SHORT WAVE & TELEVISION

The Popular Radio Magazine

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HUGO GERNSBACK
EDITOR

★

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

★

APRIL
1938

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J. E. Smith, President
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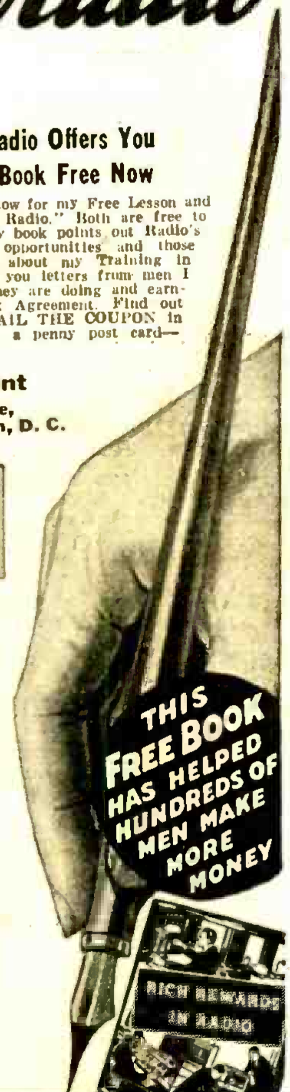

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Globe Photo

Frederick Lanaway, of London, winner of the 45th Short Wave Scout Trophy, in his listening den.

SHORT WAVE & TELEVISION

APRIL — 1938

Vol. VIII No. 12

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

The Next issue comes out April 1st

Feature Authors this Month

Dr. D. M. Morandini, Ph. D.
C. W. Palmer, E.E.
George W. Shuart, W2AMN
Edward Peil, Jr.
John Stewart
Pierre Delaunay

•

In the May Issue

How to Build a "Lie Detector," with photos and diagrams, by George F. Huether.

The 1938 Beginner's Station, George B. Hart

2-Tube 5-Meter Receiver, George W. Brooks, W1JNO.

5-Tube Battery Superhet, Raymond P. Adams.

Build Your Own Television Receiver, Part 3, C. W. Palmer, E.E.

250 Watt R.F. Amplifier using 808's, Art Gregor.

Latest Short-Wave and Television Foto News.

In This Issue

Cover photo composition by H. Gernsback and Arthur Maclean. Maxine, popular NBC songstress is featured. Tower is that of Columbia Broadcasting System station WABC.

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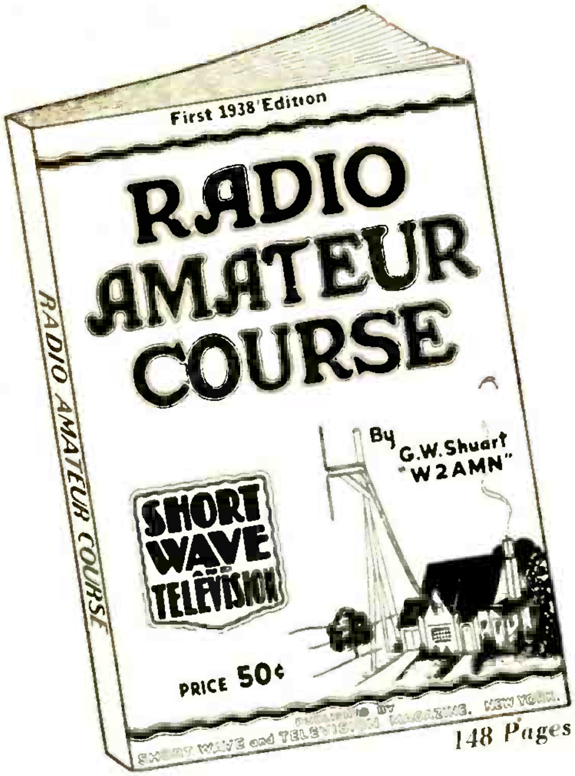

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SHORT WAVE & TELEVISION

HUGO GERNSBACK, EDITOR H. WINFIELD SECOR, MANAGING EDITOR

New Avenues for TELEVISION

Dr. D. M. Morandini, Ph.D.

● RECENTLY radio and television underwent changes of minute elaboration and coordinative complexity. The unique behavior of electron-emitting devices, such as radio tubes, cathode-ray tubes and photoelectric cells, is responsible first of all for the rapid development of the radio and television arts during the past two decades. The quick rate of advance, and the precision in detail and in coordination of parts brought forth highly sensitive and dependable sending and receiving apparatus in the field of communication by means of high frequency electrical radiations. In television, for instance, 441 line scanning is contemplated with 30 pictures to be sent per second, establishing—theoretically—the necessity of sending, in case of a square picture, 5,834,430 picture impulses in the same short time. And although the actual number of changes in unit time may be taken to be much less, nevertheless the high number of impulses still remaining demands a precision and cooperation (synchronization) between sender and receiver, which ten years ago was not even thought of, and which renders the art of television, by means of short waves and scanning, highly complex.

Today we have an elaborate electrical system with monitors, modulators, video amplifiers, master oscillators, transfer circuits, transmission lines, coaxial cables, synchronizing generators, cathode-ray oscillographs, and photo-cells (with various trade-names), etc., and a correspondingly elaborate system of electron-optics. Disturbances, such as interference, drifting of the picture, fading, etc., will, under these circumstances, make the introduction of practical television in this country a very difficult matter even without considering the economic difficulties which almost prohibit the sale of cheap television receivers.

I often wonder whether this orientation of the television art, toward which we are all working, will really supply the solution that will have as permanent an effect on television practice as the present radio design principles have on aural radio. The composition of television images from an enormous number of electronically generated picture mosaics, which follow one another in a synchronized time order of extremely short intervals, may seem to us a technically most expedient solution at the present time. However, its feasibility and the inventive ingenuity applied to it by our best technical brains should not, I believe, divert all our inventive readiness into a single groove. It appears to me that any other method than a transmission involving electron-scanning is not even thought of any more. All other possibilities seem to be simply considered as impossible of solution. This is not to say that our present elaborations of high precision, detail and complexity are not appreciated. The author has occupied himself along these lines for many years now. It simply means we should heed the warning that there may be other avenues of approaching the solution, so as to encourage the imaginative faculties of those who dream along other lines and, at the same time, have the necessary technical preparation to pursue their dreams and check them by their engineering talents.

Dr. D. M. Morandini
Mechanical and electrical engineer, lecturer in mathematical physics, instructor of television at University College, University of Southern California. Director of research at the Television Research Society, Los Angeles, California.

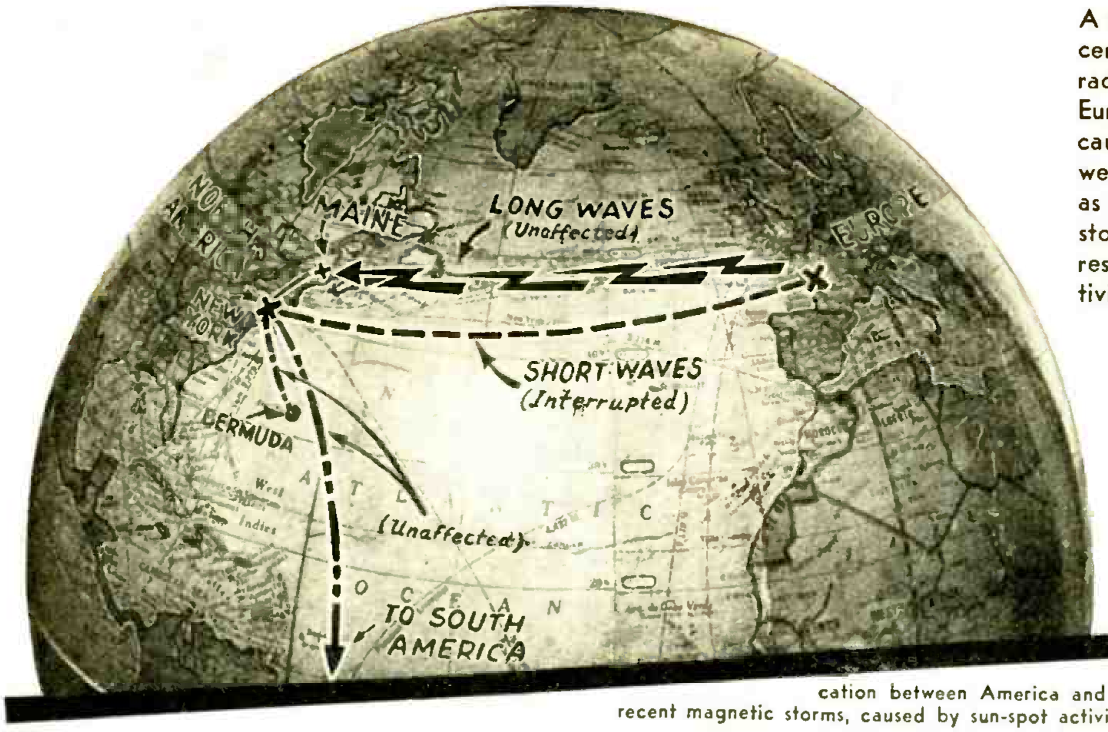
Sixteenth of a Series of "Guest" Editorials.

Although, at the present time, I am not able to point out definitely any direction which would serve as an additional basis for development and would furnish us with dependable alternatives, yet I can not acquiesce complacently in the unconditional acceptance of a *single-track* method of attack. It may easily be that the transmission of television communication through cables accommodating wide frequency ranges will be adopted for the development of a trans-American television network, when and if conditions will permit its introduction; the problems of transmission and redistribution, however, will still welcome, I think, new methods if such are made available.

Let me point to at least one path offering such an assisting possibility. Our attention in dealing with electronic devices in television has been concentrated thus far around the electron (cathodic) beam which is utilized in picture analysis and synthesis. At the transmitting end we expose the picture elements, upon a light-sensitive surface, one by one, in quick succession and in a definite order, to such beams in order to transmit them, one after the other, and we reassemble them at the receiving end by a cooperating or "synchronized" cathode beam operating on a sensitive luminescent screen surface. Not much attention has been paid to the possibility of utilizing positive (canal, mass) rays for picture transmission, and there seem to be very good reasons for this. First of all, the heavy atom or molecule parts of which such a positive beam consists involve, supposedly, the employment of high accelerating voltages; secondly, their thousand times greater masses than those of the electrons introduce high inertias and high kinetic energies to be

(Continued on page 713)

A severe magnetic storm recently disrupted short-wave radio transmission between Europe and America and caused auroral displays which were observed as far south as Bermuda. These magnetic storms are believed to be the result of unusual sun-spot activity. While such unusual sun-spot activity causes a decrease in short-wave transmission in certain directions, long-wave transmission does not appear to be affected.



How short-wave communication between America and Europe was interrupted by recent magnetic storms, caused by sun-spot activity is indicated on the map.

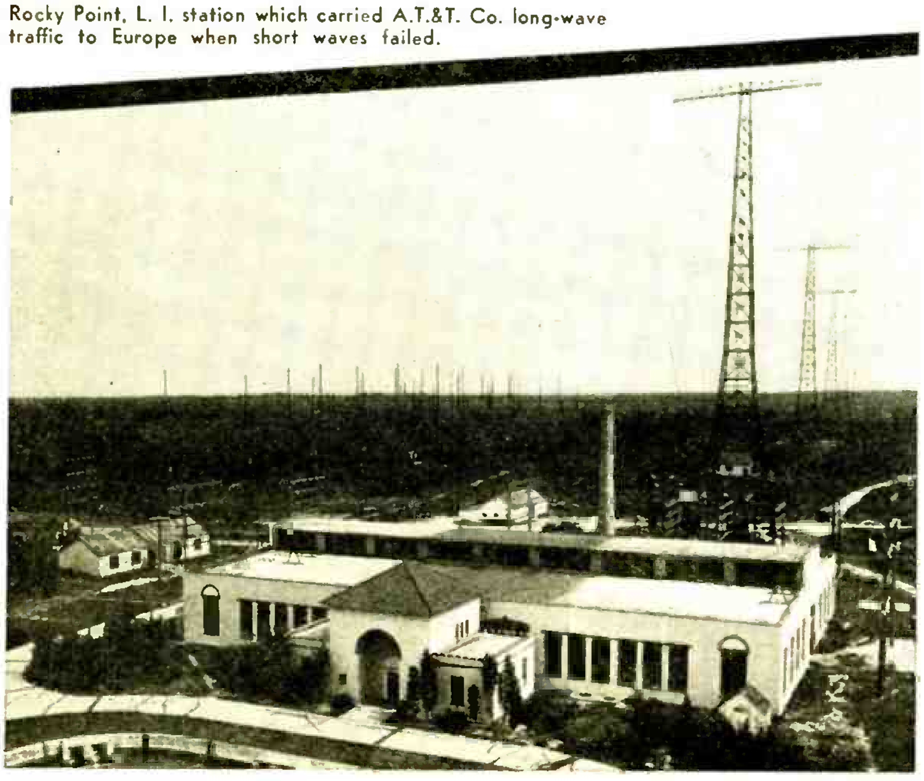
● HELLO. LONDON . . . . ? ? ? Short-wave communication between America and Europe stopped as abruptly as the foregoing sentence indicates, due to a severe magnetic storm which recently swept over the earth as a result of unusual sun-spot activity. Telephone traffic across the Atlantic was shifted to the longer wavelengths, in the 5,000 meter region, which paradoxically are more effective than usual during periods of magnetic storm activity.

The earth acts as a gigantic spherical magnet and is surrounded by a powerful magnetic field, and the strength of this field varies throughout constantly. We all know that if a wire connected in a sensitive recording circuit is moved across the field of a magnet, that a current is induced in this wire. In the same way if any outside influence, such as a stream of electrified particles emanating from a large sun-spot (or prominence) strikes this magnetic field surrounding the earth, we will have an upset condition in this field. Such an effect as this is believed by scientists today to be the cause of the aurora borealis observed in the North Polar regions (and the complementary auroral effect observed in the South Polar regions, known as the aurora australis).

These magnetic storms react in a peculiar manner—certain high frequencies or short-waves on certain paths are not affected, while others are completely "wiped out," sometimes for a short period and at other times for a long period. Signals develop a flutter several days (and even weeks, in some cases) before the effect becomes sufficiently strong to *blot out* short-wave communication over long distances.

What Sun-

Rocky Point, L. I. station which carried A.T.&T. Co. long-wave traffic to Europe when short waves failed.



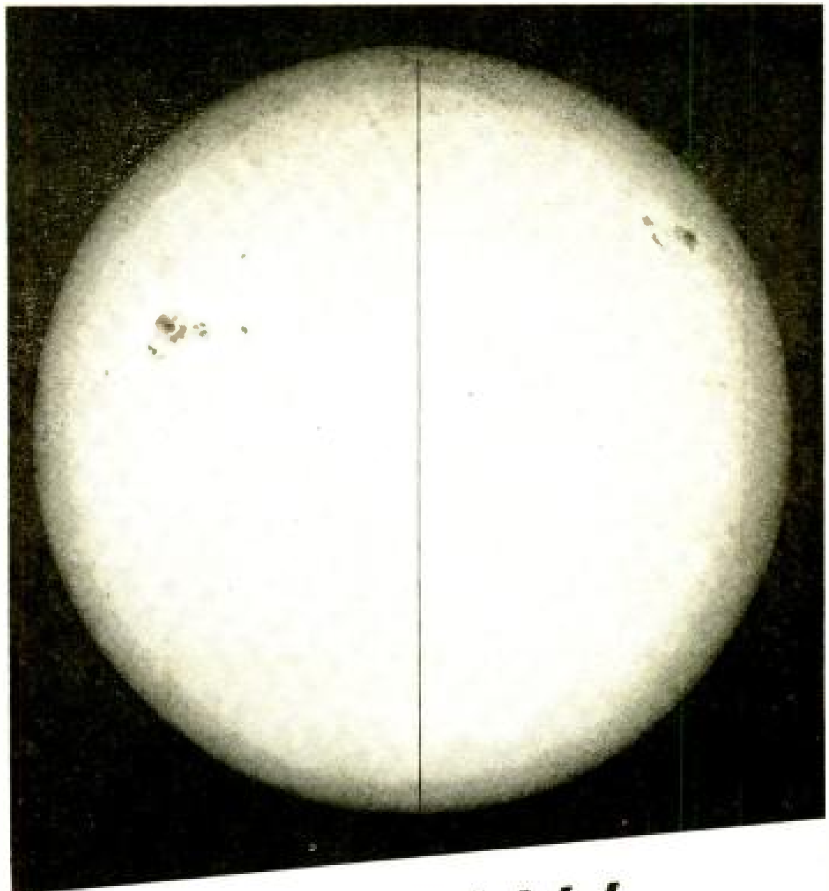
The short-wave channels in operation nearest to the North Pole were the most affected, as might be expected, owing to the greater magnetic activity in this region. As a result, short-wave communication on the usual trans-Atlantic frequencies in the neighborhood of 16-19 meters was interrupted several times, while short-wave channels in operation farther south, across the Pacific Ocean, experienced but little interference from the recent magnetic storm. A surprising and very important fact was that short-wave transmission from New York to Buenos Aires, or in a north and south direction, was practically not affected at all. Likewise, short-wave communication between New York and Bermuda remained about the same throughout the magnetic storm.

The RCA Communications had a remarkable experience during the magnetic storm, when short-wave communication between America and Europe directly across the Atlantic failed. They re-routed their European traffic by short wave via Buenos Aires. The messages now traveled over a greatly increased length of circuit or about 5,000 miles to Buenos Aires and approximately 7,000 miles from there to London, or 12,000 miles. Compare this with the ordinary distance of 3,000 miles between New York and London!

An interesting sidelight of the effect of these magnetic storms on short-wave transmission is that the resulting *blanketing effect* on short-waves seems to spread down the coast from Maine to Florida like a fog. First the effect will be noticed at the more northern receiving stations, and gradually works down to New York and New Jersey. The reduction in transmission efficiency has been noticed in Maine several hours before New York is affected.

The general effect of sun-spot activity which passes through regular cycles is to degrade short-wave communication. During the past few years sun-spot activity has been relatively low and transmission conditions have been correspondingly good. During the next two years short-wave transmission is expected to become increasingly poorer.

Some of the freak transmission conditions which have occurred during the past year or two, due to the effect of the sun-spots, may be judged from the fact that the six meter television signals from London have been picked up quite regularly at the RCA experimental receiving station at Riverhead, Long Island, a distance of roughly 3,000 miles. As the sun-spot activity subsides during the next few years, it is believed



One of the best photos taken of the recent sun-spot activity. These sun-spots are thought by scientists to be the principal cause of the severe magnetic storms which sweep over the earth at times. Sun-spots are frequently made visible by observing the sun through a piece of smoked glass or an old photo negative.

—Photo courtesy U. S. Naval Observatory.

Spots Do to Short Waves

that we will slowly go back to normal. Ordinarily wavelengths as short as 5 or 6 meters will not bridge the distance across the Atlantic Ocean between New York and London, and the all-around operating radius for such waves is approximately that circumscribed by the horizon visible from the tower on which the transmitting aerial is erected (or a few hundred miles at best).

All sorts of odd things happen during one of these magnetic storm outbursts. For instance, one RCA report was to the effect that the day wavelength of 16 meters proved excellent for traffic between America and Europe during one whole night this winter, while ordinarily this wavelength fades out completely on a winter night as darkness spreads over the ocean.

Telegraph Circuits Affected, Too

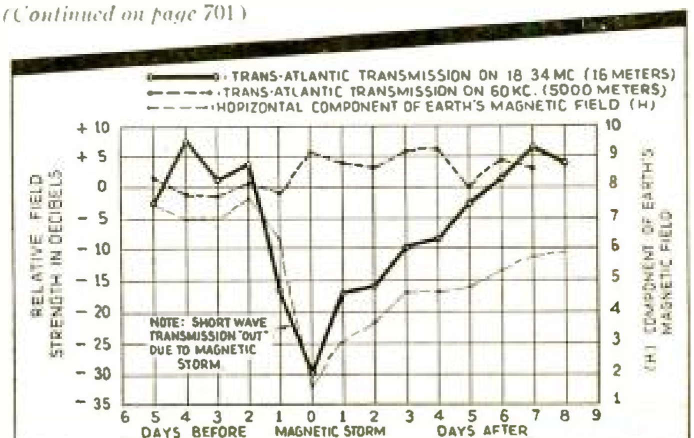
The effect of the magnetic storms on the long east and west (wire) telegraph circuits, especially in the northern part of the United States and Western Canada, is to induce abnormal currents in these circuits, which frequently burn out apparatus at certain points and in general interfere with regular service.

The wave-reflecting layers of the upper atmosphere are affected by variations in their ionization and by changes in the height of the layers above the earth. The results of these changes is to cause variations in the distances that can be spanned by certain frequencies or wavelengths.

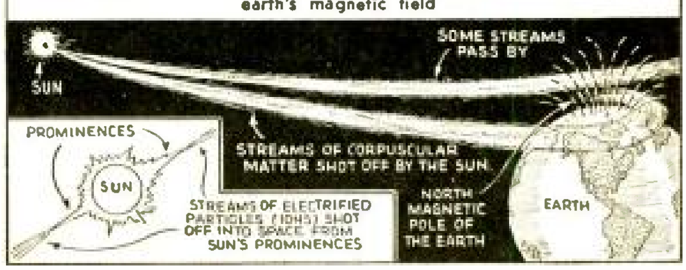
An interesting report which shows how the recent magnetic storm affected short-wave service on A. T. & T. Co. channels is reproduced here. For the magnetic storm beginning on Sunday, January 16, the effect became noticeable between 6 and 7 a.m., and affected all short-wave channels operating across the Atlantic. Practically no effect was noticed on the South American or Bermuda circuits and only a slight effect on ship-to-shore short-wave communication over short distances.

Sometimes these magnetic storms are preceded by a period of improved conditions and then, suddenly, the short-wave channel goes bad! Operations at the A. T. & T. Co. plant show that the magnetic storm effects on short-wave transmission are quite severe for about a week, but, of course, other slight effects are noticeable over a period of several weeks altogether. It was observed that the lower frequencies seem to last the longest, before the circuit is put out of commission.

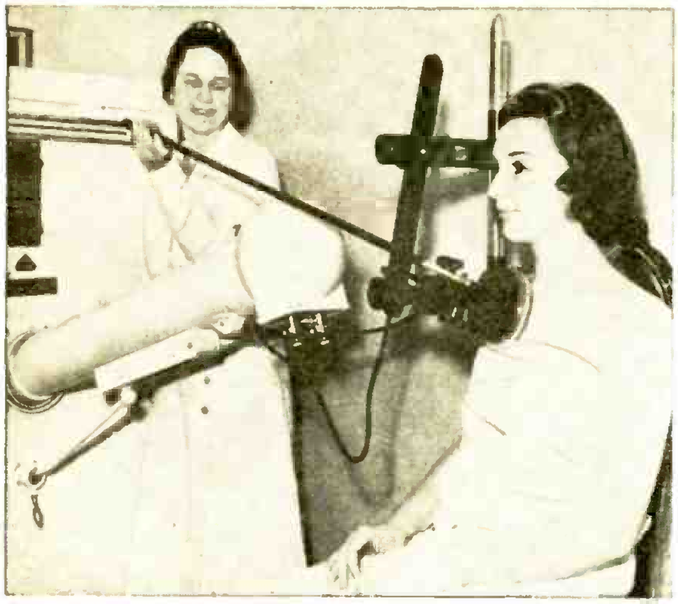
(*Continued on page* 701)



Effect of magnetic storms on short waves is shown above. Below—How streams of electrified particles shot from the sun affect the earth's magnetic field



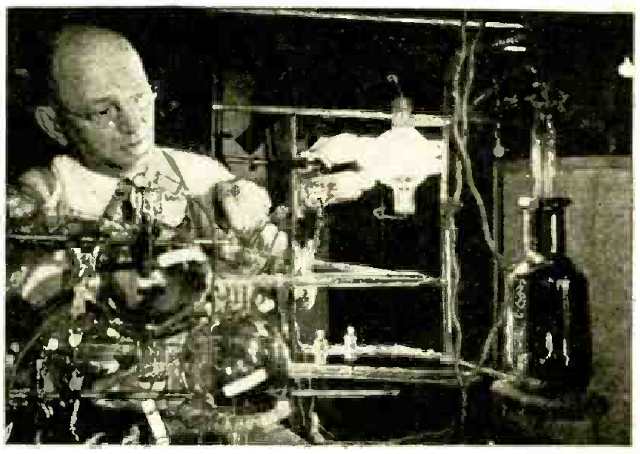
Short Wave



Left — Short-wave therapy is the latest weapon used by science in the continual fight against the common cold. Elizabeth Totman, R. N., is shown administering short-wave treatment to a patient at the Boston Dispensary, first American hospital to use this new treatment.

Right — This granite column was recently erected at Poldhu, England, to mark the site of the first wireless station constructed by Marconi. From this station the first wireless signals were transmitted across the Atlantic in 1901.

Above — A group of radio actors broadcasting a play over one of the Australian short-wave broadcasting stations. The "Aussies" are heard regularly by thousands of American short-wave fans.



Wanted—A perfect vacuum! W. A. Ruggles worked twenty-five years "trying to make nothing" in the research laboratory of the G. E. Co. He is now able to remove nearly all the air from a glass bulb, or 99.99999999%. When more perfect vacuums are obtained, Ruggles will make them!

Above—Ultra short-waves help in filming photoplays. The engineer is transmitting directions to a boat from a 5 meter set during the filming of "Lovers and Luggers."

Left—5 meter waves help movie producers—sound engineer receiving instructions from land during filming of "Lovers and Luggers" at Sydney, Australia.

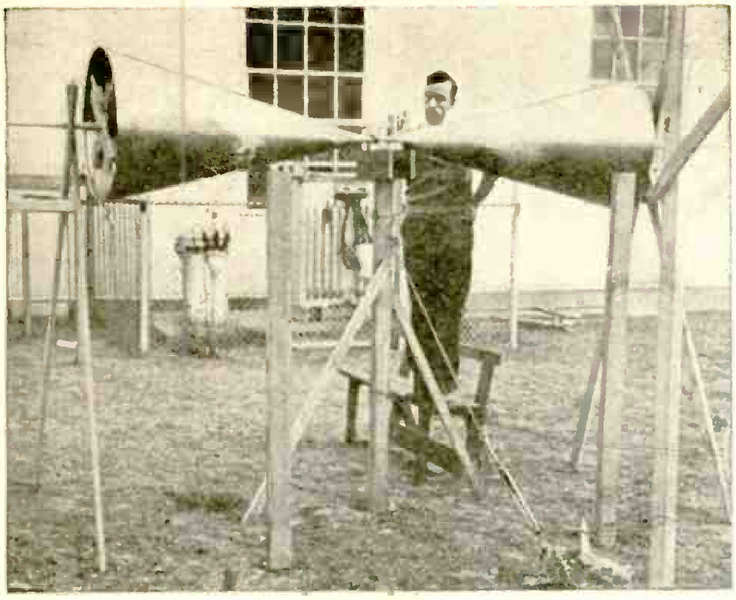


FOTO NEWS

Beauty and short wave radio combine to make this picture—the hoop is a new tubular shielded antenna now being tested by United Air Lines to eliminate static from the ground station reception of airplane signals. An airline stewardess posed in the picture to show the relative size of the loop, developed in the United's experimental laboratory.

Above—The two horn-shaped members represent the newest idea in ultra-short-wave antennas being tested experimentally by RCA engineers at Camden, N. J. The conical shape helps to direct the waves in a specific direction.

Photos above and at left show new portable S-W sets used by U. S. forest rangers. In five years the number of short-wave radio sets in use in the woods and mountains of the United States National forests has increased from 300 to 2,300. Some of the portable sending and receiving sets weigh only 8 pounds, yet have ranges of 10 to 50 miles.

The picture above shows an interesting flash of British television. The television camera at the left is picking up a scene from the play "Midsummer Madness." The performers are Marie Burke, Frederick Ranalow, Joan Collier and Henry Wendon.

—Photo Courtesy B.B.C.

Short Wave

A Real Menace

M. Harvey Gernsback

In a world filled with unrest and threats of war on all sides, a powerful new weapon for the spread of hate and dissension has been forged by the perversion of short-wave broadcasting to the purposes of power-seeking dictators.

● SPIN the dial of your radio across the short-wave bands. From Russia a voice tells the world in Oxford English—"Hitler is a degenerate pervert—a ruthless murderer of helpless women and children".—Turn the dial a little further and another English voice, this time with a trace of a German accent, is giving the latest "news" in English.—"The filthy Bolshevik government forces in Spain are responsible for the latest torpedoing of a neutral nation's steamship." "50,000 women and children are starving in the streets of Cleveland; Communists are over-running the U.S." A slight shift of the receiver's dial brings in Rome, a voice is heard describing the "holy work" done by Mussolini in bringing about "the emancipation and civilization of the benighted people of Ethiopia." (The excerpts from the Moscow and Rome broadcasts were reported in an article appearing in the *New York World Telegram* of Dec. 21, 1937.)

Any day's tuning will strengthen the belief that the world has gone mad. Challenges, denunciations and hymns of hate hurtling through space testify to the fact.

Every large nation in the world now has its short-wave voice. The Germans operate eight powerful stations which can *beam* programs to any part of the world. Twenty-three hours a day German announcers speaking in English, Dutch, Portuguese, Spanish or German, dependent on whether the program is for Australia, Asia, Africa or the Americas, punctuate musical items with undisguised propaganda. Italy boasts but one station at present. It is kept busy fourteen hours a day, however, broadcasting news in 17 languages. A more elaborate plant is under construction. The Russians have several short-wave voices, none of which are heard very well in this country. They, too, are constantly active, exhorting listeners to rise up and secure the benefits of state socialism.

Japan tells honorable listeners that she is waging a defensive war in China against "the onslaught of Communist imperialism." Nippon speaks through two powerful short-wave voices operating 6 hours daily and broadcasting in seven languages.

In these dictator countries the radio and the press have long been potent allies of government in cramming down the public's collective throat all the misinformation deemed necessary for keeping unrest down. The Charlie McCarthys who pose as radio news commentators in these countries were well trained in their art before the advent of international short-wave broadcasting. It was a simple matter for them to adopt their tactics to the larger sphere of world broadcasting.

The formula of *propagasting* is simple. It involves the denunciation of the foreign press as a group of lying charlatans. The emphatic denial of all news items tending to expose the activities

The shaded areas of the map show the seven different beams employed by the German short-wave station when broadcasting to different parts of the world.

Propaganda

To World Peace

of the speaker's country, scornful comments about democratic governments and a stirring description of what a dandy place dear old *Dictotoria* is in which to live. All mention of bloody purges, concentration camps, religious and racial persecution and terror campaigns is carefully avoided by these cheery purveyors of misinformation.

Democracy's Reaction

The democratic nations have long been active in the field of international broadcasting but they have confined their activities to general news broadcasts and entertainment represented by American radio programs.

France broadcasts news in many languages and when we say *news*, it is in the sense familiar to all Americans.

England, whose short-wave equipment is on a par with Germany's, has, until recently, been mainly concerned with keeping her vast Empire in close touch with the homeland. The fact that the short-wave programs from London were heard in foreign countries as well as in the Empire was only incidental. English was the only language heard from Daventry, the British short-wave transmitting center.

The unceasing blasts of hostile propaganda sent out by the dictator states, and particularly the anti-British programs sent out by one Italian station to stir up trouble in British-controlled Palestine and Arabia, compelled England to retaliate; special programs for Arabian listeners were made a daily feature at the beginning of this year. An important item in the programs is the news bulletin in Arabic. By giving a factual survey of the world picture, the British hope to nullify the effects of Italian propagasting.

An interesting commentary on the workings of dictatorships is the reaction in Italy to these broadcasts. The government is quite incensed and an official spokesman has said that he considers them "definitely hostile to Italy"!

The Arabs are having the time of their lives as a result. The Italians supply free radios to all and now the British are doing the same. The Italian radios are set to the Italian station and *locked* so that no other stations may be heard. The English sets are locked in similar fashion to the channel of the British station. And Hadji Ben Arab sits back and enjoys his free radio! Moral: When two big sluggers mess each other up the onlooker is sure of a good *free* show. Nice work, if you can get it.

Holland, Czechoslovakia and Denmark maintain sizeable short-wave broadcast stations but they are concerned only with broadcasting to their overseas possessions or with creating good will in foreign lands, so they do not enter the picture of organized propagasting.

Program Technique

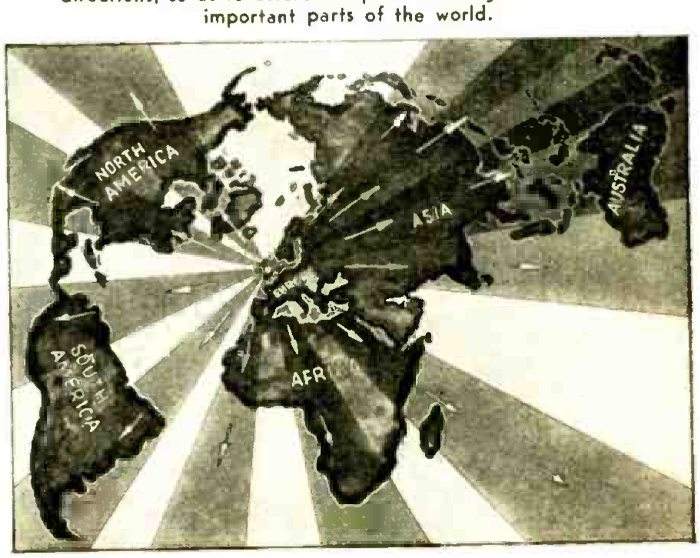
The broadcasts from Dictatorland contain more entertaining fare interspersed with attacks. If they did not, listeners would soon tune in a more diverting station.

Native music, sketches and educational talks play an important part in all programs except those from Russia. The Russians have not yet learned the virtue of a *balanced diet* in entertainment.

Announcers familiar with the customs and idiom of the

(*Continued on page* 708)

The English station at Daventry has beams pointed in eleven different directions, so as to assure complete coverage of all of the important parts of the world.



Duplex Phone on German Guard Boats

Left—Captain of German Coast Guard cutter using new type duplex radio phone.

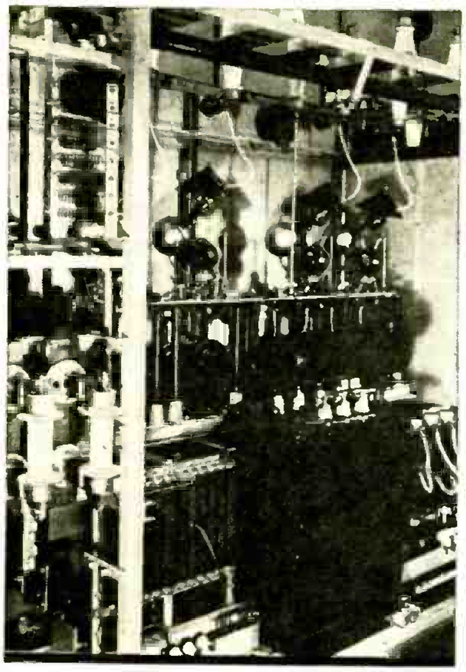
Right—A new collapsible antenna, which greatly extends the range of short waves, is used on the new cutter installations.

