a recent letter to the *New York Times*, Major Armstrong challenges his critics to state (or to demonstrate) how they can produce the static and noise-free transmission with their system comparable to that obtained by his frequency modulation method.

Through the courtesy of the General Electric Company, we present herewith the wiring diagram and receiving antenna data on the new 12-tube frequency modulation receiver.

(Experimenters might try connecting a high frequency T.R.F. or other type R.F. receiving unit ahead of the second detector, instead of the superhet line-up shown in the standard diagram, incorporating of course the demodulator tube shown in the present diagram. In any event, it is highly important that the various stages be properly "lined up" with an oscillograph, if possible, as otherwise there is likely to be quite an amount of distortion.—Editor.)

The Model GM-125 receiver is a de luxe instrument designed solely for the purpose of receiving and reproducing programs transmitted by the *frequency modulation* system. By special electrical and acoustic treatment, this receiver will reproduce program material with the exceptionally realistic fidelity that is characteristic of this method of transmission and reception.

Antenna and Ground

Since this receiver operates at a relatively high radio frequency, it is very essential to construct a good antenna and ground system in order to obtain maximum results.

For distances up to within thirty miles from the transmitter, a simple horizontal di-pole as shown in Fig. 1 should give excellent results. It should be located free from all obstructions and placed as high from the earth as possible. Make sure it is run approximately at *right-angles* to the direction of the transmitter; i.e., if the transmitter is located due west, run the horizontal doublet in a north and south direction. The horizontal flat top has an effective antenna length of 10 feet 8 inches and consists of No. 12 or No. 14 bare copper wire (preferably stranded), cut in the middle and the two halves insulated by glass insulators. A twisted lead-in wire is then soldered to each side of the doublet as shown, and the other two ends of the transmission line are connected to the No. 1 and No. 2 terminals on the receiver chassis. The lead-in transmission line may be of any length up to 100 feet and should consist of low loss antenna lead-in wire. A good ground connection to a water pipe is connected to the terminal marked "G."

Somewhat better results may be obtained by constructing the antenna shown in Fig. 2. This varies somewhat from the di-pole antenna and is more efficient due to the fact that the transmission line has very little loss.

The antenna proper consists of a 10 foot 8 inch length of 1 inch diameter copper pipe supported at the middle by a pole lo-

Tube Voltage Table

Tube	*Application*	*Plate to Gnd Volts*	*Screen to Gnd Volts*	*Cathode to Gnd Volts*	*Cathode Cur. MA*	*Filament Volts*
6SK7	RF	240	90	0	7.5	6.4
6K8	Conv.	238	90	0	8.0	6.4
	Osc.	188				
6SK7	1st IF	238	90	0	8.1	6.4
6SK7	2nd IF	230	83	0	6.1	6.4
6SK7	3rd IF	225	83	2.9	6.1	6.4
6SJ7	4th IF	65	65	0	7.2	6.4
6Q7G	1st Audio	65	—	0	—	6.4
6J5G	Inverter	48	—	1.7	2.0	6.4
(2) 6L6G	Output	267	285	21	112	6.4
5U4G	Rectifier	350/350 V. A.C. RMS	—	—	180	50

Line Voltage—120

No signal input

cated as high above the ground as possible. The transmission line is made up of two No. 12 or No. 14 copper wires, spaced about 2 inches apart and transposed every two or three feet. The antenna end of the transmission line is soldered 13½ inches each side of the center of the copper pipe and should form a triangle, 27 inches on all sides. As in the previous installation, the horizontal flat-top should run approximately at right-angles to the direction of the transmitter.

For greater distances, somewhat better results may be obtained by using a reflector in conjunction with the antenna described and shown in Fig. 2. A suggested system is to use a 1-inch diameter copper pipe similar to the antenna, running parallel to the regular antenna and located farthest from the direction of the received signal. Fig. 3 shows a diagram looking from top and dimensions should be followed very carefully. By experimenting, however, with the distance between reflector and antenna, improvement in the individual installation may be noted.

Note—The reflector is a *floating* copper bar and there are no external connections. Connect and install the regular antenna as shown in Fig. 2.

Operation

The receiver has three operating controls, as follows:

Volume Control and Power Switch.

The control marked volume (left-hand control) also actuates the power switch for the receiver. When the control is in the extreme counterclockwise position, the receiver power is off. From this position, slight rotation in the clockwise direction will turn the receiver on and the volume will be at a minimum setting. Further clockwise rotation will increase volume until full output is attained.

Tone Control

This control (right-hand control) is continuously variable from bass to full-range to treble. The proper setting depends largely upon the tone most pleasing to the listener and upon the type of program being received.

Tuning Control

The tuning control is the large drum located above the volume and tone control knobs. To tune the receiver merely rotate the drum dial with the thumb. The scale is calibrated in megacycles so as to approximately locate the desired station.

When a station is located, a final adjustment is made by leaving the drum dial set at the point of minimum noise background. This point of exact tune is very important as it is only when the receiver is tuned to the position that the full, rich tones are available.

Circuit Alignment
I.F. Amplifier

Due to the good stability of components and the wide band characteristics of this amplifier, alignment should be unnecessary under normal operating conditions. Should it become imperative that an I.F. alignment is desirable, it will be necessary to use a cathode ray oscilloscope in conjunction with a 3.0 megacycle signal generator with a superimposed ± 300 kc. sweep frequency. This generator may be built up by constructing an oscillator with the tank condenser semi-fixed and variable, the variable portion being designed to be rotated by a motor and of proper capacity to give ± 300 kc. variation of the 3.0 megacycle mid-frequency. Connect the vertical plates of the oscilloscope across the resistor R-15 of the 4th I.F. stage and align transformers T-7, T-6, T-5 and T-4 in a progressive step by step method.

Frequency Demodulator

With the same oscillator and sweep signal as used above, connect the vertical oscilloscope plates across the resistors, R-18 and R-19, then align the transformer T-8 for a cross-over curve as shown in Fig. 4. Proper alignment of trimmer C-51 is indicated when the curve crosses about midway in a vertical plane. Proper alignment of C-50 is indicated when the sides of the curve near cross-over are nearest to a straight line.

Note—Keep signal input high enough so that noise limiter is functioning. This point is indicated when an increase in signal input no longer changes the size of the curve.

R.F. Alignment

Make sure the last division on the low frequency end of the drum dial coincides with the escutcheon mark when the gang condenser is completely closed; then, proceed as follows:

1. Connect a high resistance 0-10 V. D.C. voltmeter across R-15.
2. Apply a 42.8 megacycle unmodulated signal to the antenna terminal board.
3. Set dial scale so it is tuned to 42.8 megacycle and peak oscillator trimmer C-4 for maximum voltage reading on the meter.
4. Peak the antenna (C-2) and R.F. (C-3) trimmers for maximum voltage output on meter.

Electrical Specifications

Volts	115-125
Frequency	50/60 Cycles
Watts Consumption	160
Tuning Frequency Range	37-44 mc. 8.1-6.81 meters

Intermediate Frequency

Mid-frequency	3.0 M.C.
Band Width	300 K.C.

Electrical Power Output

Undistorted	12.0 Watts
Maximum	15.0 Watts

The Radio Beginner

(Continued from page 724)

radio sets employing it are known as T.R.F. receivers. The action of such an amplifier is the same as the one already described. Plate current, flowing through the primary of the transformer, by magnetic action causes an alternating voltage to be placed on the grid of the following tube. In this instance, however, the secondary is tuned to resonance at the frequency desired by means of the variable condenser connected across it. Sometimes the primary is also tuned in this fashion. It should be observed in Figure 2 that use was made of *screen grid* tubes, in this way avoiding *feedback* through tube capacities, a situation difficult to overcome with the triodes shown in Figure 1, except through the use of an external *neutralizing* device.

In receivers employing R.F. amplification, the T.R.F. (tuned radio frequency) amplifier has found the widest application, but it should not be thought that the circuits described so far are the only ones in use.

Tuned Impedance R.F. Coupling

In the *tuned impedance coupled* R.F. amplifier, shown in Figure 3, we obtain a *voltage drop* across an impedance and apply the changes in voltage across this impedance to the grid of the next tube through a fixed condenser. The coupling device consists of a coil and condenser placed in parallel (or shunt) and inserted between the plate of the tube and the source of voltage; that is, in the plate circuit. In rotating the variable condenser, the coil-condenser combination is tuned to resonance with the frequency to be received, and in so doing offers the greatest possible impedance to that frequency. The plate current meeting this maximum impedance produces the highest possible voltage drop across the coil-condenser combination. The voltage changes are applied to the grid of the following tube by means of the fixed condenser connected to the impedance. The size of the coil and the capacity of the variable condenser are so chosen that they tune over the desired bands of frequencies. In a circuit of this type, difficulty is often experienced with feedback, since it cannot be controlled by neutralization. Resistors to control oscillation are placed in the positive voltage lead. Generally speaking, such R.F. amplifiers are seldom multiple staged, due to oscillation tendencies.

Resistance Coupling

Another type of amplifier is known as the *resistance coupled* R.F. amplifier, and is shown in Figure 4. This circuit is now seldom used for amplification before the detector stage, but has found wide use as an audio frequency amplifier and will be described in a future article on audio amplifiers.

Band Pass Filters

Sometimes certain undesirable effects known as *cross-modulation* and *second harmonic generation* are present in receivers. In order to avoid this effect, a *band pass filter* or *band selector* is used, as shown in Figure 5. The purpose of such a filter is simply to present a high impedance or resistance to all unwanted frequencies and at the same time allow the reception of those frequencies it is desired to receive. Since the *band-pass* filter couples the antenna to the grid of the first tube through a number of tuned circuits, a sufficiently high order of selectivity is obtained so that a strong signal, after passing through the filter, will not be strong enough to cause the R.F. tube to act as a detector.

New Type Communications Receiver

(Continued from page 742)

receivers, yet recommended in every receiver described in the *A.R.R.L. Handbook*. Originally advocated, it is believed, by the writer in 1932-33 as the easiest means in an I.F. amplifier of obtaining *single-signal* selectivity, its inclusion in first detector circuit also gives the high R.F. gain before frequency conversion, so essential to good signal-to-noise ratio, as well as tremendously increasing effective image frequency selectivity. In this particular design the I.F. regeneration knob is no more critical than any variable selectivity control—actually simpler to operate than usual crystal filter controls—while R.F. regeneration, once set, need never be touched again. Thus no criticism of possible complexity of operation in the bands of amateur or short-wave DX-er is justified, while the gain from the intelligent use of regeneration is amazing.

One particular advantage is the elimination of tubes which regeneration makes possible. This reduces cost and power drain, but even more important, cuts circuit noise to a surprisingly low minimum. Actually in the "Silver Super" inherent noise is only 2 milliwatts at 1 microvolt absolute sensitivity. In his experience of designing hundreds of receivers over nearly three decades, the writer has never before been able to attain such a quiet yet super-sensitive circuit.

Noise Limiter Included

Following closely the low cost single-signal super-het described in the October, 1938, and February, 1939, QSTs this new set uses one 6K8 regenerative first detector-oscillator, one 7A7 "Loctal" regenerative I.F. amplifier, 7A7 audio beat oscillator, 6B8 second detector, A.V.C. first audio amplifier and new type noise limiter, 6V6 beam power output tube, 80 rectifier, and one VR150 automatic voltage regulator tube. Including A.C. power supply, it mounts on a chassis 1/16" thick for absolute mechanical rigidity. This pan is only 15¾" long, 7" deep and 3½" high, with control panel 17" by 9½". A steel cabinet with hinged lid and removable back is available, 9½" high, 17⅞" long and 12" deep—with plenty of room behind the chassis to carry a 6-volt battery power supply or dry "A" and "B" batteries for portable operation, or the improved form of the Diversity Coupler recently described in RADIO & TELEVISION which turns the "Silver Super" into a full-fledged dual diversity receiver to minimize fading and its accompanying noise. The simplicity of parts layout, resulting in the extremely short and direct leads so essential to maximum efficiency, are clearly illustrated in Figs. 2 and 3.

Fig. 1 shows all of the controls essential to the receiver. At the center is the 7¾" dial, accurately calibrated for six wavebands from 540 to 61,000 kc., inclusive. It can be turned fast by its center knob, or at 15 to 1 reduction by the knob at its lower right. The outer edge of this dial carries 500 vernier divisions with 0-10 decimal indicator. Where greater band-spread is desired a simple 12:1 gear train can be slipped over the condenser shaft behind the panel, and projecting through a panel hole beneath the right center of the main dial, carries an 0-200 degree, 4" band-spread dial which then "peeks out" at the upper right of the main dial to be read against a second decimal vernier indicator to give eleven *feet* of dial length per hand with a readability of one part in 21,600.

Band-Switch

At the lower left of the dial is the wave-change knob operating four separate switches insulated with the new "X2B" beneath the chassis. These have double-spaced contacts spread over a full 360 degrees to give short connecting lead lengths and the lowest possible inter-circuit capacity. R.F. and oscillator circuits are simultaneously switched, with all unused coils short-circuited to prevent dead-end or absorption losses, which can become very serious at short wavelengths. All coils, including the extreme high frequency coil, are mounted on the wave-change switches themselves, as are the oscillator high-frequency padding condensers which set dial calibration. These padding condensers are compression mica on ceramic bases, not air-trimmers. Through special secret processes, these particular condensers (Guthman No. C45) are actually as stable as good air-dielectric condensers, and of very low loss design. R.F. coil sizes are such as to produce optimum Q versus shield proximity.

At the upper left of the panel is the calibrated S-meter, with below it the noise limiter knob, the extreme upper right knob being the beat oscillator pitch control. Along the bottom, left to right, are tone control, head-phone jack, antenna trimmer, beat oscillator on-off switch, wave change switch, vernier tuning, send-receive switch, audio volume control, A.V.C. on-off switch and I.F. selectivity control. Attention is called to the antenna trimmer knob; manual control of circuit tracking is provided in order to insure the very best possible results, and to take no chances of differences in antennae or adjustments of first detector regeneration upsetting circuit tracking, in line with recent trends in this direction in the newer communication receivers.

Fig. 3 shows a 6K8 tube used as detector-

(Continued on following page)

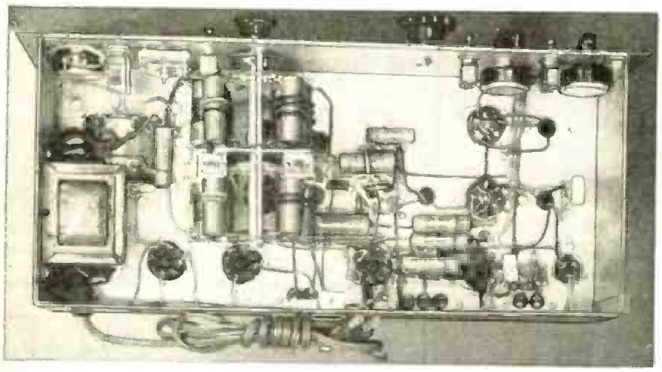


Fig. 4. Sub-chassis view. The coil and switch unit is factory-assembled.

New Type Communications Receiver

(Continued from preceding page)

oscillator. Numerous tests of many different combinations of different tubes, single and separate, showed the 6K8 to be definitely the best converter available today in terms of stable oscillator output right down to 5 meters, maximum conversion gain, and freedom for interaction between first detector and oscillator circuits. Regeneration is independent of wavelength, and permanently set upon installing the receiver, is adjusted by the potentiometer connected to the feed-back condenser C1. Stable and permanent regeneration is secured in a manner new to receivers. An R.F. choke, R.F.C., in the plate return lead provides R.F. voltage which is fed back from the arm of a potentiometer across R.F.C. to the grid circuit A.V.C. return through C1. At first this may look inoperative, but consideration of the capacity ratios of C1 and C2 should make it clear that regenerative feed-back does occur. Tuning condenser capacity is 140 mmf.—amply low for maximum gain, and far lower than is found in most all-wave or even communication receivers. C3 is the antenna trimmer, adjustable from the front panel. High impedance antenna primaries prevent differences in antennae upsetting regeneration or circuit tracking, but no chance is taken with hard-to-get signals and C3 is made manually variable. It is not critical and can be forgotten except when the weakest of signals must be pulled through.

I.F. Amplifier

The I.F. amplifier uses two permeability-tuned high-Q I.F. transformers. These are the most stable types known today, for their tuning capacities can not vary, being "Silvercons," in which silver is directly plated onto mica, so that capacity cannot change. They are *really fixed* condensers. Tuning is effected by micrometric adjustment of powdered R.F. iron cores inside each I.F. coil. These two transformers represent much research and experiment to allow them to be regenerated without any frequency shift. Ordinary 455 kc. transformers used in a regenerative I.F. amplifier will show up to 10 kc. frequency shift for different degrees of regeneration, and this is, of course, highly undesirable, if not intolerable. Careful adjustment of coupling and stray capacities results in the "Silver Super" showing no measureable frequency shift at any degree of regeneration. The I.F. tube is the new 7A7, all-glass "Loctal" type. In this new tube, element leads enter a flat base or stem, instead of running up through the usual 1½" long stem tube and so providing harmful capacity and inductance. Having no molded bakelite base, but rather contact pins set directly in the glass itself, base losses are a thing of the past. A small metal socket aligning-cap shields the base so that both grid and plate leads come out the same end—the new "single-ended" type of R.F. pentode construction. Gain is higher than for the older 6K7, for the "Loctal" idea makes real sense in tube design. A second 7A7 is the beat oscillator, coupled to the second detector by capacity provided through judicious parts placement, and tuned from the front panel by a knob controlling its powdered iron core so as to permit optimum choice of beat note for single-signal selectivity, zero beating for broadcast reception, or different beat note pitches to reduce heterodyne interference —which is noticeably absent due to the extreme selectivity possible. I.F. regeneration — selectivity and gain control — is through cathode bias with feed-back through slightly augmented grid-plate capacity of the 7A7 I.F. amplifier.

A.V.C. Switch Provided

The diode second detector and A.V.C. of the 6B8 is essentially conventional with optimum values chosen and the switch provided to cut out A.V.C. without affecting detector action when desired, as for code reception. A 7A7 is used as a V.T. voltmeter, fed from the diode load, for super-sensitive tuning meter operation. The pentode of the 6B8 is used for first audio stage—not so much for its high gain as to provide the simplest possible noise limiter. Varying the screen voltage on a pentode controls its plate current—in effect, controls its "saturation" or the strength of the signal it can handle. This characteristic allows noise louder than signal to be held down to no louder than signal by variation of screen voltage. This can be done automatically, which does not give most satisfactory results in operation, for then the system becomes a true "hole-puncher" silencing reception when noise appears. So operated, such automatic silencer is so effective that loud noise will actually shut off reception during its duration. A manual control is obviously more desirable, and so is provided. By permitting noise to be held down to signal volume, it gives the impression of having almost completely eliminated noise, so great is its seeming reduction. This noise limiter is equally effective on all types of noise, at all wavelengths.

