SHORT WAVE & TELEVISION

The Popular Radio Magazine

RADIO DUEL *of the* DICTATORS

SEE PAGE 134

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HUGO GERNSBACK
EDITOR

★

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

★

JULY 1938

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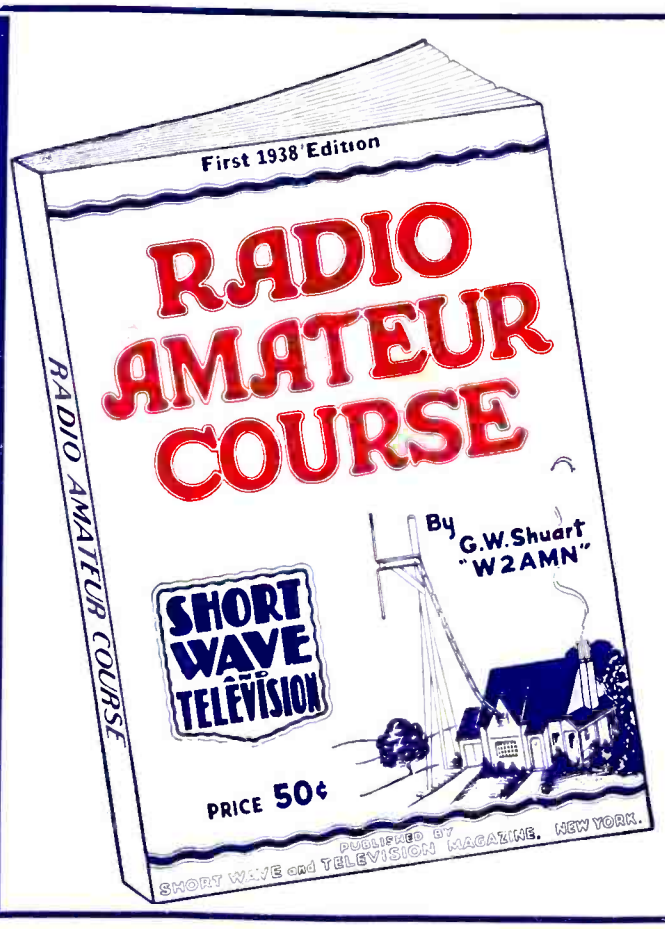

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(NAME AND ADDRESS SENT UPON REQUEST)

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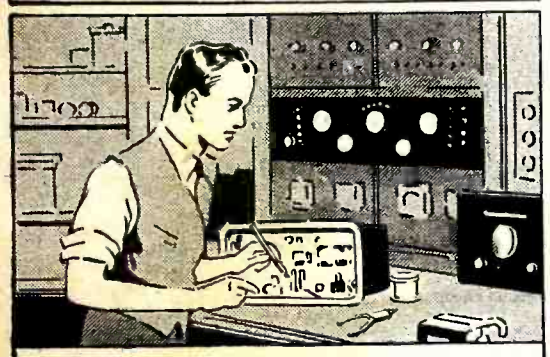
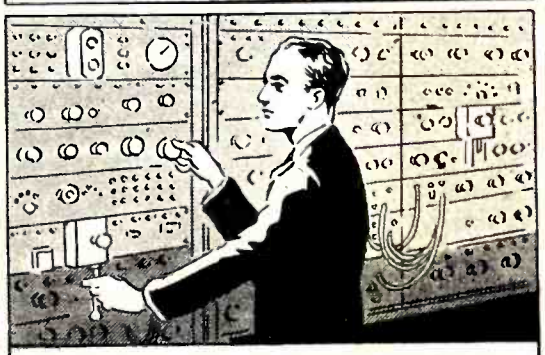
"The training National Radio Institute gave me was so practical I was soon ready to make $5, $10, $15 a week in spare time servicing Radio sets."



"When I finished training I accepted a job as serviceman with a Radio store. In three weeks I was made service manager at more than twice what I earned in the shoe factory."



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SHORT WAVE & TELEVISION
The Popular Radio Magazine

JULY—1938

Vol. IX No. 3

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

In This Issue

FEATURES

S-W STATIONS—HOW TO FIND THEM

TELEVISION

CONSTRUCTOR

MISCELLANEOUS

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In the Aug. Issue

Short-Wave Broadcasting As I See It, Dr. Frank Conrad, of the Westinghouse Co.

History of Short Wave Broadcasting, M. Harvey Gernsback.

CBS Steps Out On Ultra Short Waves.

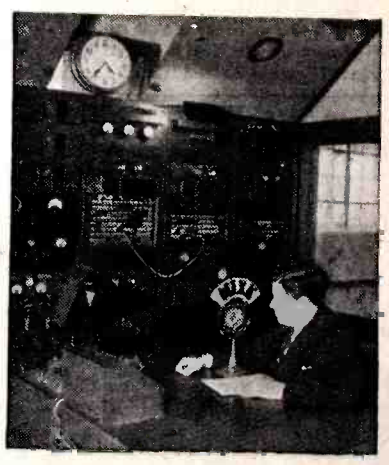
Sun-Spots and Short Waves.

Radio Control for Model Planes, Pat Sweeney.

An All-Wave T.R.F. 4-Tube Receiver.

The Beginner's Transmitter Becomes a 35-Watt Exciter, Harry D. Hooton, W8KPX.

An All-Around A.F. Amplifier, Herman Yellin, W2AJL.



A view of the control room at the short-wave transmitting station W1XK, Millis, Mass.

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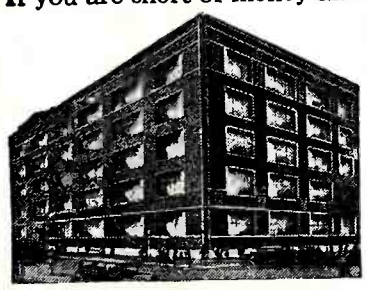

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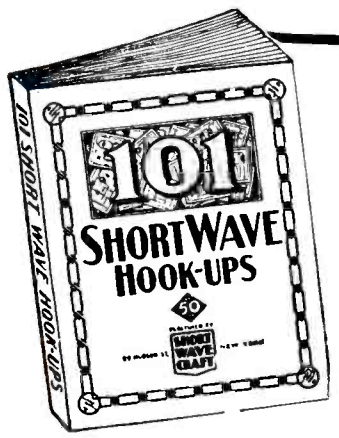

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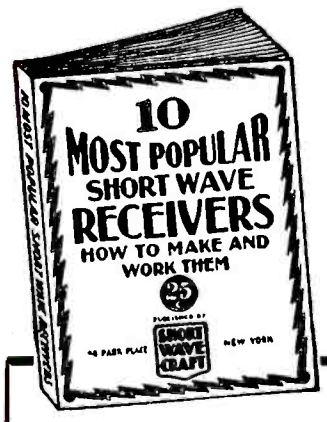

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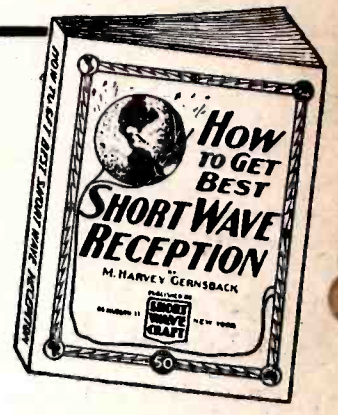

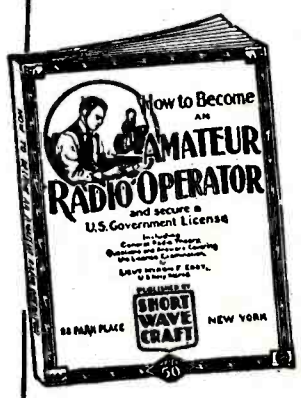

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SHORT WAVE & TELEVISION

HUGO GERNSBACK, EDITOR

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Short-Wave Program Possibilities

Elizabeth-Ann Tucker

Director of Programs, International Station W2XE, New York

● A GREAT many readers of *Short Wave & Television* will probably be as startled at having a guest editorial from one on the distaff side, as I was to be given the assignment—the honor and pleasure of saying a few words on that most important and interesting subject, *short-wave broadcasting of today.*

As we all know, within the past three years this phase of the broadcast art has made rapid and extensive strides toward being a *regular service* rather than a DXing thrill, the listeners having contributed to this as well as the amateur operators, the broadcasting and manufacturing companies. The listeners have played an important rôle in that they have taken the time and trouble to give accurate and detailed reports, enabling engineers to judge reception characteristics under varying conditions.

But this survey is not intended to dwell on things technical. It is, rather, to review, as a whole, what short-wave broadcasting means in the world of today.

Not so many years ago, short-wave listening—carrying one beyond the boundaries of his own country and customs, was limited to those few amateurs whose ears could take a beating—and the prize for the pains was the satisfaction of having heard squeaky music from a foreign country, an announcement which couldn't be understood, and a QSL card (if the call letters were given and were distinguishable). It was a thrill to say *"I heard Blotzberg last night"*—even though you couldn't say you'd *enjoyed* what you'd heard!

So much for the past. Being able to tune in London, Paris, Berlin, Rome, Buenos Aires, Rio de Janeiro, etc., for the pure pleasure of hearing the *program* is now the order of the day. Without moving from the house, one may tour the world in a single evening. Aside from the entertainment value, one has probably absorbed knowledge in a most pleasing fashion—last minute news from London; the reason for and description of a quaint fête-day in Holland; history of an opera being given at La Scala in Italy; a diplomat in Buenos Aires talking on Pan-American relationships.

Miss Elizabeth-Ann Tucker, Director of Programs, International Station W2XE of the Columbia Broadcasting System. Miss Tucker joined the Columbia Broadcasting System in 1929. In March 1931, Miss Tucker became associated with the CBS Engineering Department as secretary to the Chief Engineer, where she remained until receiving her present assignment. As thousands of letters and reports of reception of Station W2XE have passed through Miss Tucker's hands, she has an unusual first-hand knowledge of what type of programs short-wave listeners prefer.

The customs, problems, pleasures and geographic locations of the peoples of other countries are interesting to everyone and full use of the opportunity to learn about them, which is now available, should be made. Sometimes we grumble about a custom, or a fact—but by hearing how it's done elsewhere we can say, *"Well, I guess ours is all right, after all."* This is true of all nations. And there is also a great deal to be learned from others—things cultural, economic, governmental, agricultural. As an example, not long ago, Columbia received a letter from a gentleman in South Africa who had been listening to Station W2XE. He had heard a talk, given by a government official, on *soil erosion* and stated that as that was a great problem in the territory in which he lived, he wanted a copy of the talk, which he had considered exceedingly helpful as well as interesting.

So, a room papered with QSL cards is not the only prize from short-wave listening—knowledge and pleasure are also to be gained.

The amateur operators of America can and are doing excellent work in the interests of international accord, as well as rendering real service in times of emergency. This service is, as you know, being recognized. Outstanding recognition comes in the form of the William S. Paley award given by Columbia's president for the most outstanding service rendered.

Who knows—some day we may all learn how to speak Spanish, French, Italian or Arabic, by talking with a native of that country while sitting home darning socks—"whittling"—pardon me!

Women (yes, it was bound to come up) can and should play a part—and a large part in the realm of short-waves. Some night, instead of swapping tall ones with your fellow operator, let Mrs. Smith take over and swap with Mme. Blanchet, just outside of Paris, some new recipes, what women's activities are doing, the latest styles, and help each other learn their respective languages. This isn't as improbable as it sounds, due to the language element, as English is widely spoken and most people are willing and anxious to learn another's tongue.

Even romance enters the field of radio. Recently some one told the story of a rather corpulent gentleman who had been "carrying on" with a lady operator in Australia. After about a year, almost in spite of their highly technical conversations, love bloomed! And then they made the unhappy mistake of exchanging pictures. He never

(Continued on page 180)

Nineteenth of a Series of "Guest" Editorials

RADIO DUEL *of the* DICTATORS

Hugo Gernsback

Europe's dictators are waging a war of words. Here is how phantom short-wave broadcasters have succeeded in breaking down the walls of censorship around their countries.

● THE three totalitarian States, Germany, Italy and Soviet Russia, today find themselves in a quandary; to them deathly serious, to the rest of the world, hilarious.

It is the avowed principle of all Dictators to permit their nationals to know only what they, the Dictators, are willing to let them know. Anything not in keeping with the policies of the Dictators is not only taboo, but treasonable as well. All three States censor all news and are always on the alert to keep out of their respective countries, magazines, newspapers and other printed matter that runs counter to their fixed principles. Consequently, the populations of these respective countries read only what they are supposed to read; not what they themselves wish to read. Letters, circulars or other printed matter from abroad, addressed personally to people in these countries are often intercepted by the governments and even destroyed.

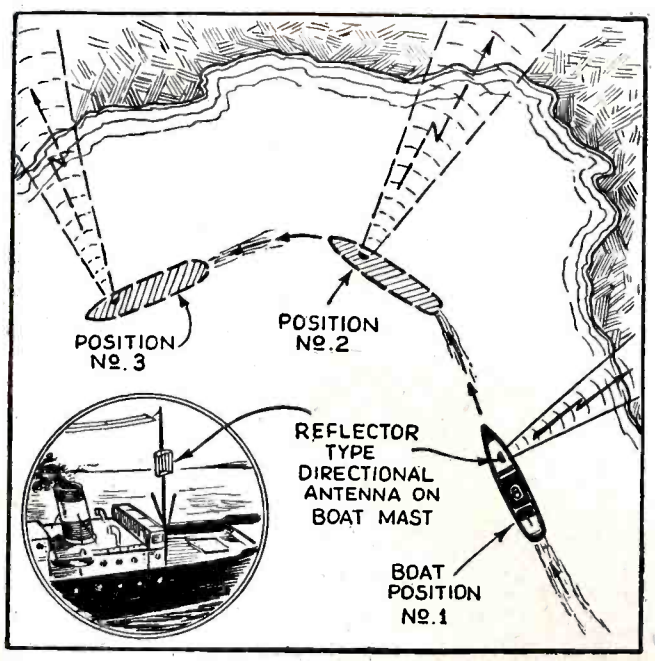
If you cross the frontier into a Dictator country, you are searched for offending magazines, newspapers and the like and, if found, are confiscated. Of course there is always some bootlegging of the printed word going on, despite this vigilance, but it does not amount to great proportions; and if the Dictators had to cope only with such sources, their populaces would remain uninformed. This sort of thing would have been marvelous 25 years ago before the advent of radio, but today the picture has changed completely, and to the extreme discomfiture of all Dictators.

Radio Word-War Being Fought

At the present time, a fierce radio war is being fought, principally between the two Allied Dictatorship countries, Germany and Italy, and their arch enemy, Soviet Russia, who is anxious to tell the Germans and Italians the absurdity of their two governments and all that they stand for, while Germany and Italy, on the other hand, are eager to tell the Russians how uncivilized and downtrodden they have become under Communistic rule.

So Moscow sends out powerful radio signals which cover all Europe. These broadcasts are of course in German and Italian and are obviously directed to the people of these two countries. To be sure, Moscow denies all knowledge of this; indeed no Dictator or his Government ever has acknowledged these surreptitious broadcasts. Always, some one else is blamed, even if the point of origin and actual physical location of the offending radio station is shown as having been located in the Dictator's country.

For the "protection" of their own population, and to prevent them from listening in, Germany has taken the most drastic steps of any country. In Germany, for instance, it is not only a criminal but also a treasonable offense to listen in on any Soviet Russian program. Anyone caught doing so may be sent forthwith to a concentration camp or worse. The idiocy of this plan is that it notifies everyone that there is something extraordinary to hear, otherwise why would it be forbidden? Therefore, as a matter of course, a large percentage of Germans who own radio sets, listen in on these very broadcasts. Detection is difficult and no loud speaker is needed when a pair of headphones will do just as well. A large proportion of German listeners use earphones anyway, so when they do listen in, they receive these secret broadcasts not only from Soviet Russia but other points as well, as we shall see.



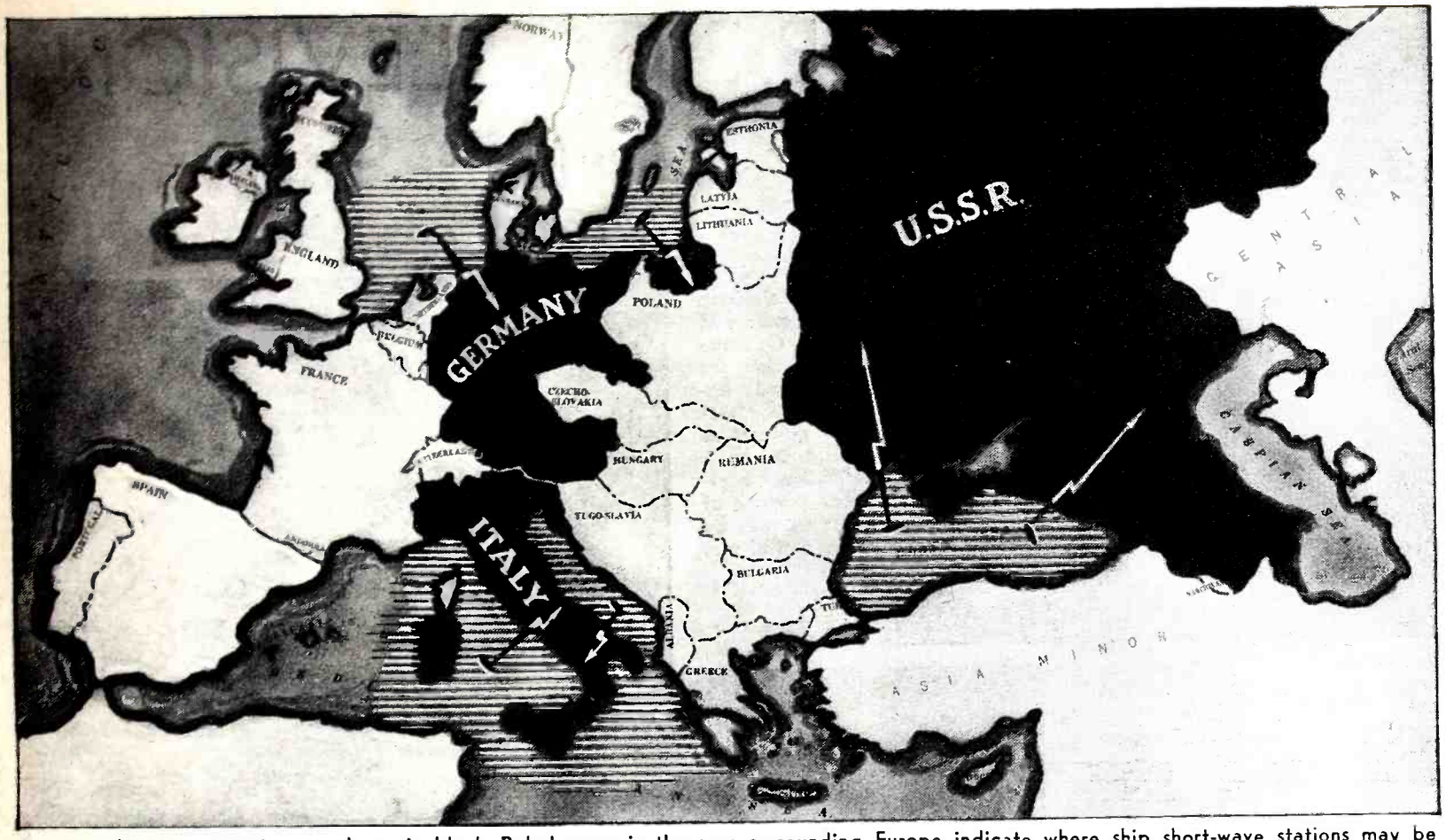
How a short-wave station on shipboard can send out signals in various directions, making it difficult to locate it.

Nazis Try to "Jam" Phantom Signals

Another, and slightly more effective means of preventing German listeners from hearing forbidden broadcasts is for the Government to "jam" the signals which emanate from the unknown transmitter, as soon as they are detected. The Nazi Government, in their usual effective way, have stationed Government listeners all over the Reich who do nothing but listen in on these secret broadcasts. As soon as the wavelength of the suspicious transmitter is ascertained, Berlin headquarters is immediately notified by telephone, whereupon a powerful station at Berlin or a transmitter at some other point goes on the air with its *"Störsender."* These are tuned in on the exact wavelength of the offending broadcaster and are supposed to *blanket* the signal so as to garble it and make it unintelligible to the listeners. Usually phonograph records are played or dots and dashes are sent out, or shrieking whistling sounds produced by an oscillator are broadcast to "jam" the offending transmission. These counter-offense noise transmitters, however, are only partly effective, for the reason that on the short waves, on which practically all the secret transmissions occur, the law of "skip-distance" comes into force. This means large areas where the *"Störsender"* will prove ineffective and where the German people can therefore listen in without Governmental interference. Naturally the secret transmitters must, for obvious reasons, keep moving from day to day, so the skip-distance effect consequently changes from day to day as well, and the German public who do not get the broadcast one night will get it the next night or next week, all depending on where the traveling transmitter will then be located.

Radio Mischief from Within

The general situation, however, becomes a great deal more complex when we consider for a moment that Soviet Russia not only transmits propaganda in German as well as in Italian, but for political reasons, radio mischief is going on right *within* the borders of all the totalitarian states. Thus, there are secret radio stations operating within Germany as well as in Soviet Russia and Italy, and all of these broadcasts are usually in the language of the country they are located in. In Germany, for instance, there have been transmitters, avowedly operated by the Communistic Party, which went to great pains to tell the German populace all the news of other countries, news which the Germans can not get in their own newspapers. Similarly, in Soviet Russia, where it still occurs and likewise in Italy but in less measure. Although the German government has always



Europe's dictator countries are shown in black. Ruled areas in the seas surrounding Europe indicate where ship short-wave stations may be located for sending strong phantom signals into these countries.

denied such tactics, there is good reason for believing that German-owned or German-sanctioned radio transmitters, broadcast in Russian and tell the Soviet Russians what is what in no uncertain terms.

Threats Against Life of Josef Stalin

How complex the situation is becoming in this "radio war" can best be understood by a few quotations dated Berlin: May 13, 1938—and reprinted from the New York *World Telegram* of the same date.

Radio experts believed today that a mysterious wireless station which for weeks had been broadcasting death threats against Josef Stalin, probably was operated inside Russia near the Baltic States, on its western frontier.

"Your days are numbered! Your murders are about to take your own head!" and similar threats have been broadcast persistently by the station.

Listeners throughout Germany and the Baltic States have tried to calculate the exact position of the station, as have the Russian secret police, who according to reports here have had a dozen radio finder cars patrolling roads for weeks trying to get cross-bearings on the transmitter.

The transmitter was silent for several days recently, and the Baltic amateurs believed that the Russian police might have caught its crew. But it resumed activity Tuesday night, announcing that one of its secret opposition groups had been arrested in Moscow May 1st, and adding:—

"We will keep the Soviet Union informed of their fate in the secret police prisons. Russian citizens, none of our comrades will turn traitor. No one will break his oath. Their trial will be new evidence of Stalin's cowardice. But they may turn the courtroom into a trial of Stalin's tactics."

The secret station asserted that since it first began sending warnings such as *"Stalin: Justice is about to overtake you"* and urging the Red Army to *"turn your guns on the reviewing stand before the Kremlin when you march past"* recruits have been enrolling steadily in opposition ranks. Listeners throughout northeastern Europe have been following the broadcasts. They come nightly between 8 p.m. and midnight (3 p.m. to 7 p.m. New York time) on a short-wave length of between 26 and 32 meters.

A survey brought the following comments:—

Tallinn, Esthonia—"The broadcasts seem to come from just within Russia. Possibly, however, several stations are operating alternately to confuse Russian Police."

Riga, Latvia—"The station is heard nightly, though Moscow oftens succeeds in disturbing the transmission. Experts are inclined to believe that the transmitter is of somewhat primitive type, possibly operating from central Russia."

Kaunas, Lithuania — "The station is believed by amateurs here to be in Western Russia, but not South of the 50th parallel of latitude (which lies across Southern Russia, southern Poland and central Germany). It is noted that a man and woman who broadcast use abbreviations which are little known outside Russia for Russian institutions."

Warsaw, Poland—"Experts believe that the station is in Western Russia and that a travelling transmitter may be used."

Berlin—German experts favor Western Russia as the origin of the broadcasts and suggest either that several stations may be used or that the transmitter is a travelling one, installed in a motor car. German newspapers cartoon the consternation of the Russian police and tell readers that Stalin, petrified with fear, has ordered (despite his petrification) that all energies of the police be devoted to stopping the broadcasts. Berlin wits tell each other:—*"Of course the Russian police won't find it because it probably is at Koenigswuesterhausen"* (the giant Nazi Government station near Berlin.)

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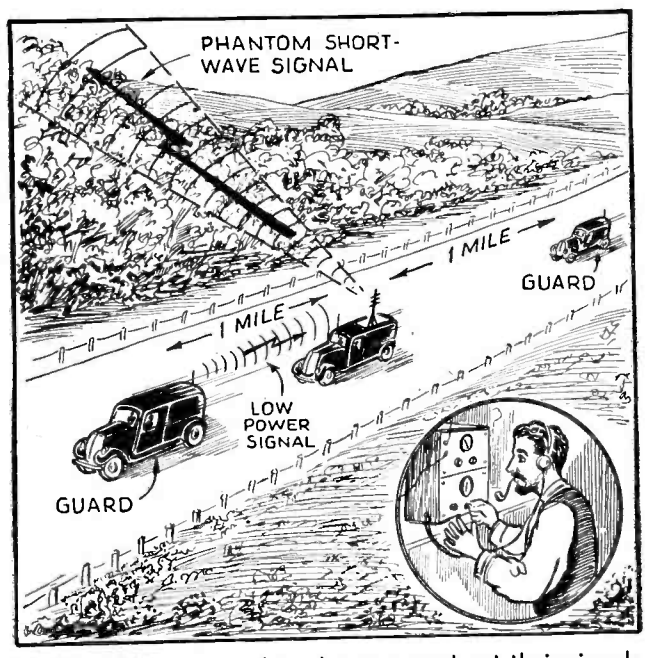
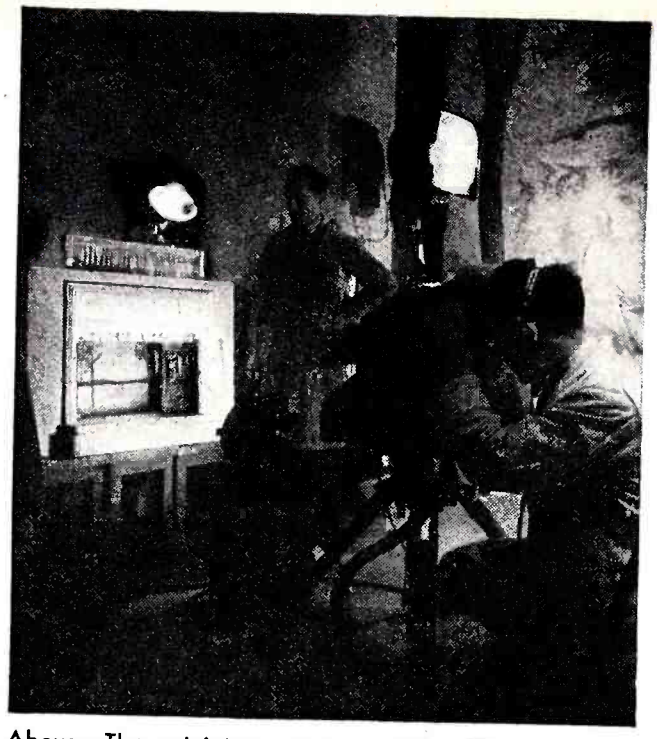


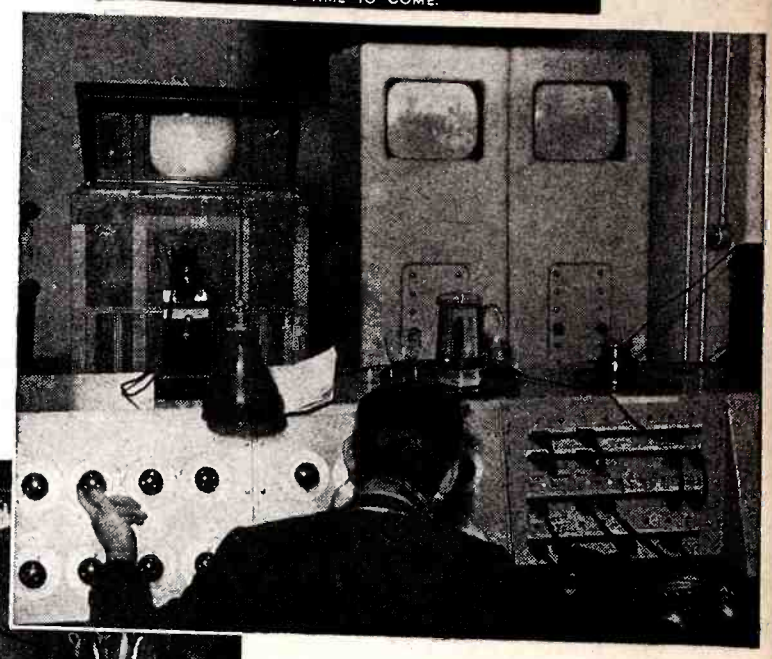
Mobile S-W phantom broadcasters send out their signals from secluded roads. They are flanked by guarding cars to warn of the approach of strangers.

B.B.C. TELEVISION
Steps Out

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

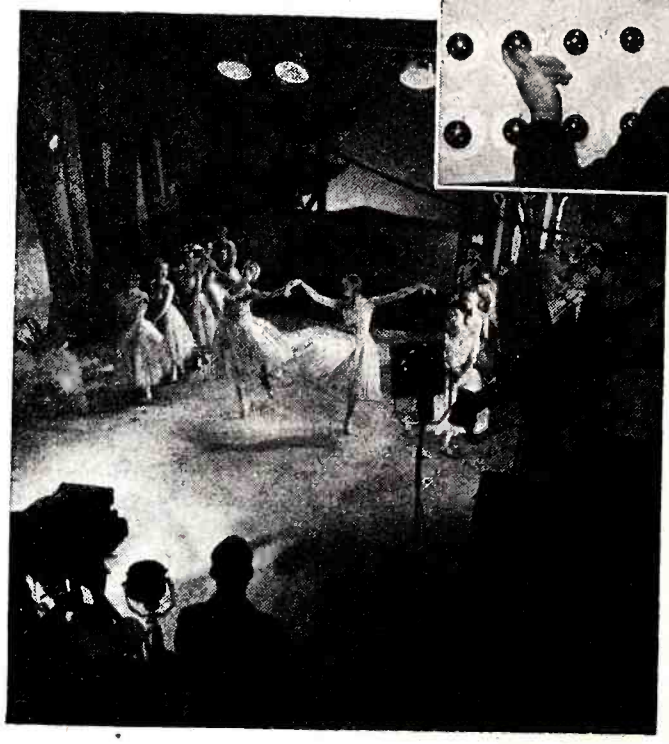


Above—The miniature stage and curtains are viewed by a television camera. This image is broadcast as a preliminary to a television program, the raising of the curtain being the opening feature. When the curtain is up the operator switches over to another camera focused on the "live" scene.



Right—Television control gallery at B.B.C. On the screens in the background appear the televised pictures as picked up by 3 television cameras. Any one of 3 scenes may be broadcast at will.

Above—Actual photo of a B.B.C. televised scene as it appears on the screen of vision receiver.

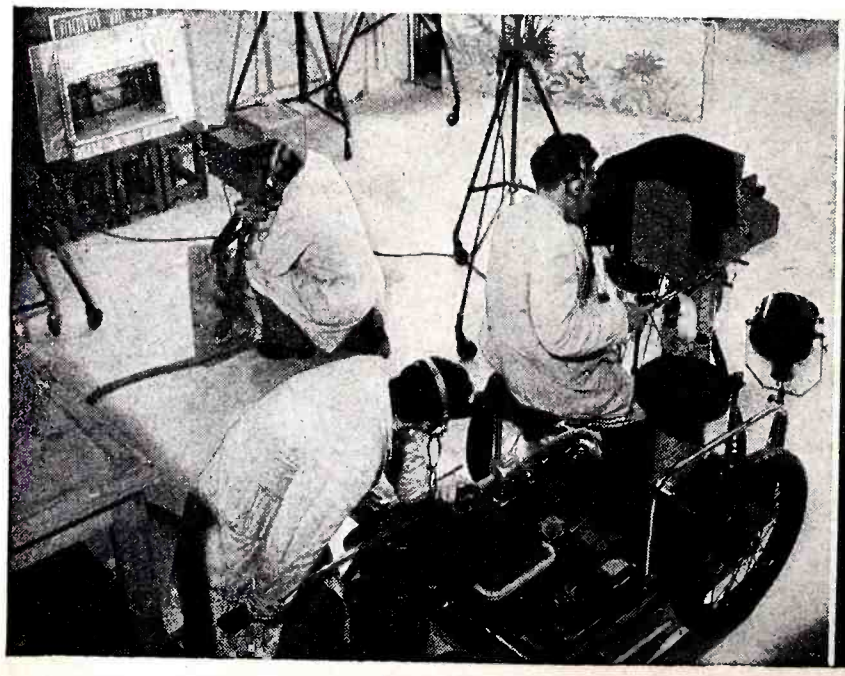


Television for the public is more advanced in England than in any other country at the present time. It is a question whether the tremendous amount of money spent in television broadcasting by the B.B.C. has really been worthwhile, as there seems to be a great deal of research still to be done. That is one reason why television in this country has been retarded, in order that more faithful detail may be obtained.

A studio scene during the pick-up of the Vic-Wells Ballet "Le Lac des Cygnes." The television camera may be seen in action at the left of the picture. The whole scene very much resembles one in a photoplay studio.

Below—Television cameraman gets a ride. The vision camera is mounted on the rubber-tired carriage, which is wheeled about by the assistant at the left. Director's cues are received by means of the headphones.

In this country, NBC has given a great deal of publicity to Miss Betty Goodwin. Below we have the popular English television announcer, Miss Jasmine Bligh, shown speaking before the television camera observed at the right of the picture.



Photos by Monkemeyer

Cold Waves and Hot Waves

J. Merino y Coronado, T12JM
Ex Asst. Prof. of Physics, Liceo, Costa Rica

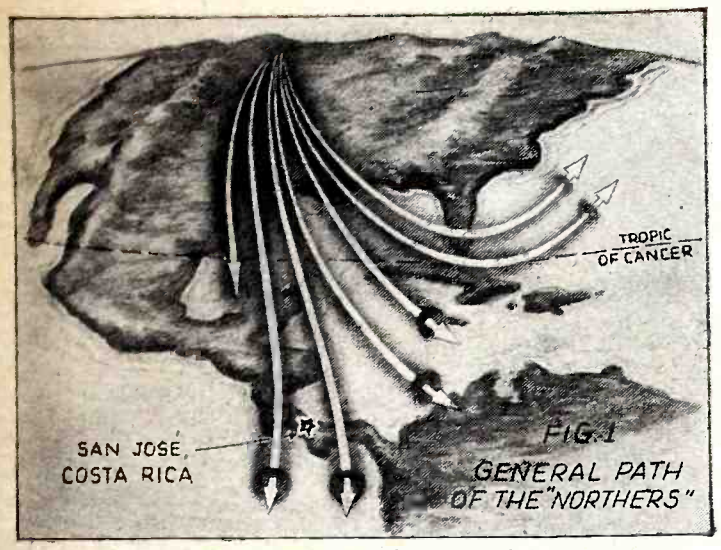


Fig. 1—Path of the "northers" of interest to Central America. They generally come down from the Dakotas and followed the general path indicated.

● IN the September issue of *Short Wave & Television* I described a new system of weather forecasting, using the properties of radio waves. Since that date the author has received many letters encouraging him to publish a more detailed description covering the subject of how to follow a *high-pressure* area. But it was not until recently that the author decided to write such an article (even if it is not exactly what he was asked for but rather the description of phenomena produced by high-pressure areas), which leads us to some interesting conclusions.

The idea of all these experiments was primarily to develop an easy, fairly accurate system of weather forecasting, to be used by farmers of Costa Rica, where a good meteorological service is unknown. It is true we happened to have one station (and a very little one) but the government suppressed it recently, because they supposed it was very expensive!

Some time ago Prof. Coronado explained a new system of forecasting the weather, by noting the change in strength of short-wave signals received in certain directions. Here he describes how short-wave reception may indicate the approach of cold northern waves in Central America—a new advance in scientific weather-casting.

Equipment Used

The equipment used in the observation of the phenomena about to be described was very simple, and the only one at hand. It was impossible to secure the Government's cooperation, or the cooperation of any of the several educational institutions existing in the country. No one has any interest in "weather prophets," as they smilingly say. So the apparatus was reduced to a home-made radio receiver (such as the one described in the March, 1935, issue of *Short Wave & Television)* not so powerful, but sufficient to hear something; a small transmitter employing 10 type tubes in push-pull, a little aneroid barometer, two thermometers (used as psychrometer also) and an old Weston multitester, which gave valuable indications about output strength, etc., during the long years of investigations. A long-wave, home-made receiver, using a lot of old 01A tubes was used with a static recorder made from an alarm clock movement. A loop aerial for observing local storms, two meters and some wire completed the *equipment*. This was all, but the results were quite surprising.

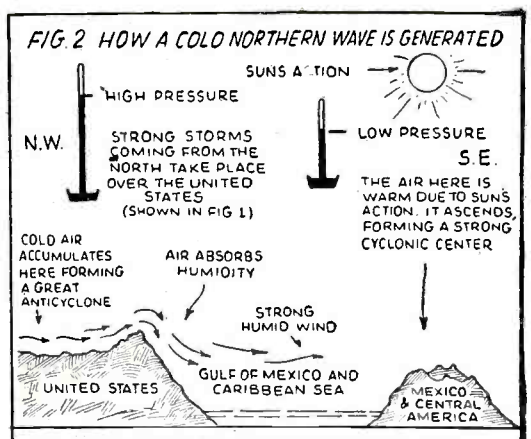
Now, let us consider meteorological phenomenon produced by high-pressure areas, i.e., a *cold northern wave*, and study it by means of *short* radio waves.

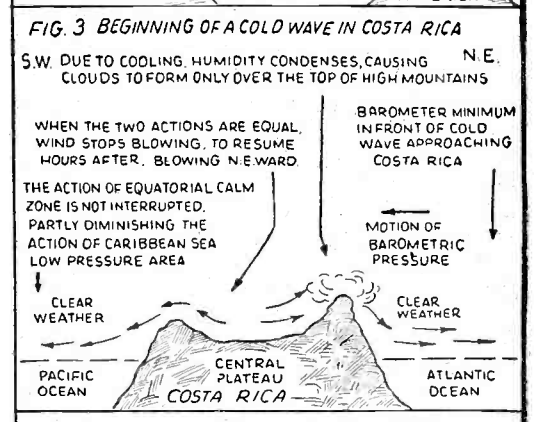
Cold Northern Waves

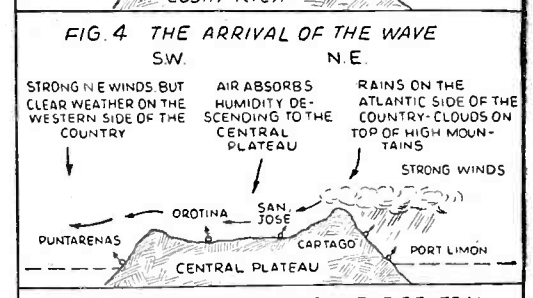
From December to February, the air is very cold in Canada and the northern part of the United States. This cold and heavy air accumulates throughout a vast area in the central part of the States, constituting an anti-cyclonic (high-pressure) area. At the same time, the Gulf of Mexico is heated by the sun's action and generates a cyclonic area (low-pressure). The cold air accumulates more and more, and at last it literally "fills" all the northern and central part of the United States. Then, it goes out in the form of storms, to the low-pressure area (Gulf of Mexico) in the form of cold northern waves, producing strong winds.

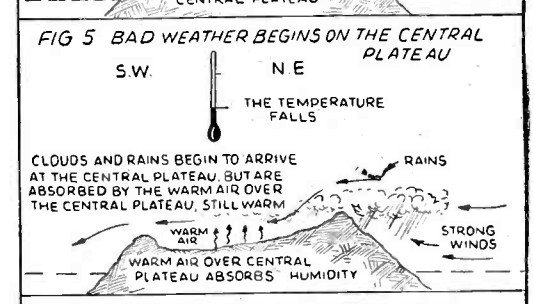
A part turns northeastward, following the general path of the North Atlantic wind system (along the Gulf Stream) producing fogs, strong winds, etc., along the eastern coast of the United States, and the rest continues southward, toward Central America and Panama, in an effort to follow the general path of the Pacific system of winds, because the Gulf of Mexico and Central America are the *points of contact*

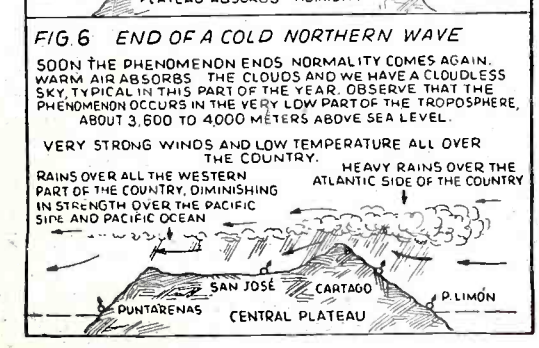
(Continued on page 175)











Spot News

Action for the listener, but consider the workout the Special Events department gets arranging an "on-the-spot" broadcast!

A news flash comes over the teletype in the press room at NBC.

The chief announcer, Pat Kelly, breaks into a program to announce a special news bulletin.

The news editor reading the flash over the microphone in the press room. News ticker machines are in the foreground.

● ONE of the most exacting but nevertheless interesting jobs in the field of broadcasting is that of the *special events* staff. It is this group's business to think up new and unusual stunt broadcasts and to be ready at any moment to make arrangements for *on-the-spot* broadcasts when some important world event warrants it. In the category of stunt broadcasts such things as descriptions of an Easter parade via a diminutive transmitter in the announcer's silk top hat and broadcasts from unusual places are everyday affairs. Since these stunt broadcasts are arranged in advance, the necessary details can be worked out carefully and all hitches smoothed out long before the broadcast actually goes on the air.

Other special broadcasts, although prepared in advance, entail a great deal of difficulty, due to the remoteness of the scene of the broadcast. In this class might be mentioned the description of the eclipse of the sun broadcast last year from Canton Island in the South Pacific Ocean, the broadcast from shipboard of the Macgregor Arctic Expedition and broadcasts from the Holden Expedition in South America. All these are relayed to the United States by portable short-wave transmitting equipment and frequently mean a great deal of hardship for the engineers and production managers.

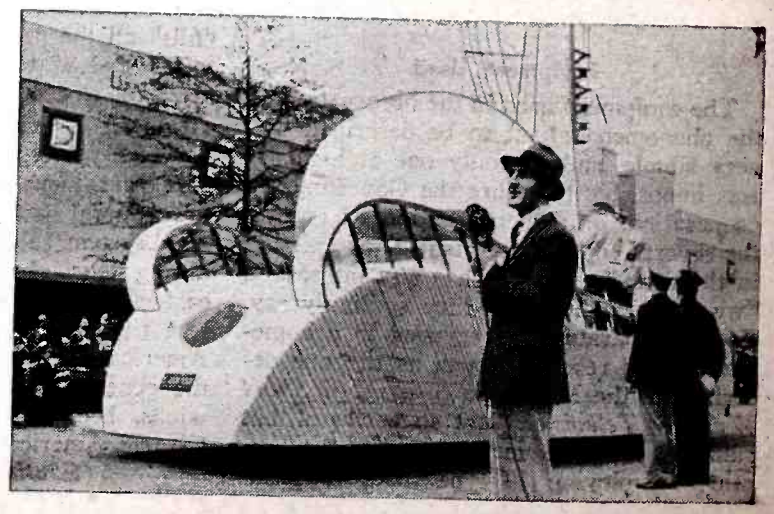
"On-the-Spot" News Broadcasts

The type of special events broadcast which causes gray hairs to sprout on the heads of the *special events* staff are those which have to be prepared on the spur of the moment, due to some startling development in world affairs. The annexation of Austria by Hitler's cohorts this spring happened so suddenly that it was inevitable that a special on-the-spot broadcast would have to be arranged within a few hours' time, for on-the-spot broadcasts of an event of this type must be presented as soon as possible after the event occurs to interest the listening public. The recent California floods provided another situation where special broadcasts had to be arranged at a moment's notice.

Introducing the "Special Events" Crew

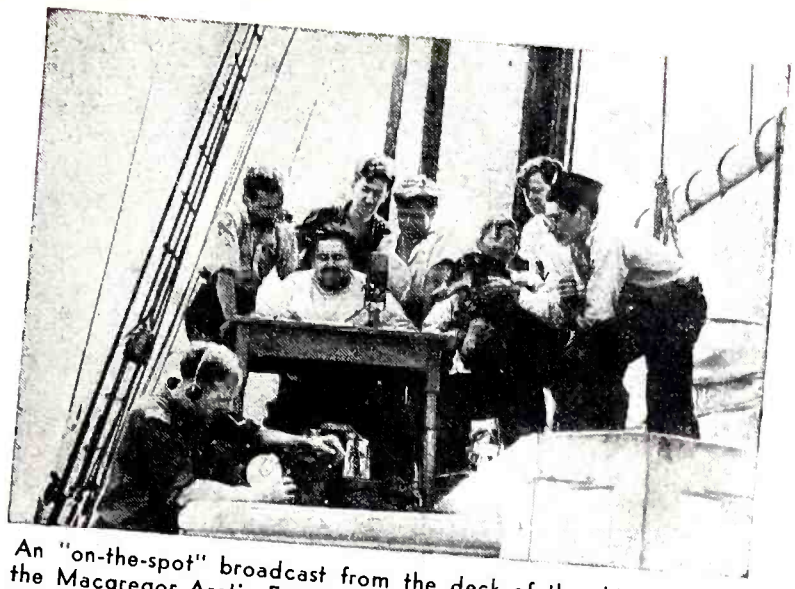
The men who prepare the special programs, the difficulties and the problems they must solve before going on the air seldom break into print. A news story breaks—and in a few hours the listener is "on the spot," hearing the first-hand description via radio. Consider, for example, the occasion of the bombing of the U. S. gunboat "Panay" and how the *Special Events* and *News Department* of the National Broadcasting Company handled it. Picture the news room in the Radio City headquarters of NBC on Sunday evening the twelfth of December. A battery of news ticker machines line one side of the room. These machines are connected to the Press Radio Bureau, which supplies news from The Associated Press, United Press and International News Service. All the important events of the day are printed automatically on them. Next to them stands a microphone used for broadcasting important news flashes. A pair of headphones for monitoring and an "On the Air" signal light complete the picture. When a news flash comes over the wires, the chief an-

An "on-the-spot" broadcaster describing the passage of floats at the preview of the New York World's Fair.



Spells Action!

M. Harvey Gernsback



An "on-the-spot" broadcast from the deck of the ship used by the Macgregor Arctic Expedition sent by short-wave to the U.S.

nouncer at Radio City, Pat Kelly, in studio 5R, is notified by telephone. Through a control panel on his desk he can fade out any program on the air and make special announcements or connect the microphone in the news room for broadcasting news flashes.

Abe Schechter, Director of News and Special Events for NBC, and the News Editor are startled by the persistent chiming of the bell on one of the news machines, indicating a flash. (When a flash comes over, a bell on the machine gives 10 or 15 rings.) The news editor runs over to the machine, reads the flash and hurriedly turns to Schechter—*"Call the chief announcer, the Japanese have bombed and sunk a U. S. gunboat in China!"*

Schechter picks up his phone and dials studio 5R. *"Hello, Kelly, we've got a hot news flash, give us the air!"*

The news editor takes his place before the microphone and dons the headset. In a moment he hears the chief announcer's voice telling America: *"We interrupt this broadcast to present a special news bulletin from the Press Radio Bureau."* The signal behind the microphone in the press room lights up with the words "On the Air." The news editor clears his throat; he speaks, *"Shanghai, the U.S. gunboat 'Panay' was bombed and sunk by Japanese airmen on the Yangtze River today—for further details see your daily newspaper."* The red light goes off.

No time is lost in attempting to arrange an "on-the-spot" broadcast from China. A cable is dispatched to the NBC representative in Shanghai with instructions to arrange for a *spot* broadcast. At the same time a call is put through to Don Thompson, the special events man in the San Francisco headquarters of NBC. Thompson is instructed to make arrangements with the Trans-Pacific radio station at Point Reyes, Calif., for picking up this special broadcast. At the same time, the New York headquarters of the RCA Communications is contacted for information as to the best time of day and the most suitable frequency to use for sending the program across the Pacific by short-wave. Next, the night program manager in Radio City is consulted to find out when there will be time available on the networks for presenting the program. When this has been determined, a second cable is sent to Shanghai with the information.

Within an hour and a half an answer comes from Shanghai that a broadcast is being arranged which will present a newspaperman giving his observations on the affair.

This matter being disposed of, the special events department is occupied until late at night broadcasting 5 minute news summaries every half hour on the "Panay" incident. Final arrangements for the special broadcast from China are completed and it is scheduled to go on the air at 12:45 the next afternoon. At that time the announcer steps to the microphone and confidently says: *"We now take you to Shanghai"* and in a moment's time, America is getting its first direct account of the bombing.

The broadcast originates in the International Settlement in Shanghai, where a temporary 3 kw. transmitter was set up following the bombardment of the regular

(Continued on page 188)

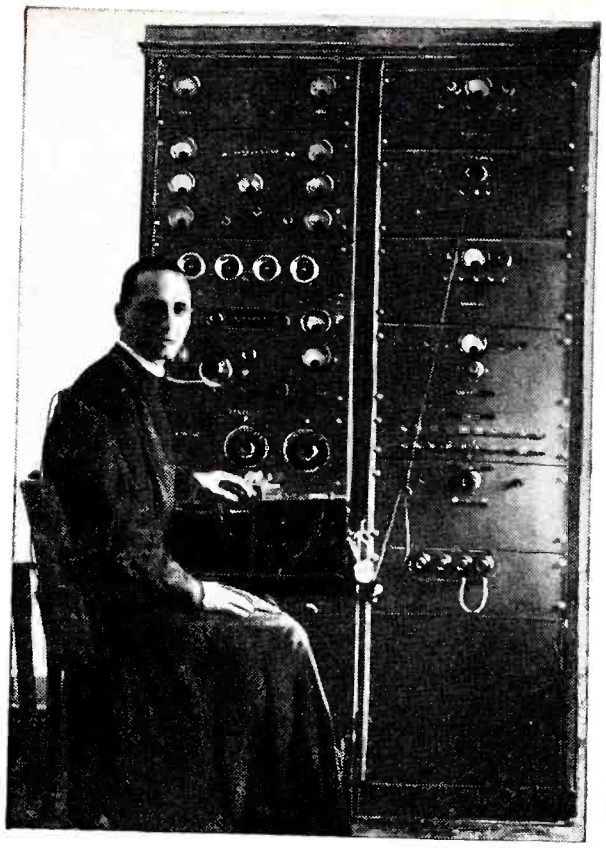
Announcer George Hicks broadcasting from Canton Island, scene of a solar eclipse broadcast.

Charles Lyon, NBC announcer, broadcasting over the beer-mug U.H.F. transmitter from the 500 mile auto sweepstakes, at Indianapolis, Ind.

The NBC mobile short-wave transmitter on the spot at Lakehurst, N. J. The ill-fated airship Hindenburg is seen in the background.

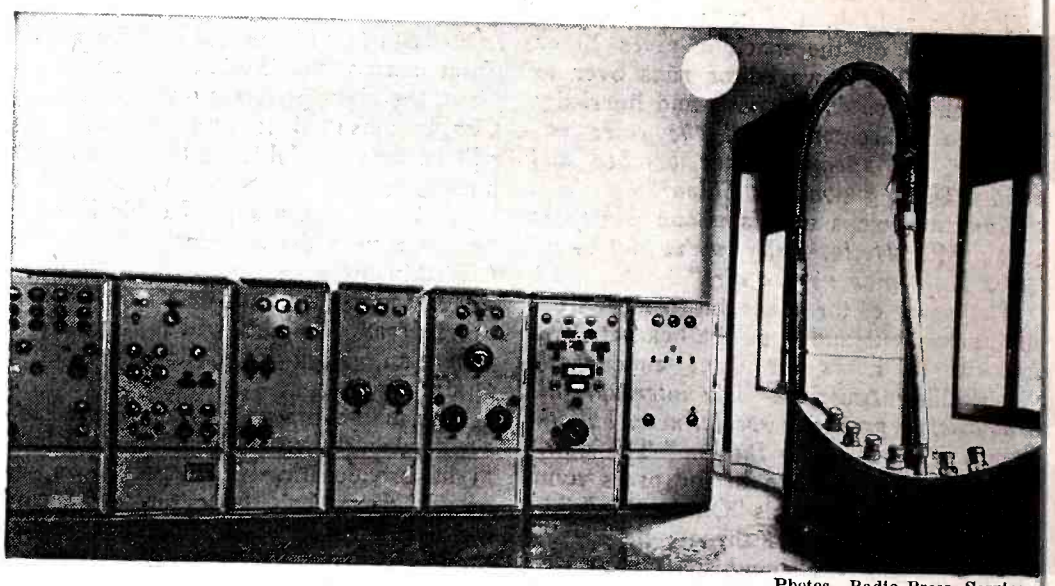
Vatican's New 50 Kw. Voice

A new 50 kw. short-wave transmitter has recently been installed in the Vatican City at Rome. Daily programs are broadcast in seven languages.



