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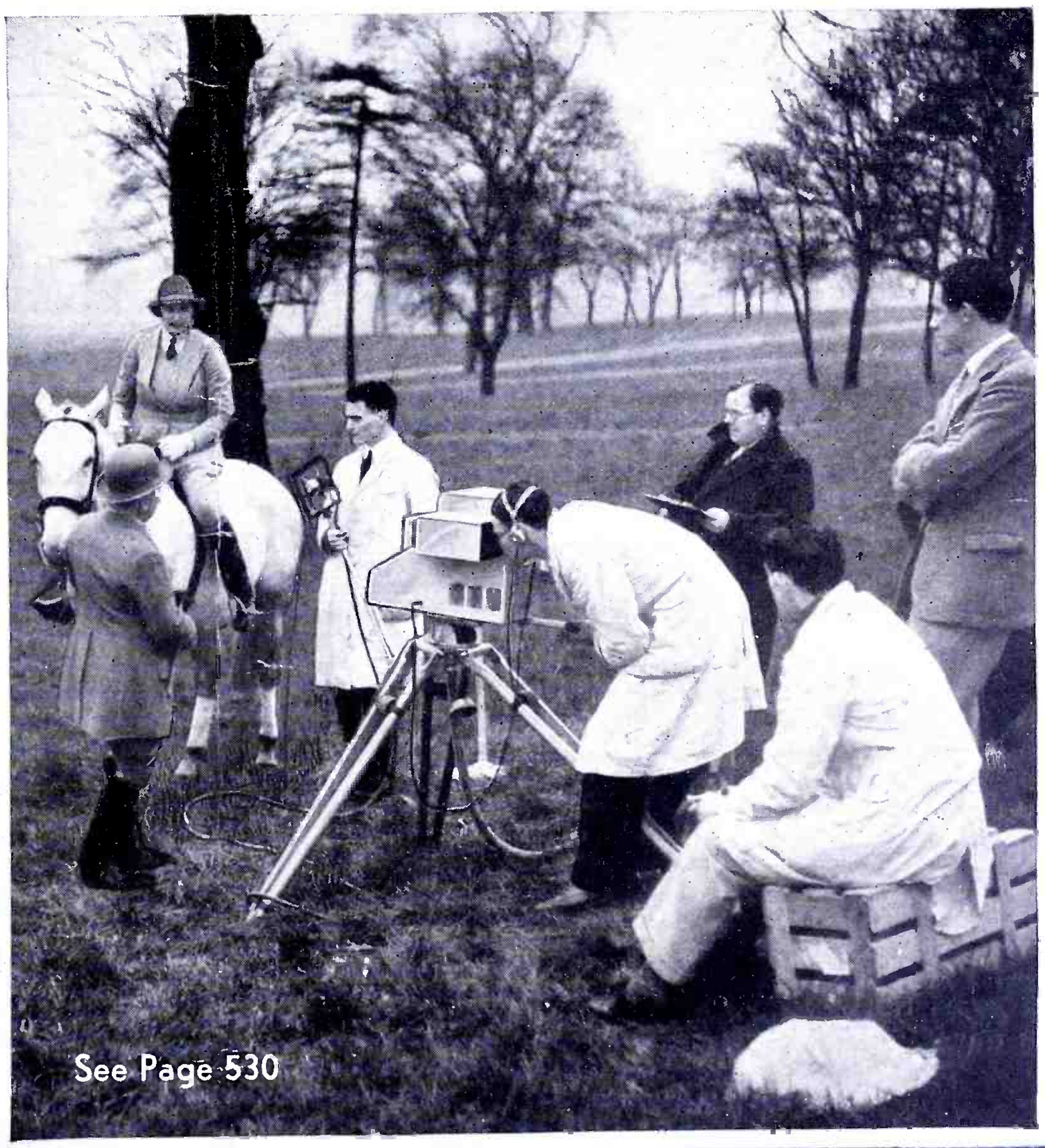

See Page 530

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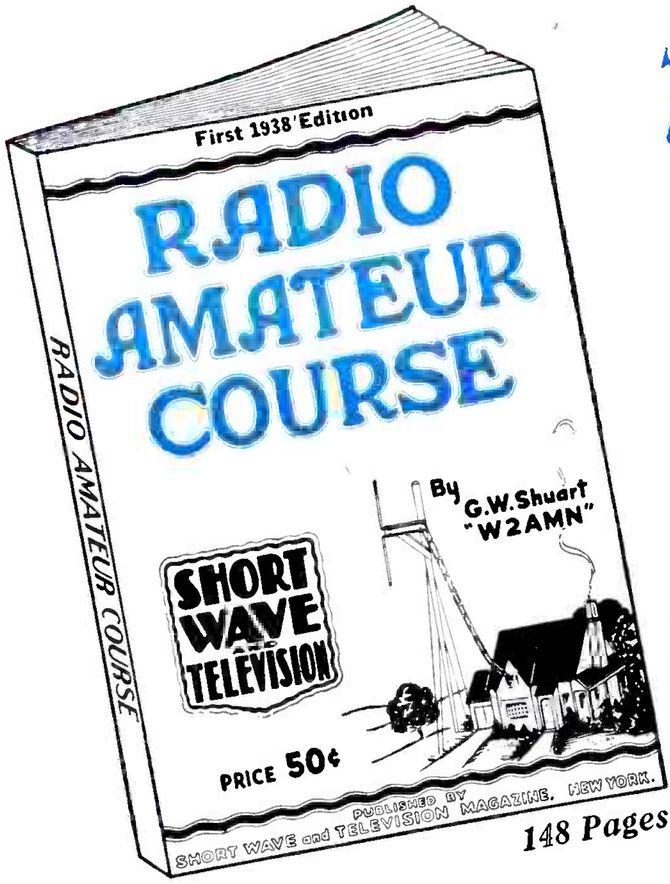
FEB 38

HUGO GERNSBACK, Editor

The Radio Experimenter's Magazine



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FEBRUARY - 1938

Vol. VIII No. 10

SHORT WAVE AND TELEVISION

The Next issue comes out February 1st

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

FEATURE AUTHORS THIS MONTH:

Donald McNicol

DeWitt R. Goddard

George F. Huether, W2IHO

George W. Shuart, W2AMN

Raymond P. Adams

P. M. Ohlinger

Joe Miller

●

IN THE MARCH ISSUE:

The "S.W. & T." 441-line Television Receiver—How To Build It, C. W. Palmer.

300-Watt R.F. Amplifier Using T-125 Tube, Art Gregor.

S-W Superhet Using New H.F. Intermediates, Raymond P. Adams.

Short Waves Guide Planes Between Europe and South America.

An Up-To-Date 5-Meter Transmitter.

●

OUR COVER

The front cover illustration this month shows an outdoor scene being televised in England by BBC experts.
(By Courtesy B.B.C.)

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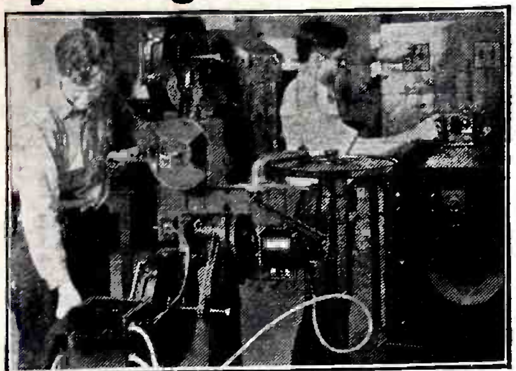
By Doing Actual Jobs—*Not Correspondence*—On Modern Radio Equipment



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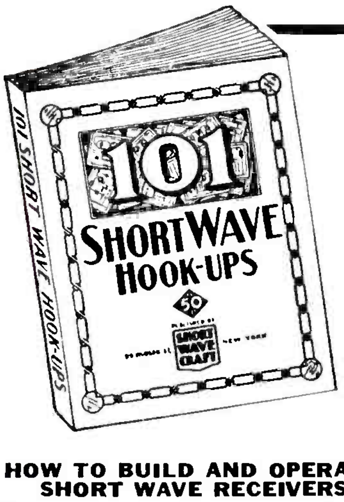

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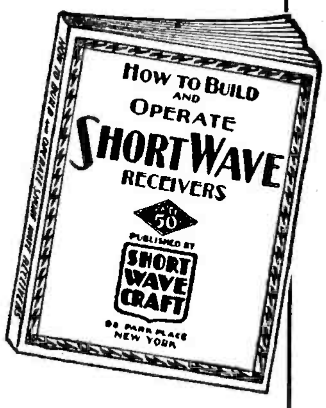

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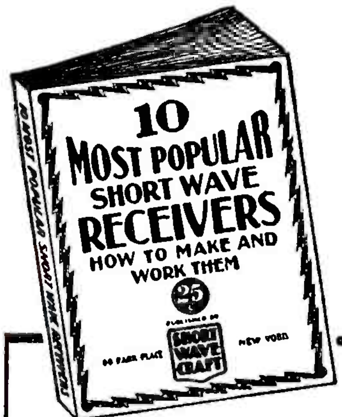

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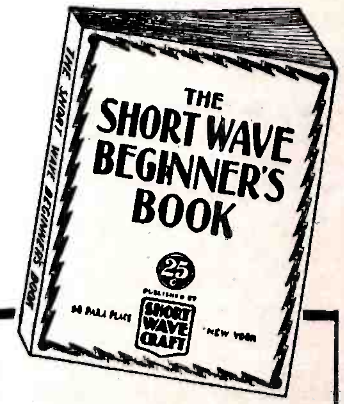

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TELEVISION—How Soon?

Donald McNicol, past-president of the Institute of Radio Engineers, discusses the various problems to be solved in order to realize commercial television in this country.

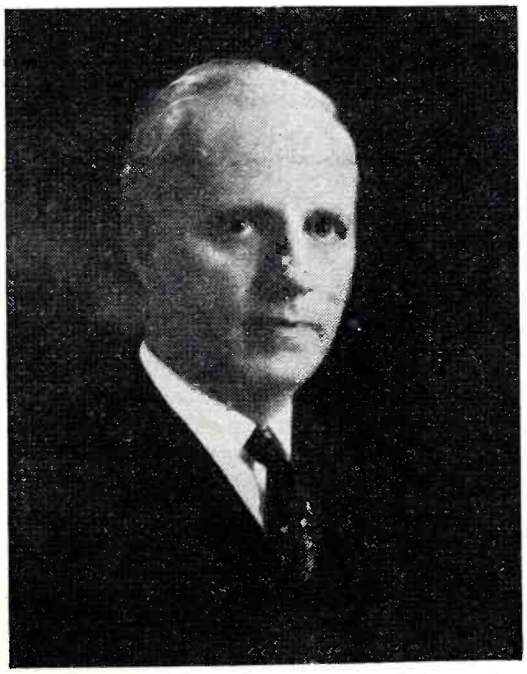
IN files of scientific literature of ten years ago there are advertisements which announced the perfection of television. In the year 1937, in clubs, in newspaper offices, on trains, on street corners, radio engineers are still being asked the question, *"When are we to have television?"* What there is available at the moment in the way of television service has cost, it is said, some fifty million dollars, and when the public views present television performance, the question still is asked, *"When are we to have television?"*

Apologists say that television is making as rapid progress toward perfection as was that made by radio. There is substance in this argument if radio's beginning is dated from the year 1894 and its profitable employment from 1923—a span of twenty-nine years. But, if the period of radio's development encompasses the evolution of radio-telephony—radio broadcasting, then the radio period shortens to 1915-1923, a span of eight years. The logic of the separation lies in the assumption that spark-gap wireless telegraphy, and vacuum tube transmitters for radio-telephony were concurrent developments mainly in the hands of the same experimenters, fathered by a common objective, but nonetheless separate arts.

Television has been a laboratory baby since 1920. Long before that year however, thought was given the subject and experimental systems tinkered with, but the year 1920 may be taken as a date when what we have today in the way of television took form. That is a span of seventeen years, compared to an equivalent span of eight years for radio broadcasting—and still the question, *"When are we to have television?"*

Engineering Progress—There are engineers who say that we shall have television just as soon as someone invents it, by which is implied that a television system to which the public will take, as it took to radio sound broadcasting in 1922, will be the fruition of discoveries or inventions yet to be made. As to this it is not likely that the fifty million dollars so far expended has been wasted. What has gone before in association with what is to come will in some degree bear the relation of concurrent arts, as in the case of radio-telephone development.

Television's ultimate attainments have been set for it by moving pictures on large screens, and the task rendered more difficult with the perfection of talking pictures. The public has its own ideas of what will be acceptable in television service. There is a parallel in air transport: An airplane that would carry as many as fifty passengers across the Atlantic, bears some relation to a great ship that carries thousands of passengers, but as a means of transport there is an impressive difference. Could the *Normandie* be equipped with wings that would carry her across the Atlantic in a day and a half, that would be something! If a citizen, on a wall in his living room had a 3-foot, or 4-foot square screen upon which he could view "pictures" as in the movies, that would be television, as the public which pays for services desires television.



Donald McNicol, who has held many important positions, has been an active worker in the field of electrical and radio engineering.

There are two factors in the television situation which are of creditable significance; creditable to the engineers and to the commercial organizations likely to exploit and promote television when it arrives. In the promotion of television the operating organizations, heirs to what the engineers may accomplish, have avoided premature, sensational exploitation. This is salutary and commendable. On the part of the host of engineers and experimenters who are devoting their lives and talents to the development of television, there is a determination to succeed which can have only a satisfactory outcome.

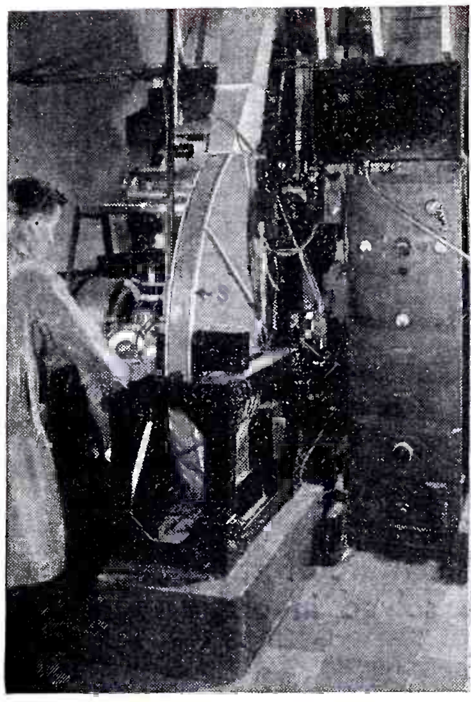
Channels for Television—As has been the entire history of radio, experimentation and research in the engineering of television have profited from inventions and discoveries in collateral departments of science. The explorations of radio amateurs into the realms of high-frequency (short-wave) radio transmission, and the work of promoters of new services such as police radio, in the ultra-high frequency bands, have contributed measureably.

As matters stand at the moment, the conclusion of television engineers is that a swath six megacycles (6,000,000 cycles) wide is satisfactory for picture and sound transmission, and it has been proposed that—excluding the amateur band between 56 and 60 megacycles—the frequencies between 42 and 90 megacycles be assigned to television. In view of the notion held by laymen as to the immense number of channels made available by utilization of ultra-high frequencies, it is of interest to note that in the band recommended for television there are but seven channels of 6 megacycles width. Even with the limited range or coverage of a television transmitter as at present contemplated, large cities like New York and Chicago might have not more than three or four television transmissions. The present high cost of television studios and transmitters, with particular respect to the high cost of suitable entertainment material for transmission, renders quite remote the likelihood that television service to rural areas will be available by direct transmission until relaying at commercial costs is practicable.

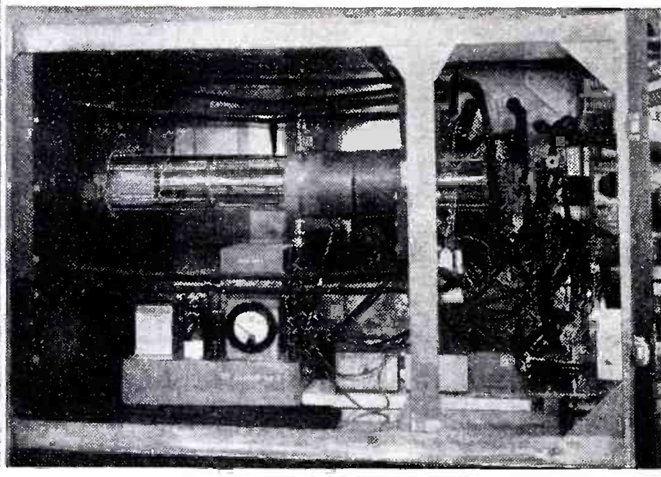
New York, Then Hollywood—In view of what the public is likely to expect from television it is realized that New York and Hollywood constitute the two most dependable sources of talent. It would appear that New York is to be the (*Continued on page 570*)

Fourteenth of a Series of "Guest" Editorials.

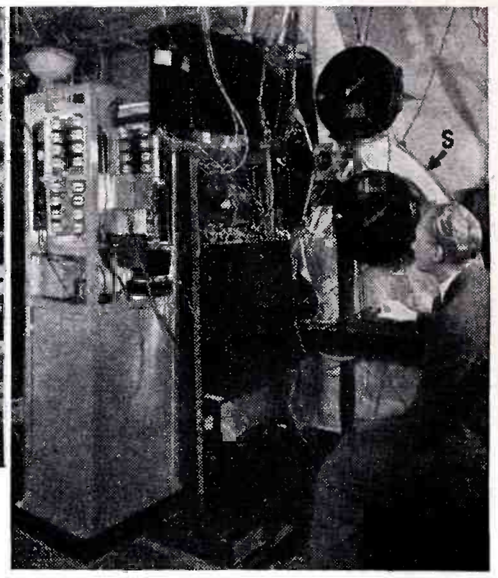
Television "Piped" from New York to Philadelphia



Enclosed lens scanning disc at transmitter is indicated at S.



A close-up of the large cathode ray tube which reconstructs the images.



Photos courtesy of Bell Telephone Lab.
Another view of the television transmitter at New York.

● IN the Bell Telephone Laboratories in New York recently a sound-picture film was run through a transmitter and its two records—sound and scene—were converted into electric currents and transmitted to Philadelphia, 90 miles distant. There the picture was reproduced on a glass screen large enough for a group of ten people to see easily, while the accompanying sound came from a loud-speaker. The sound picture described, by voice and animated diagrams, the coaxial cable system and explained briefly the operation of the picture transmitter and receiver. Some films typical of the news-reel theatre were also transmitted. The film itself told the story of the experiment.

Between the Long Lines offices in New York and Philadelphia there extends a cable which contains two coaxial-conductor units. Each unit is formed by a flexible copper tube and a single wire enclosed by the tube and held at its center by thin disks of hard rubber. Along the route are unattended installations of special amplifying equipment which receive their power over the inner wires of the two coaxials. The cable with its amplifiers and with its terminal equipment is an experimental installation for the development of broad-band transmission.

Motion pictures were recently transmitted a distance of 90 miles between New York and Philadelphia by the Bell Telephone Labs., over their new coaxial cable system. 240 line definition was used and the images were surprisingly steady and clear.

Each coaxial conductor unit with its associated one-way amplifiers is capable of transmitting simultaneously the currents of two hundred and forty different telephone transmitters. Using separate units for transmission in opposite directions, the system provides for two hundred and forty simultaneous conversations. The million-cycle range of each unit is utilized by carrier-current methods. In the present arrangement the transmitters are formed into twenty groups of twelve each. Each transmitter is limited to a frequency band of four kilocycles; and the bands from the twelve transmitters of each group are raised to successive positions between sixty and one hundred and eight kilocycles. Twenty complicated currents are thus obtained. These currents, by another modulation, are spaced in the range from sixty to one thousand and twenty kilocycles. This system of multi-channel telephony was recently tested over a looped back circuit equivalent to thirty-eight hundred miles; and transmission was satisfactory.

Another question remained: Can the system transmit satisfactorily a single message the frequency components of which occupy its entire range, that is, a current of the kind required in *television* programs. To study that possibility there were constructed in the Bell Telephone Laboratories a transmitter to originate a signal of that wide range of frequencies and a suitable receiver, both of which utilize some of the present techniques of television.

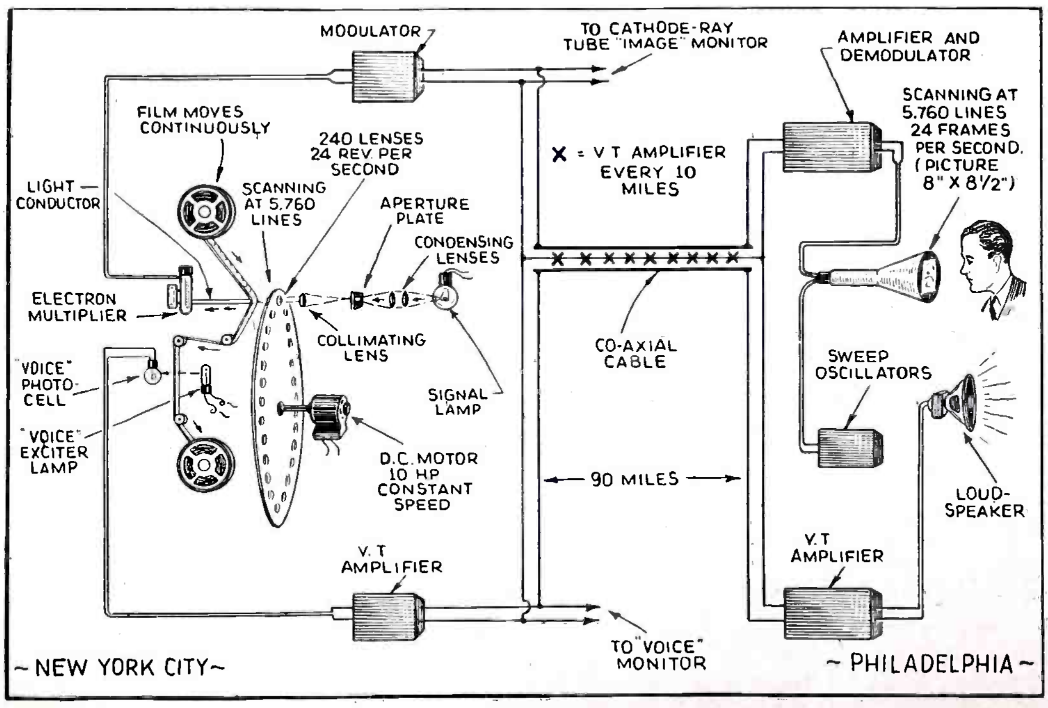


Diagram shows in simplified fashion the set-up for transmitting television over the coaxial cable between New York and Philadelphia.

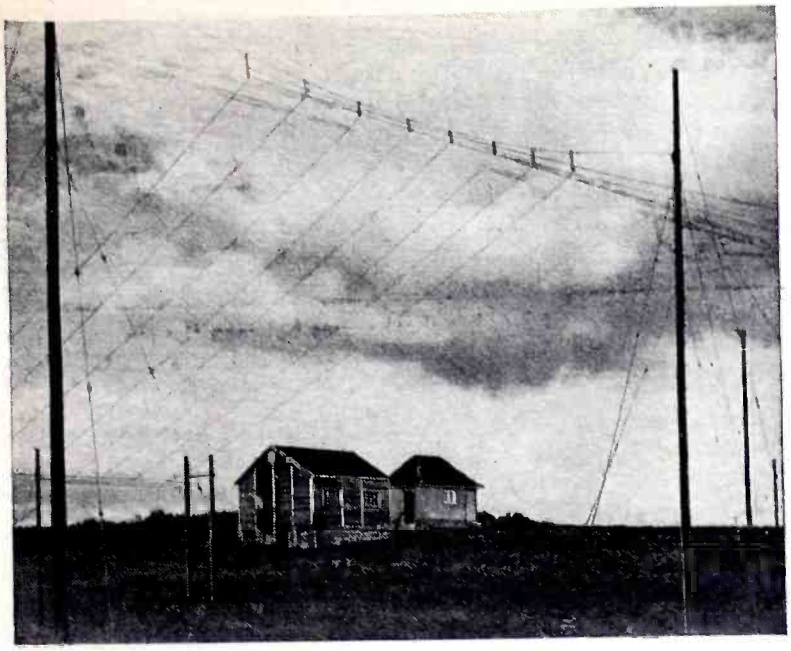
Lens Disc Scans Film Images

For a signal which can be repeated over and over a motion picture is used; it moves uniformly past a picture gate where lenses in a large rotating disc sweep across it a light beam three-thousandths of an inch square! The light passing through the film enters an electron multiplier. The resulting current contains frequencies between zero and about eight hundred kilocycles. Before transmission it is raised by modulation about one hundred kilocycles higher.

High Frequencies—*Sharpness of detail in a picture implies a rapid change from light to*
(Continued on page 574)

9 People Can Talk 2-Way on 1 U.S.W. Circuit

Ireland and Scotland now joined by forty-one-mile 3.6 meter U.-S.W. link carrying nine 2-way conversations.



Receiving and transmitting aerials at Portpatrick (Stranraer) Scotland.

● THE inauguration by Sir Walter J. Womersley, M.P., Assistant Postmaster General, of the Belfast-Stranraer 9-channel *ultra-short wave* radio telephone link recently marks one of the most outstanding achievements of today in the world of communications.

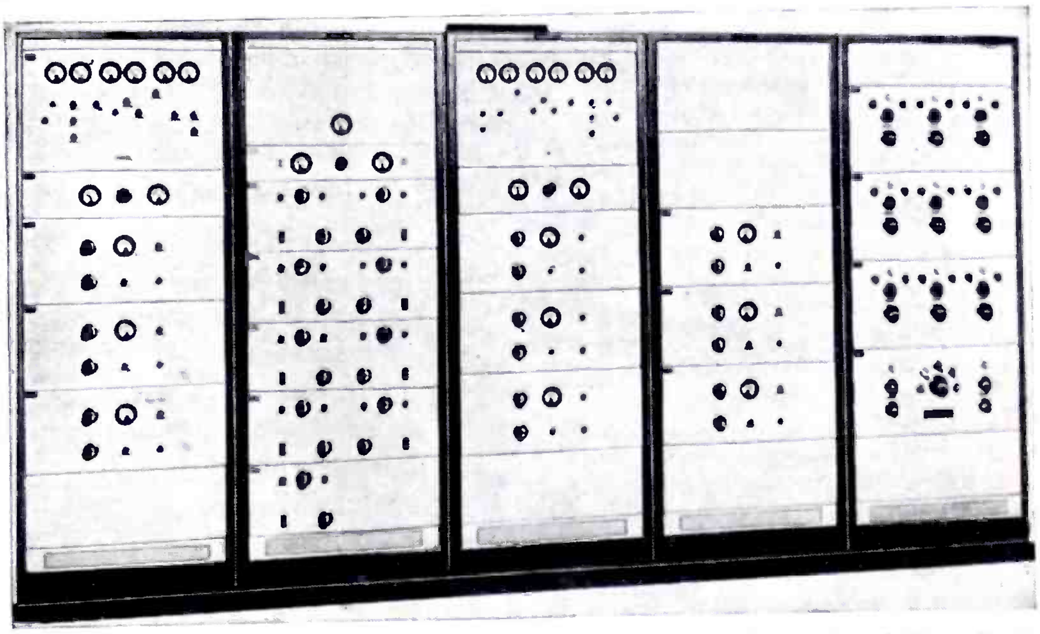
Although the use of ultra-short waves for commercial telephony is by no means new—an experimental service having been operated by the British Post Office as long ago as 1932—this is the first application in Great Britain, or in fact in the world, of a system wherein as many as nine telephone channels are passed simultaneously over a single radio link.

This system is the outcome of many years of research by engineers into the technique of ultra-short wave communication, coupled with long and arduous field trials. It is interesting to note, too, that the *ultra-short wave* is by no means the limit of wavelength for communication purposes and that the researches of Standard Radio engineers into *microrays* resulted in the design and installation as long ago as 1933 of the Lympne-St. Inglevert *micro-ray link* used by the Air Ministry, which operates on a wavelength of 17.4 cms. (6.9 inches) over an optical distance of 21.7 miles (35 km).

Foremost among the virtues of the ultra-short waves is the possibility of transmitting *wide bandwidths*. The width of the band that can be transmitted increases as the wavelength is shortened, and it is for this reason mainly that high definition television stations all operate in this region, as they require a total bandwidth of as much as six megacycles.

Apparatus Is Automatic in Operation

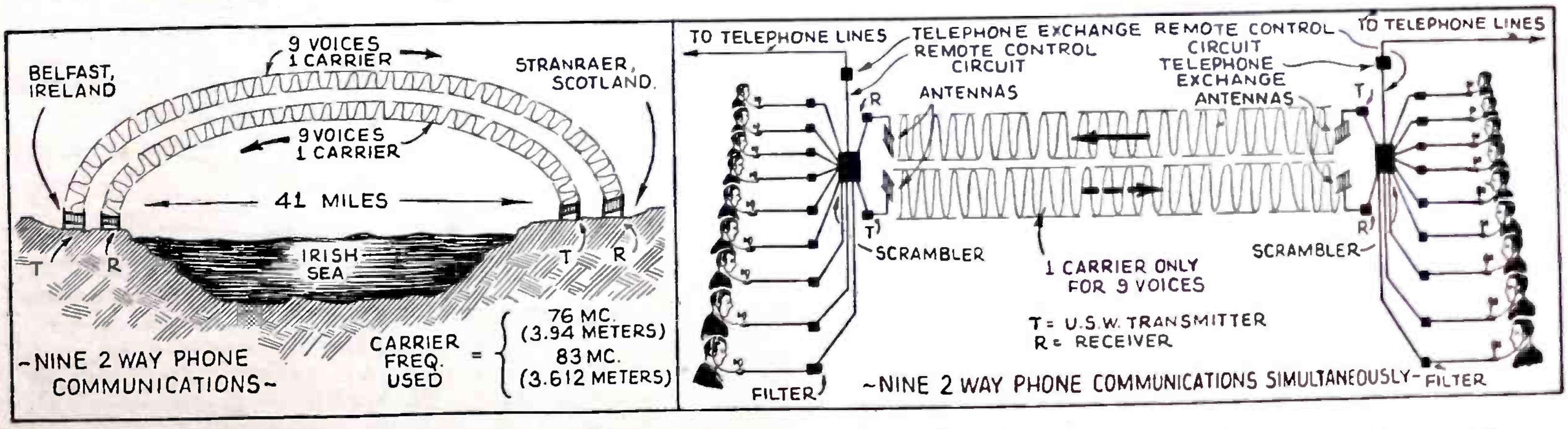
The equipment is designed for unattended operation and is capable of complete remote control from the nearest telephone exchange. In addition it is provided with spare equipment, part of which is brought automatically into operation on the occurrence of any abnormal condition. Both transmitting and receiving equipments derive their whole power supply from the public supply mains, the only battery used in the equipment being that for the operation of the relay system. A Diesel-electric power plant is arranged so that in the event of failure of the public electricity supply, it will take over the load automatically approximately one minute after such failure and thus avoid serious interruption of the service.



Transmitter of the type used at Belfast and Stranraer for the 9-Channel U.-S.W. radio link across the Irish Sea.

Transmitter: Let it be assumed that the input of channel No. 1 is supplied with

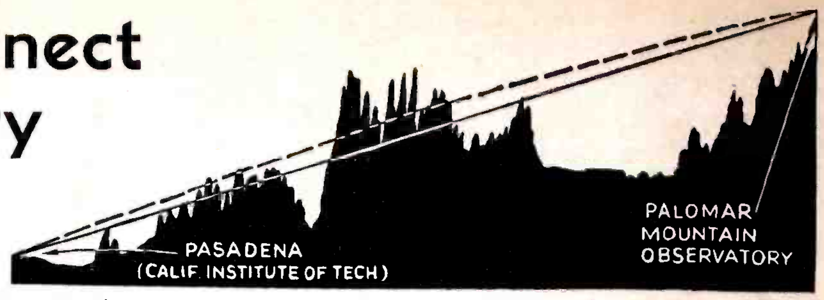
(*Continued on page* 578)



One of the latest and cleverest developments in ultra-short-waves for the 41-mile link joining Ireland and Scotland—18 people may talk over this 2-way 9-channel system. One carrier uses a 3.94 meter (76 mc.) carrier, while the second carrier, for transmission in the opposite direction, uses a 3.61 meter (83 mc.) carrier wave.

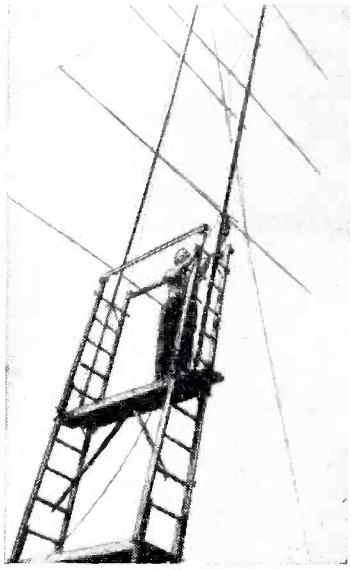
Ultra-Short Waves Connect Institute to Observatory 90 Miles Distant

AUSTIN BAILEY
Transmission Development, Bell Telephone Laboratories



The 90-mile gap spanned by ultra-short waves between the mountain top, where the world's largest telescope is to be erected, and the California Institute of Technology is shown above.

● THERE is under construction on the top of Palomar Mountain, in Southern California, a new astronomical observatory in which the world's largest telescope is to be installed. The establishment of the observatory represents a major construction project, for which a telephone "order wire" is required between the mountain top and the headquarters at the California Institute of Technology, which is situated about ninety miles away.

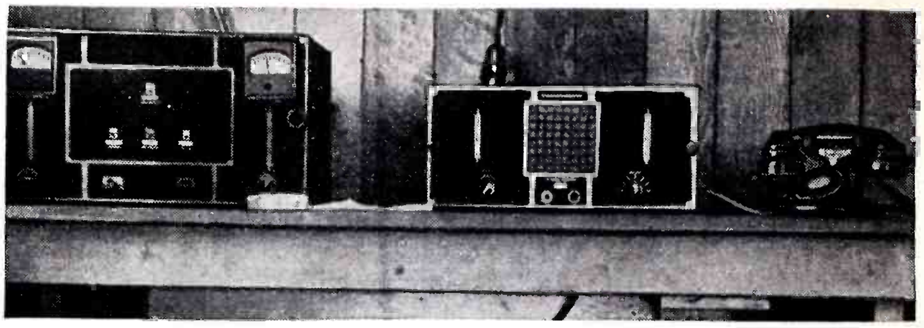


One of the antenna structures used for ultra-short wave experiments.

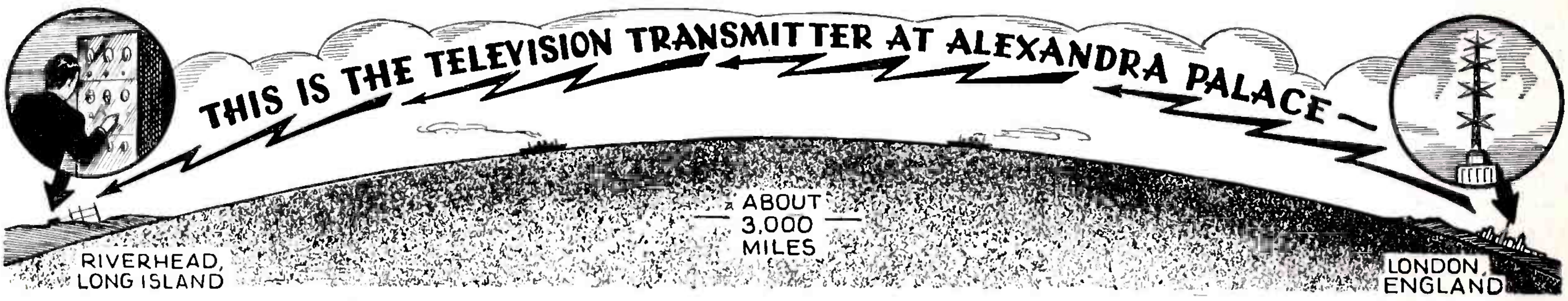
Members of the staff of the California Institute proposed establishing the desired telephone connection by means of an *ultra-short wave radio link*. As this seemed to be a favorable opportunity to try out ultra-short waves for telephone purposes over an unusual and difficult transmission path, the engineers of the Laboratories became interested in it, and the project was undertaken on a coöperative basis. The Bell System agreed to contribute the apparatus and the Institute to carry out the work of setting up the circuit and operating it for their purposes, while both have joined in the experimental study of the propagation path.

The transmission path is characterized by its considerable length, ninety miles, and the fact that the peaks of an intervening range of mountains protrude into it. The situation is illustrated by the profile chart where the solid line indicates the shortest path and the dashed one represents the mean path which the ultra-short waves would be

(*Continued on page* 571)



Interior of the radio shack at Palomar, showing the ultra-short wave receiver and transmitter.



TRANS-ATLANTIC TELEVISION?

Report on English Vision Signals Picked Up Here

DeWitt R. Goddard
R.C.A. Communications, Riverhead, L.I.

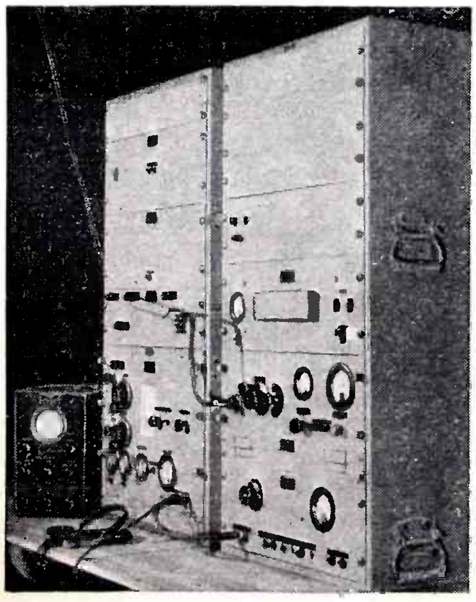


Fig. 1—Receiver used to pick up European television signals at Riverhead, Long Island.

● ON January 21, 1937 one of our engineers at the Frequency Measuring Laboratory at Riverhead, N.Y., was making his usual routine "Cruise of the ether" in the neighborhood of 40 megacycles when to his surprise he heard a carrier modulated with a voice having a distinct English accent. A hurried check of the frequency showed the carrier to have a frequency of 41.5 megacycles per second, (7.22 meters) the assigned frequency of the voice channel of the Alexandra Palace television transmitter. A few minutes later the transmitter's identity was confirmed as the announcer said: *"this is the television transmitter at Alexandra Palace, London."* Imagine the operator's surprise!

This was the start of a series of observations and measurements on the English and German *television* transmissions. Fig. 1 shows the ultra-high frequency receiver used. The lower panel of the further rack is the receiver proper, while just above it is a low capacity antenna switch used to connect the receiver to either the incoming transposed

(*Continued on page* 577)

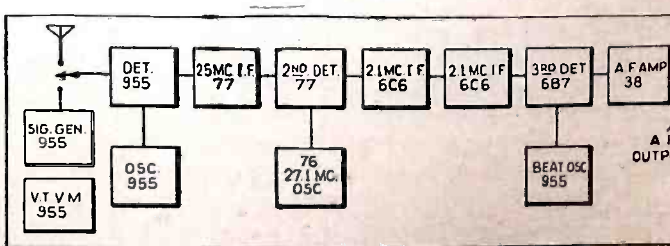
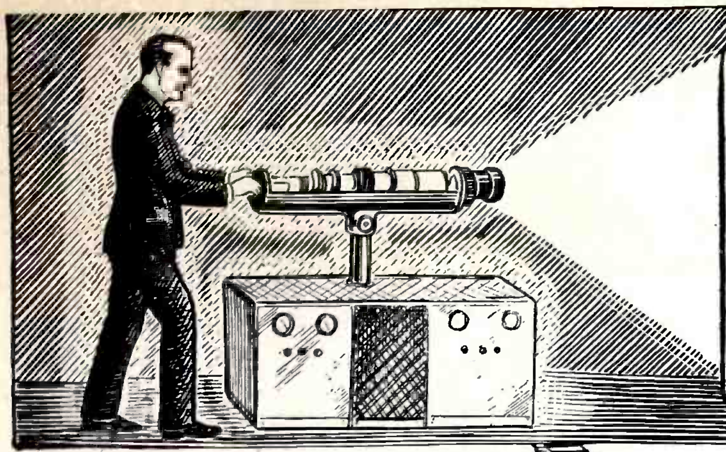


Fig. 2—Block diagram of the U.-H.F. receiver, showing types of tubes used.



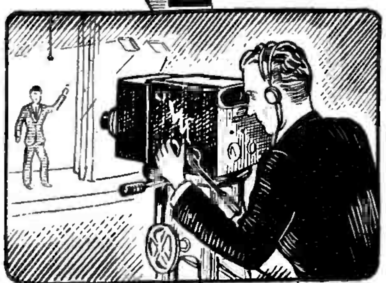
How Can I Obtain A Practical Education in RADIO & TELEVISION?

—H. W. Secor

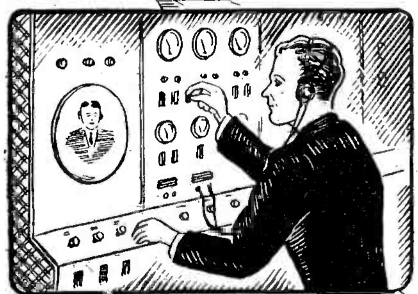
● Today thousands of young men are asking themselves the important question—How can I enter the radio-television field?—What subjects should the radio or television student pursue? How can home-study work be made most effective?

These and many other vital questions concerning the problem of how to obtain the best education in this rapidly growing profession are answered in the present article. Competition in the world of radio-television is keener than it has ever been, and it is practically imperative that one pursue a well planned course of technical training, such as those offered by numerous schools and colleges today, if he ever expects to attain a worth-while position in radio and television. ●

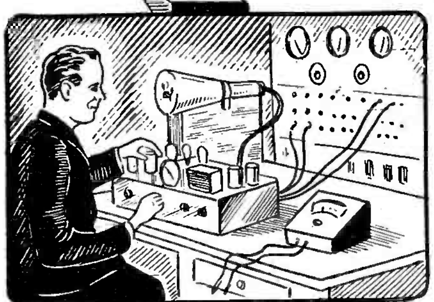
Only trained men can and will operate television cameras and projectors.



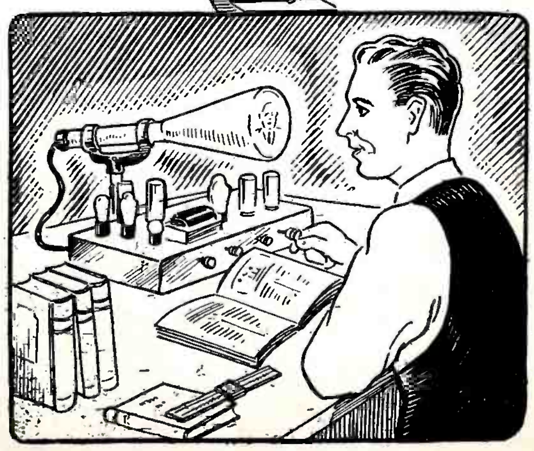
Television operators will be in great demand tomorrow.



The student will do well to obtain a position in the radio-television field



Below—The student should always check theory with practical experiments.



● TELEVISION is rapidly becoming such an important subject that young men everywhere are beginning to ask the question as to how and where they can obtain a thorough training in this subject. In the first place a television expert does not grow overnight, as the general public is often prone to think, but he is the product of many months, even years, of careful training and laboratory research. A television expert is nothing more, nor *less*, than a person with electrical or radio training who has specialized in the latest developments in electronics, so that he has become an expert in the more restricted branches of the radio art dealing with television.

In other words, when a good television expert emerges from his studies he has a first class education in mathematics and the elements of electricity, including a thorough study of dynamos, batteries, magnets, chemistry, etc. All modern radio and television courses, as a study of the various schools will disclose, provide for this thorough basic training in electrical subjects including mathematics. There are a few specialized television courses which have been arranged for the more advanced students, who may have had a good basic training in technical or electrical subjects.

One may gather from what has been said thus far, that a man who is a first-class radio expert, may easily step over into the realm of television operation and design. Relatively speaking this is true, providing that he has kept pace with the recent technical developments in television. Another plan would be for such a radio expert to take one of the modern specialized courses in television offered by various schools which will enable the ambitious student to bring his radio education right up-to-date.

Short-wave hams make very excellent television course students, as they usually have acquired a good practical knowledge of radio matters in general. The ham's knowledge of the radio code will always stand him in good stead, as code signals are frequently useful in checking up between television stations. Those who intend to become television announcers, and there will be plenty of demand for them in the coming decade, will do well to study a foreign language or two, and they should also take a course in public speaking and debating. A specialized short course in television technique should also be taken by those aspiring to be television announcers, as a certain amount of technical knowledge will always prove extremely useful.

Resident instruction is desirable in radio and television work, as it is in many other subjects, but all of us cannot afford the time and money required to attend resident schools. Very excellent courses have been prepared and are now offered by a number of radio schools, whereby most, and in some cases all, of the instruction can be carried on by home-study. One of the weakest points about home-study courses has always been that the student may not be occupied daily in work of the same type as he is studying and, so, acquires only a theoretical knowledge of the subject. This has now been remedied by the fact that quite elaborate experimental apparatus is often furnished with the home-study course, and the student has to construct a number of different types of sets and make a report on them to his instructor. It is best, but not always essential, that the student of a home-study course endeavor to obtain a position with some company in the radio or television field, so as to gain practical experience.

Television *set-servicing* is a new branch of the radio industry which will before long demand the earnest attention of students everywhere. Television receivers are far more complicated than even the largest broadcast receiving sets and only those servicemen who have received special training will be able to make satisfactory adjustments or repairs on the modern electronic television receivers. One of the peculiar things about this whole subject of television training, whether it is from the servicemen's point of view or the technician's, is that in any event the best men in the respective branches of the television art, will always be those who have a thorough basic training in electricity, mathematics and the subject of electronics. Rome wasn't built in a day, neither are television experts made over night! Forever and a day the television expert must be a student.

One of the modern courses offered in television starts the student off with a short history of the subjects and then provides an elementary study of the electron theory. Fundamental electrical terms are then discussed and next the student receives instruction in mathematics, alternating currents and the theory of vacuum tubes. Just why and how vacuum tubes do the things they do constitutes one of the main subjects in any radio or television course of study.

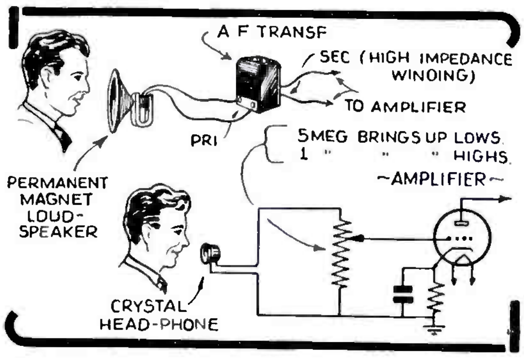
Other important topics taken up in one of these typical modern courses are: how to plot graphs, study of electromagnetism and the action taking place in magnetic circuits, studies in magnetic induction and how transformers work. The action occurring in condensers is then studied and the calculation of capacity with series and parallel (*Continued on page* 566)

New Experiments with Radio Apparatus

The experimenter has at his command today, many new devices which were not available yesterday. See if you can adapt some of these radio parts to non-radio applications—we offer cash prizes for ideas accepted and published.

Loudspeaker Used As Microphone

When cone loudspeakers first came into use it was soon discovered that if a person spoke in proximity to one of these speakers, that the voice could be picked up and transmitted through an amplifier. The modern type small loudspeakers, particularly the 3" and 4"

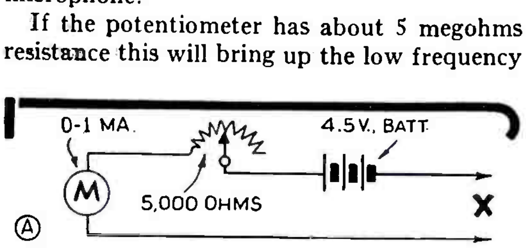


Here is a very useful idea—how to use a loudspeaker as a microphone.

diameter sizes having a permanent magnet field, are very useful as "mikes," and they develop their own voice currents as the diaphragm moves back and forth. They should be used in connection with a matching transformer; a little experimenting may be necessary to match the impedance for best results. An output transformer will usually serve the purpose of matching the speaker to the input of an amplifier.

A very good substitute for a mike is to use a crystal type headphone. These have quite a high impedance and they also develop their own voice currents in the form of piezo-electricity. The hook-up is shown for using a crystal headphone as a *mike*. The arm of the potentiometer enables the input to the amplifier to be adjusted as desired. The crystal phone has a very high output as a microphone.

If the potentiometer has about 5 megohms resistance this will bring up the low frequency



The two circuits shown above for a home-made ohmmeter, will prove valuable to both the radio and electrical experimenter. The advantages of each circuit are explained in the text.

components of the speech or music, while if the potentiometer has about 1 megohm resistance it will be found that the high-frequency speech components are brought out.

A Simple Ohmmeter

If a low-range milliammeter is at hand, one having a scale reading say O-1 ma., then it is a simple matter to arrange for the direct measurement of resistance. In the simpler form of ohmmeter circuit shown at A, a variable resistance of about 5,000 ohms is connected in series with a flashlight or other battery of say 4.5 volts potential, while the unknown resistance is connected across the terminals X.

In such a set-up the resistance may be judged relatively by comparing the readings on the milliammeter scale for a series of known resistances; a paper scale calibrated in ohms, may be pasted over the milliammeter dial. Even without such a calibrated scale, the relative value of a resistance may be judged by the difference in readings on the

MONEY FOR YOUR IDEAS!

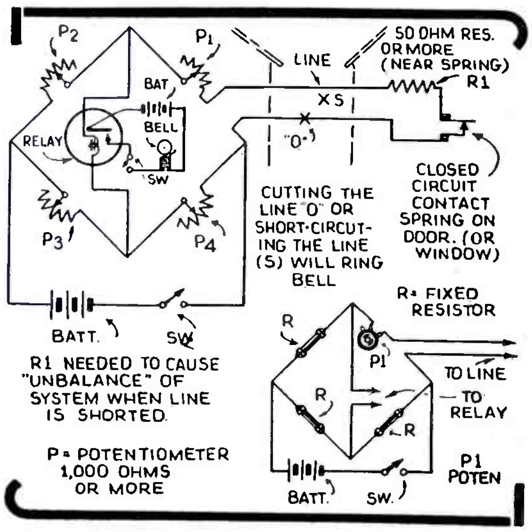
Each month we will award 2 prizes, the first of $10, the second $5, for the best NON-RADIO uses of ordinary radio parts and radio instrumentalities. Hundreds of different ideas may be adapted for this contest; the editors will be grateful for your ideas.

meter. Before making any measurements the variable resistance in series with the battery is adjusted until the meter reads full scale (with the terminals XX shorted together), in this way variations in voltage as the battery gets older are compensated for. The higher the voltage of the battery, the higher the resistance must be to compensate for it, and the higher the ohmmeter will read on its scale.