Audio gain control is in the 6B8 grid circuit, with tone control and head-phone jack in its plate circuit, which is followed by a 6V6 beam power output tube for loudspeaker operation—and this set will "rattle the speaker" on almost any signal that can be heard. Power supply is essentially conventional, with chassis-mounted power transformer of ample size for good heat radiation, large, very high effective inductance filter choke and plenty of sealed-in-metal-can dry electrolytic capacity of generous voltage rating for extreme safety. Sockets are provided for the VR150 automatic voltage regulator tube for the user who desires the frequency stability usually associated only with a fine frequency meter, but seldom with receivers. This tube is not essential, but is a distinctly worthwhile refinement.

"Send-Receive" Switch

In line with attaining extreme stability, the send-receive switch is used in a new way. Instead of breaking only one or two plate circuits to mute the receiver during transmission, the S-R switch cuts the entire "B" supply to all tubes, including power to the filter. Thus, the operator, desiring a taste of real receiver frequency stability for a change, may leave the on-off switch on all the time—or turn it on in the morning before an evening of operation—so that tubes and set will have reached stable temperature by evening and there just won't be any frequency drift.

Still another refinement is the eight-prong socket and dummy plug just before the filter. Pulling the plug opens the filament and B-supply circuits so that with a live plug another source of power—dry batteries, dynamotor or vibrator "B" and battery "A" can be connected to the set. It is thus substantially independent of power sources, and can be operated A.C. or battery.

For the amateur who cannot afford to immediately buy all parts for the receiver as described, a distinct convenience exists in that he can buy parts for everything except the power supply, 6V6 power output stage, beat oscillator, tuning meter and voltage regulator tubes. He can then assemble a 3-tube set—regenerative detector—oscillator, regenerative I.F. amplifier, second detector, A.V.C., audio amplifier and noise limiter that on headphones, with batteries or "junk-box" power unit, will give performance which will amaze the hard-boiled operator who sniffs at any communication receiver costing less than $200.00. The user can then add on as he can afford to, until in the full-sized eight tube set he has something that has banished his receiver worries for a long time to come.

The writer will gladly answer questions, or give complete parts list and full "how-to-build-it" details to any who may care to write to him in care of this magazine.

Photos and description courtesy of Edwin I. Guthman & Co., Inc.

A Letter from London

(Continued from page 718)

to a letter from the editorial department of the *British Broadcasting Corporation*, asking further information, J. R. T. Hopper writes: "We would like to make it clear that the cable has been installed by the Post Office primarily for multi-telephone work, and that the suggestion that it may be used for television has been purely incidental. As a matter of fact, decision on the possibilities and method of extending television beyond the London area lies with the Television Advisory Committee, and so far no official announcement has been made."

Antennas—Past, Present and Future

Harold H. Beverage

(Continued from page 709)

200 miles or so apart. It is interesting to note that there are as many cycles between 5 meters (60 megacycles) and 10 meters (30 megacycles) as there are in the entire radio spectrum above 10 meters. The services that will undoubtedly develop in the ultra-short wave spectrum may eventually become as important, or even more important, than the services now existing in all of the rest of the radio spectrum. For example, the ultra-short wave band is the only part of the spectrum suitable for high definition television. Bands of 6 megacycles width in this spectrum have already been ear-marked by the Federal Communications Commission for experimental *television* transmission.

We have seen that in the transition from the long waves to short waves, there was a radical change in the type of antennas that were found useful and necessary for the new services. Will the development of the ultra-short wave spectrum see a radical change in antenna structures such as we do not dream of today?

In the long distance use of short waves, a limit was found in the concentration of the radio beam that could be used successfully. To obtain a high power gain, it was necessary to concentrate the radiation into a narrow beam in the vertical plane as well as the horizontal plane. It was found that there is no single vertical angle at which the radiation can be launched that will be effective over a considerable period of time. The classic work of the Bell Laboratories in the development of the MUSA system indicates very clearly that the signals may travel over several bundles of rays, but that these paths are quite variable and require a wide range of vertical angles to obtain reliable communication over a considerable period of time. This phenomenon sets a limit on the usable concentration of the radiated or received radio energy. As a practical matter, an antenna with a concentration which produces a power gain of 100 is probably close to the useful limit. Will a similar limitation in the concentration of power be found on the ultra-short waves? No such limitation is known today, and as the wavelength becomes shorter it is practicable to build antennas that will highly concentrate the radio beam. Will we see strange contraptions with power gains of 1000 or more on relay chains carrying television network programs and multiplexed mass communication? If power gains of a high order can be used, the transmitter power required will decrease in proportion so we may see a miniature "acorn" tube transmitter associated with an enormous directive antenna structure. The possibilities of using radio *repeaters* even smaller than telephone type repeaters, and concentrations of energy that reduce the attenuation over a given path to a very low value are indeed intriguing to the imagination.

Another factor that will affect the antenna design for the ultra-short waves is the necessity for providing antennas covering an extremely wide band for high definition television. We have already seen some radical departures from familiar forms of antennas in this field in the television antenna recently erected on the Empire State Building in New York. Here we see radiator elements looking like Indian clubs projecting from an expanding throat, appearing somewhat like the stream-lined Nacelle of a modern air liner. By this unusual design, a radiator is obtained which, electrically, looks like a resistance over the complete octave of frequencies from 30 to 60 megacycles, many times wider than any omni-directional (all-directional) antenna known to the prior art. In other words, this antenna has a flat characteristic over a range 30 times as wide as the normal broadcasting band.

As we learn how to use shorter and shorter wavelengths we may well expect to see increasingly radical antenna designs which have little resemblance to the antennas that have been familiar to us in the long wave and short wave fields.

Television "Sight Effects"

(Continued from page 710)

looking at a *miniature* house. And what a house!—the shingles were even cut on a taper, and every detail of the full-sized door, even down to the doctor's nameplate, was accurately reproduced in the miniature. The chimney of this model house was constructed of lumps of sugar suitably painted with water colors.

In one of the interesting scenes, an animated spider's web was desired, and here the spiders—which were made in the studio specially for the purpose—were caused to move by a series of small rods rotating inside hollow tubes forming part of the web. These rods were geared together by means of a chain and driven by a motor.

Some of the books used in the television scenes are made of plaster of Paris, suitably painted to resemble actual books.

The writer was quite astonished to learn at what speed some of these objects were constructed and painted. Warships in miniature are made in a jiffy, as also are models of certain animals desired, not to mention artificial flowers and trees, miniatures of people in any style of dress or uniform, etc.

In making motion pictures, such effects as those here described are very easy to produce, for the camera can be stopped while certain changes are made in the objects or in the scene before the camera; but in television, the action of the scene cannot be stopped to permit such changes being made and the action must be continuous. Thus, an entirely new method of procedure had to be worked out by Mr. Eddy and his associates.

NOTICE

In reviewing the Thordarson Electric Mfg. Co.'s "Sound Amplifier Guide," we neglected to mention that the price of this bulletin (No. 346-D) is 15c, direct from the manufacturer, or through jobbers at the usual trade discounts.

Third of the new series "Getting Started in Amateur Radio," by C. W. Palmer, E.E., in the next issue.

BOOK REVIEW

RADIO-FREQUENCY ELECTRICAL MEASUREMENTS. Hugh A. Brown, M.S., E.E., 384 pages, illustrated, size 6" x 9". Published by McGraw-Hill Co., Inc., New York and London.

Mr. Brown, who is Associate Professor of Electrical Engineering at the University of Illinois, has done a masterly work, covering his subject most thoroughly. Not only does he give the necessary formulae for use in various types of measurement work, but also gives diagrams of apparatus and lucid explanations on procedure. The book is very well illustrated with circuits and schematics, as well as a number of very interesting graphs, etc. The principal chapter headings are: Measurements of Circuit Constants; Measurement of Frequency; Antenna Measurements; Electromagnetic-Wave Measurements; Measurement of Electron-Tube Coefficients and Amplifier Performance; Electromotive Force; Current Power; Measurement of Wave Form; Modulation, Receiver and Piezo-Electric Crystal Measurements. The index is particularly ample and easy to use.

6-Tube, 1.4 Volt Superhet.

(Continued from page 735)

various connections in the R.F. circuit; the filament, I.F. and A.F. circuits are wired with the stranded push-back hook-up wire.

The I.F. circuit should be aligned from the 460 kc. signal of a test oscillator if possible. However, in lieu of a test oscillator routine, the following procedure may be used. Plug in a pair of coils covering the 7 mc. amateur band and tune for one of the "dotter" stations usually heard in this region. A weak, steady signal is best for alignment purposes. Turn up the mixer regeneration control about three fourths way full-on and rotate the R.F. (mixer) trimmer condenser for maximum sensitivity. Now with an insulated screw-driver or neutralizing tool, beginning with the output I.F. transformer, adjust each I.F. trimmer screw for maximum signal strength.

The beat-frequency oscillator is built on a separate 4x3x1½ inch chassis and is coupled to the 1N5-G detector control grid as indicated in Fig. 1. Condenser "C," indicated on the diagram, consists of two pieces of insulated hook-up wire about one inch long, loosely twisted together. The lead from the oscillator must be shielded right up to the point where it connects to condenser "C"; otherwise, the oscillator signal will get into the I.F. amplifier, causing the detector to block on strong signals.

If the receiver is to be used for c.w. code reception only, the beat-frequency oscillator may be omitted and the receiver aligned as follows: First, tune a "dotter" signal as outlined above and, with the detector out of oscillation, adjust the I.F. trimmers for maximum volume. Adjust the mixer regeneration control just below the point of oscillation and rotate the mixer and oscillator trimmers for greatest sensitivity. Now, while tuning back and forth across a signal, turn the *output* I.F. *transformer grid trimmer screw* to the right or left until the signal can be barely heard. Adjust the detector regeneration condenser until the 1N5-G is oscillating and advance the I.F. trimmer, still rotating the dial back and forth across the signal, until a point is found where one side-band is almost completely cut off.

The set will operate a loudspeaker with fairly good volume on most stations. When purchasing a speaker it is advisable to get a *permanent magnet dynamic* type fitted with a *universal* output transformer, which will permit accurately matched output from the 1A5-G audio amplifier. When using crystal headphones, an A.F. choke of about 30 henries, 15 ma. rating and an .05 mf., 600 volt condenser should be connected to the 1A5-G plate as shown in Fig. 1. Be sure that the coupling condenser is not leaky and is of good quality.

Either a doublet or single-wire antenna may be used with the receiver.

Coil Data

Mixer Coils

Grid Coil L3	*Spacing*	*Tickler L4*	*Wire*	*Dia.*	*Band*
4 turns	1"	3 turns	20 E.	1"	10 meters
12 turns	1½"	4 turns	20 E.	1"	20 meters
17 turns	1¾"	6 turns	22 E.	1½"	40 meters
37 turns	1¾"	9 turns	26 E.	1½"	80 meters
58 turns	1¾"	14 turns	28 E.	1½"	160 meters

Antenna coil L2 same wire and number of turns as for tickler.

Oscillator Coils

Grid Coil L6	*Spacing*	*Tickler L5*	*Wire*	*Dia.*	*Band*
4 turns	1"	3 turns	20 E.	1"	10 meters
12 turns	1"	4 turns	20 E.	1"	20 meters
15 turns	1¼"	6 turns	22 E.	1½"	40 meters
32 turns	1¾"	9 turns	26 E.	1½"	80 meters
52 turns	1¾"	16 turns	28 E.	1½"	160 meters

All coil forms are 5-prong types. All ticklers close-wound on "cold" or ground end of form.

NEWEST RADIO APPARATUS

New Band-Switching Pre-Selector

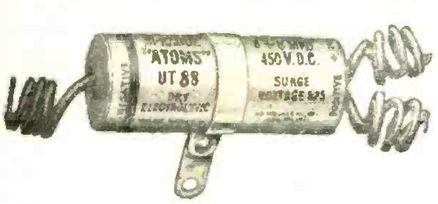
● A NEW 5-band pre-selector, which has continuous coverage from 5 to 185 meters (1.6 to 64 mc.) with band-switching, has been announced by the Browning Laboratories, Inc.

The unit employs an 1852 tube as regenerative R.F. amplifier. Image rejection ratios of 500 or more are obtainable, while the use of a high-Q tuned antenna system affords marked gain in the signal-to-noise ratio. R.F. amplification may be as high as 800, even on the 5 and 10 meter bands, depending upon the amount of regeneration used. The main tank condenser with electrical band-spread, used for tuning, is provided with a dial calibrated for each of the five bands.

The unit, which is known as model No. BL-5DX, includes a filament transformer so that it may be used with any receiver. It may be had either in kit form or completely assembled.

Full Line of Dual Atoms

● THE Sprague midget line now includes a full line of dual combinations which, according to the manufacturer, are the only small duals having common negative leads. The new line includes a



450 V. 8-8 mf.; a 50 V. 10-10 mf.; 200 V. 16-16 and 8-16 mf. units; a 250 V. 6-18 mf.; and 450 V. 8-16 mf. The condensers are hermetically sealed.

New Resistor Line

● A NEW line of carbon fixed resistors of solid molded construction, permanently bonded into one compact unit, has been announced by Consolidated Wire & Associated Corporations. These resistors are guaranteed within 10% plus or minus and variation is maintained within a 5% average. They are completely moisture-proof and non-inductive, having no capacity effect, and maintaining resistance value over an extremely wide temperature range.

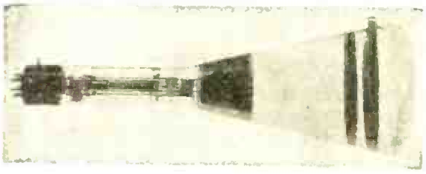
The same company also announces an iron core, double-tuned, band-expanding I.F. transformer. Their new transformer line includes air core and iron core I.F. transformers, mica-trimmed, permeability-tuned, double and triple-tuned units; antenna, R.F., and oscillator coils; chokes, replacement primary windings, etc. These coils are pre-aligned and checked to assure their ready interchangeability and easy installation. Each is treated with a special moisture proof compound to insure permanence in the original adjustment.

Intensifier Type Cathode-Ray Tube

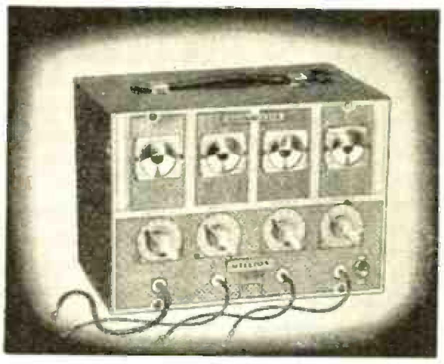
● A NEW type of television tube, called the "Intensifier," is considered by its manufacturers as "the first fundamental improvement affecting sensitivity since the inception of cathode-ray tubes 40 years ago."

The intensifier electrode takes the form of one or two metallic deposit rings near the screen end of the cathode-ray tube, and serves to accelerate the electrons *after* deflection, to afford increased brilliance without corresponding loss in deflection sensitivity.

The DuMont 54-9-T five-inch tube is provided with the intensifier feature, as well as several refinements in its "gun" structure to obtain better focus and modulating characteristics. The electron gun is operated at the same potentials and in the same manner as other tubes of corresponding type and screen diameter.



New Set Tester



● A NEW set tester, which indicates the presence of a signal throughout all sections of a receiver, draws no current from the circuit at any time. There are four input connections, one of which is a co-axial cable for use on ultra-high frequencies. The input impedance consists of approximately 5 mmf. Three of the inputs operate on AC and one on AC or DC.

The circuit incorporates electronic rather than radio engineering principles, and makes use of four 6E5's, two 6F8's and one 76, AC output.

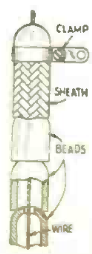
The instrument, known as the "Million Signalyzer," simulates the functions of a vacuum tube voltmeter, output indicator and potential measuring device. It permits any 4 sections of a set to be checked simultaneously and a service man can learn its use in five minutes, its sponsors say.

New Type of Switch

● A LOW capacity lever-action switch has just been announced by the Centralab concern. The switches are similar to toggle switches in their action, as far as the operating lever is concerned, but the contacts are more like those of the familiar rotary switches. They take up an extremely small amount of space on the panel, and multiple mounting plates are provided so that they may be conveniently grouped.

Coaxial Cable for Hams

● A NEW type of coaxial cable is being produced by the Transducer Corporation. This cable consists of a length of braided tinned copper sheath, a length of tinned copper cable and a large number of ceramic insulated beads of unique shape. The amateur makes his own coaxial cable by stringing the beads on the cable and then forcing them through the braided copper sheath. When the sheath is clamped to the end beads, the cable is ready for permanent use. It is flexible so that it may be employed for antenna lead-ins, cathode-ray tube uses, P.E. cell connections, etc. Its capacitance is 10 mmf. per foot and its characteristic impedance, 150 ohms.



Rhumbatron

(Continued from page 712)

is based on some original ideas of Irving Metcalf of the former Bureau of Air Commerce.

"When Mr. Metcalf and John Easton, Chief of the Aircraft Section, Bureau of Air Commerce, first studied the principles of the Klystron and the Rhumbatron at the invitation of the Stanford authorities, they saw immediately a broad general field of application embracing, in addition to the *blind landing* system, a number of other projects including *obstacle detection, collision prevention, traffic control, en route guidance, position fixes,* and others.

"The Sperry Gyroscope Company, as one of the collaborators in the Metcalf blind landing development and as a manufacturing unit, assumed the responsibility of developing the Klystron in order to make sure that the finished product would fit the needs of the Bureau's blind landing system.

"Sperry's interest in this blind landing problem is very logical. The gyroscopic instruments, especially the directional gyro and the gyro-horizon have added very considerably to the safety of en route blind flying. The Metcalf blind landing system involves the application of modified gyroscopic instruments as well as considerable new radio technique.

"The research program surrounding this development has been conducted at Stanford University under the direction of Prof. D. L. Webster, executive head of the physics department. Other scientists who have played prominent roles include: R. H. and S. F. Varian, who are brothers; Prof. W. W. Hansen, associate professor of physics at Stanford; and Mr. John Woodyard, research associate in the physics department."

