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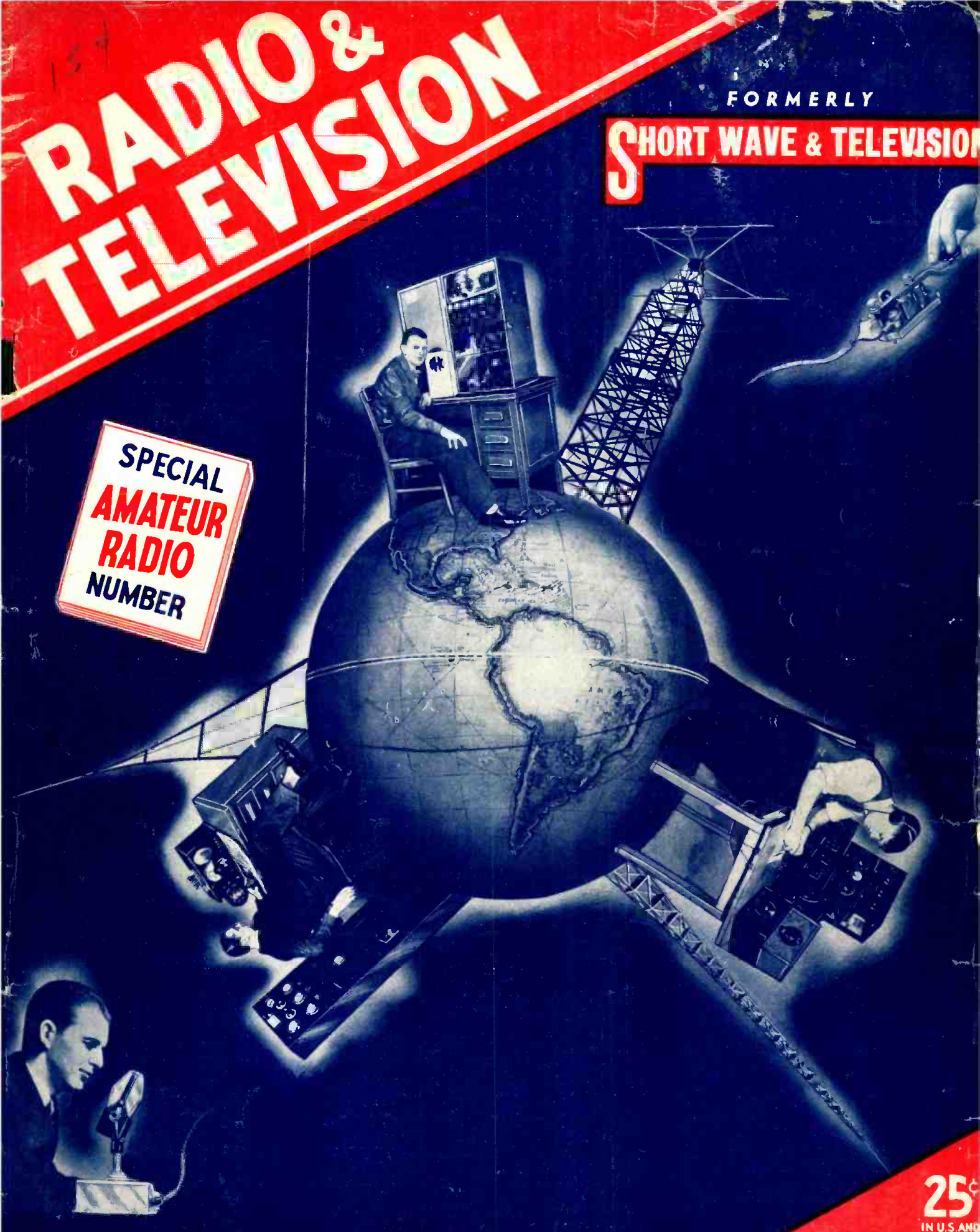

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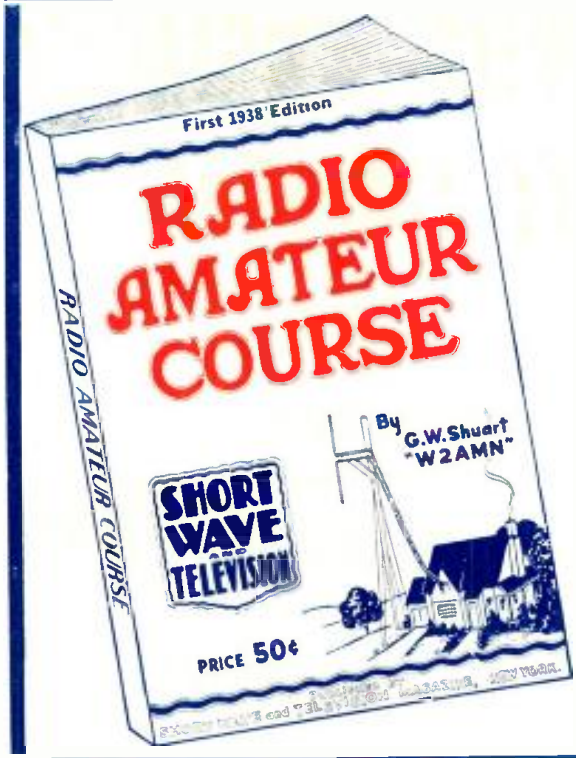

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RADIO & TELEVISION

The Popular Radio Magazine

OCTOBER—1938

Vol. IX No. 6

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

In This Issue

Cover composition by H. Gernsback and Thomas D. Pentz. Photos: HAM Stations, top—C. A. Kowalski, W9KHC; right—Max Otto; left—Eric W. Vogeler, W1JXV. Antennas, top—W. S. Burkhart, W4DLH; others—C. A. Kowalski.

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In the Nov. Issue

A 110 Volt D.C. Transmitter—Herman A. Yellin, W2AJL.

A Versatile Cathode-Ray Monitor for the HAM Station—A De Luxe Instrument of Low Cost—C. Walter Palmer, E.E.

A DX Aerial for Short-Wave Fans—Tom Aso.

A 5 to 50 Meter 6-Tube Super—Harry D. Hooton, W8KPX.

One Meter Transmitter—Nelson G. Haas and Carl A. Erbacher.

Reception with the Flat-Top Beam Antenna—John D. Kraus, W8JK.

Here's a glimpse of the cathode-ray de luxe monitor to be described in the next issue by C. Walter Palmer, E.E. A demonstration proved that it is indeed an instrument of many uses.

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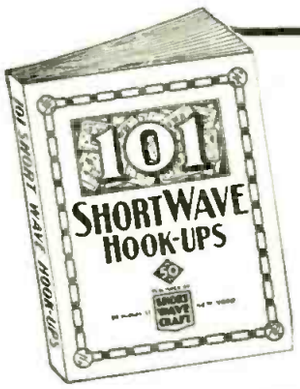

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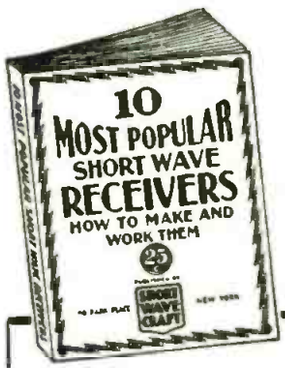

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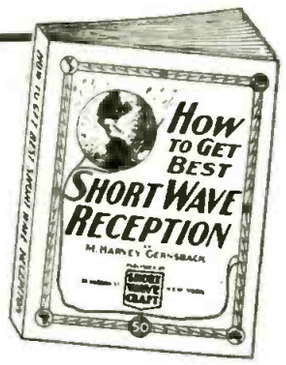

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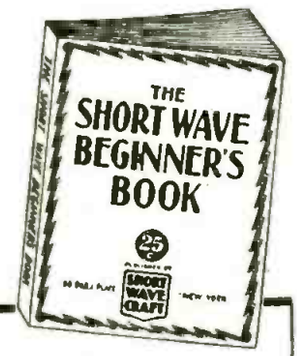

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Please say you saw it in RADIO & TELEVISION

HUGO GERNSBACK, EDITOR

H. WINFIELD SECOR, MANAGING EDITOR

"RADIO & TELEVISION"

HUGO GERNSBACK, Editor

● WHEN in June, 1930, I published the first issue of this magazine under the name of SHORT WAVE CRAFT, the short wave art had just gotten under way and its wonders attracted many thousands of individuals. Particularly was this true of the radio experimenters and constructors who were intensely interested in building one and two tube short wave receivers, with which it was perfectly possible, even in those days, to receive radio programs from foreign countries.

As the art progressed, during the next few years, the incentive to build short wave receivers by private individuals slowed down, for the reason that commercial sets were appearing in ever increasing numbers and it became possible to buy such sets at constantly lower prices.

When a few short years ago the all-wave radio receivers made their appearance, the incentive to build one, two and three tube short wave sets was still further diminished, while today practically all radio sets that you may purchase in the open market are built for broadcast and short wave reception.

History repeated itself in this respect, duplicating the pioneer days of broadcasting. In the early 20's when you could not buy a complete radio set, the experimenter and builder had a paradise of his own. Then about 1925 the commercial radio sets made their appearance, which spelled the doom of over one million home radio set-builders—except for a group of about 100,000 builders who still continued to construct radio sets for the mere enjoyment of it. It was this class who, about 1930, graduated into Short Waves and who were kept busy constructing receivers up to the past few years, when again the commercial sets overtook them and reduced the incentive for building purely short wave sets.

By all this I do not mean that there are no radio set-builders left in the United States today. Quite to the contrary I believe their name is still legion and I know there are even today between 75,000 and 100,000 individuals left who are interested in radio building and radio experimentation.

Changing times and changing conditions naturally influence these builders. Many go into other lines, become engineers, engage in the manufacture of radio material themselves, become servicemen, etc. But in their place you will find every year a new crop of radio enthusiasts, who as yet have not had a taste of radio experimentation and to whom the entire field is still new.

During the past few years we have not had a vital reduction in radio enthusiasts, but to the contrary there has often been a healthy increase. This may best be shown by the continuous and steady growth of those radio experimenters called *radio amateurs*, who now have rolled up A GREATER TOTAL THAN HAS EXISTED AT ANY TIME IN THE HISTORY OF AMATEUR RADIO IN THIS COUNTRY.

Changing conditions in radio make necessary other changes within the industry. One of the minor changes —in order to keep abreast of the times—has been the change of the name of this magazine.

For some time we felt that the name SHORT WAVE & TELEVISION was not broad enough to cover this fast growing industry. Moreover, the distinction between short waves and other radio waves is no longer as marked as it was eight years ago when this magazine was launched. For this reason it was felt that the change of the title to RADIO & TELEVISION would be more in keeping with the changing times and would not impede the progress of the magazine.

On the other hand, the new title will broaden the field of the magazine, particularly the field of radio experimentation and amateur radio.

No radical change of editorial policy is contemplated in RADIO & TELEVISION. The magazine will continue to serve the thousands of radio experimenters and radio amateurs and particularly the new-comer in radio experimentation, as well as the man who hopes to break into amateur radio.

Particular attention will be paid, as of old, to the radio beginner, that is the young man who knows nothing of radio today and who will be one of the countless thousands of radio experts of tomorrow.

There is no other magazine today in the United States which serves the radio beginner and RADIO & TELEVISION will continue in helping to shape the radio destiny of those serious-minded young people, who are just getting under way in radio and who, ten years hence, will be the backbone of the radio industry itself.

FAMOUS RADIO EXPERTS

DR. LEE DE FOREST, Ph.D., Sc.D.

Dr. de Forest—world-famous for his invention of the audion, which included a grid in the vacuum tube. This made possible our present marvelous V.T. amplifiers, modulators and transmitters. He was also a pioneer in radio telephony.

● AT this time it is fitting to recall briefly the part played by the "Ham" and amateur in Radio's development. The early amateurs, between 1906 and '12, were usually considered by all "professional" operators, commercial and naval, simply as unmitigated pests, to be legislatively suppressed. How often was a ship operator told by some small boy (location unknown) whom he had just asked to "Shut up"—"G.T.H. this is a free country. Ain't the air free?" Then came the Radio Act of 1912, the irksome license requirements, and all Hams thrust tyrannically into the cellar (or attic) below 200 meters, considered then as a bleak and unprofitable ethereal Siberia.

The World War first demonstrated the priceless value to the nation of the radio amateur, as has every crisis of flood, storm, or earthquake since. While the "commercials" were struggling for dependable trans-oceanic communication with cumbersome alternators, arc generators, and even spark transmitters, using thousands of watts of power on the "very valuable" wavelengths from 600 to 20,000 meters, *(Continued on page 358)*

DR. FRANK CONRAD

Assistant Chief Engineer, Westinghouse Electric & Manufacturing Co.

Dr. Conrad—the "father of short waves" in America. He carried out extensive tests in the early days of short waves which laid the groundwork for our present structure.

● LIKE many others, my first experiences in radio came when I was an amateur. The first call letters assigned me in 1915 were 8XK. I worked under this call for many years.

My first radio set was hand-built so that I might obtain, for my own personal information, Arlington Time Signals. After this first set was constructed and ready to operate, instead of getting Washington, I actually received the signals from another amateur, John Coleman, who lived a few squares distant from me in Pittsburgh.

Later as my experience in radio grew and equipment became more extensive, I corresponded with many amateurs in various parts of the country. Some of the pioneering testing was reported by these correspondents. They aided the art in those early days by keeping in touch with those who were engaged in trying out new ideas, many of them revolutionary at the time.

I remember, too, that after broadcasting began and the commercial stations became powerful, that the amateurs whose spark sets often blasted early programs were quick to respond to requests that they shift their hours of operation to wavelengths bands that did not interfere.

Many executives, prominent in radio today, began their careers as amateurs whose experience became their springboard to commercial jobs with broadcasting concerns and radio manufacturers.

I feel even today a strong bond of fellowship with all radio amateurs who now, just as in the old days, carry on their own individual experimenting and their communications, not only in this country but with other amateurs in all parts of the world.

One of the most important developments of radio has been in the so-called short-wave field. Prior to 1921 it was believed that these high frequencies could carry only a few miles as the skip-distance effect had not, at that time been thoroughly investigated. The common wavelength for radio communication was somewhere around 300 meters, except for government stations such as Arlington.

Now these short waves, in which the modern amateur operates, carry to every part of the globe and in this band are the future possibilities for an expansion of radio's service.

There will always be a definite place in radio for the amateur. As an individual and as a group my experience with him has been worthwhile. My heartiest wishes are that long may he continue to be a part of the radio world.

DR. E. F. W. ALEXANDERSON

Consulting Engineer, General Electric Company

Dr. Alexanderson—famous radio research engineer and one of America's radio pioneers. Designed early high frequency generators and basic antennas. Demonstrated "large screen" television ten years ago.

● THE amateur has always been a pioneer exploring the latest developments in radio. When we did our first experimental broadcasting from Schenectady in 1916, we received many letters from amateurs reporting on the quality of the reception. Radio telephony was then new and these reports served us both as a guide in our technical endeavor and as encouragement in our efforts along new lines. Later, when broadcasting was well established, the amateurs were among the first to explore the use of short waves over long distances; thus again when we broadcast television regularly from Schenectady in 1928 we had to depend largely upon the amateur for forming an opinion on the value and practicability of long distance television. Among the amateurs who sent us regular reports were one in Los Angeles and another in Germany. The fact that clear images could be received occasionally was interesting and encouraging, but we concluded that the results were too unreliable for regular broadcasting and these tests were discontinued.

It is my sincere hope that the amateurs will continue their pioneer work. The wavelengths below one meter is a large and unexplored field and even if it is found that reliable communication is limited to the visual horizon, there are interesting possibilities for amateurs to form chains to relay such waves over long distances. The amateurs may also do valuable work in popularizing new developments in radio transmitters and receivers, such as the Armstrong system of frequency modulation.

RALPH R. BEAL

Research Director, Radio Corporation of America

Ralph Beal holds the important post of Research Director of RCA and he has had an extensive career in American radio. As a practical engineer, his word to the American radio amateur is very welcome.

● THE American radio amateur occupies a position that is fast becoming unique in the field of world radio. Here, we look upon the radio amateur as an American institution, and it is apparent that in a comparatively short time he will be limited almost completely to the Americas. An indication of this is to be found in estimates which show that out of a world total of 70,000 licenses, the United States has approximately 48,000.

The American amateur's status is based upon two fundamentals. He has at his disposal the knowledge and the material with which he performs a service of value to himself, to the public, and to the radio industry; and he has the personal freedom to perform this service, privately or publicly. He lives under a democratic form of government that recognizes the right to individual freedom, while in other sections of the world the amateur is permitted to exist only under restricting regulations, if at all.

Both the public and the radio industry owe debts of gratitude to the American amateur. He stands *(Continued on page 358)*

O. B. HANSON

Vice-president and Chief Engineer, National Broadcasting Company

Mr. Hanson—chief engineer of the NBC, is responsible for the many new and valuable engineering achievements put into practice over the vast network operated by his company.

● MOST of us who now control the technical operations of radio broadcasting began our careers as "hams." Some of us still tinker in the amateur bands, trying our hands at new circuits and testing the *(Continued on page 358)*

SALUTE THE AMATEUR

JOHN V. L. HOGAN

Consulting Engineer

Allied News-Photo.

Mr. Hogan is well known to American amateurs for his work in radio, particularly in television and facsimile. Also his "high fidelity" transmitting station now in operation near New York City, marks a new departure in broadcasting.

● IT seems to me that the present status of the radio amateur is vastly improved, in comparison to his standing in "the old days," and that there is little or no uncertainty as to his future. Because the radio amateur is one who loves radio, and who works in a communication field closely parallel to that of commercial radio, he generally is able to contribute usefully to the service of radio. His contribution may be in his experienced and skilful work, it may be by way of invention, or it may simply be the use of his own equipment to provide a valuable communication link in some emergency. In any event, amateur radio operations always have been (and always should be) encouraged, for they are good for the science, the art and the business of radio. Better yet, they are good for the amateur himself.

Looking back to my own amateur days, from 1904 to 1909, I feel that what I then learned by practical experience in the use of radio apparatus has been of inestimable value in my later professional work. There is perhaps no better way to learn what radio is about and how it works than to study the literature of the art and to apply its teachings in one's own amateur station. Today the amateur has the benefit of finer apparatus, better books and periodicals, and greater communication opportunities than existed in the early 1900's. In those days one could not find hundreds of fellow hams to talk with over the air, and we had no radiotelephony and no vacuum tubes. There were so few stations that no licensing system was needed to limit interference, and, while we had almost infinite opportunity to copy messages from nearby or distant ship and shore stations, we usually could find only a few friends to whom we might transmit.

Amateur conditions have changed for the better since those times, but the old excitement of improving one's apparatus and the old romance of receiving over great distances remain the same. And so does the opportunity for the progressive amateur to move forward into a successful professional career.

C. W. HORN

Director of Research & Development, National Broadcasting Company

Mr. Horn, like Dr. Conrad, has been responsible for a great deal of our short-wave engineering triumphs. Thousands of tests were made with transmitters, receivers and antennas by Mr. Horn when short waves were believed to be practically useless.

● THE average person thinks of the radio amateur as something of a "bug" who loves to operate his station to communicate with his friends both far and near. In doing so he sometimes causes some interference to broadcast reception, which results in occasional letters to broadcasting stations or the United States Radio Supervisor. I feel that the true worth of the amateur is not usually understood, sometimes even by the amateur himself.

In the old days when the amateurs were using spark sets, they caused a great deal of interference to broadcast reception, but when the problem became serious the amateurs cooperatively undertook to cure the evil, and succeeded almost 100 per cent. As a pioneer in the broadcasting game, I received many complaints, and there was even action taken to restrict the amateur. Instead of forwarding these complaints to the governmental authorities, I usually referred them directly back to the amateur, and frequently to the Amateur Radio Relay League, because I knew that many of the complaints were unjustified, and also that the amateurs themselves would correct their apparatus and eliminate the difficulty. I am happy to state that not one of the thousands of complaints that I received was ever forwarded to a government inspector.

Perhaps my attitude was due to my having been one of the old pioneer amateurs.

(Continued on page 358)

JAMES MILLEN

"Jim" Millen, as he is known affectionately to thousands of "hams," is well known for his development of high-class "ham" transmitting and receiving equipment. He has also written many valuable articles and books on short waves, and his personality and engineering ability have been a powerful factor in amateur radio development.

● IT seems to me that many of the present day amateurs are missing one of the most important benefits to be derived from amateur radio, in confining their contacts with other hams to a standardized description of their rigs, type of antennas, and the weather. Amateur radio affords too great an opportunity for the exchange of opinions, information, and ideas on worth-while subjects of mutual interest. If one's hobby is amateur radio, and he wants to confine his transmissions to a discussion of amateur equipment, certainly there is ample material for worth-while discussion other than the endless repetition of a highly condensed station description.

On the other hand, amateur radio affords such an unusual opportunity to discuss other hobbies and subjects such as photography, stamp collecting, model airplane construction, gardening, etc., that it is a shame that more of us do not use this modern communication system as an entering medium to other new, interesting, and educational fields.

R. A. HEISING

Bell Telephone Laboratories

The name of Heising is known to every radio amateur. The famous Bell Telephone Laboratories are to be congratulated on having associated with them a man of such far-sighted engineering introspection as Mr. Heising. His researches have greatly benefited American radio development.

● IT has been said that the radio amateur has made many of the important technical advances in radio. That certainly is true. It is very often the man who can bring a new point of view into a problem who can find a successful answer.

But who is an amateur? It might surprise one to think of the Bell System being a radio amateur at one time, but that is the case. In 1914 the American Telephone and Telegraph Company put into commercial use as wire telephone amplifiers the high vacuum tubes that had been developed in its laboratory. Telephone executives began to think they might experiment in radio to see what there was to it. They hired a number of young men right out of college, including the writer, and began active work. None of the new men, nor the directing engineers, were *radio* men, nor did they have any practical knowledge of radio. They were all rank amateurs in that respect.

They worked in the laboratory first. They built a transmitter at Montauk and a receiver at Wilmington and made their first radio telephone tests. They built a transmitter at Arlington and sent out receivers to remote places and made longer radio telephone tests. Then they made other sets at the request of the Navy Department for experimental use. All this time there was no plan for commercial exploitation. It was all to see what could be done.

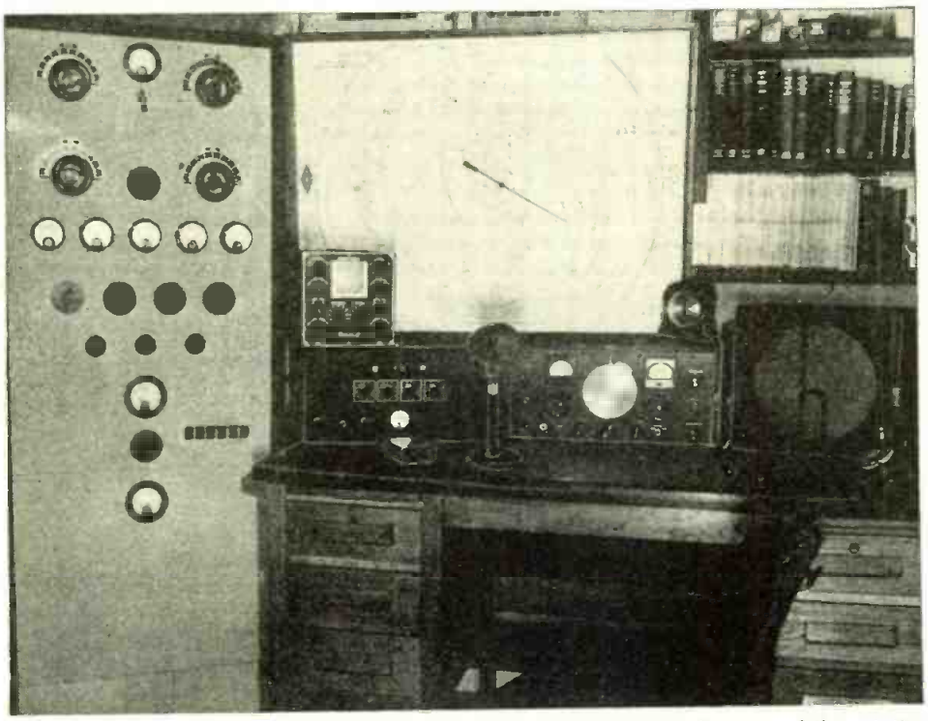
But, like all amateurs, their experience was valuable to the government when we got into the war. The radio telephone experience of the Bell System was called upon immediately to provide something of military value and use. As a result, radio telephones were made for submarine chasers to give instant communication in convoy service, and radio telephones were made for airplane spotting service and formation flying. These were the first practical radio telephones in history. They contained new circuits that were so much more efficient than those in previous radio telephones and so much simpler in construction and operation, that they were instantly adopted and continued to be used for many years. Because the engineers who developed them had a substantial background of telephone principles and practices, the purely radio part was backed up by the important wire part of properly designed telephone accessories for satisfactory reproduction of speech. It was the happy combination of the fresh viewpoint of the amateur backed up by the seasoned judgment of the expert that made the radio telephone possible, and which brought the broadcasting art to its present high quality.

(Article by Comdr. R. H. G. Matthews appears on page 358)

The PHONE HAM and What He

Llewellyn Bates Keim,

Many people ask —"What does a *phone ham* do?" Mr. Keim is an outstanding American radio amateur who carries on phone contacts with stations both in this country and abroad; he here tells many unusual things about the "phone ham".



W2BTP. A neat and effective 20 meter station, particularly interesting because of the rotating antenna installation. The large map pointer turns with the antenna, indicating the direction in which the signal is traveling.

● HAVE you ever stopped to wonder, while tuning on the short wave bands of your broadcast receiver, just what sort of "Genus Homo" is this thing known as a *radio amateur,* and just why is he there? Though the amateur fraternity is divided into two groups, those who communicate by the Continental Morse code and its language of dots and dashes, and those who use telephony, this latter group—although smaller in number—is the more important. Important, I repeat, for it is through them that the public has largely learned of this vast army of experimenters with Hertzian waves.

Popular misconception has associated the radio amateur with a performer on a broadcast hour involving non-professional talent as its entertainment vehicle. But the genuine "ham" dates back many years before the war, when the amateurs gave the Brooklyn Navy Yard keen competition, before the days of licensing authorities or the Federal Communications Commission. The art of wireless communication has made great strides in the last thirty years, and ever in the vanguard of this march of progress has been the *amateur,* with his omnipresent tubes, coils, and condensers.

Early Phone Hams Gave Us Broadcasting

Lest you may wonder why there is a spot on the dials of your receiver, devoted to this activity, instead of providing an operatic or educational program, for your entertainment, let me trace a little of the history of the *phone ham* as a class. All of our present-day broadcasting is due directly to the activities of some of the earliest *hams,* and among them the names of de Forest, Cannon and Conrad are ranked as the *pioneers.* These, and *hundreds of others like them,* have by their interest and devotion to their hobby, made possible this whole thing known as *broadcasting,* and it will ever be a lasting tribute to the amateur, that hardly a broadcast station exists in this or any other country which does not number at least one amateur on its staff. The so-called short waves were once considered useless for commercial use, so the amateur was told to play there, and, to the consternation of his more learned elders, he turned this part of the ether spectrum into the most valuable of all the com-

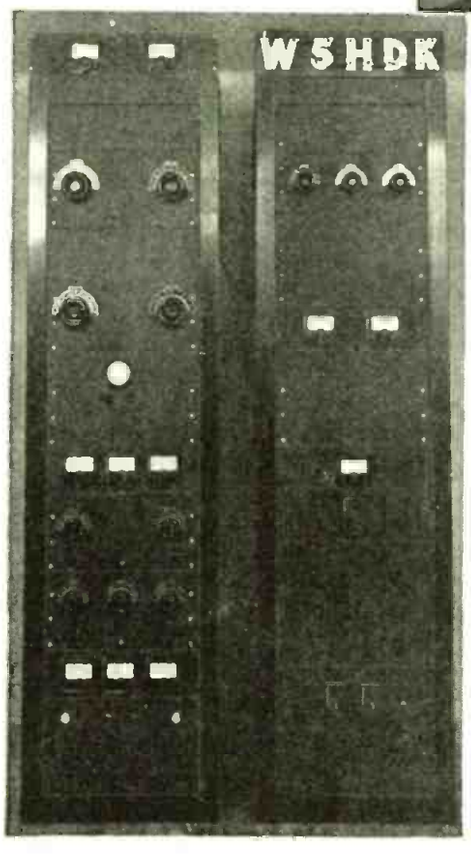
Below—Radio Amateur Station, W8KXN, Plattsburgh, New York. Located deep in the Adirondack Mountains, Mr. Lambert is well known on 75 meters, throughout the Eastern part of the U.S. and in England.

Does

W2IKV

Boy, what an amateur phone station! The call letters are W5HDK and the equipment includes professional type receivers and a transmitter designed and built by W5JC.

In the photo below of the transmitter, note the neon call letters above the modulator rack. The r.f. rack contains two transmitters of one kilowatt each, for operation on 10 and 160 meters.



munication frequencies. As a pioneer, *the radio amateur has no master.*

As we mentioned above, there are telegraph devotees, and those to whom the radio telephone is the more interesting. It is with this latter group that we are more concerned for the moment.

Phone Ham May Be 16 or 60

Let us never lose sight of the fact that all *phone hams* are also telegraphers, and the amateur who follows along this track is an equally important part of the fraternity, providing a great number of skilled operators ever ready to serve their country in time of emergency. But the general public knows little of them and their activities, since the average household receiver is not equipped to render code signals intelligible, and even fewer average householders can read the dots and dashes. This does not hold true of the daily conversations of the phone ham, and it is this fellow in whom we are interested.

Statistics show that he may be sixteen or sixty, a wealthy corporation executive or a young lad striving hard to save enough to acquire that new piece of apparatus so badly needed in his rig, yet all of them meet on one common ground—they are brother hams. The friendships they make over the air are far, wide and lifelong, and all that each knows of his friend is the way he handles his key, or the sound of his voice, and the personality behind the microphone.

Ranging from the amateur who has purchased his equipment completely assembled, to the lad who builds his all, there is every possible stage in between. To each one the hobby holds forth a different interest. Some wish constantly to try out a new circuit by arranging their available gear into a new combination, claimed by a brother ham to give more power and a louder signal at the far end; others wish only to develop their operating ability and prowess at contacting the more elusive of dx stations. Still others are chiefly interested in the way the several bands available for amateur communications behave throughout the year, experimenting with various antennas until they can foretell what type of conditions to expect. This study of the propagation of electric waves is perhaps the most interesting of problems an amateur can set for himself, the field is the largest and least crowded, and in the end, the results may be the most interesting. No matter what else he may be doing, however, the true phone ham is constantly delving into some problem, and the desire for knowledge is enormous.

5 Bands Open to Phone Hams

What goes on inside of a ham station during a typical day's operating would be hard to relate, as there are so many activities that a short article could hardly do them all justice. There are five bands open to radiotelephone operation, provided the amateur holds the Class A license, and each of these has its devotees, but this does not say that an amateur may not operate on all bands. Many do, and advisedly so, thereby covering the widest scope of activity and making the most of their hobby. The wise amateur selects his operating frequency to cover the distance he wishes to work, and, transmitting conditions being favorable, he contacts his station with the least interference to his brother hams. Local contacts, those within a radius of about twenty-five miles, now take place mostly on five meters, a beehive of phone activity in the metropolitan centers, and at times this band, too, offers signals from surprisingly great distances.

One never knows what thrills lie in store in this great indoor pastime. Because of the simpler nature of equipment needed to set up a station on five meters, many newcomers make their bow to the air waves here, and even the more seasoned amateur finds pleasure in outfitting his auto or even his boat, if he is fortunate enough to own one, with a complete station, so that he may try his skill in mobile operation. This

(Continued on page 364)

Back in the CRASHING

Experimenter-Amateur 5QW (until 1915). Author, Inventor, Engineer, Chief Radio Operator "WNU"—signed "Z." First Editor "Radio News"—Member Institute Radio Engineers, Sales Executive and presently Manager, Advertising and Sales Promotion—Engineering Products, RCA Manufacturing Co., Camden, N. J.

E. T. Jones

● AFTER I tell you that I have been searching twenty-nine years for the radio bug that bit me during the latter part of 1909, you'll be disappointed when you fail to find me hiding behind a set of long gray whiskers. While I have not as yet seen this strange yet fascinating creature, he must look something like an octopus with about forty times the number of tentacles because once he grabs you there is no "letting go."

It was during the autumn of 1909 when I first felt its pleasant bite. I had just listened to telegraph signals coming from apparently nowhere—right out of the air—without the aid of connecting wires between the point of transmission and reception. Unbelievable—but there the signals were, loud and clear. My hair stood on end—it was like receiving a great shock—it registered a long-lasting impression that is just as realistic today as it was then—29 years ago.

The "First"

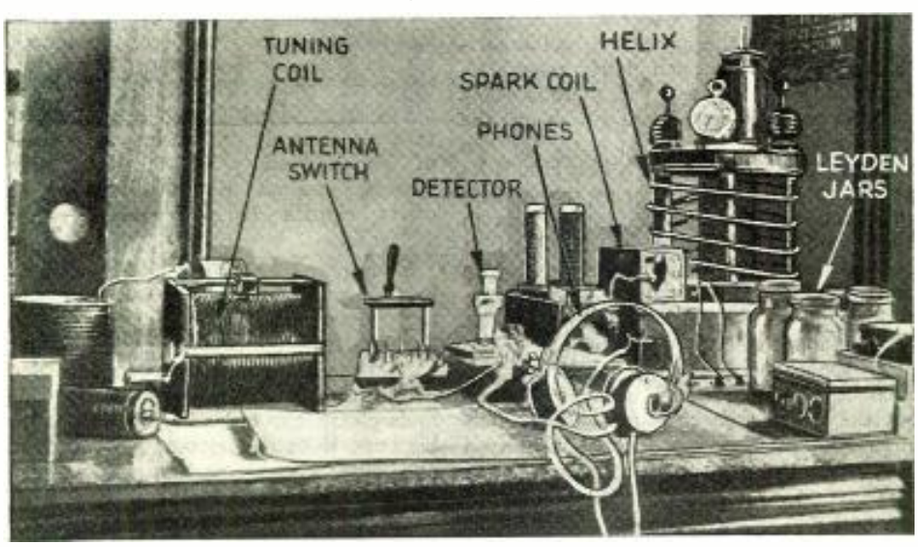
The only book on the subject available to me at the time was Hugo Gernsback's MODERN ELECTRICS. I read each issue at least *one dozen times,* while waiting patiently for the next issue to arrive. I read interesting accounts of extremely successful Amateurs who were able to copy ships and radio stations *from tremendous distances* up to and including 75 miles! Of course they employed super receiving stations—especially the antennae—4 to 8 wires, 200 to 300 feet in length, supported by two 80 foot masts. Then I would gaze on their pictures—garbed in white coats (for scientific atmosphere, I guess)—comfortably perched in front of their equipment with their noses pointed skyward, as though they had Steinmetz, Edison and Marconi in the palms of their hands. For one most distinguished pose I refer you to page 527, December issue 1910 of MODERN ELECTRICS.

What's the duster for? Don't ask! Anyhow, it's an honest-to-goodness "ham" station—vintage of 1910—and it appeared in the "Wireless Telegraph" contest department in the December 1910 issue of "Modern Electrics" magazine. (Published and edited by Hugo Gernsback; first issue May, 1908!)

When the modern hams of today learn from the following, how I constructed my first radio receiving set, they'll probably page Mr. Ripley, but it's the truth! Fortunately in those days even the electric street cars employed dry cells to ring the bell announcing your desire to "take leave" of the contraption (and it was a relief, I assure you). I resided but three squares from a central car-barn where these crates were overhauled. That barn became the most important building in the U.S.A. insofar as I was concerned. It supplied me with numerous partially dead dry cells. In those days flat carbons were used for the *positive* electrodes in dry cells. By removing the carbon strips, cutting and drilling them as required, an excellent *carbon detector* was constructed with the aid of a sewing needle, a porcelain knob, and a few pieces of hardware. (See figure No. 1.) Another of the partially dead dry cells furnished the small amount of current required for the proper operation of the detector, in series with the highly sensitive (???) 75 ohm watch-case telephone receiver. Diagram of connection is shown in figure No. 2.

The rig appeared to work perfectly. Stations were coming in from all over the world, so it seemed. This belief continued until I finally reached the point where I could copy 25 words per minute, at which time I discovered, *to my great embarrassment,* that most of these supposed signals were nothing more than mechanical vibrations being picked up by the ultra sensitive (or should I say ultra *microphonic?*) carbon detector. At least it proved one thing—it worked! Believe it or not, I was picking up signals from a 25 kw. station located about 2 miles from my home! Station HB—United Fruit Company, New Orleans, La. I made another great discovery which was as embarrassing as the microphonic re-

E. T. Jones' first real attempt at building a "ham radio station."



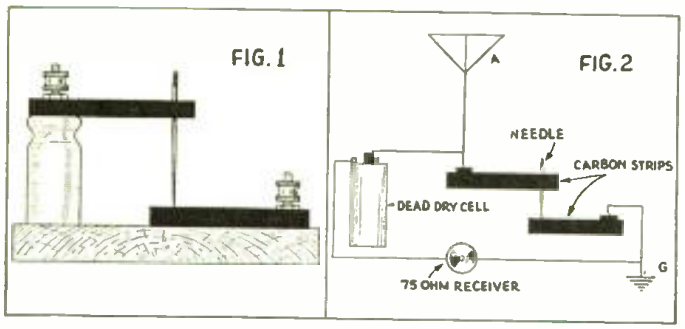
Days of SPARK-GAPS

Says E. T. J.—"When the radio 'ham bug' bites you, you stay bit!"

ceptions. I found that I could read the signals from that station without the aid of a radio receiver—when the wind was blowing in the right direction—by merely sticking my head out of the window. (And I didn't get Chile—Bah!) Station HB was using a 25 kw. Fessenden 500 cycle rotary gap, *without mufflers*, which—at the station proper—sounded like an earthquake every time a spark jumped the gap. Some fun, eh keed? Ask good old "Dot"[1] how loud it was!

of *both* ends of the primary tubing, and would have tried another if we could have gotten it out of the side.

It is this kind of so-called shenannigans which was and still is happening daily and deep into the night in thousands of homes in America that stamps Amateurs as the *real pioneers* of the radio industry. Without their spirit of stick-to-itiveness and their dogged determination to succeed under the most trying and heart-rending conditions, I doubt very much if the radio art would



The extremely simple carbon-steel needle microphone detector used back in those palmy days by E. T. Jones.

We Strike "Pay Dirt"!

We amateurs had been hearing strange rumors about a mysterious crystal which would supplant the carbon (microphonic) detector. This precious crystal was known as *Silicon*. From what little information we gathered, it appeared as though it would cost a king's ransom to take even as much as a peek at it under lock and key. It was soon learned that a local iron foundry used great quantities of this material in the treatment of metals. I won't take up valuable space telling you about the tremendous problem this company had on their hands from that time on. Sooooo—to make a long story short—they gave us enough of the crystals to last us a life-time in order to get rid of us. This marked the beginning of all future nervous breakdown cases—the *cat-whisker era* I call it. This ancient art was revived in 1922—remember?

With the aid and encouragement of Hugo Gernsback, the *Father of Amateur Radio*, we tried everything under the sun, from sticking needles in a spud (potato to you, Oswald) to the use of carbide enclosed in glass tubes. We made *permanently adjusted* crystal detectors, sealed in beeswax, that when dropped on the floor would retain their precious adjustments! We made loose couplers with secondaries coming out

have progressed to the lofty heights it has reached today.