Fig. B shows an improved form of ohmmeter, employing a milliammeter with a scale of about O-1 ma. This set-up is particularly useful for measuring resistances below 300 ohms. This shunt circuit type of ohmmeter will enable resistance values to be read within about ½ ohm. This feature is of great merit when testing low-resistance coils, such as those in R.F. and I.F. transformers. In this circuit whenever the battery switch is closed, the meter reads full scale at all times, until you connect an unknown resistance across the terminals. When through making the test the battery switch is, of course opened. The lower the unknown resistance, the farther the meter needle will move toward the left.

Balanced Burglar-Alarm Circuit

If you have several potentiometers of about the same resistance lying around, then you can make a bridge for one end of the circuit, as shown in the diagram. These potentiometers may be of 1,000 ohms value, or several thousand ohms, depending upon the resistance and sensitivity of the relay. If the relay is only a few hundred or possibly 1,000 ohms

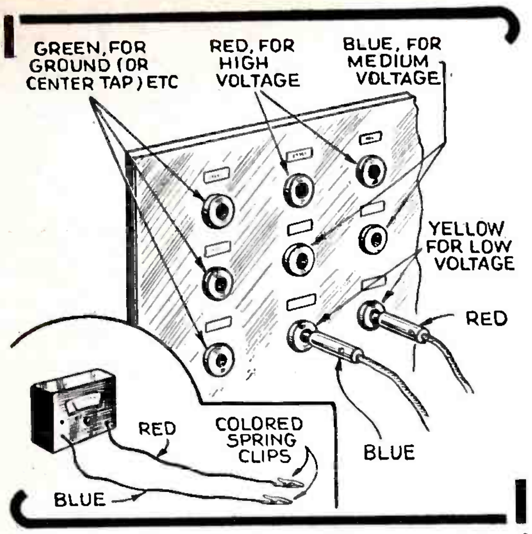


A simple balanced burglar alarm circuit.

resistance, then the potentiometers should not greatly exceed this, or an excessive battery current will be required to operate the relay.

As the system is balanced by adjusting the resistance of the four arms of the bridge until no current passes through the relay, it will be seen that if one of the wires constituting the circuit between a house and garage, for instance, is disturbed one arm of the bridge will be unbalanced and the relay will receive sufficient current to close an armature and ring a bell, etc. If a resistance, R1, of 50 ohms or so were not placed close to the closed-circuit contact on the garage door, for example, a piece of wire placed across the external line between the two buildings, would allow the thief to open the door without sounding an alarm.

One of the diagrams shows an optional and cheaper method of rigging up the resistance bridge. Here three of the arms are formed of ordinary fixed resistors, about 1,000 ohms each, and a variable resistor or potentiometer of 1,000 ohms is used in the fourth arm to balance the line resistance and also that of R1. The battery used across the bridge may be an Edison primary cell, dry cells or rectified A.C.



Colored jacks and plugs will save a lot of time and burned out instruments in the experimental laboratory.

Colored Jacks and Plugs for Test-Boards

The accompanying picture shows how the brightly colored jacks and plugs now available in radio-supply stores may be used to good advantage for test switchboards in the home laboratory or service shop. Red is usually assigned to high voltage plus, while blue or yellow might be used to indicate medium voltage, and green or blue for B minus or ground lines.

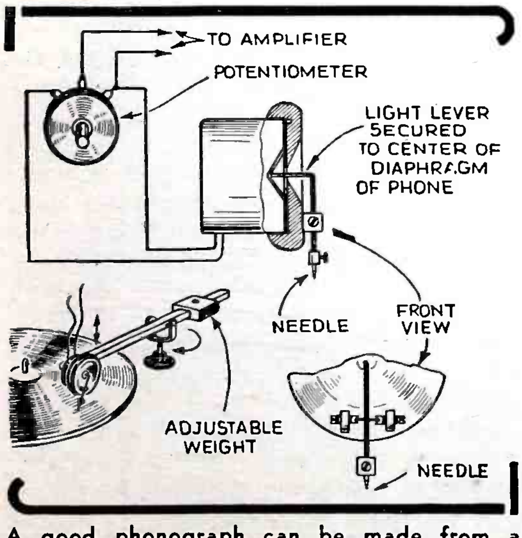
We have seen many home-made testing instruments built up in neat cabinets by servicemen and radio experimenters in general, but we have been surprised to note that very little use has been made of the handsome colored pin-jack terminals and plugs now available on the market. By using colored wires in connection with these colored terminals, of the pin-jack or other variety, tests can be much more quickly and accurately carried out.

Phono Pick-Up Made from Headphone

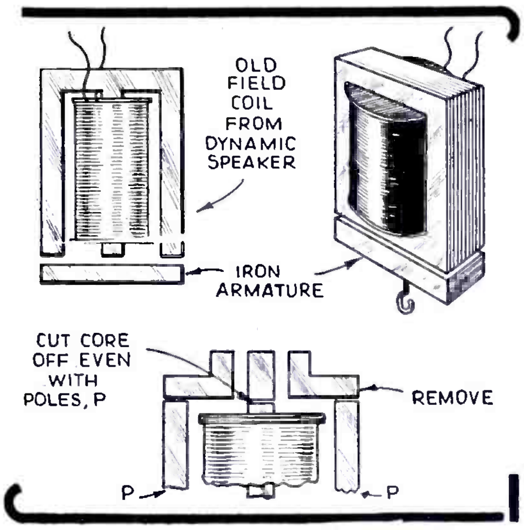
After all, phonograph pick-ups cannot be bought for a song, and every once in a while the experimenter may desire to make use of such a device, without caring to spend several dollars for one of these pick-ups. A Baldwin type phone makes a very good phonograph pick-up when rebuilt in the manner shown in the picture.

In some cases the lever and bearing supports for it may be procured from a local radio and phonograph shop, an old sound-box being sometimes available at slight cost. The lever and supports are mounted on the cap of the phone or the old phonograph sound-box frame may be screwed or clamped to the headphone. A small piece of stiff wire may be cemented in place from the center of the phone diaphragm to the top of the balanced pick-up lever; on the lower end mount the needle-holder. The ingenious experimenter can also easily rig up a balanced arm to carry the magnetic pick-up as shown in the sketch. As will be seen the arm must have two motions, up and down and also sidewise.

A balance weight can be placed on the outer end, and by putting a thumb-screw on this so that it can be slid along the arm, any amount of pressure can be exerted on the phonograph needle. Hill and dale records may be played by turning the pick-up into the proper position.



A good phonograph can be made from a headphone, especially one of the Baldwin type.



A powerful magnet can easily be built from an old loudspeaker unit. Many other variations of the idea shown in the picture will suggest themselves to the live-wire experimenter, such as heavy-duty relays constructed from the magnet frame and coil, etc.

Powerful Magnet from Old Speaker Unit

The illustration shows how a strong electromagnet may be made from an old loudspeaker frame. In some of the older type speakers the field coil was wound for 6 volts and if you happen to run across one of these, it should make a very strong battery magnet.

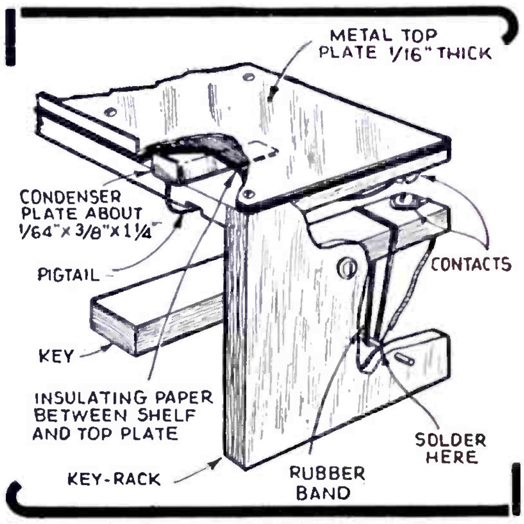
In any event a new iron armature will have to be provided and this may be made by riveting together a bunch of transformer punchings or else formed from a piece of wrought iron or mild steel about ½" or ¾" square. The pole-pieces are best removed from the outer frame of the magnet and, if necessary, the central core cut off so as to be flush with the outer iron ring, as shown in the drawing.

For maximum results with any magnet it is very essential that the pole-pieces be very carefully and accurately smoothed off with a file or with the help of a grinding machine. If the magnet is to be used for any length of time and should heat up, simply connect a 110 volt lamp (about 50 watt size) in series with it.

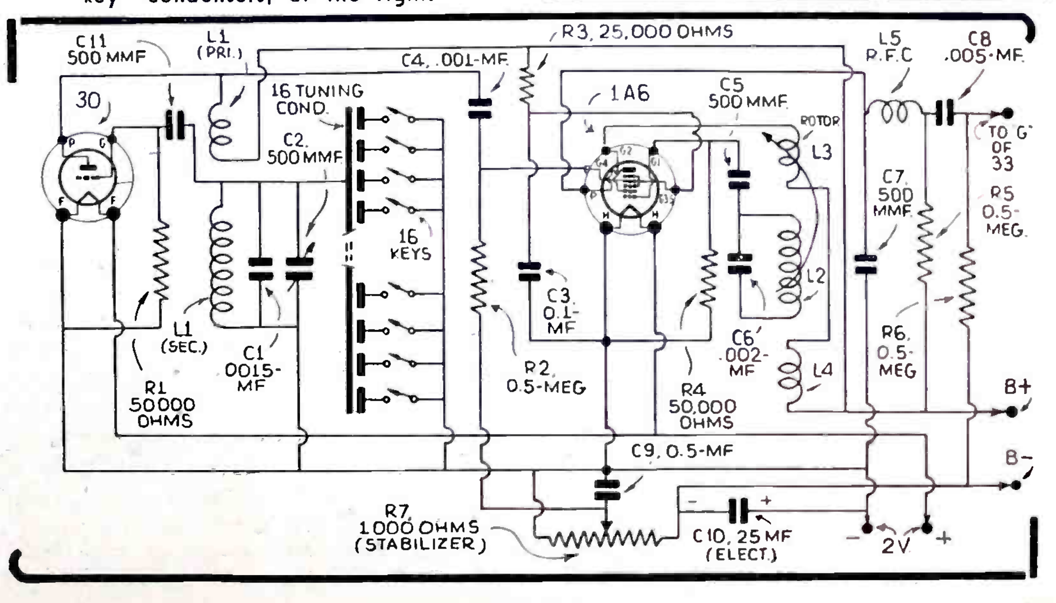
Radio Piano from Odd Parts

Electronic music with flute-like notes can be produced by means of oscillators connected in a circuit like that shown. The primaries and secondaries, L1, may be wound on a single piece of insulating tube, while the coil L3 is arranged on a small shaft with a knob, so that it can be turned at different angles to the stationary coil, L2. L4 is wound below L2 on the bottom of a piece of tubing. For L1, any 2-circuit broadcast tuner may be used, while a 3-circuit coupler may be used as L2, 3 and 4.

The different tones will have to be calibrated with the aid of a piano, unless one has a trained musical ear or a set of pitch-pipes. The 16 tuning condensers are small affairs and comprise brass or other metal plates, measuring about ⅜" x 1¼" long, with several thicknesses of insulating paper placed between these note condensers and a common condenser plate. The small note plates are moved in or out until all the respective notes for the scale are obtained. The keys may be made from wood. The output may be fed into the grid of a 33 tube, whose plate is connected to a permanent magnet loudspeaker.



A radio piano on which different tunes can be played is shown in the diagram below, and in the detailed drawing of one of the "key" condensers, at the right.



The induction phone transmitter with 1-stage A.F. amplifier, the second tube being a rectifier. Only the mike on the handset is being used in this case.

How to Make

● A NEW dress for an old idea is brought forth in this apparatus. It is a "wireless" telephone based on the principle of electro-magnetic induction.

It should be understood that a small radio transmitter and receiver could accomplish the same results over much longer distances than this device. The use of ultra-short waves could very nicely do this. However the apparatus described is not intended as a substitute for radio. It is to the general radio student and experimenter that this is offered as a novel and interesting experiment.

Briefly the idea is this. When a varying current flows through a coil, electro-magnetic lines of force are set up. When another coil is placed in the field of the first coil, a current similar to the original current is set up in the second coil; this is called electro-magnetic induction.

In this apparatus large coils or loops are used in conjunction with audio amplifiers. When a person talks into the microphone, his voice is amplified by a one tube pentode amplifier of simple design. The output of this amplifier is connected through a transformer to a coil of about 50 turns Electro-magnetic lines of force are set up and these in turn cut across the turns of the receiving loop of about 100 turns. These coils may be spaced with this model, a maximum distance of about 20 feet. The weak current set up in the receiving coil is in turn amplified to bring up the signals to an audible strength.

Numerous applications will suggest themselves to the experimenter with ingenuity and imagination.

Those who are also interested in amateur magic will find a practical use for this outfit. Here is one suggestion by which a very clever illusion of telepathy and clairvoyance can be created. A confederate, walking through the aisle, solicits questions from the audience. When he receives a question, he apparently transmits it telepathically to the performer on the stage, who answers it apparently without having heard the question or seen the questioner!

The confederate in this act carries a portable, battery-operated model with the coil sewed into the back of his coat. He can use a lapel or chest microphone so that when the person asks a question, it will be picked up and transmitted to the performer on the stage. The performer carries a similar apparatus using a small head set concealed in his turban or in any other way that might suggest itself. In this way he can hear the question asked and give whatever answer he thinks will suit the occasion. This is but one of many practical variations to which this induction telephone can be put.

Of course, the apparatus required would be of necessity extremely portable and easily concealed. The principle of operation, however, is the same.

Circuit Data

The transmitting amplifier uses a type 42 tube. This is coupled to the loop through an output transformer designed to match a ten ohm voice coil. The loop is connected across the ten ohm winding. Any suitable power-supply can be used.

The receiving amplifier uses a 6C6 tube, resistance-coupled to a 76. The loop is coupled to the 6C6 grid through a 50 ohm to grid transformer. (A single-button mike transformer to grid can be made to pinch hit if this is not available.)

For those desiring battery operation, the following layout is suggested. In the transmitter, a single 33 is used. The filament of this tube has a comparatively low current drain and the required 2 volts can be supplied by 2 flashlight cells in series. Three small size 45 volt B batteries will supply the required 135 volts on the plate. The transformer and loop are the same as for the A.C. model.

The receiver uses a 34 tube resistance-coupled to a type 30. Here again flashlight cells can be used for the filament. The plate voltage can be supplied by the same type B supply. The transformer and loop are similar to those used on the A.C. model.

The loops are the really important part of this outfit. They are set up on a framework of 2 pieces of 1 inch square pine. One piece 2 feet long crosses a 3-foot section at right-angles 1 foot from the top. This forms a cross around the outside of which the wire is wound, making a loop that looks very much like the once-famed indoor loop of a by-gone era. The whole is set on a base so that it stands upright. Complete construction details are given in the accompanying sketch. The only difference between the two coils is in the number of turns used. The transmitter end uses 50 turns of number 22 double-silk covered wire, while the receiver uses 100 turns of number 32 double-silk covered wire.

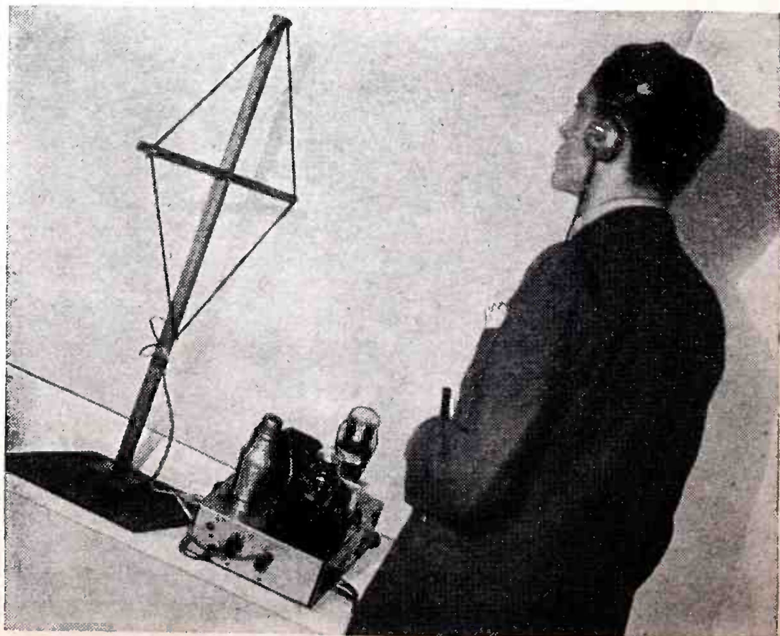
While operating, the coils should face one another so that they will be exactly in each other's field. If placed at right-angles no current will be set up in the receiving end.

If the directions as presented here are followed, the experimenter can be assured of surprising and interesting results. As this is only a simple model, the experimenter who is interested can develop as elaborate an apparatus as he may desire. Increasing the number of turns and diameter of the loop will increase the strength of the field and greater coverage can be expected. Increasing the number of stages of amplification on both the transmitting and receiving ends will also accomplish this result. Of course the number of stages used at the receiving end will be limited only by tube noise.

As no experiments have been conducted with multi-stage apparatus, the author would appreciate comments from anyone conducting experiments with this apparatus.

Interesting Tests Made by the Editors

A number of experiments were carried on



The voice waves are picked up by magnetic induction on the loop aerial here shown and amplified by the 2-stage A.F. amplifier observed in the picture. Distances up to 10 ft. were bridged by this system.

A Simple Induction Phone

George F. Huether, W2IHO

Mind-reading acts, party stunts and many other uses will suggest themselves for the application of this induction-type phone. Under ordinary conditions no interference with radio sets is caused by this simple phone system.

by the editors with this interesting loop induction phone and some of them are described herewith for the benefit of those desiring to try them.

In the original induction phone no vacuum tube amplifiers were used and this set-up was tried with the loop aerials. An ordinary carbon microphone was connected in series with a 4½ volt battery (three dry cells) with a loop, as shown in one of the diagrams; at the receiver the loop aerial was simply connected to a pair of headphones. Even when a pair of 2,000 ohm phones were used the results were quite good and the loops could be separated about 3 ft., and the voice still clearly understood.

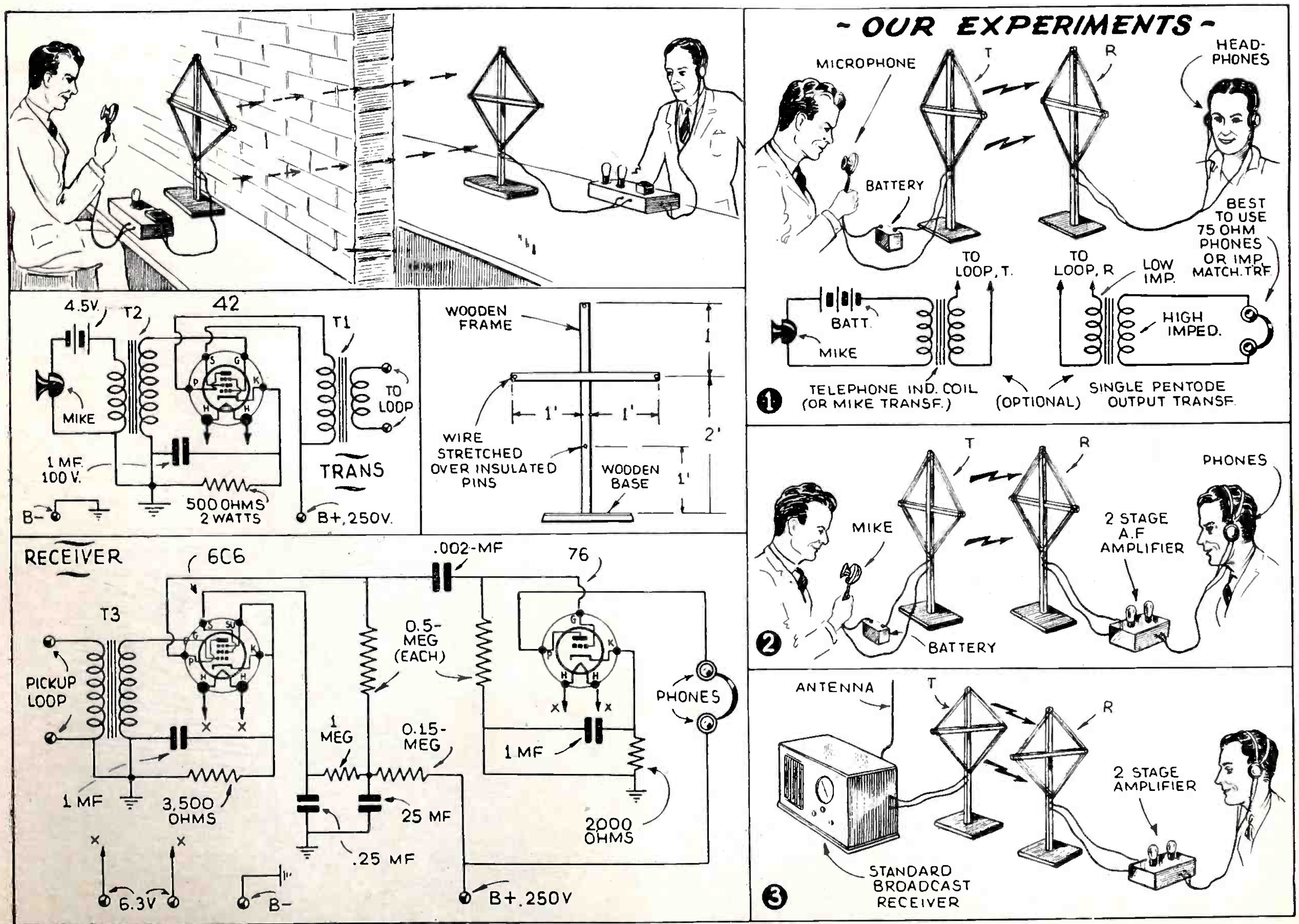
With this simple set-up of the induction phone, the transmitter may be improved by connecting a telephone induction coil between the microphone and battery and the loop aerial as shown. A microphone transformer may also be tried and, in any event, the secondary should have a very low impedance so as to match the loop as nearly as possible.

At the receiving end better results will be obtained if a pair of 75 ohm headphones are used in connection with the loop, as they will nearly match the impedance of the loop. If a single pentode output transformer is at hand, this will provide a closer matching of the impedance, the loop being connected to the voice coil winding on the transformer and the 2,000 ohm phones to the high impedance winding.

The next experiment involved a set-up shown in fig. 2, and here the microphone and 4½ volt battery were simply connected to the loop as in the first experiment. For this test, however, the advantage of a 2-stage audio frequency amplifier connected to the receiving loop was tried, and the distance separating the two loops could now be increased from 2 to 2½ times, or about 5 to 6 ft., with the voice still strong and clear in the phones. For certain requirements for those problems where an induction phone system of this type might be desirable or useful, another way to increase the range is, of course, to use an audio frequency amplifier of several stages so as to more highly magnify the currents induced in the receiving loop.

The third experiment tried and shown in fig. 3, involved the transmission of radio programs from one loop to the other. The transmitting loop was connected across the terminals of the low impedance output transformer and the voice coil of the loudspeaker in the radio set disconnected. The 2-stage A.F. amplifier described in the present article was used in connection with the receiving

(*Continued on page* 592)



Diagrams above show 1-tube A.F. amplifier used at the transmitter, and 2-stage A.F. amplifier used at the receiving loop. Also hook-ups for duplicating the editors' tests, made without amplifiers.

UNCONTROLLED

Bouquets and Brickbats

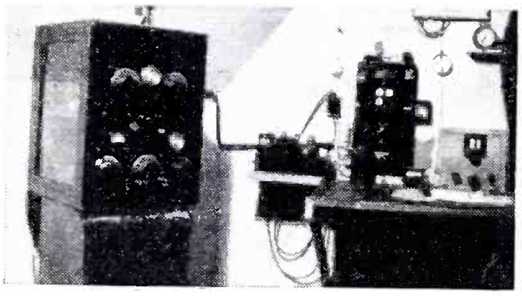


Photo above shows a dandy "rig" in Copenhagen. The station call letters are OZ3U. The address of the station is Alhambrave 3, Copenhagen, Denmark.

Has 2,500 Veris!!!

Editor,

Ever since the time when I was building crystal sets to listen to the "yokel" a few miles away I have been more or less an "ole" DX hound. A year ago my log was well over 5,000 but at that time my only interest concerning DX was the logging of distance. Since then I have decided to obtain a veri for every station logged and to date I have over 2,500 veris, most of those being QSL cards from 20 meter "hams" in 51 countries.

I am sending you one of my old QSL cards. I would like to hear from other SWLs and if anyone is interested in obtaining a list of some real DX stations on 20 meters, I will be glad to pass it on to them.

I hope *"S. W. & T."* will continue to be the "mag." it always has proved to be.

MATTY WILLIAMS.
703 Asbury Ave.,
Asbury Park, N.J.

He Deciphered Message from Mars!

Editor,

The article on the possibility of establishing communication with Mars in the current issue of *Short Wave & Television* was very interesting.

This is the first time I ever heard that a signal had actually been received from that planet, so I immediately assumed the task of deciphering the message.

So Mickey Mouse comes from Mars!

Very truly yours,
PAGE TAYLOR,
14717 Detroit Ave., Lakewood,
Cleveland, O.

How to Signal Mars

Editor,

After reading *"Can We Signal Mars?"* in the December, 1937 issue of *Short Wave and Television,* I offer the following:

As a possible means of signalling Mars, why not employ a narrow concentrated beam against the moon? This beam could be reflected from the surface of the moon at a proper angle, so as to obtain a suitable spread akin to the X-ray tube. This reflection occurring in space should materially reduce losses that are ordinarily encountered in our atmosphere. It is possible that we may produce in effect a secondary emission of higher frequency, that would further aid the beam in bridging the gap.

Very truly yours,
EDWARD L. SCHIAVONE,
3410 13th St., N.W.,
Washington, D.C.

(Attaboy, Edward! Let's have some more ideas on this Martian problem.—Editor.)

A Boost from India!

Editor,

I am a regular subscriber and reader of *Short Wave & Television* for the last year. I just want to convey to you my impressions about this magazine. It is absolutely indispensable for all radio enthusiasts, because it gives theoretical as well as practical information regarding this highly popular subject of modern times.

Even to an amateur like me, this magazine has helped tremendously. With its aid I have secured verifications from more than twenty foreign countries—including the far away, short-wave stations of the U.S.A.

I am a member of the *Short Wave League* and justly very proud of it. I am also a member of the *British Long Distance Listeners' Club* of London.

MR. N. G. MUJUMDAR,
187, Kasaba Peth,
Poona City, India.

An Elaborate English S-W Listening Post

Editor,

I have been a reader of your magazine for just two years, and thought perhaps my fellow readers would like to see a photo of a British receiving station (I have it in the attic of my house).

My main receiver in the center of the photo is a 3 tube 0-V-2 pentode output, using an all-wave coil 10-2000 meters, working from "B" eliminator power-supply and "A" storage battery, that I keep trickle-charged.

The receiver to the left is a small 2-tube band-spread Short-Waver, with plug-in coils to tune 12.5-180 meters. This receiver also works from another "B" eliminator supply, etc. I use it more as a *stand-by* receiver for European and local *ham* listening.

Directly above this set is my 5, 7 and 10 meter RX, a 3-tube superregenerative with interchangeable coils. This also works from the same type of "A" and "B" supplies.

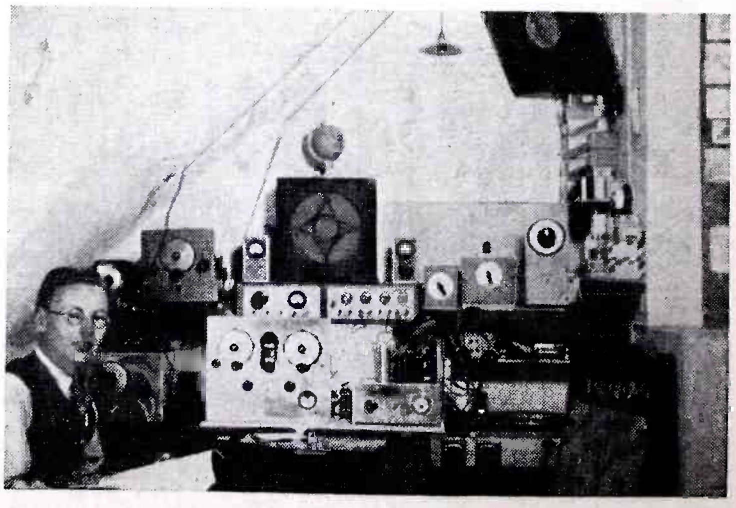
Continuing along this shelf on right of loudspeaker, is a 5-7 meter test-oscillator, and a 80-175 meter converter adaptor, together with a 10-80 meter beat-oscillator. The switches below the loudspeaker are used for switching in phones or speakers, while the meter checks the current taken by the receiver.

Down onto the bench again, next to the receiver, is an all-electric A.F. amplifier, employing 2-76's, coupled to two 42's working in push-pull, and one 80 rectifier, and this circuit, I am pleased to say was taken from a copy of *Short Wave & Television,* and is working very well.

I can, by turning a switch on the panel of the short-wave receiver, switch out the pentode output tube, and connect the first two tubes onto the amplifier, and it sure "punches it out"! To make a change from DXing, I can switch in a phonograph turn-table and pickup for recorded music.

Well this letter has developed into quite a budget, but when one is writing or talking about such a grand hobby as radio, I find there is no limit, so with wishing your magazine every success, and 73 to all my fellow readers,

I am, yours sincerely,
R. ALLEN,
R.S.G.B., B.R.S. 3028.
37 Highfield Road,
Bognor Regis, England.



Above—Listening post of R. Allen, Sussex, England.

He Wants Reports—Did You Hear Him?

Editor,

I would be very pleased if you would insert a notice in your magazine to the effect that I would like DX reports on my C.W. trans-

OSCILLATIONS
from Our Readers

missions on 20 and 40 meters. All reports will be answered with QSL and reports must contain the following particulars: QSA-R & T, report or RST. Freq., time and date of reception. Type receiver, number tubes, type of tubes. Type aerial, any other DX audible at same time as my sigs. What was type of communication by me (CQ, etc.).

Any other particulars considered of interest may be added. Listeners can depend on me that all reports received will be QSL'd within 24 hours of receipt. My call sign is VK2ABL.

Hope your listeners, that is readers, Hi! will find this of interest in your valuable paper. Reports are requested from any country.

Yours faithfully,
Les Tanner, VK2ABL,
Delamere Street,
Canley Vale, N. S. W.,
Australia.

Great Results With His 23-Tube Scott

Editor,

Not to be outdone in appreciation by friend and co-enthusiast, Theodore Domby, I thought I would drop you a line myself. I started along the S-W road about the end of last January with the arrival of my Scott 23 tuber—and then—the old rocking chair got me!

My antenna is a Scott double-doublet, running NE-SW, elevated about 60 ft., between two tall trees. I use a Visa-glow arrester to avoid signal loss. I do not have any special den, but I use my headphones most of the time so as not to annoy the XYL, also for sitting up nights—and mornings!

Yours was the first short-wave magazine I used, and I am a member of the I.S.W.C., the N.N.R.C., and Rueda del Oeste (WA3F), and it is all I can do to find time to listen, QSL and report to I.S.W.C. and N.N.R.C. I buy regularly and greatly value *Short Wave & Television,* and I often find valuable data not given in other magazines I receive.

I am quite impartial in my search for good catches; sometimes I fish for the phone stations only, and as the result I have logged LSY, OPL, GAU, FZS, GAS, GAW, IAC, GBC, TYA, GBS, DZE, TPZ2, KKO, FZE8, KIO, GBP, OPM, LSN, ICK, KEE, KEJ, DAF, KKJ, RKI, ZFA, JVH, JDY, JYS, TYC, FNSK, DOA1, PMC, W2XGB, ITK, IUG, KWU, RIM, IQA, DZH, GBW, IDU.

On other occasions I go for the broadcasters, sometimes sticking to the bands from 6.00 to 10.00 mc. and at other times working from 10.00 upwards to 15.00 mc. Some star catches have been KZRM, YDC, SM5SX, VPDZ, VK6ME, ZMBJ, EA6AH, EAJ43, OAX4G, ORK, LSX, ZTJ, YSD, CR7RH, PMN, and a considerable number of others more easily caught.

I sometimes devote whole evenings to the 40 and 20 meter amateur bands, and among some of my better catches have been K7FST, K7FBE, CE3DW, KA1ME, J2MI, 4 PK's, 8 VK's, ZM2DI, FTE8 (St. Pierre Miquelon) ZE1JR, SU1CH, SU8KG, OX2QY, several XU's, ZU6AF, ZL4BR, and very many others too numerous to mention. (Why is it so hard to get New Zealanders?)

So far my verified log for nine months includes 190 cards from 58 countries in all continents.

I like the make-up of your magazine, especially the *dope* on verifying stations. This data and Joe Miller's department and the "When To Listen In" articles are my favorites. I also find it very interesting to see pictures of rare QSL cards, some of which I myself have received.

Neville C. Seymour,
Insuranshares Certificates Incorporated,
401 Keyser Bldg.,
Baltimore, Md.

P.S.—While in England this spring, I saw copies of your magazine in several "shacks" I visited—and they are the *bible* to those boys!

Constructive Criticism—And How!

Editor,

Taking the editorials, this is considered a good feature, one of interest to all radio-minded persons. The idea of having "Guest" editorials occasionally by leaders in the field of S.W. radio is a good one.

The usual articles describing technical advances in S-W's and Television are interesting, doubtless, but from my own experience, these are rarely read through, usually being only glanced at, to ascertain whether there is any new data to be gleaned of possible value in radio reception.

The point is here made that there is a decided lack of helpful articles for the SWL in getting the most out of his present appartus, or in improving his results, through inexpensive alterations in his listening set-up.

A remark is appropriate here concerning the make-up of these articles. At present, in most articles that have appeared of this nature, not enough data was given to each item, at least from my viewpoint. Consideration is given to the inevitable necessity for conservation of space, but it seems to me that it would be better to take one or two items each month and treat them *fully,* with all angles fully discussed in your usual clear, layman's language.

For instance, at present, antennas are now considered more important than ever before. Articles describing various types of antennae with directional effects would be found to be of much interest among DXers. For myself, wanting to log Africans to help my DX log, I undertook the erection of a diamond rhombic beam aimed at the heart of South Africa. With the help of three other enthusiasts, therefore, it was erected, and the results were most interesting.

All data should not be dealt with in one article, but should be taken and made up into a number of fully detailed articles, published monthly, until all types were fully covered.

Though undoubtedly it is considered to make the magazine more colorful and "eye-catching," the abundance of illustrations seem to me to detract from the publication's effectiveness.

More attention should be accorded to articles dealing with S.W. DX reception. Articles for S.W. beginners (in DXing) dealing with the method of logging of stations, of writing for veris, of how to tell different stations by the sound of their carriers, of how to mount veris and how to care for them, of other small, but to the DXer, important items should be fully discussed in articles every month; one or two items each month being treated, and most completely covered so that the merest beginner will be able to learn the fascinating game within a short period.

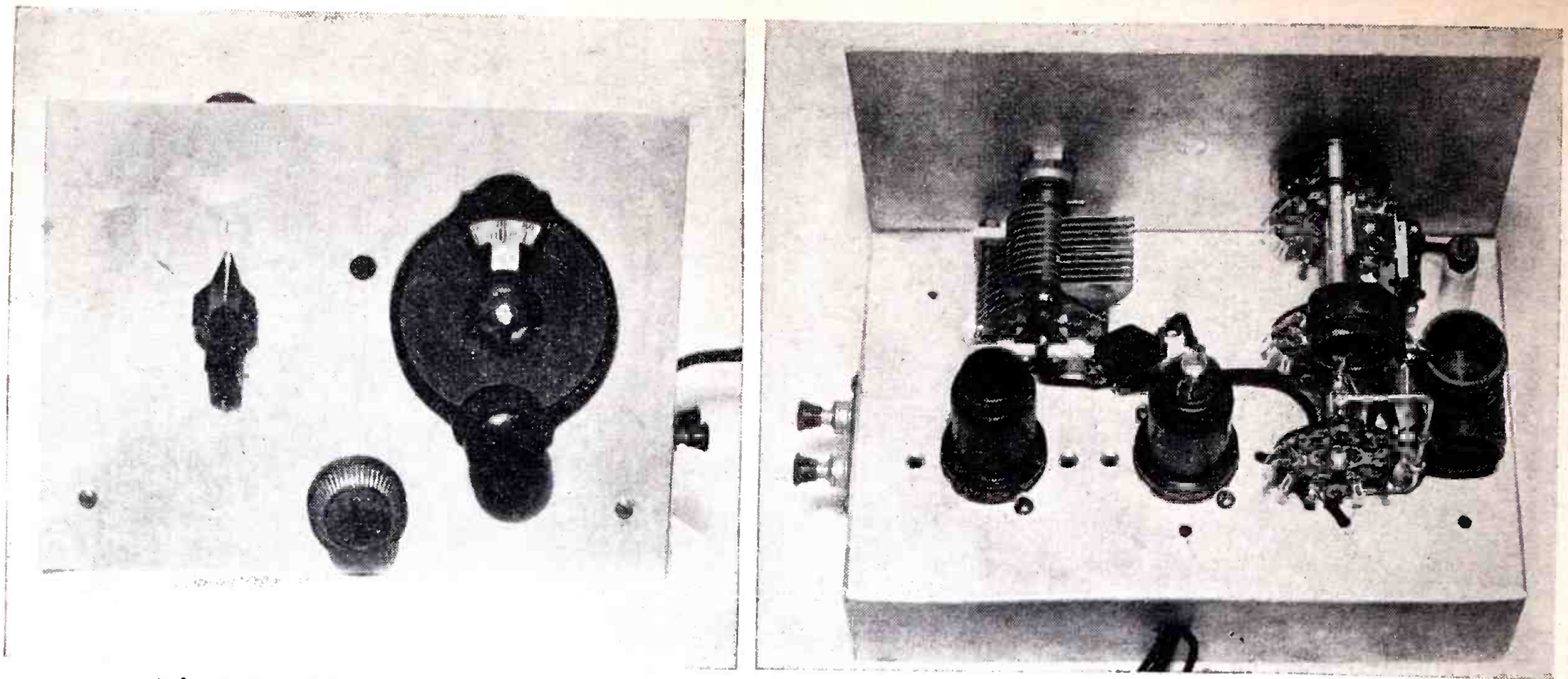
Regarding the Scout Trophy, given monthly, that is a good attraction but doesn't seem to bring as great a response as it should.

Descriptions of the more elementary types of transmitters is of much interest, as many DXers are potential "hams" and plan to some day erect their own station.

Sincerely yours,
J. Miller,
New York City.

● ***The Editors would like to see more letters of a controversial nature. If you are displeased with anything in the radio field, or if you disagree with the viewpoints of authors of articles published in this magazine, write us giving an exposition of your feelings on the matter. We will endeavor to publish all such letters on these pages.***

Miss Beatrice Holman, W1KTG, of Belmont, Mass., who won this Hallicrafter communications receiver at a recent "hamfest" held in Boston.



A front view of the receiver and view behind the panel; note how the coils, condensers and tubes are arranged.

The SWITCH BAND-2 Receiver—for the S-W FAN

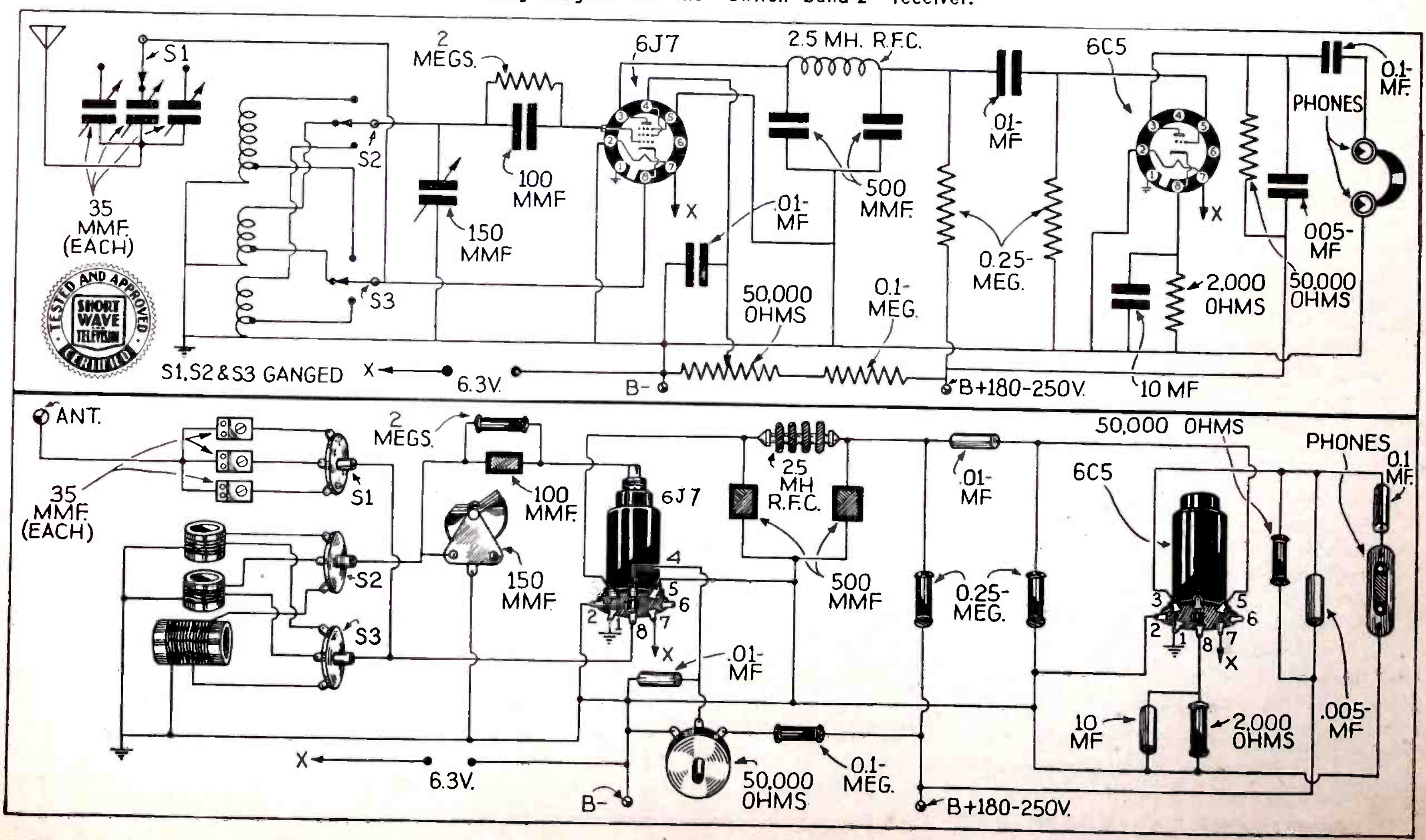
George W. Shuart, W2AMN

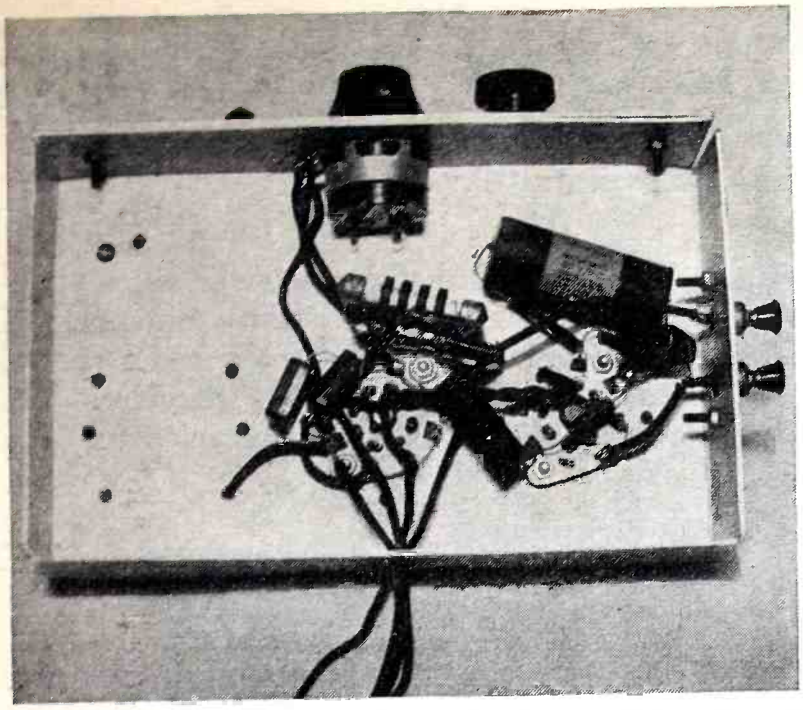
● BAND-SWITCHING is here to stay so we might just as well use it in our smaller receivers and make use of its many desirable features. There are probably two reasons why the beginner in the art of short-wave set building does not use *band-switching* and they are—one, that the first set is by no means a permanent affair and the plug-in coils used in it can be used in another set without breaking down the first one—too, band-switching sounds terribly complicated to the beginner.

Switching Scheme Simple

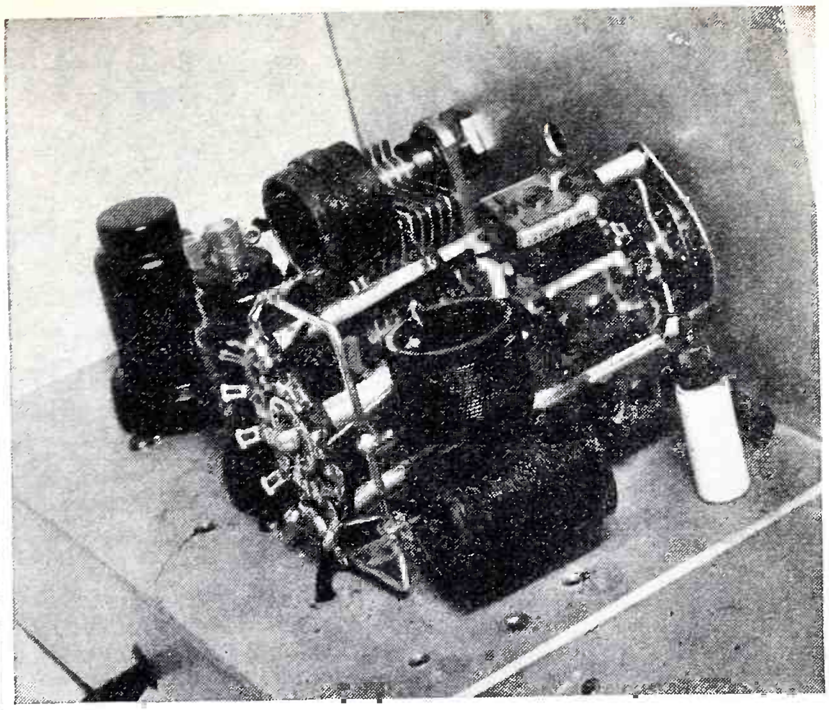
Neither of the above should prevent the newcomer from using band-switching, because in the first place the switching mechanism can be made in a unit that may be changed from one receiver to another, although not as rapidly as can plug-in coils. And in the second place the switching unit is not at all complicated and can be made by the newest of newcomers. The inductance switches that are now on the market are very efficient and

Wiring diagram for the "Switch band-2" receiver.





Bottom view of the receiver, showing the few essential parts required.



Close-up of the hand-wound coils, data for which is given.

With this low-cost receiver the short-wave fan may hear stations in all parts of the world on a pair of headphones. The different bands are switched in or out quickly and proper antenna condenser adjustment is automatically made for each band. A smooth working set with a real kick in it!

not at all expensive. Winding the coils is a very simple matter, just as simple in fact as making the plug-in coils. Choosing the design or method of construction of the unit is the only item requiring the slightest mental strain.

In the band-switching unit used in the two-tube set shown in the photos we have used a three-gang rotary inductance switch of standard manufacture. This switch, as it happens, has eleven positions for each rotor. These are not all necessary of course, but we advise the reader to obtain a switch with more contacts than necessary for two reasons, first, because he may wish to add more bands or circuits to the unit at a later date and, second, because it is advisable to leave some space between the used contacts. For instance we have used every other contact on the stationary plate in order to reduce as much as possible the coupling between any two leads of the coil assembly.

Range Easily Increased

In our case we have divided the most popular short-wave range into three parts by employing three coils. There is no reason why the range of the receiver could not be increased to suit the builder. Adding coils for an increased tuning range will in no way impair the performance of the receiver. The only important point is to keep the coils at a reasonable distance from each other, avoiding crowding and placing each coil at right-angles to the coil nearest to it. If this is done there will be no dead-spots in the tuning range caused by the unused coils.

The diagram shows that the common ground or B— ends of the coils are all connected together to a common lead. These need not be switched. There are only two leads on each coil that are switched, the cathode tap and the grid lead. Using the cathode method of obtaining regeneration simplifies the switching arrangement considerably.

Antenna Condensers Switched Also

By this time the reader will be wondering why we have used a three-gang switch. Well so long as a switch is employed to simplify the receiver, we might as well do the job right. In small receivers where the antenna is coupled to the input of a regenerative stage the degree of coupling must be changed as the frequency to which the receiver is tuned is increased. We can, however, find an optimum adjustment for any one of the various bands into which the range has been divided. This means that every time we change bands we also have to change the antenna coupling. The third section on the switch in this assembly does just that for us. We have employed three antenna coupling condensers and each is set, by trial and error, to give best results in the particular band in which we are tuning. Then as we switch bands we also switch preadjusted antenna coupling condensers. This gives us real switch-band performance without the necessity for fiddling with adjustments every time we change from one band to another.

Coil Winding Data

The coils are wound on one-inch diameter bakelite tubing with No. 24 double-silk covered copper wire. These coils are all close wound. The largest coil has 36 turns and the cathode tap is at the 8th turn from the B minus end; the next largest coil has 14 turns and is tapped at the 3rd turn for the cathode; the smallest coil has 7 turns and is tapped at the 2nd turn from the cathode. These coils cover a range of from 2600 kc. to 15,000 kc. This range can, as said before. be altered to fit the readers' requirements.

Mounting the coils has been done in the simplest manner but any other convenient method may be used. When winding the coils leave leads about six inches long at the start and finish. After the coils are wound, given a heavy coat of coil dope and thoroughly dried, these leads are looped several times through the hole where the coil is started. These loops are about an inch long and are twisted to form a heavy lead which will support the coil and also serve as the connecting leads to the switch.