● AN especially interesting detail to be found aboard the new German coast guard cutters is the new transmitter. This unit operates in the range from 50-100 and 500-1000 meters with an output of 40 watts on short waves and 70 on long waves.

The transmitter has extremely small overall dimensions and permits duplex telephone conversation, using a French type phone, as well as code transmission. The receiver section of the

(Continued on page 702)

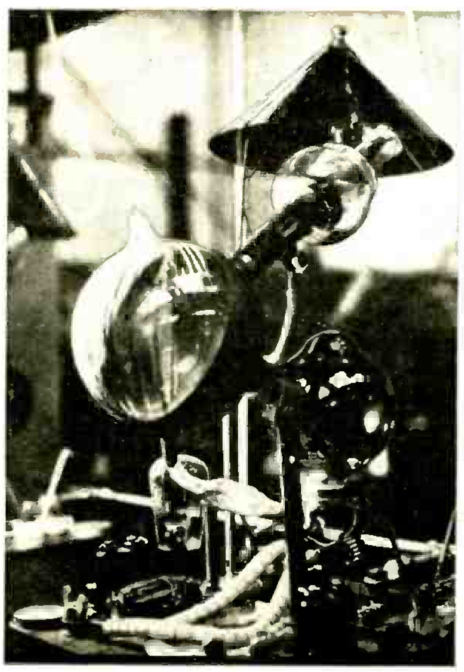
Short-Wave Broadcasting In India



Above—Rear view of a group of rectifier tubes and high voltage transformers.

● IN the development of broadcasting in India it has been accepted by All-India Radio as a fundamental precept that a satisfactory broadcasting system must provide a measure of service to the whole country. This immediately determines the principle of operating transmitting stations on the *short* wavelengths. At the same time it is admitted that this is not, in itself, a final solution. Simultaneously with the provision of a short-wave or "second-grade" service to the whole area, a medium-wave "first-grade" service is necessary for the large towns. The basic principle of broadcasting development in India, therefore, is to provide a *short-wave* service to the whole country and to support this by a continual expansion of the area served by medium-wave stations as funds become available.

To this end ten transmitters have been ordered. Four short-wave "key" stations will be established at Delhi, Bombay, Calcutta and Madras, and will be of 10 kw.



Close-up of one of the new Philips rectifier tubes used in the new Indian S-W transmitters.

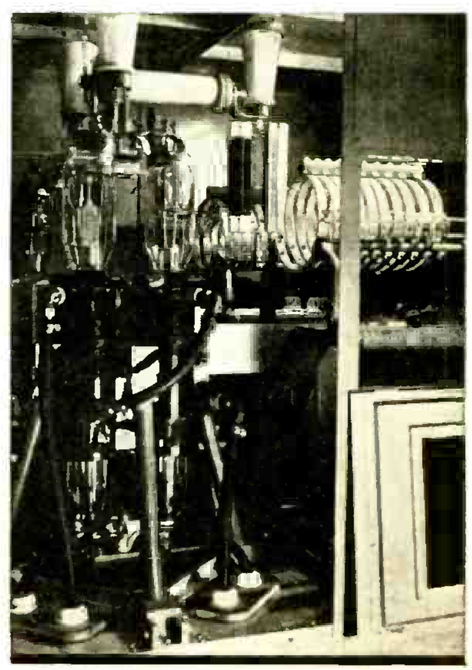
aerial power. A second short-wave transmitter of 5 kw. power is also to be provided at Delhi for special purposes. The development program does not envisage any future increase in the number of short-wave stations. These short-wave stations will provide a "second-grade" service to the whole of India.

At the same time five medium-wave stations have been ordered, and will be situated at Lahore, Lucknow, Trichinopoly, Dacca and Madras, the first four stations having a power of 5 kw. The Madras medium-wage station will have a power of 250 watts, and will give a service to the city only, as Madras will also be provided with a 10 kw. short-wave transmitter. With these stations, and the existing medium-wave stations at Delhi, Bombay, Calcutta, and Peshawar, All-India Radio will have in operation five short-wave stations and nine medium-wave stations.

Choice of Short Wavelengths

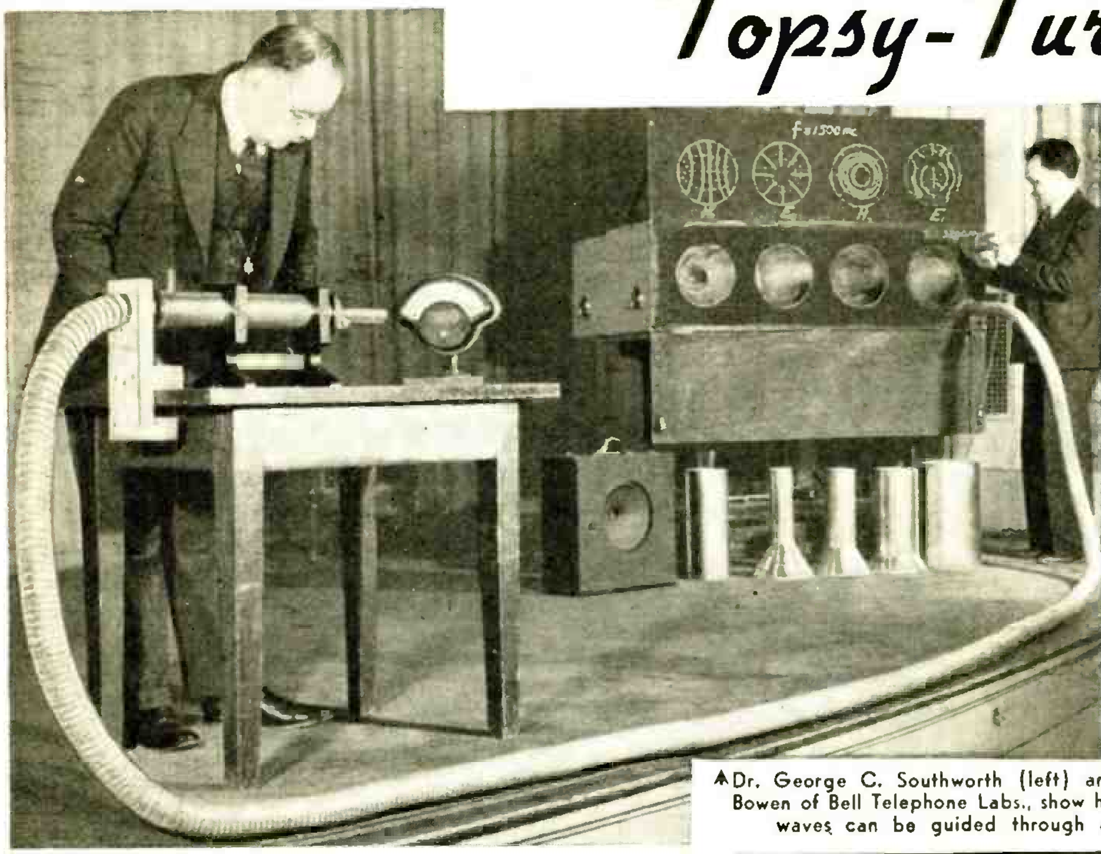
It is expected that the Indian short-wave stations will normally operate in the daytime on the 30-meter and 49-meter bands and at night principally on the new 60-

(Continued on page 716)



Right—New water-cooled power tubes, tuning inductances and condensers.

4-Inch Waves Turn Science *Topsy-Turvy*



▲Dr. George C. Southworth (left) and his assistant Mr. A. E. Bowen of Bell Telephone Labs., show how extremely short electric waves can be guided through a flexible metal pipe.

A recent demonstration of microwaves by Dr. George C. Southworth of the Bell Telephone Labs., had the apparent effect of turning some of our best scientific theories upside down. Signals were transmitted over a rubber rod and many strange effects noted.

● ELECTRIC waves that flow through pipes were demonstrated before the Institute of Radio Engineers recently, by Dr. George C. Southworth, research engineer of the Bell Telephone Laboratories. Holding a receiver at the end of a long flexible tube, Dr. Southworth showed that energy was flowing, regardless of how the tube was bent. But when the tube was interrupted, the tone from the receiver stopped, showing that the signal came through the tube and not through free space.

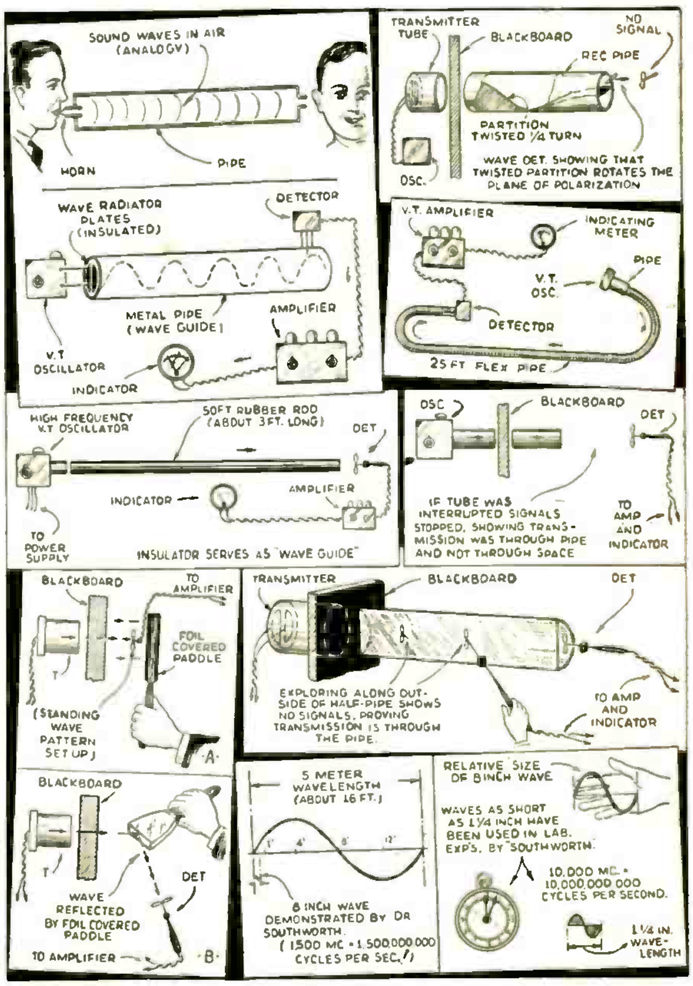
Standing in front of a blackboard, Dr. Southworth demonstrated by an electric probe that energy was coming through the blackboard at four different points. By moving the probe, he was able to delimit the energy areas, and by holding up a reflector a foot or so away from the blackboard, he was able to set up standing waves. Measurements made on the spot showed that the wave length was about 20 centimeters (8 inches), corresponding to a frequency of fifteen hundred million cycles per second (1500 megacycles).

That the waves coming through the four different areas were not all alike was shown by two distinct methods. In the first of these, it was shown that certain of the waves would pass through relatively small pipes, whereas others could be transmitted only through relatively large pipes. In the other method, the probe was held close to the blackboard and oriented into various positions to give maximum signal. A plot of these positions drawn with chalk on the blackboard showed patterns of distinguishing characteristics. From one of these, for example, it could be deduced that if the wave were visible to the eye, it would look like a series of smoke rings blown from a pipe.

A striking demonstration was that in which Dr. Southworth held in front of one of the areas a brass grating perhaps an inch deep, made of sheet brass strips on edge and spaced about an inch apart. In one position, this grating offered no barrier to the waves, but if given a quarter-turn it would almost completely suppress them.

(Continued on page 706)

Drawings at right show some of the mystical effects performed by Dr. Southworth's 4-inch waves. These waves can be piped, reflected, deflected, and polarized. ➤



ingly exact workmanship, of the French torpedo boat, "*Le Terrible.*" The hull, built by Mr. Casel himself, is 11.4 ft. long and 1.14 ft. wide. With full sailing equipment, the ship has a draft of 4.4 inches and a weight of 176 to 220 lbs.

The effective speed is 7.2 miles per hour, a speed which is not according to scale,

This photo shows model warship "Terrible" arranged for short-wave control. It was demonstrated on the River Marne by Mr. Casel, its builder. The control transmitter is shown on the pier.

The editors have received numerous inquiries for data on a radio-control system adaptable to model boats or planes. Those looking for this information will undoubtedly be pleased to read the present article by Mr. Delaunay. Of course, amateur transmitters and receivers of any desired frequency may be used to put the system into operation. Some experimenters may wish to try ultra short-waves for the purpose; a good transmitter and receiver suited to operation on 1/2 to 1 meter wavelength was described in the Jan. 1936 issue.

MODEL SHIP Guided by Radio Waves

Pierre Delaunay

● A MODEL of the torpedo boat, "*Le Terrible,*" has executed maneuvers on the river Marne (France), directed from the banks by means of radio waves. This use of *telautomatics* has, owing to the ingenious way in which it was done, attracted great attention.

Many experiments have been made in this field. The applications to which the Army and Navy could apply such a device have not escaped the attention of military and naval experts.

Those opposed to remote control point out that radio transmission is never sure, that a code system is only relatively safe, and that, above all, interfering stations which are stronger than the controlling station could at least jam the transmission.

This article will deal with these objections. As *telautamatics* has many supporters, we think it worthwhile to study the latest device which Mr. R. Casel has worked out.

About twelve years ago, Mr. Casel obtained excellent results with a very small model. His most recent researches have necessitated the construction of a larger model. He has been quite willing to give public demonstrations which have shown the safety of his system and its workability.

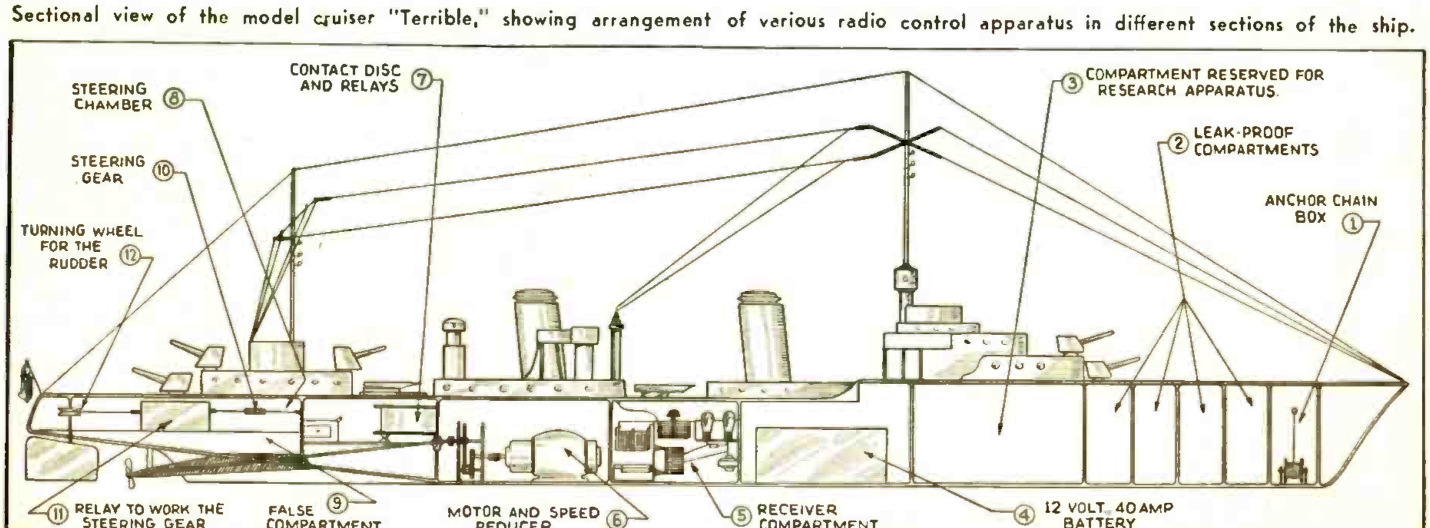
The model is a reproduction, of astonishingly exact workmanship, of the French torpedo boat, "*Le Terrible.*" [continued above]

but much higher. It is not necessary to point out that in the case of propeller-driven ships, the increase in effective speed is not in direct proportion to the increase in power applied. There are two reasons for this, one the law of energy, and one mechanical. The law of energy is that the force necessary for the propulsion of a definite mobile entity must be *squared* when the velocity is to be doubled. This is to say that the energy increases in geometric progression (logarithmic) and the velocity in arithmetic (linear). Furthermore, the resistance to advance in the water varies with the speed for defined forms according to laws whose different factors enter successively into play. (Resistance, suction, current, instability of the mobile unit and so forth, modify the result.)

The mechanical reason is that up to a certain point the "relation force" exerted

(*Continued on page* 697)

Sectional view of the model cruiser "Terrible," showing arrangement of various radio control apparatus in different sections of the ship.



What Do You Think?

Wants More "Amateur Course"

Editor,

For many years I have been an uncomplaining reader of your publications, which is equivalent to saying "I like them."

There is no one who knows better than the editor of this magazine just how much radio owes to the amateur, though he be dubbed a "ham."

The particular brick, hot from the kiln, that I want to throw into your editorial sanctum is this one.

Aside from all the valuable articles, hookups and other aids, there is so little that will help the prospective amateur to qualify himself and get into the field. There are many aids which, though of value, all leave the prospect to figure out or do without explanations which he does not fully understand. My suggestion would be a department of the magazine devoted to helping the untrained novice who is just "itching" to enter the field, and maybe in a short time become something more than merely an amateur. Such a department should begin with the simplest fundamentals going through training for learning the code and the essential technical information which he must acquire before. This should go step-by-step through the fundamentals with detailed explanations, theories, reasons and experimental layouts which the coming amateur can use in acquiring a practical knowledge of the fundamentals, demonstrating the theories and their application, and also a department in which the "prospect" could have his practical problems answered would lead him on instead of leaving him "stumped" when he runs onto something he doesn't understand. In a certain S-W Ham Manual many things are admirable, with laws, regulations, etc., but in the theory of radio, such as self-excited oscillation, and the functions of the vacuum tube as an amplifier, both R.F. and A.F. things are not so clear for many students. They have no source of further information, no "daddy" to go to for a simplified explanation. In this event the student has to do one of two things: either he has to give up in disappointment, or go on with an *imperfect understanding* of the essential fundamentals which only too often block his progress.

At the end of the series such information could be published in pamphlet form and offered as a premium with a subscription, etc. If the department were continued year after year it could be improved, and you would be able to place in the hands of the prospective amateur a mass of tested and tried information, the like of which does not exist today.

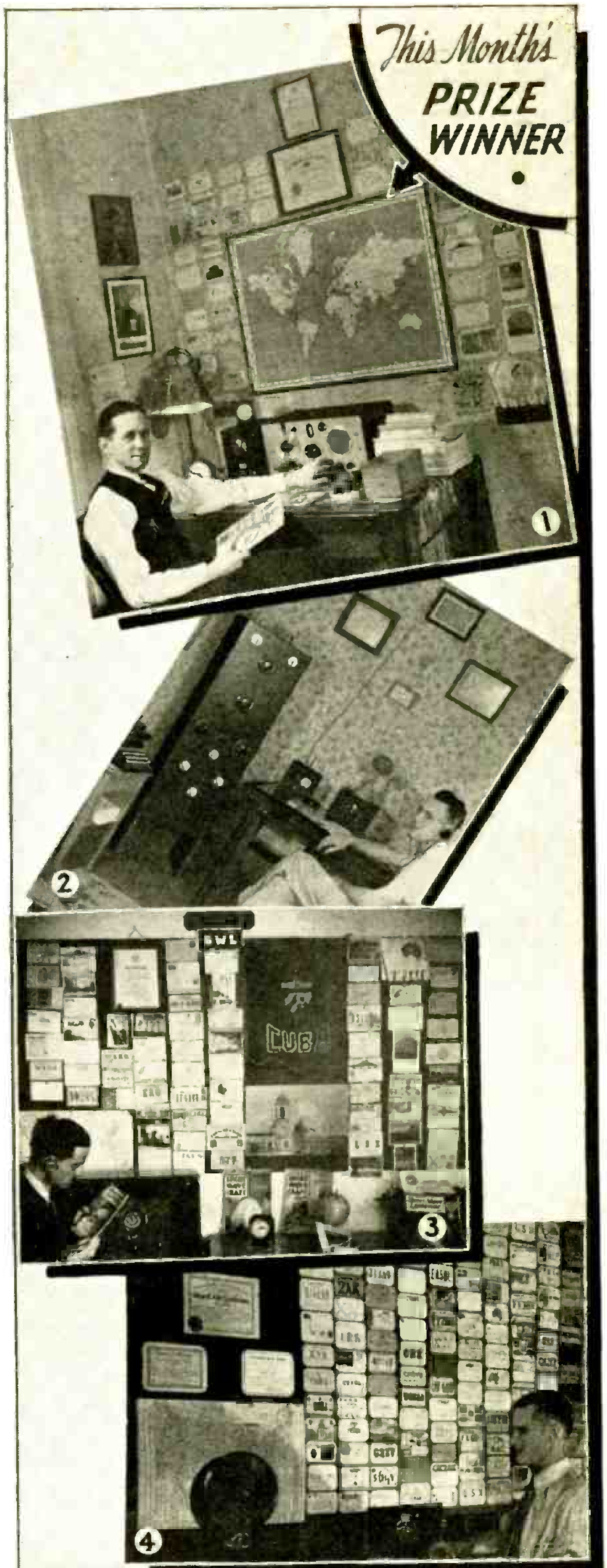
The difficulty that the prospective amateur gets into without knowing a way out, suggests an old proverb that the "bitter fruit kills the tree that grows it."

GEO. B. THOMPSON, M. D.
1611½ S. Arlington,
Los Angeles, California.

(*Continued on page* 709)

One Year's Subscription to SHORT WAVE & TELEVISION Awarded for the Best S-W Den Photo

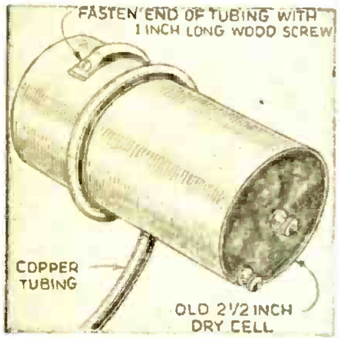
Closing date for each contest—75 days preceding date of issue: March 15th for June issue, etc. The editors will act as the judges and their opinions will be final. In the event of a tie a subscription will be given to each contestant so tying.



1—Prize-winning listening post photo. of Caleb Wilkinson, c/o Gen. Del., Texarkana, Ark. Note the "Super-Skyrider." 2—Mel Wentz, W8EEQ and his Ham station at Rawson, Ohio. 3—Jose Morales Hernandez, San Carlos No. 109 (altos), Cienfuegos, Cuba. 4—Edwin E. Hatch, 5508 N. Mascher St., Phila., Pa.

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.

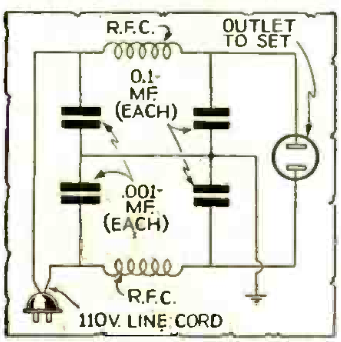


COIL WINDING

An aid in winding coils of copper tubing is shown. An old dry cell 2½" in diameter serves as a coil-winding form. Thread a hole in the end of the tubing and place a wood-screw through it, which is then turned into the casing of the dry cell to secure the tubing during the winding process. Sweet and simple, we calls it.—*Bob Pratt.*

◆

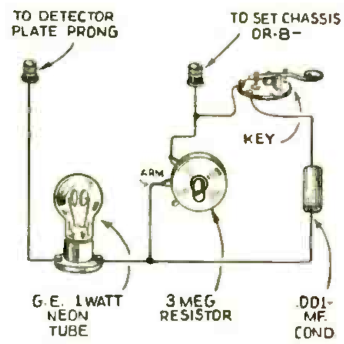
NOISE ELIMINATOR



A filter for reducing electrical interference brought into a receiver from the powerlines is shown in the sketch. It consists of 2 R.F. chokes and several by-pass condensers. The R.F. chokes consist of 47 turns of No. 14 enameled wire wound on ½" diameter forms. The common returns of the by-pass condensers should be grounded to an external point. Another use for a filter of this type is to connect it between electrical apparatus generating electrical interference and the powerline to stop the noise at its source. In this case care must be taken to see that the amount of current drawn by the apparatus can be safely passed by the No. 14 wire of the choke coils. No. 14 wire, in this case, can safely handle about 15 amperes.—*Ralph D. Scott.*

A NEON OSCILLATOR

An oscillator which can be attached to a receiver for code practice purposes is shown. It is a variation of the ordinary neon tube oscillator. The proper connections to a receiver are clearly shown. Varying the 3 megohm resistor changes the pitch. If the receiver uses a diode detector it will be necessary to connect one end of the neon tube to the plate prong of the first audio tube instead of the detector.—*R. Willoughby.*



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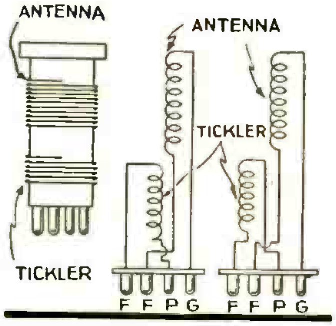
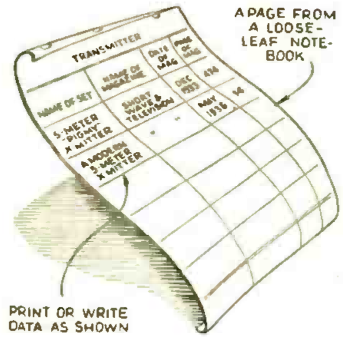
REGENERATION AID

When experimenting with new circuits it is frequently found after wiring up a circuit that a regenerative detector cannot be made to oscillate. Then it is necessary to reverse the wires to the tickler coil. To eliminate the necessity for this, have 2 plug-in coils, identical except that in one the connections from the tickler winding to the base pins are reversed, as shown in the drawing. If the set will not work with one coil it will generally be found to perform satisfactorily with the other. Once it has been determined which arrangement is proper for a given set, it is a simple matter to make any changes necessary in the wiring.—*Kenwood Truesdale.*



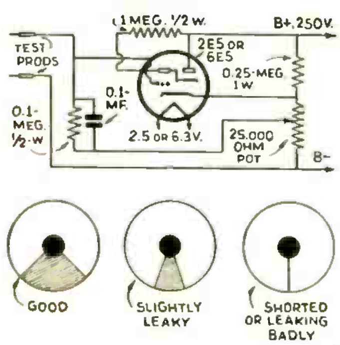


INDEX

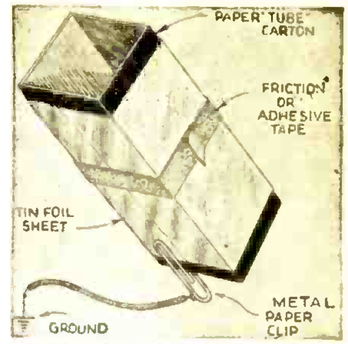
A simple indexing system which should prove a great time saver to the experimenter is shown. It is simply a page from a notebook which has been ruled off into several classifications for making a quick-reading rough chart for locating the whereabouts of articles which have appeared in various periodicals.—*John E. Harley.*

◆

CONDENSER TESTER



Here is another use for the magic eye tube. In this case it is used as a testing device for paper condensers. The diagram shows how to connect the tube for this use and also the indications for different condenser tests. In addition to testing a condenser for leakiness or shorting, the device can be used to give a rough check on the relative capacity of a condenser by observing the length of time it takes for the eye pattern to open after the condenser has been connected to the test prods. When connecting a condenser the eye shadow will close momentarily until the condenser is charged. This charging period varies from a fraction of a second to several seconds, depending upon the capacity of the condenser.—*Harold Brower.*

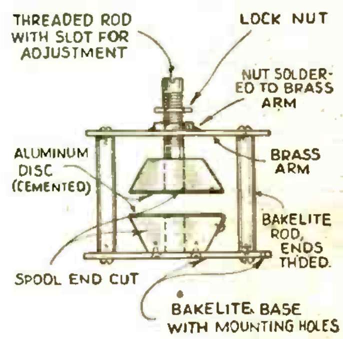


TEMPORARY TUBE SHIELD

1st PRIZE WINNER

How often have you needed a tube shield to complete an experimental circuit, only to find none around? A temporary one is easily made from a tube carton and tinfoil. Wrap several layers of tinfoil around the carton and secure it with cellophane or friction tape as indicated in the drawing. Grounding contact is made with a paper clip at the bottom of the carton. —*Clarence Ilk.*

◆



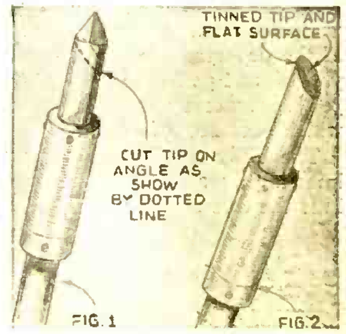
SPOOL CONDENSER

A novel neutralizing condenser may be made from an old thread spool and other odds and ends. The sketch is self-explanatory. This condenser can also be used as an antenna coupling unit or for that matter for any other application requiring a low-capacity condenser.—*Hoy Mah.*

◆

SOLDERING AID

A modification of a soldering iron tip is shown. The large flat surface made by cutting off part of the tip is useful when soldering heavy wires and also when soldering directly to a chassis. The tapering point of the new tip enables ordinary light soldering to be handled nicely.—*Harry W. Crowder.*



Short Wavers' Yardstick

A quick reference chart showing where short-wave broadcasts come in on an all-wave receiver's dial. For operating schedules of stations, refer to the Station List on page 676.

MEGACYCLES

49 Meter Band

6.004	RV59	Moscow, U. S. S. R.
6.005	CFCX	Montreal, Canada
6.015	PRA8	Pernambuco, South America
6.010	COCO	Havana, Cuba
6.020	DJC	Berlin, Germany
6.030	OLR2B	Prague, Czechoslovakia
6.040	WIXAL	Boston, Mass.
6.042	HJIABG	Barranquilla, Colombia
6.069		Tananarive, Madagascar
6.100	W3XAL	Bound Brook, New Jersey
6.117	XEUZ	Mexico City, Mexico
6.125	CXA4	Montevideo, Uruguay
6.130	ZGE	Kuala Lumpur, Malaya

31 Meter Band

9.500	XEWW	Mexico City, Mexico
9.500	VK3ME	Melbourne, Australia
9.510	GSB	Daventry, England
9.520	OZF	Skamleboaek, Denmark
9.523	ZRH	Roberts Heights, South Africa
9.530	W2XAF	Schenectady, New York
9.550	OLR3A	Prague, Czechoslovakia
9.580	VLR	Melbourne, Australia
9.580	GSC	Daventry, England
9.590	PCJ	Huizen, Holland

25 Meter Band

11.710	SBP	Motala, Sweden
11.715	TPA4	Paris, France
11.720	CJRX	Winnipeg, Canada
11.750	GSD	Daventry, England
11.760	TGWA	Guatemala City, Guatemala
11.770	DJD	Berlin, Germany
11.790	OER3	Vienna, Austria
11.800	JZJ	Tokio, Japan
11.810	2RO	Rome, Italy
11.840	CSW	Lisbon, Portugual
11.860	YDB	Soerabaja, Java, N. E. I.
11.900	XEWI	Mexico City, Mexico

19 Meter Band

15.110	DJL	Berlin, Germany
15.120	HVJ	Vatican City
15.130		Essarts, France
15.140	GSF	Daventry, England
15.150	YDC	Bandoeng, Java, N. E. I.
15.155	SM5SX	Stockholm, Sweden
15.160	JZK	Tokio, Japan
15.160	XEWW	Mexico City, Mexico
15.190	ZBW4	Hongkong, China
15.200	DJB	Berlin, Germany
15.220	PCJ	Huizen, Holland
15.230	HS8PJ	Bangkok, Siam
15.250	WIXAL	Boston, Massachusetts
15.260	GSI	Daventry, England
15.270	W2XE	New York, New York
15.290	LRU	Buenos Aires, Argentina
15.310	GSP	Daventry, England

16 Meter Band

17.755	ZBW5	Hongkong, China
17.760	W2XE	New York, New York
17.760	DJE	Berlin, Germany
17.770	PHI	Huizen, Holland
17.780	W3XAL	Bound Brook, New Jersey
17.785	JZL	Tokio, Japan
17.790	GSG	Daventry, England
17.800		Essarts, France
17.800	TGWA	Guatemala City, Guatemala

Listen in the 13 and 16 meter bands in broad daylight; in the 19 and 25 meter bands afternoons and night; and in the 31 and 49 meter bands at night.

13 Meter Band

21.470	GSH	Daventry, England
21.500	W2XAD	Schenectady, New York
21.520	W2XE	New York, New York
21.530	GSJ	Daventry, England
21.540	W8XK	Pittsburgh, Pennsylvania
21.550	GST	Daventry, England

MEGACYCLES

Only short wave broadcast stations are listed in the chart above. The channels between the broadcast bands are occupied by amateur and commercial telephone and telegraph stations, all of which operate on irregular schedules.

S-W's Land Planes In New Army System

By using a series of short-wave vertical beacons and ingenious automatic altitude control devices, Army planes can be landed automatically in any weather.

Left—Army plane fitted with new automatic short-wave landing system. A series of vertical short-wave radio-guide beacons, one form of which is shown at the right, are used.

Mobile type of short-wave guide-beacon station.

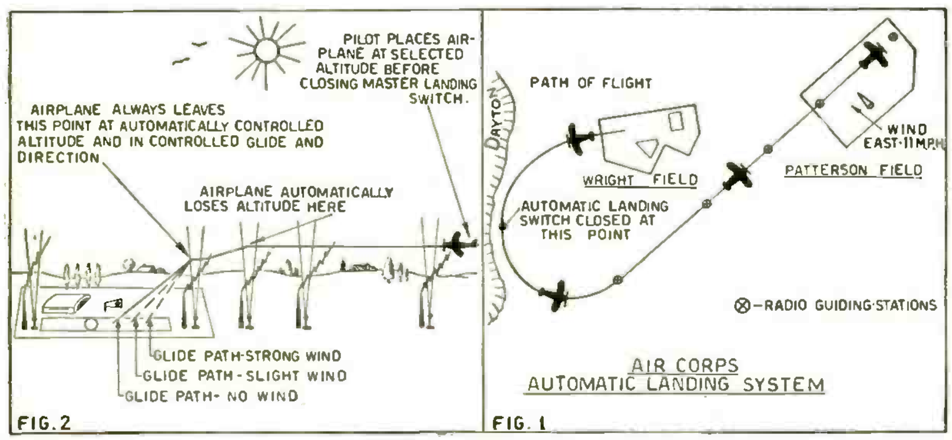
● TWO U. S. Army Air Corps experts, Captain Carl J. Crane and Captain George V. Holloman, have designed and flight-tested a new system of landing planes automatically by means of short-waves and some of the highlights of this ingenious method are here illustrated.