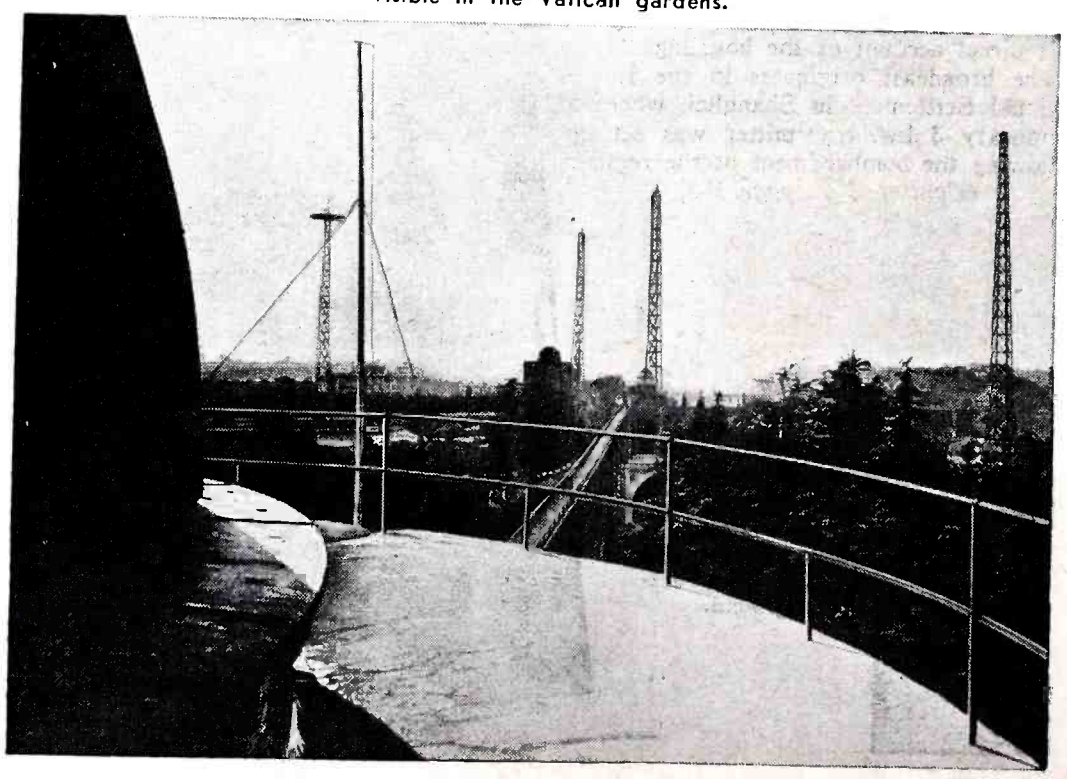
Left—The Rev. Prof. Filippo Soccorsi, director of the Vatican Radio at the control-board of the new short-wave transmitter.

● FATHER SOCCORSI, S. J., director of the Vatican Radio Station is proud of his new 50 kw. short-wave transmitter which was designed and built by Telefunken. The old transmitter was rated at 12 kw. and was installed in 1931. As the Vatican is such an important ecclesiastic center and reaches listeners scattered to the four corners of the globe, it became important that a new and more powerful radio transmitter be installed. Short waves have proved their value in maintaining long distance communication over paths reaching half-way around the world. As long as the experts in charge choose the proper wavelength or frequency for the changing seasons and the time of day, the short waves have proved themselves to be a staunch ally of the church.



Photos—Radio-Press Service.

Photo at right shows the interior of the new Vatican short-wave transmitting station which links the church of Rome with all parts of the world. The transmitter was built and installed by the well-known Telefunken company of Germany. At the right may be seen the switch for changing from one directional aerial to another. Photo below shows a view from the roof of the Papal Observatory, the aerial masts supporting the directional antennas being visible in the Vatican gardens.



Daily programs are broadcast from the Vatican station not only in six modern languages, but also in Latin.

Wavelengths varying from 15 to 60 meters may be selected quickly and also an elaborate aerial switching arrangement is provided, so that antennas directed toward the north, south, east or west may be put into service at a moment's notice.

An interesting part of the apparatus used with the new 50 kw. transmitter is the elaborate temperature-controlled oven or cabinet, in which the quartz crystals for stabilizing the transmission frequencies of the various channels are mounted. This carefully built cabinet contains 10 crystals, each ground for a different frequency, and any one of which can be switched into circuit immediately.

The Vatican station, HVJ, broadcasts daily from 10.30-10.45 a. m. on 15.127 mc. and on Saturday from 10-10.45 a. m. It also tests on 11.74 mc. and 6.03 mc.

BRAIN WAVES! What Are They?

Are they electrical? Is it possible to record them? Of what value are they? These and other questions are answered in this article.

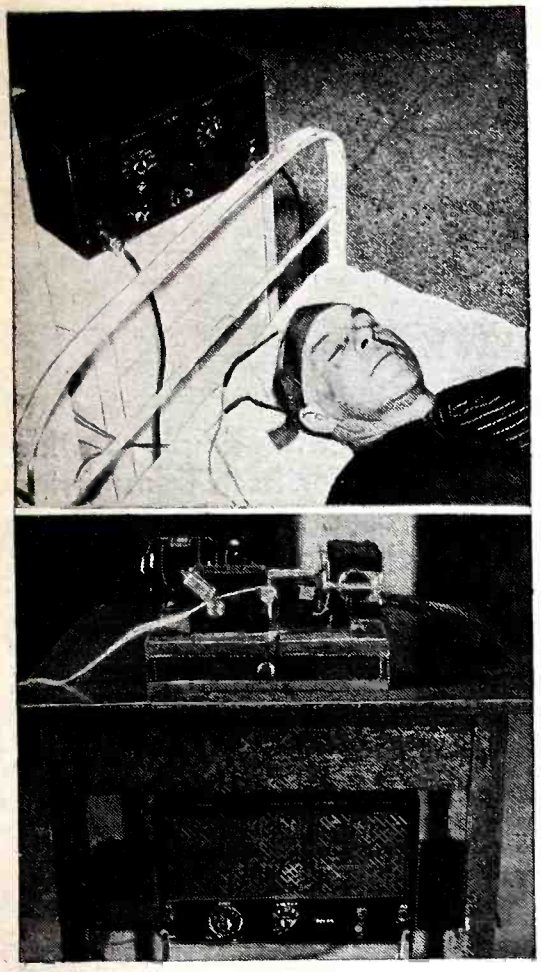
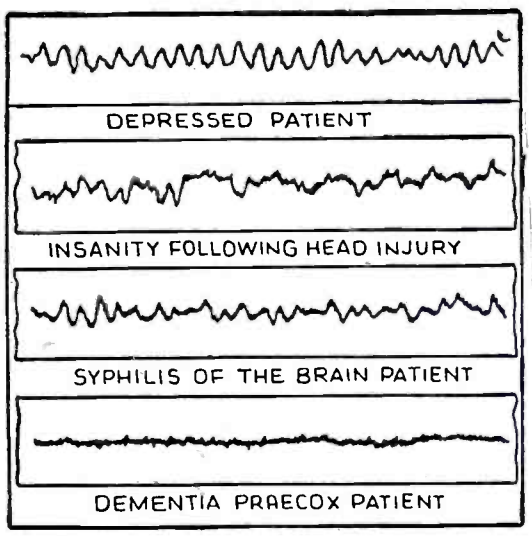


Photo shows patient wearing head-band containing electrodes for recording brain waves. One of the amplifier stages is also shown. Lower photo shows second amplifier stage and the ink-writer for recording.

● WE have heard a great deal about *short* waves and *long* waves but now we come to the latest discovery of science—*brain* waves! Readers may well ask what is a brain wave? Brain waves have been found to be weak electrical pulses, having certain frequency characteristics and which emanate from different parts of the brain. These brain waves or currents, as they may be called, vary with different subjects as some of the accompanying graphic curves show. Brain waves recorded from a patient suffering from insanity are considerably different from those recorded for a normal healthy patient. Medical experts who have been investigating this intensely interesting new branch of science, have not been able to catalog many different types of brain waves just yet, but tomorrow the physician, and especially the psychiatrist, will undoubtedly use this method for diagnosing physical and mental ailments.

Brain waves have been recorded even from children and waves having a frequency of four to five per second have actually been recorded from an infant as early as the first day after birth. As pointed out by Dr. Frederick Lemere, who has done considerable work along this line, the majority of these waves seem to come from the surface or cortex of the brain, and are produced by groups of nerve cells over an area probably as large as a dime. This means that many millions of cells have to get together and beat synchronously in order to produce the voltage recorded. The brain waves manifest themselves only with the patient relaxed and with his mind not particularly occupied. As the patient is directed to focus his attention on some object or problem, each nerve cell is then occupied with its own special function, and is not free to beat together with the other nerve cells.

Dr. Lemere points out in a letter to the editor that some degree of satisfaction has already been obtained in physical diagnosis made by means of the brain-wave recorder, and that several cases of brain tumor have been diagnosed and located with the apparatus. The accompanying brain-wave records are reproduced through the courtesy of Dr. Lemere.



The "brain wave" records above are very interesting and show how we may diagnose various human ailments tomorrow.

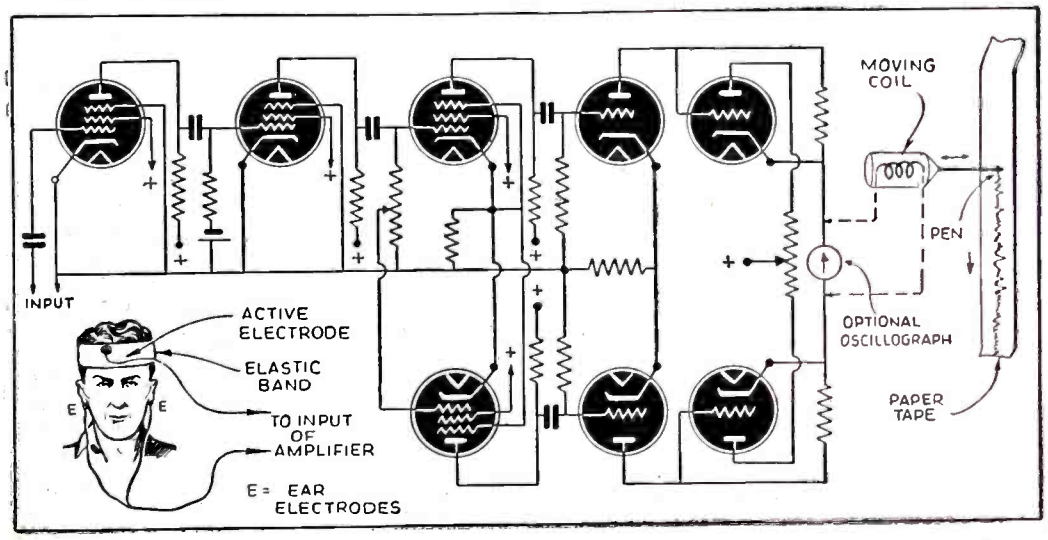
For the general experimenter interested in this remarkable new branch of science, it might be mentioned that the recording apparatus should be capable of registering waves or oscillations of the pen (or other type recorder) having a frequency of from 1 to 100 per second. In the ink-writing apparatus used for registering brain waves, a paper tape may be moved past the pen by a clockwork mechanism.

A typical amplifier for use in recording brain waves comprises three stages of resistance—capacity coupled high-mu pentodes, with the last of the three stages in push-pull.

In making the records of brain waves the patient is usually placed in a darkened room and instructed to keep his eyes closed. In one method an electrode is attached to the lobe of each ear and these two electrodes connected in parallel to form one wire of the measuring circuit. A small coil of silver wire forms the active electrode and this may be attached to a piece of sponge rubber and held in place on the head by means of an elastic head-band. The sponge may be moistened with a little salt water or saline electrode paste. For those interested in further details concerning the application of the electrodes, this information may be secured in a paper published by the American Medical Association, entitled—

(Continued on page 190)

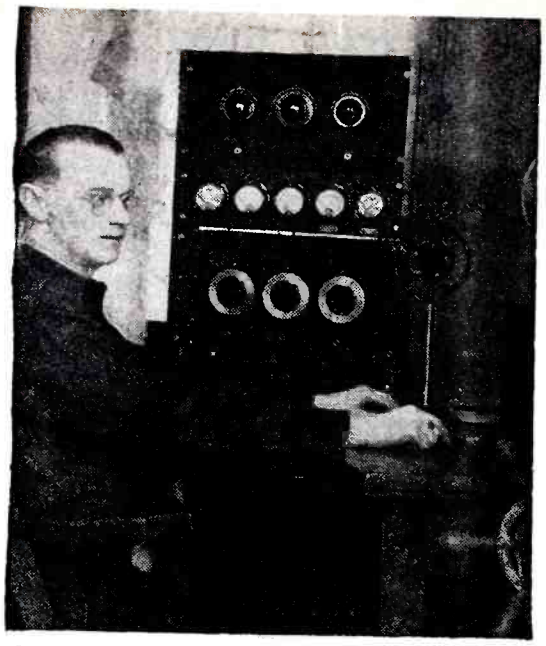
Vacuum tube amplifiers play an important part in recording brain waves, as the diagram herewith shows. An ink-writer or an oscillograph may be employed for recording.



This Rotating Antenna Fits In Your Attic

Ben Robin, W2BIG

Actual tests have proved that this simple rotating antenna is extremely useful for both transmitting and receiving. It is controlled from the operating room and has a direction indicator.

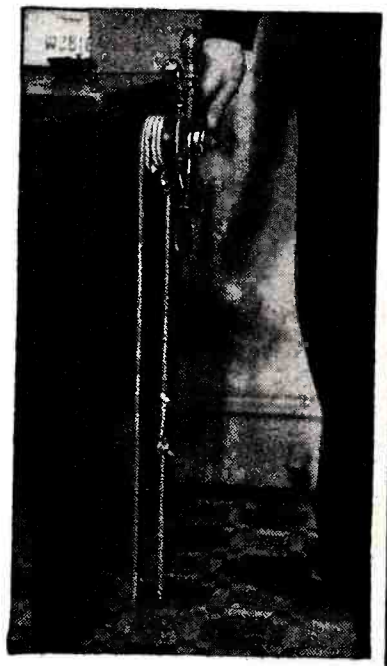


Mr. Dare Aucott, W3CRY, Brigantine, N. J., seated at his transmitter. Note rotating antenna control wheel in picture at right, and also on side of desk in view above.

● LIVING on the island of Brigantine, three miles north of Atlantic City, New Jersey, Mr. Dare Aucott, operating amateur radio station W3CRY, has devised a simple means of rotating a directional antenna which is installed in the attic of his two-story home. This is done by means of remote control right from his station's operating desk which is located on the first floor.

Most radio amateurs install outside antennae and these generally operate very well. W3CRY, however, had numerous complaints from the neighbors when he previously erected a mast and an out-of-doors aerial. Each time a local oil-burner started, or some one used a dial telephone, the loud-speakers of the radios in the neighborhood blared forth with squeals, clicks and anything but music. Immediately, some one would offer the solution; *"W3CRY is broadcasting, can't you see his antenna over there?"* Many times when Dare was so accused he was not even at home, much less using the transmitter.

Finally he decided that what people didn't see wouldn't bother them; so he figured on an *indoor* antenna. Mr. Aucott first secured an old ship's steering wheel and fastened it to the side of the desk in his operating room. He then purchased some sash cord and pulleys, drilled two holes in the floor directly under the ship's wheel and after wrapping the cord a few turns around the wheel, brought the sash cord through the holes into the basement.



Left—View of the control wheel and rope which swings antenna. Photo at right shows special direction indicator.

Below, by simply throwing a D.P.D.T. switch the antenna is connected to the transmitter or the receiver.

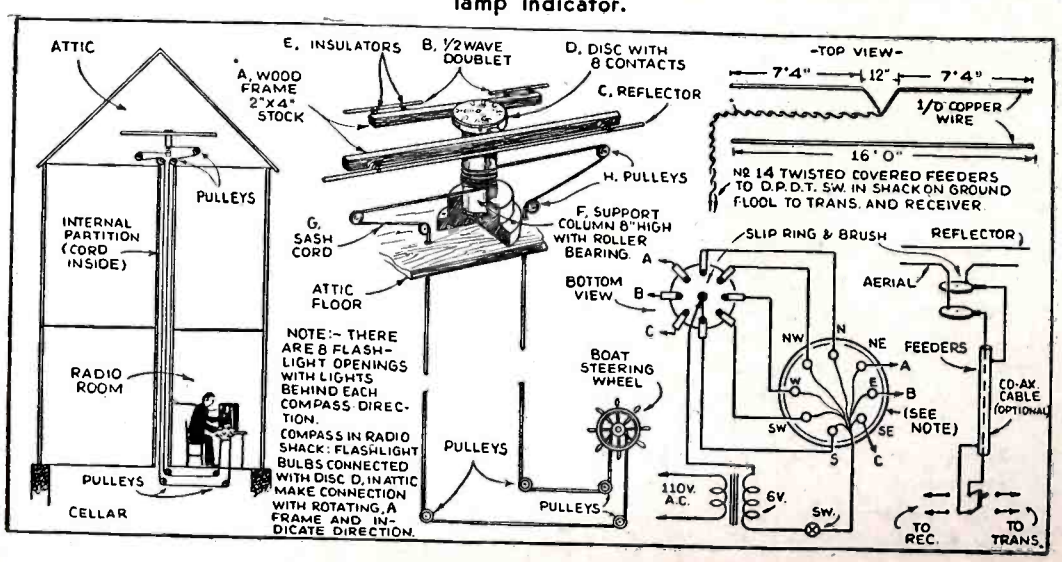
In the attic Mr. Aucott erected the antenna, a half - wave doublet with a quarter-wave reflector behind. He built the aerial on a large "H" shaped frame and mounted the frame on a huge round wooden dowel, which elevated the aerial about a foot off the attic floor. The sash cord and pulley system was terminated here at this end with a few tight turns of the cord around the wooden dowel. Now Mr. Aucott could sit in his radio room on the first floor and swing the antenna around in any direction at will.

But how was he to know which way it was pointing without going up in the attic to look? Aucott did not let a little thing like this stop him. He built a compass with eight directional points, and behind each point placed a flashlight bulb. He then installed on the antenna frame a round disk with eight metal contacts and ran wires from the attic down to this compass, which was then mounted on the radio shack wall. A transformer was hooked in the circuit and when the aerial was rotated by turning the ship's wheel, each respective point on the compass would light up as the antenna faced in that direction.

This aerial has worked so well that now W3CRY has put in a double-pole, double-throw switch and uses it for *receiving* as well as *transmitting*. Mr. Aucott's phone

(Continued on page 192)

Diagrams show simple rig used for control of rotating antenna and the simple direction lamp indicator.



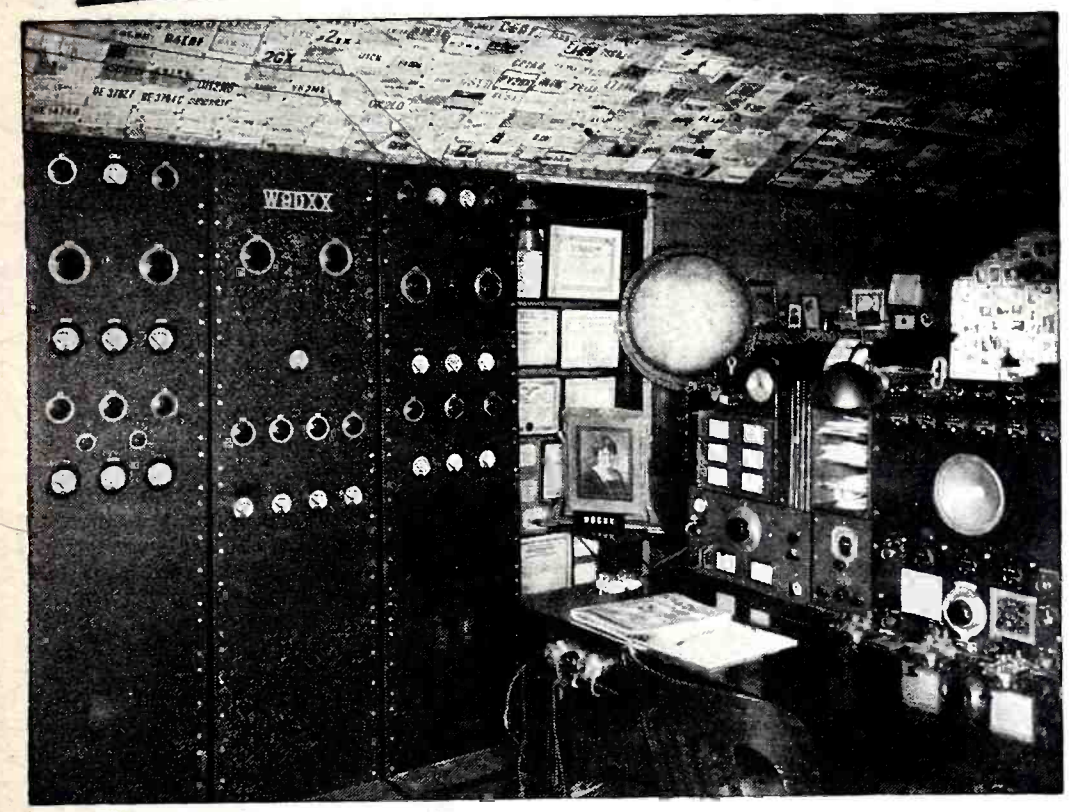
First Silver Trophy Award Goes to

Alice Bourke

W9DXX, Chicago, Ill.

For best HAM STATION Photo of the Month

Alice R. Bourke, W9DXX, 2560 E. 72nd Place, Chicago, Ill., wins the first silver trophy with this excellent photo of her top-notch Ham station. Look at those receivers!



This beautiful silver trophy stands 11¾" high and is to be awarded monthly by SHORT WAVE & TELEVISION magazine for the best photo of a Ham station. The silver statue stands on a handsome bakelite base on which is a silver plate. The name of the winner will be engraved on this plate before the trophy is sent to him. See rules on page 182.

● RADIO STATION W9DXX is operated and owned by Mrs. Alice R. Bourke of Chicago, Illinois.

Signal honor was bestowed on this station recently, through its selection by the Rosenwald Museum of Science and Industry, as representative of an excellent, high-power American (amateur) station.

A large photograph of radio station W9DXX transferred to glass and illuminated from the rear, has been placed in the permanent Physics Exhibit of the world-famous Chicago museum.

The 60-foot transmitting antennas of W9DXX are located close to the edge of Lake Michigan, and the station's signals have brought fine reports from throughout the world. W9DXX has worked all continents, all 48 of the United States, and 57 foreign countries, with more than 500 different DX QSO on the station log. The walls and ceiling of the big radio room at W9DXX are covered with thousands of QSLs and photos of ham shacks and operators.

The station is very generally known abroad, and has received much publicity in the radio journals of Great Britain, France, Russia and Poland.

W9DXX has just returned to the air after a long period of inactivity due to illness of the operator's parents. During this shutdown period, the station was rebuilt and modernized.

At the present time there are three separate transmitters. The 10-meter rig has a pair of 100TH's in final, input 375 watts. The 20-meter transmitter utilizes a pair of 150T's in the final stage, with input of 900 watts. A pair of 203A's are employed in the 40-meter rig, with 450 watts input. All three transmitters are used for C.W. exclusively.

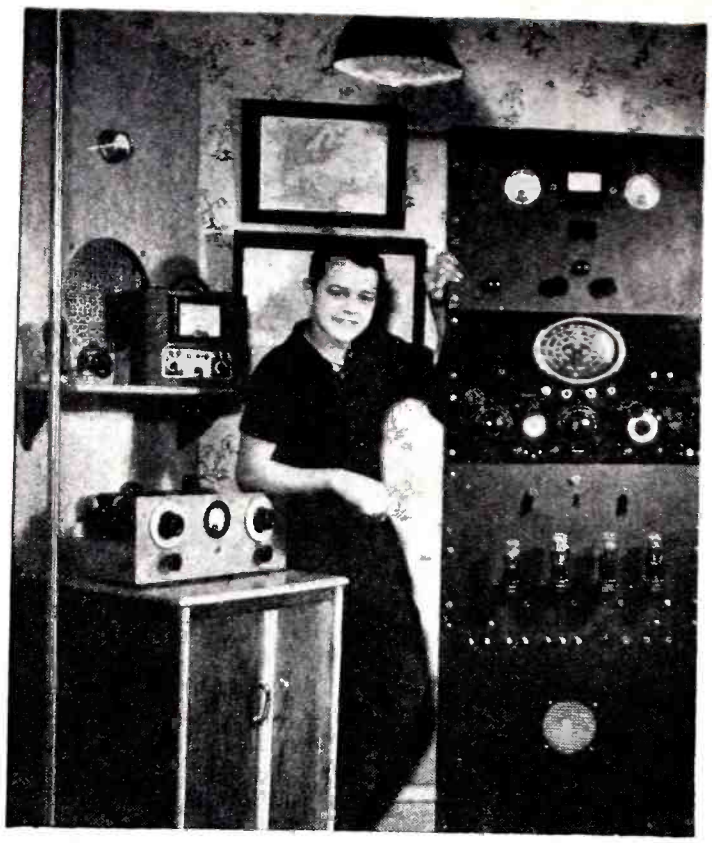
A fourth transmitter, designed for 10-meter phone work, is under construction.

Two National HRO's and an AGSX constitute the present *receiving* equipment.

W9DXX was granted a Class B ticket April 19, 1930; a Class A license was ob-

(Continued on page 182)

WHAT



Prize Winner this month—S-W Listening Post of Jerry D. Potter, Jr.

A Real DX Listener

Editor,

Here is a photo of my radio den. Your magazine has been the inspiration for this assembly of radio apparatus.

The large rack at the right contains from top to bottom a panel that will hold my transmitter when I get my ham license, the meters are not hooked up yet but are ready and waiting, below this is a factory built super-het., next a very interesting receiver that I have built from a combination of various circuits that have appeared in your magazines from time to time, this set has regenerative R.F. that works all the way from 10 meters to 600 meters, below is an all purpose amplifier used for this set, recording and testing other all wave receiving circuits. On the left is a cabinet containing a phono., turntable and pickup, tubes and tools. On top is a five- and ten-meter set, also built from some of your circuits. A vertical 5 meter antenna can be seen hanging from the ceiling. On the shelf can be seen some of my test equipment; above the speaker an "R" meter for the U.H.F. receiver. On the roof I have three antennas, cut to resonate on different bands. So far I have heard nearly *all continents* and most of them have been verified.

JERRY D. POTTER, JR.
2248 Hutchinson St.,
Chicago, Illinois.

S.W.&T. Helped Him Get Veris!

Editor,

I want to tell you how much I enjoy your magazine. I am very much interested in *foreign* short-wave programs and I think this department in your magazine is the best published. It has the most complete list of short-wave stations and station identifications of any magazine.

I am using a 9-tube Arvin receiver for short-wave reception with very good results, with the help of your fine short-wave suggestions.

I have so far received verification cards from the following short-wave stations: W9XF Chicago, Ill.; COCX Havana, Cuba; DJD Zeesen, Germany; PCJ Eindhoven, Holland; W3XAL Bound-Brook. N. J.; TPA4 France; HJ1ABE Cartagena, Col., S. A.; W2XAD Schenectady, N. Y.; XEWI Mexico; W1XAL Boston, Mass.; GSD Daventry, England; HJ1ABP Cartagena, S. A.; CJRX Winnipeg, Canada, YV1RH Maracaibo, Venezuela; OLR Praha, Czechoslovakia; 2RO Rome, Italy. Your magazine was a great help to me in bagging these stations and veris.

My latest veri is TGWA, Guatemala City, Guatemala.

TGWA gives its frequencies (on veri) as 9685, 11760, 15170, 17800 kilocycles and a power of 10 kilowatts. (As of Dec. 18th.)

The card is white with blue lettering and a picture of a native bird in natural colors; it's very pretty.

I hope that with the help of your wonderful magazine, *Short Wave & Television,* I shall be able to verify many more foreign short-wave stations.

I have been a reader of your magazine for only about a year, but I could hardly do without it now, for the purpose of obtaining information on short-wave stations and many other useful suggestions.

WERNER R. SCHNAPPAUF,
Fredericksburg, Texas.

He Built 20 Sets!

Editor,

I have been a *Short Wave League* member for quite some time. I also am a faithful reader of *Short Wave & Television* magazine. My first copy was purchased in August-September 1930, and up to date I have not missed a single copy. Before I purchased my first copy I did not think much of radio. Since then I have obtained all of my short-wave and television information from your F. B. magazine. I have built about twenty S-W sets, including the "Beginner's Twin," "Doerle 5-Tube Electric" and several 5-meter receivers.

On the 5-tube Doerle I received 1500 amateur stations, including many foreign countries such as Germany, Japan, England, France, South America, Cuba and various others; all in all, about 90 to 100 short-wave broadcast stations. You see my 5-tube T.R.F. Doerle is my best bet for DX.

With my 5-meter receiver I received a distance of about 30 miles, which I think is very good DX and I am going to send for 5-meter veris and see how many QSL's I can collect. I would like to correspond and exchange ideas with Hams and SWL's. I will answer all mail.

GERARD E. JANSEN,
2551 W. Monroe St.,
Chicago, Ill.

We Started Him in S-W's

Editor,

The time has come for me to take off my fur-lined mitts and come down out of the north in the form of a letter to your very FB magazine. And just to be a little more businesslike, I might add that it goes over R9+ up here.

Where anybody can find anything to squawk about I don't know, but of course, it's hard to please everybody. I, myself, do not read some articles as I am not interested in them, but what the heck, I get more than two bits worth out of the rest of the magazine.

It was *Short Wave Craft* that started me on the road to being an ardent S-W Fan. A friend gave me a copy (don't worry, I gave it back) and I straightway bought myself an up-to-date issue. Boy, I was bit bad!

Not knowing the first thing about radio, except what I'd learned in ye olde technical school, I decided to find out. I built a Doerle, using 2—30's, and wonder of wonders—it perked right off the bat—pulling in Germany loud enough to make it uncomfortable to listen to (on phones). I still have the set, although I have built myself an A.C. "junkbox three" and use it all the time.

According to sensible ethics, it shouldn't work, but this set is different! The detector is a 27, audio-coupled to a 26, which is audio-coupled to a 71A. This outfit pushes the "sigs" through an output transformer into an old oval P.M. speaker. I have worked out a very smooth regeneration control which has, no doubt, been used by many an experimenter before. The two audio transformers are 3½ to 1 and 3 to 1, taken from old battery sets and the antenna trimmer is home-made. The regeneration as I said before is very smooth and also remains constant over any coil I happen to be using. It utilizes a potentiometer which controls the voltage in the plate of the detector, and a condenser which is connected from the tickler to ground.

I also have a switch on the front panel for "flipping" to earphones for the faint sigs, which are very few. My plug-in coils range from 10 to 550 meters and are hand-wound. In order to plug them in without having to twist the chassis round every time I wish to change, I have mounted the socket on the front panel. There are no complications from hand-capacity and I have not attempted to shield any of the parts (though, doubtless, there should be some shielding done; what do you say?).

Radio reception is very bad up here in this "neck of the woods," owing to the high percentage of nickel and copper in the hills round about the valley. An eight-tube "commercial" set has no more pep than a worn out 4-tuber, and consequently DX suffers. In spite of this I have managed to pin some 20 veris on the wall. My best is from Prague, Czechoslovakia, which I got on the first day it was broadcasting.

JOHN RUSSELL KINCH,
Copper Cliff, Ontario,
Canada.

DO YOU THINK?

He Wants Television "Info"

Editor,

I have both *bouquets* and *brickbats* for you. I heartily second (maybe it's thousandth it by now) the idea of S.W.&T. printing the list of stations who don't send QSL cards. Also I suggest you print a list of those who don't date those they send, such as W8XK.

I have built several sets that worked O.K. (which were described in your mag.) but I don't see why you don't have more diagrams using the older tubes, such as the 57, 58, 56, 2A5, and several other types. I don't think your average readers have the money to buy new tubes every one or two issues, such as the sets you print require. I would like to see a set of the following characteristics printed and discussed: 58 regenerative T.R.F. into a 57 grid det. with an extra 56 in control of regeneration for the det. into 56 first audio, into 2A5 power output. This type of receiver would be about the peak of T.R.F. receiver design, wouldn't it? I think George W. Shuart would be able to handle this, although it doesn't matter to me. With the rectifier there would be a total of six tubes.

I think the kink dept. is sa-well. All were good in the Jan. '38 issue.

I hear about an equal number of nays and yeas for the *television* information, so I add my comment. There probably are very few of your readers who could possibly do anything on the construction line, but still the info is *very* interesting. I like to read anything, construction or otherwise, on *television*. Some of those readers of yours can't seem to get it through their blocks that television will be here in a few years and then radio will go fast.

I like the pictures of listening posts and stations; keep it up!

I think the fellow who thought up the "New Experiments with Radio Apparatus" column *has a brain*. It is an invaluable asset to your magazine!

I might inform Charles Fiege that the *hams* around here have a few SWL cards and nearly always send QSL's in return. I think this man was trying to make your mag. get flooded with SWL replies.

London Allbright,
1219 So. Verdugo Ave.,
Burbank, California.

(Fine business, London, and we agree with you that television will be in our homes before we know it—not in a few years (but in less than a year, we might even venture). Regarding the construction of a "television" receiver, you will find that this is not so terribly difficult, and the data for building a modern cathode-ray receiver has appeared serially in this magazine. —Editor.)

He Built "Induction Phone"

Editor,

I have made your Induction Phone (described in the Feb. issue) and had good luck with it. My friend and I have talked when the loops were six feet apart, *without any amplifier!*

Junior McKinney,
310 South Ninth,
Albuquerque, New Mexico.

(Swell, J. M. Let's hear from more of you fellows who build "our" sets.—Ed.)

So Help Us—Another Kick!

Editor,

I have been a reader of your magazine for more than four years and I have taken notice of the changes in it. I am sorry to say that *I don't like them.* It was better when you had Doerle and many others in the old times.

About the television business, I don't believe in an immediate future for it. First, a receiver will cost from $750.00 to $2,000.00, and secondly to receive an image (picture) the transmitter should be in the vicinity.

That does not mean that I do not enjoy your magazine any more, but I like it less than before. One good addition is the Barter and Exchange advertising department.

Charles A. Piche, VE2IZ,
4327 Parthenais,
Montreal, Quebec.

What Do You Say, SWL's?

Editor,

I just finished reading "Uncontrolled Oscillations" in your March issue of S.W.&T. for answers to Mr. Fiege's letter which appeared in the January issue.

I was an operator at K5AH. There were four of us "ops." They were "Duke" (who held the station license), "Woody", "Roscoe", and "Kong" (myself). Those Hams who have worked us will know who we are. ("Duke", "Woody" and "Roscoe", if you see this, drop me a line.) I left the Canal Zone in June '36 so I don't know who is at K5AH now. I haven't had time since I left the Canal Zone to knock a station together, so I repose in the SWL class. Not that I like the idea, however.

I take Mr. Fiege's stand, but not quite so pointed. By that I mean, we checked SWL cards against QSL cards and our "log." Those that didn't check went into the waste basket. On an average, only one of six ever checked.

Here is an example of how inaccurate SWL's are. I worked PY2QD (now PY5QD) and he gave me a report of RST 2/3.47 using a "Comet Pro" receiver. An SWL card was received from a Georgia SWL giving a report of R 8 to 9 on that same QSO! We worked several amateurs in Georgia and never received over an R6 report. Usually they ran from R3 to 5.

I'm not condemning all SWL's, but after getting five out of six reports like that, I ask the reader, could we give or put much credit in SWL reports?

What do SWL's say to this?

I sign off now wishing S.W.&T. the best of luck. 73.

T. R. George,
Ogdensburg, Pa.

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

Closing date for each contest—75 days preceding date of issue; July 15 for Oct. issue, etc. The editors will act as judges and their opinions will be final. In the event of a tie a subscription will be given to each contestant so tying.

S-W Listening Post of Clifford Patern, 104-44 108th St., Richmond Hill, L. I., N. Y.

About Those Martians

Editor,

Since you welcome "discussable" articles, I decided to come back at you, but not with any bricks, so don't worry. I've got nothing but admiration for the way you put out S.W.&T. and hope you keep up the good work indefinitely.

I am inclined to take sides with R. T. Warner, whose letter was in the same issue as mine. He states that it is rather farfetched to suppose that the Martians could communicate with us by means of numbers. And so it is! There's every chance in the world of the Martians having a different numbering system. They could easily be using a system entirely beyond our conception and most likely much more difficult to understand than our highest calculus. Then again, if there are any Martians, perhaps they have not yet reached that stage of intelligence which warrants their communicating with us in any way at all.

I am in favor of believing that there is life on Mars, and for that matter, on any of the planets. I'll bet that statement will bring a nice pile of protests, but let them come! Hi!

I don't claim to know much about radio, but I wonder if it wouldn't be possible to use a sort of parabolic reflector to send a narrow radio beam toward Mars on a wavelength that we know has good distance qualities. Of course, we have to penetrate the various ionized layers above the earth's atmosphere. In that case, surely someone has discovered a wavelength or other means of piercing those troublesome shields. Come on, you experimenters, come out from under the table and give us your ideas. Hi!

That fellow Charles Fiege, Jr., seems to be getting it in the neck about the S.W.L. cards. Personally, I have never QSL'd a Ham, but I imagine that he would be more than tickled pink to receive cards from listeners, especially from distant points. In the same issue, March, on the bottom of page 605, we see Fred Baines with one of the nicest layouts yet, for a "listening post." Incidentally, there are over thirty SWL cards on his walls (count 'em)! Even though Fred isn't a Ham, that proves something, or doesn't it?

John R. Kinch,
Copper Cliff, Ontario,
Canada.

Short Wave League

HONORARY MEMBERS

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

When to Listen In

M. Harvey Gernsback

CAIRO RESULTS . . . During the first part of this year an International Conference was held at Cairo, Egypt, to discuss allocations of radio channels for the whole world. The final results of this conference, as far as short-wave broadcasting is concerned, are now available. The changes adopted will go into effect September 1, 1939.

Three new broadcast bands have been opened for use for local broadcasting in tropical countries, where high static levels make it impossible to use the regular long-wave band for this purpose. These bands are from 2.3 to 2.5 mc., 3.3 to 3.5 mc., and 4.7 to 4.9 mc. The second of these bands cannot be used by Central and South America, however.

The 6 mc. short-wave broadcast band will spread from 6 to 6.2 mc. A new broadcast band will be opened from 7.2 to 7.3 mc. for the use of European stations. This is in the 40 meter ham band. The other broadcast bands will be from 9.5 to 9.7 mc., 17.75 to 17.85 mc., and 21.45 to 21.75 mc. The 11 and 15 mc. broadcast bands were not changed at the conference and will remain as they are at present.

NRH . . . How many *Short Wave Leaguers* heard the special broadcast dedicated to the League by TI2NRH at Heredia, Costa Rica. This broadcast was very well heard from 9 to 10 p.m. on May 12 in New York. We wish to thank Céspedes Marin for the nice things he said about the League and *Short Wave & Television.*

GUATEMALA . . . TGWA at Guatemala City now broadcasts on weekdays from 12:45 to 1 p.m. and from 10 to 11:30 p.m. On Sunday, the schedule is from 12:45 p.m. to 10:15 p.m. At present TGWA operates on 15.17 mc. before 6 p.m. and on 9.685 mc. after 6 p.m. It is probable that during the summer the frequencies used will be 11.76 and 17.8 mc. Power is 10 kw. A new Guatemala transmitter which will shortly be on the air is TGWB, which will operate from 7:50 to 8:30 a.m., from 12:45 to 3:15 p.m. and from 7:30 to midnight. On Sunday the schedule will be 10:30 a.m. to 4:15 p.m. and 7 p.m. to 12:15 a.m. TGWB will operate on 6.04 mc. with 1 kw.

ROME . . . A new station is heard on 15.3 mc., relaying 2RO until 9 p.m. This apparently is the same station which was heard last month on 17.81 mc.

RIO DE JANEIRO . . . PSE on 14.94 mc. at Rio de Janeiro, Brazil, broadcasts on Wednesday from 3:45 p.m. to 4:15 p.m. PPQ, also at Rio, on 11.67 mc. is heard testing irregularly with Rocky Point, N. Y., from 5:45 to 6:45 p.m.

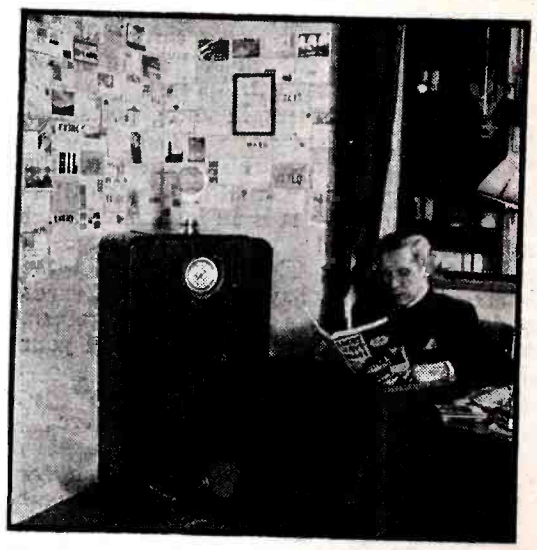
MEXICO . . . A new Mexican is operating on 11.73 mc. The call is XETA and it is located at Monterey. Programs of XET are relayed from 12 noon to 2 p.m. The address is supposed to be P.O. Box 203.

HAVANA . . . COCX has moved up to 11.74 mc. where it is heard very well; in fact, it sometimes interferes with GSD at Daventry.

QUAKER CITY . . . W3XAU at Philadelphia has adopted a new operating schedule. On Monday, Thursday and Saturday they broadcast from 12 noon to 12 midnight; on Tuesday, Friday and Sunday from 11 p.m. to 12 midnight and on Wednesday from 9 p.m. to 12 midnight. This is on 9.59 mc. On 6.06 mc. the schedule is Tuesday, Friday and Sunday, 12 noon to 11 p.m. and Wednesday 12 noon to 9 p.m. The schedule was worked out to avoid conflict with the broadcasts from PCJ, Holland, which shares the 9.59 mc. channel with W3XAU.

JACKSON SWL . . . We are glad to note that the Jackson Short Wave League of Jackson, Mich., now has a membership at large of 42. This is a supplementary group to their regular membership and is open to Short Wave Leaguers in all parts of the world. The regular Jackson League, of course, consists of residents in and near Jackson, Mich. The group sends out a transit bulletin which is passed on by mail from member to member. Each person adds whatever information he may have and the last person returns it to the Jackson headquarters. The local group meets twice a month in Jackson, except during July and August. Dues are ten cents a year and a membership card is supplied to all who join. All those interested write to Roy E. Chisholm, 616 Fourth Street, Jackson, Mich.

SPAIN . . . There are a large number of stations in Spain broadcasting news for both sides of the fracas. Stations relaying the rebel national station at Salamanca can be heard on 15.88 and 7.5 mc. from 3 to 4 p.m., on 7.36 mc. from 5:45 to 6:45 p.m., on 7.3 from 3:15 to 3:40 p.m. and on 7.26, 7.4, 7.3, 7.18 and 7.1 mc. irregularly from 4 to 7 p.m.



The listening post of "Short Wave Leaguer" Carl Huppenburg of Stockholm, Sweden. The receiver is of American manufacture.

Loyalist stations in Madrid include ED5 on 7.08 mc. from 7:30 to 8 p.m., EA4R, Radio Norte on 7.05 mc. from 4 to 7:15 p.m., Radio Madrid on 7.01 mc. from 4 to 7 p.m. and Radio Azed on 7.075 mc. and 6.76 mc. from 4 to 7 p.m. Another Loyalist station whose location is unknown is on 7.46 mc. from 6 to 9 p.m. Two more stations reported are on 11.04 mc. from 6:45 to 9:45 p.m. and EA8AG on 7.22 mc. from 4 to 7 p.m. Most of the stations in the 7 mc. band are operated by amateurs.

All schedules in Eastern Standard Time

SCHENECTADY . . . The summer schedule for W2XAD is: 21.5 mc., 7-11 a.m., 15.33 mc. 11:30 a.m. to 6 p.m., 9.55 mc. 6:30 to 10 p.m. For W2XAF on 9.53 mc. the schedule is 3 to 11 p.m. Incidentally, these stations will shortly increase their power to 100 kw., making them the most powerful short-wave broadcasters in the world.

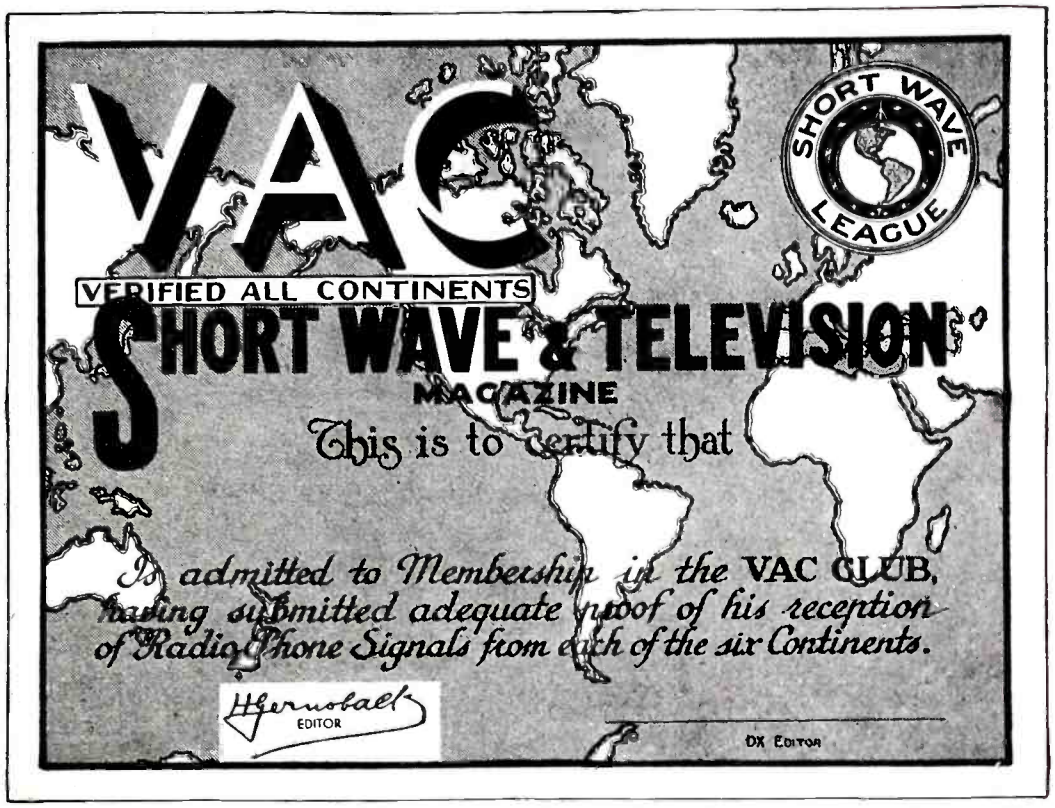
U.S. BROADCASTER? . . . Much has been said in several articles in past issues of the possibility that the U.S. government might build a short-wave broadcast station for the purpose of combatting short-wave broadcasts directed at South America from Europe. The evolution of this plan seems to be reaching a more concrete stage as several bills are now before Congress for the erection of such a station to be operated by the U.S. Navy. As might be expected, the politicians have their fingers in the pie and are scrambling to have the station erected where it will do them the most good politically.

The broadcasting industry is worried about the possibility of this station actually being erected, as they fear that it may be an opening wedge for the government to get into the broadcasting field in this country. Their contention is that the existing short-wave facilities operated by the privately owned companies are more than adequate, since the government has always been allowed free time on the air.

Final action on the project has been postponed at the request of the Administration, pending a report from a special committee, which will not be available until next fall. This delay may be a graceful way of sidetracking the whole matter.

SUN SPOTS AGAIN . . . How many listeners noticed the complete wipe-out of short-wave signals on the afternoon of May 11? We turned on our set about 5:45 p.m. and went looking for the usual European *locals*. Not a sound could be heard, however. Even with the beat oscillator on, not a carrier could be raised. This condition continued for approximately an hour. By 7:45 p.m., however, stations could once more be heard very weakly. Interestingly enough, the stations to the south of us, notably LRX at Buenos Aires, were heard stronger than usual, although suffering from bad fading. This is in line with the observations of the commercial radio companies that north and south reception is not generally affected at these times.

Here's the New VAC Certificate



A reproduction of the new VAC certificate. The certificate is printed in black on a blue background on heavy ledger paper, 8½" x 11" in size. It is quite a handsome affair and we are sure that listeners will be proud to display it.

● *SHORT WAVE & TELEVISION* has prepared a handsome VAC (Verified All Continents) certificate which will be issued to all short-wave listeners submitting adequate proof of verification from all continents. To secure a VAC certificate the listener must send in a verification card from each of the continents. The VAC certificate will only be issued for verifications of radiophone stations, not C.W. stations. The certificates will be signed by the DX Editor, and Hugo Gernsback, Editor-in-Chief of *Short Wave & Television*.

It is advisable that the cards be sent in a neat package and insured for safe delivery. All cards submitted will be returned. The listener should enclose return postage.

A nominal charge of twenty-five cents (25c) will be made for the certificate to cover the cost of handling and printing.

The DX Editor will be the judge as to whether the verifications submitted are bona fide.

A special seal will be available for attaching to the certificate in the event that a listener has more than one complete set of verifications from all continents. A seal of this type will be issued for each complete set of all continent cards so that as ones VAC collection grows, it may be certified by affixing a new seal to the certificate.

The DX editor will also judge whether the verifications that are submitted for the seals are bona fide. The charge for the seal service will be ten cents.

All entries should be made to the *VAC Editor, Short Wave & Television, 99 Hudson Street, New York, N. Y.*

Can You Answer These Radio Questions?

1. By what simple method could a short-wave transmitter sending "phantom" messages be located on a boat without being detected? See page 134.
2. How is a "rising curtain" effect obtained in television broadcasts by the B.B.C.? See page 136.
3. What is the effect of a cold wave on short-wave reception, so far as weather prediction is concerned, and how can this effect be used in weather forecasting? See page 137.
4. Can you explain how a "spot news" broadcast is picked up from Shanghai? See page 138.
5. In how many languages does the new Vatican short-wave station broadcast and what frequencies are used? See page 140.
6. What radio instrumentality is used in the detection and recording of "brain waves"? See page 141.
7. What is the main purpose of a rotary antenna? See page 142.
8. What is the VAC certificate and how may one be obtained? See page 147.
9. How can a standard loudspeaker be used as a super-sensitive collector of sound waves? See page 162.
10. How can a 3-tube receiver be used as a preselector? See page 164.
11. How can regeneration be added in a simple manner to a superhet to increase its sensitivity? See page 166.
12. What are the first steps in getting ready to put a transmitter on the air? See page 169.

Let's Listen In

● RECEPTION during the past month has been very good most of the time. Although the usual summer noise is fast becoming noticeable, it is not yet strong enough to cause too much interference. The Aurora Borealis, or northern lights, are still bothersome, but not as they were some months ago. This is particularly true in the northern states, while the southern states very rarely experience this phenomenon.

SINGAPORE

The Malayan station ZHP at Singapore, Straits Settlement, may be heard between 5:30 and 6:30 a.m., E.S.T. It will be found on 9.53 megacycles and puts in a fairly good signal.

IRELAND

A new 2,000 watt short wave station will be built soon at Moydrum, Ireland. The frequency on which it is to operate has not yet been announced. It has been reported that it will be on several wavelengths between 19 and 50 meters.

BRITISH STATIONS

Characteristic of the British stations is the striking of the hour by "Big Ben" in London. This has been used for many years to identify the Daventry stations. It may be best heard in the United States at present at the following times and frequencies:— at 1 a.m., E.S.T. (6 a.m., G.M.T.) on GSG (17.790), GSO (15.180), GSF (15.140); at 9 a.m., E.S.T. over GSF (15.140), GSG (17.690), GSJ (21.530); at 11 a.m., E.S.T. over GSG (17.790), GSF (15.140); at 4 p.m., E.S.T. over GSG (17.790), GSP (15.310); at 8 p.m., E.S.T. over GSP (15.310), GSD (11.750), GSC (9.580).

GSI at Daventry is now heard from 9:20 to 11:30 p.m., E.S.T. daily on 15.260 mc. This is on transmission 6 of the British Broadcasting System.

ROME

The Italian stations located at Rome have changed their schedules and may now be heard as follows: from 5 a.m. to 2:56 p.m., E.S.T. and from 6 to 8:25 p.m. on 11.81 megacycles; from 3 to 5:55, and from 7:30 to 9 p.m., E.S.T. on 9.635 megacycles. Reception of the Italian stations has been very good lately, with little or no outside interference.

ST. KITTS

Late Saturday nights and early Sunday mornings, VP2LO (6.38) at St. Kitts, B. W. I., may be heard testing. New directive types of antennae have been erected and reception has been greatly improved.

A station that is no more, is the one located on the Channel Islands. It was being operated without a license by a private concern. The transmitting equipment has been confiscated by the British Postal authorities. Reports say that a license was never applied for.

*Carl J. Madson, W1ZB, claims to have first established radio contact with Pitcairn Island, over a year ago, when the schooner "Yankee" (WCFT) visited there.

JAPAN

Transmitters located at Tokyo, Japan, are now verifying reports instead of the usual *"thank you"* letter which has been used in the past. This makes replies from these stations much more valuable than in the past.

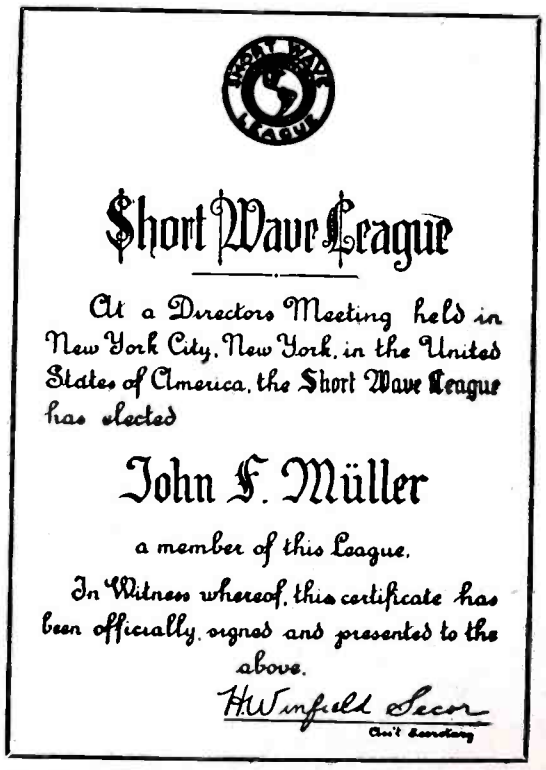
Have you heard three cuckoo calls and wondered what it was? You have no doubt been listening to HJ7ABB (4.82) of Bucaramanga, Colombia. HJ3ABX has changed its frequency to 5.99 megacycles. It is located in Bogota, Colombia, and is heard with a fair signal.