The tap on the coil is formed in a conventional manner, by making a small loop in the wire as the coil is wound. A glance at the rear view of the receiver will show the reader just how the coils are supported and mounted on the switch. Under each supporting screw at the end of the switch plate place a soldering lug. A piece of No. 12 bus-bar is formed in a manner to support one end of the three coils and also to serve as the common B— lead. The other ends are supported by the heavy twisted leads, mentioned before, which are soldered directly to the terminals of the switch.

Screen-grid Regen. Control

The rest of the receiver is more or less the same as any other two-tuber. It employs a 6J7 detector and a 6C5 A.F. Amp. Any similar tube combination may be used with equal results. No band-spread is provided other than the use of a 270 degree tuning condenser which helps to spread out the tuning. Band-spread may be added or the receiver may be made to operate in narrow bands such as the *ham* bands, by using small

(*Continued on page* 584)

NEXT ISSUE!!

Part I—

The "S. W. & T" 441-Line

CATHODE-RAY

Television Receiver

For "Sight and Sound" Reception.

Designed by—

C. W. Palmer, E.E.

John Ledden, Hollywood personality and former New Jersey newspaper publisher, looks over the "upstairs" layout. Note the output coil with shield removed.

UHF CONVERTER

Raymond P. Adams

This specially designed 5 and 10 meter converter employs inexpensive metal tubes in a new circuit. It has a regenerative mixer, a very stable oscillator, A.C. power-supply, and a special arrangement for matching the output to any receiver. This converter will bring in high-fidelity BC. transmissions, also television "sound" channels.

● A LITTLE while ago—when 5 meter and general UHF communication was something new and the average transmitter working at extreme frequencies was a single-tube, self-excited affair putting out a signal both broad and uncertainly located in frequency, our best and perhaps only receiving bet was the familiar super-regenerator, which featured good sensitivity on the one hand and a wide acceptance on the other. Superhets were as a rule quite out of question, as they generally provided us with far more noise than signal, involved large constructional cost, and were altogether too selective to hold creeping signals and to afford a band-width sufficient for amplification of much more than the intelligible voice frequencies.

But times, conditions, and transmitting practices have changed. While a great many transceivers are still in existence, the average mobile job employs a M.O.P.A. transmitting set-up; and an increasingly large number of amateurs are on the 56 mc. band with quite stable, crystal-controlled signals (Broadcasters, of course, hold frequency exactly). And however much the superregenerator remains a widely accepted type of receiver by reason of its simplicity, low cost, sensitivity, and broad tuning—more and more listeners are turning to the superhet for UHF signal interception (an expected and paralleling trend, of course); the more modern superhets, frankly, perform in a distinctly acceptable manner, noise being minimized and band-width extended through proper design and the use of the now-available I.F. components in the higher frequency ratings.

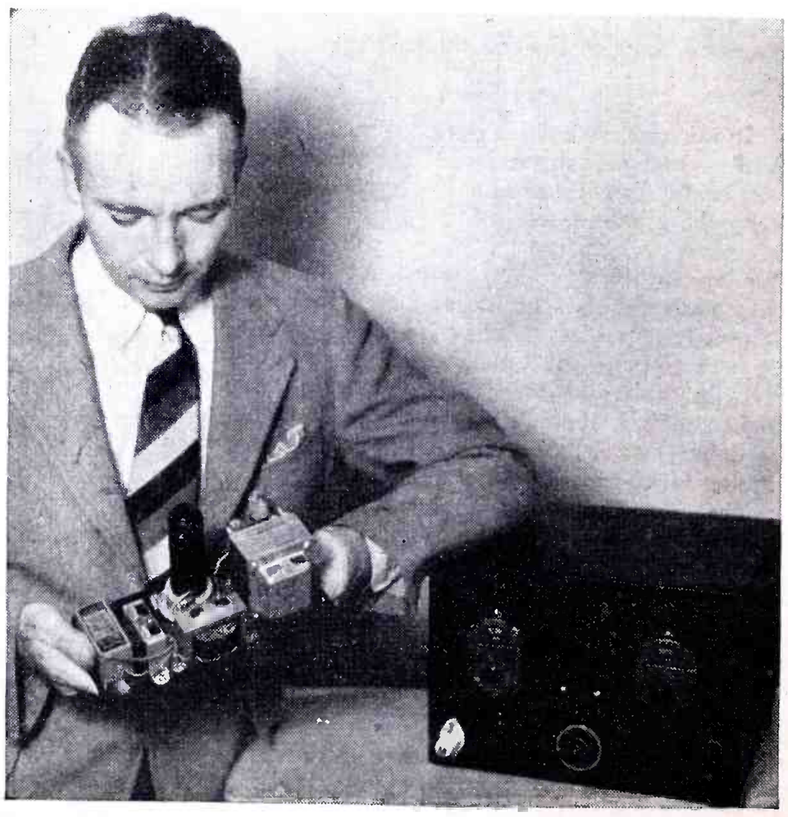
UHF broadcast signals, as we have noted, are very well controlled and show so little drift that they may be held on any superhet, whatever the I.F. This does not mean to say that any superhet will afford a wide enough acceptance for the high-fidelity pick-up of these signals, which are generally characterized by extremely wide modulation range, or that it will do a good job on audio modulation tracks related to *video* (picture) transmissions for television; nor does it say that any superhet will afford proper image rejectivity with UHF inputs. But it does make it clear that the conventional-modern day receiver will at least permit the intelligible reception and logging of the transmissions, which is something of an experience whether full modulation is passed or not.

Amateur phone transmissions, being similarly well controlled on the whole, may also be held and logged—within limits of course. Then, amateurs, today, don't spend much time seeking modulation-system fidelity; frankly, they deliberately hold modulation width to the intelligible voice frequencies, and for very obvious reasons; and if the I.F. portion of a receiver will accept these frequencies—if the receiver has say a normal 8 to 10 kc. band-pass characteristic or means of varying the selectivity through the overcoupling of coils in I.F. components—then very satisfactory reception may be expected on all but broad and creeping transmissions, matters of proper image rejectivity not being considered.

Those matters of image, however, *are* important to the critically-minded amateur and experimenter. They depend upon input range, input acceptance, dial coverage, and the frequency of the I.F. For good image rejectivity on 10 meters, the I.F. should be at least 1500 kc.; for similar rejectivity on 5 meters the I.F. should be from 3,000 to 5,000 kc. in value; and from this it is apparent that where *any* I.F. will be at least acceptable for signal pickup, logging, and intelligible reception — a very definite I.F. is in order where image selectivity *must* be considered. A UHF superheterodyne logically should have an I.F. tuned somewhere in the 5,000 kc. to 1500 kc. range—the value being such as to give best image rejectivity with a certain R.F. coverage—or compromise rejectivity where the coverage is extended over several plug-in coil ranges.

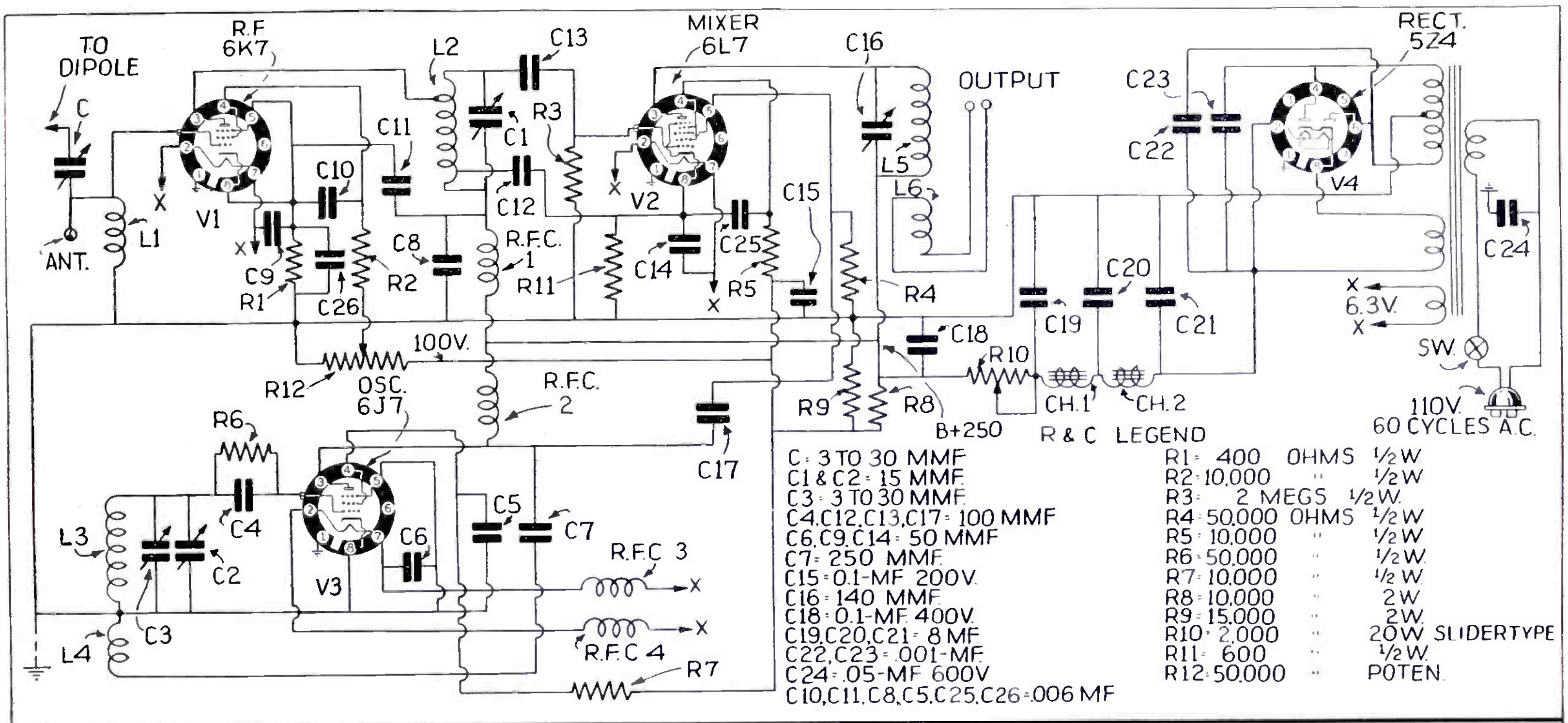
This brings us to a consideration of the practicality of a *converter* tunable over UHF wavelengths and designed to feed its output into an available receiver (TRF or Superhet.) If an ordinary super with any I.F. will do the trick providing its *front end* coverage extends to and through ultra-high frequencies, then very certainly a *converter-receiver* assembly will work out satisfactorily. If the receiver is a *broadcast-band* job, then we may convert to 1500 kc. and provide for a fairly good compromise image rejectivity with 60 to 30 mc. input; if the receiver is an *all-wave super,* then we may convert to any initial I.F. which seems most satisfactory, tuning the receiver to that frequency. If the broadcast-band receiver is of the TRF or variable selectivity superhet type, a fairly good acceptance may possibly be provided, particularly suitable in any event for 10 meter reception. If the all-wave receiver is properly designed, it will provide for proper image selectivity whatever the converter tun-

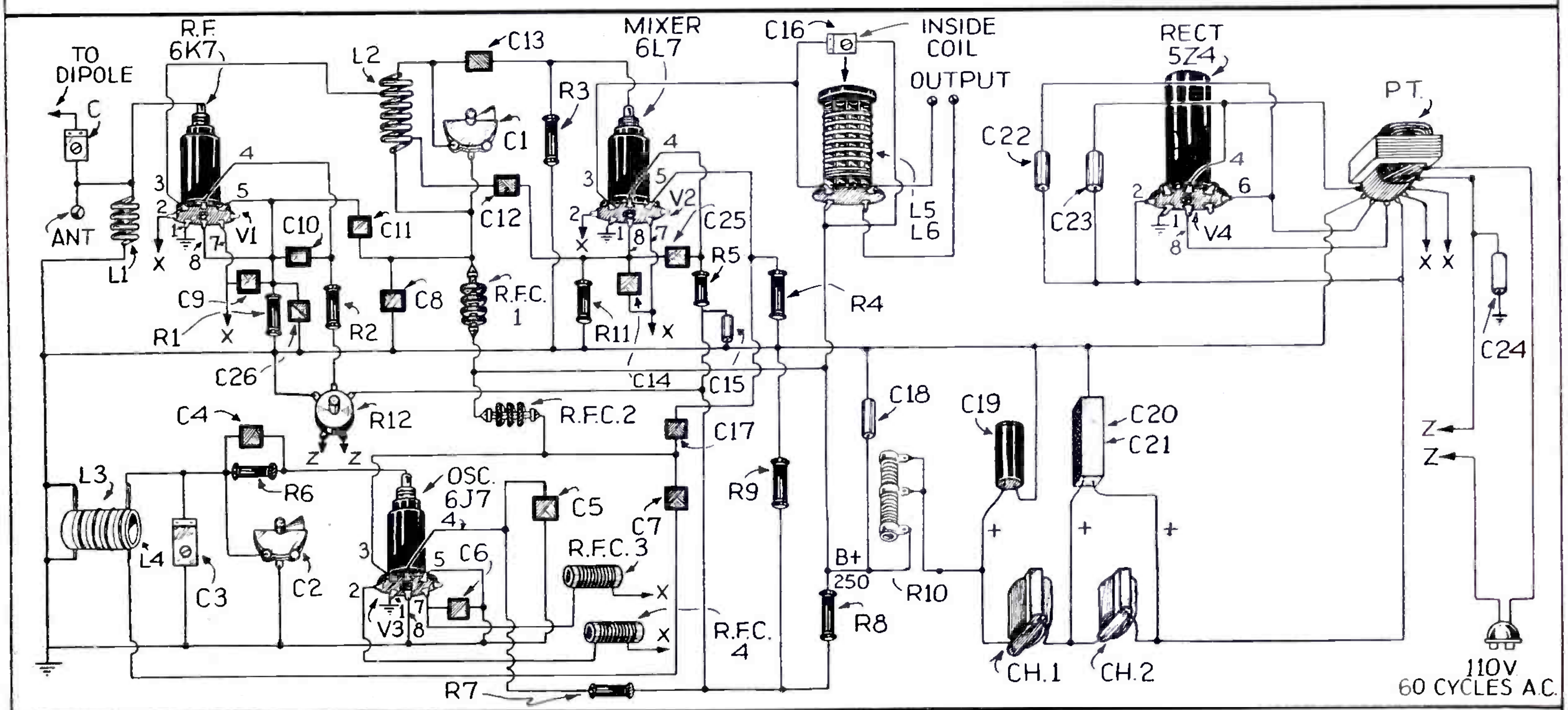
(*Continued on page* 585)

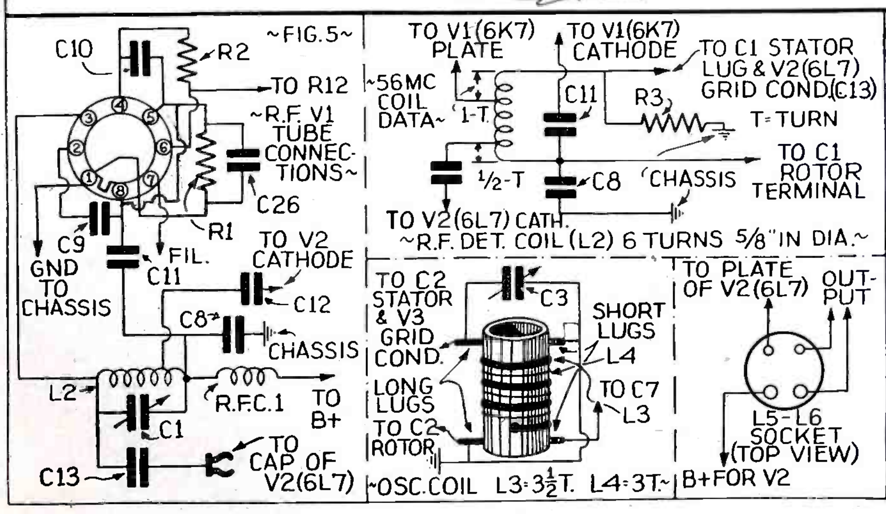


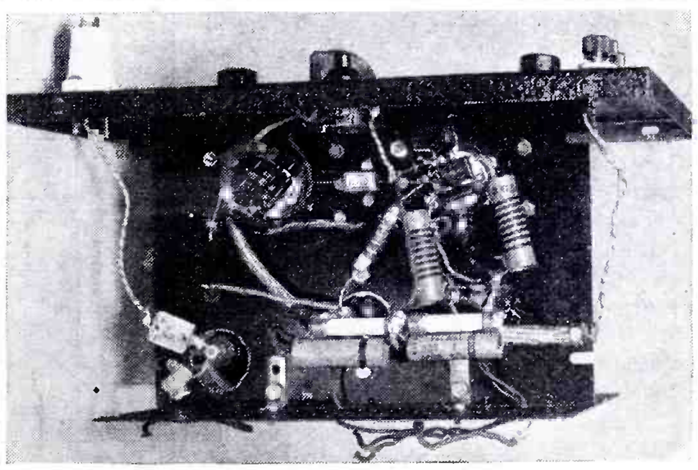
Mr. Leddin, who is a short-wave enthusiast, examining the "power-supply," which has been removed from the converter cabinet.

Brings in 5 and 10 Meter Signals On Your Present Receiver

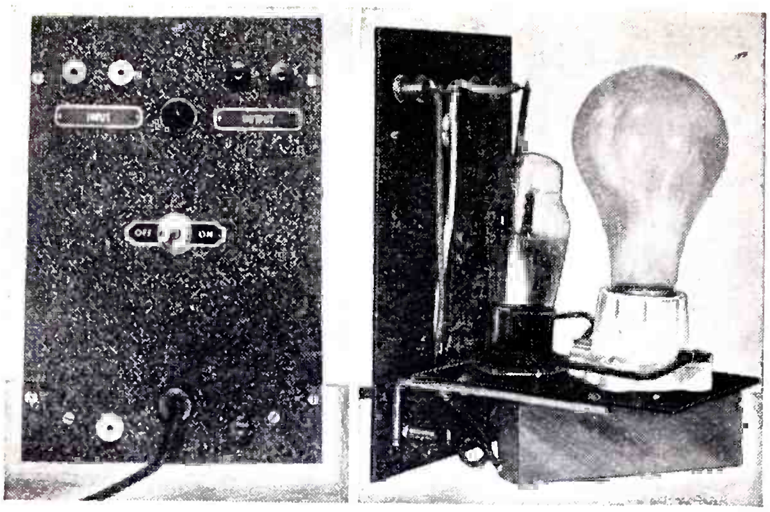








Complete wiring diagrams, in both schematic and picture form, are given above. Even the beginner should experience no trouble in building this 5 and 10 meter converter. The photo shows an under-chassis view.



Front and rear views of peak voltmeter.

How To Build A Peak Voltmeter

P. M. Ohlinger

A peak voltmeter is useful to every radio experimenter. Here's how to make one simply and cheaply.

● A PEAK voltmeter is a handy piece of equipment for the experimenter or serviceman to have about. The unit to be described will allow any external D.C. voltmeter to be used to measure peak A.C. voltages. Ordinary voltmeters and ammeters measure the effective or R.M.S. (root mean square) voltage only.

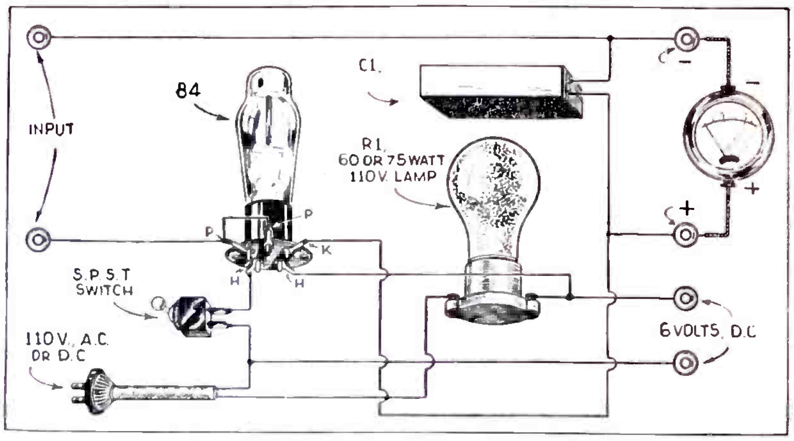
For alternating voltages and currents of true sine wave variation, the RMS voltage, multiplied by 1.41 gives the peak A.C. voltage. For instance; A voltage of 110 volts A.C. multiplied by 1.41 gives us 155, the peak A.C. voltage. The peak voltage multiplied by .707 gives us the RMS voltage. A peak voltage of 140 multiplied by .707 gives the RMS voltage of 98.9. These formulas hold true only for a true sine wave, and values of waves other than this must be found with a peak voltmeter.

Keep in mind the fact that although the ordinary voltmeter readings in RMS values may indicate that the current and voltage rating of chokes and filter condensers is high enough, the insulation must be able to stand the *peak voltage* in A.C. circuits and this *twice* in every cycle.

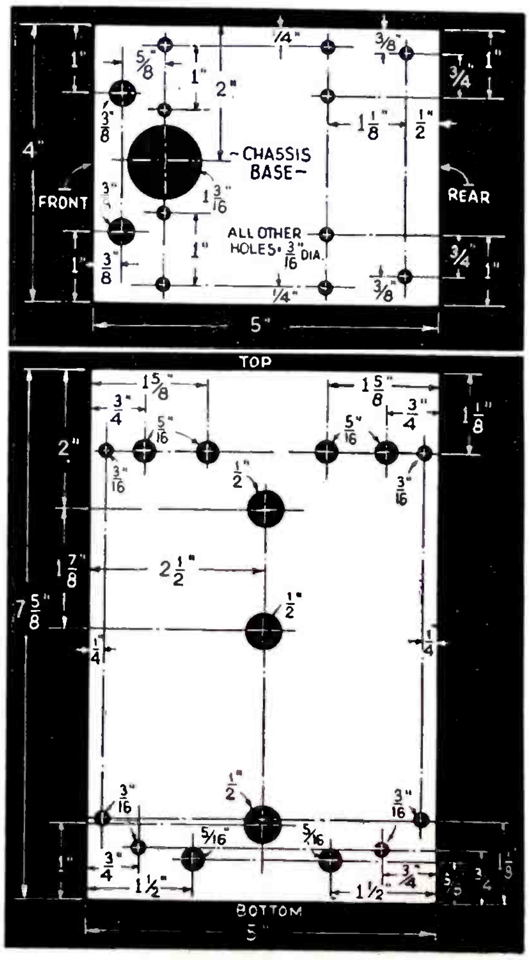
A few of the uses this peak voltmeter unit may be put to are:

1. Measuring peak voltages, especially across the first filter condenser, as this condenser must have a voltage rating slightly higher than the peak voltage.
2. As an output meter when connected from plate to plate or plate to chassis. Also connections may be made directly across the voice coil of the speaker and readings taken when a low meter range is used.
3. To find transformer ratios, open circuits, noisy or incorrectly center-tapped transformers, apply the 110 V. A.C. line voltage to one winding of a transformer and measure the voltage developed across the other winding with a peak voltmeter. Dividing the one voltage into the other will give the approximate ratio of step-up or step-down.
4. To measure the peak A.C. voltage across the high voltage winding of the power transformer.
5. To determine the efficiency of the filtering in power supplies. Measure the peak voltage across the first filter condenser. Now measure the RMS voltage. The difference between the two voltages is the A.C. ripple voltage. The decrease of the A.C. ripple across the succeeding chokes and filter condensers will determine the efficiency of the filtering network system.
6. Vibrator units and power packs of auto and 6 volt farm radios can be efficiently tested by this unit because it draws little current.

Peak voltages from ten or twenty volts on up can be measured with a good degree of accuracy. The accuracy is dependent on the type meter used, the 1000 ohms per volt type being preferable, using a scale of 100 volts and more. It is important also to use the paper condenser specified, as this affects the accuracy of the unit in that if there is much current drain through the condenser, the meter readings will be inaccurate and low in value.



Wiring diagram for the constructor.



Chassis layout details.

The unit is housed in a shield box finished in black crackle enamel, dimensions of the box being 4½ x 7½ x 5 inches high. The front panel fastens to the extended flange of the shield box, making the unit ideal for panel mounting.

Insulated tip jacks are used on the metal front panel and name plates mark the jacks INPUT and OUTPUT. Of the two Input jacks, the lead from one connects to the plate of the type "84" tube and that of the other to the lead of the condenser. One lead from the *output* jack connects to the cathode of the tube and the remaining lead of the condenser. The lead from the other *output* jack goes to the *input* jack which is connected to the condenser.

The external voltmeter is plugged into the *output* jacks, which are color-coded as the correct polarity must be observed in the meter connection. Test leads are connected to the *input* jacks and the voltage to be measured.

The filament circuit has been arranged so that this instrument may be used on either 110 Volts A.C. or D.C. or 6 volts battery. Leads to two insulated jacks are brought to the front panel for the battery connections.

The current drain of the type "84" tube differs with the tube brand but a 60 watt, 110 volt lamp will drop the 110 AC-DC volts to a filament voltage suitable for operating the tube specified.

PARTS LIST

CORNELL-DUBILIER

RM6200—2 mf. 600 W.V. Capacitor.

(Continued on page 592)

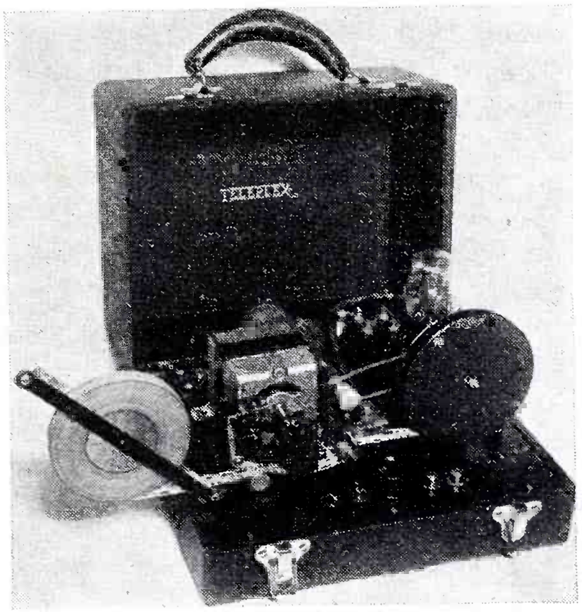
LATEST in Short-Wave APPARATUS

Machine Makes Learning Code Easy

● THE dits and dahs that mean radio code have prevented thousands of people from enjoying the most fascinating of all modern hobbies—Amateur Radio. As a matter of fact, learning to send and receive the code is very simple. The process is relatively slow and one cannot see from day to day that he is making any progress. For that reason many beginners become discouraged and give it up.

For the past fifteen years R. G. Miller has been making code-teaching instruments to aid beginners in mastering the dits and dahs. He recently said, "Any one could learn the code with my first *code instructor*. But that is not enough; I must provide a method whereby one will thoroughly master the code."

In the old days when students used the *teleplex* to learn American Morse, it meant a living to them, and they worked hard to learn, because it meant a job. With the advent of *amateur radio* beginners were not faced with the urge of necessity and frequently became discouraged and quit. It was then that Mr. Miller started bending all of his efforts toward finding a way to make the study of code more interesting so that the student would actually want to practice.



This tape-operated machine teaches you code, or it may be used to record code signals. (No. 678)

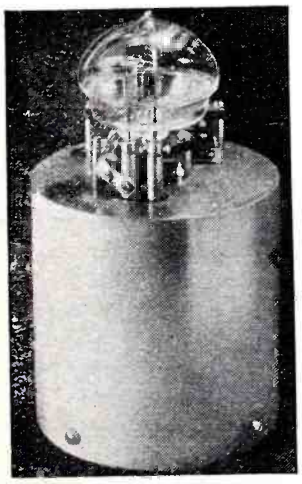
The new Master Teleplex is practically a perfect code instructor. This instrument does not send mechanical signals; it is a mechanical means of sending *actual* code signals that are made by hand or with a "bug."

The device comes complete with everything that is necessary for a beginner to thoroughly master the code, or for an experienced operator to speed up his sending and receiving. It operates on 110 volts A.C.; just plug it in and it is ready to go.

The new code teacher will accurately *record your own sending* so that you can see exactly how you make your characters. It will then repeat them back so that you can hear how your signals sound. This is an extremely important and valuable feature, because the U. S. Government requires you to pass a test in *sending* as well as *receiving*. Most people are of the erroneous opinion that learning to send is easy. As a matter of fact, learning to send *properly* is much more difficult than learning to receive. Even among professional operators we find exceedingly few good senders. Sending is very much like handwriting. Everyone sends differently—everyone has his own peculiar characteristics. An experienced operator learns to recognize the sending of another operator just as one recognizes another's hand writing. No operator really knows what his sending sounds like—he doesn't know whether he is a good sender or not —unless he has some means of *recording* it. Just try writing a few words blindfolded and then see how much better you can do with your eyes open. That will give you a clear idea of what it means to be able to *see* your own signals.

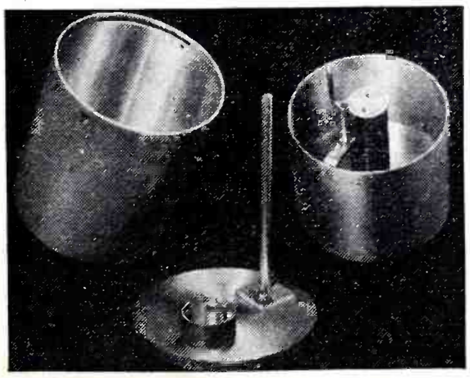
As every operator sends differently a person must be able to read *all* of them if he expects to get the full enjoyment from amateur radio. An ingenious scheme has been worked out for exchanging tapes, so that students using this machine will have the advantage of unlimited practice material. When a student is convinced that he can send readable signals, not necessarily perfect signals, he submits a sample of his sending. If the signals are found to be readable, he is given a list of other students who (*Continued on page* 591)

Ultra-Hi Freq. Oscillator



A new U.H.F. oscillator (No. 679)

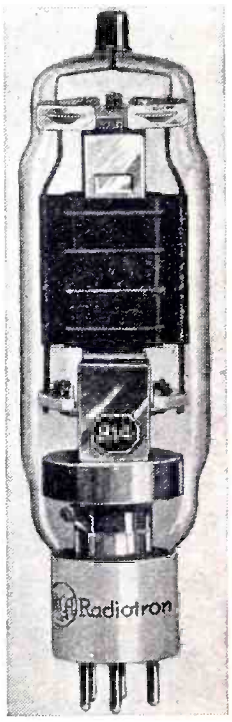
● THE photos at the left and at the bottom of the center column, show an interesting new ultra-high-frequency oscillator intended for measurement making applications. This oscillator uses one of the new U.H.F. tubes and it operates at frequencies as high as 100 megacycles or 3 meters; at this frequency the "Q" of the resonant circuit is approximately 2500. This oscillator fulfills laboratory requirements which demand a high degree of frequency stability under varying external conditions. A confined electro-magnetic field, ample output for use as a source for high-frequency measurements, and finally a convenient physical size. The complete oscillator as shown in the photo herewith has an overall height of but 7". Referring to the photo in which the tank circuit is shown in disassembled form, the outer brass shell is shown on the left, the inner copper cylinder on the right. The brass disc in the foreground closes the brass cylinder after the copper insert has been placed in position. The small copper cylinder, located eccentrically on a shaft passing through the disc, is used in conjunction with the large copper cylinder to form a small, variable condenser for the adjustment of the frequency to a particular (*Continued on page* 591)



The concentric-element oscillator tank circuit disassembled.

New Beam Xmitter Tube

● HERE is one of the newest tubes of interest to short-wave hams, a transmitting beam-power amplifier, known as the RCA 814. This tube is particularly suited for use as an R.F. power amplifier, oscillator and frequency multiplier. In class C service it is capable of giving a power output of 130 watts, or better with a driving power of only 1.5 watts. The tube has top cap plate connection to insure high insulation and low grid-plate capacitance, with effective shielding to minimize the need for neutralization. A ceramic base is provided also and the tube is of the filament type. The screen absorbs little power (*Continued on page* 591)



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

World-Wide Short-Wave Review

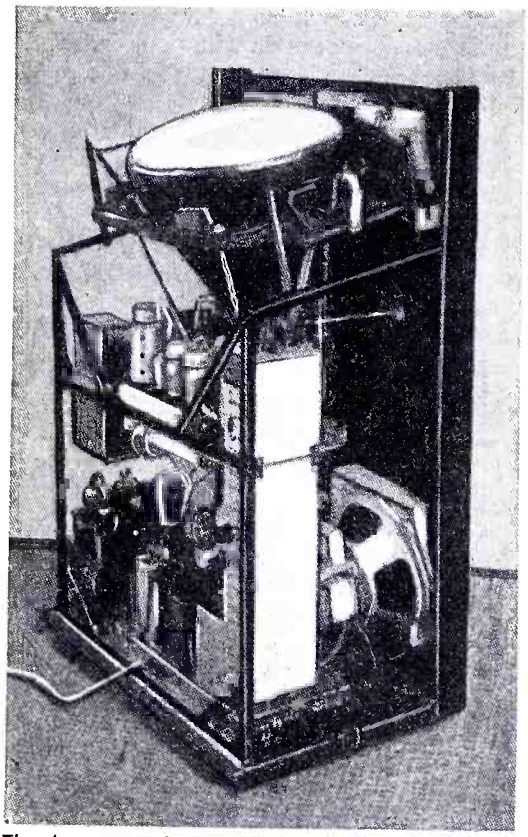
—Edited by C. W. Palmer

A German Television Receiver

● IN the latest issue of *Populaer Radio* (Copenhagen) an interesting view of the latest model Telefunken image receiver was shown.

This set, shown in the photo here, is a combination image and sound receiver using 36 tubes and built to receive 441 line images on the waveband between 4 and 7 meters.

The positions of the parts, especially the cathode-ray tube, which tilts back against the edge of a mirror is interesting to the television-minded short-wave fan. This vision tube, incidentally, operates with a potential on the focusing electrodes of 12,000 volts and produces images of approximately 8 x 10 inches.

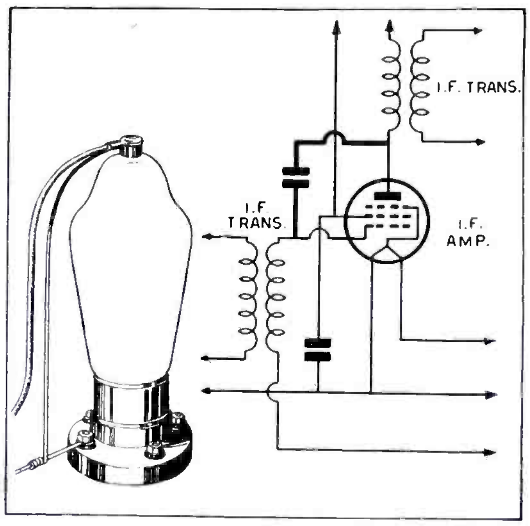


The latest model Telefunken television receiver for both image and sound. It uses 36 tubes and will pick up the new 441 line images.

C.W. On a Superhet

● IT is usually considered necessary to couple a separate oscillator to the I.F. amplifier of a superheterodyne receiver in order to receive continuous wave signals. This necessitates changes in the wiring and an additional tube which cannot always be fitted onto the chassis of the set.

Another way to produce this oscillation was described in a recent issue of *Practical and Amateur Wireless* (London). It consists of providing feedback in one of the I.F. amplifier tubes so that this tube will oscillate and thus produce the interfering voltage which makes the C.W. signal audible.



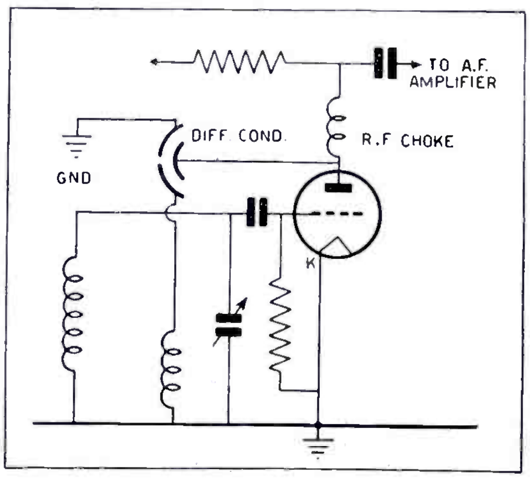
A clever way in which to receive C.W. signals on a superhet receiver. This circuit provides feed-back in one of the I. F. amplifier stages, thus causing the oscillations necessary for C.W. reception.

A very simple method of introducing regeneration in the I.F. amplifier is to couple a wire from the control grid to the plate, as shown in the sketch. As shown in the circuit this wire, which is connected to the grid and is insulated from but wrapped around the plate wire, is the same as a small condenser connected between the grid and plate.

It may be necessary to readjust the trimming condensers on the I.F. transformers to permit high efficiency.

Differential Regeneration Control

● IN Europe, the regeneration in the detector circuit of regenerative receivers is often controlled by means of a "differential condenser" which consists of two small variable condensers on a single shaft. In its usual form this condenser consists of two stators with a single rotating group of plates which shift from one set of stator plates to the other.



By using a differential condenser as described in the article, superior reception in regenerative circuits is made possible.

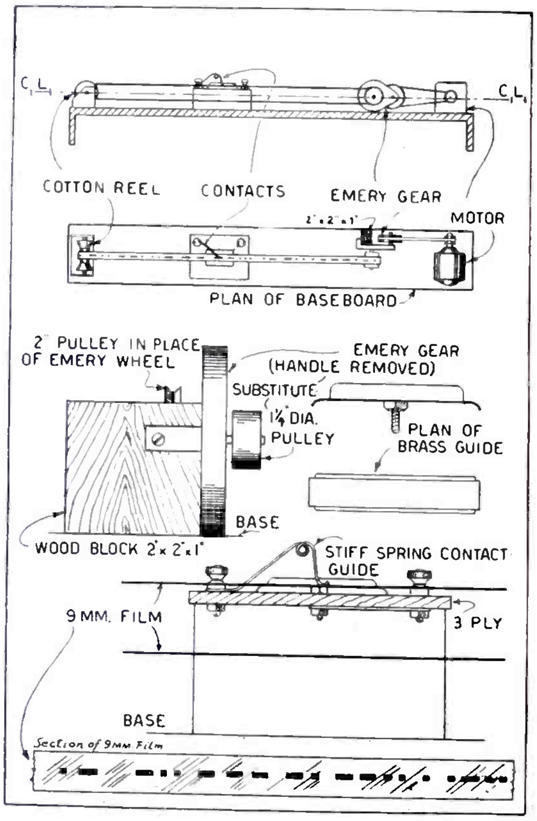
This condenser has never become popular in the U.S., but it actually has certain advantages over the usual condenser or resistance control of feedback.

The circuit shown here is a part of the usual type of regenerative circuit found in English radio magazines. When the differential condenser is in the lower position, the condenser acts in the usual manner to control the reactance of the plate coil, so that the regeneration can be adjusted just below the oscillation point.

However, on those parts of the bands where very little regeneration is needed, and a very small capacity is used, the plate bypass, which is provided by the regeneration condenser, is so small that instability often results. This difficulty is overcome by the second set of plates connected to ground which provides the needed bypass to ground, at the same time allowing the desired small feedback capacity.

While differential condensers are not available in the U.S., two small trimmer condensers can be connected on the same shaft with the stators opposite so that one condenser increases in capacity as the other decreases. The two rotors are then connected together and replace the single rotor of the differential condenser.

An Automatic Sender For C.W. Work



In this automatic code transmitter the signal is recorded on a strip of celluloid in the form of slots, which cause contacts to open and close the transmitter circuit.

● EVER since the early days of amateur radio "Rube Goldberg" gadgets have been made to automatically send CQ signals, test signals, and the many other long repeated signals that hams must otherwise pound out

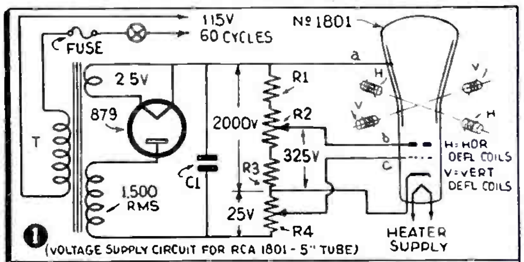
(*Continued on page* 578)

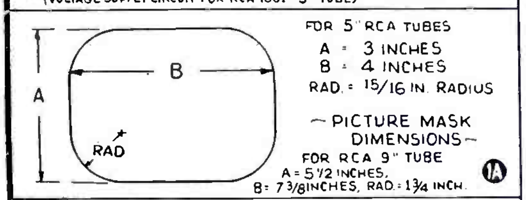
TELEVISION Sweep Coil Data

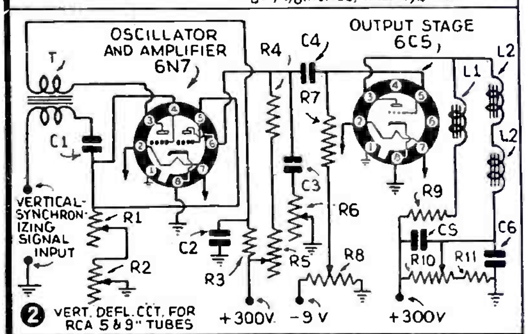
Complete constructional data is given here for building the oscillators and magnetic scanners for use with the new RCA cathode-ray television tubes.

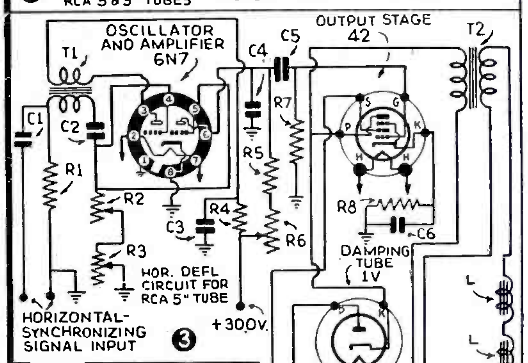
● INTEREST in television reception is increasing at a great rate, due for one thing to the recent introduction to the experimental fraternity of the new 5" and 9" diameter cathode-ray tubes by RCA. These tubes are specially designed for experimental television reception and are for use with electromagnetic scanning. Data for building the scanning or sweep coils is given here.

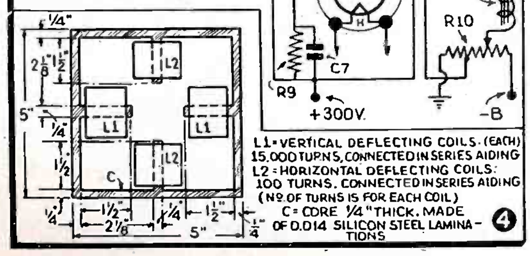
The picture below shows various circuits necessary for exciting the magnetic scanning device used with the new experimental television tubes. Complete data on the circuits is given in the accompanying article.











Kinescope RCA-1801 is a cathode-ray tube designed primarily for the reproduction of television pictures. It is being used by the amateur and experimenter for the reception of experimental television transmissions. This tube is intended for use with electromagnetic deflection and has a bulb-end 5 inches in diameter. The screen, which fluoresces brightly with a yellowish hue, accommodates a picture 3 inches by 4 inches in size.

Five-Inch Electromagnetic-Deflection Type with Medium-Persistence Screen

The electrodes in the 1801 provide a focused beam of electrons. These electrons impinge on the fluorescent screen and produce a spot of light. The brightness of this spot can be controlled by a modulating voltage applied to the grid. The position of the spot can be controlled by means of two sets of electromagnetic-deflecting coils, one of which is used to control the horizontal movement of the spot; the other, the vertical movement of the spot.

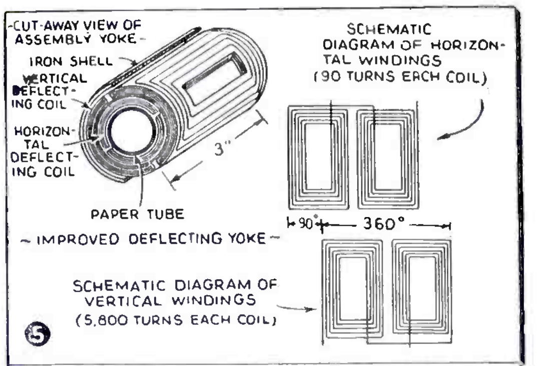
In the use of the RCA-1801 for television reception, currents of sawtooth waveform are supplied to the vertical-deflecting coils and to the horizontal-deflecting coils. The resultant deflections cause the spot to scan the rectangular picture area on the screen. At the same time, the television picture signal is applied to the grid to modulate the brightness of the spot. As a result of the modulation and motion of the spot, the spot traces on the screen of the Kinescope a reproduction of the scene being transmitted.

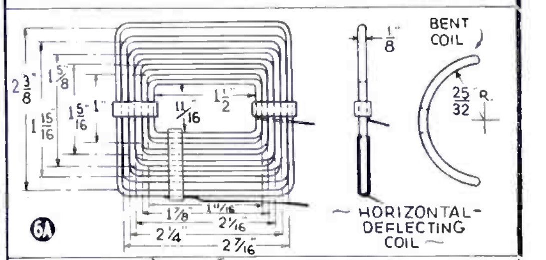
Tentative Characteristics and Ratings

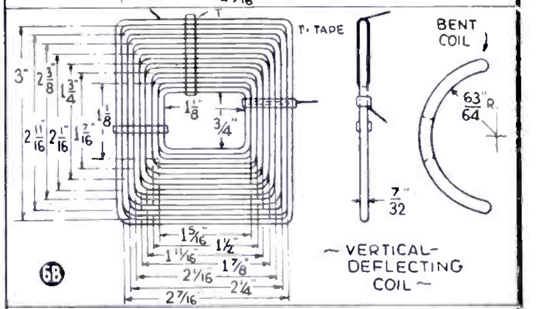
Heater Voltage (A.C. or D.C.) .... 2.5 Volts
Heater Current .... 2.1 Amperes
Fluorescent screen:
  Material .... Phosphor No. 3
  Color of Fluorescence .... Yellow
Direct Interelectrode Capacitance:
  Grid to all other electrodes .... 12 *max.* mmf.
Overall Length .... 15¾" (plus or minus ⅜")
Maximum Diameter .... 5 1/16"
Bulb J-40
Cap .... Medium Metal
Base .... Medium 5-Pin

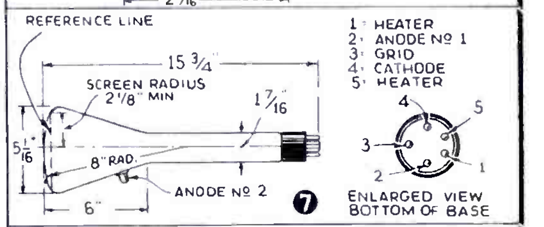
Maximum Ratings and Typical Operating Conditions

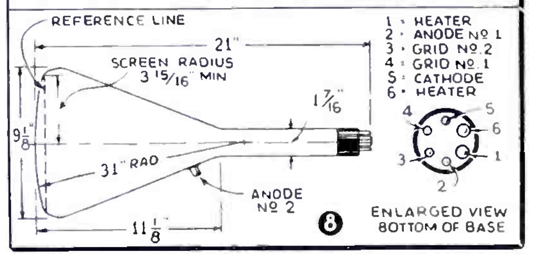
High-Voltage Electrode (Anode No. 2) Voltage .... 3000 *max.* Volts
Focusing Electrode (Anode No. 1) Voltage .... 1000 *max.* Volts
Control Electrode (Grid) Voltage ..... Never Positive
Grid Voltage for Current Cut-off* —35 *approx.* Volts
Fluorescent-Screen Input Power per Sq. Cm. .... 10 *max.* Milliwatts
Typical Operation:
  Heater Voltage .... 2.5 Volts











The diagrams above provide further details of the sweep oscillator circuits and magnets to be used with the new tubes.

Anode No. 2 Voltage .... 2000 Volts
Anode No. 1 Voltage (Approx.) .... 325 Volts
Grid Voltage adjusted to give suitable luminous spot
Grid Signal-Swing Voltage (Approx.)** ... 15 Volts

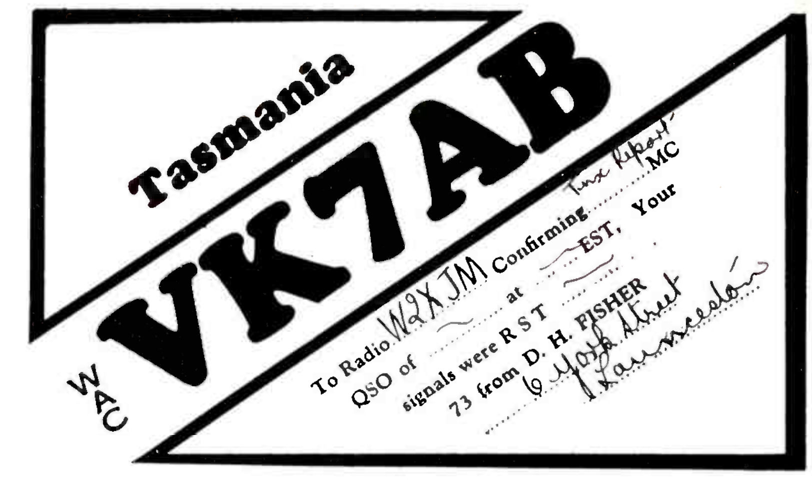
*With approximately 500 volts on Anode No. 1 and 3000 volts on Anode No. 2.

**Peak-to-peak value for optimum contrast.

Installation

The *handling* of RCA-1801 in transportation and storage requires great care, because the tube may be broken or permanently damaged if subjected to sudden jars or excessive strains. Each 1801 is supported within its shipping carton so that it will not come in contact with the sides of the carton during shipment. When the 1801 is stored or transported, the tube should be protected from moisture and should be in an upright position with the large end of the bulb (viewing screen) always up. In no case should the tube be placed on or slid across a hard surface, such as a table or a laboratory work bench. Such practice may result in scratches at the rim of the conical portion of the bulb, where the viewing screen merges into the bulb flare. Scratches on the bulb, especially on this por-

(*Continued on page 576*)



VK7AB, Tasmania—A neat card with black letters contrasting beautifully on a white card.

Let's Listen In

Winner of the 30th

● CONDITIONS for the month of November have been quite profitable in the matter of accumulating a good log of new DX stations, although as usual, the amateurs have supplied most of the activity.

Up to about the last week in November conditions had been fairly good on all bands, but during the last week, a universal plaint has been raised by amateur and SWL alike, regarding the noticeable let-down in DX reception, most marked on the 20 meter band, which generally serves as a reliable gauge of conditions best suited to long distance reception.

At the time of this writing, poor conditions still persist, but we feel certain that "the band" will open up again, to help us to further enrich our log book with jottings on good DX catches.

What Is a Veri?

We have been requested by the Golden Gate Chapter of the International DXer's Alliance, San Francisco, through Ashley Walcott, Secretary, to state our opinion in regard to the matter of so-called "artificial verifications," and, as our opinion coincides with that of the findings of a referendum made at a meeting of the G. G. Chapter, we are glad to clear up the matter here.