For over a year Air Corps test planes have been flown automatically over distances that have demonstrated the thorough reliability of the devices now employed. Automatic landing of a plane involves other factors besides control of direction; these factors are—control of altitude, engine control, glide control and further engine control after landing.

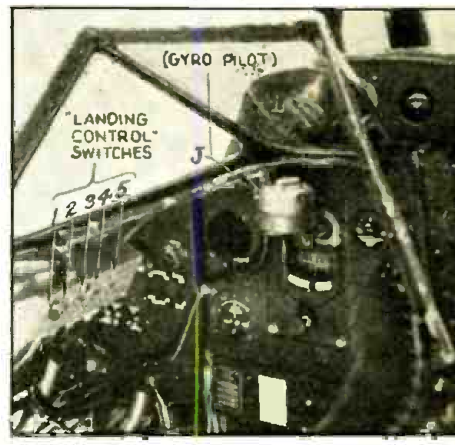
Fig. 1 represents the path of flight and landing made by an army plane fitted with new apparatus. Fig. 2 illustrates a vertical view of the plane's flight path, and also the landing path followed by the plane in making a full automatic landing. Note that in making an automatic landing that the pilot places his plane at a pre-selected altitude before he closes the master landing switch. The plane then flies along at a fixed altitude until a certain number of vertical short-wave beacons have been passed, as the

(*Continued on page* 710)

The diagrams show how short-waves guide the plane automatically to a landing.



Plane's cockpit with control switches and gyro-pilot.



News Bulletins Via Wired Television

Television news cabinet in Jack Dempsey's restaurant, New York.

● JACK DEMPSEY'S restaurant in New York City was recently the scene of the first commercial television demonstration in America. News bulletins were flashed from the Hotel Lincoln, about five blocks away, over a leased telephone circuit.

This television news bulletin system is the invention of William Hoyt Peck, a leading American television inventor, and a strong proponent of optical and mechanical scanning. Mr. Peck's invention uses mechanical scanning and the results obtained have been surprisingly fine. The messages were typed on a transparent ribbon at the Hotel Lincoln by means of a special automatic-feed typewriter, and one of the photos shows Jack Dempsey preparing the first message to be sent over the circuit.

After the letters composing the message have been typed on the transparent ribbon (*Continued on page* 705)

Jack Dempsey operating the transmitter.

How To Identify Short Wave Stations

Keep These Lists for Future Reference

FREQ. CALL TYPE LOCATION

6.077 OAX4Z—B—Lima, Peru.
"Radio Nacionales." Dual call "OAX4A y OAX4Z." Pronounces Z as "Zeta."

6.075 VP3MR—B—Georgetown, British Guiana.
Slogan *"The voice of British Guiana."* Signs off with *"God Save the King."*

6.073 HJ3ABF—B—Bogota, Colombia.
"La voz de Bogota." Lately announces as HKF, instead of HJ3ABF.

6.072 OER2—B—Vienna, Austria.
See OER2, 11.778 mc. (Sept. issue).

6.065 SBO—B—Motala, Sweden.
Announces *"Radio Motala, relaying programs of Oslo."*

6.06 FIQA—B—Tananarive, Madagascar.
See FIQA, 11.81 mc. FIQA no longer on 11.81 mc., but is now broadcasting simultaneously on 6.06, 9.38, 10.95 mc., 3:30-4:30 a.m. daily, 2:30-4 a.m. Suns.

6.053 HJ6ABA—B—Pereira, Colombia.
Announces—*"Achey hota seis ah bay ah—Pereira."*

6.045 XETW—B—Tampico, Mexico.
Announces—*"Eckees ay tay duble-vey."*

6.042 HJ1ABG—B—Barranquilla, Colombia.
Slogan *"Emisora Atlantico."*

6.033 HP5B—B—Panama City, Panama.
Slogan *"Estacion Miramar."* Signs off with the march *"Panama."*

6.03 XEBQ—B—Mazatlan, Mexico.
Announces—*"Eckees ay bay Coo."*

6.03 OLR2B—B—Prague, Czecho-Slovakia.
See OLR6A, 21.45 mc.

6.023 XEUW—B—Vera Cruz, Mexico.
Slogan *"El Eco de Solavento desde Vera Cruz."* Signs off with *"La Golondrina,"* waltz.

6.017 HI3U—B—Santiago, Dom. Rep.
Slogan *"La voz de Commercio."* Signs off with organ solo *"Maria My Own."*

6.015 PRA8—B—Pernambuco, Brazil.
Slogan *"A voz do Norte en Pernambuco."*

6.015 RADIO PHILCO—B—Saigon, French Indo-China.
See R. P., 11.705 mc. Frequency varies from 6.015 up to 6.055.

6.013 HJ3ABX—B—Bogota, Colombia.
Slogan *"La voz de Colombia, Bogota."*

6.01 OLR2A—B—Prague, Czecho-Slovakia.
Same as OLR2B, 6.03 mc.

6.01 COCO—B—Havana, Cuba.
Announces—Freq. in Spanish and English. Spanish *"Say oh, say oh, Habana de Cuba."*

6.01 9MI—B—"S. S. Kanimbla".
Out of Melbourne, Australia. Program begins with ship's bells, and blast on ship's whistles, followed by music. All programs are broadcast for relay by some Australian BCB station. Miss Arlene Foley announces; call given after every selection *"Marine station 9MI calling—, —, from the motor vessel Kanimbla at sea*—(location)". Closes with ship's bells, concluding announcement, and *"God Save the King."*

6.007 RANGOON—B—Rangoon, Burma.
Call given after every second selection Government Radio Station, Rangoon, Burma. Signs off with *"God Save the King."*

6.005 HP5K—B—Colon, Panama.
Slogan *"La voz de la Victor"*; dual call "HP5O y HP5K."

6.004 RV59—B—Moscow, U.S.S.R.
See RAN, 9.60 mc.

6.002 CXA2—B—Montevideo, Uruguay.
Announces—*"Say eckees ah dos"*, signs off with *"Good Night Melody."*

6.00 XEBT—B—Mexico, D. F., Mexico.
Uses various identifying signals, as auto horns, sirens, etc. Uses dual call "XEB y XEBT."

5.997 CS2WD—B—Lisbon, Portugal.
Announced as *"Radio Renascena."*

5.975 OAX4P—B—Huancayo, Peru.
Slogan *"La voz de Huancayo, Radio Andina Jienin."*

5.947 PJC1—B—Curacao, N. W. Indies.
Announced as— *"Radio CUROM."* Signs off with Dutch National Anthem.

5.94 TG2X—B—Guatemala City, Guatemala.
Slogan *"La voz de la Policia Nacional."* Not used when relaying TGW, and often when relaying TGW, forgets to use own call, announcing simply as *"TGW, Radio Nacional."*

5.935 YV1RL—B—Maracaibo, Venezuela.
Slogan *"Radio Popular."* Opens and signs off with *"National Emblem March."* Will soon relay YV1RK, so will use both calls in announcements.

5.913 YV4RH—B—Valencia, Venezuela.
Slogan *"Radio Valencia."* This is old YV15RV.

5.905 TILS—B—San Jose, Costa Rica.
Slogan *"Radio Parati."*

5.895 YV3RA—B—Barquisimeto, Venezuela.
"La voz de Lara"; dual calls "YV3RA y YV3RB."

5.89 JIC—C&B—Taihoku, Taiwan. (Formosa.)
Identifies in Japanese at start of phone Xtsns with Tokio. Inverted speech used thereafter.

5.89 HH2S—B—Port-au-Prince, Haiti.
Speaks French; announces in English and French, and occasionally in Spanish.

5.885 HI9B—Santiago De Los Caballeros, Dom. Republic.
Slogan *"Broadcasting Hotel Mercedes"* (rarely heard).

(To be continued)

Can You Answer These Radio Questions?

1. Do sun-spots improve short-wave transmission? See page 662.
2. Where was the play "Midsummer Madness" broadcast by television? See page 665.
3. Why do foreign countries spend large sums of money on short-wave broadcasting? See page 666.
4. Is it possible to transmit short-wave signals through a rubber rod? See page 669.
5. Where are the principal short-wave broadcast stations located on your all-wave dial? See page 673.
6. How do short-wave beacons now make it possible to land airplanes blind? See page 674.
7. What two foreign short-wave stations will transmit special programs for "S.W.&T." readers? See page 677.
8. How can radio parts be used to build a "buried pipe" or faulty circuit locator? See page 681.
9. How may 5-prong band-spread coils be adapted for use in a receiver wired for 4-prong coils? See page 683.
10. Is it possible to build a receiver using but one coil which will have a range of 4.5-11 meters? See page 688.
11. Is it practical to use only one oscillator for combination vision and sound superhets? See page 690.
12. Where is the frequency stabilizing crystal usually connected in a Ham transmitter? See page 692.

World Short Wave Stations

Revised Monthly

Broadcasters' Calls in bold type
Phones' in light type

Reports on station changes are appreciated.

Mc.	Call	
31.600	**W3XEY**	**BALTIMORE, MD.**, 9.494 m., Relays WFBR 4 pm.-12 m.
31.600	**W2XDV**	**NEW YORK CITY**, 9.494 m., Addr. Col. Broad. System, 485 Madison Ave. Daily 6-11 pm.; Sat. and Sun. 1.30-6, 7-10 pm.
31.600	**W9XHW**	**MINNEAPOLIS, MINN.**, 9.494 m. Relays WCCO 9 am.-12 m.
31.600	**W3XKA**	**PHILADELPHIA, PA.**, 9.494 m., Addr. NBC. Relays KYW 12 n-10 pm.
31.600	**W5XAU**	**OKLAHOMA CITY**, 9.494 m., Sun 12 n-1 pm., 6-7 pm. Irregular other times.
31.600	**W4XCA**	**MEMPHIS, TENN.**, 9.494 m. Addr. Memphis Commercial Appeal. Relays WMC.
31.600	**W8XAI**	**ROCHESTER, N. Y.**, 9.494 m., Addr. Stromberg Carlson Co. Relays WHAM 7.30-12.05 am.
31.600	**W8XWJ**	**DETROIT, MICH.**, 9.494 m., Addr. Evening News Ass'n. Relays WWJ 6-12.30 am., Sun. 8 am-12 m.
31.600	**W9XPD**	**ST. LOUIS, MO.**, 9.494 m., Addr. Pulitzer Pub. Co. Relays KSD.
26.400	**W9XAZ**	**MILWAUKEE, WIS.**, 11.36 m., Addr. The Journal Co. Relays WTMJ from 1 pm.
26.100	**W9XJL**	**SUPERIOR, WIS.**, 11.49 m. Relays WEBC daily.
26.100	**GSK**	**DAVENTRY, ENG.**, 11.49 m., Addr. B.B.C., London. Operates irregularly.
25.950	**W6XKG**	**LOS ANGELES, CAL.**, 11.56 m., Addr. B. S. McGlashan, Wash. Blvd. at Oak St. Relays KGFJ 24 hours daily.
21.550	**GST**	**DAVENTRY, ENG.**, 13.92 m., Addr. (See 26.100 mc.) Irregular at present.
21.540	**W8XK**	**PITTSBURGH, PA.**, 13.93 m., Addr. Grant Bldg. Relays KDKA 6.45-9 am. Exc. Sun.
21.530	**GSJ**	**DAVENTRY, ENG.**, 13.93 m., Addr. (See 26.100 mc.) 5.45-10.30 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 morn.
20.020	DHO	NAUEN, GERMANY, 14.99 m., Addr. Reichspostzenstralamt. Works S. Am. mornings.
19.900	LSG	BUENOS AIRES, ARG., 15.08 m., Addr. (See 20.700 mc.) Tests irregularly.
19.820	WKN	LAWRENCEVILLE, N. J., 15.14 m., Addr. A. T. & T. Co. Calls England daytime.
19.680	CEC	SANTIAGO, CHILE, 15.24 m., Addr. Cia. Internacional de Radio. Calls Col. and Arg. daytime.
19.650	LSN5	BUENOS AIRES, ARG., 15.27 m., Addr. (See 21.020 mc.) Calls Europe daytime.
19.620	VQG4	NAIROBI, KENYA, 15.28 m., Addr. Cable and Wireless, Ltd. Calls London 7.30-8 am.
19.600	LSF	BUENOS AIRES, ARG., 15.31 m., Addr. (See 20.700 mc.) Tests irregularly.
19.480	GAD	RUGBY, ENG., 15.4 m. Calls VQG4 7.30-8 am.
19.355	FTM	ST. ASSISE, FRANCE, 15.5 m. Calls S. America mornings.
19.345	PMA	BANDOENG, JAVA, 15.51 m. Works Holland 5.30-11 am.
19.260	PPU	RIO DE JANEIRO, BRAZ., 15.58 m., Addr. Cia. Radiotel. Brasileira. Works France mornings.
19.220	WKF	LAWRENCEVILLE, N. J., 15.6 m., Addr. A.T.&T. Co. Calls London and Paris daytime.
19.200	ORG	RUYSSELEDE, BELGIUM, 15.62 m. Calls OPL mornings.
19.160	GAP	RUGBY, ENG., 15.66 m. Calls Australia 1-8 am.
19.020	HS8PJ	BANGKOK, SIAM, 15.77 m. Mondays 8-10 am.
18.970	GAQ	RUGBY, ENG., 15.81 m. Calls S. Africa mornings.
18.890	ZSS	KLIPHEUVEL, S. AFRICA, 15.88 m., Addr. Overseas Comm. of S. Africa, Ltd. Calls GAQ 9-10 am.
18.830	PLE	BANDOENG, JAVA, 15.93 m. Calls Holland early am.
18.680	OCI	LIMA, PERU, 16.06 m. Tests with Bogota, Col.
18.620	GAU	RUGBY, ENG., 16.11 m. Calls N. Y. daytime.
18.450	HBF	GENEVA, SWITZERLAND, 16.26 m., Addr. Radio Nations. Tests irregularly.
18.345	FZS	SAIGON, INDO-CHINA, 16.35 m. Works Paris early morning.
18.340	WLA	LAWRENCEVILLE, N. J., 16.36 m., Addr. A.T.&T. Co. Calls England daytime.
18.310	GAS	RUGBY, ENG., 16.38 m. Calls N.Y. daytime.
18.299	YVR	MARACAY, VENEZ., 16.39 m. Works Germany mornings.
18.250	FTO	ST. ASSISE, FRANCE, 16.43 m. Works S. America daytime.
18.200	GAW	RUGBY, ENG., 16.48 m. Works N.Y.C. daytime.
18.135	PMC	BANDOENG, JAVA, 16.54 m. Works Holland mornings.
18.115	LSY3	BUENOS AIRES, ARG., 16.56 m., Addr. (See 20.700 mc.) Tests irregularly. Broadcasts 5-6 pm. Friday.
18.040	GAB	RUGBY, ENG., 16.83 m. Works Canada morning and afternoon.
17.810	PCV	KOOTWIJK, HOLLAND, 16.84 m. Works Java 6-8 am.

16 Met. Broadcast Band

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., 12.20-4 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.-6.45 pm.
17.770	**PHI**	**HUIZEN, HOLLAND**, 16.88 m., Addr. (See PHI, 11.730 mc.) Daily except Wednesday, 8.25-10 am., Sun. 7.25-10.25 am.
17.760	**DJE**	**BERLIN, GERMANY**, 16.89 m., Addr. Broadcasting House. 12.05-10 am.; also Sun. 11.10 am-12.25 pm.
17.760	**W2XE**	**NEW YORK, N. Y.**, 16.89 m., Addr. Col. Broad. System, 485 Madison Ave. Daily 6.20 pm.-12 m.
17.755	**ZBW5**	**HONGKONG, CHINA**, 16.9 m., Addr. P.O. Box 200. 4-10 am. irregular.

End of Broadcast Band

Mc.	Call	
17.741	HSP	BANGKOK, SIAM, 16.91 m. Works Germany 3-5 am., 8-9 pm. Works JVE 11 pm.-6 am.
17.650	XGM	SHANGHAI, CHINA, 17 m. Works London 7-9 am.
17.520	DFB	NAUEN, GERMANY, 17.12 m. Works S. America, near 9.15 am. Works Siam 3-5 am., 8-9 pm.
17.480	VWY2	KIRKEE, INDIA, 17.16 m. Works London 7.30-8.15 am.
17.310	W2XGB	HICKSVILLE, L. I., N. Y., 17.33 m., Addr. Press Wireless, Box 296. Tests 9.30-11.30 am. except Sat. and Sun.
17.120	WOO	OCEAN GATE, N. J., 17.52 m., Addr. A.T.&T.Co. Works ships irregularly.
17.080	GBC	RUGBY, ENG., 17.56 m. Works ships irregularly.
16.835	ITK	MOGADISCIO, ITAL. SOMALILAND, 18.32 m. Calls IAC around 9.30 am.
16.270	WLK	LAWRENCEVILLE, N. J., 18.44 m., Addr. A.T.&T. Co. Works S. Amer. daytime.
16.270	WOG	OCEAN GATE, N. J., 18.44 m., Addr. A.T.&T. Co. Works England late afternoon.
16.240	KTO	MANILA, P. I., 18.47 m., Addr. RCA Comm. Works Japan and U. S. 5-9 pm. irregularly.
16.233	FZR3	SAIGON, INDO-CHINA, 18.48 m. Calls Paris early morning.
16.030	KKP	KAHUKU, HAWAII, 18.71 m., Addr. RCA Comm. Works Dixon 3-10 pm.
15.880	FTK	ST. ASSISE, FRANCE, 18.9 m. Works Saigon 8-11 am.
15.865	CEC	SANTIAGO, CHILE, 18.91 m. Calls Peru daytime irregular.
15.810	LSL	BUENOS AIRES, ARG., 18.98 m., Addr. (See 21.020 mc.) Works London mornings and Paris afternoons.
15.660	JVE	NAZAKI, JAPAN, 19.16 m. Works Java and Siam 3-5 am.
15.620	JVF	NAZAKI, JAPAN, 19.2 m. Works Cal. near 5 am. and 8 pm.
15.550	**CO9XX**	**TUINICU, ORIENTE, CUBA**, 19.29 m., Addr. Frank Jones, Central Tuinicu, Tuinicu, Santa Clara. Broadcasts irregularly evenings.
15.440	**XEBM**	**MAZATLAN, SIN., MEX.**, 19.43 m., Addr. Flores 103 Alto. "El Pregonero del Pacifico." Irregularly 7 am.-10 pm.
15.430	IUD	ADDIS ABABA, ETHIOPIA, 19.44 m. Works Rome 9.15-10.30 am.
15.415	KWO	DIXON, CAL., 19.46 m., Addr. A. T. & T. Co. Works Hawaii 2-7 pm.
15.370	**HAS3**	**BUDAPEST, HUNGARY**, 19.52 m., Addr. Radiolabor, Gyali Ut 22. Sun. 9-10 am.
15.360	DZG	ZEESEN, GERMANY, 19.53 m., Addr. Reichspostzenstralamt. Tests irregularly.
15.355	KWU	DIXON, CALIF., 19.53 m., Addr. A.T.&T. Co. Phones Pacific Isles and Japan.

19 Met. Broadcast Band

Mc.	Call	
15,340	**DJR**	**BERLIN, GERMANY**, 19.56 m., Addr. Br'dcast'g House, 8-9 am.
15,330	**W2XAD**	**SCHENECTADY, N. Y.**, 19.56 m., Addr. General Electric Co. Relays WGY 11 am. to 9 pm.

(Continued on page 678)

All Schedules Eastern Standard Time

Let's Listen In with Joe Miller

FR8VX—Reunion Island—Breaking a precedent, we print this QSL of Tom Jordan's. If you hear the "special" S-W broadcast, you'll earn one of these!

● ANOTHER month has passed and here we are almost at the threshold of Spring, with its greatly increased activity on the amateur bands, and a general pick-up in signals from all parts of the world.

The past month has been quiet in so far as DX in general is concerned, but one or two developments of late have kept the month from being too lacking in DX interest.

With the on-coming *International Amateur DX Contest* in March, DXers will have a wonderful chance to enrich their "logs" with many good catches from remote corners of our little globe, with the awakening of interest for many amateurs, who will find the "Contest" a means by which to add new countries to their logs, and for many, an opportunity to earn the coveted "W.A.C." certificate.

As the "Contest" will demand most of the DXer's attention during March, we will give particulars of this *World-Wide Amateur Competition*.

The Contest is to be divided into 2 sections; one, for *C.W.* or *code only*, from March 4, at 7:01 p.m. to March 13, 6:59 p.m., and the second half of Contest will be for *phone only*, from March 18, 7:01 p.m. to March 27, 6.59 p.m. (all times E.S.T.). Of course, our attention is to be concentrated in the *phone* contest, as will be the case for all of you OM's.

SPECIAL BROADCAST from Reunion Island!

● **FR8VX, Reunion Island, will transmit a broadcast for readers of "S.W.&T.," sponsored by Joe Miller, on March 19, 20 and 21, from 3-3:30 p.m., E.S.T. Frequency will be 14,340 kc., phone, and Prince Vinh San, the operator, who is a regular reader of our columns, will use a beam antenna toward North America; power used will be 25 watts.**

All reports should include a "reply coupon," and all writing should thank the Prince for his courtesy.

Special thanks to Tom Jordan of Scranton, Pa., for his aid in arranging this "FB" Special. Good luck to all of you dial-twisters!

In preparation for this event, we are erecting a W8JK Flat-top Beam here, for 20 meter reception, and as results are said to be a substantial gain of about 3Rs in signal strength over a conventional half wave doublet, the one we now have, we look forward to making a real DX success of this contest. Upon ascertaining the results of this antenna's operation, if it is as good as claimed, we will have full data published in the following issue.

While on the subject of the all-important angle of good skywires, we wish to add a note or two concerning the effectiveness of the diamond rhombic beam we have used, for our reception of South African and other African amateurs on 20 meter phone.

This antenna was directed at a point crossing through the center of the Union of South Africa.

When listening to a South African ham while having our doublet switched in, we would have some difficulty if the signal was weak, as the bi-directional properties of the doublet picked up much extraneous noise, and QRM from other stations near the same frequency.

Upon throwing the antenna switch over to the rhombic, a surprising effect was noticed, namely, that the extraneous noise dropped to a negligible value, and that the signal was usually clarified to a remarkable degree, often making the difference between a readable, and an unreadable signal! The QRM situation was also greatly aided by the use of this fine beam, as the pick-up was concentrated in one direction, and stations not located inside of the beam's radius, and which were interfering with the desired signal, were usually attenuated sufficiently by the beam's selective properties, resulting in but a negligible degree of QRM.

Naturally, everyone has not the opportunity to erect such beams, with their accompanying requisite of the large area necessary for such layouts, but experimentation in this all-important respect will usually help the DXer to improve upon his reception, no matter where his location, nor under what conditions he may labor.

Regarding this Flat-top beam, designed by our world-famous amateur friend, John Kraus, we will add the interesting data that, though its pick-up may reasonably be compared with a diamond rhombic, its requirements of space are no more than that of a half-wave doublet! This should enable

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ZT6AK—South Africa—A very handsome QSL with blue letters on rainbow tinted card.

Mc.	Call	
15.320	OLR5B	**PRAGUE, CZECHOSLOVAKIA,** 19.58 m. Addr. (See 11.875 mc.) Daily ex. Sun. 6.30-7.30 am., Sun. 6-7.30 am.
15.310	GSP	**DAVENTRY, ENG.,** 19.6 m., Addr. (See 26.100 mc.) 1.45-4 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 12.10-1.10 pm.
15.280	DJQ	**BERLIN, GERMANY,** 19.63 m., Addr. Broadcasting House. 12.05-10 am., 4.50-10.45 pm. Also Sun. 11.10 am-12.25 pm.
15.270	W2XE	**NEW YORK CITY,** 19.65 m., Addr. (See 21.520 mc.) Daily except Sat. and Sun., 1-2.15 pm.
15.260	GSI	**DAVENTRY, ENG.,** 19.66 m., Addr. (See 26.100 mc.) 12.20-4 pm.
15.252	RIM	**TASHKENT, U.S.S.R.,** 19.67 m. Works RKI near 7 am.
15.250	W1XAL	**BOSTON, MASS.,** 19.67 m., Addr. University Club. Daily 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,** 19.7 m. Irregularly Mon. 8-10 am.
15.230	OLR5A	**PRAGUE, CZECHOSLOVAKIA,** 19.7 m., 6.30-7.30 am. Sun. 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., 4.50-10.45 pm. Also Sun. 11.10 am.-12.15 pm.
15.190	ZBW4	**HONGKONG, CHINA,** 19.75 m., Addr. P. O. Box 200. Irregular. 11.30 pm. to 1.15 am., 4-10 am., Sat. 9.15 pm.-1 am., Sun. 3-9.30 am.
15.180	GSO	**DAVENTRY, ENG.,** 19.76 m., Addr. (See 26.100 mc.) 3.15-5.30, 5.45-10 am., 4.15-6 pm.
15.170	TGWA	**GUATEMALA CITY, GUAT.,** 19.77 m., Addr. (See 17.8 mc.) Irregular 11.30 am.-2 pm.
15.160	XEWW	**MEXICO CITY, MEXICO,** 19.79 m., 12 n.-12 m., irregular.
15.160	JZK	**TOKIO, JAPAN,** 19.79 m. Irregular.
15.155	SM5SX	**STOCKHOLM, SWEDEN,** 19.79 m., Daily 11 am.-5 pm., Sun. 9 am.-5 pm.
15.150	YDC	**BANDOENG, JAVA,** 19.8 m., Addr. N. I. R. O. M. 6-7.30 pm., 10.30 pm.-2 am., Sat. 7.30 pm.-2 am., 5.30-10.30 am.
15.140	GSF	**DAVENTRY, ENG.,** 19.82 m., Addr. (See 26.100 mc.) 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.
15.080	RKI	**MOSCOW, U.S.S.R.,** 19.87 m. Works Tashkent near 7 am. Broadcasts Sun. 12.15-2.30 pm.

End of Broadcast Band

Mc.	Call	
15.055	WNC	**HIALEAH, FLORIDA,** 19.92 m., Addr. A.T.&T. Co. Calls Central America daytime.
14.980	KAY	**MANILA, P. I.,** 20.03 m., Addr. RCA Comm. Works Pacific Is.
14.960	PSF	**RIO DE JANEIRO, BRAZIL,** 20.05 m., Works with Buenos Aires daytime.
14.950	HJB	**BOGOTA, COL.,** 20.07 m. Calls WNC daytime.
14.940	HII	**CIUDAD TRUJILLO, D. R.,** 20.08 m. Phones WNC daytime.
14.940	HJA3	**BARRANQUILLA, COL.,** 20.08 m. Works WNC daytime.
14.920	LZA	**SOPHIA, BULGARIA,** 20.10 m., Addr. Radio Garata. Mon., Tues., Thurs., Fri. 11.30 am.-2.45 pm., Wed. 11.30 am.-4.45 pm., Sat. 11.30 am.-5 pm., Sun. 2 am.-5 pm. Daily except Sun. 5-6.30 am.
14.845	OCJ2	**LIMA, PERU,** 20.21 m. Works South America stations daytime.
14.790	ROU	**OMSK, SIBERIA, U.S.S.R.,** 20.28 m. Works Moscow irregularly 7-9 am.
14.730	IQA	**ROME, ITALY,** 20.37 m. Broadcasts 6-9 pm. irregular.
14.653	GBL	**RUGBY, ITALY,** 20.47 m. Works JVH 1-7 am.
14.640	TYF	**PARIS, FRANCE,** 20.49 m. Works Saigon and Cairo 3-7 am, 12 n.-2.30 pm.
14.600	JVH	**NAZAKI, JAPAN,** 20.55 m. Broadcasts irregularly 5-11.30 pm. Works Europe 4-8 am.
14.590	WMN	**LAWRENCEVILLE, N. J.,** 20.56 m., Addr. A.T.&T. Co. Works England morning and afternoon.
14.535	HBJ	**GENEVA, SWITZERLAND,** 20.64 m., Addr. Radio Nations. Broadcasts Sat. 6.45-8 pm.
14.530	LSN	**BUENOS AIRES, ARG.,** 20.65 m. Addr. (See 20.020 mc.) Works N. Y. C. afternoons.
14.500	—	**ASMARA, ERITREA, AFRICA,** 20.69 m. Works Rome and Addis Ababa 6.30-7.30 am.
14.500	LSM2	**BUENOS AIRES, ARG.,** 20.69 m., Addr. (See 21.020 mc.) Works RIO and Europe daytime.
14.485	TIR	**CARTAGO, COSTA RICA,** 20.71 m. Works Central America and U. S. A. daytime.
14.485	YSL	**SAN SALVADOR, SALVADOR,** 20.71 m. Irregular.
14.485	HPF	**PANAMA CITY, PANAMA,** 20.71 m. Works WNC daytime.
14.485	TGF	**GUATEMALA CITY, GUATEMALA,** 20.71 m. Works WNC daytime.
14.485	YNA	**MANAGUA, NICARAGUA,** 20.71 m. Works WNC daytime.
14.485	HRL5	**NACAOME, HONDURAS,** 20.71 m. Works WNC daytime.
14.485	HRF	**TEGUCIGALPA, HONDURAS,** 20.71 m. Works WNC daytime.
14.470	WMF	**LAWRENCEVILLE, N. J.,** 20.73 m., Addr. A.T.&T. Co. Works London and Paris daytime.
14.460	DZH	**ZEESEN, GERMANY,** 20.75 m., Addr. (See 15.360 mc.) Irregular.
14.440	—	**RADIO MALAGA, SPAIN,** 20.78 m. Relays Salamanca. Irreg. afternoons.
14.440	GBW	**RUGBY, ENG.,** 20.78 m. Works U.S.A. afternoons.
14.166	PIIJ	**DORDRECHT, HOLLAND,** 21.15 m., Addr. (See 7.088 mc.) Sat. 12 n.-12.30 pm.
14.030	EA9AH	**TETUAN, SPANISH MOROCCO,** 21.4 m. Daily except Sun. 2.15-5, 7 and 9 pm.
13.990	GBA	**RUGBY, ENG.,** 21.44 m. Works Buenos Aires late afternoon.
13.820	SUZ	**ABOU ZABAL, EGYPT,** 21.71 m. Works with Europe 11 am.-2 pm.
13.690	KKZ	**BOLINAS, CALIF.,** 21.91 m., Addr. RCA Comm. Irregularly.
13.635	SPW	**WARSAW, POLAND,** 22 m., Mon., Wed., Fri. 12.30-1.30 pm. Daily 6-8 pm. Sun. 6-9 pm.
13.585	GBB	**RUGBY, ENG.,** 22.08 m. Works Egypt and Canada afternoons.
13.415	GCJ	**RUGBY, ENG.,** 22.36 m. Works Japan and China early morning.
13.410	YSJ	**SAN SALVADOR, SALVADOR,** 22.37 m. Works WNC daytime.
13.390	WMA	**LAWRENCEVILLE, N. J.,** 22.4 m., Addr. A.T.&T. Co. Works England morning and afternoon.
13.380	IDU	**ASMARA, ERITREA, AFRICA,** 22.42 m. Works Rome daytime.
13.345	YVQ	**MARACAY, VENEZUELA,** 22.48 m. Works WNC daytime.
13.285	CGA3	**DRUMMONDVILLE, QUE., CAN.,** 22.58 m. Works London and ships afternoons.
13.330	IRJ	**ROME, ITALY,** 22.69 m. Works Tokio 5-9 am. irregularly.
13.075	VPD	**SUVA, FIJI ISLANDS,** 22.94 m. Irregularly.
12.882	W9XDH	**ELGIN, ILL.,** 23.25 m. Press Wireless, Tests 2-5 pm.
12.840	WOO	**OCEAN GATE, N. J.,** 23.36 m., Addr. A.T.&T. Co. Works with ships irregularly.
12.825	CNR	**RABAT, MOROCCO,** 23.39 m., Addr. Director General Tele. & Teleg. Stations. Works with Paris irregularly.
12.800	IAC	**PISA, ITALY,** 23.45 m. Works Italian ships mornings.
12.780	GBC	**RUGBY, ENG.,** 23.47. Works ships irregularly.
12.325	DAF	**NORDDEICH, GERMANY,** 24.34 m. Works German ships daytime.
12.290	GBU	**RUGBY, ENG.,** 24.41 m. Works N. Y. C. evenings.
12.250	TYB	**PARIS, FRANCE,** 24.49 m. Irregular.
12.235	TFJ	**REYKJAVIK, ICELAND,** 24.52 m. Works Europe mornings. Broadcasts Sun. 1.40-2.30 pm.
12.215	TYA	**PARIS, FRANCE,** 24.56 m. Works French ships in morning and afternoon.
12.150	GBS	**RUGBY, ENG.,** 24.69 m. Works N. Y. C. evenings.
12.130	DZE	**ZEESEN, GERMANY,** 24.73 m., Addr. (See 15.360 mc.) Tests irregular.
12.120	TPZ2	**ALGIERS, ALGERIA,** 24.75 m. Calls Paris 12 m.-6.30 am.
12.060	PDV	**KOOTWIJK, HOLLAND,** 24.88 m. Tests irregularly.
12.060	RNE	**MOSCOW, U.S.S.R.,** 24.88 m. Daily 6-7 am., 12.15-1 pm., 8-9.15, 10-11 pm., also Sun. 6 am.-1 pm.
11.991	FZS2	**SAIGON, INDO-CHINA,** 25.02 m. Phones Paris mornings.
11.970	HI2X	**CIUDAD TRUJILLO, D. R.,** 25.07 m., Addr. La Voz de Hispaniola. Relays HIX Tue. and Fri. 8.10-10.10 pm.
11.955	IUC	**ADDIS ABABA, ETHIOPIA,** 25.09 m. Works IAC around 12 m.
11.950	KKQ	**BOLINAS, CALIF.,** 25.1 m. Tests irregularly evenings.
11.940	FTA	**STE. ASSISE, FRANCE,** 25.13 m. Works Morocco mornings and Argentina late afternoon.