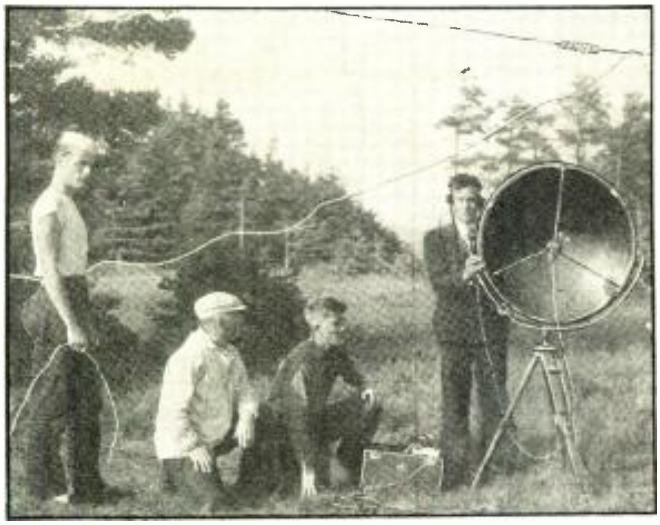
Wavelength—An Unknown Quantity

Then began the era of *all-wave* transmitters—from 10 to 40,000 meters—all at the same time!! Nice coverage—if you can get it today. Better see F.C.C. first though. Our transmitters were about as wide open as Tony Galento is when he approaches his opponent. Wavelength?—let me see—what on earth could that have been at that time? No one paid any attention to it—the amateur who had the longest and largest antenna and the largest tuning helix was the nertz. The race was on, loose couplers that could have tuned to 100,000 meters were built and the champion of them all was Johnny Dobbins—now at WNU, New Orleans—who used a hat shipping container for the primary of his loose coupler! It measured about two feet in diameter and four feet in length—wound full of No. 22 DCC wire with a double slider—*E. I. Co.'s famous ball bearing sliders.*

Then came the race for POWER (did I hear anyone paging a broadcast station in the lobby of the F.C.C. office?). My contribution consisted of a One Kilowatt OPEN CORE transformer floating in a bath of oil to prevent FIRE! The boiling oil came in handy during the winter months—it kept the shack warm. With

(Continued on page 370)

[1] W. E. Beakes—who signed "E"—now Vice-President and General Manager, Tropical Radio Tel. Co., Boston, Mass.



One of the radio amateurs who helped to trap wild bird calls is seen standing beside the parabolic microphone. Speech amplifier and standard "mike" used by the expedition are seen at the right.

Radio Amateurs Help to Record *Bird Calls*

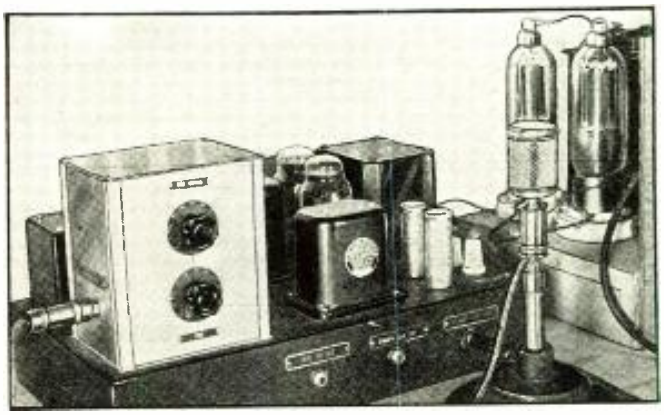
● ONE of the unique projects attempted at Kent's Island (by the Bowdoin Scientific Expedition) was the recording of bird songs by means of radio. The recordings were made possible by the cooperation of Mr. Albert R. Brand of the Laboratory of Ornithology, Cornell University, Ithaca, New York.

Since it was impracticable to transport the heavy Ford sound truck to Kent's Island, it was driven to Eastport, thence carried by steamship to Grand Manan, the nearest accessible point to Kent's Island. From Kent's Island the bird songs were transmitted by the Station's *short wave* amateur radio and picked up by the sound truck stationed at Seal Cove, Grand Manan, eight miles distant.

To the pet raven "Croaky" went the distinction of being the first bird to transmit his harsh sonorous voice over the air to be permanently recorded. Calls from the gull colony nearly a *mile away* were also picked up with the aid of a parabolic reflector in the focus of which a microphone was placed.

The recordings of the petrel presented a more difficult problem. It was necessary to set up a sensitive microphone very near the burrows of the nesting colony. The petrel utters its song at very uncertain and irregular intervals. The best performances are given only at night between ten in the evening and three o'clock in the morning. Furthermore, the birds are most active when the

(Continued on page 380)



Metal Horn Focuses Ultra Short Waves

● A SIMPLE and efficient means of producing a beam of ultra-high frequency radio waves in which a flared metal horn is used as an antenna to project the waves into space in much the same manner as acoustical horns can concentrate sound waves into a beam, has been developed in the communication laboratories of the Massachusetts Institute of Technology by Dr. Wilmer L. Barrow. This new development in directive "antennas" was described by Dr. Barrow in a paper presented at the joint meeting of the Institute of Radio Engineers and the International Scientific Radio Union and aroused great interest.

The electromagnetic horn or trumpet should find early application to micro-ray communication, in which the intelligence is sent over a narrow pencil-like radio beam at wavelengths only about a tenth of a meter long. Other applications may be to airplane and ship navigation, and similar problems to which these very short waves are adapted. This range of wavelengths, roughly below one meter in length, is rapidly being explored and being put to practical use. For example, several micro-wave communication channels have been in use in Europe for three or four years. The one across the English Channel is perhaps the best known. These micro-waves and the horn antenna appear to be almost ideally suited for application to the "blind" landing of airplanes under conditions of fog, snow or rain, although a further increase in the reliability and ruggedness of the sending and receiving apparatus is needed before the shorter micro-waves can be safely employed here.

The possibilities of radiating waves from electromagnetic horns was first described

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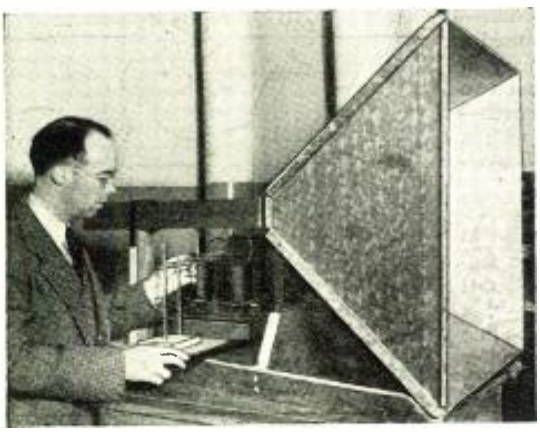
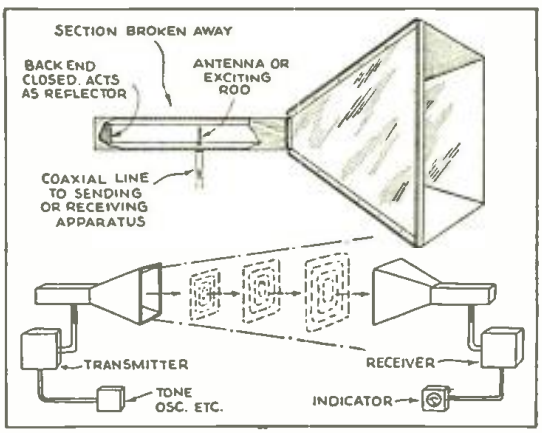


Left—Metal horn recently devised and successfully used by Prof. Wilmer L. Barrow in focusing ultra short waves; waves in the region of 300 to 4300 megacycles (wavelengths of from 1 meter to 7 centimeters).

Right—Detail of wave focusing horn developed by Prof. Barrow at the Massachusetts Institute of Technology. The receiver may be fitted with a corresponding focusing horn.



Dem was the HAPPY DAYS

Austin C. Lescarboura

Mr. Lescarboura, one of the real early "hams" in this country, gives us some very interesting side-lights on the experiences he encountered while operating one of the first "spark-coil" and "crystal-detector" stations.

● IF that Marconi operator hadn't made such an impression on my young mind as he sat before a huge spark coil emitting its dazzling sparks, this story wouldn't have been written. However, upon the occasion of the first electrical exposition in New York City back in 1907, which featured a Marconi wireless demonstration from one end of the old Madison Square Garden to the other, Yours Truly decided then and there upon an amateur wireless career.

There wasn't much choice of equipment in those early days, thirty years ago. The commercial stations, particularly ship installations, were using spark coils mainly, although power transformers were beginning to be used at the leading shore stations. The coherer-decoherer had already given way to the carbon-granule coherer and earphones, as well as the Marconi magnetic detector, but the latter, with its elaborate spring motor, grooved wheels and moving belt of iron wire, was too ambitious for the amateur to tackle. So the choice was usually the carbon-granule auto-coherer, soon to be replaced by the electrolytic detector, the needle resting on knife-edge carbons, and the various forms of crystal detectors.

Late in 1907 I began receiving signals on a carbon-granule detector, connected with a couple of dry cells and an ordinary 75-ohm watch-case telephone receiver. For an aerial, I used the fire-escape of our apartment house. On several occasions I was rewarded by very weak dots and dashes. The whole family had to listen in on this wonder of the ages. My reputation was duly established as another Marconi in the making.

Worked with Hugo Gernsback

Years passed. 1910. My meagre spending money went into a 2-inch spark coil, purchased at the inside factory price because I happened to be working for dear old Mesco at the time. Meanwhile, I had been serving as assistant engineer of the Telefunken Wireless Telegraph Company of America, learning much about the more practical side of wireless. Also, I had worked with Hugo Gernsback in the pioneer days of the old E. I. Co. But, not getting enough wireless during working hours, I spent most of my evenings rigging up a lofty aerial on the apartment-house roof, and wiring and rewiring the spark coil, key, condensers made of ordinary window glass and tinfoil, changeover switch, two-slide tuning coil, silicon detector, and earphones.

The power problem was really the main hitch. The two-inch coil drew at least 6 amperes. My early efforts with dry battery proved very costly, for a set of cells wouldn't last more than a week. And so I turned to a storage battery, bought, painfully, cell by cell. Being blessed with D.C. supply, and having an old-fashioned link-fuse panel board available in the kitchen, I proceeded to connect my storage battery in series with our electric lights, so that the more lights used by the family the greater the charging rate. In this way I obtained a good source of power at no extra cost.

Later came a Wehnelt electrolytic interrupter, so that the two-inch coil could be operated directly off the 110 volts D.C. This interrupter consisted of a piece of heavy glass tubing with bottom end fused about a length of platinum wire. The inside of the tube was filled with mercury to make contact between the platinum wire and the lead wire. Rapid interruption of the current produced a steady spark or really an *arc* from the coil secondary, resulting in a great step-up in transmitting power. Also a higher pitched signal which was so much more "professional" than the ragged buzz I had been using.

But whom to talk to? That was the question. There were other amateurs on the air, some of the fellows whose names

(Continued on page 365)

How HAM RADIO Saved Shawneetown!

Robert T. Anderson's Own Story

Mr. Anderson was awarded the second Paley trophy for an outstanding radio amateur performance. The exciting events which led to this award are described in this exclusive article.

Many times Mr. Anderson and his short wave radio equipment were nearly thrown overboard by the rough water encountered during the flood period in Illinois.

● JANUARY 20, 1937, one of the early days of the flood, nearly caught me without a transmitter. I had just built a rack and panel job consisting of a 1.6 tritet, 10 buffer driving P P 10's operating on 3920 kc., but the final had a bad case of parasitic oscillation, and I had never tried the outfit. However, I had remarked that it should be easy to use the exciter as a portable, and considered building up power supplies to enable me to do so, but put it off until the main rig was working satisfactorily.

Finally arriving at the scene of operations, Mr. Anderson proceeded to "set up" his transmitting and receiving equipment, the only illumination being furnished by a flashlight.

My emergency work actually started at noon Thursday, Jan. 21, 1937, when K. E. Schonert, W9HQD, and I discussed the situation, decided it looked serious and placed our stations at the service of the Red Cross and other relief agencies.

At 3 p. m. when the heavy rain began changing to sleet and freezing on suspended wires, we realized that conditions were becoming very serious and that communications would be disrupted by morning, so I took the rest of the day off and went home to start work on the "rig." By midnight the rig was on the air. By this time there was considerable ice on the ground as well as suspended objects, and the precipitation was still heavy, principally in the form of sleet, with some rain and snow.

An Urgent Message

When I arrived at the shop the next morning I found an urgent telephone call waiting for me from the authorities wanting to know how soon I could leave for Shawneetown, 23 miles away, with enough "gear" to establish and maintain communication. Since I had no emergency equipment ready, and had to obtain supplies, arrangements were made to leave at noon.

At 12:30 p. m. we loaded my equipment consisting of the exciter unit, a Crosley Model 636 allwave, 6V battery receiver; a set of spare tubes for transmitter and receiver; an adequate tool kit; a flashlight, 6 Eveready 486 B-batteries, a box of incidental parts and a tent.

By this time the road between Harrisburg and Shawneetown was flooded and impassable in four places. We were able to detour around the first flooded area, and crossed the second in a small boat over water so rough that the men had refused to take a reporter over an hour before *at any price!* Since I had a radio set they took me across for nothing.

A Hazardous Trip

A three mile ride in a farm wagon took me to the third gap at a coal mine within nine miles of Shawneetown. I found the telephone at the mine still working to Shawneetown, contacted the authorities there and prepared to set up and handle messages. However, the authorities insisted that I continue across the next gap by boat and promised to meet me in a boat and take me across the last gap. They told me of their plight: that provisions of all kinds were low and they were entirely out of bread. At this time I joined forces with a bread salesman who was trying to deliver several hundred loaves of bread and some meat to Shawneetown. About dark we secured a small boat and pushed off.

We were so badly overloaded that we would have been swamped immediately if the man nearest the bank had not jumped overboard. The water was not deep but the temperature was about 20° Fahr. and the blizzard was at its height. We later found another boat, split our load and reached the railroad crossing and the last gap of water. Here we found ourselves unable to go farther or return. Our motorboat failed to arrive, the current in the last gap was terrific, and it would have been suicidal to have attempted crossing in our small boats without oars. Since we had no adequate oars it was impossible to return to the mine against the northwest gale. So we "set up" by light from the

(Continued on page 373)

●

Exclusive photo showing Mr. Anderson and the emergency short wave transmitter and receiver which he used in calling help to rescue the inhabitants of Shawneetown.

●

The "YL" in Amateur Radio

Beatrice Holman
W1KTG

Photo by Boris

Beatrice Holman, W1KTG, licensed radio amateur of Belmont, Mass. The number of young lady "Ham" operators is increasing each year.

Photo by Chandler

A dandy Ham station we'll say! It is operated by the author of the accompanying article. If you're a Ham, you've probably heard this station "on the air".

● THE YL in amateur radio leads a charmed existence. She is a mystery to her other YL friends, a problem to her family and the delight (she hopes) of her brother amateurs. She would rather wear ear-phones than a Paris hat; she would rather stay up till three QSO-ing her boy friend in Sydney or Brisbane than dance at the Ritz; she subscribes to radio magazines and would rather read Terman on antennas than the latest novel about the younger set. She may live in a pent-house in a big city, with the latest type commercial equipment under her control, or she may have her shack in a lonely outpost with battery or windmill power and a make-shift rig; in any event, *the world is at her feet!* So is the postal service, for her daily mail in time is likely to become a major item in the carrier's routine.

Hams Are Gallant

She likes the friendly spirit of amateur radio, finding it one of the best influences in the world today. It breaks down borders and barriers; it spans the high seas and the long trek to make communication possible between people who would otherwise never know each other; it creates pleasant and lasting friendships; it knows no distinctions of nationality, politics or class.

Because women radio operators are still in the minority, the YL in amateur radio has an unusually interesting time. If she needs assistance in putting up masts or rhombics, she gets it promptly through the gallantry of her brother hams; in the same way, any technical advice which she requests is promptly and freely offered. (In the case of my own station, I speak from experience, because one amateur has not only given his time, help and advice but actually built my transmitters as well.)

Sweet Voice—Quick Response

Probably there are more YL amateurs who operate phone than cw. transmitters. Their voices become as well known on the air as the broadcasting stars. In fact, amateur radio activities are good preparation for broadcasting. For DX phone work, one must think quickly and speak clearly in order that the foreign contact may be complete. Familiarity with the operation of an amateur phone station helps develop confidence and poise; the operator knows that a pleasing voice brings a quick response, and that is where the YL has an advantage. In this respect, I think particularly of Eileen, the XYL at G6DH, whose cheery greeting on ten meter phone is *known to hams the world over!* Then in this country on ten and twenty meters there are many outstanding YL personalities, including *Eunice* at W5ZA and *Jean* at W4DGO.

Although I enjoy phone contacts very much indeed, I prefer to operate cw. In many countries today phone operation is forbidden; there amateurs are allowed to use only code transmitters. The YL who can handle a key or bug, then, has an almost unlimited possibility of contacts in every continent, all over the globe, from the Arctic circle through all the zones. In some cases, owing to atmospheric difficulties or interference, the QSO's may be short—a mere exchange of greetings and reports on signal strength; more often, however, they are an interesting exchange of facts and the beginning of many schedules.

Your Geography Begins to "Live"!

Places on the map that were just memories of school geography become very real when one establishes contact with them by air. And the wonder and speed of radio are all the more impressive when the resulting QSL or letter arrives with the foreign stamps after a long journey by boat or plane. I have learned interesting facts about people and places in my own country through radio contacts—about the oil industry in Oklahoma, farming in the South and West, the occupations and ideas of

(Continued on page 363)

The WORLD COMES To My Room—

Via Amateur Radio

John "Pop" Garvey, W8RID, tells Michael Hrehocik all about it.

Amateur Radio brings the world to the bedside of "Pop" Garvey's room. The transmitter was built by "ham" friends.

"Pop" is in the coal business and he takes orders—via telephone. Note how the phone is "rigged" by a special bracket.

● ARE you looking for an inexpensive hobby that takes a comparatively short time to master? A hobby that will bring the outside world to your room—to your bedside. One that will create an outlet for your repressed feelings and one that will make it possible for you to make hundreds of friends. Smiling John "Pop" E. Garvey of Cleveland, Ohio, bed-ridden with arthritis for over ten years, was searching for one and found it—a short wave amateur station.

"CQ . . . CQ . . . CQ . . . W8RID, Cleveland, Ohio . . . calling CQ . . . CQ . . . ," Pop sharply spoke into his "Mike" a second after I had entered his room. Pop, a jolly, round faced individual, with laughing blue eyes, pudgy nose and a big black cigar at a cocky angle, was lying in his bed—a portable bed equipped with balloon tire wheels. He had just snapped on a switch that is attached to his microphone line. This line leads to his transmitting cabinet that stands two or three feet to the side of the bed. Repeating the call CQ . . . —a general inquiry in the vernacular of the amateur operators indicating that he wished to contact someone—he got in touch with a chap in Michigan. After talking to him for a half hour, he signed off with a rousing 73—goodbye.

Mr. and Mrs. John E. Garvey "at home." By means of a mirror, "Pop" can see what is going on all about him.

Not many of us relish the thought of not eating for a day. "But," comments Pop, "most amateurs will gladly pass up their victuals in order that they may put in a few more hours on the air. Why, the young fellow I just talked to is really a fanatic. He's up to three or four o'clock every morning chewing the rag. His wife doesn't permit him to stay up later than 11 or 12 o'clock. She believes that he abides by this ruling, for she can check up on him in his log book. Every amateur is required to keep a log book into which he records the station he contacts, the time he begins and signs off and various other details. But he fools her, for he keeps two log books—one for her to peer into and one for the government inspector. Yes sir, once you get this disease of being an amateur radio operator, it's less curable and more deadly than arthritis."

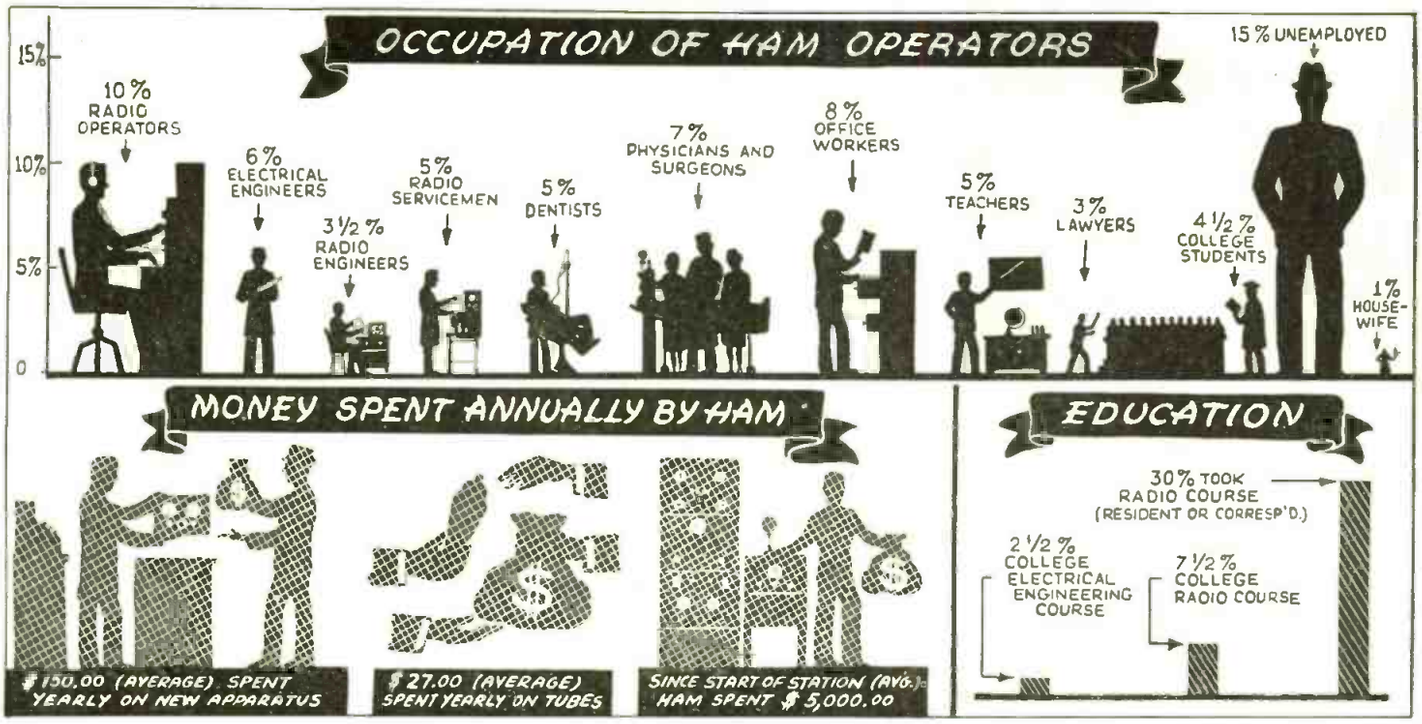
"I always thought that it took a radio engineer or someone in his category to run an amateur station. How did you ever get mixed up in this?" I questioned.

"Being a victim of arthritis, I was confined to my bed and had plenty of time on my hands. A larger portion of this time I devoted to listening to my short-wave set and this was the factor that led me into my thrilling hobby. I began corresponding with a few out of town amateurs and through them I became acquainted with a few hams in Cleveland. I was curious to get as much information about short wave as possible, and as these local amateurs would call on me I would pepper them with hundreds of questions. Seeing my interest develop rapidly, quite a number of the local hams formed a club at my home and decided to build me a set. When the boys had a few hours to spare they would work on it and in this way my transmitter was completed in six months.

Cost of Set Nominal

"While my set did cost more than the average, one can either buy or build a receiving set for about $50 and a transmitter from $75 to $100. If one has the necessary background, he can build it

(Continued on page 378)



What Price HAM Radio?

How much money do American Hams spend annually for radio apparatus?

Do they buy more ready-made receivers than they do transmitters?

How many battery sets are used?

How much do Hams spend for tube replacements?

H. W. Secor

● THE editors of this magazine were greatly interested in determining a number of interesting facts about the American Radio Amateur or "Ham," as he is more popularly called. There was only one way to find out and that was to mail questionnaires to a great number of leading Hams all over the United States—and this was done.

What Hams Do for a Living

Probably the most interesting fact about the average Ham station owner and operator concerns his occupation. The answers to the questionnaires disclosed that 10% of the amateurs are licensed radio operators, occupied either in the commercial field or as police and marine operators. Six per cent of the amateurs are graduate electrical engineers, while 3½% are radio engineers. Radio service-men figured in the answers to the questionnaires to the extent of 5%, radio technicians 2½%, telegraphers 3%, radio broadcast engineers 2%. Among the professional men who are licensed, according to the questionnaires, 2% are ministers, 3% writers, 5% dentists, 7% physicians and surgeons, 3% lawyers, and 1% musicians. Other interesting figures show 5% teachers, 5% business executives, 8% office workers, officers and salesmen, 5% merchants, 4½% college students, 15% unemployed, and even the housewife showed up as 1%.

A further analysis of the occupations of radio amateurs indicates that quite a number occupy Government positions, either with the Army, Navy, Marines or in the Government service. Quite a few Hams are airplane pilots, 2% farmers, 1% newspaper reporters, while others are sprinkled through the various professions of optometrist, librarian, the advertising profession, statisticians, printers, bank tellers, restaurant workers, express messengers, time-keepers, telephone engineers, signal engineers, radio editors, radio communications experts, movie sound engineers, motion picture projection operators.

Education

A highly important factor in any profession, including data on the radio amateur, is education. The answers to the questionnaires disclosed that 2½% of the Hams have taken a college *electrical engineering* course and 7½% have pursued technical radio courses at some one of America's well-known colleges or universities. About 30% had taken, either resident or correspondent, courses in some one of the numerous radio schools that are scattered across the country. 51% had no formal radio training or background, but simply educated themselves by reading books and technical magazines such as RADIO & TELEVISION.

Money Spent Annually on Ham Stations

When it comes to the amount of money spent by the individual Ham annually on his station, either for new apparatus or for tube replacements, this, of course, varies a great deal and the figure obtained by checking an average of the amounts mentioned in the answers given to the questionnaires does not show what the amateur with the small station spent. Naturally, if he only has a small station and has been in the Ham game for only a short time, he will probably not spend as much annually for apparatus or tubes as would those who have been in the game for 5 or 10 years and who have built up elaborate stations.

The questionnaires were sent to representative amateur operators, as nearly as could be judged, and the average amount spent by this representative class of amateur operators on new equipment each year is $150.00; for tube replacements, the average is $27.00 per year.

The radio dealer or manufacturer should not take this as a representative figure for all operators, as the only way to reach such a figure bearing on the whole membership of 46,000 licensed Hams would be to send a questionnaire to every one of them. This must be understood for the very good reason that among some of the reports handed in by the radio amateurs, we find those who spent as much as $3,000 during the past year on new equipment,

(Continued on page 374)

A Day in the of a

E. E. C. England, VE3QL

The accompanying article gives a new slant for the layman on what a busy "ham" can do with 24 hours. How does he eat, sleep and carry on "day" and "night" schedules? Read on . . .

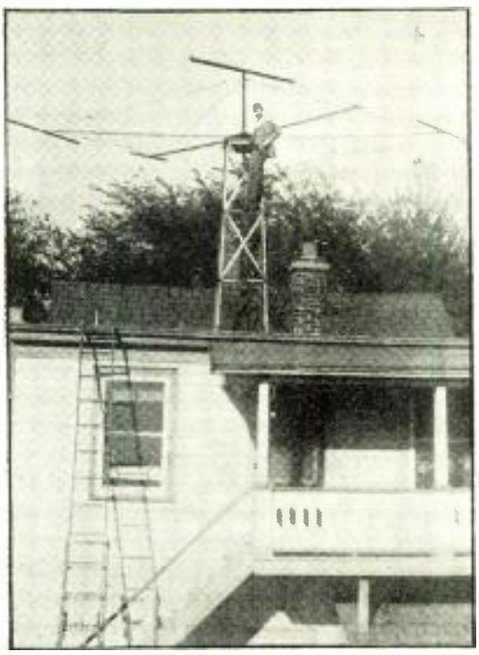
Here's the smiling face of VE3QL—E. E. C. England of Walkerville, Ont., Can., a real live "ham".

● THE following episode is taken from a day during the last amateur phone contest. The time, 7:00 P.M., E.S.T., Friday evening, March 18th. Everything was in readiness waiting for the one minute to roll around. Everything had been checked over and over to avoid disappointments. The beam antenna had been oiled, greased, and calibrated to make it twirl around at the touch of the wheel. The receiver was all tuned, waiting for the DX to roll in—one minute more—just sixty seconds—there—7:01 and just listen to the DX rolling in. A pair of earphones bought specially for the occasion were installed in case of too much QRM. At last through the jumble of voices came a CQ, fading a little, but at least readable; would he never sign his call, here it is—GM6WD—and on the other end of the band. Up from the chair and around the back of the transmitter to change crystals, just hoping he wouldn't "sign his call" and look over the band before I changed frequency.

Three Visitors—and What a Time!

My hope was granted and he later signed, listening for W stations. Well, I took the chance, and lo and behold, he came back to VE3QL the first GM station (Scotland) I had ever contacted. We exchanged our serial numbers and signed. I was off to a good start at least. Then came disaster, a knock at the door and in walked three short wave listeners (SWL's). Of all the times to pick, when DX was just pounding in, and me trying to listen to DX stations and answer their questions at the same time. It proved to be a bigger job than I had anticipated.

Silence once again and eight o'clock striking, one hour of good DX gone, and also a slight increase of QRM (interference). Another CQ—very faint—but the signal slowly climbing up. PAOFB—was I hearing right—the Netherlands calling CQ; so back I went to the old frequency. I gave him a long and bellowing call and back he came to VE3QL, with a 4R7 signal fairly good. I had just signed off with him when QRM from one end of the band to the other just smothered the DX out of the picture. Somebody *would* put an electric razor on, as if he couldn't pick some other time to shave! It was only on about five minutes and I made up for lost time by working six G's and another GM which was the last up to nine o'clock. Not too bad, considering the delays.



Mr. England is seen standing on the tower supporting his beam antenna. More than once he had to crawl up that ladder and see what was wrong with the antenna on a "dark and stormy night."

French Contact

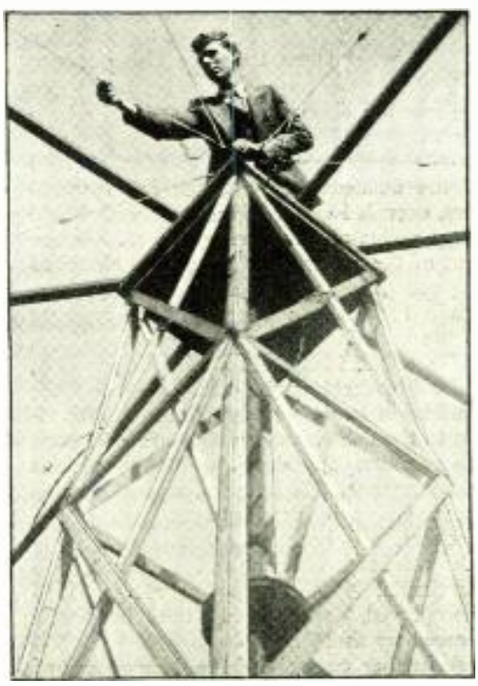
Another hour on its way and no idea of what it held. The French stations were beginning to come through—maybe I could work a couple to boost my score. I slowly tuned down the band and VP6MR calling CQ Canada, that sounded easy, and after a short call I finally *contacted* him. I got my number from him, but we still continued the QSO (contact). After a description of his "rig," he continued on the location of Barbados and a rough description of the West Indies—from the type of weather to his own kind of work. We had quite a QSO with no QRM for either of us. Time flew by and no real difficulties had transpired, which was something to be thankful for. A few G (English) stations were worked and then time was called. Even hams have to eat, and with a big night ahead of me, I felt the need of something energizing.

Ten after ten, and back I went to the receiver, ready to call them when they called CQ. My DX included, up to this time, the West Indies, Netherlands, England, France and Scotland—not too bad. I only needed an Asiatic contact for my WAC (worked all continents), but so far I had heard nothing from that part of the world. Of course there was a whole week ahead of me, and a lot could happen before then. During the hour I got my French stations, five in all, plus a Belgian station.

The Family Retire

Ten forty-five, and the family having been in and out of the room since the contest started, they finally went to bed, leaving the house in silence and the cat and me to keep each other company. The CW (code) was starting to come through heavy

Another view of the rotary beam antenna tower; the operator is repairing one of the wires.



Life Busy HAM

but the earphones helped a little. The wind was coming up and the wheel of the beam antenna was beginning to turn back and forth slowly. A lot of *local* stations which were not in the contest signed off, sleep being the better proposition, and this also improved the listening part of my problem. I had the usual run of luck in contacting stations, but had heard nothing in the line of DX for ten minutes. The favorite pastime seemed to be tuning from one end of the band to the other, over and over. A path was worn from the chair to the back of the transmitter, from changing frequencies so often.

Down over the band again and T12AV was calling CQ with an R8 signal; success at last, if I could hook him.

Beam Antenna Out of Control!

A short call and back he came, but not receiving me so well, so I got up to turn the antenna and snap, *off came the chain*—a very unpleasant situation. The QSO was completed, with lots of tough listening at the other station. Then came the problem of climbing up on the roof and repairing the damage at eleven-thirty at night, a slight wind, and nobody to hold the light for me! Out came the ladder and up I went, fixing pulleys, straightening wires. Back to the room and exactly twelve o'clock, *Everything* and *everybody* was *on the air!* So far I hadn't heard an Asiatic—if it were only my luck to contact one.

I started off the hour with an HK (Colombia, S.A.) and an ON in Belgium. From twelve o'clock on to five o'clock in the morning I just sat in my chair and worked the stations on the average of four or five an hour.

A Fine "Log"

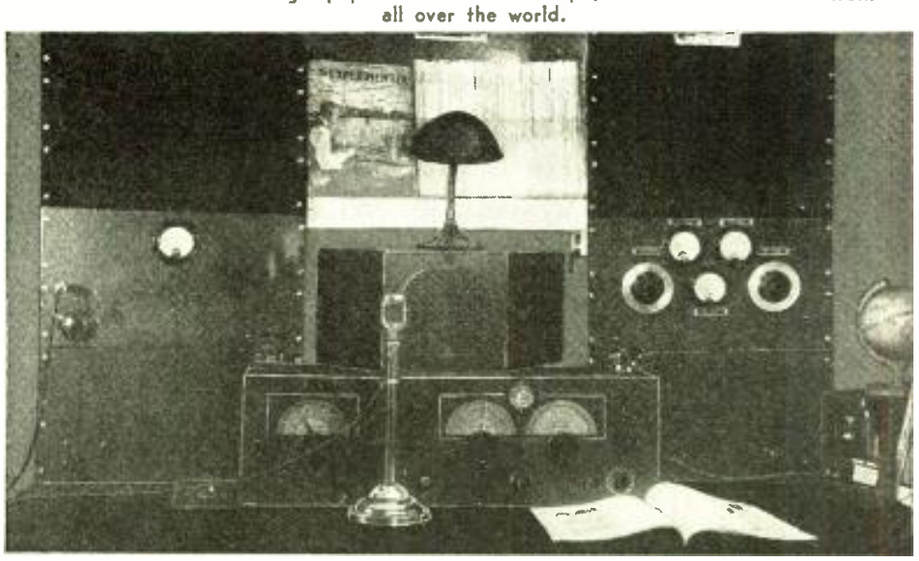
Five o'clock and quite a nice report "log" to show for my hours of patient listening and talking on the air. It became impossible to keep my eyes open, and the stations seemed to fade away as I slowly began to get drowsy. I shut off the transmitter and receiver, wound up the clock, set the alarm for eleven that morning, and dropped down on the couch, falling asleep immediately.

Eleven o'clock and the sun brightly shining, the sky was as clear as could be with no signs of rain for the present. I turned on the receiver and listened across the band, but there wasn't much on. Ten meters seemed to be quite alive, if only the antenna would work down there. It was worth a try at least. I got the rig all in working order after a few delays and tried to work somebody. I called CQ until I was hoarse and then tried calling other stations; but it just wouldn't work. I finally decided it was the antenna, and went outside to look over the problem. It wouldn't work no matter how hard I tried to fix it, so that meant keeping on twenty meters. By this time lunch was ready and I was summoned for it.

Foreign Contacts Galore!

Ten after one and I again went downstairs. The desk had to be cleaned up a little bit after the night before. Papers and books, pencils and pens, paper that had been torn into small pieces while trying to get a call letter through. Clear at last; now to try and work somebody. I began by working England, four in succession, followed by an HK, and then France. A couple of

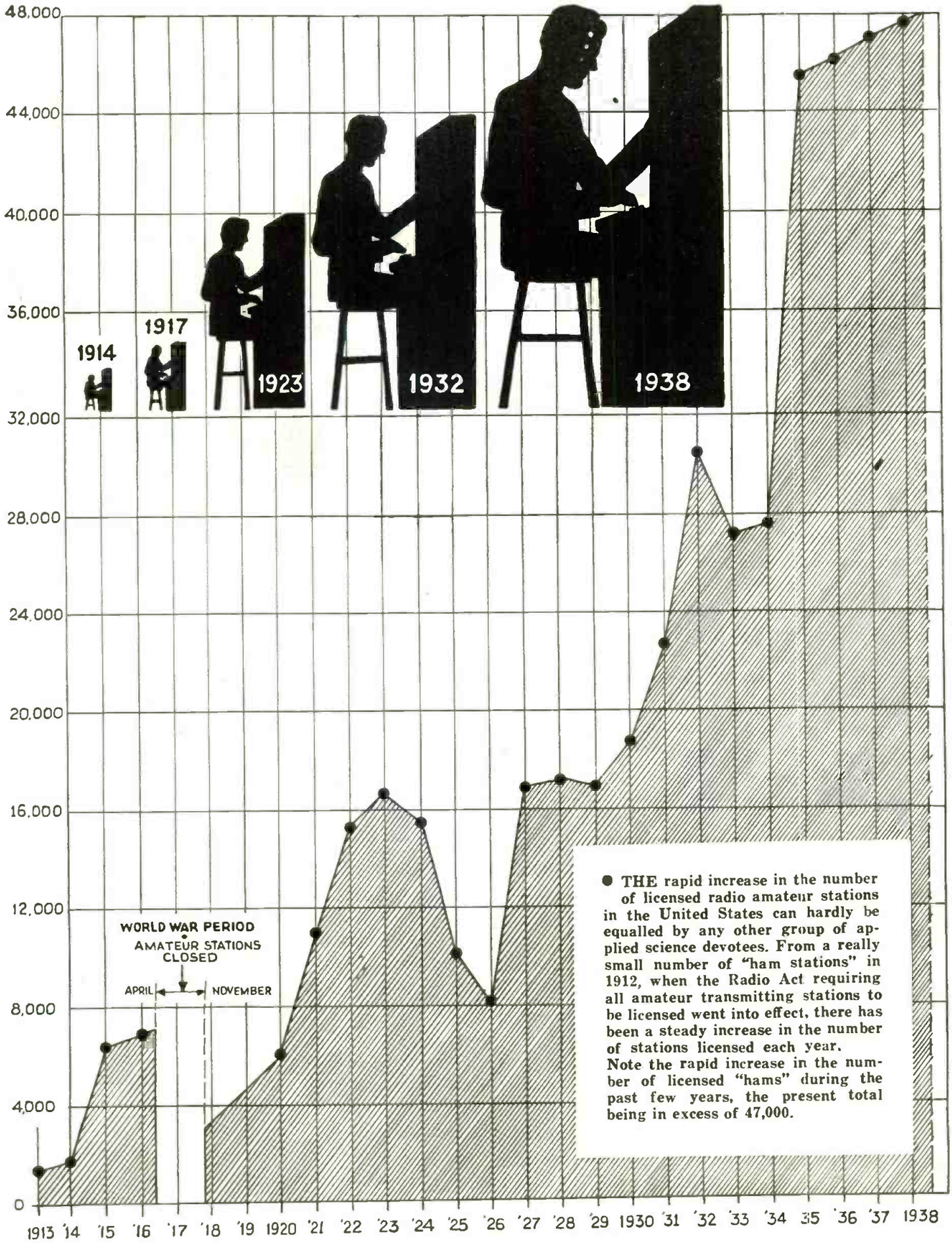
(Continued on page 377)



The elaborate receiving equipment at station VE3QL, where stations roll in from all over the world.

Drawings above show some of the incidents in the daily life of a busy "ham".

Rapid Growth of Radio Amateurs



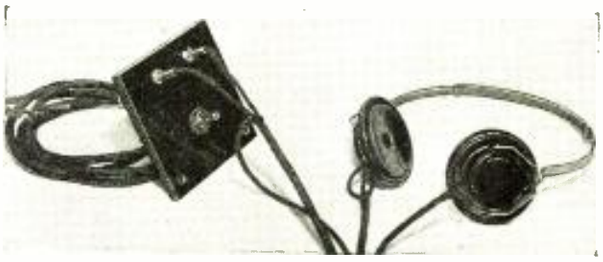
● THE rapid increase in the number of licensed radio amateur stations in the United States can hardly be equalled by any other group of applied science devotees. From a really small number of "ham stations" in 1912, when the Radio Act requiring all amateur transmitting stations to be licensed went into effect, there has been a steady increase in the number of stations licensed each year. Note the rapid increase in the number of licensed "hams" during the past few years, the present total being in excess of 47,000.