The above is in regard to the issuance of unauthorized verifications of reception for transmissions from Daventry, and also from HRN, Honduras, and perhaps other stations.

It is our opinion that such confirmations are worthless, and as such, will not be accepted for any contests in which verifications need be entered. It is to be noted that the practice of verifying reports of reception of the above mentioned stations has in no way been authorized by these stations!

Furthermore, this practice will have a most harmful tendency in regards to the grand hobby of QSL collecting.

If continued, such procedure will eventually be regarded by a goodly number of stations as sufficient excuse to discontinue their own verification work, something perhaps unforeseen when this practice was begun by several Eastern DX fans. We must give a little credit to these fans for their good intentions, as they sacrificed their time to "monitor" programs, and conducted the system on a "cost" basis, but we feel certain these parties did not foresee into what a muddle they would lead the verification hobby, if such a practice spread, and was accepted by more and more stations.

In general, the above opinion has been found to be in accord with that of other leading radio publications, and with that of the leading DX Clubs in the U.S.A.

Therefore, we hereby request of the authors of this "artificial verification" system that they realize the bad effects the hobby will eventually suffer, and that they discontinue further activity along this line. We hope to see this practice cease.

And now to DX:

MADAGASCAR

Radio Tananarive, located in the city of Tananarive, is now being heard on three frequencies on the West Coast, by Ashley Wolcott, our Pacific Coast correspondent.

● ***If you have logged a new station be sure to write the DX Editor, c/o Short Wave & Television, and give him this information for the benefit of other listeners.***

Ashley received a veri of the 9 mc. frequency, and data in the letter states that Tananarive now operates on the following freqs.: 10.96, 9.503, and 6.069 mc. However, Ashley hears Tananarive on these freqs.: 10.95, 9.38, and 6.06 mc.!

The 10.95 mc. freq. is reported as the best signal, 9.38 mc. next best, and 6.06 mc. is heard only on good mornings, all these heard from 10-11 a.m., E.S.T. on the coast.

However, for Eastern DXers the best time is daily from 3:30-4:30 a.m., and on Sundays from 2:30-4 a.m., this being the latest schedule received.

Having already verified Tananarive on 6 mc., we are going to try for the two other freqs., and hope to be able to report favorable results on at least one of the two, as we have just received the new '38 Skyrider, which we feel is fully capable of receiving these faint, rare, signals, judging from our brief tests for a few days. Next month we will give the results of our tests on this fine receiver.

Back to Madagascar! This station usually tests for about 15 minutes before each broadcast, ordinarily playing one record over and over, the well-known "Over the Waves" waltz. Of course, all frequencies transmit simultaneously. Opening announcement is *"Allo, allo, ici Station Radio Tananarive."* To be mentioned is the fact that Tananarive's freqs. are inclined to be unstable, but should be found somewhere near freqs. listed. Full QRA are given in a previous column.

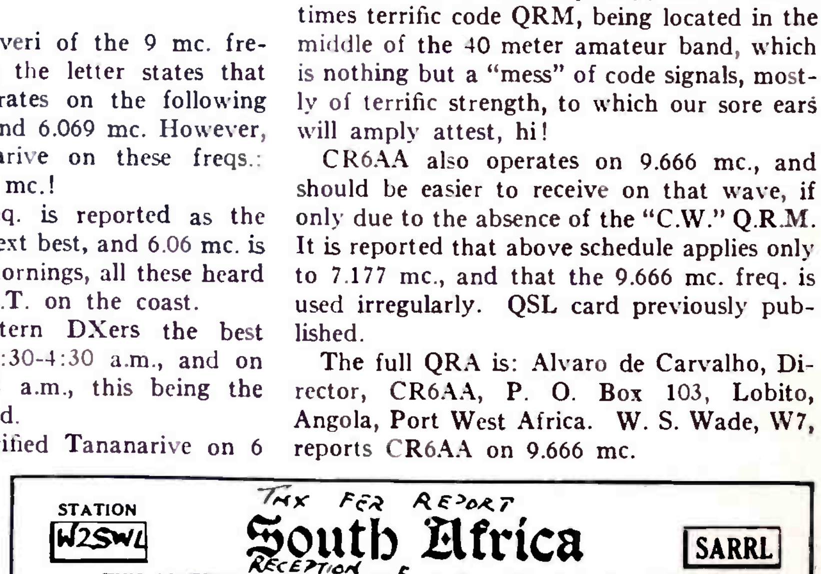
ANGOLA

CR6AA, 7.177 mc., at Lobito, was logged the other day at 3:30 p.m., inside their regular schedule of 2:45-4:30 p.m., on Weds. and Sats.

This rare catch is a regular visitor around the holiday season, as conditions are best at this time of the year for the rare African SW-Broadcasters. CR6AA is rather difficult to log on the 7 mc. frequency, due to the at times terrific code QRM, being located in the middle of the 40 meter amateur band, which is nothing but a "mess" of code signals, mostly of terrific strength, to which our sore ears will amply attest, hi!

CR6AA also operates on 9.666 mc., and should be easier to receive on that wave, if only due to the absence of the "C.W." Q.R.M. It is reported that above schedule applies only to 7.177 mc., and that the 9.666 mc. freq. is used irregularly. QSL card previously published.

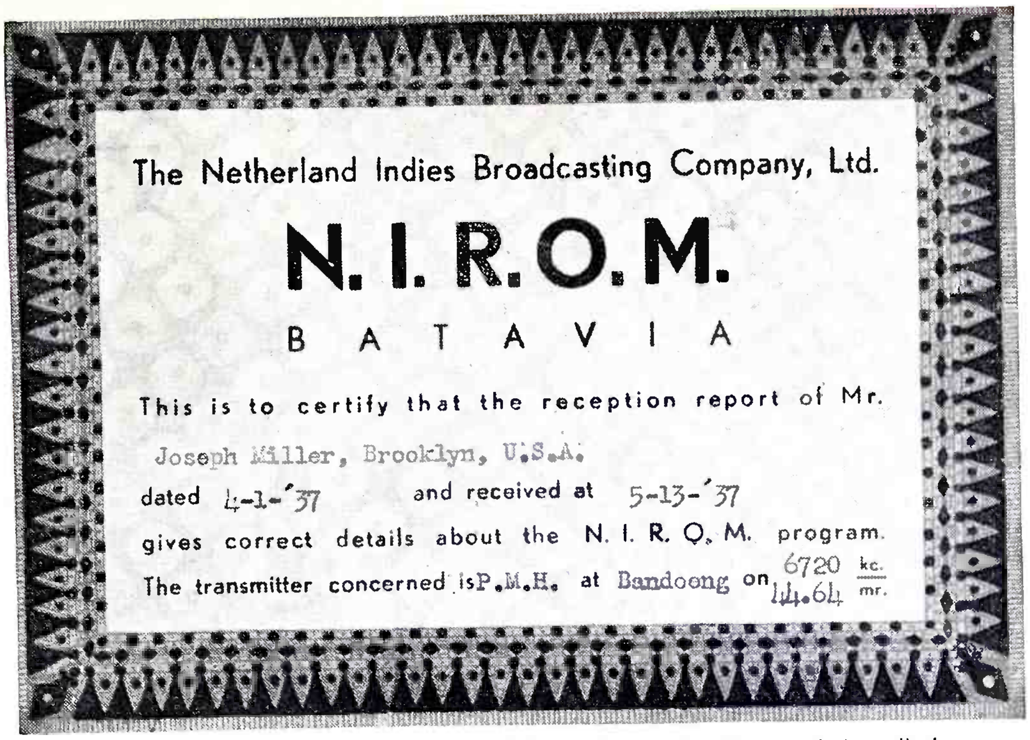
The full QRA is: Alvaro de Carvalho, Director, CR6AA, P. O. Box 103, Lobito, Angola, Port West Africa. W. S. Wade, W7, reports CR6AA on 9.666 mc.



ZU6E, South Africa—Green letters on a light tan background make this a striking QSL.

With Joe Miller

S.W. Scout Trophy


The Netherland Indies Broadcasting Company, Ltd.

N. I. R. O. M.

B A T A V I A

This is to certify that the reception report of Mr.

Joseph Miller, Brooklyn, U.S.A.

dated 4-1-'37 and received at 5-13-'37

gives correct details about the N. I. R. O. M. program.

The transmitter concerned is P.M.H. at Bandoeng on 6720 kc. / 44.64 mr.

PMH—N.I.R.O.M. Java—This handsome QSL is the verification card for all Javanese S.W. broadcasters.

EGYPT

SUZ, 13.83 mc., Cairo, was heard at the most unusual hour of 4:05 a.m. recently, in contact with GBB, 13.58 mc., Rugby, England, as usual. This is far off their regular daily (ex. Sun.) sked of 11 a.m. SUZ can easily be logged if one tries for a week or so, at 11 a.m. E.S.T., as they clearly announce their call and location when contacting Rugby.

QRA: Marconi Radiotelegraph Co., P. O. Box 795, Cairo, Egypt.

SOUTH AFRICA

The Klipheuvel station which takes its programs from Capetown, on 9.615 mc., is holding up very well, a fine, consistent signal, judging from reports throughout the U.S. and Canada. As reports are requested to be sent to ZTJ's QRA: P. O. Box 4559, Johannesburg, we assumed this to be ZTJ on a higher freq., perhaps we have erred. This station is on every day but Saturday, from 11:45 p.m.—12:45 a.m.

ITALIAN AFRICANS

ITK, 16.385 mc., Mogadiscio, Italian Somaliland, heard recently at 9:15 a.m., fair signal.

A new Italian African, we believe, is the signal heard just to the high freq. side of IAC, 17.70 mc., Pisa, Italy, and we place the unknown's freq. as 17.73 mc. Time heard has been 9:15 and 10:30 a.m. Signal, of course, does not compare with IAC's tremendous power.

CANARY ISLANDS

EAJ43, 10.37 mc., Santa Cruz de Tenerife, is now operating daily on a new, announced "sked" of 2-3 a.m., "Canary Island Time," or 9-10 p.m., E.S.T. They should be very well heard on this new schedule.

Regarding EAJ43, we've a story to relate. When first we heard EAJ43, we sent them a report, along with the rest of our immediate DX friends. When one after another got their QSL cards back, but not us, we repeated our report again and again, but in each instance heard nothing from the station. Being persistent, and perhaps a bit "mad," we came to the situation where we had *five* reports out to EAJ43, *and still no answer!*

About two months after mailing our last report, we finally—great day!—received our QSL, the one recently pictured, this confirming our most recent report! Oddly, we got a second QSL later, this confirming our next most recent report, the third and fourth reports the same, and the fifth, a report of last October, '36, came in, being last to be answered, hi! It seems they work in reverse as far as QSL's are concerned! We can't complain, however, we certainly got our QSL's, all five of them, hi!

SPANISH MOROCCO

EA9AH, 14.01 mc., Tetuan, sends a card which is slightly different from one recently pictured, to Gilbert B. Devey, W8, stating that they transmit war news in English from 11:05-11:15 p.m., E.S.T., and from 1:30 a.m., on, daily. Power is increased to 500 watts. Anyone can hear this station's strong signal, and a handsome card awaits all correct reports to: Fernando Diaz Gomez, EA9AH, P. O. Box 124, Tetuan, Spanish Morocco.

Outside of above schedule, this station operates irregularly throughout the evening hours, often calling and working North and South American amateurs, using either English or Spanish, upon occasion.


I certify herewith ~~contact with you~~ your observation on the 2 th October 1937

I heard your signals fone W — qrk — quality

HA4A

Input 200 W

Ant. ef dip

Wx

QRH 6 14140

QRA Budapest, I., Györi-út 12

PSL QSL

Op Dénes v. Bibó

Vice-president of the National Union of the Hungarian Shortwave Amateurs

Chairman of the Technical Comitee

HA4A, Hungary—Unusual card with black letters on a reddish-buff card.

SIAM

Through information received from Indo-China and Siam, we have news on several radiophone stations heretofore unlisted in any publication. Firstly, however, in a letter from Sangiem, Powtongsook, Bangkok, we learn that HSJ, 7.955 mc., Bangkok, occasionally contacts ZGB, 13.642 mc., Kuala Lumpur, FMS, and with FRS3, 5.00 mc., Saigon, Indo-China.

HSG, 10.957 mc., has a daily (except weekends) schedule with ZGB at 9:40 p.m., and 1:40 a.m., E.S.T., rather poor times for reception in the U.S. In case of unfavorable conditions for HSG, HSJ will be used instead.

INDO-CHINA

A letter from Saigon gives us the following data: FZS3, 9.62 mc., is an unlisted radiophone usually employed for telegraphy, but occasionally is used as a radiophone transmitter.

Also, the correct call of FZS on 11.991 mc., is FZS4. The other Saigon station unlisted is already mentioned, FRS3, operating on 5.00 mc.

INDIA

VWY2, 17.48 mc., Poona, India, heard lately at 7:45 a.m., using inverted speech. A very good signal.

JAPAN

JVE, 15.66 mc., Nazaki, heard at 7:45 a.m., JVK, 12.02 mc., at 7:55 a.m.

JZJ, 11.80 mc., will broadcast the Overseas program from 12:30-1:30 a.m. from Nov. 10. JZK, now broadcasting above feature, will cease doing so on Nov. 14. This from Harry Honda, W6. Harry also mentions that JVE phones KWO, 15.41 mc., Dixon, Cal., irregular between 10:30-11:30 p.m., using man and lady announcers.

BURMA

VVS, 12.87 mc., Mingaladon, heard recently phoning VVN, 13.26 mc., Fort Madras, India.

(*Continued on page* 580)

World Short-Wave Stations

Revised Monthly

Broadcasters Calls in **bold type**
Phones in light type

Reports on station changes are appreciated.

↓ S.W. BROADCAST BAND ↓

Mc.	Call	
31.600	**W3XEY**	**BALTIMORE, MD.,** 9.494 m., Relays WFBR 4 pm-12m.
31.600	**W2XDV**	**NEW YORK CITY,** 9.494 m., Addr. Col. Broad. System, 485 Madison Ave. Daily 6-11 pm.; Sat. and Sun. 1.30-6, 7-10 pm.
31.600	**W3XKA**	**PHILADELPHIA, PA.,** 9.494 m., Addr. MBC. Relays KYW 12 n-10 pm.
31.600	**W5XAU**	**OKLAHOMA CITY,** 9.494 m., Sun 12 n-1 pm., 6-7 pm. Irregular other times.
31.600	**W4XCA**	**MEMPHIS, TENN.,** 9.494 m., Addr. Memphis Commercial Appeal. Relays WMC.
31.600	**W8XAI**	**ROCHESTER, N. Y.,** 9.494 m., Addr. Stromberg Carlson Co. Relays WHAM 7.30-12.05 am.
31.600	**W8XWJ**	**DETROIT, MICH.,** 9.494 m., Addr. Evening News Ass'n. Relays WWJ 6-12.30 am., Sun. 8 am-12 m.
31.600	**W9XPD**	**ST. LOUIS, MO.,** 9.494 m., Addr. Pulitzer Pub. Co. Relays KSD.
26.400	**W9XJL**	**SUPERIOR, WIS.,** 11.36., Relays WEBC daily.
26.400	**W9XAZ**	**MILWAUKEE, WIS.,** 11.36 m., Addr. The Journal Co. Relays WTMJ from 1 pm.
26.100	**GSK**	**DAVENTRY, ENG.,** 11.49 m., Addr. B. B. C., London. Operates irregularly
25.950	**W6XKG**	**LOS ANGELES, CAL.,** 11.56 m., Addr. B. S. McGlashan, Wash. Blvd. at Oak St. Relays KGFJ 24 hours daily.
21.550	**GST**	**DAVENTRY, ENG.,** 13.92 m., Addr. (See 26.100 mc.) Irregular at present.
21.540	**W8XK**	**PITTSBURGH, PA.,** 13.93 m., Addr. Grant Bldg. Relays KDKA 6.45-9 am. Exc. Sun.
21.530	**GSJ**	**DAVENTRY, ENG.,** 13.93 m., Addr. (See 26.100 mc.) 5.45-8.55 am.
21.520	**W2XE**	**NEW YORK CITY,** 13.94 m., Addr. Col. Broad. Syst., 485 Madison Ave. 7.30-10 am., Sat. and Sun. 8 am.-1 pm.
21.470	**GSH**	**DAVENTRY, ENG.,** 13.97 m. (See 26.100 mc.), 5.45 am.-12 n.
21.420	WKK	**LAWRENCEVILLE, N. J.,** 14.01 m., Addr. Amer. Tel. & Tel. Co. Calls S. Amer. 7 am.-7 pm.
21.080	PSA	**RIO DE JANEIRO, BRAZ.,** 14.23 m., Calls WKK daytime.
21.060	WKA	**LAWRENCEVILLE, N. J.,** 14.25 m. Addr. (See 21.420 mc.) Calls England morning and afternoon.
21.020	LSN6	**BUENOS AIRES, ARG.,** 14.27 m., Addr Cia. Internacional de Radio. Works N. Y. C. 7 am.-7 pm.
20.860	EHY-EDM	**MADRID, SPAIN,** 14.38 m., Addr. Cia. Tel. Nacional de Espana. Works S. Amer. mornings.
20.700	LSY	**BUENOS AIRES, ARG.,** 14.49 m., Addr. Transradio Internatl. Tests irregularly
20.380	GAA	**RUGBY, ENG.,** 14.72 m. Calls Arg., Brazil mornings.
20.040	OPL	**LEOPOLDVILLE, BELGIAN CONGO,** 14.97 m. Works ORG mornings.
20.020	DHO	**NAUEN, GERMANY,** 14.99 m., Addr. Reichspostzenstralamt. Works S. Am. mornings.
19.900	LSG	**BUENOS AIRES, ARG.,** 15.08 m., Addr. (See 20.700 mc.) Tests irregularly.
19.820	WKN	**LAWRENCEVILLE. N,J.,** 15.14 m., Addr. A. T. & T. Co. Calls England daytime.
19.680	CEC	**SANTIAGO, CHILE,** 15.24 m., Addr. Cia. Internacional de Radio. Calls Col. and Arg. daytime.
19.650	LSN5	**BUENOS AIRES, ARG.,** 15.27 m., Addr. (See 21.020 mc.) Calls Europe daytime
19.620	VQG4	**NAIROBI, KENYA,** 15.28 m., Addr. Cable and Wireless, Ltd. Calls London 7.30-8 am.

Mc.	Call	
19.600	LSF	**BUENOS AIRES, ARG.,** 15.31 m., Addr. (See 20.700 mc.) Tests irregularly.
19.480	GAD	**RUGBY, ENG.,** 15.4 m. Calls VQG4 7.30-8 am.
19.355	FTM	**ST. ASSISE, FRANCE,** 15.5 m. Calls S. America mornings.
19.345	PMA	**BANDOENG, JAVA,** 15.51 m. Works Holland 5.30-11 am.
19.260	PPU	**RIO DE JANEIRO, BRAZ.,** 15.58 m., Addr. Cia. Radiotel. Brasileira. Works France mornings.
19.220	WKF	**LAWRENCEVILLE, N. J.,** 15.6 m., Addr. A. T. & T. Co. Calls London and Paris daytime.
19.200	ORG	**RUYSSELEDE, BELGIUM,** 15.62 m. Calls OPL mornings.
19.160	GAP	**RUGBY, ENG.,** 15.66 m. Calls Australia 1-8 am.
19.020	**HS8PJ**	**BANGKOK, SIAM,** 15.77 m. Mondays 8-10 am.
18.970	GAQ	**RUGBY, ENG.,** 15.81 m. Calls S. Africa mornings.
18.890	ZSS	**KLIPHEUVEL, S. AFRICA,** 15.88 m., Addr. Overseas Comm. of S. Africa, Ltd. Calls GAQ 9-10 am.
18.830	PLE	**BANDOENG, JAVA,** 15.93 m. Calls Holland early am.
18.680	OCI	**LIMA, PERU,** 16.06 m. Tests with Bogota, Col.
18.620	GAU	**RUGBY, ENG.,** 16.11 m. Calls N. Y. daytime.
18.450	**HBF**	**GENEVA, SWITZERLAND,** 16.26 m., Addr. Radio Nations. Tests irregularly.
18.345	FZS	**SAIGON, INDO-CHINA,** 16.35 m. Works Paris early morning.
18.340	WLA	**LAWRENCEVILLE, N. J.,** 16.36 m., Addr. A. T. & T. Co. Calls England daytime.
18.310	GAS	**RUGBY, ENG.,** 16.38 m. Calls N. Y. daytime.
18.299	YVR	**MARACAY, VENEZ.,** 16.39 m. Works Germany mornings.
18.250	FTO	**ST. ASSISE, FRANCE,** 16.43 m. Works S. America daytime.
18.200	GAW	**RUGBY, ENG.,** 16.48 m. Works N. Y. C. daytime.
18.135	PMC	**BANDOENG, JAVA,** 16.54 m. Works Holland mornings.
18.115	**LSY3**	**BUENOS AIRES, ARG.,** 16.56 m., Addr. (See 20.700 mc.) Tests irregularly. Broadcasts 4-5 pm. Friday.
18.040	GAB	**RUGBY, ENG.,** 16.63 m. Works Canada morning and afternoon.
17.810	PCV	**KOOTWIJK, HOLLAND,** 16.84 m. Works Java 6-8 am.

↓ S.W. BROADCAST BAND ↓

Mc.	Call	
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. 3.15-5.30 am., 5.45 am.-12 n., 12.20-3.45 pm.
17.785	**JZL**	**TOKIO, JAPAN,** 16.87 m. Tests irregularly.
17.780	**W3XAL**	**BOUND BROOK, N. J.,** 16.87 m., Addr. Natl. Broad. Co. 8.55 am.-9 pm.
17.770	**PHI**	**HUIZEN, HOLLAND,** 16.88 m., Addr. (See PHI, 11.730 mc.) Daily except Wednesday, 8.25-10 am., Sun. 7.25-10.25 am.
17.760	**DJE**	**BERLIN, GERMANY,** 16.89 m., Addr. Broadcasting House. 12.05-10 am.; also Sun. 11.10 am.-12.25 pm.
17.760	**W2XE**	**NEW YORK, N. Y.,** 16.89 m., Addr. Col. Broad. System, 485 Madison Ave. Daily 6.20 pm.-12 m.
17.755	**ZBW5**	**HONGKONG, CHINA,** 16.9 m., Addr. P. O. Box 200. 4-10 am. irregular.
17.741	HSP	**BANGKOK, SIAM,** 16.91 m. Works Germany 3-5 am., 8-9 pm. Works JVE 11 pm.-6 am.

Mc.	Call	
17.650	XGM	**SHANGHAI, CHINA,** 17 m. Works London 7-9 am.
17.520	DFB	**NAUEN, GERMANY,** 17.12 m. Works S. America, near 9.15 am. Works Siam 3-5 am., 8-9 pm.
17.480	VWY2	**KIRKEE, INDIA,** 17.16 m. Works London 7.30-8.15 am.
17.310	**W2XGB**	**HICKSVILLE, L. I., N. Y.,** 17.33 m., Addr. Press Wireless, Box 296. Tests 9.30-11.30 am. except Sat. and Sun.
17.120	WOO	**OCEAN GATE, N. J.,** 17.52 m., Addr. A. T. & T. Co. Works ships irregularly.
17.080	GBC	**RUGBY, ENG.,** 17.56 m. Works ships irregularly.
16.835	ITK	**MOGADISCIO, ITAL. SOMALILAND,** 18.32 m. Calls IAC around 9.30 am.
16.270	WLK	**LAWRENCEVILLE, N. J.,** 18.44 m., Addr. A. T. & T. Co. Works S. Amer. daytime.
16.270	WOG	**OCEAN GATE, N. J.,** 18.44 m., Addr. A. T. & T. Co. Works England Late afternoon.
16.240	KTO	**MANILA, P. I.,** 18.47 m., Addr. RCA Comm. Works Japan and U. S. 5-9 pm. irregularly.
16.233	FZR3	**SAIGON, INDO-CHINA,** 18.48 m. Calls Paris early morning.
16.030	KKP	**KAHUKU, HAWAII,** 18.71 m., Addr. RCA Comm. Works Dixon 3-10 pm.
15.880	FTK	**ST. ASSISE, FRANCE,** 18.9 m. Works Saigon 8-11 am.
15.865	CEC	**SANTIAGO, CHILE,** 18.91 m. Calls Peru daytime Irregular.
15.810	LSL	**BUENOS AIRES, ARG.,** 18.98 m., Addr. (See 21.020 mc.) Works London mornings and Paris afternoons.
15.660	JVE	**NAZAKI, JAPAN,** 19.16 m. Works Java and Siam 3-5 am.
15.620	JVF	**NAZAKI, JAPAN,** 19.2 m. Works Cal. near 5 am. and 8 pm.
15.550	**CO9XX**	**TUINICU, ORIENTE, CUBA,** 19.29 m., Addr. Frank Jones, Central Tuinicu, Tuinicu, Santa Clara. Broadcasts irregularly evenings.
15.450	IUG	**ADDIS ABABA, ETHIOPIA,** 19.41 m. Works Rome 9.15-10.30 am.
15.440	**XEBM**	**MAZATLAN, SIN., MEX.,** 19.43 m., Addr. Flores 103 Alto. "El Pregonero del Pacifico." Irregularly 7 am.-10 pm.
15.415	KWO	**DIXON, CAL.,** 19.46 m., Addr. A. T. & T. Co. Works Hawaii 2-7 pm.
15.370	**HAS3**	**BUDAPEST, HUNGARY,** 19.52 m., Addr. Radiolabor, Gyali Ut 22. Sun 9-10 am.
15.360	**DZG**	**ZEESEN, GERMANY,** 19.53 m., Addr. Reichspostzenstralamt. Tests irregularly.
15.355	KWU	**DIXON, CALIF.,** 19.53 m., Addr. A. T. & T. Co. Phones Pacific Isles and Japan.

↓ S.W. BROADCAST BAND ↓

Mc.	Call	
15.340	**DJR**	**BERLIN, GERMANY,** 19.56 m., Addr. Br'dcast'g House, 8-9am.
15.330	**W2XAD**	**SCHENECTADY, N. Y.,** 19.56 m., Addr. General Electric Co. Relays WGY 11 am. to 9 pm.
15.310	**GSP**	**DAVENTRY, ENG.,** 19.6 m., Addr. (See 26.100 mc.) 1.45-3.45 pm.
15.290	**LRU**	**BUENOS AIRES, ARG.,** 19.62 m., Addr. El Mundo. 6-8 am.
15.280	**HI3X**	**CIUDAD TRUJILLO, D. R.,** 19.63 m. Relays HIX Sun. 7.40-10.40 am. Weekdays 12.10-1.10pm.
15.280	**DJQ**	**BERLIN, GERMANY,** 19.63 m., Addr. Broadcasting House. 12.05-10 am., 4.50-10.45 pm. Also Sun. 11.10 am -12.25 pm.
15.270	**W2XE**	**NEW YORK CITY,** 19.65 m., Addr. (See 21.520 mc.), Daily except Sat and Sun., 1-2.15 pm.

(Continued on page 556)

(All Schedules Eastern Standard Time)

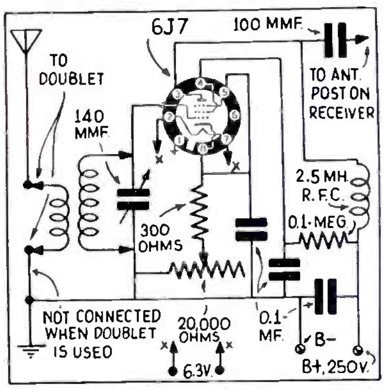
Question Box

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

? 30 WATT MODULATOR

Will you please print the diagram for a modulator suitable for use with the crystal-controlled 5 and 10 meter transmitter appearing in the April 1937 issue.—Glenn Attrill, Poenta, Calif.

A. We have shown a modulator which should be quite satisfactory for use with this transmitter. It is for crystal mike input and employs a pair of 6L6 beam tubes in a push-pull output stage operating in class AB. It is capable of supplying about 30 watts of audio output, depending on the design of the power transformer and filter chokes. To realize maximum output, it is important that the D.C. resistance of the 200 ma. chokes be as low as possible. It is also important that the power transformer have very good regulation.



R. F. Amplifier—1109

? 6K7 R.F. AMPLIFIER

Please print a diagram of a tuned R.F. amplifier using a 6K7 tube. This amplifier should use regular four prong plug-in coils with the tickler portion as the antenna coil.—Charles Mourmouris, Denver, Colo.

A. We have shown the diagram requested employing a 6K7 as a R.F. amplifier. We have shown connections for both the doublet and straight antenna and ground. When the doublet is used, the antenna connects to both terminals of the antenna coils and there is no connection between this coil and ground. Sensitivity in this circuit is controlled by a 20,000 ohm potentiometer in the cathode circuit. If a common B supply is employed there will be no need for a separate connection between the B negative of the pre-amplifier and the receiver. Note that although the diagram shows a 6J7, a 6K7 is proper. Connections are the same for either tube.

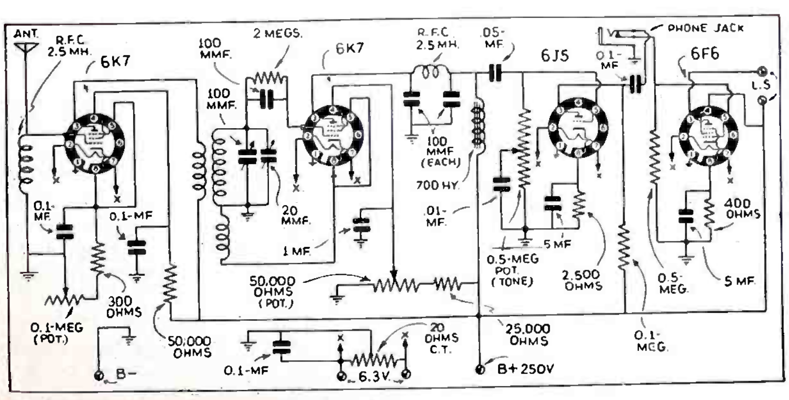
? 2-TUBE BATTERY SET

I would like you to publish a diagram of a receiver employing 2 type 30 tubes in a simple circuit.—Mack Mckenzie, Frostburg, Md.

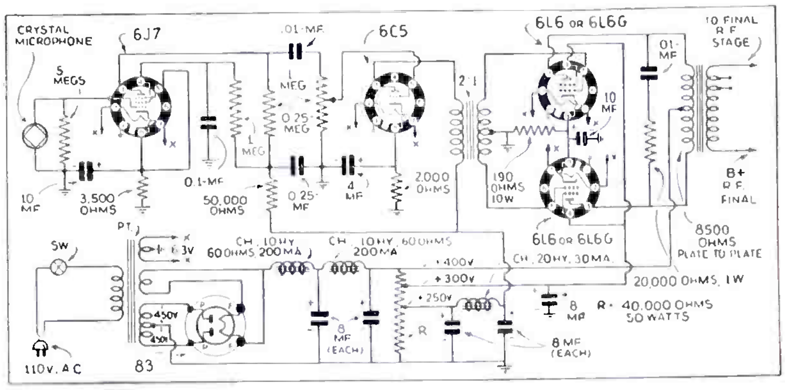
A. A 2-tube receiver consisting of a regenerative detector and a stage of audio is reproduced on this page. The coils are of the 3-winding, 6-prong type. The primary winding, that is the coil which is interwound with the grid coil, is used for antenna coupling.

? UNTUNED TRF RECEIVER

Please publish the diagram for a set employing high-gain tubes and consisting of an R.F. stage inductively coupled to a regenerative detector, which in turn is resistance coupled to the first audio stage, driving a pentode output tube. The set should also have a phone jack, band-spread, and volume and tone controls, as well as a regeneration control.—Charles Dickson, Belle Vernon, Pa.



TRF Receiver—1111



Modulator for 5 and 10 Meter Rigs—1108

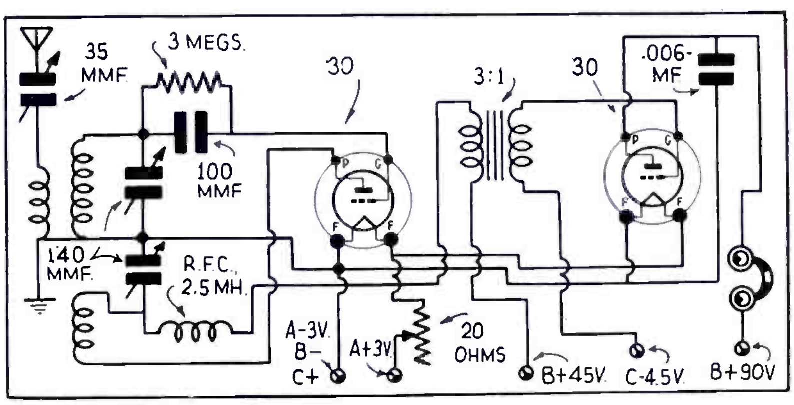
A. The 4-tube receiver illustrated should meet your requirements. Metal tubes are used throughout; 6K7 pentodes are used in the R.F. and detector stages, and a 6J5 high-gain general-purpose triode is used for the first audio. A 6F6 power pentode comprises the output stage. The detector uses electron coupling. A simple power pack similar to those which have appeared on this page in the past issues will be satisfactory for use with the receiver, providing that a B supply of 250 Volts at a drain of about 60 ma. is available. A center-tapped filament winding delivering 6.3 volts at 3 amperes will take care of the heaters. The center tap should go to B—.

? AN IMPRACTICAL CIRCUIT

Please print a diagram of a 4-tube A.C.-D.C. short-wave set using a 56, 57, 58, 2A5 and an 80 tube.—Sidney Yaffe, Brooklyn, N.Y.

A. The circuit you request is impractical. The tubes you have are for 2.5 Volt filament operation and require quite a high amperage. To use them in an A.C.-D.C. circuit would mean that the current consumption from the 110 V. line would be very high. Further, it is probable that a considerable amount of hum would be noticeable when using this type of tube in such a circuit.

An 80 tube is designed for use only with a power transformer and could not be used satisfactorily in an A.C.-D.C. circuit. We suggest you either build an A.C. set using a power transformer or secure 6.3 V. tubes suitable for use in A.C.-D.C. designs. Numerous circuits for A.C.-D.C. operation have been published in the magazine.



Battery Set Using 30-type Tubes—1110

? POWER SUPPLY PROBLEM

I am going to build a power supply which must supply the "B" voltage for a 2 tube set and a 6 tube set. What should the current rating of the power transformer be to cover this wide range?—George Black, Beaumont, Tex.

A. If the available voltage is correct, the current rating of the power supply is not important so long as the rating is equal to, or greater than, the requirement of the receiver. A large power supply will operate a small receiver satisfactorily, but a small power supply will not operate a large receiver.

Mc.	Call	
15.260	GSI	**DAVENTRY, ENG.,** 19.66 m., Addr. (See 26.100 mc.) Irreg. 12.20-3.45 pm.
15.252	RIM	**TACHKENT, U.S.S.R.,** 19.67 m. Works RKI near 7 am.
15.250	W1XAL	**BOSTON, MASS.,** 19.67 m., Addr. University Club. Daily 2.15-4 pm., Sun. 10.15 am.-12 n.
15.245	TPA2	**PARIS, FRANCE,** 19.68 m., Addr. 98 bis. Blvd. Haussmann. "Radio Colonial." 6-11 am.
15.230	HS8PJ	**BANGKOK, SIAM,** 19.32 m. Irregularly Mon. 8-10 am.
15.230	OLR5A	**PRAGUE, CZECHOSLOVAKIA,** 19.32 m., 6-7.30 am.
15.220	PCJ	**HUIZEN, HOLLAND,** 19.71 m., Addr. N. V. Philips' Radio, Hilversum. Tues. 3.30-5 am., Wed. 9 am. -12 n.
15.210	W8XK	**PITTSBURGH, PA.,** 19.72 m., Addr. (See 21.540 mc.) 9 am.-7 pm.
15.200	DJB	**BERLIN, GERMANY,** 19.74 m., Addr. (See 15.280 mc.) 12.05-11 am. Also Sun. 11.10 am. to 12.25 pm.
15.190	ZBW4	**HONGKONG, CHINA,** 19.75 m., Addr. P. O. Box 200. Irregular. 11.30 pm. to 1.15 am., 4-10 am., Sat. 9.15 pm.-1 am., Sun. 3-9.30 am.
15.180	GSO	**DAVENTRY, ENG.,** 19.76 m., Addr. (See 26.100mc.) 3.15-5.30, 5.45-8.55 am, 4-6 pm.
15.170	TGWA	**GUATEMALA CITY, GUAT.,** 19.77 m., Addr. (See 17.8 mc.). Irregular 11.30 am.-2 pm.
15.165	XEWW	**MEXICO CITY, MEXICO,** 19.78 m. 12 n.-12 m. irregular.
15.160	JZK	**TOKIO, JAPAN,** 10.79 m. Irregular.
15.150	YDC	**BANDOENG, JAVA,** 19.8 m., Addr. N. I. R. O. M. 6-7.30 pm.. 10.30 pm.-2 am., Sat. 7.30 pm.-2 am., 5.30-10.30 am.
15.140	GSF	**DAVENTRY, ENG.,** 19.82 m., Addr. (See 26.100 mc.) 5.45 am.-12 n.
15.120	HVJ	**VATICAN CITY,** 19.83 m., 10.30-10.45 am., except Sun., Sat. 10-10.45 am.
15.110	DJL	**BERLIN, GERMANY,** 19.85 m., Addr. (See 15.280 mc.) 12 m-2, 8-9 am., 10.40 am. to 4.30 pm. Sun. also 6-8 am.
15.055	WNC	**HIALEAH, FLORIDA,** 19.92m., Addr. A .T. & T. Co. Calls Central America daytime.
15.038	RKI	**MOSCOW, U.S.S.R.,** 19.95 m. Works Tashkent near 7 am. Broadcasts Sun. 12.15-2.30 pm.
14.980	KAY	**MANILA, P. I.,** 20.03 m., Addr. RCA Comm. Works Pacific Islands.
14.970	LZA	**SOPHIA, BULGARIA,** 20.04 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.
14.960	PSF	**RIO DE JANEIRO, BRAZIL,** 20.43 m., Works with Buenos Aires daytime.
14.950	HJB	**BOGOTA, COL.,** 20.07 m. Calls WNC daytime.
14.940	HII	**CIUDAD TRUJILLO, D. R.,** 20.08 m., Phones WNC daytime.
14.940	HJA3	**BARRANQUILLA, COL.,** 20.08 m. Works WNC daytime.
14.845	OCJ2	**LIMA, PERU,** 20.21 m. Works South American stations daytime.
14.790	ROU	**OMSK, SIBERIA, U.S.S.R.,** 20.28 m. Works Moscow irregularly 7-9 am.
14.730	IQA	**ROME, ITALY,** 20.37 m. Tests irregularly.
14.653	GBL	**RUGBY, ENG.,** 20.47m. Works JVH 1-7am.
14.640	TYF	**PARIS, FRANCE,** 20.49 m. Works Saigon and Cairo 3-7 am, 12 m.-2.30 pm.
14.600	JVH	**NAZAKI, JAPAN,** 20.55 m. Broadcasts irregularly 5-11.30 pm. Works Europe 4-8 am.
14.590	WMN	**LAWRENCEVILLE, N. J.,** 20.56 m., Addr. A. T. & T. Co. Works England morning and afternoon.
14.535	HBJ	**GENEVA, SWITZERLAND,** 20.64 m., Addr. Radio Nations. Broadcasts Sat. 6.45-8 pm.
14.530	LSN	**BUENOS AIRES, ARG.,** 20.r.5 9m., Add (See 20.020 mc.) Works N. Y. C. afternoons.
14.500	——	**ASMARA, ERITREA, AFRICA,** 20.69 m. Works Rome and Addis Ababa 6.30-7.30 am.
15.500	LSM2	**BUENOS AIRES, ARG.,** 20.69 m., Addr. (See 21.020 mc.) Works RIO and Europe daytime.
14.485	TIR	**CARTAGO, COSTA RICA,** 20.71 m. Works Central America and U. S.A. daytime.
14.485	YSL	**SAN SALVADOR, SALVADOR,** 20.71 m. Irregular.
14.485	HPF	**PANAMA CITY, PANAMA,** 20.71 m. Works WNC daytime.
14.485	TGF	**GUATEMALA CITY, GUATEMALA,** 20.71 m. Works WNC daytime.
14.485	YNA	**NICARAGUA, MANAGUA,** 20.71 m. Works WNC daytime.
14.485	HRL5	**NACAOME, HONDURAS,** 20.71 m. Works WNC daytime.
14.485	HRF	**TEGUCIGALPA, HONDURAS,** 20.71 m. Works WNC daytime.
14.470	WMF	**LAWRENCEVILLE, N. J.,** 20.73 m., Addr. A. T. & T. Co. Works London and Paris daytime.
14.460	DZH	**ZEESEN, GERMANY,** 20.75 m., Addr. (See 15.360 mc.) Irregular.
14.440	GBW	**RUGBY, ENG.,** 20.78 m. Works U. S. A. afternoons.
14.200	EA9AH	**TETUAN, SPANISH MOROCCO,** 21.13 m. Daily except Sun. 2.15-5,7 and 9 pm.
14.164	PI1J	**DORDRECHT, HOLLAND,** 20.52 m., Addr. (See 7.088 mc.) Sat. 12 n.-12.30 pm.
13.990	GBA	**RUGBY, ENG.,** 21.44 m., Works Buenos Aires late afternoon.
13.820	SUZ	**ABOU ZABAL, EGYPT,** 21.71 m. Works with Europe 11 am. to 2 pm.
13.690	KKZ	**BOLINAS, CALIF.,** 21.91 m., Addr. RCA Communications. Irregular.
13.635	SPW	**WARSAW, POLAND,** 22 m., Mon., Wed. Fri. 12.30-1.30 pm., Daily 6-7 pm.
13.585	GBB	**RUGBY, ENG.,** 22.08 m. Works Egypt and Canada afternoon.
13.415	GCJ	**RUGBY, ENG.,** 22.36 m. Works Japan and China early morning.
13.410	YSJ	**SAN SALVADOR, SALVADOR,** 22.37 m. Works WNC daytime.
13.390	WMA	**LAWRENCEVILLE, N. J.,** 22.4 m., Addr. A. T. & T. Co. Works England morning and afternoon.
13.380	IDU	**ASMARA, ERITREA, AFRICA,** 22.42 m. Works Rome daytime.
13.345	YVQ	**MARACAY, VENEZUELA,** 22.48 m. Works WNC daytime.
13.285	CGA3	**DRUMMONDVILLE, QUE., CAN.,** 22.58 m. Works London and ships afternoons.
13.330	IRJ	**ROME, ITALY,** 22.69 m. Works Tokio 5-9 am. irregularly.
13.075	VPD	**SUVA, FIJI ISLANDS,** 22.94 m. Irregularly.
12.840	WOO	**OCEAN GATE, N. J.,** 23.36 m., Addr. A. T. & T. Co. Works with ships irregularly.
12.825	CNR	**RABAT, MOROCCO,** 23.39 m., Addr. Director General Tele. & Teleg. Stations. Works with Paris irregularly.
12.800	IAC	**PISA, ITALY,** 23.45 m. Works Italian ships mornings.
12.780	GBC	**RUGBY, ENG.,** 23.47. Works ships irregularly.
12.325	DAF	**NORDDEICH, GERMANY,** 24.34 m. Works German ships daytime.
12.300	CB615	**SANTIAGO, CHILE,** 24.39 m., Addr. Louis Desmaras, Casilla, 761. 11 am.-1 pm., 4-8 pm., Sun. 4-10 pm.
12.290	GBU	**RUGBY, ENG.,** 24.41 m. Works N. Y. C. evenings.
12.250	TYB	**PARIS, FRANCE,** 24.49 m. Irregular.
12.235	TFJ	**REYKJAVIK, ICELAND,** 24.52 m. Works Europe mornings. Broadcasts Sun. 1.40-2.30 pm.
12.215	TYA	**PARIS, FRANCE,** 24.56 m. Works French ships in morning and afternoon.
12.150	GBS	**RUGBY, ENG.,** 24.69 m. Works N. Y. C. evenings.
12.130	DZE	**ZEESEN, GERMANY,** 24.73 m., Addr. (See 15.360 mc.) Tests irregular.
12.120	TPZ2	**ALGIERS, ALGERIA,** 24.75 m. Calls Paris 12 m.-6.30 am.
12.060	PDV	**KOOTWIJK, HOLLAND,** 24.88 m. Tests irregularly.
12.000	RNE	**MOSCOW, U.S.S.R.,** 25 m. Daily 6-7 am., 12.15-1 pm., 8.30-11 pm., also Sun. 6 am.-1 pm.
11.991	FZS2	**SAIGON, INDO-CHINA,** 25.02 m. Phones Paris mornings.
11.960	HI2X	**CIUDAD TRUJILLO, D. R.,** 25. 08 m., Addr. La Voz de Hispaniola. Relays HIX Tue. and Fri. 8.10-10.10 pm.
11.955	IUC	**ADDIS ABABA, ETHIOPIA,** 25.09 m. Works IAC around 12 midnight.
11.950	KKQ	**BOLINAS, CALIF.,** 25.1 m. Tests irregularly evenings.
11.940	FTA	**STE. ASSISE, FRANCE,** 25.13 m. Works Morocco mornings and Argentina late afternoon.
		↓ S.W. BROADCAST BAND ↓
11.910	CB1190	**VALDIVA, CHILE,** 25.2 m., P. O. Box 642. Relays CB69 11 am.-11 pm.
11.900	XEWI	**MEXICO CITY, MEXICO,** 25.21 m., Addr. P. O. Box 2874. Tues. and Thurs. 7.30 pm.-12 m., Fri. 9 pm.-12 m. Sunday 12.30-2 pm.
11.895	HP5I	**AGUADULCE, PANAMA,** 25.22 m. Addr. La Voz del Interior. 7.30-9.30 pm.
11.880	TPA3	**PARIS, FRANCE,** 25.23 m., Addr. (See 15.245 mc.) 2-5 am., 12.15-6 pm.
11.870	W8XK	**PITTSBURGH, PA.,** 25.26 m., Addr. (See 21.540 mc.) 7-10 pm.
11.860	YDB	**SOERABAJA, JAVA,** 25.29 m., Addr. N. I. R. O. M. Sat. 7.30 pm. to 2.30 am., daily 10.30 pm. to 2 am.
11.860	GSE	**DAVENTRY, ENG.,** 25.29 m., Addr. (See 26.100 mc.) Irregular.
11.855	DJP	**BERLIN, GERMANY,** 25.31 m., Addr. (See 15.280 mc.) Irregular 11.35 am. to 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. Stat. 11.30 am.-1.30 pm. irreg.
11.840	OLR4A	**PRAGUE, CZECHOSLOVAKIA,** 25.35 m. Addr. Czech Shortwave Sta., Praha X11, Fochova 16. Daily 2-2.15 pm.
11.830	W9XAA	**CHICAGO, ILL.,** 25.36m., 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 Daily 2.30-6 pm.
11.820	XEBR	**HERMOSILLA, SON., MEX.,** 25.38 m., Addr. Box 68. Relays XEBH. 2-4 pm., 9 pm.-12m.
11.820	GSN	**DAVENTRY, ENG.,** 25.38 m., Addr. (See 26.100 mc.). Irregular.
11.810	2RO	**ROME, ITALY,** 25.4 m., Addr. E.I.A.R., Via Montello 5. Daily 5-8.30 am., 10.30 am.-12.20 pm.
11.805	OZG	**SKAMLEBOAEK, DENMARK.** 25.41 m. Addr. Statsradiofonien. Irregular.
11.800	JZJ	**TOKIO, JAPAN,** 25.42 m., Addr. Broadcasting Co. of Japan, Overseas Division. 8-9 am, 3-4, 4.30-5.30 pm.
11.800	OER3	**VIENNA, AUSTRIA,** 25.42 m. Daily 10 am.-5 pm. Sat. until 5.30 pm.
11.795	DJO	**BERLIN, GERMANY,** 25.43 m., Addr. (See 15.280 mc.). Irregular.
11.795	OAX5B	**ICA, PERU,** 25.43 m., Addr. Radio Universal. 11 am.-12 n, 4-11.15 pm.
11.790	COGF	**MATANZAS, CUBA,** 25.45 m., Addr. Gen. Betancourt 51. Relays CMGF. 2-3, 4-5, 6-11 pm.
11.790	W1XAL	**BOSTON, MASS.,** 25.45 m., Addr. (See 15.250 mc.) Daily 4.45-6.30 pm., Sat. 1.45-5.15, 6-6.30 pm., Sun. 3-6.30 pm.
11.770	DJD	**BERLIN, GERMANY,** 25.49 m., Addr. (See 15.280 mc.) 10.40 am.-4.30 pm., 4.50-11 pm.
11.760	TGWA	**GUATEMALA CITY, GUAT.,** 25.51 m. (See 17.8 mc.) Tues. and Thurs. 8 pm.-12 m.

(*Continued on page* 558)

(All Schedules Eastern Standard Time)

How To Identify S-W Stations

Keep These Lists for Future Reference

WORLD-WIDE STATION IDENTIFICATION LIST

Part Eight

FREQ. CALL TYPE LOCATION

6.69 TIEP—B—San Jose, Costa Rica.
Slogan *"La voz del Itmo,"* *"the voice of the Isthmus."*

6.65 YNLG—B—Managua, Nicaragua.
See 8.505 mc. Signs off with selection *"Good night, ladies."*

6.65 JFZC—C—"S. S. Chichibu Maru". N.Y.K. liner See JFZC, 17.70 mc.

6.635 HC2RL—B—Guayaquil, Ecuador.
Opens and closes with the Ecuadorian National Anthem. Announces every 15 minutes in English and Spanish, prefacing English announcements with *"Hello America, this is station HC2RL, Guayaquil, Ecuador."*

6.63 HIT—B—Trujillo, Dom. Rep.
"La voz de la Victor," announces as *"HIT—T as in Texas."* Opens, closes, with *"Anchors Aweigh."*

6.625 PRADO—B—Riobamba, Ecuador.
Announces *"Estacion Prado, en Riobamba, Ecuador."* Opens with chimes.

6.555 HI4D—B—Trujillo, Dom. Rep.
Slogan *"La voz del Quisqueya."*

6.55 TIRCC—B—San Jose, Costa Rica.
Slogan *"Radioemisora Catolica Costarricense."*

6.545 YV6RB—B—Bolivar, Venezuela.
"Ecos del Orinoco."

6.54 YNIGG—B—Managua, Nicaragua.
"La voz de los Lagos"

6.52 YV4RB—B—Valencia, Venezuela.
"La voz de Carabobo." Uses dual call "YV4RA y YV4RB."

6.50 HIL—B—Trujillo, Dom. Rep.
Gives call, saying *"L—as in London,"* in English.

6.50 J2AA—C—Haneda Airdrome.
Tokyo, Japan. Announces as *"Kochira wa J2AA, Haneda."* Phones aircraft.

6.485 HI1L—B—Santiago de los Cabelleros, Dom. Rep.
"Emisora Nacionales."

6.485 Radio Guardia Civil, Tetuan, Spanish Morocco.
Announces *"Attencion, attencion, aqui es Radio Guardia Civil, en Tetuan, Marruecos Espanol."*

6.479 HI8A—B—Trujillo, Dom. Rep.
"La Fa-doc en el Aire, Ciudad Trujillo."

6.46 KZGF—C—Manila, Philippines.
See KZGF, 7.855 mc. Address: Philippine Long Distance Telephone Company, Box 444, Manila, Philippines. (Radiophone Dept.).