PMC of Bandoeng, Java, may occasionally be heard phoning in straight speech on 18.135 megacycles. It is usually heard around 8 p.m., E.S.T. The station usually makes use of *scrambled* speech.

CUBA

A very interesting verification card is now being sent to listeners by COJK (8.665) of Camaguey, Cuba. It is made in the form of a book with four pages. The first contains the verification while on pages two and three, will be found the call of the short wave station COJK and the long wave station CMJK. Each of these is in large wide letters and each letter has a small picture taken in Cuba filling it. The last page has a short descriptive history of the city of Camaguey.

Another Cuban card is sent out by stations CMBZ for long waves and COBZ for short waves. On one side is a picture of the monument erected by Cuba to the memory of the crew of the ill-fated U. S. Battleship *Maine*. On the reverse side is the verification of your report.



This handsome certificate is presented FREE to all members of the SHORT WAVE LEAGUE. The full size is 7¼" x 9½". (See page 184)

VATICAN CITY

HVJ (15.12) is now being heard with a very good signal usually around 10 to 11 a.m. Occasionally it is heard at other times but usually with a weaker signal. The card sent out by HVJ has many views of the Vatican, and verifies reports.

MOZAMBIQUE

CR7BH (11.718) at Lourenco Marques, Portuguese East Africa, is no longer being heard as it was a few months ago. Its signal now is very weak and is only heard now and then. When it does comes through, it is almost completely covered with QRN. It is hoped that a card from this station will be forthcoming to this shack. This catch was received here in April when its signal was the strongest ever heard. If you have heard this station, you may still have a chance to log it. Its signal is weak, but at times it is strong enough to be heard easily. Try for it about 3 to 4 p.m.

BINGHAMTON

W8CNA was the first person* in the world to contact VR6A at Pitcairn Island. Mention of this in the last issue brought to mind this particular amateur. He was heard here, about forty miles away, one time last winter. At that time he was working on the 20 meter band and is the nearest ham ever heard on this band. Usually one is trying for distance, but this time it was the other way around.

HAMS WHAT AM

VR6AY is still being heard with a very good signal during the early morning hours. According to other hams to whom we have been listening, a very nice card will be sent to those who write a useful report to this station. The report should be accompanied by the usual postal reply coupon and addressed to: Mr. Andrew Young, Station VR6AY, Pitcairn Island, South Pacific Ocean.

The European DX season is beginning to fade from sight, although several are still being heard with fair volume. They are best heard during the early morning hours, usually appearing about 1 or 1:30 a.m. and being heard until about 2:30 or 3 a.m. The VK's are still coming through from about midnight until about 7 or 8 a.m.

ZS2X, way down there in Port Elizabeth, South Africa, was heard again the other day. This is the first time that we have heard from Rex Bosman, the operator, in several months. If you do not have his card, which was shown in this column several months ago, you should certainly try for it. The printing is in white on a black background. It shows a large white elephant. Rex uses white ink when confirming reception. Don't forget to inclose the postal reply coupons when sending for one. Send a full report and one that Rex will be glad to receive. He sends out a large number of cards. The one decorating the shack here was received about a year ago and is number 1227.

With Elmer R. Fuller

Short Wave DXer

RUSSIA

RNE has moved to its former position on the dials, 12.0 megacycles. It may be heard from 10:15 to 11:00 p.m., E.S.T. The news may be heard in English over RKI at Moscow on 15.08 megacycles from 7 to 9:15 p.m., E.S.T. Occasionally the same programs may be heard being relayed by either RWG (8.183), RBO (8.31), RPK (7.42), RKA (6.96), or RYS (6.75).

FRANCE

TPB7 on 11.885 and TPA4 on 11.720 may be heard nightly from 8:30 to 11 pm., E.S.T. They both radiate the same programs but the former is the stronger of the two. Very good reception, however, is usually heard from both.

ITALY

2RO8, a new transmitter located at Rome, has been heard testing on 17.82 with 2RO4 on 11.81 megacycles. The quality is very good, although the volume is rather low. Other stations at Rome have been coming in with very strong signals for the past month.

HOT DX TIPS

ZHP, Singapore
9.53 mc. 5.30 a.m.

VP2LO, St. Kitts
6.38 mc. Early a.m. Sunday

2RO8, Rome
17.82 mc. Afternoons

PSE, Rio de Janeiro
14.94 mc. Wed. 3.45-4.15 p.m.

FINLAND

A new Finnish transmitter is being reported heard on a frequency of approximately 9.5 megacycles. Reception is not very satisfactory and it is heard only occasionally.

NORWAY

A new 5,000 watt outfit will soon replace the low-powered transmitter at Jeloy, near Oslo. One of the following frequencies will be used:— 6.13, 9.53, 11.735, 15.17, or 17.755 megacycles.

TURKEY

On July 22, the new 20,000 watt transmitter near Ankara, Turkey, will be inaugurated. It will use a frequency of either 9.465 or 15.195 megacycles.

JUGOSLAVIA

A 10,000 watt transmitter is under construction at Belgrade. It is expected to be completed and put into use before autumn.

COSTA RICA

TIGX, a new Latin broadcaster located at San Jose, Costa Rica, was heard on April 23rd. The frequency used at that time was about 11.90 megacycles. The regular schedules of this station have not yet been announced.

Television Terms Defined

(Continued from March Issue)

LINE OF SIGHT—The visible distance between a viewer and the horizon. This term is finding considerable use in ultra-high frequency work, especially in Television, which will be transmitted on these frequencies.

LUMEN—A measurement of light flux; that is, a unit quantity of light. (One candle-power of light is equal to 4 pi lumens—12.56 lumens.)

—M—

MAGNETIC DEFLECTION—A system utilizing coils located at the "neck" of the receiving picture tube to impart the lateral and vertical motion necessary to the cathode ray to properly scan the picture by means of the electro-magnetic fields near such coils when a saw-tooth wave of current flows through them.

MAGNETIC FOCUS COIL—Synonym for "Concentration Coil."

MASTER PULSE GENERATOR — Equipment used at the transmitting source to provide all necessary synchronizing and blanking impulses to keep the spot at the receiver in step with the scanning process at the transmitter.

MEGACYCLE—One million cycles.

MEGOHM—One million ohms.

MICROWAVE—A term applied to the shortest radio waves so far attainable. Wavelengths of one meter or below (300 megacycles and above) can be considered as micro-waves.

MIRROR (VIEWING)—Some models of television receivers are arranged so that the "looker in" does not view the image directly on the picture reproduction tube, but by reflection from a viewing mirror.

MODULATION GRID — The more modern name for the Wehnelt Cylinder of the cathode ray reproduction tube. The modulation grid acts much the same as the grid in a regular triode tube as, by variation of potentials applied to it, the brilliance of the spot can be controlled over wide limits.

MOSAIC—The light sensitive surface of the Iconoscope Tube.

MULTIPACTOR—A tube employing a cold cathode operating on the principle of a secondary emission multiplier or amplifier.

—N—

NEGATIVE PICTURE—A picture in reverse light intensity, that is, all objects which should appear dark are light and all which should be light are dark. This is caused by one too many, or one too few amplifier stages in the receiver for the type of picture being transmitted.

NEGATIVE POLARITY OF TRANSMISSION — This is a system whereby the power in the antenna upon modulation by the picture signal produces a *decrease* in antenna power when there is an *increase* in light on the object being scanned, and an *increase* in antenna power when there is a *decrease* in the amount of light on the object being scanned.

NEUTRALIZATION OF RETURN SWEEP—At the end of each scanning line and at the end of each field the cathode ray spot must make a return stroke to begin either a new line or a new field, as the case may be. This return sweep can be seen and disturbs the picture unless one of the several methods of blanking out the spot on this return trace is employed. This process of squelching the luminous spot during the retrace time is called neutralization of the return sweep.

—O—

ODD LINE INTERLACE—An interlaced scanning field in which, for each complete frame scanned there is an odd number of lines.

ODD LINES INTERLACED SCANNING—The process of interlaced scanning accomplished by using a frame of an odd number of lines, with an even number of field frequencies for each frame, generally two.

OPTICAL FOCUS—The actual focusing of the optical image on the light sensitive material of the electron signal pick-up tube (Iconoscope or Dissector Tube).

OSCILLIGHT TUBE—A trade name used to designate a type of television picture reproduction tube which uses magnetic focusing coils to focus the cathode ray stream.

OSCILLOGRAPH - OSCILLOSCOPE —Terms used more or less interchangeably, although by absolute definition of each this practice is incorrect. When speaking of a cathode ray oscillograph or oscilloscope, it is generally meant as a device using a cathode ray tube including power supply, and may or may not incorporate linear sweeps, internal amplifiers, etc. Such a device is very helpful in observing wave phenomena, and can, to a certain extent, be used as a measuring instrument also to measure voltage, current, frequency, etc.

(To be continued)

World Short Wave Stations

Revised Monthly

Broadcasters' Calls in bold type
Phones' in light type

Reports on station changes are appreciated.

Mc.	Call	
31.600	W3XEY	**BALTIMORE, MD.,** 9.494 m., Relays WFBR 4 pm-12 m.
31.600	W2XDV	**NEW YORK CITY,** 9.494 m., Addr. Col. Broad. System, 485 Madison Ave. Daily 5-10 pm.; Sat. and Sun. 12.30-5, 6-9 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.
26.400	W9XAZ	**MILWAUKEE, WIS.,** 11.36 m., Addr. The Journal Co. Relays WTMJ from 1 pm.
26.100	W9XJL	**SUPERIOR, WIS.,** 11.49 m. Relays WEBC daily.
26.100	GSK	**DAVENTRY, ENG.,** 11.49 m., Addr. B.B.C., London. Operates irregularly.
25.950	W6XKG	**LOS ANGELES, CAL.,** 11.56 m., Addr. B. S. McGlashan, Wash. Blvd. at Oak St. Relays KGFJ 24 hours daily.
21.550	GST	**DAVENTRY, ENG.,** 13.92 m., Addr. (See 26.100 mc.) Irregular at present.
21.540	W8XK	**PITTSBURGH, PA.,** 13.93 m., Addr. Grant Bldg. Relays KDKA 6.45-9 am. Exc. Sun.
21.530	GSJ	**DAVENTRY, ENG.,** 13.93 m., Addr. (See 26.100 mc.) 5.45 am.-12 n.
21.520	W2XE	**NEW YORK CITY,** 13.94 m., Addr. Col. Broad. Syst., 485 Madison Ave. 6.30-9 am., Sat. and Sun. 7 am.-12 n.
21.500	W2XAD	**SCHENECTADY, N. Y.,** 13.95 m., General Electric Co., 7-11 am.
21.470	GSH	**DAVENTRY, ENG.,** 13.97 m. (See 26.100 mc.), 5.45 am.-12 n.
21.450	DJS	**BERLIN, GERMANY,** 13.99 m., Addr., Broadcasting House. 12.05-11 am.
21.420	WKK	**LAWRENCEVILLE, N. J.,** 14.01 m., Addr. Amer. Tel. & Tel. Co. Calls S. Amer. 7 am.-7 pm.
21.080	PSA	**RIO DE JANEIRO, BRAZ.,** 14.23 m., Calls WKK daytime.
21.060	WKA	**LAWRENCEVILLE, N. J.,** 14.25 m. Addr. (See 21.420 mc.) Calls England morning and afternoon.
21.020	LSN6	**BUENOS AIRES, ARG.,** 14.27 m., Addr. Cia. Internacional de Radio. Works N.Y.C. 7 am.-7 pm.
20.860	EHY-EDM	**MADRID, SPAIN,** 14.38 m., Addr. Cia Tel. Nacional de Espana. Works S. Amer. mornings.
20.700	LSY	**BUENOS AIRES, ARG.,** 14.49 m., Addr. Transradio Internatl. Tests irregularly.
20.380	GAA	**RUGBY, ENG.,** 14.72 m. Calls Arg., Brazil mornings.
20.040	OPL	**LEOPOLDVILLE, BELGIAN CONGO,** 14.97 m. Works ORG morn.
20.020	DHO	**NAUEN, GERMANY,** 14.99 m., Addr. Reichspostzenstralamt. Works S. Am. mornings.
19.900	LSG	**BUENOS AIRES, ARG.,** 15.08 m., Addr. (See 20.700 mc.) Tests irregularly.
19.820	WKN	**LAWRENCEVILLE, N. J.,** 15.14 m., Addr. A. T. & T. Co. Calls England daytime.
19.680	CEC	**SANTIAGO, CHILE,** 15.24 m., Addr. Cia. Internacional de Radio. Calls Col. and Arg. daytime.
19.650	LSN5	**BUENOS AIRES, ARG.,** 15.27 m., Addr. (See 21.020 mc.) Calls Europe daytime.
19.620	VQG4	**NAIROBI, KENYA,** 15.28 m., Addr. Cable and Wireless, Ltd. Calls London 7-8.30 am.
19.600	LSF	**BUENOS AIRES, ARG.,** 15.31 m., Addr. (See 20.700 mc.) Tests irregularly.
19.480	GAD	**RUGBY, ENG.,** 15.4 m. Calls VQG4 7.30-8 am.
19.355	FTM	**ST. ASSISE, FRANCE,** 15.5 m. Calls S. America mornings.
19.345	PMA	**BANDOENG, JAVA,** 15.51 m. Works Holland 5.30-11 am.
19.260	PPU	**RIO DE JANEIRO, BRAZ.,** 15.58 m., Addr. Cia. Radiotel. Brasileira. Works France mornings.
19.220	WKF	**LAWRENCEVILLE, N. J.,** 15.6 m., Addr. A.T.&T. Co. Calls London and Paris daytime.
19.200	ORG	**RUYSSELEDE, BELGIUM,** 15.62 m. Calls OPL mornings.
19.160	GAP	**RUGBY, ENG.,** 15.66 m. Calls Australia 1-8 am.
19.020	HS8PJ	**BANGKOK, SIAM,** 15.77 m. Mondays 8-10 am.
18.970	GAQ	**RUGBY, ENG.,** 15.81 m. Calls S. Africa mornings.
18.890	ZSS	**KLIPHEUVEL, S. AFRICA,** 15.88 m., Addr. Overseas Comm. of S. Africa, Ltd. Calls GAU 6.30-7 am.
18.830	PLE	**BANDOENG, JAVA,** 15.93 m. Calls Holland 6-11 am.
18.680	OCI	**LIMA, PERU,** 16.06 m. Tests with Bogota, Col.
18.620	GAU	**RUGBY, ENG.,** 16.11 m. Calls N. Y. daytime. Calls ZSS 6.30-7 am.
18.480	HBH	**GENEVA, SWITZERLAND,** 16.26 m., Addr. Radio Nations. Sun., 10.45-11.30 am.
18.345	FZS	**SAIGON, INDO-CHINA,** 16.35 m. Works Paris early morning.
18.340	WLA	**LAWRENCEVILLE, N. J.,** 16.36 m., Addr. A.T.&T. Co. Calls England daytime.
18.310	GAS	**RUGBY, ENG.,** 16.38 m. Calls N.Y. daytime.
18.299	YVR	**MARACAY, VENEZ.,** 16.39 m. Works Germany mornings.
18.250	FTO	**ST. ASSISE, FRANCE,** 16.43 m. Works S. America daytime.
18.200	GAW	**RUGBY, ENG.,** 16.48 m. Works N.Y.C. daytime.
18.135	PMC	**BANDOENG, JAVA,** 16.54 m. Works Holland mornings.
18.115	LSY3	**BUENOS AIRES, ARG.,** 16.56 m., Addr. (See 20,700 mc.) Tests irregularly. Broadcasts 5-6 pm. Friday.
18.040	GAB	**RUGBY, ENG.,** 16.83 m. Works Canada morning and afternoon.
17.810	PCV	**KOOTWIJK, HOLLAND,** 16.84 m. Works Java 6-8 am.

16 Met. Broadcast Band

17.810	—	**ROME, ITALY.** 16.84 m., Addr. (See 2RO, 11.81 mc.) Relays 2RO to 6 pm. irregularly.
17.800	TGWA	**GUATEMALA CITY, GUAT.,** 16.84 m., Addr. Ministre De Fomento. Irregular.
17.790	GSG	**DAVENTRY, ENG.,** 16.86 m., Addr. B.B.C., London. 12 m.-2.15 am., 5.45 am.-12 n., 12.20-6 pm.
17.785	JZL	**TOKYO, JAPAN,** 16.87 m. Tests irregularly.
17.780	W3XAL	**BOUND BROOK, N. J.,** 16.87 m., Addr. Natl. Broad. Co. 8 am.-8 pm.
17.770	PHI2	**HUIZEN, HOLLAND,** 16.88 m., Addr. (See PHI, 11.730 mc.) Daily except Wednesday, 7.25-9.30 am., Sun. 6.25-9.30 am.
17.765	TPB3	**PARIS, FRANCE,** 16.88m. Addr. (See 15.245 mc.) 8.30-10 am.
17.760	DJE	**BERLIN, GERMANY,** 16.89 m., Addr. Broadcasting House. 12.05-10 am.; also Sun. 11.10 am-12.25 pm.
17.760	W2XE	**NEW YORK, N. Y.,** 16.89 m., Addr. Col. Broad. System, 485 Madison Ave. Irregular.
17.755	ZBW5	**HONGKONG, CHINA,** 16.9 m., Addr. P.O. Box 200. 4-10 am. Irregular.

End of Broadcast Band

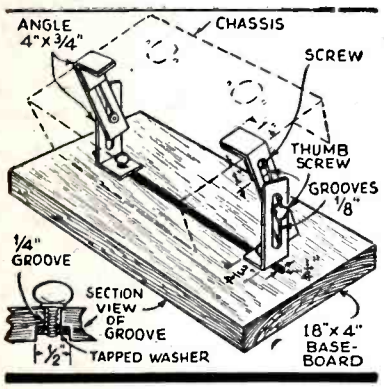
17.741	HSP	**BANGKOK, SIAM,** 16.91 m. Works Germany 6-7 am., 8-9 pm. Works JVE 11 pm.-6 am.
17.650	XGM	**SHANGHAI, CHINA,** 17 m. Works London 7-9 am.
17.520	DFB	**NAUEN, GERMANY,** 17.12 m. Works S. America, near 9.15 am. Works Siam 6-7 am., 8-9 pm.
17.480	VWY2	**KIRKEE, INDIA,** 17.16 m. Works London 7.30-8.30 am.
17.310	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, FR. SOMALILAND, AFR.** 17.36 m., Phones Paris near 8 am. Tests 1st Thurs. in the month, 8-8.30 am.
17.120	WAQ	**OCEAN GATE, N. J.,** 17.52 m., Addr. A.T.&T.Co. Works ships irregularly.
17.080	GBC	**RUGBY, ENG.,** 17.56 m. Works ships irregularly.
16.835	ITK	**MOGADISCIO, ITAL. SOMALILAND,** 18.32 m. Calls IAC around 9.30 am.
16.270	WLK	**LAWRENCEVILLE, N. J.,** 18.44 m., Addr. A.T.&T. Co. Works S. Amer. daytime.
16.270	WOG	**OCEAN GATE, N. J.,** 18.44 m., Addr. A.T.&T. Co. Works England late afternoon.
16.240	KTO	**MANILA, P. I.,** 18.47 m., Addr. RCA Comm. Works Japan and U. S. 5-9 pm. and early am. irreg.
16.233	FZR3	**SAIGON, INDO-CHINA,** 18.48 m. Calls FTK 6-9 am.
16.030	KKP	**KAHUKU, HAWAII,** 18.71 m., Addr. RCA Comm. Works Dixon 3-10 pm.
15.880	FTK	**ST. ASSISE, FRANCE,** 18.9 m. Works Saigon 6-9 am.
15.865	CEC	**SANTIAGO, CHILE,** 18.91 m. Calls Peru daytime irregular.
15.810	LSL	**BUENOS AIRES, ARG.,** 18.98 m., Addr. (See 21,020 mc.) Works London mornings and Paris afternoons.
15.660	JVE	**NAZAKI, JAPAN,** 19.16 m. Works Java and Siam early am.
15.620	JVF	**NAZAKI, JAPAN,** 19.2 m. Works Cal. near 5 am. and 8 pm.
15.550	CO9XX	**TUINICU, ORIENTE, CUBA,** 19.29 m., Addr. Frank Jones, Central Tuinicu, Tuinicu, Santa Clara. Broadcasts irregularly evenings.
15.440	XEBM	**MAZATLAN, SIN., MEX.,** 19.43 m., Addr. Flores 103 Alto. "El Pregonero del Pacifico." Irregularly 7 am.-10 pm.
15.450	IUG	**ADDIS ABABA, ETHIOPIA,** 19.44 m. Works Rome 9-10.30 am.
15.415	KWO	**DIXON, CAL.,** 19.46 m., Addr. A. T. & T. Co. Works Hawaii 2-7 pm.

(Continued on page 152)

All Schedules Eastern Standard Time

Short Wave Kinks

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

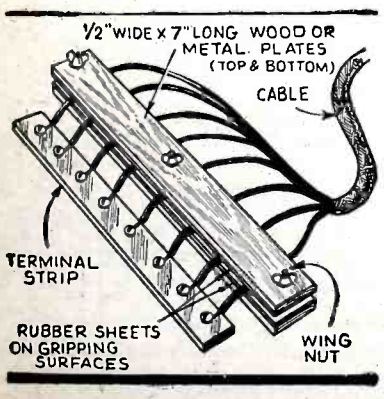


CRADLE

A convenient adjunct to any workshop is a chassis holder in which the receiver can be clamped during assembly or repair. All that is necessary is four pieces of angle iron 4 inches long by ¾ inches wide. The angle should be 90°. In addition, two pieces of metal 2 x ¾ should be secured and bent to match the angle irons. These are used as the clamp for holding this chassis as shown in the drawing. When the chassis is clamped in the holder it may be rotated to the most convenient position for the user.—*Casimir Rauba.*

A NEAT IDEA

A handy gadget for those who use cables to connect their receivers to power-supply equipment is this clamp, used for holding the various wires of a cable in their proper order. If the cable is disconnected from the binding post block of a receiver, it is not necessary to pick out the various wires when reconnecting it, as they will always be in their proper position. (See sketch.)—*Gerald M. Burdick.*

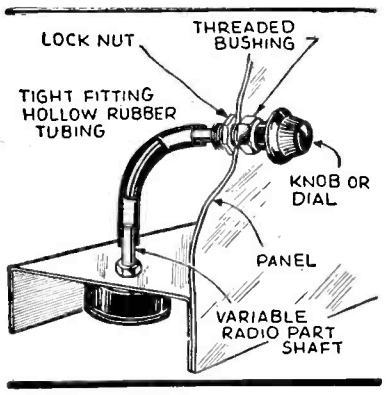


COMPACT AERIAL

A handy aerial for use with portable equipment can be made from a steel pocket tape and a short length of metal stake. The tape and the metal strip are mounted on a bakelite block as shown with connections brought out from the back of the bakelite for aerial and ground terminals. When on portable location, simply push the metal stake (which should have a pointed end), into the ground, draw out the steel rule from its case and connect the receiver to the unit. The metal stake in the ground will serve as a fairly satisfactory ground connection in most cases. A steel rule having a length of at least 6 ft. will suffice to pick up signals. —*Hector Short.*

REPAIRING CRYSTAL

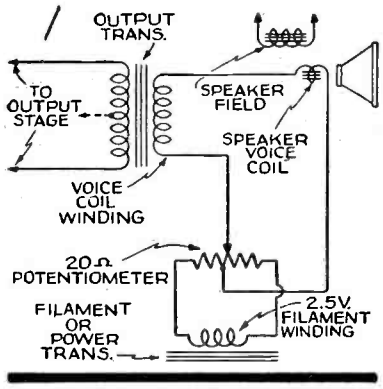
If you have any quartz crystals with chipped corners or pock marks on the surface they can be readily repaired by the following procedure. A small piece of plate glass is covered with a mixture of Bon Ami and water. The crystal is placed on the glass with the damaged surface facing downward and is rubbed over the mixture with a flat object placed on top to bear down on the crystal with an even pressure. If the crystal is chipped, the corner may be smoothed with a carborundum stone and then finished off by rubbing in the Bon Ami. The resonant frequency of the crystal is increased slightly by this procedure, but it should oscillate properly.—*M. W. Gribble.*



FLEXIBLE COUPLER

A simple emergency flexible coupler can be made from a piece of rubber tubing of not less than 2 inches in length. One end of the tubing goes to the shaft of the condenser or potentiometer to be controlled, and the other end to a shaft with a knob.—*R. J. Roach.*

A HUMDINGER

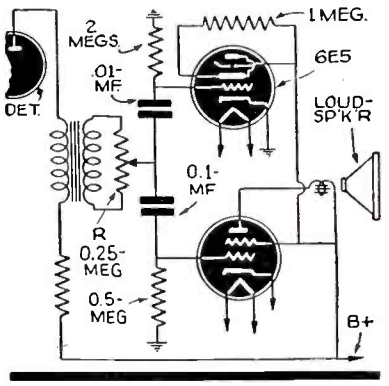


If you use an electro-dynamic speaker which does not have a hum-bucking coil and which generates a considerable amount of 60 cycle hum when in operation, here is a useful idea. The 2½ volt filament winding of a power transformer and a 20 ohm rheostat are connected as shown. A fixed tap should be soldered to the exact center of the potentiometer, in addition to the moving slider. By adjusting the slider on the potentiometer, a 60 cycle hum opposite in phase to that generated in the speaker fielding will be induced in the speaker and when equal in magnitude to the field hum, cause complete hum cancellation.—*Robert Andersen.*

MODULATION METER

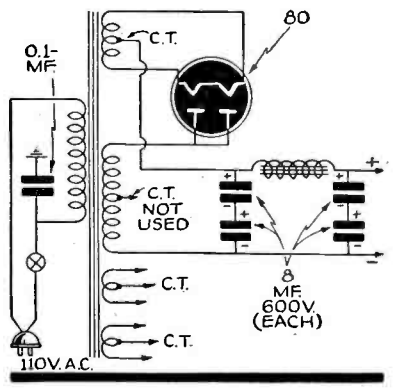
1st PRIZE

Another use for the *magic-eye* tube is shown in the circuit. It is connected in the audio amplifier of a receiver employing a regenerative detector. By throwing the detector into oscillation and tuning in a signal, the pattern on the 6E5 tube will indicate the carrier strength. When the regeneration control is retarded to the point where the receiver stops oscillating, only the modulation of the carrier will deflect the 6E5 pattern. By noting the difference of deflection between the modulation peaks and the carrier, an estimate of the modulation percentage of the carrier can be arrived at. Modulation percentage is modulation power divided by carrier power.—*Maurice Gribble.*



HIGH VOLTAGE SUPPLY

Oftentimes it is necessary to have a power-supply delivering a much higher voltage than that available from the normal unit. If the current required is not too heavy, it is possible to modify an ordinary power unit to deliver approximately twice the output voltage, at the same time lowering its output current. The plates of the rectifier tube are tied in parallel and brought to one side of the high voltage winding of the power transformer. The other end of the winding is used as a negative return. The center-tap is not used. Of course, it converts the circuit into a half-wave rectifier system and it may make extra filtering necessary. — *Al Kocherek.*



Mc.	Call	
15.370	HAS3	BUDAPEST, HUNGARY, 19.52 m., Addr. Radiolabor, Gyali Ut 22. Sun. 9-10 am.
15.360	DZG	ZEESEN, GERMANY, 19.53 m., Addr. Reichspostzenstralamt. Tests irregularly.
15.355	KWU	DIXON, CALIF., 19.53 m., Addr. A.T.&T. Co. Phones Pacific Isles and Japan.

19 Met. Broadcast Band

15,340	DJR	BERLIN, GERMANY, 19.56 m., Addr. Br'dcast'g House, 8-9 am., 4.50-10.45 pm.
15,330	W2XAD	SCHENECTADY, N. Y., 19.56 m., Addr. General Electric Co. Relays WGY 11.30 am.-6 pm.
15.320	OLR5B	PRAGUE, CZECHOSLOVAKIA, 19.58 m. Addr. (See 11.840 mc.) Sun., Wed., Sat. 5-5.10 pm.; Mon., Tues., Thurs., Fri. 6.55-9.55 pm.; Sun. 5.55-8.55 pm.
15.310	GSP	DAVENTRY, ENG., 19.6 m., Addr. (See 26.100 mc.) 12.15-1.15, 4.15-6, 6.20-8.30 pm.
15.300	—	ROME, ITALY, 19.61 m., Addr. (See 2RO, 11.81 mc.) Relays 2RO to 9 pm. irregularly.
15.290	LRU	BUENOS AIRES, ARG., 19.62 m., Addr. El Mundo. Relays LRI, 7-9 am.
15.280	HI3X	CIUDAD TRUJILLO, D. R., 19.63 m. Relays HIX Sun. 7.40-10.40 am. Weekdays 12.10-1.10 pm.
15.280	DJQ	BERLIN, GERMANY, 19.63 m., Addr. Broadcasting House. 12.05-10 am., 4.50-10.45 pm. Also Sun. 11.10 am-12.25 pm.
15.270	W2XE	NEW YORK CITY, 19.65 m., Addr. (See 21.520 mc.) Daily except Sat. and Sun., 12 n-5 pm., Sat. & Sun. 1.30-5 pm.
15.260	GSI	DAVENTRY, ENG., 19.66 m., Addr. (See 26.100 mc.) 9.20-11.20 pm.
15.252	RIM	TASHKENT, U.S.S.R., 19.67 m. Works RKI near 7 am.
15.250	W1XAL	BOSTON, MASS., 19.67 m., Addr. University Club. Daily 1-2 pm., Sun. 10 am.-12 n.
15.245	TPA2	PARIS, FRANCE, 19.68 m., Addr. 98 bis. Blvd. Haussmann. "Paris Mondial" 5-10 am.
15.230	HS8PJ	BANGKOK, SIAM, 19.7 m. Irregularly Mon. 8-10 am.
15.230	OLR5A	PRAGUE, CZECHOSLOVAKIA, 19.7 m. Addr. (See OLR4A, 11.84) Sun., Wed., Sat. 5-5.10 pm.; Mon., Tues., Thurs., Fri. 6.55-9.55 pm.; Sun 5.55-8.55 pm.
15.220	PCJ2	HUIZEN, HOLLAND, 19.71 m., Addr. N. V. Philips' Radio Hilversum. Tues. 2-3.30 am., Wed. 9.30-11 am.
15.210	W8XK	PITTSBURGH, PA., 19.72 m., Addr. (See 21.540 mc.) 9 am.-7 pm.
15.200	DJB	BERLIN, GERMANY, 19.74 m., Addr. (See 15.280 mc.) 12.05-11 am., 4.50-10.45 pm. Also Sun. 11.10 am.-12.15 pm.
15.190	ZBW4	HONGKONG, CHINA, 19.75 m., Addr. P. O. Box 200. Irregular. 11.30 pm. to 1.15 am., 3-10 am.,
15.180	GSO	DAVENTRY, ENG., 19.76 m., Addr. (See 26.100 mc.) 12 m.-2.15, 5.45-10 am., 4.15-6, 6.20-8.30 pm.
15.170	TGWA	GUATEMALA CITY, GUAT., 19.77 m., Addr. (See 17.8 mc.) Daily 10.45-11 am.; Sun. 10.45 am.-6 pm.
15.160	XEWW	MEXICO CITY, MEXICO, 19.79 m., 12 n.-12 m., irregular.
15.160	JZK	TOKYO, JAPAN, 19.79 m. 12.30-1.30 am., 4.30-5.30, 6-6.30 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 5.30-10.30 am.
15.140	GSF	DAVENTRY, ENG., 19.82 m., Addr. (See 26.100 mc.) 12 m.-2.15, 5.45 am.-12 n., 4.15-6, 6.20-8.30.
15.130	TPB6	PARIS, FRANCE, 19.83 m., Addr. "Paris Mondial," 98 Bis Blvd. Haussmann. 6-8.15 pm.
15.130	W1XAL	BOSTON, MASS., 19.83 m., Addr. World-Wide B'cast'g Foundation. University Club. 10-11 am., Mon.-Fri.
15.120	HVJ	VATICAN CITY, 19.83 m., 10.30-10.45 am., except Sun., Sat. 10-10.45 am.
15.110	DJL	BERLIN, GERMANY, 19.85 m., Addr. (See 15.280 mc.) 12 m.-2, 8-9 am., 10.40 am. to 4.30 pm. Sun. also 6-8 am.
15.080	RKI	MOSCOW, U.S.S.R., 19.87 m. Works Tashkent near 7 am. Broadcasts Sun. 12.15-2.30 pm. Daily 7-9.15 pm.

End of Broadcast Band

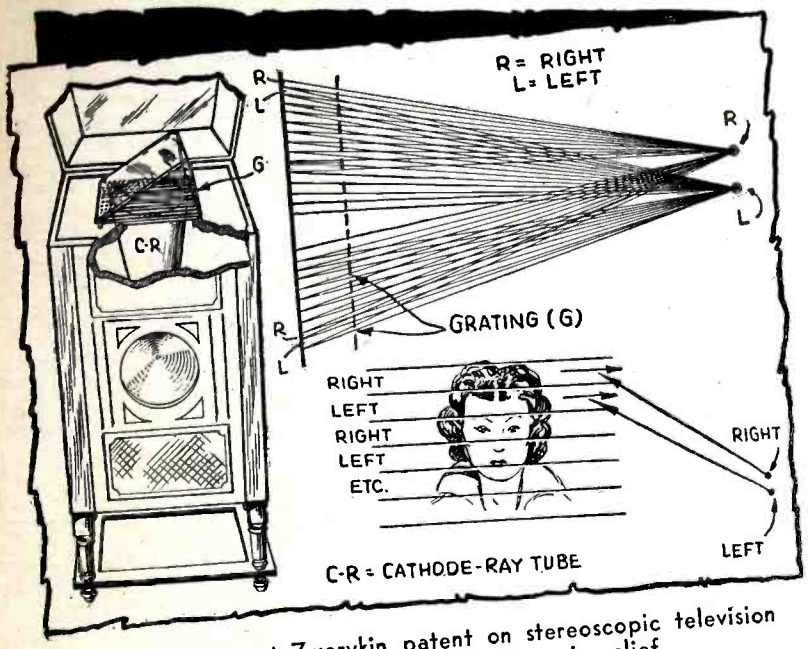
15.055	WNC	HIALEAH, FLORIDA, 19.92 m., Addr. A.T.&T. Co. Calls Central America daytime.
14.980	KAY	MANILA, P. I., 20.03 m., Addr. RCA Comm. Works Pacific Is. Mornings.
14.960	PSF	RIO DE JANEIRO, BRAZIL, 20.05 m., Works with Buenos Aires daytime.
14.950	HJB	BOGOTA, COL., 20.07 m. Calls WNC daytime.
14.940	PSE	RIO DE JANEIRO, BRAZIL, 20.08 m., Broadcasts Wed. 3.45-4.15 pm.
14.940	HII	CIUDAD TRUJILLO, D. R., 20.08 m. Phones WNC daytime.
14.940	HJA3	BARRANQUILLA, COL., 20.08 m. Works WNC daytime.
14.920	LZA	SOPHIA, BULGARIA, 20.10 m., Addr. Radio Garata. Mon., Tues., Thurs., Fri. 11.30 am.-2.45 pm., Wed. 11.30 am.-4.45 pm., Sat. 11.30 am.-5 pm., Sun. 2 am.-5 pm. Daily except Sun. 5-6.30 am.
14.845	OCJ2	LIMA, PERU, 20.21 m. Works South America stations daytime.
14.790	ROU	OMSK, SIBERIA, U.S.S.R., 20.28 m. Works Moscow irregularly 7-9 am.
14.730	IQA	ROME, ITALY, 20.37 m. Broadcasts 6-9 pm. irregular.
14.653	GBL	RUGBY, ITALY, 20.47 m. Works JVH 1-7 am.
14.640	TYF	PARIS, FRANCE, 20.49 m. Works Saigon and Cairo 3-7 am, 12 n.-2.30 pm.
14.600	JVH	NAZAKI, JAPAN, 20.55 m. Broadcasts irregularly 5-11.30 pm. Works Europe 4-8 am.
14.590	WMN	LAWRENCEVILLE, N. J., 20.56 m., Addr. A.T.&T. Co. Works England morning and afternoon.
14.535	HBJ	GENEVA, SWITZERLAND, 20.64 m., Addr. Radio Nations. Broadcasts Sun. 1.45-2.30 pm., Mon. 1.30-1.45 am.
14.530	LSN	BUENOS AIRES, ARG., 20.65 m. Addr. (See 20.020 mc.) Works N. Y. C. afternoons.
14.500	LSM2	BUENOS AIRES, ARG., 20.69 m., Addr. (See 21.020 mc.) Works Rio and Europe daytime.
14.485	TIR	CARTAGO, COSTA RICA, 20.71 m. Works Central America and U. S. A. daytime.
14.485	YSL	SAN SALVADOR, SALVADOR, 20.71 m. Irregular.
14.485	HPF	PANAMA CITY, PANAMA, 20.71 m. Works WNC daytime.
14.485	TGF	GUATEMALA CITY, GUATEMALA, 20.71 m. Works WNC daytime.
14.485	YNA	MANAGUA, NICARAGUA, 20.71 m. Works WNC daytime.
14.485	HRL5	NACAOME, HONDURAS, 20.71 m. Works WNC daytime.
14.485	HRF	TEGUCIGALPA, HONDURAS, 20.71 m. Works WNC daytime.
14.480	IBS	ROME, ITALY, 20.7 m. Works Eritrea and Addis Ababa 6.30-7.30 am.
14.470	WMF	LAWRENCEVILLE, N. J., 20.73 m., Addr. A.T.&T. Co. Works London and Paris daytime.
14.460	DZH	ZEESEN, GERMANY, 20.75 m., Addr. (See 15.360 mc.) Irregular.
14.440	—	RADIO MALAGA, SPAIN, 20.78 m. Relays Salamanca 8.15-8.45 pm. Sometimes 2-4 pm.
14.440	GBW	RUGBY, ENG., 20.78 m. Works U.S.A. afternoons.
14.166	PIIJ	DORDRECHT, HOLLAND, 21.15 m., Addr. (See 7.088 mc.) Sat. 12 n.-12.30 pm.
14.004	EA9AH	TETUAN, SPANISH MOROCCO, 21.4 m. Daily except Sun. 2.15-5. 7 and 9 pm.
13.990	GBA	RUGBY, ENG., 21.44 m. Works Buenos Aires late afternoon.
13.820	SUZ	ABOU ZABAL, EGYPT, 21.71 m. Works with Europe 11 am.-2 pm. Works GBB daily at 11 am.
13.690	KKZ	BOLINAS, CALIF., 21.91 m., Addr. RCA Comm. Irregularly.
13.635	SPW	WARSAW, POLAND, 22 m. Daily 6-8 pm, Sat. & Sun. 6-9 pm.
13.630	ZGB	KUALA LUMPUR, F.M.S. 22 m. Works Java, VVS, VVN and Siam, 6.30-8 am.
13.585	GBB	RUGBY, ENG., 22.08 m. Works Canada afternoons. Works SUZ at 11 am.
13.415	GCJ	RUGBY, ENG., 22.36 m. Works Japan and China early morning.
13.410	YSJ	SAN SALVADOR, SALVADOR, 22.37 m. Works WNC daytime.
13.390	WMA	LAWRENCEVILLE, N. J., 22.4 m., Addr. A.T.&T. Co. Works England morning and afternoon.
13.380	IDU	ASMARA, ERITREA, AFRICA, 22.42 m. Works Rome daytime.
13.350	VVN	FT. ST. GEORGE, MADRAS, INDIA, 22.46 m. Works VVS, Burma, near 7 am.
13.345	YVQ	MARACAY, VENEZUELA, 22.48 m. Works WNC daytime.
13.285	CGA3	DRUMMONDVILLE, QUE., CAN., 22.58 m. Works London and ships afternoons.
13.330	IRJ	ROME, ITALY, 22.69 m. Works Tokyo 5-9 am., irregularly.
12.870	VVS	MINGALADON, BURMA, 23.30 m. Works ZGB, VVN, and Siam, 6.30-7.30 am.
12.862	W9XDH	ELGIN, ILL., 23.32 m. Press Wireless, Tests 2-5 pm.
12.840	WAQ	OCEAN GATE, N. J., 23.36 m., Addr. A.T.&T. Co. Works with ships irregularly.
12.830	CNR	RABAT, MOROCCO, 23.38 m., Addr. Director General Tele. & Teleg. Stations. Works TYA, Paris 6-7 am., 2.30-4 pm.
12.800	IAC	PISA, ITALY, 23.45 m. Works Italian ships mornings.
12.780	GBC	RUGBY, ENG., 23.47. Works ships irregularly.
12.325	DAF	NORDDEICH, GERMANY, 24.34 m. Works German ships daytime.
12.290	GBU	RUGBY, ENG., 24.41 m. Works N. Y. C. evenings.
12.250	TYB	PARIS, FRANCE, 24.49 m. Irregular.
12.235	TFJ	REYKJAVIK, ICELAND, 24.52 m. Works Europe mornings. Broadcasts Sun. 1.40-2.30 pm.
12.215	TYA	PARIS, FRANCE, 24.56 m. Works French ships in morning and afternoon.
12.150	GBS	RUGBY, ENG., 24.69 m. Works N. Y. C. evenings.
12.130	DZE	ZEESEN, GERMANY, 24.73 m., Addr. (See 15.360 mc.) Tests irregular.
12.120	TPZ	ALGERS, ALGIERS, 24.75 m. Calls Paris near 6 am., and 2.30-4 pm.
12.060	PDV	KOOTWIJK, HOLLAND, 24.88 m. Tests irregularly.
12.060	RNE	MOSCOW, U.S.S.R., 24.88 m. Daily 6-7 am., 12.15-1 pm., 8-9.15, 10-11 pm., also Sun. 6 am.-1 pm.
11.991	FZS4	SAIGON, INDO-CHINA, 25.02 m. Phones Paris irregular.
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.
11.955	IUC	ADDIS ABABA, ETHIOPIA, 25.09 m. Works IAC around 12 m.
11.950	KKQ	BOLINAS, CALIF., 25.1 m. Tests irregularly evenings.
11.940	FTA	STE. ASSISE, FRANCE, 25.13 m. Works Morocco mornings and Argentina late afternoon.

25 Met. Broadcast Band

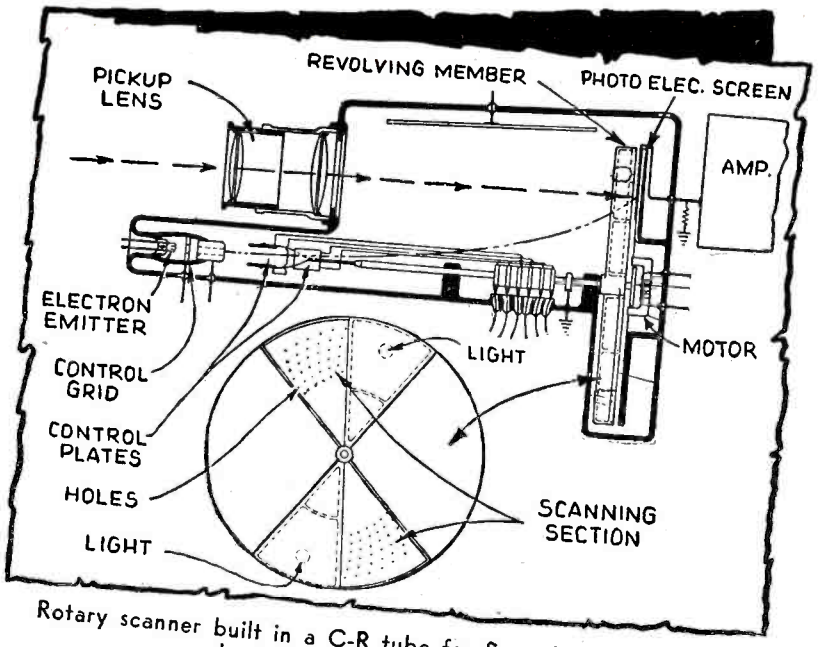
11.910	CDI190	VALDIVA, CHILE, 25.2 m., P. O. Box 642. Relays CB69 10 am.-1 pm., 3-6 pm., 7-10 pm.
11.900	TPA3	PARIS, FRANCE, 25.21 m., Addr. (See 15.245 mc.) 1-4 am., 10.15 am.-5 pm.

(Continued on page 154)

All Schedules Eastern Standard Time



Recent Zworykin patent on stereoscopic television —the images appear in relief.



Rotary scanner built in a C-R tube for finer detail and secret transmission.

Recent Radio and Television Patents

New inventions cover stereoscopic television images, cathode-ray tube, mechanical scanner and antenna de-icer.

● ONE of the most interesting patents recently issued on television improvements is that of Vladimir K. Zworykin of the R.C.A., which describes a system for producing television images in relief. As one of the accompanying drawings discloses, a special grill is so arranged in the television receiver that the observer will see two sets of reconstructed image lines, one with the right eye and one with the left. At the television transmitter two different images are picked up by two cathode ray tubes, or their equivalent.

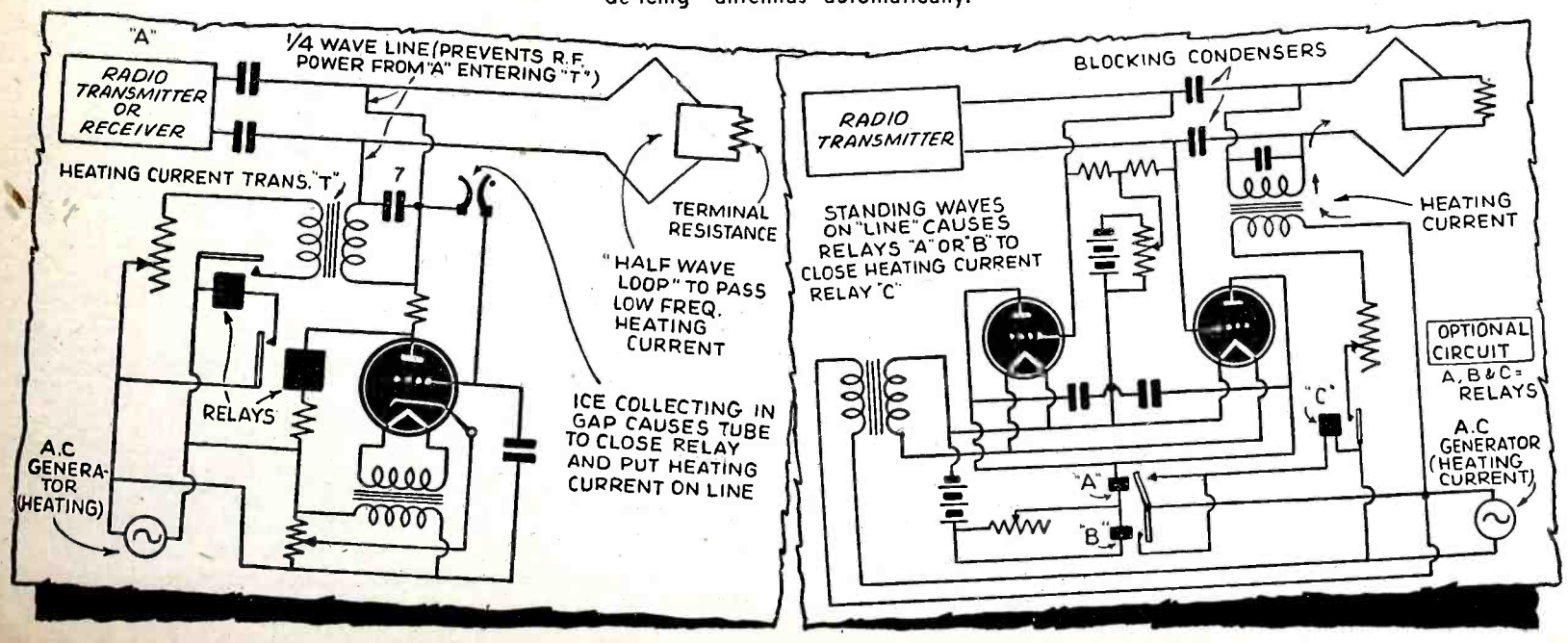
The patent is a lengthy one and covers a great number of details of interest to every television and radio student and a copy of it should be procured for further study.

As is well-known, the usual method of obtaining a stereoscopic or relief effect in viewing an image is to have two viewing points located approximately the same distance apart as the two eyes of the individual. In other words, we always view objects *in relief* naturally, although we seldom realize it. The two image patterns picked up by two cathode ray tubes, for example, are transmitted over a television circuit in such a manner that the image signals for first one tube, and then the other, are progressively viewed in the receiving apparatus. Due to the retentivity of the eye and the high speed with which the scanning is done by the two cathode ray tubes at the transmitter, the rapid alternation of the two scanning signals at the receiving tube also succeed in fooling the eye. Instead of seeing a continuous scanning path on the end of the receiver C-R tube, one image is actually built up in alternate lines, while the scanning paths between these lines constitute the second image, essential in producing the stereoscopic effect.

Due to the peculiar arrangement of the special grating on the receiver C-R tube, the observer's right eye can observe certain portions of the fluorescent end of the image tube, while the alternate portions will be invisible. But the left eye will be able to observe the portions of the image end of the tube which are masked to the right eye. (Patent No. 2,107,464.)

(Continued on page 177)

Drawings below show two methods of "de-icing" antennas automatically.



Mc.	Call	
11.900	XEWI	MEXICO CITY, MEXICO, 25.21 m., Addr. P. O. Box 2874. Tues. and Thurs. 7.30 pm.-12 m., Fri. 9 pm.-12 m. Sun. 12.30-2 pm.
11.895	HP5I	AGUADULCE, PANAMA, 25.22 m. Addr. La Voz del Interior. 7.30-9.30 pm.
11.885	TPB7	PARIS, FRANCE, 25.24 m. (See 15.245 mc.) 8.30-11 pm.
11.870	W8XK	PITTSBURGH, PA., 25.26 m., Addr. (See 21.540 mc.) 7-11 pm.
11.860	YDB	SOERABAJA, JAVA, 25.29 m., Addr. N. I. R. O. M. Sat. 7.30 pm. to 2.30 am., daily 10.30 pm. to 2 am.
11.860	GSE	DAVENTRY, ENG., 25.29 m., Addr. (See 26.100 mc.) Irregular.
11.855	DJP	BERLIN, GERMANY, 25.31 m., Addr. (See 15.280 mc.) Irregular 11.35 am.-4, 7-10.45 pm.
11.840	KZRM	MANILA, P. I., 25.35 m. Addr. Erlanger & Gallinger, Box 283. 9 pm.-10 am. Irregular.
11.840	CSW	LISBON, PORT., 25.35 m. Nat'l Broad. Station. 11.30 am.-1.30 pm. Irregular.
11.840	OLR4A	PRAGUE, CZECHOSLOVAKIA, 25.35 m., Addr. Czech Shortwave Sta., Praha XII, Fochova 16. Daily 1.55-4.40 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. 5.30-10 pm.
11.826	XEBR	HERMOSILLA, SON., MEX., 25.37 m., Addr. Box 68. Relays XEBH. 2-4 pm., 9 pm.-12 m.
11.820	GSN	DAVENTRY, ENG., 25.38 m., Addr. (See 26.100 mc.) Irregular.
11.810	2RO	ROME, ITALY, 25.4 m., Addr. E.I.A.R., Via Montello 5. Daily 5-8.45 am., 10 am.-9 pm.
11.805	COGF	MATANZAS, CUBA, 25.41 m., Addr. Gen. Betancourt 51. Relays CMGF. 2-3, 4-5, 6-11 pm.
11.805	OZG	SKAMLEBOAEK, DENMARK, 25.41 m. Addr. Statsradiofonien. Irreg.
11.800	JZJ	TOKYO, JAPAN, 25.42 m., Addr. Broadcasting Co. of Japan, Overseas Division. 12.30-1.30, 7-7.30, 8-9.30 am., 2.30-4, 4.30-5.30, 6-6.30 pm.
11.795	DJO	BERLIN, GERMANY, 25.43 m., Addr. (See 15.280 mc.) 7.15-11 pm.
11.790	—	VIENNA, AUSTRIA, 25.45 m. Irreg.
11.790	WIXAL	BOSTON, MASS., 25.45 m., Addr. (See 15.250 mc.) Daily 3.15-5.30 pm., Sat. 5-5.30 pm., Sun. 2-5.30 pm.
11.770	DJD	BERLIN, GERMANY, 25.49 m., Addr. (See 15.280 mc.) 10.40 am.-4.30 pm., 4.50-11 pm.
11.760	TGWA	GUATEMALA CITY, GUAT., 25.51 m. (See 17.8 mc.) Sun., Tues. and Thurs. 8 pm.-12 m.
11.760	OLR4B	PRAGUE, CZECHOSLOVAKIA, 25.51 m., Addr. (See 11.840 mc.) Irregular.
11.750	GSD	DAVENTRY, ENG., 25.53 m., Addr. B.B.C., London. 12 m.-2.15 am., 12.20-4.00 pm., 6.20-8.30, 9.20-11.20 pm.
11.740	COCX	HAVANA, CUBA. 25.55 m. P. O. Box 32. 6.55 am.-1 am. Sun. till 12 m. Relays CMX.
11.740	HVJ	VATICAN CITY, 25.55 m. Testing irregular.
11.730	XETA	MONTEREY, MEX. 25.57 m., Addr. Box 203. Relays XET, 12 n.-2 pm.
11.730	——	SAIGON, INDO-CHINA, 25.57 m., Addr. Radio Philco. 11 pm.-1 am., 5.30-9.30 am.
11.730	PHI	HUIZEN, HOLLAND, 25.57 m., Addr. N. V. Philips' Radio.
11.730	WIXAL	BOSTON, MASS., 25.57 m., Addr. World-Wide B'cast'g. Foundation, University Club. Daily exc. Sat. and Sun. 8-10 pm.
11.720	CJRX	WINNIPEG, CANADA, 25.6 m., Addr. James Richardson & Sons, Ltd. Daily 6 pm.-12 m., Sun. 5-10 pm.
11.718	CR7BH	LAURENCO MARQUES, PORTUGUESE E. AFRICA, 25.6 m. Daily 12.05-1, 4.30-6.30, 9.30-11 am., 12.05-4 pm., Sun. 5-7 am., 10 am.-2 pm.