Want to Learn Foreign Languages?

Hon. Michael Norton, B. A.

(England)

Mr. Norton has worked out a system, which—when used in conjunction with a short-wave receiver—enables you to learn a foreign language easily.



By fitting a simple switch attachment to your receiver, headphone reception may be enjoyed and is a great aid in studying "foreign" languages.

Left—A pair of good headphones and a switch and cable like that shown provide "private" reception.

● THE short waves are bringing many foreign language programs to the United States. The American citizen seems to be more enterprising than the European. He wants to learn *foreign* languages so that he will miss nothing.

Over here in Europe, we miss about 60 per cent of what is on the air, some of us even more. I have learned four *foreign* languages and have used various methods. The fourth language I learned was Italian, and *I did this mostly by listening to radio programs from Italy*. I feel sure that if you want to learn to speak a language and to understand it when spoken, then learn by radio. But learn by a system! In teaching myself, I have found the following method the soundest.

Spend the first week in just getting to know the *sound* of the language. Just listen to the language over the radio for as long a time as possible every day! Don't try and understand it at first, but try and imitate it as if you were a child mimicking a grown-up person. You will soon be able to repeat little words to yourself. You may not know what you are saying, but you will be saying it correctly, more correctly than others who have been learning much longer by other methods.

At this stage, you can begin to learn just the elementary rules of the language from a *self-tuition* book giving the imitated pronunciation. The grammar need not be closely studied, but a knowledge of the construction of the language will be a great help in guessing it from the radio. The first step in disentangling a language is to be able to identify the parts of speech. When you can do this, you will be able to use a dictionary. During the first week of listening, there will have been some words which you have heard several times. Those that you remember, you can look up in a dictionary. You can guess some of them. When you know a few words, you can guess a lot more.

The subject matter that you will have to deal with will be the weather forecast, the news and possibly advertisements. When you can understand a sentence here and there, try and get an idea of the subject matter, and don't bother about details. If you concentrate on any detail, you lose about three sentences that come after.

From the beginning practice repeating to yourself any sentences that you have remembered. You will soon be able to anticipate call signs, advertisements, and parts of the weather forecast. Now you should practice saying them over in unison with the announcer. When you can understand most of the news, you will be able to understand only some of the talks. Broadcast talks may be divided into two classes: elementary and advanced. When you have mastered all the news, you will be able to understand all the elementary talks, for they will be delivered slowly and with a good deal of explanation.

The talks which are not elementary are usually technical; though not so technical that you, as a student of the language, should ignore them. They deal with the topics most discussed in the country from which they come. To understand these talks, you must read the language, but it is best if you read what is of current interest. After reading newspapers and then periodicals, a light novel need not prove too difficult, provided that you keep your mind on the plot and do not bother too much about details—just as you have been doing in your listening.

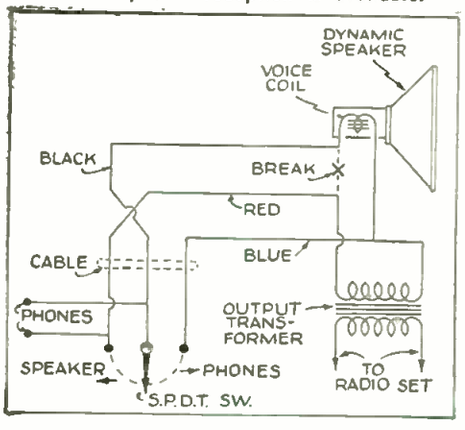
The reading of stories and novels will help you to master the abstract words that you will not have met much in the news. You should therefore pay special attention to these. Having learned to understand the different styles of different writers on various subjects, you will find that you can now follow the most difficult talks. When you can easily understand all the talks given by all the varying types of people, you can claim a very good knowledge of the language.

Some people might think that you could gain only a limited knowledge of a language from listening in. On the contrary, an extensive knowledge will be yours. Starting with the most simple and ordinary topics of the time and the weather, you progress step by step to the arts and to all sorts of branches of modern technical development. You will hear many different voices and accents. But remember that anyone speaking with the accent of an announcer is most likely to be understood by the largest number of people in the country to which the announcer belongs. You will have copied the *right* man.

Now you want to begin *listening*. Remember to turn up the volume control of your radio for foreign languages. You must do this because you want to copy what you hear. When an artist copies a picture, he

(Continued on page 372)

The diagram below shows how to connect the simple switching system, whereby headphone or loudspeaker reception is available.



The Short Wave League

On the Ham Bands

(with the Listening Post Observers)

Edited by
Elmer R. Fuller

● WELL, another month has rolled by and here we are again with the second edition of this department. "Yours truly" is wondering just how this column is being received by the radio *hams* and *fans*; but I'll probably hear about it soon enough if it isn't what we intended it to be. About twenty-three reports on reception during the past month (July) have been received. All of these, I regret to say, are not usable. On every report it is necessary to include certain things and many of you have not done this.

In every report include the station call, approximate frequency, readability, and signal strength. This is not hard to follow, but it is very important. I know that many have home-built and other types of receivers which are not calibrated as accurately as they might be. This need not stop you from giving the approximate frequency. You can certainly make a frequency graph to cover the ten and twenty meter amateur bands, and these are the ones most frequently used for getting real, good DX. LIST ONLY AMATEURS! This department does not care a thing about the commercial phones nor the short wave broadcast stations. We are interested only in the *amateurs* and matters concerning them and their stations.

Each month pictures of *Listening Post Observers* and their equipment will be published in these pages. Why not send in yours now? This month, because this is a new feature, we had to skip this procedure, but we do not wish to do it again. So, dig out the camera, get into the picture yourself, and then have someone else snap it for you. (Or trip the shutter with a string.—*Editor*) Let's see who will be the first to get his picture into print. First here, first served.

Now let's get down to the reports of the month. From them I find that conditions were about the same all over the country. During July it was very rare that any real good DX came through. But from the reports, I find that there were some, and some that were rather good.

Harry Honda, out there on the Pacific coast, reports the following on twenty meter phone:—

Call	Freq.	R	S
VR6AY	14.35	–	–
VK2NS	14.02	–	–
AC4AN	14.20	5	5
TI1AF	14.09	5	7
HH5PA	14.05	5	8
ZS1AX	14.04	5	9
ZS5AW	14.08	5	5
ZS6AD	14.01	–	5
ZS2AZ	14.11	–	6
ZS6ED	14.005	–	6

E. H. Walker—Observer for England
(All on 20 meter fone)

LU1QI	———	5	7
LU8AB	———	5	7
VE5ACN	———	5	4
HK3LC	———	5	5
TI1AF	———	5	6
CO2RQ	———	5	5
CO2SV	———	5	5
PY1FR	———	5	7
PY2CK	———	5	7
PY2LM	———	5	6
PY4CT	———	5	5
SU1JM	———	5	6
SU1KG	———	5	9
W5BYS	———	5	4
W6AM	———	5	5
W6GRL	———	5	4
W6GVM	———	5	7
W6NTX	———	5	5
W7BVO	———	5	4

Roger Legge, Jr.—Observer for New York

LX1AI	14.03	5	6
HA4A	14.13	–	6
ZS1AX	14.03	–	7
TG9AA	14.06	–	7
GW2IP	14.03	–	7
GM6SR	14.02	–	8
GI8UW	14.08	–	7
PK6XX	14.01	–	6
HA8Q	14.06	–	7
CN8AR	14.28	–	7
CN8AM	14.08	–	7
CN8MA	14.08	–	7
FA3QV	14.32	–	7
FA3HC	14.09	–	6
VP7NR	14.14	–	6
SM7UC	14.05	–	7
EA8AE	7.16	–	6
EA8AK	7.12	–	5
EA8AS	7.27	–	7
I1MY	14.32	–	6
VS2AE	14.37	–	5

Wally Hallgren—Observer for California

K6OQE	———	5	7	20 meters
K6CMC	———	5	7	
G6ID	———	4	5	

Stanley Clarke—Observer for Canada

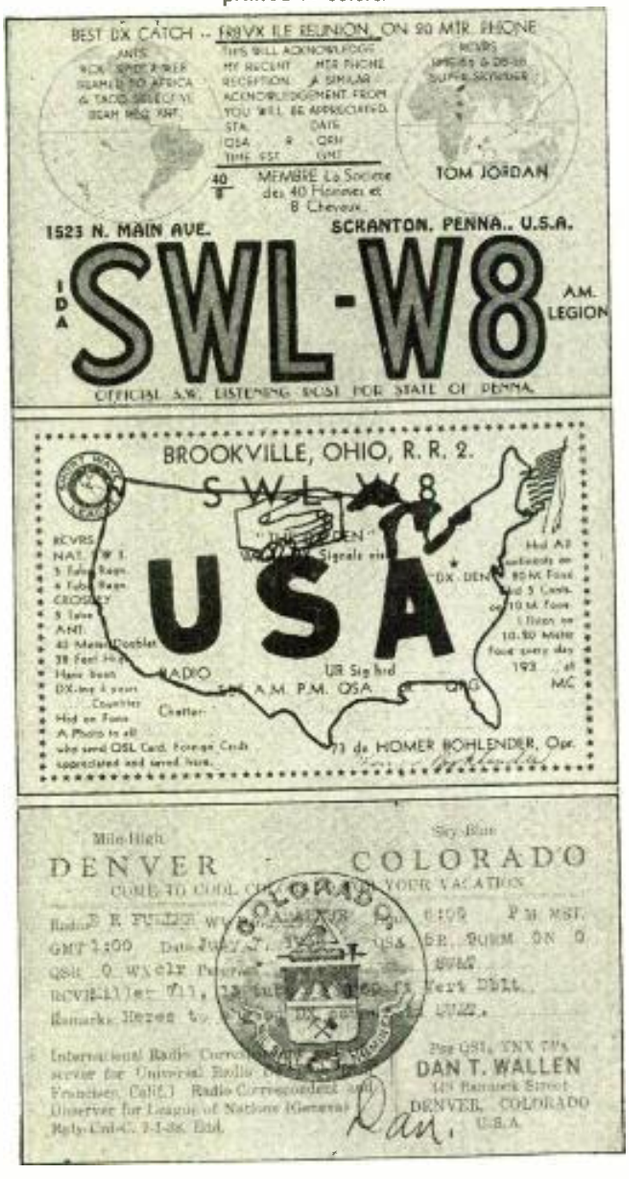
U1FC	14.400	3	4	cw
PY2CK	14.090	5	7	
PY2GC	14.105	5	6	
OK1PZ	14.405	5	6	cw
PJ3CO	14.400	5	8	cw
YR5CF	14.390	5	7	cw
FM8AD	14.270	5	8	cw
U1AD	14.420	5	5	cw
SP1RG	14.400	3	5	cw

Richard A. Rush—Observer for California

PY2AK	28.200	–	–

(Continued on page 377)

Three good examples of short wave listener cards; some are printed in colors.



Local HAM Gossip

A new Department—you can help make this a valuable and entertaining feature. Rush news of Ham club activities to "Local Ham Gossip" Editor, c/o this magazine.

Lee R. Kemberling, W8ESN, who tells the interesting story of the great 5-meter "Field Meet" held in Toledo, Ohio.

● THE Toledo Ultra High Frequency Ass'n is made up of a group of hams and DXers interested in ultra-high frequency work. This group held meetings at the homes of members until the membership passed 15. All this time, Lee R. Kemberling, W8ESN, was watching their progress and was building his new radio shack in the rear of his home. The size of this building is 22 x 27 ft. When the shack was about completed, he went to one of the meetings of the Association, and gave a long talk on getting one's license and just what had been done in the past on Ultra Hi Freq. He added that if the "gang" wanted to grow right and get some place, they should have a room in which to meet besides the homes of the members, as many fellows would come to a public meeting place, although they would not go to private homes. He offered the TUHFA his shack, as a meeting place; it will hold about 50 to 75 in the large room 18' x 22'.

The TUHFA held the first meeting there in October, with a membership of 12. In the first 2 months the membership went to 25, meeting every Tuesday night at 7 p.m. W8ESN talks on the F.C.C. laws and gives code lessons for one hour. This group grew until they had to put a limit on it! Now over half the members have licenses and more will be going up later this year. This is largely attributed to W8ESN's talks and code lessons. At W8ESN he has put 250 watts on 5 meters and, beginning the first of September, will be on the air every third night with code and talks on amateur radio for one hour at 7 p.m. Lee Kemberling is now an Honorary Member of the Association and Activity Manager of programs. At the close of the summer activities on July 12, the membership was 25, with 20 more

5-METER-5
FIELD MEET JULY, 10
OTTAWA PARK, 10A.M.

PRIZES HIDDEN 5 METER XMTR HUNT. **PRIZES**
FOR BEST HOME BUILT ULTRA HI FRE RECEIVER, TRANS-RECEIVER
BRING YOUR LUNCH. LEMONADE FREE
SPONSORED BY TOLEDO ULTRA HI-FRE. ASS'N. & TOLEDO RADIO CLUB
CALL CHAIRMAN W8ESN LEE R. KEMBERLING. FOREST 3695-J

Card announcing 5-meter "Field Meet" of the Toledo Hams. Live Stuff!

waiting on the list. The 5-Meter Field Meet closed the summer. The officials of the TUHFA are: Bernard Shonebarger, Pres.; Lawrence Gilsdorf, Vice-Pres.; Dean Seaman, Recording Sec'y; Stephen Petroll, Treas., and Lee R. Kemberling, Activities Manager. All mail is sent to the Radio Shack W-8-E-S-N, Box No. 3, Toledo, Ohio.

TUHFA & TRC Field Meet

Starting on Sunday July 10, the gang had a good start before 10 a.m. First the Receiver prizes were given for the best Ultra Hi home-made receiver, rated both for looks and operation. We had 18 receivers set up, and as we could not get A.C. at the park where we were going to hold the meet, the gang went over to W8ESN's Radio Shack and cleaned out the side yard and in the rear of the shack, this giving us room for over 100 cars to park and a place to hold the meeting. The Receiver prize was won by a Mr. C. H. Peters, with a set which would operate on A.C. or 6 volts D.C. Second prize, Ralph Kachenmeister, receiver both A.C.—6 volt D.C. portable. This took until noon—time out for lunch. We had 65 gallons of lemonade made up and kept a 10 gallon jug going all the time. By noon there were over 90 hungry guests. A half-hour talk on "Benefit of Ultra Hi Frequency to Mankind" was given by Lee R. Kemberling (W8ESN). This lasted over 1½ hours, as there were many questions asked. After this a talk on Ultra Hi Frequency Antennas was given by Dean Seaman and Stephen Petroff. They did a lot of drawing on the blackboard to show the various types of "ultra high" antennas.

At 3 p.m., the 5-meter "Xmtr hunt" started. This Xmtr was hidden the day before by Burt Holmes. Ed Martin and yours truly, and was tested after midnight to make sure it would cover the city, which it did. This Xmtr is W8ESN's portable, and has an output of 10 watts crystal controlled on 5. There were 56 cars in this hunt and over 150 were at the meet. About 70 were from out of town, some coming over 200 miles. W8ESN put on the big 5-meter rig which has 250 watts and all the cars left the radio shack and started out to look for the hidden Xmtr. After 5 minutes on the air with the large rig, the gang got word to start to look for the small rig. B. Holmes and E. Martin heard the large rig sign off and at once put the hidden Xmtr on the air and placed a tone on the sig. Every 15 minutes they stopped and gave the call. At 3:35 p.m., C. H. Peters found the Xmtr, got his slip and reported back to the radio shack. At 4:10 p.m., A. M. Cooper (W8BHL) with Gail Griner (W8DPN) found the Xmtr and at 4:25 p.m. Hal Shafer was third. This ended the hunt and W8ESN went on the air with the large rig and called all the other cars into the shack. This hunt was one of the best that has been put on around this part of the country and the boys from out of town would like to have one later on. A hunt like this makes the gang get up on their toes and keeps them working on new rigs all the time.

At 5 p.m., the transceiver prize was called. Receivers were set up at the shack. We had three: Super-Skyrider, HRO and a Hammarlund Pro., all working on 5 meters. We would start the three cars out that had transceivers in them and would work them at given spots in and out of the city, a distance of over 5 miles, checking each car off in ¼; sixteen were in this. First prize went to Ray Lewis, Pres. Toledo Radio Club with L. Gilsdorf (W8RQI) at the mike. Third prize to Dean and Richard Seaman with Ray Zeh (W8RQI) at the mike. Third prize to C. H. Peters, with Paul Luckman (W8KPH) at the mike.

This took 2 hours and it was now 7 p.m. —time to sign off after a very interesting

(Continued on page 368)

WANTED

● **Local correspondents, who are able to send us from time to time news items (with photographs, when possible) of the activities among Hams, DXers and amateur radio personalities.**

Regular space rates will be paid for the most interesting items submitted by anyone, each month.

To avoid errors, please typewrite your copy.

The name of each correspondent will be printed at the bottom of the items sent in.

Address—"Local Ham Gossip" Editor,
RADIO & TELEVISION,
99 Hudson Street,
New York, N. Y.

What Do You Think?

(1) Listening post of Nicola Cannata, 1003 So. Halsted St., Chicago, Ill. (2) Prize Winner Zana Kandle, also from Chicago, 7953 Dobson Ave.; she uses a Midwest receiver. (3) Jim Groll, North Chicago St., Dwight, Ill. (4) Station VE4ACP, R. Peters, Jr., 356 Aikins St., Winnipeg, Man., Can.

Hi! Fellers! Did You Send That QSL Card?

Editor,

There has been a lot of "pro and con" talk about this SWL-QSL business.

It seems like the hams, and I mean HAMS who are always belching about SWL's sending cards to them requesting a QSL, are about at the end of their rope; I believe that it would be a good idea for them to give up ham radio, before they find themselves in a state of nervous prostration.

I have been in the amateur game only 18 years now and feel that I still have enough reciprocity left to send a card to a SWL who requests one.

I also have a better feeling towards the SWL than I do a lot of hams. I have been trying here to make WAS on 20 meters and have asked the fellows (some are skunks) to pse QLS as I needed their state for WAS (worked all states) and believe it or not, I have gone to the trouble to write them a letter three times already, and do you think they QSL'd? Well, the truth is, they did *not!* Would you call this ham radio? If so, then the game is going to the dogs. The stations I refer to are—W9 in Willmar, Minn., a W9 in Emporia, Kans., a W5 in Kerrville, Tex., a W4 in Atlanta, Ga., a W9 in Louisville, Ky., a boy, oh boy, a hundred others. If you would like to publish their full call letters, I would be more than pleased to furnish them.

I know a W4 who receives an average of 200 SWL cards a month, *and he answers all of them;* I don't receive that amount but what I do receive. *I acknowledge.*

But these mugs, lugs or bugs, whatever they are, who do not QSL the stations they work when asked to, are not fit to be called *amateurs.*

I have had punks tell me over the air that I had better send my card first, if I wanted one of theirs. Suppose we all felt this way? Phew, the whole business is getting rotten, or is it the smell of these certain SKUNKS?

Then there are the hams and I mean *real ones* whom I have QSL'd, who make the other no-good punks look like the rankest of beginners. These fellows are worth their weight in gold, just to have their friendship.

These squawkers who complain about the SWL who puts R9 reports on their cards must be crazy. If they do not believe their signals to be that loud, they should do something about improving their efficiency or their antenna, so it would be that loud.

I am open for any comments or debate—come one, come all.

If I have stirred the gander in you punks out there, then this article has served its purpose. And do you want to hear more from me? If so, I will spill plenty.

But I believe a word to the wise (?) is sufficient. An *eye for an eye and a tooth for a tooth* is my motto. What? 73 es CUL.

Louis C. Bremer, W3LE,
130 S. Broadway,
Baltimore, Md.

Constructive Criticism

Editor,

I am about the very last person to throw brickbats but I just can't help throwing a few, I feel this way since the day I read the April 1938 issue.

What is the matter with 160 meter transmitters? Seems that the fellow with the class A ticket should get all of the gravy for 20 and 80 meter rigs.

In the receiver diagrams why not let the readers wind their own coils instead of buying them ready made and then tearing them apart later and removing turns of wire, etc.?

Your radio log is the most perfect I have ever seen. I have been trying to log one foreign station for 5 years and only succeeded after looking up the schedule and frequency in Short Wave & Television.

I can't see why you are against S-W Adaptors. I have been using a five-tube superheterodyne converter with a very sensitive 9-tube broadcast receiver for 5 years; I really started logging stations a month ago when I started using an adaptor, plugged into a midget receiver which is home-made (the audio section consists of a single 27 and a single 47 and a 24 detector). When I use a 24 tube in the adaptor I get good results down to 19 meters; when I use a 27 tube I get down below 10 meters.

Frank Saj,
818 Carrol,
Buffalo, N. Y.

A Real S-W Fan

Editor,

Here's from a reader since 1932 April issue, and I still have the copy. I've missed some of course since then and having very limited means, financially, I expect to miss some copies in the future. But thanks to friendly hams, I've come smilin' through thus far. I've thought many times of writing to ye old "ed," but know you're busy as heck, so procrastination is the thief of time, etc. Say, the ex-YL says all radio men are nuts; how about it?

Oh yeah! Well she listened to S. & L. "ringside" via short wave. My hookup is from S. W. C. mag., how's that; we have three B.C. receivers, but SW phone and CW for me. I get the drowsy cheer from the ex-YL about three a.m., but what care I after 10 years "on the air." Now pardon a long note, but the air is quite rite now, so I'm scratching the Parker.

Glancing up at the chronometer, I see it's

(Continued on page 376)

Fourth Silver Trophy Awarded to *William Orr*, W2HCE

Bronxville, N. Y.

For Best HAM STATION Photo of the Month

● THE transmitter rig is to the left and is working on 20 meter phone. The rig uses a 41 xtal oscillator on 7.088 kc., a RK39 doubler to 14.176 kc., link coupled to a 805 in the class "C" amplifier, running at 200 watts input. This R.F. equipment is contained in the two top panels. In the next panel, the third from the top, is the speech amp. This uses a 57 pentode, 57 triode, push-pull 56's, and push-pull 45's as drivers. The modulators, which consist of 4-46's in push-pull parallel are in the next panel, with the square meter. The bottom panel contains the 500 v. 0.5 amp. power-supply for the modulators, and the 1250 volt 0.3 amp. supply which supplies juice to the 805. The four 866's can be seen in the cut out. On the table to the right is the D-104 crystal microphone, electric clock, and the receiver.

The receiver is a *home-built* job. The line-up is 6K7 R.F. amp., 6A8. 1st det.. 6C5 H.F. osc., 2 6K7's I.F. with three iron core 465 kc. I.F. transformers. A "R" meter is incorporated in the I.F. amp. in a Wheatstone bridge circuit. 6H6 2d det. and noise-silencer, 6C5 and 6F6 audios. The receiver uses a Tobe tuning unit which covers 20, 40, 80 and 160 vy fb. In front of the receiver are a pair of Brush xtal phones. To the right of the receiver is a small B.C.L. midget for use when 20 m. is flat. On the wall are the Phone "WAC" ticket and the six QSL's that brought it.

I have one of your "globe" lamps on the receiver. The doohickey to the right of the lamp is a tricky match stand. The whole station, from the antenna to the receiver, is home-made.

Mr. Orr's first-rate Ham shack, located at 11 Sunny Brae Place, Bronxville, N. Y., has been the scene of much experimenting. Antennas and transmitters of every kind imaginable have been "given the works" at this station. He tells you about some of them in his very interesting description of the station.

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

The antenna is a *rotary beam* supported on a 36 ft. telephone pole erected in the back yard. The antenna is 17' x 17' square and is bi-directional. It gives a 4R gain on receiving and a 1½R gain in transmitting over ½ wave doublet. The antenna is fed with a quarter wave stub and 45 ft. of coaxial cable. It is extremely effective, as we have worked 55 countries on phone in all continents. WAC on phone was made with 120 watts in 1936. We worked VU2CQ several times and got reports ranging up to R8. The antenna is rotated by means of two ropes from the shack.

So much for the present rig. Hr's some other dope you might be interested in.

I'm 19 years old and am in the first year

(Continued on page 376)

World Short Wave Stations

Revised Monthly

Complete List of SW Broadcast Stations

Reports on station changes are appreciated.

Mc.	Call	
31.600	W1XKA	BOSTON, MASS., 9.494 m., Addr. Westinghouse Co. Daily 5 am.-12 m., Sun. 7 am.-12 m. Relays WBZ.
31.600	W1XKB	SPRINGFIELD, MASS., 9.494 m., Addr. Westinghouse Co. Daily 5 am.-12 m., Sun. 7 am.-12 m. Relays W8Z.
31.600	W3XEY	BALTIMORE, MD., 9.494 m., Relays WF8R 4 pm-12 m.
31.600	W2XDV	NEW YORK CITY, 9.494 m., Addr. Col. Broad. System, 485 Madison Ave. Daily 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.
26.450	W9XA	KANSAS CITY, MO., 11.33 m., Addr. Commercial Radio Eqpt. Co. Testing after August 1st.
26.400	W9XAZ	MILWAUKEE, WIS., 11.36 m., Addr. The Journal Co. Relays WTMJ from 1 pm.
26.300	W2XJI	NEW YORK, N. Y., 11.4 m., Addr. Bamberger Broad. Service, 1440 Broadway. Relays WOR 8 am.-1 am.
26.100	W9XJL	SUPERIOR, WIS., 11.49 m. Relays WEBC daily.
25.950	W6XKG	LOS ANGELES, CAL., 11.56 m., Addr. B. S. McGlashan, Wash. Blvd. at Oak St. Relays KGFJ 24 hours daily.
25.950	W9XUP	ST. PAUL, MINNESOTA. 11.56 m. Relays KSTP.
21.550	GST	DAVENTRY, ENG., 13.92 m., Addr. (B.B.C., London) Irregular at present.
21.540	W8XK	PITTSBURGH, PA., 13.93 m., Addr. Grant Bldg. Relays KDKA 6.45-9 am. Also Sunday. 6 pm.
21.530	GSJ	DAVENTRY, ENG., 13.93 m., Addr. (See 21.550 mc.) 5.45 am.-12 n.
21.520	W2XE	NEW YORK CITY, 13.94 m., Addr. Col. Broad. Syst., 485 Madison Ave. Daily exc. Sat. and Sun. 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 21.550 mc.), 5.45 am.-12 n.
21.450	DJS	BERLIN, GERMANY, 13.99 m., Addr., Broadcasting House. 12.05-11 am.
19.020	HS8PJ	BANGKOK, SIAM, 15.77 m. Mondays 8-10 am.
18.480	HBH	GENEVA, SWITZERLAND, 16.23 m., Addr. Radio Nations. Sun., 10.45-11.30 am.

16 Met. Broadcast Band

17.810	—	ROME, ITALY. 16.84 m., Addr. (See 2RO. 11.81 mc.) Relays 2RO to 6 pm. irregularly.
17.810	TPB3	PARIS, FRANCE, 16.84 m. Addr. (See 15.245 mc.) 8.30-10 am.
17.800	TGWA	GUATEMALA CITY, GUAT., 16.84 m., Addr. Ministre De Fomento. Irregular.
17.790	GSG	DAVENTRY, ENG., 16.86 m., Addr. B.B.C., London. 1 m-3.15 am., 5.45 am.-12 n., 12.20-6, 6.17-8.30 pm.
17.785	JZL	TOKYO, JAPAN, 16.87 m. Irregular.
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.) Off the air at present.
17.760	DJE	BERLIN, GERMANY, 16.89 m., Addr. Broadcasting House. 12.05-10 am.; also Sun. 11.10 am-12.25 pm. Daily 4.50-10.45 pm.
17.760	W2XE	NEW YORK, N. Y., 16.89 m., Addr. Col. Broad. System, 485 Madison Ave. Irregular.
17.755	Z8W5	HONGKONG, CHINA, 16.9 m., Addr. P.O. Box 200. 4-10 am. Irregular.

End of Broadcast Band

17.310	W2XGB	HICKSVILLE, L. I., N. Y., 17.33 m., Addr. Press Wireless, Box 296. Tests 9.30-11.30 am. except Sat. and Sun.
15.550	CO9XX	TUINICU, ORIENTE, CUBA, 19.29 m., Addr. Frank Jones, Central Tuinicu, Tuinicu, Santa Clara. Broadcasts irregularly evenings.
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.

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.
15.310	GSP	DAVENTRY, ENG., 19.6 m., Addr. (See 17.79 mc.) 4.15-6, 6.20-8.30 pm.
15.300	XEBM	MAZATLAN, SIN., MEX., 19.61 m., Addr. Box 78, "El Pregonero del Pacifico." Irregularly 9-10 am., 1-2, 8-10 pm.
15.300	—	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	H13X	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 17.79 mc.) 1-3.15 am., 12.20-4 pm., 9.20-11.25 pm.
15.250	W1XAL	BOSTON, MASS., 19.67 m., Addr. University Club. Daily 1-2 pm., Sun. 10 am.-12 n. Tues., Thurs. 3.30-5.30 pm.
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.
15.220	PCJ2	HUIZEN, HOLLAND, 19.71 m., Addr. N. V. Philips' Radio Hilversum. Sun., Mon., Thur., Fri., Sat. 6.25-9.30 am., Tues. 12.30-2 am., 6.25-9.30 am., Wed. 9.30-11 am.
15.210	W8XK	PITTSBURGH, PA., 19.72 m., Addr. (See 21.540 mc.) 8 am.-6 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.-12.25 pm.
15.190	LYZ4	LAHTI, FINLAND. 19.75 m. Addr, Oy Suomen Yleisradio, Ab., Lahten Yleisradioasema, Lahti. Irregular 12.30-1.30 pm.
15.190	ZBW4	HONGKONG, CHINA, 19.75 m., Addr. P. O. Box 200. Irregular. 11.30 pm. to 1.15 am., 3-10 am.
15.180	GSO	DAVENTRY, ENG., 19.76 m., Addr. (See 17.79 mc.) 4.15-6, 6.20-8.30 pm., 1-3.15 am.
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., 2.30-4, 4.30-5.30, 8-8.30 pm., 12.30-1.30 am.
15.160	VUD3	DELHI, INDIA, 19.79 m., Addr. All India Radio. 1.30-3.30 am., 6.30-8.30 am.
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 17.79 mc.) 5.45 am.-12 n.
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., Tues., Wed. & Thurs.
15.110	DJL	BERLIN, GERMANY, 19.85 m., Addr. (See 15.280 mc.) 12 m.-2, 8-9 am., 10.40 am.-4.25 pm., also Sun. 6-8 am.
15.080	RKI	MOSCOW, U.S.S.R., 19.87 m. Works Tashkent near 7 am. Broadcasts Sun. 12.15-2.30 pm. Daily 7-9.15 pm.

End of Broadcast Band

14.940	PSE	RIO DE JANEIRO, BRAZIL. 20.08 m., Broadcasts Wed. 3.45-4.15 pm.
14.920	LZA	SOFIA, 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.
14.600	JVH	NAZAKI, JAPAN, 20.55 m. Broadcasts irregularly 5-11.30 pm. Works Europe 4-8 am.

(Continued on page 348)

All Schedules Eastern Standard Time

Let's Listen In with

Joe Miller

"DX" Editor

● HERE 'tis, the October issue, and with it the end of our second year with SHORT WAVE & TELEVISION.

We can certainly look back over the past two years with pleasant memories of the many FB acquaintances we have made among our numerous readers.

As this article is being written, in the midst of the August heat wave, DX conditions are fairly good, but not dependable from day to day. The still high noise level mars many good DX signals, often being the difference between hearing or losing the call letters of the weaker fones.

By the time this article appears in print, the fall upswing in improved reception will definitely be evident, with continually lowering QRN and a pick-up in strength of many signals.

Begin tuning the 10 meter ham band as soon as you read this, if not yet, as this band *begins* its fall and winter peak during this month. Best times for good DX between 10 am.-1 pm., with a peak near noon.

During the past month, we realized a much-cherished and coveted objective, in our final realization of 100 VAC, which mark we have since comfortably passed. Never did we imagine, when we began SW DXing somewhat less than 5 years ago, that such an attainment was even within the realm of possibility!

To mind comes the occasion, 3 short years ago, when a well-known DXer's mark of all of 6 *VAC* was challenged by a then well-known DX writer as *impossible!* Impossible that any DXer could have amassed such a remarkable total, and this only 3 years ago!

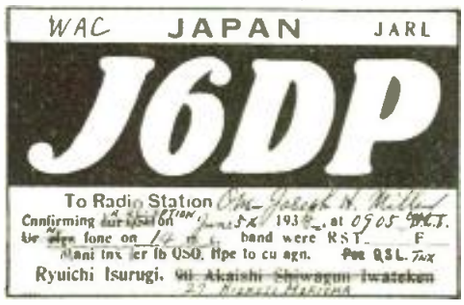
And so short waves go on, with yesteryear's impossibility today's reality in achievement.

As the world's first DXer to reach 100 VAC, we are moved to inaugurate a new DX organization, for which we hope some of you may eventually become eligible, i.e., the Century VAC Club, certainly the most exclusive DX organization one could imagine, hi, what with the *only* requirement being that one possess veris on fone totalling 100 VAC!

Now to DX:

Left: J6DP (Photo) Here's a really FB DX shack, which RYUICHI proudly presents! FB, OM!

Below: An outstanding DX QSL card: white letters on blue background.



FRENCH INDO-CHINA

Radio Boy-Landry, 9.76 mc., at Saigon, was well received one am. during July, despite QRN. The 31 meter band, year in and year out, is the most reliable SW DX band, and most anything on the air, no matter where it's located on this ever-shrinking little globe of ours, will sooner or later be logged, if one but perseveres, on this popular SW BC band. Boy-Landry transmits on 3 waves now, 6.20, 11.71, and on 9.76 mc. Look for Saigon on the 2 higher frequencies in September, in the early am. hours.

QRA: Ets. Boy-Landry, Dept. Radio, 17, Place A Foray, Saigon, French Indo-China.

Rene Lebon, whose station card and photo we showed in our last article, operates in Hanoi as FI8AC, a famous Asiatic amateur call. He sends us some news of new SW BC stations in Indo-China.

Radio Hanoi I, 9.51 mc., and Radio Hanoi II, 11.90 mc., using 15 and 150 watts respectively, and built personally by Rene, are now on the air daily, midnight, 2 am. and 6-10 am. EST. Rene adds that these stations are owned by the Radio Club de l'Indochine, and that all correct reports will be verified. Address the Radio Club de l'Indochine, Radio Hanoi, Hanoi, French Indo-China.

CHINA

XTJ, 11.69 mc., Hankow, was very well heard one morning while in contact with XTS, 11.44 mc., at Swatow, also a fine signal. Both stations used inverted speech. This at 5:25 am.

XTJ daily broadcasts from 7-7:30 am. as "The Voice of China," and is very well heard on the West Coast, both while phoning at all hours of am. and broadcasting.

XGX, 9.20 mc., also at Hankow, which relays the powerful XGOW, BCB station at Hankow, is being well heard on the West Coast from 5-10 am, according to Ashley Walcott, W6. Tho the assigned frequency of XGX is 9.20 mc., the station varies this frequency inside the limits of 9-9.25 mc., to avoid interference, probably purposely created, by the enemy forces. XGX uses 150 watts. In a verification of XGX to Mr. Walcott, T. Y. Woo, Director, the Central Broadcasting Administration, Central Executive Committee of Kuomintang, Chungking, China, states that a powerful new 35 kw. transmitter is being installed, and will be broadcasting within a few months. Reports on XGX should be sent to Mr. Woo.

FB8AB—A charming photo of "OM" Paul and the Junior "OP," all set in his FB DX shack to work some real DX. And Paul is some DXer!

FINLAND

Lahti is now being reported by numbers of alert DXers throughout the U. S., mostly on the 31 meter band, where its signal is heard at 9.50 mc., its schedule being 12:15-5 pm. On 11.78 mc., the schedule is 1:05 am.-12:05 pm. This data is contained in a veri to Ed Goss, W2, N. Y. State manager for I. D. A., for the 9.50 mc. wave. Veri states power is 1 kw.

Lahti is also reported with an exceptional rating of R9 for the West Coast by Max Fisher, W6, on 15.189 mc., one morning, from 12:30 am. till after 3 am. Max adds that a woman makes announcements, these in English, on the hour, with often a 2-5 minute silence between annts. When heard in early am., this station broadcasts physical exercises, conducted by either a man or woman, accompanied by an organ. Watch for this new country to add to ur logs. Lahti QSLs promptly. QRA in last issue.

MADAGASCAR

Radio Tananarive, with its 3rd verification here (this for 10.95 mc.), has been, to put it aptly, "cleaned up," as we already had the 9.5 and 6 mc. veris of this ace catch. Look for this rare DX "sig" this fall and winter on frequencies of 9.38 and 10.95 mc. on a schedule of 12:30-12:45 am., 3:30-4:30 am., 10-11 am. wkdays; and 2:30-4 am. Sundays. Our luck has always held up on the Sunday transmissions between 2:30-4 am.

FED. MALAY STATES

ZGE, 6.21 mc. (now heard on 6.24) at Kuala Lumpur, at last QSL'd our hopeful reports of April, 1937, with its station card, which will be shown next month (conditions permitting). We had the ill-fortune to forget to write ZGE c/o the Malayan Amateur Radio Society, which organization operates the transmitter, the same one as used for commercial telephony under the call ZGB. However, a follow-up report,

(*Continued on page 379*)

Mc.	Call	
14.535	HBJ	GENEVA, SWITZERLAND, 20.64 m., Addr. Radio Nations. Broadcasts Sun. 1.45-2.30 pm.
14.440	—	RADIO MALAGA, SPAIN, 20.78 m. Relays Salamanca 8.15-8.45 pm. Sometimes 2-4 pm.
14.166	PIIJ	DORDRECHT, HOLLAND, 21.15 m., Addr. (See 7.088 mc.) Sat. 12 n.-12.30 pm.
14.004	EA9AH	TETUAN, SPANISH MOROCCO, 21.4 m. Apartado 124. News at 4.30 and 7.15 pm. Relays Salamanca from 5.40 pm.
13.635	SPW	WARSAW, POLAND, 22 m. Daily 6-8 pm. Sat. & Sun. 6-9 pm.
12.862	W9XDH	ELGIN, ILL., 23.32 m. Press Wireless, Tests 2-5 pm.
12.235	TFJ	REYKJAVIK, ICELAND, 24.52 m. Works Europe mornings. Broadcasts Sun. 1.40-2.30 pm.
12.200	——	TRUJILLO, PERU, 24.58 m., "Rancho Grande." Address Hacienda Chiclin. Irregular.
12.060	RNE	MOSCOW, U.S.S.R., 24.88 m. Daily 6-7 am., 12.15-1 pm., 8-9.15, 10-11 pm., also Sun. 6 am.-1 pm.
11.970	HI2X	CIUDAD TRUJILLO, D. R., 25.07 m., Addr. La Voz de Hispaniola. Relays HIX Tue. and Fri. 8.10-10.10 pm.