"Buncher" and "Catcher"=Klystron

Two rhumbatrons, called the "buncher" and "catcher," together with other apparatus, make the Klystron. Its name comes from the Greek verb "klyzo," denoting the breaking of waves on a beach. This is roughly descriptive of the action of the device, for in the buncher Rhumbatron is an oscillating electric field, parallel to a stream of electrons passing through it. The field is of such strength as to change the speeds of the electrons by appreciable fractions, accelerating some, slowing down others. After passing through the buncher, the electrons with increased speeds begin to overtake those with decreased speeds which are ahead of them. This motion groups the electrons into bunches separated by relatively empty spaces. By passing the stream through the catcher rhumbatron, within which is an oscillating electric field changing synchronously so as to take energy away from the bunched electrons, a considerable fraction of the power of the electron-bunches is converted into power of high-frequency oscillations.

Advantages of the Klystron principle are threefold. It produces strong waves; they are at stable frequencies; and they have strong amplification at the receiving end. The present working minimum wavelength employed by airlines in radio work is about one meter. But the Stanford Klystron produces waves one-tenth that length. Such waves, when emitted from a reflector one meter in diameter, would radiate within a narrow angle of only *six degrees.* The Klystron's inventors believe wavelengths considerably less than 10 centimeters can be reached, thereby still further narrowing the angle of radiation.

Electronic Television Course

(Continued from page 725)

order to transmit an image by television, we must pick up this image point by point and line by line, and transmit each point rapidly enough so that the eye may receive each complete picture in rapid enough succession to give the illusion of motion. Motion pictures in our theaters, when projected on a screen, are repeated at the rate of 24 pictures per second and each picture is interrupted twice by a shutter incorporated in the projecting apparatus, so that the eye receives 48 periods of light and 48 periods of dark for each second that we view the picture. In modern television, we have stepped up this rate of projection to 30 complete frames or 60 half-frames per second.

Feature Articles April, 1939
RADIO-CRAFT

Television standards in the United States, as agreed upon by the Radio Manufacturers' Association *Television Committee*, standardized 441 lines per picture, 30 pictures per second, interlaced (i.e., 60 half-frame pictures), an aspect ratio of 3 to 4 (3 units in height to 4 in width) negative transmission and 10% of each line and frame allotted to synchronizing impulses. These standards and their relation to the transmission and reception of television images will be more fully explained in this and subsequent chapters of this course.

Figure No. 4 shows in block diagram the essential apparatus required for the transmission of a television image. It consists of an iconoscope, monoscope or image dissector, vertical and horizontal deflection circuits, amplifiers, power supplies, and a radio frequency television transmitter, suitably coupled to an antenna for radiating the electrical impulses picked up and produced by the picture tube. The deflection circuits mentioned in the above paragraph serve to deflect the electronic cathode beam in a vertical and horizontal direction, while it sweeps the mosaic screen or target electrode, as the case may be. The vertical deflection circuit causes the beam to move from top to bottom 60 times per second and the horizontal deflection circuit causes the beam to move from left to right 13,230 times per second. The sequence in which the picture is scanned is as follows: lines, No. 1, 3, 5, 7, etc., to 220½ are scanned in the first 1/60th of a second (see Fig. 5-A). The beam then returns and scans lines Nos. 2, 4, 6, 8, etc., in other words, the beam scans one-half of the picture, then returns and scans the space between the lines previously scanned, giving us 60 half-frames or 30 complete frames or pictures per second. This process of scanning each picture twice, is called *interlaced scanning* because each pair of odd lines is interlaced by an even line. This is analogous to the motion pictures in the theater where each picture on the film is projected upon the screen twice while standing still in the projection aperture.

Interlaced scanning reduces the amount of flicker in a picture when viewed, because the eye receives two impulses of light; whereas in sequential scanning (scanning lines 1, 2, 3, 4, 5, 6, 7) the eye would perceive each picture but once and consequently the apparent projection rate would be slower and cause more flicker. During the interval of time that the vertical deflection circuit is sweeping the beam downward, the horizontal deflection circuit is moving the beam from left to right rapidly enough to scan 220½ lines. It might be well to mention at this point that the electronic beam moves in both directions; top to bottom and left to right in a linear manner, and when reaching the end of a line or frame returns to its starting point in 1/10th of the time that it took to travel the line or frame, as illustrated in Figure 5. It will be perceived that the voltage or current wave-forms assume the shape of a *saw-tooth* and it is for this reason that oscillators producing this wave shape are often termed *saw-tooth* oscillators. This quick return of the electronic beam causes a large signal in the output of the pick-up tube which is used at the receiving end for a synchronizing pulse. When delivered to the grids of the sweep circuit oscillators it causes them to keep in step with those of the transmitter, thus giving perfect synchronization between transmitter and receivers.

Due to the fact that the television signal is transmitted *negatively* (the carrier of the transmitter increases in amplitude for the black portions of a picture and decreases in amplitude for the whites), these synchronizing impulses represent the highest modulation capabilities of the television transmitter and when received they represent in the picture what may be termed "blacker than black" and consequently are of no significance, as far as the eye is concerned when viewing an image.

In Chapter No. 3, we shall discuss the radio and video frequencies involved in the transmission and reception of television images, the elements of cathode ray receiving tubes, electro-static and electro-magnetic deflection, and the modulation of a cathode ray electronic beam by the transmitted picture impulses.

Answers to QUIZ on page 719

1. *b*
2. *aC, bE, cA, dF, eD, fB*
3. *c*
4. *c, minimum; d, maximum*
5. *d*
6. *a—too costly*
7. *c & d*
8. *all—though not all are classed as movie stars, their major activities being in other fields.*
9. *b*
10. *d*
11. *aC, bF, cE, dA, eB, fD*
12. *cA*
13. *d—KOIL, Blue; WOW, Red*
14. *c—experimental*
15. *c*
16. *Most often c or b; sometimes b & c; almost never a or d*
17. *b*

World S-W Stations

(Continued from page 732)

Mc.	Call	
6.090	CRCX	**TORONTO, CAN.,** 49.26 m., Addr. Can. Broadcasting Corp. Daily 7.45 am.-5 pm., Sun. 10.30 am.-12 n.
6.090	ZBW2	**HONGKONG, CHINA,** 49.26 m., Addr. P. O. Box 200. Irregular.
6.083	VQ7LO	**NAIROBI, KENYA, AFRICA,** 49.31 m., Addr. Cable and Wireless, Ltd. Mon., Fri. 5.30-6 am., 11.15 am.-2.15 pm., also Tues. and Thurs. 8.15-9.15 am.; Sat. 11.15 am.-3.15 pm.; Sun. 10.45 am.-1.45 pm.
6.081	YV1RD	**MARACAIBO, VEN.,** 49.32 m. 6-11 pm.
6.080	W9XAA	**CHICAGO, ILL.,** 49.34 m., Addr. Chicago Fed. of Labor. Relays WCFL irregular.
6.079	DJM	**BERLIN, GERMANY,** 49.34 m., Addr., Broadcasting House. 4.50-11 pm.
6.077	OAX4Z	**LIMA, PERU,** 49.35 m. Radio Nacional 7 pm.-1.30 am. Except Sun.
6.075	VP3MR	**GEORGETOWN, BRI. GUIANA,** 49.35 m. Sun. 7.45-10.15 am.; Daily 4.45-8.45 pm.
6.070	CFRX	**TORONTO, CAN.,** 49.42 m. Relays CFRB 7.30 am.-12 m., Sun. 10 am.-12 m.
6.070	VE9CS	**VANCOUVER, B. C., CAN.,** 49.42 m. Sun. 1.45-9 pm., 10.30 pm.-1 am.; Tues. 6-7.30 pm., 11.30 pm.-1.30 am. Daily 6-7.30 pm.
6.069	——	**TANANARIVE, MADAGASCAR,** 49.42 m., Addr. (See 9.53 mc.) 12.30-12.45, 3.30-4.30, 10-11 am., Sun 2.30-4.30 am.
6.065	SBO	**MOTALA, SWEDEN,** 49.46 m. Relays Stockholm 4.15-5 pm.
6.060	—	**TANANARIVE, MADAGASCAR,** 49.5 m., 12.30-12.45, 3.30-4.30, 10-11 am.
6.060	W8XAL	**CINCINNATI, OHIO,** 49.5 m., Addr. Crosley Radio Corp. Relays WLW Tues., Fri., Sun. 5.45 am.-12 n., 11 pm.-2 am.; Wed. 5.45 am.-12 n., 9 pm.-2 am.; Mon., Thurs., Sat. 5.45 am.-2 am.
6.060	W3XAU	**PHILADELPHIA, PA.,** 49.5 m. Relays WCAU Tues., Fri., Sun. 1 pm.-Mid. Wed. 1-10 pm.
6.057	ZHJ	**PENANG, FED. MALAY STATES,** 49.51 m. 6.40-8.40 am., except Sun., also Sat. 11 pm.-1 am.
6.054	HJ6ABA	**PEREIRA, COL.,** 49.52 m. 9.30 am.-12 n., 6.30-10 pm.
6.050	GSA	**DAVENTRY, ENGLAND,** 49.59 m., 10.45 am.12 n., 12.20-4, 4.15-6 pm.
6.050	HJ1ABG	**BARRANQUILLA, COL.,** 49.65 m., Addr. Emisora Atlantico. 11 am.-11 pm.; Sun. 11 am.-8 pm.
6.050	HP5F	**COLON, PAN.,** 49.59 m., Addr. Carlton Hotel. Irregular.
6.045	RV15	**KHABAROVSK, U.S.S.R.,** 49.63 m. 2-11 am.
6.045	XETW	**TAMPICO, MEXICO,** 49.6 m. Irregular 7-11 pm.
6.040	W4XB	**MIAMI BEACH, FLA.,** 49.65 m. 1-3 pm., 9 pm.-12 m. Relays WIOD.
6.040	W1XAL	**BOSTON, MASS.,** 49.65 m.. Addr. University Club. Irregular.
6.033	HP5B	**PANAMA CITY, PAN.,** 49.75 m., Addr. P. O. Box 910. 10.30 am.-2, 6-10 pm.
6.030	VE9CA	**CALGARY, ALTA, CAN.,** 49.75 m. Thur. 9 am.-1 am.; Sun. 12 n.-12 m.
6.030	RV59	**MOSCOW, U.S.S.R.,** 49.75 m. 5-6, 10-11 pm. Irregular.
6.030	OLR2B	**PRAGUE, CZECHOSLOVAKIA,** 49.75 m. (See 11.875 mc.) Off the air at present.
6.023	XEUW	**VERA CRUZ, MEX.,** 49.82 m., Addr. Av., Independencia 98. 10 pm.-1 am.
6.020	DJC	**BERLIN, GERMANY,** 49.83 m., Addr. (See 6.079 mc.) 1-4.30 pm.
6.017	HI3U	**SANTIAGO DE LOS CABALLEROS** D. R., 49.85 m. 7.30-9 am., 12 n.-2 pm., 5-7 pm., 8-9.30 pm.; Sun. 12.30-2, 5-6 pm.
6.015	PRA8	**PERNAMBUCO, BRAZIL,** 49.84 m., Radio Club of Pernambuco, 4-9 pm.
6.010	OLR2A	**PRAGUE, CZECHOSLOVAKIA,** 49.92 m., Addr. (See OLR, 11.84 mc.) Wed., Thurs., 4.40-5.10 pm.
6.010	COCO	**HAVANA, CUBA,** 49.92 m., Addr. P. O. Box 98. Daily 7.55 am.-12 m., Sun. until 11 pm.
6.010	VK9MI	**S. S. KANIMBLA,** 49.92 m. (Travels between Australia and New Zealand). Sun., Wed., Thurs. 6.55-7.30 am.
6.010	CJCX	**SYDNEY, NOVA SCOTIA,** 49.92 m. Relays CJCB 7 am.-1 pm., 4-8 pm. 1.30 pm. 8.30 pm.
6.007	ZRH	**ROBERTS HEIGHTS, S. AFRICA,** 49.94 m., Addr. (See ZRK, 9.606 mc.) Daily exc. Sun. 10 am.-3.30 pm.; Sun. 9 am.-12 n., 12.15-3.15 pm. Daily exc. Sat. 11.45 pm.-12.50 am.
6.007	ZRJ	**JOHANNESBURG, S. AFRICA.** 49.94 m., Addr. S. African Broadcast. Co., 3.30-4 pm. exc. Sun.
6.005	HP5K	**COLON, PAN.,** 49.96 m., Addr. Box 33, La Voz de la Victor. 7-9 am., 10.30 am.-1 pm., 5-11 pm.

(Continued on page 761)

Let's Listen In with Joe Miller

(Continued from page 727)

(I.D.A.) XGAP verifies promptly. Reports on XPSA, 7.01 mc., Kweiyang, are desired. Don Williams, W6, reports XPSA.

JAPAN

JLG, 7.285 mc., Tokio, is broadcasting daily to Europe from 2:30-4 p.m., but very difficult to hear on East Coast, being in the 40 meter amateur band, and too early for such a frequency to be well heard, even if in the clear.

New "Jap" phones to be added recently are: JVW, 7.26; JVW2, 9.673; JVW3, 11.725; JVW4, 17.823 mc. (I.D.A.)

JIA, on approximately 15.80 mc., in Formosa, recently QSL'd by Jap phone QRA, along with JVL, another phone. JIA was heard at 3:30 a.m., but may also be heard much later, being frequently logged at 6-7:30 a.m.

Murray Buitekant reports JFZC, 17.64 mc., the Chichibu Maru, at 7:45 a.m., JVT, 6.75 mc., at 3:50 a.m., and JVA, 18.91 mc., at 7:30 a.m. FB OM! Ralph Gozen, also W2, got a JVJ veri. JVE, 15.66 mc., heard here at 8:10 a.m.

Anyone reporting Jap phones now will receive a very prompt and certain reply, if report correct, with their new attractive card, recently illustrated, so now is the time to clean up on J's!

U.S.S.R.

RV15, 4.275 mc., at Khabarovsk, Siberia, will positively *not* verify, according to letter received from Radio Centre, Moscow, recently received by Harold B. Clein, W6. We had wondered why our report of RV15 was not answered, but this clears things up, although a big disappointment.

Gail T. Beyer, W9, reports similar failure to elicit a QSL for ROU, Omsk, from Moscow, so it seems the only stations in the U.S.S.R. that may be verified are S-W Broadcasters in Moscow. RKI, 15.083 mc., and RAN, 9.60 mc., reported on Sunday at 10 p.m., with RKI very strong, by Daryl Sebastian.

ANGOLA

CR6AA, 7.614 mc., at Lobito, was recently "logged," but with a weak signal, at 4:30 p.m. on a Saturday. CR6AA operates Weds. and Sats., 2:45-4:45 p.m., and supposed to be also on Mons., but has never been heard or reported on this day. This makes 3 freqs. heard on this "FB" catch, the 9.6 and 7.177 mc. sigs being verified.

DX REVIEW

TAHITI—FO8AA, 7.10 mc., Papeete, is not QSL'ing reports, according to numerous complaints from readers. We don't know what can be done, except that *registered reports* may help. FO8AA always has had a bad "rep" for QSL's, but though answering after long delays, usually has come through. We will send a copy of this issue of our column to FO8AA, when published, hoping notice will be taken of this item by the Station Director, and the situation remedied.

FRENCH MOROCCO—CNR, 12.83 mc., Rabat, heard using the usual side-band secrecy transmission at 3:30 a.m., when frequently logged.

NORWAY—LKC, 9.53 mc., Oslo, has been verified by Ray A. Bernhardt, W6, a nice catch for West Coast. LKQ, 11.72 mc., is also reported on same schedule, 4:30-9 a.m., daily, Suns., from 2:30 a.m. Another transmitter on 15.166 mc. is reported on after 10:30 a.m., but may be only on Sundays. (I.D.A.)

TURKEY—TAP, 9.465 mc., Ankara, continues to pound in afternoons till 5 p.m., or so during week-ends. TAQ, 15.195 mc., is reported on daily 5:30-7 a.m. W. G. Layton, W3, states that the reason why no QSL's of the Turkish stations have been received, at least as yet, is due to the very poor mail service there. Mr. Layton relates he once was in Turkey, and after mailing some 50 letters to the U. S. from there, found that not one ever reached its destination! He adds that evidently the P.O. employees collect stamps, hi! Turkish Ambassador please note. This mention is made in the light of universal plaints regarding lack of answers from TAP—TAQ reports. Ian Jamieson, England, reports TAP at 3 p.m. on.

JOTTINGS

Bert Wolfe, W6, reports the first VU *card* veri. from VUD2. Also reported by Bert is a very handsome QSL from ZHP, Singapore, FB! Bert says Bangkok, Siam, and CSW will not QSL to him.

G. C. Gallagher, W6, reports a "FB" QSL in ZHO, 6.185 mc., Singapore. A nice catch, OM! Jack Wells recently got a FB YCP, Dutch Borneo veri, and gives our ol' column all the credit. Thanks, Jack! He also was sent a clipping of a New Zealand paper in which his excellent report of VK9MI, *S.S. Kanimbla*, was commented upon, this by Miss Eileen Foley, who answers the reports on 9MI. Whatta thrill!

Hal Clein, W6, states ZNB, which FB catch in Bechuanaland recently QSL'd to him, is the friendliest station on the air, judging from his very courteous, personal letter from the operator, Chips Brittz. ZNB sends a gorgeous QSL, recently shown here.

HAM STARDUST

20 meters has been rather dead during the past month, mid-Jan. to mid-Feb., but the advent of the A.R.R.L. DX contest, and the fine DX conditions soon to be experienced as Spring evidences itself, will doubtless bring much interest back to this usually reliable amateur band.

As this issue will be published just before the Contest begins, we hope a couple of tips will be of assistance to you.

Last year, European "hams" were heard between 1-4 a.m. on East Coast, and many rare calls were "logged," so watch 20 at this time, from the time you read this.

Then, too, some Asiatic DX may be heard between 2-4 a.m. as the J hams are licensed to operate at certain periods daily, and one of them is 2-4 a.m., when a number of J's were well heard last year. J's are also licensed to operate 6-8 a.m. This period is the best time, of course, for East Coast reception of Asiatics.

Africans can be heard during afternoons, and North Africans at same time as Europeans, which will roar in during afternoons, and occasionally, around 10-10:30 p.m. Europeans will often hold up during afternoons till 7 p.m.