25 Met. Broadcast Band

Mc.	Call	
11.910	CD1190	**VALDIVA, CHILE,** 25.2 m., P. O. Box 642. Relays CB69 10 am.-1 pm., 3-6 pm., 7-10 pm.
11.900	XEWI	**MEXICO CITY, MEXICO,** 25.21 m., Addr. P. O. Box 2874. Tues. and Thurs. 7.30 pm.-12 m., Fri. 9 pm.-12 m. Sun. 12.30-2 pm.
11.895	HP5I	**AGUADULCE, PANAMA,** 25.22 m. Addr. La Voz del Interior. 7.30-9.30 pm.
11.880	TPA3	**PARIS, FRANCE,** 25.23 m., Addr. (See 15.245 mc.) 2-5 am., 12.15-6 pm.
11.870	W8XK	**PITTSBURGH, PA.,** 25.26 m., Addr. (See 21.540 mc.) 7-11 pm.
11.860	YDB	**SOERABAJA, JAVA,** 25.29 m., Addr. N. I. R. O. M. Sat. 7.30 pm to 2.30 am., daily 10.30 pm. to 2 am.
11.860	GSE	**DAVENTRY, ENG.,** 25.29 m., Addr. (See 26.100 mc.) Irregular.
11.855	DJP	**BERLIN, GERMANY,** 25.31 m., Addr. (See 15.280 mc.) Irregular 11.35 am.-4, 7-10.45 pm.
11.845	—	**ESSARTS, FRANCE,** 25.34 m. Radio Coloniale. Testing.
11.840	KZRM	**MANILA, P. I.,** 25.35 m. Addr. Erlanger & Gallinger, Box 283. 9 pm.-10 am. Irregular.
11.840	CSW	**LISBON, PORT.,** 25.35 m. Nat'l Broad. Station. 11.30 am.-1.30 pm. Irregular.
11.840	OLR4A	**PRAGUE CZECHOSLOVAKIA,** 25.35 m., Addr. Czech Shortwave Sta., Praha XII, Fochova 16.
11.830	W9XAA	**CHICAGO, ILL.,** 25.36 m., Addr. Chicago Federation of Labor. Irregular 7 am.-6 pm.
11.830	W2XE	**NEW YORK CITY,** 25.36 m., Addr. Col. Broad. System, 485 Madison Av., N.Y.C. 1-6, 6.30 pm.-12 m.
11.826	XEBR	**HERMOSILLA, SON., MEX.,** 25.37 m., Addr. Box 68. Relays XEBH. 2-4 pm., 9 pm.-12 m.
11.820	GSN	**DAVENTRY, ENG.,** 25.38 m., Addr. (See 26.100 mc.) Irregular.
11.810	2RO	**ROME, ITALY,** 25.4 m., Addr. E.I.A.R., Via Montello 5. Daily 5-8.30 am., 10.30 am.-12.20 pm.
11.805	COGF	**MATANZAS, CUBA,** 25.41 m., Addr. Gen. Betancourt 51. Relays CMGF. 2-3, 4-5, 6-11 pm.
11.805	OZG	**SKAMLEBOAEK, DENMARK,** 25.41 m., Addr. Statsradiofonien. Irreg.
11.800	JZJ	**TOKIO, JAPAN,** 25.42 m., Addr. Broadcasting Co. of Japan, Overseas Division. 12.30-1.30, 7-7.30, 8-9.30 am., 2.30-4, 4.30-5.30, 6-6.30 pm.
11.795	DJO	**BERLIN, GERMANY,** 25.43 m., Addr. (See 15.280 mc.) Irregular.

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All Schedules Eastern Standard Time

many readers, limited as to antenna space, to erect such a beam, with its accepted excellency of results!

More in the next issue regarding this Flat-top beam antenna.

And now, regarding DX:

DELHI, INDIA

VUD, 9.59 mc., approximately, located at Delhi, is being heard here in the East with a surprisingly strong signal, rating R8-9 daily when it pounds in at 9.30 p.m., at which time the program begins.

Just commencing to be heard lately, this station is causing quite a sensation in DXing ranks, what with such a strong signal at this time of night, for the East Coast! Many DXers who were informed of this station, upon hearing it, could scarcely believe they were hearing a station in distant India!

VUD has its strongest peak just as it opens its programs, and about 11:30 p.m., the signal dies out. To receive this station one will experience little difficulty, as one merely has to tune in GSC on 9.58 mc., and tune just a hair off GSC towards the higher frequencies, and at once will be noticed another signal, which will usually be slightly QRM'd by London's strong carrier. However, using the '38 Skyrider, we can hear VUD with no interference whatever from GSC, when using the crystal, and with VUD still a good R6!

VUD transmits a typically Oriental program, consisting of chantings and native songs, with a chorus and orchestra frequently interspersed. Station opens at 9:30 p.m., with the familiar Westminster Chimes played by a clock, the clock chiming eight times, for 8 a.m. At 10:40 p.m., English news and station announcements are made, but at this time the signals are so much poorer that most of the announcement is lost.

An air-mail letter from an Indian DXer, Ahmed Nawaz, of Lahore, gives us more authentic data on VUD. This station also operates on 6.085 mc., and 3.49 mc.! On 6.085 mc., VUD is heard from 10:30 p.m.-midnight, and again from midnight-4 a.m., E.S.T. On 3.49 mc., signal is scheduled from 7:30 a.m.-12:30 p.m., E.S.T. This is very helpful data, and we thank Mr. Nawaz for his aid in giving full data on this rare scoop! The address is Station Manager, Station VUD, New Delhi, India.

Mr. Nawaz also sends a newspaper clipping from a native paper, showing the daily program of VUC, 6.11 mc., Calcutta, India, and the schedule, as Mr. Nawaz states, is quite different from that listed for VUC. VUC broadcasts daily from 3:29-5:59 a.m., and from 7:59 a.m.-1:14 p.m., E.S.T.

ZBIL — Malta— This is the first veri of a Maltese amateur in the U. S. Coloring blue.

In Burma, we have XYS, 12.87 mc., Mingaladon, heard phoning in inverted speech at 7 a.m. Good signal, as always.

JAVA

YDB, 4.47 mc., Soerabaja, is being heard with a fair signal most mornings, on this unusually low frequency, for an Asiatic. YDB has 1 kw. power.

"SPECIAL" FROM SIAM!

● **HS1BJ, 14,070 kc, Bangkok, Siam, operated by our friend Sangiem Powtongsook, Ass't Engineer at HS8PJ, Siamese National Station, will again Broadcast a program for our readers, and this time we feel conditions will be better than for the last Special. Times will be: March 31, April 1 and 2, from 6-8 a.m., 2 solid hours daily!! HS1BJ should be heard with good strength this time. Power is 25 watts, phone. Address reports, with a reply coupon to Sangiem Powtongsook, HS1BJ, Royal Siamese Post and Tel. Dept., Saladeng, Bangkok, Siam. Good luck to all!**

YDA, 3.04 mc., Tandjongpriok, is occasionally heard, but usually with a poorly modulated carrier, making logging difficult.

PMY, 5.145 mc., Bandoeng, also is heard well, being audible every a.m., and this station sends a neat QSL. PLP, 11.00 mc., Bandoeng, is almost inaudible now, strangely, while PMN, 10.26 mc., Bandoeng, is heard better than PLP, the reverse of what will be true this summer, as always, when PLP is heard with a powerful signal.

To any DXers needing Asiatic veris, these stations present an opportunity to add several good catches, and also to garner some attractive QSLs, as all but PMY are verified by N.I.R.O.M., with the beautiful QSL shown in Feb. issue. All above signals should be very well heard by the first of March, when this article is published.

ST. KITTS, B.W.I.

VP2LO, 6.38 mc., at Basseterre, was logged one Saturday at 5 p.m., when they were heard testing this new *broadcaster*, contacting VP2CD, an amateur.

This station will enable all DXers to add still another country to their logs, and with ease.

As yet VP2LO has no regular schedule, heard occasionally at 5 p.m., and reported by Eli Powers, W2, at 4 a.m., several Sundays. Constant watching on this frequency should reward the DXer with a new country, so go to it! QRA: Ica Radio Sales & Service, P.O. Box 88, Basseterre, St. Kitts, B.W.I.

MANCHUKUO

JDY, 9.925 mc., Dairen, is sending letter veris to many DXers of our acquaintance, and this nice Asiatic catch, a new country for all DXers, and a very easy signal to log, should be tuned for by all of our readers, as the station cannot be missed, being all alone on that frequency, consequently being very simple to "spot."

Station schedule is listed as from 7:10-8 a.m., daily, but heard here beginning at 7 a.m. sharp. A very strong signal, and *they do verify!* What more can any DXer ask of an Asiatic catch such as this? On their commercial transmissions, when phoning JVO, 10.37 mc., Nazaki, we have been unable to solicit a veri in 3 tries, but everyone, it seems, has received a veri of their broadcast period.

Address reports to: Manchuria Tel. and Tel. Co., 7, Oyamagori, Dairen, Kwantung Peninsula, Manchukuo. A handsome photo of the station bldg. is often included in the veri.

Harry Honda, W6, reports JDY, phoning JVO at 4 a.m., using inverted speech.

(Continued on page 717)

SPIDC — Pola —A rare veri from a Polish amateur. Blue printing on white card.

Mc.	Call	
11.790	OER3	VIENNA, AUSTRIA, 25.45 m. Daily 10 am.-5 pm. Sat. until 5.30 pm.
11.790	WIXAL	BOSTON, MASS., 25.45 m., Addr. (See 15.250 mc.) Daily 4.45-6.30 pm., Sat. 1.45-5.15, 6-6.30 pm., Sun. 3-6.30 pm.
11.770	DJD	BERLIN, GERMANY, 25.49 m., Addr. (See 15.280 mc.) 10.40 am.-4.30 pm., 4.50-11 pm.
11.760	TGWA	GUATEMALA CITY, GUAT., 25.51 m. (See 17.8 mc.) Sun., Tues. and Thurs. 8 pm.-12 m.
11.760	OLR4B	PRAGUE, CZECHOSLOVAKIA, 25.51 m., Addr. (See 11.875 mc.) Irregular.
11.750	GSD	DAVENTRY, ENG., 25.53 m., Addr. B.B.C., London. 3.15-5.30, 10.45 am.-12 n., 12.20-6.00 pm., 6.20-8.30, 9.15-11.15 pm.
11.740	HVJ	VATICAN CITY, 25.55 m. Testing irregular.
11.730	—	SAIGON, INDO CHINA, 25.57 m., Addr. Radio Philco. 11 pm.-1 am., 5.30-9.30 am.
11.730	PHI	HUIZEN, HOLLAND, 25.57 m., Addr. N. V. Philips' Radio.
11.720	CJRX	WINNIPEG, CANADA, 25.6 m., Addr. James Richardson & Sons, Ltd. Daily 6 pm.-12 m., Sun. 5-10 pm.
11.718	CR7BH	LAURENCO MARQUES, PORTUGUESE E. AFRICA, 25.6 m. Daily 12.05-1, 4.30-6.30, 9.30-11 am., 12.05-4 pm., Sun. 5-7 am., 10 am.-2 pm.
11.715	TPA4	PARIS, FRANCE, 25.61 m., (See 15.245 mc.) 6.15-8.15 pm., 10 pm.-1 am.
11.710	SBP	MOTALA, SWEDEN, 25.63 m., 1.20-2.05, 6-9 am., 11 am.-1 pm., Sat. 1.20-2 am., 6 am.-1.30 pm., Sun. 3 am.-1.30 pm.
11.710	YSM	SAN SALVADOR, EL SALVADOR, 25.63 m., Addr. (See 7.894 mc.) Irregular 1.30-2.30 pm.
11.700	HP5A	PANAMA CITY, PAN., 25.65 m. Addr. Radio Teatro, Apartado 954. 10 am.-10 pm.
11.700	CB1170	SANTIAGO, CHILE, 25.65 m. Relays CB89 6 pm.-12 m.
		End of Broadcast Band
11.680	KIO	KAHUKU, HAWAII, 25.68 m., Addr. RCA Comm. Irregularly.
11.595	VRR4	STONY HILL, JAMAICA, B. W. I., 25.87 m. Works WNC daytime.
11.560	VIZ3	FISKDALE, AUSTRALIA, 25.95 m., Addr. Amalgamated Wireless of Australasia Ltd. Tests irregularly.
11.530	SPD	WARSAW, POLAND, 26 m., Addr. 5 Mazowiecka St. Testing daily 6-8 pm., Sun. 6-9 pm.
11.500	XAM	MERIDA, YUCATAN, 26.09 m. Irregular 1-7.30 pm.
11.500	PMK	BANDOENG, JAVA, 26.09 m. Tests irregularly.
11.420	COCX	HAVANA, CUBA, 26.25 m. P. O. Box 32. 6.55 am.-1 am. Sun. till 12 m. Relays CMX.
11.413	CJA4	DRUMMONDVILLE, QUE., CAN., 26.28 m. Tests irregularly.
11.402	HBO	GENEVA, SWITZERLAND, 26.31 m., Addr. Radio Nations. Sat. 6.45-8 pm.
11.040	CSW	LISBON, PORTUGAL, 27.17 m., Addr. Nat. Broad. Sta. 1.30-5 pm.
11.005	ZLT4	WELLINGTON, NEW ZEALAND, 27.28 m. Works Australia and England early morning.
11.000	PLP	BANDOENG, JAVA, 27.27 m. Relays YDB. 6-7.30 p.m., 5.30-10.30 or 11 am. Sat. until 11.30 am.
10.970	OCI	LIMA, PERU, 27.35 m. Works Bogota, Col. evenings.
10.960	—	TANANARIVE, MADAGASCAR, 27.36 m., Addr. (See 9.53 mc.) 12.30-45, 3.30-4.30, 10-11 am.
10.840	KWV	DIXON, CALIF., 27.68 m., Addr. A.T.&T. Co. Works with Hawaii evenings.
10.770	GBP	RUGBY, ENGLAND, 27.85 m. Works Australia early morning.
10.740	JVM	NAZAKI, JAPAN, 27.93 m. Works U.S.A. 2-7 am.
10.675	WNB	LAWRENCEVILLE, N. J., 28.1 m., Addr. A.T.&T. Co. Works with Bermuda irregularly.
10.670	CEC	SANTIAGO, CHILE, 28.12 m. Irregular.
10.660	JVN	NAZAKI, JAPAN, 28.14 m. Broadcasts daily 2-8 am. Works Europe irregularly at other times.
10.600	ZIK2	BELIZE, BRIT. HONDURAS, 28.25 m., Tues., Thurs., Sat. 7.30-7.45 pm.
10.550	WOK	LAWRENCEVILLE, N. J., 28.44 m., Addr. A.T.&T. Co. Works S. A. nights.
10.535	JIB	TAIHOKU, TAIWAN, 28.48 m. Works Japan around 6.25 am. Broadcasts, relaying JFAK 9-10.25 am., 1-2.30 am. Sun. to 10.15 am.
10.520	VLK	SYDNEY, AUSTRALIA, 28.51 m., Addr. Amalgamated Wireless of Australasia Ltd. Works England 1-6 am.
10.430	YBG	MEDAN, SUMATRA, 28.76 m. 5.30-6.30 am., 7.30-8.30 pm.
10.420	XGW	SHANGHAI, CHINA, 28.79 m. Works Japan 12 m.-3 am.
10.410	PDK	KOOTWIJK, HOLLAND, 28.8 m. Works Java 7.30-9.40 am.
10.410	KES	BOLINAS, CALIF., 28.8 m., Addr. RCA Communications. Irregular.
10.370	JVO	NAZAKI, JAPAN, 28.93 m. Broadcasts around 5 am.
10.370	EAJ43	TENERIFFE, CANARY ISLANDS, 28.93 m. Relays Salamanca, Spain, 2.15-3.15, 6.15-10 pm.
10.350	LSX	BUENOS AIRES, ARG., 28.98 m., Addr. Transradio International. Tests irregularly.
10.330	ORK	RUYSSELEDE, BELGIUM, 29.04 m. 2.30-4 pm.
10.300	LSL2	BUENOS AIRES, ARG., 29.13 m., Addr. Cia. Internacional de Radio. Works Europe evenings.
10.290	DZC	ZEESEN, GERMANY, 29.16 m., Addr. (See 15.360 mc.) Irregular.
10.260	PMN	BANDOENG, JAVA, 29.24 m. Relays YDB 5.30-10.30 or 11 am., Sat to 11.30 am.
10.250	LSK3	BUENOS AIRES, ARG., 29.27 m., Addr. (See 10.310 mc.) Works Europe and U.S.A. afternoons and evenings.
10.230	CED	ANTOFAGASTAN, CHILE, 29.33 m. Tests 7-9.30 pm.
10.220	PSH	RIO DE JANIERO, BRAZIL, 29.35 m., Addr. Box 709. Broadcasts 6-9 pm.
10.160	RIO	BAKOU, U.S.S.R., 29.5 m. Works Moscow 10 pm.-5 am.
10.140	OPM	LEOPOLDVILLE, BELGIAN CONGO, 29.59 m. Works Belgium around 3 am. and from 1-4 pm.
10.080	RIR	TIFLIS, U.S.S.R., 29.76 m. Works Moscow early morning.
10.070	EDM-EHY	MADRID, SPAIN, 29.79 m. Works S. A. evenings.
10.065	JZB-TDB	SHINKYO, MANCHUKUO, 29.81 m. Works Tokio 6.30-7 am.
10.055	ZFB	HAMILTON, BERMUDA, 29.84 m. Works N.Y.C. irregular.
10.055	SUV	ABOU ZABAL, EGYPT, 29.84 m. Works Europe 1-6 pm.
10.042	DZB	ZEESEN, GERMANY, 29.87 m., Addr. Reichspostzenstralamt. Irregular.
9.990	KAZ	MANILA, P. I., 30.03 m., Addr. RCA Communications. Works Java early morning.
9.980	COBC	HAVANA, CUBA, 30.04 m., Addr. P. O. Box 132. Relays CM8C 6:55 a.m.-12:30 a.m.
9.950	GCU	RUGBY, ENGLAND, 30.15 m. Works N.Y.C. night time.
9.940	CSW	LISBON, PORTUGAL, 30.18 m. Addr. Nat. Broad. Sta. 5-7 pm.
9.940	JDY	DAIREN, MANCHUKUO, 30.18 m. Relays JQAK daily 6.50-8 am.
9.930	HKB	BOGOTA, COL., 30.21 m. Works Rio evenings.
9.890	LSN	BUENOS AIRES, ARG., 30.33 m., Addr. (See 10.300 mc.) Works N.Y.C. evenings.
9.870	WON	LAWRENCEVILLE, N. J., 30.4 m., Addr. A.T.&T. Co. Works England nights.
9.865	COCM	HAVANA, CUBA, 30.41 m., Addr. Transradio Columbia, P. O. Box 33. 7 am.-12 m. Relays CMCM.
9.860	EAQ	MADRID, SPAIN, 30.43 m., Addr. Post Office Box 951. Irregular.
9.830	IRF	ROME, ITALY, 30.52 m. Works Egypt afternoons. Relays 2RO, 6-9 pm.
9.800	XGOX	NANKING, CHINA, 30.61 m., Reported off the air.
9.800	LSI	BUENOS AIRES, ARG., 30.61 m., Addr. (See 10.350 mc.) Tests irregularly.
9.790	GCW	RUGBY, ENGLAND, 30.64 m., Works N.Y.C. evenings.
9.760	VLJ-VLZ2	SYDNEY, AUSTRALIA, 30.74 m., Addr. Amalgamated Wireless of Australasia Ltd. Works Java and New Zealand early morning.
9.750	WOF	LAWRENCEVILLE, N. J., 30.77 m., Addr. A.T.&T. Co. Works London and Paris night time.
9.745	COCQ	HAVANA, CUBA, 30.78 m. Addr. 25 No. 445, Vedado, Havana. 6.55 am.-1 am. Sun. till 12 m.
9.710	GCA	RUGBY, ENGLAND, 30.9 m. Works S. A. evenings.
9.698	TI4NRH	HEREDIA, COSTA RICA, 30.91 m., Addr. Amando C. Marin, Apartado 40. Sun. 7-8.30 am., Irregular evenings.
9.685	TGWA	GUATEMALA CITY, GUAT., 30.96 m. Irregular.
9.680	FZF6	FORT DE FRANCE, MARTINIQUE, 30.97 m., Addr. P. O. Box 136. 11.30 am.-12.30 pm., 6.15-7.50 pm.
9.675	DZA	ZEESEN, GERMANY, 31.01 m., Addr. (See 10.042 mc.) Irregular.
9.660	LRX	BUENOS AIRES, ARG., 31.06 m., Addr. El Mundo. 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.
9.640	CXA8	COLONIA, URUGUAY, 31.12 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	JFO	TAIHOKU, TAIWAN, 31.16 m. Relays JFAK irreg. 8-10.25 am., 1-2.30 am., Sun. 8-10.15 am.
9.617	HJ1ABP	CARTAGENA, COL., 31.20 m., Addr. P. O. Box 37. 11 am.-1 pm., 5-11 pm., Sun. 10 am.-1 pm., 3-6 pm.
9.615	ZRK	KLIPHEUVAL, SOUTH AFRICA, 31.2 m., Addr. P. O. Box 4559, Johannesburg. Daily, exc. Sat. 11.45 pm.-12.40 am. Daily exc. Sun. 3.20-7.20. 9-11.40 am., Sun, 4-5.30, 8-11.40 am.
9.607	HP5J	PANAMA CITY, PANAMA, 31.23 m. Addr. Apartado 867. 12 n. to 1.30 pm., 6-10.30 pm.

31 Met. Broadcast Band

Mc.	Call	
9.600	RAN	MOSCOW, U.S.S.R., 31.25 m. Daily 7-9.15 pm.
9.595	HBL	GENEVA, SWITZERLAND, 31.27 m., Addr. Radio Nations. Irregular.
9.590	PCJ	HUIZEN, HOLLAND, 31.28 m., Addr. (See 15.220 mc.) Sun. 2-3, 7-9.15 pm., Tues. 5.30-8 am., 2-3.30 pm., Thurs. 7-8.30, 9-10.30 pm.
9.590	VK6ME	PERTH, W. AUSTRALIA, 31.28 m., Addr. Amalgamated Wireless of Australasia, Ltd. 6-8 am. exc. Sun.
9.590	VK2ME	SYDNEY, AUSTRALIA, 31.28 m., Addr. Amalgamated Wireless of Australasia, Ltd., 47 York St., Sun. 1-3 am., 5-9, 9.30-11.30 am.
9.590	W3XAU	PHILADELPHIA, PA., 31.28 m. Relays WCAU 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, 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. Radio Universal 6-10 pm.
9.570	KZRM	MANILA, P. I., 31.35 m., Addr. Erlanger & Galinger, Box 283. 4.30-6 pm., 5-9 am., Sun 4-10 am.

(Continued on page 682)

All Schedules Eastern Standard Time

New Experiments With Radio Apparatus

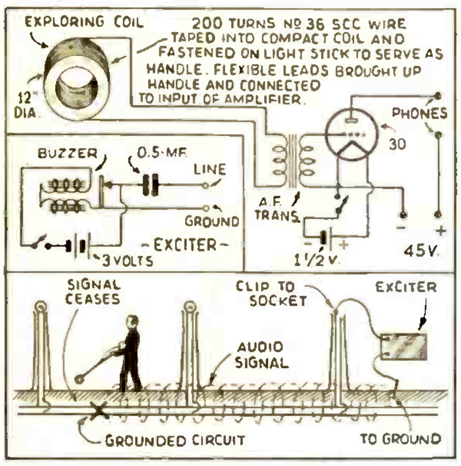
MONEY FOR YOUR IDEAS!

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.

First Prize -- $10.00

Faulty Circuit Locator

● I AM pleased to submit a brief description of the construction and use of an instrument which has saved us many hours of labor, and shortened the time required



This simple device locates faults in lighting or other circuits and is easily and cheaply made.

to locate and repair outages of our multiple low-voltage underground street-lighting circuits.

In practically every case of trouble, whether an *open- or short-circuit*, these circuits show *grounded*. Therefore, an instrument that will show the spot where the circuit is grounded, without digging, is certainly of great benefit to the trouble-shooter.

I devised a system, using two units, an *exciter* and an *exploring coil* connected through a small amplifier to a headset.

As shown by the accompanying sketch, the *exciter* consists simply of a buzzer *(Continued on page* 689)

Inter-Office Carrier Phone System

● INTER-OFFICE telephone systems are being widely adopted, the instruments used for both talking and listening utilizing radio parts such as tubes, resistors, loudspeakers, etc. The accompanying diagram shows one form of *carrier type* inter-phone using four tubes and an additional so-called tube containing a ballast resistor.

A dynamic speaker of the permanent magnet type and about 5" in diameter serves very well as both transmitter and receiver, a simple gang-switch being turned to send or receive. (Marked "S" or "R" in diagram.) The power-supply uses a 25Z6 tube and a 300 ohm A.C.-D.C. choke, shunted by two 8 mf. electrolytic condensers. A jack is provided for headphone reception, which is sometimes quite desirable; pilot lights indicate the *send* and *receive* conditions. A gain control is also provided, and the whole affair fits into a 5" x 6" x 9" cabinet, which should be of metal to prevent R.F. radiation.

A 25A6, triode-connected, is used as the detector-oscillator as the diagram shows. I.F.T.1, may be most anything: for example, a broadcast R.F. transformer capable of being tuned to a point below or above the regular B.C. channels. Again it may be an I.F. transformer or a single layer home-made coil, tuned by a small condenser to any desired operating frequency.

The 25A6 tube is used as the modulator power-amplifier and a 6F5 is the voltage amplifier for the loudspeaker when used as a microphone. The ganged "*send* to *receive*" changeover switch is a 4-pole double-throw type. The coil used at T1 is a universal output transformer, the voice-coil of which remains unused. Note that the chassis is connected to B– only through the condenser C16. The return connections for the electrolytic filter condensers and also the by-pass condensers are joined to B–.

When the switch is turned to the *send* position the 10,000 ohm resistor is connected to ground. In case difficulty is had with the 25A6 tube as det.-osc., so far as oscillation is concerned, the recommended substitute is a 6J7. When different tubes are substituted, care must be taken to make any required change in the value of the ballast resistor.

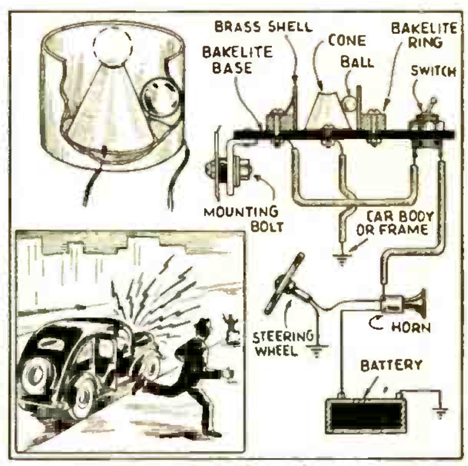
For further details on this carrier type inter-phone system, refer to the June 1937 issue of *Radio-Craft*.

Second Prize -- $5.00

Automobile Theft Alarm

● HERE is a simple motor-car theft alarm which I have constructed from an old tube socket. I turned a piece of metal in a lathe in the shape of a cone as shown in the drawing; then I machined out a slight depression at the top of the cone in which a brass or steel ball would rest when carefully placed thereon.

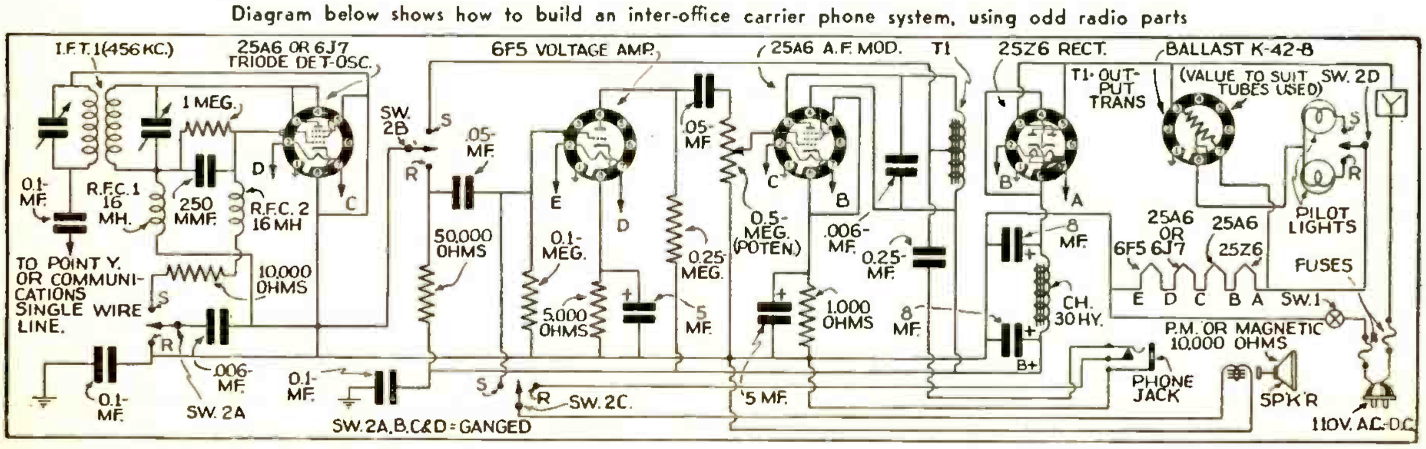
The diagram shows how this auxiliary



One of the simplest and yet most sensitive electric theft alarms for attachment to automobiles is that shown here. It is made from an old tube socket.

alarm circuit for the horn is wired. If anyone jars the car, such as would be the case when trying to remove a tire or break open *(Continued on page* 707)

Diagram below shows how to build an inter-office carrier phone system, using odd radio parts