6.45 HI4V—B—San Francisco de Macoris, Dom. Rep.
"La voz de la Marina."

6.42 HI1S—B—Santiago de los Cabelleros, Dom. Rep.
"La voz de la Hispaniola."

6.416 YV6RC—B—Bolivar, Venezuela.
"Radio Bolivar."

6.41 TIPG—B—San Jose, Costa Rica.
"La voz de la Victor." Closes with *"Parade of the Wooden Soldiers."*

6.40 YV5RH—B—Caracas, Venezuela.
"Ondas Populares." Uses dual call "YV5RG y YV5RH."

6.38 YV5RF—B—Caracas, Venezuela.
"Ecos de Caribe." Uses dual call "YV5RE y YV5RF." Closes with *"Blue Danube"* organ recording.

6.365 YV1RH—B—Maracaibo, Venezuela.
"Ondas del Lago," then a burst of music. Then announces *"Emisora Philco, YV1RF y YV1RH."*

6.357 HRP1—B—San Pedro Sula, Honduras.
"El Eco de Honduras." Announces frequency as "6,350 kc."

6.34 HI1X—B—Trujillo, Dom. Rep.

6.335 OAX1A—B—Chiclayo, Peru.
Slogans—*"Radio Delcar,"* and *"la voz de Chiclayo."* Also *"la voz de Ica,"* and *"Radio Philco."* Signs off with Good Night song by Ted Lewis.

6.33 JZG—C—Nazaki, Japan.
When relaying JOAK's program follows same outline as JVN, 10.66 mc. When phoning ships, usually calls in code and follows with inverted speech.

6.31 HIZ—B—Trujillo, Dom. Rep.
"Broadcasting Nacional." Uses dual call "HIZ y HIJ." Also uses slogan *"La voz de los Muchachos."*

6.31 TG2—B—Guatemala City, Guatemala.
Uses dual call "TG1 y TG2."

Have You Heard These South American Artists?

Left—ISABEL MARENGO, Argentine Soprano, who is a featured artist at Radio El Mundo.

•

Right—MAESTRO JULIO DE CARO, composer and orchestra leader, whose distinctive style and remarkable orchestrations are one of the most interesting features of radio El Mundo programs.

Can You Answer These Radio Questions?

1. What type of scanning was used at the transmitter in the recent Bell Telephone Labs. television demonstration? See page 534.
2. How long ago and between what points was micro-ray transmission established commercially? See page 535.
3. In the recent reception by RCA engineers of Trans-Atlantic television signals, was the image picked up, or only the station carrier and voice? See page 536.
4. What is the name of the Observatory connected with Pasadena by ultra-short waves? See page 536.
5. Can you name five important subjects which every radio and television expert should master thoroughly? See page 537.
6. Do you know how to connect a loudspeaker so it can be used as a microphone? See page 538.
7. What are the limitations of the induction phone and can its range be increased indefinitely? See page 540.
8. Is there any special manner in which the tuning coils in a switch-band receiver should be arranged to avoid interaction? See page 544.
9. Is there any advantage in being able to match the output of an S-W converter to the input of the receiver, and how would you accomplish it? See page 546.
10. What are some of the uses of a Peak Voltmeter? See page 548.
11. Where are the "sweep coils" placed on a cathode ray television tube? See page 551.
12. What short-wave broadcast station is aboard a steamship? See page 581.

Mc.	Call	
11.760	OLR4B	**PRAGUE, CZECHOSLOVAKIA,** 25.51 m., Addr. (See 11.875 mc.) Irregular.
11.750	GSD	**DAVENTRY, ENG.,** 25.53 m., Addr. B. B.C., London. 3.15-5.30, 8.55 am.-12 n., 12.20-6.00 pm., 9.15-11.15 pm.
11.730	——	**SAIGON, INDO CHINA,** 25.57 m., Addr. Radio Philco. 11pm.-1am.,5.30-9.30am.
11.730	PHI	**HUIZEN, HOLLAND,** 25.57 m., Addr. N. V. Philips' Radio.
11.720	CJRX	**WINNIPEG, CANADA,** 25.6 m., Addr. James Richardson & Sons, Ltd. 4-10pm.
11.718	CR7BH	**LAURENCO MARQUES, PORTUGESE, E. AFRICA,** 25.6 m. Daily 12.05-1, 4.30-6.30, 9.30-11 am., 12.05-4 pm., Sun. 5-7 am., 10 am.-2 pm.
11.715	TPA4	**PARIS, FRANCE,** 25.61 m., (See 15.245 mc.) 6.15-8.15 pm., 10 pm.-1 am.
11.710	SBG	**MOTALA, SWEDEN,** 25.63 m., 1.20-2.05, 8-9 am., 11 am.-1.30 pm.
11.710	XEWB	**GUADALAJARA, MEX.,** 25.63 m., Addr. Juarez 289. Irregular.
11.710	YSM	**SAN SALVADOR, EL SALVADOR,** 25.63 m., Addr. (See 7.894 mc.) Irregular 1.30-2.30 pm.
11.700	HP5A	**PANAMA CITY, Pan.,** 25.65 m. Addr. Radio Teatro, Apartado 954. 10 am.-10 pm.
11.700	CB1170	**SANTIAGO, CHILE,** 25.65 m., Relays CB89 6 pm.-12 m.
11.680	KIO	**KAHUKU, HAWAII,** 25.68 m., Addr. RCA Communications. Irregularly.
11.595	VRR4	**STONY HILL, JAMAICA, B. W. I.,** 25.87 m. Works WNC daytime.
11.560	VIZ3	**FISKVILLE, AUSTRALIA,** 25.95 m., Addr. Amalgamated Wireless of Australasia Ltd. Tests irregularly.
11.530	SPD	**WARSAW, POLAND,** 26 m., Addr. 5 Mazowiecka St. Testing daily 6-7 pm.
11.500	XAM	**MERIDA, YUCATAN,** 26.09 m. Irregular 1-7.30 pm.
11.500	PMK	**BANDOENG, JAVA,** 26.09 m. Tests irregularly.
11.435	COCX	**HAVANA, CUBA,** 26.21 m. P. O. Box 32. 6.55 am.-1 am. Sun. till 12 m. Relays CMX.
11.413	CJA4	**DRUMMONDVILLE, QUE., CAN.,** 26.28 m. Tests irregularly.
11.402	HBO	**GENEVA, SWITZERLAND,** 26.31 m., Addr. Radio Nations. Sat. 6.45-8 pm.
11.280	HIN	**CIUDAD TRUJILLO, D. R.,** 26 m.,Addr. La Voz del Partido Dominicano. Irregular.
11.050	ZLT4	**WELLINGTON, NEW ZEALAND,** 27.15 m. Works Australia and England early morning.
11.040	CSW	**LISBON, PORTUGAL,** 27.17 m., Addr. Nat. Broadcasting Sta. 1.30-5 pm.
11.000	PLP	**BANDOENG, JAVA,** 27.27 m. Relays YDB. 5.30-10.30 or 11 am. Sat. until 11.30 am.
10.970	OCI	**LIMA, PERU,** 27.35 m. Works Bogota, Col. evenings.
10.960	——	**TANANARIVE, MADAGASCAR,** 27.36 m., Addr. (See 9.53 mc.). 12:30-45, 3:30-4:30, 10-11 am.
10.840	KWV	**DIXON, CALIF.,** 27.68 m., Addr. A. T. & T. Co. Works with Hawaii evenings.
10.770	GBP	**RUGBY, ENGLAND,** 27.85 m. Works Australia early morning.
10.740	JVM	**NAZAKI, JAPAN,** 27.93 m. Works U.S.A. 2-7 am.
10.675	WNB	**LAWRENCEVILLE, N. J.,** 28.1 m., Addr. A. T. & T. Co. Works with Bermuda irregularly.
10.670	CEC	**SANTIAGO, CHILE,** 28.12 m. Daily 7-7.15 pm.
10.660	JVN	**NAZAKI, JAPAN,** 28.14 m. Broadcasts daily 2-8 am. Works Europe irregularly at other times.
10.600	ZIK2	**BELIZE, BRIT. HONDURAS,** 28.25 m., Tues., Thurs., Sat. 7:30-7:45 pm.
10.550	WOK	**LAWRENCEVILLE, N. J.,** 28.44 m., Addr. A. T. & T. Co. Works S. A. nights.
10.535	JIB	**TAIHOKU, TAIWAN,** 28.48 m. Works Japan around 6.25 am. Broadcasts, relaying JFAK 9-10.25 am. 1-2.30 am. Sun. to 10.15 am.
10.520	VLK	**SYDNEY, AUSTRALIA,** 28.51 m., Addr. Amalgamated Wireless of Australasia Ltd. Works England 1-6 am.
10.430	YBG	**MEDAN, SUMATRA,** 28.76 m. 5.30-6.30 am., 7.30-8.30 pm.
10.420	XGW	**SHANGHAI, CHINA,** 28.79 m. Works Japan 12 m.-3 am.
10.410	PDK	**KOOTWIJK, HOLLAND,** 28.8 m. Works Java 7.30-9.40 am.
10.410	KES	**BOLINAS, CALIF.,** 28.8 m., Addr. RCA Communications. Irregular.
10.370	JVO	**NAZAKI, JAPAN,** 28.93 m. Broadcasts around 5 am.
10.370	EHZ	**TENERIFFE, CANARY ISLANDS,** 28.93 m., Relays EAJ43 2.15-3.15, 6.15-8.55 pm. Relays Salamanca, Spain 8.55-10 pm.
10.350	LSX	**BUENOS AIRES, ARG.,** 28.98 m., Addr. Transradio International. Broadcasts 5-6 pm. Mon. and Fri. Tests irregularly at other times.
10.330	ORK	**RUYSSELEDE, BELGIUM,** 29.04 m. 2.30-4 pm.
10.300	LSL2	**BUENOS AIRES, ARG.,** 29.13 m., Addr. Cia. Internacional de Radio. Works Europe evenings.
10.290	DZC	**ZEESEN, GERMANY,** 29.16 m., Addr. (See 15.360 mc.) Irregular.
10.260	PMN	**BANDOENG, JAVA,** 29.24 m., Relays YDB 5.30-10.30 or 11 am., Sat. to 11.30 am.
10.250	LSK3	**BUENOS AIRES, ARG.,** 29.27 m., Addr. (See 10.310 mc.) Works Europe and U.S.A. afternoons and evenings.
10.230	CED	**ANTOFAGASTAN, CHILE,** 29.33 m. Tests 7-9.30 pm.
10.220	PSH	**RIO DE JANIERO, BRAZIL,** 29.35 m. Broadcasts 7-9 pm.
10.170	RIO	**BAKOU, U.S.S.R.,** 29.15 m. Works Moscow 10 pm.-5 am.
10.140	OPM	**LEOPOLDVILLE, BELGIAN CONGO,** 29.59 m. Works Belgium around 3 am. and from 1-4 pm.
10.080	RIO	**TIFLIS, U.S.S.R.,** 29.76 m. Works Moscow early morning.
10.070	EDM-EHY	**MADRID, SPAIN,** 29.79 m. Works S. A. evenings.
10.065	JZB-TDB	**SHINKYO, MANCHUKUO,** 29.81 m. Works Tokio 6.30-7 am.
10.055	ZFB	**HAMILTON, BERMUDA,** 29.84 m. Works N. Y. C. irregular.
10.055	SUV	**ABOU ZABAL, EGYPT,** 29.84 m. Works Europe 1-6 pm.
10.042	DZB	**ZEESEN, GERMANY,** 29.87 m., Addr. Reichspostzenstralamt. Irregular.
9.990	KAZ	**MANILA, P. I.,** 30.03 m., Addr. RCA Communications. Works Java early morning.
9.950	COCU	**HAVANA, CUBA,** 30.15 m., Addr. (See 6.590 mc., COCU). Relays CMCU 7 am.-12 m.
9.950	GCU	**RUGBY, ENGLAND,** 30.15 m. Works N. Y. C. night time.
9.930	HKB	**BOGOTA, COL.,** 30.21 m. Works Rio evenings.
9.930	CSW	**LISBON, PORTUGAL,** 30.31 m., Addr. Nat. Broad. Station. 5-7 pm.
9.925	JDY	**DAIREN, MANCHUKUO,** 30.23 m. Relays JQAK daily 6.50-8 am.
9.890	LSN	**BUENOS AIRES, ARG.,** 30.33 m., Addr. (See 10.300 mc.) Works N. Y. C. evenings.
9.870	WON	**LAWRENCEVILLE, N. J.,** 30.4 m., Addr. A. T. & T. Co. Works England nights.
9.860	EAQ	**MADRID, SPAIN,** 30.43 m., Addr. Post Office Box 951. Daily 5.15-7.30 pm., Sat. also 12 n.-2 pm.
9.833	COCM	**HAVANA, CUBA,** 30.51 m. Addr. Transradio Columbia, P. O. Box 33. 7 am.-12 m. Relays CMCM.
9.830	IRM	**ROME, ITALY,** 30.52 m. Works Egypt afternoons.
9.800	XGOX	**NANKING, CHINA,** 30.61 m., Relays XGOA 6-10 am.
9.800	LSI	**BUENOS AIRES, ARG.,** 30.61 m., Addr. (See 10.350 mc.) Tests irregularly.
9.790	GCW	**RUGBY, ENGLAND,** 30.64 m. Works N. Y. C. evenings.
9.760	VLJ-VLZ2	**SYDNEY, AUSTRALIA,** 30.74 m., Addr. Amalgamated Wireless of Australasia Ltd. Works Java and New Zealand early morning.
9.750	WOF	**LAWRENCEVILLE, N. J.,** 30.77 m., Addr. A. T. & T. Co. Works London and Paris night time.
9.740	COCQ	**HAVANA, CUBA,** 30.78 m. Addr. 25 No. 445, Vedado, Havana. 6.55 am.-1 am. Sun. till 12 m.
9.710	GCA	**RUGBY, ENGLAND,** 30.9 m. Works S. A. evenings.
9.685	TGWA	**GUATEMALA CITY, GUAT.,** 30.96 m. Irregular.
9.680	FZF6	**FORT de FRANCE, MARTINIQUE,** 30.97 m., Addr. P. O. Box 136. 11.30 am.-12.30 pm., 6.15-7.50 pm.
9.675	DZA	**ZEESEN, GERMANY,** 31.01 m., Addr. (See 10.042 mc.) Irregular.
9.670	TI4NRH	**HEREDIA, COSTA RICA,** 31.02 m., Addr. Amando C. Marin, Apartado 40. 8.30-10 pm., 11.30 pm.-12 m.
9.660	LRX	**BUENOS AIRES, ARG.,** 31.06 m., Addr. El Mundo. 8.30 am.-10.30 pm.
9.650	CS2WA	**LISBON, PORTUGAL,** 31.09 m., Addr. Radio Colonial. Tues., Thurs. and Sat. 4.30-7 pm.
9.650	DGU	**NAUEN, GERMANY,** 31.09 m.,Addr.(See 20.020 mc.) Works Egypt afternoons.
9.645	HH3W	**PORT-AU-PRINCE, HAITI,** 31.1 m., Addr. P. O. Box A117. 1-2, 7-8 pm.
9.645	YNLF	**MANAGUA, NICARAGUA,** 31.1 m. 8-9 am., 12.30-2.30, 6.30-10 pm.
9.640	CXA8	**COLONIA, URUGUAY,** 31.1 m., Addr. Belgrano 1841, Buenos Aires, Argentina. Relays LR3, Buenos Aires 6 am.-11 pm.
9.635	2RO	**ROME, ITALY,** 31.13 m.,Addr.(See 11.810 mc.) Daily 12.30-9 pm.
9.630	HJ7ABD	**BUCARAMANGA, COL.,** 31.14 m. 10 am.-12 n., 4-11 pm.
9.625	——	**TAIHOKU, TAIWAN,** 31.16 m.. Relays JFAK irreg. 8-10.25 am., 1-2.30 am., Sun. 8-10.15 am.
9.620	HJ1ABP	**CARTAGENA, COL.,** 31.19 m., Addr. P. O. Box 37. 11 am.-1 pm., 5-11 pm. Sun. 10 am.-1 pm., 3-6 pm.
9.615	——	**KLIPHEUVAL, SOUTH AFRICA,** 31.22 m., Addr. P. O. Box 4559, Johannesburg. Daily, exc. Sat. 11:45 pm.-12.40 am., Daily exc. Sun. 3.20-7.15, 9-11:40 am., Sun. 4-5:30, 8-11.40 am.
9.615	HP5J	**PANAMA CITY, PANAMA,** 31.22 m. Addr. Apartado 867. 12 n. to 1.30 pm., 6-10.30 pm.
		↓ S.W. BROADCAST BAND ↓
9.600	RAN	**MOSCOW, U.S.S.R.,** 31.25 m. Daily 7-9.15 pm.
9.595	HBL	**GENEVA, SWITZERLAND,** 31.27 m., Addr. Radio Nations. Sat. 5.30-6.30 pm.
9.590	PCJ	**HUIZEN, HOLLAND,** 31.28 m., Addr. (See 15.220 mc.) Sun. 2-3, 7-9.15 pm., Mon. 9-10.30 pm., Tues. 5.30-8 am., 2-3.30 pm., Wed. 8-9.30 pm., Thurs. 7-8.30, 9-10.30 pm.
9.590	VK6ME	**PERTH, W. AUSTRALIA,** 31.38 m., Addr. Amalgamated Wireless of Australasia, Ltd. 6-8 am. exc. Sun.
9.590	VK2ME	**SYDNEY, AUSTRALIA,** 31.38 m., Addr. Amalgamated Wireless of Australasia, Ltd.,47 York St.,Sun. 1-3 am.,5-11am.
9.590	W3XAU	**PHILADELPHIA, PA.,** 31.28 m. Relays WCAU Sun., Tues., Wed., Thurs. 12 n-7 pm., other days to 8 pm.
9.580	GSC	**DAVENTRY, ENGLAND,** 31.32 m., Addr. B. B. C., Portland Pl., London, W. 1. 4.15-6, 6.20-8.30, 9.15-11.15 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. 6-10 pm.
9.570	KZRM	**MANILA, P. I.,** 31.35 m., addr. Erlanger & Galinger, Box 283. 4.30-6 pm., 5-9 am., Sun 4-10 am.
9.570	W1XK	**SPRINGFIELD, MASS.,** 31.35 m., Addr. Westinghouse Electric & Mfg. Co. Relays WBZ 7 am. to 1 am. Sun. 8 am. to 1 am.

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(All Schedules Eastern Standard Time)

Short Wave League

HONORARY MEMBERS

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

Broadcasting a play at VLR, Melbourne, Australia.

WHEN TO LISTEN IN

by
M. Harvey Gernsback

All Schedules in Eastern Standard Time

JAPAN . . . The broadcasts from Japan now take place on JZI, 9.53 mc. and JZJ, 11.8 mc. The schedule is 12:30-1:30 am., 5-9 am., 1-4 and 4:30-5:30 pm., daily. At present JZJ is being heard very well in New York from 4:30-5:30 pm. Wonders of short waving are never-ending. While listening to Japan one Sunday afternoon recently, we heard strangely familiar sounds emanating from the loud-speaker. It turned out to be "The Music Goes Round and Round"! The pay off came when the vocal chorus was sung in Japanese! The effect was quite startling.

ROME . . . 2RO has announced an enlarged schedule of operations effective December 1st. The new schedule is from 5-8:30 am., and 10 am.-12:20 pm. on 11.81 mc. From 12:30 to 9 pm. 2RO broadcasts on 9.635 mc. This schedule is daily including Sunday. From 6-7:30 pm. a program for South America is broadcast and from 7:35-9 pm. there is a program for North America. Note that these are now a daily feature. The station also announces that it is putting into operation two new experimental transmitters having a power of 2 kw. These transmitters will operate on three frequencies, 17.17, 15.23, 15.20 mc., and will send out the same programs as 2RO. They will be put into regular service by February 1st.

CZECHOSLOVAKIA . . . The Prague short-wave station has also announced a new schedule of operations. A program is broadcast for North America over OLR3A, 9.55 mc. on Monday, Wednesday and Friday from 8-10:55 pm. A program for South America is broadcast on Sundays from 6:15-8:55 pm. on the same frequency. For Europe programs are heard daily from 12:55-4:40 pm. on 9.55 mc. For Asia a program is broadcast daily from 6:55-7:30 am. on OLR5A, 15.23 mc. A second program for Asia is broadcast daily except Sunday from 9:25-10:10 am. on 9.55 mc. However, judging by past performance of the station it is quite possible that this schedule will not be adhered to exactly.

ENGLAND . . . Daventry has returned to the 6 megacycle bedlam. GSL 6.11 mc. is now on from 6:20-8:30 pm. and from 9:15-11:15 pm. for North America. Other transmissions for North America are: GSP 15.31 mc. 1:45-4 pm., GSC, 9.58 mc. 4-6 pm., GSC, 9.58 mc. 6:20-8:30 and 9:15-11:15 pm. GSB 9.51 mc. 6:20-8:30, 9:15-11:15 pm.

AUSTRALIA . . . VK3LR, the Melbourne station on 9.58 mc. informs us that the call letters of the station have been changed to VLR.

OFFICIAL OBSERVERS . . . for PCJ are requested by N. V. Philips' Radio of Eindhoven, Holland. Since the inauguration of their new 60 kw. transmitter, the operators are anxious to secure comprehensive reception reports from all over the world on their station's performance. They have informed us that listeners who send in regular reports for a period of one year will be rewarded with a souvenir from the station. A few observers in each country of the world are requested. Observers in the United States have already been appointed so that any of our readers outside the United States interested in co-operating with PCJ should write directly to the station. Special log forms have been prepared for observers.

KLIPHEUVAL . . . Thanks to several South African readers, we are able to give the complete story on the Klipheuval station. This station has been put into service to provide an alternative program service for South African listeners. Up to the present the only Cape Town station has been one operating on the broadcast band. The new short-wave station will be principally for the benefit of Afrikaans and most announcements from this station will be made in Afrikaans, which is a language of Dutch origin. During the daytime hours in South Africa this station operates on 9.615 mc. but during their evening hours it shifts to 6.097 mc. which is the same frequency as the Johannesburg station. Under the new set up the Johannesburg station operates on 6.097 mc. during the day but signs off when Klipheuval comes into operation on this frequency. So now there are actually two stations on 6.097, one in Klipheuval and one in Johannesburg.

The Klipheuval station has a power of 2 kw., Johannesburg's is much less than this. For complete schedule see the station list.

ZNB, at Mafeking, Bechunaland, on 5.9 mc. is no longer operating regularly according to a dispatch we have just received from a listener in Natal. The station got into a dispute over the payment of royalties for playing phonograph records on the air so that at present the station operates on Sunday only at 1:30 pm. when it broadcasts a news bulletin in English. It is used for general experimental work, however, irregularly at other times.

PORTUGAL . . . The call letters of CT1AA at Lisbon have been changed to CS2WA. There is a new station in Lisbon on 5.977 mc., this is CS2WD. The station generally operates from 3:30–6 pm. Address is Rua Capelo 5.

MOSCOW . . . RNE on 12 mc. has enlarged its schedule considerably. Full details may be found in the station list. RNE is also operating on 6 mc. daily from 3-6 pm. The schedules of RAN and RKI remain the same as last month.

FRANCE . . . The long heralded expansion of Radio Coloniale has at last occurred. Regularly about once every six months for the last three years we have received notices that Radio Coloniale had its new high powered

(*Continued on page 590*)

Additions to Station List

Mc.	Call	Location
31.600	W3XKA	PHILADELPHIA, PA.
31.600	W5XAU	OKLAHOMA CITY, OKLA.
15.170	TGWA	GUATEMALA CITY, GUAT.
10.500	......	TANANARIVE, MADAGASCAR
10.600	ZIK2	BELIZE, BRIT. HONDURAS
7.000	......	GUADALAJARA, JALISCO, MEX.
6.300	HI8A	LA VEGA, D. R.
6.097	......	KLIPHEUVAL, SO. AFRICA
6.015	PRA8	PERNAMBUCO, BRAZIL
5.910	9MI	S. S. KANIMBLA
5.977	CS2WD	LISBON, PORTUGAL

Mc.	Call	
9.560	DJA	**BERLIN, GERMANY,** 31.38 m., Addr. Broadcasting House. 12.05-11 am., 4.50-10.45 pm.
9.550	OLR3A	**PRAGUE, CZECHOSLOVAKIA,** 31.41 m. See 11.840 mc. Daily exc. Sun. 9.25-10.10 am., Daily 12.55-4.40 pm. Sun. 6.15-8.55 pm. Mon., Wed., Fri. 8-10.35 pm.
9.550	XEFT	**VERA CRUZ, MEX.,** 31.41 m. 11.30 am.-4 pm., 7 pm.-12 m.
9.550	YDB	**SOERABAJA, JAVA,** 31.41 m., Addr. N.I. R.O.M. Daily exc. Sat. 6-7.30 pm., 5.30 to 10.30 or 11 pm. Sat. 5.30-11.30 am.
9.540	DJN	**BERLIN, GERMANY,** 31.45 m., Addr. (See 9.560 mc.) 12.05-10 am., 4.50-10.45 pm.
9.540	VPD2	**SUVA, FIJI ISLANDS,** 31.45 m., Addr. Amalgamated Wireless of Australasia, Ltd. 5.30-7 am.
9.535	JZI	**TOKIO, JAPAN,** 31.46 m., Addr. (See 11.800, JZJ) 12.30-1.30, 8-9 am., 3-4, 4.30-5.30 pm.
9.535	HB9D	**ZURICH, SWITZERLAND,** 31.46 m., Addr. Radio Club of Zurich, Post Box Zurich 2. Sun. 9-11 am., Thur. 1-3 pm.
9.530	W2XAF	**SCHENECTADY, N. Y.,** 31.48 m., Addr. General Electric Co. 4 pm.-1 am.
9.530	——	**TANANARIVE, MADAGASCAR,** 31.48 m., Addr. Le Directeur des PTT, Radio Tananarive, Administration PTT. 12.30-12.45, 3.30-4.30, 10-11 am.
9.525	ZBW3	**HONGKONG, CHINA,** 31.49 m., Addr. P. O. Box 200. 11.30 pm. to 1 am., 4-10 am., Sat. 9 pm.-1 am., Sun. 3-9.30 am.
9.525	LKJ1	**JELOY, NORWAY,** 31.49 m. 5-8 am.
9.520	HJ6ABH	**ARMENIA, COLOMBIA,** 31.51 m. 8-11 am., 6-10 pm.
9.520	OZF	**SKAMLEBOAEK, DENMARK,** 31.51 m., Addr. Statsradiofonien, Copenhagen. 2-6.40 P.M.
9.520	YSH	**SAN SALVADOR, EL SALVADOR** 31.51 m., Addr. (See 7.894 mc.) Irregular 6-10 pm.
9.520	XEDQ	**GUADALAJARA, GAL., MEXICO,** 31.51 m. Irregular 7.30 pm. to 12.30 am.
9.510	VK3ME	**MELBOURNE, AUSTRALIA,** 31.55 m., Addr. Amalgamated Wireless of Australasia, 167 Queen St. Daily except Sun. 4-7 am.
9.510	GSB	**DAVENTRY, ENGLAND,** 31.55 m., Addr. (See 9.580 mc.—GSC) 3.15-5.30 am., 12.20-6 pm., 6.20-8.30, 9-11 pm.
9.510	HS8PJ	**BANGKOK, SIAM,** 31.55 m. Thursday, 8-10 am.
9.505	HJ1ABE	**CARTAGENA, COLOMBIA,** 31.57 m. Addr. P. O. Box 31. 5-10.30 pm.
9.500	XEWW	**MEXICO CITY, MEX.,** 31.58 m. Addr. Apart. 2516. Relays XEW. 6 pm.-12 m.
9.500	HJU	**BUENAVENTURA, COLOMBIA,** 31.58 m., Addr. National Railways. Mon., Wed. and Fri. 8-11 pm.
9.500	PRF5	**RIO DE JANIERO, BRAZ.,** 31.58 m. Irregularly 4.45 to 5.45 pm.
9.478	EAR	**MADRID, SPAIN,** 31.65 m., Addr. (See 9.860 mc.) 7.30-9.30 pm.
9.460	ICK	**TRIPOLI, N. AFRICA,** 31.71 m. Works Rome, 5.30-7 am.
9.440	HC2RA	**GUAYAQUIL, ECUDAOR,** 31.78 m. Irregularly till 10.40 pm.
9.428	COCH	**HAVANA, CUBA,** 31.8 m., Addr. 2 B St., Vedado. 7 am.-1 am.
9.415	PLV	**BANDOENG, JAVA,** 31.87 m. Works Holland around 9.45 am. Broadcasts 5.30-9.30 am., 6-6.30 pm.
9.330	CGA4	**DRUMMONDVILLE, CANADA,** 32.15 m. Works England irregularly.
9.330	OAX4J	**LIMA, PERU,** 32.15 m., Addr. Box 1166, "Radio Universal." 12 n.-3 pm., 5 pm.-1 am.
9.300	YNGU	**MANAGUA, NICARAGUA,** 32.26 m. 12 n.-2 pm., 6-7 pm.
9.280	GCB	**RUGBY, ENGLAND,** 32.33 m. Works Canada and Egypt evenings and afternoons.
9.275	HIG	**CIUDAD TRUJILLO, D. R.,** 32.33 m. 7.10-8.40 am., 12.40-2.10, 8.10-9.40 pm.
9.200	COBX	**HAVANA, CUBA,** 32.59 m., Addr. San Miguel 194, Altos. Relays CMBX 7 am.-12 m.

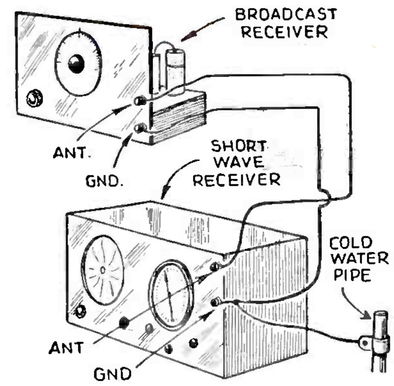
Mc.	Call	
9.170	WNA	**LAWRENCEVILLE, N. J.,** 32.72 m. Works England evenings.
9.150	YVR	**MARACAY, VENEZUELA,** 32.79 m. Works with Europe afternoons.
9.125	HAT4	**BUDAPEST, HUNGARY,** 32.88 m., Addr. "Radiolabor," Gyali-ut, 22. Sun. and Wed. 7-8 pm., Sat. 6-7 pm.
9.090	COBC	**HAVANA, CUBA,** 32.98 m. Addr. P.O. Box 132. Relays CMBC. 6.55 am.-12.30 am
9.060	TFK	**REYKJAVIK, ICELAND,** 33.11 m. Works London afternoons.
9.030	COBZ	**HAVANA, CUBA,** 33.2 m., Radio Salas Addr. P. O. Box 866, 7:45 am-12.10 am. Irreg. 12.30-2 am. Relays CMBZ
9.020	GCS	**RUGBY, ENGLAND,** 33.26 m. Works N. Y. C. evenings.
9.010	KEJ	**BOLINAS, CAL.,** 33.3 m. Relays NBC and CBS programs in evening irregularly.
8.967	VWY	**KIRKEE, INDIA,** 33.43 m. Works with England in morning.
8.960	TPZ	**ALGIERS, ALGERIA,** 33.48 m. Works Paris afternoons.
8.920	COKG	**SANTIAGO, CUBA,** 33.61 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.
8.830	HCJB	**QUITO, ECUADOR,** 33.95 m. 8.30-10.30 pm. except Monday.
8.775	PNI	**MAKASSER, CELEBES, N. I.,** 34.19 m. Works Java around 4 am.
8.765	DAF	**NORDDEICH, GERMANY,** 34.23 m. Works German ships irregularly.
8.760	GCQ	**RUGBY, ENGLAND,** 34.25 m. Works Africa afternoons.
8.750	FZE8	**DJIBOUTI, FR. SOMALILAND, AFRICA,** 34.29 m. Works Paris around 2.30 am.
8.730	GCI	**RUGBY, ENGLAND,** 34.36 m. Works India 8 am.
8.720	VPD3	**SUVA, FIJI ISLES,** 34 m., Addr. (See 9.540 mc., VPD2). 5.30-7 am.
8.700	HKV	**BOGOTA, COLOMBIA,** 34.46 m. Tues. and Fri. 7-7.20 pm.
8.680	GBC	**RUGBY, ENGLAND,** 34.56 m. Works ships irregularly.
8.665	COJK	**CAMAGUEY, CUBA,** 34.62 m., Addr. Finlay No. 3 Altos. 5.30-6.30, 8-11 pm., daily except Sat. and Sun.
8.580	YNLG	**MANAGUA, NICARAGUA,** 34.92 m. 7.30-9.30 pm.
8.560	WOO	**OCEAN GATE, N. J.,** 35.05 m. Works ships irregularly.
8.400	HC2CW	**GUAYAQUIL, ECUADOR,** 35.71 m. 11.30 am.-12.30 pm., 8-11 pm.
8.380	IAC	**PISA, ITALY,** 35.8 m. Works Italian ships irregularly.
8.190	XEME	**MERIDA, YUCATAN,** 36.63 m., Addr. Calle 59, No. 517, "La Voz de Yucatan desde Merida." 10 am.-12n., 6 pm.-12 m.
8.185	PSK	**RIO DE JANEIRO, BRAZIL,** 36.65 m. Irregularly.
8.036	CNR	**RABAT, MOROCCO,** 37.33 m. Sun. 2.30-5 pm.
7.975	HC2TC	**QUITO, ECUADOR,** 37.62 m. Thurs. and Sun. at 8 pm.
7.901	LSL	**HURLINGHAM, ARGENTINA,** 37.97 m. Works Brazil at night.
7.894	YSD	**SAN SALVADOR, EL SALVADOR,** 37.99 m., Addr. Dir. Genl. Tel. & Tel. Irregular 7-11 pm.
7.860	SUX	**ABOU ZABAL, EGYPT,** 38.17 m. Works with Europe, 4-6 pm.
7.854	HC2JSB	**GUAYAQUIL, ECUADOR,** 38.2 m. Evenings.
7.797	HBP	**GENEVA, SWITZERLAND,** 38.48 m., Addr. Radio-Nations. Sat. 5.30-6.30 pm.
7.715	KEE	**BOLINAS, CAL.,** 38.89 m. Relays NBC and CBS programs in evening irregularly.
7.626	RIM	**TACHKENT, U.S.S.R.,** 39.34 m. Works with Moscow in early morning.
7.610	KWX	**DIXON, CAL.,** 39.42 m. Works with Hawaii, Philippines, Java and Japan, nights.
7.550	TI8WS	**PUNTA ARENAS, COSTA RICA,** 39.74 m., Addr. "Ecos Del Pacifico", P. O. Box 75. 6 pm.-12 m.

Mc.	Call	
7.520	KKH	**KAHUKU, HAWAII,** 39.87 m. Works with Dixon and broadcasts irregularly nights.
7.520	RKI	**MOSCOW, U. S. S. R.,** 39.87 m., Relays RAN 7-9.15 pm. Works RIM early am.
7.510	JVP	**NAZAKI, JAPAN,** 39.95 m. Irregular.
7.390	ZLT2	**WELLINGTON, N. Z.,** 40.6 m. Works with Sydney, 3-7 am.
7.380	XECR	**MEXICO CITY, MEX.,** 40.65 m., Addr. Foreign Office. Sunday 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. Daily at 9 pm.
7.100	FO8AA	**PAPEETE, TAHITI,** 42.25 m., Addr. Radio Club Papeete. Tues. and Fri. 11 pm.-12 m.
7.090	——	**GUADALAJARA, JALISCIO, MEX.,** 42.29 m., La Radiodifusora del Pueblo. 9-11 pm.
7.088	PI1J	**DORDRECHT, HOLLAND,** 42.3 m., Addr. Dr. M. Hellingman, Technical College. Sat. 11.10-11.50 am.
6.996	PZH	**PARAMIRABO, DUTCH GUIANA,** 42.88 m., Addr. P. O. Box 18. Daily 6.06-8.36 am., Sun. 9.36-11.36 am., Daily 5.36-8.36 pm.
6.977	XBA	**TACUBAYA, D. F., MEX.,** 43 m. 9.30 am.-1 pm., 7-8.30 pm.
6.976	HCETC	**QUITO, ECUADOR,** 43m., Addr. Teatro Bolivar. Thurs. till 9.30 pm.
6.905	GDS	**RUGBY, ENG.,** 43.45 m. Works N.Y.C. evenings irregularly.
6.860	KEL	**BOLINAS, CALIF.,** 43.70 m. Tests irregularly. 11 am.-12 n., 6-9 pm.
6.850	XGOX	**NANKING, CHINA,** 43.8 m Daily 6.40-8.40 am., Sun. 4.40-6.05 am.
6.800	HI7P	**CIUDAD TRUJILLO, DOM. REP.,** 44.12 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.
6.770	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.
6.775	WOA	**LAWRENCEVILLE, N. J.,** 44.41 m., Addr. A. T. & T. Co. Works England evenings.
6.750	JVT	**NAZAKI, JAPAN,** 44.44 m., Addr. Kokusai-Denwa Kaisha, Ltd., Tokio. Irregular.
6.730	HI3C	**LA ROMANA, DOM. REP.,** 44.58 m., Addr. "La Voz de la Feria." 12.30-2 pm., 5-6 pm.
6.720	PMH	**BANDOENG, JAVA,** 44.64 m. Relays NIROM programs. 5.30-9 am.
6.710	TIEP	**SAN JOSE, COSTA RICA,** 44.71 m., Addr. Apartado 257, La Voz del Tropico. Daily 7-10 pm.
6.672	YVQ	**MARACAY, VENEZUELA,** 44.95 m. Sat. 8-9 pm.
6.670	HC2RL	**GUAYAQUIL, ECUADOR, S. A.,** 44.95 m., Addr. P. O. Box 759. Sun. 5.45-7.45 pm., Tues. 9.15-11.15 pm.
6.650	IAC	**PISA, ITALY,** 45.11 m. Works ships irregularly.
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.
6.590	COCU	**HAVANA, CUBA,** 45.52 m., Addr. Estrada Palma 25, Vibora, Havana. Relays CMCU 7 am.-12 m.
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..

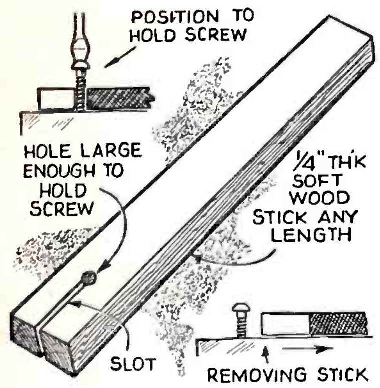
(Continued on page 564)

(All Schedules Eastern Standard Time)

Short Wave Kinks



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



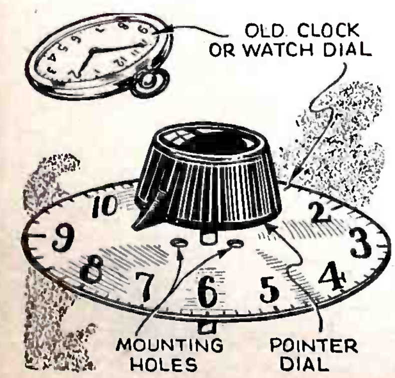
SCREW HOLDER

A handy gadget is this screw holder made from a piece of soft wood 1/4" thick. Cut an 1/8" slot in the wood for a distance of about 1/4" from the end; then drill a hole through the wood large enough to pass a 10/32" screw (see illustration). The gadget can then be used as a screw holder to get screws into holes which are in awkward positions. The slot permits the stick to be withdrawn from the screw after it has been secured.

Another use for the stick is to hold the screw while it is being turned into position by a screwdriver.—*W9WLE.*

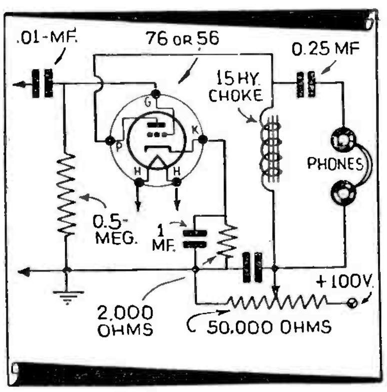
AN ECONOMICAL DIAL

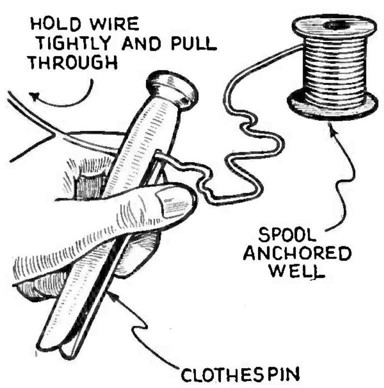
To make a dial cheaply remove the dial from a clock or watch and secure it to the panel of your receiver as shown in the illustration. A pointer knob is attached over the control shaft, covering all of the dial except the numerals. A large clock-face dial can be used for the main tuning condenser dial, whereas a watch dial is ideally suited to a volume or regeneration control. The hole in the center of the dial through which the hands passed should be enlarged slightly to pass the shaft of the control.—*Robert Jones.*



SIGNAL LIMITER

A circuit is shown in the diagram for reducing the effect of noises and fading on C-W reception. This signal limiter is employed as one of the audio amplifier stages in a receiver. The 50,000 ohm potentiometer is adjusted so that all signals above a certain level are reproduced at the same volume. This arrangement, of course, will result in poor quality of reproduction on music because any loud passages of music will be similarly limited. It will, however, greatly reduce the annoyance of static crashes. When the potentiometer is set at the high voltage end of its range, this circuit will function as a normal amplifier.—*David McKinney.*

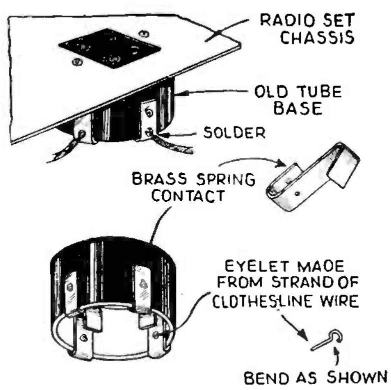




KINK FOR UNKINKING

The humble clothespin comes to the rescue of the experimenter once more. In this case it is used to straighten out the kinks in wire used for coil winding.

Pass the wire through the slot in the clothespin and pull the wire through, at the same time squeezing the clothespin to compress the slot. This will straighten out the kinks in the wire very nicely. (See sketch.)—*Victor Galka.*



HOME-MADE TUBE SOCKET

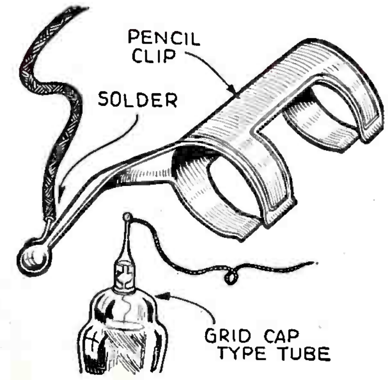
For those who make their own sockets, or for emergency use, all that is necessary is an old tube-base, some old brass condenser plates, a strand of clothesline wire, and some small bolts. The prongs of the tube-base are drilled out from the inside with bits that correspond in thickness to the respective prongs. Cut several brass strips from the condenser plates and bend as shown in the sketch. Drill a small hole through the strips and wall of tube-base and secure with eyelets as shown. Two small screws fasten the socket under the panel of the set. Contact is just as sure as in ready-made sockets.—*Mervyn Chappell.*

AN EMERGENCY GRID CAP

How many times have you wired up a receiver and discovered at the last moment that there were no more grid clips in the junk box?

Here is a kink which will take the place of a standard grid cap very nicely.

Take an ordinary pencil clip and bend the clamps so that they will slide over the grid cap of the tube easily. Solder the lead to the other end of the clip as shown in the drawing.—*Bob Wachter.*

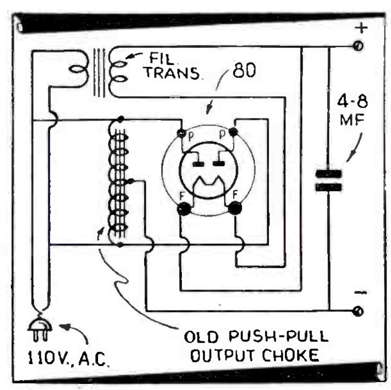


CALIBRATING S-W SETS

1st Prize Winner

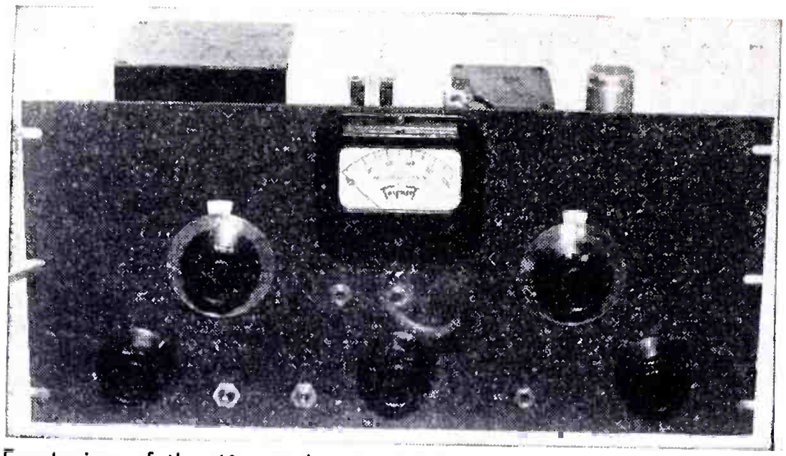
If you have a small regenerative receiver that covers the B.C. band and wish to calibrate a larger S.W. receiver, read on. The first thing to do is to tune the B.C. receiver to zero beat with, let us say, WLW on 700 kilocycles. This, of course means that it must be in an oscillating condition. Now let your short-wave receiver warm up thoroughly and then tune for the harmonics of the B.C. receiver, which will appear at multiples of 700 kc., that is 7,000 kc., 7,700 kc., 8,400 kc., etc. By putting down this information on calibration charts for every harmonic of every B.C. station you can hear, you will have an extremely accurate set of calibration charts. As B.C. stations do not vary more than 50 cycles, the most you can be off at the tenth harmonic is one half a kilocycle, although you may not be able to record this accurately on the chart.—*Edward W. Karpen.*

SIMPLE POWER-SUPPLY



A low-cost power-supply can easily be made from parts around the average junk-box as shown in the accompanying diagram. Parts required are a tube socket, an old push-pull choke, a 5-volt filament transformer and an electrolytic condenser. Approximately 120 volts will be delivered by the unit. The current drain must be kept very low in this unit, however. It should make an ideal source of C-bias supply. An ordinary filter may be attached to the output.

When using this unit it should be remembered that the B- is connected directly to the power line. The receiving equipment must be grounded through a .5 mf. paper condenser instead of directly to prevent short circuits.—*Robert C. Hurson.*



Front view of the 40-watt band-switching exciter, which may also be used as a transmitter if desired.

Forty-Watt Exciter Or

George W.

● IN order to simplify the operation of our own all-band transmitter, we decided to build an all-band *exciter unit* which did not use plug-in inductances. This *band-switching* exciter turned out so successfully that we thought other hams, facing similar problems, would be interested in this particular unit.

Where an amateur station is operated on two or more of the *ham* bands, the old style transmitter, with its plug-in coils is outmoded. The many extra coils around the shack, not to mention the time and labor necessary in changing bands, are inconvenient to say the least.

The average amateur transmitter, as far as we have been able to determine, has an output of around 100 to 200 watts. This means that the exciter unit must have an output of around 15 to 25 watts, unless of course, the transmitter uses one of the pentode or tetrode tubes in the *final*, which requires much less excitation than the average triode. This exciter will supply about 40 watts of power and is capable of driving the average final amplifier, using well known standard tubes, to an input of from 200 to 400 watts with no trouble at all. In fact the input to our final with this exciter is slightly less than 400 watts in the 20 meter phone band.

Serves as 40-watt CW Xmitter Also

Besides being an efficient exciter unit this little rig will serve as a modern up-to-the-minute 40-watt CW transmitter for the *brass-pounder* who likes to work all bands in a single evening.