Mc.	Call	
11.715	TPA4	PARIS, FRANCE, 25.61 m., (See 15.245 mc.) 6-8.15 pm., 8.30-11 pm.
11.710	SBP	MOTALA, SWEDEN, 25.63 m., 1.20-2.05, 6-9 am., 11 am.-1 pm., Sat. 1.20-2 am., 6 am.-1.30 pm., Sun. 3 am.-1.30 pm.
11.710	YSM	SAN SALVADOR, EL SALVADOR, 25.63 m., Addr. (See 7.894 mc.) Irregular 1.30-2.30 pm.
11.700	HP5A	PANAMA CITY, PAN., 25.65 m. Addr. Radio Teatro, Apartado 954. 10 am.-10 pm.
11.700	CB1170	SANTIAGO, CHILE, 25.65 m. Relays CB89 6 pm.-12 m.
		End of Broadcast Band
11.680	KIO	KAHUKU, HAWAII, 25.68 m., Addr. RCA Comm. Irregularly.
11.595	VRR4	STONY HILL, JAMAICA, B. W. I., 25.87 m. Works WNC daytime.
11.560	VIZ3	FISKDALE, AUSTRALIA, 25.95 m., Addr. Amalgamated Wireless of Australasia Ltd. Tests irregularly.
11.530	SPD	WARSAW, POLAND, 26 m., Addr. 5 Mazowiecka St. 6-8 pm., Sat. & Sun. 6-9 pm.
11.500	XAM	MERIDA, YUCATAN, 26.09 m. Irregular 1-7.30 pm.
11.500	PMK	BANDOENG, JAVA, 26.09 m. Tests irreguiarly.
11.413	CJA4	DRUMMONDVILLE, QUE., CAN., 26.28 m. Tests irregularly.
11.402	HBO	GENEVA, SWITZERLAND, 26.31 m., Addr. Radio Nations. Sun. 7-7.45 pm., Mon. 1-1.15 am.
11.050	ZLT4	WELLINGTON, NEW ZEALAND, 27.15 m. Works Australia and England early morning.
11.040	CSW	LISBON, PORTUGAL, 27.17 m., Addr. Nat. Broad. Sta. 1.30-5 pm.
11.000	PLP	BANDOENG, JAVA, 27.27 m. Relays YDB. 6-7.30 p.m., 5.30-10.30 or 11 am. Sat. until 11.30 am.
10.970	OCI	LIMA, PERU, 27.35 m. Works Bogota, Col., evenings.
10.960	——	TANANARIVE, MADAGASCAR, 27.36 m., Addr. (See 9.53 mc.) 12.30-45, 3.30-4.30, 10-11 am.
10.910	KTR	MANILA, P. I. 27.41 m. Phones ships 6-10 am.
10.840	KWV	DIXON, CALIF., 27.68 m., Addr. A.T.&T. Co. Works with Hawaii evenings.
10.770	GBP	RUGBY, ENGLAND, 27.85 m. Works Australia early morning.
10.740	JVM	NAZAKI, JAPAN, 27.93 m. Works U.S.A. 2-7 am.
10.680	PLQ	BANDOENG, JAVA. 28.09 m. Works Javanese Isles and other Asiatic phones 6-8.30 am.
10.675	WNB	LAWRENCEVILLE, N. J., 28.1 m., Addr. A.T.&T. Co. Works with Bermuda irregularly.
10.670	CEC	SANTIAGO, CHILE, 28.12 m. Irregular.
10.660	JVN	NAZAKI, JAPAN, 28.14 m. Broadcasts daily 2-8 am. Works Europe irregularly at other times.
10.600	ZIK2	BELIZE, BRIT. HONDURAS, 28.25 m., Tues., Thurs., Sat. 7.30-7.45 pm.
10.550	WOK	LAWRENCEVILLE, N. J., 28.44 m., Addr. A.T.&T. Co. Works S. A. nights.
10.535	JIB	TAIHOKU, TAIWAN, 28.48 m. Works Japan around 6.25 am. Broadcasts, relaying JFAK 9.05-10 am., 1-2.30 am. Sun. to 10.15 am.
10.520	VLK	SYDNEY, AUSTRALIA, 28.51 m., Addr. Amalgamated Wireless of Australasia Ltd. Works England 1-6 am.
10.430	YBG	MEDAN, SUMATRA, 28.76 m. Calls Java 5.30-6.30 am.
10.410	PDK	KOOTWIJK, HOLLAND, 28.8 m. Works Java 7.30-9.40 am.
10.410	KES	BOLINAS, CALIF., 28.8 m., Addr. RCA Communications. Irregular.
10.370	JVO	NAZAKI, JAPAN, 28.93 m. Works TDE 3-8 am.
10.370	EAJ43	TENERIFFE, CANARY ISLANDS, 28.93 m. Relays Salamanca, Spain, 2-4, 5-9.45 pm.
10.350	LSX	BUENOS AIRES, ARG., 28.98 m., Addr. Transradio International. Tests irregularly.
10.330	ORK	RUYSSELEDE, BELGIUM, 29.04 m. Broadcasts 1.30-3 pm. Works OPM 1-3 am., 3-5 pm.

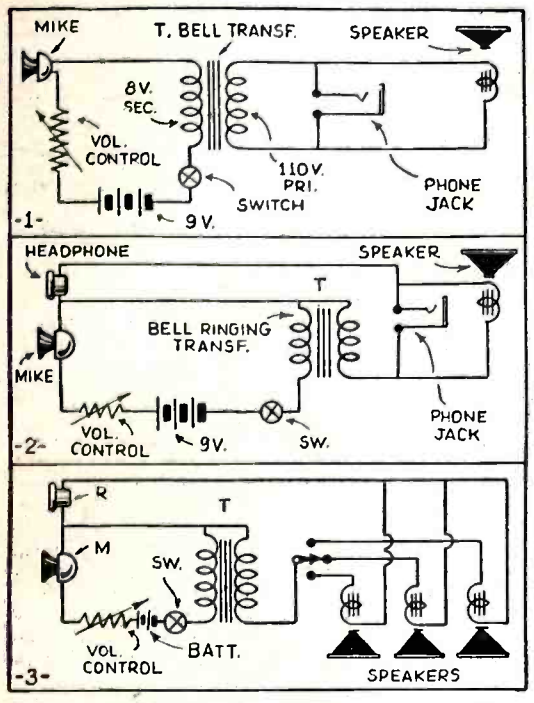
Mc.	Call	
10.300	LSL2	BUENOS AIRES, ARG., 29.13 m., Addr. Cia. Internacional de Radio. Works Europe evenings.
10.290	DZC	ZEESEN, GERMANY, 29.16 m., Addr. (See 15.360 mc.) Irregular.
10.260	PMN	BANDOENG, JAVA, 29.24 m. Relays YDB 5.30-10.30 or 11 am., Sat to 11.30 am.
10.250	LSK3	BUENOS AIRES, ARG., 29.27 m., Addr. (See 10.310 mc.) Works Europe and U.S.A. afternoons and evenings.
10.230	CED	ANTOFAGASTAN, CHILE, 29.33 m. Tests 7-9.30 pm.
10.220	PSH	RIO DE JANEIRO, BRAZIL, 29.35 m., Addr, Box 709. Broadcasts 6-9 pm.
10.160	RIO	BAKOU, U.S.S.R., 29.5 m. Works Moscow 10 pm.-7.30 am.
10.140	OPM	LEOPOLDVILLE, BELGIAN CONGO, 29.59 m. Works Belgium 1-3 am. and 3-5 pm.
10.080	RIR	TIFLIS, U.S.S.R., 29.76 m. Works Moscow 12 m.-8 am.
10.065	TDE	SHINKYO, MANCHUKUO, 29.81 m. Works JVO 3-8 am.
10.055	ZFB	HAMILTON, BERMUDA, 29.84 m. Works N.Y.C. irregular.
10.055	SUV	ABOU ZABAL, EGYPT, 29.84 m. Works Europe 1-6 pm.
10.042	DZB	ZEESEN, GERMANY, 29.87 m., Addr. Reichspostzenstralamt. Irregular.
9.990	KAZ	MANILA, P. I., 30.03 m., Addr. RCA Communications. Works Java early morning.
9.980	COBC	HAVANA, CUBA, 30.04 m., Addr. P. O. Box 132. Relays CMBC 6:55 a.m.,-12:30 a.m.
9.950	GCU	RUGBY, ENGLAND, 30.15 m. Works N.Y.C. night time.
9.940	CSW	LISBON, PORTUGAL, 30.18 m. Addr. Nat. Broad. Sta. 5-7 pm.
9.940	JDY	DAIREN, MANCHUKUO, 30.18 m. Relays JQAK daily 7-8 am. Works Tokyo occasionally in early am.
9.930	HKB	BOGOTA, COL., 30.21 m. Works Rio evenings.
9.890	LSN	BUENOS AIRES, ARG., 30.33 m., Addr. (See 10.300 mc.) Works N.Y.C. evenings.
9.870	WON	LAWRENCEVILLE, N. J., 30.4 m., Addr. A.T.&T. Co. Works England nights.
9.865	COCM	HAVANA, CUBA, 30.41 m., Addr. Transradio Columbia, P. O. Box 33. 7 am.-12 m. Relays CMCM.
9.860	EAQ	MADRID, SPAIN, 30.43 m., Addr. Post Office Box 951. Irregular.
9.830	IRF	ROME, ITALY, 30.52 m. Works Egypt afternoons. Relays 2RO, 6-9 pm.
9.800	LSI	BUENOS AIRES, ARG., 30.61 m., Addr. (See 10.350 mc.) Tests irregularly.
9.790	GCW	RUGBY, ENGLAND, 30.64 m., Works N.Y.C. evenings.
9.760	VLZ-VLK	SYDNEY, AUSTRALIA, 30.74 m., Addr. Amalgamated Wireless of Australasia Ltd. Works Java and New Zealand early morning.
9.750	WOF	LAWRENCEVILLE, N. J., 30.77 m., Addr. A.T.&T. Co. Works London and Paris night time.
9.745	COCQ	HAVANA, CUBA, 30.78 m. Addr. 25 No. 445, Vedado, Havana, 6.55 am.-1 am. Sun. till 12 m.
9.710	GCA	RUGBY, ENGLAND, 30.9 m. Works S. A. evenings.
9.700	FZF6	FORT DE FRANCE, MARTINIQUE, 30.9 m., Addr. P. O. Box 136. 11.30 am.-12.30 pm., 6.15-7.50 pm.
9.690	TI4NRH	HEREDIA, COSTA RICA, 30.94 m., Addr. Amando C. Marin, Apartado 40. Sun. 7-8 am. Tues., Thurs., Sat. 9-10 pm.
9.685	TGWA	GUATEMALA CITY, GUAT., 30.96 m. Daily 10-11.30 pm.; Sun. 6-11.30 pm.
9.675	DZA	ZEESEN, GERMANY, 31.01 m., Addr. (See 10.042 mc.) Irregular.
9.660	LRX	BUENOS AIRES, ARG., 31.06 m., Addr. El Mundo. Relays LRI, 9.30 am.-11.30 pm.
9.650	CS2WA	LISBON, PORTUGAL, 31.09 m., Addr. Radio Colonial. Tues., Thurs. and Sat. 4.30-7 pm.
9.650	DGU	NAUEN, GERMANY, 31.09 m., Addr. (See 20.020 mc.) Works Egypt afternoons.

(Continued on page 156)

All Schedules Eastern Standard Time

New Experiments with Radio Apparatus

First Prize -- $10.00



3 useful circuits for inter-room telephone service, using odd radio parts.

Inter-Room Phone System

● HERE are a few circuits for inter-room phone service. A small cone-type permanent magnet speaker connected in the primary side of a bell-ringing transformer, with a six-volt battery, microphone and switch in series with the secondary coil is employed. If a telephone microphone is used, better results will be had. To control volume, a small variable resistor is inserted between the battery and switch. With the small transmitter in one room and the speaker in another, inter-room communication can be carried on, provided a French phone is used.

The diagrams are self-explanatory and I believe many uses can be made of this device. The phone jack is to aid the person at the mike to hear himself. When phones are not used, the volume in the speaker is greater, but can be regulated by the volume control.

As an inter-office system, it is economical and operation is simple. In both circuits it is possible to hear the person at the speaker end and also to talk to them. In the first diagram, the earphones enable the transmitting person to hear the other one. In the second, the French phone is the hearing aid.

If built in a compact compartment, which can easily be done, it is possible to use the apparatus as an aid to those partially deaf. When used in this manner, the speaker is not used, but in its place earphones are connected.

In a private home, such a system is of important service as an inter-room call system. The transmitter could be placed in the kitchen and several speakers placed around the house, in the dining room, bedroom and living room.—ERNEST HULIN.

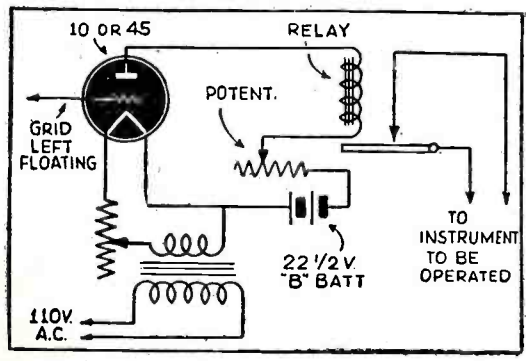
Second Prize -- $5.00

Improvised Photo-Cell

● THE simple circuit shown allows ordinary radio vacuum tubes to be used as photo-electric cells for burglar alarms, light switches and countless other ways. Though by no means as sensitive as commercial photo-cells, the radio tube will give surprisingly good results with even a low-priced relay.

MONEY FOR YOUR IDEAS!
Each month we will award 2 prizes, the first of $10, the second $5, for the best NON-RADIO uses of ordinary radio parts and radio instrumentalities.

I have found that the 210, 245 and the 250 tubes are photo-electric to a marked degree, and that the light response is sufficient to trip even a cheap relay. Tubes which give the best results are those having open or clear tops, so that light from external sources may reach the grid. It is

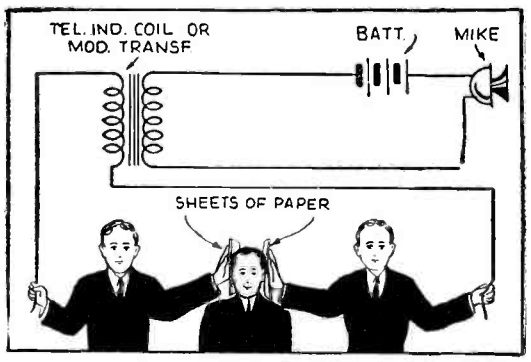


An improvised photo-cell may be made from an ordinary radio tube.

essential also that the grid prong be cut off.

In the accompanying circuit you will notice that the filament voltage is regulated by a rheostat in the secondary of the transformer circuit. The experimenter will have to discover the best filament voltage by tests.

The relays used in connection with these photo-electric cells should be capable of operating in a range between 1 to 10 milliamperes. When operating the tubes, remember that the more light that reaches the grid, the greater will be the current output. Therefore, it is advisable to install the tube so that the light strikes it on the top, head-on.—CARL F. MACCAULL.



If a person speaks into the mike, the man in the center will hear the voice reproduced by the vibrating sheets of paper.

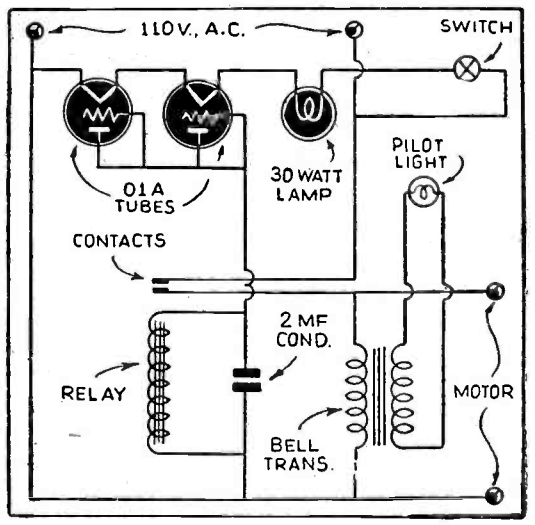
Talking Condensers

● THE experiment illustrated will probably be of interest to the average reader who has never attempted any stunts of this type. A small induction coil, such as a telephone coil or microphone transformer, may be connected in the manner shown to a battery of a few cells and a mike. A sheet of paper is held against each ear of the person in the center of the group; now if one speaks into the mike, the voice will be reproduced by condenser action. The two sheets of paper will act as electro-static loudspeakers. A variation of this interesting experiment is to place several sheets of tinfoil between layers of paper, the paper being cut a little larger than the foil, all of the sheets of foil and paper being loosely arranged. Every other tinfoil sheet is connected to one terminal and the alternate sheets to the other. This forms a "talking condenser."—R. E. VAN DYKE.

All-Electric Power Relay

● THE following described power relay will be found useful for remote-control of small motor-generator sets or other apparatus used in experimental work. In

(Continued on page 171)



A handy remote control relay utilizing a pair of 01A tubes as rectifiers.

Mc.	Call	
9.645	HH3W	PORT-AU-PRINCE, HAITI, 31.1 m., Addr. P. O. Box A117. 1-2, 7-8 pm.
9.640	CXA8	COLONIA, URUGUAY, 31.12 m., Addr. Belgrano 1841, Buenos Aires, Argentina. Relays LR3, Buenos Aires 7 am.-12 m.
9.635	2RO	ROME, ITALY, 31.13 m., Addr. (See 11.810 mc.) Daily 3-6 pm.
9.630	HJ7ABD	BUCARAMANGA, COL., 31.14 m. 10 am.-12 n., 4-11 pm.
9.625	JFO	TAIHOKU, TAIWAN, 31.16 m. Relays JFAK irreg. 4-10 am.
9.617	HJIABP	CARTAGENA, COL., 31.20 m., Addr. P. O. Box 37. 11 am.-1 pm., 5-11 pm., Sun. 10 am.-1 pm., 3-6 pm.
9.615	ZRK	KLIPHEUVAL, SOUTH AFRICA, 31.2 m., Addr. P. O. Box 4559, Johannesburg. Daily, exc. Sat. 11.45 pm.-12.50 am. Daily exc. Sun. 3.20-7.20, 9-11.45 am., Sun. 3.30-4.30 or 4-5, 8-11.40 am.
9.607	HP5J	PANAMA CITY, PANAMA, 31.23 m. Addr. Apartado 867. 12 n. to 1.30 pm., 6-10.30 pm.

31 Met. Broadcast Band

9.600	RAN	MOSCOW, U.S.S.R., 31.25 m. Daily 7-9.15 pm.
9.595	HBL	GENEVA, SWITZERLAND, 31.27 m., Addr. Radio Nations. Irregular.
9.590	VUD2	DELHI, INDIA, 31.28 m. Addr. All-India Radio, 8.30-10.30 pm., 1.30-3.30 am.
9.590	PCJ	HUIZEN, HOLLAND, 31.28 m., Addr. (See 15.220 mc.) Sun. 2-3, 7.15-9.25 pm., Mon. 8.15-9.45 pm., Tues. 1.45-2.40, 7-10.15 pm., Wed. 7.15-8.15 pm.
9.590	VK6ME	PERTH, W. AUSTRALIA, 31.28 m., Addr. Amalgamated Wireless of Australasia, Ltd. 6-8 am. exc. Sun.
9.590	VK2ME	SYDNEY, AUSTRALIA, 31.28 m., Addr. Amalgamated Wireless of Australasia, Ltd., 47 York St., Sun. 12 m.-2 am.; 4.30-8.30 am.; 11.30-am.-1.30 pm.
9.590	W3XAU	PHILADELPHIA, PA., 31.28 m. Relays WCAU Mon., Thurs., Sat. 12 n.-12 m.; Tues., Fri., Sun. 11 pm.-12 m.; Wed. 9 pm.-12 m.
9.580	GSC	DAVENTRY, ENGLAND, 31.32 m., Addr. B. B. C., Portland Pl., London, W. 1, 6.20-8.30, 9.20-11.20 pm.
9.580	VLR	MELBOURNE, AUSTRALIA, 31.32 m. Addr. Box 1686, G. P. O. Daily 3.30-8.30 am. (Sat. till 9 am.) Sun. 3-7.30 am. Daily exc. Sat. 9.35 pm.-2.15 am.
9.580	OAX5C	ICA, PERU, 31.32 m. Radio Universal 6-10 pm.
9.570	KZRM	MANILA, P. I., 31.35 m., Addr. Erlanger & Galinger, Box 283. 4.30-6 pm., 5-9 am., Sun 4-10 am.
9.570	WIXK	SPRINGFIELD, MASS., 31.35 m., Addr. Westinghouse Electric & Mfg. Co. Relays WBZ 6 am. to 12 m. Sun. 7 am.-12 m.
9.570	TPBII	PARIS, FRANCE, 31.35 m. Addr. (See 15.245 mc.) 1-3 am., 10.15 am.-5 pm.
9.560	DJA	BERLIN, GERMANY, 31.38 m., Addr. Broadcasting House. 12.05-11 am., 4.50-10.45 pm.
9.550	W2XAD	SCHENECTADY, N. Y., 31.41 m., General Electric Co., 6.30-10 pm.
9.550	OLR3A	PRAGUE, CZECHOSLOVAKIA, 31.41 m. (See 11.840 mc.) Mon., Tues. 4.40-5.10 pm.
9.550	XEFT	VERA CRUZ, MEX., 31.41 m. 11.30 am.-4 pm., 7 pm.-12 m.
9.550	YDB	SOERABAJA, JAVA, 31.41 m., Addr. N.I.R.O.M. Daily exc. Sat. 6-7.30 pm., 5.30 to 10 am. Sat. 5.30-11.30 am.
9.550	VUB2	BOMBAY, INDIA. 31.41 m., Addr. All India Radio. 1-3.30 am.
9.540	DJN	BERLIN, GERMANY, 31.45 m., Addr. (See 9.560 mc.) 4.50-10.45 pm.
9.540	VPD2	SUVA, FIJI ISLANDS, 31.45 m., Addr. Amalgamated Wireless of Australasia, Ltd. 5.30-7 am.

Mc.	Call	
9.535	JZI	TOKYO, JAPAN, 31.46 m., Addr. (See 11.800, JZJ) 12.30-1.30 am., 2.30-4, 4.30-5.30 pm.
9.535	HB9D	ZURICH, SWITZERLAND, 31.46 m., Addr. Radio Club of Zurich, Post Box Zurich 2. Sun. 9-11 am., Thur. 1-3 pm.
9.530	W2XAF	SCHENECTADY, N. Y., 31.48 m., Addr. General Electric Co. 3-11 pm.
9.526	XEDQ	GUADALAJARA, GAL., MEXICO, 31.49 m. Irregular 7.30 pm. to 12.30 am.
9.525	ZBW3	HONGKONG, CHINA, 31.49 m., Addr. P. O. Box 200. 11.30 pm. to 1 am., 3-10 am.
9.525	LKJI	JELOY, NORWAY, 31.49 m. 5-8 am.
9.523	ZRH	ROBERTS HEIGHTS, S. AFRICA. 31.5 m., Addr. (See ZRK, 9.606 mc.) Daily exc. Sun. 5-7.30 am.; Sun. 3 or 3.30 to 4.30 or 5 am.
9.520	HJ4ABH	ARMENIA, COLOMBIA, 31.51 m. 6-10 pm.
9.520	OZF	SKAMLEBOAEK, DENMARK, 31.51 m., Addr. Statsradiofonien, Copenhagen., 2-6.40 pm.
9.520	YSH	SAN SALVADOR, EL SALVADOR 31.51 m., Addr. (See 7.894 mc.) Irregular 6-10 pm.
9.510	GSB	DAVENTRY, ENGLAND, 31.55 m., Addr. (See 9.580 mc.—GSC) 12 m.-2.15 am., 12.20-6 pm., 9.20-11.20 pm.
9.510	HJU	BUENAVENTURA, COLOMBIA, 31.55 m., Addr. National Railways. Mon., Wed. and Fri. 8-11 pm.
9.500	VK3ME	MELBOURNE, AUSTRALIA, 31.58 m., Addr. Amalgamated Wireless of Australasia, 167 Queen St. Daily except Sun. 4-7 am.
9.500	XEWW	MEXICO CITY, MEX., 31.58 m. Addr. Apart. 2516. Relays XEW. 6 pm.-12 m.
9.500	HS8PJ	BANGKOK, SIAM, 31.58 m. Thursday, 8-10 am.
9.500	PRF5	RIO DE JANEIRO, BRAZ., 31.58 m. Irregularly 4.45 to 5.45 pm.
9.488	EAR	MADRID, SPAIN, 31.6 m., Addr. (See 9.860 mc.) 7.30-8.30 pm. Mon., Tues., Thur., Sat. at 9.30 pm. also.

End of Broadcast Band

9.460	ICK	TRIPOLI, N. AFRICA, 31.71 m. Works Rome, 5.30-7 am.
9.445	HCODA	GUAYAQUIL, ECUADOR, 31.77 m. Irregularly till 10.40 pm.
9.428	COCH	HAVANA, CUBA, 31.8 m., Addr. 2 B St., Vedado. 7 am.-1 am.
9.415	PLV	BANDOENG, JAVA, 31.87 m. Works Holland 5.30-9 am.
9.380	—	TANANARIVE, MADAGASCAR, 31.96 m. Addr. Le Directeur des PTT, Radio Tananarive, Administration PTT. 12.30-12.45, 3.30-4.30, 10.11 am.
9.355	HCIETC	QUITO, ECUADOR, 32.05 m., Addr. Teatro Bolivar, Thurs. until 9:30 p.m.
9.345	HBL	GENEVA, SWITZERLAND, 32.08 m., Addr. Radio Nations Fri. 7:15-8:30 p.m., 6:45-8 p.m.
9.330	CGA4	DRUMMONDVILLE, CANADA, 32.15 m. Works England irreg.
9.330	OAX4J	LIMA, PERU, 32.15 m., Addr. Box 1166, "Radio Universal." 12 n.-3 pm., 5 pm.-1 am.
9.290	HIG	CIUDAD TRUJILLO, D. R., 32.29 m. 7.10-8.40 am., 11.40 am.-2.10 pm., 3.40-8.40 pm.
9.280	HC2CW	GUAYAQUIL, ECUADOR, 32.31 m., 11.30 am.-12.30 p.m., 8-11 pm.
9.280	GCB	RUGBY, ENGLAND, 32.33 m. Works Canada and Egypt evenings and afternoons.
9.200	COBX	HAVANA, CUBA, 32.59 m. Addr. San Miguel 194, Altos. Relays CMBX 7 am.-12 m.
9.180	ZSR	KLIPHEUVEL, SOUTH AFRICA. 32.66 m. Phones London late afternoon.
9.170	WNA	LAWRENCEVILLE, N. J., 32.72 m. Works England evenings.
9.150	YVR	MARACAY, VENEZUELA, 32.79 m. Works with Europe afternoons.

Mc.	Call	
9.125	HAT4	BUDAPEST, HUNGARY, 32.88 m., Addr. "Radiolabor," Gyali-ut, 22. Sun. and Wed. 7-8 pm., Sat. 6-7 pm.
9.120	YCP	BALIKPAPAN, DUTCH BORNEO. 32.88 m. Phones Bandoeng 5.30-7.30 am.
9.100	COCA	HAVANA, CUBA, 32.95 m., Addr. Galiano No. 102. Relays CMCA 9 am.-12 m.
9.060	TFK	REYKJAVIK, ICELAND, 33.11 m. Works London afternoons.
9.030	TYA2	PARIS, FRANCE. 33.2 m. Works TPZ2 near 2 am. and 4-5 pm.
9.020	COBZ	HAVANA, CUBA, 33.26 m., Radio Salas Addr. P. O. Box 866, 7:45 am.-12.10 am. Irreg. 12.30-2 am. Relays CMBZ.
9.020	GCS	RUGBY, ENG., 33.26 m. Works N. Y. C. evenings.
9.010	KEJ	BOLINAS, CAL., 33.3 m. Relays NBC and CBS programs in evening irregularly.
8.967	VWY	KIRKEE, INDIA, 33.43 m. Works with England 1.30-3 am.
8.965	COKG	SANTIAGO, CUBA, 33.44 m. Addr. Box 137. 9-10 am., 11.30 am.-1.30 pm., 3-4.30, 5-6, 10-11 pm., 12 m.-2 am.
8.960	TPZ2	ALGIERS, ALGERIA, 33.48 m. Works TYA2, near 2 am. and 4-5 pm.
8.841	HCJB	QUITO, ECUADOR, 33.5 m. 7-8.30 am., 11.45 am.-2.30 pm., 5-10 pm., except Mon. Sun. 12 n.-1.30 pm., 5.30-10 pm.
8.840	ZMBJ	S.S. AWATEA, 33.92 m. Steamer out of New Zealand. Saturday at 11 pm. Phones Australia early am. irregularly.
8.775	PNI	MAKASSER, CELEBES, N.E.I., 34.19 m. Works Java around 4 am.
6.765	DAF	NORDDEICH, GERMANY, 34.23 m. Works German ships irregularly.
8.760	GCQ	RUGBY, ENG., 34.25 m. Works Africa afternoons.
8.730	GCI	RUGBY, ENG., 34.36 m. Works India 8 am.
8.700	HKV	BOGOTA, COLOMBIA, 34.46 m. Tues. and Fri. 7-7.20 pm.
8.860	GBC	RUGBY, ENG., 34.56 m. Works ships irregularly.
8.665	COJK	CAMAGUEY, CUBA, 34.64 m., Addr. Finlay No. 3 Altos. 5.30-6.30, 8-11 pm., daily except Sat. and Sun.
8.665	W2XGB	HICKSVILLE, N. Y., 34.64 m., Addr. Press Wireless, Mon. to Fri. News at 9 am. and 5 pm.
8.580	YNPR	MANAGUA, NICARAGUA, 34.92 m. Radiodifusora Pilot.
8.560	WAQ	OCEAN GATE, N. J., 35.05 m. Works ships irregularly.
8.380	IAC	PISA, ITALY, 35.8 m. Works Italian ships irregularly.
8.185	PSK	RIO DE JANEIRO, BRAZIL, 36.65 m. Irregularly.
8.036	CNR	RABAT, MOROCCO, 37:33 m. Works Paris irreg. in afternoons.
7.901	LSL	BUENOS AIRES, ARGENTINA, 37.97 m. Works Brazil at night.
7.894	YSD	SAN SALVADOR, EL SALVADOR, 37.99 m., Addr. Dir. Genl. Tel. & Tel. 7-11 pm.
7.870	HCIRB	QUITO, ECUADOR, 38.1 m. La Voz de Quito. 9-11 pm.
7.860	SUX	ABOU ZABAL, EGYPT, 38.17 m. Works with Europe, 4-6 pm.
7.854	HC2JSB	GUAYAQUIL, ECUADOR, 38.2 m. Evenings to 11 pm.
7.797	HBP	GENEVA, SWITZERLAND, 38.48 m., Addr. Radio-Nations.
7.780	PSZ	RIO DE JANEIRO, BRAZIL. 38.54 m. Phones 6-11 pm. irregularly.
7.715	KEE	BOLINAS, CAL., 38.89 m. Relays NBC and CBS programs in evening irregularly.
7.680	YBZ	MENADO, CELEBES, N.E.I., 39.04 m. Phones PNI and Bandoeng, 5.30-7 am.
7.626	RIM	TACHKENT, U.S.S.R., 39.34 m. Works with Moscow in early morning.
7.610	KWX	DIXON, CAL., 39.42 m. Works with Hawaii, Philippines, Java and Japan, nights.
7.560	FZE9	DJIBOUTI, FRENCH SOMALILAND. 39.66 m. Phones Paris early am.

(Continued on page 158)

All Schedules Eastern Standard Time

Talking on a Light Beam

Robert F. Scott

● THE diagram shows my uses for radio parts in a non-radio application. This set-up is used to communicate over short distances by means of a beam of light. The light ray is modulated in intensity by a "light valve."

The device consists of two principal parts, the amplifier and modulator. The amplifier may be any hi-gain low-power amplifier with a hi-impedance input for a photo-electric cell, and a low-impedance input transformer for a carbon mike or phono-pickup. S1, S2 is a D.P.D.T. switch wired so that when using mike in the input the magnetic speaker or phones are disconnected. When using photo-electric input, the speaker is in circuit. Plate voltage for the cell may be adjusted by means of variable resistor of 100,000 ohms in B+ lead to the cell. "A" or light valve of modulator unit must be made of very light metal, and cemented to inside of voice coil with speaker cement.

The light source may consist of a concentrated ray of strong light centered on the light slot of the modulator. Adjust the slot so that only a very thin ribbon of light passes through it. Mount a plano-convex lens with flat side toward the light ray. Focus this ray so that a very sharp image of the slot will be seen on a suitable background.

By using a convex-plano lens with convex side toward the ray,

(Continued on page 179)

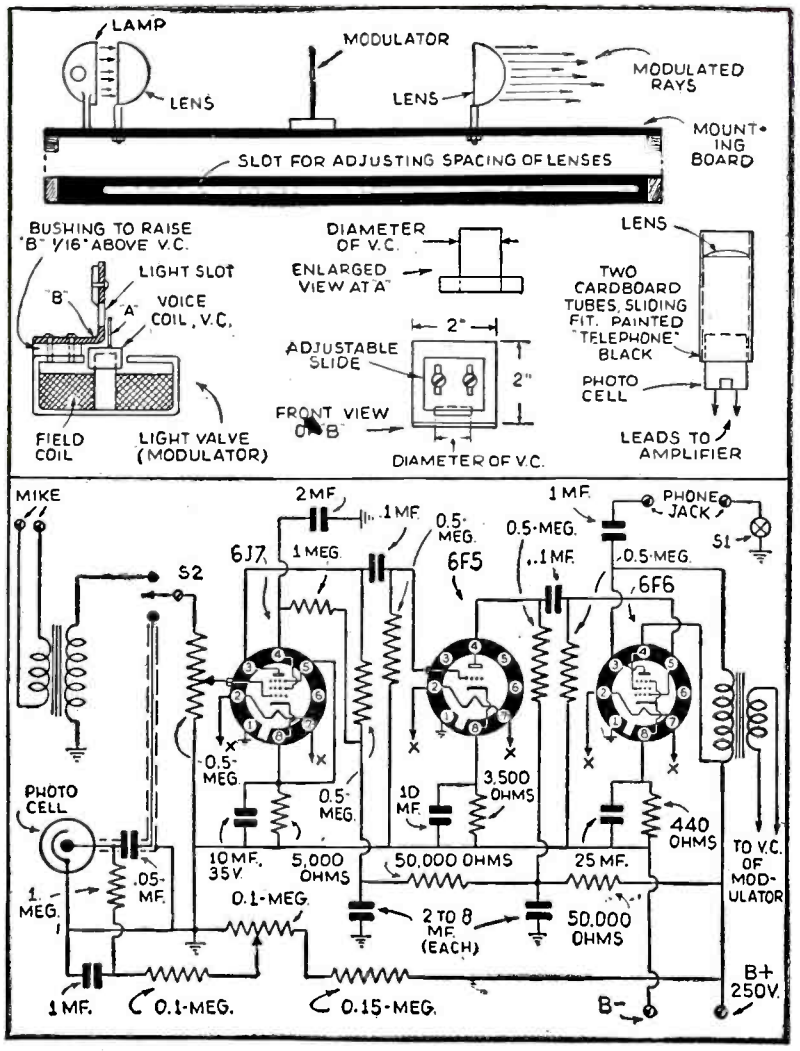


Diagram shows amplifier for use with photo-cell in photophone set-up here described. Arrangement of light source, modulator and lenses is shown.

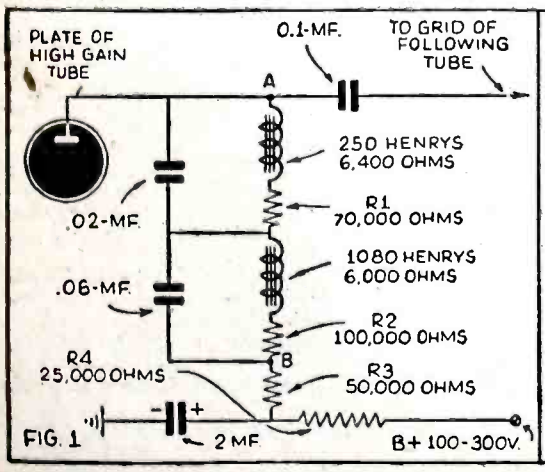
Bass Boosting for Any Amplifier

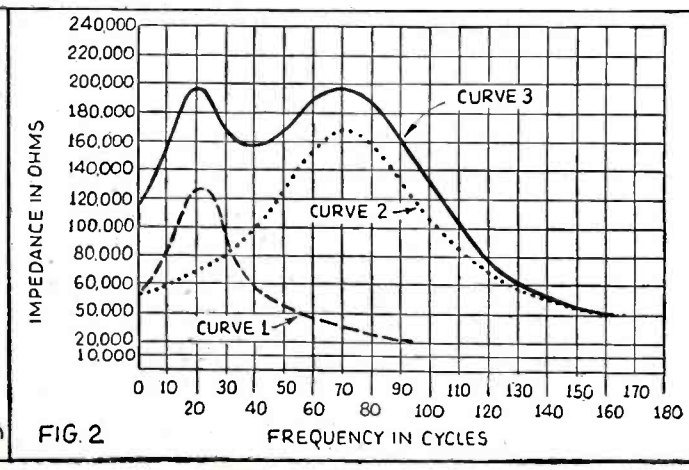
● MANY radio fans own receivers that are good in almost every respect, except that they haven't sufficient bass response to allow the listener to really enjoy good music. Probably the fan who owns such a receiver has often thought about improving its frequency response, but lacks the means of going about it. The writer painstakingly consumed a "small fortune" in stationery in devising a suitable means of improving bass response, and finally emerged with a ridiculously simple circuit that does everything that could be desired.

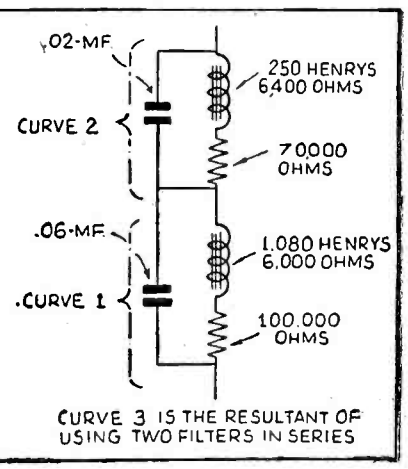
Briefly, the method consists of causing one of the tubes to amplify the bass end of the audio frequency range more than the middle or high end. Other things being equal, the amplification of a tube will increase as the load impedance to which it is connected increases—within limits of course. The frequency response can be adjusted over almost any desired range by using a suitable combination of impedances in the plate circuit of an amplifier tube. If the impedances to be used are larger for low frequencies than for middle or high frequencies, the amplification supplied by the tube will be large for low frequencies and correspondingly less for the middle and high frequencies.

The type of impedance selected for the job is a parallel resonant filter, which consists simply of an inductance and capacitance connected in parallel. This combination has the property of offering a much higher impedance at one particular frequency than at other frequencies—that is, it is a tuned circuit resonating at a definite frequency. By using two such filters in series and choosing proper inductance and capacitance values, the writer found it

(Continued on page 191)







It is a simple matter to boost the bass notes and thus obtain better quality in sound reproduction as shown.

Mc.	Call	
7.540	RKI	MOSCOW, U.S.S.R., 39.76 m. Works RIM early am.
7.520	KKH	KAHUKU, HAWAII, 39.87 m. Works with Dixon and broadcasts irregularly nights.
7.510	JVP	NAZAKI, JAPAN, 39.95 m. Irreg.
7.410	HCJB4	QUITO, ECUADOR, 40.46 m., 7-9.30 pm. irregularly.
7.390	ZLT2	WELLINGTON, N. Z., 40.6 m. Works with VLZ near 4 am.
7.380	XECR	MEXICO CITY, MEX., 40.65 m., Addr. Foreign Office. Sun. 6-7 pm.
7.220	HKE	BOGOTA, COL., S. A., 41.55 m. Tues. and Sat. 8-9 pm. Mon. and Thurs. 6.30-7 pm.
7.200	YNAM	MANAGUA, NICARAGUA, 41.67 m. Irregular at 9 pm.
7.177	CR6AA	LOBITA, ANGOLA, PORT. WEST AFRICA. 41.75 m.. Wednesday and Saturday 2.45-4.30 pm.
7.100	FO8AA	PAPEETE, TAHITI, 42.25 m., Addr. Radio Club Oceanien. Tues. and Fri. 11 pm.-12.30 am.
7.088	PIIJ	DORDRECHT, HOLLAND, 42.3 m., Addr. Dr. M. Hellingman, Technical College. Sat. 11.10-11.50 am.
6.990	XEME	MERIDA, YUCATAN, 42.89 m., Addr. Calle 59, No. 517, "La Voz de Yucatan desde Merida." Irregular.
6.980	KZGG	CEBU ISLAND, P. I. 42.95 m. Phones Manila near 4 am.
6.977	XBA	TACUBAYA, D. F., MEX., 43 m. 9.30 am.-1 pm., 7-8.30 pm.
6.905	GDS	RUGBY, ENG., 43.45 m. Works N.Y.C. evenings irregularly.
6.860	KEL	BOLINAS, CALIF., 43.70 m. Tests irregularly, 11 am.12 n., 6-9 pm.
6.805	HI7P	CIUDAD TRUJILLO, DOM. REP., 44.06 m., Addr. Emisoria Diaria de Commercio. Daily exc. Sat. and Sun. 12.40-1.40, 6.40-8.40 pm. Sat. 12.40-1.40 pm. Sun. 10.40 am.-11.40 am.
6.790	PZH	PARAMIRABO, DUTCH GUIANA, 44.16 m., Addr. P. O. Box 18. Daily 6.06-8.36 am., Sun. 9.36-11.36 am. Daily 5.36-8.36 pm.
6.775	HIH	SAN PEDRO DE MACORIS, DOM. REP., 44.26 m. 12.10-1.40 pm., 7:30-9 pm. Sun. 3-4 am., 4.15-6 pm., 4.40-7.40 pm.
6.755	WOA	LAWRENCEVILLE, N. J., 44.41 m., Addr. A.T.&T. Co. Works Eng. evenings.
6.750	JVT	NAZAKI, JAPAN, 44.44 m., Addr. Kokusai-Denwa Kaisha, Ltd., Tokyo. Irregular.
6.730	HI3C	LA ROMANA, DOM. REP., 44.58 m., Addr. "La Voz de la Feria." 12.30-2 pm., 5-6 pm.
6.720	PMH	BANDOENG, JAVA, 44.64 m. Relays NIROM programs. 5.30-9 am.
6.690	TIEP	SAN JOSE, COSTA RICA, 44.82 m., Addr. Apartado 257, La Voz del Tropico. Daily 7-10 pm.
6.675	HBQ	GENEVA, SWITZERLAND, 44.94 m. Addr. Radio-Nations. Sun. 1.45-2.30 pm.
6.672	—	—— 44:94 m., relays Salamanca, Spain, 7-9.45 pm.
6.672	YVQ	MARACAY, VENEZUELA, 44.95 m. Irregular.
6.650	IAC	PISA, ITALY, 45.11 m. Works ships irregularly.
6.635	HC2RL	GUAYAQUIL, ECUADOR, S. A., 45.18 m., Addr. P. O. Box 759. Sun. 5.45-7.45 pm., Tues. 9.15-11.15 pm.
6.630	HIT	CIUDAD TRUJILLO, D. R., 45.25 m., Addr. "La Voz de la RCA Victor," Apartado 1105. Daily exc. Sun. 12.10-1.40 pm., 5.40-8.40 pm.; also Sat. 10.40 pm.-12.40 am.
6.625	PRADO	RIOBAMBA, ECUADOR, 45.28 m. Thurs. 9-11.45 pm.
6.558	HI4D	CIUDAD TRUJILLO, D. R., 45.74 m. Except Sun. 11.55 am.-1.40 pm.
6.550	XBC	VERA CRUZ, MEX., 45.8 m. 8.15-9 am.
6.550	TIRCC	SAN JOSE, COSTA RICA, 45.8 m., Addr. Radioemisora Catolica Costarricense. Sun. 11 am.-2 pm., 6-7, 8-9 pm. Daily 12 n.-2 pm., 6-7 pm., Thurs. 6-11 pm.
6.545	YV6RB	BOLIVAR, VENEZUELA, 45.84 m., Addr. "Ecos de Orinoco." 6-10.30 pm.
6.520	YV4RB	VALENCIA, VENEZUELA, 45.98 m. 11 am.-2 pm., 5-10 pm.
6.516	YNIGG	MANAGUA, NICARAGUA, 46.02 m., Addr. "La Voz de los Lagos." 8-9 pm.
6.500	HIL	CIUDAD TRUJILLO, D. R., 46.13 m. Addr. Apartado 623. 12.10-1.40 pm., 5.40-7.40 pm.
6.490	HIIL	SANTIAGO DE LOS CABALLEROS, D. R., 46.2 m., Addr. Pres., Trujillo 97, Altos., 5.40-7 pm.
6.470	YNLAT	GRANADA, NICARAGUA, 46.36 m., Addr. Leonidas Tenoria, "La Voz del Mombacho." Irregular.
6.465	YV3RD	BARQUISIMETO, VENEZUELA, 46.37 m. Radio Barquisimeto, irregular.
6.450	HI4V	SAN FRANCISCO DE MACORIS, D. R., 46.48 m. 11.40 am.-1.40 pm., 5.10-9.40 pm.
6.440	TGQA	QUEZALTENANGO, GUATEMALA, 46.56 m. Mon.-Fri. 9-11 pm., Sat. 9 pm.-1 am., Sun. 1-3 pm.
6.420	HIIS	SANTIAGO, D. R., 46.73 m. 11.40 am.-1.40 pm., 5.40-7.40, 9.40-11.40 pm.
6.416	YV6RC	BOLIVAR, VENEZUELA, 46.73 m. Radio Bolivar.
6.410	TIPG	SAN JOSE, COSTA RICA, 46.8 m., Addr. Apartado 225, "La Voz de la Victor." 12 n.-2 pm., 6-11.30 pm.
6.400	YV5RH	CARACAS, VENEZUELA, 46.88 m. 7-11 pm.
6.388	HI8J	LAS VEGAS, D. R., 46.92 m., Irreg.
6.384	VP2LO	STE. KITTS, B.W.I. 46.96 m. ICA Service Labs, Box 88, Daily 4-4.45 pm., Sun 10-10.45 am. and irreg. at other times.
6.380	YV5RF	CARACAS, VENEZUELA, 46.92 m., Addr. Box 983. 6-10.30 pm.
6.370	TI8WS	PUNTARENAS, COSTA RICA, 47.07 m., Addr. "Ecos Del Pacifico", P. O. Box 75. 6 pm.-12 m.
6.365	YVIRH	MARACAIBO, VENEZUELA, 47.18 m., Addr. "Ondas Del Lago," Apartado de Correos 261. 6-7.30 am., 11 am.-2 pm., 5-11 pm.
6.360	HRPI	SAN PEDRO SULA, HONDURAS, 47.19 m. 7.30-9.30 pm.
6.350	JZG	NAZAKI, JAPAN, 47.22 m. Relays Tokyo 5-7.30 am. irreg. Phones ships early am.
6.340	HIIX	CIUDAD TRUJILLO, D. R., 47.32 m. Sun. 7.40-10.40 am., daily 12.10-1.10 pm., Tues. and Fri. 8.10-10.10 pm.
6.335	OAXIA	ICA, PERU, 47.33 m., Addr. La Voz de Chiclayo, Casilla No. 9. 8-11 pm.
6.324	COCW	HAVANA, CUBA, 47.4 m., Addr. La Voz de las Antillas, P. O. Box 130. 6.55 am.-1 am. Sun. 10 am.-10 pm.
6.310	HIZ	CIUDAD TRUJILLO, D. R., 47.52 m. Daily except Sat. and Sun. 11.10 am.-2.25 pm., 5.10-8.40 pm. Sat. 5.10-11.10 pm. Sun. 11.40 am.-1.40 pm.
6.300	YV4RD	MARACAY, VENEZUELA, 47.62 m. 6.30-9.30 pm. exc. Sun.
6.295	OAX4G	LIMA, PERU, 47.63 m., Addr. Apartado 1242. Daily 7-10.30 pm.
6.290	HIG	TRUJILLO CITY, D. R., 47.67 m. 7.10-8.40 am., 11.40 am.-2.10 pm., 3.40-8.40 pm.
6.280	COHB	SANCTI SPIRITUS, CUBA, 47.77 m., Addr. P. O. Box 85. 9-11.30 am., 12.30-1.30, 4-7, 8-11 pm.
6.270	YV5RP	CARACAS, VENEZUELA, 47.79 m., Addr. "La Voz de la Philco." Daily to 10.30 pm.
6.255	YV5RJ	CARACAS, VENEZUELA, 47.18 m.
6.243	HIN	CIUDAD TRUJILLO, D. R., 48 m., Addr. "La Voz del Partido Dominicano." 12 n.-2 pm., 6-10 pm.
6.235	HRD	LA CEIBA, HONDURAS, 48.12 m., Addr. "La Voz de Atlantida." 8-11 pm.; Sat. 8 pm.-1 am.; Sun. 4-6 pm.
6.225	YVIRG	VALERA, VENEZUELA, 48.15 m. 6-9.30 pm.
6.220	——	SAIGON, INDO-CHINA, 48.2 m., Addr. Radio Philco. 4.30 or 5.30-9.30 am.
6.210	TG2	GUATEMALA CITY, GUAT., 48.28. m., Addr. Dir. Genl. of Electr. Commun. Relays TGI Mon.-Fri. 6-11 pm., Sat. 6 pm.-1 am. Sun. 7-11 am., 3-8 pm.
6.205	YV5RI	CORO, VENEZUELA, 48.32 m., Addr. Roger Leyba, care A. Urbina y Cia. Irregular.
6.200	HI8Q	CIUDAD TRUJILLO, D. R., 48.36 m. Irregular.
6.200	ZGE	KUALA LUMPUR, FED. MALAY ST., 48.36 m. Sun., Tue. and Fri. 6.40-8.40 am.
6.185	HIIA	SANTIAGO, D. R., 48.5 m., Addr. P. O. Box 423. 7 am.-5 pm.
6.171	XEXA	MEXICO CITY, MEX., 48.61 m., Addr. Dept. of Education. 7-11 pm.
6.156	YV5RD	CARACAS, VENEZUELA, 48.71 m. 11 am.-2 pm., 4-10.40 pm.
6.153	HI5N	MOCA CITY, D. R., 48.75 m. 6,40-9.10 pm.

49 Met. Broadcast Band

Mc.	Call	
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, 48.75 m. 5-6 pm.
6.147	ZRD	DURBAN, SOUTH AFRICA, 48.8 m., Addr. (See ZRK, 9.606 mc.) Daily exc. Sat. 11.45 pm.-12.50 am.; Daily exc. Sun. 3.30-7.30 am., 9 am.-3.45 pm.; Sun. 8-11.30 am., 12 n.-3.20 pm.
6.147	ZEB	BULAWAYO, RHODESIA, S. AFRICA, 48.8 m. Mon., Wed., and Fri. 1.15-3.15 pm.; Tues. 11 am.-12 n.; Thurs. 10 am.-12 n. Sun. 3.30-5 am.
6.145	HJ4ABE	MEDELLIN, COL., 48.79 m. 11 am.-12 n., 6-10.30 pm.
6.140	W8XK	PITTSBURGH, PA., 48.86 m., Addr. Westinghouse Electric & Mfg. Co. Relays KDKA 11 pm.-12 m.
6.137	CR7AA	LAURENCO MARQUES, PORT. E. AFRICA, 48.87 m. Daily 12.05-1, 4.30-6.30, 9.30-11 am., 12.05-4 pm., Sun. 5-7 am., 10 am.-2 pm.
6.130	VP3BG	GEORGETOWN, BRIT. GUIANA. 48.94 m. From 5 pm. on.
6.130	COCD	HAVANA, CUBA, 48.94 m., Addr. Box 2294. Relays CMCD 7 am.-1 am.
6.130	VE9HX	HALIFAX, N. S., CAN., 48.94 m., Addr. P. O. Box 998. Mon.-Fri. 7 am.-11.15 pm., Sat. 11 am.-11 pm., Sun. 12 n.-11.15 pm. Relays CHNS.
6.130	LKL	JELOY, NORWAY, 48.94 m. 11 am.-6 pm.
6.125	CXA4	MONTEVIDEO, URUGUAY, 48.98 m., Addr. Radio Electrico de Montevideo., Mercedes 823. 10 am.-12 n., 2-8 pm.
6.122	HP5H	PANAMA CITY, PAN., 49 m., Addr. Box 58. 12 n.-1 pm., 8-10 pm.
6.120	W2XE	NEW YORK CITY, 49.02 m., Addr. Col. B'cast. System, 485 Madison Ave. 10.30-11.30 pm.
6.117	XEUZ	MEXICO CITY, MEX., 49.03 m., Addr. 5 de Mayo 21. Relays XEFO 1-3 am.
6.115	HJ3ABX	BOGOTA, COL., 49.05 m., Addr. La Voz de Col., Apartado 2665. 12 n.-2 pm., 5.30-11 pm.; Sun. 6-11 pm.
6.115	OLR2C	PRAGUE, CZECHOSLOVAKIA, 49.05 m. (See 11.40 mc.)
6.110	XEPW	MEXICO CITY, MEX., 49.1 m., Addr. La Voz de Aguila Azteca desde Mex., Apartado 8403. Relays XEJW 11 pm.-1 am.
6.110	VUC	CALCUTTA, INDIA, 49.1 m. Daily 2.06-4.36 am., 6.36 am.-12.06 pm.; Sat. 10.06 pm.-2.06 am., Sun. 7.36 am.-12.36 pm.
6.110	VPB	COLOMBO, CEYLON, 49.1 m. Daily 7-9.30 am; Sun. 6.30-9.30 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. 12.45-2.30, 4-8 am., 1-6 pm.
6.100	W3XAL	BOUND BROOK, N. J., 49.18 m., Addr. Natl. Broad. Co. 8.25 pm.-12 m.
6.100	W9XF	CHICAGO, ILL., 49.18 m., Addr. N.B.C. 4-6.50 pm., 1.05-2 am. Sun. 1-5.50 pm.
6.097	ZRK	KLIPHEUVEL, S. AFRICA, 49.2 m., Addr. S. African Broad. Co., Johannesburg. Daily 12 n.-4 pm., Sun. 12 n.-3.20 pm.