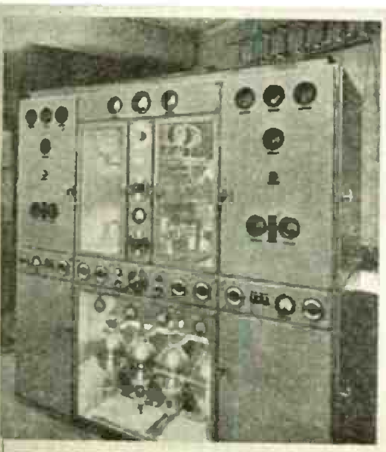
Now to reports:

ASIA

VU2FU, 14375, India, announcing as "France, United," reported by Hal Clein, W6, who also reports a "beaut" of a QSL from VU2JN. "FB" DX, Hal!

VU2CQ, 14120, and VU2BG, 14145, also reported by Gail Beyer, W9.

(Continued on following page)



The 1 kW transmitter You have heard. The two crystal controlled exciters corresponding to two wavelengths are on both sides of the high level modulated power amplifier.

The Finnish Short Wave Broadcasting Transmitter at Lahti, Suomi (Finland)

Georg. loc. 25° 39' E, 60° 59' N

Mr. Joseph H. Miller

We acknowledge with thanks Your report on our short wave transmissions. It checks well with our own log and we would be pleased to receive further reports from You of the audibility of our other wavelengths. They are:

	M.	Kc.	GMT.
OFD	31,58	9500	17.1[illegible]
OFE	25,47	11780	06.0[illegible]
OIE	19,75	15190	06.05-09; 14-22
OIH	16,85	17800	09-14.
OII	13,92	21550	

Our short wave transmitter is daily on the air and usually relays the regular Finnish Broadcasting Programmes.

8.12.38. Oy. Suomen Yleisradio Ab.

Lahden Yleisradioasema

Lahti, Suomi (Finland)

sign.

An Attractive "Veri" Card—one to be proud of.

Let's Listen In with Joe Miller

(Continued from preceding page)

PK1JR, 14300; PK4KS, 14320; PK4JD, 14020, Java, reported by Mike Soplop, W8. PK4's are in Sumatra. PK4KS also reported by Ralph Gozen, W2. PK1RI, 14350, and PK4JD, 14090, reported by Ian Jamieson, England. PK1VM, 14100, and PK4KS reported by Gail Beyer. PK1GL, 14080, heard here at unusual time of 4:45 a.m.

XZ2DY, 14350, logged at 7:45 a.m. by Mike Soplop, W8, a FB catch!

KA1ME, 14260; KA1CS, 14145; KA7EF, Philippines, reported by Mr. Soplop, also. KA1ME also by Mr. Beyer.

ZC6EC, 14316 (announced) Palestine, heard at 8 a.m. by Ralph Gozen, W2. A real ace!

FI8AC, 14080, French Indo-China, reported by Ian Jamieson, England. XU8ET, 14050, 9 a.m., by Mario Cassina, W2.

AFRICA

"ZS" stations too numerous to mention, and data on them will be of little use now, So. Africa having more or less faded out for the season.

SU2JR, 14070, Egypt, by Ian Jamieson.

VQ4ECJ, 14010, Kenya, logged here at 3 p.m., good sig.; also by Ralph Gozen.

VQ2HC, 14070 and 14320, Northern Rhodesia, reported by Ian Jamieson. Also VQ2FJ, 14130, nice DX!

FB8AD, 14310, Madagascar, also by Ian. FB8AH, 14340, reported by Tom Jordan, W8. FB8AH also by Norm Kriebel, W8.

We skipped over VQ2PL, whose FB card is illustrated this month. VQ2PL reported on 14415 by Mr. Soplop and Mr. Kriebel. Peter Lowth, who is VQ2PL, tells us in the interesting letter we received with his QSL, that his ambition is to some time relay the roar of the famous Victoria Falls in Northern Rhodesia to the fellows here. It would be interesting, indeed! Peter is located but 5 miles from the Falls. Ralph Gozen also reports VQ2PL.

CN8AW, 14110; CN8BA, 14070; CN8AL, 14070 and 14110; CN8MT, 14100; CN8AN, 14040; CN8AY, 14130; CN8MB, 14068; CN8AI, 14070, all reported by Messrs. Kriebel, Gozen, Beyer and Y.T., besides Ted Bottema, so French Morocco is well represented this month! Also CN8MV, 14055, by Y.T.

Also from Egypt is reported SU1MW, 14130, and SU1AX, by Norm Kriebel, 1AX being reported on 14050 by Norm, and on 14028 by Gail Beyer.

ZE1JX, 14030, by Norm and Gail, and ZE1JR, 14074, by Ted Bottema, these in Southern Rhodesia.

CT3AB, 14050, 3:30 p.m., is a "FB" catch in Madeira, for Gail Beyer.

40 METERS

CT3AN, 7090, Madeira, heard regularly around 8:30 p.m., E.S.T., by Ian Jamieson, England.

CN8AJ, 7050, French Morocco, was logged by Norm Kriebel, along with other Africans and Europeans, from 1:30-4 a.m. CN8MT, 7050, by Ralph Gozen.

FA8AW, 7070, FA8CF, 7180, Algeria, also by Norm. FA3WW, 7260, and FA8CF by Ralph Gozen.

Best reception on this band was in early December.

OTHER DX

ZL2BE, 14210, and ZL2JQ, 14260, heard after 7:30 a.m. by Norm Kriebel. These in New Zealand. ZL2BE, 14170, also by Ted Bottema.

ZA1CC, 14130, Albania, reported by Ian Jamieson, at 2:15 p.m. Sun.

SV1CA, 14055, Greece, by Y. T. SP1MR, 14025, Poland, by Y. T. OH2OI, 14160, Finland, Y. T. and Mr. Gozen.

10 METERS

Some fine DX has been reported and heard on this band of late, and we do hope good conditions will continue on this exciting stretch of kilocycles.

From Africa, numbers of ZS stations are heard from 10 a.m.-2 p.m., peaking around noon.

Other Africans on 10 are: SU1MW, 28400, Y. T. and Norm Kriebel, this one from Egypt.

ZE1JZ, 28400, So. Rhodesia, by Y. T.

CN8BA, 28150, CN8AV, 28150, in French Morocco, Y. T.

From Oceania are heard ZL2BE, 28500, and ZL2BT, 28400, by Norm Kriebel.

Also from New Zealand, Y. T. hears ZL3IF, 28600, ZL2FY, 28120, ZL2BT and ZL2BE, the latter usually very fine, along with 2FY.

From Greece, we have SV1CA, 28200.

From Latvia, on the recent I.D.A. special broadcast arranged by Roger Legge, an old reporter, and now editor of I.D.A.'s Ama-touring, we had the good fortune to hear a FB catch in YL2CD, 28080. YL2CD was heard R6-7 solid, very good.

Some late tips from Hal Clein, W6: YN3DG, 14256, 7128, will gladly QSL, but only if a U.S. 10c piece is sent him. Also, XAR2LA, 14370, aboard a Norwegian freighter, giving his name as Gunnar, and is a ham in Oslo, when home.

We wish to thank all you OM's for the swell bouquets you've thrown at us, and do hope we can continue rating your praise. We sure appreciate it!

World S-W Stations

(Continued from page 758)

Mc.	Call	
6.005	CFCX	MONTREAL, CAN., 49.96 m., Can. Marconi Co. Relays CFCF 6.45 am.-12 m.; Sun. 8 am.-10.15 pm.
6.005	VE9DN	DRUMMONDVILLE, QUE., CAN., 49.96 m., Addr. Canadian Marconi Co.
6.002	CXA2	MONTEVIDEO, URUGUAY, 49.98 m. Addr. Rio Negro 1631. Relays LS2, Radio Prieto, Buenos Aires. 7.30-10.30 pm.
6.000	ZEA	SALISBURY, RHODESIA, S. AFRICA, 50 m. (See 6.147 mc., ZE8.) Also Sun. 3.30-5 am.
6.000	XEBT	MEXICO CITY, MEX., 50 m., Addr. P. O. Box 79.44. 8 am.-1 am.

End of Broadcast Band

Mc.	Call	
5.977	CS2WD	LISBON, PORTUGAL, 50.15 m., Addr. Rua Capelo 5. 3.30-6 pm.
5.975	OAX4P	HUANCAYO, PERU, 50.16 m. La Voz del Centro del Peru. 8 pm. on.
5.970	YV5RC	CARACAS, VEN., 50.26 m., Addr. Radio Caracas. Sun. 7 am.-10 pm. Daily 7-8 am., 1-1.45 pm., 4-9.30 or 10 pm.
5.968	HVJ	VATICAN CITY, 50.27 m. Off the air at present.
5.950	HH2S	PORT-AU-PRINCE, HAITI, 50.37 m., Addr. P. O. Box A103. 7-9.45 pm.
5.936	YV1RL	MARACAIBO, VEN., 50.52 m., Addr. Radio Popular, Jose A. Higuera M. P. O. Box 247. Daily 11.43 am.-1.43 pm., 5.13-10.13 pm.; Sun. 9.13 am.-3.13 pm.
5.920	YV4RH	VALENCIA, VEN., 50.68 m. 5-9.30 pm.
5.900	ZNB	MAFEKING, BRI. BECHUANALAND S. AFRICA, 50.84 m. Addr. The Govt. Engineer, P. O. Box 106. 6-7 am. 1-2.30 pm. Ex. Suns.
5.900	TILS	SAN JOSE, COSTA RICA, 50.85 m. 6-10 pm.
5.898	YV3RA	BARQUISIMETO, VEN., 50.86 m., Addr. La Voz de Lara, 12 n.-1 pm., 6-10 pm.
5.885	HI9B	SANTIAGO, D. R., 50.95 m. Irregular 6-11 pm.
5.875	HRN	TEGUCIGALPA, HONDURAS, 51.06 m. 1.15-2.15, 8.30-10 pm.; Sun. 3.30-5.30, 8.30-9.30 pm.
5.855	HI1J	SAN PEDRO DE MACORIS, D. R., 51.25 m., Addr. Box 204. 12 n.-2 pm., 6.30-9 pm.
5.845	YV1R8	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.
5.826	TIGPH	SAN JOSE, COSTA RICA, 51.5 m., Addr. Alma Tica, Apartado 800. 11 am.-1 pm., 6-10 pm. Relays TIX 9-10 pm.
5.813	TIGPH2	SAN JOSE, COSTA RICA, 51.59 m., Addr. Senor Gonzalo Pinto, H.
5.790	TGS	GUATEMALA CITY, GUAT., 51.75 m. Casa Preidencial, Senor J. M. Caballeroz. Irregular.
5.758	YNOP	MANAGUA, NICARAGUA, 52.11 m. 8-9.30 pm.
5.740	YV2RA	SAN CRISTOBAL, VENEZUELA, 52.23 m., Addr. La Voz de Tachira. 11.30 am.-12 n., 5.30-9 pm., Sun. till 10 pm.
5.735	HC1PM	QUITO, ECUADOR, 52.28 m. Irregular 10 pm.-12 m.
5.145	OK1MPT	PRAGUE, CZECHOSLOVAKIA, 58.31 m., Addr. (See OLR, 11.84 mc.) Fri. 4.45-5.10 pm.: Sat. 5.15-5.40 pm.
5.145	PMY	BANDOENG, JAVA, 58.31 m. 5.30-11 am.
4.995	VUD2	DELHI, INDIA, 60.06 m., Addr. All India Radio. 7.30 am.-12.30 pm.
4.950	VUM2	MADRAS, INDIA, 60.61 m. Addr. All India Radio. 7 am.-12 n.
4.905	VUB2	BOMBAY, INDIA, 61.16 m. Addr. All India Radio, 7 am.-12.30 pm.
4.900	HJ3ABH	BOGOTA, COL., 61.19 m., Addr. Apartado 565. 12 n.-2 pm., 6-11 pm.; Sun. 12 n.-2 pm., 4-11 pm.
4.880	VUC2	CALCUTTA, INDIA, 61.48 m. Addr. All India Radio. 6.36 am.-12.06 pm.
4.880	HJ4ABP	MEDELLIN, COL., 61.44 m. 8-11 pm.
4.876	ZRD	DURBAN, SOUTH AFRICA, 61.5 m., Addr. (See ZRK, 9.606 mc.) Daily 12 m.-3.45 pm., Sat. till 4 pm., Sun. till 3.20 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.
4.800	HJ1ABE	CARTAGENA, COL., 62.46 m., La Voz de los Laboratorios Fuentes. Addr. Box 31. Daily 8.30 am.-11 pm., Sun. 10 am.-9 pm.
4.780	HJ1ABB	BARRANQUILLA, COL., 62.72 m. La Voz de Barranquilla, 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.
4.740	HJ6ABC	IBAGUE, COL., 63.25 m. 7 pm.-12 m.

COMMERCIAL NOTICES 10¢ A WORD

Under this heading only advertisements of a commercial nature are accepted. Remittance of 10c per word should accompany all orders. Copy should reach us not later than the 10th of the month for the second following month's issue.

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QSL, SWL CARDS, SAMPLES Free. The Royal Press, Meriden, Conn.

RADIO

STOP:—BEFORE YOU BUY A short wave receiver, send dime for our 24-page catalog containing circuit diagrams and information on over 25 Doerle short wave receivers and transmitters. See Dec. 1938 issue for page ad describing a few of our models. Oscar B. Kusterman, 297 DeKalb Ave., Brooklyn, N.Y.C.

PLANS 18 RECORD-BREAKING Crystal sets. SW record 4250 miles, with "Radiobuilder"—year, 25c. Laboratories, 7700-A East 14th, Oakland, California.

ANY RADIO CIRCUIT DIAGRAM 25c. Order mentioning manufacturer's name, model. Catalog Free. Supreme Publications, 3727 West 13th, Chicago.

CRYSTAL, SELECTIVE CRYSTAL set plans 15c. Trent, Box 291, New Brunswick, N. J.

SHORT WAVE RECEIVERS

WE STILL HAVE A FEW USED Doerle receivers Models D-38, BS5 and 7C, reconditioned by factory, at 40% off. See Dec. 1938 Radio and Television for description. Oscar B. Kusterman, 297 DeKalb Ave., Brooklyn, N.Y.C.

SONG POEMS WANTED

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

FOR SALE (NON COMMERCIAL) 3¢ A WORD

Under this heading we accept advertisements only when goods are offered for sale without profit. Remittance of 3c per word should accompany all orders. Copy should reach us not later than the 10th of the month for the second following month's issue.

BRAND NEW RADIO BUG $4.25 (money back guarantee), 160-80 meter crystals (ground) $1.15, blanks: 160-80 meter $.85, 40-20 meter $1.00, radio tubes (most popular types) only 20c each. Richard Dawson, 1308F, The Dalles, Oregon.

GHIRARDI'S "RADIO PHYSICS Course," second edition $3.00. Rider's two books Servicing Superheterodynes, Servicing Sets by Resistance Measurement $1.50. Frederick Aldridge, 1228 Shepard St., Petersburg, Virginia.

INTERNATIONAL CORRESPONDence School Radio Servicing Course, 1938 edition, complete $10.00. Mostacello, 2714 Bainbridge Ave., New York City.

HAVE SW-3s, SKY BUDDIES, and other apparatus for sale. Send for List. John Womack, Dimmitt, Texas.

PRACTICALLY NEW INSTRUCTOgraph, seven tapes $8.98. W1LRV, 16 Sanger St., Medford, Mass.

SKY CHAMPION 8 TUBE REceiver perfect electrical mechanical condition $35.00. Alvin Abrams, 20 Laurel Hill Terrace, N.Y.C.

SKY BUDDY $15.00, SW3 $12.50, FB7 $19.00, RME-69 $89.00. W9ARA, Butler, Missouri.

FOR SALE, SEVERAL NEW IN fac cases 8" PM speakers for 38 or 39 Buick $10 or $12 list, $2.75. A. Jonas, 1019 Wood, Flint, Mich.

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

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

HAVE OVER 2,000 BOOKS TO trade for anything I can use. Your list for mine. M. Epstein, 2953 Ruckle, Indianapolis, Ind.

SWAP ANSLEY PORTABLE radio and phono. combination, AC-DC., Philco 20 and 90. Bradley snowshoes. Crosley model 51, two tube portable battery set. Silver key wound watch. for? Joseph Kubik, 37 Pine Street, Gt. Barrington, Mass.

HAVE FIRST FIVE VOLUMES Science Wonder Stories Magazine complete, first class condition. Amazing Stories dating from August, 1928. Others. Send for list. Trade for communications receiver, radio equipment. J. H. Hood, 37 Club Drive, Greenville, S. C.

WANTED, FOR COIN COLLECtion 1899 Liberty head nickel, also want Indian head pennies. Will swap 200 U.S. stamps for nickel or for four (4) Indian head pennies. Dawson, 1308F, The Dalles, Oregon.

TRADE AUTOMOBILE AND motorcycle license plates with collectors in other states and countries. Will buy if cheap. Swap shortwave set and big Western hat for old car. Or? Anthony Shupienus, Newport, N. J.

WANT SAMPLE OF FLINT AND other rocks, minerals (ore), foreign coins, samples of wool (graded) and samples from five different breeds of sheep. Have all kinds of things. C. Raymond, Maple Street, South Hadley Falls, Mass.

WILL GIVE 50 FOREIGN STAMPS for 15 U.S. commem. except NRA, Chicago, and Anthony. 25 postmarks, 10 tax tokens, 1 newspaper for 10 U.S. commem. Orville Arnold, Box 311, Henryetta, Oklahoma.

HAVE: CHARLES ATLAS PHYSIcal Development course. Western Electric pickup, heavy-duty phonomotor, turntable. Want S-W 3 or other short wave receiver. Paul O'Donnell, 83 Sagamore Avenue, Atlantic, Massachusetts.

WILL SWAP 16MM PROJECTOR, radio parts, stamps, 5 meter transceiver, radio books for low power transmitter. All letters ans. Anthony C. Conlin, 83 Westfield Rd., Holyoke, Mass.

HAVE RADIO PARTS, POWER packs, condensers, tubes, one and two tube battery and electric sets. Want rifles, cameras, field glasses or what have you. John Haynes, Doe Run, Mo.

EXCHANGE MAGAZINE SUBscriptions for transmitting equipment. Will give subscriptions to any magazine for good crystals, transformers and other transmitting apparatus. Like to hear from U.H.F. fans. 100% QSL. R. H. Alexander, Richmond Hill, Ont., Canada.