25 Met. Broadcast Band

11.910	CD1190	VALDIVA, CHILE, 25.2 m., P. O. Box 642. Relays C869 10 am.-1 pm., 11 am.-10 pm.
11.900	XEWI	MEXICO CITY, MEXICO, 25.21 m., Addr. P. O. Box 2874. Mon., Wed., Fri. 3-4 pm., 9 pm.-12 m. Tues. and Thur. 7.30 pm.-12 m., Sat. 9 pm.-12 m.
11.895	HP5I	AGUADULCE, PANAMA, 25.22 m. Addr. La Voz del Interior. 7.30-9.30 pm.
11.885	TPA3	PARIS, FRANCE, 25.24 m., Addr. (See 15.245 mc.) 1-4 am., 10.15 am.-5 pm.
11.885	TPB7	PARIS, FRANCE, 25.24 m. (See 15.245 mc.) 6-8.15, 8.30-11 pm.
11.870	W8XK	PITTSBURGH, PA., 25.26 m., Addr. (See 21.540 mc.) 6-8.45 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 11.75 mc.)
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, 25.34 m., Addr. Czech Shortwave Stg., Praha XII, Fochova 16. Mon., Tues., Thurs., Fri. 6.55-9.55 pm.
11.830	W9XAA	CHICAGO, ILL., 25.36 m., Addr. Chicago Federation of Labor. Irregular 7 am.-6 pm.
11.830	W2XE	NEW YORK CITY, 25.36 m., Addr. Col. Broad. System, 485 Madison Av., N.Y.C. 5.30-10 pm.
11.826	XEBR	HERMOSILLA, SON., MEX., 25.37 m., Addr. Box 68. Relays XEBH. 1-4 pm., 9 pm.-12 m.
11.820	GSN	DAVENTRY, ENG., 25.38 m., Addr. (See 11.75 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 St. 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. 7-7.30, 8-9.30 am., 2.30-4, 4.30-5.30 pm.
11.795	DJO	BERLIN, GERMANY, 25.43 m., Addr. (See 15.280 mc.) Off the air at present.
11.790	WIXAL	BOSTON, MASS., 25.45 m., Addr. (See 15.250 mc.) Mon., Wed., Fri. 3.30-5.30 pm., Sat. 5-5.30 pm., Sun. 2-4.30 pm.
11.780	HP5G	PANAMA CITY, PAN., 25.47 m., Addr. Box 1121. Heard till 12 m.
11.780	LYZ3	LAHTI, FINLAND, 25.47 m. Addr. (See 15.190 mc., LYZ4) Irregularly after midnight.
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.) Irregular 10-11.30 pm. Sun. 6-11.30 pm., irregular.
11.760	OLR4B	PRAGUE, CZECHOSLOVAKIA, 25.51 m., Addr. (See 11.840 mc.) Irregular.
11.750	GSD	DAVENTRY, ENG., 25.53 m., Addr. B.B.C., London. 1-3.15, am., 12.20-4.00 p.m., 6.20-8.30, 9.20-11.25 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	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.
11.715	TPA4	PARIS, FRANCE, 25.61 m., (See 15.245 mc.) 5-7.15 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. Addr. P.O. Box 706. Relays CB89 6 pm.-12 m.

End of Broadcast Band

11.530	SPD	WARSAW, POLAND, 26 m., Addr. 5 Mazowiecka St. 6-9 pm.
11.402	HBO	GENEVA, SWITZERLAND, 26.31 m., Addr. Radio Nations. Sun. 7-7.45 pm., Mon. 1-1.15. am.
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 YD8. 6-7.30 p.m., 5.30-10.30 or 11 am. Sat. until 11.30 am.
10.960	——	TANANARIVE, MADAGASCAR, 27.36 m., Addr. (See 9.53 mc.) 12.30-45, 3.30-4.30, 10-11 am.
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.
10.535	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.
10.370	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.
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.
10.220	PSH	RIO DE JANEIRO, BRAZIL, 29.35 m., Addr. Box 709. Broadcasts 6-9 pm.
10.042	DZB	ZEESEN, GERMANY, 29.87 m., Addr. Reichspostzenstralamt. Irregular.
9.980	COBC	HAVANA, CUBA, 30.04 m., Addr. P. O. Box 132. Relays CMBC 6:55 a.m.,-12:30 a.m.
9.940	JDY	DAIREN, MANCHUKUO, 30.18 m. Relays JQAK daily 7-8 am. Works Tokyo occasionally in early am.
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. 7.30-8, 8.40-9 pm.
9.830	IRF	ROME, ITALY, 30.52 m. Works Egypt afternoons. Relays 2RO, 6-9 pm.
9.760	CSW	LISBON, PORTUGAL, 30.74 m. Addr. Nat. Broad. Sta. 5-8 pm.
9.760	——	SAIGON, INDO-CHINA, 30.72 m., Addr. 17, Place A. Foray. "Radio Boy-Landry." Heard 6-9.15 am.
9.720	COCQ	HAVANA, CUBA, 30.85 m. Addr. 25 No. 445, Vedado, Havana, 6.55 am.-1 am. Sun. till 12 m.
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 LR1, 9.30 am.-11.30 pm.
9.650	CS2WA	LISBON, PORTUGAL, 31.09 m., Addr. Radio Colonial. Tues., Thurs. and Sat. 3.30-6 pm.
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.-11 pm.
9.635	2RO	ROME, ITALY, 31.13 m., Addr. (See 11.810 mc.) Off the air at present.
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.
9.616	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, 5.30-7, 9-11.45 am.
9.607	HP5J	PANAMA CITY, PANAMA, 31.23 m. Addr. Apartado 867. 12 n. to 1.30 pm., 6-10.30 pm.

31 Met. Broadcast Band

9.600	RAN	MOSCOW, U.S.S.R., 31.25 m. 7-9.15 pm.
9.595	HBL	GENEVA, SWITZERLAND, 31.27 m., Addr. Radio Nations. Irregular.
9.590	VUD2 VUD3	DELHI, INDIA, 31.28 m. Addr. All India Radio, 1.30-3.30 am., 6.30-8.30 am., 7.30 am.-12.30 pm.
9.590	PCJ	HUIZEN, HOLLAND, 31.28 m., Addr. (See 15.220 mc.) Sun. 2-3, Mon. 7-8, 8.15-9.25 pm. Tues. 1.45-2, 2.10-3.40 pm., Wed. 7-8.30, 8.45-10.15 pm., Thurs. 7-9 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	W2XE	NEW YORK, N. Y., 31.28 m., Addr. CBS, 485 Madison Ave., Irregular.

(Continued on page 350)

All Schedules Eastern Standard Time

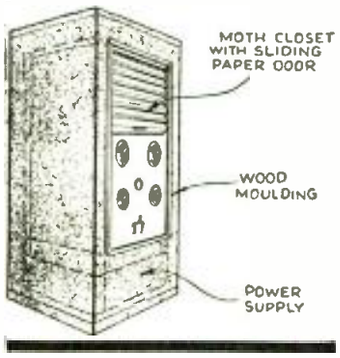
Radio Kinks

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

Housing for Xmtr

1st Prize

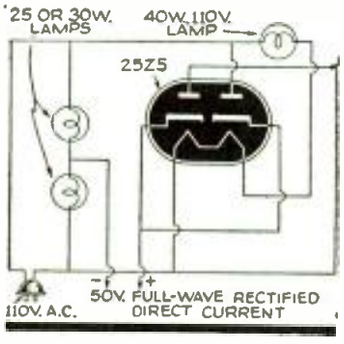
A sturdy moth-proof closet makes a first rate housing for a transmitter—and is very inexpensive. Those of the kind that are made with pressed wood panels on a wooden frame, and



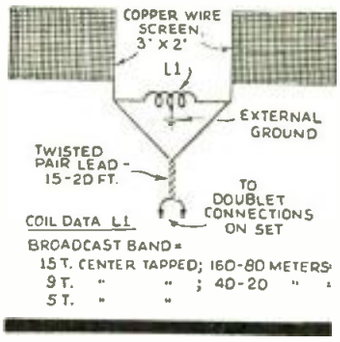
which are equipped with sliding corrugated cardboard doors are excellent, for the framework will hold up to 150 lbs. weight. The heaviest unit—the power supply—rests on the floor inside the closet, so need not be included when calculating the weight of the apparatus. These cabinets are 2 feet deep by 3 feet wide, and may be had either 4 feet or 6 feet high.—*George Nichols.*

Power Supply

A way of securing full-wave rectification of alternating current without the use of a power transformer is shown in the diagram. Two 25 or 30 watt incandescent lamps are connected in series across the 110 volt a.c. line, as shown, and the center point between them is used as the negative leg of the rectified voltage. The positive leg is

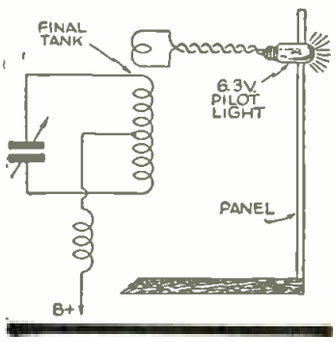


taken from the two cathode terminals of the 25Z5 rectifier tube, as shown. The voltage output with this arrangement is about 50 volts at low current drains. The 40-watt lamp is used to reduce the filament voltage for the 25Z5 to its proper point.—*Russell Yost.*



Aerial Hint

I have had considerable interference with radio reception in my locality and finally hit on the scheme described for UHF reception. The coils specified are wound with No. 26 D.C.C. wire on a 1¼" diameter tube, suspended between the two legs of the antenna. I have had most gratifying results with this arrangement, the noise pick-up being very low and the signal pick-up high.—*Frank Owens.*

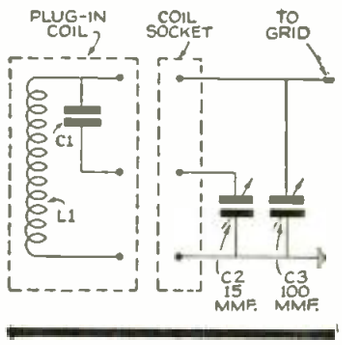


Carrier Indicator

A simple visual means of showing when a transmitter is on the air is to use a small wire loop coupled either to the final tank or to the oscillator coil of the transmitter. The ends of this loop are connected to a 6.3 volt pilot light on the front panel of the transmitter. When the transmitter is put on the air, the R.F. voltage induced in the loop will light up the 6.3 volt pilot bulb. Care must be taken that the coupling loop is not too close to the transmitter coils to prevent the bulb from being burned out.—*Robert J. Ingelsby.*

Even Bandspread

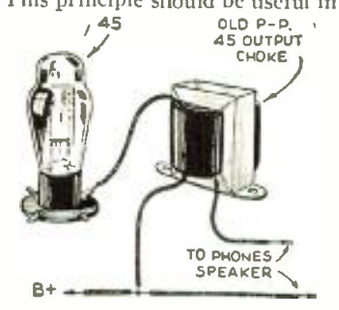
A particularly good way of assuring that any desired band is spread over an equal area on the tuning dial is shown here. A fixed condenser, C1, is mounted inside the plug-in coil form and connected as shown, in series with the bandspread tuning condenser C2. If desired, C1 can be a variable condenser having a maximum capacity of 100 mmf. It should be adjusted so that the limits of any ham or broadcast band correspond to one complete rotation of band-



spread condenser C2. Without the use of condenser C1, it will be found that some bands will only cover a part of the rotation of the bandspread condenser while other bands will not be completely covered by one complete rotation of this condenser. —*Homer Apple.*

Phone & Speaker Kink

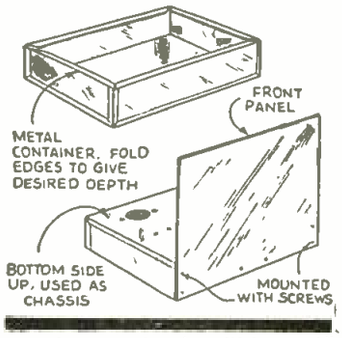
The diagram shows how I wired an output terminal for phones or loud speaker from a 45 tube. The inductance used is an old push-pull 45 output choke, and it works very well with phones or magnetic speaker. This principle should be useful in



sets using push-pull audio systems, by removing one of the power tubes and connecting the phones between the plate terminal on the socket of the tube removed and the B+.—*M. P. McKay.*

Low-Cost Chassis

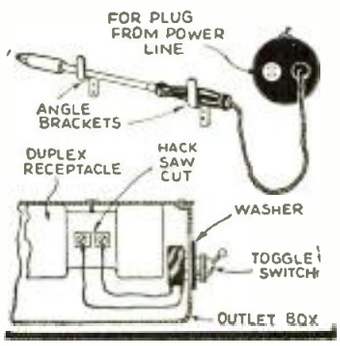
For experimental work a simple chassis may be fashioned at very little cost from tin containers such as are available from drug stores and garages. Baking pans will also serve for the purpose. With a pair of tinsnips, cut off the bottom of the



container so that it will be a ¼" deeper than the desired chassis. Fold the extra ¼" back to secure a smooth non-scratching edge. Holes for sockets, etc., can easily be cut with an old knife.—*Jim Lattig, W9QJR.*

Soldering Aids

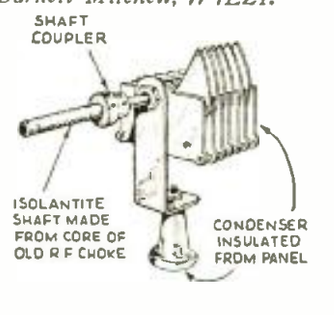
Two angle brackets mounted on the wall provide a resting place for the iron. If the iron is to be placed here while still warm, it is advisable to mount a piece of asbestos on the wall so



it will not be scorched. A duplex receptacle is needed, as shown in the sketch, and a toggle switch mounted on the side of a metal box provides a semi-permanent method of supplying power to the soldering iron. The toggle switch turns the iron on or off, as desired.—*Lincoln Weeks.*

Novel Condenser Shaft

It is frequently necessary to mount a condenser back of the metal panel on a transmitter or receiver and this arrangement requires the use of an insulated shaft. The drawing shows how an insulated section of shaft can be coupled to the condenser; the insulated section is made from the core of a pie-wound R.F. choke. The windings are cut off and the small metal caps on the ends are also removed. A shaft coupler completes the job.—*Barnett Mitchell, W4EZI.*



Mc.	Call	
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, 9.20-11.25 pm.
9.580	VLR	MELBOURNE, AUSTRALIA, 31.32 m. Addr. Box 1686, G. P. O. Daily 3.30-8.30 am. (Sat. till 9 am.) Sun. 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. Sun. 3-10 am. Daily exc. Sat. 4.30-7 pm., 11.15 pm.-12.15 am. Daily exc. Sun. 4-10 am.
9.570	W1XK	SPRINGFIELD, MASS., 31.35 m., Addr. Westinghouse Electric & Mfg. Co. Relays WBZ 6 am. to 12 m. Sun. 7 am.-12 m.
9.560	DJA	BERLIN, GERMANY, 31.38 m., Addr. Broadcasting House. 12.05-11 am., 7-10.45 pm.
9.550	TPBII	PARIS, FRANCE, 31.41 m. Addr. (See 15.245 mc.) 1-3 am., 10.15 am.-5 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.) Irreg.
9.550	XEFT	VERA CRUZ, MEX., 31.41 m. 10.30 am.-4.30 pm., 10.30 pm.-12.30 am.
9.550	YDB	SOERABAJA, JAVA, 31.41 m., Addr. N.I.R.O.M. Daily exc. Sat. 6-7.30 pm., 5.30 to 10 am. Sat. 5.30-11.30 am.
9.550	VUB2	BOMBAY, INDIA. 31.41 m., Addr. All India Radio. 9.30-10.30 am., 1 am.-3.30 pm.
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.
9.535	JZI	TOKYO, JAPAN, 31.46 m., Addr. (See 11.800, JZJ) Irregular.
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.
9.530	ZHO	SINGAPORE, MALAYA, 31.48 m., Mon.-Fri. 12.40-1.40 am., Sat. 12.25-1.40 am., 10.40 pm.-1.10 am. Irreg. 5.40-9.40 am.
9.526	XEDQ	GUADALAJARA, GAL., MEXICO, 31.49 m. Irregular 7.30 pm. to 12.30 am.
9.526	ZBW3	HONGKONG, CHINA, 31.49 m., Addr. P. O. Box 200. 11.30 pm. to 1 am., 3-10 am.
9.525	LKJ1	JELOY, NORWAY, 31.49 m. 5-8 am.
9.523	ZRH	ROBERTS HEIGHTS, S. AFRICA. 31.5 m., Addr. (See ZRK, 9.606 mc.) Daily exc. Sun. 5-7.30 am.; Sun. 5.30-7 am.
9.520	HJ4ABH	ARMENIA, COLOMBIA, 31.51 m. 6-10 pm.
9.520	OZF	SKAMLEBOAEK, DENMARK, 31.51 m., Addr. Statsradiofonien, Heibergsgade 7, Copenhagen., 2-6.40, 8-11 pm.
9.520	YSH	SAN SALVADOR, EL SALVADOR 31.51 m., Addr. (See 7.894 mc.) Irregular 6-10 pm.
9.510	GSB	DAVENTRY, ENGLAND, 31.55 m., Addr. (See 9.580 mc.—GSC) 1-3.15 am., 1.30-4, 4.15-6, 6.20-8.30, 9.20-11.25 pm.
9.510	HJU	BUENAVENTURA, COLOMBIA, 31.55 m., Addr. National Railways. Mon., Wed. and Fri. 8-11 pm.
9.500	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	LYZ2	LAHTI, FINLAND, 31.58 m., Addr. (See 15.19 mc. LYZ4) 2-5 pm.
9.500	HS8PJ	BANGKOK, SIAM, 31.58 m. Thursday, 8-10 am.
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.

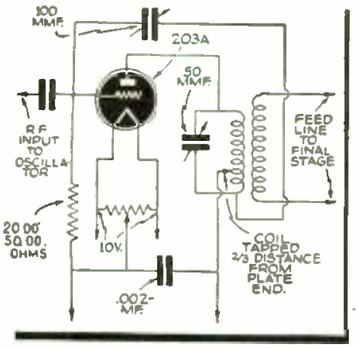
End of Broadcast Band

9.445	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.
9.380	—	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. Off the air at present.
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.
9.200	COBX	HAVANA, CUBA, 32.59 m. Addr. San Miguel 194, Altos. Relays CMBX 7 am.-12 m.
9.125	HAT4	BUDAPEST, HUNGARY, 32.88 m., Addr. "Radiolabor," Gyali-ut, 22. Sun. and Wed. 7-8 pm., Sat. 6-7 pm.
9.100	COCA	HAVANA, CUBA, 32.95 m., Addr. Galiano No. 102. Relays CMCA 9 am.-12 m.
9.020	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.
8.965	COKG	SANTIAGO, CUBA, 33.44 m. Addr. Box 137. 9-10 am., 11.30 am.-1.30 pm., 3-4.30, 5-6, 10-11 pm., 12 m.-2 am.
8.841	HCJB	QUITO, ECUADOR, 33.5 m. 7-8.30 am., 11.45 am.-2.30 pm., 5-10 pm., except Mon. Sun. 12 n.-1.30 pm., 5.30-10 pm.
8.700	HKV	BOGOTA, COLOMBIA, 34.46 m. Tues. and Fri. 7-7.20 pm.
8.665	COJK	CAMAGUEY, CUBA, 34.64 m., Addr. Finlay No. 3 Altos. 5.30-6.30, 8-11 pm., daily except Sat. and Sun.
8.665	W2XGB	HICKSVILLE, N. Y., 34.64 m., Addr. Press Wireless. Mon. to Fri. News at 9 am. and 5 pm.
8.580	YNPR	MANAGUA, NICARAGUA, 34.92 m. Radiodifusora Pilot.
7.894	YSD	SAN SALVADOR, EL SALVADOR, 37.99 m., Addr. Dir. Gen. Tel. & Tel. 7-11 pm.
7.870	HCIRB	QUITO, ECUADOR, 38.1 m. La Voz de Quito. 9-11 pm.
7.854	HC2JSB	GUAYAQUIL, ECUADOR, 38.2 m. Evenings to 11 pm.
7.797	HBP	GENEVA, SWITZERLAND, 38.48 m., Addr. Radio-Nations.
7.410	HCJB4	QUITO, ECUADOR, 40.46 m., 7-9.30 pm. irregularly.
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.
7.088	PIIJ	DORDRECHT, HOLLAND, 42.3 m., Addr. Dr. M. Hellingman, Technical College. Sat. 11.10-11.50 am.
6.990	XEME	MERIDA, YUCATAN, 42.89 m., Addr. Calle 59, No. 517. "La Voz de Yucatan desde Merida." Irregular.
6.977	XBA	TACUBAYA, D. F., MEX., 43 m. 9.30 am.-1 pm., 7-8.30 pm.
6.805	HI7P	CIUDAD TRUJILLO, DOM. REP., 44.06 m., Addr. Emisoria Diaria de Commercio. Daily exc. Sat. and Sun. 12.40-1.40, 6.40-8.40 pm. Sat. 12.40-1.40 pm. Sun. 10.40 am.-11.40 am.
6.790	PZH	PARAMIRABO, SURINAM. 44.16 m., Addr. P. O. Box 18. Daily 6.06-8.36 am., Sun. 9.36-11.36 am. Daily 5.36-8.36 pm.
6.775	HIH	SAN PEDRO DE MACORIS, DOM. REP., 44.26 m. 12.10-1.40 pm., 7:30-9 pm. Sun. 3-4 am., 4.15-6 pm., 4.40-7.40 pm.
6.750	JVT	NAZAKI, JAPAN, 44.44 m., Addr. Kokusai-Denwa Kaisha, Ltd., Tokyo. Irregular.
6.730	HI3C	LA ROMANA, DOM. REP., 44.58 m., Addr. "La Voz de la Feria." 12.30-2 pm., 5-6 pm.
6.720	PMH	BANDOENG, JAVA, 44.64 m. Relays 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. Off the air at present.
6.672	—	—— 44.94 m., relays Salamanca, Spain, 7-9.45 pm.
6.672	YVQ	MARACAY, VENEZUELA, 44.95 m. Irregular.
6.635	HC2RL	GUAYAQUIL, ECUADOR, S. A., 45.18 m., Addr. P. O. Box 759. Sun. 5.45-7.45 pm., Tues. 9.15-11.15 pm.
6.630	HIT	CIUDAD TRUJILLO, D. R., 45.25 m., Addr. "La Voz de la RCA Victor," Apartado 1105. Daily exc. Sun. 12.10-1.40 pm., 5.40-8.40 pm.; also Sat. 10.40 pm.-12.40 am.
6.625	PRADO	RIOBAMBA, ECUADOR, 45.28 m. Thurs. 9-11.45 pm.
6.558	HI4D	CIUDAD TRUJILLO, D. R., 45.74 m. Except Sun. 11.55 am.-1.40 pm.
6.550	XBC	VERA CRUZ, MEX., 45.8 m. 8.15-9 am.
6.550	TIRCC	SAN JOSE, COSTA RICA, 45.8 m., Addr. Radioemisora Catolica Costarricense. Sun. 11 am.-2 pm., 6-7, 8-9 pm. Daily 12 n.-2 pm., 6-7 pm., Thurs, 6-11 pm.
6.545	YV6RB	BOLIVAR, VENEZUELA, 45.84 m., Addr. "Ecos de Orinoco." 6-10.30 pm.
6.520	YV4RB	VALENCIA, VENEZUELA, 45.98 m. 11 am.-2 pm., 5-10 pm.
6.516	YNIGG	MANAGUA, NICARAGUA, 46.02 m., Addr. "La Voz de las Lagos." 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	T18WS	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.

(Continued on page 384)

All Schedules Eastern Standard Time

Question Box



Circuit for a regenerative doubler —1154

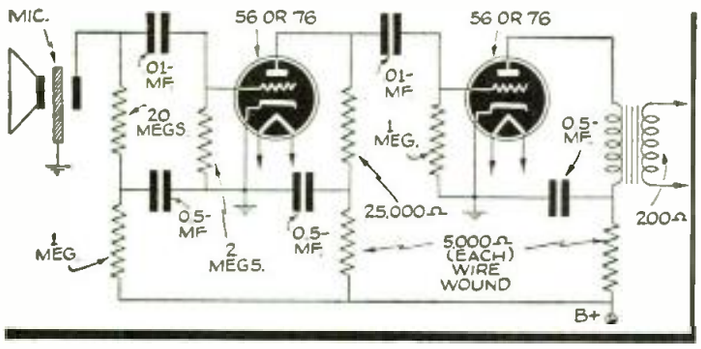
? Frequency Doubler

I have a 203A and an 800 and would like to use either as a frequency doubler. I intend to use either of these tubes at frequencies up to about 14 or 15 megacycles. Can you furnish me with a diagram of a doubler, using either of these tubes, and also state which tube I should use? I have seen many diagrams of frequency doublers in your magazine but none have appealed to me for my particular need.—G. H. Harris, Watertown, N. Y.

A. A 203A makes a wonderful frequency doubler at frequencies up to about 15 mc.; a single one in a regenerative doubler circuit will put out close to 100 watts on 20 meters, when excited by a 40-meter crystal oscillator. This is more than enough to "kick the pants off" a pair of 852's in push-pull when inductively coupled to them. Thus we can have over 750 watts in the antenna on 14 mc. with only three stages. The efficiency of the 03A stage could be increased either by increasing the excitation or by lowering the input, but we can sacrifice a little efficiency for the sake of the output, because a 03A will dissipate 80 or 90 watts without getting too warm. Thus if the efficiency of the 03A is only about 60%, we can still get about 100 watts out of it without exceeding the dissipation rating of the tube. The diagram of the frequency doubler is shown. There is much controversy as to whether the circuit is regenerative, degenerative or neutralized, but in any event, the output is greatly increased over that of a straight doubler. The grid resistor should be between 2,000 and 5,000 ohms and if over 1000 volts is placed on the tube, some protection in the form of battery bias in addition to the resistor bias is advisable.

By substituting an 800 for the 03A, the circuit will function nicely on 10 meters, but the output will be limited to about 25 watts because of the lesser allowable plate dissipation on the tube. With the 800, about 90 volts of battery bias should be used in addition to the grid-leak bias, for protection in the event that the tube should lose excitation.

A Low-Level Amplifier



Hook-up for low-level amplifier with condenser microphone—1155

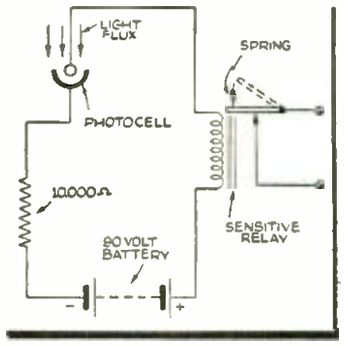
? *I have a large number of resistors on hand and would like to construct a high quality low-level audio frequency amplifier suitable for use with either a condenser or dynamic type microphone. This should be one for use with either the 56 or 76 type tubes. If possible could you publish a diagram of such an amplifier, giving list of parts?—Hiram Johnson, Harrisburg, Pa.*

A. A number of inquiries have been received by this department requesting data for such an amplifier, for use with either of the microphones mentioned. A diagram of such an amplifier is shown. With these microphones, an input transformer can be used, in which case the transformer secondary is connected directly from grid to ground across the 2 megohm grid-leak or resistor. With the use of an input transformer, we would eliminate the 20 and 1 meg. resistors and the .01 and .5 mf. conds. used to supply and isolate the d.c. polarizing voltage which places an initial charge on the "hot" plate of the condenser head.

Note that these tubes operate without bias. This is possible because of the small magnitude of the voltages involved. The output of the condenser head rarely exceeds 1/1000 volt. The gain of this amplifier is about 40 db, and the output can be connected to an amplifier designed to amplify the output of a double-button mike. This amplifier should be well shielded, especially if used in the vicinity of a transmitter, and should be kept far away from any power supply equipment, to avoid hum pickup. If A.C. is used on the heaters the heater circuit should be by-passed with 1 mf. condensers.

Photo-Cell Relay Circuit

? *Will you kindly publish a diagram of a simple photo-electric cell circuit, in which a sensitive relay can be made to operate. I would like to use this in connection with a circuit for a burglar alarm. I have the necessary apparatus on hand. All I would like is the diagram of the simplest relay system that I may use.—Harold M. Wilson, Cleveland, Ohio.*

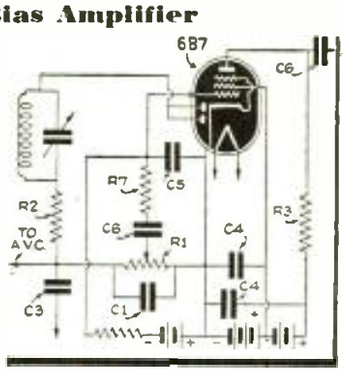


A simple photo-cell relay circuit —1156

A. There are any number of types of circuits that can be used in conjunction with photo-electric cells. However, one of the simplest photo-electric relay circuits is shown here. It is self-explanatory. A very sensitive relay should be used; one that will operate on about 30 microamperes. A very intense illumination or light source should be used.

A.V.C.-Fixed Bias Amplifier

? *I am constructing a super-het. receiver for all-wave operation but especially for reception on waves below 20 meters. In this receiver I wish to use a duplex-diode pentode of the 6B7 type as a half-wave rectifier and A.V.C., also as a fixed bias amplifier. Is it possible for me to secure a diagram showing how such a tube can be used as mentioned above? I intend to use all 6.3 volt heater tubes throughout the receiver. —Max Liebowitz, Montreal, Canada.*



Simple A.V.C.-fixed bias amplifier —1157

A. The 6B7 is recommended for performing the simultaneous functions of A.V.C., detection and amplification. This 3-in-1 feature is important, allowing the constructor to choose whichever way he wishes to utilize the component units. Here is a diagram showing a half-wave detector, which utilizes both plates in parallel as the diode. The A.V.C. action is obtained by utilizing the voltage drop caused by the rectified current flowing through a resistor in the detector circuit.

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.

An ADVANCED High-Frequency Receiver

Howard G. McEntee, W2FHP

8-tube receiver covers 10, 20 and 40 meter bands. A high class set with bandspread, audio output meter, a built-in monitor, beat oscillator and a crystal filter.

● TO BEGIN with, the old receiver did not have sufficient "gimp"on the 20 meter band, and worse yet, it did n t cover 10 meters at all. It was satisfactory, however, at 40 meters and the higher wavelengths. This led to the conclusion that the new job should be made to cover 40, 20 and 10 meters only. There is no reason why it cannot be used successfully on 5 meters, although no experiments have been conducted on this band. At this station, as at most others, a satisfactory 5 meter receiver was already at hand, and it was not desired to compromise the design too much. This receiver, then, is extra "hot" for 10 and 20, covers 40 in fine shape, and was designed with an eye to 5 meters.

Plug-In Coils Used

The highest efficiency called for plug-in coils, and being of a lazy type we did not care for the idea of lifting the cover and poking coils inside whenever a frequency shift was needed. Hence, a simplified means of inserting the coils through the front panel in one unit was worked out. The coil sets are completely self-contained and protected.

Several ideas in receiver features have long been attractive to us. Who has not, when transmitting C.W., tuned the receiver to his own signal to improve keying or just to gloat over his own beautiful signal? The use of a *built-in* monitor has always seemed a fine solution to this problem, so such a unit is incorporated. Regeneration and tuning controls are right on the front panel, where they may be changed to suit. The monitor tube is also used as the beat oscillator, switching being accomplished by a relay as seen in the circuit diagram. This relay also has a set of contacts which open the B+ leads of the whole H.F. and I.F. portion of the receiver when the monitor is in operation. The relay operation is controlled by a switch incorporated in the monitor regeneration control. However, for ideal operation, the relay should be controlled by the same switch that turns on the transmitter, and for this purpose a pair of screw terminals are placed on the rear of the chassis so that the monitor is turned on, and the B+ on all but tubes V5 and V6 turned off, when these terminals are closed. A separate volume control for the monitor makes it unnecessary to disturb settings of receiver controls in any manner when using the monitor. This latter control is mounted on the shield of the B.F.O. compartment, directly over the relay.

Standard plug-in coils are used for the monitor with the addition of a 50 mmf. trimmer condenser placed in each coil. This acts as the *tank* condenser while the monitor panel control provides *bandspread* tuning.

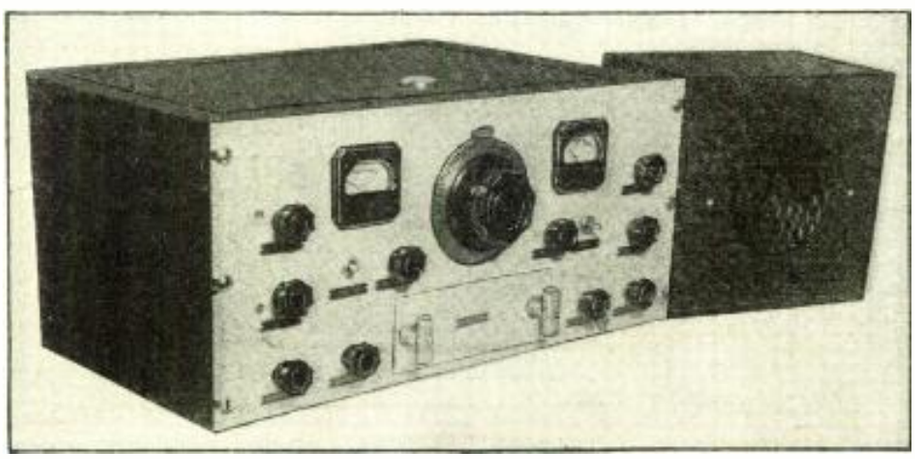
Audio Output Meter

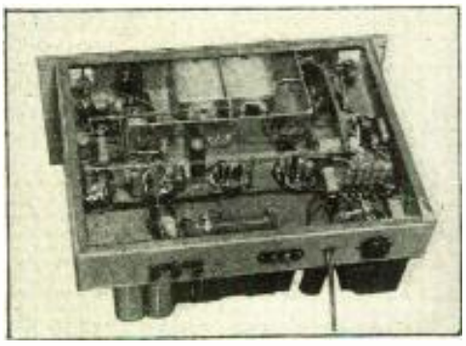
Another unusual feature of the receiver is the addition of an *audio output meter.* This is very useful, particularly for radiofone work, and some very useful data may be secured when the A.F. voltage is noted in conjunction with the carrier strength as shown by the "R Meter." Of course, since no attempt is made to match the impedance of the meter to that of the output circuit, the true A.F. output capabilities of the set are not registered, but the meter is useful mainly for comparative purposes. Possessing a basic range of 0-1 V. A.C., the 13,000 ohm resistor gives a rough multiplication of 10, which is a sufficient range in view of the existing impedance mismatch.

Crystal Filter

The balance of the receiver is more or less straightforward, with possible exception of the *crystal filter* circuit. An I.F. of 1600 kc. is employed, and the use of the conven-

(Continued on page 382)





Bottom view.

Note the handsome appearance of the Communications Receiver built by Mr. McEntee and shown above, together with loud-speaker, which is housed in the grilled cabinet at the right.

Rear view of the receiver, showing the power transformer and chokes.

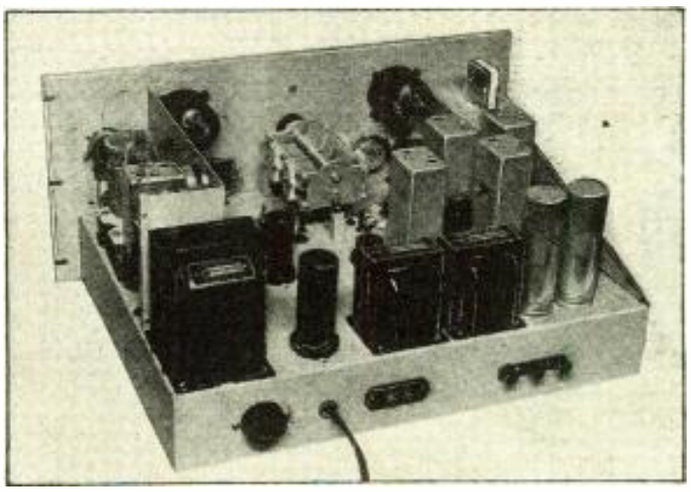
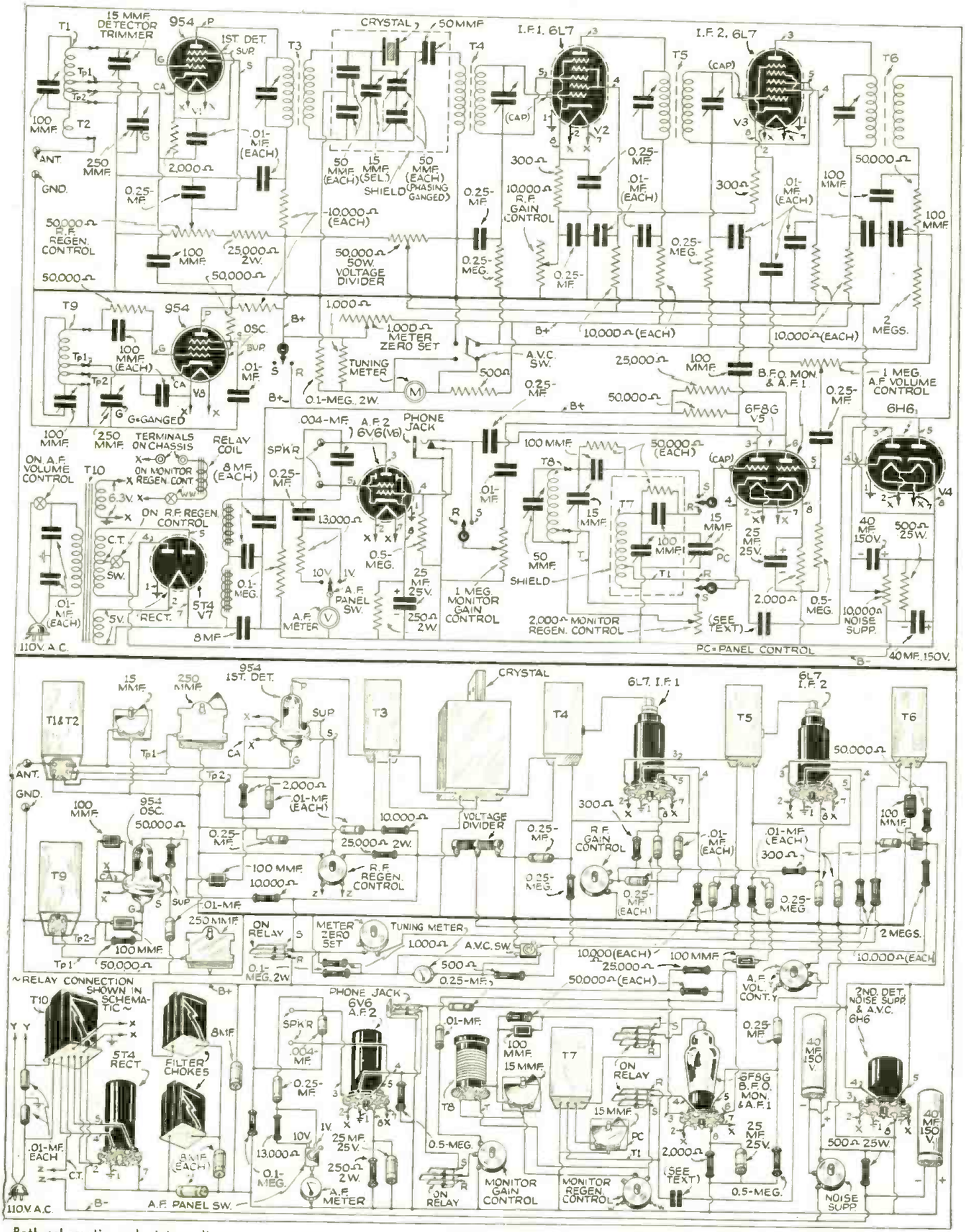
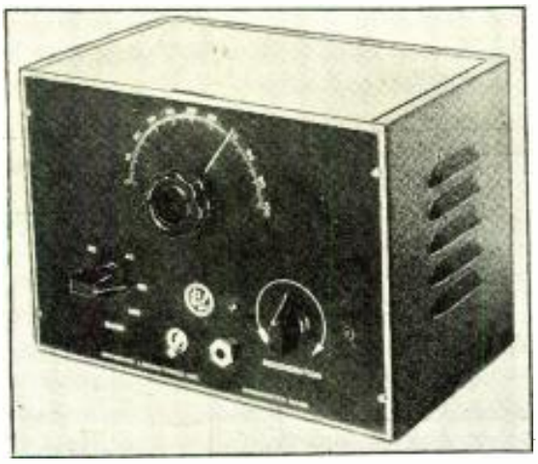


Diagram for Advanced H. F. Receiver



Both schematic and picture diagrams are given above for the construction of the Communications Type Receiver. The relay is not shown in the picture diagram; the relay terminals on the chassis connect with the transmitter. This set has a built-in monitor.



The 2-tube 5-band Amateur Receiver, complete in cabinet. The accurately calibrated tuning unit is factory-built.

An Efficient 5-Band Amateur Receiver

A dandy 2-tube receiver which operates from batteries or A.C. power. Band-spread; tunes 10, 20, 40, 80 and 160 meters.