(Continued on page 183)

All Schedules Eastern Standard Time

HINTS on FACSIMILE Reception

● THE circuit of the Finch facsimile recorder is shown in simplified form in Fig. A. By means of a wafer fitted on the output tube of the broadcast receiver, the image signal is picked up through a ¼ mf. coupling condenser. The signal passes through a 3—1 A.F. transformer and into a 6A6 tube with its grid and plates hooked together to act as a rectifier. In other words, both the synchronizing impulse and the picture recording signals are rectified. When the recording arm A is in the left-hand or *neutral* position, the cam on the motor shaft leaves the circuit closed through the cut-out magnet. The motor, of the synchronous or induction type, together with the gearing used is adjusted so that the arm travels slightly faster than the arm at the transmitter.

As a consequence, arm A, at the receiver, always returns to the left-hand position ahead of time and waits for the synchronizing impulses. While the arm is moving from left to right, the rectified picture signal passes through the Finch specially prepared dry processed paper and leaves a black line of varying width. By means of a cam on the shaft (or else by allowing the synchronizing impulses to operate a magnetic mechanism—Editor) the paper is advanced about 1/100-inch ready for the next line. On the return stroke of the arm from right to left, no picture signal is coming in and no record is made of this stroke. The arm moves toward the right in 1/120 of a second and the return stroke occupies the same amount of time. As soon as the clutch is released by the magnet M, the circuit from the rectifier tube to the magnet is open, and the signal is shunted through the recording arm. It will be noted that the only current used for recording the signal or operating the clutch relay is the current *induced* in the 6A6 tube circuit through the 3—1 transformer. Of course, the signal picked up from the BC receiver must be quite strong, the Finch experts recommending the use of a set having not less than 3 watts output. The voltage of the recording signal will vary from 40-150 volts on an average.

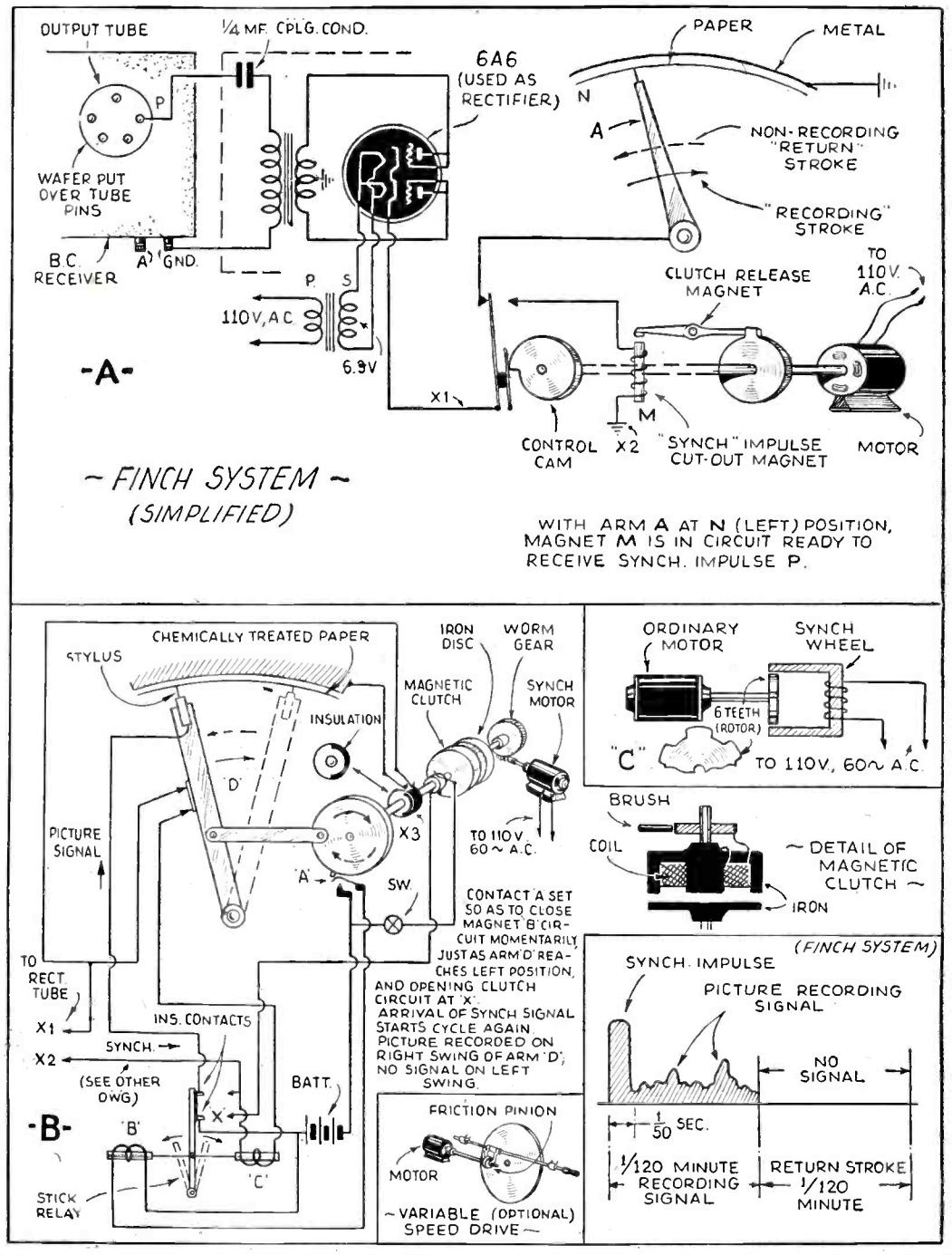
Hints to the Experimenter

Fig. B shows an idea which may interest the experimenter who would like to try his hand at facsimile recording. Any one of the several methods outlined in the previous article, such as the corona method, may be used for recording. If some of the chemically processed paper which turns black when a current is passed through it (A.C. or D.C. may be used for recording) is available, then the arrangement shown may be of interest.

A small magnetic clutch is used to connect the arm with the motor, propelling the arm first toward the right and then back to the left on the return stroke. The motor may be of the synchronous type or else an ordinary induction motor, and if care is taken a battery motor may be used. A rectifier tube is used for the experimental set-up shown in diagram B, corresponding to the 6A6 in Fig. A. The magnetic clutch may be about 2 inches in diameter and made of wrought iron or even mild steel. The plate of the clutch is about ⅛" thick and the magnet part may measure ¾" or more in depth. An annular ring is machined out as shown and a coil of about 150 to 180 turns of No. 26 magnet is wound to fit into the slot as shown. An insulated fibre disc is mounted on the shaft near the clutch with a spring brush bearing against it, to carry one side of the circuit to the clutch; the other side of the clutch windings may be grounded. The winding data given is suitable for battery operation (6 to 8 volts).

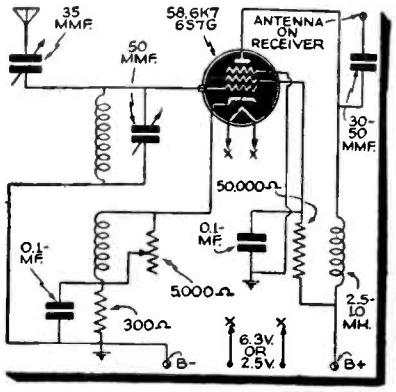
Looking at the circuit, Fig. B, the syn-

(Continued on page 180)



The upper diagram, Fig. A, shows simplified circuit of the Finch facsimile recording system. The lower diagram, Fig. B, gives a suggestion for facsimile experimenters.

Question Box



Regenerative Preselector—1135

? Preselector

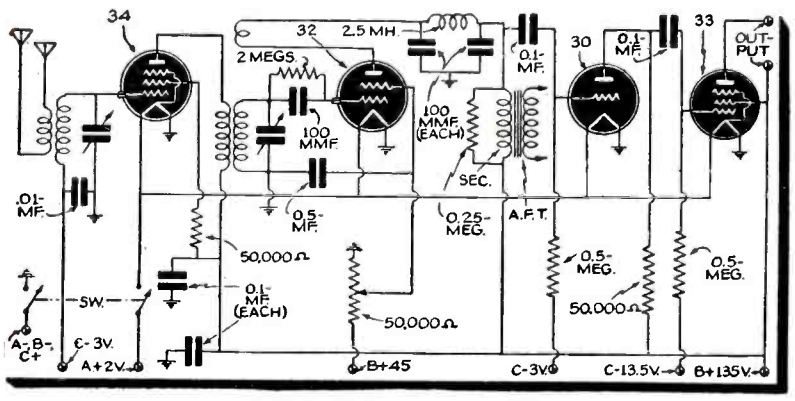
I would like to build a TRF preselector using a 58 tube and a 50 mmf. tuning condenser.—Arthur Townsend, Toronto, Canada.

A. The most efficient type of preselector makes use of a regenerative TRF circuit and we have shown such an arrangement. The tube used may be a 58, a 6K7, a 6S7G or any similar tube. The 5,000 ohm potentiometer is used to control regeneration. This circuit will give a great deal more gain and selectivity than a non-regenerative arrangement.

? Revamping a Two Volter

I have a receiver using a 34 R.F., a 30 detector and a 30 A.F. amplifier. I wish to change the line-up to a 34 R.F., 32 detector and an additional A.F. stage, using a 33. Can the 32 detector be transformer coupled to the first audio?—Ralph Bolster, Loggieville, N. B., Canada.

A. The circuit changes you require are shown in the diagram published on this page. It is not possible to get good results by transformer coupling the 32 to the first A.F. stage. If, however, you have a transformer on hand, connect the secondary in the plate of the 32 as shown so that it functions as an A.F. choke and shunt it with a .25 megohm resistor and couple to the following tubes through a resistance-condenser combination as shown. This arrangement should give satisfactory performance. You do not state whether you used a C battery in your original receiver,



2-Volt Battery Set—1136

but we have shown one in the revised circuit as it is essential to bias the grid of the 33 tube to conserve battery current and to protect the tube. Regeneration is controlled by varying the potential on the screen grid of the 32 tube.

? Transformerless A.C. Receiver

Please publish a transformerless A.C. receiver circuit using a 25Z6 used as a voltage doubler, a 6C5 A.F. amplifier and a 6J7 detector using standard plug-in coils and a 140 mmf. tuning condenser.—Matthew B. Warren, Dallas, Texas.

A. The circuit you requested is reproduced using four prong coils. The output for headphones is arranged so that crystal phones may be used if desired without any alterations. Note that this receiver can be used only on A.C. In case any hum is heard in the headphones, it may be advisable to connect the common return lead line of the receiver to an external ground through a .1 mf. condenser. This condenser should have a working voltage of at least 400.

? Conversion Job

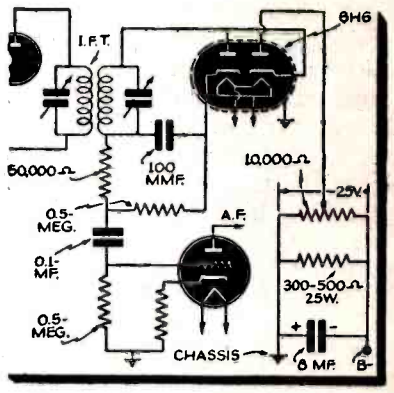
I have an audio amplifier using a 37 feeding into two 42's in push-pull. I would like to know if I could make it into a communications receiver.—A. Oxstein, Fort Wayne, Ind.

A. The answer to your question is no! In the first place, the tube combination you have is not satisfactory for R.F. work and in the second place a communications type receiver is quite an elaborate affair using a considerable number of tubes.

? Noise Silencer

Can you publish the circuit of a fairly simple noise silencer which may be added to any superheterodyne receiver? The arrangement should not require too many parts.—Andrew Cateret, San Francisco, Calif.

A. An effective and inexpensive noise silencer can be made with a 6H6 tube which is used as a combination second detector tube and noise silencer. This arrangement is similar to that employed in the 2AJL Superhet described in the last issue. One of the diode sections is used as an ordinary second detector while the other is used as noise silencer. The noise silencer diode has its plate biased negative with respect to the cathode by the voltage developed across the potentiometer "R". When noise or a signal is strong enough to cause the voltage built up across the diode No. 1 load resistor, to exceed the negative bias on the plate of diode No. 2, this diode will draw current and form a low impedance across the detector diode circuit, effectively limiting its output. To operate the device the potentiometer should be set so that no distortion of phone signals is heard in the output under any conditions but signals (noise or otherwise) above a certain level are cut off.



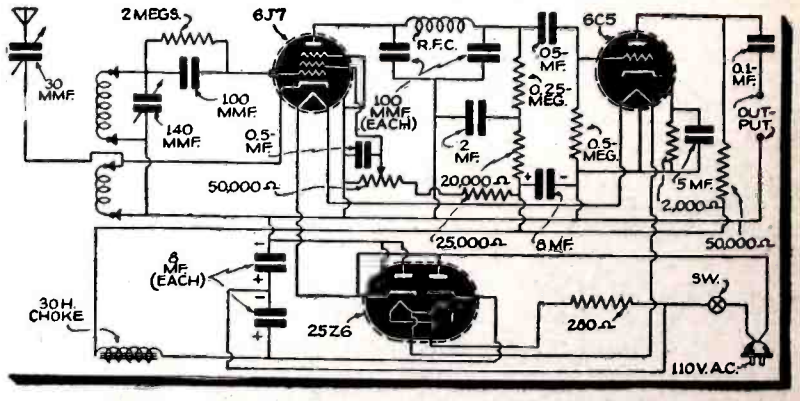
Noise Silencer Circuit—1138

? AVC Action

I have a TRF short-wave receiver using a 1A4, a 34 detector, a 1B4 first audio and 2—49's second audio. However, I am troubled with fading and I would like to know if it is possible to add AVC to this receiver.—Richard Zwes, Tela, Honduras, C. A.

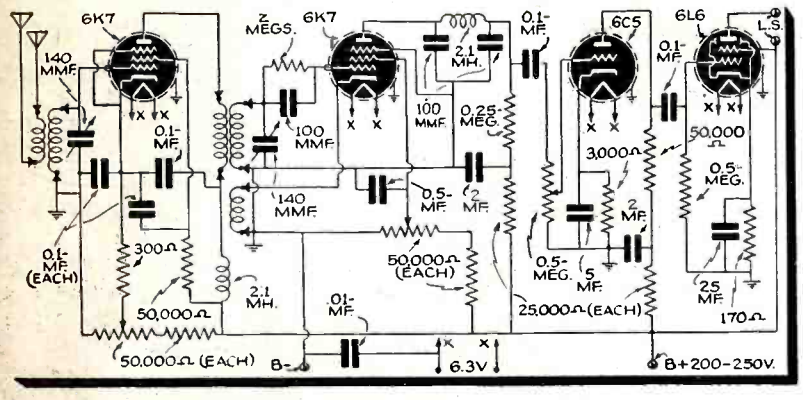
A. It is impractical to use AVC on a small TRF regenerative receiver. There is not enough overall gain in the receiver to get satisfactory control and in addition the AVC action would tend to cause the set to go in and out of oscillation as the signal faded when the detector was operated near regeneration point. AVC can be used successfully in multi-stage TRF receivers which do not use a regenerative detector, and in superheterodyne receivers.

Another reason which makes it impractical to use AVC in a small set is the fact that a simple receiver is not very selective and when listening to a station in one of the congested short-wave bands, it is possible that interfering signals on an adjacent channel will affect the AVC action so that if an interfering station is stronger than the desired station, this station will control the AVC action.



Transformerless A.C. Receiver—1137

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.



T.R.F. Set With Beam Power Output Tube—1132

Metal Tube Set

Please publish the circuit diagram of a set with a 6K7 TRF amplifier, a 6K7 electron coupled detector followed by a 6C5 A.F. amplifier and a 6L6 output stage. It should have R.F., regeneration and volume controls.—F. Bellington, Jr., Brooklyn, N. Y.

A. We have prepared the circuit you requested and it is reproduced on this page. Three winding plug-in coils are used between the R.F. and detector stage, while two winding coils are used in the antenna circuit. For coil data, see the Question Box, March 1938 issue. Resistance coupling is used throughout the audio amplifier as it is simple, economical and efficient. If the two tuning condensers are ganged they should have small trimmer condensers (10-35 mmf. each) shunted around each section.

A.C.-D.C. Receiver

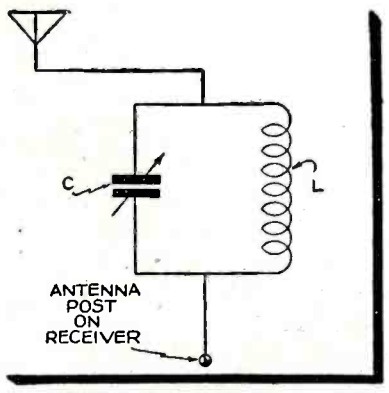
Will you please publish a diagram of a 5-meter transceiver using a 6N7 tube in an A.C.-D.C. circuit?—Felix Domekowski, Carle Place, L. I., N. Y.

A. We do not recommend the circuit you request. Single tube transceivers are rather unstable in regard to frequency when used for transmitting and should only be used in portable equipment. Congestion in the 5-meter bands is already quite bad and further use of such unstable equipment will only cause more interference to other Hams. Five meter rigs for operation in fixed stations should make use of a separate transmitter and receiver for best results. We suggest looking through past issues of the magazine for suitable receivers and transmitters.

Police Band Wave Trap

On my short-wave receiver I am troubled with police calls breaking through. Will you please publish a diagram of a wave trap for eliminating this trouble. The calls are heard mainly from 160-175 meters.—P. R. Shepherd, Berkeley, Calif.

A. A simple wave trap is shown which should eliminate this trouble except in the most stubborn cases. However, if you are troubled with interference from several stations operating on different frequencies, it will be necessary to build a separate wave trap for each station concerned and adjust it until it cuts out the offender. The traps should be connected in series between the antenna and the aerial post of the receiver. The coil should be 3" in diameter with about 20 turns of No. 18 cotton covered wire. Condenser C may be 250 to 350 mmf.



Police Station Wave Trap—1133

Two Equals Four Receiver

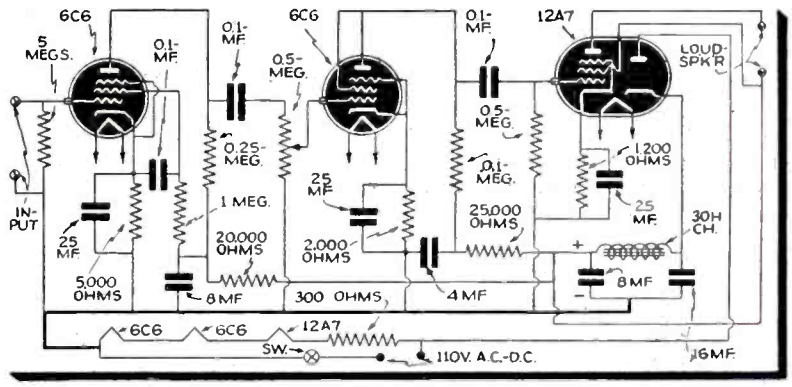
I would like to build a set using two metal tubes which should be of the dual purpose type. The set should have an R.F. stage, a detector and two stages of audio amplification.—Bob Whitely, Richmond, Va.

A. It is impossible to comply with your request as there are no dual purpose metal tubes which would perform all the functions you require. The only dual purpose metal tubes at the moment are of dual triodes. These are quite satisfactory for combining the functions of two stages of audio or a detector and a stage of audio in one tube, but they cannot be used as a combination stage of R.F. and detector. The only tube available which would do this is the 6F7 triode-pentode, but there is no metal equivalent of this tube.

A.C.-D.C. Amplifier

I am interested in securing a diagram of an audio amplifier using 2—6C6's and 1—12A7.—Ralph Thomas, Hillsboro, N. C.

A. An A.C.-D.C. circuit using resistance coupling should meet your requirements nicely and we have prepared such an arrangement for you. Note that the volume control is in the grid circuit of the second 6C6 tube. The output transformer to the loudspeaker



Universal A.F. Amplifier—1134

should have a primary impedance of approximately 13,500 ohms. Liberal use has been made of decoupling circuits in the plates of the first 2-tubes to reduce hum to a minimum. The input to the amplifier is high impedance so that virtually any type of equipment may be attached to it without making any change.

Freak Reception

When my short-wave receiver and midget superhet broadcast receiver are on at the same time, the program being heard on the broadcast set can also be picked up at one place on the dial of my short-wave receiver. Is the broadcast set acting as a modulated transmitter in this case?—Tom Lemley, Sarasota, Fla.

A. Yes, it is apparent that the broadcast set is acting as a miniature transmitter. What apparently is happening is that the R.F. circuits in your receiver are not adequately filtered and so the receiver is radiating a modulated signal. In any case, the remedy probably would be to insert an R.F. filter consisting of a 60 mh. choke and a 500 mmf. condenser across the output of the second detector, or to shield the oscillator circuits more thoroughly.

Connecting a .1 mf. condenser from both sides of the 110 v. line cord to ground is also helpful.

How to Build the 1938 A.C.-D.C. "Hear-All" DEAF-AID

H. G. Cisin, M. E.

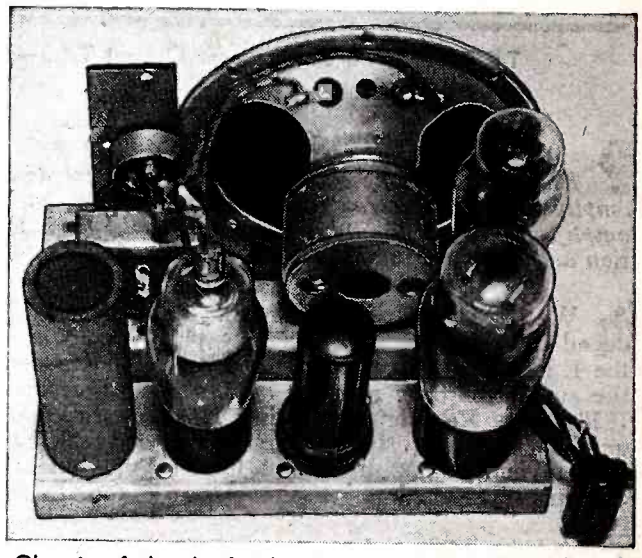
This extremely sensitive sound-indicating instrument may be used as a detectiphone and also as an inter-office telephone.

The deaf-aid instrument in operation—note the tiny headphone which fits right into the ear.

● THE hearing aid shown and described in this article is the result of a great many years of research on the part of the writer. This particular model represents the last word in A.C.-D.C. hearing aids, consistent with the present knowledge and developments in the electronic field. The problem originally presented was to design an electronically operated amplifying device, having high sensitivity, low hum-level, operable from any power supply source, light in weight, compact, rugged and easy to use. All of these requisites have been fully complied with in the 1938 Hear-All and in addition, it has been found possible to design an instrument which can be produced, even in small quantities, at very low cost.

After the invention and development of the underlying basic circuit, the patent on which is held by the writer (2,086,256), the ensuing steps consisted principally in testing out and applying the latest improvements in tubes and associated components and applying them in the actual device. The hearing aid, as now presented, would have been impossible without the cathode heater vacuum tube. The early tubes of this type, however, required comparatively large filament current and as a result, a compact device was impossible due to the larger amounts of energy to be handled, larger components required for filtering, etc. Therefore, a tremendous impetus was given to the hearing aid art with the availability of power-operated tubes drawing as little as .3 ampere filament current. Before the advent of the A.C.-D.C. circuit, A.C. operated electronic devices required a bulky, expensive power transformer. Now this is no longer necessary, and thus there is available an additional means of reducing weight, size and cost.

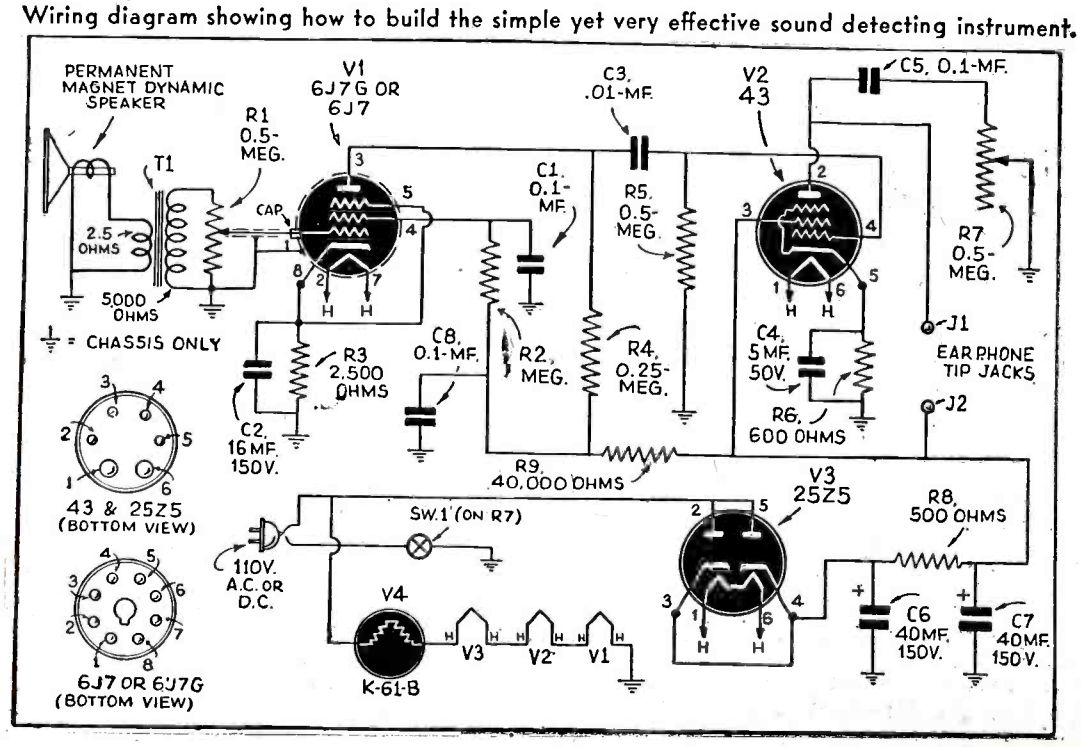
In the last few years, there have been a number of other important improvements in components, all of which have been utilized to refine the instrument. In the earlier models, the use of a sensitive, expensive microphone of conventional design was an absolute necessity. After considerable experimentation, the writer has found it possible to dispense with the expensive microphone and use in its place a permanent-magnet dynamic speaker. The speaker costs a great deal less than a suitable microphone and gives superior results for all around use in a hearing aid. There are no carbon granules to pack and a great many of the objectionable characteristics inherent in all types of microphones are absent in the permanent-magnet speaker.



Chassis of the deaf-aid instrument showing amplifying tubes and speaker used as a microphone.

Another recent development in components, of considerable importance in the power-operated hearing aid field, has been the new ultra small size electrolytic condensers. Through their application, it is possible to pack a great many more microfarads of filtering capacity into the small space available in a modern hearing aid.

Wiring diagram showing how to build the simple yet very effective sound detecting instrument.



Circuit Uses Radio Parts

Before proceeding with the actual constructional details, let us examine the circuit. It is immediately apparent that this circuit resembles very closely that of a present day A.C.-D.C. radio amplifier. Particular reference is called to this fact in order to emphasize the idea that the hearing aid is obviously a *radio* item. This means that the amateur who is able to build a radio set can also successfully produce a very fine deaf aid. This hint should certainly suggest money-making possibilities to wide-awake radio set builders. Everyone, no matter how limited his range of acquaintances, knows or knows about some one who is hard of hearing. As a matter of fact, this unfortunate impairment is a most

(Continued on page 173)

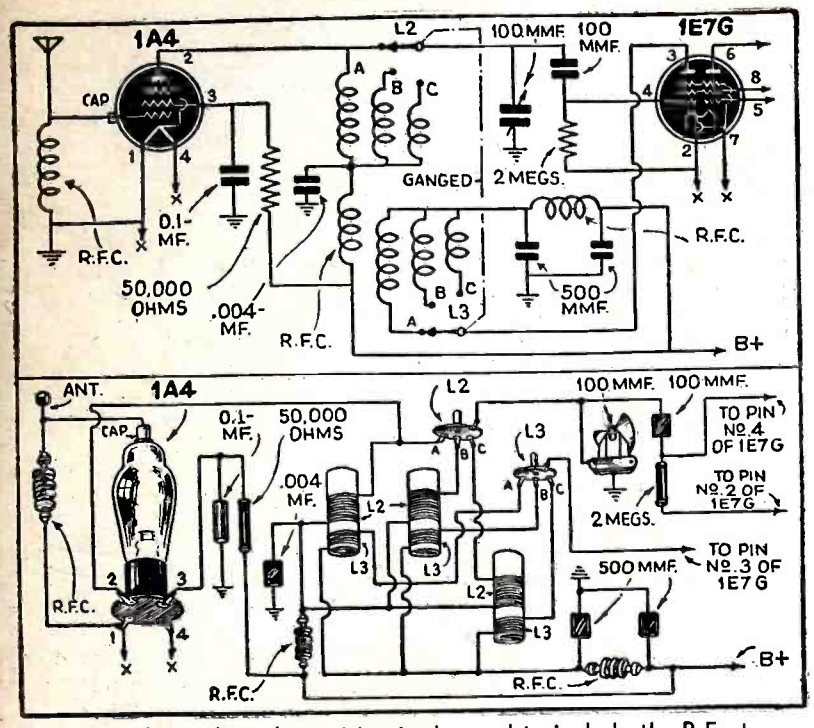
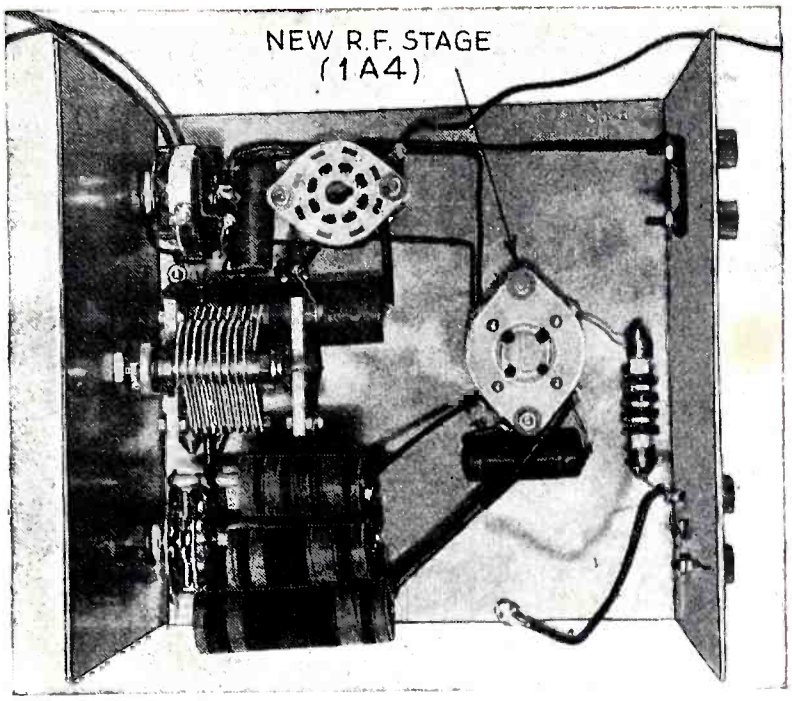


Diagram above shows how wiring is changed to include the R.F. stage.



The addition of an R.F. stage to the 1-tube Duplex is very easy.

Adding an R.F. Stage to the 1-TUBE DUPLEX

The 1-tube Beginner's Receiver described last month can be greatly improved by the simple addition of an R.F. stage. It is just the set for those desiring to listen in on short waves with a pair of headphones and it works on batteries.

● LAST month's description of the simple one-tube beginner's receiver evoked such enthusiastic comment from several constructors that it was decided to add an additional tube. For simplicity and optimum results, an untuned R.F. stage was decided upon; the tube being a 1A4, an R.F. pentode well suited for the purpose. Although more gain could have been obtained by using a tuned R.F. stage, the additional complications necessary to having two tuned stages were felt to mitigate against its successful use by the beginner. Since the receiver was designed for the SWL just breaking into the short-wave field, the fewer the stumbling blocks placed in his way, the less would be the danger of his enthusiasm cooling off.

Pre-Amplifier Stage Worthwhile

The untuned R.F. stage has sufficient gain to make it well worthwhile, especially on phone signals when the detector is not oscillating. There is, of course, a drop in gain at the higher frequencies. There are other good features about an R.F. stage besides gain, however. Regenerative detectors, when coupled to an antenna, have a very bad habit of radiating energy or acting as a miniature transmitting station. In fact, oscillating receivers have been heard for as much as 50 miles on broadcast frequencies. Using an R.F. stage between the antenna and the detector, however, entirely prevents radiation. Another advantage of an R.F. stage is its isolating effect between the antenna and detector. Antenna lengths have no effect on tuning. The receiver may be calibrated with no fear of its losing that calibration by a change in antenna length or position.

Before describing how to add the R.F. stage, it might be well to review the original *one-tuber*. The receiver used a 1E7G tube, one section of which was used in a regenerative detector circuit and the other section as a stage of resistance-coupled audio amplification. Antenna, detector and tickler coils are changed for the different bands by a new type of coil switch. This switch not only connects in the desired coil, but shorts out the unused lower frequency coils. This prevents the unused coils from having any absorption effect on the coils in use. Separate antenna coils were used for each band, thereby dispensing with an antenna series condenser and automatically providing optimum results on each band. Regeneration is provided by the time-tried method of a potentiometer varying the screen-grid voltage. For smoothness and quietness this method has no equal. Only a single tuning condenser was employed, bandspread not being used in the original model. Those desiring to spend most of their time listening on the amateur bands, might well place a 25 or 35 mmf. condenser in parallel with the regular tuning condenser. This small condenser, furnished with a vernier dial, will spread the *ham bands* nicely over a large portion of the dial scale. The combination panel-chassis was simply constructed from a sheet of 1/16 inch aluminum 19 by 7 inches. It was bent into a "U" shape, leaving a six-inch high by seven-inch wide *front* panel, and a *rear* panel of the same size. The base or top is seven inches square. In the original receiver it was possible to strap the batteries inside the chassis, if the constructor so desired.

Addition of R.F. Stage Is Simple

For those who have already built the one-tube receiver, the addition of the single tube R.F. stage is very simple. Two one-eighth inch holes must be drilled in the chassis to accommodate the additional tube socket. This socket of the Isolantite 4-prong variety is mounted slightly back of the tuning condenser. Its position is not at all critical. Besides the socket, the only other components necessary for the R.F. stage will be 2 small 2.5 millihenry pie-wound R.F. chokes, a 0.1 mf. paper condenser, a 50,000 ohm ½-watt resistor, a standard tube grid cap and a .004 mf. mica condenser.

The wiring should take very little time, the diagram showing the completed 2-tube receiver. The first step is to disconnect the antenna coil terminals on the band-switch from the antenna binding post. The screen-grid terminal of the 1A4

(Continued on page 181)

A *Slick* Preselector—

An SW-3 connected as a preselector ahead of a National NC81-X. Note the transmission line connected to the input terminals of the NC81-X.

● CONGESTION in the amateur and short-wave broadcast bands makes the use of a *super* more or less essential for wading through the mass of clamoring signals from all parts of the world. Present-day supers fall roughly into two classes, those with *preselection* ahead of the first detector and those without. In general, receivers with preselection have an advantage over those without, although there are several sets not using preselection which give superior performance.

Nevertheless, virtually any superhet's performance is improved with the addition of a good preselector. Image pick-up is reduced, signal-to-noise ratio is greatly increased and overall sensitivity and selectivity are improved. The advantages of a suitable preselector can not be minimized.

Many fans have National SW-3 receivers which are used for extra sets or for listening on uncongested bands. Recent experiments have proven that the SW-3, *with no circuit changes,* makes a honey of a job for preselector use. Drag it out and see for yourself!

Hooking It Up

Reference to the circuit diagram and to the photo shows that all that is necessary is a length of twisted pair or transmission line. Fashion a one-turn loop at one end of the line and slip it over the tickler winding of the detector plug-in coil of the SW-3. The center point of this loop (where the two ends of the pair are twisted together) is grounded to the SW-3 chassis at a soldering lug just below the coil socket. The other end of the transmission line is connected to the doublet input terminals of the superhet.

Operation

Antenna and ground (or doublet lead-in) are connected to the SW-3 input. Both the super and the SW-3 must be tuned simultaneously of course and the preselector's plug-in coils must be changed for each band. In operation the SW-3 regeneration control is adjusted to just below the oscillation point. The regenerative detector of the SW-3 functions as a regenerative R.F. stage fed by the non-regenerative antenna stage. The combination results in *plenty gain!* The regeneration makes a definite improvement in selectivity with a *consequent lowering of interference* from atmospherics.

When receiving very strong signals, the regeneration control can be retarded, reducing the volume. In fact, this control serves a very useful purpose as a supplementary volume and background noise control. It should be used in combination with the super's volume control.

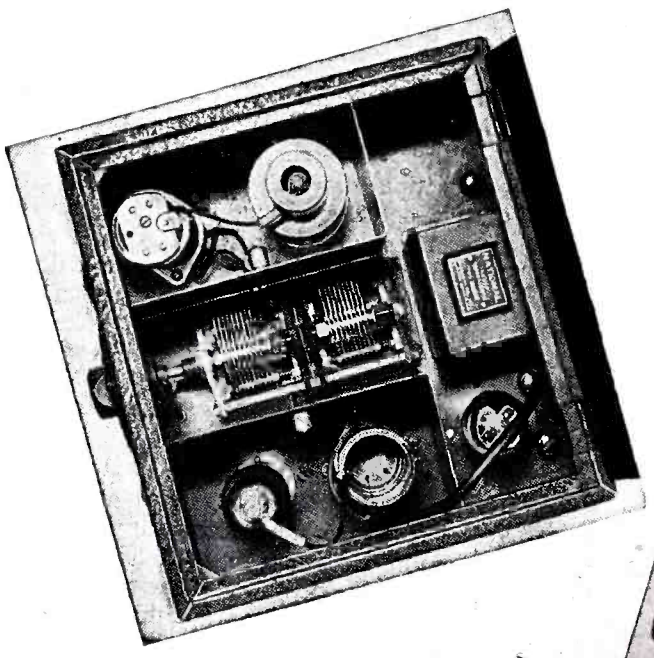
The method of coupling the unit to the receiver entails some loss due to impedance mismatches as the average super's input impedance is quite a bit higher than that of the one-turn loop and the twisted pair. This loss can be overlooked, however, because of the tremendous gain in the preselector. Other methods of coupling can be devised, no doubt, by the resourceful but the method suggested is as good as any.

Power-Supply

Power for the SW-3 may be taken from an external power-pack, from the superhet, from a combination of both, or from a self-contained power unit, depending on the user's preference. It is possible to mount a small filament transformer on the back wall of the SW-3 cabinet and take the B power from the big set. Another alternative (which entails alteration of the SW-3, however) is to replace the A.F. tube with a rectifier and the audio coupling impedance with a small power transformer and midget filter choke.

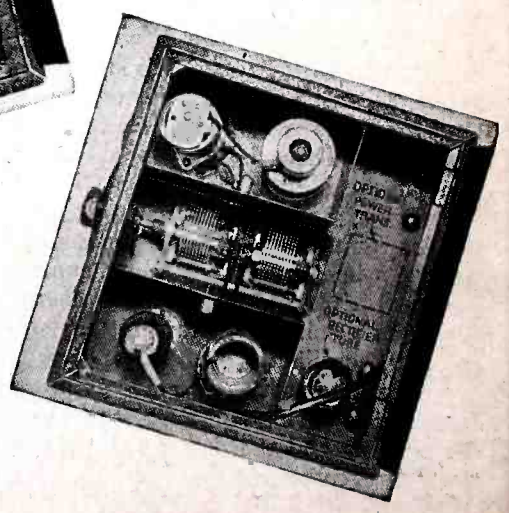
A suggested circuit for this arrangement is shown at B. This, of course, would require experimentation to find the most suitable arrangement and is suggested only for those capable of doing the job properly. This arrangement results in a completely self-contained, self-powered preselector. If the SW-3 is modified to have a self-contained power-pack, the 58 detector tube should get its B+ supply voltage from the point X on diagram A.

For those who have the 6.3 volt battery type SW-3 and intend using it with a battery-operated receiver there would be no point in making any changes in it. Simply connect it to the batteries used with the super. This assumes, of course, that the super makes use of



Another view of the interior, showing how the audio coupling unit might be removed for those desiring to build in an A.C. power-supply. As this is only a suggested change, no recommendations as to placement of new parts can be given.

Interior view of the SW-3, showing how the transmission line cable is slipped over the detector plug-in coil.



Photos Courtesy Sun Radio Co.

The National SW-3!

An old friend in a new guise. The versatile SW-3 TRF Receiver makes a hot preselector. When used ahead of any superhet, watch those weak signals come up out of the noise as R8's.

tubes having 6.3 volt heaters. For those using an SW-3 employing 2 volt D.C. tubes, a 2 volt battery supply is necessary for the tube filaments.

Results

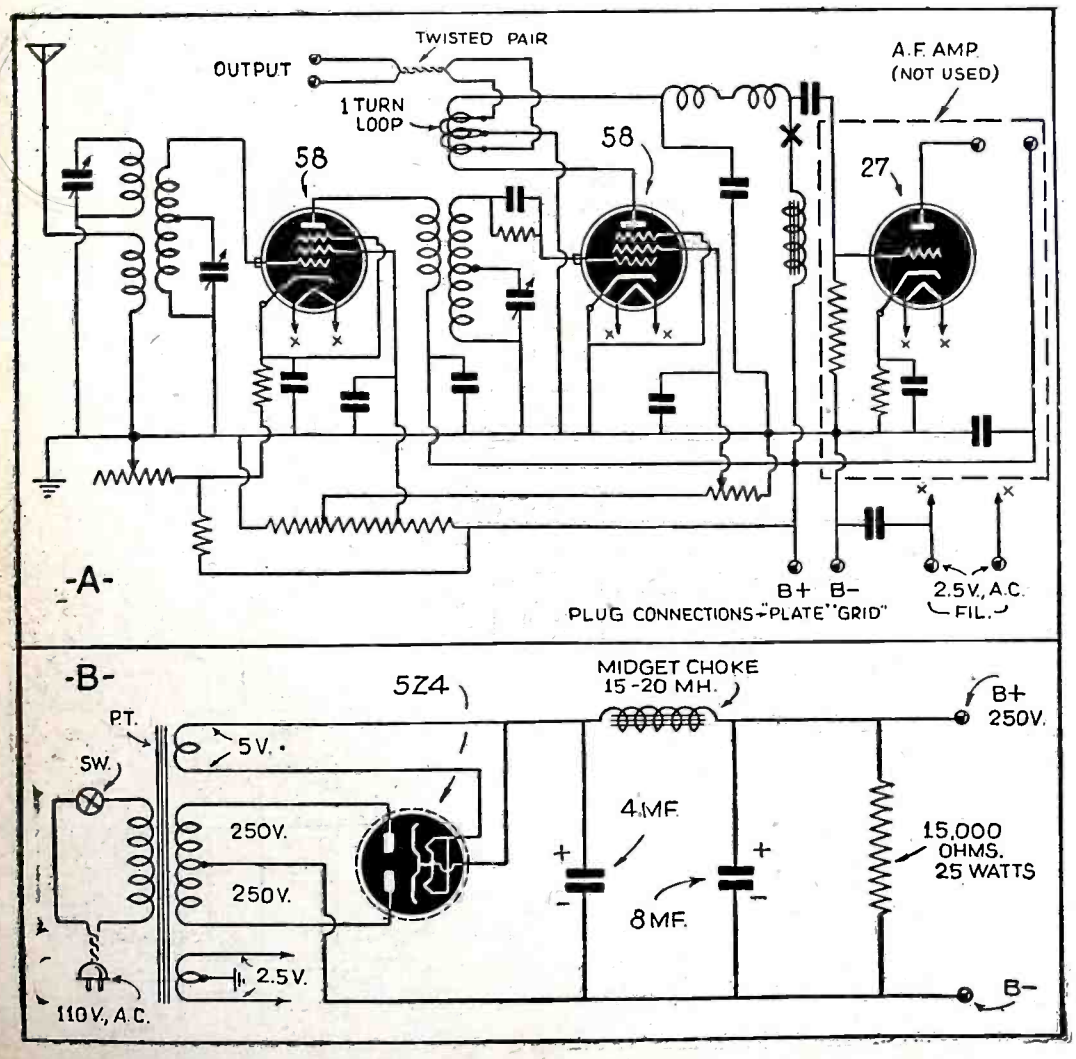
Of course, the most interesting thing to the reader is the results achieved in actual operation. One of these jobs was attached ahead of a *communications* receiver which has a built-in stage of preselection. This receiver, incidentally, is a top-notch performer by itself and has given very good results even on weak signals. With the addition of the preselector, the results are really remarkable. Signals which are only unintelligible carriers without the preselector, turn into good R6 and R7 signals when the preselector is cut in. A good many signals which were formerly heard only under ideal conditions are easily logged regularly. In addition to this, the background noise on all signals has decreased considerably.

The benefits of the preselector are especially noticeable below 20 meters and particularly on the 10 meter ham band. Another noticeable improvement is the suppression of all images on the higher frequencies.

In the 10 meter ham band images which heterodyne the desired signal sometimes make reception difficult. However, with the preselector attached the image ratio is so greatly improved that this trouble disappears.

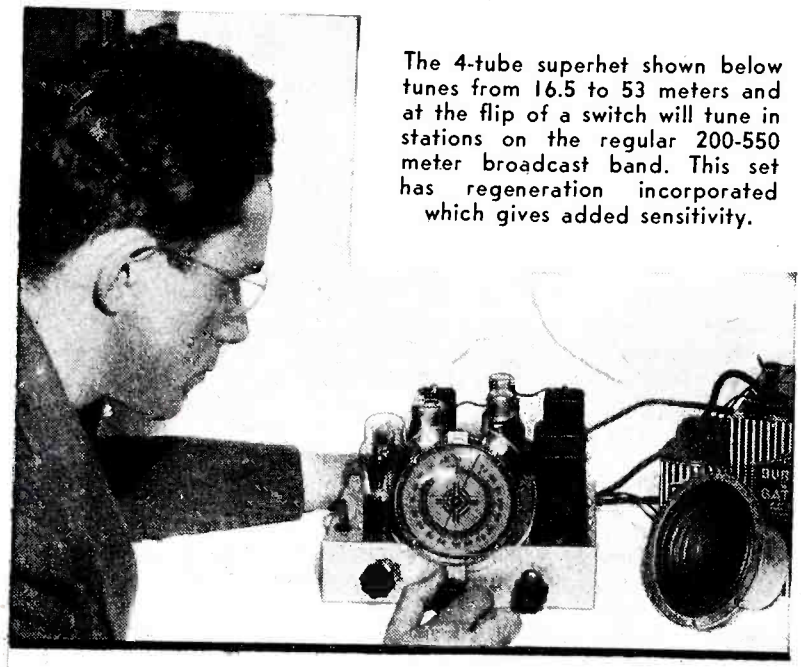
Moderately strong signals which were formerly received with some background noise caused by tube hiss, are much quieter with the preselector in use.

A shows the circuit diagram for the A.C. SW-3 showing the way in which the pick-up coil is placed over the tickler winding of the detector plug-in coil. B shows a suggested power-supply unit for use with the preselector.



The B.C. and S.W. Portable

This battery-operated superhet will appeal to short-wave Fans and Hams. It brings in stations on the regular broadcast band and also the European S-W broadcast and Amateur stations.



The 4-tube superhet shown below tunes from 16.5 to 53 meters and at the flip of a switch will tune in stations on the regular 200-550 meter broadcast band. This set has regeneration incorporated which gives added sensitivity.

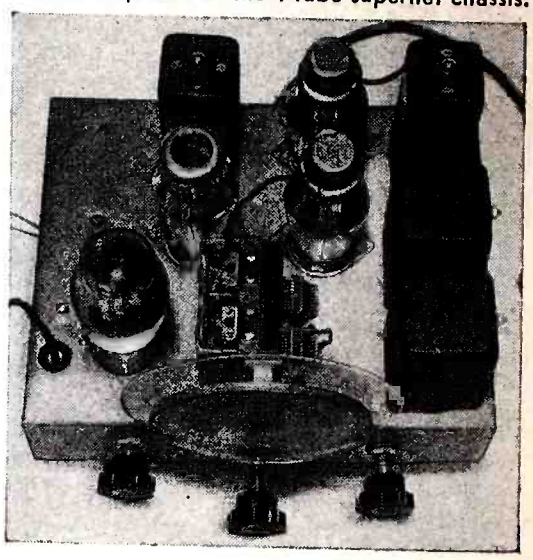
● THIS simple portable battery-operated superheterodyne has been designed for amateur emergency service and outdoor use. Ruggedness, efficiency, low current drain and light weight all combine to make this receiver ideal for the amateur working on the 20 and 40 meter bands, or the DX'er who wants to follow up those elusive *foreign* S-W stations while on vacation at the seashore or the mountains. The use of standard parts further reduces the low cost of the set.

Using only four, low drain, two-volt tubes in a simple, yet unusual, superheterodyne circuit this set will compare favorably in operation with many larger sets.

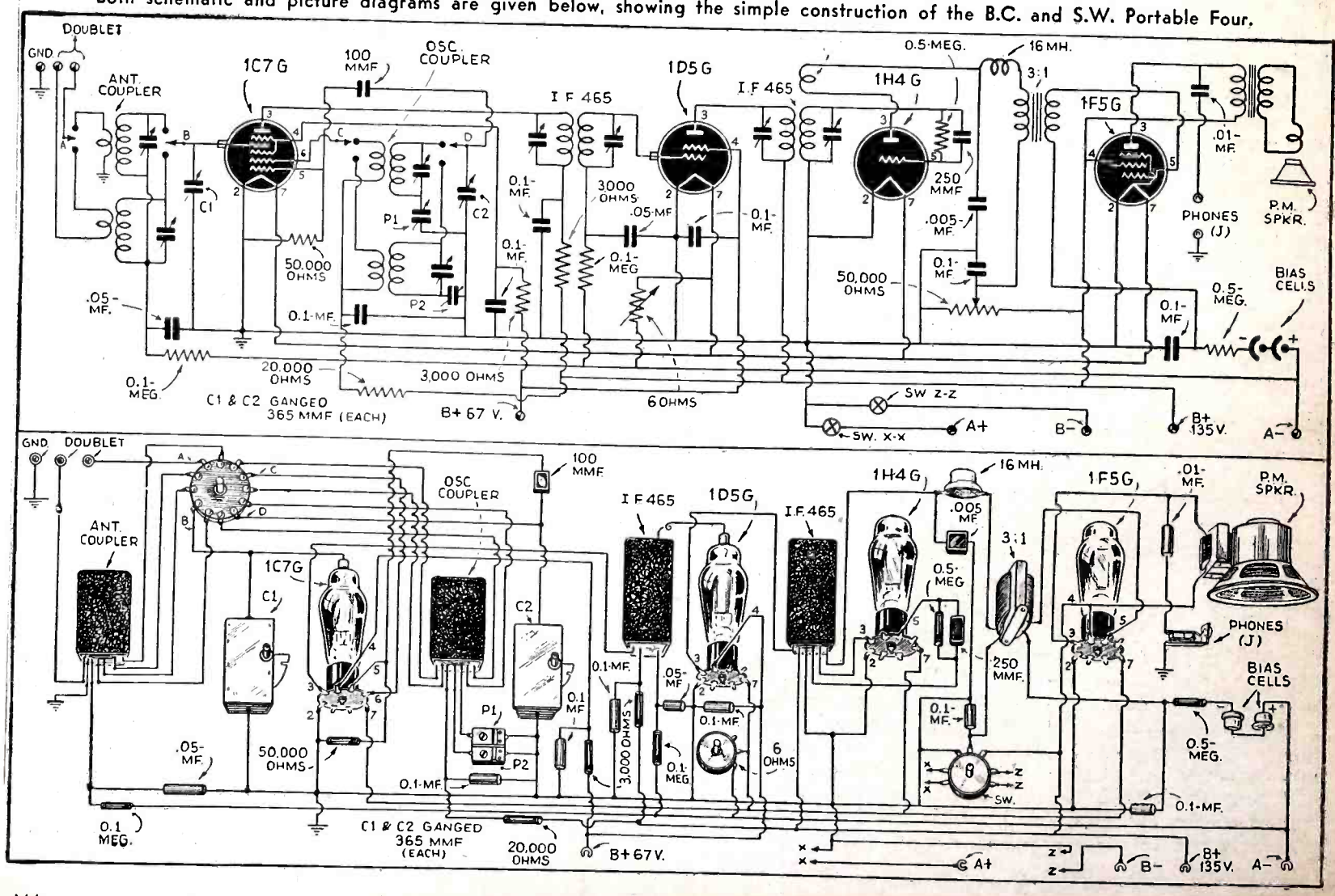
A laboratory model of this set has been tried in an average location, using only a short roof-top antenna. Short-wave *sensitivity* and *selectivity* were found to be excellent. The European short-wave "locals" came in with excellent volume. Stations in the crowded 19, 25, 31 and 49 meter S-W broadcast bands were easily separated.

All the K and W districts were heard on the S-W *amateur* bands. VK's and G calls were heard several times on both twenty and forty meters. While not essentially a band-spread set, the coils have been

Below—Top view of the 4-tube superhet chassis.

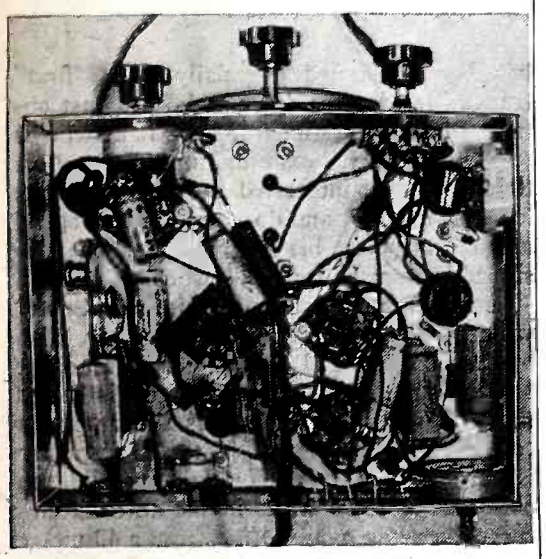


Both schematic and picture diagrams are given below, showing the simple construction of the B.C. and S.W. Portable Four.