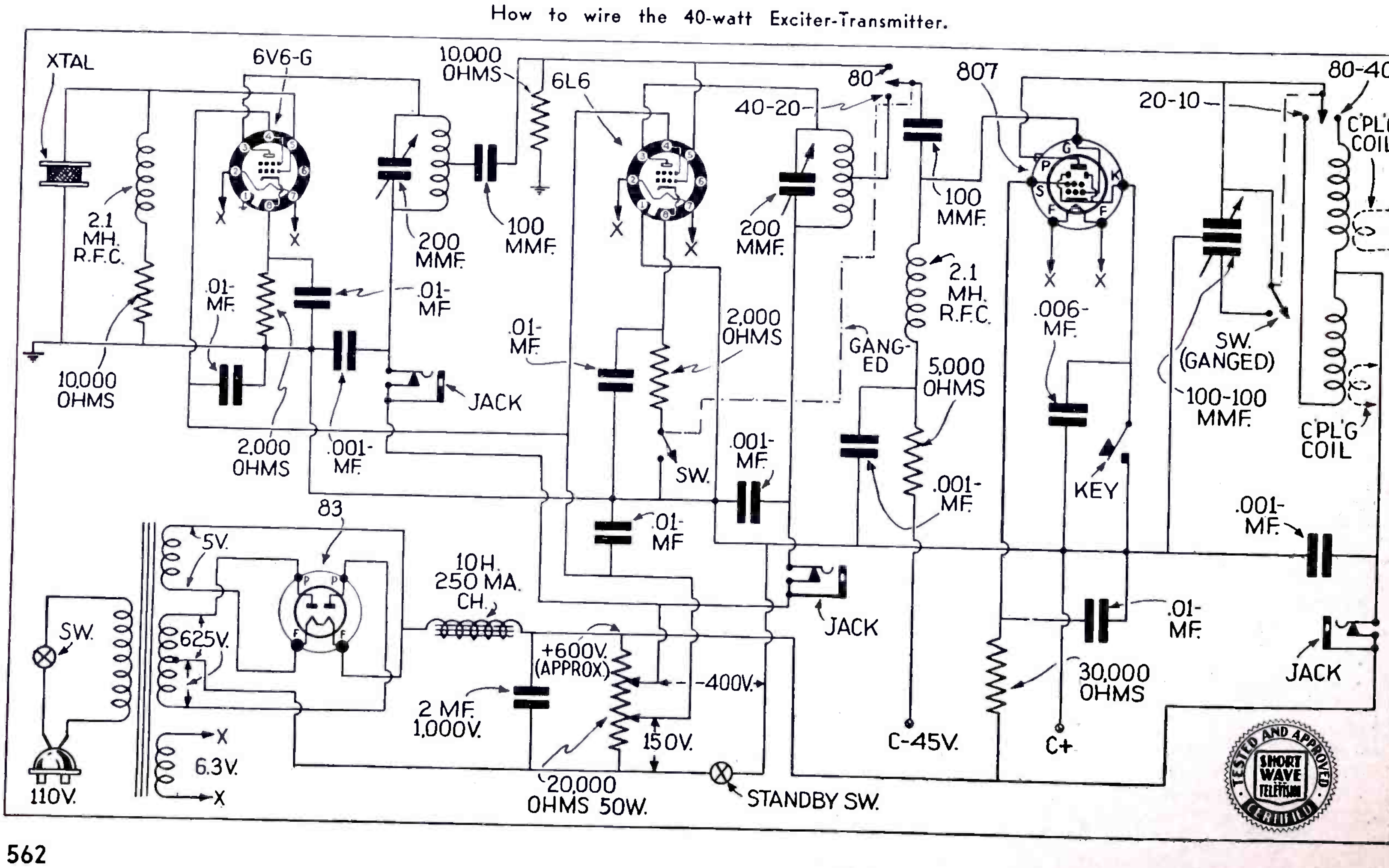
The genesis of this unit is the all-band *desk-type* transmitter described in the Dec. '37 and Jan. '38 issues. The latter proved that it is more than convenient to have a complete unit, that is, the power-supply and all accessories as well as band-switching on the same chassis. In the new exciter we start out with a 6V6-g oscillator tube, followed by the old faithful 6L6, and ending with one of the new 807's with the increased ratings. With this tube line-up it is possible to work on four bands with a *single* crystal. On 80, 40 and 20 meters the 807 is operated as a straight amplifier, and on 10 meters it functions as a *frequency doubler*.

The output on the first three bands is a good forty watts, and on ten meters it is only slightly less.

In order to avoid complication in the band-changing arrangement we have resorted to rather large tuning capacitors. The tuning condensers for both the oscillator and the multiplier stages are 200 mmf. midgets and will take in any two bands with the same inductance in the circuit. In the case of the oscillator there is only one coil and that serves for either an 80 or 40 meter crystal.

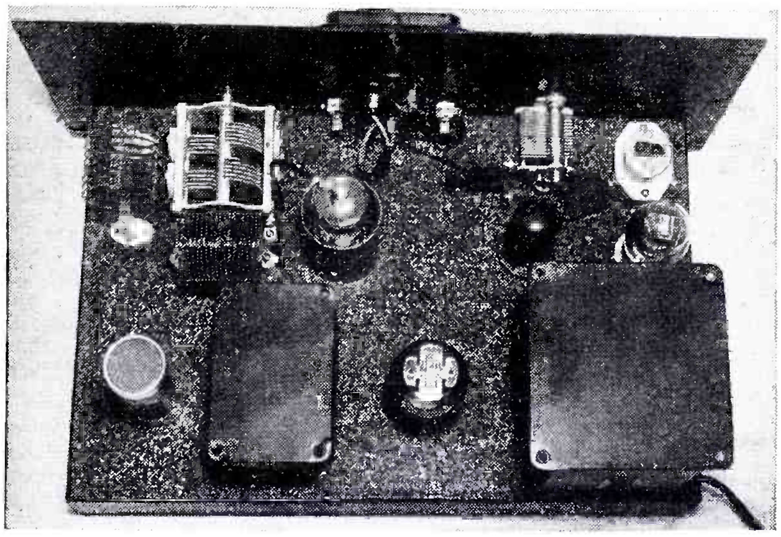
The 40 meter crystal is not needed but the circuit is designed to accommodate it in case one is used, in order to make available another frequency in the three higher frequency bands covered by the unit. The output from the oscillator plate tank is taken from a point at about the center of the inductance. This is done to lighten the load on the circuit in order that it will start oscillation easily when the power is turned on. Also the full output of the oscillator is not needed to drive the multiplier tube.

How to wire the 40-watt Exciter-Transmitter.



Band-Switching Transmitter

Shuart, W2AMN



Rear view of the exciter.

When working on 80 meters the oscillator drives the 807 direct and the 6L6 is switched out of the circuit. If the output was taken directly from the plate of the oscillator the above arrangement for 80 meter operation would not be possible without some difficulty.

6L6 Multiplier Stage

The 6L6 multiplier stage also has only a single coil. This stage is used for operation on only the three higher frequencies. It tunes to either 40 or 20 meters. In the latter case it is a frequency quadrupler and provides good excitation for the output tube. This plate tank circuit is also tapped at about the center of the coil. This allows better efficiency in this stage and here also the full output is not needed.

The final stage employs two inductances, one for 40 and 80 meters, which is permanently mounted on the chassis, and another which is plug-in for 20 meters. This coil is plug-in because for 10 meter operation a separate coil must be used for best results. Remember that the last tube is a *doubler* and a tap on the 20 meter coil would not work out so well. A separate coil could be mounted on the chassis and connected to the switch or the 20 meter coil might have been made small enough to tune to both 10 and 20 with the large capacitor. This last method would result in poor efficiency, due to the very high C in the circuit for 20 meter operation. The separate coil, whether connected to the switch or not, is the best arrangement. The tuning condenser in this stage is of the split stator type; both stators are connected in parallel for 80 and 40 meter operation, while on 20 and 10 the switch opens the circuit, leaving only one stator in use. The capacity of each section is 100 mmf.

Going back to the multiplier stage we find that the band-switch there only connects the grid or input of the 807 to the proper driving stage, and at the time it is connected to the oscillator for 80 meter operation, the switch opens the cathode circuit of the 6L6, thus putting it out of operation.

Coil Data

The coils for the oscillator and multiplier stages are very compact, being only one inch in diameter. They are wound with No. 22 double silk covered wire. The oscillator coil has 24 turns and is tapped at the exact center, while the multiplier coil has 10 turns and is tapped at the 4th turn from the *cold* end. Both coils are close-wound and are self-supporting, being first wound on a one-inch dia., form, given a coat of coil dope and later removed. Winding them on a bakelite tube should make it easier to mount them and is probably the simplest method.

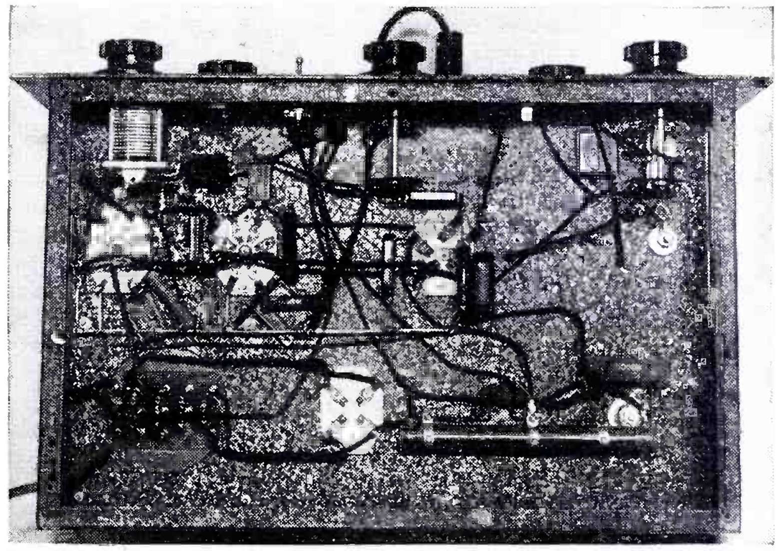
Coils for the output stage are constructed with No. 16 silk covered wire and are of the space wound type using celluloid strips for support. The 80-40 meter coil has 18 turns, is 1¾ inches inside diameter and 2¼ inches long. The 20 meter coil is of similar construction and has 8 turns, 1¾ inches in diameter and 1¾ inches long. For ten meters the coil has 5 turns, 1⅛ inches in diameter and 2 inches long.

Hams will find this band-switching exciter a very valuable asset to their station; this rig may also be used as a modern 40 watt C.W. Xmitter. The 80, 40, 20 and 10 meter bands are covered.

Power-Supply

The power-supply uses a 625 volt transformer which, after rectification and filtering results in nearly 600 volts under full load. A voltage divider is used to obtain the lower voltages except for the screen voltage on the 807 which is supplied through a series resistor and is to be recommended in all cases. The various voltages under operation are indicated on the diagram. Combination grid leak and cathode resistor bias is used on the first two stages while both grid-leak and fixed, external, bias is used on the 807. The entire combination is necessary for good stability. The oscillator operates more smoothly with this arrangement, while the multiplier operates more efficiently. The *final* uses external bias so that when and if the excitation is removed the tube will not be destroyed.

Tuning is a matter of experience, of course, but a few suggestions are in order: First tune everything for peaks and dips the same as in any transmitter. Then you will probably find that on the two lowest frequency bands, 80 and 40, the excitation will be too great for the final 807. Returning to the oscillator, detune it until the 807 functions properly. The oscillator control can be varied considerably and has a great effect on its output. This will serve as an excitation adjustment. If further reduction is necessary the multiplier *tank circuit* may be detuned. None of these detuning adjustments will impair the performance of the transmitter in the least.



Bottom view of the unit. Note the neat arrangement.

Parts List

HAMMARLUND

(condensers and sockets)
2—200 mmf. var. cond. MC-200-M
1—100-100 mmf. var. cond. MTCD-100-C
2—2.1 mh. rfc. CHX
2—8-prong sockets S8
2—5-prong sockets S5
1—4-prong socket S4

CORNELL-DUBILIER

(condensers)
2—.0001 mf. mica cond. 1,000 v.
5—.01 mf. mica cond. recv. type
4—.001 mf. mica cond. 1000 v.
1—.006 mf. mica cond. 600 v.
1—2 mf. oil filter cond. 1000 v.

I. R. C.

(Resistors)
1—30,000 ohm 20 watt resistor

(*Continued on page* 591)

Mc.	Call	
6.545	YV6RB	**BOLIVAR, VENEZUELA,** 45.84 m.. Addr. "Ecos de Orinoco." 6-10.30 pm,
6.530	YNIGG	**MANAGUA, NICARAGUA,** 45.94 m. Addr. "La Voz de los Lagos." 8-9 pm'
6.520	YV4RB	**VALENCIA, VENEZUELA,** 46.01 m' 11 am.-2 pm., 5-10 pm.
6.500	HIL	**CIUDAD TRUJILLO, D. R.,** 46.15 m., Addr. Apartado 623. 12.10-1.40 pm., 5.40-7.40 pm.
6.500	TIOW	**PUERTO LIMON, COSTA RICA,** 46.15 m., Addr. Ondas del Caribe. Daily 12 n.-1.30 pm.
6.490	HI1L	**SANTIAGO DE LOS CABALLEROS, D. R.,** 46.2 m., Addr. Pres.,Trujillo 97, Altos., 5.40-7 pm.
6.477	HI4V	**SAN FRANCISCO de MACORIS, D. R.,** 46.32 m. 11.40 am.-1.40 pm., 5.10-9.40 pm.
6.470	YNLAT	**GRANADA, NICARAGUA,** 46.36 m., Addr. Leonidas Tenoria, "La Voz del Mombacho." Irregular
6.420	HI1S	**SANTIAGO, D. R.,** 46.73 m. 11.40 am. -1.40 pm.. 5.40-7.40, 9.40-11.40 pm.
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.
6.396	COX4S	**MARIANAO, CUBA,** 46.9 m., Addr. Jefe del Cuerpo de Senales de la Republica de Cuba, Ciudad Militar, Marianao. Tests daytime and evenings.
6.380	HI8J	**LA VEGA, D. R.,** 46.99 m., Irregular
6.380	YV5RF	**CARACAS, VENEZUELA,** 47.02 m., Addr. Box 983. 6-10.30 pm.
6.360	HRP1	**SAN PEDRO SULA, HONDURAS,** 47.19 m. 7.30-9.30 pm.
6.360	YV1RH	**MARACAIBO, VENEZUELA,** 47.19 m., Addr. "Ondas Del Lago," Apartado de Correos 261. 6-7.30 am., 11 am.-2 pm., 5-11 pm.
6.350	HRY	**TEGUCIGALPA, HONDURAS,** 47.24 m. 6.30-8.30 pm.
6.340	HI1X	**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.
6.330	COCW	**HAVANA, CUBA,** 47.39 m. Addr. LaVoz de las Antillas, P. O. Box 130. 6.55 am.- 1 am. Sun. 10 am.-10 pm.
6.316	HIZ	**CIUDAD TRUJILLO, D. R.,** 47.5 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.
6.310	TG2	**GUATEMALA CITY, GUAT.,** 47.55 m., Addr. Secretaria de Fomento. Relays TG1 11 pm.-2 am.
6.300	YV4RG	**MARACAY, VENEZUELA,** 47.62 m. 8-10.30 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." Irregular,
6.243	HIN	**CIUDAD TRUJILLO, D. R.,** 48 m.,Addr. "La Voz del Partido Dominicano." 12 m.-2 pm., 7.30-9.30 pm., irregularly.
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.
6.230	YV1RG	**VALERA, VENEZUELA,** 48.15 m. 6-9.30 pm.
6.230	OAX4G	**LIMA, PERU,** 48.15 m., Addr. Apartado 1242. Daily 7-10.30 pm.
6.220	——	**SAIGON, INDO-CHINA,** 48.2 m., Addr. Radio Philco. 4.30 or 5.30-9.30 am.
6.210	YV5RI	**CORO, VENEZUELA,** 48.31 m., Addr. Roger Leyba, care A. Urbina y Cia. Irregular.

↓ S.W. BROADCAST BAND ↓

Mc.	Call	
6.190	HI8Q	**CIUDAD TRUJILLO, D. R.,** 48.47 m. 11.45 am.-1 pm., 4.45-6.45 pm.
6.185	HI1A	**SANTIAGO, D. R.,** 48.5 m., Addr. P. O. Box 423. 7 am.-5 pm.
6.171	XEXA	**MEXICO CITY, MEX.,** 48.61 m., Addr. Dept. of Education. 7-11 pm.
6.160	YV5RD	**CARACAS, VENEZUELA,** 48.7 m. 11 am.-2 pm., 4-10.40 pm.

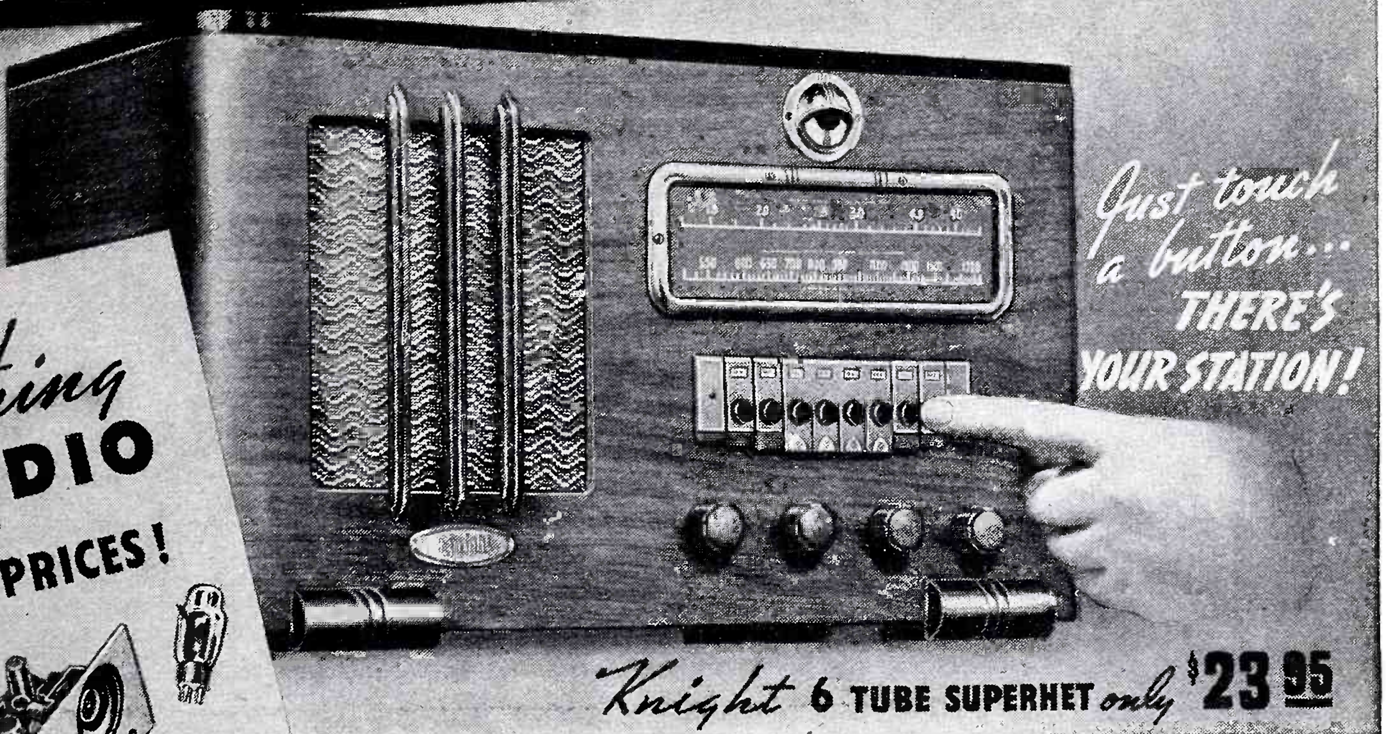
Mc.	Call	
6.160	VPB	**COLOMBO, CEYLON,** 48.7 m. Daily exc. Thurs. and Fri., 6.30 am.-12.30 pm.; Sun. 7-11.30 am.
6.150	CSL	**LISBON, PORTUGAL,** 48.78 m. Irregular. 7-8.30 am., 2-7 pm.
6.150	CJRO	**WINNIPEG, MAN., CANADA,** 48.78 m., Addr. (See 11.720 mc.) 4-10 pm.
6.147	ZEB	**BULAWAYO, RHODESIA, S. AFRICA,** 48.8 m. Mon., Wed. and Fri. 1.15-3.15 pm.; Tues. 11 am.-12 n.; Thurs. 10 am.-12 n.
6.145	HJ4ABU	**PEREIRA, COL.,** 48.8 m. 9.30 am.-12 m., 6.30-10 pm.
6.140	W8XK	**PITTSBURGH, PA.,** 48.86 m., Addr. Westinghouse Electric & Mfg. Co. Relays KDKA 10 pm.-1 am.
6.137	CR7AA	**LAURENCO MARQUES, PORT. E. AFRICA,** 48.87 m. Daily 12.05-1, 4.30-6.30, 9.30-11 am., 12.05-4 pm., Sun. 5-7 am., 10 am.-2 pm.
6.135	HJ1ABB	**BARRANQUILLA, COL.,** 48.9 m., Addr. P. O. Box 715. 11.30 am.-1 pm., 4.30-10 pm.
6.135	HI5N	**SANTIAGO, D. R.,** 48.9 m. 6.40-9.10 pm
6.130	TGXA	**GUATEMALA CITY, GUAT.,** 48.94 m., Addr. Giornal Liberal Progressista. Irregularly.
6.130	VP3BG	**GEORGETOWN, BRIT. GUIANA.** 48.94 m. From 5 pm. on.
6.130	COCD	**HAVANA, CUBA,** 48.94 m., Addr. Box 2294. Relays CMCD 7 am-1 am.
6.130	VE9HX	**HALIFAX, N. S., CAN.,** 48.94 m., Addr P. O. Box 998. Mon.-Fri. 9 am.-1 pm., 5-11 pm. Fri.; 1-3 pm., Sat.; Sun. 9 am.-1 pm., 2-11 pm. Relays CHNS.
6.130	ZGE	**KUALA LUMPUR, FED. MALAY ST.,** 48.94 m. Sun., Tue. and Fri. 6.40-8.40 am.
6.130	LKL	**JELOY, NORWAY,** 48.94 m. 11 am.-6 pm.
6.125	CXA4	**MONTEVIDEO, URUGUAY,** 48.98 m., Addr. Radio Electrico de Montevideo., Mercedes 823. 10 am.-12 n., 2-8 pm.
6.125	OAX1A	**CHICLAYO, PERU,** 48.98 m., Addr. La Voz de Chivlayo, Casilla No. 9. 8-11 pm.
6.122	OAX4P	**HUANCAYO, PERU,** 49 m. La Voz del Centro del Peru. 8 pm. on.
6.122	HP5A	**PANAMA CITY, PAN.,** 49. m. Addr. Box 58. 12 n-1 pm., 8-10 pm.
6.122	HJ3ABX	**BOGOTA, COL.,** 49 m., Addr. La Voz de Col., Apartado 2665. 12 n.-2 pm., 5.30-11 pm.; Sun. 6-11 pm.
6.120	W2XE	**NEW YORK CITY,** 49.02 m., Addr. Col. B'cast. System, 485 Madison Ave. Irregular.
6.120	XEUZ	**MEXICO CITY, MEX.,** 49.02 m., Addr. 5 de Mayo 21. Relays XEFO 1-3 am.
6.115	OLR2C	**PRAGUE, CZECHOSLOVAKIA,** 49.05 m. (See 11.875 mc.)
6.110	XEPW	**MEXICO CITY, MEX.,** 49.1 m., Addr. La Voz de Aguila Azteca desde Mex., Apartado 8403. Relays XEJW 11 pm.-1 am.
6.110	VUC	**CALCUTTA, INDIA,** 49.1 m. Daily 3-5.30 am., 9.30 am.-12 m.; Sun 7.30 am.-12 m.
6.110	GSL	**DAVENTRY, ENGLAND,** 49.1 m., Addr. (See 26.1 mc.) 6.20-8.30, 9.15-11.15.
6.110	YUA	**BELGRADE, JUGOSLAVIA,** 49.18 m., 12.45-2.30, 4-8 am., 1-6 pm.
6.105	HJ4ABB	**MANIZALES, COL.,** 49.14 m., Addr. P. O. Box 175. Mon.-Fri 12.15-1 pm.; Tue. and Fri. 7.30-10 pm.; Sun 2.30-5 pm.
6.100	W3XAL	**BOUND BROOK, N. J.,** 49.18 m., Addr. Natl. Broad. Co. 9.15 pm.-1 am.
6.100	W9XF	**CHICAGO, ILL.,** 49.18 m., Addr. N.B.C. 8 am.-9.10 pm., 1.05-2 am.
6.100	HJ4ABE	**MEDELLIN, COL.,** 49.18 m. 11 am.-12 m., 6-10.30 pm.
6.097	——	**KLIPHEUVAL, S. AFRICA,** 49.2 m., Daily 12 n.-4 pm., Sun. 12 n.-3:05 pm.
6.097	ZTJ	**JOHANNESBURG, S. AFRICA,** 49.2 m., Addr. African Broad. Co. Daily exc. Sat. 11.45 pm.-12.40 am.; Daily exc. Sun. 3.20-7.15, 9-11.40 am.

Mc.	Call	
6.095	JZH	**TOKIO, JAPAN,** 49.22 m., Addr. (See 11.800 mc., JZJ.) Irregular.
6.092	OAX4Z	**LIMA, PERU** 49.25 m. Radio National 7-11 pm.
6.090	HJ4ABC	**IBAGUE, COL.,** 49.26 m. 7 pm.-12 m.
6.090	CRCX	**TORONTO, CAN.,** 49.26 m., Addr. Can. Broadcasting Corp. Daily 5.30-11.30 pm.; Sun. 5-11.30 pm.
6.090	XEBF	**JALAPA, MEXICO,** 49.26 m., Addr. Insurgentes 34. Testing.
6.090	ZBW2	**HONGKONG, CHINA,** 49.26 m., Addr. P. O. Box 200. Irregular.
6.085	HJ5ABD	**CALI, COLOMBIA,** 49.3 m., Addr. La Voz de Valle. 12m.-1.30 pm., 5.10-9.40 pm.
6.083	VQ7LO	**NAIROBI, KENYA, AFRICA,** 49.31 m., Addr. Cable and Wireless, Ltd. Mon.-Fri. 5.30-6 am., 11.15 am.-2.15 pm., also Tues. and Thurs. 8.15-9.15 am.; Sat. 11.15 am.-3.15 pm.; Sun. 10.45 am.-1.45 pm.
6.080	ZHJ	**PENANG, FED. MALAY STATES,** 49.34 m. 6.40-8.40 am., except Sun., also Sat. 11 pm.-1 am.
6.080	W9XAA	**CHICAGO, ILL.,** 49.34 m.. Addr. Chicago Fed. of Labor. Relays WCFL irregular.
6.079	DJM	**BERLIN, GERMANY,** 49.34 m., Addr. Broadcasting House. Irregular.
6.070	VP3MR	**GEORGETOWN, BRI. GUIANA,** 49.42 m. Sun. 7.45-10.15 am.; Daily 4.45-8.45 pm.
6.070	HJ3ABF	**BOGOTA, COL.,** 49.42 m. 7-11.15 pm.
6.070	CFRX	**TORONTO, CAN.,** 49.42 m. Relays CFRB 6.30 am-11 pm. Sun. 9.30 am.-11 p. m.
6.070	YV1RE	**MARACAIBO, VEN.,** 49.42 m. 6-11pm.
6.070	VE9CS	**VANCOUVER, B. C., CAN.,** 49.42 m. Sun. 1.45-9 pm., 10.30 pm.-1am.; Tues. 6-7.30 pm., 11.30 pm.-1.30 am. Daily 6-7.30 pm.
6.069	——	**TANANARIVE, MADAGASCAR,** 49.42 m., Addr. (See 9.53 mc.), 12.30-12.45, 3.30-4.30, 10-11 am., Sun 2.30-4.30 am.
6.065	HJ4ABL	**MANIZALES, COL.,** 49.46 m. Daily 11 am.-12 m., 5.30-7.30 pm.; Sat. 5.30-10.30 pm.
6.065	SBG	**MOTALA, SWEDEN,** 49.46 m. Relays Stockholm 1.30-5 pm.
6.060	W8XAL	**CINCINNATI, OHIO,** 49.6 m., Addr. Crosley Radio Corp. Relays WLW 6.30 am.-8 pm., 11 pm.-2 am.
6.060	W3XAU	**PHILADELPHIA, PA.,** 49.5 m. Relays WCAU 8-11 pm.
6.050	HP5F	**COLON, PAN.,** 49.59 m., Addr. Carlton Hotel. 11.45am.-1.15 pm., 7.45-10 pm.
6.050	GSA	**DAVENTRY, ENGLAND,** 49.59 m. Addr. (See 26.1 mc.) 12.20-4 pm.
6.045	HI9B	**SANTIAGO, D. R.,** 49.63 m. Irregular 6-11 pm.
6.042	HJ1ABG	**BARRANQUILLA, COL.,** 49.65 m., Addr. Emisora Atlantico. 11 am.-11 pm.; Sun. 11 am.-8 pm.
6.040	W4XB	**MIAMI BEACH, FLA.,** 49.65 m. Relays WIOD 12m.-2 pm., 5.30-6 pm., 10 pm.-12 m.
6.040	W1XAL	**BOSTON, MASS.,** 49.65 m., Addr. University Club Exc. Sat. 7-9 pm.
6.040	YDA	**TANDJONGPRIOK, JAVA,** 49.65 m., Addr. N.I.R.O.M., Batavia. 10.30 pm.-2 am.; Sat. 7.30 pm.,-2 am.
6.030	HJ4ABP	**MEDELLIN, COL.,** 49.75 m. 8-11 pm.
6.030	HP5B	**PANAMA CITY, PAN.,** 49.75 m., Addr. P.O. Box 910. 12m.-1 pm., 7-10.30 pm.
6.030	VE9CA	**CALGARY, ALTA., CAN.,** 49.75 m. Thur. 9 am.-2 am.; Sun 12 m.-12 m.
6.030	OLR2B	**PRAGUE, CZECHOSLOVAKIA,** 49.75 m. (See 11.875 mc.)
6.025	HJ1ABJ	**SANTA MARTA, COL.,** 49.79 m. 11.30 am.-2 pm., 5.30-10.30 pm. except Wed.
6.020	DJC	**BERLIN, GERMANY,** 49.83 m., Addr. (See 6.079 mc.) 10.40 am.-4.30, 4.50-10.45 pm.
6.020	XEUW	**VERA CRUZ, MEX.,** 49.83 m., Addr. Av. Independencia 98. 8 pm.-12.30 am.

(*Continued on page* 581)

(All Schedules Eastern Standard Time)

ALLIED OFFERS RADIO'S GREATEST VALUES!



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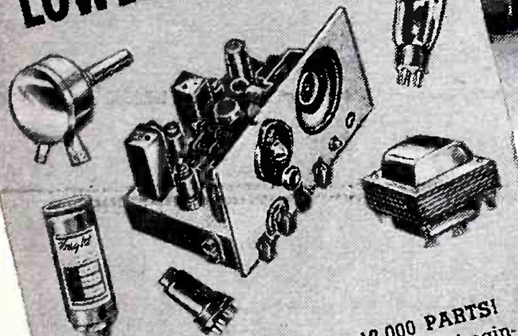

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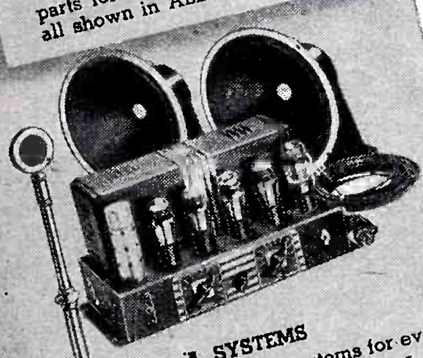

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KNIGHT Integrated Sound Systems for every P.A. need—8 to 60 Watts—Portable, Mobile and Permanent—and Inter-Com Systems—2 way, Selective and Super-Selective.

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Testers of every type — Analyzers, Tube Checkers, Set-Testers, Meters, Signal Generators — all nationally known brands. See them at lowest prices in ALLIED'S 1938 Catalog.

KNIGHT PUSH-BUTTON TUNING MODELS AT STARTLING LOW PRICES!

KNIGHT Radios bring you Push-Button Tuning and every newest feature at prices that fit EVERYBODY'S purse. Here are radio's supreme values! The beautiful 6 Tube AC 2-Band Superhet shown above, offers an R.C.A. and Hazeltine licensed circuit with Push-Button Tuning, new Slide-Rule Type Dial, Electric Eye, Tone Control, A.V.C., Electro-Dynamic Speaker, and 3 Watts power output —all for only $23.95. In the 60 other KNIGHT models, you'll find values equally astonishing—made possible only by ALLIED's volume and low distribution costs—prices that make the KNIGHT Radio's Greatest Value, offering biggest profits for you. 61 KNIGHTS to choose from—a set for every purpose—5 to 16 tubes, for AC, AC-DC, 6 Volt, 32 Volt, Battery, and Auto operation. See all 61 models in ALLIED's Catalog. Send coupon now.

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Address ....
City .... State ....

How Can I Obtain a Practical Education in Radio & Television

(Continued from page 537)

connection of condensers, losses and breakdowns in condensers, etc., come up for consideration. Under vacuum tubes, such technical aspects as the static and dynamic characteristics, the amplification factor, how to choose amplifier tubes, etc., are studied.

The student's interest is kept alive with experiments and carefully prepared theoretical studies on such subjects as filters, rectifier circuits, and audio and radio frequency amplifiers, to mention a few.

Radio subjects which every good television expert must be thoroughly familiar with include—oscillators and how to adjust and calibrate them, the use of cathode ray oscilloscopes for testing, shooting trouble on all-wave superheterodynes, crystal control oscillators, various types of modulation, etc.

Of course, every radio and television technician must have absorbed a goodly amount of knowledge with regard to the design and operation of radio transmitting stations, for he may some day find himself in charge of such a station and he must know exactly what is going on and the use of the different apparatus. Thus we find that the up-to-date television or radio course includes plenty of material on the different classes of modulators and amplifiers, with a great deal of study assigned to speech or video amplifying systems, microphones, transmitter circuits in general, including various types of relays, monitors, etc., and most important—different types of antennas and how they work.

After the student, whether he is pursuing a home study or resident course, has, in the estimation of his instructor's judgment been given a sufficient amount of basic training in electricity, mathematics and electronics, he will then be ready for the more advanced subjects in *television*, which include a study of the various principles of scanning, optics, photo-electric cells, television cathode ray tubes, television receiver circuits, synchronization and television sound receivers.

Before the student receives his diploma, at least one school requires that he must also qualify in the following subjects, which are offered in one form or another in the various courses offered today. The student must have qualified and either answered questions, or written reports on his knowledge of how to install television receivers, how to test cathode ray tubes, the action of television cameras, the best methods of lighting television studios and arranging the best sound pick-up, the technique of transmitting motion picture films by television and also the transmission of photos by wire or radio (facsimile or telephotography).

Why Television and Radio Experts Need to Have a Broad Education

Perhaps it is rather difficult for a young student of television or radio subjects to fully realize just why he should, if possible, learn at least one foreign language, or why he should study general philosophy, rhetoric, etc. The writer has known many cases where those engaged in radio and television work have suddenly been asked to fill in as announcers, or are perhaps called upon to give a talk before a group of men, so that he cannot too strongly recommend that the student endeavor to make his education just as broad as he possibly can.

The ability to make even a brief speech in a pleasing and forceful manner in public is one of the attributes of the average college-bred man, but we all cannot have the benefits of a resident school education. The recommendation is made, therefore, that students taking a home-study course endeavor at every turn to broaden themselves as much as possible, by becoming members of local debating clubs, or, at least some local organization which will give them the opportunity for self-expression.

Now let us examine for the moment the more technical subjects with which the radio course student is expected to be familiar. Sometimes the student will tire of a course and find that he is making a pretty good amount of money from radio servicing, let us say, but the writer would most urgently advise that at every opportunity the young man endeavor to study every important branch of the subject, as outlined in the various school catalogs.

Here is an example of the indifferent manner in which some students take up a course of study. The writer has talked with many students and has been surprised to note that quite a number of them had, apparently, paid but scant attention to such subjects as dynamos, motors, storage batteries, transformers, etc., when they were taking their courses. Another weak spot in the education of some radio men is mathematics, and this is a tremendously important subject if you ever expect to tackle a real job in the radio and television industry.

Some students apparently simply follow the lesson paper and work out the problems as they are outlined, so that they can finish the course and get a certificate. The thorough student, however, will soon perceive that the best way to obtain a complete education on a subject is to read at least one book, and better still half a dozen, on a specific subject. You may ask the average technician how to calculate the turns ratio in a transformer, in order to convert a certain voltage to one of another value (or some similar and fairly simple question) and receive an answer. But if you ask him about vector diagrams, or how he would calculate the primary input current for a certain size transformer, with a specified load connected across the secondary, the answer is liable to be rather vague. Here the value of a thorough training in transformer theory, for example, will begin to assert itself.

If you are a self-taught reader and did not take any prescribed course, either resident or home study, one of the most important subjects to study and master as thoroughly as possible is physics. Such practical everyday phenomena as the expansion and contraction of metals, the expansion law for gases and liquids, the laws of physical optics, why certain lenses should be used for transmitting light in a given television design—all these vital points must be studied and understood by the real television and radio technician.

Today we have a new subject which the student of physics of a generation ago never heard of, that of *electron optics*. Men like Dr. Vladimir Zworykin, famous physicist of the RCA Engineering Labs., and Philo T. Farnsworth—these men know their electron optics. And if such men as Zworykin and Farnsworth had not made a very intense study of just what happens inside a cathode ray tube, we would still be waiting for the iconoscope and the oscillight.

TAKE YOUR CHOICE

Reading the 'want-ads' in the hope of finding just any sort of a job—

Glamour and romance in Television-Broadcasting! An action scene "on stage" in the Power and Light Building, the home of Midland Television and the base of Midland's training.

A Lifetime of Fear for the FUTURE ? —OR— A GOOD JOB, MORE MONEY, A BRILLIANT FUTURE *in*—

TELEVISION

YOU CAN BE ONE OF THE VERY FIRST TO BE TRAINED ON "ULTRA-MODERN," 441-LINE ELECTRONIC TELEVISION EQUIPMENT

BROADCASTING—AIRLINE OPERATING SHIP OPERATING POLICE RADIO

Sound advice. Based on ironclad facts! If that's what you want, read on. But if you're looking for the easy, "gambling way" of winning success, you might as well stop reading right now.

This very minute you're confronted with opportunities of such magnitude that you may be inclined to doubt their existence...Yet you know how Radio skyrocketed into a giant industry almost overnight. You know that many young men have won, and are continuing to win, success in Radio—BECAUSE THEY TRAINED THEMSELVES FOR SUCCESS...And now we all know that TELEVISION will be another world-wide industry, rich in rewards for those who are prepared...WILL YOU BE READY?...Yes, if you take immediate advantage of the outstanding features of Midland training!

Midland is the ONLY independent school offering complete, ultra-modern training on 441-line RCA electronic television receiving and transmitting equipment. And *that* is the type of equipment that is bringing commercial television closer every day. Already perfected to a point comparable to motion pictures, "electronic scanning" is almost ready to do its part in starting America on another era of prosperity.

Midland training includes actual experience as a Television Camera Man!

To take advantage of Midland's outstanding training, you don't have to give up your present job. You complete your preliminary training *at home*—studying intensely interesting "color-coded" lessons, conducting a host of fascinating and instructive experiments, with *equipment we provide*—and then you come to Kansas City and our beautiful home in the Power & Light Building for *actual experience*. For remember, this is NOT a correspondence course. It is a combined extension-resident training. You study actual operation of radio and television in our resident school, in our modern laboratories—under an engineering staff of accomplished, friendly men, with years of practical experience.

If you are sincere in desiring to enter an industry that offers immediate, substantial cash rewards and a brilliant future, we invite you to send for your FREE copy of "Fortunes in Foresight." Just fill out, clip, and mail us the coupon below. DO IT TODAY AND WE WILL DO THE REST.

Full Transportation Allowance to Kansas City

"... It was you who pointed out the vast possibilities of a radio career for me. It was Midland that made it possible."

Orwin Middleton, employed by Earl J. Goetze, Inc., wholesale distributors RCA-Victor products.

"... Thank you for obtaining my new position. Even though only part way through my course of study with Midland, I have already received much value for the money and time invested."

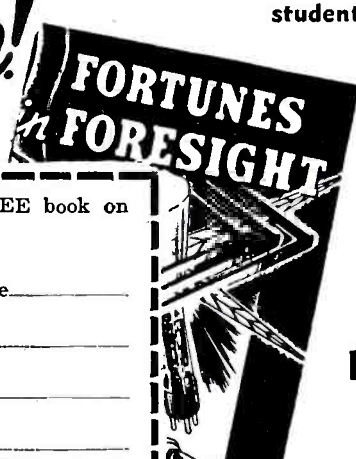
Donald Welborn, employed by Radiolab, radio and public address sales, Kansas City, Mo.

"... and I want to tell you and the whole wide world that I owe it all to your incomparable training and wholehearted help!"

Wm. Davis, Radio Operator with TWA, stationed at Amarillo, Texas.

Midland training prepares for TWO Government radio operator's license exams; qualifies for immediate employment in radio, and the marvelous future opportunities in television. As a Midland student, everything will be in your favor.

Free!



Gentlemen: Without obligating me, please send me your new FREE book on Radio-Television opportunities, "Fortunes in Foresight."

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I am most interested in ☐ Broadcasting ☐ Television ☐ Police Radio ☐ Ship Radio Operating ☐ Airline Radio Operating.

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Short Wave

The Forty-Sixth Trophy

Presented to SHORT WAVE SCOUT

ROBERT D. WADE

3704 Tyler Street

Amarillo, Texas

For his contribution toward the advancement of the art of Radio

by

SHORT WAVE and TELEVISION

Honorable Mention: Edward A. Flood, Union City, N. J.; Israel Sinofsky, Passaic, N. J.; John Pawluck, Los Angeles, Calif.

39 Stations Win The North American Contest

● Mr. Wade submitted a list of 43 stations in North and Central America and the West Indies, of which 39 were allowed. This marks Mr. Wade's third attempt to win the trophy. The receiver used was an Atwater Kent 1935 model with a double-doublet antenna 40 ft. high.

His listening period was from January 8 to February 7, 1937.

This contest was particularly close because the three runners-up submitted entries totalling 43, 41, and 39 veris. However, after examination of cards of each contestant a certain number were rejected as not complying with contest rules. So the final result was 39 for Mr. Wade, 37 for Mr. Flood, 35 for Mr. Sinofsky and Mr. Pawluck.

We salute you Mr. Wade and say better luck next time to the runners-up!

List of Stations

W8XAL, 6,060 kc., Cincinnati, Ohio
W1XAL, 6,040 kc., Boston, Mass.
W1XAL, 11,790 kc., Boston, Mass.
W1XAL, 15,250 kc., Boston, Mass.
W8XK, 6,140 kc., Pittsburgh, Pa.
W8XK, 11,870 kc., Pittsburgh, Pa.
W8XK, 15,210 kc., Pittsburgh, Pa.
W2XE, 6,120 kc., New York City
W2XE, 11,830 kc., New York City
W2XE, 15,270 kc., New York City
W2XE, 17,760 kc., New York City
W2XE, 21,520 kc., New York City
W3XAU, 6,060 kc., Philadelphia, Pa.
W3XAU, 9,590 kc., Philadelphia, Pa.
W3XAL, 6,100 kc., New York City
W3XAL, 17,780 kc., New York City
W9XF, 6,100 kc., Chicago, Ill.
W9XAA, 6,080 kc., Chicago, Ill.
W9XAA, 11,830 kc., Chicago, Ill.
W2XAF, 9,530 kc., Schenectady, N.Y.
CFCX, 6,005 kc., Montreal, Canada
CJRX, 11,720 kc., Winnipeg, Canada
CJRO, 6,150 kc., Winnipeg, Canada
TIPG, 6,410 kc., San Jose, Costa Rica
TIRCC, 6,550 kc., San Jose, Costa Rica
TG2X, 5,940 kc., Guatemala City
TGW, 9,450 kc., Guatemala City
CO9JQ, 8,668 kc., Camaguey, Cuba
COCO, 6010 kc., Havana, Cuba
COCX, 11,490 kc., Havana, Cuba
COCD, 6,130 kc., Havana, Cuba
HI1X, 6,340 kc., Ciudad Trujillo, R. D.
HIT, 6,630 kc., Ciudad Trujillo, R. D.
HI1J, 5,865 kc., San Pedro de Macoris, R. D.
XEBT, 6,000 kc., Mexico, D. F.
XEBM, 15,300 kc., Mazatlan, Mexico
XEFT, 9,510 kc., Vera Cruz, Mexico
XEUW, 6,020 kc., Vera Cruz, Mexico
XEWI, 11,900 kc., Mexico, D. F.

First World-Wide Contest Closes January 24th

Beginning this month, the original type of contest will be run again. That is to say, there will be no restriction on the geographical location of the stations to be entered in any one contest. Each contest will be *world-wide.* Stations heard and verified during any thirty-day period, regardless of their location, will be acceptable provided that at least 50% of the stations submitted are from countries other than the one in which the contestant resides. The May contest will close on February 24.

Contest Rules

The purpose of this contest is to advance the art of radio by "logging" as many short-wave phone stations as possible.

A notarized affidavit must be sent with the veri cards.

By midnight, Jan. 24th, all entries for the April contest must be in the hands of the Editors, together with the veris and the notarized oath that the contestant personally listened to all of the stations listed.

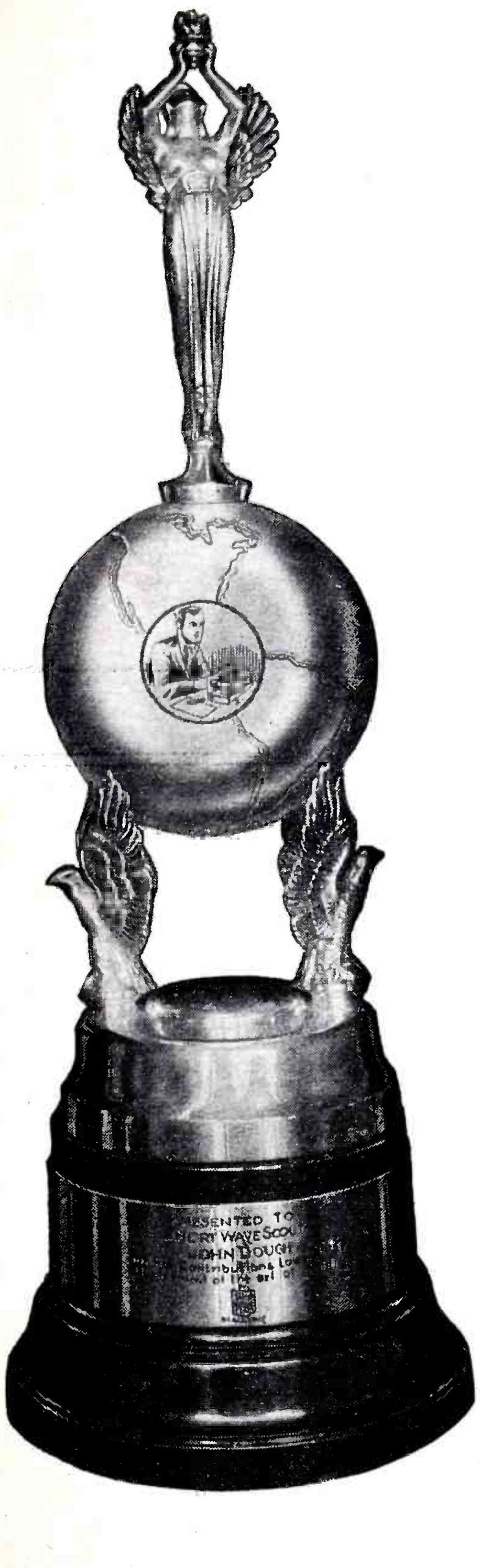
In the event of a tie between two or more contestants, each listing the same number of stations, the judges will award a similar trophy to each contestant so tying.

Bear in mind that the veri cards should be absolute verifications, and not simply an acknowledgment that you notified a station that you heard them. Several stations do not verify, but simply send an acknowledgment card. Note that only experimental, phone, or broadcast stations should be entered in your list. No *amateur* transmitters or *commercial code* stations can be entered

The judges in each contest will be the Editors of *Short Wave & Television* and the opinion of the judges will be final.

Send veri cards with your letter and oath certificate all in one package. Use a single line for each station and list them in a regular order, such as: frequency, schedule (all time should be reduced to E.S.T., which is five hours behind G.M.T.), name of station, city, country; musical identification signal if any.

Scouts



The handsome trophy which was designed by one of New York's leading silversmiths. It is made of metal throughout, except for the base, which is black Bakelite. The metal itself is quadruple silver-plated, in the usual manner of all trophies today.

It is a most imposing piece of work, and stands from tip to base 22½". The diameter of the base is 7¾". The diameter of the globe is 5¼". The work throughout is first-class. It will enhance any home, and will be admired by everyone who sees it.

The trophy will be awarded every month to that SHORT WAVE SCOUT who has logged the greatest number of short-wave stations in each contest as explained elsewhere. The winner will be announced in a subsequent issue of SHORT WAVE & TELEVISION. The winner's name will be hand engraved on the trophy.

Television—How Soon?

Donald McNicol

(*Continued from page 533*)

first beneficiary of television on a commercial, scheduled scale. Land elevations in New York are relatively low, and television coverage over the entire greater city may be obtained from transmitters radiating from the tops of skyscraper buildings. In the city proper radio shadows due to the wide use of steel in building construction introduce difficulties such as those experienced in receiving ordinary broadcasts in the same locations, but in outlying districts within range the service should be uniform and dependable.

Quality of Television Pictures—The engineering technique of television has been largely concerned with the term *number of lines,* the parallel and adjacent paths over which moves a spot of light which produces the television picture to be viewed. Readers doubtless are familiar with the density progress from 24 lines to the present 441. At the lower frequency the picture was but a series of blurs, only roughly duplicating the original. In the course of experimentation to better definition 45-line and 60-line pictures were considered. Systems were developed employing 120, and then 180-line pictures.

The present accepted standard is 441 lines, with a frame frequency of 30 per second, a field frequency of 60 pictures per second, interlaced, and an aspect ratio of 4:3, as in motion-picture engineering. The size of pictures, in one system, is 7½ by 10 inches, or that practicable with a 12½ inch cathode ray tube. Employing optical projection from a kinescope, demonstrations have been given, producing a picture 8 by 10 feet. Obviously, the 7½" by 10" pictures are too small to afford anything other than makeshift entertainment.

Economics Important—It is probable that there is good sense in a situation wherein a spectacular scientific (engineering) development, nearing commercial status, finds itself involved in economics. Engineers in radio services in early years and who have long memories, will recall that a succession of stock-jobbers mulcted an enthusiastic, if too sanguine public out of their surplus cash in advance of the time when radio was commercially useful and a profitable field had been found for it. It is possible that the American public has, in its collective mind, become accustomed to gleaning mental peace from reading Gray's quatrains, while at the same time listening to the ebb and flow of the Battle of Cathartics. If the public has become thus mentally dextrous, possibly it can get used to reading editorials about the submerged-third while occasionally viewing the Dionne hopefuls being scrubbed with Pfenfinger's soap. The promoters of television, it appears, have little hope of financing the service from the sale of television receivers. The cost of the service will be large, and the cost of receivers at present is several hundred dollars. Inquiry is abroad searching out possible sources of sustenance. One report on television prospects reads: *"It is argued that if large governmental subsidies can be secured, better shows will become available, and eventually widespread public interest and participation can be enlisted."* A spokesman for one of the radio operating organizations hoping to cash-in on television wrote: *"I believe that owners of television receivers in the United States will not be required to pay a fee for television programs. This is an aspect of the television problem* **in which the advertising fraternity will doubtless cooperate in finding the commercial solution."**

In any event there you are. That, briefly, is television at the dawn of 1938.

Articles Wanted

Be sure to write the Editors and give them a brief description of your particular circuit; if they are interested, they will inform you promptly, so that you can prepare an article and take photos of the set. Otherwise, the set can be sent to the Editors and they will photograph it.

---

60 Words Per Minute—no Errors!

● L. R. McDONALD, W8CW, the winner of the 1937 A.R.R.L. Code Contest held in Detroit, September 8th, copied 60 words per minute without error.

Mr. McDonald, who learned the code by the Candler System, believes that practice alone will not develop a fast operator. The mental training which is part of the system taught by Mr. Candler, was in a considerable measure responsible for his success.