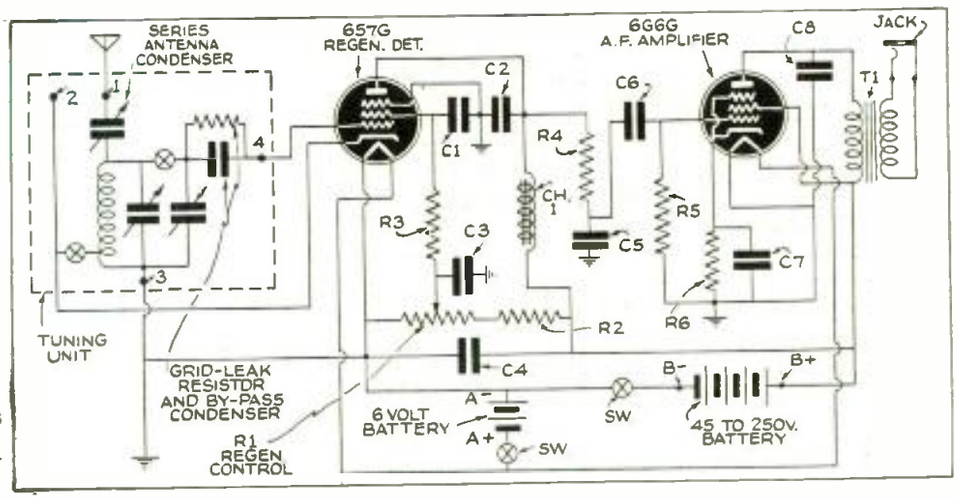
F. J. Gaffney and E. P. Tilton, W1HDQ

● IN these days of high-powered communication receivers, the progressive amateur is apt to cast a disdainful glance at a receiver as simple as an autodyne detector and one stage of audio. The results obtained with the inexpensive receiver to be described will convince even the most skeptical that a tremendous amount of pleasure can be gained from the operation of a truly quiet receiver, especially after listening to the sizzle and crackle of a powerful superhet. This is especially true on the 10- and 20-meter bands where, in most cases, the autodyne receiver will compare most favorably with the 10-tuber.

The amateur set to be described was designed with two fundamental considerations in view: First, to make available an efficient 5-band band-spread amateur receiver at a fraction of the cost usually considered necessary for amateur requirements; Second, to design this receiver so that it was readily portable and could be readily used in emergency cases.

More and more, amateurs are organizing and building their equipment

(Continued on page 371)



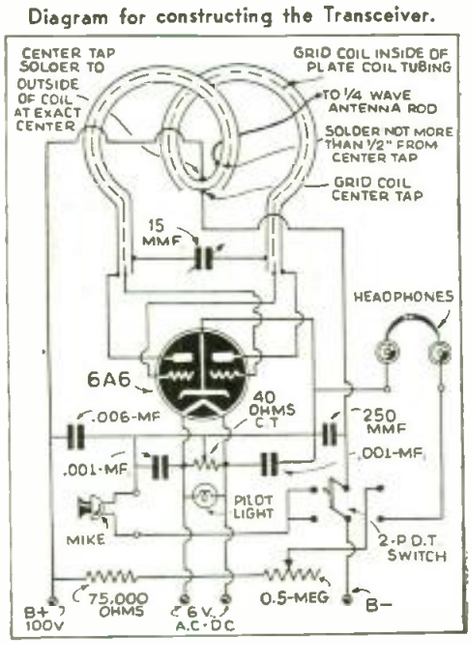
Simple wiring diagram of the 5-band Receiver is shown at the right. Fig. 1.

Low Cost A.C. Transceiver

M. N. Beitman

● FIVE-METER, two-way radio communication still represents the simplest way for the beginner amateur to get started.

Diagram for constructing the Transceiver.



In the past, the majority of five-meter transceivers have been built for battery operation and have considerably inconvenienced the builder who had facilities for obtaining 110-volt A.C. power. The illustrated A.C. or battery operated transceiver, built in the familiar bread-board style, represents the simplest and least expensive unit that combines high efficiency and ease of operation. The unit, of course, may be constructed in other forms and may be mounted in a small portable case for specific applications.

This A.C. Transceiver is available in kit form.

Since the distance covered by an *ultra high-frequency* transmitter depends primarily on the height of the antenna above ground and very little upon the power, a simplified low-power single-tube circuit is used. The type 6A6 dual-triode operates as a push-pull oscillator for transmission and as a push-pull super-regenerative detector for reception. The double-pole, double-throw switch employed makes the necessary circuit changes from "transmit" to "receive."

Grid modulation is employed, and the microphone varies the grid bias at the modulation frequency. The transmitter will not oscillate when the microphone is flat. This phenomenon may be illustrated by holding a single turn of wire attached to a pilot light near the tank coil. With the microphone in the upright position, the unit will oscillate, and the light will light brightly. On the other hand, when the microphone is lying flat, this will not take place.

The plate coil is made of two turns of

(Continued on page 375)

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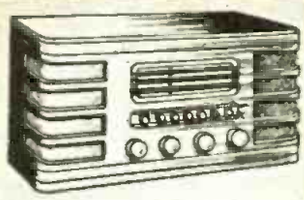

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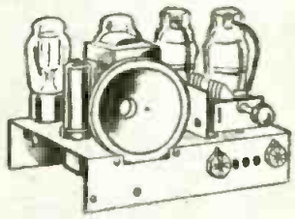

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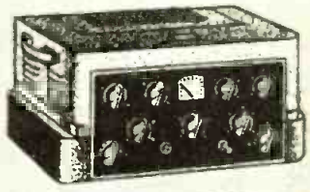

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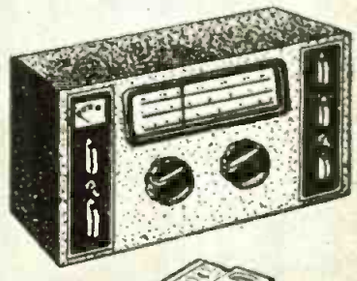

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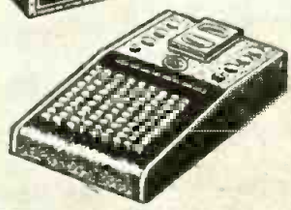

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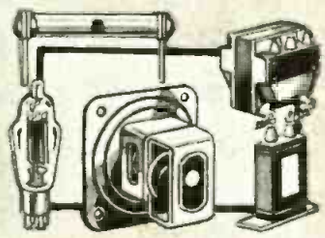

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5-Meter Super-Receiver Uses

Herman

This 5-meter receiver will prove interesting to short wave Fans and Hams; it will pick up the television sound channel. It is a complete set with built-in power-supply and loud speaker.

It is easy to tune in stations on this 5-meter receiver, and the high quality of the voice is surprising.

● RECENT activity on five meters has taken a tremendous spurt upward. The reason for this has been twofold:—unusual conditions have enabled amateurs to maintain *two-way* communication over several hundred miles with ease, and in a few cases distances of 1500 miles have been covered. Naturally enough, such DX conditions have attracted many hams from the lower frequencies. A second incentive for 56 megacycle operation has been the operation of the NBC television station in New York City and the station in Los Angeles. Considering the complexities of the equipment necessary for adequate reception, a larger number of amateurs than one would expect, have gone in for this latest phase of short-wave communication.

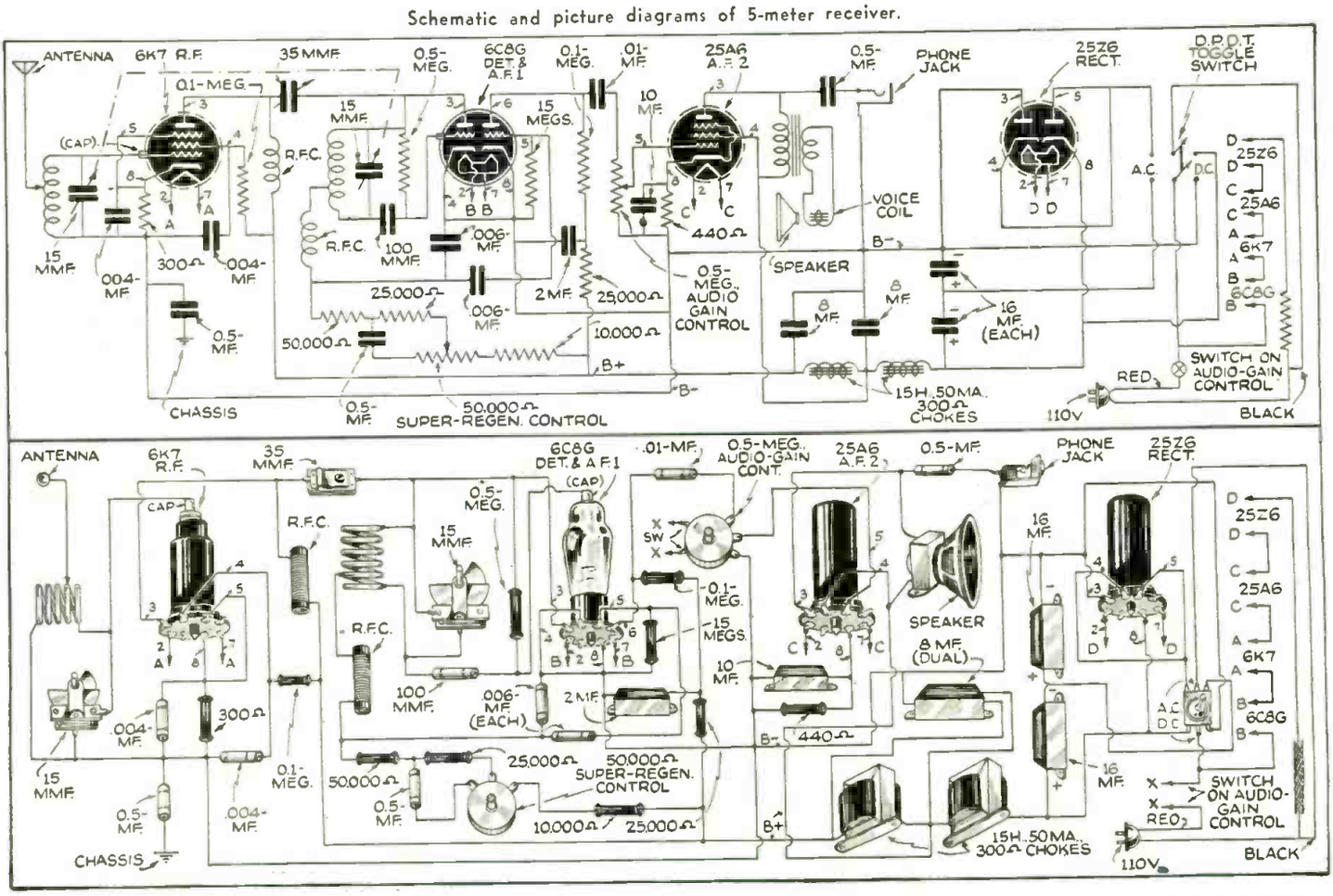
Before we go any further, it might be well to state that the five-meter receiver to be described is definitely *not* suitable for intercepting the television images. It is, however, a thoroughly practical and economical receiver for intercepting the *sound* accompanying the images.

The receiver, of the *super-regenerative* type, has nothing radically new in principle, but it does contain a number of novel features to recommend it to the ultra-high frequency enthusiast. It is completely self-contained except for its antenna, having a built-in power supply and a panel mounted speaker actuated by an audio amplifier delivering approximately 2.75 watts. The built-in power supply operates on either alternating or direct current. On alternating current the 25Z6 rectifier acts as a voltage-doubler delivering 200 volts. When used on direct current, it is necessary to throw a toggle switch which disconnects the rectifier tube from the circuit. With the lower voltage available on D.C. there is little loss in sensitivity; the main difference in performance is in the output volume.

4 Tubes Used

The receiver uses a total of four octal base tubes, a metal 6K7 as a tuned R.F. amplifier, a 6C8G double triode tube as a combination self-quenched detector and

Schematic and picture diagrams of 5-meter receiver.

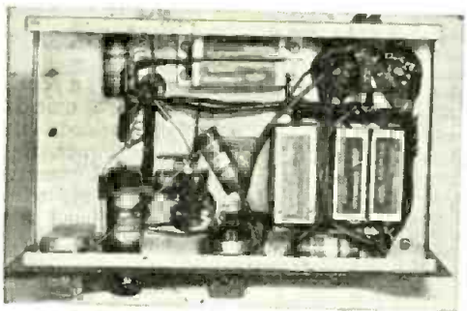


Regenerative 4 Tubes

Yellin, W2AJL

audio amplifier feeding into a 25A6 power amplifier. A 25Z6 acts as a voltage doubler when the receiver is operated on A.C.

The receiver was built around a 7 by 12 inch panel fastened to a 6½ by 11 inch chassis. The two potentiometers and the phone jack serve to hold the panel to the chassis quite firmly. A standard Bud 5½ by 7 inch interstage shield provided the shielding between the detector and R.F. amplifier. Before using it, the shield is



Note the neat appearance of the bottom of the receiver, as constructed by the author. The cost of building this job is nominal.

trimmed down to 5½ by 4⅞ inches and drilled according to the dimensions shown in figure 2c. This shield serves as the mounting for the detector tuning condenser and also to support the detector tube socket holder. The socket holder, cut bent and drilled to the size shown in figure 2d, is made from the unused portion of the original shield. Figure 2a shows the placement and dimensions of all the holes on the chassis. Likewise figure 2b gives all the panel drilling dimensions, including the

speaker opening. Some difficulty may arise in drilling the speaker opening. If a fly cutter and a drill press are available, the operation will be quite painless.

R.F. Isolating Stage Essential

Super-regenerative detectors have strong radiating properties, being much more prone to cause interference with neighbor-

(Continued on page 366)

COMDR. R. H. G. MATTHEWS

Commander Matthews, radio amateur since 1909, has seen the rise of amateur radio to its present great magnitude. He has been active in the affairs of the American Radio Relay League, and through his broad experience in commercial as well as amateur radio, he speaks with authority.

● I HAVE had the rare opportunity of observing the development and growth of amateur radio since its inception. Having had my first amateur station in 1909, I have always been proud of the way the American amateur has maintained his position and privileges in contrast to the treatment received by amateurs of the other nations of the world. Looking back over this period, it is obvious that the amateur has never lost any frequencies or other privileges, with one exception, the importance of which time has minimized.

I can well recall how sad I felt about the prospects of amateur radio when the privilege of using 425 meters in connection with my special amateur license for station 9ZN was terminated, and we were told that amateur operation must take place thenceforth below 200 meters. That single loss, which no one certainly decries today, is, to my knowledge, the only curtailment of privilege which the American amateur has suffered.

I would like to pay tribute to the man whose imagination and breadth of vision made amateur radio possible, and laid the foundation for our present tremendous amateur operations. It was my privilege to have been associated, as Vice President of the *American Radio Relay League*, with its founder and first President, the late Hiram Percy Maxim. No publication commemorating the growth of amateur radio can do justice to its subject without paying tribute to this truly great man.

It has again been my privilege in recent years to serve the amateur as Central Division Director of the League. The problems confronting amateur radio now are different from those of its early days, but surely no greater or more dangerous. Our greatest danger is the infringement on amateur bands by the propaganda stations of certain European nations, whose respect for treaties is not too marked. Our government sustained the rights of the American amateur at the recent Cairo conference in a manner which has earned the gratitude of all amateurs acquainted with the proceedings. It is necessary for this government of ours to know that there is a solid phalanx of amateur radio standing behind it, and that American amateurs are anxious to lend their entire support to self-regulation and cooperation in every respect with American regulatory bodies.

With this type of close cooperation between the amateurs and the government, there is no reason why American amateur radio cannot continue its growth at the same rate it has maintained since its earliest days of thirty years ago.

Famous Radio Experts Salute the Amateur

(Continued from page 327)

Continuations of Radio Leaaers' Opinions

RALPH R. BEAL

(Continued from page 326)

ready at all times to act for the people during public peril or emergency. His performance during the great floods in the Ohio Valley and in California will always be a testimonial to this fact. And he serves as a large-scale laboratory that has been of inestimable value to the radio industry. It is not too much to say that, without the amateur's work of testing new devices and equipment and his gathering of much important data, radio would not have so quickly reached its present high technical standards.

We in the radio industry recognize and appreciate the amateur's contributions to the development of radio. Today, we are facing an ever-widening horizon of discoveries and applications in the radio spectrum. We are penetrating the enchanting domain of ultra-short waves, out of which is coming television and facsimile; and we are examining the equally fascinating field of "micro-waves," which seems to hold infinite possibilities. Here are great opportunities for the amateur, and there is every reason to expect that his contrihutions in the future will be just as important as those in the past.

DR. LEE DE FOREST, Ph.D., Sc.D.

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the lowly amateur with his vacuum tube oscillator and 5 or 10 watts, was consistently communicating over thousands of miles on the discarded waves below 200. By 1925 American amateurs, operating on wavelengths as short as 20 meters, were in daily communication with all parts of the world.

In 1929 I wrote to Hiram Percy Maxim:

"What the technique of modern short-wave radio owes to our amateur, the world is never told. or is loath to admit. Discoveries which the paid commercial engineer would never dare attempt to make, simple and compact constructions which only poverty, necessity, and an untutored common-sense could ever evolve, have time and time again emanated from the 'ham's' work-bench, to confute and confound the professional into speedy confiscation. All these things, priceless in themselves, we owe to the amateur.

"But more than these material gifts we owe to him the invaluable spirit of discovery, of wide-awake experimentation not shackled hy the book knowledge and predetermined notions of the engineer; of youthful enthusiasm, the tireless spirit of quest—that which was chiefly responsible for radio at its inception, and for its matchless rapidity of growth. This spirit alone is priceless.

"And little does the amateur ask in recompense for all this. Merely to be left alone in a now cramped cranny in the wide fields of higher frequencies which he discovered and gave to mankind."

But since this was written commercial, military, and aviation demands have encroached still further, until today we have a total in wave bands of only 38.854 meters available for more than fifty thousand amateurs! The resulting jam seems sufficient to take most of the old-time zest out of that Ace of Indoor Sports, ham "rag-chewing." But a vast amount of this present activity is, I believe, utterly unprofitable, at least for those hams who are gifted for invention and discovery.

To all such my earnest advice is to begin anew to investigate, this time in the quasi-optical frequency range which is left to you. Tubes are now available for 100 to 300 megacycle work. The remaining essential apparatus is cheap, easily assembled. Let Club members chip in, pool their resources, map out programs for attacking the new problems. Aim your sharp beams skyward and learn where they return to Earth, rotate your arrays, study shifting and fading. Such work will be no end of fun. And soon you will be discovering new principles and modalities invaluable to aviation, taking some of the dangers from blind-flying in fog and landing. For it is in your power, now as never before, to save human lives.

O. B. HANSON

(Continued from page 326)

qualities of a novel antenna array. All of us are still "hams" by what you might call remote control.

We find it profitable to take an occasional peek over the amateur's shoulder. In the "ham shack" the new device or method undergoes a quick, thorough and decisive test. In no other laboratory is a dark region of the radio spectrum so quickly explored, its contours determined, its limits defined. I give a single instance. Recently at my home in Westport, Connecticut, I was amazed when I tuned my television receiver to the five-meter band and heard not one, but several, amateur stations in the Middle West.

Now, it has been understood generally that the range of the five-meter band was practically limited to the optical horizon. In our own laboratories we have speculated on the various qualities of ultra high frequencies. To try out our varied theories, however, we would have to scatter hundreds of men with appropriate equipment over large areas of the country, gather data under all sorts of conditions and then collate the mass. In commercial radio that, of course, is impossible.

But the blessed "ham" is always and everywhere on the air, gathering the stuff of radio progress. It matters little whether a new field seems to offer commercial possibilities; the "ham's" interest lies in doing the apparently impossible. Right now radio's technical men are deep in the problems of television, peering into a darkness that obscures many of the basic facts we must have before we send pictures through the air into the American home. I feel certain that before long the amateur will emerge from his shack with some of the answers.

C. W. HORN

(Continued from page 327)

I operated a station before there were licenses, and then obtained one of the very first licenses. My call letters in those days were "NH" and my station was located at Far Rockaway. My chief claims to amateur radio distinction are the interference that I caused the Navy station at Fire Island, and the fact that I heard the CQD sent out by Jack Binns when the *S.S. Republic* was rammed by the *S.S. Florida.*

The rapid growth of radio broadcasting can be credited to the fact that there were thousands of radio amateurs when broadcasting first began in 1920. These men were naturally the first to build receivers

(Continued on page 373)

20 Meter Rotary Beam Works Wonders at W2AZ

New Type of Construction and Elements Produces Small Beam Which Now Does Work of Three Large Fixed Beams. Ideal for Congested Area.

An Interview with FRANK CARTER, W2AZ
By H. WINFIELD SECOR

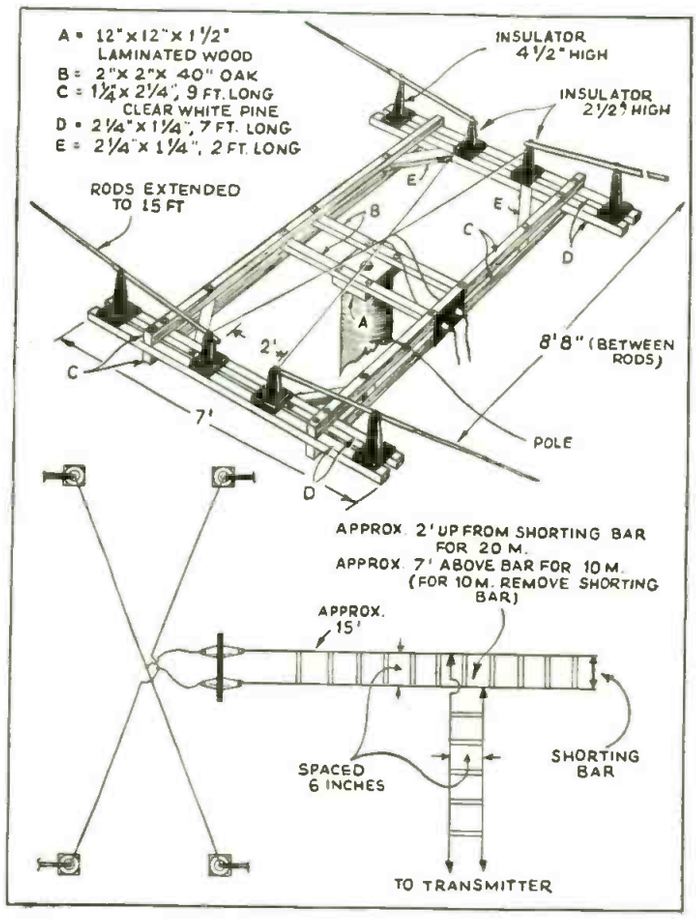
● WATCHING, as we do, for outstanding performances among the amateurs of the country, our attention was attracted by a report, in a recent number of QST, which indicated that some exceptional work was being done by Frank Carter, W2AZ, of East Rockaway, L. I. He was reported to have worked 36 zones, on twenty meters. The total number of zones is 40. so we figured that he was doing so well that a visit to his station would be of interest. It was, and how! We found that he had worked 75 different countries on twenty meter phone.

An outstanding feature, and one of great interest to every amateur who uses either *ten* or *twenty* meters—was the rotary beam used at W2AZ; it can be used on both frequencies, by the simple expedient of altering the connections from the transmission line to the matching stub.

Mr. Carter is the organizer and president of the very active organization which is doing so much to cut down all kinds of man-made interference, the *National Association for the Prevention of Radio Interference.* Amateur radio is his hobby, but he also obtains his livelihood from radio; he is the manager of the Service Department of the Ludwig Baumann Company, and it is his job to keep the owners of nearly 100,000 radios, purchased on the installment plan, happy.

The transmitter at W2AZ can be run with an input up to a full kilowatt, though it seldom is run above 800 watts. There are two

(Continued on page 362)



Construction of the rotary beam antenna at W2AZ.

Modulator for the 35 Watt Transmitter

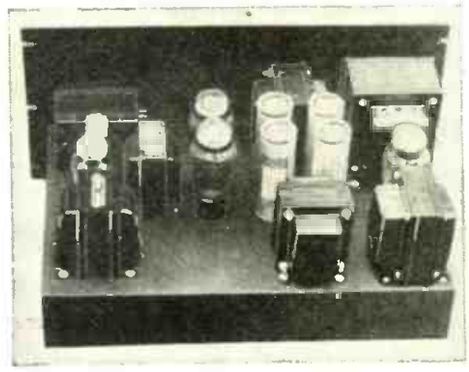
HARRY D. HOOTON,
W8KPX

This picture shows the 35-watt transmitter at the top of the rack, while just below it appears the modulator. Cabinet seen at left of picture is the station receiver.

In the July issue, Mr. Hooton described a very interesting 35-watt transmitter for the "ham" beginner. The present article deals with the construction of a suitable phone modulator for that transmitter. The construction cost is very nominal.

● RECENTLY we described the radio frequency portion of the 35-watt transmitter-exciter. The remaining standard chassis and panel section which will be described in this article, contains the power supply and the 15-watt audio unit used for plate and screen modulating the RK-39 final. All of the equipment, R.F. and A.F., has been installed in a standard, 17½x13x20 inch, crackle finished steel cabinet. This makes a snappy little table model rig—an ideal phone and C.W. transmitter for the 14 and 28 megacycle bands where only a very little power is required.

The modulator, as Fig. 1 "a" shows, consists of a double-button carbon microphone, transformer coupled to a 6F5G which is in turn resistance-capacity coupled to a 6F8G, with the two triode sections in parallel, driving a pair of 6L6Gs in push-pull class "A" audio. The output of the modulator is about 15 watts which is more than sufficient to 100% modulate the plate and screen of the RK-39 when running 35 to 40 watts input. The power unit shown at "b" is practically the same as that described in July issue, using a 5U4G as rectifier. The swinging choke is not absolutely necessary in a class "A" modulator circuit, but it does give better regulation under the varying load of C.W. work and is therefore very desirable. The two pairs of filter condensers are connected in series in order to eliminate any possibility of their breaking down under the normal load. The purpose of the 0.5 megohm resistors across the individual condensers is to equalize the voltage so that each condenser in the string will take a proportionate share; if the resistors are not used trouble may be encountered by having one condenser "blow out" repeatedly because of unequal voltage distribution across the electrolytics. The use of *dry* electrolytic condensers is not recommended; use *wet, heavy-duty* filter units with a *working voltage* rating of at least 550 or 600 volts. Two of the condensers must have their metal cans insulated from the chassis.



Rear view of the modulator.

Placing the Parts

The construction of the *modulator-power unit* is quite simple and straightforward and no difficulty whatever should be encountered if the proper precautions are observed. The position of the various transformers, chokes, etc., is extremely important in any small, compact audio system if the A.C. *hum level* is to be kept down to the minimum. In the present unit each transformer and choke has been placed at right-angles with respect to its neighbor and if the specified components are used, the layout as shown in the photographs will be correct. If the constructor already has some parts of a different manufacture on hand, the following method of orientation may be used: Mount the high-voltage and filament transformers as shown and connect their primary windings to the 110 volt A.C. line. *Be careful not to come in contact with the secondary terminals of the high-voltage transformer;* the 800 volts will give a painful shock and is plenty high enough to be fatal in many instances. Connect a pair of headphones to the terminals of each filter choke and transformer in turn and rotate it about on the chassis until the position is found which gives the minimum hum in the phones. The use of cheap, "bargain sheet" or unshielded audio and

filter components should be avoided at all costs as these are almost certain to cause trouble in an installation of this kind. It is necessary to shield all of the leads from the microphone jack, the microphone transformer and the gain control, with copper braid suitably grounded at several points to the chassis, in order to eliminate any possibility of audio feedback or extraneous noise getting into the modulator circuit.

Tuning Up the Transmitter

The actual *tune-up* procedure of the phone transmitter is not at all complicated or difficult. Adjust the R.F. portion as outlined in July issue article, making sure that the RK-39 is receiving plenty of excitation (5 ma. grid current) but do not connect the antenna. Remove the microphone plug from its jack and turn on the modulator voltages. The 0-200 milliammeter is now plugged into the plate circuit of the 6L6G modulator tubes and the 200 ohm cathode resistor is adjusted until the plate current is about 110 to 120 milliamperes. Connect the antenna to its feed-through insulators and adjust the coupling until the RK-39 is drawing 80 milliamperes (400 volts divided by 80 milliamperes gives a 5,000 ohm load which matches the tap on the modulation transformer). Do not attempt to modulate the transmitter or operate the modulator without the proper load on the secondary of the modulation transformer; if no secondary load is presented, then the excess energy generated in the primary may cause it to either burn out or the insulation to break down. Turn up the gain control while talking or whistling into the microphone until the RK-39 plate milliammeter needle moves slightly with the modulation. Adjust the gain to just below the point where the needle begins to move; this will give approximately 100% modulation.

If the use of a crystal or velocity type microphone is desired, it will be necessary to add another stage of pre-amplification, using a high-gain type of tube such as the 6S7G or 6J7, ahead of the 6J5G. It is also better to replace the 6J5G with either a 6C5 or a 6C5G. Because of the extremely high gain developed in such a circuit, all input and grid leads will have to be shielded carefully and a de-coupling filter must be used in the 6S7G or 6J7 plate lead. Unless the constructor has had some experience with high-gain audio equipment, it is best to stick to the double-button carbon microphone arrangement.

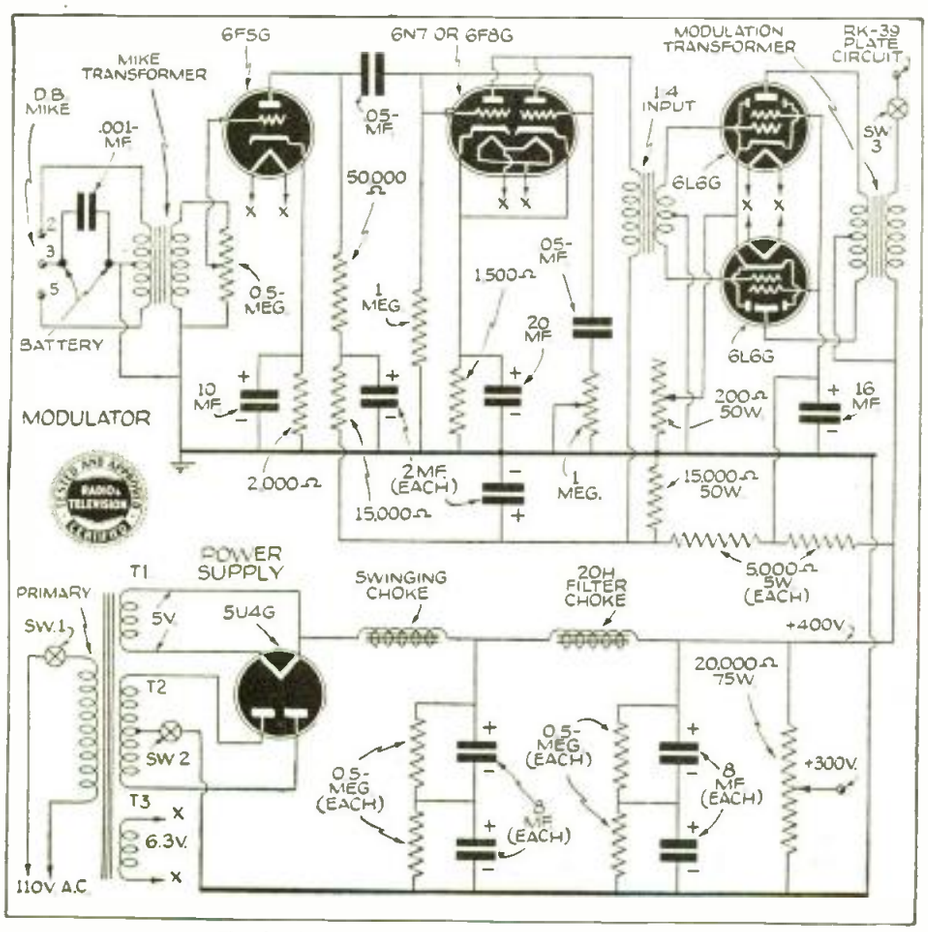
This is the concluding article in this low-power transmitter series. If the instructions have been carefully followed, no difficulty whatever should be experienced. If any additional advice or information is required, however, the author will be glad to correspond with readers who enclose a stamped, self-addressed envelope with their letter. Address all letters in care of RADIO & TELEVISION.

List of Parts

I.R.C. (Resistors)

One volume (gain) control, 0.5 megohm
One volume (tone) control, 1 megohm
One metallized resistor, insulated type, 50,000 ohms, 1 watt

(Continued on page 369)



The hook-up of the modulator is shown above.

20 Meter Rotary Beam Works Wonders at W2AZ

(Continued from page 359)

receivers, a National HRO and a Hammarlund Super Pro. Mr. Carter is very enthusiastic about the National SW-3, which he uses for a two stage, regenerative preselector, as suggested on page 164 of SHORT WAVE & TELEVISION for July, 1938.

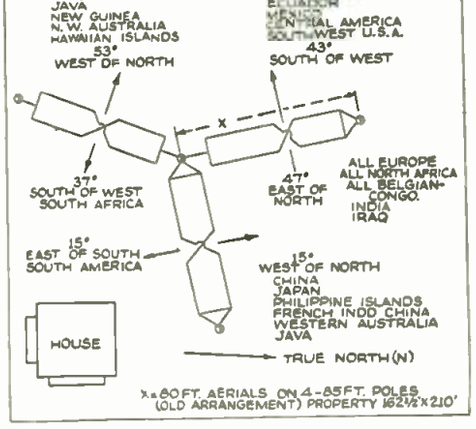
Mr. Carter lives in a section reasonably free from radio interference and he has a large piece of property—see sketch. And it is just this feature of his station which brought the value of his beam so forcibly to us, as we realized that very few amateurs would have space enough to duplicate his three "fixed" arrays, even if they could afford to buy the necessary telephone poles, etc. The accompanying pictures illustrate most of the major points which were brought home to us by this amateur, whose voice has been heard in nearly every corner of the globe, and who talks about his "skeds" with hams in Australia in much the same way as we talk about a phone conversation with someone a couple of blocks away. He talks with a somewhat Southern accent, which is very pleasant to hear. So picture him, sitting there, before his operating table, with you occupying the large over-stuffed chair in front of the loudspeakers, in the very large living room, which he has converted into his radio "shack." Said Mr. Carter:

"Before giving you the full details on the construction and operation of this rotary beam, we want you to know that we put it up very much against our will. We were talked into it, and it took a lot of talking. After all, we were getting out pretty well with the three *fixed* beams we were using and we couldn't see any excuse for going to the expense and the trouble of making a rotary beam. You see that little SW-3 sitting there on the table? Well, that belongs to an old friend of ours, Arthur Lynch, W2DKJ. He told us that it would help us in getting some of the weak boys through. As you can see, we have very fine receivers, and we thought that the addition of the pre-selector was kind of silly. He brought it over, we hooked it up, and he hasn't been able to talk us out of it again.

"He told us about a new type of *rotary beam* that he had designed, which he thought was 'hot stuff,' and that he wished we would try it out, in comparison with the three fixed beams which we then had in operation. He came over one night and brought a small carton with him. The elements which now comprise our beam were in the carton. It was about four inches square and six feet long and weighed less than fourteen pounds—the elements themselves weigh less than nine pounds. We built up the framework, set the rods on the insulators and put the whole works on top of one of the lower poles which was near the house. It was very easy to tune the thing up. When we put it on the air, we got the shock of our life!

"The little rotary did everything that the three fixed beams, each of which was twice its size and twenty-five feet higher, would do. In addition, it brought signals to us, from directions not actually in a direct line with one of the fixed beams, with better strength and with less interference. Long periods of test—our beam has been up for several months—indicate that there have been only a few occasions when the signal from any of our fixed beams was any better anywhere than the signal from the little rotary. On these occasions, the increase of signal strength from our station, as reported in South Africa, for instance, has been just a slight change in the needle on the S meter of the HRO, used by the operator at the receiving station.

"A very important point, not generally considered when directional aerials are contemplated, has been very thoroughly demonstrated by our experience with these beams. As you have seen, all three of our fixed beams are quite a distance apart. Also, they are set at angles, with relation to each other, as far as the limits of our property will permit, so that parasitic excitation and reradiation from those which are not in use is cut to a minimum. However, when we pump full power into one of the fixed beams, we can measure plenty of current in the others. This indicates that it is impossible for us to get full efficiency out of any one of the three fixed beams, while the others are still in the air. Of course, we have made tests with stations in other parts of the



New rotary aerial does all the transmitting and receiving DX formerly accomplished by the 3 large aerials shown.

world and reception is possible in directions other than that covered by the beam which is being powered, until we lower the other beams; then transmission is limited to the desired direction. The same thing occurs when we are receiving. Therefore, we have found that better, all around results are obtained with our little rotary, both on transmitting and receiving.

"When our attention was first called to the telescopic, corrugated, copper-plated, steel tubing, used for beam elements, we would not believe that tubing could be made so light, with any degree of rigidity. We had tried many other types of solid and hollow elements, but had not been able to secure any which did not sag too much.

"That, we believe, Mr. Secor, along with your sketches, should enable any experienced amateur, who is a bit handy with carpenter tools and who knows something about beam antenna tuning, to get very much better performance out of his present transmitter than would be possible with the ordinary type of antenna, or even with a group of rather elaborate arrays of the kind we used to think were really modern."

It will be seen that none of the mechanical measurements will have to be changed if operation on the "ten meter" band is desired. It is but necessary to open the shorting bar, at the base of the half-wave stub, and run the transmission line up to a point on the stub, where a correct impedance match is obtained, as indicated by the removal of standing waves on the transmission line. For full details regarding the adjustment of beams of this type for ten or twenty meter operation, we refer our readers to the various articles which have been written by John D. Kraus, W8JK, after whom this type of beam is sometimes called. Herewith is brief log of DX "worked" with this aerial.

DATE TIME	STATION CALLED	CALLED BY	IF QSO RESULTED: STATION WORKED R	S	MY SIGS R	S	TIME OF ENDING QSO		REMARKS
637 P	KA7EF	X	5	8	5	9	652 P		July 30 Philippine Is.
8 A	CQ	X	5	8	5	9	822 A	VK2VV	Aug. 7 Australia
822 A	X	VK3UM	4	6	5	9	829 A		Australia
838 A	VK4JU	X	5	7	5	9	915 A		Australia
1125 A	CQ	X	4	6	5	9	1136 A	W9QTR	
135 P	GM6RG	X	5	9	5	7	250 P		Scotland
758 P	CQ	X	5	9	5	9	831 P	CE1AD	Chile
150 A	CQ	X	5	9	5	9	158 A	ON4NW	Belgium
545 A	CQ	X	5	7	5	8	618	GM8CH	Aug. 14 Scotland
618	X	G6BG	5	7	5	8	632 A		England
632	X	VK4JU	5	7	5	8	718 A		Australia
726 A	VK2UC	X	5	8	5	9	749 A		Australia
803 A	PK6XX	X	5	8	5	9	910 A		Dutch New Guinea
242 P	GSML	X	5	9	5	9	330 P		England
351 P	EI2L	X	5	8	5	8	128 P		Ireland

The "YL" in Amateur Radio

(Continued from page 335)

people in every section. Information obtained in this direct way is much more valuable because it is personal and true. *It is the next best thing to travel!*

Though most of the amateurs in foreign countries speak English, sometimes they prefer to write in their own language; we rather expected that, and can take care of French, German, Spanish and Italian nicely; letters in Esperanto were a puzzle at first, but YL curiosity can solve almost any difficulty.

The YL radio operator, like her brother ham, soon finds that she needs a systematic file for her correspondence, and scrap-books for her photographs of operators and their equipment. The compactness, neatness and efficient arrangement of apparatus in the photographs which I have collected speak very well for their owners. They range from the elaborate layout of OE3AH, the Archduke Anton of Hapsburg, to small portable outfits in gold-mining camps, or portable jobs for car, plane, or marine operation. One station is entirely contained in a packing-case; another uses a variety of transmitters for separate bands and looks like the control room of a broadcast station.

I Visit a Freighter

Not long ago I had the opportunity of visiting a freighter which I had *worked* during last winter on ten meter cw., while it was crossing the Atlantic. The operator, W6BOY, uses a low-powered transmitter and the ship's 600-meter antenna, with surprisingly good results. His pile of DX QSL's would be the envy of any shack. On his trip to Europe, he visited some of his European radio friends and had many pleasant times in stations which he had worked. His account of the ten meter DX which he was able to contact on the high seas in the night-time was very interesting, as he figured that darkness prevailed over three-quarters of the distance which he covered, and his description of the Aurora Borealis at sea *was something to remember!* He now has a ten meter phone transmitter for use in port, as the ship is on a coastwise run. After looking at W6BOY's log with its consistent record of fine operating, I decided that what I needed for DX was a shack on a ship in the North Atlantic and a 600-meter antenna—without the rough weather!