Four

B. J. Barnett



A peek at the bottom of the 4-tube receiver.

so designed that accurate "logging" of amateur stations is possible directly on the dial. Broadcast reception was of very high quality.

Circuit Details

The circuit is straightforward and not complicated. The low-loss band-switching circuit not only changes the coils from the short-wave to the standard broadcast band, but automatically switches the antenna from the conventional "L" type on broadcast to an optional doublet on the higher frequencies.

The type 1C7G modulator-oscillator tube is used as a conventional first detector, feeding through an iron-core 456 kc. I.F. transformer into a single stage of high-gain intermediate frequency amplification, using a type 1D5G remote cut-off pentode amplifier to avoid distortion.

The second-detector employs a type 1H4G triode tube in a novel and advanced type circuit. The special *three-winding* coil is available or can be made from a standard interstage I.F. transformer. The special tickler winding is made up of six turns of No. 26 D.S.C. wire, wound on the bobbin of the second I.F. transformer, adjacent to the grid coil.

By proper selection of circuit components, the 50,000 ohm potentiometer becomes a regeneration control in its upper resistance limits, while acting as a standard volume control as the knob is turned to the left and the resistance reduced. Proper coil design permits the tube to handle input power at levels unusual for a grid leak type detector. As a result the triode detector gives flawless, distortion-free reproduction on standard broadcast programs, while combining the functions of a sensitive detector and beat-frequency oscillator on the short-wave bands.

A standard midget 3-1 audio transformer couples the output of the detector tube to the type 1F5G power pentode output stage. The use of this new tube allows a high audio output, combined with an unusually low filament and "B" battery drain. The output of this tube is more than sufficient to give comfortable room volume on the P.M. dynamic speaker recommended.

A phone jack is placed in the output circuit of this tube, in an unusual circuit using the same condenser to block D.C. from the headphones, and at the same time smooth out the response curve of the speaker.

Careful design throughout has removed the chief difficulty experimenters encounter when building superheterodynes—uncontrollable oscillation. A careful examination of the circuit will reveal that filter resistors and paper bypass condensers have been used in all the important leads going to the first detector oscillator tube to provide necessary decoupling action.

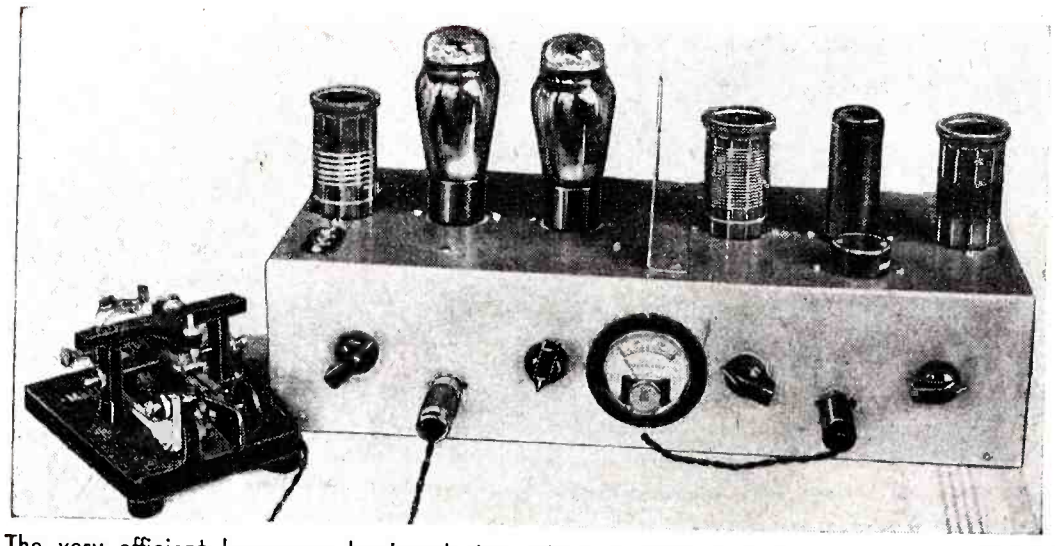
In the plate and screen-grid return leads 3000 ohm non-inductive resistors are used in conjunction with 0.1 mf. condenser, preventing feedback of the intermediate or audio frequency signals into the high-frequency section of the circuit. The grid return of the 1C7G tube is decoupled by means of a 100,000 ohm resistor and a .05 mf. condenser. These values have been determined by experiment and are the best from the standpoint of circuit efficiency. A similar decoupling circuit is used in the I.F. amplifier.

To prevent audio feedback into the grid bias supply system, a special filter is inserted in the grid return of the audio output tube. This filter consists of a 500,000 ohm resistor in series with the bias voltage,

(Continued on page 174)

Build the "W8KPX" Beginner's

Harry D. Hooton, W8KPX



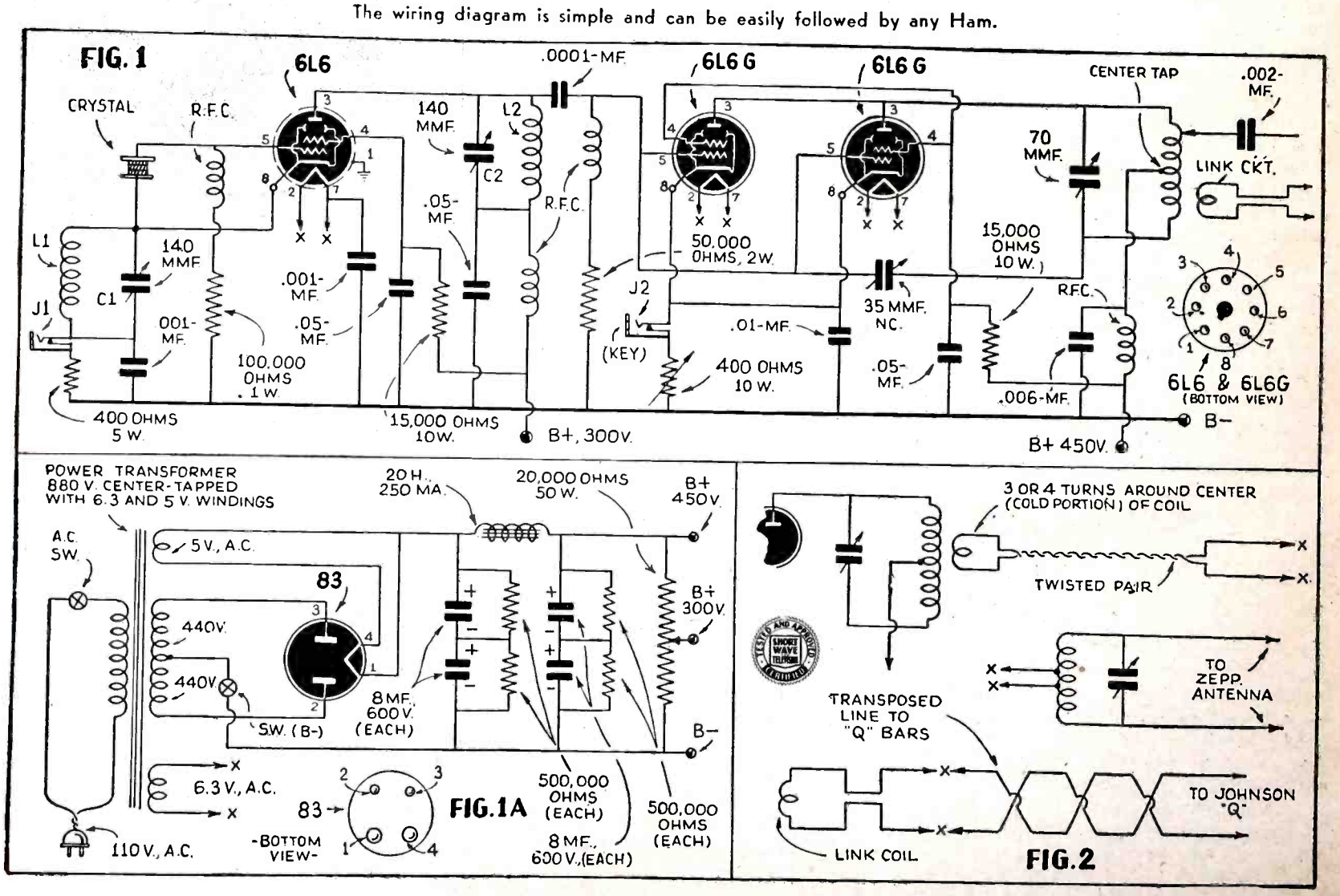
The very efficient low-power beginner's transmitter is illustrated above—a very neat job!

● EVER since the publication of the "M-T" transmitter article in the September 1936 issue of *Short Wave and Television*, the author has been the recipient of an almost constant stream of letters from *ham beginners* and *would-be hams* requesting constructional data on a more powerful and up-to-date model. In each case the specifications stated that the transmitter must be of low cost, both in construction and upkeep, easy to build and operate, constructed entirely from receiving type parts and capable of at least 25 or 30 watts *output* on all of the popular amateur bands, including *ten meters!*

The little 75 watt rig to be described here has been designed especially as a "first" transmitter for the fellow who has just obtained his ticket, the would-be ham who is studying for the examination or the "ole timer" who is interested only in a simple, low-power outfit and does not want to spend much money on his hobby. Although designed primarily for CW work on the 80, 40 and 20 meter bands, this transmitter will, by the proper crystal selection, also operate on 160 and 10 meters. The output on the four lower frequency bands is better than 35 watts; on 10 meters the output is considerably lower but if the transmitter is carefully built it should be possible to obtain at least 20 watts in the antenna circuit even when *quadrupling* from a 40 meter crystal. More output can be obtained when using a 20 meter crystal but the amplifier will then have to be *neutralized*—a job which, although not at all difficult, might prove confusing to the beginner. The use of a 17 inch chassis allows the addition of a *standard 19 inch panel* if *rack* or *cabinet* type construction is ever desired.

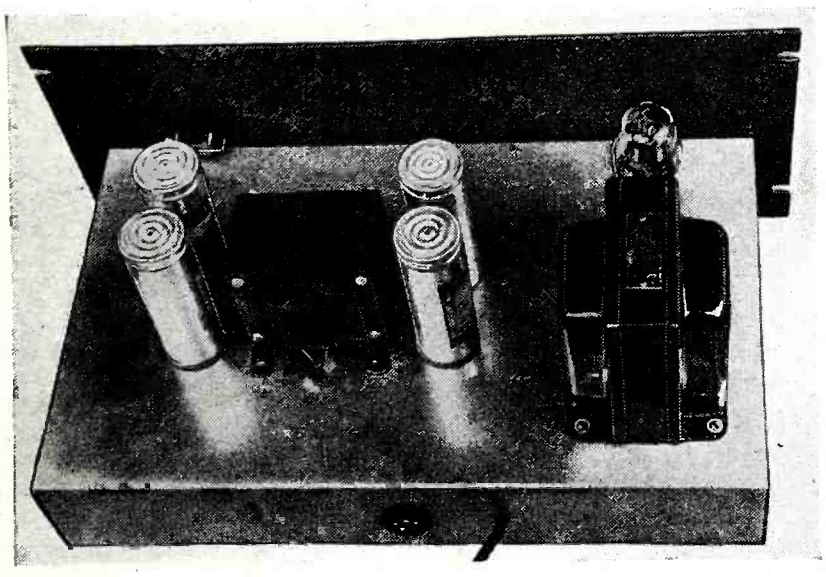
As shown in the schematic diagram, Fig. 1, the circuit is more or less conventional, starting with a Tri-tet crystal oscillator-

The wiring diagram is simple and can be easily followed by any Ham.



Transmitter

Mr. Hooton, well known to the amateur fraternity for his many articles on short-wave transmitters, receivers, etc., describes a simple, yet highly efficient, transmitter. It has crystal control to stabilize the frequency and with 75 watts input, the output is over 35 watts. It covers all bands.



The author describes a very effective power-supply unit, and this is pictured in the photo at the right.

frequency multiplier using a metal-type 6L6 tube. The amplifier uses *a pair of glass 6L6Gs in parallel,* capacity-coupled to the output of the crystal oscillator circuit. The parallel connection simplifies the entire transmitter design and the single-ended amplifier permits the use of standard, factory-wound plug-in coils, which improves the efficiency and appearance of the set considerably.

The *power-supply* unit is built up on a 10 x 17 x 3 inch steel chassis and a 7 x 19 inch standard steel panel. As the photographs and diagrams show, this has also been trimmed down to its bare essentials; the condenser-input filter system actually gives about 450 volts output from the voltage-divider terminals and the regulation is very good, so long as the transformer is not operated beyond its rating. The single power transformer supplies not only the 880 volts, center-tapped, for the plates, but also 6.3 and 5 volts A.C. for the 6L6s and the 83 heaters as well. The filter condensers are of the new 600 volt, wet type; their useful life is lengthened and the safety factor increased considerably by using the two pairs in the series arrangement as shown.

Preparing the Chassis

The actual construction of the transmitter is not at all difficult. Lay out the chassis as shown in the drawing, cut out the corners with a hack-saw, make a deep scratch or cut along the lines on the *inside* surface of the aluminum and bend the chassis to its proper shape as indicated by the dotted lines. The tube and coil socket holes may be punched out or, if no punch of the proper size is on hand, may be reamed out and then dressed down with a half-round file. When making accurate measurements such as the tube or coil socket mounting holes, always use a pair of dividers and transfer the settings to the chassis. Drill and cut all of the holes before mounting any of the parts; metal filings or dust, once they have become imbedded in the isolantite insulation of the sockets or tuning condensers, are not only extremely difficult to remove but are almost certain to cause heavy R.F. losses, especially when operating on the 10 meter band. Cut the socket holes large enough so that the coil and tube prongs cannot touch against the chassis when these are being changed. It is a good practice to go over the chassis thoroughly with steel-wool or 00 sandpaper and remove all small burrs or sharp points of metal before the parts are mounted.

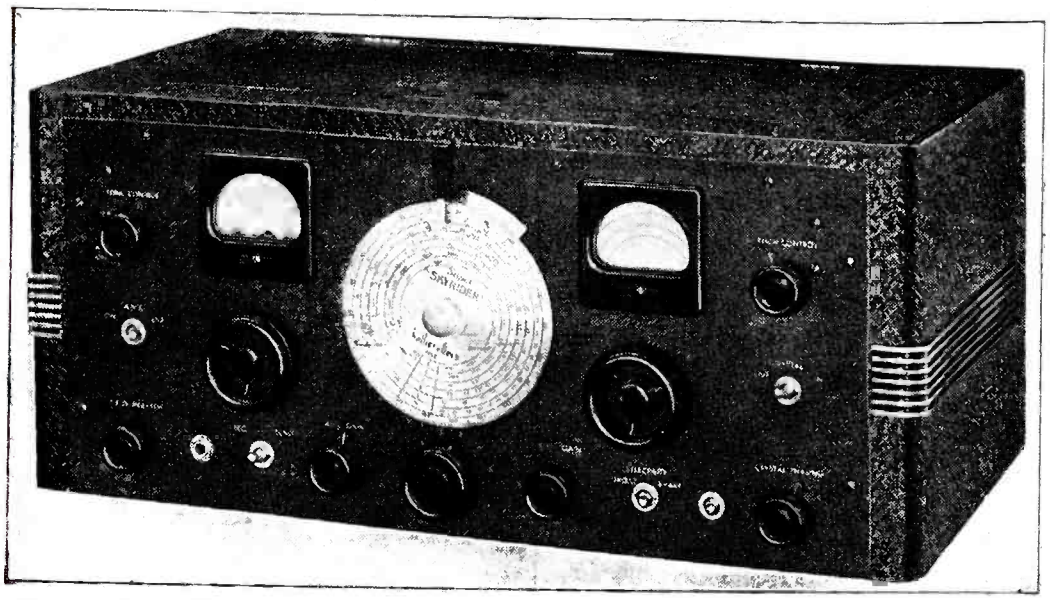
The wiring, especially the "hot," R.F. carrying, plate and grid leads from the tubes to the coil sockets and the tuning condensers, must be kept as *short* and *direct* as possible. Use either the ordinary tinned copper "push-back" wire or No. 14 tinned bus wire for connecting up the various parts. The soldering iron must be hot, clean and *well-tinned;* use just enough of the *resin-core* solder to make a good connection and melt it into the joints thoroughly. All excess flux should be removed with a clean cloth or brush moistened in carbon tetrachloride or alcohol. It is not necessary to use such extreme care with the power and non-R.F. carrying leads, but these should not be excessively long.

Putting the Transmitter on the Air

The adjustment of this transmitter is simplicity itself and, if these instructions are carefully followed, no difficulty what-

(Continued on page 184)

What's New in S-W Apparatus



The new Super Skyrider receiver, model SX17, is a valuable asset to any Ham station and also the short-wave Listening Post. Short-wave listeners will find a receiver of this type extremely valuable, owing to its sharp tuning and ability to roll in DX stations.

Communications Type Receivers Serve the Whole Family

Alvin Webster

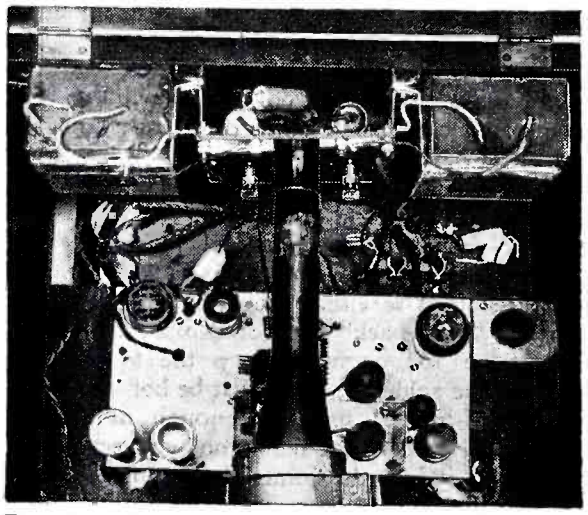
● MORE and more the dyed-in-the-wool radio fan is inclined toward the use of a "communications" type receiver rather than the usual variety of home radio. The "home" receiver is designed for maximum simplicity in operation—to be tuned and operated by every member of the family—*from grandmother down to little Johnnie.* The trend toward still further simplification is apparent on every hand, as indicated by such features as automatic frequency control, push-button tuning, etc.

These steps toward simplification have in many cases limited the usefulness of these "home" receivers so far as the DX'er, the short-wave enthusiast and the amateur are concerned. "Communications" type receivers, on the other hand, have been advancing in design and widened in their scope of applications until today they not only provide the extreme degrees of selectivity, sensitivity, band-spread and flexibility in operation required by the real radio "bug," but they also, or some of them at least, outdo most regular "home" receivers in the matter of local broadcast reception. We have just added a new Super Skyrider SX17 to our ham station and short-wave listening post and find that in the matter of tone quality it far exceeds the average, better class "home" type receivers. Its frequency response characteristic, flat within 5 db. from 50 to 8000 cycles as measured from antenna to output transformer, represents a wider range than that employed in many broadcast transmissions. Moreover, once the various controls have been set

(Continued on page 178)

It's Here! First TELEVISION SET *Offered to the Public*

First 441-line television receiver offered for sale to American public. It uses 14 tubes.



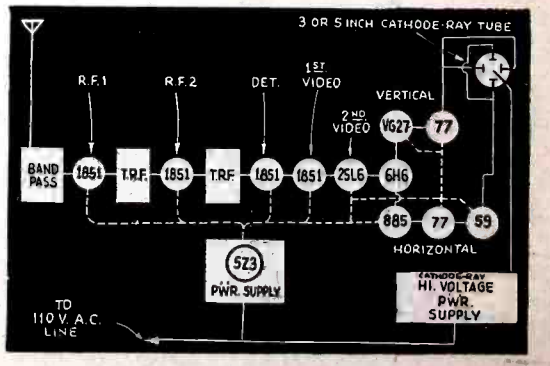
Top view, showing cathode ray tube. Right—block diagram of image receiver.

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

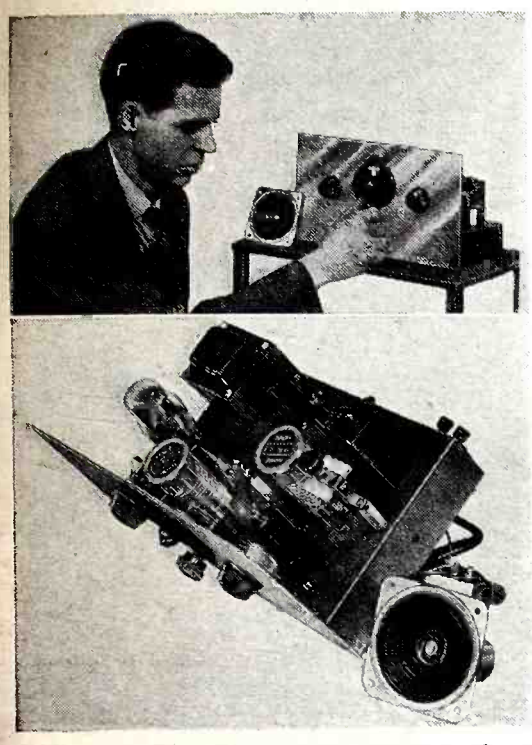
● AT long last some one has decided to take a chance and offer television receivers for sale to the general public in New York City. New York newspapers of May 12 carried the news item that a new television receiver would shortly be marketed at a price of $125.00. Although the newspaper stories stated that the receiver only contained nine tubes, the actual model to be marketed contains a total of fourteen tubes, including a 3-inch cathode-ray tube. A model employing a 5-inch C-R tube will also be available at a higher price. A move to bring television out in the open in this way has been expected for a long time, but this is the first concrete step to be taken.

The editors examined the equipment and were struck by the relative simplicity of it, compared to the more elaborate apparatus used in experimental demonstrations of television. Signals from the Empire State transmitter of the National Broadcasting Company were picked up and appeared on the screen of an ordinary 3-inch oscilloscope type C-R tube. These images, of course, are green and white but nevertheless they were satisfactory in appearance. Another feature of the equipment was the fact that once the receiver was brought into synchronism, no further adjustments were necessary for a long period of time.

(Continued on page 179)



Universal Superhet Has Regeneration



Photos above show neat appearance of regenerative superhet here described. (No. 717)

● THIS receiver is a superheterodyne of such simplicity that it will strongly appeal to every amateur and short-wave listener who plans to build a set. As a result of many tests it was finally decided that a simple superheterodyne with controllable regeneration would be the best solution to the simple receiver problem. The circuit was adopted only after every value of resistor and condenser and even various types and sizes of tickler coils were tried.

A tickler coil is wound on the I.F. transformer to supply regeneration. A three-inch dynamic speaker was selected for reasons of economy; however, a larger speaker could easily be used as the 6F6 output tube can produce about three watts of audio power.

The parts layout is not critical as each tube circuit operates at a different frequency. This reduces the possibility of instability caused by interstage coupling. The noise-level is exceptionally low, and even very weak signals are clearly received with complete stability and no hand-capacity effects whatever. It has remarkable selectivity considering that only one intermediate frequency transformer is used. A major part of this selectivity is due to the high conversion gain in the oscillator-mixer stage, and the balance through the use of regeneration in the second detector.

After the chassis and panel have been drilled and all parts are mounted in place, the next step is to carefully wire the receiver as shown in the diagram furnished with the outfit.

The last few leads to the tuning condensers and regeneration control on top of the chassis complete the wiring, and with the tubes and coils inserted in their sockets and the speaker connected, the set is ready for test. Incidentally, it is good practice to recheck all wiring before placing the unit in operation.

The regeneration control regulates the screen voltage of the 6K7 second-detector, and thus it is also a volume control. For normal operation to provide maximum gain, it should be adjusted to a point just below regeneration. However, for C.W. reception, the control should be advanced somewhat further to produce regeneration, thus acting like a beat frequency oscillator.

This receiver will work with a conventional antenna or a doublet. The doublet is recommended for the best performance and may be loosely coupled to the set by looping two turns of push-back wire loosely around the primary of the antenna tuning coil.

Features are—Extreme sensitivity; band-spread on 20, 40, 80 and 160 meters; unusually good selectivity; controllable regeneration for reception of C.W.; 3 watts output. This summary makes it obvious that a very high standard of performance is obtained.

This article has been prepared from data supplied by the courtesy of Wholesale Radio Service Corp.

All-Electric Power Relay

(Continued from page 155)

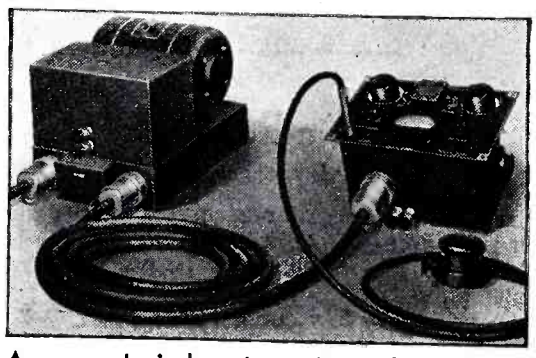
cases where the motor-generator is located in the basement or in some other part of the building the relay may be put to very interesting use.

An ordinary low current D.C. relay may be used, as the two vacuum tubes connected in parallel act as a half-wave rectifier. Any chattering of the relay which might be caused by the pulsating D.C. is eliminated by connecting a filter condenser across the relay coil as shown in the drawing. A filament transformer may be used in place of the 30 watt light bulb to supply filament current. The relay may be homemade in which case large size silver contacts should be used.

The control switch may be mounted in any convenient position and if desired a small bell transformer may be connected as indicated to supply current to a small pilot light located at the switch to indicate when the relay has closed properly. —Arnold M. Anderson.

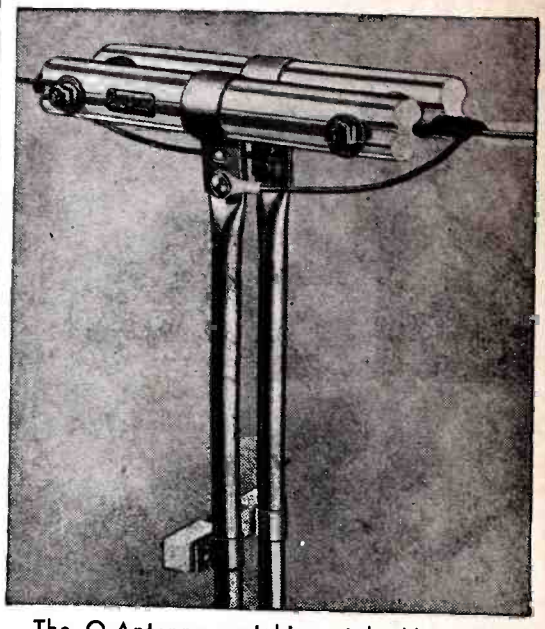
MIDGET AIRPLANE TRANSMITTER

● A NEW midget radio transmitter for use in privately owned planes has been recently marketed. Weighing only twenty-two pounds, it delivers more than 15 watts carrier power to its antenna. Transmission may be made on any of the 42 airline frequencies or on the private flier frequencies of 3.105, 3.12 and 6.21 mc. The unit can be adjusted for operation between 2.8 and 6.4 mc. A built-in relay permits the same antenna to be used for transmitting and receiving, while the push-button on the microphone controls two-way communication. (No. 700.)


A compact airplane transmitter of interest to private fliers.

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

The Q-Antenna System


The Q-Antenna matching stub. No. 718.

● A HIGHLY efficient antenna matching system which has met with great favor among the Hams is the Johnson Q-Antenna. The unusually high efficiency of this aerial antenna matching system for transmitters is due to the accurate match of the open-wire transmission line to the antenna, which is accomplished by means of a quarter-wave matching section built of aluminum tubing. Although generally used to match an open-wire transmission line to the center of a half-wave doublet, the matching section is widely used with directional antenna systems as well. In this way, the exceptional efficiency of this antenna is utilized, plus the effective gain of the directive system.

Perhaps the most popular, as well as most simple, directive system to which this antenna is easily applied is the harmonic radiator. This type of antenna is easily erected and provides a good degree of gain and directivity, the amount and the degree varying with the length of the radiator.

In addition to the harmonic radiator, it may be used with any antenna having a radiation resistance between 70 and 170 ohms. This great flexibility is made possible through the design of the quarter-wave matching section. The aluminum tubing is held in place by slotted porcelain insulators with adjustable clamps. Spacing of the tubing center to center is adjustable between ⅞" and 3⅝" and lock-nuts assure permanent adjustment. Such changes in spacing permit matching the wide range of impedances mentioned above. The entire assembly is light enough to allow its suspension from the antenna wire, as shown in the photograph.

The antenna may be fed by any open-wire line having an impedance of 400 to 625 ohms.

This antenna matching outfit is available in kit form and is complete except for end insulators and transmission line material. Enough non-stretch, high tensile strength enameled copperweld wire is supplied for a half-wave doublet, but special lengths for directive systems are supplied in one piece. Tubing for the quarter-wave matching system is generally supplied coiled, but it is available in straight lengths for 5, 10, and 20 meters, inclusive. Outfits for all bands, 5 to 80 meters, are also available.

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

Deaf-Aid

(Continued from page 162)

common one since it almost invariably accompanies the normal process involved in old age.

Many elderly people would consider a hearing aid such as this one as a Godsend, since such a device would enable them to join the family circle once more and not to have to sit apart, embarrassed in the presence of company and fearful of being a nuisance to their dear ones. With the added advantages that this instrument can be produced from ordinary radio parts, and at a very low cost, there is not the slightest excuse for anyone who needs such a device to be without it. It can also be used to pick-up voices as a *detectiphone,* or again it can be used as an inter-office phone.

Getting back to the schematic diagram, it will be noted that the tubes used are a 6J7G, a 43 tube and a 25Z5 rectifier. There is no reason whatsoever why the all-metal tubes may not be substituted for the glass tubes, in which case the tubes used would be a 6J7, 25A6 and a 25Z6. The circuit disclosed is a standard two stage A.C.-D.C. amplifier circuit, resembling the amplifiers employed in radio sets, except that the input of the first stage is through the permanent-magnet dynamic speaker instead of from the detector tube of a radio set. The output of the 43 tube, instead of going to a speaker, leads to earphone tip jacks.

The other variations from standard amplifier design have been arrived at through experimentation and are introduced in the circuit mainly to overcome background hum. It will be seen that the filtering condensers have unusually high capacity. The volume control is shunted around the secondary of the input transformer and a tone control, which also carries the "on-off" switch is connected in the plate circuit of the 43 tube.

Device Is Small in Size

The device is constructed on a small metal chassis of the step type. This chassis measures only 6¾" long by 4" deep. The first or rear step is ½" high and the second step is 1½" high. There is a cutout at the front center of the chassis which permits the five-inch speaker to set into the chassis, thus reducing the overall size of the completely assembled chassis to 5⅛". The volume control is mounted on a right angle bracket placed at the right of the speaker. The speaker transformer is mounted directly behind this control. Directly below it but beneath the chassis, is the combined tone control and switch. The tubes and one condenser constitute the only parts above the chassis. All other parts are mounted beneath the chassis steps. To conserve space, all resistors with the exception of the 500 ohm filter resistor should be of 1/3 watt size. It is advisable to use a filter resistor of at least one watt value.

The wiring is as easy to perform as that of any three tube radio set except for the difficulties introduced through working in such small space. However, problems presented from that cause can readily be solved through the exercise of ordinary ingenuity. In other words, the larger parts, such as condensers or other parts which tend to obstruct the wiring of the sockets should be the last ones to be wired into the circuit.

When the chassis has been completely wired, the tubes should be inserted and the device tested. If any tendency to "howl" is present, this can usually be eliminated by rearranging the position of the grid connections. Incidentally, the connection from the center tap of the volume control to the cap of the 6J7G tube should be shielded with the shield grounded to the chassis.

Cabinet

After successful tests on A.C. and D.C. have been completed, the chassis should be mounted in a suitable carrying case or cabinet. The one illustrated is 7⅜" wide by 4⅝" deep by 5⅞" high. It is made of wood of about ⅜" thickness. A leather strap may be fastened to the top and four rubber feet on the bottom.

The completed chassis with tubes weighs less than *three pounds.* The chassis installed in carrying case weighs less than 3½ pounds. The pin jacks may be mounted for convenience at the side of the cabinet. It may be found advisable to close in the rear of the carrying case not only to keep out dust, but also to prevent tampering.

The instrument may be connected to any house lighting source. If D.C. is used, the plug may have to be reversed in case the correct polarity is not obtained at the first try. There is no necessity to do this on A.C., although a reduction in hum level may be obtained in some cases by reversing the plug. It operates on A.C. of any frequency. While it is not suitable as a *deaf-aid* for use on the street, it can be used in the home or office and when visiting and there is never any trouble or inconvenience of purchasing or installing batteries, as in the case of battery-operated instruments. As regards earphones, any standard radio headset of light weight may be used with it. The earphone shown in the accompanying illustration, however, is of a special design, made to fit within the ear of the hard-of-hearing person. Bone conduction instruments may also be used.

Complete List of Parts Required

CORNELL-DUBILIER (Fixed Condensers)

2—40 mf. 150 volts, type BR (C6, C7)
1—16 mf. 150 volts, type BR (C2)
1—5 mf. 50 volts, type ED-3050 (C4)
3—.1 mf. 400 volts, type DT-4P1 (C1, C5, C8)
1—.01 mf. 400 volt, type DT-4S1 (C3)

I.R.C. (Resistors)

1—1 meg. 1/3 watt (R2)
1—40,000 ohm, 1/3 watt (R9)
1—250,000 ohm, 1/3 watt (R4)
1—500,000 ohm, 1/3 watt (R5)
1—600 ohm, 1/3 watt (R6)
1—2,500 ohm, 1/3 watt (R3)
1—500 ohm, 1 watt (R8)
1—500,000 ohm Potentiometer (R1) Midget Size
1—500,000 ohm Potentiometer (R7) with switch (SW-1) Midget Size

RAYTHEON (Tubes)

1—6J7G (V1)
1—43 (V2)
1—25Z5 (V3)

Ballast Tube*

1—K-61-B (V4)

Speaker*

1—"Permag" Permanent-Magnetic Speaker

TRIMM

1—Special deaf-aid high impedance earphone

MISCELLANEOUS*

1—Output transformer (used as input), 2.5 ohms to 5000 ohms
1—Step chassis
2—Octal wafer sockets
2—Six-prong wafer sockets
2—Pin jacks (J1, J2)
1—Cabinet
1—Roll hook-up wire
1—Metal tube type screen grid clip
2—Knobs
1—Dial
1—Line cord and plug

*Most Radio mail order houses can supply these items if properly identified as to title of article, issue (month) of Short Wave & Television and year.

The B.C. and S.W. Portable Four

(Continued from page 167)

while the signal grid return to ground is completed through a .1 mf. condenser.

Adjustments

After all wiring is completed, recheck carefully to make sure that all connections are correct. The batteries should now be connected, and the rheostat (mounted at the rear of the chassis) adjusted to about half way. Now you can turn on the switch. If a filament voltmeter is available, check the rheostat setting. The voltage across the filament terminals of any tube should read two volts.

With the band-switch in the broadcast position, a signal should be tuned in at the high frequency end of the dial and the broadcast band trimmer condensers adjusted. (These condensers are mounted directly on the coils, inside the shield.) Next the set is tuned to the low frequency end of the dial and the circuit brought up to resonance by adjusting the broadcast band-padder condenser. The variable condenser must be continuously adjusted, or "rocked," during this operation. Now you may tune in a station at the middle of the dial and adjust the I.F. transformer trimmers for maximum response. The volume control must be set somewhat below the point of oscillation while the tracking adjustments are made.

The same procedure may be followed on the short-wave band. However, the set may be allowed to oscillate if a CW signal is used for alignment.

If possible, a calibrated signal generator should be used. In this case, the I.F. transformer should be aligned first to 456 kc. The other adjustments are performed in the same order as has already been described. With a signal generator, the proper adjustment frequencies would be 1600 kc. and 600 kc. for the broadcast band and 17 mc. and 5.1 mc. for the short-wave band.

After the set is properly aligned, you can put it into immediate operation. The set will work very well on both bands on the standard inverted "L" antenna, although the use of the set's provision for a doublet antenna on the short-waves will improve reception on that band. In all cases, the use of a good ground or counterpoise is strongly recommended.

As shown in the diagram, 135 volts of "B" battery are specified. This set, however, has been so designed that it will work with as little as a single 45 volt "B," with only a slight reduction in efficiency.

The small size of this set, combined with its economical battery requirements, makes it ideal for use as a *portable* unit. The use of standard dry cells and real long-life "B" batteries make it possible to operate this radio on a single set of batteries during the average vacation.

Once constructed, aligned and put into operation, this set will reward the builder with many hours of exciting amateur reception, DX'ing and broadcast entertainment. On vacations, at picnics and at outings, this set will place the entire world right before you.

List of Parts*

1—365 mmf. 2 gang tuning condenser
1—Three terminal strip
1—Six terminal strip
4—Two lug terminal strips
2—Grid caps for metal tubes
1—Four-pole, double-throw switch
1—Phone jack
4—Octal wafer sockets
3—Tube shields
1—7 x 11 x 2 inches chassis, drilled
1—7 x 12 front panel, drilled
1—Roll of hook-up wire
4½ ft. five-conductor battery cable
1—5 in. P.M. dynamic speaker with transformer
4—Knobs
1—4-inch airplane dial
1—Dual band antenna coil, 16-55, 175-550 meters (Meissner)
1—As above, oscillator coil (Meissner)
1—Dual padder condenser, 500 to 1120 mmf.
1—Dual padder condenser, 120 to 600 mmf.
1—I.F. input transformer, 456 kc. (Meissner)
1—I.F. interstage transformer, 456 kc. (Meissner)
1—16 mh. R.F. choke
2—.001 mf. 400 volt condensers
1—.00025 mf. mica condenser
1—.0001 mf. mica condenser
2—.01 mf. 400 volt condensers
2—.05 mf. 400 volt condensers
6—.1 mf. 400 volt condensers
2—30,000 ohm, ¼ watt resistors
1—50,000 ohm, ¼ watt resistor
2—100,000 ohm, ¼ watt resistors
2—500,000 ohm, ¼ watt resistors
1—6 ohm rheostat
1—50,000 ohm potentiometer
1—D.P.S.T. attachable switch
1—Dual bias cell holder
2—Bias cells

ACCESSORIES*

3—Portable 45 volt "B" batteries
2—Compact dry cells (1.5 volts, connected in series)
1—Type 1C7-G tube
1—Type 1D5-G tube
1—Type 1H4-G tube
1—Type 1F5-G tube

*Most Radio mail order houses can supply these items if properly identified as to title of article, issue (month) of Short Wave & Television and year.

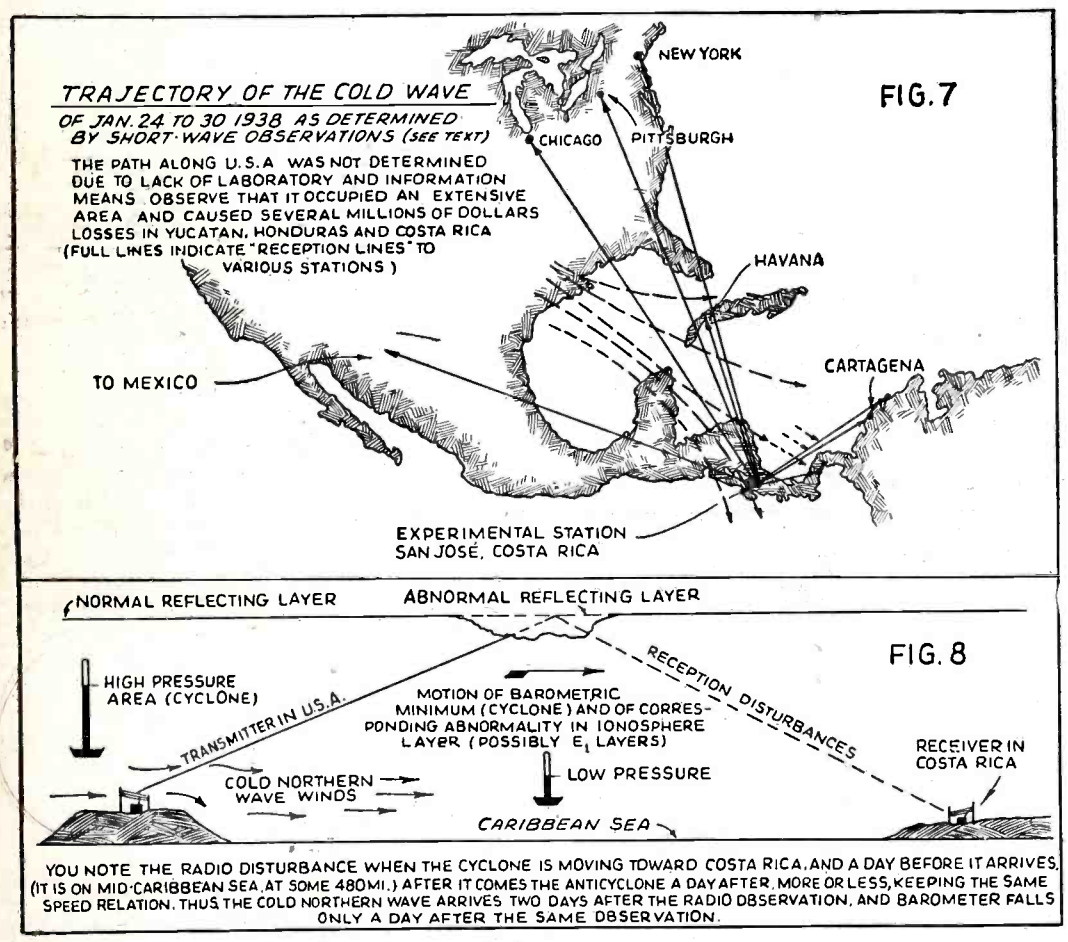
Cold Waves and Hot Waves

(Continued from page 137)

of the two systems above mentioned, as every student of meteorology probably knows. The general trajectories of such cold waves are shown in Fig. 1.

As pointed out by Dr. Borel (Costa Rica, 1935) the phenomenon takes places only in the very low parts of the troposphere, literally being an "inundation of cold air," as he graphically says. This last statement holds true and was proved recently (in January, 1938) during a very strong cold northern wave (described in the following) when the Pan American Airways planes not only did not stop regular service, but, flying at an altitude of 12,000 feet, found *almost no wind* and clear fair weather.

The effects of a cold northern wave in Costa Rica are best explained by reference to Figs. 2 to 6.



YOU NOTE THE RADIO DISTURBANCE WHEN THE CYCLONE IS MOVING TOWARD COSTA RICA, AND A DAY BEFORE IT ARRIVES, (IT IS ON MID-CARIBBEAN SEA AT SOME 480MI.) AFTER IT COMES THE ANTICYCLONE A DAY AFTER, MORE OR LESS, KEEPING THE SAME SPEED RELATION. THUS THE COLD NORTHERN WAVE ARRIVES TWO DAYS AFTER THE RADIO OBSERVATION, AND BAROMETER FALLS ONLY A DAY AFTER THE SAME OBSERVATION.

Effect of "Norther" on Radio Reception

And now, let us follow by radio a typical example of such a phenomenon, that of Jan. 24 to 31, 1938. We take this example because it has been the most remarkable in our 8 years of daily observations.

On Jan. 24, we had normal *short* and *long* wave reception, with weak N.E. winds, that soon changed to S.W. But at 10 p.m. we began to hear eastern U.S. short-wavers with less strength than early in the night. We were in the condition shown by Fig. 3. The cyclonic center in the Caribbean Sea was more powerful than that produced by the equatorial calm zone (being nearer, its action was more pronounced) producing a suction of the air, with subsequent S.W. winds.

On Jan. 25 we had almost no wind, cloudy weather and some little rains in the higher parts of the Central Plateau. We heard Schenectady with very little strength, and the old reliable short-wave station W8XK with intense fading at very short intervals. It was the beginning of such a case as shown in Fig. 4.

January 26, we had strong winds all day, some rains, and the humidity went up to 75%, which is enormous here for this month. A remarkable temperature descent was observed, and our pocket aneroid showed a barometric pressure drop. The long-wave American stations were heard with low static (stable reception) but with low signal strength. Regarding short-wave reception, eastern U.S.A. stations were heard with severe short fading at long intervals. The "front wave" was arriving, and we were as in the case pointed out in Fig. 5. It was impossible to hear Cuba.

Freak Weather

January 27. Strong, stormy winds and rains on the Central Plateau, and very strong winds and rains on the Atlantic side of the country. The rains and winds destroyed *all* telegraph lines, and the railway to Port Limón was washed out in several places, making a service interruption of more than 15 days. The temperature was very low, and the entire sky was covered by clouds. Local reception was bad, but *no lightning* was present. Local aviation companies discontinued *all* services, but the Pan American Airways Company flew its planes at an altitude of some 12,000 feet, making the regular service between U.S.A. and South America, finding clear, fair weather, sunny skies and almost no wind.

This experience makes a very good corroboration of Dr. Borel's statement that cold northern waves are phenomena occurring only at very low altitudes. And we are able to say here "that sunny skies come after every rain" only in a vertical fashion. . . . . Bad local reception was due possibly to strong ionization of local, low layers. This day the electric lines were destroyed at several points, making it impossible to have any records of short-wave reception. Fig. 6 explains clearly the conditions on this day. *(Continued on following page)*

Cold Waves and Hot Waves

(Continued from preceding page)

On Jan. 28, the wind diminished its strength in the afternoon, but diluvial rains continued on the Atlantic side of the country, while in the Central Plateau and Pacific side, the rains were less frequent each hour. As to radio reception, long waves were heard with a pronounced background noise (local ionization and atmospheric electricity not producing lightning because of the high degree of humidity). On short waves, Schenectady and Pittsburgh were heard very clearly, but with intense, short fading at irregular intervals. This day it was possible to hear Cuba (Havana) again.

All this indicates a local, low perturbation of the ionized layers, but it means also that the last part of the cold northern wave is passing over Costa Rica. The day before, Colombia was heard quite well, but not on this day.

Normal Weather at Last

On Jan. 29 normality returned. We still had strong winds, but no rains on the western part of the country. On broadcast waves, it was possible to hear U.S.A. and Mexico with only a low background noise. On *short* waves, Pittsburgh, Chicago and Schenectady were heard very well, with only a little fading at regular intervals, which is normal in this season. But Colombia was heard with strong fading at regular intervals, showing that air ionization was abnormal between our experimental station and that country. Looking at Fig. 7 you will be able to understand the condition better. And at last, on Jan. 30, we had a veritable "Sunday reception" on a true Sunday, after several days of terrible weather, with the signal strength of every station increased, and little fading at long intervals. It was very good weather.

FINAL CONSIDERATIONS. It was possible to make the weather predictions for the next 4 or 5 days, on Jan. 24. The same held true for the next day. Of course, it is necessary to know the effect of such atmospheric and radio disturbances to be able to do so. As the eastern coast of the U.S.A. is a partial trajectory of cold northern waves, it is important for radio amateurs living in that part of the country to observe and record such phenomena.

Why Radio Waves Are Affected by Weather

Some observers throughout the world, and particularly Dr. Murray of Chicago, report to us the observation of a radio-perturbation a day before the barometer fall and two days before the arrival of the storm. The author has observed the same thing. *In our particular case* the explanation is simple if Fig. 8 is studied. *Pushed*, let us say, by the high-pressure area, the cyclonic center moves southwestward and you are able to detect its presence by radio a day before its action is apparent. It begins drawing away the Central Plateau air, and when it arrives, a day after, it produces the barometric fall. With the equatorial calm zone at the southwest (low-pressure area) and a cyclonic center which is always in front of a cold northern wave at the N.E., their actions mutually cancel each other and the wind stops, which is also true in practice. A day after the barometer fall, the storm arrives!

You are able to detect by radio the presence of cyclonic centers, such as Caribbean Sea cyclones and low-pressure areas in front of cold waves, possibly due to changes in height of the higher ionospheric layers. (A change in the real height or a change in the ionization or *electron density* produce the same effect of varying virtual height; that is the phenomenon you note.) But when you have the cold wave above your station, it is impossible to believe this statement will hold true. It is possible that ionization changes happen in the very low troposphere layers, because above 12,000 feet we find good weather. It is true that the author has not any data about reception on the P.A.A. planes, but as in the last days of the observed phenomenon every station was heard poorly, there remains only the hypothesis of the local ionization of very low layers, perhaps those described by Dr. Colwell in his booklet *The Lower Ionosphere*.

Since it is true that the phenomenon here described was the strongest observed in 8 years of obsèrvations by the author, is it due to some form of solar activity? We can only say that on the same days an aurora was observed in Barcelona, Spain, the only one visible in many years. And they had stormy weather in the eastern United States, England and other parts of Europe and the world. Coincidence? Maybe—or maybe not. Here in Costa Rica, we have absolutely no information sources for the investigator and scientist. No library is scientifically up to date. It is up to you to investigate such things with better laboratory means than the author possesses.

Suggestions

As you probably will have noticed, the equipment used was very cheap and simple, and yet the only means on hand due to the impossibility of securing the cooperation of the physics laboratory of any of the three or four colleges here. But as the results obtained are very good, it would be interesting if many radio amateurs, physicists and students with better laboratory means, scattered throughout the world (and especially along the general paths of big atmospheric disturbances) would make observations of this kind. It is useful to make some C Q calls and ask for *complete* details about the signal's reception (the author employs this method extensively). Ordinary QSA and R methods are of no use.

In making observations, avoid as far as possible the use of automatic volume control, so as to hear the variations in signal strength occasioned by the fading. And make every record preferably well after sunset, to avoid changes in signal strength due to the sun's action.

For any further information, address letters to Prof. J. Merino y Coronado, 150 V. S. de La Tranquilidad, San José, Costa Rica.

Recent Radio and Television Patents

(Continued from page 153)

Cathode Ray Mechanical Scanner

● THIS patent for an improved cathode ray scanning tube for television was granted to François Charles Pierre Henroteau of Ottawa, Canada, and relates to a new and improved tube of this character which provides a finer detail in the image and also, when desired, a secret method of scanning. This latter point may be of interest for military applications of such apparatus in the future. In this new tube, a tremendous number of tiny photo-electric cells are employed, all of them insulated one from another; as many as sixteen million cells to the square inch, or four thousand cells to the linear inch, may be used and form an important part of Mr. Henroteau's invention in that a much finer grained image may be thus obtained.

As the drawing shows, there is a revolving scanning sector driven by a synchronous motor, which serves to sweep the cathode ray over the photo-electric screen. The image passes through the pick-up lens and falls on the photo-electric screen, made up of the myriads of cells aforementioned; this light-sensitive screen is stationary. The image flashed on the screen causes the accumulation of a positive charge upon the cells, corresponding in magnitude to the intensity of the light in each spot, and also to the duration of its impression.

The P.E. cells forming the plate are electrically connected in a circuit by making the photo-electric plate one element of an electric condenser. The charges stored up in the P.E. cells or globules are released by the revolving electron scanning beam. A current corresponding to the intensity of the light falling on each spot on the P.E. screen (over which the electron beam passes) flows in the input circuit of a vacuum tube amplifier connected with the plate.

A comparatively fine degree of scanning is produced by this apparatus, as the scanning plate limits the size of the scanning spot; this makes it possible to obtain an image having a greater number of picture elements per unit area.

A series of contact rings and brushes supply current to the scanning electrodes, mounted on the end of the motor-driven shaft, and rotate along with the scanning disc. Ordinarily at the receiving end, the reverse arrangement shown at the transmission end is to be employed, the scanning plate being driven by a synchronous motor or by synchronizing impulses transmitted from the sending station. Also, at the receiver, in place of the photo-electric plate used at the transmitter, the intensity of the light falling on the screen is varied in exact relation to the strength of the signals received from the transmitter. (Patent No. 2,104,862.)

De-Icing Antenna

● THIS interesting patent for automatically eliminating ice on transmitting antennas was recently granted to Francis Merriam of Montclair, N. J. One of the principal objects of this invention is to automatically remove sleet from antennas, especially those used in short-wave radio stations. The presence of ice and sleet on antennas materially affects the range of a station; therefore the importance of this invention.

Several different methods of melting sleet or ice are described in this patent. One employs a source of heating energy which is responsive to the presence of standing waves (caused by ice formation) on the line feeding the antenna. This heating current melts the ice, removing unbalance caused by the standing waves and the balanced impedance relation at the junction of feeder-line and antenna is restored. The heating source is then automatically disconnected. In one provision of this patent the existence of standing waves on the line between the transmitter and the antenna caused by a breaking of the line cuts off the transmitter.

In the diagram shown, an A.C. generator supplies the required heating current. A horn-type gap is arranged in connection with the transmission line so that when ice forms on the wires of a transmission line, the ice gap is closed and its resistance lowered to a value which permits the negative charge to leak off the control electrode of the tube, substantially lowering the negative bias on the tube. Next the current in the output circuit of the tube energizes the relay connected in the plate circuit, which causes a second relay in the circuit of the A.C. generator to be closed. The low frequency heating current from the generator passes through the transformer to the transmission line and the antenna. A half wavelength loop at the end of the Rhombic antenna, in parallel with the terminating resistance, provides a low resistance path for the heating current, without interfering with the function of the terminating resistance.

The antenna de-icing system shown in fig. 2 depends upon the existence or non-existence of standing waves on the line leading from the radio transmitter to an antenna. This system differs mainly from that shown in the first diagram, in respect to the method employed for turning the power on or off. Here the presence of standing wave voltages are produced on the line, one of the relays indicated is closed. This in turn causes the secondary relay controlling the flow of heating current to the line to be closed. A D.C. de-icing system is also disclosed. Those interested may refer to the United States patent which bears the number 2,105,925.

Communications Type Receivers Serve Family

(Continued from page 170)

for operation in the broadcast band the manipulation of the receiver within that band is as simple as any of them. The stations are tuned on the large accurately calibrated dial and volume is regulated by means of a conventional volume control knob.

Adjustment Really Simple

The large number of controls on a good communications receiver are provided primarily to make the receiver *"all things to all men."* Most of them are not operating controls at all but rather "setting up" controls which are set for the particular type of reception desired at the moment and left that way. We have operated the receiver on 10 meters for hours at a time, for instance, *without touching a single control other than the band-spread tuning knob* (a wheel in this case). At other times, when interference between stations becomes bad, we resort to the use of one or two other controls. By switching in the crystal filter we can continue to hear a desired station which might otherwise have been buried under a strong, nearby signal; or if we want to run down into the c.w. (code) portion of this *amateur* band, we flip on the *beat oscillator* switch. Many people are under the impression that all of the controls on such a receiver are used all the time, and that its operation is therefore extremely complicated. This is almost entirely the psychological effect of seeing a front panel cluttered up with the numerous knobs, dials and switches. Actually the controls associated with the crystal filter operation are the only ones that offer any complications whatsoever, and these are used primarily when tuning in the c.w. (code) ranges.