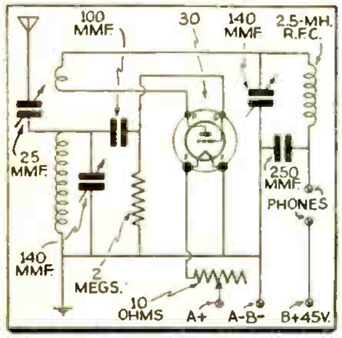
Mc.	Call	
9.570	WIXK	**SPRINGFIELD, MASS.,** 31.35 m., Addr. Westinghouse Electric & Mfg. Co. Relays WBZ 7 am. to 1 am. Sun. 8 am. to 1 am.
9.560	DJA	**BERLIN, GERMANY,** 31.38 m., Addr. Broadcasting House. 12.05-11 am., 4.50-10.45 pm.
9.550	OLR3A	**PRAGUE, CZECHOSLOVAKIA,** 31.41 m. (See 11.840 mc.) Daily exc. Sun. 10.05-11 am., daily 12.55-4.40 pm. Sun. 6.15-8.55 pm. Irregular Mon., Wed., Fri. 8-10.35 pm.
9.550	—	**FRANCE,** 31.41 m. Radio Coloniale. Testing evenings.
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 am., 2.30-4, 4.30-5.30 pm.
9.535	HB9D	**ZURICH, SWITZERLAND,** 31.46 m., Addr. Radio Club of Zurich, Post Box Zurich 2. Sun. 9-11 am., Thur. 1-3 pm.
9.530	W2XAF	**SCHENECTADY, N. Y.,** 31.48 m., Addr. General Electric Co. 4 pm.-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.
9.526	XEDQ	**GUADALAJARA, GAL., MEXICO,** 31.49 m. Irregular 7.30 pm. to 12.30 am.
9.525	ZBW3	**HONGKONG, CHINA,** 31.49 m., Addr. P. O. Box 200. 11.30 pm. to 1 am., 4-10 am., Sat. 9 pm.-1 am., Sun. 3-9.30 am.
9.525	LKJ1	**JELOY, NORWAY,** 31.49 m. 5-8 am.
9.523	ZRH	**ROBERTS HEIGHTS, S. AFRICA,** 31.5 m., Addr. (See ZRK, 9.606 mc.) Daily exc. Sat. 11.45 pm-12.45 am.; Daily exc. Sun. 5-7.30 am.; Sun. 3 or 3.30 to 4.30 or 5 am.
9.520	HJ6ABH	**ARMENIA, COLOMBIA,** 31.51 m. 8-11 am., 6-10 pm.
9.520	OZF	**SKAMLEBOAEK, DENMARK,** 31.51 m., Addr. Statsradiofonien, Copenhagen,. 2-6.40 PM.
9.520	YSH	**SAN SALVADOR, EL SALVADOR** 31.51 m., Addr. (See 7.894 mc.) Irregular 6-10 pm.
9.510	GSB	**DAVENTRY, ENGLAND,** 31.55 m., Addr. (See 9.580 mc.—GSC) 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.
9.510	HJU	**BUENAVENTURA, COLOMBIA,** 31.55 m., Addr. National Railways. Mon., Wed. and Fri. 8-11 pm.
9.500	VK3ME	**MELBOURNE, AUSTRALIA,** 31.58 m., Addr. Amalgamated Wireless of Australasia, 167 Queen St. Daily except Sun. 4-7 am.
9.500	XEWW	**MEXICO CITY, MEX.,** 31.58 m. Addr. Apart. 2516. Relays XEW. 6 pm.-12 m.
9.500	PRF5	**RIO DE JANIERO, BRAZ.,** 31.58 m. Irregularly 4.45 to 5.45 pm.
9.488	EAR	**MADRID, SPAIN,** 31.6 m., Addr. (See 9.860 mc.) 7.30-8.30 pm. Mon., Tues., Thur., Sat. at 9.30 pm. also.
		End of Broadcast Band
9.460	ICK	**TRIPOLI, N. AFRICA,** 31.71 m. Works Rome, 5.30-7 am.
9.445	HCODA	**GUAYAQUIL, ECUADOR,** 31.77 m. Irregularly till 10.40 pm.
9.428	COCH	**HAVANA, CUBA,** 31.8 m., Addr. 2 B St., Vedado. 7 am.-1 am.
9.415	PLV	**BANDOENG, JAVA,** 31.87 m. Works Holland around 9.45 am. Broadcasts 5.30-9.30 am., 6-6.30 pm.
9.355	HC1ETC	**QUITO, ECUADOR,** 32.05 m., Addr. Teatro Bolivar, Thurs. until 9:30 p.m.
9.345	HBL	**GENEVA, SWITZERLAND,** 32.08 m., Addr. Radio Nations Fri. 7:15-8:30 p.m., 6:45-8 p.m.
9.330	CGA4	**DRUMMONDVILLE, CANADA,** 32.15 m. Works England irreg.
9.330	OAX4J	**LIMA, PERU,** 32.15 m., Addr. Box 1166, "Radio Universal." 12 n.-3 pm., 5 pm.-1 am.
9.290	HIG	**CIUDAD TRUJILLO, D. R.,** 32.29 m. 7.10-8.40 am., 11.40 am.-2.10 pm., 3.40-8.40 pm.
9.280	HC2CW	**GUAYAQUIL, ECUADOR,** 32.31 m., 11.30 am.-12.30 p.m., 8-11 pm.
9.280	GCB	**RUGBY, ENGLAND,** 32.33 m. Works Canada and Egypt evenings and afternoons.
9.200	COBX	**HAVANA, CUBA,** 32.59 m. Addr. San Miguel 194, Altos. Relays CMBX 7 am.-12 m.
9.170	WNA	**LAWRENCEVILLE, N. J.,** 32.72 m. Works England evenings.
9.150	YVR	**MARACAY, VENEZUELA,** 32.79 m. Works with Europe afternoons.
9.125	HAT4	**BUDAPEST, HUNGARY,** 32.88 m., Addr. "Radiolabor," Gyali-ut, 22. Sun. and Wed. 7-8 pm., Sat. 6-7 pm.
9.100	COCA	**HAVANA, CUBA,** 32.95 m., Addr. Galiano No. 102. Relays CMCA 9 am.-12 m.
9.060	TFK	**REYKJAVIK, ICELAND,** 33.11 m. Works London afternoons.
9.020	COBZ	**HAVANA, CUBA,** 33.26 m., Radio Salas Addr. P. O. Box 866. 7:45 am.-12.10 am. Irreg. 12.30-2 am. Relays CM8Z.
9.020	GCS	**RUGBY, ENG.,** 33.26 m. Works N. Y. C. evenings.
9.010	KEJ	**BOLINAS, CAL.,** 33.3 m. Relays NBC and CBS programs in evening irregularly.
8.967	VWY	**KIRKEE, INDIA,** 33.43 m. Works with England in morning.
8.965	COKG	**SANTIAGO, CUBA,** 33.44 m. Addr. Box 137. 9-10 am., 11.30 am.-1.30 pm., 3-4.30, 5-6, 10-11 pm., 12 m.-2 am.
8.960	TPZ	**ALGIERS, ALGERIA,** 33.48 m. Works Paris afternoons.
8.841	HCJB	**QUITO, ECUADOR,** 33.5 m. 7-8.30 am., 11.45 am.-2.30 pm., 5-10 pm., except Mon. Sun. 12 n.-1.30 pm., 5.30-10 pm.
8.775	PNI	**MAKASSER, CELEBES, N. I.,** 34.19 m. Works Java around 4 am.
8.765	DAF	**NORDDEICH, GERMANY,** 34.23 m. Works German ships irregularly.
8.760	GCQ	**RUGBY, ENG.,** 34.25 m. Works Africa afternoons.
8.750	FZE8	**DJIBOUTI, FR. SOMALILAND, AFRICA** 34.29 m. Works Paris around 2.30 am.
8.730	GCI	**RUGBY, ENG.,** 34.36 m. Works India 8 am.
8.720	VPD3	**SUVA, FIJI ISLES,** 34 m., Addr. (See 9.540 mc., VPD2). Irregular.
8.700	HKV	**BOGOTA, COLOMBIA,** 34.46 m. Tues. and Fri. 7-7.20 pm.
8.860	GBC	**RUGBY, ENG.,** 34.56 m. Works ships irregularly.
8.665	COJK	**CAMAGUEY, CUBA,** 34.64 m., Addr. Finlay No. 3 Altos. 5.30-6.30, 8-11 pm., daily except Sat. and Sun.
8.665	W2XGB	**HICKSVILLE, N. Y.,** 34.64 m., Addr. Press Wireless, Mon. to Fri. News at 9 am. and 5 pm.
8.580	YNPR	**MANAGUA, NICARAGUA,** 34.92 m. Radiodifusora Pilot.
8.560	WOO	**OCEAN GATE, N. J.,** 35.05 m. Works ships irregularly.
8.380	IAC	**PISA, ITALY,** 35.8 m. Works Italian ships irregularly.
8.185	PSK	**RIO DE JANEIRO, BRAZIL,** 36.65 m. Irregularly.
8.036	CNR	**RABAT, MOROCCO,** 37.33 m. Sun. 2.30-5 pm. Irregular.
7.901	LSL	**BUENOS AIRES, ARGENTINA,** 37.97 m. Works Brazil at night.
7.894	YSD	**SAN SALVADOR, EL SALVADOR,** 37.99 m., Addr. Dir. Genl. Tel. & Tel. 7-11 pm.
7.870	HC1RB	**QUITO, ECUADOR,** 38.1 m. La Voz de Quito. 9-11 pm.
7.860	SUX	**ABOU ZABAL, EGYPT,** 38.17 m. Works with Europe, 4-6 pm.
7.854	HC2JSB	**GUAYAQUIL, ECUADOR,** 38.2 m. Evenings to 11 pm.
7.797	HBP	**GENEVA, SWITZERLAND,** 38.48 m., Addr. Radio-Nations. Sat. 5.30-6.30 pm.
7.715	KEE	**BOLINAS, CAL.,** 38.89 m. Relays NBC and CBS programs in evening irregularly.
7.626	RIM	**TACHKENT, U.S.S.R.,** 39.34 m. Works with Moscow in early morning.
7.610	KWX	**DIXON, CAL.,** 39.42 m. Works with Hawaii, Philippines, Java and Japan, nights.
7.540	RKI	**MOSCOW, U.S.S.R.,** 39.76 m. Relays RAN 7-9.15 pm. Works RIM early am.
7.520	KKH	**KAHUKU, HAWAII,** 39.87 m. Works with Dixon and broadcasts irregularly nights.
7.510	JVP	**NAZAKI, JAPAN,** 39.95 m. Irreg.
7.410	HCJB4	**QUITO, ECUADOR,** 40.46 m., 7-9.30 pm. irregularly.
7.390	ZLT2	**WELLINGTON, N. Z.,** 40.6 m. Works with Sydney, 3-7 am.
7.38	XECR	**MEXICO CITY, MEX.,** 40.65 m., Addr. Foreign Office. Sun. 6-7 pm.
7.220	HKE	**BOGOTA, COL., S. A.,** 41.55 m. Tues. and Sat. 8-9 pm. Mon. and Thurs. 6.30-7 pm.
7.200	YNAM	**MANAGUA, NICARAGUA,** 41.67 m. Irregular at 9 pm.
7.100	FO8AA	**PAPEETE, TAHITI,** 42.25 m., Addr. Radio Club Oceanien. Tues. and Fri. 11 pm.-12.30 am.
7.090	—	**GUADALAJARA, JALISCIO, MEX.,** 42.29 m., Addr. Madero 210, 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.
6.990	XEME	**MERIDA, YUCATAN,** 42.89 m., Addr. Calle 59, No. 517, "La Voz de Yucatan desde Merida." Irregular.
6.977	XBA	**TACUBAYA, D. F., MEX.,** 43 m. 9.30 am.-1 pm., 7-8.30 pm.
6.905	GDS	**RUGBY, ENG.,** 43.45 m. Works N.Y.C. evenings irregularly.
6.860	KEL	**BOLINAS, CALIF.,** 43.70 m. Tests irregularly. 11 am.-12n., 6-9 pm.
6.850	XGOX	**NANKING, CHINA,** 43.8 m. Daily 6.40-8.40 am., Sun. 4.40-6.05 am.
6.805	HI7P	**CIUDAD TRUJILLO, DOM. REP.,** 44.06 m., Addr. Emisoria Diaria de Commercio. Daily exc. Sat. and Sun. 12.40-1.40, 6.40-8.40 pm. Sat. 12.40-1.40 pm. Sun. 10.40 am.-11.40 am.
6.790	PZH	**PARAMIRABO, DUTCH GUIANA,** 44.16 m., Addr. P. O. Box 18. Daily 6.06-8.36 am., Sun. 9.36-11.36 am. Daily 5.36-8.36 pm.
6.775	HIH	**SAN PEDRO DE MACORIS, DOM. REP.,** 44.26 m. 12.10-1.40 pm., 7:30-9 pm. Sun. 3-4 am., 4.15-6 pm., 4.40-7.40 pm.
6.755	WOA	**LAWRENCEVILLE, N. J.,** 44.41 m., Addr. A.T.&T. Co. Works Eng. evenings.
6.750	JVT	**NAZAKI, JAPAN,** 44.44 m., Addr. Kokusai-Denwa Kaisha, Ltd., Tokio. Irregular.
6.730	HI3C	**LA ROMANA, DOM. REP.,** 44.58 m., Addr. "La Voz de la Feria." 12.30-2 pm., 5-6 pm.
6.720	PMH	**BANDOENG, JAVA,** 44.64 m. Relays NIROM programs. 5.30-9 am.
6.690	TIEP	**SAN JOSE, COSTA RICA,** 44.82 m., Addr. Apartado 257, La Voz del Tropico. Daily 7-10 pm.
6.672	—	—— 44.94 m., relays Salamanca, Spain, evenings.
6.672	YVQ	**MARACAY, VENEZUELA,** 44.95 m. Irregular.
6.650	IAC	**PISA, ITALY,** 45.11 m. Works ships irregularly.
6.635	HC2RL	**GUAYAQUIL, ECUADOR, S. A.,** 45.18 m., Addr. P. O. Box 759. Sun. 5.45-7.45 pm., Tues. 9.15-11.15 pm.
6.630	HIT	**CIUDAD TRUJILLO, D. R.,** 45.25 m., Addr. "La Voz de la RCA Victor," Apartado 1105. Daily exc. Sun. 12.10-1.40 pm., 5.40-8.40 pm.; also Sat. 10.40 pm.-12.40 am.
6.625	PRADO	**RIOBAMBA, ECUADOR,** 45.28 m. Thurs. 9-11.45 pm.

(Continued on page 684)

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.



Set for Battery Use—1116

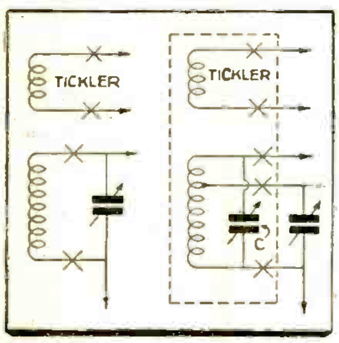
? BATTERY SET

Please print a diagram of a 1-tube battery receiver using a 30 type tube, 4-prong plug-in coils and a 140 mmf. condenser to control regeneration. I intend to use a short piece of copper tubing for the antenna.—Edward H. Nagel, Buffalo, N. Y.

A. We have reproduced the diagram you requested. This receiver can be used with any type of antenna, but when using the short piece of copper tubing it would probably be advisable to try *shorting* out the antenna coupling condenser completely. Signal pick-up will not be very great with a small antenna.

? BANDSPREAD COILS

I have a 2-tube receiver using 4-prong plug-in coils. How can I connect 5-prong bandspread coils in it?—Marc Molyneux, Jr., Saraland, Ala.



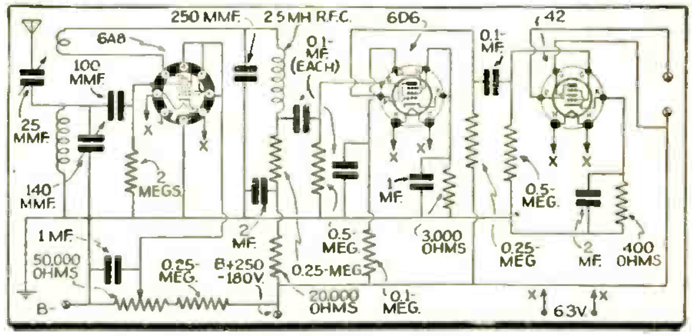
Using Bandspread Coils—1117

A. We have drawn a diagram showing the proper method of making the change. You will notice that condenser C is self-contained within the bandspread coils. The external connections are made only at the points marked X.

? POWER UNIT

Please publish a diagram of a power pack having very low hum level for experimental purposes.—R. Hayhurst, Toronto, Ont.

A. We have drawn the diagram of a universal type power supply. The value of the high voltage winding has not been shown because this would depend upon the output voltage desired by the user. The rectifier tube is an 80. The power transformer should be capable of supplying the required voltages at the required current drain. The current drain, of course, depends upon the number and type of tubes in the receiver with which the unit is used. The bleeder should have a value of 20,000 ohms—20 watts, for output voltages ranging from 200 to 300 volts. The chokes should have the specified inductance at the current drain at which they will be operated. For example, a 10 henry choke designed for operation with a current of 65 ma. will have a much higher inductance at a lower current drain and a much lower inductance at a higher current drain. For an output voltage of 250 at a current drain of about 50 ma., the high voltage winding should be approximately 300 volts each side of center-tap.



3-Tube Receiver—1119

? 3-TUBE RECEIVER

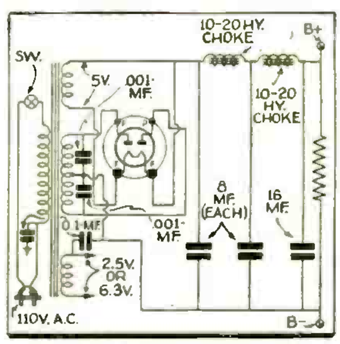
Please print a circuit with a 6A8 as a detector, 6D6 as a first A.F. and 42 for the output.—Gerald Pipin, Farnham, P. Q.

A. Although we do not recommend the use of a 6A8 as a regenerative detector, we have drawn a diagram as you requested. Note particularly the way the extra grids of the 6A8 are connected. It would be better to use a 6C6 or 6D6 as the detector.

The combination of the 6D6 and 42 for the audio stages should result in a quite high-gain audio system. The output of the 42 should be fed to a loudspeaker through a coupling transformer.

? 2-TUBE RECEIVER USING A 24 AND A 27

Please publish the circuit of a 2-tube set using a 24 and a 27.—James Sutera, Brooklyn, N. Y.



Low Hum Power Supply—1118

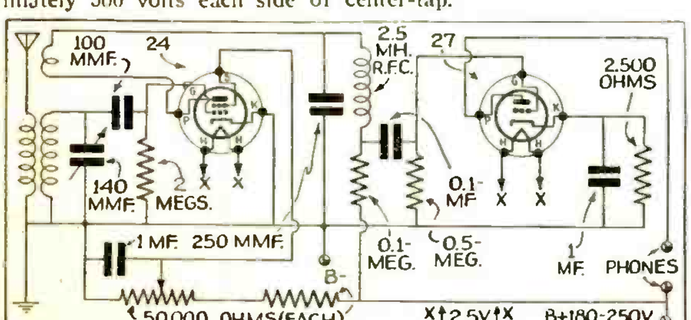
A. The circuit you request is reproduced on this page. A 24 tube is used as a regenerative detector employing a screen grid potentiometer for regeneration control and a 27 tube as an A.F. amplifier. Ordinary 6-prong plug-in coils can be used. (1120)

? PORTABLE 2

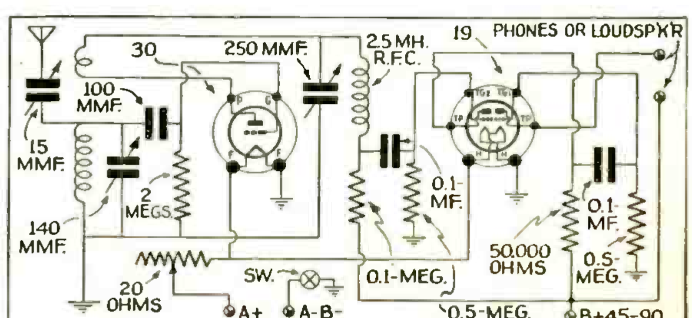
Please diagram a receiver employing a 30 and a 19 type tube for portable use.—Raymond Chandler, Springfield, Mo.

A. A circuit employing these tubes is shown. The 30 is used as a regenerative detector and the 19 as a 2-stage A.F. amplifier. Four-prong plug-in coils may be used for the set, which can very easily be made into a portable unit.

Regeneration is controlled by a 250 mmf. variable condenser in the plate circuit of the 30. For a saving in filament current consumption, the 19 tube might be replaced by a 1J6G, an octal based tube identical to the 19, except that it consumes less filament current.



Set with a 24 and a 27 Tube—1120



Portable 2-Tube Circuit—1121

Mc.	Call	
6.558	HI4D	**CIUDAD TRUJILLO, D. R.,** 45.74 m. Except Sun. 11.55 am.-1.40 pm.
6.550	XBC	**VERA CRUZ, MEX.,** 45.8 m. 8.15-9 am.
6.550	TIRCC	**SAN JOSE, COSTA RICA,** 45.8 m., Addr. Radioemisora Catolica Costarricense. Sun. 11 am.-2 pm., 6-7, 8-9 pm. Daily 12 n.-2 pm., 6-7 pm., Thurs. 6-11 pm.
6.545	YV6RB	**BOLIVAR, VENEZUELA,** 45.84 m., Addr. "Ecos de Orinoco." 6-10.30 pm.
6.520	YV4RB	**VALENCIA, VENEZUELA,** 45.98 m. 11 am.-2 pm., 5-10 pm.
6.516	YNIGG	**MANAGUA, NICARAGUA,** 46.02 m., Addr. "La Voz de los Lagos." 8-9 pm.
6.500	HIL	**CIUDAD TRUJILLO, D. R.,** 46.13 m. Addr. Apartado 623. 12.10-1.40 pm., 5.40-7.40 pm.
6.490	HIIL	**SANTIAGO DE LOS CABALLEROS, D. R.,** 46.2 m., Addr. Pres., Trujillo 97, Altos., 5.40-7 pm.
6.470	YNLAT	**GRANADA, NICARAGUA,** 46.36 m., Addr. Leonidas Tenoria, "La Voz del Mombacho." Irregular.
6.465	YV3RD	**BARQUISIMETO, VENEZUELA,** 46.37 m. Radio Barquisimeto, irregular.
6.450	HI4V	**SAN FRANCISCO DE MACORIS, D. R.,** 46.48 m. 11.40 am.-1.40 pm., 5.10-9.40 pm.
6.440	TGQA	**QUETZALTENANGO, GUATEMALA,** 46.56 m. Irregular eve.
6.420	HIIS	**SANTIAGO, D. R.,** 46.73 m. 11.40 am.-1.40 pm., 5.40-7.40, 9.40-11.40 pm.
6.416	YV6RC	**BOLIVAR, VENEZUELA,** 46.73 m. Radio Bolivar.
6.410	TIPG	**SAN JOSE, COSTA RICA,** 46.8 m., Addr. Apartado 225, "La Voz de la Victor." 12 n.-2 pm., 6-11.30 pm.
6.400	YV5RH	**CARACAS, VENEZUELA,** 46.88 m. 7-11 pm.
6.388	HI8J	**LAS VEGAS, D. R.,** 46.92 m., Irreg.
6.384	VP2LO	**STE. KITTS, LEEWARD ISLANDS, B.W.I.** 46.96 m. Irregular around 5 pm.
6.380	YV5RF	**CARACAS, VENEZUELA,** 46.92 m., Addr. Box 983. 6-10.30 pm.
6.370	TIBWS	**PUNTARENAS, COSTA RICA,** 47.07 m., Addr. "Ecos Del Pacifico", P. O. Box 75. 6 pm.-12 m.
6.365	YVIRH	**MARACAIBO, VENEZUELA,** 47.18 m., Addr. "Ondas Del Lago," Apartado de Correos 261. 6-7.30 am., 11 am.-2 pm., 5-11 pm.
6.360	HRPI	**SAN PEDRO SULA, HONDURAS,** 47.19 m. 7.30-9.30 pm.
6.340	HIIX	**CIUDAD TRUJILLO, D. R.,** 47.32 m. Sun. 7.40-10.40 am., daily 12.10-1.10 pm., Tues. and Fri. 8.10-10.10 pm.
6.335	OAXIA	**ICA, PERU,** 47.33 m., Addr. La Voz de Chiclayo, Casilla No. 9. 8-11 pm.
6.324	COCW	**HAVANA, CUBA,** 47.4 m., Addr. La Voz de las Antillas, P. O. Box 130. 6.55 am.-1 am. Sun. 10 am.-10 pm.
6.310	HIZ	**CIUDAD TRUJILLO, D. R.,** 47.52 m. Daily except Sat. and Sun. 11.10 am.-2.25 pm., 5.10-8.40 pm. Sat. 5.10-11.10 pm. Sun. 11.40 am.-1.40 pm.
6.300	YV4RD	**MARACAY, VENEZUELA,** 47.62 m. 6.30-9.30 pm. exc. Sun.
6.295	OAX4G	**LIMA, PERU,** 47.63 m., Addr. Apartado 1242. Daily 7-10.30 pm.
6.290	HIG	**TRUJILLO CITY, D. R.,** 47.67 m. 7.10-8.40 am., 11.40 am.-2.10 pm., 3.40-8.40 pm.
6.280	COHB	**SANCTI SPIRITUS, CUBA,** 47.77 m., Addr. P. O. Box 85. 9-11.30 am., 12.30-1.30, 4-7, 8-11 pm.
6.270	YV5RP	**CARACAS, VENEZUELA,** 47.79 m., Addr. "La Voz de la Philco." Daily to 10.30 pm.
6.255	YV5RJ	**CARACAS, VENEZUELA,** 47.18 m.
6.243	HIN	**CIUDAD TRUJILLO, D. R.,** 48 m., Addr. "La Voz del Partido Dominicano." 12 n.-2 pm., 6-10 pm.
6.235	HRD	**LA CEIBA, HONDURAS,** 48.12 m., Addr. "La Voz de Atlantida." 8-11 pm.; Sat. 8 pm.-1 am.; Sun. 4-6 pm.
6.225	YVIRG	**VALERA, VENEZUELA,** 48.15 m. 6-9.30 pm.
6.220	—	**SAIGON, INDO-CHINA,** 48.2 m., Addr. Radio Philco. 4.30 or 5.30-9.30 am.
6.210	TG2	**GUATEMALA CITY, GUAT.,** 48.28 m., Addr. Secretaria de Fomento. Relays TGI 11 pm.-2 am.
6.205	YV5RI	**CORO, VENEZUELA,** 48.32 m., Addr. Roger Leyba, care A. Urbina y Cia. Irregular.
6.200	HI8Q	**CIUDAD TRUJILLO, D. R.,** 48.36 m. Irregular.
6.185	HIIA	**SANTIAGO, D. R.,** 48.5 m., Addr. P. O. Box 423. 7 am.-5 pm.
6.171	XEXA	**MEXICO CITY, MEX.,** 48.61 m., Addr. Dept. of Education. 7-11 pm.
6.160	VPB	**COLOMBO, CEYLON,** 48.7 m. Daily exc. Thurs. and Fri., 6.30 am.-12.30 pm; Sun. 7-11.30 am.
6.156	YV5RD	**CARACAS, VENEZUELA,** 48.71 m. 11 am.-2 pm., 4-10.40 pm.
6.153	HI5N	**MOCA CITY, D. R.,** 48.75 m. 6.40-9.10 pm.

49 Met. Broadcast Band

Mc.	Call	
6.150	ZRD	**DURBAN, SOUTH AFRICA,** 48.78 m., Addr. (See ZRK, 9.606 mc.) Daily exc. Sat. 11.45 pm.-12.45 am.; Daily exc. Sun. 3.30-7.30 am., 9 am.-3.45 pm.; Sun. 8-11.30 am., 12 n.-3.20 pm.
6.150	CJRO	**WINNIPEG, MAN., CANADA,** 48.78 m., Addr. (See 11.720 mc.) Daily 6 pm.-12 m., Sun. 5-10 pm.
6.147	ZEB	**BULAWAYO, RHODESIA, S. AFRICA,** 48.8 m. Mon., Wed., and Fri. 1.15-3.15 pm.; Tues. 11 am.-12 n.; Thurs. 10 am.-12 n.
6.145	HJ4ABE	**MEDELLIN, COL.,** 48.79 m. 11 am.-12 n., 6-10.30 pm.
6.140	W8XK	**PITTSBURGH, PA.,** 48.86 m., Addr. Westinghouse Electric & Mfg. Co. Relays KDKA 11 pm.-1 am.
6.137	CR7AA	**LAURENCO MARQUES, PORT. E. AFRICA,** 48.87 m. Daily 12.05-1, 4.30-6.30, 9.30-11 am., 12.05-4 pm., Sun. 5-7 am., 10 am.-2 pm.
6.130	VP3BG	**GEORGETOWN, BRIT. GUIANA.** 48.94 m. From 5 pm. on.
6.130	COCD	**HAVANA, CUBA,** 48.94 m., Addr. Box 2294. Relays CMCD 7 am.-1 am.
6.130	VE9HX	**HALIFAX, N. S., CAN.,** 48.94 m., Addr. P. O. Box 998. Mon.-Fri. 7 am.-11.15 pm., Sat. 11 am.-11 pm., Sun. 12 n.-11.15 pm. Relays CHNS.
6.130	ZGE	**KUALA LUMPUR, FED. MALAY ST.,** 48.94 m. Sun., Tue. and Fri. 6.40-8.40 am.
6.130	LKL	**JELOY, NORWAY,** 48.94 m. 11 am.-6 pm.
6.125	CXA4	**MONTEVIDEO, URUGUAY,** 48.98 m., Addr. Radio Electrico de Montevideo., Mercedes 823. 10 am.-12 n., 2-8 pm.
6.122	HP5H	**PANAMA CITY, PAN.,** 49 m., Addr. Box 58. 12 n.-1 pm., 8-10 pm.
6.120	W2XE	**NEW YORK CITY,** 49.02 m., Addr. Col. B'cast. System, 485 Madison Ave. Irregular.
6.117	XEUZ	**MEXICO CITY, MEX.,** 49.03 m., Addr. 5 de Mayo 21. Relays XEFO 1-3 am.
6.115	HJ3ABX	**BOGOTA, COL.,** 49.05 m., Addr. La Voz de Col., Apartado 2665. 12 n.-2 pm., 5.30-11 pm.; Sun. 6-11 pm.
6.115	OLR2C	**PRAGUE, CZECHOSLOVAKIA,** 49.05 m. (See 11.40 mc.)
6.110	XEPW	**MEXICO CITY, MEX.,** 49.1 m., Addr. La Voz de Aguila Azteca desde Mex., Apartado 8403. Relays XEJW 11 pm.-1 am.
6.110	VUC	**CALCUTTA, INDIA,** 49.1 m. Daily 3-5.30 am., 9.30 am.-12 n.; Sun. 7.30 am.-12 n.
6.110	GSL	**DAVENTRY, ENG.,** 49.1 m., Addr. (See 26.1 mc.) 6.20-8.30, 9.15-11.15 pm., irregular.
6.108	HJ6ABB	**MANIZALES, COL.,** 49.14 m., Addr. P. O. Box 175. Mon.-Fri. 12.15-1 pm.; Tue. and Fri. 7.30-10 pm.; Sun. 2.30-5 pm.
6.100	YUA	**BELGRADE, JUGOSLAVIA,** 49.18 m. 12.45-2.30, 4-8 am., 1-6 pm.
6.100	W3XAL	**BOUND BROOK, N. J.,** 49.18 m., Addr. Natl. Broad. Co. 7 pm.-1 am. Sun. 6 pm.-1 am.
6.100	W9XF	**CHICAGO, ILL.,** 49.18 m., Addr. N.B.C. 4-6.50 pm., 1.05-2 am. Sun. 1-5.50 pm.
6.097	ZRK	**KLIPHEUVEL, S. AFRICA,** 49.2 m., Daily 12 n.-4 pm., Sun. 12 n.-3.20 pm.
6.097	ZRJ	**JOHANNESBURG, S. AFRICA,** 49.2 m., Addr. African Broad. Co. Daily exc. Sat. 11.45 pm.-12.40 am.; Daily exc. Sun. 3.15-7.30, 9-11.30 am.
6.095	JZH	**TOKIO, JAPAN,** 49.22 m., Addr. (See 11.800 mc., JZJ.) Irregular.
6.090	CRCX	**TORONTO, CAN.,** 49.26 m., Addr. Can. Broadcasting Corp. Daily 7.45 am.-5 pm., Sun. 10.30 am.-12 n.
6.090	ZBW2	**HONGKONG, CHINA,** 49.26 m., Addr. P. O. Box 200. Irregular.
6.085	HJ5ABD	**CALI, COLOMBIA,** 49.3 m., Addr. La Voz de Valle. 12 n.-1.30 pm., 5.10-9.40 pm.
6.083	VQ7LO	**NAIROBI, KENYA, AFRICA,** 49.31 m., Addr. Cable and Wireless, Ltd. Mon., Fri. 5.30-6 am., 11.15 am.-2.15 pm., also Tues. and Thurs. 8.15-9.15 am.; Sat. 11.15 am.-3.15 pm.; Sun. 10.45 am.-1.45 pm.
6.081	YVIRD	**MARACAIBO, VEN.,** 49.32 m. 6-11 pm.
6.080	ZHJ	**PENANG, FED. MALAY STATES,** 49.34 m. 6.40-8.40 am., except Sun., also Sat. 11 pm.-1 am.
6.080	W9XAA	**CHICAGO, ILL.,** 49.34 m., Addr. Chicago Fed. of Labor. Relays WCFL irregular.
6.079	DJM	**BERLIN, GERMANY,** 49.34 m., Addr., Broadcasting House. Irregular.
6.077	OAX4Z	**LIMA, PERU,** 49.35 m. Radio Nacional 7-11 pm.
6.075	VP3MR	**GEORGETOWN, BRI. GUIANA,** 49.35 m. Sun. 7.45-10.15 am.; Daily 4.45-8.45 pm.
6.073	HJ3ABF	**BOGOTA, COL.,** 49.41 m. 7-11.15 pm.
6.070	CFRX	**TORONTO, CAN.,** 49.42 m. Relays CFRB 7.30 am.-12 m., Sun. 10 am.-12 m.
6.070	VE9CS	**VANCOUVER, B. C., CAN.,** 49.42 m. Sun. 1.45-9 pm., 10.30 pm.-1 am.; Tues. 6-7.30 pm., 11.30 pm.-1.30 am. Daily 6-7.30 pm.
6.069	—	**TANANARIVE, MADAGASCAR,** 49.42 m., Addr. (See 9.53 mc.) 12.30-12.45, 3.30-4.30, 10-11 am., Sun 2.30-4.30 am.
6.065	SBO	**MOTALA, SWEDEN,** 49.46 m. Relays Stockholm 1.30-5 pm.
6.060	W8XAL	**CINCINNATI, OHIO,** 49.5 m., Addr. Crosley Radio Corp. Relays WLW 6.30 am.-8 pm., 11 pm.-2 am.
6.060	W3XAU	**PHILADELPHIA, PA.,** 49.5 m. Relays WCAU 8-11 pm.
6.054	HJ6ABA	**PEREIRA, COL.,** 49.52 m. 9.30 am.-12 n., 6.30-10 pm.
6.050	HP5F	**COLON, PAN.,** 49.59 m., Addr. Carlton Hotel. Irregular.
6.050	GSA	**DAVENTRY, ENGLAND,** 49.59 m. Addr. (See 26.1 mc.) Irregular.
6.045	XETW	**TAMPICO, MEXICO,** 49.6 m. Irregular 7-11 pm.
6.042	HJIABG	**BARRANQUILLA, COL.,** 49.65 m., Addr. Emisora Atlantico. 11 am.-11 pm.; Sun. 11 am.-8 pm.
6.040	W4XB	**MIAMI BEACH, FLA.,** 49.65 m. Off the air temporarily.
6.040	WIXAL	**BOSTON, MASS.,** 49.65 m., Addr. University Club. Exc. Sat. 7-9 pm.
6.040	YDA	**TANDJONGPRIOK, JAVA,** 49.65 m., Addr. N.I.R.O.M., Batavia. 10.30 pm.-2 am.; Sat. 7.30 pm.-2 am.
6.033	HP5B	**PANAMA CITY, PAN.,** 49.75 m., Addr. P. O. Box 910. 12 n.-1 pm., 7-10.30 pm.
6.030	VE9CA	**CALGARY, ALTA, CAN.,** 49.75 m. Thur. 9 am.-1 am.; Sun. 12 n.-12 m.
6.030	OLR2B	**PRAGUE, CZECHOSLOVAKIA,** 49.75 m. (See 11.875 mc.) Daily 12.45-4.40 pm. Mon., Wed. and Fri. 8-10.35 pm.
6.023	XEUW	**VERA CRUZ, MEX.,** 49.82 m., Addr. Av. Independencia 98. 8 pm.-12.30 am.

(Continued on page 702)

All Schedules Eastern Standard Time

The Listener *Asks*

Questions asked by not-so-technically inclined listeners are answered in this department.

WHISTLING

Q. *When operating my receiver on the short-wave bands, I notice that certain stations have a whistling sound mixed in with the program. Why is this and what can I do about it?*

A. Since you say that only certain stations are affected by this phenomenon, it is probable that the trouble is *not* your receiver. In the congested short-wave broadcast bands there are a great many stations operating on relatively few channels. It frequently happens that two or more stations may be operating on the same channel simultaneously. When this occurs, a whistle is heard when the receiver is tuned to this channel. The pitch of the whistle is an indication of the difference in frequency between the interfering stations. There is nothing that can be done to remedy this situation except by international agreement to restrict the use of channels to one station at a time. A good many South American stations have settled down on various channels which have been assigned by international agreement to other countries and are causing a great deal of interference of this type. The broadcasting authorities of various countries are trying to eliminate this situation which is especially bad in the 6 and 9 mc. short-wave broadcast bands.

A very selective receiver will frequently permit reception without hearing the whistle, but, at the same time, the quality of reproduction of the station will be seriously impaired, so that enjoyable entertainment is not possible.

LIFE OF TUBES

Q. *My radio is about two years old and none of the tubes have been replaced. They all light up, but I have been wondering whether it would be advisable to replace them?*

A. After two years' use it is quite possible that one or more of the tubes in your receiver have lost their efficiency. The *average* life of a tube is generally considered to be 1,000 hours. In actual practice, however, tubes last much longer. No general rule about their life can be laid down. It is a good practice to have tubes tested about once a year and to replace any which are not in good condition. It is not necessary to make complete replacement of tubes periodically.

The mere fact that a tube lights up is not an indication of its condition. Modern tubes used in electrically operated receivers do not burn out readily; in most cases they wear out before they burn out. If certain tubes in a receiver wear out quickly, it is wise to have the receiver examined because there may be a defective part in the set which is shortening the tubes' life.

TYPES OF S-W STATIONS

Q. *The dial of my all-wave receiver indicates "amateur" stations, "broadcast" stations and "telephone" stations. Just what is the difference between these various stations?*

A. An amateur station is one operated by an experimenter for his own pleasure or education. Amateur stations may send out either voice or dots and dashes (code). The various governments of the world have set aside certain frequencies for the exclusive use of amateur stations. Amateurs generally use their stations for the purpose of communicating with other amateurs. It is for this reason that if you pick up one of these stations you generally hear one end of a conversation. They do not broadcast entertainment of any sort, as they are forbidden by law to do this in most countries.

Short-wave broadcast stations send out regular programs of entertainment in a manner similar to the ordinary long-wave broadcast station. Special frequency bands have been allotted for the exclusive use of short-wave "broadcasting" stations by international agreement, as is the case with amateur stations. However, a good many countries do not abide by these international agreements and operate short-wave broadcasting stations on frequencies which are not within the limits of the prescribed bands. But by far the greater number of short-wave broadcasters are to be found in these various broadcast bands. On page 673 there is a "tuning yardstick" which shows just where these "broadcast" bands are located on the short-wave tuning dial.