Other interesting contacts made at W1KTG include a phone QSO with Unalaska, one of the Aleutian Islands—in answer to a CQ! The Canal Zone, where many of the men in the service are amateur radio enthusiasts, is a source of many pleasant QSO's; the operators are real rag-chewers, have something to say and know how to say it, so that it is always fun to work a K5 or an NY.

SWL Cards Galore for YL's

The YL operator receives many more SWL cards as a rule than her brother hams. They arrive in all kinds and sizes, from the very technical report on a specially designed card to the hurried notation on a slip of paper. At this station, they are always welcome and always answered. Sometimes they give me exactly the information which I want and have been unable to get on the air because of lack of contacts with certain districts or sections. For example, we tried experiments with a twenty meter Zepp but had no QSO's with New Zealand. We discarded the antenna and later got a very fine report from a listener in Dunedin which was greatly appreciated.

The interest in amateur radio all over the world is greater than most people realize; and in no other country, as far as I know, has the amateur such opportunities to obtain the best equipment at a reasonable cost, in no other country is he so wisely controlled by the government, as in the United States.

The YL who handles traffic or even an occasional message finds the other stations on the air willing to go out of their way to help. The press contributes information accurately and without delay.

The Phone HAM and What He Does

(Continued from page 329)

is most interesting in the summer months, when the desire for the "open road" beckons one forth from the shack, scene of home operations.

Talking on 10 Meters

Lower in frequency is ten meters, that elusive band, where power means nothing and conditions mean all, towards a successful contact or QSO, in the parlance of the ham. Ten meters is said to close up in summer, thus most of the activity takes place in the winter months, though W5HDK, whose new station on this band is illustrated, has been having some very successful summertime contacts with the Antipodes. Long distance operation is the main feature of this band, thus most hams who put in their time here can also be found talking on some other band, and 160 meters is the current second choice for "L L" as he gives his handle (Christian name, in amateur parlance).

Operating an amateur-built transmitter with an input of one kilowatt, the maximum legal power allowed, this station is an example of neatness and efficiency. Listen for him, and you will hear a true amateur talking with his fellows.

Around the World on 20 Meters

To talk of *twenty meters* is to talk of the amateur's dream of paradise on the air. Here the gang can gather and commune with the world, forgetting their cares for the time, and becoming a part of the universal society of mankind. If every country were as friendly toward the amateur as Uncle Sam, encouraging him onward, there would be less talk of war, for no one would wish to shoulder arms against his friend, even though that friend be of another nationality. These air friendships, unusual as they may seem to the outsider, are genuine, sincere good fellowships. The human voice can be a great factor in building friendship, and the personality of the man behind the microphone goes a long way to cement the bond, although the parties thereto may be separated by the seven seas.

Twenty meters offers just such an opportunity, day and night, almost any time of the year. Here is probably the height of activity for the phone man, for there is hardly an hour of the day that some distant nation is not audible on this band, together with many stations from one's own country. One moment you may talk with that elusive Filipino, about whom you have heard so much, or perhaps it will be an expedition to New Guinea, known to all the amateurs as PK6XX. As the clock runs on, stations from far and near fill the dial of the amateur's receiver, and it is his privilege and pleasure to talk with one and all. Schedules take up a good part of his operating hours, and these contacts are often as regular as the arrival and departure of an airplane. But it is not always possible to contact a distant station, and those located near at hand offer as much pleasure to the constant listener.

By no means do all of the activities of an amateur take place on the air, far from it. There are radio clubs, conventions, and hamfests, gatherings of the clan, and what gatherings these are! Here is where the great hobby shows its true side of friendship, for at long last you are afforded the opportunity of talking with and meeting in person the fellow whom you have known for years. Memorable occasions these, and the phone men seem to be at the greater advantage, for they know and recognize the voices long before they are introduced to one another. Until you have attended a national amateur convention, such as was held in Chicago on the last Labor day, you cannot know all there is to the true amateur spirit.

"What It Takes" to Become a Ham

What does it take to become a ham? The will to learn, and the ability to be a good sport and to share with your fellows your problems and achievements. Any citizen can obtain his license and operate a station, but that does not say that he is a true ham. Nor is the desire to see one's call letters published in all the radio papers of the globe a true exemplification of the amateur spirit. Personal publicity can be far better acquired by a good public relations counsel than by operating an amateur station. Sad to relate, not all those possessing an amateur license have learned this fact, to the everlasting harm of this great hobby, especially when their eagerness to gain the spotlight assumes the proportions of an international diplomatic misunderstanding. But these unpleasantries, though they do occur, are few and infrequent, and the loyal amateur is ever on the alert to avoid them.

Good Will Among Nations

The true ham spirit, which has bonded together this vast, cosmopolitan army of men and women, with a common interest in a scientific hobby, will go a long way towards cementing the good will among nations. The true amateur is humble, quiet, self-effacing, and desirous only of the opportunity to perfect his station and his equipment. He asks but the liberty to carry on his experiments which have bettered all mankind, the developments which have been rewarded, not with financial gain, but with that greatest of all payments, the satisfaction of completing a self-imposed problem. So, if you do happen to hear an amateur who may momentarily disturb your pleasure in listening to a broadcast, by interfering with your receiver, do not condemn him unjustly, but rather cooperate with him, for the interference may result from some experiment that will shortly bring you, his hearer, a more perfect form of entertainment, be it *sight* or *sound*, or something which we today dare not imagine possible.

Dem Was the Happy Days

(Continued from page 333)

have made radio history, including Armstrong, King, Burghard, Amy, Pacent, Dr. Hudson, Dr. Goldsmith, Cannon, Vermilye, and others, in the New York area alone. But for some reason I never seemed to get out to their receivers. Hence I found it necessary to establish a receiving station just for my own signals. A friend, George Barr, gladly consented to become partner in the ordeal, and purchased his own 2-inch spark coil, tuner, 'phones and other paraphernalia, which we set up about two miles distant. Soon we had a nice communication system established, and dot-dashed back and forth each evening and most of Sunday.

Everything was swell for awhile. Then came an unwelcome intruder. A chap signing himself "HB" thundered in at both our stations like the proverbial ton of bricks. Indeed, HB simply swamped out everything on the local ether. We occasionally heard the Operator Pickerel, who held forth at Station WA atop the old Waldorf-Astoria Hotel, coming back at HB, requesting him to stand by for awhile, so that WA might clear its traffic to DU, the station atop the Hotel DuPont in Wilmington, Del.

In time I was invited to visit HB. He turned out to be a doctor; his transmitter was a revamped X-ray outfit with rotary spark gap. This improvised transmitter was capable of packing a terrific wallop into the huge aerial on the roof.

By 1911 there were really serious attempts made to tune our signals. Instead of the plain aerial system, whereby the antenna was connected to one side of the spark gap and the ground to the other, we now made use of a closed oscillating circuit for the primary, and the antenna and ground connected to the *secondary* of the *oscillation transformer*. A small lamp bulb placed in the ground lead indicated by its dim glow whether we had the proper number of turns connected in the primary circuit.

Late in 1911 I had advanced to a quarter-kilowatt open-core, oil-bath transformer, a rotary spark gap, a large bank of condensers made of good window glass with tinfoil sheets shellacked in place, and a rotary interrupter. My call letters were JB, for no other reason than their delightful rhythm in the Morse code then used by American radio operators. How clumsy seemed the Continental code used by foreign ships in our harbors and off our coasts!

Miracle of the Ages

Perhaps the greatest thrill of those days was the occasional human voice picked out of the ether. I believe it was in 1908 when, one evening, I was startled to hear a voice standing out from the background of dots and dashes. The voice was counting numbers. Presently, it proved to be Dr. Lee de Forest, operating a radio telephone transmitter somewhere in New York City. The whole family came rushing into my room to see what had happened to me. I was shouting for the whole world to experience this miracle of the ages.

The greatest difficulty of early wireless days, at least for one living in a city apartment, was a good aerial. Our apartment house had a nice flagpole at one corner of the roof. I dared hitch a *three-wire* aerial on to the ropes of the flagpole and to hoist it high in the air. That evening I was thrilled by listening to many brand new call letters.

The joy was short-lived. Within a few weeks, the result of pulling the aerial wires taut, the flagpole developed a decided bend. Our building superintendent's attention was called to the fact by some not over-friendly neighbors. Whereupon he made his annual visit to the roof, discovered the offending aerial, and promptly hauled it down.

We may have dreamed of the days when we might converse by voice; however, I for one feel that the memory of those early days still holds the greatest thrill for those who make radio their hobby.

R.C.A. INSTITUTE TELEVISION COURSES

● WITH the inauguration of television field tests, R.C.A. Institutes assigned two of its instructors to the engineering group in charge of the experimental work. These instructors have had immediate contact with development and have studied at first hand the many problems and vicissitudes with which the new art has been confronted. Concurrently other members of the school staff have been engaged in the preparation of lesson material and construction of special *television* demonstration equipment.

In addition, two volumes of significant papers were published in July, 1936, and October, 1937. These books, titled *Television*, Volumes I and II, are two of the most complete books available on the subject.

Feeling that the basic system of television is unlikely to undergo any immediate major change R.C.A. Institutes considers the time propitious for the inception of its *Television Courses*. These courses will begin with the fall term, convening September 6, 1938. For persons who have had no previous training in Radio Engineering, the course requires a period of two years in the day school or five years in the evening school. Special *Television Units* of six months' duration in the day school or one year in the evening school are available to applicants possessing adequate technical background.

5-Meter Super-Regenerative Receiver

(Continued from page 357)

ing and distant receivers than even the old regenerative receivers. In order to eliminate this radiation, the detector should be isolated from the antenna by a stage of R.F. The R.F. grid coil and condenser are the same size as the detector tuning combination. Both condensers have a capacity of 15 mmfd.

Acorn Tube May Be Used for R.F.

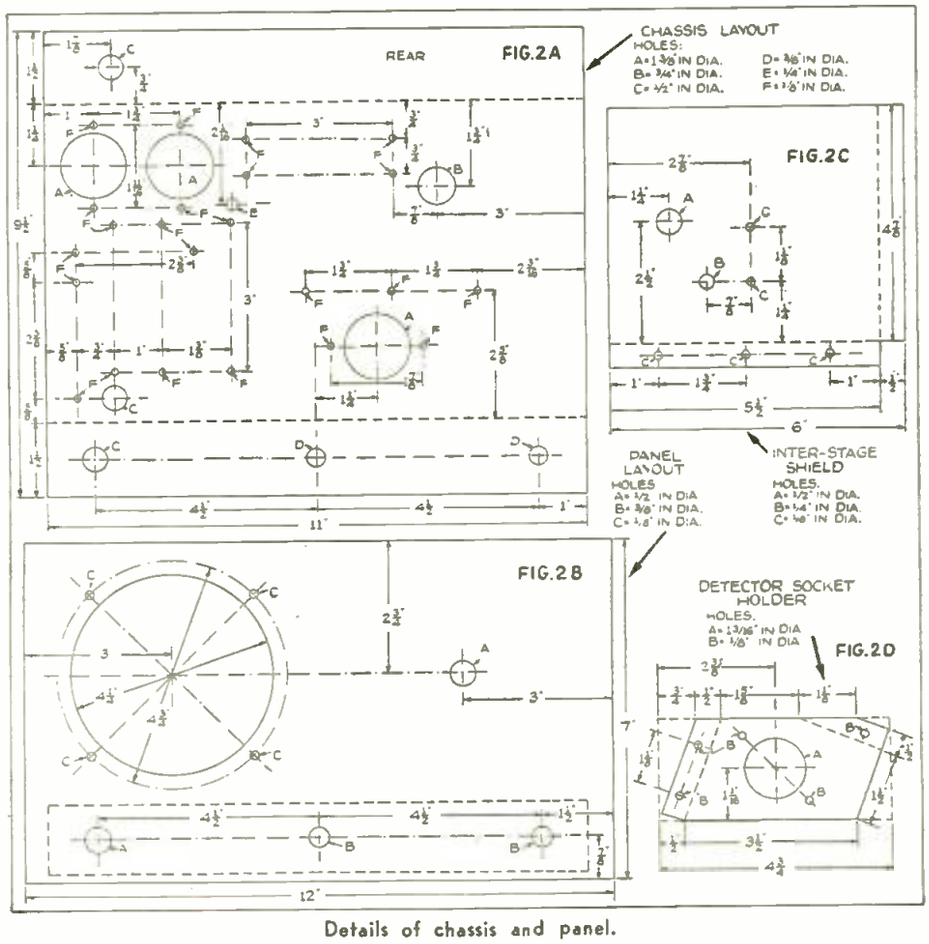
Since the tube filaments were all connected in series, all tubes used would of necessity be of the 0.3 ampere type. Thus the choice of an R.F. tube fell quite naturally to the metal type 6K7. Use of the acorn type 954 would have resulted in much greater gain, but the cost would have been greater. However, the 954 can be used instead of the 6K7 with only minor changes. The filament of the 954 would have to be shunted with a 42 ohm resistor since it has a 0.15 ampere filament. All grounds are brought to one point for each stage and then connected together by a ground bus which is then connected to the chassis by a half microfarad paper condenser. Nothing is grounded to the chassis directly. The reason for this is to eliminate the possibility of shorting the 110 volt line with a reversed line plug or of the cabinet appearing *hot* on D.C. with the line plug reversed. The R.F. grid coil is mounted directly on the terminals of the 15 mmfd. tuning condenser. This condenser is insulated from the panel by a bakelite washer. It might even be desirable to mount this condenser on an angle bracket instead of directly on the panel. Provision has been made for an antenna with *single wire feed*. If it is desired to use a doublet type of antenna, a small coupling coil of two or three turns of number 12 bus bar can be suspended from the antenna posts on the side of the cabinet. Coupling between the two coils should be varied for optimum results.

1 Tube Acts as Detector and 1st A.F.

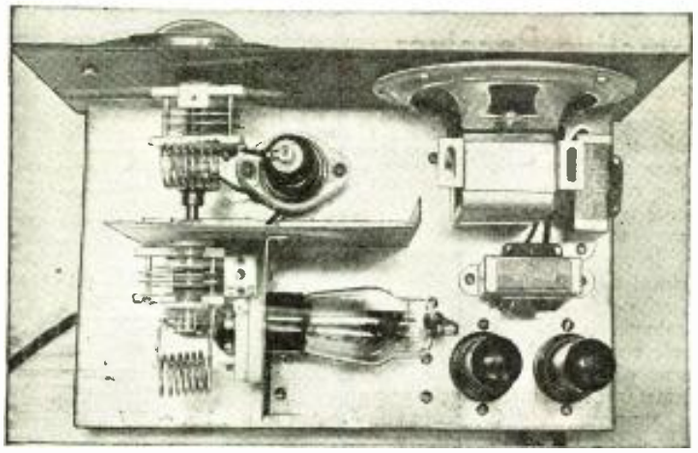
The R.F. tube is coupled to a combination detector and first stage of audio. This tube is a 6C8G which has two separate triodes in one envelope. One triode section is employed as a *self-quenching detector* and the other half is used as an *audio amplifier*. The section having both its grid and plate terminals coming out at the base of the tube is used as the detector. The other section has its grid terminal at the top of the glass envelope. Having the grid and plate terminals close together makes for a minimum of wiring, there being practically no high frequency wiring at all. A material contribution to the shortness of leads was the method of mounting the 6C8G. This was mounted in a horizontal position parallel to the panel and close to the detector tuning condenser. The bracket holding the detector tube also serves to lend added rigidity to the interstage baffle shield. As stated before, this bracket is constructed from the remainder of the interstage shield.

The detector grid-leak is mounted directly on the socket between the grid and plate terminals, while the grid condenser is wired directly between the grid and the rotor of the tuning condenser. The leads in no case are more than a quarter of an inch long. Incidentally, a little experimenting with grid-leaks will amply repay the constructor. The writer uses a 15 megohm leak, but the constructor should experiment with values from 10 to 20 megohms.

Both the R.F. plate choke and the detector choke coils are of the same size and of the



Details of chassis and panel.



Top view of receiver.

manufactured type having an inductance of 5.7 microhenries. The .006 mf. mica condenser bypassing the detector choke coil should be connected directly to the cathode of the 6C8G. The detector choke is connected to the third turn from the plate end of the detector tuning coil. The method of mounting this choke coil is as follows: the end of the choke connecting to the detector coil is fastened to the unused prong (No. 1) of the detector socket and a half inch length of wire is run directly from the terminal to the coil. The tap can then be easily changed from one turn to another. The other end of the choke is mounted on a single terminal insulating strip mounted on the socket. As the photo shows, this results in the choke coil being at right-angles to the detector coil. As in the R.F. stage, all grounds are brought to one point and connected to the *common* ground bus.

Super-Regenerative Control

Super-regeneration is controlled by a 50,000 ohm potentiometer. The voltage from this control is passed through a resistance-capacity filter to prevent common coupling between the detector and the other tubes. When first tried out the receiver had a tendency to motor-boat, but the addition of the 25,000 ohm resistor in series with the regeneration control rotor effectively squelched any such tendencies.

The .006 mf. condenser which couples the detector section of the 6C8G to the audio section may seem rather small, but it is the correct value. The new and rather novel system of *automatic biasing* is used in this audio section. The cathode is grounded, thus resulting in a minimum of hum and the bias generated across the 15 megohm grid-leak. Most tubes draw grid current even with zero grid bias. The reason for this is that electrons are emitted from the cathode at so high a velocity that they reach the grid, even without any positive potential on the grid. By employing a very large value of grid-leak and grounding the cathode, the small drop across the leak due to the minute current will provide sufficient negative bias for proper operation. Using a larger coupling condenser than that shown, will result in a momentary *blocking* when tuning in a particularly loud signal.

The grid coupling condenser and leak were placed underneath the chassis at a point beneath the detector stage and a shielded wire run to the grid cap of the tube. The use of shielded wire obviated the possibility of any hum pickup. The plate resistor has a value of 100,000 ohms, while a 2 mf. condenser and a 25,000 ohm resistor comprise the R-C decoupling filter. These values were chosen so that the amplifier would work on both 100 volts as would be the case where D.C. is used and with the higher voltage available when the receiver is operated on A.C. A .01 mf. paper condenser couples the first audio stage to the 25A6 power audio stage through a 500,000 ohm potentiometer. This audio gain control and the regeneration control are completely independent of each other. There is no interaction between them; varying the audio gain will not result in a variation of super-regeneration. The audio gain control contains the line switch for turning the receiver *on* and *off*.

Phones or Speaker May Be Used

Bias for the 25A6 is derived from a 440 ohm, 5 watt wire-wound cathode resistor, by-passed by a 10 mf. electrolytic condenser. The power stage furnishes sufficient audio power to actuate the loud speaker, even on weak signals. In addition, a *phone jack* was incorporated in the receiver. However, in actual practice the loudspeaker has been used exclusively. Although the photograph shows a standard dynamic speaker with field coil, it has since been replaced with a *permanent magnet* speaker which is strongly recommended. The field coil had been connected across the rectifier output. The additional drain of the field caused a 30 volt drop in voltage when the receiver was operated on A.C. Since it was desired to have the maximum signal possible, the change was made to the P.M. speaker with a slight rise in power output. On D.C. however, there is no voltage drop caused by the field, since it is connected across the D.C. line. For those desiring to use the field coil type of dynamic, one should be used having a field resistance of 5000 ohms.

Voltage Doubler Used with Rectifier

The power-supply consists of a 25Z6 rectifier used as a *voltage doubler* on alternating current. On D.C. the rectifier is cut out of the circuit. Briefly operation of the voltage doubler is as follows:—on one half of the A.C. cycle one of the 16 mf. condensers is charged up, and on the other half of the cycle the other 16 mf. condenser is charged. The two condensers being connected in series with respect to the load, the voltages across them become additive, resulting in an output voltage of twice the A.C. voltage. In actual practice the output voltage is slightly less than double the A.C. voltage because of the current drawn by the load. Two 15 henry choke coils and two 8 mf. electrolytic condensers comprise the filter circuit. The audio power stage receives its plate voltage at the junction of the two chokes, since it does not require such highly filtered voltage. The detector, R.F. and first audio stages make use of the full filter system.

All tube filaments are connected in series with the 200 ohm resistor cord. The tube filaments should be connected in the sequence shown on the diagram. The 6C8G filament is wired so that it is nearest to ground; then come the 6K7, 25A6 and 25Z6 in the order named. The 200 ohm series resistor is contained in the special line cord which has three leads. The thickest lead is the end of the resistor and connects to one

(Continued on following page)

5-Meter Super-Regenerative Receiver

(Continued from preceding page)

side of the 25Z6 filament, the red lead connects to the switch and the black lead runs to the plate and cathode terminals of the 25Z6. Since the resistor element is distributed evenly over the entire length of the line cord, *no attempt should be made to shorten the cord* by cutting it. The *entire length* must be used. In operation, the cord will become warm, but not too hot to touch.

Adjusting Set for Best Reception

Once the receiver has been completely wired, a few adjustments will result in efficient operation. The receiver is turned on by advancing the combination audio gain control and line switch and the gain control advanced to its maximum clockwise position. The regeneration control is then slowly advanced in a clockwise direction. At some point a slight click or smooth plop will be heard; this indicates that the detector is oscillating; the regeneration control is advanced another few degrees when a loud rushing noise will be heard. This indicates *super-regeneration*, and at this point, the receiver is in its most sensitive condition. The Audio gain control may now be retarded if the rushing noise is too loud for comfort.

When a signal is tuned-in the rushing noise will disappear or be reduced in intensity. On strong signals it will disappear entirely, while on weak signals the noise will still be heard in the background.

Once a signal has been tuned-in the R.F. and detector circuits can be brought into resonance. This is done by changing the inductance of the coils by either compressing or expanding the coils. Incidentally, the frequency range of the receiver can be adjusted within small limits by this operation. Although the same size coils are used by the constructor and the receiver wired exactly like the photo, some adjustment of the coils may be necessary to cover the desired frequency range. It may even be necessary to *add* or *subtract* a turn.

By using different size coils different frequency ranges can be obtained. As built by the writer for 56 megacycle reception, both coils consist of seven turns of number 12 bus bar, wound on a diameter of ⅝ inch. For the 112 mc. range approximately 3 turns wound to a diameter of ½ inch will be required.

List of Parts

BUD
1—Metal Cabinet No. 994 (7x12")
1—Chassis 11x6½" No. 997
1—Interstage shield 5½x7" No. 1256
2—15 mmf. variable condensers No. 565
2—U.H.F. R.F. chokes No. 925
2—Octal isotex sockets No. 959
2—Octal bakelite sockets No. 1063
1—Ceramic flexible coupling No. 795
2—Metal tube grid caps No. 108
1—Phone jack No. 233
1—4" black bakelite dial (vernier) No. 103B
2—Knobs No. 183
1—35 mmf. coupling cond. adjustable No. 833

SPRAGUE (Condensers)
2—16 mf. 200 v. type BT-162
1—8x8 mf. 450 v. type PTM-88
1—10 mf. 25 v. type BH-10
1—2 mf. 200 v. type BT22
3—½ mf. 600 v. type TC-5
1—.01 mf. type SW-11
1—.0001 mf. mica type 1FM-31
2—.004 mf. mica type 1FM-24
2—.006 mf. mica type 1FM-26

I.R.C. (Resistors)
1—440 ohms type AA
1—50,000 ohm potentiometer
1—50,000 ohm pot. type 11-123
1—S.P.S.T. switch No. 21
1—300 ohms type BT½
1—50,000 ohms type BT½
2—100,000 ohms type BT½
2—25,000 ohms type BT½
1—10,000 ohms
2—15 megs.

RAYTHEON (Tubes)
1—6K7
1—6C8G
1—25A6
1—25Z6

OXFORD-TARTAK
1—5" P.M. or 5000 ohm field loud-speaker

STANCOR
2—15 henry chokes 50 ma. No. c-1277

Miscellaneous
1—D.P.D.T. toggle switch
2—Lengths No. 12 bus bar
1—200 ohm resistor line cord

Local HAM Gossip

(Continued from page 343)

day on 5 meters. With 65 gallons of lemonade and all the prizes gone, we QRT for the summer and closed the radio shack up until Sept. 1st. I am sure from what the gang had to say, they will want a "field meet" this fall. This one will be better and bigger than the last, *I hope*. One hundred and fifty-three attended—all free! The radio clubs paid for the lemonade and drinks; the prizes were given by Warren Radio Co., 1110 Madison Ave., Harry's Auto Supply Co., Adams St., Toledo Radio Spec. Co., on 10th St., and the Lifetime Mike Co., on Madison Ave. The total value of the prizes was $30. Joe Solark was chairman of the group of TUHFA and TRC members that made the lemonade.

Modulator for the 35 Watt Transmitter

(Continued from page 361)

One metallized resistor, insulated type, 15,000 ohms, 1 watt
One metallized resistor, insulated type, 2,000 ohms, 1 watt
One metallized resistor, insulated type, 1,500 ohms, 2 watts
One metallized resistor, insulated type, 1 megohm, ½ watt
Four metallized resistors, insulated type, 0.5 megohm, 1 watt
One wire-wound resistor, 200 ohms, 50 watts; adjustable type
One wire-wound resistor, 15,000 ohms, 50 watts
Two wire-wound resistors, 5,000 ohms, 25 watts
One wire-wound resistor, 20,000 ohms, 75 watts

AEROVOX (Condensers)

One electrolytic condenser, 10 mf., 25 volts
One electrolytic condenser, 25 mf., 25 volts
One electrolytic condenser, 25 mf., 50 volts
One electrolytic condenser, 16 mf., 450 volts
Two electrolytic condensers, 2 mf., 450 volts
Two paper dielectric condensers, 0.05 mf., 600 volts
One mica condenser, .001 mf.

SOLAR (Condensers)

Four electrolytic condensers, 8 mf., 600 volts, wet type

RCA (Tubes)

One 6F5G tube
One 6F8G or 6N7G tube
Two 6L6G tubes
One 5U4G tube

PAR-METAL (Cabinet, panel and chassis)

One two-panel size steel cabinet, black crackle, 17½x13x20"
Two standard steel panels, 8¾x19"
One standard steel chassis, 10x13x3", black crackle finish

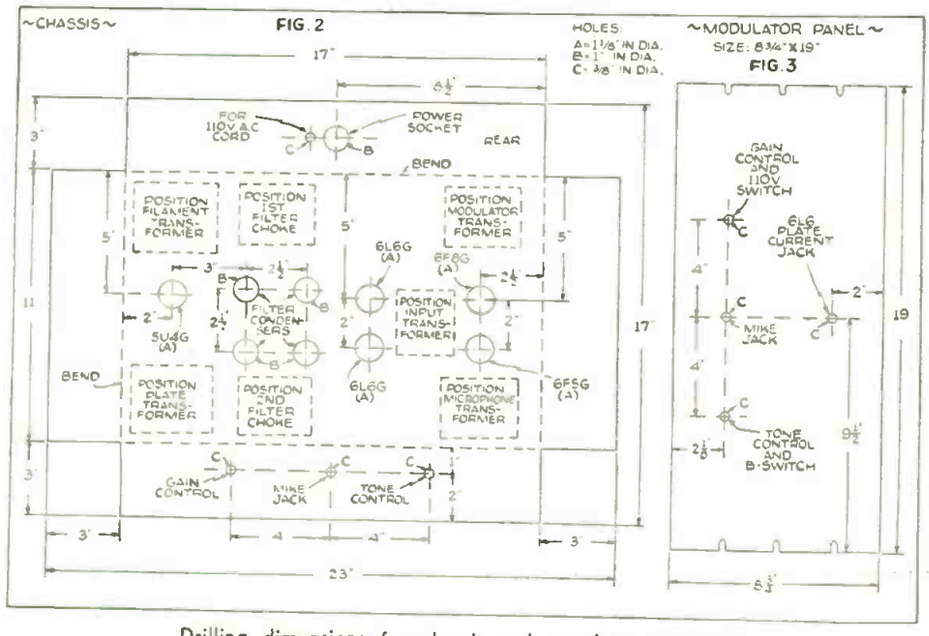
JEFFERSON (Transformers)

One microphone transformer, universal type
One input transformer. One plate to p.p. grids
One modulation transformer. Push-pull 6L6S in class "A" to 5,000 ohm class "C" load

STANCOR (Transformers)

One "swinging" choke, 8-30 henries, 250 milliamperes
One filter choke, 15 henries, 250 milliamperes
One plate transformer, 800 volts, c.t., 300 milliamperes
One filament transformer, 5 volts at 6 amperes and 6.3 volts at 6 amperes

Don't miss the November issue—chock full of HAM and FAN features.



Drilling dimensions for chassis and panel of modulator.

Back in the Days of Crashing Spark-Gaps

(Continued from page 331)

that kind of a "rig" it didn't matter how big you built your loose coupler tuner. You couldn't get away from my signals—two turns or 500 turns it was just as loud and persistent.

Antenna Radiation meter, did you say? Yes—a darned good strong 32 candle-power carbon lamp (and it had to be strong) made a good one. INSULATION??? Why worry about that when without it your lamp lighted brighter with most of the current going to ground via the antenna mast and guy wires—not to mention the lead-in! At least you thought you were getting plenty "into the air"—no one else could light up a 32 C.P. lamp as brightly. You were the "tops."

Then came the best friend the Amateurs of this country ever had. Mr. E. T. Cunningham who gave us the *audiotron* . . . . first vacuum tube and the one gadget that really put Amateur radio here to stay. Unheard of distances were covered and soon everyone was in touch with one another . . . . swapping experiences. This education led to the development of highly efficient amateur equipment and stations.

In fact Amateur radio has progressed so rapidly that it recently became necessary to ship a transmitting unit to Pitcairn Island, so that present day Amateurs might *manufacture a new spot on the globe to conquer.* After that—well, perhaps they'll take a shot at Mars, but I assure you that it will be the only spot not as yet touched by Amateur signals.

If you are capable of realizing the kick that Jules Verne would get from one little peek through the periscope of a modern submarine—then you will fully appreciate how I feel when I see a youngster busily engaged in the operation of his modern 1938 Ham rig—so great is the contrast between modern equipment and that which I had to make and use in the year 1909.

I could go on raving like this for months with great pleasure and without end—but Hugo has been kind enough to allot me sufficient space in which to jot down a small portion of my romantic reminiscences —which I deeply appreciate—so CUL.

An Efficient 5-Band Amateur Receiver

(Continued from page 354)

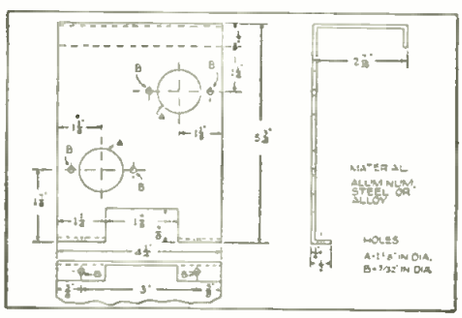
so that it may be of service when other communication means fail.

The amateur set to be described covers the 10-, 20-, 40-, 80- and 160-meter bands. The heart of the receiver is the BL-5H Tuner, a 5-band coil switching arrangement so designed that the coils not in active use are *shorted*. Band-setting trimmers are rigidly mounted on each of the 5 coils, thus allowing the amateur bands to be *spread* over substantially all of the tuning range, as well as to allow adjacent channel reception in case this is desired.

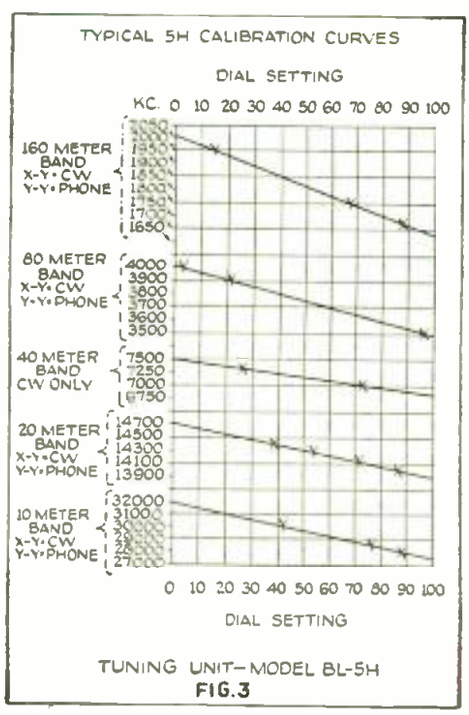
Construction of the Receiver

The construction of the receiver is extremely simple as will be evidenced by the circuit diagram shown in Fig. 1. For simplicity, only *one* of the 5 sets of coils employed is shown. The components of the receiver are mounted on a small sub-base, details of which are shown in Fig. 2. A 6S7G is used for a *regenerative detector*, while a 6G6G is used for the *audio amplifier* (other tubes with similar characteristics may be used if desired). The filaments of these tubes may be either operated from a 6.3-volt filament transformer for station operation or may be heated either from a 6-volt storage battery or three dry cells connected in series when it is desired to operate the receiver "portable." In any case, the total filament drain is only 300 milliamperes. *Regeneration* is accomplished by varying the screen voltage on the detector and, if the receiver is carefully constructed, this regeneration control will be found to be especially *smooth*, thus providing maximum gain and sensitivity. In this connection, it is especially important that the RF filter system in the plate circuit of the 6S7G be connected as indicated in Fig. 1. The 100 mmf. plate by-pass (C_2) condenser and the .002 mf. screen by-pass (C_1) condenser should be grounded to the same point, as indicated. It is advisable also to ground the BL-5H Tuner to this common ground. The filter system in the screen circuit consisting of the .002 mf. condenser, the 1000-ohm resistor and the .1 mf. condenser is essential for smooth regeneration. In order to prevent the regeneration control from being too critical, a 20,000 ohm resistor is placed in series with the 50,000 ohm potentiometer. The value of this resistor, in many cases, should be increased. It must be sufficiently low so as to allow regeneration over all of the 5 amateur bands, yet sufficiently high so that the control is not critical. If the antenna used with the receiver has a very low radio-frequency resistance, it will be found that this resistor may be increased to 50,000 or 75,000 ohms. However, if the antenna used is not well insulated, it may be necessary to employ as low a value as 10,000 ohms for this resistor.

The audio choke employed in the plate circuit of the detector has an inductance of approximately 100 henrys. A resistor can not be used in this position in place of the choke without increasing the B battery voltage very materially.



Chassis detail. Fig. 2.



Calibration curves for 5 bands.

Wiring the Receiver

In wiring the receiver, all components should be so situated that the leads carrying radio frequency current are kept as short as possible. The tube positions indicated on the chassis layout shown in Fig. 2 have proven very satisfactory. The 6S7G tube must be shielded. As will be noted from the photograph of the receiver, the choke and the output transformer in the plate circuit of the 6G6G are mounted on top of the chassis, while the other component parts are mounted underneath. The output transformer should have an impedance rating of approximately 12,000 to 2,000 ohms, the 12,000 ohm side being connected in the plate circuit of the 6G6G, while the 2,000 ohms impedance approximately matches the phones or magnetic speaker, which are conveniently plugged into the jack provided.

If the receiver is to be completely operated from batteries, it is necessary to employ an on-and-off switch which opens both the –B battery lead as well as the A battery lead, as otherwise a constant drain on the B battery through the voltage dividing system on the screen of the detector tube will result. The B supply voltage may have any value between 45 and 250 volts; 90 volts is entirely satisfactory.

Adjusting Band-Setting Condensers on 5H Tuner

The antenna is connected either through a *series* antenna condenser or to the cathode tap on the coils of the 5H Tuner. Since

(Continued on following page)

An Efficient 5-Band Amateur Receiver

(Continued from preceding page)

the capacitance of the antenna system alters the tuning position, it will be necessary for the amateur to adjust the band-setting condensers associated with each of the 5 coils. These condensers should all be set with the antenna connected to the receiver, although it is advisable before the final adjustment on these condensers are made to determine which connection gives better signal strength. On the 160 and 80 meter bands, antenna connection to the point marked No. 1 usually results in better reception, while on the 10-, 20-, and 40-meter bands connecting the antenna to point No. 2 is usually advisable. This however depends somewhat upon the antenna used. In fact when working portable with a "fish pole" antenna the series antenna condenser may be *shorted*. Having determined the antenna connections for the various bands, connect the antenna to its appropriate point and set the dial or pointer knob so that it is approximately 50 on the scale. With the series antenna condenser partially closed (this will depend upon antenna length) adjust the band-setting condenser on the 160-meter coil until phone reception is heard. If a signal generator is available place the output lead from the signal generator so that it closely parallels the antenna lead-in. With the pointer set at 50 on the scale, adjust the band-setting condenser on the 160-meter coil for 1.86 mc. A similar procedure is followed for each of the other coils, following the frequency calibration for the various bands given in Fig. 3 as a guide. Another method of adjusting the *band-setting* condensers is to tune in a station the frequency of which is known, set the pointer to the position on the scale which corresponds to this frequency (see Fig. 3), adjust the band setting condenser until this station is again tuned in.

This article prepared from data supplied by courtesy of the Browning Laboratories.

Parts List

BROWNING LABORATORIES, INC.

1—BL-5H Tuner
Etched and engraved panel—7" x 10"
1½" knob with 1½" pointer and two 1¼" pointer knobs

I.R.C. (Resistors)

R1—50,000 ohms, 1 watt Potentiometer (Type 11-123)
R2—20,000 ohm. ½ watt (BT-½)
R3, R4—1000 ohm. ½ watt (BT-½)
R5—.25 megohm. ½ watt (BT-½)
R6—500 ohm. ½ watt (BT-½)

CORNELL-DUBILIER (Condensers)

C1, C8—.002 mf. mica
C2, C5—.0001 mf. mica

BUD MFG. CO.

Cabinet—6" x 7" x 10"

YAXLEY OR UTAH

1—Phone Jack

U.T.C.

CH1—100 henry audio choke (S-24)
T1—10,000 to 2000 ohm impedance output transformer (S-18)

TOBE (Condensers)

C7—10 mf. 50 volt dry electrolytic condenser
C3, C6—0.1 mf. 400 volt paper condenser
C4—.05 mf. 400 volt paper condenser

MISCELLANEOUS

On-off switch
Tube shield

Want to Learn Foreign Languages?

(Continued from page 341)

stands nearer to it than if he were just looking at it to see and appreciate it.

By listening to loud reproduction, you will learn to shout. This *learning* to shout is a good thing. For when you repeat the language to yourself for practice, you may say it louder than normal, but when you come to speak it, you will instinctively speak no louder than the person with whom you are talking. Anyone who has already tried speaking in a *forcign* language will tell you that if ever they have to talk loud, they find pronunciation difficult. So it will be just the opposite with you. You learn to speak loud, and then when you come to talk at ordinary volume, any defect in pronunciation will be reduced.

Headphone Adapter for Any Radio

For greater sensitivity and for private listening at late hours, a headphone adapter permitting headphone reception with the speaker off is essential. The simplest adapter is illustrated. The single-pole double-throw switch and the two phone tip-jacks are mounted on a piece of bakelite two inches square. A three-conductor cable is wired according to the circuit diagram and is connected to the radio set dynamic speaker's voice coil. If a magnetic speaker is used the speaker coil is used instead.

Headphone Adapter Parts List

5 ft. 3-conductor cable*
1 S.P.D.T. toggle switch*
2 Tip-jacks*
1 Bakelite panel 2" x 2"*

TRIMM

Featherweight headphones

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

How HAM RADIO Saved Shawneetown!

(Continued from page 334)

flashlight, in a farmhouse where we found eleven marooned refugees, and finally contacted Harrisburg and got out the first news from Shawneetown. By 3 a. m. my storage battery was exhausted and I was forced to suspend action.

Fortunately, a good friend, Jack Hatfield, arrived from the mine in a large boat propelled with a pair of oars, loaded us aboard and returned us to the mine.

When we reached the mine about daylight I set up and started relaying messages between Shawneetown and Harrisburg. In response to these messages, food, medicines, doctors and nurses were dispatched via the Ohio River and a large towboat, the *Patricia Barrett* left Memphis with a covered barge to assist in the possible evacuation.