The following list of the controls, as shown in the accompanying photograph will convey some idea of the refinements and special features provided:

In the center is seen the main dial on which is engraved complete frequency calibrations for each of the six tuning ranges and, on its outer edge, a special reference calibration with vernier scale which is employed in conjunction with the band-spread system. Below this dial is the band selector switch, the six positions of which provide continuous coverage of the range from 545 kc. to 61 megacycles. The pointer above the main dial moves to indicate the calibration of the range for which this switch is set.

Tuning Meter

The main tuning control takes the form of a 2¼-inch wheel to the left. This and the *band-spread* wheel at the right are both controls of the free-wheeling type which, given one spin with the fingers, are carried along by their own momentum to facilitate quick jumps from one point to another on the dial, with a minimum of effort. This feature is an advantage because a relatively high gear ratio is employed and tuning would otherwise be a rather slow process. Just above this wheel is the meter which is calibrated to indicate the carrier level of each signal tuned in, in terms of the "S" scale. It serves also as an exact tuning indicator.

To the right is the band-spread tuning wheel and, behind the window, the illuminated band-spread scale. The spiral scale is marked off into 1000 divisions and it requires 33 revolutions of the control wheel to tune through its range. So excellent is the band-spread that even at 10 meters, each division represents only about 2.5 kc. and to jump 10 kilocycles requires almost a 1-inch movement of the tuning wheel. A light moving behind the translucent scale indicates the portion of the spiral range in use.

Other Control Features

Other controls, reading from the upper left-hand corner, down, across and up:

Tone control and A.C. line switch.
A.V.C. "off-on" switch.
Beat-frequency oscillator "off-on" switch and injector or intensity regulator.
Headphone jack (cuts out speaker when phones are plugged in).
Stand-by switch.
Audio gain control.
R.F. manual gain control (used when A.V.C. is "off").
Selectivity "broad-sharp" switch (I.F. expansion).
Noise silencer "off-on" switch.
Crystal phasing control (regulates effective selectivity of crystal filter).
Crystal filter "in-out" switch.
B.F.O. pitch control (regulates pitch of beat note).
"S" meter zero adjustment (on rear of receiver).

Two of its features are of special use in the ranges above 10 megacycles, and well nigh invaluable at frequencies above 15 megacycles. One of these is the *noise-silencer* and the other the provision of two tuned R.F. stages.

The noise problem on these higher frequencies is quite different from that generally encountered on the lower frequencies. In general noises such as static and many of the man-made variety decrease or even disappear entirely while others, such as auto-ignition noise and radio-therapy *hash* become much worse. At 10 meters the auto-ignition noise is the worst offender, but it is a fortunate fact that this is the very type of noise on which the silencer does an excellent job. So effective is it that oftentimes signals that are completely buried under severe ignition noise can be made 100 per cent understandable by switching in the noise-silencer. Not the least advantage of the system used in this receiver is the fact that it involves no manual adjustment, which in older systems were extremely critical. Nor does it in any noticeable way affect the operating characteristics of the receiver as, for instance, in reducing the audio output, introducing distortion, etc. The function is performed by a single, diode-connected 6J5, a fixed resistor and a fixed condenser paralleled across a portion of the regular diode detector load circuit.

The two R.F. stages, while they do add sensitivity, are more important in the part they play in reducing image interference or the common repeat points. It has been common practice to include one such stage in the better superheterodyne receivers, its purpose being to improve the signal-to-noise ratio (and therefore the usable sensitivity) and the image selectivity. This is highly satisfactory, provided the R.F. stage is an efficient one, up to about 20 megacycles. At higher frequencies its effectiveness falls off until in the 10-meter amateur band, for instance, a goodly number of the signals heard in the 29-30 megacycle half of this band are again heard in the lower half (where most of the foreign DX is tuned in). Through the use of two good stages ahead of the mixer, this condition is corrected in the SX-17.

Last but not least, it permits exploration of the brand-new ultra-high frequency ranges in which broadcast, commercial, amateur and television assignments are now being made by the F.C.C. And its excellent performance on the broadcast band will delight the less radio-wise members of the family.

First Television Set for Public

(Continued from page 170)

This, of course, is very important for enjoyable reception of television in the home.

Naturally on a simplified equipment of this type the pictures do not compare in brilliancy and clarity with those shown on the elaborate television receivers used in the RCA and NBC tests, but when one considers the fact that the receivers used in the NBC tests employ anywhere from 25-33 tubes and could not be marketed for less than $250.00-$300.00 at present, the results achieved with the simplified equipment are most interesting. The televisor shown did not have provisions for picking up the sound channel of the television signals. A separate receiver is necessary for this purpose.

Circuit Arrangements

The simplified receiver design employs a T.R.F. circuit instead of the more commonly used superheterodyne arrangement. This results in a great saving in the number of tubes used in the equipment. In order to achieve proper band-pass characteristics an input circuit of special design was developed. Details on this part of the equipment are not available. The R.F. amplifier uses the new television pentode type 1851 tubes, which are the tubes recommended by Mr. Palmer in his article, "The S.W.&T. 441-Line Television Receiver," described in the last four issues. Two stages of R.F. using these tubes are employed, followed by a detector using another 1851 and a first video amplifier which also uses the 1851. The second video stage employs a 25L6. This unusual arrangement was employed because the designer claims that the 25L6 has very desirable characteristics, although its use necessitated an extra filament winding to supply the 25 volts for its heater. The 25L6 is followed by a 6H6 double diode tube, used in the synchronizing circuit.

The *vertical sweep* circuits employ a VG27 tube as a saw-tooth oscillator, followed by a 77 as a linear sweep amplifier. The output of this tube feeds directly to the vertical deflecting plates of the C-R tube. The *horizontal sweep* circuits employ an 885 tube as saw-tooth oscillator, followed by a 77 linear amplifier, which in turn is followed by a 59. The output of the 59 feeds to the horizontal deflecting plates of the C-R tube. Electro-static deflection is employed in the C-R tube rather than magnetic deflection. The power-supply for the receiver uses a 5Z3, while the high voltage power supply for the C-R tube employs an 879.

The low-frequency synchronizing impulses are taken directly from the 60 cycle power line, while high-frequency synchronizing depends on the synchronizing impulses sent out by the television transmitter.

Is Television About to Break?

More interesting perhaps than the circuit details is the possible consequences that the marketing of this televisor may have. The question in everyone's mind is whether the receiver will *sell,* and if so, what will the effect be on the radio industry in general? NBC and RCA have been conducting *experimental* broadcasts with a handful of receivers in the homes of engineers for the past two or three years. They have consistently shied away from attempting to put the sets in the hands of the general public. The Columbia Broadcasting System has on order a high-power television broadcasting station which will be installed in the Chrysler Building tower in New York City.

Letting the general public in on television reception may force the hands of the broadcasting companies and RCA, and compel them to offer their equipment for sale to the general public to meet the competition from the low-priced televisors. This step might mean the long-awaited arrival of general television broadcasting or it may fizzle out into nothing.

The situation is complicated by the fact that, at present, there are very few cities in the United States possessing television transmitters. New York, Philadelphia and Los Angeles seem to be the important centers of television transmitting activity. But even in these cities (Los Angeles excepted) the transmissions are not for the general public and are highly experimental. In the Middle West there are several experimental television broadcasters in operation using various scanning methods. The New York and Los Angeles stations, operating on fairly regular schedules, seem to be the only *high-definition* stations. The NBC station in New York now operates on a regular schedule of five hours a week and it is rumored that they will double this schedule within the next month or so. At present the station operates from 3-4 p.m. on Tuesday, Wednesday and Thursday with *still* pictures and charts, and from 8-9 p.m. on Tuesday and Thursday with *live* talent. This is Eastern Daylight Saving Time. Their transmitter is W2XBS with 441 lines at 30 frames per second. The *image* is broadcast on a frequency of 46.5 mc. and the *sound* on 49.75 mc. Programs originate in the Radio City studios of the National Broadcasting Company. The carrier has a power of 7.5 kw.

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

Talking on a Light Beam

(Continued from page 157)

the ray may (by careful focusing) be concentrated on the plate of the P.E. cell of the receiver.

This photophone actually worked well over a distance of 50 ft.; the reproduction was excellent. The photo-electric cell used must be of a type that has no time lag. A copper-oxide cell won't work. An 868 tube has a high output and a low plate voltage.

See drawings of the transmitter (A) and receiver (B). The lens in front of the lamp is adjusted to concentrate light on the modulator light slot. This light passes through the second lens and the rays are then parallel. The receiver was built into an "oatmeal box" with a short cardboard tube sliding snugly inside of it. The lens is mounted in the "oatmeal box" and the cell in the tube. By sliding the box over the tube the modulated rays may be concentrated on the cell. To aid in light concentration, both tubes are painted a dull black.

The voice coil used in the modulator must be one that is supported by a spider that is attached to the sides of bottom edge. A coil having a spider suspended from the field core won't work.

Hints on Facsimile Reception

(Continued from page 159)

chronizing impulse (which lasts about 1/50 of a second and is much stronger than the picture signal) finds a path through the contacts at the left of the arm D, then through the magnet C of the stick relay, the armature of which stays in whichever position the movable iron core pulls it (i.e., to right or left). When the relay armature moves to the right, the circuit to the magnetic clutch is closed and the arm D starts moving toward the right, recording the picture signal on the paper. The segment on the fibre disc X3 can be set on the shaft with a locking screw, so that as the arm D moves back toward the left, the circuit is opened through the picture recording system. The adjustment must be carefully set so that the arm will just close the contact springs, thus closing the circuit through C in readiness for the next synchronizing impulse, which occurs 1/60 of a second after the start of the original right-hand movement of the arm.

If trouble is experienced with an induction motor, owing to the slip of the motor or due to severe line voltage fluctuations, a synchronous arrangement can be improvised as shown in Fig. C, where an ordinary motor is mounted on the same shaft with a synchronizing wheel or motor having a six-tooth gear made of laminated iron or transformer steel. This six-tooth wheel rotates between the poles of a laminated iron magnet, such as an old transformer of small size, the stationary winding of which is connected to a 110 volt, 60 cycle A.C. circuit. This was used to synchronize television scanning discs.

The picture signal is fed continuously to the recording arm during its right-hand swing. The picture signal passes through a round-nosed, spring-propelled needle or stylus at the outer end of the arm, goes through the chemically treated paper and then through the curved metal plate against which the paper rests, thence to *ground* on the chassis of the facsimile receiving mechanism. In this way the circuit is completed back to the center tap of the input transformer of the recorder. An auxiliary contact is arranged to open the recording circuit on the return stroke of the arm D.

Short-Wave Program Possibilities

ELIZABETH-ANN TUCKER

(Continued from page 133)

heard from her again. But he didn't mind—we'll leave her picture to your imagination, plus a large wart on the end of her nose.

To digress for a moment, and allow me to take the opportunity to blush with pardonable pride over the fact that a certain short-wave station on the East Coast (confidentially, W2XE), will, on May 12th, have completed one year's operation utilizing its new, high power, completely modern facilities to transmit programs especially designed for a world-wide audience. We're proud, because the barometer—fan mail—has told us that we may consider the year a successful one.

And speaking of mail—here's a new technical problem to be solved. A lady in Wuhu, China, working in a hospital, wrote that she had been listening to a program from her home, America, but had difficulty hearing everything clearly, due to interference from a Chinese gun-boat berthed in the river practically under her window.

What price wave-traps!

1-Tube Duplex

(Continued from page 163)

is by-passed to ground by the 0.1 mf. condenser and connected to "B" plus through the 50,000 ohm resistor. The antenna binding post connects to the control-grid of the 1A4 which comes out the top of the tube. An R.F. choke coil from the control-grid to the filament and two wires hooking up the filament complete the new wiring. A slight change still remains to be made in the original circuit. The original five-ohm resistor in series with the filament must be changed to a 3.5 ohm resistor. Because of the increased filament current, there will be greater voltage drop across this resistor, so that the filament voltage would be lower than the required two volts. This assumes that a 3 volt "A" battery is being used. While changing this resistor, place it in series with the "A" minus lead instead of in the "A" plus lead. Connecting the grid return end of the R.F. choke to the minus filament end of the 1A4 and grounding the "A" minus will enable the 1 volt drop in the filament resistor to be used as the bias on the R.F. tube.

The grid coil L2 is isolated from the tuning condenser and filament circuit by the 0.004 mf. condenser to enable the coil to carry the plate current to the 1A4. The grid coil acts as a common coupling impedance between the R.F. and detector stages. The extra R.F. choke is placed in series with the grid coil and the "B" plus. The grid-leak is changed from its former position across the grid condenser. It must be reconnected from the grid of the 1E7G to the positive filament terminal of the tube. Otherwise the remainder of the circuit is unchanged.

If the constructor would still like to carry his batteries inside the chassis, the 1A4 tube socket might be mounted on one of the sides, thus leaving sufficient space for small batteries. The receiver thus becomes completely portable and can be carried around in an automobile. Operated in this manner it makes an excellent monitoring receiver for the amateur desirous of checking the quality of his phone or CW transmitter. Unlike ordinary monitors, this unit need not be used close to the transmitter, thus allowing more accurate checks to be made at a distance from the transmitter.

List of Parts

NATIONAL

1—4-prong Isolantite socket
2—2.5 mh. R.F. chokes

CORNELL-DUBILIER

1—.004 mf. mica condenser
1—.1 mf. tubular paper condenser

I.R.C.

1—50,000 ohm ½-watt resistor
1—3.5 ohm wire-wound resistor

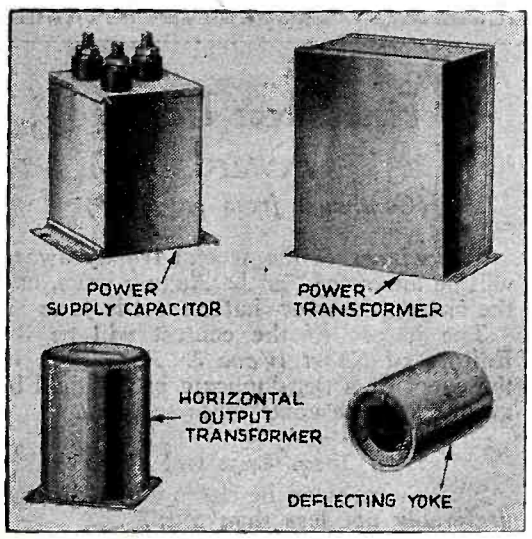
Television Parts Available

● THE accompanying photo shows four pieces of television apparatus selected from the new RCA television parts catalog, which contains others not here illustrated.

One of the most interesting devices shown is the special *deflecting yoke* which slips over the neck of the cathode-ray television tube. This device contains specially arranged intricate windings which cause magnetic fields to act on the cathode beam in the tube, providing both horizontal and vertical movements of the beam. This yoke has been carefully designed by expert television engineers and is designed to have a uniform flux distribution. It has an outside diameter of 2½", a length of 3¾" and the inside opening is of the proper size to fit RCA 1800 and 1801 type kinescope (television cathode-ray) tubes.

A special power transformer for television purposes is also shown and this includes all windings necessary for complete power supply for the anode and heater circuit of the 1800 kinescope. A plate winding of 4500 volts and 2—2.5 V. heater windings are included. The entire transformer is insulated to stand high voltage. It is known as item No. 9832.

A horizontal output transformer is illustrated also and this is designed to have the correct characteristics to supply a 13,200 cycle saw-tooth current wave to the magnetic deflecting yoke. The core and coil are rubber mounted to eliminate noises. It is type No. 9836.



New RCA television parts

The fourth television unit shown is a power supply capacitor type No. 984. This is for the 1801 type kinescope tube. It contains 1—.025 mf. 4,000 V. unit and 1—.05 mf. 3500 V. unit. It is the oil-filled type with special high voltage terminals as the picture shows.

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

tained October 10, 1935. The station is *on the air* daily, except Friday and Sunday, most of the operating being done on the low ends of the 10- and 20-meter bands.

Before succumbing to the wiles of Ham radio, Alice R. Bourke was well known in the Chicago newspaper world. For a time she was on the staff of the Chicago *Daily News*, and for several years she edited the Chicago *Comet*, a community newspaper. When radio "got" her, she had completed more than eight years on the staff of the Chicago *Daily Tribune* as night police reporter.

Rules for Trophy Contestants

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

The trophy stands nearly 12" high and is a fine example of the silversmith's art. We are sure that every Ham in the country will be tickled with it, if he should win it. The silver trophy represents the spirit of victory and it was designed by one of the leading silversmiths. The name of the winner each month will be engraved on a silver plate mounted on the black bakelite pedestal before the trophy is sent to the successful contestant.

First Silver Trophy Award

(Continued from page 143)

The winner of the second trophy award will be announced in the August issue, and the closing date for that contest is June 10.

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

Note These Important Rules

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

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

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

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 *SHORT WAVE & 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 Short Wave & Television, 99 Hudson Street, New York, N. Y.

World Short Wave Stations

(Continued from page 158)

Mc.	Call	
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., 8-11.30 am.
6.095	JZH	TOKYO, JAPAN, 49.22 m., Addr. (See 11.800 mc., JZJ.) Irregular.
6.090	CRCX	TORONTO, CAN., 49.26 m., Addr. Can. Broadcasting Corp. Daily 7.45 am.-5 pm., Sun. 10.30 am.-12 n.
6.090	ZBW2	HONGKONG, CHINA, 49.26 m., Addr. P. O. Box 200. Irregular.
6.085	HJ5ABD	CALI, COLOMBIA, 49.3 m., Addr. La Voz de Valle. 12 n.-1.30 pm., 5.10-9.40 pm.
6.083	VQ7LO	NAIROBI, KENYA, AFRICA, 49.31 m., Addr. Cable and Wireless, Ltd. Mon., Fri. 5.30-6 am., 11.15 am.-2.15 pm., also Tues. and Thurs. 8.15-9.15 am.; Sat. 11.15 am.-3.15 pm.; Sun. 10.45 am.-1.45 pm.
6.081	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. Irregular.
6.077	OAX4Z	LIMA, PERU, 49.35 m. Radio National 7-11 pm.
6.075	VP3MR	GEORGETOWN, BRI. GUIANA, 49.35 m. Sun. 7.45-10.15 am.; Daily 4.45-8.45 pm.
6.073	HJ3ABF	BOGOTA, COL., 49.41 m. 7-11.15 pm.
6.070	CFRX	TORONTO, CAN., 49.42 m. Relays CFRB 7.30 am.-12 m., Sun. 10 am.-12 m.
6.070	VE9CS	VANCOUVER, B. C., CAN., 49.42 m. Sun. 1.45-9 pm., 10.30 pm.-1 am.; Tues. 6-7.30 pm., 11.30 pm.-1.30 am. Daily 6-7.30 pm.
6.069	——	TANANARIVE, MADAGASCAR, 49.42 m., Addr. (See 9.53 mc.) 12.30-12.45, 3.30-4.30, 10-11 am., Sun 2.30-4.30 am.
6.065	SBO	MOTALA, SWEDEN, 49.46 m. Relays Stockholm 1.30-5 pm.
6.060	—	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. 12 n.-11 pm.; Wed. 12 n.-9 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	HP5F	COLON, PAN., 49.59 m., Addr. Carlton Hotel. Irregular.
6.045	XETW	TAMPICO, MEXICO, 49.6 m. Irregular 7-11 pm.
6.042	HJ1ABG	BARRANQUILLA, COL., 49.65 m., Addr. Emisora Atlantico. 11 am.-11 pm.; Sun. 11 am.-8 pm.
6.040	W4XB	MIAMI BEACH, FLA., 49.65 m. Off the air temporarily.
6.040	W1XAL	BOSTON, MASS., 49.65 m., Addr. University Club. Exc. Sat. 6-7.45 pm.
6.040	YDA	TANDJONGPRIOK, JAVA, 49.65 m., Addr. N.I.R.O.M., Batavia, 10.30 pm.-2 am.; Sat. 7.30 pm.-2 am.
6.033	HP5B	PANAMA CITY, PAN., 49.75 m., Addr. P. O. Box 910. 12 n.-1 pm., 7-10.30 pm.
6.030	VE9CA	CALGARY, ALTA, CAN., 49.75 m. Thur. 9 am.-1 am.; Sun. 12 n.-12 m.
6.030	OLR2B	PRAGUE, CZECHOSLOVAKIA, 49.75 m. (See 11.875 mc.) Thurs. 4.45-5.10 pm.; Wed. 5.15-5.40 pm.
6.023	XEUW	VERA CRUZ, MEX., 49.82 m., Addr. Av. Independencia 98. 8 pm.-12.30 am.
6.020	DJC	BERLIN, GERMANY, 49.83 m., Addr. (See 6.079 mc.) 10.40 am.-4.30 pm.
6.017	HI3U	SANTIAGO DE LOS CABALLEROS D. R., 49.85 m. 7.30-9 am., 12 n.-2 pm., 5-7 pm., 8-9.30 pm.; Sun. 12.30-2, 5-6 pm.
6.015	PRA8	PERNAMBUCO, BRAZIL, 49.84 m., Radio Club of Pernambuco, 6-9 pm.
6.010	OLR2A	PRAGUE, CZECHOSLOVAKIA. 49.92 m., Addr. (See OLR, 11.84 mc.) Thurs. 4.45-5.10 pm.; Wed. 5.15-5.40 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.
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. 10.30 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. 7-9 am., 11.30 am.-1 pm., 6-11 pm.
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.
6.004	RV59	MOSCOW, U.S.S.R., 49.97 m. Irregular.
6.002	CXA2	MONTEVIDEO, URUGUAY, 49.98 m. Addr. Rio Negro 1631. Relays LS2, Radio Prieto, Buenos Aires. 11.30 am.-11.30 pm.
6.000	ZEA	SALISBURY, RHODESIA, S. AFRICA, 50 m. (See 6.147 mc., ZEB.) Also Sun. 3.30-5 am.
6.000	XEBT	MEXICO CITY, MEX., 50 m., Addr. P. O. Box 79.44. 8 am.-1 am.

End of Broadcast Band

5.977	CS2WD	LISBON, PORTUGAL, 50.15 m., Addr. Rua Capelo 5. 3.30-6 pm.
5.975	OAX4P	HUANCAYO, PERU, 50.16 m. La Voz del Centro del Peru. 8 pm. on.
5.968	HVJ	VATICAN CITY, 50.27 m. 2-2.15 pm. daily; Sun. 5-5.30 am.
5.940	TG2X	GUATEMALA CITY, GUAT., 50.47 m. 4-6, 9-11 pm.; Sun. 2-5 am.
5.940	PJC1	CURACAO, DUTCH W. INDIES, 50.47 m., Mon., Wed., Fri. 6.36-8.36 pm., Sun. 10.36 am.-12.36 pm.
5.935	YVIRL	MARACAIBO, VEN., 50.52 m., Addr. Radio Popular, Jose A. Higuera M, P. O. Box 247. Daily 11.43 am.-1.43 pm., 5.13-10.13 pm.; Sun. 9.13 am.-3.13 pm.
5.913	YV4RP	VALENCIA, VEN., 50.71 m. Irreg.
5.900	ZNB	MAFEKING, BRI. BECHUANALAND S. AFRICA, 50.84 m. Addr. The Govt. Engineer, P. O. Box 106. 6-7 am. 1-2.30 pm.
5.900	TILS	SAN JOSE, COSTA RICA, 50.85 m. 6-10 pm.
5.898	YV3RA	BARQUISIMETO, VEN., 50.86 m., Addr. La Voz de Lara, 12 n.-1 pm., 6-10 pm.
5.892	HH2S	PORT-AU-PRINCE, HAITI, 50.89 m., Addr. P. O. Box A103. 7-9.45 pm.
5.890	JIC	TAIHOKU FORMOSA, 50.9 m. Works Tokio 5-10 am. irregular.
5.885	HI9B	SANTIAGO, D. R., 50.95 m. Irregular 6-11 pm.
5.875	HRN	TEGUCIGALPA, HONDURAS, 51.06 m. 1.15-2.16, 8.30-10 pm.; Sun. 3.30-5.30, 8.30-9.30 pm.
5.855	HI1J	SAN PEDRO DE MACORIS, D. R., 51.25 m., Addr. Box 204. 12 n.-2 pm., 6.30-9 pm.
5.853	WOB	LAWRENCEVILLE, N. J., 51.26 m., Addr. A.T.&T. Co. Works Bermuda nights.
5.845	YVIRB	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.

(Continued on page 189)

All about the

SHORT WAVE LEAGUE

A FEW WORDS AS TO THE PURPOSE OF THE LEAGUE

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

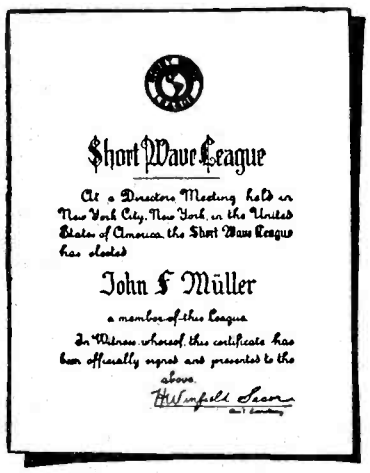
Dr. Lee de Forest, John L. Reinartz, D. E. Replogle, Hollis Baird, E. T. Somerset, Baron Manfred von Ardenne, Hugo Gernsback, Executive Secretary.

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

FREE MEMBERSHIP CERTIFICATE

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

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



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

SHORT WAVE ESSENTIALS LISTED IN OPPOSITE COLUMN SOLD ONLY TO SHORT WAVE LEAGUE MEMBERS

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

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

Application for Membership SHORT WAVE LEAGUE

SHORT WAVE LEAGUE 7-38
99-101 Hudson Street, New York, N. Y.

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

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

I own the following radio equipment:

Transmitting .....

Call Letters .....

Receiving .....

Name .....

Address .....

City and State .....

Country .....

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

Build the "W8KPX" Beginner's Transmitter

(Continued from page 169)

ever should be experienced in getting the rig "on the air"!

The coils are placed in the following order: The Tri-tet cathode coil at the right of the 6L6, the 40 meter plate coil at the left of the oscillator tube, near the shield and the 20 meter amplifier plate coil at the extreme left end of the chassis. The 80 meter crystal socket is just in front of the 6L6 tube. Connect the power unit to the transmitter, and turn on the 110 volt A.C. switch; the tubes should light up. After the heaters have been on for about 30 seconds, place an open or "dummy" plug in the amplifier cathode jack and close the high voltage switch. Rotate the oscillator plate tuning condenser until the greatest dip or maximum neon lamp brilliance is obtained. Switch off the plate and screen voltage, remove the "dummy" plug from the amplifier circuit and insert the milliammeter plug in its place. Apply the plate and screen voltage and quickly rotate the amplifier plate circuit tuning condenser for the maximum dip in plate current. Connect the antenna and adjust the coupling until the desired input, as indicated by the milliammeter, is obtained. It will be necessary to retune for the dip each time the coupling is increased or decreased. The transmitter is now properly tuned for operation on the 20 meter band, quadrupling from an 80 meter crystal.

40 Meter Operation

For 40 meter operation, the oscillator is adjusted as outlined above; the amplifier, however, will now have to be neutralized. The procedure is as follows: Place the 40 meter coil in the amplifier plate circuit and remove the plate and screen voltage from the 6L6Gs by reinserting the "dummy" plug in the milliammeter jack. Touch a neon lamp to the plate end of the coil and tune the circuit to resonance, which will be indicated by maximum brilliance. Then, leaving the tank tuning condenser alone, find the adjustment of the neutralizing condenser which will cause the R.F. in the amplifier plate circuit to drop to zero. The neutralizing condenser setting may have some effect on the adjustment of the oscillator output circuit, so it should be carefully retuned to resonance.

Touch the neon lamp to the plate tank once more and again retune the plate circuit to resonance. The resonance point may now occur at a slightly different setting and the second reading of the neon lamp R.F. indicator will be lower than the first one. Retune the oscillator stage once more and go through the whole procedure again. Continue until the neon lamp gives no indication when the plate tank circuit is tuned in the region of resonance. When this has been accomplished, the amplifier is neutralized.

To Operate Directly on Crystal Frequency

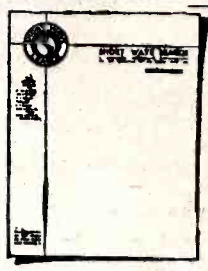
For operating directly on the crystal frequency, a blank coil form is prepared by connecting the two large prongs together with a jumper wire. When this is inserted in the cathode coil socket, the 140 mmf. condenser, C1, is short-circuited and the 6L6 operates as a straight crystal oscillator. The coils used in both the oscillator and amplifier plate circuits must have sufficient windings to tune to the crystal frequency. The adjustment and neutralization procedure is exactly the same as that outlined above.

The author will be interested in hearing from those who build this little transmitter. Write in care of *Short Wave & Television.*

Accessories for Members of the

SHORT WAVE LEAGUE

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



LEAGUE LETTERHEADS

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

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

A—50c per 100

WORLD GLOBE

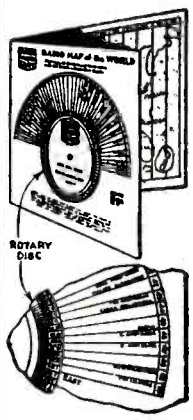
This important essential is an ornament for every den or study. It is a globe, 6 in. in diameter, printed in fifteen colors, glazed in such a way that it can be washed. This globe helps you to intelligently log foreign stations. The base is of solid walnut, and the semi-meridian of a nickel-like metal.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

D—Globe of the World ..... Prepaid **89c**

D—89c each

SHORT WAVE MAP OF THE WORLD

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



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

WORLD RADIO MAP AND STATION FINDER

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

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

C—25c each

LEAGUE LAPEL BUTTON

E—35c each

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

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

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

LEAGUE SEALS

G—15c for 25

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

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

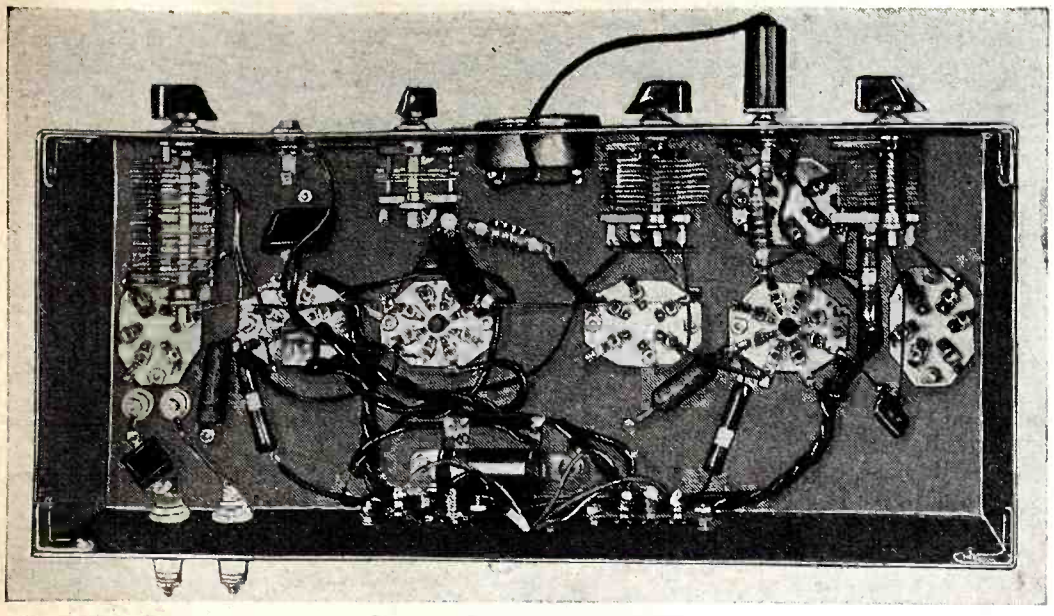
SHORT WAVE LEAGUE
99-101 Hudson St., New York, N. Y.

SHORT WAVE LEAGUE, 7-38
99-101 Hudson Street, New York, N. Y.
Gentlemen.
☐ I am a member of the SHORT WAVE LEAGUE
☐ Please send me application for membership in the SHORT WAVE LEAGUE
Please send me the following short wave essentials as listed in this advertisement:

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

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

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



Bottom View of Transmitter.

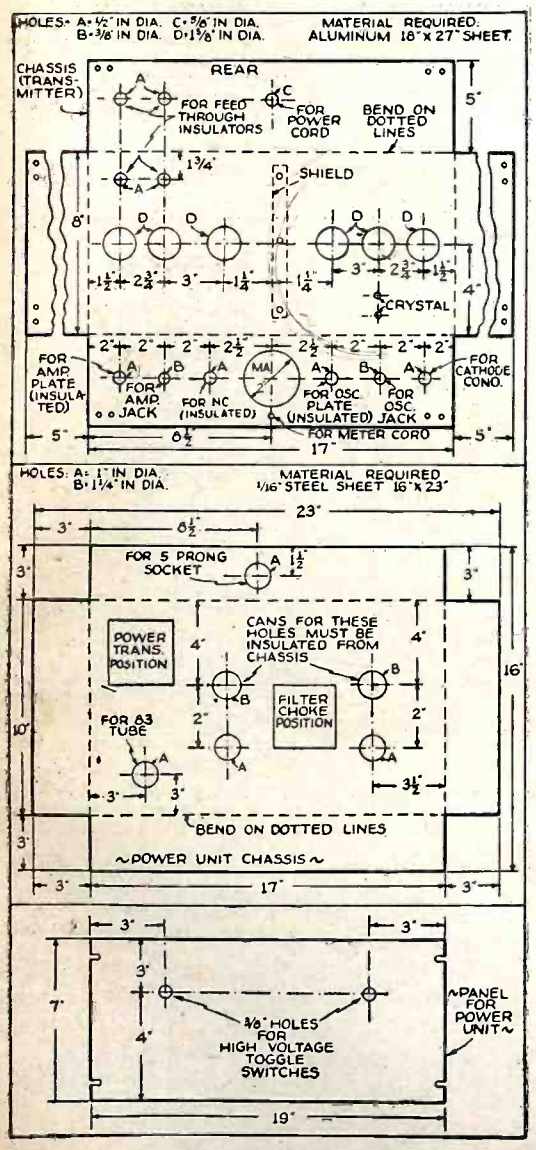
Coil Data

Band	Spacing	Turns	Link
28 mc.	1¼"	3 No. 16	4 turns No. 22
14 mc.	1½"	9 No. 16	4 turns No. 22
7.0 mc.	1⅝"	18 No. 24	4 turns No. 22
3.5 mc.	1⅝"	25 No. 26	4 turns No. 22
Cathode coil	1"	11 No. 20	

All amplifier coils center-tapped; spacing refers to the length of the winding on the coil form. All forms 1½ inches in diameter, 6-prongs.

Antennas

The author has used the simple single-wire fed radiator, with the transmission line clipped directly on the tank coil through a small mica condenser (Fig. 1). For all-band operation, however, a more efficient antenna will be desirable. That in Fig. 2 can be used to couple to the Zepp, the Johnson "Q" and others. The Zepp is especially good for all-band work.



Chassis Details.

List of Parts "W8KPX" Transmitter

HAMMARLUND
2—"MC" midget tuning condensers, 140 mmf. each
1—"MC" midget tuning condenser, 35 mmf.
1—"MCD-X" double-spaced split-stator condenser, 35 mmf. per section (two sections in parallel to obtain 70 mmf.)
4—Isolantite sockets, six-prongs, type "S-6"
3—Isolantite sockets, eight-prongs, type "S-8"
4—R.F. chokes, 2.5 mh. each, type "CHX"
1—17-41 meter coil, six-prongs, type 61
2—33-75 meter coils, six-prongs, type 62
2—66-150 meter coils, six-prongs, type 63
1—Six-prong cathode coil (see coil table)
1—Blank six-prong, "XP-53" form

AEROVOX (Condensers)
1—Mica condenser, 0.001 mf., 500 volts, receiving type
1—Mica condenser, 0.0001 mf., 500 volts, receiving type
1—Mica condenser, 0.006 mf., 1,000 volts, transmitting type
1—Mica condenser, 0.002 mf., 1,000 volts, transmitting type
2—Paper condensers, 0.05 mf., 600 volts
1—Paper condenser, 0.05 mf., 1,000 volts
1—Paper condenser, 0.01 mf., 400 volts

IRC (Resistors)
1—Fixed resistor, 400 ohms, 5 watts
1—Fixed resistor, 400 ohms, 25 watts (with sliding clip)
2—Fixed resistors, 15,000 ohms, 10 watts
1—Fixed resistor, 100,000 ohms, 1 watt
1—Fixed resistor, 50,000 ohms, 2 watts

BLILEY
1—Crystal and holder

MISCELLANEOUS
2—Closed-circuit jacks
1—Chassis (see text and drawings)
Feed-through insulators, knobs, plugs, etc.

RAYTHEON
2—Glass 6L6G tubes
1—Metal 6L6 tube

TRIPLETT
1—Milliammeter 0-150 ma. D.C.

Power Unit*
1—Power transformer (880 v. center-tapped at 250 ma. with 5.0 and 6.3 volt windings)
1—Filter choke, 20 henries, 250 ma. Smoothing type

1—Type 83 tube
1—Isolantite socket, spring mounting type, four-prongs
4—Resistors, 500,000 ohms each, 2 watts
1—Adjustable voltage-divider resistor, 20,000 ohms, 50 watts
2—S.P.S.T. toggle switches
1—10 x 17 x 3 inch steel chassis
1—7 x 19 inch steel panel
1—Bakelite five-prong socket for power cord connection
4—Wet electrolytic condensers, 8-mf. 600 v. each.

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

BUILD IT YOURSELF!

The Publishers of Short Wave & Television Present

fifty 10¢ publications featuring construction of the most popular short-wave receivers and transmitters

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

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

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

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

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

THE PUBLISHERS OF "SHORT WAVE & TELEVISION" WILL REFUND YOUR MONEY INSTANTLY IF YOU ARE NOT FULLY SATISFIED WITH ANY ONE OF THE PROJECTS.

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

COMPLETE LIST OF 10c PUBLICATIONS

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

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

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

HOW TO BUILD A 4-BAND 3-TUBE SUPERHET. A 3-tube receiver giving 4-tube results. Rack and panel type construction is employed. It has a regenerative second detector.....No. 4

HOW TO MAKE A FIXED-BAND 8-TUBE SUPERHET. This short-wave "fan" receiver tunes over a wide band of frequencies without coil switching or changing. It's a real performer. It operates directly from 110 V. A.C. and has band-spread.....No. 5

HOW TO BUILD A 5-TUBE SUPERHET FOR FAN AND HAM. A sure-fire receiver for all short-wave enthusiasts. It uses plug-in coils and iron core I.F. transformers which assure plenty of gain.....No. 6

HOW TO MAKE A TWIN-PENTODE RECEIVER. This receiver, especially designed for the beginner, employs but one dual purpose tube which gives results equivalent to a 2-tube receiver. It is for 2-volt battery operation with headphones.....No. 7

HOW TO BUILD AN EFFECTIVE SHORT WAVE PRESELECTOR. A signal-booster that will greatly improve reception on any short-wave super. It employs two 6K7 tubes in parallel in a highly efficient circuit in which both input and output are tuned.....No. 8

HOW TO BUILD A REGENERATIVE 2-TUBER. This unusual receiver has the tickler coil in the screen grid circuit of the detector. The receiver tunes from 9-270 meters; band-spread is included; metal or glass tubes may be employed.....No. 9

HOW TO MAKE THE S.W.&T. COMMUNICATIONS RECEIVER. An unusually fine receiver for the critical Ham and Fan, incorporating many exceptional features. Regeneration is employed in the first detector stage which makes use of an acorn tube. The receiver also incorporates a noise-control circuit, variable selectivity control and a tuning meter.....No. 10

HOW TO MAKE A BAND-SWITCHING 2-VOLT RECEIVER. This fine receiver for battery operation employs a band-switching arrangement, enabling the builder to tune from 16-550 meters by flipping a switch. No. 11

HOW TO BUILT THE MULTI-BAND 2 RECEIVER. A receiver for the short-wave beginner. It has a remarkable tuning range of 2½-270 meters with band-spread on all bands. Plug-in coils are used and complete data for an A.C. power supply is given.....No. 12

HOW TO MAKE THE VS-5 METAL TUBE SUPERHET. This complete all-wave receiver boasts, among other things, variable selectivity, metal tubes, AVC and band-spread. The tuning range is from 17-550 meters. .....No. 13

HOW TO BUILD A BEGINNERS 2-TUBE SUPER. A simplified superhet using 2 volt battery tubes which is just the thing for the beginner. It employs plug-in coils which cover a tuning range from 15-200 meters. .....No. 14

HOW TO MAKE A T.R.F.-3 FAN RECEIVER. This is an all-around receiver employing 2 volt tubes. A T.R.F. stage ahead of the regenerative detector insures good selectivity and sensitivity. Band-spread is provided by a two-speed dial.....No. 15

HOW TO BUILD THE FORTY-NINER—A RECEIVER FOR LEAN PURSES. This novel receiver features a space-charge detector and requires only 12 volts of B battery. It uses 2-49 tubes which may be operated from any 2 volt A battery.....No. 16

HOW TO MAKE A REAL 5-METER SUPERHET. This carefully designed receiver for ultra-short wave reception employs a straightforward circuit. Careful placement and high quality parts insure fine results...No. 17

HOW TO BUILD THE 2-VOLT SUPER DX-4. This superhet, though small in size is big in performance. Using battery type tubes, it features continuous band-spread, and automatic volume control, which may be cut in or out as desired.....No. 18

HOW TO MAKE THE ULTRA-HIGH FREQUENCY WIZARD-6. This is a first-class 5-meter super-regenerative receiver, using acorn tubes in the R.F. and detector stages. The other tubes are of the metal type. The use of the acorn tubes insures exceptionally fine results. No. 19

HOW TO BUILD A HIGH-GAIN METAL-TUBE RECEIVER. This little receiver is a real performer, tuning from 10-200 meters. Continuous band-spread is provided. .....No. 20

HOW TO BUILD THE WORLD-WIDE 10-METER CONVERTER. Many enthusiastic reports have been received from the builders of this unit, which may be attached to your present receiver for picking up 10 meter signals from all parts of the world. Only 2-tubes are used. .....No. 21

HOW TO BUILD A DE LUXE 3-TUBER. This is the receiver for the Ham or Fan who wants a really high class receiver of simple design. It employs an unusual band-spreading dial. The circuit, employing metal tubes, has a stage of T.R.F. followed by a regenerative detector and a stage of audio.....No. 22

HOW TO BUILD THE OCTODE METAL TUBE-3. This receiver is capable of excellent performance on the short waves. It requires only one plug-in coil for each band as a stage of untuned R.F. precedes the detector. It also has an A.F. stage for boosting the volume to comfortable headphone level.....No. 23

HOW TO MAKE THE 3-IN-1 REFLEX SET. A 2-tuber giving 4-tube performance is this receiver which does its work with a minimum of tubes. A 6F7 is used as a combined R.F. amplifier, detector and first audio stage; a 6C5 is used as second audio stage.....No. 24

HOW TO BUILD THE 100 WATT QRM DODGER— A COMPACT 5-METER TRANSMITTER. This M.O.P.A. rig puts out a hefty signal and by use of a calibrated vernier oscillator control will overcome the QRM problem on 5 meters.....No. 25

HOW TO BUILD A DE LUXE 5-METER MOBILE STATION. A really fine M.O.P.A. mobile transmitter which will work real DX on portable location. It employs five metal tubes.....No. 26

HOW TO BUILD THE H-G-M MEDIUM POWER TRANSMITTER. A crystal control set with an output of 90 watts. Band-switching is employed for operation on the 80, 40, 20 and 10 meter Ham bands. It gave excellent results under test.....No. 27

HOW TO MAKE THE 806 ALL-BAND TRANSMITTER. An unusual transmitter delivering 400 watts output from an 806 final amplifier. A crystal pen-tet oscillator is used, followed by a driver stage. Real DX has been worked on 10, 20, 40 and 80 meters with this smooth working job.....No. 28

HOW TO BUILD A 125-WATT MODULATOR USING 35T's. This is an ideal unit for the amateur and will modulate any transmitter with a power input up to about 400 watts. A total of 10 tubes are used including the power supply unit.....No. 29

HOW TO BUILD THE C-O-M 150 WATT TRANSMITTER. An unusual crystal oscillator, multiplier with but one tuned circuit. It uses a pair of RK37's in parallel with a RK39 driver. The crystal oscillator circuit uses a 6L6.....No. 30

A LONG-LINES TRANSMITTER FOR 1-METER TRANSMISSION, AND A COMPANION RECEIVER. A really special job for the seriously minded experimenter. This outfit permits short distance contacts in this interesting band.....No. 31

HOW TO BUILD A 200 WATT XMITTER WITH PEN-TET EXCITER. This transmitter will really go to town. The use of the Pen-Tet crystal oscillator and frequency multiplier circuit eliminates many headaches from cracked crystals.....No. 32

HOW TO BUILD A 10 AND 20 METER TRANSMITTER. A 200 watt transmitter which worked world-wide DX on test. Although compact, it is highly efficient in the 10 and 20 meter bands. Five tubes are used. .....No. 33

HOW TO MAKE THE WIZARD 1-TUBE 50-WATT TRANSMITTER. An amateur, crystal-controlled c.w. transmitter using the RK20 screen grid pentode. In tests, it compares with 250-watters.....No. 34

HOW TO MAKE THE "OSCILLODYNE" 1 TUBE WONDER SET. One of the most sensitive short-wave sets designed, employing a really new circuit for the first time. Battery operated.....No. 35

HOW TO MAKE THE "19" TWINPLEX (ONE TUBE PERFORMS AS TWO) RECEIVER. One of the most sensitive 1-tube sets ever designed and very popular. .....No. 36

HOW TO MAKE THE IMPROVED 3-TUBE DOERLE SET FOR BATTERY OPERATION. One of the finest of the Doerle series, by the famous short-wave inventor. .....No. 37

HOW TO MAKE THE "GO-GET-'EM 2" RECEIVER FOR THE BEGINNER. This unusual 2-tube circuit gives 3-tube results. Battery operated. Excellent for beginners. .....No. 38

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

HOW TO MAKE THE 2 TO 5 METER TWO-TUBE LOUDSPEAKER SET. This receiver may be used with batteries or with an A.C. power pack. Packs a big wallop. .....No. 40

HOW TO MAKE THE 3-TUBE BATTERY SHORT-WAVE RECEIVER. This receiver was a prize winner in SHORT WAVE CRAFT. An unusual short-wave receiver, easy to build.....No. 41

THE BRIEF-CASE SHORT-WAVE RECEIVER AND HOW TO BUILD IT. So small that the entire set, batteries, head set, aerial and everything, goes into a brief-case. Stations from Europe are often received. By Hugo Gernsback and Clifford E. Denton.....NO. 42

HOW TO BUILD THE POCKET SHORT-WAVE RECEIVER. One of the smallest, pocket-size, battery receivers ever designed by Hugo Gernsback and Clifford E. Denton. A marvelous set that brings in European stations. .....No. 43

HOW TO BUILD THE CIGAR-BOX 1-TUBE "CATCH ALL" RECEIVER. An effective short-wave battery set which fits into a small cigar box, insuring high portability yet great efficiency.....No. 44

HOW TO BUILD THE "DUAL-WAVE" SHORT-WAVE BATTERY RECEIVER. With this set, you can hear both ends of radiophone talk, on one set of phones. In other words, you can listen to a ship at sea and the land station communicating with it, simultaneously, by means of this double receiver.....No. 45

HOW TO BUILD THE 1-TUBE "53" TWINPLEX RECEIVER. The twinplex, although it has only one tube, works as if it had two. Marvelous in efficiency. Uses either batteries or A.C. power pack for "B" supply. .....No. 46

HOW TO BUILD THE PORTABLE MINIDYNE SHORT-WAVE BATTERY SET. Uses no aerial, no ground. The total weight is 3¼ lbs. and measures 5x5x6 inches. Self-contained batteries, tube, condensers, and loop. Highly sensitive circuit.....No. 47

HOW TO BUILD THE HAM-BAND "PEE-WEE" 2-TUBER. A dandy receiver with high efficiency and band-spread tuning. Works a loudspeaker, yet the entire receiver is no larger than your hand. Works with either batteries or an A.C. power pack.....No. 48

HOW TO BUILD THE DUO-AMPLIDYNE. The ideal 1-tube set for the beginner. One of the finest 1-tube sets; it really gives 2-tube performance. Made for battery operation. With only ten-foot antenna brings in the good European stations.....No. 49

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

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

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

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

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Address .....

City .....State SWT-7

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

Radio Duel of the Dictators

Hugo Gernsback

(Continued from page 135)

The last sentence (italics are ours) shows exactly which way the wind is blowing in this international radio duel. All of the governments have been forced to take a hand in this radio war whether they like it or not. One government evidently tries to outshout the other, and each vies with the other to send forbidden news across the border. This comic opera business then resolves itself naturally into the absurd situation where the censorship each Dictator so arduously places on his own country is immediately defeated by the governments themselves.

In the meanwhile, all the totalitarian countries get the news in the most ludicrous stage-setting anyone could ask for. The outsider who looks in on the show naturally begins to scratch his head and says to himself —"Why do Dictators go to all this trouble to supply each other with forbidden news, when it would be much less troublesome to lift the censorship and at least preserve their pride and self-respect?" However, this idea will probably never occur to any censor, who is obviously much happier trying to close all the little holes that might bring in some news, but can't do anything about the big holes where all the news comes in anyway.

Difficult to Locate "Phantom" Radios

One of the great mysteries of the past two years has been the ability of secret broadcasters to carry on without being apprehended. The reason why they are not caught quickly is that all of the successful broadcasts are sent out on *short waves,* which due to the "skip-distance" effect previously mentioned, makes detection difficult if not actually impossible.

In this article we have printed a dispatch from Berlin which shows the utter confusion that has arisen regarding the point of origin of these transmissions; thus Tallinn, Esthonia, thinks the broadcasts come from within Russia, while Riga, Latvia's, experts think it is in Central Russia; Kaunas, Lithuania, believes the station to be in Western Russia! In other words, no one knows actually where the transmissions originate. It is a comparatively simple thing to place a powerful short-wave broadcast transmitter in an ordinary automobile, truck, motorboat, barge or ship. Remember also that in Europe, automobiles are not as plentiful as they are in the United States.

We understand, from reliable sources, that when automobiles or trucks are used, they usually work in threes. The broadcasting car is usually in the center and the covering cars or lookouts are in the front and back of the transmitter. These lookouts usually are a mile or so away from the sending car and can give warnings by means of special "radio" buzzer signals which reach not more than a mile and are used only in an emergency.

Generally, the broadcasting is done from little traveled roads and from within forests, etc. If another suspicious looking car comes within range, the broadcasting car is notified immediately, it ceases transmission and moves on as long as there is danger.

River boats have also worked in this fashion, but the best means, for obvious reasons, are specially hired yachts or small tramp steamers which can keep on the move and can easily operate as far out at sea as necessary. A look at the map shows how simple it is for a Soviet Russian transmitter to operate in the North Sea or the Baltic and blanket Germany with its broadcasts. Another easy way is for the Germans or Italians to operate their transmitters via the Black Sea or the Baltic Sea against Russia, and indeed there is good reason to believe that High Sea transmission is being used more extensively than land stations, because detection is far more difficult. Remember also that all of the secret broadcasting is ALWAYS done at night, never during the day. It is almost impossible to hunt a small ocean steamship or yacht after dark, particularly when we do not know where it is located. The ship can change its position right along, and any clever radio engineer can increase or decrease the intensity of the signal in such a manner as to make a search for a ship almost an impossibility. In addition, the antenna can be continuously swung around and it is not particularly difficult to rig up a "beam" directional aerial. By changing the direction of the ship and simply veering it around, it soon becomes a hopeless task to try to get any accurate bearings on such a moving beam transmitter.

These transmissions usually take place between 9 and 10 megacycles on the short-wave band and are sometimes powerful enough to be heard even in the United States. There was a secret broadcast which was sent out during 1937 at 10 p.m. Central European Time on a wavelength of 29,8 meters, and whose transmitter supposedly was in Germany.

It usually started as follows: *"Here speaks an illegal broadcasting station in Germany of the German Communist Party."*

A recent dispatch to the New York *Times* dated Moscow, May 9th, stated that the radio broadcast denouncing the present Soviet Russian leaders purportedly came from the heart of Russia, but did not originate there at all. According to *Tass,* the Soviet Russian news agency, this broadcast was a fake and was apparently sent out by the Italian station IRF.

From all this it will become apparent that all three governments blame each other for these broadcasts and none wishes to take the blame, despite the fact that 90% of the broadcasts originate with the sanction of the government of one or the other countries. There is an off chance that 10% or even less of the secret stations are not owned by any of the three governments, but are actually operated by some of the democratic countries or their nationals who for reasons of their own do news broadcasting, too. This is easily accomplished throughout the Northern waters, either the North Sea or the Baltic Sea. Anyone who has a grudge against the Totalitarian States—and we must not forget that there are thousands who have such grudges—can operate powerful motor-boats or old sailing vessels and create all the mischief they wish. In any event it is plain that radio is giving news to the Dictator countries—Dictator or no Dictator.

A recent article in *Ken* Magazine, Chicago, entitled *Inside the Third Reich,* proves the point conclusively. The writer, Carl Marzani, in his travels throughout Germany found that the average German was well informed as to what was going on outside the Reich. He found many people who admitted listening to the forbidden

(Continued on page 188)

COMMERCIAL NOTICES 10¢ A WORD

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

AGENTS WANTED

500% PROFIT SELLING GOLD Leaf Letters for Store Windows. Free Samples. Metallic Co., 440 North Clark, Chicago.

CORRESPONDENCE COURSES

500,000 USED CORRESPONDENCE Courses and Educational Books. Sold. Rented. Exchanged. All subjects. Satisfaction guaranteed. Cash paid for used courses. Complete details and bargain catalog free. Send name. Nelson Company, 3280 Manhattan Building, Chicago.