HAVE BROWN BOBBY DOUGHnut machine. Jowett dumbbell course complete. McFadden five volume encyclopedia of physical culture. Want Von Schrader rug washer, barbell set, correspondence courses, or what have you? Harold P. Sheehan, Caledonia, Minn.

HAVE STEVENS .22 repeating rifle, headphones, Atwater Kent 5 tube battery radio, reversible sewing machine motor, other parts; want auto radio, double button mike, Riders manuals, ?. Harold Hitchen, W7GRH, R2, Newberg, Oregon.

SWAP GOOD FOREIGN STAMPS for Lincoln pennies, Indian head pennies, Columbian half dollars or other good U. S. coins. Karlecheks, 905 5th Ave., Moline, Ill.

WANTED—ALL 8 MM AND 16MM films, also camera and projector. Offer books, greeting cards and view cards and some cash. Write to Joseph Nagy, Jr., 9610 Kennedy Ave., Cleveland, Ohio.

WANTED — SKY-BUDDY REceiver. Will trade 1,000 different, unused postcard views, Sterling's radio manual, Supreme 333 analyzer, etc. Joseph McGuire, 5022 So. 38th St., Omaha, Nebr.

TRADE 5x8 PRINTING PRESS, complete modern rack, all accessories, for used FB7X National receiver with coils, good working condition. Trade motion picture camera, projector (Keystone) both perfect working condition for SW3 National. D. M. Sheehan, W1LMS, 96 Franklin St., Stoneham, Mass.

EXCHANGE BOOKS, STAMPS, precancels, Buro prints for all radio books, 16 mm films, taxidermy supplies, natural history magazines. Send your swap list with want lists. Joseph Bouvette, Box 66, So. Station, Fall River, Mass.

WANTED—265 MMFD. PER SECtion split stator condenser, 7.5v. fil. transformer, T40 or T55. Will swap 1961 KC. crystal for? W4FQX, Edw. T. Blackmon, 2955 Memorial Dr., Decatur, Ga.

WILL TRADE 5-TUBE T.R.F. REceiver, meters, RCA-852's, Cardwell condensers, Thord. 1200V. C.T. at 300 MA for what have you? Write E. Kammerling, 616 N. Central, Chicago.

HAVE PHILCO OUTPUT METER, Ghirardi's Radio Physics Course, 2nd edit., radio parts. Want 0-1 D.C.M.A., D.P.D.T. Federal anticapacity switch. All letters answered. Steve Nagy, Main St., Box 273, Twin Rocks, Pa.

SWAP 1 RCA ELECTRIC SET, needs servicing, 1 $5 microscope, variable condensers, stamps, radio parts and speaker for auto radio, working order, or? Raymond Hower, Rural 3, Bloomsburg, Pa.

HAVE 47 SCIENCE FICTION magazines, Wonder, Amazing, Astounding, etc., 1931 to 1936. Will trade each for 15c face in mint U. S. comm. stamps before 1928. Fred W. Wayman, 286 Pike St., Carbondale, Pa.

WILL TRADE NEW 6-TUBE BATtery set, Silvertone radio for typewriter, musical instruments or what have you? Value $40 in trade. Edward Owens, Wellington, Alabama.

(Continued on opposite page)

The Martian Flash

(Continued from page 720)

images exactly as if one were viewing them from the outside. It took a long time for Martians to become adept in this form of reception, as there are a minimum of ten different wave forms necessary, all being transmitted simultaneously to accomplish this purpose.

Let us suppose, however, that a Martian does *not* wish to receive the television images being transmitted. That again is very simple. As the Martian antennae is made in such a fashion by nature that it can be straightened out or curled at the tip, (as similarly accomplished by insects.) it is only in the straightened condition that the interception of the oscillating waves is possible. At the same time and using the same means, the sounds are also received and thus the Martian can hear and see what is going on in the distant television transmitter, without any special apparatus of any kind. If he does not wish to receive the television program, he merely relaxes his antennae, which then curls at the end and the reception is blotted out, due to the changed wave length of the head antenna. If anything of special national importance arises, special impulses are transmitted which are received by the curled antennae and the Martian will instantly know that something of unusual significance has occurred. He will automatically straighten out his antennae and will be ready for reception in the flash of a second.

There are all sorts of refinements, but I will only mention one: Suppose a Martian is busy with his own work and can not find the time to have his television-sound program at the time. That makes little difference because he can enjoy it later on if he wishes to. In his own home or in his abode where he performs his work there is a certain recording apparatus which for a whole Martian day, stores not only the television and sound programs but many other programs too. These programs can then be reeled off as it were, from any time of the day simply by pressing or manipulating a few buttons. If, for instance, at what would correspond to noon on Earth one would wish to get the noon program at midnight, manipulation of a few buttons will bring that program instantly. At the end of the day the programs are automatically obliterated.

One can, if he so desires, go to the Central Office and get a program no matter how old it is. Thus, the other day, just for the fun of it, I went to the Central recording office and enjoyed a very fine television and musical presentation which had been recorded 1,250,000 years ago! And I am here to tell you that it was a good program too. It showed, among other things, special ultra-telescopic views of the planet Earth during the midst of one of its periodical ice ages and when Man as yet had not made his initial appearance. Close-ups showed the wild animals still in full reign on the planet and as far as Man was concerned, all I saw was ape-like beings. It made me shiver to think how far the Martians were ahead of us even BEFORE we existed.

This is the third issue of *The Martian Flash*. The publishers would like to know if you like it. Vote and mail coupon.

THE MARTIAN FLASH

STOP IT .... ☐
KEEP IT .... ☐

Name ....

Address ....

Rotating Beam Loop

(Continued from page 722)

Twenty-four inches of ½ in. by ⅛ in. iron (an old coal scuttle handle) was fitted with one bolt as a bracket near the top, and a 12-inch piece of dowelling was clipped in this for the rope to run over.

A 6-inch wheel was fixed to a 30-inch length of iron rod (from a car bonnet hinge), and this rod is passed through a hole in a hard wood block near the bottom of the mast, and through the side of the French window-frame. A car window winder makes a neat job on the inside and one complete rotation moves the loop 360°. A compass card under the handle gives the bearing.

The Aerial

The aerial itself was made possible by the discovery that steel cored copper wire is now available cheaply. and two 8 foot lengths of 12 S.W.G. made two very stiff loops. The open ends are 1 inch apart and cemented into two small pieces of bakelite that happened to be available. but celluloid or glass tube would do as well. (Fig. 2.)

Eight stand-off insulators were screwed to the ends of the wooden cross. and small brass clips (springs from lamp batteries) hold the two loops firmly in place under the terminals.

At present a waterproof cable, twin rubbered flex. covered with Empire cloth (or oil cloth), as used for car lighting, is being tried. This has worked well up to 14 Mc.; spaced feeders are heavy and clumsy to mount. A matching stub is not being used, as this cable draws into 100 ohms. Up to 14 Mc. power loss is reasonable, and climatic conditions do not bring changes. as with flex or even some open lines; and this cable is also comparatively light.

In case references are not available for a Reinartz loop. the following information is given:—56 Mc.. 8 ft. ½ in. of wire. 30 inches diameter. loops spaced 3 in.; 28 Mc., 16 ft. 1 in. wire, 60 inches diameter, loops spaced 3 in. Loop ends approximately 1 in. apart.

A narrow beam, in a direction away from the open end of the loop for transmitting, is given.

Results

A month's test with a constant input of 7 watts has obtained an average report of S4 at 20 miles. with a back coverage of S1 using a frequency of 57.488 kc. Short range tests have given reports of S6.

BOOK REVIEW

VAN NOSTRAND'S SCIENTIFIC ENCYCLOPEDIA. 1234 pages, illustrated, cloth covers, size 8" x 11" x 2½". Published by D. Van Nostrand Co., New York City.

Among the many subjects covered by leading authorities, we find Aeronautics, Astronomy, Botany, Geology, Mathematics, Medicine, Navigation, etc. Twenty-one leading scientific authorities wrote it.

All of the subjects are arranged alphabetically and can be located quickly. Under "A," for example, we find such timely and important subjects as airplane engines, airships, alcohols and avigation. Under "B" appears, ably treated and illustrated—balloons, bees, bending moment, binomial formula, blast furnace, blind landing, blood (with color charts), oil burners, etc. Under "C" important topics covered include—cancer, catalysis, chemical compounds, coal, coke and colloids. Under "D" appears—definite integral, derricks, digitalis, dyes, etc. In the "E" section we find eclipses, Einstein theory, electrical topics (such as dynamos, motors and controlling systems), electro-magnets, esters, eugenics and evolution.

The variety of topics included is beyond the scope of this review column, but we might mention a few more subjects just to give the reader some idea of the vast scope of this remarkable volume. Among others we note—fish, fuels, fungi, harmonic analysis, helium, hydraulic turbine, interferometers, invertebrate paleontology, Lentz's law, leukemia, ultra short wave, uremia, vectors, X-rays, telephony, television, tonsillitis, etc., etc.

BARTER and EXCHANGE FREE ADS (continued)

WANTED BEST TYPEWRITER. Will give ten dollars cash or will exchange fifteen dollars worth Indian stone pipes, pots, bowls, copies of prehistoric, for it. Mrs. Nutman, Route 1. Box 125. San Luis Obispo, California.

HAVE CAMERAS, WATCHES, 55 Stanley plane. Stanley brace. miter machines, studio lights. Masonic books. Want small plate cameras, kodaks, small radio, radio books and courses and parts. A. S. Sizemore, Box 483, Jackson, Ky.

HAVE MANY POP. MECH. & Science, other mech. magazines, 1-tube portable battery receiver. uses '30 tube. Want radio parts, anti-capacity switch, or tube-testing transformer. Robert Dick, 708 W. John St., Martinsburg, W. Va.

WANTED — UNIVERSAL S.B. label mike. 10 mtr. xtal. 5Z3 tube, 0-100 MA meter for what do you want in exchange or what have you got besides. John H. Walker. 97-34 Alstyne Ave., Corona, L. I., N. Y.

WANT MODERN SHIP RECEIVER. Navy or RCA. Swap Candler course, Instructograph and tapes. Speed-X bug even money. Give particulars. Must cover commercial bands 600 meters up. John A. Patterson, 3259 N. Philip St., Phila., Pa.

WILL TRADE 22,000 VOLT INduction coil giving 1½ inch spark, for radio parts such as variable condensers, carbon mikes, etc. James Marshall. 1728 Pacific Ave., Atlantic City, N. J.

I HAVE MOST ANYTHING. POSTcards, souvenirs, etc., to swap for transportation tokens of street cars, buses, etc., from anywhere. I answer all. B. Meltobie. 1030 Big Falls Ave., Akron, Ohio.

WANTED 40M CRYSTALS. TRADE for 45 Popular Educators (new) or complete set of QST mags June '37 to '38 and three other late editions of radio from December to February. Stanley Gordon, W5GTN—AARS, 15 Summit St., Hot Springs, Ark.

HAVE COMPLETE N.R.I. COURSE (1928). Servicing and Transmitting, with code instructor, with 5 tapes. Want S.W. receiver. Make trade offer. Clarence H. Moore. 1322 Gilham St., Philadelphia, Pa.

SWAP AN EILEN 7C-AB REceiver 110 volts with 20-40-80-160 coils. A1 condition. for small 5-meter transceiver, or small 160 mtrs. xmtr or what? Maurice Dubreuil. Lavaltrie, Quebec, Canada.

WANT SCIENCE FICTION, TELEvision magazines, old and new. Want old television stuff, test equipment. Have radio magazines. 1923 Popular Mechanics. 1927 television magazine valued at $5.00. diagrams, cowboy songs, odds. Bill Esllek, Norwich, Kans.

HAVE SET OF LIONEL STANDard gauge trains valued at approximately $75.00 which I would like to trade for some radio equipment or testing apparatus. Jack Hedlundh. 133-16 32 Ave., Flushing, N. Y.

INTERESTED IN SECURING A Master Teleplex with tape. Gustave Mondrush, 9918 Lander Ave., Detroit, Mich.

TRADE: 32 VOLT TO 250 V. power supply. Silvertone 7-tube battery set, late model, complete 32 volt Atwater Kent radio 7 tube, crystal mike, carbon mike, for? C. J. Gates, 239 Main St., Jonesboro, Ark.

TRADE: 250 EXCELLENT AIRplane pictures, Army, Navy and foreign planes. What have you in radio you don't want? QTH Raymond Berube, 24 Hawley St., Lawrence, Mass.

NEEDED VERY BADLY, MODUlator or speech amp., xtals, any kind of xmitter wanted. Anything xmitter or recording needed. Swap QSL, SWL cards, QSL 100%. Send details. Ray E. Murphy, 7311 Georgetown Rd., Bethesda, Maryland.

BATTERY CHARGER, 1—20, HOYT meter battery tester 38 h.p. Large hunting knife, sheath, No. 1 pocket Kodak, tripod, Popular Mech., Popular Science, National Geographic mags. Want good SW receiver, elect. M. Gohr, Box 64, Willow Springs, Ill.

RCA - VICTOR 9-40 RADIO chassis, tuner, power pack, dynamic speaker and loop. Ideal for experimenters or loud speaker system. Instrument cost $1000.00. Exchange for standard make movie outfit, rifles. P.O. Box 124, Somerset, Ky.

WANTED—NATIONAL PW2 TUNing unit, 160 mmfd. per section, complete with gear box and dial. Aladdin IFs types S-2212A, S-2242B only. Have Instructograph with tapes, oscillator like new. Andrew Balint, 3318 W. 31st St., Cleveland, Ohio.

WANTED: COILS FOR PILOT Super Wasp battery type s.w. recvr., also Riders manuals, B Eliminators and code tapes. Write. Archibald Bursey, Burlington, Newfoundland.

SWAP ARGUS CANDID CAMERA, or G.E. ¼ h.p. electric motor, heavy duty induction type, for model airplane motor or repeating rifle. Ray Cecil, Winters Lane, Cold Springs, Kentucky.

A 1938 FULTONE S AND L WAVE receiver complete, in perfect condition, value $14.00 AC-DC. Trade for bicycle of like value in Arizona only. Send stamp. William Sickle, Rte. 4, Box 653, Tucson, Arizona.

WANTED 465 KC XTAL. VAR. tube R meter, crystal mike. (Have typewriter Oliver.) Green Flyer phonomotor and xtal pickup, multimeter and oscillator, Triplett. SWLs answered. "Let's Swap." Eldon Wooster, Feesburg, Ohio.

HAVE SX-11 SUPER SKYRIDER with Hallicrafters 12" speaker, 8 mm camera, 2 sets SWK6 coils, numerous parts and tubes. Want late model 22 hp outboard, or? C. Brown, 333 Hazel St., Lancaster, Pa.

5 TUBE TRUETONE SHORTwave and broadcast AC mantle receiver and 8-tube AC Silvertone cabinet broadcast receiver. .22 pump rifle. Speakers. Need radio books, parts, meters, etc. Al Slaney, 3517 Hennepin Ave., Minneapolis, Minn.

HAVE $39.50 ELGIN NATURAL gold watch, pair photo cells, magnetic pick-ups, elec. razor, pair crystal fones, 2-tube A.C. set. Want Sky Buddy or receiver capable of operating speaker. L. Warren Morris, Williamstown, Pa.

TRADE: COLLECTION OF APproximately 4,000 postal card views. 12 ga. repeating shotgun. Crosley "flver" radio. electric shaver. Want outboard motor, stamp collection or what have you? Answer all inquiries. E. Pence, Box 22, Griggsville, Ill.

TRADE COMPLETE LA SALLE accounting course, cost $130.00, for superhet radio, 30 watt amplifier, service equip., or. G. H. Heidenbrand, Staplehurst, Nebr.

WANTED—AC-SW3 WITH COILS, tubes and power supply or Sky Champion or Howard or other suitable SW receiver. Trade $55 wood Bb clarinet. All letters answered. Huddleston, 918 South 25th Street, Temple, Texas.

ONE PROJECTOR WITH 3¼" lens, for showing solid object like postcards, snapshots, onto screen, up to six ft. in diameter. Exchange for six volt generator in excellent condition. F. McNabb, Green City, Missouri.

WANTED RIDERS MANUALS 1 to 9 volumes. Will pay cash. Carl M. Jensen, 211 East 200 St., Bronx N. Y.

WANTED—CASH OR TRADE—old radio tubes for hobby collection. Need not be in working condition if eye perfect. Send list. Have duplicates for trade. M. Snavely, 1014 Cedar St., Elkhart, Ind.

CANADIANS—WILL TRADE SWC es Radio & Television mags es radio parts for washing machine gas engine or 250 volt 50 mill motor generator. J. O. S. Hunter, Kensington, P. E. Island.

WANTED RCA 955 ACORN TUBE, have new Cardwell variable cond. 15 mmfd., 3 Hammarlund 5-prong Isolantite sockets, 2 R.F. chokes 2.1 MH. John Evanovsky, 17 Robert St., So. Paterson, N. J.

WANTED VARIABLE BEAT FREquency audio oscillator. Will pay cash. Give make, model, condition and price in first letter. Gardner Radio Service. 2689 L St., San Diego, California.

TRADE: EILEN RX-14-AR 6-tube T.R.F. receiver. Cost $24.40 new. Coils for 20—40—80—160—BC bands. Built-in speaker. What have you? All letters ans. W9TME—2901 N. Kilbourn Ave., Chicago, Illinois.

WANTED: U. S. STAMPS, HIGH values, commemoratives, precancels or slogan meters. Will trade magazines including Radio-Craft, old issues of Electrical Experimenter, Esquire, etc. Send for free list. Charles Chenoweth, 1218 S. Blanchard St., Findlay, Ohio.

SWAP—TOOLS, CAMERA, CROWN crimping machine, mounted owl, jig saw, stereotype caster, novelties, small printing press, etc. Want—microscope typewriter, postal scales, .22 cal. rifle, rotary tool. Will exchange lists. Albert O. Rimer, Rimer, Penna.

16 H.P. LOCKWOOD OUTBOARD motor, will swap for motorcycle, short wave receiver or what have you. W. R. Cotter, 34 Pearl St., Springfield, Mass.

HAVE NEW $150 PORTABLE POPcorn machine for new or nearly new Hallicrafter or National receiver, or what have you? Gerald H. Worth, 803 Randolph, Waterloo, Iowa.

HAVE OVER $200 WORTH OF high grade s.w. receiver parts and kits to exchange for stamps or receiver such as Sky Champion or Howard 430. J. Kasperski, 34 Albern Ave., Oceanside, N. Y.