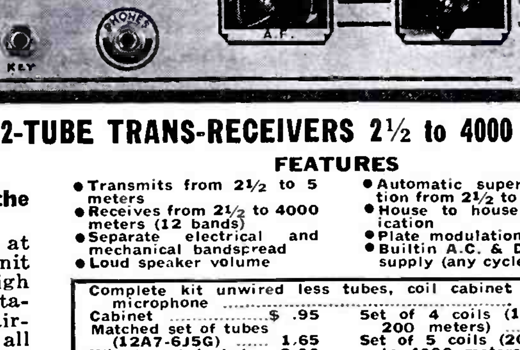
expected to take under average conditions, were no barriers present. The curvature is due to atmospheric refraction which is caused primarily by water vapor in the air. It is difficult to predict results on a theoretical basis, but preliminary studies indicated that the obstruction of the mountains might insert a transmission loss of about eighteen db. The indications were that five-watt transmitters might serve if the local noise conditions were not too severe and if antennas of reasonable gain were employed.

The circuit has now been established and is used thirty or forty times on each work day. The transmission to Palomar Mountain proves to be fairly satisfactory with the five-watt transmitter and the directive antenna which were erected; but with similar equipment the transmission in the reverse direction, to the Institute, has been subject to considerable interference. This arises largely from the ignition systems of automobiles in nearby streets. For purposes of convenience and for economy the Institute desired to locate the receiving antenna on a building in Pasadena rather than in the outlying country, where greater freedom from such interference could be obtained. To over-ride this

Ultra-Short Waves Connect Institute to Observatory 90 Miles Distant

(*Continued from page* 536)

noise and to fortify the circuit in general, the California Institute engineers have recently constructed forty-watt amplifiers which have



Both local and radio-connected telephones have been installed. Remote control units are provided to establish radio connection with distant telephones.

been added to the five-watt transmitters at both terminals.

The equipment provided by the Laboratories consists of modified W.E. apparatus of the type which was developed principally for mobile use and for operation in the frequency band of *thirty to forty-two megacycles* (9.9 to 7.13 meters). One of the requirements of the project was that the transmitters and receivers be so stable in operation that contact could be maintained between the two terminals without continual attendance. The transmitters have quartz-crystal oscillators which maintain the frequency well within 0.025 per cent of the nominal value for a temperature range of zero to sixty degrees Centigrade. Each crystal is also provided with a thermostatically controlled heater which becomes operative for temperatures below zero. The receivers are a-c operated superheterodynes with beating oscillators which are crystal-controlled. A third d-c operated receiver was provided for mobile testing.

Arrangements were provided to connect several telephone stations to the radio circuit, and code ringing features were included to enable a person at any telephone to ring any of the other telephones, local or distant. Other arrangements permitted connection of extra telephones to the local circuit without access to the radio circuit.

Certain telephones were provided with special features which permit them to control the radio circuit. In placing a call over the radio circuit the calling party, if he finds the circuit idle, holds his handset and operates a key to energize the radio transmitter. After pausing for a few seconds until the filaments are heated, he operates another key, which controls the carrier and sends the code of the desired telephone as a series of dashes. This causes a sequence of operations at the distant radio receiver which ends in the ringing of call bells at the distant terminal, in accordance with the transmitted code. The answering party then picks up his handset and momentarily depresses a key to start the radio transmitter so that conversation may begin. Power is automatically disconnected from the radio transmitters as soon as the respective parties replace their handsets, and a single ring on the magnetos by each party then indicates that the circuit is idle.

Experiments were made with the receiver and a simple half-wave vertical antenna on the roof of the Optics Shop on the campus. These tests showed a maximum signal with the center of the antenna sixteen feet above the roof of the penthouse, and a gratifying decrease in noise from all sources. The advantage of this location was probably due to its being somewhat shielded by the building from nearby automobile traffic. To gain this improvement, the radio equipment was removed from the Astrophysical Observatory and installed in a convenient room on the first floor of the Optics Shop. A new permanent antenna has been installed sixteen feet above the penthouse roof. This height was redetermined and checked the optimum value previously found for vertically polarized signals. A concentric conductor transmission line connects this antenna to the radio equipment. The antenna consists of two vertical half-wave driven radiators spaced twenty feet apart at right angles to the line of transmission. A quarter wavelength behind these are two parasitically excited half-wave antennas which form a reflector. A back-end null for this combination is directed toward the High-Voltage Laboratory when the two driven antennas are excited in phase. Final adjustment of this system has not as yet been completed, but considerable improvement over the previous location of the apparatus has already been realized.

Experimental antennas were also installed at Palomar Mountain. A single wire line 342 feet long was supported above the ground on thirty-foot poles down the slope in the direction of Pasadena and connected to the radio set through a quarter-wave matching section of line. This was about the proper height above ground to obtain phase reinforcement of the direct waves and waves reflected from the slope, but the length of the antenna was not the optimum required to use the maximum of the cone of receptivity. The topography of the ground prevented obtaining a wire length sufficient to place this cone correctly. The results were inferior to those obtained with a half-wave vertical and a reflector.

An eighty-five-foot water tower with a metal tank provided a location at a still higher elevation. The receiver and equipment were taken to the platform on the tower and a half-wave length vertical antenna mounted about 4½ feet out from the tank, using the tank itself as a reflector. A null was found for a vertical antenna at a point about eight to nine feet from the tank. The local noise level was low and the results were so good that the antenna was located permanently on the tower. A single half-wave vertical in front of the tower is now in regular use.—*Bell Laboratories Record.*

Radio—A Wide-Open Door To Opportunity

Alfred A. Ghirardi, E. E.

● THE radio industry has progressed with lightning-like rapidity. Each year has brought some new development to add to the wonder, convenience, and delight of the public.

There are those, both within and without the industry, who deny this and contend that the peak of radio development has been reached; but these men, too lazy and unwilling to keep up with the giant strides of radio, are indulging in a bit of wishful thinking, rather than basing their conclusions on actual, hard fact. They are the ones for whom no line of work holds opportunity, because they themselves refuse to accept opportunity even when it knocks on their very door.

Based as it always has been on a constant parade of new ideas, radio offers success only to those who are alert to progress, who are eager to fit themselves eminently for this type of endeavor, and who are interested in radio enough to devote a large amount of their time to keeping up with it. The men who made radio the great thing that it is today—both those untrained in scientific methods of research and those best prepared as to educational background and elaborate laboratory equipment—were men of that calibre. From the initial development of A.C. tubes and A.C. line operation of radio sets these men were responsible for such rapidly following innovations as power tubes, single-dial tuning, dynamic speakers, electrolytic condensers, screen-grid and pentode type tubes, radio-phonograph combinations, single-control superheterodyne receivers, midget receivers, automatic volume control, inter-channel noise suppression, small automobile type tubes, remote tuning control devices, vibrator-type power supply units, automobile receivers, wave-band switching systems, short-wave and all-wave receivers, and push-button tuning—innovations without which radio could not have reached its present position of importance and supremacy in the industrial scene.

Radio today, far from having achieved its maximum growth, is, rather, opening on a phase of even greater development insofar as it provides a stepping stone to fields hitherto uncultivated by radio men. Radio today is the object of more research than has ever before been devoted to it! If this same spirit of advancement that characterized its early years continues, the radio industry can never become inactive. The result of all this display of initiative and study cannot be stagnation, as some would have us believe; the result can only be greater accomplishments for radio with its ensuing benefits for the radio-buying public as well as for the men connected with the innumerable branches of one of our greatest industries.

Among the more promising of the new branches of radio is that devoted to the development of real high-fidelity with relation to both reception and transmission. And with this high-fidelity reception comes more than the mere problem of extending the range of reproduction further into the high and low frequency regions. It poses to the radio technician the more difficult questions of noise elimination, construction and servicing of receivers and set design. It even brings up the consideration of proper acoustics for the room in which the set is to be placed. The radio man who tackles these questions now will be in a very enviable position when the inevitable boom, that will accompany the development of satisfactory high-fidelity receiving equipment which can be marketed at a price suitable for mass consumption, comes. When this goal in high-fidelity research is achieved it will mean the beginning of an expansion far greater than any the radio industry has ever known, and those men who are far-sighted enough to realize this and prepare themselves for it will share in its benefits.

A branch of industry into which radio men can step right now without having to wait for a perfected development is the photo-electric field. The electric eye is continually used in industry today and other new uses for it are constantly being unfolded. How-

(*Continued on page* 582)

Television "Piped" from New York to Phila.

(*Continued from page 534*)

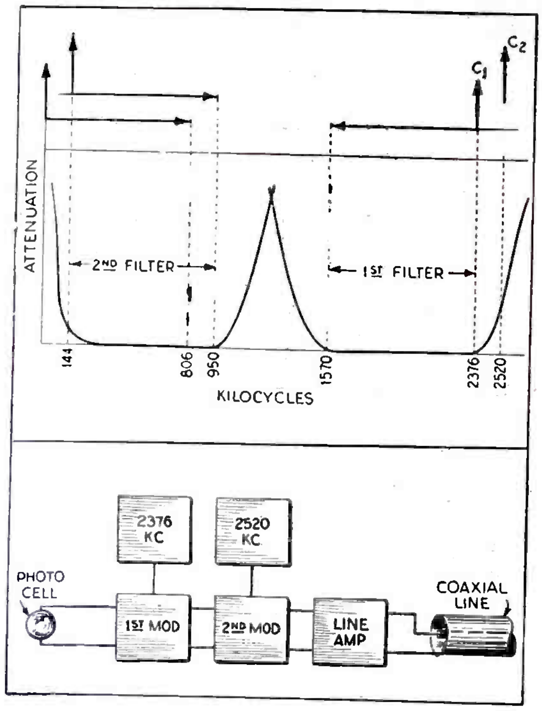
dark and vice versa. That in turn means a current from the photoelectric device that changes rapidly from strong to weak. A changing current can be shown to be a group of alternating currents whose frequencies reach higher values as the change becomes more rapid. Conversely, if the circuit suppresses some of these high frequencies, the current will seem to change more slowly. That in turn means blurred television details. Hence a high quality system is designed to handle high frequencies.

At the receiving terminal, in a cathode-ray tube, the current is supplied to a set of plates so arranged that the current corresponding to the brightest spot on the film centers the electron stream on an aperture one two-hundredth of an inch square. For less bright points the beam does not center on the aperture and fewer electrons pass. The stream then passes two more pairs of plates; one of which sweeps it back and forth fifty-seven hundred and sixty times a second; and the other up and down twenty-four times a second.

Scanning Frequencies—To permit the use of standard sound-film in the transmitter, the system is designed to scan 24 "frames" a second. The scanning disc contains 240 lenses and runs at 24 revolutions per second, scanning 5760 lines a second. Similarly the screen at the end of the receiving tube is scanned horizontally by the electron stream at the rate of 5760 lines a second, that is 240 lines for each of the 24 frames which are transmitted each second.

In transmission over the cable the lowest frequencies fall behind the highest, taking about twenty millionths of a second longer in travel. In that time the cathode beam can move forty times its width. The effect is the same as if the finer the picture details the more out of synchronism were scanning disc and cathode beam. For the new coaxial transmission, however, delay equalizers were developed to keep together all the components of the current to a precision corresponding to the motion of the beam for half its width, that is, *a dead-heat finish between all the frequencies to within a quarter of a millionth of a second!*

Amplifiers designed for a still wider band are under development, which will permit more telephone channels and more detail in a transmitted scene.



In the recent demonstration of television transmission over the coaxial cable between New York and Philadelphia a frequency band width of 806 kc. was employed. Since the coaxial cable is not designed to transmit frequencies below 60 kc., however, the original frequency band from 0 to 806 kc., had to be raised by modulations to a higher position in the frequency spectrum.

This is accomplished through double modulation. The first modulation employs a carrier of 2376 kc., and results in a lower side-band from 1570 to 2376 kc., and an upper side-band from 2376 to 3182. A filter then removes all of the upper side-band except a small section of its lower frequencies, which is passed by the sloping corner of the filter characteristic. A second modulation with a carrier of 2520 kc. results in an upper side-band from 4090 to 4896 kc., and a lower side-band from 950 to 144 kc., with the addition of a group of somewhat lower frequencies corresponding to the vestigial upper side-band passed by the first filter. A second filter easily removes the upper side-band, and is accurately designed to cut off the vestigial frequencies below 144 kc., so that the frequencies transmitted run from 144 to 950 kc.

Images Transmitted on New Single Side-band System

Dr. Frank B. Jewett, President of the Bell Telephone Laboratories, made the following statement on coaxial cable developments:

"In order properly to appraise the demonstration of television pictures transmitted over the coaxial cable from New York to Philadelphia and the semi-technical explanation of it, it is necessary to understand just what the demonstration was designed to show; what it was and was *not;* and what was new and an advance over the preceding art.

"The demonstration was *not* the first transmission of television image currents for long distances over wires. The first such demonstration was made by the Bell System in 1927 when television image currents were transmitted from Washington to the Bell Telephone Laboratories in New York and there reproduced. In that demonstration transmission was over specially conditioned telephone circuits of ordinary construction. The characteristics of such circuits were sufficiently good for the poor grade of television picture then attainable by the equipment for scanning and reproducing (50 lines, corresponding to a frequency band width of approximately 22,500 cycles).

"The latest demonstration was *not* designed to show an improved television per se. In fact the images (240 lines) were inferior in grain to those produced by the most modern

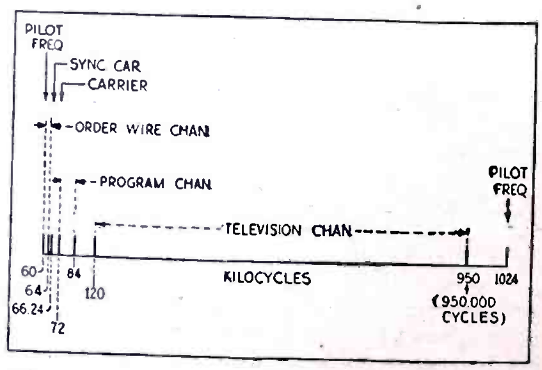
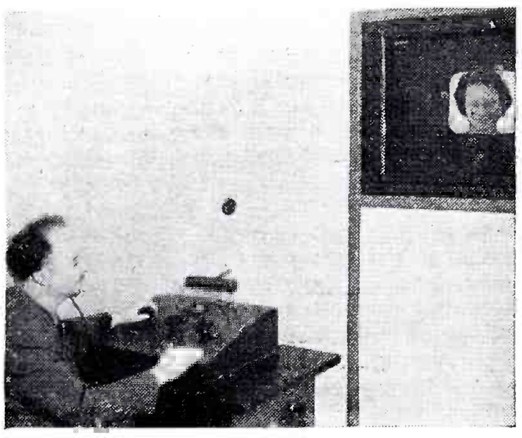


Diagram above shows television transmission band of nearly one million cycles used in the transmission of images.

television equipment (441 lines or better). This was not due to any limitation imposed by the scanning or reproducing apparatus, but to the limitations imposed by the experimental terminal and repeater equipment now on the New York-Philadelphia cable. This equipment limits the top frequency of the transmitted current to approximately 1,000,000 cycles so that a 240-line picture is about the finest grain image that can be transmitted.

"What the demonstration did show for the first time is the unique and economical utilization for television currents of the frequency band of a long coaxial cable. Instead of transmitting the television currents by the *double* side-band method common to radio broadcasting, a method for *single* side-band transmission was developed, thus utilizing to the fullest the frequency range for which the cable system was equipped. The double side-band method has been used in Europe for transmission of 180 line images over coaxial cable. In that transmission each side-band occupied only about 1/3 of the transmission range of the cable system, amounting to the television use of the available frequency range at only 33 percent efficiency. In the method which has just been demonstrated at Philadelphia a single side-band is obtained by double modulation and precise filtering; and this side-band is placed



The image control desk and the screen behind which a large cathode ray tube was mounted.

to avoid the first 100 kilocycles of the frequency range of the cable system where transmission is unsatisfactory and the various components cannot easily be amplified. There was also introduced compensation for the different velocities of transmission of different frequency components. The result is the delivery of an essentially perfect replica of the almost infinitely complex current produced at the sending end by the scanning equipment.

2,000,000 Cycle Repeaters To Be Tried Next

"These are results never before obtained. As soon as the present experiments are completed the experimental 1,000,000 cycle repeaters on a portion of the cable are to be replaced by experimental 2,000,000 cycle repeaters, as the next orderly step in the development of equipment which will give a coaxial cable system capable of accommodating the maximum number of telephone channels which it is economical to handle on such a cable or the widest band of frequencies which the best television scanning and reproducing apparatus may require.

"As stated above, a 1,000,000 cycle band will accommodate television currents corresponding to about 240-line pictures. It will also afford channels for about 240 simultaneous high grade telephone channels. A 2,000,000 cycle system will provide about 480 telephone channels or accommodate television currents corresponding to about 350-line pictures."

Television Sweep Coil Data

(*Continued from page* 551)

tion, should be avoided because they tend to weaken the bulb, which is under considerable pressure due to its high vacuum. The bulb should not be subjected to extreme or rapid temperature changes. When an 1801 is removed from its associated apparatus, it is recommended that the tube be stored in its original carton, with the viewing screen up.

The *base* pins of the 1801 fit a standard, five-contact socket, which can be installed for the operation of the tube in any position. The socket mounting should preferably be adjustable. The socket should be made of good insulating material; insulating baffles between contacts provide an additional factor of safety.

The *heater* is designed to operate at 2.5 volts. The transformer winding supplying the heater power should be designed to operate the heater at the rated voltage under average line-voltage conditions.

The *fluorescent screen* in the 1801 employs phosphor No. 3 material, and is of the medium persistence type having high luminous efficiency. It is recommended that, in equipment using the 1801, the screen of the tube be covered with a plate of clear, shatter-proof glass. This glass plate provides protection against the possibility of the bulb collapsing due to some abnormal condition.

A *deflecting yoke* for use in television equipment is shown in Fig. 4. This yoke has the advantages that it is simple and is easy to construct. It has the disadvantage that it produces a certain amount of pincushion distortion and defocusing of the spot at the edges of the picture. This distortion and defocusing are due to non-uniformity of the fields of the two sets of coils, and to coupling between the two sets of coils. A more complicated yoke can be designed[1] so that the distortion and defocusing are very small. However, the distortion and defocusing produced by the simple yoke shown in Fig. 4 are sufficiently small so that this yoke is entirely satisfactory for many applications of the Kinescope. A yoke of advanced design which has been developed by RCA engineers is shown in Figs. 5 and 6.

A *shielding case* for the Kinescope may be desirable if the tube is operated near electrical apparatus whose fields may cause distortion of the spot. If an iron or steel case is employed, care should be taken in its construction to insure that the case is completely demagnetized. In television equipment, or in other applications of the 1801 where the anode No. 2 is at high potential above ground, a shielding case protects the operator against accidental contact with the high voltage on the anode No. 2 terminal cap.

The *d-c supply voltages* for the electrodes may be obtained conveniently from a high-voltage, vacuum-tube rectifier. Because the 1801 requires very little current, the rectifier system can be of either the half-wave or the voltage-doubler type. For the same reason, the filter requirements are simple. A 0.5- to 2.0-mf. condenser will ordinarily provide sufficient filtering. If this is inadequate for a particular application, a two-section filter is recommended. A circuit of a suitable power supply is shown in Fig. 1.

The *optimum value of anode No. 2 voltage* for television applications is dependent on the desired picture quality and the allowable cost of voltage-supply equipment. For high definition and high brightness of the picture, it is desirable that anode No. 2 voltage be high in order to obtain a spot which not only is small but which also has high intensity. If

[1] "The Cathode-Ray Tube in Television Reception," I. G. Maloff, Proc. Radio Club of America, October, 1935.

(*Continued on page* 579)

Trans-Atlantic Television?

(*Continued from page 536*)

transmission line from the antenna, or to a calibrated ultra-high frequency signal-generator contained in the rack in the foreground. The bottom panel of this rack is a peak voltmeter useful in comparing peak signal values and determining signal-to-noise ratios. The upper panels of the two racks contain the necessary power supplies and regulators. In order to have the receiver remain perfectly stable and the signal generator hold its frequency setting, it was found desirable to regulate the a-c power supply and also the d-c plate supplies from the rectifiers.

Special Double IF Superhet Used

Fig. 2 shows a block diagram of the receiver. The 955 acorn first detector, which may be tuned from 30 to 200 megacycles, is fed the signal and also the output of the 955 acorn high frequency or first oscillator, and produces the *first* intermediate frequency of 25 megacycles, which is fed to the broadly tuned first intermediate frequency amplifier. The second detector receives this 25 megacycle signal and also the output of the second oscillator which is set at 27.1 megacycles. This detector produces the *second* intermediate frequency of 2.1 megacycles, which is amplified by the second intermediate frequency amplifier. This amplifier has a flat band width of 100 kilocycles. The *third* detector is fed the 2.1 megacycle signal and provision is also made to supply it with a 2.1 megacycle voltage from the *third* oscillator. This third oscillator is used for cw reception and as an aid in tuning the desired signal to the center of the 2.1 mc intermediate frequency amplifier. The third detector drives a single-stage audio amplifier, the output of which terminates in a pair of jacks at the lower right-hand corner of the receiver. Provision is also made to get at the diode output directly. The receiver input may be switched to either the aerial or a signal generator. A vacuum-tube voltmeter is used to hold this generator's output constant.

To receive the ultra-short wave signals, a horizontal rhombic antenna was constructed. This antenna was 134 feet long, 69 feet wide, 45 feet high, and had an effective height of about 8 meters. The direction of London from New York is approximately N 50° E.

From January 1 to April 4, the *voice channel* from London was heard 45 times, whilst the video (image) channel was heard 15 times. Usually the signals were rather weak, but at times *both* the audio (voice) and video (picture) channels became quite strong. The maximum field strength observed was about 70 microvolts per meter on both channels. As the rhombic antenna used had an effective height of about 8 meters, the signal strength at the terminals of the receiver was about 500 microvolts.

Signal Strong Enough to Produce Image

Unfortunately, during the period of maximum signal strength, there was no television receiver available on which to observe the video signal optically. When such a receiver was procured the period of strong signals had passed and there was not sufficient signal voltage to permit proper Kinescope synchronization. However, judging from the fact that at times the received video signal reached a value of well over *400 microvolts*, it would be reasonable to assume that a useful picture could have been obtained.

The audio (voice) signal frequently was of sufficient strength to give *excellent loud-speaker reproduction!* Its fading was prone to be deep and rather fast, but rarely was it of a selective (distortion producing) nature. In fact, when passed through a high fidelity amplifier and loud-speaker system, it produced exceptionally fine results as the transmitter's audio system, from microphone to antenna, is reputed to have a flat audio response curve from 40 to 10,000 cycles, something rarely to be found in the American broadcast band, due to the close spacing of transmitters and telephone line limitations. Only once was interference noted and that came from the fifth harmonic of a code transmitter on 8.3 megacycles, located on a ship off the coast of Scotland.

The audible response from the video channel consisted of a sharp 50 cycle buzz. This made it difficult to determine whether or not selective fading was present. The fading on this channel was quite slow and usually not deep.

German and French Vision Signals Heard

It should be mentioned that the German and French *television* transmitters were heard on several occasions, but in general these signals were not as strong as the English transmissions and were heard less consistently. There was also reason to believe that the Italian television voice channel was received, although positive identification was not established.

Probably the reader now wonders if this is the start of regular trans-oceanic television broadcasting. In the opinion of the author this phase of television is still distant. The trans-oceanic reception of 40 to 45 megacycles may be explained as being due to exceptionally high ionization of the F_2 region of the Kennelly-Heaviside layer. This is turn is in phase with the great increase in *sunspot activity* as the maximum of the eleven-year sunspot cycle is approached. With this in mind, it is reasonable to assume that for the next few years there will be sporadic reception of ultra-high frequencies over great distances. This phenomenon should reach its peak the winter of 1938-1939.

How to Listen for BBC Television Signals

Anyone possessing a receiver that is fairly sensitive in the region of 40-45 megacycles could probably hear these English emissions occasionally during the coming winter. A properly designed antenna is almost essential, as the usual broadcast antenna is usually quite poor on these ultra-high frequencies. One of the simplest to construct is the common half-wave doublet. It should be 40 to 45 feet above ground (higher or lower will give inferior results), face England and have a length of 11¼ feet. The two-wire transmission line should be as short as possible.

It should be remembered that winter is the time of year most favorable for long distance reception of these signals. Probably from the middle of December to the last of February is the time during which the strongest signals will be heard. At present the London television equipment is in operation daily except Sunday from 10:00 to 11:00 a.m. and 4:00 to 5:00 p.m. Eastern Standard Time. So far we have heard only the morning program.

More on TELEVISION in next issue—Data for building a receiver and other practical information.

9 People Can Talk 2-Way on One U.S.W. Circuit

(*Continued from page* 535)

sinusoidal tone of frequency f1 kc. per second. This input modulates a channel-frequency oscillator having a frequency in the range 150 to 300 kc. per second, say, 155 kc. per second, resulting in a carrier frequency of 155 kc. per second together with upper and lower sidebands of (155 + f1) and (155 — f1) kc. per second. If channel No. 2 be supplied with a tone input of frequency f2, this will modulate an oscillator having a frequency of, say, 165 kc. per second, resulting in a carrier frequency of 165 kc. per second and upper and lower sidebands of (165 + f2) and (165 — f2) kc. per second. Similarly, channel 3 may have a carrier frequency of 180 kc. per second, and so on to the ninth channel of which the carrier frequency might be 280 kc. per second.

The bands of frequencies derived from the 9 channels are now added together, producing in total a single frequency band extending from (155 — f1) kc. to (280 + f9) kc. per second. This total frequency band is now used to modulate the output of the ultra short wave transmitter having a carrier frequency in the neighborhood of 76,000 kc. and to produce by this means a lower side-band extending from 76,000 — (280 + f9) kc. to 76,000 — (155 — f1) kc., and an upper side band extending from 76,000 + (155 — f1) kc. to 76,000 + (280 + f9) kc. per second. This is the band of frequencies which is radiated by the aerial system.

Superheterodyne Receiver and Filters Employed

The band of frequencies radiated by the transmitting system, as described above, is delivered by the distant receiving aerial system to a superheterodyne type of receiver. The second detector of this receiver produces from the above input the original side band extending from (155 — f1) kc. to (280 + f9) kc. This band of frequencies is then applied to a bank of 9 selecting circuits which operate as band-pass filters. The currents of frequency (155 — f1), 155 and (155 + f1) kc., will be passed by the first filter to a detector circuit which delivers the original frequency of f1 kc. to the first channel. Similarly, the frequencies (165 — f2) 165 and (165 + f2) kc. will be passed by the second filter to a detecting circuit which delivers the original frequency f2 to the second channel. In this manner the whole of the band of frequencies delivered by the second detector of the superheterodyne receiver will be split up, detected and delivered to the appropriate channel.

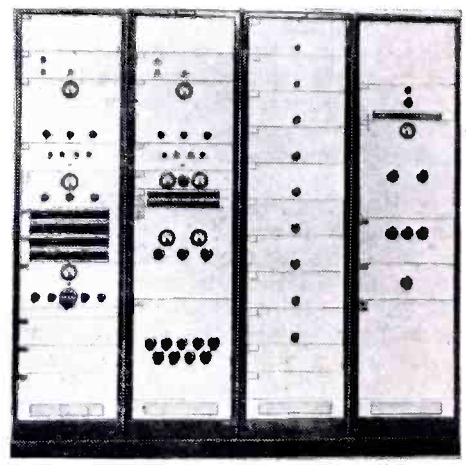
The carrier frequency of the ultra short wave transmitter is held constant within very close limits by a crystal-controlled master-oscillator, while the beating oscillator of the superheterodyne receiver is similarly crystal-controlled.

The foregoing explanation covers the transmission of 9 channels in one direction on a carrier wave of 76 megacycles (3.94 meters) approximately. For the reverse direction the circuits of the same 9 channels are transmitted on a carrier wave of 83 megacycles (3.612 meters) approximately.

Aerials: in order to minimize interference between the transmitting and receiving waves, the plane of polarization of the waves emitted by the transmitting aerial is at right-angles to that of the waves received by the receiving aerial. At one terminal, therefore, the transmitter is equipped with an aerial system designed for vertical polarization, whereas the receiver is fitted with an aerial designed for horizontal polarization. At the other terminal the receiving aerial is vertically and the transmitting aerial horizontally polarized.

Receiver: The receiver is a superheterodyne in the output of the second detector of which the 9 auxiliary carrier frequencies of the distant transmitter are present. Each auxiliary carrier, together with its side bands, is separated out by means of filters, amplified and rectified to reproduce the original speech frequencies corresponding to the channel in question. After amplification these frequencies are passed out to the line at the required level.

It is easy to mix together 9 channels, but to separate them out again without noticeable crosstalk is a problem all its own. It is on the special design of the channel selecting circuits, by means of which this end is achieved that the successful operation of the whole system primarily depends.



The receiver as installed at Belfast, Ireland, and Stranraer, Scotland.

General: It is quite evident that a fault in any part of the equipment common to all channels would be a catastrophe; a fault in one channel is serious, but the failure for any appreciable time of 9 channels is disastrous. The ultra short wave transmitter unit, being common to all 9 channels, is therefore, provided in duplicate. The reserve unit is normally not under tension, but if a fault such as the failure of a tube occurs, the power supplies and the aerial are automatically switched from the service to the reserve unit and a fault signal is given to the distant remote control point. That portion of the receiving equipment, which is common to all 9 channels, is similarly duplicated. In addition, the power supply is duplicated by an emergency plant which is switched in on failure of the public supply.

An Automatic Sender for CW.

(*Continued from page* 550)

with a hand key. The basis of the unit is a hand emery wheel which is obtainable from the "5 and 10." The emery wheel is removed and replaced with a small pulley and the handle is likewise taken off and replaced by a pulley to connect it to a small electric motor. The gears of the emery wheel provide the desired speed reduction from the motor speed.

The actual signal is recorded on a strip of celluloid or movie film which has slots cut in it for the dots and dashes of the message. This strip is cemented to form an endless belt which runs over a pair of contacts which close at the points where the slots are cut in the celluloid strip. Messages are changed by changing the strips and cutting new ones with the desired calls, test signals, etc.

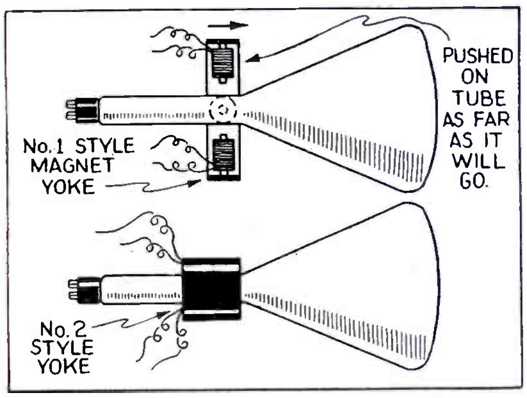
Television & Short Wave World (London).

Television Sweep Coil Data

(*Continued from page 576*)

anode No. 2 voltage is not high, some decrease in picture brightness or definition, or both, is to be expected. However, operation at a low voltage permits of substantial saving in the cost of circuit parts, especially in the cost of the filter condenser in the rectifier circuit supplying the anode No. 2 voltage. A saving can also be made in the cost of the parts in the d-c power supply for the deflecting circuits, the reason being that the deflecting current required for full deflection of the spot is less for a low value of anode No. 2 voltage than for a high value.

The high voltages at which the 1801 is operated are very dangerous. Great care should be taken in the design of apparatus to prevent the operator from coming in contact with these high voltages. Precautions include the enclosing of high-potential terminals and the use of "interlock" switches to break the primary circuit of the high-voltage power supply when access to the apparatus is required. It is recommended that, when feasible, the 1801 be operated with the anode No. 2 at ground potential and the cathode at high negative potential with respect to ground. With this arrangement, the dangerous voltages can be made inaccessible more easily than when the tube is operated with the anode No. 2 terminal-cap at high potential above ground. The recommended arrangement generally can not be used in television equipment but is suitable for most oscillograph applications. When the recommended arrangement is used, the cathode should be connected directly to one side or to the mid-tap of the heater winding. *The heater winding should be adequately insulated to withstand the high voltage on the cathode.*



How Sweep Coils are placed on Cathode Ray Television Tubes.

In the use of a Kinescope, it should always be remembered that high voltages may appear at normally low-potential points in the circuit, due to condenser breakdown or to incorrect circuit connections. Therefore, before any part of a Kinescope circuit or its associated circuit is touched, the power-supply switch should be turned off and both terminals of any charged condenser grounded.

Application

An *operating circuit* for the 1801, with voltage supply, is shown in Fig. 1. The electrode voltages are obtained from a bleeder circuit connected across a high-voltage supply. A bleeder current of two to five milliamperes is usually satisfactory; considerably larger values may require the use of more filtering than that provided by a single condenser shunted across the d-c supply. With small bleeder currents, a single condenser filter is usually adequate. A variable d-c voltage for the control electrode and for anode No. 1 can be obtained from potentiometers in the bleeder circuit. In a television receiver, the video signal and background-control bias supplied by the receiver are introduced in the grid-cathode circuit of the 1801.

It is important to note that the input power to the fluorescent screen should not exceed 10 mw. per sq. cm. A screen-input power in excess of this rating may cause temporary loss of sensitivity or permanent destruction of the screen material. To prevent this possibility, it is recommended that the spot always be kept in motion over a large area of the screen by the application of current to both sets of deflecting coils. When it is desired to make observations on a stationary spot, or when the spot is to scan only a small area of the screen, the brightness of the spot should be reduced to a low value by adjustment of the grid bias. In oscillograph applications where the spot traverses slowly any portion of a pattern, the brightness of the spot should be limited. When the spot moves so slowly that it is seen as a spot rather than as a line, the screen-input power should be limited as in the case of a stationary spot.

The currents to be supplied to the deflecting coils depend on the application of the 1801. In use of the tube as an oscillograph, a time-axis current is supplied to the horizontal-deflecting coils and the current under observation is amplified if necessary and supplied to the vertical-deflecting coils. In television reception, the currents supplied to the horizontal- and vertical-deflecting coils should have a sawtooth waveform, and a frequency controlled by the synchronizing components of the incoming television signal. Suitable circuits for supplying these currents are shown in Figs. 2 and 3.

A *typical vertical-deflecting circuit* is shown in Fig. 2. The vertical-synchronizing signal, which consists of a series of positive voltage pulses, is applied to the grid of the left-hand triode unit of the 6N7. When one of these pulses arrives at the grid, the left-hand triode unit starts to oscillate because of the feedback provided by the transformer T. The flow of grid current which accompanies this oscillation builds up a negative bias voltage on the grid leak and condenser, R_1-R_2 and C_1. In a very short time this grid-leak bias reaches a value sufficient to cut off plate current. The left-hand triode unit, therefore, goes through only one half-cycle of oscillation, and then ceases to conduct. Each pulse of synchronizing voltage causes repetition of this self-blocking oscillation. In terms of grid voltage, this means that, with each pulse of synchronizing voltage, the grid goes positive for a very short time and then goes negative and stays negative until the next synchronizing pulse arrives.

The grid of the right-hand triode unit of the 6N7 is connected to the grid of the other triode unit. Therefore, with each synchronizing pulse, the plate current of the right-hand triode unit rises suddenly to a large value for a short time and then falls to zero and stays at zero until the arrival of the next synchronizing pulse. With the sudden rise in plate current, there is a sharp decrease in plate voltage because of the IR drop across R_4-R_5. During the time that plate current is cut off, there is a comparatively slow increase in plate voltage, the rate of increase being limited principally by the rate at which C_3 can charge up through R_4-R_5. Since plate voltage goes periodically through a sharp decrease followed by a comparatively slow increase, the variation in plate voltage has a sawtooth waveform. This sawtooth voltage is applied to the grid of the 6C5, through C_4 and R_7, and produces a sawtooth current in the plate circuit of the 6C5. Because the impedance of the deflecting coils L_2 is low compared with that of the coupling choke L_1, a large part of the sawtooth current flows through the deflecting coils. *Courtesy RCA Mfg. Co.* (*To be concluded.*)

Let's Listen In

(*Continued from page* 553)

Both good signals, this at 7:20 a.m.

MANCHUKUO

TDD, 5.83 mc., Shinkyo, is heard from 6-9 a.m., phoning JVU, 5.79 mc., Nazaki, almost daily, good signals, this from Ashley Walcott, W6. W. S. Wade, W7, reports TDE, on 10.065 mc., as do we, with a steady signal near 6-7 a.m., daily; rarely on voice, however.

CHINA

XGOX, 9.77 mc., Nanking, still is on the air, but who knows for how long? A fairly readable signal, we do regret the hopelessness of sending them a report.

We were certainly surprised last week to receive two letters from Shanghai, verifying XTB, XTS, XTR, XGW. The letters must have just made the last mail!

JAVA

PMH, 6.72 mc., Bandoeng, is coming in very well lately, best around 6:30-7 a.m. Also YDC, 15.15 mc., at Bandoeng, with a fine signal near 7 a.m. PMN, 10.26 mc., heard this morning with an unusually FB signal for PMN, and PLP, 11.00 mc., are all easy to log. Latter two also at Bandoeng. All these stations will verify with the handsome QSL pictured in this month's column. Address reports to QRA printed on this card.

PHILIPPINE ISLANDS

KZIL, 14.06 mc., Phil. Gov't. station at Iloilo, on Panay Island was heard by Harry Honda, W6, calling KA1YL, the yacht *"Latitude,"* at 9:30 a.m.

EUROPE

YUA, 6.10 mc., Belgrade, Yugoslavia, was again logged on a Sun. morning at 1:30 a.m., fair signal. This is a hard-to-get country that *can* be logged this winter.

RIR, 10.08 mc., Tiflis, U.S.S.R., was heard phoning RNE, 12.00 mc., Moscow, at 2:25 a.m.

Jim Lanyon, VES, reports three Russians, on 11.90, 14.71, and 14.93 mc., all heard relaying RNE's program, with fine signal strength, from 11:30 a.m.-12:30 p.m.

✦

✦ ✦ HAM STARDUST ✦ ✦

During November, as we predicted, the South African "deluge" did materialize, and we hope all of you DX fans did "clean up" at least a few of the choice South African signals on the 20 meter band. However, So. African ham DX will be coming through, though not every night, up to as late as the end of February, and if one tries nightly, 2 or 3 times a week, some of the South Africans may be heard, from 11 p.m.-12:30 a.m.

Below follows a list of our DX on 20 meters, from So. Africa:

ZS2N, 14010; ZS6AJ, 14030; ZT6AL, 14050; ZT6Y, 14050; ZS6T, 14050; ZE1JR, 14065; ZU6P, 14070; ZU6N, 14110; ZU5L, 14140; ZT6J, 14140; ZS6AJ, 14140; ZS6S, 14140; ZE1JN, 14145; ZT6AM, 14280; ZS-3F, 14310; ZS5M, 14314; ZU6T, 14325; ZS5J, 14370; ZU6AF, 14380; ZT6AL, 14390; ZT5S, 14410.

Two of these, ZE1JR and ZE1JN, are in Southern Rhodesia. ZS3F also heard at 2:50 p.m., and ZU6N was heard at 3:22 p.m.

Roger Legge, W2, reports ZS3F, ZS2N, ZE1JR, ZS5M, ZT5S, ZT6AM, ZS6AU, 14300, ZU6AF, ZS6AJ, ZT6Y, ZU5G, 14350. "FB," Roger!

Ashley Wolcott reports ZS5M, ZT5S, ZU-6P, ZU6AF. Murray Buitekant, W2, reports ZS5AB, 14060, ZS1B, 14065, ZS5M. FB, OB!

Harry Kentzel, W2, reports ZS3F, ZS5J, ZS5M, ZT6AL, ZT6AM, also FA3LY, L. F. end., Algeria. "Randy" Carpenter, W3, reports ZT5S, ZU6AF, and ZT6X. Come again, OM!

World Short-Wave Stations

(*Continued from page* 564)

6.018	ZHI	**SINGAPORE, MALAYA,** 49.18 m., Addr. Radio Service Co., 2 Orchard Rd. Mon., Wed. and Thu0 5.40-8.0 am.. Sat. 10.40 pm.-1.10 am.
6.015	HI3U	**SANTIAGO DE LOS CABALLEROS D. R.,** 49.88. m. 7.30-9 am., 12m.-2 pm., 5-7 pm., 8-9.30pm; Sun. 12.30-2, 5-6 pm.
6.010	COCO	**HAVANA, CUBA,** 49.92 m., Addr. P. O. Box 98. Daily 7.55 am.-12m., Sun. till 11 pm.
6.010	PRA8	**PERNAMBUCO, BRAZIL,** 49.92 m., Radio Club of Pernambuco, 6-9 pm.
6.010	9MI	**S. S. KANIMBLA,** 49.92 m. (Travels between Australia and New Zealand). Sun. around 7 am.
6.010	CJCX	**SYDNEY, NOVA SCOTIA,** 49.92 m. Relays CJCB 7 am.-1 pm., 4-8 pm.
6.005	HP5K	**COLON, PAN.,** 49.96 m., Addr. Box 33. 7-9 am., 11.30 am.-1 pm., 6-11 pm.
6.005	CFCX	**MONTREAL, CAN.,** 49.96 m., Can. Marconi Co. Relays CFCF 7.45 am.-1 am.; Sun. 10 am.-12.15 am.
6.005	VE9DN	**DRUMMONDVILLE, QUE., CAN.,** 49.96 m., Addr. Canadian Marconi Co. Sat. 11.30 pm.-2 am.
6.000	CXA2	**MONTEVIDEO, URUGUAY,** 50 m. Addr. Rio Negro 1631. Relays LS2, Radio Prieto, Buenos Aires. 10.30am.-10.30 pm.
6.000	ZEA	**SALISBURY, RHODESIA, S. AFRICA,** 50 m. (See 6.147 mc., ZEB.) Also Sun. 3.30-5 am.
6.000	RV59	**MOSCOW, U.S.S.R.,** 50 m. Irregular. 3-6 pm.
5.990	XEBT	**MEXICO CITY, MEX.,** 50.08 m., Addr. P. O. Box 79-44. 8 am.-1 am.
5.977	CS2WD	**LISBON, PORTUGAL,** 50.15 m., Addr. Rua Capelo 5. 3:30-6 pm.
5.970	HJ4ABD	**MEDELLIN, COL.,** 50.26 m., Addr. La Voz Catia. 8-11.30 pm.
5.968	HVJ	**VATICAN CITY,** 50.27 m. 2-2.15 pm. daily; Sun. 5-5.30 am.
5.950	HJN	**BOGOTA, COL.,** Radiodifusora Nacional, 50.42 m. 6-11 pm.
5.940	TG2X	**GUATEMALA CITY, GUAT.,** 50.5 m. 4-6, 9-11 pm.; Sun. 2-5 am.
5.930	YV1RL	**MARACAIBO, VEN.,** 50.59 m., Addr. Radio Popular, Jose A. Higuera M, P. O. Box 247. Daily 11.43 am.-1.43 pm., 5.13-10.13 pm.; Sun. 9.13 am.-3.13 pm.
5.925	HH2S	**PORT-AU-PRINCE, HAYTI,** 50.63 m., Addr. P. O. Box A103. 7-9.45 pm.
5.917	YV4RP	**VALENCIA, VEN.,** 50.71 m. Irregular.
5.900	ZNB	**MAFEKING, BRI. BECHUANALAND S. AFRICA,** 50.84 m. Addr. The Govt. Engineer, P. O. Box 106. Gives news Sun. at 1.30 pm.
5.900	TIMS	**PUNTARENAS, COSTA RICA,** 50.85 m. 6-10 pm.
5.898	YV3RA	**BARQUISIMETO, VEN.,** 50.86 m., Addr. La Voz de Lara, 12 m.-1 pm., 6-10 pm.
5.890	JIC	**TAIHOKU, FORMOSA,** 50.93 m. Works Tokio 6-9 am.
5.885	HCK	**QUITO, ECUADOR,** 50.98 m. 8-11 pm.
5.875	HRN	**TEGUCIGALPA, HONDURAS,** 51.06 m. 1.15-2.16, 8.30-10 pm.; Sun 3.30-5.30, 8.30-9.30 pm.
5.865	HI1J	**SAN PEDRO DE MACORIS, D. R.,** 51.25 m., Addr. Box 204. 12 m.-2 pm., 6.30-9 pm.
5.853	WOB	**LAWRENCEVILLE, N. J.,** 51.26 m., Addr. A. T. & T. Co. Works Bermuda nights.
5.850	YV1RB	**MARACAIBO, VEN.,** 51.28 m., Addr. Apartado 214. 8.45-9.45 am., 11.15 am.-12.15 pm., 4.45-9.45 pm.; Sun. 11.45 am.-12.45 pm.
5.830	TDD	**SHINKYO, MANCHUKUO,** 51.46 m. Works Tokio 6-9 am.
5.830	TIGPH	**SAN JOSE, COSTA RICA,** 51.5 m., Addr. Alma Tica, Apartado 800. 11 am.-1 pm., 6-10 pm. Relays TIX 9-10 pm.
5.813	TI2H	**SAN JOSE, COSTA RICA,** 51.59 m., Addr. Senor Gonzalo Pinto, H.
5.800	YV5RC	**CARACAS, VEN.,** 51.72 m., Addr. Radio Caracas. Sun. 8.30 am.-10.30 pm. Daily 7-8 am., 10.30 am.-1.45 pm., 3.45-9.30 pm.
5.790	JVU	**NAZAKI, JAPAN,** 51.81 m. Irregular.
5.780	OAX4D	**LIMA, PERU,** 51.9 m., Addr. P. O. Box 853. Mon., Wed. and Sat. 9-11.30 pm.
5.770	YV2RA	**SAN CRISTOBAL, VENEZUELA,** 51.96 m., Addr. La Voz de Tachira. 11.30 am.-12 n., 5.30-9 pm., Sun. till 10 pm.
5.758	YNOP	**MANAGUA, NICARAGUA,** 52.11 m. 8-9.30 pm.
5.740	TGS	**GUATEMALA CITY, GUAT.,** 52.26 m. Wed., Thur. and Sun. 6-9 pm.
5.730	HC1PM	**QUITO, ECUADOR,** 52.36 m. Irregular 10 pm.-12 m.
5.720	YV2RB	**SAN CRISTOBAL, VEN.,** 52.45 m., Addr. La Voz de Tachira. 6-11.30 pm.
5.500	TI5HH	**SAN RAMON, COSTA RICA,** 54.55 m. Irregular 3.30-4, 8-11.30 pm.
5.145	PMY	**BANDOENG, JAVA,** 58.31 m. 5.30-11 am.
5.077	WCN	**LAWRENCEVILLE, N. J.,** 59.7 m. Addr. A. T. & T. Co. Works England late at night irregularly.
5.025	ZFA	**HAMILTON, BERMUDA,** 59.7 m. Works N. Y. C. irregularly at night.
5.000	TFL	**REYKJAVIK, ICELAND,** 60 m. Works Europe nightime irregularly.
4.975	GBC	**RUGBY, ENG.,** 60.3 m. Works ships irregularly.
4.900	HJ3ABH	**BOGOTA, COL.,** 61.19 m., Addr. Apartado 565. 12 n.-2 pm., 6-11 pm.; Sun. 12m.-2 pm., 4-11 pm.
4.836	HJ3ABD	**BOGOTA, COL.,** 62 m., Addr. La Nueva Granada, Box 509. 12 m.-2 pm., 7-11 pm., Sun. 5-9 pm.
4.820	GDW	**RUGBY, ENG.,** 62.24 m. Works N.Y.C. nightime irregularly.
4.810	HJ2ABC	**CUCUTA, COL.,** 62.34 m. La Voz de Cucuta, 8 pm. to 12 m.
4.807	HJ1ABB	**BARRANQUILLA, COL.,** 62.39 m., La Voz de Barranquilla, Addr. P. O. Box 715. 11.30 am. to 1 pm., 4.30-6 pm.
4.790	VE9BK	**VANCOUVER, B. C., CAN.,** 62.63 m. Addr. Radio Sales Service, Ltd., 780 Beatty St. Except Sun. 11.30-11.45 am., 3-3.15, 8-8.15 pm.
4.752	WOO	**OCEAN GATE, N. J.,** 63.1 m., Addr. A. T.& T. Co. Works ships irregularly.
4.600	HC2ET	**GUAYAQUIL, ECUADOR,** 65.22 m. Addr. Apartado 249. Wed. and Sat 9.15-11 pm.
4.272	WOO	**OCEAN GATE, N. J.,** 70.22 m., Addr, A. T. & T. Co. Works ships irregularly.
4.250	RV15	**KHABAROVSK SIBERIA, U. S. S. R,** 70.42 m. 1-10 am.

2 men, 7 miles apart, shown on Television Screen

In a recent dispatch to the New York Times it was reported that television history was made when persons in London saw and heard in their homes an animated conversation between two men standing more than seven miles apart, who could both see and hear each other.

Gerald Cook, television director of the British Broadcasting Corporation, talked before a screen at the corporation's television station in Alexandra Palace, and Walter Mycroft, film director, was before a television receiver at the Elstree studios. The success of the experiment is held to be a remarkable foretaste of television's possibilities.

RADIO INSTRUCTION

Radio—A Wide-Open Door to Opportunity

(*Continued from page* 573)

ever, in spite of the fact that their training and every-day experience makes them so eminently fitted for this kind of work, in spite of the fact that this field offers such unlimited possibilities, most radio technicians seem to have overlooked completely this market for their labors. Most photo-electric installations employ vacuum tube amplifiers, with the same radio tubes and basic circuits that radio technicians are used to handling every day in radio receivers, yet most of them are completely unaware of this fact.

Because of their technical background and their first-hand knowledge of some of the most important parts of photo-electric installations; because of their experience and skill in dealing with delicate electrical equipment, radio men are the logical ones to build up this new industry whose potentialities are so vast and whose possibilities have barely been exploited. Yet, undoubtedly because it is not strictly radio work, most of them have disregarded it entirely, despite the fact that it offers even greater opportunities than radio. However, those technicians today who possess the same mettle as the pioneers in radio, who are alert enough to study the photo-electric field now and learn everything there is to know about it, are opening up a new and very promising field for their work.

A third market for the radio man's skill lies in the field of public address equipment. The public address man must have the basic knowledge that every radio serviceman has, which means that any radio serviceman interested enough and progressive enough to want to find new fields for his talents can devote himself to the study of this new branch of radio with every assurance of success. It is only recently, within the past few years, as a matter of fact, that this vast field has really been thrown open to the individual radio man, for up to that time public address equipment was not practicable for wide-scale consumption, being outside of a reasonable price range and not altogether as dependable as it is today.

The field of office and factory intercommunicating systems, long a very minor part of the public address field, has also finally come into its own since the recent development of more compact and more inexpensive units. Its potentialities are so vast that it will undoubtedly grow to be a separate and distinct field of radio, employing thousands of men for production, sales, and service work.