The third class of stations are the "commercial" stations. These are operated by commercial communication companies for the purpose of maintaining communication lines between various parts of the world. These stations either send out telephony or dots and dashes. The telephony stations are used to carry telephone conversations overseas and to ships-at-sea and are connected with the regular wire telephone circuits in each country. To insure privacy of conversations being carried on these stations, special devices are employed at the transmitters to render all speech transmitted unintelligible to anyone listening in on an ordinary receiver.

Behind the scenes of a "short-wave rebroadcast" from abroad—next month. Don't miss it!

METERS VERSUS MEGACYCLES

Q. *Some stations announce that they operate on a wavelength of so many meters; others announce that they operate on a frequency of so many megacycles; and still others say they operate on a frequency of so many kilocycles. Please explain the meaning of these terms.*

A. A radio station sends out invisible waves. These waves have a definite length. It would be quite possible to measure these different wavelengths in feet or inches, but it has become customary to measure the waves by the metric system in meters. So if a station operates with a wavelength of 30 meters it means that the waves sent out by that station have a length of 30 meters (or 98.4 ft.).

The speed at which these waves travel is approximately equal to the speed of light—186,000 miles (or 300,000,000 meters) per second, regardless of the length of the wave. At any given point a certain fixed number of these waves will pass in one second. Since the speed at which they travel is constant but the length of the waves is variable, the number of waves passing the given point per second will vary as the length of the wave is varied.

For example, if a station transmits a wave having a length of 30 meters, a little simple arithmetic (dividing the speed of the waves, 300,000,000 meters/sec., by the length of the waves, 30 meters) will show that ten million of these waves will pass a given point in a second, or, stated otherwise, the wave has a frequency of ten million cycles per second. However, in radio the use of such large numbers to express the frequency is cumbersome so instead of saying ten million cycles the term kilocycle (kc.) is used—meaning 1,000 cycles. Therefore, ten million cycles is the same as 10,000 kilocycles, so a wave having a length of 30 meters has a frequency of 10,000 kilocycles. Even this is a rather cumbersome figure to handle, especially when dealing with short waves or higher frequencies; therefore, it has become customary to further abbreviate and use the term megacycles (mc.). One megacycle is equal to one million cycles or 1,000 kc. So ten million cycles is equal to 10,000 kc., which is equal to 10 mc. This is not difficult to follow if you just remember that you can call a mile 5,280 ft. or 63,360 inches. In the United States it has become customary to use the frequency terms as a means of stating the channel on which a station operates; while in Europe until recently it was customary to use the wavelength method to state a station's operating channel.

Changing bands on this single-tube receiver is a simple matter—just plug-in a different coil

Any Beginner Can Build This 1-TUBER

George W. Shuart, W2AMN

An ideal short-wave receiver for the beginner—it provides world-wide headphone reception on one tube. The tube used is the Twin-Triode 6F8G. Set may be operated on batteries if desired.

● WE have had many "dual purpose" tubes, but never one quite like the 6F8G. All of the dual tubes in the past have had a *common* cathode. This tube has two separate cathodes and is, in the true sense of the word, a *twin triode*. This tube makes it possible for us to build a real two-tube set using only one tube, paradoxical as it may seem.

This receiver is intended for the beginner who wants a good one-tube set that is simple to build and easy to operate, and does not cost a fortune to construct.

Naturally we have selected the time-tried regenerative circuit with one stage of audio amplification. While there have been many "one-tube wonders," most of them have been, to put it mildly, quite tricky. This set offers no "wonders." It is a straight 2-tuber, with no tricks in it. It will provide plenty of entertainment, and is really *the* set with which the *newcomer* should start.

Our original intention was to construct this receiver on a bread-board, but we recalled one of our young friends having had no end of trouble with such a set. Now, we don't claim that all bread-board sets are taboo, but the chassis type of construction leads to much less trouble.

The chassis on which this set is built is made of 1/16" aluminum and measures 1x4x7-inches. The panel is 5x7-inches and supports the two variable condensers. One of these condensers is the main tuning control, while the other controls regeneration. The only other control on the set is the antenna series condenser. This condenser, while adjustable, does not require continual adjustment. Once set for optimum results it needs no further attention unless the coil is changed or the antenna is altered. It can be adjusted so that it requires no changing, even though the coils are changed. This latter setting is convenient but does not provide maximum sensitivity or signal strength. Better results can be obtained if this condenser is frequently adjusted as the set is tuned over a fairly wide frequency range.

Referring to the circuit diagram, we find that resistance coupling is employed in the audio stage. Transformer coupling might just as well have been used with a slight increase in volume. However, the choice is up to the builder.

As mentioned before, a condenser is used to control the regeneration. An alternative would be the use of a potentiometer to vary the plate voltage, thus controlling the amount of feed-back in the circuit. However, we find that where low plate voltage is employed, the condenser method of controlling regeneration works out much better than the potentiometer method. We mention low voltage because this receiver will operate with as low as 45 volts on the plates of the tube. Slightly higher voltage will result in an increased signal strength. This does not mean that we can increase the plate voltage to a couple of hundred volts. If we do, the regeneration control will become "sticky" and result in uncomfortable tuning. If, however, the plate circuit of the detector tube is fed separately with only 45 to 67.5 volts, then the voltage of the amplifier section may be increased to 135 or more in order to obtain greater audio amplification and louder signals. The main purpose of this receiver was low cost of operation and the use of a single 45 volt "B" battery. Therefore, we have shown both tubes, or both sections of the tube, tied together and going to a common B terminal.

One triode section of the tube has its grid terminal coming out the top of the glass envelope. We have used this section of the tube as the detector in order to reduce losses as much as possible. Also, this arrangement provides easier construction insofar as wiring is concerned.

While the wiring diagram does not indicate it, the B negatives (or common grounds) are all connected to a single soldering lug. The metal chassis is not depended upon to carry current or serve

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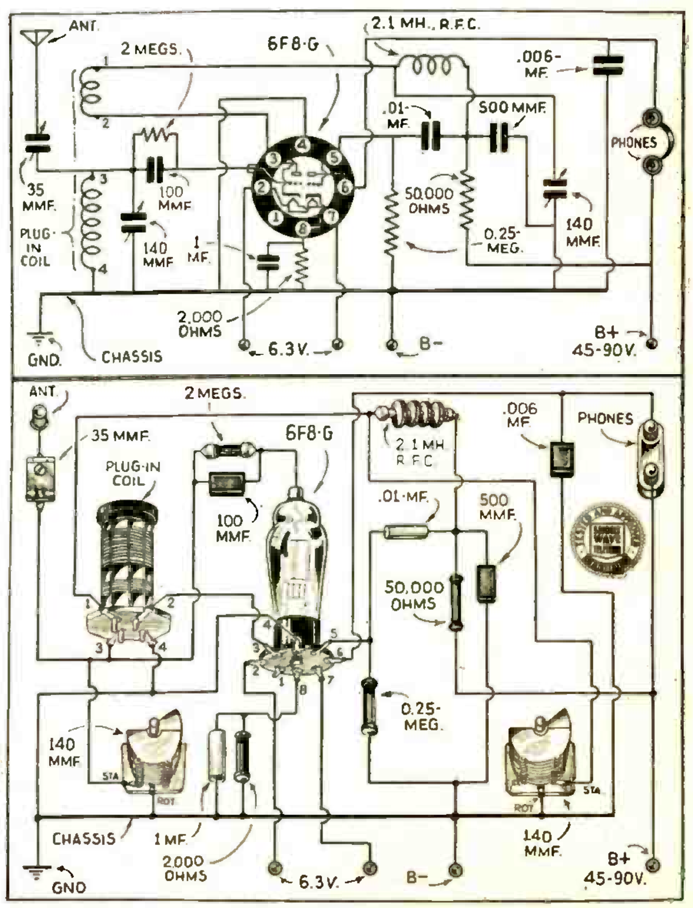
The wiring diagram for this 1-tube receiver is extremely simple to follow and the author reports excellent reception and smooth tuning with this set



as a connecting link between circuits. Since the rotors of the condenser are connected to the chassis, they must in turn be used in the *cold* part of the circuit. The panel connects the two rotors together and if they are then connected to the wrong part of the circuit they will be short-circuited and not only become inoperative but the B battery will be run down, due to the short-circuit across it. Make sure that the stator of the grid tuning condenser connects to the grid side of the coil, and the stator of the regenerative condenser to the tickler.

Proper placement of the parts on the chassis is quite important. If the parts are placed properly with respect to one another, the leads will be short and the receiver will be more efficient and stable in operation.

As viewed from the front, the coil is on the left, and the tube is on the right. The coil socket has its large holes facing the tube, while the tube socket is mounted with the key-slot facing the right.

The midget condenser on the left (in front of the coil) is the tuning condenser and that on the right is for controlling regeneration.

The antenna condenser is a 35 mmf. compression type padder and is supported by a ½-inch stand-off insulator, which also serves as the antenna binding post.

Tuning and adjustment of this receiver is the same as with any other regenerative set, the technique of which can only be developed by experience.

Best results are obtained with the proper adjustment of the antenna condenser and the regeneration control. Once the "feel" of the receiver is obtained there will be no difficulty in tuning in even the weakest stations.

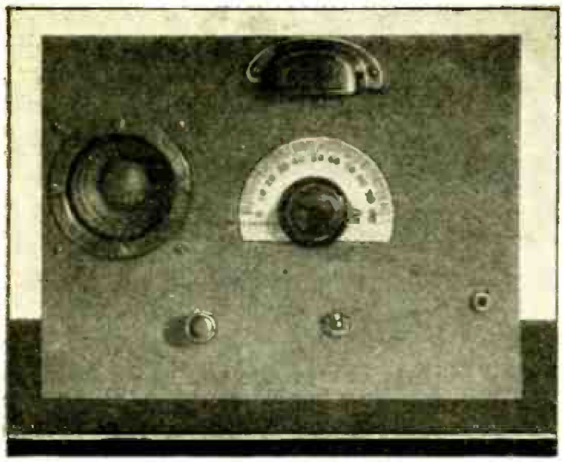
As for results, this receiver will pull in even the most remote stations with good earphone volume, provided a fairly efficient antenna is used. The author has found that a 75-foot over-all single wire, mounted clear of all objects and as high as possible, is about the best for this type of receiver.

Parts List

HAMMARLUND

2—H.F. 140 mmf. condensers.
1—4-prong socket, Isolantite.
1—8-prong socket, Isolantite.
1—35 mmf. Trimmer.
1—2.1 mh. R.F. choke.
1—Set SWK Coils—17-260 meters range.

(Continued on page 696)



Front view of the 5-meter, 3-tube receiver (Fig. 3)

A "3 for 5" Receiver

Ed. Peil, Jr.

The author calls this his "surprise" high frequency receiver and states that very fine reception results have been obtained with it. The circuit employs a super-regenerative self-quenching detector, one stage of A.F. and a half-wave rectifier. Coverage is 4.5 to 11 meters.

● THIS "Five-Meter Three-Tuber" gave me a real surprise, for in dressing it up, so to speak, for this article I made a few changes, wound a new coil of 9 turns, ¾" outside diameter, and spaced it so that in conjunction with a 15-plate Hammarlund condenser (15-plate per section, 2-gang), it not only worked below five meters, but also took in *television* on 6 meters, police cars on 7½ meters, police and Hi. Freq. stations on 9 meters, such as W9XPD, etc. The 10 meter band brought in Hams from all districts—Canadian, Mexican, etc. The "top of the dial" brought in W9XAD, W6XKG, etc.—all on the same coil.

A sketch is included of the dial and log. These and many, many more stations wait to be tuned in by those that build this set, built of parts taken from half a dozen old or "junked" sets.

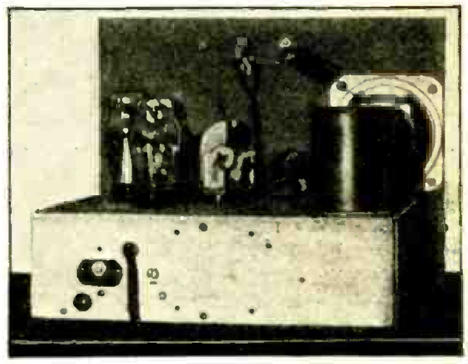
The chassis is an old converter chassis, 7½"x10" and 3" deep. The panel is not metal but is made of tempered Masonite, 11"x8½", and there are *no hand capacity* effects.

The speaker is a 3" dia. P.M. type. A dial flange is used to frame the speaker on the panel. A drawer pull reflects the panel or dial light; the dial consists of a pointed knob that is set over a silver and black lettered dial taken from a midget set. The "stand-by" switch which turns the speaker on and off is from my old "Super-Wasp" receiver. The other on and off switch is from the "junk box." A single-circuit jack makes up the remainder of the panel equipment.

The circuit? Well, maybe I should have mentioned it first. It's novel, yet simple. A super-regenerative, self-quenching detector, one-stage of A.F. and a half-wave rectifier (56 Det. 56 A.F. 27 rect.) as simple a line-up as possible, yet efficient.

I got tired of building Hi-Freq. sets in which I had to use a yard or so of insulated shafts and bushings and sit across the room from the set while tuning. So I simply decided to use a two-gang variable condenser, with the shaft grounded to eliminate this. The coil is tapped 5 turns from the plate-end, or 4 turns from the grid-end; the exact placement of this tap is most essential. Experiment until you get it where there are no dead-spots over the entire dial. The antenna is not connected during this operation. The detector R.F. choke, too, has to be just about right; 75 to 100 turns wound on a burned-out fuse taken from an auto set, with pig-tail connections soldered to the ends, before you start to wind the choke. The choke in the power-supply can be any one you have handy.

Two marked improvements may be added



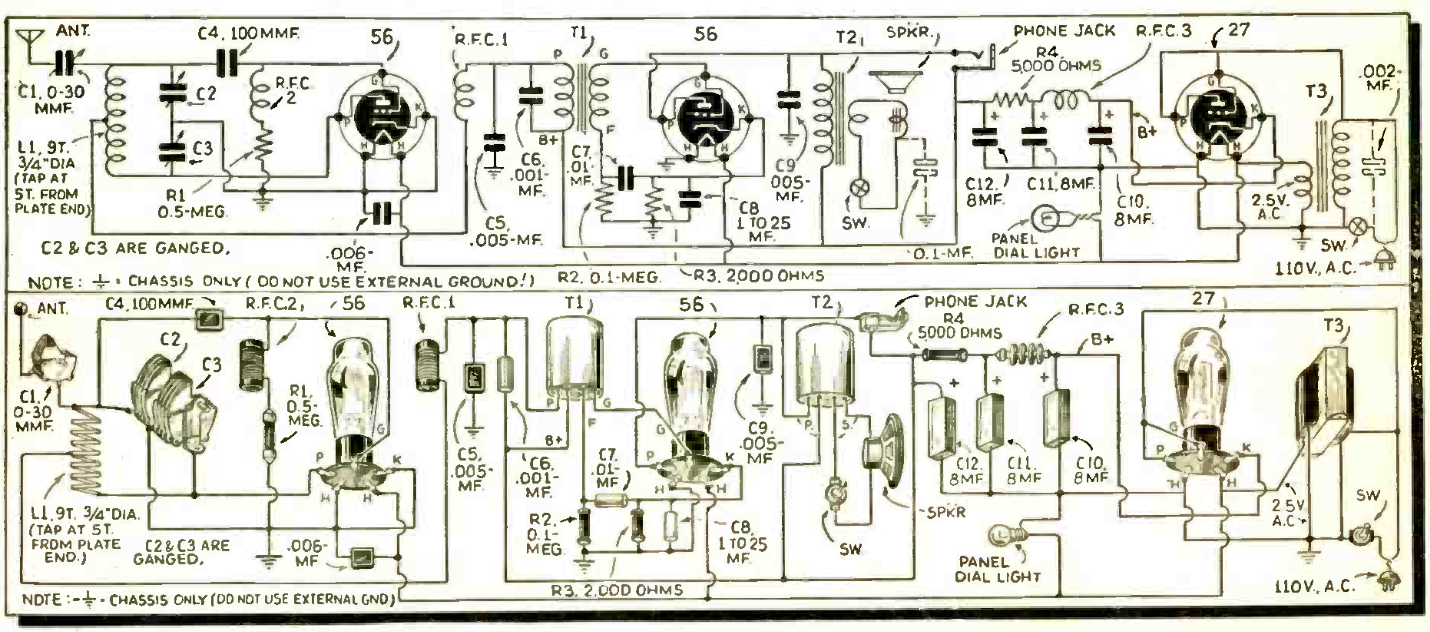
Rear view of the receiver.

to the original set. First by putting a 50,000 to 75,000 ohm resistance in series with the detector "B" positive lead, and connecting a suitable condenser from "B+" on the transformer to ground.

Second improvement is to connect a .01 mf. condenser in series with a variable re-

(Continued on opposite page)

How to wire the simple but very efficient 5-meter receiver, described by Mr. Peil



sistance (pot.) from the 56 A.F. plate to ground. This not only acts as a tone control; it also cuts down noise and filters out the high pitched whistle common in super-regenerative sets, and amplified through the A.F. stage. This control practically eliminates it altogether.

These two controls were left off this set for simplicity's sake. It might be interesting to note that a 110v. to 2½v. step-down transformer is used in the power-supply; the same filament voltage of 2½v. supplies all three tubes.

Either single or double 8 mf. condensers are used in the filter and do a good job of filtering. A 5,000 ohm resistor takes the place of the more common type iron-core choke.

The P.M. speaker is insulated from the metal chassis, but is connected to the chassis through a by-pass condenser to tie it down to as near ground potential as possible.

The A.F. transformer used has a 5-to-1 turns ratio. I would even recommend a 10-to-1. The A.F. stage is of good design and will give a high gain. No "fringe howl" was noticed in the set, so it will not be necessary to use a resistor across the secondary of the A.F. transformer. This only tends to cut down volume.

Here is a point up to the prospective builder of this set. If you have a step-down transformer of 110 to 6 volts, and you wish to use a type 76 tube instead of a 56, F.B.—go ahead—but I would suggest the following tube line-up—76 Det., 38 A.F., while the rectifier could be a 76—, 1V, or an 84. Whichever tubes you use, experiment, get that old super-detector to *suping*. Try winding several kinds of R.F. chokes; try different condenser and resistance combinations. Try to better the receiver—I dare you!

I'll guarantee that a real thrill awaits you when you build this surprise high frequency receiver, and now "good luck" and 73.

Parts List

L1—9 turn coil ¾" outside diam. Tapped approximately 5 turns from plate end or 4 turns from grid end of coil.

HAMMARLUND

C1—30 mmf. Trimmer condenser.
C2-C3—Two-gang, 15-plate per section. (Cap. per section 100 mmf.)

MISCELLANEOUS*

C4—.0001 mf. Mica condenser.
C5—.005 mf. Mica condenser.
C6—.001 mf. Mica condenser.
C7—.01 to .1 mf. tubular condenser.
C8—1. to 25 mf. tubular condenser.
C9—.005 mf. Mica or tubular.
C10-C11—8 mf. condensers.

T1—5 to 1 A.F. transformer.
T2—6 ohm output to P.M. speaker.
T3—110 to 2½ V. step-down transformer.

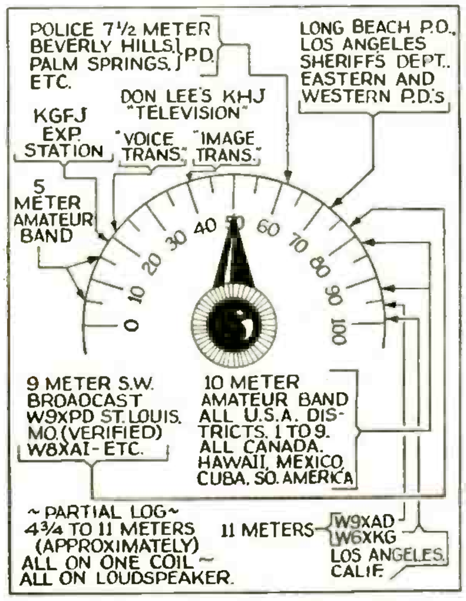
R1—500,000 ohm grid resistor.
R2—100,000 ohm resistor.
R3—2.000 ohm resistor.
R4—5.000 ohm resistor, 5 watt.

R.F.C.1-2—As specified in article.
R.F.C.3—2½ mh. R.F. choke.

Magnetic or permanent magnet Loud-speaker.
3 five-prong sockets.
Chassis, panel, single-pole switches, knobs, jack, nuts, bolts, etc.

Drawer-pull used as reflector for panel light; one dial light and socket.

*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.



Some of the stations the author picked up on the "3 for 5" receiver.

Faulty Circuit Locator

(Continued from page 681)

driven by two dry-cells. Output binding-posts connect across the contacts through a blocking condenser, which prevents a short across the output from putting the buzzer out of commission.

One side of the output is connected to the circuit in trouble at any convenient point, which may be at the socket of any street lamp near where the trouble might be expected. The other side is connected to ground through an iron stake or in any way convenient.

In operation this causes an audio frequency note to travel along the underground circuit to the point where the ground has occurred, thence back through the ground to the exciter.

The locator unit consists of an exploring coil wound with approximately 200 turns of No. 36 S.C.C. wire into a twelve-inch ring, the turns being tightly taped together and then fastened by tape or otherwise to a light wooden handle about three feet long, for convenience.

Flexible leads are brought from the ends of the coil up the handle and connected to the small portable amplifier. By using two flashlight cells connected in parallel for the filament supply and the smallest size 45 volt "B" battery, the whole thing is not much larger and weighs about as much as a box camera.

Signals from the exciter may be picked up for surprising distances but when the coil has passed over the *grounded point* in the underground circuit, *the signal stops at once*, indicating that you have found, or are very close to the point of trouble.

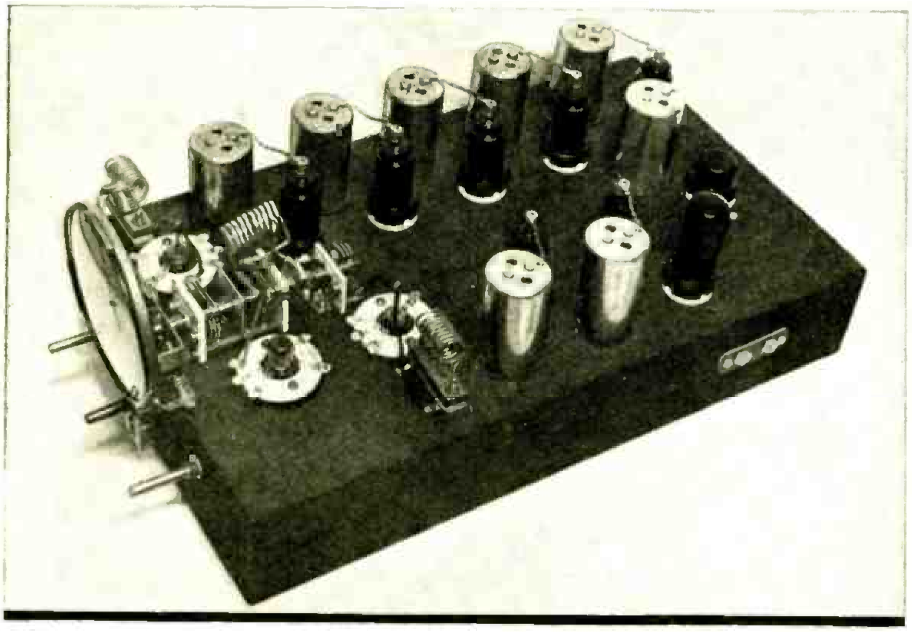
Needless to say, the regular lighting supply current should be cut out during this procedure.

For tracing underground circuits in service, the pick-up coil amplifier and phones do a good job, without the exciter.

When tracing any line keep the plane of the pick-up coil in a line with the wire to be followed.—G. C. WILKINS, W8HIG.

Build Your Own Television

The 441-Line "S.W. & T." Sight and Sound Receiver



General view of the "S.W.&T." cathode-ray Sight and Sound receiver. Power-supply unit is not shown as this is built as a separate unit.

● IN Part I of this series we pointed out that the modern cathode-ray television receiver consists of three essential parts: (1) a radio receiver which will tune to the transmission frequency and have certain characteristics which will be outlined later: (2) a special type of power-supply system, and (3) a "television type" cathode-ray tube with suitable circuits for "sweeping" the spot of fluorescent light across the end of the tube and keeping this motion synchronized with the scanning which takes place at the television transmitter.

The particular part of the television receiving system which we are building in this part is the radio receiver. For convenience in operation, two distinct receivers are included on the chassis shown in the photos. One of these receivers picks up the sound accompaniment of the pictures or images and reproduces these sounds through a loudspeaker. This receiver which we will call the *sound receiver* is a normal U.S.W. superhet type set with a pentode second-detector and a 6V6 beam-power output stage.

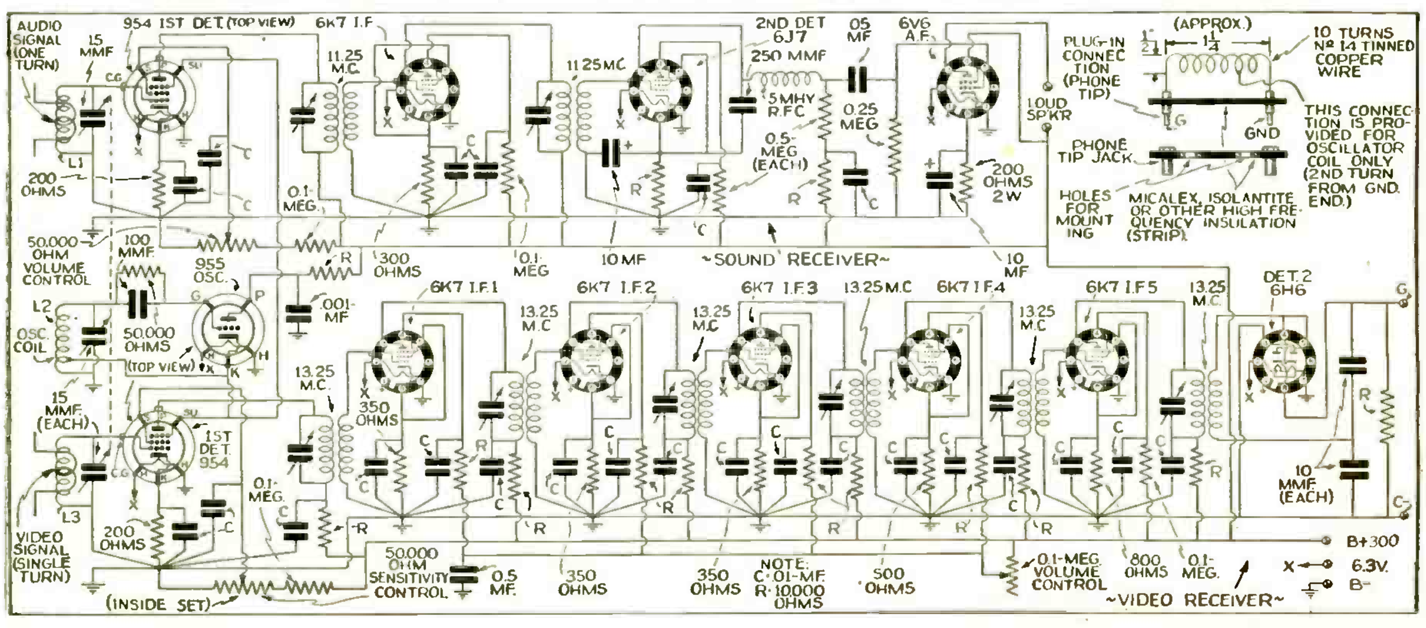
The "Image" Receiver

The second receiver is the actual television or image receiver which we will call the video receiver. This is also a superhet type receiver with 5 stages of intermediate-frequency amplification following the oscillator and first detector. The 5 stages are needed because a very high I.F. is necessary in order to pass a band of frequencies more than 2 megacycles wide. With 441-line images a band width of 2,000,000 cycles is required to reproduce clear, undistorted images. This compares with 5,000 to 10,000 cycles needed for music reproduction—which explains some of the difficulties encountered in the design of a high quality television receiver.

Special I.F. transformers are used, designed for the purpose of amplifying video signals. These transformers have very small inductances and comparatively large trimming capacities. It is well known that a large C and small L in a tuned circuit will produce a lower value of selectivity than a high L to C ratio. In addition, close coupling—commonly called "over coupling" is used to further widen the pass band. A slight misalignment of the I.F. transformers, thus staggering the I.F., further widens the band. But all these broadening effects are accompanied with a reduced amplification which, combined with the very high frequency used for the I.F. amplifier, explains why so many amplifying stages are needed.

A single oscillator beats against the incoming signals in the first detectors of both sound and video receivers. This combination permits simultaneous tuning of both receivers with a single dial and also eliminates the need for excessive shielding between receivers that would be needed if

Wiring diagram of the Sight and Sound superhet receivers, not including the power-supply, which will be described later.



Receiver Part II

C. W. Palmer, E.E.

two separate oscillators and first detectors were used.

Acorn tubes are employed in both the detector and oscillator circuits of the two receivers, to keep the noise level and tube noise to a minimum and to permit high efficiency on the high frequencies used for television transmissions.

An unusual second detector is used in the video set. An examination of the schematic circuit shows that this detector is an adaptation of the *voltage-doubling* scheme used in some power supply-systems, which is applied to high-frequency work. This detector was developed in England by W. T. Cocking and was described in *Wireless World* (London) some time ago. With this detector and the 5 stages of I.F. amplification it is possible to eliminate the need for a video frequency amplifier (the same as an audio-frequency amplifier in ordinary receivers, but having a flat response from 20 or 30 cycles to at least 1,500,000 cycles), thus greatly simplifying the construction and adjustment of the set. A peak voltage swing of well over 60 volts from the detector is possible with this arrangement within reasonable distances from the transmitter when an I.F. of higher than 3 or 4 mc. is used. At lower I.F.'s the need for extremely low load-impedance limits the output—but this does not apply to our receiver which employs an I.F. of 13.25 mc.

So much for the design considerations. This discussion of the many problems encountered could be continued indefinitely—but we must turn to the actual construction of our set.

First, however, it may be well to point out once more that the construction of a television receiver is not a problem for the novice to tackle. Hams and experimenters who have used high voltage equipment and know something of the operation and characteristics of cathode-ray tubes—and who live near one of the experimental transmitters now in operation in several of our large cities—will get a great kick out of building and operating an image and sound receiver and will learn a lot about television, at the same time. For this class of reader, this receiver has been designed and constructed.

Top view of the "S.W.&T." television receiver.

Construction

The first thing to do after obtaining the parts listed in the parts list at the end of this article is to lay out the chassis, placing the parts as shown in the photographs. No drilling details are given as the parts are best laid out and sealed right on the chassis. The left-hand side of the chassis looking from the front is the video side. Directly behind the dial on the left side is the 954 first detector of the video set. This is tuned by the front section of the 3-section tuning condenser. Behind this is the first I.F. coil of the *video* amplifier. The 6 transformers are situated as shown, in a row down the side and across the back. The tube sockets are located in a line, and are set diagonally between the transformers—to keep the leads short.

On the right-hand side of the chassis, looking back from the dial are: first, the oscillator, type 955, tube which is tuned by the second condenser section of the tuning condenser. This is followed by the first detector, type 954, tube of the *sound* receiver and the I.F. amplifier, second detector and beam-power amplifier of the *sound* receiver.

(*Continued on page* 699)

5 and 10 Meter Crystal-Control Transmitter

John Stewart

● OUR five-meter transmitters have always been quite a problem. To make them truly modern has, in the past, meant considerable complication. We have all looked forward to a simple five-meter rig which should have all the advantages of our lower frequency transmitters. We know that it is possible to build a very efficient two-stage transmitter for our other bands, but until recently this has not held true with our five-meter gear.

A transmitter for 5 and 10 meter operation. Crystal-control provides high stability; power supply data is included. Set uses new 10 meter crystal.

It seems that the manufacturers of crystals have been giving this problem considerable thought, for their research and experimentation have now produced a good 10 meter crystal and its cost is no greater than an ordinary low-frequency crystal. These new 10 meter crystals open a vast field for improvement in the present-day ultra-high frequency transmitters. It is now possible to build a crystal-controlled rig for 5 meters which is very simple and not the least costly. Those who have been complaining that a crystal-controlled rig was too complicated and far too costly, especially for short-haul contacts such as we have on five meters, have an answer to all their alibis in this new crystal. Why the whole problem is so simplified that it is now possible to build an efficient one-tube 5-meter crystal-controlled transmitter. (Not including the modulator and the power-supply.) To illustrate what can be done to this end we have shown a diagram of just such a rig. This is so simple that there is no excuse for modulated oscillators remaining in the 5 meter band. Those of the "five meter gang" now using the famous 6L6 MOPA can convert it to crystal-control in a few moments' time by replacing the oscillator tube and adding the crystal.

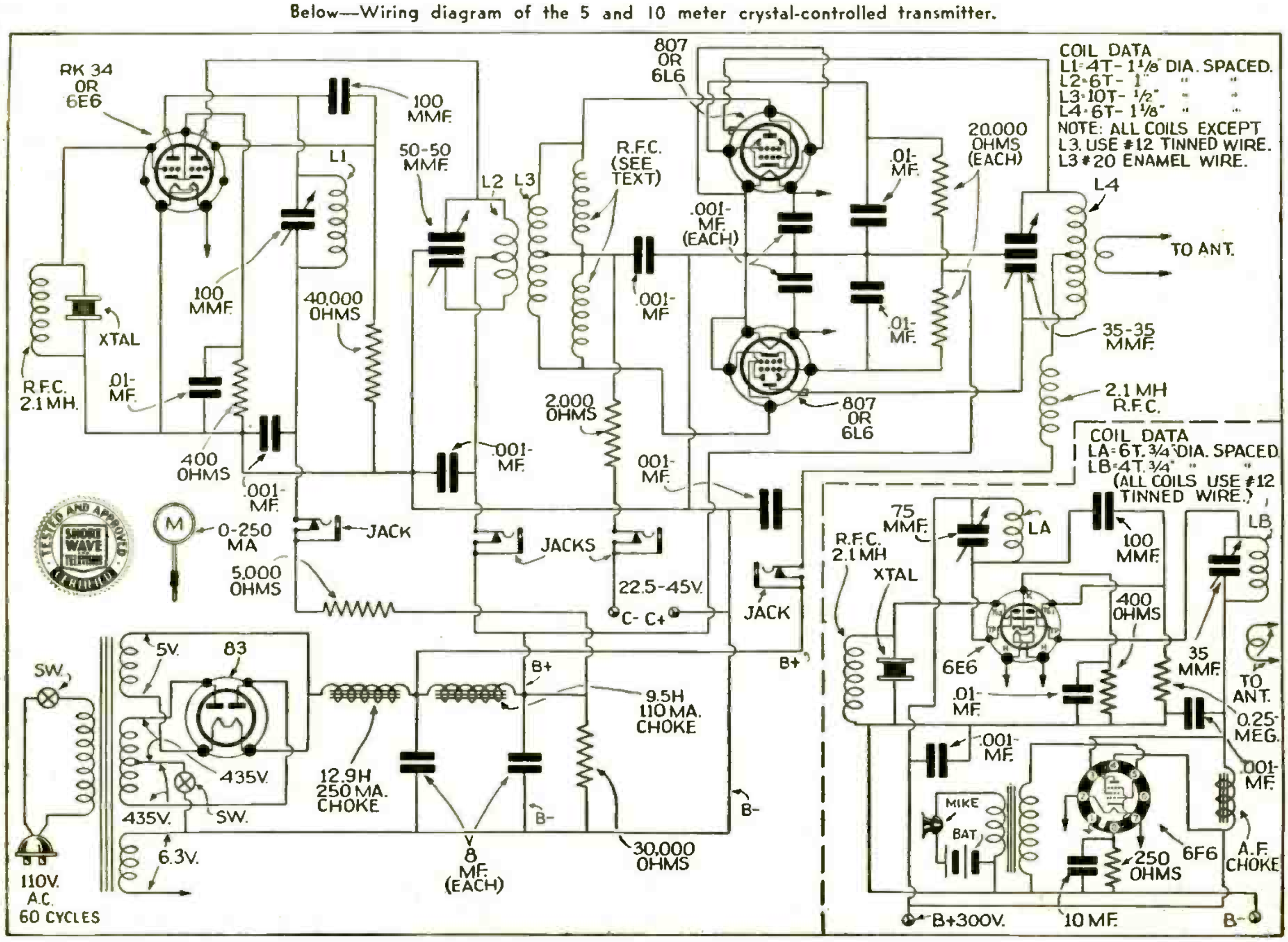
It has long been established that 40 or 50 watts output from a five-meter transmitter is sufficient to work anything heard on that band. The really important item is not the power output of the transmitter, but the efficient radiation of that power, whatever the amount. But we are not discussing antennas in this article; plenty has been said in these pages in the past about good antennas.