SWAP 300 INDIAN HEAD PENnies, half cents, two- and three-cent pieces, old nickels, half dimes, Bliley xtal, D.B. mike for portable battery receiver or phonograph turntable. W2GPG, 139 So. Day St., Orange, N. J.

OFFER — BATTERY CHARGER, movie projector and films, violin, phono oscillator, mike, test equipment, alignling tools, radio books and magazines, movie camera, films, or. Harry Parker, Sylva, N. C.

SWAP F.B. PRINTING FOR S.W. receiver or transmitter parts or? I will pay spot cash for a small beginner's C.W. transmitter if reasonably priced. Must be complete. Lawrence Pleasant, P.O. Box 58, Mattoon, Illinois.

WANTED: 5-METER RECEIVER. Will trade $3.00 chemical set. QRA J. Krehel, 3581 E. 104 St., Cleveland, Ohio, U.S.A.

WILL TRADE RADIOS, AMPLIfiers, and watches. Want good typewriter. Eugene Cox, Harrisonville, Mo.

HAVE BRAND NEW AUDITORIUM amplifier guitar complete with case. Want: good velocity or crystal microphone. Have N.R.I. Radio and Television course complete. What have you? Walter Burdine, Waynesville, O.

HAVE CODE PRACTICE OSCILlator, one tube audio amplifier, radio magazines, want microphone, 0-100 ma milliammeter, 0-500 volt voltmeter, 6 volt vibrator transformer and vibrators. William Blecha, Pawnee City, Nebr.

SWAP FOR TRANSMITTER parts. Garage battery charger, Prestolite tank, auto radio, plumber's firepot, washer motor, 4 yrs. Radio-Craft, Maytag engine, 2-tube Kadette, large telescope, cost over $200. E. C. Warren, Capac, Mich.

HAVE BRUNSWICK JR. POOL table, 48" by 31" (folding legs) with set of agate balls, triangle, two 40" unfinished wood cues. Very good condition. Want testing equipment, or? Vercoe Jones, 61 Carlton Ave., Trenton, N. J.

HAVE ARGUS CANDID CAMERA. Like new. Want U. S. stamps or short wave equipment or set or what have you? James E. Wilkelm, Box 693, Elkins, W. Va.

HAVE ONE SUPERIOR ALL wave signal generator with audio frequencies. Want a 5 meter transmitter or a receiver or anything that you have to swap. Write what you have. Will answer. Albert Sebesta, Snook, Texas.

WANTED — POSTCARD SIZE Kodak, F6.3 lens. Will trade a pair of 800 xmitting tubes, 0-25 MA. Weston, 0-100 MA. Triplett. % W2GWQ, 7 Avenue B, New York City.

SWAP—WESTINGHOUSE 110 V. A.C. 200 watt generator, 4 replacement carbon brushes and blueprint. For Speed key, Mac. osc., Barbells, etc. A. Bellan, R.F.D. No. 3, New Brunswick, N. J.

WANT CODE MACHINE WITH tapes. Have Dayrad tube checker, Ranger signal generator and Triplett meters. Donald H. Marcotte, Garvin, Minnesota.

WANTED — STAMPS, POSTAL cards and book matches from all foreign countries. Have such to exchange from this end. Will also exchange Colorado tokens for other tokens. Ellis L. Parr, 405 Ash Street, Trinidad, Colorado, U. S. A.

HAVE 2 H.P. OUTBDARD MOTOR, 2 B. and L. microscopes, 300 to 2,000 diam., 1 pr. binoculars, 8 pwr., 1 Schick dry shaver. Will swap. Peter Lambert, 27 Vernon Street, Worcester, Mass.

WILL SWAP: "HOW TO PLAY Blues on a Harmonica," Brandes "Superior" headphones, type 30 tube. Will swap for electric shaver or wristwatch. M. Konon, 48 Edwards St., Patchogue, N. Y.

WANTED RADIO PARTS, PREFerably headphones or var. condensers. Have 209 U. S. and foreign stamps. Over half are commemoratives. Two are over fifty years old. Carl O. Hicks, Route 2, Laverne, Okla.

WANTED: NATIONAL FB7 WITH coils and power supply, or other good communication receiver. Will pay cash or trade. Have several interesting items to trade. H. S. Lair, Vineyard Haven, Mass.

HAVE 7 WATT AMP. 4 TUBE, trade for good lathe, good phono pickup-motor-and-turntable, or small gasoline engine. Trade tubes, R.F.C. coils and ant. coils. Elthue Thompson, Box 481, Kosciusko, Miss.

HAVE FB D.B. MIKE, SW4 WITH all coils to 18 meters, handset, 0-5 Weston 3 volt-meter, also 3 PJ-4 tubes, a real antique. So wat sa? W1LDO, Roxbury (19), Mass.

WANTED AN ULTRA STRATOsphere "10" complete with all coils, must be in perfect shape, also want short wave sets and transceivers. Steve Novota, Jr., Moweaqua, Ill.

CANADIANS—HAVE 2,000 RARE British Colonies, Dominions, stamps mounted, including Coronations. Collection costing $110, 80 Stamps Magazines, Rapkin Favorite album, for good transmitter, 50 watts, or parts. Herbert Wagman, 11 Lauder, Toronto.

TRADE FOLLOWING PHOTOgraphic articles—8x10 plate Kodak with several old lenses; Foth Derby F:2.5 new, with case; enlarging lens F:3.5; Univex movie lens F:3.5; radio parts. For? Gerard Lacombe, Box 513, Madawaska, Maine.

(Continued on page 764)

BARTER and EXCHANGE FREE ADS (continued)

HAVE NEW RIDERS VOLS. 2. 4. 5. 6. Philco signal gen. All wave mod. 088. Jewell analyzer. mod. 911. Dayrad tube testers. short wave parts for what? Jos. Bakutis. 794 Quinnipiac Ave.. New Haven. Conn.

HAVE 200W—16 MM MOVIE projector (AC-DC) with 1.000 ft. movie films value $50.00. Want 8 mm movie equipment. or what have you. J. Winkler. 62 Bergen Ave.. Clifton. N. J.

SWAP JANETTE ROTARY CONverter. 32 V DC to 110 AC. for Sky Buddy or typewriter. In good condition. Cost $35. Also have 12" dynamic spkr.. for crystal. parts. Jack Spencer. 513 W. La. Ave.. Ruston. La.

HAVE 1/6 H.P. A.C. MOTOR. 2 Magic Eye tubes. Will exchange or buy old coins dated before 1900. Please send exchange list or price in first letter. QRA: Stanley. Box 183. Winchendon. Mass.

WANT MICROSCOPE. TELEscope. chemistry outfit. electrical engineering course. large dictionary or encyclopedia set. Have audio amplifier. speakers. power packs. 4 radios and bundles of tubes and radio parts. Claude Carpenter. Sweet Springs. Missouri.

INSTRUCTOGRAPH OR OTHER code machine wanted or set tester. Trade 180V genemotor. model A100 Utah dynamic speaker with power supply or other radio parts. John Malder. Blanchard. Idaho.

HAVE $200.00 BUSINESS CORrespondence course. ten tube battery radio and many radio parts. Swap for test equipment. meters. Riders manuals. National SW3 or preselector. E. S. Barnett. South Boston. Va.

TRADE 2 LIONEL STANDARD trains and equipment worth over $100. for good .22 repeating rifle and shotgun or late Skyrider or Howard receiver. etc. Also have stamps. Ray Bowers. 671 E. 92 St.. Cleveland. Ohio.

WANTED: CHEAP ELECTRIC MOtor with turntable. suitable for use with pick-up. Tell R.P.M.. age. make and price. I will QSL 100%. Don Pettijohn. 2117 East Mifflin St.. Madison. Wisconsin.

IRELAND CALLING. WILL EXchange stamps. cigarette cards. or post cards for stamps only. British colonials and air mails preferred. Mervyn L. Colhoun. 18 Grove Place. Londonderry. Northern Ireland.

WANTED: SWITCH BAND SHORT and long wave receiver. I have books or will pay cash. Not over 6 tubes. Prefer metal ones. Chas. D. Miller. Box 4145. Pinewood. Rural Sta.. Miami. Fla.

HAVE 6-TUBE. 2-VOLT BATTERY broadcast receiver. Want lathe. electric drill or drill press. ½ h.p. motor. A.C. short wave set or what have you? Carroll P. Clark. Gossville. New Hampshire.

HAVE VICTOR 16 MM MOVIE projector. silent. cost approx. $100.00. Will trade for a Hallicrafter Sky Champion. Must be in good condition. L. A. Dare. Co. 544. C.C.C.. Yellowstone Park. Wyo.

TRADE KELSEY 5x8 PRESS. hedal operated. 8 cases of type. new rollers. 2 new type 10 National Union heavy duty tubes. Want low power ten meter phone or outboard motor. H. Cary. W9TOF. Eagle Lake. Minn.

YOUR DUCK HUNTING STAMP is worth ten unused purple postage stamps to me. if in good condition. Stamps. covers. postals. seals. radio parts. to swap for same. Drop a postal today. Mervyn Reynolds. Jefferson. Maine.

WILL SWAP CABINETED MAjestic speaker. 2 dynamic 5 in. speakers. 2 tube Philmore all wave receiver. Send list for mine. A. S. Brazanskos. 105 Elizabeth St.. Athol. Mass.

WANTED: ARGUS ENLARGER or? Have rifle. radio tubes and parts. stamp catalog. back issues of S.W. &T.. also many other assorted books and magazines. Robert E. Lloyd. Box 94. Portsmouth. Ohio.

REGULAR LINOTYPE KEYboard. Good for learning to operate. Will exchange for receiver or what have you? George Mraz. 615 7th Ave.. Williamsport. Pa.

SWAP COMPLETE SET TEACHers and Pupils Encyclopedia. like new. value $28. for good battery operated amateur receiver. Ernest Verity. Box 20. Goodwater. Sask.. Can.

HAVE GE 12.000 VOLT CT 22 milliampere transformer. Buescher B flat soprano saxophone. large stamp collection. mint U. S. commemoratives. Want transmitting equipment. test instruments. manufactured receiver. crystal microphone. W7FER. 1405 East Washington. Boise. Idaho.

HAVE EMERSON DYNAMOTOR. 6 volts input and 180 volts output. Zenith wind charger. Maytag gasoline motor. 32 volt lite plant. Sonora amplifier and speaker. Wanted Riders or Gernsback manuals. Gottfried Streckert. Chilton. Wisc.

HAVE B SUPPLY AND NUMERous other radio parts to swap for photographic equipment. All letters answered quickly and cheerfully. Billy Criswell. 57 Minard Street. Lockport. New York.

HAVE MOVIE AND CANDID cameras. filters. mint U. S. comm. stamp. precancels. electric shaver. etc. Want good reflex camera. enlarger. photographic items. or? Michael Gianfrocco. 604 Union Ave.. Prov.. R. I.

SWAPPERS! I SWAP EVERYthing under the sun. Mostly hobby goods such as stamps. coins. etc.. for what have you? Stamp brings list. Virgil Clemetson. Roswell. South Dakota. U. S. A.

WILL EXCHANGE: R.C.A. MAGnetic speaker. trickle charger. Tungar battery charger. old typewriter; for testing equipment. Prefer good tube tester. Write. J. Marsh. 111 Van Liew Ave.. Milltown. N. J.

HAVE: NO. 4 ERECTOR. LINO. carving tools. lab. equip.. books. speaker. pin collection. tent. axe. knife. etc. George Fried. 1764 Weeks Ave.. Bx.. N. Y.

SWAP—FOR USED DO-ALL DEluxe or similar set:—a G.E. Tungar charger. Charges up to 16 batteries. (Swell for serviceman.) Has extra bulb. all A-1 condition: list free. Don Yocom. Bettsville. Ohio.

SWAP: TWO 12 GA. DOUBLE hammer style. Stevens 410 ga. double hammerless shot guns. Eastman 4 x 5 autographic kodak. registered A.K.C. cocker spaniel pups. Started. trained beagles. Wanted: Kodaks. rifles. Gust Spink. Route 30. Muskegon. Mich.

WANTED: SPRAYBERRY'S LATest regular radio course. Have to trade automatic code machine and code course. all-wave amateur set. xmitting parts. mikes. meters. etc. For list write to: S. J. Niewicz. 79 Church St.. Broad Brook. Conn.

WANTED: TEST EQUIPMENT. auto radio. Have 57-56-2A5-80 amplifier with 9" Utah spkr.. 7148 KC crystal. 35MM DeVry camera. C. Fortier. 4 Clinton St.. Potsdam. N. Y.

WANTED RIDER'S MANUALS. 2" C.R. tube. double extension plate camera. Have 1" C.R. tube. excellent barometer. F4.5 ½ VPK camera. 3 yrs. Pop. Sci.. 4 yrs. Journal Amer. Chem. Soc. Leo J. Jennings. 75 Hume Ave.. Medford. Mass.

AM A BEGINNER IN RADIO. Would like to swap parts and correspond with other beginners. Francis Berkshire. Bx. 65. Masontown. Pa.

WANTED. USED 100 MMF 10.000 volt transmitting condenser. Will QSL with YL's in foreign countries only. K. B. Hume. W1KRK. 51 Atlantic Ave.. Boothbay Harbor. Maine.

TRADE: EASTMAN BABY Brownie camera $1.00. Univex model A camera 50c. Want camera that takes time exposures. snapshots. Will add books if your camera costs a little more. Alexander Podstepny. 217 Pine St.. Phila.. Penna.

WANTED A GOOD SHORT WAVE receiver. Have three months' old Remington portable with case. Also cash if necessary. I. Mininsohn. 128 Franklin Street. Hightstown. N. J.

WANTED: HALLICRAFTER REceiver. I have 110 aviation and 20 Popular Science magazines. Dick Sauer. 506 Vo'usia Avenue. Dayton. Ohio.

BEST TRADE OFFER TAKES Jewell tube tester. Checks all glass tubes. Trade for radio equipment. Columbus Emma. 6339 Gaviota Ave.. Van Nuys. Calif.

HAVE 133 MAGS.. AERO DIGEST. Popular Aviation. Air Trails. Flying Aces and Popular Mech.. 6x biascope. all parts from Majestic 70. Want s.w. A.C. receiver or? Joseph Lukas. 87 Bernice St.. Johnson City. N. Y.

SWAP: STAMPS. PRINTING equipment. printing. fiction magazines. and radio parts for communications receiver. radio parts. mechanic magazines or what have you? Earle Hammond. Albion. Maine.

SWAP: 1½ H.P. FAIRBANKS-Morse gas engine like new. battery charger A1 shape. ¼ H.P. "B line" 110V electric motor. radio magazines. good A eliminator for radio parts. especially xmitting. Walter Blumer. R2. Jefferson. Wis.

TRADE—NEW KODAK BANTAM. $27.50 value with anastigmat f4.5 lens. 1/200 S.P. lens and camera in perf. cond. Will trade for SW receiver of similar value. Raymond Mueller. 33 Seventh St.. Fond du Lac. Wisconsin.

WANTED TO SWAP "PORTEX" Underwood typewriter for ½ to ¾ HP gasoline engine or good battery radio. Typewriter complete with new ribbon and carrying case. Thomas H. Brook. Haleyville. Alabama.

WANT ENLARGER. DEVELOPING tank. printer. exposure meter. and other photographic equip. Will trade printing of stationery. etc.. new earphones. phono-pickup. 10 watt amplifier. power supply. QSL's printed or cash. Bill Pearce. P.O. Box 671. Klamath Falls. Ore.

WILL SWAP ONE ELGIN 3 TUBE S.W. receiver and coils complete for xmitter parts. meters or good mike. All mail answered. Pauline White. Pittsville. Maryland.

WILL EXCHANGE 32 VOLT ONE H.P. generator D.C. Packard electric razor. 6 volt model. Hammond typewriter. For 16 mm films. Clare E. Ernst. 1107 Root St.. Flint. Mich.

WANTED A 6L6B MODUL. AND speech amp. 6L6 tubes also. Condenser and mike. Pay cash or swap. Ray Rozek. 712 So. Farragut St.. Bay City. Mich.

WANT ELECTRIC DRILL. HAVE numerous transmitting and receiving parts. also many back issues QST to swap for drill. Describe drill and what you need. Herman Yellin. 351 New Lots Ave.. Brooklyn. N. Y.

WANT 456 KC AIR TUNED I.F. transformers. 456 KC I.F. crystal. Meissner slide rule. dial. coils. and tuning condenser. Have radio parts. tennis racquet. camera. cash. Harry Dinackus. 800 Sixth St.. Reading. Pa.

HAVE FISHING TACKLE. RIFLES. radio mags.. short wave radio parts. BC parts. power pack and new tubes. Want Stromberg-Carlson No. 69 SW converter or fishing tackle. H. D. Stansel. Lowell. N. C.

HAVE NATIONAL 45 RECEIVER. 3 pr. coils. freq. meter. xtals. trans.. vernier dials. tubes. misc. Everything for ham xmitter. Want stamps or camera. All letters answered. Jack Cisek. 4 Gibson St.. Natrona. Pa.

I HAVE 10" UTAH SPEAKER. 5" RCA speaker with output transformers. I want Ralston code records or what have you. Robert C. Dole. 10 Clinton Ave.. Rutland. Vermont.

WILL TRADE NEATLY CONstructed 50 watt CW transmitter. 6L6G xtal and 10 final. for medium power transmitting parts such as power supply. tubes. or what have you? W9RXW. 2119—12 Street. Moline. Illinois.

BEST TRADE OFFER TAKES 25 cycle power transformers. 6 volt speakers. QST. class B output transformer. 33. 2A3. 81 tubes. 110 volt. 700 watt. 60 cycle generator. band switch coil assembly. condenser. D. Buck. 43 Hagen Ave.. N. Tonawanda. N. Y.

HAVE OLD 9-TUBE PHILCO B.C. receiver. good tone. sensitivity. needs minor repair: trade for typewriter. Ivan Rice. Meredosia. Ill.

WANTED: 5 METER C.W. TRANSceiver. Trade home chemical laboratory consisting of approximately 300 different chemicals in vials. jars. Also includes glassware. several books on chemical analysis. Outfit cost $20. Rudolph Thoma. 1720 Putnam Ave.. Brooklyn. N. Y.

HAVE TRIPLETT SIGNAL GENerator. Model 1230. Good cond.. but less batteries. Will trade for "bug." G. H. Bruns. CCC 4607 DG-98. Dubois. Idaho.

SWAP—ABSOLUTELY ALL NEcessary parts for six tube super—Meissner IF's. Hammarlund's. tubes. power supply. speaker: for Vollenda. Goldi. enlarger. or Kayak. More by letter if interested. Hubert Siuda. 3703 Belmont. Chicago. Illino's.