While I handled messages, Jack went back into the backwater in a motor-boat he had secured, and broke a lane in the ice which had formed. It took all morning to reach Shawneetown, for by this time the water had covered the railroad track. He returned to the mine in the afternoon and took me to Shawneetown, arriving at 6 o'clock.

I set up the apparatus in the WPA office on the third floor of the oldest bank in the state of Illinois.

Conditions in Shawneetown were indescribably bad. It was not yet flooded, but the immediate danger was so great that the town was practically evacuated to the schoolhouse and every other possible shelter located out of the levee district.

Next morning we improvised an organization for rapid handling of messages, improved the antenna systems, and "handled all messages." It was a big job and kept four of us busy all of the time. As I was the only operator, I was at the key at all times but since all incoming messages were by radio phone I had a stenographer take them in shorthand and transcribe them later.

At one time the power failed for several hours, but I hooked up the batteries and handled messages without interruption.

At 2 a. m. Monday it was apparent that it would be impossible to save Shawneetown and would be necessary to evacuate the inhabitants to a safer place. The *Patricia Barrett* had arrived and was capable of carrying everyone at one load, but there was no place to take them.

Early Monday morning everyone who wished to leave went aboard the *Barrett*. I set up my station in the pilot house and we left Shawneetown, tying up to some trees downstream until refugees from the High School could be brought aboard. At noon we received orders from the Red Cross to take refugees to Mt. Vernon, Ind., and Henderson, Ky. Shortly before the boat departed upstream I removed the gear and returned to Harrisburg where the situation had become critical.

During the rest of the emergency I helped operate W9HQD, which operated 24 hours a day. Too much praise cannot be given Kes Schonert, W9HQD, for the part he played in clearing the air and listening for my weak signals.

Famous Radio Experts Salute the Amateur

C. W. HORN

(Continued from page 358)

and gave us an immediate audience of many thousands. The amateurs were responsible for the construction of many of the homemade sets during the first years and for assisting their friends in the building of broadcast receivers. Many of the amateurs saw an opportunity of engaging in a profitable business, and, therefore, the industry had available many trained men upon whom to draw for engineering and service work. KDKA is generally thought of as a pioneer broadcasting station, and the men associated with this pioneer were mostly amateurs, such as Dr. Frank Conrad, Frank Falkner, John Coleman, and many others who have built a name and reputation in the industry.

As radio became a more complicated science, the big laboratories were naturally the source of new developments. The amateur could not afford the expensive laboratory equipment, but he did the next best thing, and immediately tried out every new tube and device that the laboratories produced. As a result the manufacturers had available an immediate field test of the newly developed devices, which saved time and resulted in a large amount of data that was helpful to the industry.

Today we are confronted with a new frontier in radio development in which we have to solve many problems in *television* and *ultra high frequency* transmissions. The television receiver is a highly complicated piece of mechanism as compared with the sound receiver. Therefore, even if television should become a reality today, and receivers be placed on the market, the industry would be faced with a tremendous shortage of trained personnel for installation and service work. The only hope of meeting this demand for highly technical men is from the ranks of the amateurs. This was one of the reasons why the RCA decided to put kinescope tubes and other parts on the market. With thousands of experimenters building their own receivers, we can expect a fair percentage of them to enter the radio field, and these, to some extent, meet the demand for these specialists.

Consequently the amateur is making a valuable contribution to the welfare of his country. Because of the amateur the radio industry can more quickly get under way and make available to the public the latest advancements. This aids the national economic picture. In addition to this the amateur keeps himself in training and thus stimulates future advancements. In the event of war, the American people will be grateful to the amateur, because communication is probably the most vital factor for the national defense, particularly in view of the fact that modern warfare calls for rapid movement, and depends upon mobile units such as tanks and airplanes. The amateur as a class is patriotic, and many of them are members of the U.S. Army and U.S. Navy Reserves. It is unnecessary to repeat the good work that they do during times of disaster and floods. However, I feel that the amateurs' greatest contribution lies in the less spectacular and fundamentally more important service they play as yeomen in the advancement of radio and science, which benefits the country as a whole.

I am proud of the amateurs and proud that I was one myself.

More "Salutes" Next Month

What Price HAM Radio?

(Continued from page 337)

while one Ham operator spent $900.00 on new tubes and tube replacements during the past year! So, between the two extremes of the well-financed Ham station owner and operator, and those in the lower brackets (the beginners and small station owners), there is a broad financial chasm.

Power of Average Transmitter

While the maximum power limit set by the Federal Communications Commission for amateur stations is 1000 watts, there are numerous small stations, such as those operated by beginners and others, that are rated at only 20 to 50 watts. Among the Hams who answered the questionnaire, 15% own 1000 watt transmitters; 1% each own 900 and 800 watt transmitters; 11% 500 watters; 3% 400 watters; 3% 300 watters; 7½% 250 watters; 10% 200 watters and 11% 150 watters. The balance is distributed over various values of transmitter power from about 20 watts up to 150.

Manufactured Versus Home-Made Apparatus

A surprising fact which the questionnaires showed was that the average Ham, if he can afford it, will purchase a good factory-made receiver. The tabulated answers showed that 60% own factory-built receivers. Of these, 35% own manufactured receiving sets costing $175 or more apiece, while 8.6% have factory-built receiving sets which cost between $200 and $300 apiece; for sets costing $100 to $150 we find 36½%. The balance of the sets owned by station operators are the usual run-of-the-mill sets costing between $30 and $100.

When it comes to transmitters, 88% of the Hams questioned by the editors preferred to *build their own*, either by buying the parts separately or from kits; 8% own manufactured transmitters and the balance are of composite construction.

Antenna Kits—Phones—Test Equipment

Regarding antenna kits, 8% use transmitting antenna kits, such as the Johnson-Q. Most of the receiving aerials are home constructed and only about 1% use factory-made kits.

As to headphones, all of the leading makes are well represented in Ham stations. Leading with 22% are Baldwin phones, Trimm phones are next with 17%, Western Electric 11%, Brandes 10%, Brush 8%. (Of course this picture might be different, if all 46,000 Hams were questioned.—*Ed.*)

Only about half the Hams who answered the questionnaires own factory-built testing equipment (not forgetting the fact, of course, that most of the Hams probably own from one to a dozen meters which are "built into" their transmitters). Among the leading makes of measuring instruments used we find Triplett leading with 18½%, Weston 15%, Jewell 8%, General Radio 2½%, Supreme 2%, Westinghouse 1½%, RCA and Du Mont 1½% each, with a small percentage divided among the other well-known makes of testing instruments.

Battery Versus A.C. Operation

Ninety-four per cent of the Ham stations covered by the questionnaires are operated on 110 volt, A.C., while 6% are battery-operated.

Another interesting figure shows that 2½% of the Ham stations are shared by a YL (unmarried young lady); 7½% by an XYL (their wives); 13% share with another Ham, while 1% are "club" owned and operated stations.

Low Cost A.C. Transceiver

(Continued from page 354)

3/16 of an inch copper tubing. The diameter of the coil is 2 inches. For unity coupling the grid coil is placed inside of the plate coil and consists of ordinary hook-up wire. The center tap of the grid coil is brought out through a hole in the tubing.

The tuning is accomplished with the aid of a 15 mmf. variable condenser of the low-loss type. Since both the rotor and the stator plates of this condenser are above ground potential, the unit is mounted away from the control panel to eliminate possible body capacity. An insulated extension shaft permits the control of this condenser at a distance.

The unit is designed for operation from batteries or from an A.C. power-pack. The filament of the tube should be operated from a 6-volt storage battery or from a step-down transformer, supplying 6.3 volts. For plate potential, any voltage from 60 to 100 volts will serve. Any standard type power-pack, designed for use with short-wave radio sets, may be employed.

The 500,000 ohm variable resistor controls regeneration for reception. It has no effect on transmission. The setting of this control is critical, but once adjusted, it will require but little further change.

The antenna recommended for use with any transceiver should be an odd-multiple of a quarter-wave length. This means that the antenna may be 4, 12 or 20 feet long.

Before placing the transmitter portion in operation, it is advisable to check the transceiver on *reception*. Placing the switch in the *"receive"* position and connecting the proper power supply, the variable resistor should be set at a point where the characteristic rushing noise of the super-regenerative receiver is loudest. The dial should now be turned slowly until the point is reached where the hissing noise ceases. This point indicates that the station has been tuned in. The variable resistor is then adjusted to the point of maximum response.

The advanced Ham, as well as the beginner, will find this excellent transceiver well adapted for their requirements and can obtain the required parts, as well as drilled panels completely matched for easy assembly and proper operation.

This article prepared from data supplied by courtesy of Allied Radio Corp.

List of Parts

Knight A.C. Operated Transceiver

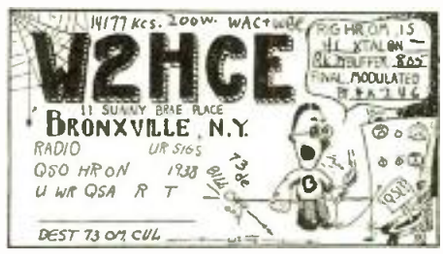
1—Foot 3/16" copper tubing, B2476
1—Hammarlund Star 15 mmf. variable condenser, B5328
1—Hammarlund Isolantite 1 prong socket, B5342
1—Knight .006 mfd. mica condenser, B7823
1—Knight .00025 mfd. mica condenser, B7833
1—DPDT toggle switch, B5459
1—Knight 75,000 ohm ½ watt resistor, B4990
1—Knight 500,000 ohm potentiometer, B5970
1—Insulated coupling, B4570
1—Insulated shaft, B4584
1—3" Kurz Kasch dial, B6200
2—Knobs, B6208
2—Pair tip jacks, B4069
1—25 ft. roll hookup wire, B3560
1—7¼ x 6¼" drilled bakelite panel, N2236
1—5 6/7" x 4" drilled bakelite panel, N2234
1—7¼" x 6¾" x ⅜" plywood baseboard, N2233
2—Feet 4 conductor battery cable, B3502
1—Hardware kit, N1610
1—6A6 R.C.A. tube, B175
2—.001 mf. mica condensers, B7837
1—Plug, B1807
1—¼ Wave brass rod, N2448
1—Bull's eye indicator, B6388
1—Pilot bulb, 6.3 volts, B1253

Fourth Silver Trophy Award

(Continued from page 345)

at Columbia University taking an E.E. course. Got interested in radio about 10 years ago and progressed through the xtal sets, battery sets and the like. Got my ticket in 1934, and got on 160 phone with a pair of 59's, suppressor modulated. Since I was cursed with an experimental nature, the rig was rapidly rebuilt and torn down 19 times in one year! I tried suppressor, grid, and plate modulation, controlled carrier and tried out several antennas. I had the best luck with a 250 ft. center-fed job. We didn't use over 60 watts on 160. In 1935 I got my class A and stuck the rig on 14 mc. phone. As you can guess, the parallel 46's didn't put out much, so the rig was ripped down. *I rebuilt it 9 times before I was satisfied!* I tried 46's, an 825, 203A, 242A, 211, 852, and finally ended up with the 805. After this I got ideas on oscillators and tried all of 'em. After I blew up a couple of xtals with hi-powered oscillators, I decided the 41 pentode oscillator was best. I messed around with buffers, and finally stuck in a RK39 as a doubler with 600 v. on it. It works wonderfully, and I can drive the 805 to 50 grid mills. During this time I messed around on 56 mc. with W2HXD (he heard the five meter sigs of G5BY a few years ago). I also tried 20, 80, and 160 c.w.

The receiver has only been changed about five times, but it seems to be OK now.



That's about all there is about the station. I've handled a little flood tfc. (traffic) and took messages from the "Morrisey," W1OXDA, but I don't regularly do much tfc. handling. My main interest, when the rig is in working order, is to experiment with antennas and work DX on phone.

Just thought I'd let you know about S.W.&T. I've been reading it since it came out every other month. Remember?

What Do You Think?

(Continued from page 344)

2:17 a.m. PST so I'm hooking up with a Canadian friend, a 200 watter, who comes in here like a house afire! I take in my antenna when I have him on! (Say, a lot of us are fair liars too.) But I get good reception here year around; east is good too. We, my pardner and I, are busy day and nite; not much money, but boy we "go to town" anyway. We trade around quite a lot and borrow each other's stuff.

Say, "ed," pardon me taking your time to spill the ink, but I thought I should tell you what S.W.&T. has meant to us here on the west coast. Through your magazine, I've bought other publications too.

A photo of the shack soon—it's somewhat "tore up" at present, so the delay is necessary.

M. E. VAN NATTAN,
6151 Walnut Ave.,
N. Long Beach, Calif.

Prize of 1 year's subscription to *Radio & Television* given each month for best "listening post" photo.

Short Wave League — On the Ham Bands

(Continued from page 342)

Call	Freq.	R	S	
James R. Wood - Observer for Minnesota				
VS6AG	14.084	4	6	
Howard Kemp Observer for Connecticut				
EA9AH	13.99	4	6	
K6KPM	14.22	3	4	
F8FN	14.07	4	6	
EI6G	14.40	3	4	
VR6AY	14.34	4	5	
F8MA	14.12	3	4	
ZS1AA	14.09	3	4	
F8VP	14.10	4	4	
F8NT	14.08	4	6	
M. J. Markuson- Observer for Colorado				
CE1AG	14.040	5	4	
CE1BC	14.350	5	5	
KA1ME	14.230	5	4	
KA2OV	14.230	4	5	
KA1HF	14.225	5	5	
K6OQE	14.230	5	6	
L. F. Gallagher Observer for New York				
FA8CC	14.120	5	6	
FA3HC	14.280	4	7	
XU8RB	14.080	4	6	
OZ5G	14.300	5	7	
OZ3U	14.340	4	6	
PK1PK	14.030	3	7	
SU1RK	14.330	4	6	
SU1CH	14.390	5	8	
ZT6P*	14.265	3	6	
SM5SD	14.270	5	7	
YR5KW	14.120	5	6	
KA1MG	14.310	4	7	
SP1CC	14.340	4	8	
VR6AY	14.350	5	7	
LA8C	14.125	5	7	
SV1KE	14.300	4	7	
HA8X	14.125	5	9	
VU2LL	14.340	4	7	
VU2CQ	—	5	7	
I1KN	14.360	4	7	
J7CB	14.310	4	6	
CN8AM	14.090	5	7	
CN8AU	14.130	4	7	

*The QRA of this station is in doubt in the mind of "yours truly." Will someone write and tell me where it is?

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.

Call	Freq.	R	S	
Clarence Hartzell Observer for Pennsylvania				
F8AF	14.075	3	5	
F3OX	14.078	4	7	
PA0MZ	14.038	4	5	
VK4VD	14.148	5	7	
VK2UC	14.134	4	6	
EA9AH	13.996	5	9	
FA3HC	14.105	3	6	
PK1MX	14.300	2	4	
Edmond H. Davenport —Observer for Vermont				
VK2ABK	—	4	6	
CT1ZZ	14.050	4	6	
SU1KG	—	3	4	
VP3WA	14.150	5	7	
Robert Hatcher Observer for Virginia				
ZB1R	14.050	–	7	
AC4AN	—	–	5	
FA3HC	—	–	7	
TF3C	—	–	6	
FA8HT	—	–	6	
AH2BU*	14.410	5	8	
ZD2B	—	–	–	
ZB1R	14.410	3	5	fone
ZB1R	14.410	5	7	cw
ZC6AQ	14.020	5	7	cw

*This is also a new one to yours truly and I would like to have its QRA from someone.

Call	Freq.	R	S	
PK6XX	14.200	–	8	
KA3AA	—	–	–	cw
KA7EF	14.70	–	7	cw
KA1CS	14.75	–	8	cw
ZK1AA	—	–	–	
J7CR	–	–	6	

Excellent results on the five meter band have been reported by Owen Shepherd, Jr., who is Observer on five meters for the State of Connecticut. This is the only band which Owen is working under the call of W1IJ. During the month of July, he has reported as hearing every district in the United States except the 7th. In Canada, he has received stations in the 3rd and 9th districts. We wish to congratulate W1IJ upon his accomplishments on the five meter band, and we hope that he will continue to show reports like the one received here last month. Part of his report is as follows:

W4EDD	5-4	CSU	5
FLH	5	EKI	4
AUU	3	ML	4
W5ZS	4	W6DNS	7

"Yours Truly"— Observer for New York			
W1OXDA	14.350	5	7
F3OX	14.155	3	5
PA0DGA	14.200	4	9
K4ENT	14.255	4	5
OA4C	14.345	3	5
F3HM	14.165	4	7
EI2L	14.100	5	7
ON4AM	14.210	5	7
K4ENY	14.237	3	8
LU4AD	14.210	5	6
Charles H. Fuller— Observer for New York			
HH2B	14.155	5	8
HK3LC	14.200	5	9
PY5BL	14.200	5	6
LU8AB	14.150	5	6

In order to reduce the reports to include only real, good DX, the following distances have been decided upon, to be considered in publishing these reports. There is no need in reporting stations which may be heard at almost any time of day or night. For the 160 meter band, 1000 miles has been set as the minimum distance, and for the 80 meter band, 1500 miles. For the 20 meter band, 2000 miles has been established and the same distance for the 10 meter band.

Once more, may I remind you to include the *approximate frequency*, *readability*, and *signal strength* in your reports.

The Life of a Busy Ham

(Continued from page 339)

the local hams dropped in about two o'clock, to find out how the "rig" had been working, and upon seeing the log from 7:01 p.m. to the present time, 2:05 p.m. they knew that the transmitter was at least working *across the ocean!*

Three o'clock and once again I was alone, ready to start all over again. Back over the band again, but many attempts to contact someone proved unsuccessful. I began to look over the rig, to make sure everything would be in order for this evening. A few slight alterations and everything was completed. Leaving instructions to wake me up for supper, I went to bed.

Six o'clock and supper on the table. After a hurried meal I rushed downstairs and again put the transmitter and receiver on, got out the call book, log book and scrap pad, sharpened half a dozen pencils, and prepared for the evening ahead of me. I began by working Cuba, South America, Ireland and the Netherlands—all within the next hour.

Seven o'clock rolled around and with it the end of one of the busiest twenty-four hours of activity I had experienced for a long time.

himself; otherwise, he can contact almost anyone in the radio line to help, especially if you happen to be a shut-in."

"Even though arthritis has made it virtually impossible for me to move around," said Pop, "I still manage to work my fingers and with them I am able to press buttons. And so when I wish to go on the air I snap the button just below the microphone. Should anything go wrong with the set, it is so constructed that it shuts off automatically. There really isn't much to operating it, but never-the-less one needs a background for it. While all the building was taking place, in the meantime I was busy being taught the ABC's of shortwave. I listened intently to the boys whenever they made the slightest remark related to this field. I read several text books and after about 11 months of study I thought I was sufficiently prepared to take a test for a short-wave operator's license."

"They certainly must have had a swell time carrying your bed up the stairs leading to the Federal Communications Commissioner's office when you went to take your test," I commented.

"Why, no. I didn't even have to leave the house. I simply wrote to the Commission stating that I would like to take a test, but that I was a *shut-in*. And so I filled out a Class C application, which signifies that a person is unable to come down for the examination; therefore, the Commission sends an amateur out to your home to give you the test—that is if you live within a radius

The World Comes to My Room

(Continued from page 336)

of 100 miles. There is no expense involved in taking the test."

Continuing, he says, "And now you come to the point where you face the music. You have your set; you've been studying pretty hard, and now the test. Two sentinels guard the sacred entrance. They stop you and ask, 'Halt who goes there?' The first one is the code—which requires one to be able to take the Continental Morse Code at 13 words a minute. You must pass this in order to take the next step—a question and answer quiz to determine whether or not you are thoroughly acquainted with the mechanical parts of a transmitter. If you are successful in both, the sentinels step aside and cheerfully utter, 'You may pass.' But sometimes these tests are like big trailers out on a highway—you fail to pass them and I fell into this category. But shucks, after one waits three months, he can try again."

Conducts "Coal Business" by Telephone

Brring! Brring! It's Pop's telephone—a cradle type that is affixed to a bracket. When this bracket spreads out towards him, the receiver comes to rest at a point slightly over his ear and the mouthpiece at an angle below his chin. This eliminates the holding of the telephone, which he is unable to do. The call happened to be an order—a coal order. For while radio is his hobby, he never-the-less keeps abreast in business. At first he used to sell post cards, automobile polish and several other items, but now a sign out on his porch reads, "Coal orders taken." During the past few years he has built up a lucrative business.

Thrilled by First "Out-of-Town" Contact

"And the stirring interest in getting your first *out-of-town* station; and then those from other states. I felt chills go up and down my spine. Here I was lying in bed, talking to a fellow away down in Texas hundreds of miles away, who perhaps may be a wealthy ranchman or just a cow rustler. A half hour later I tuned in a lad in Alabama, who earns his bread pickin' the little balls of cotton."

In addition to broadcasting over his amateur station, Pop has also been on the air over a commercial station WJAY (now WCLE), Cleveland.

Shut-ins and other listeners bombarded the station with letters and cards. They had found a leader. They liked to listen to his advice and all agreed that it was an inspirational program. Pop's card file has increased steadily and he has added people from all walks of life to his list, including such celebrities as Gene and Glenn, radio stars, Joe E. Brown, Tony Wons and many others.—Courtesy OUTWITTING HANDICAPS MAGAZINE.

Let's Listen In with Joe Miller

(Continued from page 347)

registered, with return receipt, elicited a reply from the commercial phone's offices, and we were assured our report would be passed on to the Amateur Society. Sure enough, 2 weeks later we received ZGE's card!

QSL states frequency is 6.135 mc. (tho now 6.24 mc.), and schedule is Tues., Fri. and Sun., 6:40-8:40 am. EST.

DX GOSSIP

ZHP, Singapore, has now changed to 9.68 mc., where it is heard almost daily up to 9:45 am. by Ashley Walcott, W6. Look for this catch.

JAPAN—JZL, 17.785 mc., Nazaki, is heard daily, 6-6:30 am., while JVH, 14.60 mc., is reported on Sats. at 11 pm. transmitting baseball.

PAPUA—VHPM, using freqs. of 8.08 mc. and 6.54 mc., at Port Moresby, has been reported testing between 5:30-6:30 am. Here is a real DX catch, and a new country for all, so keep a sharp watch for it, *daily*.

INDIA—VVX, 13.35 mc., Fort St. George, heard calling VVS, in Burma, with a very strong signal, at 6 am. but VVS, tho on, did not reply.

CHINA—LATE FLASH—Roy Myers, W6, reports a Shanghai fone on 15.46 mc., working in clear speech with JVE, 15.66 mc., 4-6 am. As speech from Shanghai is also Japanese, transmitter must be operated by Japanese occupants of Shanghai.

HAM STARDUST

ASIA

Asiatic ham sigs died down during these hot months, but we look with the certainty of past experience to a very decided improvement for the PK's, VS's, and KA's, etc., beginning with Sept., and continuing throughout the cool months.

Many FB catches are reported from the West, where DXers log those rare 'uns, undaunted by varying seasons, due to their proximity to those coveted DX signals.

Those reported from Asia are:

BURMA: XZ2EX, "England-Xray," 14060; XZ2PB, "Portugal Boston," 14035; XZ2DX, "Denmark-Xray," 14045; XZ2EZ, 14350, by Roy Myers, Max Fisher, and Jas. Moore, W6.

CHINA: XU6TL, 14120; XU8ET, 14160; XU8RJ, 14110 and 14340; XU8AM, "America, Mexico," 14080; XU8RB, 14100; XU6DL, 14000. XU8RB QSLs here with 2 FB QSLs and a very courteous 6 page letter, relating his most interesting experiences in China, which we cert wish we could describe here, but would require far more space than we could command. Many tnx, Reggie, OB, for ur FB reply, and best o' luck to you out there!

HONGKONG: VS6AG, 14090; and VS6AF, 14300, reported. In the Federated Malay States, VS2AE, 14360.

PHILIPPINES: KA1YL, H.F.20 m.; KA1MH, 14200; KA1FH, 14100; KA4LH, 14100; KA7EF, 14150; KA3DT, 14228, last by Ye Ed.

JAVA: PK4JD, 14010, Sumatra; PK3AA, 14360; PK1JR, 14300; PK2JN, 14310; PK1VY, 14270, with a V-beam on America, and, of course, PK6XX, located at Hollandia, Netherlands New Guinea, which station is well heard all over the U. S., and uses a 1 kw. *rig*, which they may vary during tests, as on one occasion when power was altered between 25 watts and 1 kw.

A rotary beam is used, ½ wave long, and also a V-beam, 465 feet long, stretched over the water. Operator is W2BVB, Harold Ramm. Frequency ordinarily used is 14020, but also heard on 14190. Commercial freq. used are 11.355 mc. and 6.425 mc.

The station is used by its sponsor, the *Archbold Expedition* of the American Museum of Natural History, to keep in constant communication with the museum "H.Q." in the U. S. QSL cards are not available, and anyone reporting them risks failure. Reports can be sent to ARRL "H.Q." or to W2BVB's home QRA, but no guarantee of a QSL is made.

French Indo-China offers FI8AC, 14070. Straits Settlements: VS1AI, 14090; VS1AF, 14070; VS1AB, 14060.

Murray Buitekant reports a QSL from VS7RF, Ceylon, a FB "DX" catch for a W2! Congrats, OM!

7 MC.: Ashley Walcott reports some unusual DX in the way of Javanese 7 mc. fones, heretofore unreported by a U. S. DXer. Listed are: PK3WI, 7010; PK3GD, 7040, 7120, 7200, 7260; PK1MO, 7280; PK1SK, 7030-7070; PK1PK, 7020. All speak in Dutch only, on this band. Congrats, Ashley, on some FB "DX"!

NEW GUINEA: VK9WL, 7090, reported by Ashley, along with many other Aussie VK's on this band.

GILBERT & ELLICE ISLANDS: VR1AR and VR1AS, both located in this group of islands, reported by Ashley, working each other on 7.00 mc., often near 3 am.

3.5 MC.: From New Zealand, Ashley reports the following FB DX on this unusual DX band: ZL2BX, 3964; ZL2BE, 3900; ZL2BT, 4000; ZL2NP, 3830; ZL3AY, 3630; ZL1GZ, 3987; ZL2JT, 3780; ZL3CV, 3530. Ashley adds hearing several VKs on this band, and even a Russian fone. Some real DX there!

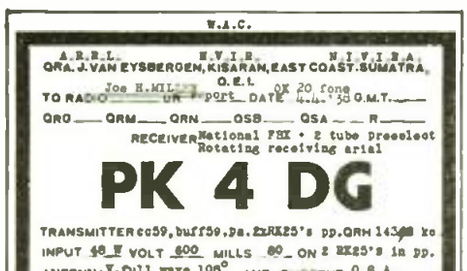
AFRICA

CR7MF, L.F. 20 m., variable freq., reported by Roy Myers, announcing as "Mexico France." This is a rare catch, from Mozambique.

From South Africa: ZS5AW, 14100; ZS2DY, 14360; ZS1BL, 14370; ZS1AX, 14250; ZS2EF, 14080; ZS6ED, 14010. From Southern Rhodesia, ZE1JR, 14350.

Not much from Africa this month. Asiatic and African reports are courtesy of: Ashley Walcott, Roy Myers, Max Fisher and Jas. Moore.

A new country on 20 m. fone is French Guiana, where FY8AC is located. Ye Ed was fortunate enough to log OM FY8AC on his very first fone QSO, and he is the first FY8 to go on phone. The card illustrated this month was promptly mailed to us for our report.



PK4DG—SUMATRA—This FB Ham QSLs with a nice card, red lettering and border.

COMMERCIAL NOTICES 10¢ A WORD

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

AGENTS WANTED

300% PROFIT SELLING GOLD Leaf Letters for Store Windows; Free samples. Metallic Co., 446 North Clark, Chicago.

CLUBS

JOIN NOW — MEMBERSHIP Card, Copy Membership Directory, Listing in next issue, 20c. Universal All-Wave League, P. O. Box 8363 Pittsburgh, Pa.

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, 3485 Manhattan Building, Chicago.

INSTRUCTION

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

AMATEUR RADIO LICENSES, home study course in code and theory. Reasonable, efficient and thorough. Results guaranteed. American Radio Institute, 200 Broadway, New York, N. Y.

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, 2¾" with 9 pt. D.P. Switch $2.75. Nat'l. MB27-4 Stg. T.R.F. chassis and Thord. 45 P.P. Pack. $7.50. 10" MUTER DYN. SPKR. $3.00 Victor 72" Hi-Fi Orthophonic Horn. Mag. and Acoustic Pick-ups, $10.00, plus express. $400.00 RCA battery Superhet—$25.00. Harry Ackerson, Ramsey, N. J.

WE OFFER SUBJECT TO PRIOR sale 7 m.m. lacquered cable used by the Government. It is an ideal cable for high voltage, low current service, such as used in radio transmitters, amplifiers, etc. It is a special steel wire, 20 gauge, with very heavy rubber insulation. Worth 12c a foot. Special price 50 ft. $2.00, 100 ft. $3.00, F.O.B. N. Y. Gold Shield Products, 350 Greenwich St., New York City.

PATENT ATTORNEYS

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

SONG POEMS WANTED

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

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. WIBEF, 16 Stockbridge Ave., Lowell, Mass.

SHORT WAVE LISTENER'S AT tractive reply getting cards. QSLs Samples (Stamps). W-8-E-S-N, 1827 Cone, Toledo, Ohio.

RADIO EQUIPMENT

FOR SALE—ONE 60 WATT WEBster amplifier used four months $140.00 Also transmitter and receiver parts of all kinds. Write us your needs. Keith Sound Service, Newton, Iowa.

RADIOS

BARGAINS—5 tube new radio complete with Dynamic Speaker $5.95. 7 tube Superhet 12½ to 35, 34 to 120, 180-550 meters $14.95. Values cannot be duplicated. Fully guaranteed. H. G. Young, 127 Liberty St., New York.

SHORT WAVE RECEIVERS

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

PLANS 18 DISTANCE RECORD Crystal Sets—with "Radiobuilder"—1 Year, 25c. Laborstories, 7700-A East 14th, Oakland, Calif.

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.

USED C.T.S. AIR CONDITIONING Course for sale at $2.95. Information gladly supplied. Wacker, 3727 West 13th, Chicago, Illinois.

SW3 $9.00. SKY BUDDY $17.50. Silver 5C $29.00. Breting 12 $59.00. W9ARA, Butler, Missouri.

SELL BATTERY RADIO WITH two tubes and batteries $6.25. Alfred Niemi, 220 East Spruce St., Chisholm, Minnesota.

FIRST $30 TAKES EFFICIENT 60 watt transmitter, tubes, coils, power supply, crystal. W3FLY, 3418 North 21 Street, Philadelphia, Pennsylvania.

2500 MILE CRYSTAL SET KIT $1.00; metal tube receiver kit $2.00. Information on request. Weingarten, Saugus, Calif.

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

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

HAVE RADIO PARTS, MAGAzines—Open Road, SW Craft, SW&T, Radio-Craft, Modern Mechanics, and stamps. Want receiver (3 or more tubes) or? F. H. Frantz, 30 N. 4th St., Coplay, Pa.

HAVE 7J ELGIN POCKET WATCH slightly used. Will trade for model gasoline engine. Have 8" Utah spkr. with rectifier, also radio parts and new tubes, what have you? Send description. Elihue Thompson, Kosciusko, Miss.

TRADE PHONOGRAPH PLAYER, record container compartment, Webster pick-up, 20 meter Bliley crystal, or what do you want for good dynamic microphone or small portable transmitter. Carl A. Kowalski, 1239 Kinsmoor Ave., Fort Wayne, Ind.

WANTED—FIVE METER TRANSceiver, small 20 meter transmitter, 16mm projector, or photography equipment. Have complete NST taxidermy course, 10 copies Short Wave Craft, Television, new speaker unit, radio parts. John Antonio, Box 32, Elkland, Penna.

WILL SWAP WINCHESTER model 67—.22 rifle, or Springfield 20 gauge shotgun, both in A-1 condition, for good candid camera with fast shutter. Trade either or both. Ray Cecil, Winters Lane, Cold Springs, Kentucky.

HAVE: CUSTOMBUILT CRYSTAL controlled transmitter; receivers; dynamic speaker; extra parts; coins; books; World War relics; other things. Want: World War relics, candid cameras, typewriter or? 1st Lt. W. DeVere Johnson, 1115—68 St., Kenosha, Wis.

HAVE: 21" BAYONET GEAR shift clock, pedometer, Sheffield hunting knife, electric table stove, cost $12.00, burglar alarm for car. For: binoculars, Civil War sword, cap and ball Colt, no parts, stamps, coins. R. Linville, 147 Vienna Ave., Niles, Ohio.

WANTED: ALL KINDS OF MODern test equipment. Buy or trade. Have 44 QST magazines from 1930 to 1934. Have DeVry model K-1 snapshot camera. Send full particulars. C. Fortier, 368 Besserer, Ottawa, Ont.

TRADE DOERLE 7C 5 TUBE receiver, 9½-1500 meters, 2 months old; for a 4 or 5 tube 5 meter transceiver. Frank Hamlll, Hixson, Tennessee.

TRADE—PATTERSON ALL WAVE preselector for what. Trade 48 acres Michigan Lake land for Scott 30 tube or McMurdo Silver Masterpiece VI receiver. Don Newbold, 218 Locust St., Akron, Ohio.

TRADE: NEW 6" PHOTOELECtric cell complete in metal cabinet with power supply, tubes, and relay, cost $40.00; 1907 to 1909 newspapers; stamp collection 1200 different; magazines; for crystal, xmitter, or parts. George Brown, Carnesville, Ga.

WILL TRADE, KEYSTONE 16 MM projector, 15" dynamic speaker and over 2,000 U.S. and foreign stamps for a good complete 3 or 4 tube SW receiver. A. Conlin, 83 Westfield Rd., Holyoke, Mass.

NEW ZEISS IDEAL B 6" F:4:5 lens, tripod, filter, pan, tilt head, lights, changing bag, daylight tank, $180.00. Want short wave receiver same value. Bert Kavanaugh, 516 West 136 St., N.Y.C., N.Y.

WANT—PORTABLE TRANSCEIVer, power tools, 3x5 printing press. Have—Wollensack 250 power microscope, sporting goods, old U.S. coins, mounted specimens of Adirondack wildlife to offer. Vern A. Scharf, St. Regis Falls, New York.

FRESHMAN 5-TUBE MASTERpiece, Freed-Eisemann 6-tube set, 1-tube battery set, Freed-Eisemann speaker, headphones, tubes, parts, 4x6 printing press, 25 golf clubs. Trade for anything equal value. E. G. Bartlett, Atlanta, Mo.

HAVE WOOD AND METAL working tools, QST's, Radio News, Radio Eng., I.C.S. course in Radio, book Principles of Radio by Kinney. Want 8 or 16 mm movie apparatus. F. W. Johnson, Antwerp, Ohio.

WANTED: USED BLILEY CRYStals in perfect condition. State type, frequency, and lowest price. Also will swap 3 tube 5 meter receiver. Glenn Godwin, W8QHX, 5 Mildred Ave., Binghamton, N. Y.

WILL TRADE FULL SIZE VIOlin, value $65.00, original oil paintings by professional artist, for ham equipment. W9IMJ, 616 N. Central Ave., Chicago, Ill.

HAVE: WURLITZER GUITAR, boy's books, mounted pheasant. Want: Beagle rabbit dog or what have you? Joseph C. Kubik, 37 Pine Street, Gt. Barrington, Mass.

WANT HUNTING AND FISHING equipment, also camera and field glasses. Have books, typewriter, radio and other articles. Samuel Prokipchak, Box 77, Moscow, Pa.

WANTED TRANSMITTER. PREfer Utah kit ready assembled or any other make, will trade Leedy trap drum outfit complete. William Tietz, 1610 Mahan Ave., Bronx, N.Y.C.

LIKE TO SWAP SWL CARDS with all fellows all over the world. Will QSL 100%. Would also like to join all radio clubs the world over. Bob Larson, 618 North June St., Los Angeles, California, U.S.A.

SWAP 25 WESTERN OR LOVE story magazines for "The Book of Old Ships" by Culver and Grant. Want Indian head pennies. Ward E. Williams, 1414 10th Ave., Lake Charles, La.

SWAP: USED DRIVER TWELVE inch band saw for Sky Buddy or other good make short wave radio. Keith Neal, 115 Fifth Street, Clear Lake, Iowa.

(Continued on opposite page)

Amateurs Record Bird Calls

(Continued from page 332)

island is enshrouded in a dense fog. From the microphone the voice of the birds was run through a field amplifier constructed by Mr. Paul Kellogg of Cornell University. From the amplifier it was continued through an insulated cable to the *amateur radio station* a quarter of a mile away. The difficulties of preventing extraneous sounds and so-called "feed back" taxed the skill and ingenuity of the radio department.

Thomas A. Gross, W1JZM, gives an interesting account of the ham radio station on Kent's Island, in the third annual report of the Bowdoin Scientific Station (Bowdoin College, Brunswick, Me).

Metal Horn Focuses Ultra Short Waves

(Continued from page 332)

by Dr. Barrow in May, 1936, in connection with the transmission of telegraph, telephone and television signals through the inside of hollow metal pipes. The development of the horn was continued intensively from both experimental and theoretical angles, until it is now possible to design horns for particular applications with an engineering precision of perhaps higher degree than results for antennas of more conventional construction. One reason for the excellent agreement between calculations and experiment is that the waves, which start from a small rod placed in the throat of the horn, are forced to follow the guiding surfaces of the horn straight out into space and cannot easily go back on connecting wires, supports and the like to be radiated in unintended directions.

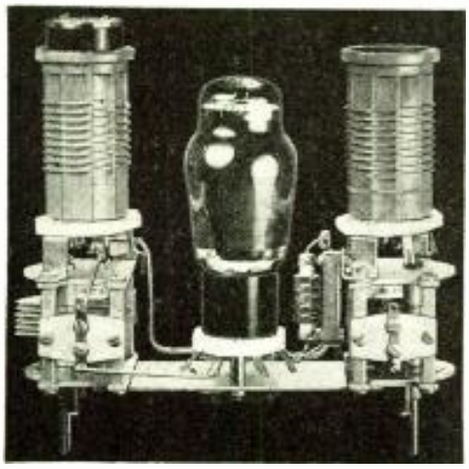
Prof. Barrows' experiments range in frequency from 300 mc. to 4,300 mc. (wavelengths from 1 meter to 7 cm., or 39" to 2.8").

Compared to other directive antennas that are used at micro wavelengths, the horn developed at M.I.T. is peculiarly easy to operate, since there is only one simple adjustment to make. The simplicity of construction of the horn, which can be made from sheet copper or galvanized iron, makes it an economical system to build. The fact that no insulators are used contributes to efficient operation and relatively permanent mechanical strength.

One feature of the electromagnetic horn of rectangular cross-section is that the sharpness of the beam in the two directions at right angles to its length can be controlled by varying the flares of the two sets of opposite sides. In this way, a fan-shaped beam may be sent out that is *sharp in one plane and broad in another.* By changing the shape of the horn a *cigar-shaped beam* can be radiated.

Waves may be started in the horn by locating a small rod antenna only a few inches long directly in the throat. Waves may also be started by connecting a hollow pipe carrying the ultra-short radio waves so that it opens into the throat, thus pouring the waves into the throat, where they broaden out through the horn and into the outer space. The first method may be likened to an old style phonograph, where the diaphragm and needle excited the sound waves directly in the throat of the now antiquated phonograph horn. The second method resembles a speaking tube connected to the small end of a horn.

Already this horn antenna is being applied to the "blind" landing of airplanes in a research carried on at the Massachusetts Institute of Technology for the Bureau of Air Commerce.