The main idea in building the transmitter shown in the photos was to introduce the 10-meter crystal in a rig which had an output of around 40 or 50 watts—one that could work anything heard on the band, and one that was complete and compact enough to take its place permanently beside our other equipment.

Lineup of R.F. Section

The lineup of the R.F. section is simplicity itself. An RK-34 is used as the oscillator and frequency-doubler. The doubler section drives a pair of 807's in push-pull as the final amplifier. The measured output with 400 volts on the plates of the 807's was 40 watts. If the plate voltage is increased to 450 the output will increase to 50 watts. Returning to the oscillator stage the reader will probably *(Continued on page 694)*

Below—Wiring diagram of the 5 and 10 meter crystal-controlled transmitter.



Short Wave Scouts

The Forty-Eighth Trophy Presented to SHORT WAVE SCOUT

JOHN PAWLUK

1081 N. Hazard Street
Los Angeles, Calif.

For his contribution toward the advancement of the art of Radio

by

SHORT WAVE and TELEVISION

Honorable Mention

JOHN SZLUCHA
R. D. No. 1, Owego, N. Y.

78 Veris Win the April Contest

● MR. PAWLUK, one of the runners-up in two previous contests, submitted a list of 102 stations. Only 78 of these came within the contest regulations, however, and they won the trophy for him.

There were four entrants each submitting more than 50 stations. The runner-up was Mr. John Szlucha, who submitted a list totaling 82 stations. However, upon examination of his entry, less than 75 cards came within the contest rules, so he was given honorable mention.

Mr. Pawluk used a 1937 model Silvertone radio with a ¼-wave 25-meter doublet. His list of cards contained entries from 31 countries and five continents. Mr. Pawluk deserves special commendation for the large list of stations which he submitted.

TROPHY AWARD TO BE DISCONTINUED

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

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

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SEE PAGE 714

Further Details on 5 and 10 Meter Crystal-Control Transmitter

(Continued from page 692)

wonder why some of the latest circuits were not used. This requires a little explaining. It seems that these new crystals give best results in a *simple triode oscillator* circuit using such tubes as the RK-34, 6E6, 6J5-G, the 955 or the newer 6F8G type. It is not advisable to attempt to use another type of tube with the 10 meter crystal. All experimental work has been done and the above listed tubes prove most satisfactory. The last mentioned tube should work out well in modernizing the 6L6 MOPA. Its output is sufficient to drive one beam tube as a modulated amplifier. This tube is a twin-triode and has two separate cathodes and one of the grid terminals comes out of the top of the glass bulb, thus reducing the feed-back from the other triode into the crystal circuit.

807 Tube Superior Performer

The final amplifier is of conventional pattern. However, all of the glass-type beam tubes will not give satisfaction in the circuit shown. The 807 works perfectly and also the 6L6 metal tube gives good results. Other types require *neutralizing* which is not easily accomplished, with the beam type tube at 56 mc. (5 meters). Experience proves the 807 to be the best performer. The new type 807 will work well with 500 volts on the plate, while the 6L6 metal tube should be run at 400 volts for maximum tube life.

The ten-meter crystals are not a bit fussy about operating properly if the correct circuit values are employed. It is possible to make the crystal oscillate at about 30 meters, if the values in the circuit are not correct. But if the reader follows the details given there will be danger of this occurring.

No grid-leak is used in the oscillator circuit. Bias is obtained with a 400 ohm cathode resistor. The crystal is shunted with an R.F. choke. This arrangement must be used if proper results are to be expected. Other arrangements reduce the output to a point where there is not sufficient to drive the final amplifier tubes. The doubler section employs 40,000 ohm grid-leak. This is a one watt metallized type and no R.F. choke was found necessary.

"Series-Feed" Used

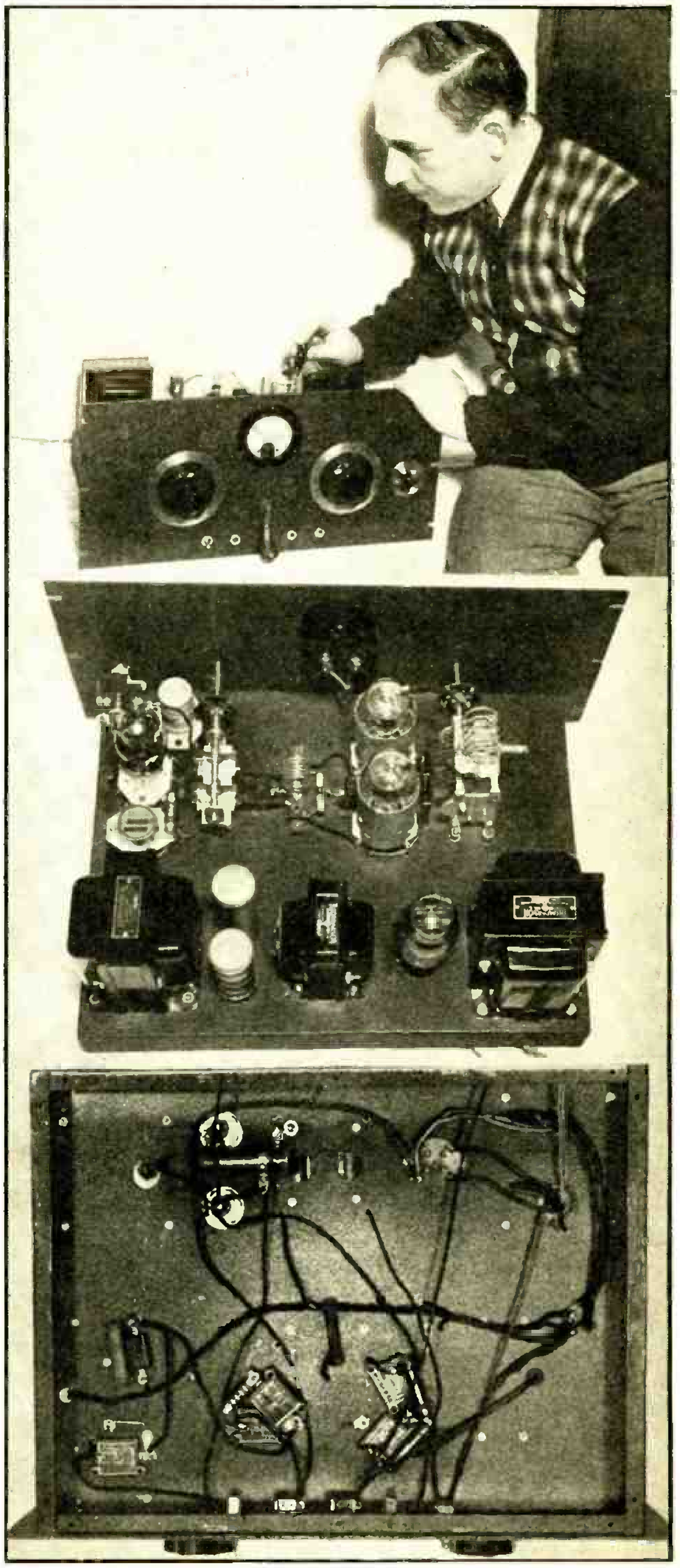
In order to evenly excite the two amplifier tubes the plate coil of the double-driver was center-tapped and tuned with a split-stator condenser. The tap on the coil must be by-passed and the rotor of the condenser grounded. Coupling between the oscillator and the doubler is accomplished with a .0001 mf. mica condenser and *series-feed* is used in all circuits associated with the RK-34 tube, because of the complications which are liable to exist with shunt-feed.

Coupling between the doubler and the final stage is *inductive* and consists of a large number of turns of small diameter mounted inside the doubler plate coil. The two coils comprise a single plug-in unit with five plugs mounted on a victron strip one-half inch in width. The base has a similar number of midget jacks and is of the same construction. A National five-prong plug and base assembly can also be used. One of the photos provides details of the plug-in unit.

Shunt-feed is used in the amplifier grid circuit to eliminate a sixth plug and jack. The choke has two windings each ¾ of an inch long and close-wound with No. 36 cotton-covered wire—later given a coat of victron coil dope.

All leads associated with the final amplifier that go to B-minus are connected to a single buss lead. This is done to avoid closed loops in the ground circuit. These loops can cause a lot of trouble and care should be taken in making the ground connections in both the oscillator-doubler portion as well as the final amplifier. The diagram shows that no plate by-pass condenser connects to the center tap of the final amplifier plate coil. A choke is used here instead and

(Continued on opposite page)



Top—General appearance of the transmitter; center—rear view of the set, and lower picture—a bottom view of the transmitter.

5 and 10 Meter Crystal-Control Transmitter

(Continued from preceding page)

the condenser is on the B plus side of the choke, greater amplifier efficiency was obtained in this manner.

Fixed Bias Used in Amplifier

Fixed bias is used in the amplifier in order to improve stability. A single 22½ volt battery of the midget variety proved sufficient. If for any reason, the grid current of the final amplifier permits it. 45 volts bias may be used. In all cases the grid current should be 5 ma. for the two tubes. For a single-ended amplifier the grid current would be 2.5 ma.

This transmitter is intended for five- and ten-meter operation, both phone and CW. Only the five-meter information will be given here. The entire transmitter may be housed in a cabinet designed to accommodate two 8¾ inch panels. This portion which we are discussing is mounted on a chassis 17 by 13 by 2 inches; the panel is 8¾ by 19 inches.

Adjustment, Antenna and Power Supply

Adjustment of the transmitter is the same as with all similar arrangements. As a guide the various current readings are as follows—oscillator plate –30 ma., doubler plate –30 ma., amplifier grid as we said before –5 ma. and the final amplifier plate may be loaded up to 200 ma. although from 150 to 175 ma. is about optimum.

No antenna data will be given because it is felt that the individual reader will prefer the one he is now using. Our only suggestion is the use of untuned feeders. The number of coupling turns should be adjusted to permit proper loading of the final amplifier.

The voltage to the oscillator should not exceed 325 volts; otherwise undue crystal heating will result. The screen voltage is 250 and the final amplifier plate voltage is just 400. The latter can be increased for greater output as we pointed out before.

Parts List

HAMMARLUND
1—100 mmf. var. cond MC-100-S
1—50-50 mmf. var. cond. MCD-50-S
1—35-35 mmf. var. cond. MTCD-35-B
1—4 prong socket
4—5 prong sockets
1—7 prong socket
2—2.1 MH RF chokes—CHX

I.R.C. RESISTORS
1—400 ohm 10 watt resistor
1—2000 ohm 10 watt resistor
1—30,000 ohm 20 watt resistor
1—40,000 ohm 1 watt resistor metalized
1—5000 ohm 20 watt resistor
2—20,000 ohm 10 watt resistors

CORNELL DUBILIER
3—.01 mf. mica condensers 600 V.
6—.001 mf. mica condensers 1,000 V.
1—.0001 mf. mica condenser rec. type
2—8 mf. electrolytic condensers 500 V.

THORDARSON
1—plate transformer—870V. ct., 6.3 V.-5 V. (T75R50)
1—filter choke 12.9 H., 250 ma.—(T75C51)
1—filter choke 9.5 H., 110 ma.—(T57C54)

BLILEY
1—HF2-10 meter crystal

TRIPLETT
1—0-250 ma. large bak. case meter

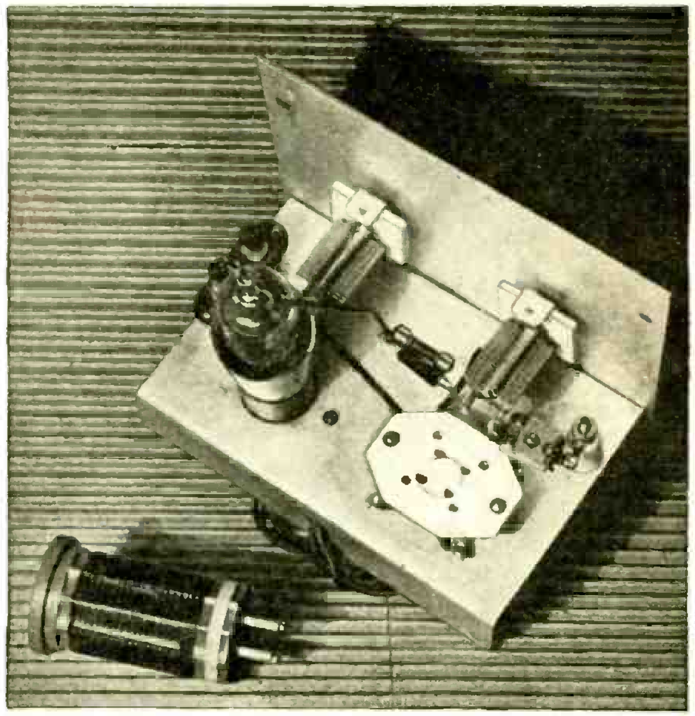
PAR-METAL
1—8¾x19 in. panel
1—17x13x2 in. chassis

TUBES
1—RK34 twin triode (Raytheon)
2—807 beam tetrodes (RCA)
1—83 rectifier (RCA)

WHERE can you Buy the RADIO AMATEUR COURSE? See page 660.

Any Beginner Can Build This 1-TUBER

(Continued from page 687)



Rear view of the 1-tube receiver—the coil socket is the one on the right.

I. R. C. (Resistors)

1—2 meg. resistor ½ w.
1—¼ meg. resistor ½
1—2,000 ohm resistor ½
1—50,000 ohm resistor ½

AEROVOX (Condensers)

1—.0001 mf. mica
1—.0005 mf. mica
1—.006 mf. mica
1—.01 mf. paper
1—1 mf. paper

TUBES (Raytheon)

1—6-F8-G tube.

MISCELLANEOUS

1—1x4x7-inch chassis.
1—5x7-inch panel.

Coil Data for 1-Tube Beginner's Receiver

Range Meters	Grid Turns	Tickler	Winding Space	Size Wire
135-270	82	16	1⅞"	No. 28
66-150	38	11	1⅝"	No. 26
33-75	18	6	1½"	No. 24
17-41	9	5	1¼"	No. 16
9-20	3½	3	1"	No. 14

All coils wound on 1½" diameter ribbed forms. Space between grid coil and tickler ¼". Winding space is length of winding. Primary is wound between turns of grid coil. All ticklers wound with No. 30 D.S.C. wire.

Neutralizing Condenser

● THE accompanying picture shows a new version of the National NC-800 neutralizing condenser for use with transmitting tubes. The frame of the condenser is substantial and long bearings insure accurate adjustments of the electrodes. A micrometer lock is provided and thus the condenser can be set and locked without the aid of a screwdriver or other tool. The threaded adjustment screw is accurately machined and the moving plate cannot wobble. (No. 693.)

This article prepared from data supplied by courtesy of the National Company.

Tiny Dynamic Mike

● ONE of the smallest true dynamic microphones ever built. The diameter of the instrument is only 1½"; the net weight 8½ ounces. This tiny mike has an excellent frequency response with an output level of –55 db., when used in connection with an efficient transformer. The mike is built in both high and low impedance types. Several different styles of mounting attachments are available for use with it, including a regular pedestal base, a handle for supporting the mike when gripped in one hand, an overhead cable support, etc. The handle supports are fitted with switches. It may be used for communications purposes, airplanes, marine installations, police broadcasting, amateur stations, public address, etc. (No. 694.)

This article has been prepared from data supplied by courtesy of the American Microphone Lab'y, Inc.

New Filament Transformers

● TO more completely meet the requirements for all types of transmitter, receiver and rectifier tubes, the Jefferson company has added three more filament transformers to their line. They are all insulated with ample factor of safety to withstand dependably the high voltages encountered in this service. Of the three new transformers, the 464-461 has a secondary of 5V/CT at 12A and is insulated for 3,000 volts. The 464-451 is similar, except that it has a secondary of 5V/CT at 20 A. The 464-441 has a secondary of 10V/CT at 4 A and is insulated to stand 2500 volts.

This article has been prepared from data supplied by courtesy of the Jefferson Electric Co.

"CQ's"

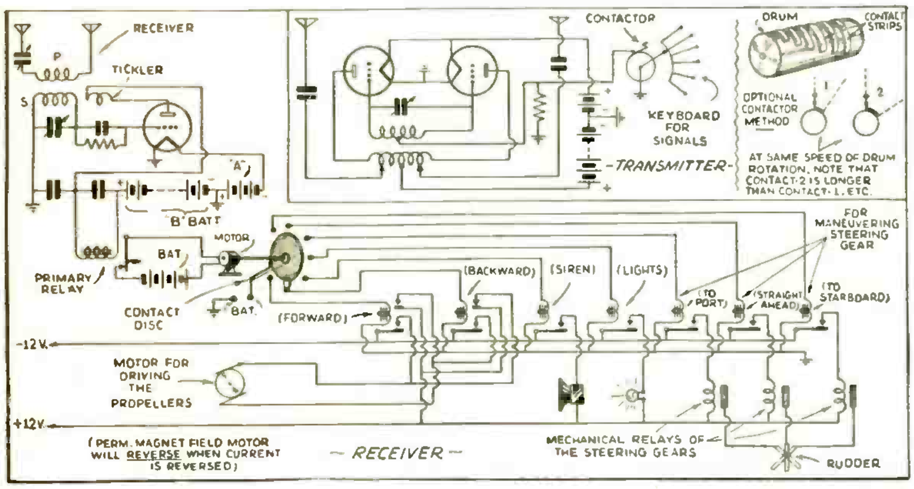
Some "Hams" sure have their troubles in getting the R.F. into their antenna. But one day when I was pounding the key to see who I could raise, checking the xmitter all over and the "soup" showing strong in the R.F. meter CQ—CQ- I got a station and started a chat when all of a sudden the R.F. meter "went west" and trouble began. After a short check-up on the xmitter, without finding my trouble, I went outside to take a peep at the antenna, and imagine my surprise. Some yard man had tied a couple of mules to the antenna pole! The mules finding no grass around, decided there was more grass down in the next block and had proceeded to take antenna—wire, pole and all!

—H. FISHER, W5AMJ

Watts a "Ham"? Is he sugar-cured? More important than that is this: Watts a "Ham" without watts?—GEO. B. THOMPSON, M.D.

Model Ship Guided by Radio Waves

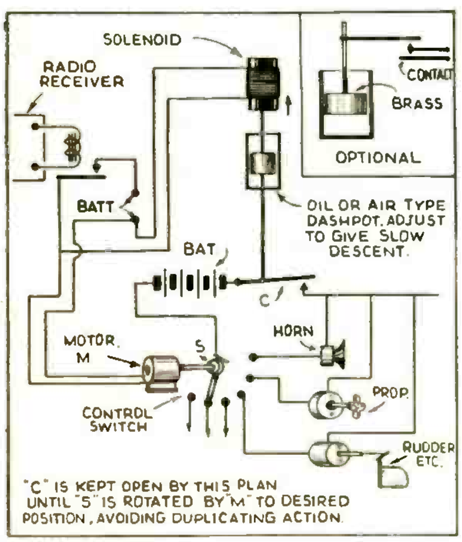
(Continued from page 670)



The receiving circuit used aboard the model cruiser "Terrible" is reproduced above. A simplified diagram of the transmitter used in France is also shown; one method of obtaining timing impulses of various lengths is illustrated in the upper right-hand picture.

upon the dead weight of the motor grows; at a certain moment the relation reverses itself; the "relation force" exerted upon the volume is then in constant progress, exerting power on the dead weight of the carrier itself increasingly. Just this reason makes the result appear very interesting. A battery furnishes the required energy. It is constructed specially so as not to shift the center of gravity of the ship. The battery weighs 88 lbs., rating is 12 volts, 40 amperes.

This battery is sufficient to put the ship through its maneuvers for three hours; the current used is about 12 amperes. In the



Optional receiving control method suggested by the editor, which incorporates a time-delay switch C. The solenoid and dashpot keep the switch C open, until the selector switch S has been rotated to the desired point. Otherwise, the successive apparatus must be momentarily switched into action as the selector is rotated, which is, of course, undesirable. By using a magnet fitted with ratchet and pawl to rotate the selector switch, this switch may be rotated by simply transmitting a sequence of "dot" signals.

present state of experimentation, with the wave lengths and power of transmission in use, the remote control works up to a distance of about 2 miles.

The transmitter has an output of 9 watts, at a wavelength of 42 meters. In order to facilitate transportation, its power-supply consists of batteries, but any other power-supply adapted to these requirements could be used.

The signals are sent out by means of a keyboard; the board has twenty keys and a circuit-breaking bar (see Fig. above). It can give signals of a duration corresponding to that required by the various maneuvers. The mechanism of the remote control proper corresponds to the working of the Breguet telegraph (which is still in use in many European railway systems).

In the interior of the boat, a very simple receiver works upon a relay, which is arranged in series. This relay closes the circuit of the contact disc.

This contact disc, under the action of the current circulating in the circuit closed in this way, always turns in the same direction, until the circuit becomes the carrier of a current, i.e., during the whole duration of the signal.

But the rotation stops at the very moment when the signal stops, and as the current starts to vary the intermediate relay breaks the circuit.

Twenty contacts are placed on the circumference of the contact disc. Each contact corresponds with a signal of a duration equal to that necessary for the contact disc to go from zero to the position of the contact in question.

The contact thus established serves to feed a relay transforming the electric energy into either light, mechanical energy or sound.

Let us take some examples which the figure above will help us to understand better:

The pilot on shore wants the boat to leave its moorings. It is only necessary to press the key marked AV (Forward) in order to transmit a signal of a given length.

This signal is received on board the model ship and by means of the radio receiver causes a current to flow in the circuit, which works upon the primary relay connected in this circuit.

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During the whole time the signal lasts, the contact disc turns. For instance, let us say that Contact No. 1 corresponds to AV (Forward); as soon as the contact disc has arrived at Contact No. 1 the signal stops because the signal must have only the duration which is absolutely necessary.

This contact closes a secondary circuit containing a relay which applies a tension of 12 volts to the motor driving the propellers, and the ship moves forward.

If we give a new signal, for instance the siren, for which Contact No. 3 is reserved, this signal will last longer than the preceding one, and the contact disc will turn correspondingly longer. At this moment there will be two closed circuits.

The opening of circuits is effected by a signal of a duration corresponding to the time which was necessary for the establishing of the contact, or the establishing of such a circuit, or a combination of circuits.

It should be noted that the transmission is not continuous; it is only in force when a signal is given.

At the present stage, the contact disc has twenty combinations, of which only ten are used.

The principal maneuvers are:

Forward.
Backward.
Starboard.
Port.
Position O.
Siren.
Firing of guns.
Explosion of a charge of powder placed in the ship.

The constructor has mounted on the masts, in addition to the position lamps, ten other lamps which by lighting show that the desired order has been received. As each lamp indicates the reception of a command, even before the ship makes the corresponding maneuver, the spectators can see that the mechanism is functioning.

The whole equipment is placed in the hull, in watertight compartments, which may be reached by lifting off the superstructures. These superstructures are movable, and cover the openings through which the operator can pass his hand or even remove a piece of the equipment.

Diagram shows how the various compartments are situated. There are several empty compartments (2) which have been placed there as stabilizers.

Then comes a large space (3) which is reserved for the experiments for which the ship was built.

The following compartment (4) contains the battery, and in (5) the receiver and its power source are placed. Through an opening placed between the two torpedo tubes right on top of this compartment, the receiver is regulated.

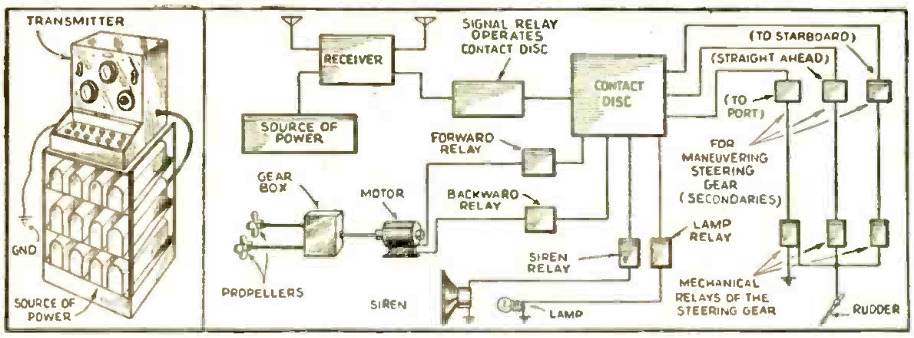
In (6) the motor for the propellers, its coupling, and other gears are placed.

Behind this in (7) are installed the contact disc and the relays. If it is necessary to get at them, it can be easily done by lifting the torpedo tube which is situated on top of them.

The last chamber (8) contains the steering gear and the three plunger magnets which control the rudder.

The large case in which the transmitter is mounted usually has enough space for any attachment for keeping the transmission secret.

An apparatus which assures *secret* communication is provided nearly always by the frequency modulation of the carrier wave, which places an interfering signal near the real control signal, or by modulation of the carrier wave itself.



Appearance of the transmitter and the keyboard control is shown at the left, while the diagram at the right shows in simplified form the receiver control circuits on the model ship.

It is clear that the choice of wavelengths is at present unimportant. However for certain special cases, Mr. Casel studies apparatuses tuned for different frequencies, either for insuring a superior transmission under circumstances where the wavelength of 42 meters doesn't work well, or in order to effect simultaneous control of several units within the same district.

He also experiments with groups of two wavelengths for giving alternative commands on one or the other wavelength by means of a synchronizing key, which can be changed according to a code; or by means of identical cam wheels placed in transmitter and receiver.

On the high seas the interception of a coded signal by an enemy ship is not a cause for worry, as it is not easy to find the key, especially as the decoding requires a code expert with special knowledge not only of codes, but also of the special technique of communication employed. It is very rare to find some one who is expert in both these lines. But admitted that a ship piloted by remote control is exposed to such a hazard, an observer who finds the key, in order to jam the radio commands, must have at his disposal a transmitter with the wavelengths in question, and apparatus which within record time can be adapted to the code.

By the time this is accomplished, the ship under remote control has completed its task and has perhaps even sent the marauder to the bottom of the sea.

At the present state of the technical development of radio communication it is easy to give the receiver a selectivity so precise, and a sensitivity so delicate that successful interference is nearly impossible.

Finally it must be mentioned that there exist already a number of sets for protection against jamming (interference) which are in general use, especially by coast stations for the automatic reception of S.O.S. calls.

After rejecting the argument that the transmission cannot be kept secret, one can easily appreciate the interest with which these experiments are followed. Mr. Casel has given them such a pleasant form that his boats seem to be only toys for amusing grown-up children.—*Courtesy L'industrie Française Radioélectrique.*

Build Your Own Television Receiver

(Continued from page 691)

It will be noticed in the photos that the two 954 tubes are inserted in their sockets "upside down". In other words, instead of the long end (plate) being on top, the short end (control-grid) is at the top. This permits the leads to the grids and plates to be short and places the plate leads below the chassis where they belong. In making this reversal it must be remembered that the screen-grid and suppressor-grid contacts on the sockets are now reversed from the manufacturer's instructions for socket connections, and must be wired in reverse.

The output of the *sound* receiver is on the right side, near the 6V6 tube. The output of the *video* side is on the rear, near the 6H6 tube while the power supply leads are located on the back also.

The various condensers, resistors and choke coils are located in such positions that the leads are as short as possible. A word at this point will avoid some trouble later. It is advisable to have a single grounding point for each stage, returning all bypass condensers grounded resistors, grid returns and other R.F. leads to this point for the stage. A terminal on one of the socket supports is a good point at which to locate the grounding for the stage as it furnishes a support for the condensers, etc., as well as providing the single point ground.

This individual chassis ground is especially important for the two first detectors (video and sound) and for the oscillator. One filament lead on each tube is connected to the chassis and the other lead is connected in parallel with the other filaments. This is a little different than the usual twisted lead filament supply method, but it has been found that grounding the filament to the chassis in this way keeps the tube noise low—an important point.

It will be noticed that no power-supply equipment is included on the receiver chassis. This has been done deliberately—for several very good reasons. First, all magnetic circuits must be kept far away from the cathode-ray tube if clear, undistorted images are to be obtained. Second, hum and induction pickup in the receiver tends to be lower when power-supply parts are removed from the receiver.

The coil winding details are shown in Fig. 2. These coils are best wound at home as they can be changed and adjusted as desired to provide the desired characteristics, as explained later under adjustment data. The coupling to the aerial is provided by a single turn of insulated wire wound around the grid coil and connected to the two halves of a dipole aerial or one side grounded and the other connected to a half-wave resonant rod—or any other form of U.S.W. aerial that the builder prefers from experience. Two aerials are needed—one for the *video* receiver and the other for the *sound* receiver.

The oscillator coil is provided with a

(Continued on page 700)

Build Your Own Television Receiver

(Continued from page 699)

tap on the second turn from the ground end. This is for the cathode connection of the "electron-coupled" oscillator circuit. A clip can be made to slip on this tap, to facilitate circuit changing. The coils can be either soldered to the socket contacts, or, micalex or isolantite strips can be obtained to provide plug-in facilities for changing coils when desired. This latter method was used in the experimental model in arriving at the coil constants given in Fig. 2.

Testing and Adjustments

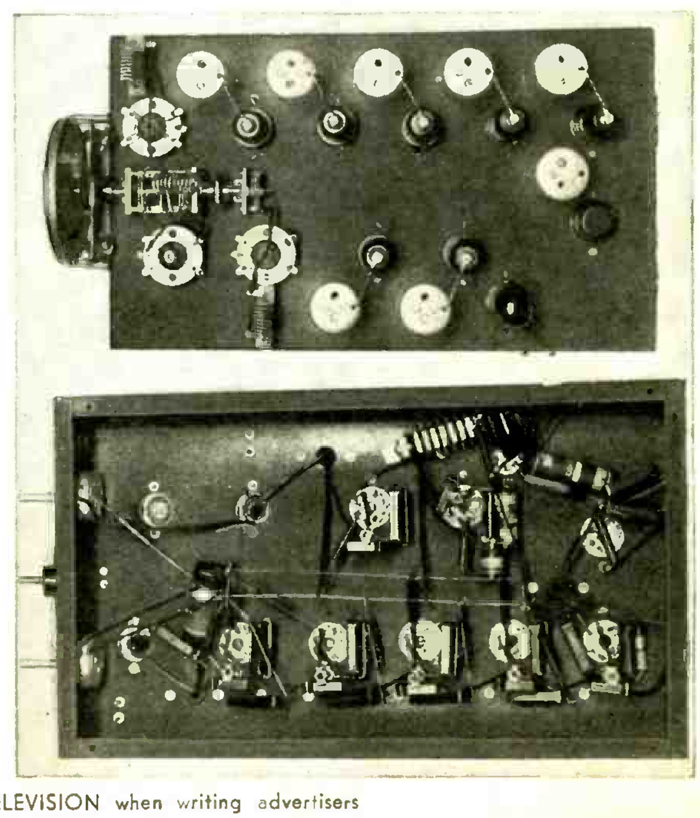
After the set has been completely wired it can be tested, using a temporary power supply providing 250 to 300 V. at about 100 ma. and 6.3 V. for the filaments. Any good power-supply unit or the power-supply of another receiver can be used.

A signal generator covering the signal frequencies of the second or third harmonics of these frequencies as well as the intermediate frequencies of 11.25 and 13.25 mc. used in the two sets is an essential part of the adjusting equipment. First, the I.F. should be adjusted to 13.25 mc. for the *video* I.F. amplifier and 11.25 for the *sound* I.F. amplifier, by coupling the signal generator to the grid of the first detector of each receiver, after disconnecting the regular grid connection. The Aladdin I.F. transformers are only tuned on one side (single tuned) so this job is not difficult with a reliable signal generator and output indicator—especially since these I.F. transformers are unusually broad in tuning as mentioned earlier in this article.

Next, the signal generator should be coupled to the *sound* receiver and tuned to the frequency of the local sound transmissions accompanying the television broadcasts. This will have to be determined by contacting the station in question. Then the tuning condenser should be turned back and forth across the band until signals are heard. The volume control of the sound receiver should be at its maximum position. Adjust the spacing between turns on the coils (aerial and oscillator) until the signals are loudest and come in near the center of the tuning band on the dial. Finally, the signal generator should be coupled to the video receiver and tuned to the frequency of the local television transmitter. The first detector coil of the video receiver should then be adjusted until the strongest signal is recorded. The sensitivity adjustment and volume controls of the *video* receiver should be at maximum position. This may necessitate changing the settings of the I.F. transformers slightly. If so, all of the I.F.'s must be changed to keep the pass band sufficiently broad.

Then the set is ready for an aerial and actual test on the air. Slight readjustments of coils and I.F. settings may be made, depending on how reliable the oscillator is that is used for adjustment. Once the condenser is set at the point of greatest signal strength for either video or sound signals, the condenser should not be touched again all through the adjustments—all corrections being done with the coils and I.F. settings. As a last resort, the plates of the two detector tuning condensers may be bent to permit alignment, taking care to avoid shifting the rotor position.