The branch of automobile radio also offers great possibilities to the progressive radio technician. Automobile radio today is far from perfect; there is very much room for improvement. And to the man who applies himself to its problems will accrue great rewards.

The same thing is true of *short-wave* and *all-wave* receivers. They, too, require the touch of perfection. In addition, their more widespread use in the home has opened still other fields for radio work. It has raised the problems of more complex sale and servicing

RADIO INSTRUCTION

requirements and has kindled a new interest in more efficient antenna and noise-reducing systems.

Even a field so closely allied to radio as radio receiver design provides the right kind of radio men with plenty of opportunity to display their skill and benefit thereby. There is still much that is short of perfection in the radio receivers that are manufactured today. This is well borne out by the fact that weak spots in receivers are constantly noted and improved as each company brings out a new model. The same can be said of the construction, operation, and performance of our radio sets, although they do maintain a very high standard.

Push-button tuning in home radio receivers has opened up new fields for both designers and service men. Unquestionably more simple, rugged, and inexpensive control mechanisms are needed and will be developed within the next few years. On the other hand, srvicemen will benefit by the additional servicing which the mechanisms and special circuits these receivers employ will require.

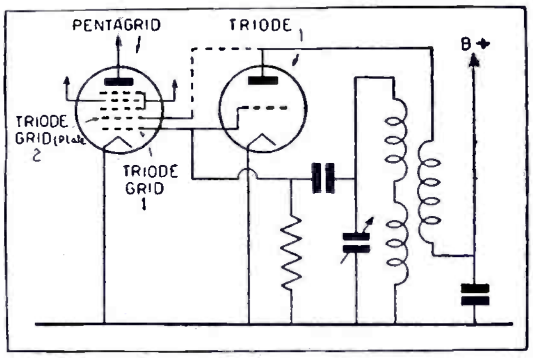
Television: Finally, the field of *television* suggests tremendous opportunities. Though the possibility of television has been imminent for so long that it has almost lost its effect, there is no doubt that the time is not very far off when television will become a reality. Considering the obstacles that have blocked the way of practical television, much progress has been made in this work and the feeling is prevalent that something will happen almost any time now that will make *television in the home* an actuality.

In view of this evidence of ever-widening, new fields for skilled radio work, the opinion that the radio industry has reached its peak of development is utterly unsound. The radio industry can offer nothing to those who are content with outmoded methods. It is overcrowded only for those who resent progress because it means learning new things all the time, and whose sluggishness has caused them to be left behind by their more alert fellow craftsmen.

Radio is a great field for men with ideas, for men who are not afraid of change; it provides opportunity for newcomers who are willing to apply themselves to the study of new techniques, who are eager to learn and to improve themselves as technicians, and who are not afraid of work—real hard work—but the most fascinating and intriguing work that any red-blooded man can possibly wish for!

(Author of Radio Physics Course; Radio Servicing Course; Modern Radio Servicing; Radio Field Service Data)

World-Wide Short-Wave Review



This circuit shows how to improve short-wave reception on the higher frequency end of the band.

Improving Short-Wave Reception

● IN all-wave and short-wave superheterodyne receivers of the type using a pentagrid converter for first detector and oscillator, difficulty is sometimes encountered in obtaining strong oscillations on the high-frequency end of the band covered.

One means of overcoming this trouble, for those who are most interested in this end of the band, is to insert a triode tube for the oscillator, either in parallel with the triode portion of the pentagrid converter or to replace it, as shown in the circuit here reproduced from *Le Journal des "8"* (Paris).

In connecting the triode in parallel with the oscillator section of the pentagrid tube, the dotted wire of the circuit is connected. In some cases the inter-element capacity may be sufficient to throw the tuning off on the S.W. bands or even to prevent oscillation. In this case, the triode plate-grid of the converter tube can be omitted, using the triode grid of the converter as an injection grid for the oscillator voltage. In this case, the dotted wire is omitted.

BOOK REVIEW

ELECTRICAL OCCUPATIONS FOR BOYS, by Lee M. Klinefelter. Stiff cloth covers, size 5½"x7¾"; 228 pages, illustrated. Published by E. P. Dutton Co., New York.

This is a dandy book for boys and one of the best that has come to the reviewer's attention, in many years. This treatise is fresh and sprightly and will give the young boy some practical idea of what the work of electrical and mechanical tradesmen are like. The various chapters are nicely illustrated with photographs of men at work on the various jobs described. Among the trades described are those of power station operators and engineers, electricians, electrical draftsmen, battery men, motion picture

All about the

SHORT WAVE LEAGUE

Application for Membership SHORT WAVE LEAGUE

SHORT WAVE LEAGUE 2-38
99-101 Hudson Street, New York, N. Y.

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

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

I own the following radio equipment:

Transmitting ....

Call Letters ....

Receiving ....

Name ....

Address ....

City and State ....

Country ....

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

A FEW WORDS AS TO THE PURPOSE OF THE LEAGUE

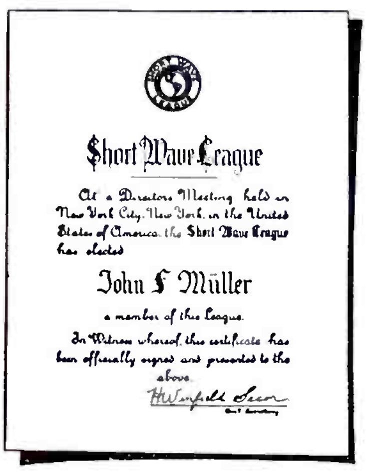
The SHORT WAVE LEAGUE was founded in 1930. Honorary Directors are as follows: **Dr. Lee de Forest, John L. Reinartz, D. E. Replogle, Hollis Baird, E. T. Somerset, Baron Manfred von Ardenne, Hugo Gernsback, Executive Secretary.**

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

FREE MEMBERSHIP CERTIFICATE

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

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



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

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

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

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

operators, radio servicemen, ship operators, broadcast operators, etc.

Later chapters take up vocations close to every boy's heart—Navy electrician's mate, the Army specialist, the telegrapher, the telephone electrician, the electric welder, etc.

The book is written in a conversational style and for this reason has a particular charm all its own. It is a fine piece of literature to place in the hands of any growing boy, and the fathers will find it immensely interesting and instructive as well.

THE RADIO AMATEURS HANDBOOK—1938 Edition. Stiff paper covers, size 6½"x9½", 564 pages, profusely illustrated. Published by the American Radio Relay League, West Hartford, Conn.

This is a very excellent treatise covering ham transmitters, receivers, antennas and, in fact, most everything a ham needs to know. The opening chapters deal with such topics as How to Get Started in Radio; Elementary Radio Principles, Vacuum Tubes, Receiver Design and Construction.

Transmitter design and construction are discussed at length, with photos and diagrams of successful transmitters and the action taking place in these circuits are discussed as well as details of practical operation. Later chapters deal with radio telephony, receivers for the ultra-high frequencies, including descriptions and illustrations of excellent sets, U.H.F. transmitters and a valuable chapter on antennas. Power-supplies are treated at length and a chapter is devoted to emergency and portable S-W. equipment. A section on instruments and measurements is provided, together with a valuable appendix and index.

EXPERIMENTAL RADIO—Fourth Edition—by R. R. Ramsey, Professor Physics, Indiana University. Cloth covers, size 6¼"x9¼"; 196 pages, illustrated. Published by the Ramsey Publishing Co., Bloomington, Ind.

This is a very fine book for the radio student who wishes to carry out his radio study and experiments at home. The diagrams and explanations given are such that the radio problems set forth can be carried out and the results determined experimentally if so desired.

Topics included are the calibration of a wavemeter by different methods; measurement of vacuum tube characteristics; oscillator circuits operating under different conditions; various methods of detection; measurement of amplification constant; push-pull amplifier; measurement of impedance of iron core coils; testing an audio frequency transformer; construction and testing of a filter; study of coupled circuits; measuring the inductance of a coil and the capacity of a condenser; the wave meter and how to use it.

The Switch-Band-2 Receiver —for the S-W Fan

(Continued from page 545)

padders on the coils and pre-tuning them to the desired band. The tuning capacity should then be reduced to around 35 mmf.

The chassis on which the receiver is built is 5 x 2 x 8 inches and the panel is 8 x 6 inches. Aluminum was used for ease in machining and its thickness should be 1/16 inch for rigidity.

The performance and adjustment of the receiver leaves little to be desired as far as two-tube sets go. Signals from all over the globe were copied with a single 75-foot wire for an antenna. The antenna should be long and out in the clear for best results.

Parts List

NATIONAL
1—150 mmf. 270 degree tuning cond.
3—35 mmf. padding conds.
2—8—prong isolantite sockets
1—small vernier dial

AEROVOX
(Condensers)
1—.0001 mf. mica cond.
2—.01 mf. mica cond.
2—.0005 mf. mica cond.
1—.005 mf. mica cond.
1—10 mf. low voltage electrolytic cond.

I. R. C.
(Resistors)
1—2 meg ½ watt resistor
1—.1 meg ½ watt resistor
2—.25 meg ½ watt resistor
1—2000 ohm ½ watt resistor
1—50,000 ohm potentiometer

RAYTHEON
1—6J7 tube
1—6C5 tube

MEISSNER
1—three section inductance switch

TRIMM HEADPHONES

UHF Converter Brings in 5 and 10 Meter Signals On Your Present Receiver

(*Continued from page* 546)

ing range, and so long as the all-wave range itself covers the desired converter-output frequency, and the converter output frequency is adjustable to desired value.

The Author's Converter—General Description

But three controls are required: one for detector circuit tuning; one for oscillator tuning; one for collective gain, sensitivity, and selectivity adjustment. The four tubes used are a 6K7 RF, 6L7 mixer, 6J7 HF oscillator, and 5Z4 rectifier—all inexpensive metal affairs. Output frequency for feeding into any receiver, may be anything application requires, within practical limits of course; output coils are *plug-in* type and individually tunable over a wide frequency range. (The coil used in the laboratory model tunes between 66 and 150 meters and is adjusted to approximately 4,000 kc. for good image rejectivity on 56 mc., with the converter feeding into an all-wave superheterodyne tunable to this 4,000 kc. value.) The instrument features a high C and stable oscillator circuit, a semi-tuned antenna or input circuit broadly resonant at 5 meters, a tuned plate R.F. circuit, and a regenerative detector.

Antenna Requirements

The "lab." model, used for 56 mc. reception, is so designed that it will work most effectively with a half-wave vertical antenna, 8 feet long, connected to the receiver through condenser C by means of a single wire "feed-line" antenna tapped 14 inches from center.

The Circuit

C is a 3-30 mf. variable trimmer. L1 is NOT an RF choke but a semi-tuned coil approximately resonant, as we have previously indicated, at the center of the 56 mc. band; no capacity other than that of the V1 tube is connected across it; *band-spotting* is effected simply by *contracting or extending its length* and by adjusting C; the resonance is rather broad, and ample gain across the whole band is thereby assured.

In the 6K7 plate circuit, we have not employed the conventional R.F. choke in the usual way—which is to say as a plate impedance. Rather, we have wired RFC1 in series with L2 so that the choke is used simply for *filtering* purposes. The tunable coil L2 is, of course, "hot"—and B plus must be isolated from the input grid of the succeeding tube through C13; R3 completing the mixer signal grid circuit to ground. This layout works exceptionally well and is to large extent responsible for the high signal gain, signal selectivity, favorable image rejectivity, and low noise-level of the converter.

L2 consists of 6 turns of No. 12 wire in ⅝ inch diameter form, self-supported on C1. L3, in the oscillator circuit, is a 3½ turn coil of similar diameter wound on a rigid fibre form and secured in place tightly, so that turns-separation expansion through thermal effects is, to all practical extent, eliminated.

To afford the oscillator circuit a high C and to provide for proper alignment with the signal circuit at any I.F. within output coil range, an adjustable trimmer is bridged across C2; this does effect a noticeable difference in frequency-capacity ratios for the two circuits and precludes any possibility of ganging C1 and C2 for single dial control, but the use of two dials suggests more practical advantage than inconvenience anyway, as ganged controls would in any event call for a manual trimmer across one or the other of the two capacities; with the high C oscillator in our set-up there is considerable *band-spread* over the oscillator dial with limited spread on the signal dial—actually facilitating tuning.

Oscillator and Power-Supply

The oscillator circuit is conventional. L4 consists of three turns of No. 24 or smaller D.S.C. wire, wound between the L3 turns; it provides for feed-back sufficient to bring the stage into oscillation with more or less constant output throughout the tuning range. RFC 3 and 4 are UHF chokes in the filament feed line and are connected, by the way, right at the V3 tube terminals.

Getting back to the mixer stage—note that the signal circuit is made regenerative through *feed-back* from the cathode to L2 (through C12). The regeneration is just enough to make the L2-C1 circuit tune about as sharply as the oscillator circuit—to noticeable selectivity and signal-to-noise ratio improvement. L5 tunes by means of C16 (which is an APC trimmer installed within the L5-L6 coil form) to the desired output frequency; L6 is the output low-impedance winding proper for a good "link-coupled" match into the receiver with which the converter is to be used. The L5-L6 combination is simply a factory-built plug-in coil, designed for installation of C16 within the form, and it is replaceable by coils wound for other ranges which, with a C16 capacity of 140 mmf. maximum, will tune from 17 to 41 meters (for wide acceptance amplification by a plug-in coil SW receiver of the TRF type), 33 to 75 meters, and 135 to 270 meters (where the receiver is a broadcast band job, TRF or superhet, requiring a converter output I.F. of approximately 1500 kc.).

The power-supply circuit is conventional and suggests the familiar arrangement of power transformer and two-section filter. C 19, 20, and 21 are all 8 mf. electrolytics, which may be of the inexpensive etched foil type. Ch1 and Ch2 are both 30 henry chokes, with a collective resistance of 1,100 ohms. R 10—an adjustable 2,000 ohm 20 watt wire wound resistor—is in circuit simply so that the power-pack output at full converter drain may be fixed at 250 volts. C 22 and C 23 are optional and advisable mica RF by-pass capacitors, with C 24 the usual line filter.

Construction

1. Shield the lead from the V2 plate to the output coil socket, using low capacity shield tubing. Also shield the low impedance winding leads from the latter socket to the output binding post assembly.

2. Keep all leads short and direct. Bring all returns for each stage to one chassis point—preferably the grounded No. 1 terminal of the stage socket.

3. Do not attempt to substitute the conventional .1 mf. tubular by-pass capacities for the mica postage-stamp type indicated.

4. Connect the 18 turn, quarter-inch diameter L1 coil between the V1 grid cap and a close-by chassis point, making sure that the body of the coil hangs well away from chassis to minimize capacity-to-ground effects.

5. Mount the filament chokes RFC 3 and 4 between the oscillator socket filament terminals and a two-point tie assembly. Connect .00005 mf. mica by-pass capacities at each tube socket, between one filament leg and the cathode terminal.

6. Install the APC trimmer in the output coil form, connecting it across the plate winding so that the V2 plate circuit may be tuned to desired output frequency.

Adjustments

Connect power pack to tuner, after checking over the wiring carefully and making the usual continuity test for opens and shorts which should precede any power turn-on. Close the A.C. line switch (which should have been mounted on the rear cover of the cabinet), measure voltages at screen, cathode, and plate points, then adjust R10 until the B plus at tube plates is 250. Screens should now measure 100 for the R.F. and H.F.O., and from 0 to 100 for the *mixer* as determined by the adjustment of R12.

If your receiver is an all-wave affair, dial it to approximately 4,000 kc.; if it is a broadcast band job only, dial it to about 1500 kc. Connect up the two units—running the two wire lead line (which should be as short as conveniently possible) through low capacity shield tubing and grounding the shield at both instruments. Using an L5-L6 coil which will tune to the adjusted receiver input frequency (the "lab." model specification coil for 4,000 kc. or a substituted coil whose range extends into the broadcast band for 1500 kc.), temporarily and loosely couple any available antenna to it at its V2 plate end; with both units turned on, adjust C 16 for maximum noise level, place the shield can over the output inductance, and retune on the receiver dial slightly to compensate for can capacity effects. The output coil and the input circuit of the receiver are now in proper alignment.

Tap the 6J7 HF oscillator grid cap. A clicking sound will indicate oscillation. Now loosely couple any antenna to L2—or wrap one end of a short length of insulated wire for a few turns around the L2 lead to the C1 stator lug. Turn the gain control up to about the half way mark and tune with both dials for noise pickup indicating that the converter is working. Generally, with the regeneration much less than maximum but with a screen potential on V2 sufficient to make the mixer circuit operative, L2-C1 tuning will be broad enough to permit some acceptance even if oscillator and signal circuits are slightly out of line.

Set the oscillator dial reading at about 50, then adjust C3 until a signal in the amateur 56 mc. band is tuned in, tracking with the other dial if that is possible. Note if this signal can be tuned in at two points (using C3), and select the adjustment indicating higher frequency (lowest C3 value). Remove the antenna, and connect the 5 meter half-wave affair to converter input by means of a single wire feed line (any length up to 100 feet) tied between aerial (fourteen inches from center) and the trimmer C. Now expand or contract the L1 coil, at the same time varying the setting of C, until maximum signal strength is indicated. Antenna input circuit is now in proper resonance at 56 mc.

Tune with the signal circuit dial for increased signal level, keeping R12 at a fairly low setting. If the detector circuit does not seem to "track," increase or decrease the spacing between L2 turns (with power off temporarily, as the L2 coil is "hot" remember) by extending or contracting the length of the winding until proper resonance obtains.

These adjustments might seem somewhat complex—but are not at all difficult. Proper alignment may be effected almost as quickly as these directional lines may be read.

10 Meter Reception

For 10 meter reception, L1 should have a size to be experimentally determined, L2 should have 11 turns tapped one turn up for regeneration and 2 turns down for V1 plate connection, and L3-4 may be the same item as required for 5 meter tuning, but loaded up to proper frequency by means of an additional fixed or variable trimmer bridged across C3. 1500 kc. makes a good I.F. or converter output frequency here, but any value within the range of the "lab." model L5-L6 coil will be satisfactory, with image suppression being of a very high order.

List of Parts for UHF Converter

MEISSNER

1—type 7684 osc. coil (L3-L4)
2—type 3656 UHF filament chokes (RFC3 and RFC4)

HAMMARLUND

2—CHX RF chokes (RFC1 and RFC2)
2—HF-15 micro-condensers (C1 and C2)
2—MEX trimmers (C and C3)
2—FC couplings
1—APC-140 micro condenser (C16)
1—CS coil shield
1—No. 43 wound plug-in coil (66-150 meter range) (L5, 6)

SOCKETS*

- 1—S-8 moulded socket
- 1—S-4 moulded socket
- 3—steatite sockets
- 2—aluminum socket shells

STANDARD TRANSFORMER (Stancor)

- 1—type P-3007 power transformer (TR)
- 2—type RC-1003 550 ohm filter chokes (CH1 and CH2)

I.R.C.

Half-watt resistors: R1—400 ohms; R2—10,000 ohms; R3—2 megohms; R4—50,000 ohms; R5—10,000 ohms; R6—50,000 ohms; R7—10,000 ohms; R11—600 ohms.

Two or three-watt resistors: one 15,000 ohms (R9) and one 10,000 ohms (R8)

- 1—20 watt, 2,000 ohm, adjustable resistor (R10)
- 1—50,000 ohm potentiometer (R12)

AEROVOX

- 6—type 1467—.006 mf. mica—C10, 11, 8, 5, 25, 26
- 2—type 1467—.001 mf.—C22, 23 (optional)
- 4—type 1468—.0001 mica—C4, 12, 13, 17
- 1—type 1468—.00025 mica—C7
- 3—type 1468—.00005 mica—C6, 9, 14
- 1—type 284 tubular—.1 mf.—C15
- 1—type 484 tubular—.1 mf.—C18
- 1—type 684 tubular—.05 mf.—C24
- 1—PBS-5 dual electrolytic (8-8 mf.)—C19, C20
- 1—PR5 single cardboard tube electrolytic (8 mf.)—C21

RCA

(Tubes)

- 1—type 6K7
- 1—type 6L7
- 1—type 6J7
- 1—type 5Z4

DIALS AND KNOBS*

- 2—dials (or two better type where increased costs are permitted)
- 2—knobs
- 1—pointer knob
- 1—dial plate

OUTPUT TERMINAL*

- 1—three post A-G assembly for output connections

MISCELLANEOUS*

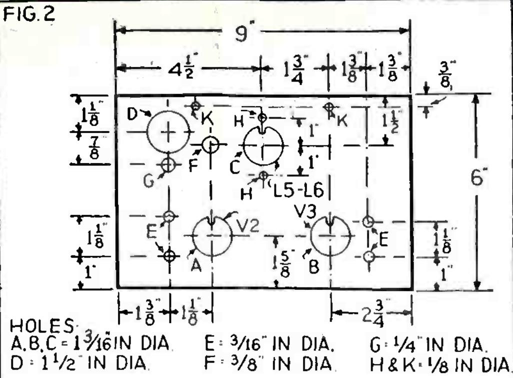
- 2—6 x 9 steel panels (base and back partition)
- 1—approx. 4 x 9 metal or wood base for power units
- 1—8 x 12 front panel—or one cabinet, 12 inches wide, 8 inches high, 11 inches deep, with front and back covers removable (a la "lab." model)
- 2—angle supports for mounting chassis-base to front panel
- 2—smaller angle supports for mounting back partition to chassis-base
- 2—angles, if desired, for mounting power-supply base to rear partition
- 3—stand-off insulators, 1½ inches high, 1⅛ inches between mounting hole centers (for L2 and L3 mount and for antenna post)
- 25—foot roll special electric low-loss RF wire for all connections except power
- 1—8 foot length of No. 12 wire or of quarter-inch tubing tapped for single wire feed to converter 14 inches from center. This as half-wave antenna for 56 mc.
- 1—spacer 1⅝ inches long, for mounting inverted RF tube (or two or three, for firm support)
- 1, 2, or 3—two-inch machine screws for R.F. tube mounting
- 3—small grid caps
- No. 6 and No. 8 machine screws—assorted lengths—with nuts
- 2—quarter inch rubber grommets
- 3—⅜ inch rubber grommets
- 2—1½ inch lengths of quarter inch extension rods

SPECIAL

L1 inductance: for 56 mc. to consist of approximately 18 turns of No. 24 D.S.C. wire (or 22) close-wound on quarter inch form, then removed, extended or contracted for proper resonance at 56 mc. and self-supported between V1 grid cap and nearby chassis-ground point.

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

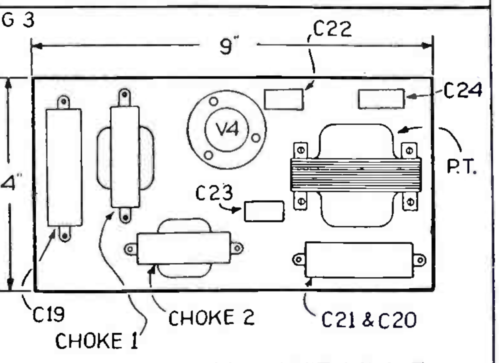
FIG. 2



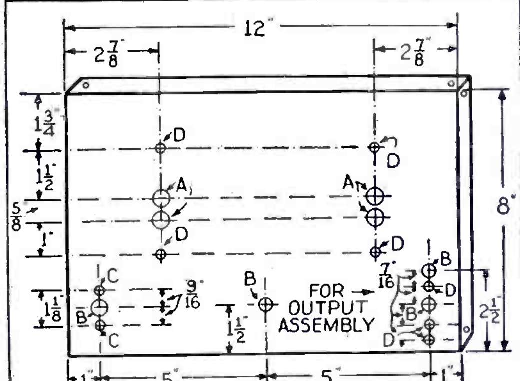
HOLES:
A.B.C = 1 3/16 IN DIA E: 3/16" IN DIA. G: 1/4" IN DIA.
D: 1½" IN DIA. F: 3/8" IN DIA. H&K: 1/8 IN DIA.

CHASSIS OR BASE LAYOUT- CONVERTER
BACK PARTITION SAME SIZE AS BASE PIECE (9"x6")

FIG 3

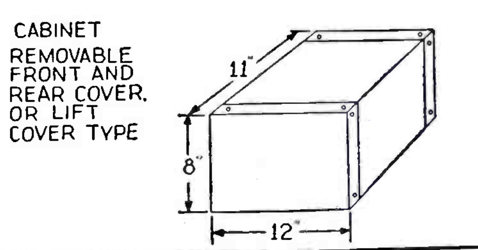


POWER SUPPLY UNIT LAYOUT.



HOLES:
A: 1/2" IN DIA. C: 3/16" IN DIA.
B: 3/8" IN DIA. D: 1/8 IN DIA.
FRONT PANEL LAYOUT

CABINET
REMOVABLE FRONT AND REAR COVER, OR LIFT COVER TYPE



The drawings above show details of the chassis for the ultra-high frequency converter, as well as the power-supply unit layout. The lower diagrams show front panel layout and dimensions of the cabinet.

Here's Your Button

The illustration herewith shows the beautiful design of the "Official" Short Wave League button, which is available to everyone who becomes a member of the Short Wave League.

The requirements for joining the League are explained in a booklet, copies of which will be mailed upon request. The button measures ¾ inch in diameter and is inlaid in enamel—3 colors—red, white, and blue.

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.

When To Listen In

(*Continued from page 559*)

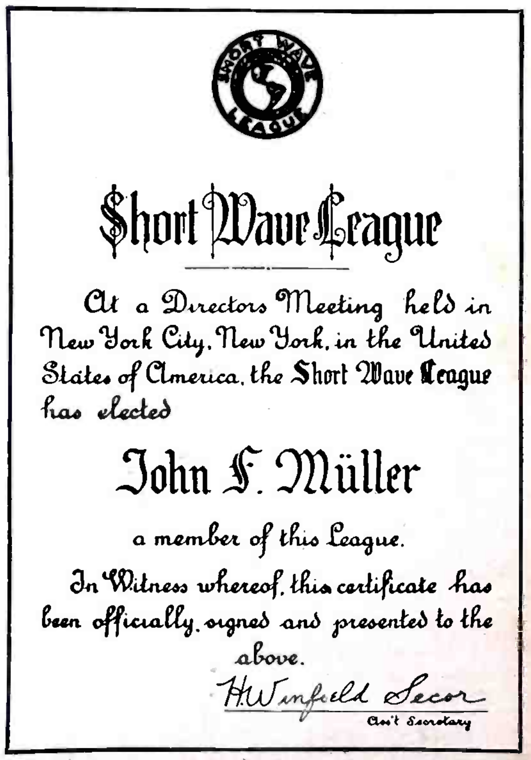
station ready to go on the air, and we, being believing souls, published the information; but nothing ever happened. This time, however, we have actually heard the new station so that there can be no doubt about the new transmitter being in operation. At present tests are conducted on 9.55 mc. (same frequency as OLR3A). The station generally broadcasts simultaneously with TPA4 from 6:15 p.m. on. It is putting over a very good signal with excellent quality. Apparently arrangements have been made with the Czechoslovakian broadcasting authorities as this station goes off the air when OLR3A comes on.

Undoubtedly the station will make use of frequencies in the other short-wave broadcast bands shortly.

RIO DE JANEIRO . . . Coincidental with the proclamation of the new constitution in Brazil short-wave broadcasting activities have taken on new life. PSH, the experimental phone station at Rio on 10.22 mc., is now broadcasting every evening from 7-9 pm. relaying the programs of broadcast station PRF4. Announcements are frequently made in English to the effect that all reports will be verified and if the reception of the programs abroad is satisfactory, the service will be considerably enlarged.

HOT AND COLD . . . Two widely separated scientific expeditions are providing very interesting broadcasts for short-wave listeners this winter. The first is the Holden expedition which is at present in an equatorial jungle near the head of the Amazon River in South America. A phone transmitter is part of the equipment and can be heard calling the National Broadcasting Company in New York frequently. Call letters are VP3THE. The station generally operates on 13.78 mc. The best time to pick up the station is from 7-9 pm. All reports should be addressed to the National Broadcasting Company in New York.

The other station is located at Reindeer Point, Greenland, approximately 600 miles from the North Pole. It is OX2QY, operated by the MacGregor Arctic Expedition and is heard nightly on about 14.36 mc., generally between 8 and 11 pm. Reports are to be sent to station W2QY, Cornwall-on-Hudson, New York. Reports will be verified when the expedition returns to New York.


Short Wave League

At a Directors Meeting held in New York City, New York, in the United States of America, the Short Wave League has elected

John F. Müller

a member of this League.

In Witness whereof, this certificate has been officially signed and presented to the above.

H. Winfield Secor
Ass't Secretary

This is the handsome certificate that is presented FREE to all members of the SHORT WAVE LEAGUE. The full size is 7¼"x9½". (See page 584.)

Machine Makes Learning Code Easy

(*Continued from page* 549)

have passed a similar test and with whom he can exchange tapes. That is an advantage all around; it gives practice in *sending*, and practice in *receiving* a great variety of senders.

Some operators use the machine as an automatic transmitter for "CQ'ing" tests, etc. It can also be used for automatically transmitting messages up to four or five hundred words.

With the proper circuit to operate a relay the device may be used to record signals from the air. If the circuit to operate a relay can be constructed, it will be easy to record the signals.

A complete course of instruction in the code is furnished. There are recorded tapes that will send to you at your speed, and blank tapes so that you can *record* your own sending. The instrument is extremely quiet in operation and the speed of the sending may be instantly set and it will send hour after hour at your speed.

Ultra-Hi Freq. Oscillator

value. The grid-blocking condenser made of a brass plate, separated from the brass disc by a thin mica sheet, is the support for the grid rod.

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

New Beam Xmitter Tube

and efficient suppressor action is supplied by space-charge effects produced between the screen and the plate. The 814 may be operated at maximum rating in all classes of service at frequencies as high as 30 mc., (10 meters). At higher frequencies the voltage and power output are somewhat reduced as the frequency is raised. For class B telephony with 1250 volts on the plate, the screen voltage is 300 and the D.C. grid voltage —28, and the peak R.F. grid voltage is 50. (No. 680)

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

40 Watt Band-Switching Exciter or Transmitter

(*Continued from page* 563)

1—10,000 ohm 10 watt resistor
2—2,000 ohm 10 watt resistor
1—5,000 ohm 10 watt resistor
1—20,000 ohm 50 watt voltage divider

KENYON

(Transformer and choke)
1—plate-fil. trans. (see diag.) T-246
1—10 H. 250 ma. choke, (T-151)

MEISSNER

(Switch)
2—2-gang rotary inductance switches

PARMETAL

(Metal frame)
1—8¾ x 19 in. panel
1—17 x 3 x 11 in. chassis

RCA

1—6V6-G tube
1—6L6 tube
1—807 tube

TRIPLETT

1—0-150 ma. meter, square case

BLILEY

1—80 meter crystal—LD-2

BARTER AND EXCHANGE FREE ADS

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, sell or exchange radios, parts, phonographs, cameras, bicycles, sporting goods, books, magazines, etc. without profit.

As we receive no money for these announcements, we cannot accept responsibility for any statements made by the readers.

Use these columns freely. Only one advertisement can be accepted from any reader in any issue. All transactions 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 profitable to both buyer and seller.

HAMS! FANS! HERE IS A GREAT opportunity to get many S.W. radio parts to build that Xmttr or Rcvr. Any part you wish is at your disposal. Write me c/o W8PGY, Oswego, N.Y. Don't delay! Write today! Parts cheap for cash. Must sell at once! Write to M. E. Weltz, c/o W8PGY, 80 Lawrence St., Oswego, New York.

TO TRADE OR SELL 1,800 GENeral world-wide stamps for a short wave receiver. Both the U.S. and Canadian collection are good. Paul L. West, 503 Hooge St., Martinsburg, W. Va.

WANTED—DIRECT CURRENT Generator from 600 to 1000 volt, 300 to 500 watt capacity. Also 110 volt generator 60 cycle A.C. of 700 watts or more. Must be suitable for gasoline engine drive. Will buy, or give choice from large stock of radio parts. E. Antoine, Rose Valley, Sask., Canada.

TRADE PRACTICALLY NEW INstructograph code machine with tapes together with Candler course for a real good camera in good shape. Rowley Noyes, Box 1, Lloydminster, Alberta, Canada.

WILL TRADE OR SELL OLD ISsues of QST in good condition 23 copies from June 1922 to June 1924 also some copies in 1926 for Hi Frequency xmitting tubes or Hi Voltage filter condensers or what have you. Also have 6 volt D.C. to 180 volt 40 mil. Genemotor. Elmer W. Parker, W9UJE, 324 Brandriff St., Fort Wayne, Ind.

WANTED TO BUY: KODAK DUO-620 or other camera with f.3.5. Anastigmat lens and Compur Rapid Shutter 1-500 sec. with a picture about 2x2. Send details. Also have to sell, 1 Official Doerle A.C.-5 No. 5000 power pack in cabinet. Coils from 10 to 550 meters included. Set in good condition. Bud Brubaker, 617 First St., Lancaster, Pa.

WANTED A LOW PRICE CODE practice machine and any other outfit to help to learn the radio code. Expect to have correspondence with other licensed amateur that wants to help the beginner. Address: Jose E. Mesorana, 62 de Diego St., Aguadilla, P. R. (U. S. A. possession.)

CANADIAN RADIO CLUBS. THE Loyalist City Amateur Radio Club Saint John N. B. is anxious to communicate with all similar radio clubs in Canada. Write President Arthur Ruthen, 56, Lansdowne Ave., Saint John, N.B.

WILL SWAP FIVE-METER Transmitter parts and Freq-Meter for anything I can use. Will trade fine printing for what have you? Am interested in radio and photography. Promise to answer all letters. Correspondents welcomed. M. Feigenbaum, 42 Jefferson Street, Yonkers, N.Y.

WANTED—EXPOSURE METER (electric) for photo. uses, for 16 mm Keystone movie camera, magazines, books, etc. or? Send swap list. Herman Williams, 94 Riverdale Ave., Yonkers, N.Y.

SELL OR SWAP—CRYSTAL SET radio, including new crystal, 2 sets of phones can be used at the same time. This set has made a good record. What am I offered? William Blecha, Pawnee City, Nebr.

EILEN BS-5 GOOD CONDITION. $11.00. Buddy II with magnetic speaker, earphones, cabinet $6.00. Want "Sky-Buddy" or "Sky-Chief. Erwin S. Kofsky, 202 S. 2nd St., Brooklyn, N.Y.

FOR SALE OR TRADE NATIONAL SW-4 Battery Receiver. All coils. Good condition. Wm. E. Sampson, Jr., 2208 Floyd Avenue, Richmond, Virginia.

WANTED: "HAM RECEIVER" Hallicrafters, R.C.A. or similar type. What have you? Arthur Ruthen, 56 Lansdowne Ave., St. John, N.B., Canada.

WANTED: PHONO-MOTOR (SINgle speed—78 R.P.M.) and Pick-Up. Or can use combination. Will swap for stamps, covers or will buy for cash. Please send description and make. Harry Gursh, 37 Amboy St., Brooklyn, N.Y.

I HAVE FOR SALE OR EXchange one complete 1937 edition of Radio and Television Institute's radio course valued at $112.50. Would trade for typewriter, all wave oscillator or what have you. For information write Lyle C. Newell, Ace Radio Service, 11 Pearl St., Claremont, N. H.

SELL: 15 WATT 160 METER C.W. rig, complete with power, tubes, crystal and detailed instructions for beginners. Price $12. Write to W. Zalner, 8 Judson Avenue, Binghamton, N.Y.

SACRIFICE: SELLING OUT AT A loss—complete Ham station transmitter 6L6 xtal osc-multiplier, all band, crystal switching, pair of 6L6's buffer-driver pair of 203A's final amp—500 watts. Fone—CW—with 3965—3564—1960.5 kc xtals—pwr supplies—rack-panel, mike—meters—and rack and panel McMurdo Silver communcations type rcvr—complete with speaker and 12 earphone outlets—complete to go at $250. W8OQV, Wellsville, N.Y.

WILL TRADE 1935, 7 TUBE SUper Skyrider, 5 bands—complete—for coupe car. Willing to make allowances. Marcus Felt, 530 East 145 St., Bronx, N.Y.

HAVE A CARTER HEAVY DUTY Genemotor 6 v. input 2.2 amp drain. 180 V. output at 30 M.A. Almost new, used 3 mo. intermittent on radio. In original carton. Has self contained filter system. Cost $13.50 new. Will sell or trade. State your best deal. R. Lewis, Griffithville, Ark.

BEST CASH OFFER TAKES NEW National SW3 for A.C. operation; perfect condition; complete with tubes and four sets of coils. E. Raymond, 6 Wing Street, New Bedford, Mass.

SELL OR SWAP—DEVRY. Model U 35MM silent movie projector. 110 volt 60 cycles A.C. like new. Complete with rewinds film, etc. Will swap for good radio test equipment amplifier, radio parts, or what have you? Joe Richards, 332 E. Helm St. Brookfield, Mo.

I AM BUILDING A "BROWNing 35." I will sacrifice my 5 tube tuned RF electron coupled receiver, complete with Rola 5" speaker and pwr. supply on same chassis. Built only 3 months ago from best of parts costing $30.00. No reasonable offer refused. Warren Leone, 6868 Middlepointe, Dearborn, Mich.

BARGAIN 100 WATT 160 PHONE transmitter. Denton receiver complete $70. W9UJP, Churubusco, Indiana.

A GOOD SHORT WAVE RECEIVer in good condition. It has four tubes and four coils used only a little since bought. Will sell or exchange for other short wave receiver. Write to Louis Oberdoester, 402 Ridge Ave., Allentown, Pa.

WANTED, A FAIRLY GOOD PREselector and Booster. Write Vincent Salerno, 2009 Woodlynne Ave., Camden, N.J.

SELL: "BAND SPREAD PORTable," a combined S.W. receiver and Monitor. Uses two type 30 tubes. Complete with tubes, batteries and coils for 160, 40 and broadcast bands. Additional coils can be obtained for other bands. Entire outfit is self-contained in a steel case with a handle on top. Will take best cash offer. Ted Supplee, W3GGM, RFD No. 3, West Chester, Pa.

ALL-STAR, JR. 5-TUBE SUPERheterodyne kit, complete with tubes, instructions and 10 inch Wright-DeCoster electro-dynamic speaker. Invite reasonable cash offer. Joseph A. Donohue, 357 S. Queen St., Lancaster, Pa.

WANTED: BAND SPREAD COILS for National receiver, SW-3. Will pay cash or trade for same. George Oberlunder, 215 East Ridge St., Ironwood, Mich.

I WILL PAY $1. PER DOZEN FOR old license plates. What years have you got? Anthony Shupienus, Newport, N.J.

WANTED—USED INSTRUCTOgraph complete with oscillator or telegraph sounder, 10 rolls of tape, key, instruction book, and headphone. American Morse code tapes preferred. Let me know the price and condition of equipment. Russell Nance, 6001 E. 10th Street, Kansas City, Missouri.

FOR SALE. BRAND NEW Haynes Clipper receiver. Fine for amateurs. $22.00. E. W. Howatt, 139 Marine St., St. Augustine, Fla.

FOR SALE: HAIGIS TRANSceiver, Peak Preselector, Tube Checker, Battery Preamplifier using two 19 tubes, D. B. Mikes, Noise Silencer, A. H. Ross 7 tube—with signal meter—5 meter Johnson Q Ant, Pilot S. W. Converter, W2ETD—Edwin Dunn, 2115 Washington Ave., Bronx, N.Y.C.

WANTED: USED CANDLER Course. James N. Glass, R. R. 1, Box 17, Eddyville, Kentucky.

WANT TO BUY GOOD SHORT wave receiver, slightly used. John Szlucha, R. D. One, Owego, N. Y.

STAMPS WANTED. WILL GIVE radio parts, etc. in exchange. Advise what you have—and want. Laboratories, 151-A Liberty, San Francisco, Calif.

HAVE A GAMMATRON HK354 tube with 24 hours use for $15 and have RCA 803 with 3 hours use for sale at $19.00. RCA 838 tube with about 400 hours use for sale at $8.00. Complete code and phone transmitter using 46 final tube, Class B. modulator, xtal controlled. This is for sale at $40, with mike, bug key and crystal. Jack Nelson, W8FU, 75 Minaville St., Amsterdam, N.Y.

HAVE STAMP COLLECTION about 230 stamps. Most are in sets and in excellent condition. Just an example of some sets: Complete U. S. Pilgrim issue mint, about 6 sets of coronations mint, and others. Above stamps alone cost me about $5.00. Will sell collection for not less than $10.00. Stamps are all in cellophane envelopes. Have also a fine mandolin—$4.50, and a fine pair of ice skates size eight—$2.50. Write for details. Charles Smejkal, 1607 First Ave., New York, N.Y.

SWAP FOR OR BUY AN INEXpensive Barometer, what have you? Chisholm, 616—4th, Jackson, Michigan.

FOR SALE: OUDIN COIL. COMplete secondary with primary form, $3.00. Pie form primary, heavy strap copper nickel plated, $2.00. Also ½ KW Transformer, Navy type, built for U.S. Gov't by Emil J. Simon, $6.00 cash. Also high voltage Fan Switch Variable Condenser with parallel sections, regular laboratory type, $3.00 High Speed G.E. Universal AC-DC motor, 10,000 R.P.M. excellent for jewelers lathe, or window display set, $3.50. Also heavy brass telegraph keys with switches, platinum points, W.U. type, only five available, $1.00 each, good for a lifetime. Must be sold for cash at once. B. Sunshine, 4408—10th Ave., Brooklyn, N.Y.

I WANT TO TRADE AN 110 VOLT 700 to 1000 watt 60 cycle ac generator for a good short wave set, Natl. SW3 SW58 or 45 or the like. Generator absolutely trouble free used but a few hours. N. R. Thornton, Somerville, Ohio.

EXCHANGE COMPLETE COIL and condenser set for seven tube super. Aeroplane dial, 550 Kc.—17 Mc. Want good mike or meters. Clarence Karzmark, Casselton, N. Dak.

RANGER .22 CALIBRE RIFLE with sling and 250 cartridges worth $15.00. $32.50 Doerle, D-38 7 tube T.R.F. receiver 9-600 meters, using 2-6K7's, 3-6C5's, 6L6G, 5Y3G—noise suppressor and all controls, bandspread, etc. Best T.R.F. on market. Will accept reasonable cash offer for one or both items or will trade for good superhet, 10-500 meters, 7 or more tubes. L. Cavalier, 220 Russell Court, Long Branch, N.J.

I WANT CONSTRUCTIONAL INformation and wiring diagrams on Ace Do-All DeLuxe, Eilen ER-20, etc., also used kits of these and other popular receivers if reasonably priced. Also want back issues of radio magazines, and a used Master Teleplex. If you have anything interesting to trade, write, Fenton Butler, Box 13, Hertford, N.C.

STAMPS—ABOUT 150 IN GOOD album, duplicates, many good, trade off others, 50c postpaid, worth much more. Envelopes with stamps intact addressed to President Roosevelt from France, Hungary, Italy, Cuba, England, Argentina; make offer. Adding Machine—adds up to one million, good as new, $1. prepaid. Gits-Nife, 50c prepaid. Hunting Knife with stag handle and in new leather sheath, 60c postpaid. To the first person buying one of the above articles I will give free gift. Address, J. S. Jackson, Jr., 1306 Adams Street, Bowling Green, Kentucky.

FOR SALE—AIRMAIL STAMP collection. 1938 Scott catalog value $14.05; 131 stamps; 27 countries. Would make excellent start for a large airmail collection. $10.00 cash. Will send complete list, giving country, catalog value, whether used or unused, general condition of stamp, etc. If these stamps were bought in a store they would cost at least $12.00. I also have a miscellaneous accumulation of stamps excellent for beginners in general collecting. Will give further details to interested persons. Martin D. Lewis, 439 East 89th Street, New York, N.Y.

TRADE: NRI ADVANCED course in Aircraft Radio for used Candler course, or what have you? Max Welton, 31 E. 24th St., Holland, Mich.

Simple Induction Phone

(*Continued from page* 541)

loop, and in this case the loops could be separated up to 7 or 8 ft. and the music heard clearly. There may be cases where this form of short-range telephone would be quite handy. For example where it might be desired to relay radio programs to someone in another building, with possibly a brick wall separating the two parties.

Another way by which the range of this induction phone may be increased is to use an amplifier tube in the transmitter, as is described in the present article. With a more powerful transmitting tube or amplifier than that described, of course, the magnetic field extending from the loop will be just that much stronger, and the stronger the magnetic field produced, the greater the distance the receiving loop can be separated from the transmitter, or at a given distance the received signal will be just that much stronger. Any of the modern type microphones may be used, care being taken to use an impedance-matching transformer. If a crystal microphone is used this is particularly important, as it has a very high impedance and with the transmitting loop of the dimensions specified in the present article, only mediocre results or none at all will be obtained unless a proper matching transformer is used.

This type of short range radio-telephone constituted one of the very first wireless systems developed, and it is, of course, of the audio frequency type and no radio frequency waves are radiated from the transmitter. This means that unless the transmitter loop happened to be located near some telephone line or other wire system, or possibly a neighbor's radio set, no interference will be created by the magnetic field of the loop.

Out in the open country or where the transmitter loop is placed at least 50 ft., or more from any open telephone lines or neighbor's radio set, there is slight, if any, chance that any interference can be picked up from the magnetic field extending from the loop. The magnetic field branching out from the transmitting loop aerial extends, of course, on either side and it is strong only for a distance of 8 to 10 ft., as the operator may soon determine after a few tests with the receiving loop.

List of Parts

1—Transformer—Single-button mike to grid (T2)
1—Transformer—pentode to 10 ohm voice coil (T1)
1—Transformer—50 ohms to grid (T3)
3—1 mf., 100 volt condenser
2—.25 mf. condensers
1—.002 mf. condenser
2—500,000 ohm resistors
1—1 megohm resistor
1—50,000 ohm resistor
1—3,500 ohm resistor
1—2,000 ohm resistor
1—500 ohm, 2 watt resistors
4—Binding post strips
2—6-prong tube sockets
1—5-prong tube sockets
Wire required:—
¼ lb. No. 22 D.S.C.
⅛ lb. No. 32 D.S.C.

How To Build A Peak Voltmeter

(*Continued from page* 548)

BUD RADIO, INC.
One box type shield, No. 1244.
Six tip-jacks, color-coded, (insulated).
One S.P.S.T. toggle Switch.
One No. 1200 metal panel (To be cut down to 5" x 8")
Three name plates, INPUT, OUTPUT, ON-OFF

Tube and Lamp
One type "84" tube.
One 60 Watt Electric Lamp.

Miscellaneous
One 5-prong socket.
One Edison base lamp receptacle.
One rubber cord and plug.
Three ⅜" rubber grommets.
One pilot light jewel.
Two angle-braces, hook-up wire and bolts.

Index to Advertisers

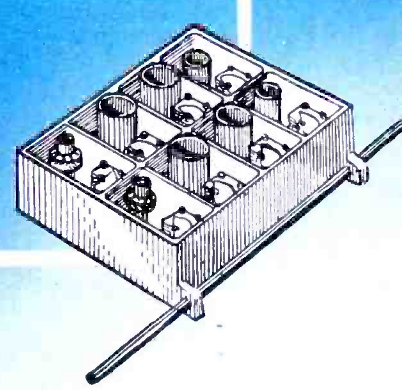
(While every precaution is taken to insure accuracy, we cannot guarantee against the possibility of an occasional change or omission in the preparation of this index.)

KABLE BROS. CO., PRINTERS

In these few short months the NC-80X has become part of the National tradition. Their advanced circuit details, including the wide-range crystal filter and high IF frequency for image rejection, have brought a new standard of performance to the low priced field. Their thorobred construction keeps that performance consistently high. And their convenience makes operation swift, accurate, and tireless.

NATIONAL NC-80X

NATIONAL COMPANY, INC.
Malden, Mass.



A page from the hallicrafters Scrapbook

THE CONTROL BOARD OF WFBR, NBC station, of Baltimore, Md., showing panel installation of 1938 Super Skyrider.

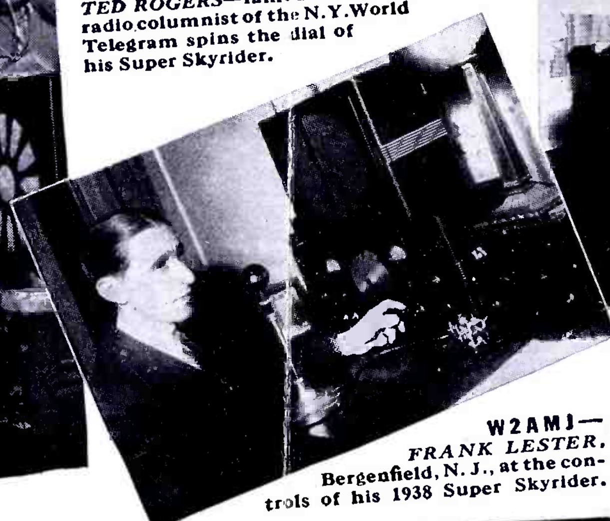
HENRY HOFFMAN, operator for Rev. Father Paul Schulte, "Flying Priest of the Arctic," writes from his post in the Arctic waste—"With the Sky Challenger, low-power transmitters were received over a surprisingly long distance, where all other receivers I used this summer in the Hudson Bay failed." Hallicrafters receivers are also used in the Mac Gregor Expedition now in the Arctic regions.

ENRIQUE HIDALGO — CIENFUEGOS, CUBA — Winner of second prize in the All-Wave B. C. DX contest with his new Super Skyrider. He says: "The receiver has created a sensation here where it has astonished every new listener."

THUMBING through the Hallicrafters' Scrap Book, one cannot help being impressed by the widespread acceptance of Hallicrafters Communications Receivers. We are proud to show on this page a very few of the outstanding personalities who operate Hallicrafters receivers and their rigs . . . The very fact that Hallicrafters receivers figure so prominently in leading amateur, commercial and scientific stations is in itself a testimonial to the merits of these outstanding receivers.

W1KTG — *BEATRICE HOLMAN,* Belmont, Mass.: "The more I operate the Super Skyrider, the better I like it and I am only too glad to add my word of praise. Am on 10 meters at present and have heard plenty of DX this morning that I never copied before."

TED ROGERS—famous short wave radio columnist of the N.Y. World Telegram spins the dial of his Super Skyrider.



W2AMJ— *FRANK LESTER,* Bergenfield, N. J., at the controls of his 1938 Super Skyrider.

W3DTX — *W. W. KELLUM,* Washington, D.C., says: "I selected the Super Skyrider because it is one of the best receivers on the market today including price and performance. In a little over a month, I have worked more DX than ever before and have had good receivers in the shack."

All Hallicrafters' Receivers available on liberal time-payments

the hallicrafters inc.

2601 Indiana Avenue, Chicago, U. S. A. • Cable Address *"Hallicraft"* Chicago

WORLD'S LARGEST BUILDERS OF AMATEUR COMMUNICATIONS RECEIVERS