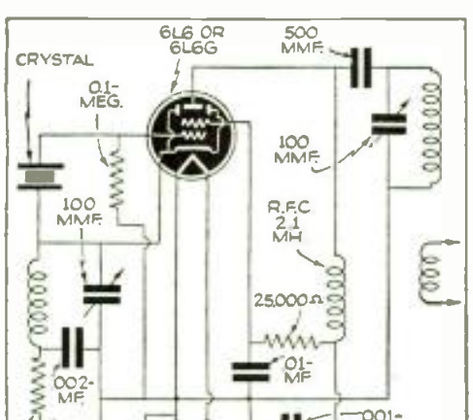
OSCILLATOR DOUBLER KIT

● CRYSTALS being rather expensive, for work on the higher frequencies, an oscillator doubler is an adjunct which affords efficiency with economy for almost any "ham" rig. Such a circuit, in foundation kit form, has just been brought out by Hammarlund Mfg. Co. under the designation of Model OD-10. The outfit is primarily designed for use with other of the manufacturer's units such as the BD-40 and PA-300 with which it forms a 300-watt *all-band* transmitter of modern design. It can also be used as a *beginner's rig.* In the latter instance, it is capable of producing outputs as high as 25 watts on two bands. Two bands are obtainable although a single crystal only is used. The manufacturer stresses the fact that the OD-10 is an excellent unit for the *beginner;* not only is he able to use it as a low-power transmitter in order to get on the air promptly and at moderate cost, but as his ability and finances enable him, he may add to it, making a more elaborate and powerful transmitter. The other units may be added without changing the unit.

All hardware is completely drilled and has a handsome satin finish.

The special isolantite crystal socket fits into the top of the coil form, so that both may be changed in a single operation. All connecting leads in the unit are short and direct, as the layout has been carefully engineered. The circuit shown in Fig. 1 is a standard "ham" circuit and uses any suitable pentode or tetrode, depending upon the power output desired. The unit, which measures 8¼"x7½"x3¼" is entirely self-supporting and fastens directly to a panel with four mounting screws.

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



Hook-up of Oscillator Doubler.

BARTER and EXCHANGE FREE ADS (continued)

SWAP USED HIGH SCHOOL mechanical drawing course and a Dietzgen drawing compass. Want a one or two tube S.W. receiver or radio parts. Whatcha say? W. Morton, 1331 Flint St., Gastonia, N. C.

SHORT WAVE LISTENERS IN U.S.A. and foreign countries. Would like to exchange my SWL card for yours. I will QSL 100%. Edmund Brummer, 34-21, 89th Street, Jackson Heights, Long Island, New York.

20W. FONE-CW MASONITE RACK transmitter. SW45 complete. Thordarson T-5381, T-8322 modulation transformer. SW&T complete from December 1931, 80 issues. Low power transmitting parts, 210's. Want 35mm candid camera, tank, enlarger. W8IZS, 421 Wayne, Johnstown, Penna.

WANTED—COLLINS 30 DXB, 32B or other model transmitter. Hallicrafter Super Rider, Challenger II or National HRO. Trade 03A's, new unused 809's for good candid camera, Eastman Bantam Special, Recomar or Retina. Radio W8OQU, Wellsville, N. Y.

WILL TRADE FOR SMALL superhet, A.C. table model, one. SW3 complete set coils power pack (1 stage amp.) and speaker. Kenneth Torgeson, Box 67, Canby, Oreg.

WANTED, A BICYCLE MOTOR for cash or trade. Send for list and describe motor. Raymond Zitta, 28-26 47 St., Long Island City, N. Y.

HAVE CIVIL WAR NEWSPAPERS, book, bayonet, scabbard and sabre. Ice skates, Philco model 20 chassis, little repair, no tubes. Want Hallicrafter or? Lionel Decker, 89 Lockman Ave., Mariners Harbor, New York, N. Y.

WILL TRADE ONE CRAFTSMAN combination wood plane, slightly used, with 23 cutters, for a 135 or 180 volt Carter Genemotor in good condition. Ben Wolf, Rt. one, Box 108, Burnet, Texas.

HAVE NEW $10 PHILCO OUTPUT meter (model 012), 90 foreign stamps, 10 U.S. recent commems, and radio tubes. Want 4&6 prg. Hammarlund plug-ins. Offers? T. Smolar, Route No. 2, Box 21-M, New Brunswick, N. J.

WILL EXCHANGE A U. S stamp book (new, unused) or many good carpenter tools for a 2 or 3 tube receiver or foreign stamps and radio parts. Will answer all letters. Charles Chapin, Crookston, Minnesota.

WANTED — GOOD SHORTWAVE electrical receiver or sender in trade for $28 Gibson Kalamazoo guitar and case, good stamp collection in $7 Scott album. Everything Al. Frank Anderson, 49 Pershing Drive, Rochester, N. Y.

CATHOLIC BIBLE, ARC LAMP information on motion picture merchants or roadshow, equipment, operation, starting on "shoe string." Want film, projection bulbs, P.E. cells, radio tubes, show equipment, motors. Harry Benson, Roadshow, Chesterton, Indiana.

HAVE RADIO PARTS AND ALSO 22 rifle, 16 mm projector. Wanted: printing supplies of all kinds. Fred Word, P.O. Box 255, Falfurrias, Texas, for full list of parts and information.

WOULD LIKE TO EXCHANGE post cards, exchange one of my location for one of yours, in U. S. or foreign, exchange with girls and boys. Let's hear from you. 73. Burdett B. Trine, Sheridan, Ore.

USED AND UNUSED U. S. COMmemoratives to trade for other U. S. stamps, stamp for stamp, also trade radio parts and old Detective, Western magazines for U. S. stamps, or? Oscar E. Tangen, Greenbush, Minnesota.

WANTED TO BUY A JUNIOR Candler code course and a code sending machine, must be reasonable. Louis Edward Rothman, C.C.C. Co. 1299, Crouch, Idaho.

ATTENTION, S.W. LISTENERS of the world. I will swap "shack" fotos with anyone; will exchange SWL cards and correspondence with foreign listeners 100% here. QRA: L. M. Carling, 1601 S. 15th Avenue, Maywood, Illinois, U. S. A.

POSTCARD COLLECTORS, WILL exchange card for one from your locality. Please autograph picture side before sending. H. Van Deventer, Sioux Lookout, Ont., Canada.

TRADE RCA 8-INCH SPEAKER model A-100 in handsome metal cabinet, 48 issues Boys Life, Open Road for Boys for what have you, radio equipment, parts, etc. Clinton Slusher, Jr., 906 Stewart Ave., Roanoke, Va.

WILL TRADE 1937-38 ISSUES OF Popular Science and Modern Mechanics for radio magazines, books, or what have you? Louis Lerine, Lake City, S. Car.

DO YOU HAVE A GOOD 5 AND 10 meter receiver you want to trade for a good All-Star Jr. Superhet? John Melvin, c/o Traffic Survey, 3731 Cedar Ave., Cleveland, Ohio.

WANTED: A GOOD TUBE TESTer, Rider Manuals. Good phonograph motor and pickup. Used Radio tubes. Must be good also. What have you P.A. parts? Joseph Geviado, 159 Sabin St., Pawtucket, R. I.

TRADE DEVELOPING AND printing outfit, complete with practically new Eastman adjustable monel tank and chromium ferrotype plate, for code course, typewriter, test instruments. Will pay difference if necessary. Howard Doane, 151 Montclair, Knoxville, Tenn.

WANT 20 METER JOHNSON "Q," "bug" key, Xmitter meters. Have "A" and "B" FB7 gc coils and other receiving equipment. Terence O'Rourke, 1832 Vancouver Drive, Honolulu, T.H.

WANT A-1 RADIO PARTS, micro-ammeter 4in2 controls for auto radio, etc. Swap elec. clipper for dry shaver. Have tools, typewriters, dozens of items, send your list. Geo. Keil, 418½ W. Spring, Freeport, Ill.

TRADE ANTENNATROL straight line frequency variable condenser .0005 cap., voltage regulator 0-3 dc., A.C.H. sharp tuner vernier dial. All new parts. Want radio books, or what have you? Alexander Podstebny, 217 Pine St., Phila., Penna.

SWL'S AND HAMS, LET'S SWAP cards. I QSL 100%. Harry Link, 618 Academy Street, New York City, New York.

ATTENTION SWL'ERS, WOULD like to receive cards from any and all SWL's especially Tennessee and vicinity. QRA William Scott, 313 W. Holston Ave., Johnson City, Tenn., U.S.A.

TRADE 6L6 XTAL TRANSMITTER, volume controls, tubes, variable condensers, resistors. Write for list of hundreds of parts for trade. Want microphone transformer or? W5HAE, 913 Jefferson, Jonesboro, Ark.

WANT INSTRUCTOGRAPH CODE machine with tapes. Will pay cash or give ham equipment for it. A. Morris Byrd, 119 N. Delsea Dr., Glassboro, N. J.

HAVE LEEDS 3564 KC. CRYSTAL with holder for 40 meter crystal. 5 meter equipment or what have you. Also have 35 diff. issues SWC and SW&T. Frank Zsilavetz, W2LKE, 894 Rogers Pl., New York City.

I WANT TO EXCHANGE SWL cards, radio mags, and stamps. What say, O.M.'s? G-SWL R. G. Auckland, 69 Tottenham Lane, Hornsey-N8, London, Eng.

WANTED GOOD 5 AND 10 METER receiver. Will swap very good All Star Jr. Super-Heterodyne receiver, complete coils 13-565 M, special, metal cabinet (16x12x8) less speaker. Elwood Brooks, 1636 East 36th St., Cleveland, Ohio.

SWAP ONE TUBE 5 METER transceiver. Uses 53 tube. Complete with tube but less power supply. A small compact transceiver. For bug, crystal mike, or what have you? Raymond Twardzik, 41 Van Derveer St., Amsterdam, N. Y.

I HAVE A BROWNING "35" TO give in exchange for a good standard make and keyboard typewriter, portable preferred, or for a fast camera. Edward M. Weaver, 122 Tenth Avenue South, Seattle, Washington.

WANTED 5 METER TRANSceiver, also photographic equipment enlarger, etc. Trade for used radio tubes most types, power transformers, 2 6", 2 5", 1 14" dynamic speakers, etc. Anthony Ceraseche, 103 Dryden Rd., Ithaca, New York.

SHORT WAVE LISTENERS IN U.S.A. and foreign countries. Would like to swap SWL cards with you. I QSL 100%. Will correspond in English and French. Frank Cole, Jr., 1209 Spruce St., Berkeley, Calif., U.S.A.

HAVE ARROWHEADS, SPEAR heads, small tomahawk, other Indian relics to trade for collectors' firearms, stamps or books. W. G. Conley, R.F.D. 4, Ozark, Ark.

HAVE CODE MACHINE, A VERY good transceiver 3 tube using 2-42s and 76 speech. Would like to trade for 10 meter crystal or some transmitter parts. Steve Vargo, Jr., 2374 Riverview Ave., Dayton, Ohio.

SWL'S AND HAMS, LET'S SWAP cards. I QSL 100% hr. Want cards from all parts of U.S. and foreign countries. QRA—Bruce H. Stribling, N. Clemson Ave., Clemson, S. C., U.S.A.

TRADE BALTIMORE NO. 9 printing Press, hand operated, assortment of type, for 2 or 3 tube A.C. or A.C.D.C. Sw set with tubes, coils, or what have you? Henry Botkin, Jr., 118 N. Main St., St. Marys, O., U.S.A.

HAVE A.C. SW3, 20, 40, 80 BAND spread coils, speaker. Four tube dual band A.C. receiver, 16mm motor driven projector. All perfect condition. Trade for good communication super. Bill Sausen, 255 So. Syndicate, St. Paul, Minnesota.

ARGUS CAMERA, PERFECT CONdition, only used for three rolls film, complete with leather case. Will trade for 6½x9 centimeter film pack camera. Give full particulars. J. F. Newman, 17214 Milburn Ave., Cleveland, Ohio.

CANOE, STURDY, 16 FT., GREEN, arrangement for sail. Will trade for an oscilloscope, auto-radio of good make, Rider's manuals, Servicemen's or Candler's Code Course, or phone transmitter. H. William Propsner, Solebury, Penna.

WANTED: RECORDING EQUIPment. Will trade transformers, speakers, auto radio, etc. I will answer all letters and cards. Seddon A. Strouse, 289 E. Bringhurst St., Germantown, Philadelphia, Pa.

MALAYA, ASIA, WANTED SWLS anywhere. Swap stamps, cards, and correspondence. All mails answered 100%. Tan bin Hussain, Municipal, Ipoh, Perak, F.M.S.

WILL TRADE TEN LESSON course in taxidermy, good shape, for one tube plug coil radio, or Trimm phone 24,000 ohms. What have you? All letters answered. Abraham Bissonnette, Tilbury Box 161, Ontario, Canada.

WILL TRADE FOR XMITTER, transceiver or xmitter parts. I have NRI $100 radio course, 53 Radio News, 43 Radio-Craft, 20 SW&T, 13 Popular Science, etc. Write W9MNF, Madison, Wisconsin.

WANTED: TOY MOLDS, RADIOS, movie films and machines, etc., binoculars, testing instruments, windcharger. Have radios, record changers, amplifiers, anything. Warren W. Wigner, 1220 Fairview, Fort Wayne, Ind.

WANT—2 TUBE U.H.F. PRODucts Ultra Air Rover. Buy or swap. Swap 2 W.E. 211, Weston switchboard voltmeter 0-15-150. Robert Lepie, 3026 S. St. Louis Ave., Chicago, Ill.

WANTED—RADIO PARTS, SHORT wave recr., camera equipment or what have you. Have Junior Instructograph with two tapes, also stamps. All letters answered. Harold Tucker, Qrs. 342, West Point, N. Y.

WANTED FOR HOBBY COLLECtion—early type receiving tubes, Meyer cartridge, two element diodes, Navy and Audion with candelabra base, etc. Let me know what you have. All correspondence answered. Charles Gosick, Fairfield, Iowa.

HAVE ONE 12" AND ONE 10" dynamics, power packs from RCA and Brunswick, radio parts and tubes. Want test equipment or what have you? M. H. Wells, 2090 Blvd. Dr., N. E., Atlanta, Ga.

WANT TO TRADE—HAM RADIO parts, good all wave Westinghouse, etc. Write—Walter D. Keith, Newton, Iowa.

WILL SWAP PICTURE POSTcards with anyone from U. S. or foreign countries. I will send you my card as soon as I receive yours. Bob Sratos, 3478 N. Holton St., Milwaukee, Wis., U.S.A.

WANTED: USED SMALL ONE cylinder gasoline engine in good working condition. Will pay cash. Send all particulars to K. Voss, 666 Onderdonk Ave., B'klyn, N. Y.

WILL SWAP KOLSTER POWER transformer for good short wave receiver. SWL's will exchange cards with you from U.S.A. and foreign countries at 100%. Albert Brunoa, South Acton, Mass.

HAVE SPRINGFIELD SINGLE shot .22; metal tube ten meter converter; 4 tube midget T.R.F. receiver; 16mm projector and films. Want crystal, power transformer, other radio or photographic equipment. Saul Weingarten, Rt. 1, Box 94, Saugus, Calif.

TRADE TWO NEW $8.00 RADIO bugs, 50 watt cw transmitter 53 xtal, dub., 6L6G final, Supreme 85PL tube, condenser and continuity tester, 6800 stamps. Want: receiver (SW3 or?) and other ham parts. Dawson, 1308-F, The Dalles, Oregon.

WILL SWAP 5 METER SUPER regen receiver complete with power supply and 5 meter transmitter complete with modulator for what have you. Columbus Emma, W6OCC, 6539 Gaviota Ave., Van Nuys, Calif.

SHORT WAVE LISTENERS OF the world. Swap cards. All QSL's answered promptly. Bob Liggett, 824 Passmore St., Philadelphia, Pa.

WILL SWAP TEN UNCUT ARIzona smoky topazes for mike, phono pickup, radio parts or what have you? Wayne Dickey, Wintersburg, Ariz.

HAVE SET OF 12 GAUGE RElloading tools for paper shot shells Crimper, etc., fair used condition. Trade watsa? W. S. Crooks, W8LVG, Box 15, Stow, Ohio.

WILL EXCHANGE JIG SAW A condition, standard track with bridges, stamps, etc., for transceiver, reporter or what have you? Jack McCoutrie, 26 Chestnut St., Salem, New Jersey.

(Continued on following page)

BARTER and EXCHANGE FREE ADS (continued)

I WISH TO HEAR FROM ALL stamp collectors wishing to exchange or swap. I will do typewriting or mimeographing for good used or mint stamps. Elvin W. Person, Esther, Alberta, Canada.

WANTED: SUPERSKYRIDER (1935 or later) will pay cash—or cash and trade a late model BCL Philco superhet. Frank L. Garkus, 218 Wayland St., San Francisco, Calif.

TRADE—2 TUBE, 6J7-12A7, AC-DC short wave set, coils, 2 General type 231-A amplifying transformers, new. Want volt-ohm-milliammeter or point to point tester or? J. A. Ketchum, Hamilton Place, Nashville, Tenn.

WOULD LIKE TO EXCHANGE SWL-QSL or fotos in U.S. or foreign countries. All cards received will be answered. All mail acknowledged. Frank Gregor, W9LYK, 1921 W. 14 Ave., Gary, Ind.

TRADE 38/55 LEVER ACTION Marlin rifle ($7), for radio parts, two tube sw battery receiver, 2—"955" tubes, carbon mike, what have you. Preferably parts or tubes. Vernon Preston, R. No. 2, Arlington, Wash.

301-A STEWART WARNER CONverter swap for short wave receiver, power supply or parts. Write Dale Cryderman, 13557 Vaughan, Detroit, Mich.

TRADE. ANSCO-MEMO CAMERA f-6.3 lenses with one-hundredth shutter stop. With case and A1 condition for SW-3 receiver or other similar receiver. W3HHY, R. W. Sommers, 310 Ellis St., Glassboro, N. J.

SWAP — DRUM OUTFIT FOR high powered binoculars or crystal microphone or what have you? Will answer all mail. Frank J. Garone, 252 Navy St., Brooklyn, N. Y.

CORRESPONDENCE WANTED from all foreign countries. Will swap stamps, postcards, photos and nature specimens. All letters answered. Maylan Wilbur, Weld, Maine, U.S.A.

WANT USED NATIONAL DIAL type "BM" or "B" or Crowe 4" vernier dial. Will trade used 12A7 tube and 8-8 mfd. filter condenser. John W. Creamer, 423 East Third, Chillicothe, Missouri.

SWAP:—COMPLETE PUBLIC ADdress system with two speakers; "B" eliminator, several small radios and many radio parts. What have you to offer? Richard Kelley, 1034 Elm St., Franklin, Pennsylvania.

WANTED—AUTO AND TABLE model radios. Have stamps and all kinds radio parts. Terrenee Gines, Box 14, Fort Lawn, S. C.

WOULD LIKE TO EXCHANGE SWL cards with any SWL in U.S. or foreign countries. All cards received here will be answered with our card. QRA John L. Ballin, 40 East 66 St., New York, N.Y.

WANTED, SMALL A.C. GENERAtor around 200 to 500 watts, also gasoline engine ½ to 2 H.P. suitable for driving generator. James N. Glass, R.R.1, Box 17, Eddyville, Ky.

SWL FOREIGN AND U.S. I SWAP cards 100%. Also want July and August 1936 issues of SW&T. will swap other radio magazines for same. Victor Samardza, 1044 Longfellow Ave., Bronx, N. Y.

HAVE SHOTGUN, 12-GAUGE, double barrel, Winchester .38-40 carbine, Waltham 17-jewel, 16 size, gold watch. Want late model radio or? C. Moore, 211 East 108 Street, Los Angeles, Calif.

HAVE BRAND NEW UNIVEX camera and projector that have had but 2 rolls of film run through them. Anyone got a Skybuddy or Sky Chief or? R. E. Fuller, Ypsilanti, Michigan.

WILL SWAP COMPLETELY equipped communications superhet; short-wave equipment; test equipment; radio books and magazines; tennis racket; kodak. Want a portable typewriter. Or what have you? John J. Vilkus, 1515 South 49th Court, Cicero, Illinois.

HAVE MOTOR DRIVEN 16MM projector to trade for electric trains and equipment or model airplane gas motor. Also have radios, amplifiers, transmitters, etc., to trade. Write Johnny Newsome, Box 725, Wake Forest, North Carolina.

HAVE ANGORA RABBITS, PIGEons, shortwave kit, radios, courses, firearms, stamps; want saxophone, xylophone, 22 rifles, cavies, lovebirds, pets? Hillary A. Munk, Somers, Conn.

HAVE RELOADING TOOL, stereoscope with 100 views 35 years old, camera, Simplex typewriter, books, radio parts, for cheap miniature cameras, value $4.00, jig saw, microscope, telescope, rifle scope, chromatic harmonica. Sofus Anderson, Lankin, N. D.

HAVE THREE CHEAP CANDID cameras, back issues technical and fiction magazines in good condition. Want stamps, first day covers, radio parts, or? All letters answered. Jack Towne, 1519 California St., Redding, Calif.

EXCHANGE RADIO PARTS, Bicycle parts and two ¼ H.P. A.C. motors for any small radio sets or 35mm film equipment and films. Joseph Geract, Jr., 3338 East 132nd St., Cleveland, Ohio.

SWL'S—I WOULD LIKE TO trade my SWL card for one of yours. I QSL 100%. QRA Roger Mais, 132 E. 8th St., Mishawaka, Indiana.

WANTED OLD AUTOMOBILE name plates and U.S. stamps in quantities of one to a hundred. Advise what you wish in exchange. Have large mimeographed swap list. Rudolph Zak, 2509 East 89th, Cleveland, Ohio.

ENGLAND CALLING. Wanted, small batches of foreign stamps, U.S.A., West Indies or South America. In exchange for English stamps uncommon values. Write S. Miles, 33 Freshwater Rd., Reading, England.

WILL SWAP MAGIC BOOKS which are in good condition for 40 or 80 meter crystal or other radio parts. Will answer all letters. Lloyd Geiser, 562 Beech St., Pottstown, Pa.

FOR TRADE—5 METER SUPERregenerative receiver. Have heard Kenosha, Wisconsin, with it. 6C5 det.—76 audio—42 output. Want 40 meter xtal, meters, xmitter parts. W2LFJ, Curtis Purdy, 50 Cleveland St., White Plains, N. Y.

HAVE—B climinators, speakers, tubes, SW-2 receiver, telescope, microscope, cartridges, plug-in coils. Want—electric razor, developing outfit, camera, photograph course, 16mm films, Hawaiian guitar, movie camera or? Stanley, 2748 Meade, Detroit.

TRADE: NEW $10-$15 VALUE electric razors for—Radio physics course and Modern Radio Servicing, watchmakers tools, AC powerpack, s.w. receiver, test equipment, or? State condition, etc. All offers considered. Miner, Oakdale, Iowa.

HAVE 100 FICTION MAGAZINES (Western, detective, short stories, Bluebook, etc.) to swap. Want power supply for small set, SW receiver or what have you? Laurence Wojcik, 117 N. Spring Street, Bloomfield, New Jersey.

SWAP DETROLA 3 TUBE S.W. converter, two Zenith doublet antenna kits, Kodak Jiffy 6-20 camera, 600 volt power supply. All in A-1 condition. What am I offered in trade? Jack Israel, 319 Peshine Ave., Newark, N. J.

I WANT TO QSL WITH ANY SWL in the world as well as at home. So come on SWL I QSL 100%. William Slaughter, 1101 W. Cary St., Richmond, Virginia.

WILL SWAP A FIVE INCH DYnamic speaker, for a three inch magnetic speaker and a 3:1 ratio audio transformer. Warren Harding Wilson, Glen Ullin, N. Dak.

I WILL EXCHANGE PRINTING for transmitter or receiver or parts for such. Please write printing orders carefully. Send to Warren Greene, 232 Grove Street, Woonsocket, Rhode Island.

WILL SWAP $15 ELECTRIC razor for candid camera, Argus preferred. Also swap 35MM Super X 40 exposures on roll, on daylight loading cartridge. P. O. Box 36, Red Hook, New York.

HAVE THREE YEARS COMPLETE SW&T magazine '35, '36, '37. Also some Radio-Craft and Radio News mags. Want single button hand mike or transceiver hand set good condition. Jack Klein, 1983 Bryant Ave., Bronx, N. Y.

SWAP ALL-STAR SENIOR REceiver complete (without cabinet) for factory-built short wave set. Cash extra if necessary. A. E. Klmeldorf, 1487 Vyse Ave., Bronx, N. Y.

WANTED: ¾, 2 OR 5 METER transceiver or transmitter also 3 or 4 tube S.W. receivers, trade about anything radio line, tubes, "B" supplies, parts, some photographic equipment. Paul Schulz, Jr., 431 45th Street, Moline, Illinois.

WILL SWAP STAMP COLLECtion value exceeds $3.50 for a pair of Baldwin, Western Electric, or other type of good earphones. William John Paley, Jr., 39 Ontario Street, Albany, New York.

WANTED: S.W. SUPER-HETERODyne receiver. Must have 10 meter band; band-spread; beat oscillator and R.F. stage. Describe fully and state price. G. H. Thompson, 531 So. Main St., Pittston, Pa.

TRADE. 130 U.S. VALUABLE commemorative stamps, 4 rare Vatican stamps and others, for 40 or 80 meter crystal or key or what have you? Carl Wack, 323 Miami St., Piqua, Ohio.

SWL'S AND HAMS IN U.S.A. and foreign countries. Will exchange my SWL card for one of yours. I QSL 100%. (QRA) Joseph Uhing Jr., 1322 West Rush St., Phila., Pa., U. S. A.

SWAP SWL CARDS AND VIEW cards with foreign and U.S. listeners. Wanted photograph equipment. C. K. Guffey, 111½ So. 15th St., Unionville, Mo.

WANT UNITED STATES COMmemoratives in blocks and first day covers. Have government postals, World War censored covers, T.B. seals, coins and stamps. Mervyn H. Reynolds, Assistant Educational Adviser, 158th Company CCC, Southwest Harbor, Maine.

WANTED: ANY KIND OF CAMera equipment such as camera, enlarger or anything else. Will trade a $35 Ukelin for equipment. Ukelin used very little. In good condition. All letters answered. Geo. Chatfield, Box 93, Wolcott, N. Y.

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

SHORT WAVE LISTENERS everywhere. I would like to exchange SWL cards with all. Foreign cards are especially wanted. Cyrus Will, 651 Brier Street, Kenilworth, Illinois.

WANTED—JEWELL ANALYZER type 1-665 and Jewell pattern 579 service test panel with remote control. Have microphones, meters, generators, lettergraph, xmitting parts, gas engine, etc. Write Stanley J. Nicewicz, 79 Church St., Broad Brook, Conn.

HAVE 40 STOCK ORCHESTRAtions past song hits arranged for dance band. Also have solotone, harmon, plunger, cup muter for trumpet. Would like Pilot "Super Wasp" A.C. complete, or? James Birch, Box 141, Barstow, Calif.

HAVE ONE AND TWO TUBE radios, crystal sets, oil paintings. Want radio parts, rifles, good field glasses, etc. John Haynes, Doe Run, Mo.

TWENTY PIECE AMERICAN Flyer electric train set, 67 consecutive weekly Philatelic Gossips, many boys' books (Tom Swift, etc.), all A-1 condition. Want Candler course, "buk," radio technical course or books, transmitter. Byron Britt, Alliance, Nebraska.

HAVE STAMP COLLECTION value about $50.00. Will trade for test equipment, battery operated. Also have parts for 6v. B Battery eliminator. S. S. Tyndall, Senlac, Sask., Canada.

I WILL TRADE A TWO TUBE Philmore battery set for a desk mike stand with a 5 or 6 inch ring with springs. Richard Kershaw, 846 University St., Springfield, Mo.

I HAVE AN 110 VOLT AC CODE practice set and a good 8" dynamic speaker (will handle 6 or 8 watts). Am interested in transmitting crystals or other equipment or? Please wire to: Douglas Gates, Seguin, Texas.

WANT OLD TYPEWRITERS (such as Oliver, etc.), wrist watch, "Radio Amateur Course," printing press, SW radio, radio books and magazines. Send for list of swaps. M. Konon, 48 Edwards St., Patchogue, N. Y.

WILL TRADE ARGUS CAMERA 4.5 lens plus cash for Gross 3 tube Stand-By receiver complete with all coils. W2LHZ. CCC No. 3205. Ashton, Idaho.

SWL'S—I WOULD LIKE TO EXchange SWL cards with any SWL in U.S. or in foreign countries. All cards received will be answered promptly. (QRA) Richard J. McCormick, 10 Bowmans, Mahanoy City, Pa., U.S.A.

HAVE GOOD AUDITORIUM guitar and new candid camera 16 pictures to roll. Trade for low power phone xmitter or 5 meter xmitter and receiver. Robert Taggart, 62 Orchard, Kansas City, Kansas.

WOULD LIKE TO TRADE FOR A 2 tube sw recr. a correspondence course in Radio. The recr. must be ac dc. Will answer all mail. A. Radesky, CCC 297 F-55, Lolo Creek, Missoula, Montana.

I WILL QSL 100% TO ANYONE in U. S., Canada and foreign countries who sends his or her card. Will join radio clubs. QRA—Aime Grosjouis, 1429 Main St., West Warwick, Rhode Island, U. S. A.

TRADE: RACK-PANEL POWER supply uses 2 R.C.A. 866's and has Weston 0-500 volt meter and variable voltage control. F.B. for class B work. Write W9TME, Chicago, Illinois, 2901 N. Kilbourn Ave.

HAVE MISC. SERVICE MANUALS on Wells-Gardner (Airline), Crosley, and Zenith radios. Will trade for resistors, condensers, wire, etc. Paul Bahr, 1205 W. 10th St., Marion, Ind.

SWAP—POSTAL PRESELECTOR, complete course in Accounting from International Correspondence School, lots of radio parts. What am I offered in trade? Charles G. Hoffman, RR5, Box 300B, Terre Haute, Ind.

WILL SWAP SWL CARDS. Send your cards. We will send our cards. A. J. Schwartz, P. O. Box 695, Albany, N. Y.

Advanced H.-F. Receiver

(Continued from page 352)

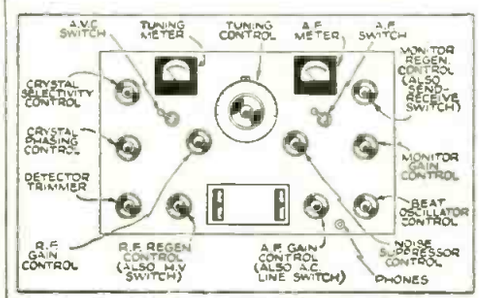
tional crystal circuit at this frequency is not entirely satisfactory due to the large detuning effect experienced from the phasing control. In this circuit, a dual 50 mmf. condenser is used for phasing and is so altered that when one section is at full capacity the other is at minimum. This alteration is easily accomplished by sawing the rotor shaft in half between the two rotor sections and soldering the ends into a ½ inch length of tight-fitting tubing so that the sections are 180 degrees apart.

A shield can 2½" x 4" x 3" deep houses the units indicated on the crystal circuit. The crystal holder plugs in at the top and the phasing condenser and the 15 mmf. unit (used as a *selectivity* control) project through the front and through suitable holes in the receiver panel. The 50 mmf. variable unit is reached through the side of the case; it is set at about ½ capacity and left there. The two 50 mmf. fixed units in series across the secondary of T3 are midget micas. Note that *all* these components are insulated from ground. Also be sure to disconnect the built-in tuning condensers on the secondary of T3 and the primary of T4, as they are not required.

TUBES

The 954 first detector is made regenerative, thus adding a tremendous amount of gain to the receiver and also aiding in *image suppression*.

Bandspread of the H.F. coils is accomplished by tapping the main tuning condensers down toward the lower end of the coils. This makes it necessary to use small tank condensers across each secondary to *set* the bands properly. 100 mmf. units were used on the 40 and 20 meter coils and 50 mmf. units on the 10 meter coils. A 15 mmf. panel trimmer on the grid coil of V1 compensates for slight changes in antennas and the like. V8 is electron-coupled to the cathode circuit of V1 giving efficient mixing with no trace of detuning or pulling effects.



Front Panel "Controls."

Passing over the crystal filter which has already been described, we come to the two I.F. tubes, V2 and V3. These are 6L7's, chosen for their superior results as A.V.C. controlled tubes. With the grids connected as shown, less voltage is needed for A.V.C. than would be the case if 6K7's were used, while the gain is entirely adequate.

I.F. Gain Control: I.F. gain is varied by cathode voltage control of the 6L7's, while the tuning meter is operated by the plate current of these tubes. The meter is of the forward-reading bridge-type, and when the set is first placed in operation, must be adjusted to zero setting by means of the associated 1,000 ohm variable resistor. This resistor is mounted on the chassis below the "lt meter" and must be adjusted when the tubes are warmed up and the R.F. gain control is set at the zero resistance setting, with no signal input to receiver. The A.V.C. switch shorts this meter when the A.V.C. circuit is grounded.

Tube V4 is the second detector, A.V.C. tube and *noise-silencer* and it certainly handles all its functions efficiently. The noise-silencer control is on the panel, of course.

Audio output from V4 goes through the A.F. volume control to the grid of one triode section of V5. The output of the triode goes through the fone jack to V6, the output tube. The second section of V5 is used as both B.F.O. and monitor, as previously noted. The B.F.O. is cut out by *shorting* the panel control, accomplished by bending one corner of a rotor plate. The B.F.O. is connected through a shielded lead to the 6H6 plate.

Coil Construction: The basis of each coil set is a 6½" x 2⅝" x ⅛" thick aluminum plate, which fits into a hole of this size in the front panel. The coil forms are 5-prong isolantite units, 1⅛" diameter. These are held firmly with their tops against 2½" x 1¼" pieces of bakelite or, preferably, Victron. Brass rods 1/16" diameter are soldered into two of the coil form prongs, the upper ends being threaded and passing through the Victron pieces, where No. 2-56 nuts hold them firmly. The Victron pieces in turn are supported about 1½" away from the ⅛" aluminum plates by screws run through bushings or sections of ¼" brass tubing of the proper length. This leaves sufficient room between the Victron piece and the aluminum plate to mount the tank condensers on brackets. Shield cans about 2½" square and 3⅜" high complete the assembly. A 1¼" hole in the top of the shield can allows the coil prongs to protrude, while a ⅛" hole in the side allows access to the tank condenser. A pair of knobs from the "5 and 10" facilitate handling the coil sets.

The sockets for the coils are simply mounted on another ⅛" piece of aluminum screwed to the underside of the chassis. A triangular brace in the rear affords the required rigidity.

The I.F. channel should be aligned using the crystal in a simple low power oscillator circuit, several of which were described in recent issues of SHORT WAVE AND TELEVISION.

The shortwave listener will doubtless have no interest in the monitor but he *should* incorporate all the other features.

Coil Table

	T2	T1			T9		
			BS	Cath.		BS	Cath.
	Turns	Turns	Tap	Tap	Turns	Tap	Tap
40 M.	5	22	4	1¼	22	4	5
20 M.	4	10¼	2	1	10¼	2	2
10 M.	3	5	1	½	5	1	1½

T1 and T9 spaced 1¼" long—No. 22 wire, bare or enameled.

T2 close wound No. 28 SSC.

Taps may need slight adjustments because of circuit and component variations.

BS—Bandspread.

List of Parts

BLILEY
1—CF1 crystal unit, 1600 kc.

TRIPLETT
1—227 R meter (0-1ma.)
1—227 rectifier type A.C. meter (0-1 V.) (both with rear illumination)

R.C.A.
2—954 tubes (V1, V2)
1—6H6 tube (V4)
2—6L7 tubes (V2, V3)
1—6F8G tube (V5)
1—6V6 tube (V6)
1—5T4 tube (V7)

PAR-METAL
1—19" x 8¾" x ⅛" panel, No. 3722 (original painted French Gray)
1—Cabinet No. SC-128
1—Chassis No. 15215 (original painted French Gray)
1—Bracket No. SB-713 (original painted French Gray)
1—Speaker case No. SC-996

HAMMARLUND
4—HF15 trimmer condensers
6—CF5M coil forms
6—S8 sockets
2—S900 sockets
3—S5 sockets
1—S4 socket
2—SWC-40 coils (monitor 10 and 20 meter bands)
1—SWC-41 coil (monitor 40 meter band)
1—MTCD-250C tuning condenser (main tuning)
6—APC50 padding condensers
4—APC100 padding condensers
1—HFD50 double 50 mmf. condenser (alter as per text)

CORNELL-DUBILIER
12—.01 mf. 600 V. paper condensers
7—.25 mf. 600 V. paper condensers
7—100 mmf. midget mica condensers
2—50 mmf. midget mica condensers
1—.004 mf. midget mica condenser
3—8 mf. 600 V. paper condensers, No. PE-B608
2—40 mf. 150 V. electrolytic condensers, No. BR4015
2—25 mf. 25 V. electrolytic condensers, No. BR252

I.R.C. (Resistors)
1—25M ohm BT½
2—2M ohm BT½
2—300 ohm BT½
2—.25 megohm BT½
1—2.0 megohm BT½
1—.5 megohm BT½
4—50M ohm BT½
1—1M ohm BT½
1—500 ohm BT½
1—13M ohm BT½
6—10M ohm BT1
1—25M ohm BT2
2—100M ohm BT2
1—250 ohm BT2
1—50,000 ohm type EPA
1—500 ohm type DHA
1—50M ohm variable
1—1M ohm variable
2—10M ohm variable
2—1 meg. ohm variable
1—2M ohm variable
3—SPST switches, No. 21

ALADDIN
1—G1601, 1600 kc. I.F. transformer (T3)
2—G1600, 1600 kc. I.F. transformer (T4, T5)
1—G1604, 1600 kc. I.F. transformer (T5)
1—S3729 1600 kc., B.F.O. oscillator (T7)

GUARDIAN
1—6.3 V. relay, series 110, 4 pole D.T.

CROWE
1—No. 296 vernier dial
10—No. 591 knobs with pointers

JEFFERSON
1—463-431 power transformer
2—466-430 shielded chokes

CINAUDAGRAPH
1—6" speaker No. MA6-8 with universal output transformer

BLAN
6—shield cans.

YAXLEY
1—Circuit-opening jack

MISCELLANEOUS
6—Handles for coil sets
1—SPDT center position off toggle switch (C-H)
1—DPST toggle switch (C-H)
1—Shield can 2¼" x 4" x 3" shield
3—Aluminum plates 6½" x 2⅜" x ⅛"
1 Set name plates (Gordon)
Hardware, etc.

World S-W Stations

(Continued from page 350)

Mc.	Call	
6.360	HRPI	SAN PEDRO SULA, HONDURAS, 47.19 m. 7.30-9.30 pm.
6.340	HIIX	CIUDAD TRUJILLO, D. R., 47.32 m. Sun. 7.40-10.40 am., daily 12.10-1.10 pm., Tues. and Fri. 8.10-10.10 pm.
6.335	OAX1A	ICA, PERU, 47.33 m., Addr. La Voz de Chiclayo, Casilla No. 9. 8-11 pm.
6.324	COCW	HAVANA, CUBA, 47.4 m., Addr. La Voz 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	YV1RG	VALERA, VENEZUELA, 48.15 m. 6-9.30 pm.
6.210	——	SAIGON, INDO-CHINA, 48.28 m., Addr. Radio Boy-Landry, 17 Place A. Foray. 4.30 or 5.30-9.15 am.
6.210	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.
6.150	CJRO	WINNIPEG, MAN., CANADA, 48.78 m., Addr. (See 11.720 mc.) Daily 6 pm.-12 m., Sun. 5-10 pm.
6.150	ZP14	VILLARRICA, PARAGUAY, 48.75 m. 5-6 pm.
6.147	ZRD	DURBAN, SOUTH AFRICA, 48.8 m., Addr. (See ZRK, 9.606 mc.) Daily exc. Sat. 11.45 pm.-12.50 am.; Daily exc. Sun. 3.30-7.30 am., 9 am.-3.45 pm.; Sun. 5.30-7, 9-11.30 am., 12 n.-3.20 pm. Also 4-5 am., 3rd Sun. of month.
6.147	ZEB	BULAWAYO, RHODESIA, S. AFRICA, 48.8 m. Mon., Wed., and Fri. 1.15-3.15 pm.; Tues. 11 am.-12 n.; Thurs. 10 am.-12 n. Sun. 3.30-5 am.
6.145	HJ4ABE	MEDELLIN, COL., 48.79 m. La Voz de Antioquia. 11 am.-12 n., 6-10.30 pm.
6.140	W8XK	PITTSBURGH, PA., 48.83 m., Addr. Westinghouse Electric & Mfg. Co. Relays KDKA 11 pm.-12 m.
6.137	CR7AA	LAURENCO MARQUES, PORT. E. AFRICA, 48.87 m. Daily 12.05-1, 4.30-6.30, 9.30-11 am., 12.05-4 pm., Sun. 5-7 am., 10 am.-2 pm.
6.130	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.

Those interested in lower-frequency stations can refer to last month's list.

● 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.)

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