WILL EXCHANGE 96-LESSON Spanish guitar course for SW receiver or what have you. Charles A. Nuss. 812 Locust St.. Williamsport. Pa.

TRADE FOR GOOD BATTERY all wave radio 4-6 tubes. Mac Practice set. 20 tubes. camera. 2 headsets W.E.. Trimm. 39 ARRL Handbook. 2 crystal sets. world globe. Hover. Box W. Lemon Grove. California.

SWAP—125 WATT RIG WITH 25-60 cycle supplies for good 5 meter transmitter and receiver. 25 watt P.A. system or? Jack Cook (VE3AMP). Box 419. Simcoe. Ontario. Canada.

SWAP: THREE POSTMARKS FOR each Planters peanut bag sent me. one hunting permit stamp brings one hundred. send return postage. all hunting stamps must be on original paper. Stanley Wright. Howard. S. Dak.

WILL SWAP AGFA D6 CAMERA. 6 jewel wrist watch. 50 foreign coins. foreign stamps and currency. oil paint set. magazines. for radio parts and equipment. S. Bederman. 1295 Sheridan Ave.. Bronx. N. Y.

2 GOOD HICKOCK HIGH FREquency milliammeters. 0-1000. 0-4000. mounted; Shure 22N microphone (poor condition): Noiseless portable typewriter like new (with case). Want cameras or photographic supplies. Robert Eichberg. 782 West End Avenue. New York City.

WANTED: SKY CHAMPION. SIGnal generator. beat frequency oscillator. oscillograph. Trade and cash balance. Must be in excellent condition. Write directly for arrangement. H. S. Loh. 9 Mellen Street. Cambridge. Mass.

SWAP PAIR T-20'S. 50 WATT class B transformers. double button mike and stand. pair 600 volt 200 mill UTC with 4 filament windings for 3000 volt condenser or transmitter parts. W5GUY. Rio Hondo. Texas.

(Continued on opposite page)

S-W League

On the "Ham" Bands

Edited by Elmer R. Fuller

● CONDITIONS during the past month have not been any too good, although some very fine business DX has been heard at times. The Europeans have been coming in very well. and about two hundred were reported by our observers in January. Conditions on the ten-meter band have been much better than ever before this season. and about half of the stations were reported on this band. Twenty meters has improved somewhat from the previous month, and is now staying open until a much later hour at night. At present it is open until around 2:00 a.m.

We have learned that ZT6P has changed his call to ZS6CK; his QRA is: E. P. Abdo. 314 Normandol Court, 109 Kerk Street, Johannesburg. South Africa.

From February 11 to about March 14, W2IWT will be en route to the island of Sumatra on an expedition. During the time he is gone. he will maintain communication with W4DLH of Goulds. Florida. He will also be in communication with PK4KS. PK4CT. and PK4HW.

To get down to business, we have reports from the following sections of the world:

Alabama	Wells, Jack
Arizona	Fuller, Lester
Arkansas	Henderson, Bill
Canada	Clarke. Stanley
Colorado	Wallen, Dan T.
Connecticut	Kemp, Howard
France	Le Rasle. Charles
Georgia	Patterson. C. R. ("Pat")
Illinois	Carling, Len M.
Kansas	Hegler. Burns E.
Louisiana	Wynne, Maurice
Maine	Barker, Elwyn
Nebraska	Noyes. William Dean
New Jersey	Fitzpatrick. John
New York	Herzog. W. F.
	Fuller, Charles H.
	Yours truly
North Carolina	Oglesby, William W., Jr.
Ohio	Gallagher, L. F.
Oregon	Trueman, Elwood C.
Pennsylvania	Hartzell, Clarence
South Carolina	Halliday, Ray
South Africa	Versfeld. John F.
	Westman. Oscar
Utah	Parker. Robert
Washington	Lang, Ernest W.

Beginning with this issue, another new plan for listing stations reported heard by our observers is being inaugurated. By use of this new method. it is thought that it will be much more useful to our readers. It is believed that readers are interested more in *where a station is being heard* than in who is hearing it. Therefore, instead of placing the name of the observer after the station reported. the name of the section of the world which that observer represents will be printed.

From Asia. the following stations have been reported. This is the largest number of Asiatics to be reported this season.

Call	*Freq.*	*R*	*S*	*Where Heard*
XZ2JB	14.3	5	6	Canada
XZ2DY	14.067	4-5	5-8	Penna., South Africa. Ohio
XZ2EX	14.	5	9	South Africa
XU8AM	14.06	3	5	Ohio
XU8ET	14.13	5	6	France
VU2DY	14.3	3	5	Ohio
VU2LY	14.265	5	6	France
VU2FU	14.19	5	9	France. South Africa
VU2CQ	14.12	5	9	France. Ala.. Penna.
VU2BU	14.	–	–	France
ZC6AA	14.415	5	6	France
ZC6AE	14.1	5	5	France
ZC6EC	14.36	5	8	France
YI2BA	14.0	5	7	France
VS1AI	14.08	–	–	France
VS2AS	14.	5	8	South Africa
VS6AS	14.13	5	9	France
VS7RA	14.28	5	6	France
VS7RF	14.1	4	5	Ohio
VS7GJ	14.04	5	9	France
J2AK	14.	5	9	South Africa
U8IB	14.445	5	6	France

Africans have fallen off some since last month. but several are being heard in the eastern United States, and are very consistent in France.

ZS1BL	14.03	5	8	France
ZS1T	14.09	5	7	France
ZS1AX	14.102	5	8	Penna.
ZS1B	14.08	3	4	Ohio
ZS2X	14.01	5	7	Canada
ZS2AZ	14.04	5	8-9	Canada. France
ZS2AF	14.110	5	7	France
	28.215	3	5	Ill.
ZS2N	14.1	4-5	7-8	France. Penna.
ZS3F	14.07	5	9	Penna.
ZS4H	14.06	5	7-8	Canada. Penna.
ZS5AW	28.1	5	7	Canada

Call	Freq.	R	S	Where Heard
ZS5T	14.1	5	8	Md.
	28.0	5	8	Neb.
ZS5CL	14.085	3	7	Penna.
ZS6A	14.015	3-4	6	Conn., Ariz.
ZS6BR	14.047	4	6	Conn.
ZS6S	14.120	5	8	Penna., N. C.
ZS6X	14.005	3	6	Penna.
ZS6AJ	14.085	4	8	Penna.
ZS6DW	14.03	4-5	6-8	Md., Ala., N. J., Ohio
	28.03	4	7	Penna.
ZS6AJ	14.04	5	7	Md.
ZS6W	28.26	5	6	Neb.
ZS6DK	14.01	5	9	France
ZD2H	14.065	5	5	France
ZE1JG	14.3	5	5	France
ZE1JE	14.045	5	8	France
ZE1JX	14.38	5	6	Ohio
CN8AW	14.04	4	6	Conn.
CN8AY	14.095	4	6	Conn.
CN8MV	14.09	4	7	N. J.
ZT6LN	14.08	5	6	Ohio
CN1AF	14.10	5	6-9	Ala., Penna.
CN8BA	14.08	4	6	Ala.
	28.11	4-5	6-7	Neb., Penna.
OQ5AJ	14.06	4	6	France
SU1MW	28.52	5	8	Penna.
FA3FB	14.160	4	5	Ohio
VQ2HC	14.260	5	7	France
VQ3LJP	14.05	4	6	France
VQ4KTB	14.13	5	7-8	France, South Africa
VQ5ELD	14.0	5	5	France

For the benefit of the amateurs in our own country, the following have been heard in foreign countries, mostly across the big ponds. These are all in North America.

TG9BA	14.285	5	8	Canada
TG9AA	14.060	5	8	Canada
K4FAC	28.55	5	8	Canada
K5AF	14.13	5	6-8	Canada, Ore.
K7FBE	14.25	3	6	France
K7FST	14.25	5	7	France
CO2EG	14.2	5	8	France
CO2WM	14.07	–	–	France
CO2LY	14.1	5	8	Canada
CO6OM	28.4	5	6	Canada
CO7CX	28.3	5	7	Canada
VP1BA	14.	5	7	South Africa
VP6YB	14.08	5	8	Canada
VP7NS	14.1	5	8	Canada
	14.37	5	9	France
VP9L	14.160	5	8	France
HI6Q	14.	–	–	France
HI7G	28.4	5	8	Canada
NY2AE	14.2	5	9	France
TI2AV	14.	5	8	France
VO1Y	14.17	5	9	France
VE2AK	28.15	4	6	France
VE4BF	28.3	3	5	France
VE4SS	28.5	5	7	France
W1AFJ	28.7	5	8	France
W1ANA	29.0	5	9	France
W1BBX	28.15	–	–	France
W1CMD	29.25	4	7	France
W1DIK	28.84	5	8-9	France
W1FVO	28.55	5	9	France
W1GUS	28.265	–	–	France
W1HJK	29.4	5	8	France
W1IGD	29.12	–	–	France
W1IYE	28.65	5	9	France
W1KUD	28.54	5	9	France
W1KRW	29.45	–	–	France
W1LMB	28.68	5	8-9	
W1LNE	28.94	5	9	France
W1WV	29.3	5	8	France
W1BLU		5	6-7	South Africa
W1AXA		5	8	South Africa
W1AJZ	14.2	5	8	France
W1BUZ	14.175	4	6	France
W1IDQ	14.185	5	7	France
W2BQI	14.24	5	7	France
W2IXY	14.225	5	8	France
W2JKQ	14.17	5	7	France, South Africa
W2JP		5	8	South Africa
W2ALK	28.725	–	–	France
W2FGB	28.5	5	8	France
W2HJU	28.7	–	–	France
W2JMC	29.3	5	9	France
W2JXZ	28.9	4	6-7	France
W2KHR	29.11	5	9	France
W2CLK	29.15	5	8	France
W3BSO	14.	–	–	France
W3DKY	14.24	5	6	France
W3FN		5	7	South Africa
W3CHE		5	7	South Africa
W3FOU	28.6	5	9	France
W3HQV	29.115	–	–	France
W3UX	29.0	5	8-9	France
W4BC	14.2	–	–	France
W4DU	14.23	5	8	France
W4BJV		5	7	South Africa
W4BMR		5	9	South Africa
W4DLH		5	9	South Africa
W4AAU		5	7	South Africa
W4AEI	29.1	5	8	France
W4DCQ	28.935	5	8	France
W4DWX	29.0	4	7	France
W4EDD	28.7	5	9	France
W4MV	29.445	5	8	France
W5ELW	14.205	4	6	France
W5GDU		5	7	South Africa
W5DNY	28.6	5	8	France

(Continued on page 767)

BARTER and EXCHANGE FREE ADS (continued)

WILL TRADE INSTRUCTIONS how to make artificial marble, etch on glass, resilver mirrors and 97 other quality formulas. Also two tube receiver (13-545 meters). What have you? M. E. Schleicher, 930 Hamilton, Peoria, Ill.

HAVE $25 WORTH OF MODERN radio parts, tubes, books, etc., too numerous to mention to swap for photographic equipment or microscope. Sieser, 56 Willett St., New York, N. Y.

I HAVE AN SW AC-DC RECEIVER, with 3 tubes and coils, runs speaker. Swap for SW3 with coils and tubes. N. Dale, 25 Wall St., Arlington, Mass.

TRADE FOR SKY BUDDY OR Super Clipper, Stevens heavy barrel target rifle. Barrel drilled for scope blocks. Also interested in buying or trading for A.C. Ultra Air Rover 2 transceiver. Bobbie Hover, Box 111, Jamul, Calif.

TRADE: SW3, 160, 80, 20, BAND-spread coils, power supply, eleven tube, dual band, Kadette radio, dynamic and magnetic speaker, tubes, parts, camera. Want Sky Champion, Sargent 39, NC44. Hue Diament, Perkiomen School, Pennsburg, Pa.

HUNDRED GOOD FORMULAS, radio reading course, "Business Letter Writer," "Toasts and Speeches," "Tricks and Knacks of Fishing," "Tricks with Coins," guitar and violin instruction books. What have you? W. R. Schroeder, 803 Wisconsin, Peoria, Ill.

WANTED GOOD TYPEWRITER. Have 8 tube Super communications receiver 530-24,000 K.C. A.V.C. manual switch, standby switch B.F.O. injection, pitch control, bandswitch, volume control and off switch, R meter. Alvin Beal, Fontana, Calif.

I HAVE FIVE DOLLARS TO spend on radio parts. What will you give me? Eugene Gutchman, Co. 4606, C.C.C., Rupert, Idaho.

HAVE A 7-TUBE, 7-BAND RACO Super Clipper. Desire to trade in on a good superhet., will pay difference. A. H. McColloch, R.F.D. No. 4, Monroe City, Missouri.

EXCHANGE AN ALL WAVE T.R.F. five-tube receiver, complete. Has received all continents. Let's hear your trade offers. R. Willey, 1705 E. Burnside St., Portland, Oregon.

WANTED—FOUR OR FIVE TUBE short wave receiver. Have telescope 10X, stamps worth $75.00 and one small motor, also science magazines. What have you in exchange. Gavin Lordier, 825 Sibley St., Hammond, Indiana.

SWAP: MOTOROLA CAR RADIO 7 tubes, Weston 0-7 voltmeter, 0-1.5 milliammeter, ham key, other radio parts for double-barreled shotgun or 30-30 or so rifle, or else. Nicholas Denono, 8148 102nd Ave., Ozone Park, N. Y.

BANJO UKE, GUITAR, ERECTOR motor, auto safety lighter, sharp tuner dial, 2 tube DC radio with amplifier, postmarks, approval stamps, block fours with plate number, want duplicator. R. Lewis, Griffithville, Ark.

HAVE 2- 5 AND 10 METER RECEIVERS using 6F5—6C5—25L6—25Z5, also 6C6,—76—43—25Z5 15-550 meter receiver. Want 5 tube Howard. Exchange printing for test equipment. Shelton Radio Club, 202 So. 2nd St., Brooklyn, N. Y.

SWAP BROWNING 35H AMATEUR receiver chassis, beat note oscillator, phone jack-stand by switch, perfect condition, just overhauled, new tubes, 12" dynamic speaker. Want 1935 Super Skyrider. Patterson PR12-1935. T. Marks, 109-19 96th St., Ozone Park, L. I., N. Y.

SWAP: TRAIN EQUIPMENT, stamps, telescopes, microscopes, army binoculars; also have radio magazines. Wanted—any type of short wave receiver. Send for list. Sid Mickelson, 3817 14th St., N.W., Washington, D. C.

WANT ADVANCED CANDLER code course and associated Candler touch typing course. Must be complete and in good condition. Have some radio parts or will pay cash if price is right. Harry Greulich, Republic, Ohio.

TRADE HIGH QUALITY 5 METER, 10 watt transreceiver, 5 meter transceiver, pressure gauges. For quality test equipment or H.M.S. Pinafore records or album. S. Andrewski, 11 Horatio St., Newark, N. J.

WILL SWAP TWO 350 MMF. condensers with dials, one 12A, four 01A tubes in perfect condition for one 1F4, two '30 tubes, three-circuit tuner to match a 350 mmf. condenser. Norman Minks, Terrebonne, Oregon.

WANTED — RECORDING OF "Stardust," 456 K.C. I.F. xfrms and to join U. S. and foreign short-wave clubs. I QSL 100%. Paul Bahr, Marion, Indiana, U. S. A.

WILL BUY ELECTRICAL PORTABLE and switchboard meters or instruments. Edward L. Boardman, 428 E. 13th St., New York City.

WANT TO TRADE OR BUY transmitting parts. Need: x-tal mike; power supply components; audio x-formers; tank coils, condensers, etc., for 100 watt transmitter. Have: 843, 801's (used 10 hours); .410 shotgun; cash. Dean Cooper, So. 17th, Fort Dodge, Iowa.

WANTED: ALL TYPES RADIO testing equipment, also Riders manuals in A-1 condition, also a short course in radio for beginners. Cash. Fred Habson, 501 E. Lowe St., Fairfield, Iowa.

HAVE ELECTRICAL LIBRARY, QST Magazines, other magazines, radios, radio parts, meters, other things. Send swap list for swap list. All letters answered. Want test oscillator and crystal pickup. Bert Agnew, 360 North Rockhill, Alliance, Ohio.

STAMPS TO TRADE! 1300 IN EXpensive album. Would like to get short-wave set in running order or what have you in this line? Roger Minard, Jr., Concord Rd., Westford, Mass.

WHAT AM I OFFERED IN TRADE for: Radio parts, Robotrol, auto fan roller skates, sheet metal punch, telescope, jigsaw, 2 books? More information on request. Best trade offer takes them. Arthur Hiller, Manito, Ill.

SWAP GENEMOTOR 6 VOLT INput, 135 volt 30 ma. output for 6L6 crystal oscillator or preselector or what have you? Write: Lester Fuller, Jr., Seligman, Ariz.

SWL EXCHANGE

SWL'S FROM ARIZONA, ARKANsas, Delaware, Georgia, Idaho, Kentucky, Nevada, New Mexico, North Carolina, North Dakota, Rhode Island, South Dakota, Tennessee, Vermont, Wisconsin, Wyoming—send your card. 100% QSL. QRA: Jack Hartley, 88 Diamond Bridge Ave., Hawthorne, New Jersey.

HI FELLAS AND YL'S, LET'S swap cards. I QSL 100%. You want mine—I need yours. QRA: Robert J. Ellis, 3539 17th St., San Francisco, Calif.

WOULD LIKE TO EXCHANGE card with SWL's or A.A.'s anywhere. I QSL 100%. 2.F.N.U. Francis Leslie Leach, 28 Wellington Street, Gloucester, England.

ATTENTION SWLS in U. S. A. and foreign countries. I QSL and exchange shack photos and postcards of the N. Y. fair 100% and answer promptly. QRA: C. Patern, 104-44 108th St., Richmond Hill, L. I., N. Y.

SWLS, EXCHANGE CARDS WITH all countries. Have attractive VK card. Will definitely QSL. Also welcome correspondence from SWLs. If interested local views also QSL for same. C. Jarlett, 26 Edith Street, Hurstville, N.S.W., Australia.

I WILL GLADLY EXCHANGE SWL cards with anyone anywhere. Carl Prince, Clifton, South Carolina, U. S. A.

SWLS OF THE WORLD U. S. A. and overseas. I want to swap SWL cards with all of you. QRA, Bob Anderson, Metropolis, Ill.