MISCELLANEOUS

3½ INCH TR. 0-125 VT. A.C. Voltmeter, 0-10 A.C. Ammeter, $2.75 each. Weston D.C. 0-7 and 0-140 Voltmeter, 2¼" with 9 pt. D.P. Switch $2.75. Nat'l. MB27-4 Stg. T.R.F. chassis and Thord. 45 P.P. Pack. $7.50. 10" MUTER DYN. SPKR. $3.00 Victor 72" Hi-Fi Orthophonic Horn, Mag. and Acoustic Pick-ups, $10.00, plus express. $100.00 RCA battery Superhet—$25.00. Harry Ackerson, Ramsey, N. J.

WE ORIGINALLY HAD FIVE thousand Stoppani Compasses for which the U.S. Government paid over $30.00 each. We sold all but a very few. We cannot obtain more to sell at three times our present price. Send in your order before they are all sold at $4.50 each, postage paid. Gold Shield Products, 350 Greenwich St., New York City.

PATENT ATTORNEYS

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

QSL—CARDS—SWL

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

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

SHORT WAVE RECEIVERS

COMMUNICATION RECEIVER—4 to 550 meters, at the phenomenally low price of $10.85. (Regular amateur net price $15.85.) Complete with 4 tubes, loudspeaker and built in A.C. high voltage power supply. A very unusual opportunity. Due to over-production of our popular AC-4 model, regenerative — super-regenerative receiver, we are disposing of a limited number at this unheard of price. Smooth, sensitive super-regenerative circuit over the rest of its tremendous tuning range with no skips. Act now! First come, first served. Fully guaranteed for 1 year. Radio Constructors Laboratories, 136 Liberty St., New York, N. Y.

6 BEGINNERS' PLANS AND "Radiobuilder" whole year—25c. Laboratories, 7700-A East 14th, Oakland, Calif.

ALL-WAVE CRYSTAL SET EASIly made. Instructions 25c. Western Radio-Labs., Santa Ana, California.

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.

WILL SELL OR SWAP 5 METER Transceptor. 5 tubes, 20 watts input, complete with all accessories, ready to operate $40.00. Frank Robaus, Jr., 3440 W. 23 Street, Chicago, Illinois.

SELL—"3 IN 2" TUBE CHAMP—4 coils, ideal for beginners. $5.00. A.W. Erickson, Arthur, Iowa.

BARTER AND EXCHANGE — FREE!

NO ADVERTISEMENT TO EXCEED 35 WORDS, INCLUDING NAME AND ADDRESS

Space in this department is not sold. It is intended solely for the benefit of our readers, who wish to buy or exchange radios, parts, phonographs, cameras, bicycles, sporting goods, books, magazines, etc. As we receive no money for these announcements, we cannot accept responsibility for any statements made by the readers. Use these columns freely. Only one advertisement can be accepted from any reader in any issue. All dealings MUST be above board. Remember you are using the U. S. mail in all these transactions and therefore you are bound by the U. S. Postal Laws. Describe anything you offer accurately and without exaggeration. Treat your fellow men the way you wish to be treated. We welcome suggestions that will help to make this department interesting and helpful to our readers.

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

HAMS, SWL's—I WOULD LIKE to exchange SWL's with you, especially those in foreign countries. All QSL's and SWL's answered promptly. (QRA) Frank A. Scalaro, 6049 Huxley Ave., The Bronx, N. Y., U.S.A.

TRADE ABOUT 40 VARIOUS RAdio magazines far back as 1925 for anything of same value other than stamps or magazines. Watsa? W. S. Crooks, W8LVG, Box 15, Stow, Ohio.

SWAP BOOK OF EIGHT BAFfling tricks of mystery and book "Star Amateur Electrician" for Jubilee Souvenir number of Radio-Craft in good condition. Also want "Radio Amateur Course." M. Konon, 48 Edwards St., Patchogue, N. Y.

WILL TRADE FOR JUNIOR Candler Code Course 48 issues of Pop. Mech.; Mod. Mech.; Pop. Science, in good condition from 1935 to 1938. All letters answered. Geo. Boles, 315-51 St., Brooklyn, N. Y.

WILL TRADE "CORONA" NO. 3 portable typewriter with carrying case, has just been overhauled and in perfect condition. For "Instructograph" or Sky Buddy receiver. Don. E. Henderson, 15302 Athens Ave., Lakewood, Ohio.

HAVE—30 WATT P.A. AMPLIfier, two sets Insuline coils, Argus camera with lens kit, new set wood chessmen, crystal set, battery chargers; want—Hallicrafter receiver. Leica camera, 80 meter crystal or? Louis Kelsey, Wilmington, Ohio.

ADVANCED STAMP COLLECTors: Will swap or trade at one-third catalog value, one Scott number 34 stamp (5c imperforate, red brown, U.S.), fair condition. Write: D. A. Pitman, Loudon, N. H.

HAVE ONE-TUBE RADIOS, OIL paintings, sign painters' letter patterns. Want radio parts or what? John Haynes, Doe Run, Mo.

WANTED: BATTERY RADIO, Hallicrafter, Sargent, Super Clipper 7 band, or RCA 155 complete with tubes, speaker; no junk, send details and lowest price. Carl Nicholas, 1220 Seventh St., Oakland, California.

WANTED: USED CANDLER "Junior" course, must be cheap. Also good preselector. Frank Doubleday, Jr., 1006 Harvey St., Beloit, Wis.

WANTED: GOOD CONDITIONED code sending machine. Will trade 21 volume Alexander Hamilton "Modern Business Course," superb condition. All offers with description answered. Bill Koch, 1736 Sheridan Ave., Whiting, Ind.

WILL SWAP A SIX-TUBE FRESHman Masterpiece for a small phone transmitter which will operate on about from 10 to 20 meters. All interested write to Gerald Nelson, Box 33, Vashon, Wash.

SWAP "6F6-6C5" FIVE-METER transceiver built by Frank Jones, power supply, mike and speaker, for Argus or other candid camera, slide projector. Dick Ferguson, W6PEV, 605 Santa Barbara Rd., Berkeley, Calif.

NEW ELGIN POWER PACK. Supplies 250-180-90 and 45 volts D.C. at 40 milliamps. 2.5 V. filament winding. Beautiful chassis. Swap for camera or supplies. Write: QRA David Vigoda, 489 Washington Street, Brookline, Mass.

WILL TRADE: EVINRUDE MOtor, about 1500 stamps, three tube all wave kit, 5 meter portable transceiver for typewriter, ham receiver, transmitter parts, or what have you? W. H. Kiser, Paris, Ky.

HAVE STAMPS AND RADIO parts for what have you? SWL's, 20 foreign stamps for card. Want to swap letters. F. H. Frantz, 30 N. 4th, Coplay, Pa.

5 METER X'CEIVER COMPLETE with tube, meter. In black cabinet with space for batteries. Also photography outfit. Will exchange either for a good SW set. What have you. Albert Hartman, 5713—5th Ave., Brooklyn, N. Y.

HAVE SUPERIOR ALLMETER. Ultra Precision Signal Generator, Philco radio 602, No. 32 S.C.E. wire, radio tubes, parts and books. Want phono motor, pickup, camera or what have you? T. Wojciechowski, 2880 Fulton St., Brooklyn, N. Y.

TRADE LAFAYETTE 5 METER superhet, new December, 1937, for good superhet or TRF for 20-40-80-160 meter hambands or what have you. Write: Dick Gulatsi, W2KRF, 485 Gramatan Avenue, Mount Vernon, N. Y.

WANTED VIBROPLEX (BUG) key or what have you. Have meters milliamp. and amp. W.E., Duovac 242-A A1 condition. What offers have you? Seymour Broder, W2IXJ, 850 McDonald Ave., Brooklyn, N. Y.

SWL's AND HAMS, LET'S SWAP cards. I QRA 100%. Dick Walker, 1028 Woodbury Rd., New Kensington, Pa.

SHORT WAVE LISTENERS IN all countries. I will exchange unused U.S.A. stamps for unused foreign stamps. To be used when sending for veries. I QSL 100%. Stanley Koenig, 1916 Gr. Concourse, New York, N. Y., U.S.A.

WILL SWAP 1 MODEL A UNIversal mike with 12" stand for S.W. receiver or commercial receiver or camera or what have you. All letters answered. Niul T. Phelps, 9 Church St., Harrisville, New York.

SOUND RECORDING EQUIPMENT wanted in exchange for chemicals and lab equipment. Give full description, age, condition, and fidelity of recorder, and I will furnish list of chemicals, etc. Harry Johnson, 97 Monroe Street, Somerville, Mass.

NEON TUBE TRANS. THREE G.E. 115-15,000 V. Sec.-30 Ma.-Ct.-High reactance. Will stand direct sec. short! Valued $7.00 each. Swap for Osc. or instruments. Elroy, 4306 Horrocks St., Phila., Pa.

WOULD LIKE TO SWAP SWL crds. with fellas in U.S.A. es Central America. Will answer all crds. So G.A. YL's es OMs., the QRA. Tony Moravetz, Jr., 1610 S. Allport St., Chicago, Ill., U.S.A.

SWAP — 1936 JONES XCITER Unit with quality parts and LD2 xtal for 12' boat, outboard motor, cameras, musical instruments, typewriter (portable). Don Stensland, Box 92, Miller, S. D.

WANTED—A FEW SAMPLES OF cotton seeds for experimental uses; also for botany classes. Experimental Gardens, 1608 Campbell Ave., Des Plaines, Illinois. L. J. Schnake, Prop.

WILL SWAP QSL AND FOTO with anyone. Send yours and I'll send mine. QRA: J. P. Adrosko, W2ICJ, 914 Lafayette Street, Elizabeth, N. J.

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Radio Duel of the Dictators

(Continued from page 187)

broadcasts, and even the most humble German found it highly amusing to listen three times a week to these all-revealing transmissions. It is the old story of forbidden fruit tasting a great deal better, just because it is forbidden, and the Dictators are certainly going out of their way to give their nationals a lot of fun at their own expense.

Spot News Spells Action!

(Continued from page 139)

Shanghai radio telephone station. From Shanghai the program goes to Manila and the Philippines where it is relayed once more by short-waves to Point Reyes, Calif., and from there by telephone wires to the coast-to-coast network of the NBC.

The difficulties of military censorship in Shanghai, occupied as it is by the Japanese, are very considerable. Previous to this time the National Broadcasting Company had shipped a special short-wave transmitter to China via Japan for use in transmitting war news bulletins from the scene of combat. However, after being shuttled back and forth between Japan and China and being refused entry, the whole project was given up and the transmitter was shipped back to San Francisco.

Here's Your Button

The illustration shows the beautiful design of the Official Short Wave League button, which is available to everyone who becomes a member of the League. The button measures ¾ inch in diameter and is inlaid in enamel—3 colors—red, white and blue. The requirements for joining the League are explained in a booklet, copies of which will be mailed upon request.

Please note that you can order your button at once—Short Wave League supplies it at cost, the price, including the mailing, being 35 cents. A solid gold button is furnished for $2.00 prepaid. Address all communications to SHORT WAVE LEAGUE, 99-101 Hudson St., New York.

BOOK REVIEW

HOW TO PASS RADIO LICENSE EXAMINATIONS, by Charles E. Drew. Stiff paper covers, 6½" x 9½", 202 pages, illustrated with line drawings, photos, and folding diagram plates. Published by John Wiley & Sons, New York—1938.

There has been a distinct need in the publication field for the thorough treatise which would help the student preparing to take a commercial radio operator's license. The present book has been written by a man who has had first hand contact with the requirements of such work, as he is a radio instructor in the RCA Institutes, N. Y., where thorough courses are given in radio operating.

The opening chapters deal with the rules of the Federal Communications Commission concerning the issuance of radio operators' licenses. The various classes of radio operators' licenses are explained in detail. Radio telegraph transmitters are discussed in "question and answer" form and with the necessary diagrams. Complete diagrams of marine radio installations are presented and discussed. Communication receivers are then explained, followed by a chapter on the general principles of electricity. A section deals with radio safety rules to be followed by operators on ships, etc.

Radiophone transmitters are discussed, together with diagrams; then come such important subjects as modulation and neutralization. The concluding section of the book deals with radio laws and regulations, radio beacon systems, a table of "Q" signals and other abbreviations and a chart of the International Morse code signals. Finally we have definitions of terms used in connection with arc and spark transmitters, automatic starters, the radiomarine automatic alarm arrangement, and a list of useful radio formulas.

World S-W Stations

(Continued from page 183)

Mc.	Call	
5.830	TDD	SHINKYO, MANCHUKUO, 51.46 m. Works Tokyo 5-10 am., irreg.
5.825	TIGPH	SAN JOSE, COSTA RICA, 51.5 m., Addr. Alma Tica, Apartado 800. 11 am.-1 pm., 6-10 pm. Relays TIX 9-10 pm.
5.813	TIGPH2	SAN JOSE, COSTA RICA, 51.59 m., Addr. Senor Gonzalo Pinto, H.
5.800	YV5RC	CARACAS, VEN., 51.72 m., Addr. Radio Caracas. Sun. 8.30 am.-10.30 pm. Daily 7-8 am., 10.30 am.-1.45 pm., 3.45-9.30 pm.
5.790	JVU	NAZAKI, JAPAN, 51.81 m. Works JIC and TDD 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.
5.740	TGS	GUATEMALA CITY, GUAT., 52.23 m. Irregular.
5.735	HCIPM	QUITO, ECUADOR, 52.28 m. Irregular 10 pm.-12 m.
5.145	OKIMPT	PRAGUE, CZECHOSLOVAKIA, 58.31 m., Addr. (See OLR, 11.84 mc.) Fri. 4.45-5.10 pm.; Sat. 5.15-5.40 pm.
5.145	PMY	BANDOENG, JAVA, 58.31 m. 5.30-11 am.
5.077	WCN	LAWRENCEVILLE, N. J., 59.03 m. Addr. A.T.&T.Co. Works England late at night irregularly.
5.025	ZFA	HAMILTON, BERMUDA, 59.65 m. Works N.Y.C. irregularly at night.
5.000	TFL	REYKJAVIK, ICELAND, 60 m. Works Europe night time irreg.
4.975	GBC	RUGBY, ENG., 60.3 m. Works ships irregularly.
4.905	VUD2	DELHI, INDIA. 61.16 m, Addr. All India Radio, 7.30 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	HJ4ABP	MEDELLIN, COL., 61.44 m. 8-11 pm.
4.842	HJ3ABD	BOGOTA, COL., 61.95 m., Addr. La Nueva Granada, Box 509. 12 n.-2 pm., 7-11 pm., Sun. 5-9 pm.
4.820	GDW	RUGBY, ENG., 62.24 m. Works N.Y.C. night time irregularly.
4.807	HJ1ABB	BARRANQUILLA, COL., 62.39 m., La Voz de Barranquilla, Addr. P. O. Box 715. 11.30 am. to 1 pm., 4.30-6 pm.
4.780	HJ1ABB	BARRANQUILLA, COL., 62.72 m. Addr. P. O. Box 715. 11.30 am.-1 pm., 4.30-10 pm.
4.772	HJ1ABJ	SANTA MARTA, COL., 62.85 m. 11.30 am.-2 pm., 5.30-10.30 pm. except Wed.

New 1938 Short-Wave Manual

● THE 1938 edition of the well-known "Hammarlund Short Wave Manual" contains a wealth of interesting material for the short-wave experimenter. Included in its 32 pages are a number of one-, two- and three-tube, A.C. and battery type short-wave receivers; short-wave converter; two-stage preselector, an ultra-high frequency superheterodyne and complete power supply data. For the amateur, there is a three-stage modern crystal controlled transmitter and also an up-to-date five-meter transmitter with appropriate receivers and power supplies for the ham. All apparatus described in this handy experimenters' manual were built and tested in the Hammarlund laboratories.

Four pages are devoted to the Short-Wave Listener and include a large short-wave station list, tuning hints for operating short-wave receivers, and information as to how to obtain verification cards. Profusely illustrated, the book contains over 50 diagrams and photographs. It has a three-color orange, blue and silver stiff paper cover and is 6" x 9".

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

BARTER and EXCHANGE FREE ADS (continued)

WILL SWAP $150 N.R.I. RADIO course for new or little used Sky-Buddy or similar receiver. Course is in good A-1 condition and complete (no instruments). Stanley J. Zuchora, 2748 Meade St., c/o Stan., Detroit, Mich.

SHORT WAVE LISTENERS IN U.S.A. and foreign countries. Would like to exchange my SWL cards for one of yours. I will QSL 100% by return mail. Marion Dickson, 4211 Caroline Ave., Toledo, Ohio, U.S.A.

WILL SWAP—HIGH POWERED astronomical telescope and almost new RCA Spiderweb antenna, for copper tubing (¼"), Isolantite standoffs, feeder spreaders, and any other hf. antenna eqpt. Write David Bulkley, 85 Griffen Ave., New Rochelle, N. Y.

WILL SWAP COURSE IN PHYSical culture and muscular development (cost $25), and stamp collection, twelve hundred different foreign, for cornet, trombone or trumpet. Write H. A. Pitman, Loudon, N. H.

HAVE 6 VOLT DYNAMICS, NAtional 803 socket, mike transformers, audio transformers, transformer 6.3 V. at 4 amp., 4 gang condenser, radio parts. Want 5 meter equipment, electrical course, electrical books or? Newell Kelly, 208 Congress St., East McKeesport, Pa.

TRADE SET OF GILBERT BOOKS (2 yrs. old, unused, valued $10), 100 power microscope, chemical outfit (home), for 5 tube 10 meter rcvr. Those interested write G. Seidel, 809 Linden Ave., Oak Park, Ill.

WOULD LIKE TO TRADE AN Arvin car radio Model 17, has been used only about 6 months. Or a brand new model Western Electric telephone. Steve Novota, Jr., 406 S. Plum St., Moweagua, Ill.

WANT CRYSTAL PICK-UP AND motor; Ultra-Stratosphere "10" transceiver; or S.W. radio as Super-Clipper; or 160-meter transmitter. Have stamp collection catalog value, $128.00, books, magazines, etc. Joseph Nagy, Jr., 9610 Kennedy Ave., Cleveland, Ohio.

WANTED: GOOD USED PREselector enclosed in metal cabinet with self-contained power-supply. Write, giving full particulars. Will swap transmitting equipment or pay cash. Henry Ritzmann, 45-23 164 Street, Flushing, L. I., N. Y.

WANTED: LESSON NUMBER ONE of a used Candler course. Will swap radio parts or magazines. Warren Wilson, Glen Ullin, N. Dak.

HAVE A PACKARD LEKTROshaver and a 5.5 mm. .22 Haenel air pistol which I will trade for a good candid camera. Will trade either or both. Edgar von Kircher, 1087 Gerard Ave., Bx., N. Y. C.

SHORT WAVE LISTENERS U.S. and foreign countries. Will swap my SWL cards for yours, QSL 100%. Want good preselector. Harold Smith, 565 W. 144th St. (Apt. 4E), New York City, U.S.A.

HAVE ELGIN AIR ROAMER III s.w. receiver complete and collection of American postage stamps with new album to swap. Want "Sky Chief" or "Sky Buddy" in good condition or? Harry Peeke, Co. 1995, CCC, Chatcolet, Idaho.

TRADE: RECORD CHANGERS, amplifiers, speakers, radios, parts, anything for radio goods, receivers, projectors, films. What have you? Warren W. Wigner, 1220 Fairview, Fort Wayne, Ind.

I WANT STAMP PUBLICATIONS of all kinds. I have fifty copies of Open Road for Boys from January, 1933, to date. Also other magazines or stamps if you desire. Robert Gise, Front Street, Nyack, N. Y.

HAVE PRACTICALLY NEW WEBster mobile 20 watt sound system complete. Value hundred dollars. Want Sky-Chief, Sky-Buddy or? Chas. W. Gwyn, Lott, Tex.

HAVE BICYCLE IN A1 SHAPE to trade for screw cutting lathe or what have you? Also have guitar. Lawrence Ruppenthal, Goltry, Okla.

SWL! WHO WOULD LIKE TO swap their own cards for one of mine. QRA Albert Fisher, 31 Woodland Ave., Laconia, N. H.

RADIOS, CAMERAS, FILMS, other items of value to swap. Want good portable receiver, portable transceiver, Rider's manuals, test equipment or what have you? Send your list or request mine. Jack Fry, Box 151, Denver.

WILL SWAP ONE VIEW CARD this region for each 4 large U.S. commem. stamps. Want: Fordson differential assembly, garden tractor, sales tax tokens. Swap stamps with South American. M. Jewell, 8 Fells Rd., Wellesley, Mass.

WANT TO TRADE—MAGNAVOX battery type dynamic speaker never used. Silver-Marshall laboratory type superheterodyne receiver 1929—used but in good order. Want Binoculars or Crossman Air gun. O. Ingmar Oleson, Ambrose, No. Dakota.

WANTED SWL CARDS FROM any part of the world, also correspondence, will exchange 100%. Will also exchange postal view cards. L. Mason, 400 Conner Ave., Detroit, Michigan.

RCA AP-947 RECTIFIED POWER amplifier unit 5 tubes 105/125V 60 cycle complete with tubes HD 6-volt PA speaker. Swap for best offer short-wave receiver. Watson, 320 Blevins, Ft. Worth, Texas.

HAVE READRITE ANALYZER model 720-A. Will swap for anything. Is in perfect condition, used very little. Original cost $14.70. Frank Hinnant, Jr., Fremont, No. Car.

HAVE 65 QST 1924-31, MISCELlaneous xmitting, rcvg parts, 1100 ohm, 8 in. Magnavox dynamic spkr., 110 volt DuMore type A motor. Swap for telescope, 16mm. motion picture film. W9TMQ, 3860 Harrison Street, Chicago, Illinois.

SWAP: LARGE U.S. STAMP book, U.S. and foreign stamps; Amateur's Callbook or Handbook, or Jones Handbook for good A.C. Ham receiver. Stanley Kasper, 933 E. 30th St., Erie, Penna.

HAVE FOTH-DERBY F3.5 CAMera; with Stoenhiel-Cassar lens, A1 condition, to trade for Riders manuals or will buy for cash. Gale Pasley, 2313 Washington Blvd., Chicago.

TRADE: HIGH QUALITY VOIGHTlander prism binoculars, good night glass, in case, for 5 meter mopa of medium power and modulator complete. No junk either way. Cecil Graves, 139 E. Main St., Madison, Ohio.

WANTED TO BUY OR SWAP: LaSalle Law Course, late books on all scientific and professional studies. What do you want? Rossiter, Waite Hall, Ithaca, New York.

WANTED: SUPER CLIPPER, SKYBuddy or Doerle D-38. Will trade "Buescher" silver plated soprano saxophone, in case, like new, or jeweler's lathe with chucks, etc. H. S. Lair, Vineyard Haven, Mass.

WANTED: GOOD CAR RADIO, 8 mm. projector, Argus enlarger, to buy or swap. Have many things. Wall, 114 Summit Avenue, Ithaca, New York.

WILL SWAP 9" MAGNAVOX dynamic speaker, set Hammarlund plugin coils, all kinds radio parts, magazines, stamps, power supply, scout books, etc. For S.W. receiver, transceiver. Please write. Myron Huebler, 2111 Ocean Ave., San Francisco, Calif.

WOULD LIKE TO SWAP SWL card with fellas in U.S. and all foreign countries. Will answer all cards. Write me in Spanish, French, Greek, Latin, German, etc. Bob Larson, 618 N. June St., Los Angeles, California.

TRADE: FRANKLIN INSTITUTE Clerk-Carrier course. Also DeForest's Institute Radio, Television and Sound Picture course. Interested in auto radio, good camera. Max Welton, 31 E. 24th St., Holland, Mich.

WANTED—A 1937 SUPER SKY Rider. Have for trade a National AC SW3, 2A5 xtal, 46 final c.w. xmitter (Triplett, National, Cardwell parts) and a complete Univex 8 mm. movie outfit. Julius Pincus, Independence, Oregon.

WANTED: OLD MODEL OF standard make super-het, power transformer, crystal and other transmitting equipment. Cheap for cash. Details first letter. Paul Ertsgaard, 1519 Allison St., N. W., Washington, D. C.

WANTED—SERVICE MANUALS. Will trade Majestic 90 B-power supply and Utah 110 Vt. A.C. field (O.K.) for Gernsback or Rider's manuals. You pay postage. C. J. Boylan, 815 Belgian Ave., Baltimore, Md.

WILL TRADE COLLECTION OF fine old and recent Canadian stamps for good camera or A.C.-D.C. All-Wave set. Will send list of stamps in collection on request. Lee Elkan, 903 Carnegie Hall, N. Y. C.

WILL TRADE—OVER 900 STAMPS —65 countries Scott Album—Covers—also Hawkins Electrical Guide 10 volumes 1925 edition for 2-3 tube 5 meter 110 A.C. receiver good condition. Arthur Landry, 18 Lester St., West Haven, Conn.

WILL TRADE—FBXA 75M. COILS for 160m. (B. Sp) T Patterson Preselector for D-104 mike, have 3909 KC crystal for 160m. fone crystal. Want Breting 12 receiver 75m. Coto-coils for 160 coils. E. W. Saxe, Northfield, Ohio.

SWL's AND POSTCARD COLlectors in the world, let's exchange cards. I also will exchange foto of me and my listening post for one of your fotos. Robert Cooper, 231 Grove Street, Tonawanda, N. Y.

HAVE COOKS ELECTRIC COURSE, Tunger charger, Waltham wrist watch, folding Kodak, camp stove, Chevrolet electric clock, horn, patented non-glare headlights, treasure locater. Want all-wave receiver, preselector, equipment, manuals. Glenn Watt, Chanute, Kansas.

WANTED: TUBETESTER OR Rider's Manuals, will pay cash or swap. State make and model. Thos. J. Tadler, Bx. 45, Owings, W. Va.

WANTED TO BUY, A 9 OR 10 inch screw cutting metal working lathe. I have a variety of radio parts, also GM photo electric unit. What have you to trade? Glenn Little, Edgewood, Md.

WILL SWAP 2 .00014 VARIABLE condensers for 2 .0001 variable condensers. Also would like to have a Xtal for 7120 Kc.'s. What do you want? Robt. Truhlar, 709 W. 61st Place, Chicago, Illinois.

HAVE BUCK JONES PUMP GUN, trade for simple short wave set, or a Kodak camera, with fast lens and shutter, both for 4 or 5 tube ham receiver. James Hagen, 109 Allendale Street, Rochester, New York.

SWL's ALL OVER THE WORLD, let's get acquainted. Send me your SWL card. I QSL 100%. QRA—Richard Briggs, 848 Belmont Street, Watertown, Massachusetts. U. S. A.

WILL TRADE—COMPLETE (NEW) course of Effective Salesmanship for good Radio & Television course (latest edition). Send description to Adrian M. Spiller, Jr., R. 2, Box 239, Sulphur, La.

WANTED: PHOTOGRAPHIC equipment, such as enlarger, complete tank developer or what have you? I have 80 meter transmitting crystal or other equipment. Bob Higgins, 41 West 8th Street, Bayonne, New Jersey.

SWAP VERY NICE CONSERVAtory oboe not used for a C. Melody Saxophone. Ernesto F. Alvarado, San Jose, Costa Rica. P. O. Box 969.

SWAP COLLECTION OF 475 stamps U.S. and foreign, mounted in 160 page Scott album for 12A7 tube and 8-8 mfd. filter condenser. Robert Pinkerton, 129 Hawley St., Rochester, N. Y.

HAVE FILAMENT TRANSFORMer 4 different windings. One, two, three tube receivers, power supplies, other radio needs. Need crystal mike, class "B" transformers. Will buy or trade practically anything Radio. James White, Box 146, Mansfield, La.

WANTED—A 16 MM. PROJECTOR or a small gasoline motor such as is used in model airplanes. Will swap radio parts. Write Terrence M. Genes, Box 14, Fort Lawn, S. C.

WANTED: LATE CANDLER RAdio Code course. Have 1 set (10 vol.) Hawkins Electrical Guides, 1 Drake's Electrical Dictionary and 1 Eastman Autographic Vest Pocket Kodak. George E. Oden, 448 Marshall St., Wauseon, Ohio.

HAVE NEW NO. 2 CHEMCRAFT set, Talk-O-Phone set, midget radio, Philmore selective crystal set. Want All-Wave radio, 5 meter set, or small communications receiver. Benjamin Kroll, 2000 Mapes Avenue, Bronx, N. Y.

TRADE 5 METER TRANSMITTER and receiver, speed key, QST, SW&T, Radio-Craft magazines, etc., transmitter power supply, pickup, meters, radio parts. Want good receiver as late Doerle, Hallicrafters. Gerald Samkofsky, 202 So. 2nd St., Brooklyn, N. Y.

SWL's, LET'S SWAP CARDS. QSL's wanted by me from U.S.A. and foreign countries. I QSL 100%. "QRA" Vincent Jager, 2220 Sturdevant Street, Davenport, Iowa.

1 RCA INDUCTION DISC MOTOR turntable, speed regulator; 1 Majestic induction motor turntable, speed regulator; 2 Magnetic pickups 2000 ohms. Will trade for good used short wave set. Victor Como, 400 Fourth Ave., McKeesport, Pa.

TRADE—16 MM. MACHINE, MOtor, 125 ft. film. Old foreign, U.S. post cards, books for boys. Swap my SWL for your QSL's? Want cheap receiving set for 20 meters. Paul Rowden, 1532 Montreat, Atlanta, Ga.

HAVE 50 QST's, POWERFUL telescope and microscope. Want 5 porcelain developing trays 7"x5", also film cutter or photo cell, or what have you? Robert Drotziger, 1303 So. 56th Ave., Cicero, Ill.

WILL TRADE TWO 2000 VOLT, 500 ma., General Electric transformers for one complete printing outfit at least 9"x12" and in good condition. Or what have you? Richard Ashton, 82 Arlington St., Lawrence, Mass.

WILL TRADE SET OF HAWKIN'S Electrical Guide (20 volumes) for communications receiver, good camera with fast lens and shutter, or what have you? H. V. Merritt, Dyer, Tenn.

SHORT WAVE LISTENERS IN the world, let's swap SWL cards. I will answer all received. QRA. Donald L. Stoberl, 130 Minerva Street, Tonawanda, New York, U.S.A.

WANTED A GOOD USED HALLIcrafter Sky-Buddy Super. Please send complete details. Also will swap new Univex folding camera for what have you. Paul Boer, Santa Ana, California.

(Continued on page 190)

BARTER and EXCHANGE FREE ADS (continued)

CORRESPONDENCE WANTED from foreign countries. I will trade picture postcards and U.S. stamps. I will answer all letters. Steve Finnegan, 723 South Federal Ave., Mason City, Iowa.

SWAP: EIGHTY DOLLAR CREDIT in the International Correspondence Schools for a good short wave set; for a better set the above and a National FB-7 complete. L. H. Jacke, 706 S. East St., Bloomington, Illinois.

SWL's I QSL 100% HR. SHIP ur ed today. Also swap picture postcards your locale for mine—quantities matched. QRA E. Steffen. CCC Co. 793, Hill City, South Dakota.

SHORT WAVE LISTENERS IN foreign countries and U. S. A. Let's trade SWL cards. I'll QSL 100%. How about it? QRA—Gerald Anderson, 539 Newton Ave. N., Minneapolis, Minnesota.

HAVE TWO NATIONAL VELVET dials, coupler, etc. Want unusual books and photos, anything. Ward E. Williams, 1414 10th Ave., Lake Charles, La.

HAVE 6 TUBE AC DC FOREIGN and American superhet, also small sets and parts. Want good Kodak or Argus candid camera, telescope, or what have you. Bob Snyder, 5148 Baltimore, Kansas City, Mo.

ATTENTION, SWL's IN ALL countries, will swap my SWL card for yours and will QSL 100 P.C. QRA—Robert McCue, 224 New York Ave., Union City, New Jersey, U. S. A.

WILL SWAP A NEW EXIDE airplane battery and 18 post cards published in 1907 for radio parts. Prefer complete set of four prong plug coils. Vernon Haywood, 228 Newport News Ave., Hampton, Virginia.

SWAP BUFFET COPPER COFFEE urn set, antique, ornamental, practical. Includes urn, pedestal, tray, shield, burner and filler. Want 40 meter crystal with holder, transmitter parts. Norman C. Kellerman, 71 Freund Ave., Buffalo, N. Y.

WOULD LIKE EXCHANGE SWL cards with any SWL in U.S. or foreign countries. All cards received will be answered with my card. Robert A. Yheaulon, 1222 W. Thompson St., Phila., Pa., U.S.A.

SWAP ONE MARATHON ELECtric motor, ¼ hp. 1710 rpm 110 DC volts, plus one 32 volt shunt motor 1/6 hp. Like to have P.A. parts, phone pick up, or? Erle Glover, Box 239, Osceola, Iowa.

HELLO, S.W. LISTENERS OF the world. Would like to exchange QSL cards with you. Send me yours. You will get mine by return mail. QRA—Charles Harold Thorpe, 25 Charles Street, North Rochhampton, Queensland, Australia.

WANTED: AMATEUR XTAL AND holder, 210 tube, or neon light. Will trade back issues of Lionel Magazine, several audio transformers, other radio parts. Make me an offer. Charles Ammerman, 355 Ridge St., Honesdale, Pa.

SWAP: MOROCCAN STAMPS OR post cards, for tubes, condensers, xtals, or what have you? CN8AH, Freddy Cote, Chez Mrs. Leriche, Rue Du Camp Senegalais, Marrakech Gueliz, Morocco.

TRADE GOOD PR. WESTERN Electric 2200 ohms headphones. Also B. Eliminator 135V peak—up to 12 tube sets. Taps at 22½-45, 67½, 90 and 135V. What have you? Norman Fleury, 1186th Co. C.C.C., Escoheag, R. I.

WANTED TO BUY: ONE RADIO engineering course second hand. Would prefer Capitol Radio course. Address particulars to R. B. McGee, VS41 Fleet Air Detachment, Coronado, California.

WANTED 1909 TO 1914 FORD Model T car in good condition. Send in pictures, description and price. Huenger, Islip Terrace, N. Y.

WILL SWAP A STEWART WARner short wave converter model 301-A for 1 or 2 tube AC short wave set. Jacob Melnick, 2317 Brown St., Phila., Pa.

SWAP 25 ISSUES AERO DIGEST from 1933 to 1936; chemical balances with weights; chemical equipment; QST and other radio magazines for short-wave radio equipment, or what have you. Jack Spencer, 513 W. 1a. Ave., Ruston, La.

ANYBODY INTERESTED IN EXchanging newspapers, send me one or two from your locality and I will return same number to you from Winnipeg, U.S.A. and Canada preferred. D. G. Sumner, 305 Washington Ave., Winnipeg, Canada.

NEED A 0-100 MILLIAMMETER, 160 meter crystal, 3—140 mmfd. midget variable condensers, mike, plus some other parts. I have a L.E.S. radio course which I will trade. Leo Gruetzmacher, Thayer, Kansas.

HAVE LARGE POST CARD PROjector, electric razor, double button mike, with transformer to match, telephone mike and cash. Want binoculars, folding camera. Send description. Chesley Towle, Route 2, Auburn, Maine.

TRADE ALL OR PART FOR GOOD miniature camera. WAC Ham Station. Transmitter RK20 final. 8 tube communications receiver built by Hallicrafters. All inquiries answered. Shelton Stanton, W5ACA, University, Louisiana.

HAVE BACK NUMBERS SW&T, radio parts, bug, earfones, meters, tubes, foreign coins, Civil War pistol. Would like to swap for photographic equipment. Write for swap list. J. H. Mason, 247 Prescott Ave., Elmira Heights, N. Y.

SWAP 4 TUBE SUPERHET 4 band converter, power supply; 3 tube super regenerative home built, factory facsimile S.W. receiver, A.C.; 20 watt CW transmitter, power supply; for? W2HAP, David Jashnoff, 1132 Forest Avenue, Far Rockaway, L. I.

HAVE 5 METER RCVR. USES 56 & 59 pwr. supply with 80 tube. National 803 socket. Elkton triple charger without rectifier. Want xmtr tubes or? Newell Kelly, 208 Congress St., East McKeesport, Pa.

I HAVE MANY ISSUES 35-36-37 and 1938 Popular Mechanics, Pop. Photography, Pop. Science and Modern Mechanics. Will trade for? Write for list. Robert Perlich, 3635 So. Wood St., Chicago, Ill.

WILL TRADE, ONE ALL WAVE signal generator A.C. D.C. made by Superior Instruments Co., one light weight 110 A.C. electric arc welder, no reasonable offer refused. R. I. Gardner, 2689 L St., San Diego, Calif.

Brain Waves! What Are They?

(*Continued from page* 141)

"Electric Potentials of the Brain in Certain Types of Mental Deficiency", by Dr. George Kreezer.

Dr. Kreezer has conducted many experiments in recording brain waves of mentally deficient patients at Vineland, N. J. It is the promise of science that tomorrow we shall know a great deal more about the human mind and the different classes of mental deficiency or affliction, so that in the next generation we shall probably be able to cure a major percentage of those afflicted with mental ailments. It can easily be seen that by comparing the brain-wave curves obtained from a mentally afflicted patient, with those of a normal person, that a great deal can be learned at once by those properly trained to make such a diagnosis.

Several classes of brain waves have already been discovered and catalogued. There is one class of wave known as the alpha rhythm, where the frequency is about ten wave per second. Other groups include waves with frequencies as low as 4 to 5 per second, like those discovered by Dr. Kreezer, which appeared over the motor areas of the brains of Mongoloid defectives, with mental ages below five years.

As pointed out by Dr. J. Roy Smith of Columbia University, who has made a specialty of brain-wave studies of infants and children, rhythmic waves with a frequency of 8 per second, as well as faster, smaller oscillations varying from 12-15 per second have been observed within a few days after birth. Waves having a frequency of 15 per second or greater have been recorded by other investigators.

An ink recorder might be made for such investigations as these, from an old dynamic loudspeaker unit, the moving coil being arranged by means of levers to actuate the ink recorder. The active electrodes (2 or 3 additional ones may be placed in position and connection made successively to the various electrodes by means of a switch or spring clip) are frequently placed at three locations on the head about one-inch to the right of the median plane, approximately over the right occipital area, over the right motor area and over the anterior part of the frontal area.

For special investigations where a very sensitive recorder is desired, the cathode ray oscillograph could be employed, but most of the investigators have not used such a sensitive apparatus, but have found an ink recorder of the usual form sufficiently sensitive for the purposes.

Another apparatus useful for the purpose and which has been employed by Dr. Kreezer at Vineland, N. J., is a bi-filar oscillograph, the record in this case being made photographically on a moving film.

As pointed out by Prof. Hallowell Davis of the Harvard Medical School, the encephalogram or brain-wave record is so distinctive for each person, that we may in the near future keep individual records of people by filing their encephalograms instead of fingerprints. Brainwaves have a potential of only a few thousandths of a volt and last for only one or two thousandths of a second, in most cases.

"CQ"

Physics Student—"How many kilocycles has WLW?"

"Ham"—"700."

Physics Student—"I thought they had more power than that!"

—E. HANNUM, W9ZNT

Bass Boosting for Any Amplifier

(Continued from page 157)

possible to secure a large impedance in a fairly flat curve from 20 cycles to 90 cycles per second. Beyond 90 cycles, the impedance of this filter drops off rapidly.

The first filter shown in Fig. 1 consists of a 250 henry choke, a 70,000 ohm resistor, and a .02 mf. condenser. This combination resonates broadly at 70 cycles. It is broad because of the 70,000 ohm resistor, which decreases the Q of the filter by a predetermined amount. The second filter consists of a 1080 henry choke, a 100,000 ohm resistor, and a .06 mf. condenser. This filter resonates at 20 cycles and is effective in flattening the response curve from 20-50 cycles. In both cases, the specified values must not be deviated from, if the proper response curve is to be secured. The 50,000 ohm resistor, R3, is also part of the load impedance, and it is this resistor only which causes the tube to amplify the middle and high frequencies. Since the total impedance of the two tuned filters from 20 cycles to 90 cycles is between 150,000 and 200,000 ohms, a considerably larger amplification will be secured at low frequencies than at middle and high frequencies. Fig. 2 shows the exact impedance curve of the two tuned filters without the 50,000 ohm resistor, R3.

The 25,000 ohm resistor and 2 mf. condenser are used as a decoupling filter, and to prevent hum disturbances which might result from boosting low frequencies.

The next step is to apply the booster to receiver or amplifier. First, select the tube to which the booster is to be connected. This tube may be either a detector or audio frequency amplifier, but it must be a high gain type; such as the 24A, 57, 6C6, 6J7, 75, 2A6, 2B7, 6B7, 6B8, 6L7, 6Q7, or 6F5; and in the original receiver circuit, it must be resistance coupled to the following tube. High gain audio tubes usually are resistance coupled, but there are exceptions, so make sure before attempting any changes. The next step is to completely remove whatever resistors are present between the plate of this tube and B+, and to connect the entire circuit shown in Fig. 1 between plate and the same B+ tap. And that's all there is to it.

The effectiveness of the booster may readily be tested by temporarily connecting a switch to the points marked A and B in the diagram. By alternately opening and closing the switch, the booster may be brought into action or be shorted out, and the exact effect on bass frequencies noted.

Should the low frequencies fail to be boosted considerably, the chances are that the rest of the audio system of the receiver is incapable of responding properly to these frequencies. A few suggestions may help to overcome this difficulty.

1—Increase the capacity of bypass condensers connected between ground and cathode of the audio tubes to 25 mf.

2—If any coupling condensers between the plate of one audio tube and the grid of the following tube is less than .05 mf., it should be replaced with a .05 mf. condenser; or still better, make it a .1 mf.

3—If the receiver uses push-pull output tubes, check to see whether these tubes are drawing equal plate currents. Radio tubes do not run absolutely uniform in production, so that under given conditions, one tube may not draw the same plate current as another of the same type. Simply connect a low range, high resistance d.c. voltmeter across the plates of the output tubes. If the plate currents of both tubes are exactly equal, the voltmeter should read zero. The reason for checking the plate currents is that push-pull transformers are usually designed to have no d.c. magnetization of the core. If the d.c. current through one half of the primary is appreciably larger than the current through the other half, the core characteristics may be altered sufficiently to produce a considerable attenuation of low frequencies.

The remedy for this is to adjust the grid bias on each of the push-pull tubes, if there is a bias adjuster in the receiver, or else obtain two tubes which draw equal plate currents.

And, of course, the receiver must use at least a ten or twelve inch speaker.—*Seymour Berkoff.*

Parts List

A.F. CHOKES*

T-93C20—250 henries—6400 ohms
T-29C27—1080 henries—6150 ohms

I.R.C. (Resistors)

1— 70,000 ohm ½ W. resistor
1—100,000 ohm ½ W. resistor
1— 50,000 ohm ½ W. resistor
1— 25,000 ohm ½ W. resistor

AEROVOX (Condensers)

1—.06 mf. tubular paper condenser (400 volt)
1—.02 mf. tubular paper condenser (400 volt)
1—2 mf. electrolytic cond. (450 volt)

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

The Rotating Antenna

(Continued from page 142)

transmitter at W3CRY uses a 20T tube in the final and runs at 100 watts input on the ten meter amateur band. With it he talks easily at high noon with stations on the Pacific Coast and has been reported heard in Bombay, India!

To the best of your author's knowledge this is the only antenna system of its kind in the world. To completely satisfy myself of the efficiency of this remarkable new rig, Mr. Aucott permitted me to talk to a West Coast station, namely W6MBD, in Los Angeles. His signals came in exceedingly strong as long as the system was facing a westerly direction.

I then asked Aucott whether it made any real difference on this matter of direction and he demonstrated it. He swung the steering wheel controlling the antenna in the attic until the compass pointed north. The signal strength of W6MBD faded from an R8 to an R6. Then he swung it south; as it passed west, the signal strength came back up to an R8. Upon passing west to south it faded back again to R6.

In the winter time amateurs have a lot of trouble with ice and sleet forming on outside antenna, stretching and sometimes even breaking them. Windstorms often blow down wires and masts. All this danger is eliminated, naturally, by Mr. Aucott's attic system. Those who intend to try it should be warned that it cannot be used effectively in buildings other than wood frame type.

Details of Feeder System

The lead-in or feeder system in use at W3CRY is ordinary twisted No. 14 wire which may be purchased at any radio store. E01 cable may be used but as the R.F. current is low in a center-fed doublet-type antenna system, Mr. Aucott found the type used very satisfactory.

Connection between the feeder system and the half-wave antenna was made by fanning out the antenna end of the feeder system for approximately twelve inches, and then soldering the No. 14 doublet wire directly to the antenna. There are no slip rings or brushes used in Mr. Aucott's case; enough slack is left in the feeder line so that the antenna may be rotated in 180 degrees in either direction; it is not rotated in a complete circle.

The antenna itself is a half-wave doublet with a quarter-wave reflector behind. The antenna is made of 1-0 solid copper wire, and is mounted in the attic on an H-shaped wooden frame, constructed of 2 x 4 inch lumber. The antenna was constructed for operation on 29,072 kc. but is now used also on 28,628 kc. Both of these frequencies are within the limits of the 28 mc. (10 meter) amateur 'phone band.

Hams Should Register at Local Post Office

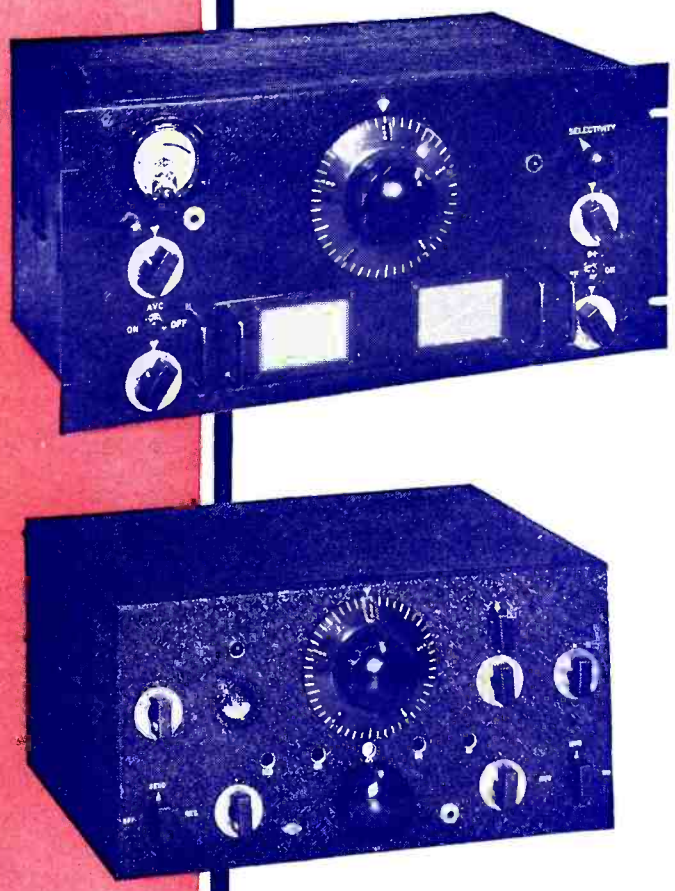
● WE are advised by one of our radio old-timers, Albert H. Ryan, that it is important that all licensed Hams register their call letters with the local post office, otherwise QSL cards addressed to them and bearing only call letters and town will not be received. After ten days, Mr. Ryan informs us, the post office destroys all QSL cards not delivered and which bear only the call letter and town.

Wanted! Old "Ham Station" Photos!

Give date when station was in operation and brief description, including owner's name and location. Send to Editor, % this magazine.

● 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.)

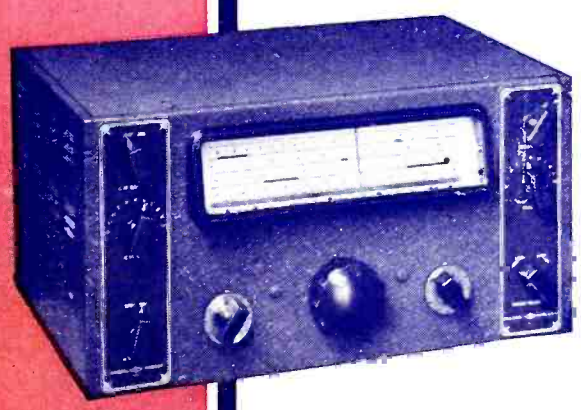


HRO

Designed with cost secondary to performance, with the one idea of obtaining the maximum of effectiveness in difficult communications work, the HRO Receiver has won a unique reputation for outstanding capability.

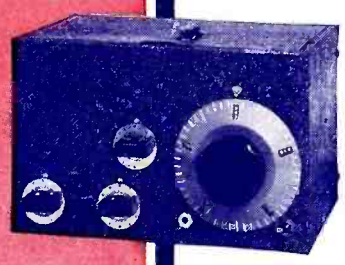
NC—101X

Somewhat lower in price than the HRO, and equipped with the added convenience of knob-controlled coil shifting, receivers of the NC-100 series have a consistently high performance that make them favorites in amateur stations throughout the world.



NC—81X

Offering the maximum of performance possible at a low price the NC-80 series are true Communication Receivers, capable, long-lived, and efficient. They provide extremely good performance-per-dollar value.



ONE—TEN

A special purpose receiver, the 1-10 Receiver covers the range from one to eleven meters, and is intended solely for work at ultra-high frequencies. It fills the need of the experimenter for an adequate receiver to cover this wide and increasingly valuable field.

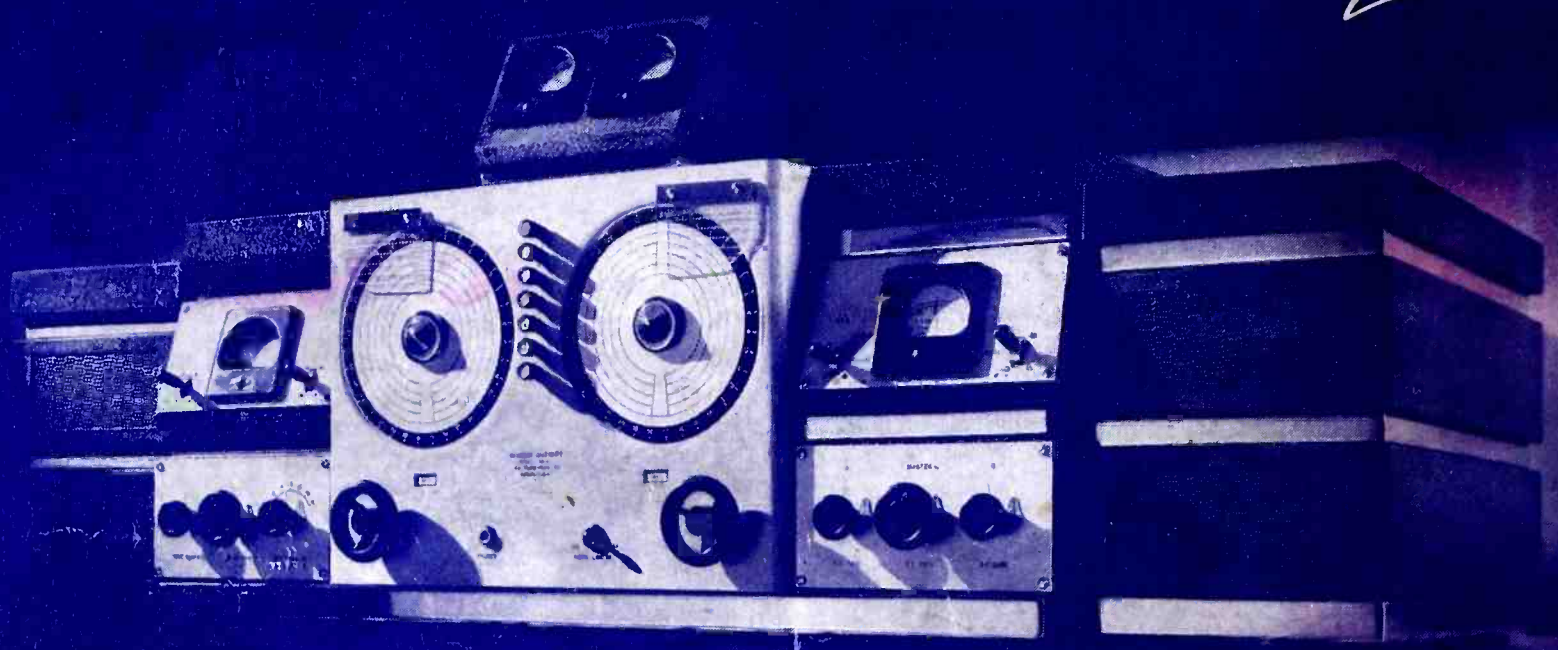
A FINE RECEIVER FOR EVERY PURPOSE

NATIONAL COMPANY, INC., MALDEN, MASS.

diversity reception for the amateur

the skyrider *Diversity*

Model DD-1



A Dual Diversity Receiving System

Students of modern radio are familiar with diversity reception as used by the larger commercial stations. Receiving Systems based on the diversity principle have been built at great expense. Designed to provide better short wave reception, they have been highly successful in eliminating fading and have effected remarkable improvement in the quality of reception.

In an attempt to bring this same quality of reception in practical form to the amateur operator and short wave listener, Mr. James L. Lamb*, Mr. J. L. A. McLaughlin** and Mr. Karl W. Miles**, engineers notable for their activity in the amateur radio field, have made an intensive study of Diversity Reception.*** The SKYRIDER DIVERSITY represents the culmination of several years' work by these engineers. The principal advantages of Diversity Reception, as provided by this Dual Diversity Receiving System, may be summed up as follows: 1. The reduction of fading to negligible proportions. • 2. An Increase of Signal Strength over that of any single receiver. • 3. Improvement of Signal-to-Noise ratio over any single receiver. • 4. Reduction of heterodyne beat note interference.

The principles of functional design have been followed throughout the construction of the SKYRIDER DIVERSITY. Every single component has had especial attention from the designing engineers, and no expense or effort has been spared to bring the SKYRIDER DIVERSITY to a high standard of electrical and mechanical perfection worthy of so advanced a receiving system.

In the SKYRIDER DIVERSITY, the Hallicrafters offer the advantages of Diversity Reception to the amateur and short wave listener for the first time, in easily operable form, and at a price within reach of the average purse. See the New SKYRIDER DIVERSITY at your dealer's today!

* Technical Editor—QST ** the hallicrafters, inc. *** QST—May, 1936, QST—November, December, 1937

All Hallicrafters Receivers available at liberal Time Payments

the hallicrafters inc.

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world's largest builders of amateur communications receivers