SWLS AND HAMS ANYWHERE in the world, I wish to correspond with you. Your SWL or QSL appreciated. I will send you my SWL. QRA: Ed Hoffman, 1744 Wilmot Ave., Chicago, Ill., U. S. A.

WOULD LIKE TO SWAP SWL cards with anyone, anywhere. I QSL 100%. QRA: Harlan C. Pruett, 514 Lineberger Street, Shelby, North Carolina.

SWL FROM IDAHO, NEVADA, Wyoming, Delaware, North Dakota. Louie Kucera, P.O. Box 102, Apache, Okla.

I EXCHANGE SWL CARDS WITH the entire world. Send me your card and get mine in return. I correspond also. Let's hear from all of you. Ed Ziny, 7217 S. California, Chicago, Illinois, U. S. A.

ATTENTION SWL'S IN U. S. AND foreign countries. Let's swap cards. I QSL 100%. The QRA is Armand Lebeau, R.F.D. No. 1, Lee, N. H.

ATTENTION ALL SWL'S. WILL exchange correspondence and postcard views with anybody in any country. QRA: John Pitzer, 62 Pell St., City Island, New York, U. S. A.

TO ALL SWL'S IN THE U.S.A. and foreign countries, would like to exchange my SWL card for one of yours, also swap "shack" fotos. I QSL 100%. Howard Perkins, 14814 Pepper Avenue, Cleveland, Ohio, U. S. A.

ATTENTION SWL'S IN CANADA, U. S. A. and all foreign countries. I would like to exchange SWL cards with you. Will positively answer all cards received with mine. James W. Newman, 45 Sixth St., New Toronto, Ontario, Canada.

I WOULD LIKE TO EXCHANGE cards with SWL's and Hams all over the world. I promise to QSL as soon as I get ur card. Larry Kaczmarczyk, 511 West Pine St., Mahanoy City, Pa., U. S. A.

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SWL'S, LET'S SWAP CARDS. Will exchange cards with anyone in the world. Will QSL 100%. QRA, James Nelson, 1838 Erie Street, Toledo, Ohio, U. S. A.

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COME ON ALL U SWL'S, XYL'S, YL's and OM. Send me ur crds and I will send u mine. QRA: Arnold Shafer, 14816 Pepper Ave., Cleveland, Ohio, U. S. A. 73's. I QSL 100%.

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ATTENTION SWL'S, ESPECIALLY you YL's, don't be shy. Let's hear from you. I QSL 100% with anyone, anywhere. My QRA is Stephen Mecseri, 34th St., John Pl., Stamford, Conn., U. S. A.

SWL ANYWHERE, WE WANT TO swap SWL cards. We QSL 100%. QRA Marvin and Nathan Greenberg, 444 East 32nd St., Paterson, N. J.

SWL'S! YOUR ATTENTION PSE. I will exchange SWL cards with any SWL in U. S. A. or foreign countries. All crds received will be promptly answered. What say, gang? QRA: Bob Greenough, 46 Chapel St., Shirley, Mass.

ATTENTION SWL'S ALL OVER the world. I will swap SWL cards 100% with anyone. You send yours. I'll send mine. QRA: Miles H. Mott, 61 Grace Street, Cranston, Rhode Island, U. S. A.

SWL'S WILL EXCHANGE SWL'S with anyone, anywhere. I QSL 100%. Harry C. Meier, 7 Roosevelt Ave., Cranford, N. J.

WOULD LIKE TO EXCHANGE SWL cards with any SWL or Ham in U. S. or foreign countries. I will QSL 100%. Leonard Meadows, 3855 Stanten Ave., New Boston, Ohio.

ATTENTION SWL'S ALL OVER the world. I will swap SWL cards 100% with everyone. 73s. My QRA is Paul Ankerman, 404 Lima St., Wapakoneta, Ohio, U. S. A.

ATTENTION ALL SWL'ERS. I have a new card and wud like to exchange with you. I QSL 100%. QRA Norman E. Wilton, 76 Green St., Greenwood, Mass., U. S. A.

ATTENTION ALL SWL'S IN U. S. A. and foreign countries. Would like to exchange SWL cards with anyone. All cards received answered 100%. William Thistle, 7 Flint St., Greenwood, Miss.

I WOULD LIKE TO HEAR FROM Hams and SWL's anywhere. Will swap cards, photos or view cards 100% with anyone. Stan Brus, 1441 Bell Avenue, North Braddock, Penna.

HI, U HAMS ES SWL'S, OM'S es YL's. Send me ur QSL or SWL. I QSL 100% anywhere with my SWL. QRA: M. Coutu, 51, Wingfield Street, Portsmouth, England.

ATTENTION SWL'S ALL OVER the world. I will swap SWL cards 100% with everyone. My QRA is Oscar Corwin, 753 S. Columbia St., Frankfort, Ind.

SWL CARDS SWAPPED WITH anyone. Come on you DX hounds. Mail me your card, mine in return mail. QRA: M. P. Wynne, 210 Hector Ave., Metairie Branch, New Orleans, La.

OVERSEAS SWL'S SEND ME UR card. I will QSL 100%. Will also include Brighton view to any SWL sending view of his town to this QRA. R. T. Parsons, 14, Carlyle Avenue, Brighton, 7, Sussex, England.

ATTENTION HAMS — SWL'S. Will swap QSL's, shack fotos, with any OM's, YL's, XYL's or SWL's. Also pleased to try skeds, 20M, 40M, 80M, C.W. only. Hows about it? VE7CW, Summerside, P.E. Island, Canada.

SWL'S IN THE UNITED STATES and foreign countries. I exchange SWL cards 100%. Also radio parts to trade. QRA: Donald D. Warnock, Converse, Indiana, U. S. A.

ATTENTION DXERS — WOULD like to exchange notes on reception, receiving equipment, etc. I answer 100%. Also exchange SWL cards. Mario Catine, 2143 Central Ave., Ashland, Ky., U. S. A.

WILL BE GLAD TO EXCHANGE SWL cards and letters with all SWL and DXers all over the world. Albert Pickering, Jr., West Medway, Mass., U. S. A.

WILL EXCHANGE SWL CARDS with any SWL or Ham in U. S. and foreign countries. Also swap stamps 100%. All cards will be answered with my card. Rober Yheulon, 1222 W. Thompson St., Phila., Pa., U. S. A.

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On the "Ham" Bands

(Continued from page 765)

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W5EB	29.4	5	6	France
W6ITH	14.23	5	9	South Africa
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W8EBS	14.24	5	8	France
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W8RLT	29.11	3	7	France
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W9WBW		5	8	South Africa
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W9DRQ	28.5	5	8	France
W9EAB	29.11	4	7	France
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W9UDW	29.375	5	8	France
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W9UWY	28.68	5	8	France
W9WUC	29.315	5	9	France
W9ZNA	29.11	–	–	France

Reception of the South American amateurs is falling off fast. A few months ago, there were too many to publish, but this month it is quite a different story. We have a few reported, but not nearly as many as have been in the past.

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LU4PB	14.1	4	6	Ill.
LU4CZ	14.04	5	8	Colo.
LU5CZ	14.085	4-5	5-9	Ark., Wash., Ill., Ariz., N. Y.
LU5CK	14.02	5	7	Md.
LU7AG	14.095	4	5	Wash.
LU7BK	14.	5	9	South Africa
LU8AB	14.100	5	9	France
LU8EC	14.01	4	7	Ill.
LU8BL	14.	5	9	South Africa
LU9DM	14.01	5	8	France
PY1MH	14.080	4	7	Ark.
PY2PV	14.155	5	5	N. Y.
PY2MI	14.272	5	5	N. Y.
PY2JC	14.	5	9	South Africa
PY2AC	14.105	4	6	Wash.
PY2DA	14.075	5	4-5	Ark., N. Y.
PY2CA	14.090	5	7	Ark.
PY4CT	14.03	3-5	5-9	France, South Africa
PY5AQ	14.	4	5	Colorado
PY7AI	14.3	5	6-7	Canada, N. Y.
PY8CF	14.090	5	8	France
CX1AA	14.290	5	6	France, Ill.
CX1AH	14.06	3	5	Ill.
CX2CO	14.055	4	5	Ill.
CX3AL	14.02	3	5	Wash.
HC1FG	14.1	5	8	France, Ill.
HC1PZ	14.3	4	6	Md.
HC2CC	14.16	4	6	Ill.
HC2HP	14.265	5	7-8	Canada, N. C., Ohio
HC2BU	14.01	5	5	France
ON4DM	28.3	5	7	Canada
ON4ZK	28.2	5	7	Canada
ON4FE	28.0	5	6	Canada
HK1AG	14.035	4	6	Connecticut
HK1AZ	14.05	4	6	Connecticut
HK2AA	14.25	5	6	N. Y.
HK3TO	14.2	5	8	N. Y.
HK3CG	14.28	5	6	Me.
HK3K	14.01	5	7	Ill.
HK3CW	14.27	5	7	Canada, Colo.
HK4DF	14.07	5	5	Colo.
HK5EE	14.272	3-4	5-7	Ill., N. Y.
HK5AR	14.087	4	6	Ill.
HK5DB	14.253	5	7	N. Y.
CE1BC	14.070	4	6	Wash.
CE1AH	14.	5	9	South Africa
CE2BX	14.14	5	8	Ill., Colo., Ariz.
CE2BR	14.059	5	8	Ill.
CE3BK	14.10	4	5	N. Y.

(Continued on following page)

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Bliley Electric Co.	Parts Mfr.	Engineering Bulletin	E-6	10c	753
		Circular	A-6	Free	
Brush Development Co.	Parts Mfr.	Catalog		Free	739
Bud Radio, Inc.	Parts Mfr.	Catalog	RT49	Free	752
		Station Log & Data Bk.		10c	
Burstein-Applebee Co.	Mail Order	Catalog		Free	753
Cameradio Co.	Mail Order	1939 Catalog		Free	755
Candler System Co.	Code Course	Book of Facts		Free	748
Cannon, C. F., Co.	Parts Mfr.	Folder	T-4	Free	757
Capitol Radio Engineering Institute	Radio School	Booklet		Free	748
Cornell-Dubilier Elec. Corp.	Parts Mfr.	Catalog	166-A	Free	755
Coyne Electrical School	Trade School	Electrical Catalog		Free	707
		Radio Catalog		Free	
Dodge's Institute	Radio School	Catalog		Free	748
Gold Shield Products	Mail Order	Catalog		Free	750.761
Guthman, Edwin I., & Co.	Set & Parts Mfr.	Information		Free	747
Hammarlund Mfg. Co.	Set & Parts Mfr.	1939 Catalog		Free	737
		Booklet		Free	
Harrison Radio Co.	Mail Order	Information		Free	753
Henry, Bob	Mail Order	Information		Free	750
Howard Radio Company	Set Mfr.	Booklet	430	Free	744
Instructograph Company	Code Machine	Information		Free	748
International Resistance Co.	Parts Mfr.	Literature		Free	743
Korrol Radio Products Co.	Parts Mfr.	Catalog		Free	757
Lafayette Radio Corp.	Set Mfr.	Radio Catalog	76	Free	741
Levine, M. M.	Coil Winding Machines	Information		Free	753
Martin Research & Mfg. Corp.	Radio Keys	Catalog		Free	737
Mass. Radio School	Radio School	52-page Catalog		Free	748
Midwest Radio Corp.	Set Mfr.	1939 Catalog		Free	750
National Company, Inc.	Set & Parts Mfr.	Catalog		Free	I.B.C.
National Plans Institute	Publisher	Book Catalog		Free	750
National Radio Institute	Radio School	64-page Book		Free	705
National Schools	Radio School	Radio & Television Bklt.		Free	748
Radio & Technical Publ. Co.	Radio Textbooks	Circulars on each Book		Free	749
Radio Train. Assn. of Amer.	Radio School	Book		Free	748
RCA Institutes, Inc.	Radio School	Catalog		Free	748
Remington Rand, Inc.	Typewriter Mfr.	Catalog		Free	768
Sargent, E. M., Co.	Set Mfr.	Information		Free	753
Solar Mfg. Corp.	Parts Mfr.	General Parts Catalog	9S	Free	739
		Transmitting Catalog	2X	Free	
		Condenser Testers Cat.	CBCC-1	Free	
Sprague Products Co.	Parts Mfr.	Condenser Catalog		Free	757
Sprayberry Acad. of Radio	Radio School	52-page Book		Free	745
Supreme Publications	Publisher	Information		Free	751
Teleplex Co.	Code Machine	Booklet	S-4	Free	748
Thordarson Electric Mfg. Co.	Parts Mfr.	Transmitter Guide	344	15c	747
		Sound Amplifier Guide	346	15c	
		Radio Service Guide	342	15c	
		Transformer Manual	340	50c	
Triplett Electrical Inst. Co.	Parts Mfr.	Catalog		Free	759
Tri-State College	Radio School	Catalog		Free	748
Turner Co., The	Parts Mfr.	Bulletin	41-A	Free	755
Wholesale Radio Service Co.	Mail Order	Radio Catalog	76	Free	741
X. L. Radio Laboratories	Parts Mfr.	Information		Free	750
Zenith Radio Corporation	Set Mfr.	Information		Free	B.C.

On the "Ham" Bands

(Continued from preceding page)

Call	Freq.	R	S	Where Heard
CE3DU	14.05	5	6	France
YV1AQ	14.005	5	6	Wash.
YV1AP	14.2	5	7	Ohio
YV4E	14.2	5	8	Me.
YV4APB	14.16	4	7	Me.
YV4ABG	14.089	4-5	4-8	Ill., Me., N. Y.
YV4AE	14.065	5	7	Wash., Ill., N. J., Colo., Ariz.
YV5AK	14.030	5	8	France, Conn.
YV5ADY	14.11	5	5	N. Y.
YV5ABY	14.1	5	9	Ohio, N. Y.
YV5AY	14.1	5	4	N. Y.
YV5AE	14.165	4	7	N. J.
YV5ABF	14.06	4	6	Colo.
YV6AM	14.087	4	7	Ill.
VP4TK	14.1	5	6	France

Due to the large number of Europeans heard and reported by our observers during January, it is impossible for us to print the usual list. This continent seemed to be very well heard last month, and about two hundred stations were reported. Therefore, we will skip Europe for this issue, but continue to send in your reports on this continent as it will probably be used in the next issue.

From Australia we have only a very few stations reported. They were rarely heard during January.

Call	Freq.	R	S	Where Heard
VK2XU	14.1	5	8	France
VK2ABU	14.05	5	8	Penna.
VK2RY	14.234	4	7	Penna.
VK2JO	14.135	4	6	Ariz.
VK2GN	14.	4	6	South Africa
VK2TL	14.4	5	6	Ohio
VK2AFQ	14.1	5	6	Ohio
VK3KX	14.25	5	9	France
VK3XG	14.337	4	6	Penna.
VK4JP	14.	4	6	South Africa
VK5MF	14.3	5	8	France
VK7CL	14.09	4-5	6	Penna., Ohio
VK9VG	14.31	5	6-8	France

Oceanic stations increased in number during January, particularly those located in the Hawaiian Islands and the Netherland Indies.

Call	Freq.	R	S	Where Heard
K6OFW	14.225	4-5	7-8	Kan., Colo., France, South Africa, Ala.
K6ILW	14.12	5	6-8	Ark., Ore., Colo.
K6IQN	14.085	4	7	Ark., Ill., Colo.
K6CMC	14.1	5	6	Ark., Wash.
K6OQ	14.2	5	6	Ark.
K6RG	28.575	4	8	Ark.
K6GAS	14.235	5	8	Canada
K6PLG	28.4	5	7	Ore.
K6TPW	28.5	5	7	Ore.
K6QQM	28.9	5	8	Ore.
K6LKN	28.5	5	8	Ore.
K6BNR	14.18	5	9	Wash., Ill., Colo., Ariz., Utah
K6PLZ	14.185	5	8	Wash., Ill., Colo.
K6OQE	14.190	5	8	Wash., Ill., Colo., Ariz.
	28.375	5	9	Penna.
K6OJI	14.2	5	9	Wash., Ill., Colo., Ariz.
K6KGA	14.18	4-5	3-7	Wash., Ill., Colo., Ariz., Utah
K6MZQ	14.185	4	7	Wash., Colo.
K6OTH	14.175	5	8-9	Wash., South Africa
K6BIR	29.01	4	5	Ill.
K6NVV	28.75	5	6	Ill.
K6QAF	14.21	5	5	Colo.
K6DTT	14.250	5	9	South Africa
VR6AY	14.342	4-5	5-6	Kan., Ohio, Ill., France, Colo., Ala., South Africa
KA1ME	14.145	4-5	6-8	Kan., South Africa
KA1CS	14.310	5	9	South Africa
KA1HS	14.282	5	8	South Africa
KA1BH	14.11	5	9	South Africa
KA1JM	14.	5	8	South Africa
KA2OV	14.228	4	5	Utah
KA7EF	14.14	5	6	Utah, Wash., South Africa
VR2FF	14.2	5	5	France
PK1MF	14.26	5	8	France
PK1MX	14.08	5	9	France
PK1VY	14.285	5	9	France
PK1ZZ	14.3	5	9	France
PK1GR	14.	5	8	South Africa
PK2KT	14.	5	8	South Africa
PK2AY	14.295	5	9	France
PK2FS	14.14	5	9	France
PK3WI	14.225	4-5	6-9	France, South Africa
PK4CB	14.34	5	6	France
PK4KH	14.3	5	7	France
PK4KS	14.31	4	6-7	Kan., Ariz., N. Y.
PK6XX	14.050	5	8	France
ZL3GU	14.3	–	–	France
ZL3IF	28.25	5	6	Ore.
ZL4CB	14.115	4	4	France
ZL6AZ	28.1	5	7	Ore.

Well, that finishes it for another month. It is hoped that you will like our new arrangement, and your letter of comment will be greatly appreciated. If you have any ideas for bettering this department, send them in to us. Your criticisms are always welcome.

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.)

NC-44

If you judge receivers on the basis of performance per dollar of cost, you will find the National NC-44 an outstanding value. This seven-tube superhet covers from 550 KC to 30 MC in four ranges. The full-vision dial is carefully calibrated in frequency. A straight-line-frequency main condenser is used in conjunction with a separate band spread condenser, and both have inertia-type tuning. A CW oscillator is provided. The performance of the NC-44 is remarkably fine, even at ten meters where so many receivers are unsatisfactory. The Net Price is only $49.50, including tubes, speaker and built-in power supply.

NATIONAL COMPANY, INC., MALDEN, MASS.