Next month we will describe the complete power-supply for the set, the cathode-ray tube and the sweep circuits. In the



Top and bottom views of the "S.W.&T." Television Receiver.

meantime, the sound accompaniments to the television broadcasts can be enjoyed, using the temporary power-supply set-up.

List of Parts

ALADDIN (Coils)
7—U-100 I.F. transformers (2 of which are resonated at 11.25 mc. and 5 at 13.25 mc.).
1—U-200 I.F. transformer (resonated at 13.25 mc.).

PAR-METAL (Chassis)
1—Black crackled finished steel chassis—10"x17"x3".
1—No. 153 dial.

CARDWELL Condensers
1—ER-15-AD 15 mmf. variable condenser.
1—ER-15-AS 15 mmf. variable condenser.
1—Type "A" flexible coupling.

HAMMARLUND
3—Isolantite Acorn tube sockets.
1—CH-500 R.F. choke.

SOCKETS*
9—RSS8 octal tube sockets (steatite).

CORNELL-DUBILIER (Condensers)
22—.01 mf. mica condensers, type 4-6S1.
1—250 mmf. mica condenser, type 4-6T25.
1—100 mmf. mica condenser, type 4-6T1.
1—.001 mf. mica condenser, type 4-6D1.
1—.05 mf. mica condenser, type 9-6S5.
2—.00001 mf. mica condensers, type 4-6Q1.

SPRAGUE
2—10 mf. 25 V. electrolytic condensers, type HC10
2—.1-mf. 400 V. paper condensers, type TC-5.
1—.5-mf. 400 V. paper condenser, type TC-1.

I.R.C.
1—200 ohm 2 W. resistor, type BW2.
1—.25 meg. 1 W. resistor, type BT1.
2—.5 meg. 1 W. resistors, type BT1.
16—10,000 ohm 1 W. resistors, type BT1.
3—.1 meg. 1 W. resistors, type BT1.
1—300 ohm 1 W. resistor, type BW1.
2—200 ohm 1 W. resistor, type BW1.
1—50,000 ohm 1 W. resistor, type BT1.
3—350 ohm 1 W. resistor, type BW1.
1—500 ohm 1 W. resistor, type BT1.
1—800 ohm 1 W. resistor, type BT1.

RCA
2—954 Acorn tubes.
1—955 Acorn tube.

RAYTHEON
6—6K7 metal tubes.
1—6J7 metal tube.
1—6V6 metal tube.
1—6H6 metal tube.

MISCELL.*
2—Potentiometers, 50,000 ohms.
1—Potentiometer, 10,000 ohms.
2—Bindingpost strips, 2 terminal type.
1—Bindingpost strip, 3 terminal type.
7—metal tube grid caps.
20 ft. No. 14 tinned copper wire.
1 roll No. 20 push-back hookup wire.

Miscellaneous rubber grommets, insulated wiring terminals, screws, nuts, washers, etc.

**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.*

What Sun-Spots Do to Short Waves

(Continued from page 663)

Eighteen mc. is normally used when it is daylight over the Atlantic—as twilight creeps over the ocean the frequency shifts to 12 mc. and then to 9 mc. at night and then finally to 7 and 5 mc. When a magnetic storm arises and the 18 mc. channel goes out, it is frequently found that 12 mc. will still carry the traffic, and when 12 mc. is no longer effective, 9 mc. can still be used in many cases.

Short-wave commercial circuits operated out of San Francisco, California, or Miami, Florida, experienced little effect from the magnetic storms. Over a period of several days the time that the usual short-wave channels were made ineffective due to magnetic storm effects varied from 15% to 65%. More spots have recently been noted on the surface of the sun than have been observed in many years.

The engineers of the A. T. & T. Co. have developed new systems and apparatus to offset the bad magnetic storm years and the results obtained during the recent severe magnetic storm proved that *single side-band* transmission helped to keep short-wave transmission effective over a longer period. Likewise the newest idea in aerials—the *multiple-unit steerable-antenna*, which will be put into service in another year, will help a great deal. The effect of this antenna is to improve or focus the receiving activity in a certain direction and for a certain frequency, and also to enable waves of different frequencies to be received with maximum efficiency. In other words, waves arriving at a receiving station at different angles can be compensated for and the maximum strength of signal realized. The *Musa* steerable-antenna, as it is called by the engineers who developed it, selects the most effective signals coming in and combines them in phase, so that they thus add up to give a signal of greater combined power.

The sun-spots move across the surface of the sun by virtue of its rotation, and successive photos have been taken, showing the movement of a spot or a group of spots across the surface of the sun as it rotates. A strong sun-spot disturbance, which resembles a veritable whirlpool of incandescent gases in the sun's surface, causes streamers to be shot forth from the sun in the region surrounding these sun-spots, some of the streamers extending more than a million miles in length, as recorded by the camera. These streamers can be likened to the jets of water caused by a revolving lawn spray, and it will be seen that as the sun rotates, and providing the streamers are pointed at the right angle to intercept the earth, the earth will be swept by one of these streamers and the speed of the sun's rotation is such that the streamer would sweep across the earth's disc in about thirty seconds.

World S-W Stations

(Continued from page 684)

Mc.	Call	
6.020	DJC	BERLIN, GERMANY, 49.83 m., Addr. (See 6.079 mc.) 10.40 am.-4.30 pm.
6.018	ZHI	SINGAPORE, MALAYA, 49.84 m., Addr. Radio Service Co., 2 Orchard Rd. Mon., Wed. and Thurs. 5.40-8 am., Sat. 10.40 pm.-1.10 am.
6.017	HI3U	SANTIAGO DE LOS CABALLEROS D. R., 49.85 m. 7.30-9 am., 12 n.-2 pm., 5-7 pm., 8-9.30 pm.; Sun. 12.30-2, 5-6 pm.
6.015	PRA8	PERNAMBUCO, BRAZIL, 49.84 m., Radio Club of Pernambuco, 6-9 pm.
6.010	COCO	HAVANA, CUBA, 49.92 m., Addr. P. O. Box 98. Daily 7.55 am.-12 m., Sun. til 11 pm.
6.010	9MI	S. S. KANIMBLA, 49.92 m. (Travels between Australia and New Zealand). Sun. around 7 am.
6.010	CJCX	SYDNEY, NOVA SCOTIA, 49.92 m. Relays CJCB 7 am.-1 pm., 4-8 pm.
6.007	ZRH	ROBERTS HEIGHTS, S. AFRICA, 49.94 m., Addr. (See ZRK, 9.606 mc.) Daily exc. Sun. 10 am.-4 pm., Sat. till 4.45 pm.; Sun. 8 am.-12 n., 12.15-3.15 pm.
6.005	HP5K	COLON, PAN., 49.96 m., Addr. Box 33. 7-9 am., 11.30 am.-1 pm., 6-11 pm.
6.005	CFCX	MONTREAL, CAN., 49.96 m., Can. Marconi Co. Relays CFCF 7.45 am.-1 am.; Sun. 9 am.-11.15 pm.
6.005	VE9DN	DRUMMONDVILLE, QUE., CAN., 49.96 m., Addr. Canadian Marconi Co. Sat. 11.30 pm.-2 am.
6.004	RV59	MOSCOW, U.S.S.R., 49.77 m. Irregular. 3-6 pm.
6.002	CXA2	MONTEVIDEO, URUGUAY, 49.98 m. Addr. Rio Negro 1631. Relays LS2, Radio Prieto, Buenos Aires. 10.30 am.-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	XEBT	MEXICO CITY, MEX., 50 m., Addr. P. O. Box 79.44. 8 am.-1 am.
		End of Broadcast Band
5.977	CS2WD	LISBON, PORTUGAL, 50.15 m., Addr. Rua Capelo 5. 3.30-6 pm.
5.975	OAX4P	HUANCAYO, PERU, 50.16 m. La Voz del Centro del Peru. 8 pm. on.
5.968	HVJ	VATICAN CITY, 50.27 m. 2-2.15 pm. daily; Sun. 5-5.30 am.
5.940	TG2X	GUATEMALA CITY, GUAT., 50.47 m. 4-6, 9-11 pm.; Sun. 2-5 am.
5.940	PJC1	CURACAO, DUTCH W. INDIES, 50.47 m., 6.36-8.36 pm.
5.935	YV1RL	MARACAIBO, VEN., 50.52 m., Addr. Radio Popular, Jose A. Higuera M, P. O. Box 247. Daily 11.43 am.-1.43 pm., 5.13-10.13 pm.; Sun. 9.13 am.-3.13 pm.
5.913	YV4RP	VALENCIA, VEN., 50.71 m. Irreg.
5.900	ZNB	MAFEKING, BRI. BECHUANALAND S. AFRICA, 50.84 m. Addr. The Govt. Engineer, P. O. Box 106. 6-7 am. 1-2.30 pm.
5.900	TILS	SAN JOSE, COSTA RICA, 50.85 m. 6-10 pm.
5.898	YV3RA	BARQUISIMETO, VEN., 50.86 m., Addr. La Voz de Lara, 12 n.-1 pm., 6-10 pm.
5.892	HH2S	PORT-AU-PRINCE, HAITI, 50.89 m., Addr. P. O. Box A103. 7-9.45 pm.
5.890	JIC	TAIHOKU FORMOSA, 50.9 m. Works Tokio 6-9 am.
5.885	HI9B	SANTIAGO, D. R., 50.95 m. Irregular 6-11 pm.
5.875	HRN	TEGUCIGALPA, HONDURAS, 51.06 m. 1.15-2.16, 8.30-10 pm.; Sun 3.30-5.30, 8.30-9.30 pm.
5.855	HI1J	SAN PEDRO DE MACORIS, D. R., 51.25 m., Addr. Box 204. 12 n.-2 pm., 6.30-9 pm.
5.853	WOB	LAWRENCEVILLE, N. J., 51.26 m., Addr. A.T.&T. Co. Works Bermuda nights.
5.845	YV1RB	MARACAIBO, VEN., 51.3 m., Addr. Apartado 214. 8.45-9.45 am., 11.15 am.-12.15 pm., 4.45-9.45 pm.; Sun. 11.45 am.-12.45 pm.

Duplex Phone on German Guard Boats

(Continued from page 668)

unit shown is constantly connected with a speaker; lifting the French phone from the hook disconnects the speaker and starts the transmitter.

The new antenna consists of a metal disk of square form (the center of which is partly cut out). This disk has been fastened atop a collapsible telescopic mast which in its maximum extended position reaches about 15 feet above the boat's deck. The S-W range has been increased 100 per cent.

This antenna, which has a surprisingly effective height and a sufficiently great capacity to insure excellent pickup and radiation, has extended the customary range of installations of this type one hundred per cent.

The "Polaroid Kinescope" for Large Television Images

Erie W. Leaver

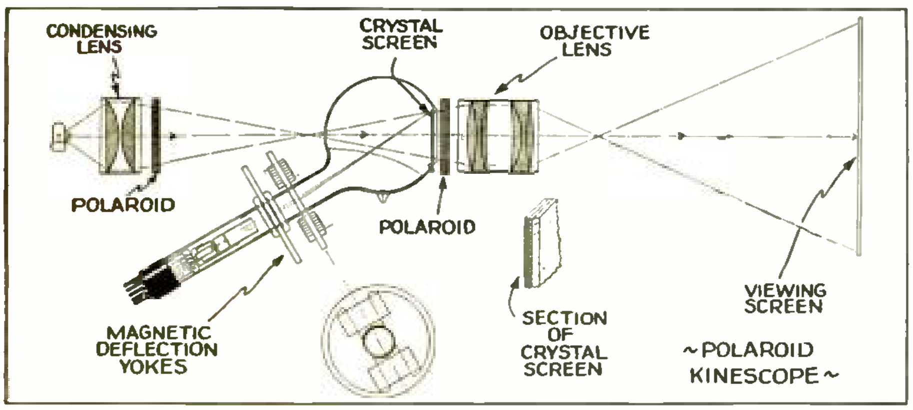
● THE continual search for some means of producing *large* and *brilliant* television pictures has occupied the time, money, and brains of most of the leading figures in television for many years. Many devices have been invented, and at the present time, quite satisfactory pictures are obtained. However, as the entertainment value of a television picture depends so much upon its size, brilliancy, and contrast, then any device which shows promise of a great stride toward improving these factors can profitably engage the attention of everyone directly concerned or interested in television. We believe that the device described in this article is such an invention.

Within the past year, the supersonic light valve and the projection type cathode ray tube have shown remarkable advances. This new device which we tentatively call "The Polaroid Kinescope," for descriptive purposes, promises to eclipse these developments. This invention may produce pictures approaching regular cinema quality.

The cathode ray tube in itself is quite an efficient instrument, and it has numerous advantages over most mechanical systems. The usual limiting factor to enlarging the picture from a cathode ray tube to any desired size greater than the end of the tube itself is usually the amount of light available. Thus, if we can greatly increase the amount of light, we have solved many of our problems, for we can project the picture on a larger screen. The incandescent light source is known for its high brilliancy, its ruggedness, and its cheapness. Therefore, if we can efficiently combine and utilize an incandescent light source with a cathode ray modulation and scanning system, we would pretty well have the omega of television reproducers.

All present day television systems use scanning. That is, they break the picture up into elements and send signals corresponding to these elements, one after the other to the receiver, where they are reassembled. In most receiving systems, each element only appears for a very small fraction of a second, and as they appear successively, the persistence of vision of the eye is relied upon to give the impression that all the elements are there all the time. As each element has such a small duration, it must be many times more brilliant than if it were present all the time to give the same impression. A somewhat similar situation exists at a transmitting end. If the picture is scanned in the usual manner so that light from portions of the picture falls upon a photo cell successively, then, one can readily see that as the definition becomes higher and the corresponding number of elements increases, the signal output from the photo cell will decrease in proportion. The signal output with high definition television using this method, may be only a few electrons. If some means were available to store the energy over a picture frame period, then obviously, the output would be tremendously increased. This arrangement has been embodied in the television camera tube known as the iconoscope. It is one of the objects and purposes of the "polaroid kinescope" to perform the same storing action at the receiver as the iconoscope performs at the transmitting end.

The apparent brilliancy of a television picture element depends not only upon the amount of light emanating from each element, but also upon the time during which the light is given off. This is due to the integrating action of the human eye. It has been found by actual experiment that the apparent brilliancy increases up to a time limit of approximately 1/20 of a second. The actual value of the time depends upon the real brilliancy of the picture element.



A new system for producing large television images is shown above.

This new invention takes advantage of the increasing apparent brilliancy with time as well as several other factors which will be described later. In effect the new reproducing device consists of a screen, the opacity of which is varied by a modulated electron beam. Further, after the beam has caused any part of the screen to have a certain translucency the screen continues to have a proportional translucency until the next frame scan when the beam strikes the element again. There have been several attempts to use this principle directly by using a material the transparency of which can be directly changed by a change in an electric field across it. Many experiments in the laboratories of the *American Television Institute* have tended to show that the direct variation of transparency does not offer a practical solution to the problem, and we have therefore resorted to a device which depends upon the rotation of the plane of polarization of light. The broad idea of the new device was conceived by Mr. U. A. Sanabria quite some time ago. Briefly, it consists of a cathode ray tube, the screen of which possesses the ability to rotate the plane of polarization of light passing through it proportional

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to the intensity of the scanning cathode ray beam. Most of us no doubt will be familiar with what plane polarized light is and how it differs from ordinary light, but for those who are not familiar, we can explain as follows:—

Light is known to be a transverse wave motion, and if a beam of light is made up of rays which are all vibrating in the same plane, the beam is said to be "plane polarized." Many substances are known to have the property of separating ordinary light (which consists of light vibrating in practically every plane) into two light beams vibrating in planes at right angles to one another. One of these rays is called the ordinary, while the other is called the extraordinary ray. In polarizers, as they are called, one of these rays is usually absorbed in some manner so that only light vibrating in one plane emerges from the other side. If two of these polarizers are placed in succession with one another, they will pass a great deal of light if they tend to polarize the light in the same direction; while if one is rotated with respect to the other so that they tend to polarize light planes at right angles to one another, then no light at all will pass through the system. Intermediate positions of the analyzer will allow various amounts of light to pass through. Various types of polarizers have been invented. One of the older types is known as the Nicol prism, while of much more recent origin is polaroid, the invention of E. H. Land.

Many substances possess the property of rotating the plane of polarization so that if one of these substances were placed between two sheets of polaroid which were originally set to cut off the light completely, some light would now pass through it. The greater the rotatability of the substance, the greater the amount of light which would pass through the combination. It was discovered that substances which normally had no effect upon polarized light would rotate the plane of polarization when under the influence of a strong magnetic field. It was found that the rotation was proportional to the magnetic field and thus, we could use this arrangement as a primitive type of light valve. It was then discovered by Kerr that the glass dielectric in a condenser possessed optical rotatability, and that the rotation was proportional to the square of the applied potential. The electrostatic ability of many substances has been determined and nitrobenzene has been found to be the most suitable for use in light valves such as the Kerr cell.

Some time later it was found that a quartz crystal could be used as a dielectric in a type of Kerr cell, and much more recently it was discovered by Pockels, that the plane of polarization of light was rotated if the light was sent through the condenser along the lines of force. This effect, named after the discoverer, is directly proportional to the applied voltage, and in some salts like Rochelle salts, the effect is quite large. One of the fundamental possibilities is to apply this effect by having a transparent plate inside the cathode ray tube in which these crystals are embedded. A beam of light from a Mazda projection lamp passes through a sheet of polaroid through the crystal sheet to another sheet of polaroid where it is completely cut off. When the electron beam scans the crystal sheet, however, a field is applied across each little crystal which causes it to twist the plane of polarization of the light passing through it, and thus, when the light strikes the second sheet of polaroid, some will pass through it onto a screen. The greater the intensity of the electron beam, the greater will be the rotation of the plane of polarization and the more light will pass through the polaroid onto the screen. To impress a field on the crystals, it will be obvious that a screen or a transparent layer of metal must be on the opposite side of the crystals from that of the electron beam.

When many crystals are subjected to an electrostatic field, they tend to twist, and therefore, their optical rotatability is changed. In other words, the piezo electric rather than the Pockel's effect can be utilized. In such a case, the crystals would be needle-shaped in form, and have their ends only embedded in the glass. Thus, there are two slightly different forms of the "polaroid kinescope."

In order that the crystals may be charged and then slowly discharged over a frame period, they may be coated with a thin transparent layer of some photo-sensitive substance such as potassium. The intense light falling on the screen causes it to become positively charged, the electrons from it having been emitted from the potassium coating and been taken up by the anode of the tube. The polaroid is adjusted so that when the screen is positively charged no light passes through it. When the electron beam strikes a portion of the screen, the positive charge on that portion becomes neutralized to an extent determined by the intensity of the beam. Thus, the rotation of the plane of polarization of the light becomes less. Therefore, the amount of light passing through the combination will

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vary accordingly, and light will continue to pass until the crystal has again been positively charged. Other methods can be devised of dissipating the charge, but the one described above has proven the most satisfactory to date. The time of discharge and charge can be so arranged that the light from each element appears for a time nearly equal to the frame period, so that the picture appears tremendously more brilliant than that produced by most other systems. Another great advantage of the device is the small amount of flicker due to the retentivity of the screen.

We might state here that we make no claim to the name "polaroid kinescope" for our new device. We realize that both the name "polaroid" and "kinescope" are trade names, and have merely used the combination for descriptive purposes. As a matter of fact, neither "polaroid" nor a "kinescope" need be part of the invention. Other means of polarizing the light can be used and may under certain circumstances be preferable, while the device known as the "kinescope" may not be by any means best for our purpose.

Laboratory experiments are continuing to determine the practicability of this invention as well as to iron out the various technical difficulties which are bound to occur in any new development. We hope that this publication of the invention will stimulate broader thought in the television field.

Courtesy American Television Institute, Inc.

News Bulletins Via Wired Television

(Continued from page 674)

it is fed through a small transmitting cabinet; as the ribbon moves along, a beam of light is caused to scan the ribbon and the letters by means of a revolving lens disc. The fluctuations in the light beam, caused by the successive letters moving along on the tape, fall upon a photo-electric cell and are converted into electrical impulses. These impulses are amplified and conducted to a standard wire line, or they may be fed to a radio transmitter.

At Dempsey's restaurant where the receiving cabinet was set up, the letters move along on a ground glass screen measuring 3 ft. long and about 6" high. The news bulletins are received by a television process, including a mechanical scanning system and a light modulating cell. The letters are easily readable from a distance of 20 ft., or more in the brightly lighted restaurant.

The general plan of the television news service is to install a number of the receiving cabinets in prominent public places such as hotels, restaurants, etc. These news bulletin receivers are to be connected to a central office where trained operators will prepare and transmit the latest spot news to the outlying stations.

"CQ"

The other day I was over to a friend Ham's shack, chewing the fat over some changes in his set, when his wife came in and said that she would like to go out that evening. When he told her he had planned to stay in that evening and modernize the set, she retorted—

"You think more of that old radio set than you do of me!"

To which remark my friend replied—

"Well, I get less interference from it." (Hi, hi!)—*Richard Dawson.*

4-Inch Waves Turn Science *Topsy-Turvy*

(Continued from page 669)

To show how the waves could be transmitted over appreciable distances, Dr. Southworth had a flexible metal pipe some 25 ft. long leading to a receiver on the opposite side of the platform. When the other end was plugged into the transmitter, a strong tone was given off by the receiver.

To make the point that the waves, while they originate with high frequency electric currents, are decidedly different from radio waves, Dr. Southworth showed that radio waves move with the velocity of light through free space. His "guided" waves, however, are restrained by a surface where the dielectric constant of a material differs from that of the surrounding air. Such a discontinuity would be found at the surface of glass, rubber or other insulating material, or it would be created by enclosing an insulator in a conducting tube. The insulator in this case *might even be air.*

These demonstrations by Dr. Southworth, may, in the editor's opinion, point the way toward the radio transmission of tomorrow. In other words, it would seem that instead of having metal pipes or tubes to guide these waves but a few inches in length, we may in the future see such waves guided by rods or tubes made of a non-metallic substance.

In the first place any loss in transmission is caused by the absorption of the energy from the waves by a metal or other tube (or rod) along which the waves travel. If an insulating material such as rubber of the proper chemical make-up, could be devised having a very small absorption factor, so far as this ultra-high frequency wave transmission is concerned, it probably would serve the purpose even better than a metal rod or tube. At the recent demonstrations the actual transmission of these ultra-high frequency waves along a soft rubber rod a few feet in length took place, much to the surprise of the audience who witnessed the experiments.

The accompanying drawings show, in simplified form, how the high frequency waves are guided along the inside of the pipe, similar to sound waves in the air column enclosed within an ordinary speaking tube. In the case of Dr. Southworth's micro-waves, the metal pipe simply acts as a *guide* to prevent the waves from spreading out and being dissipated in all directions.

The oscillators were placed behind a blackboard and the lecturer then explored the field in front of these transmitter tubes by moving a sensitive detecting instrument across the face of the blackboard. Each time the tiny pick-up antenna was in the proper position and parallel to one of the tiny waves constituting the field, a 1,000 cycle note was heard at maximum strength on the auditorium loudspeaker. The diagram shows how the energy picked up from the H.F. field was rectified by a crystal detector (silicon) and the rectified signal sent through a suitable amplifier.

In some of the other demonstrations a large indicating meter was connected to the amplifier and the changes indicated on the meter. Metal pipes of different diameters were placed in front of one of the fields, as shown in the accompanying picture, and only when a certain size pipe was placed in front of the field was there a response on the loudspeaker. The definite relation between the diameter of the wave *guide* pipe and the frequency or wavelength was thus demonstrated.

Another experiment was performed with

a copper pipe which had a partition passing through the center, this partition being twisted through 90°; when a detector unit was placed in front of this tube and parallel to the edge of the partition a response was noted; at right angles, there was no response, indicating that the H.F. wave field had been rotated while passing through the twisted pipe.

Another startling demonstration — the waves were guided through a 25 ft. length of flexible pipe as shown in the picture. An oscillator was connected at one end of the pipe and a detector unit at the other end connected with an amplifier and an indicating meter. The flexible pipe could be twisted to different positions and the response noted just the same.

In still other demonstrations, the effect of grids or gratings was shown. These had to be made in different patterns for the different types of wave fields demonstrated. For one simple type field, a filter or grid having straight slots in it, passed the wave successfully; when this grid was turned 90° the waves were cut off or stopped.

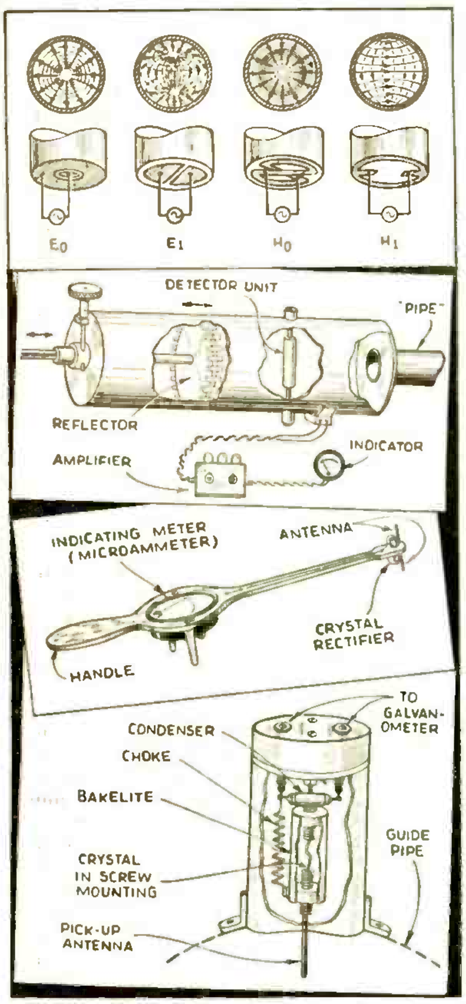
The fact that transmission of these waves took place along a soft rubber rod is due to the fact that as long as a substance having a different dielectric constant than air is provided, the waves will be guided along this substance. Some sort of tube can be used, too, one made from an insulating material or metal. If the tube is interrupted, transmission is stopped, proving that the waves are carried through the pipe and not through space.

Experiments in deflecting or reflecting the waves were made by means of a tin-foil-covered paddle as shown. If the paddle was placed between the transmitter and the detector, the signals stopped. When the paddle was carefully placed at a certain angle as shown, the waves were deflected onto the detector unit, demonstrating to the audience that the waves acted the same as light and other waves and could be deflected as well as reflected.

Another picture shows how two half-pipes made of copper were demonstrated to the audience. When a suitable detector was placed on the outer end of the two half pipes placed with their flat sides together, transmission was carried on successfully. As proof that the transmission was through the pipe, and *not* through space, one of the half-pipes was removed and when the space along the flat side of this half pipe was explored with a suitable detecting instrument, *no response was noted*. However, when the detector was placed at the open end of the half-pipe as shown in the picture, a signal response was at once obtained.

It was pointed out by Dr. Southworth that in some of the experiments in the laboratory these ultra short waves, which were really electro-magnetic in character, had been sent through tubes nearly a mile long. He stated that when properly extended and developed, such a system should prove excellent for television.

The small vacuum tubes used to produce the high frequency oscillations for these demonstrations furnished about .9 watt of power.



Top figures show four types of micro-waves produced by Dr. Southworth and various methods of connecting the oscillator to the end of the tube. The other drawings show method of detecting wave with adjustable tuner or reflector; an exploring detector, and at bottom—crystal detector and antenna unit which may be mounted wherever desired along the wave-guide pipe.

Automobile Theft Alarm

(Continued from page 681)

a door, or when stepping on the running board, the delicately poised metal ball falls off the top of the cone and closes the circuit between the large supporting cone and the metal shell of the socket.

Not only is this device very simple but it operates with the slightest vibration or jarring of the object on which it is mounted. It can also be used for protecting trailers, tents, boats or what have you?

The smaller the top of the cone on which the ball is to rest, the more sensitive the device will be. Naturally, the owner of the car equipped with this device should look around just before setting the *ball-switch* so that so far as he knows no one is watching him set the ball in place. Probably one of the best locations for the device is just inside the car door so that it can be set while reaching inside the car. It could be mounted just below the cowl or instrument board.—F. J. Faulkner.

BOOK REVIEW

THE LOW VOLTAGE CATHODE RAY TUBE, G. Parr. Stiff cloth covers; 6"x8¾", 178 pages, Chapman Hall Ltd., London, England. (Allen B. DuMont Labs., Montclair, N. J.)

This is a very excellent book which every student of television should study carefully. The first part of the book deals with low and medium voltage cathode ray tubes and goes into the construction of the tubes, with a discussion of the function of the individual parts such as the anode, screen, etc. The physics of the electro-static and electro-magnetic beam deflection systems are covered at length. Focusing of the cathode beam is explained in detail. A chapter is devoted to Lissajous' figures. Next we come to the subject of linear time bases, followed by a chapter on other types of time bases, with plenty of diagrams and photos of these important parts of television receivers (known in this country as sweep circuits).

A valuable section is devoted to the application of the cathode ray tube to radio engineering and industry. Chapter 8 deals with television reproduction with the cathode ray tube; scanning circuits are shown with the values of the parts.

Short Wave Propaganda

(Continued from page 667)

countries to which they broadcast adopt an easy informality to secure listeners' good will. A favorite device is to request listeners to write to the station, read their letters over the air, and send friendly personal greetings via the microphone. Of course the listener in Oshkosh is tickled to hear his name announced over the air from some faraway land. Such letters are a daily special in the German radio bill of fare.

Monthly or weekly program booklets printed in many languages are mailed free to all foreign listeners. Some of these have program schedules printed in the local time of the foreign country. Germany's program sheet for North America is listed in Eastern Standard Time.

The British charge $2.50 a year for their programs, which are issued weekly. The illustration across the top of the first page of this article is a photograph of program sheets from the principal countries of the world.

Broadcasts to South America

Russia, Germany and Italy, and especially the latter two nations, are engaged in a concerted effort to win public favor in South America.

Broadcasting to South America plays an important part in their propaganda activities. Every day from 4:50 to 10:45 p.m. Germany sends forth programs in Spanish and Portuguese for the ears of South Americans. Italy performs a similar daily service from 6-7.30 p.m. News bulletins attack the United States government's foreign and domestic policies and seek to paint democracies as the villains in international affairs. Fascism is extolled as the salvation of the world. Complaints have been received by American stations indicating that European stations interfere with their news broadcasts to prevent South Americans from hearing our point of view.

Washington Concerned

This situation has been causing much annoyance in Washington for it may seriously affect friendly relations with South America. The state department has been making strenuous efforts to improve Pan-American trade by the *Good Neighbor* policy only to have its efforts nullified by European sniping.

It seems evident the Fascist countries hope to swing South America into their political sphere. This is a direct threat to the traditional policy of keeping the Americas free of European entanglements.

U. S. Stations Now Active

In the United States, radio stations are owned by private capital and are not subject to any government regulation. However, station owners are granted periodic license renewals, only if it can be shown that they are performing a public service. With the growing uneasiness of the United States over the situation abroad, the large operating companies have found it advisable to cooperate with the government in enlarging the scope of their short-wave broadcasting outlets. Since last July, the National Broadcasting Company has operated its powerful short-wave station W3XAL at Bound Brook, N. J., for sixteen hours daily. From 9 a.m. to 6 p.m. programs especially designed for foreign listeners are beamed toward Europe on 17.78 mc. with news and announcements given in French, German, Italian and English.

From 6 p.m. to 1 a.m. programs are beamed to South America on 17.78 or 6.1 mc. with announcements in Spanish and

Portuguese. The General Electric Company's stations W2XAF and W2XAD at Schenectady, N. Y., on 15.23 and 9.53 mc. are performing a similar service as is the Westinghouse station W8XK at Pittsburgh, Pa., which operates 4 different frequencies.

The Columbia Broadcasting System recently enlarged its short-wave broadcasting plant at New York (W2XE) and now beams its broadcasts to Europe and South America on any of 5 different frequencies in a similar way, although foreign-language programs have not been promoted to any great extent to date. The educational station W1XAL operated by the World Wide Broadcasting Foundation at Boston, Mass., on 15.25, 11.79 and 6.04 mc., is also performing noteworthy service in this field.

To date, no effort has been made to counteract the effects of European stations' propaganda by counter propaganda. The American stations have confined themselves to broadcasting what they term *factual news* in various foreign language news bulletins. The theory is that if the listener has to choose between a so-called factual news bulletin and a highly colored one, such as that sent out by European stations, he will tend to discount the latter. Whether this is sound reasoning remains to be seen. Our whole policy at present is merely an extension of the well-known *Good Neighbor* policy. Programs are all designed to create good will among foreign listeners.

Dictatorship countries are disturbed over the entrance of the United States and Great Britain into the foreign language broadcasting field, because up to now their citizens have heard only their own governments' side of the story. In Germany the only information in the German language which could be picked up on the radio, presenting a different point of view from that presented by German radio and press was from the powerful Russian stations, which have long broadcast in various languages for the benefit of Europeans. In Germany it is a criminal offense to be caught listening to a Russian broadcast. No such drastic penalties have been inflicted upon those listening to broadcasts from democratic nations.

The recent broadcast of President Roosevelt's opening message to Congress was sent overseas in several languages, from Bound Brook, N. J., and for the first time, thousands of European S-W listeners heard the democratic point of view enunciated in their own language. Foreign language news broadcasts sent out from this country are now heard in those countries where freedom of the press does not exist and are naturally causing considerable concern to the governments in power.

Future Trends

What effect this powerful tool for molding public opinion will ultimately have on world affairs is anybody's guess.

The results of Italy's ethereal invasion of Palestine and Arabia have been noted. It is difficult to say whether or not the Arab unrest that followed the Italian broadcasts points a parallel for a similar reaction in South America. It is significant that our State Department is concerned over the situation.

Two courses are open to a nation to defend itself against these attacks. One entails the adoption of tactics similar to those used by the propagasters—fight fire with fire! The other is to smother the propaganda stations with a blanket of interfering signals so that no one can hear them. (This method has already been used by certain European nations to prevent reception of Moscow.)

Both courses mean further friction on the badly frayed cords of international diplomacy, and as long as nations continue to follow their violently nationalistic policies all talk of international regulation of world wide broadcasting is futile.

Schedule of foreign broadcasts to North and South America

GERMANY
4:50-10:45 pm.
North America (Ger., Eng.)
6.02, 11.77, 15.2 mc.
Central America (Ger., Eng., Spanish)
9.54, 15.34 mc.
South America (Ger., Span., Portuguese)
9.56, 15.28 mc.
8-9 am.
North America
15.11 mc.
Central America
15.34 mc.
6-8 am.
South America
15.28 mc.

ITALY
7:35-9 pm.
North America (Italian)
9.53, 11.9 mc.
6-7:30 pm.
South America (Span., Italian, Portuguese)
9.53, 11.9 mc.

RUSSIA
North America (Eng.)
6-9:15 pm.
9.6 mc.

JAPAN
North America (Eng., Jap.)
6-6:30 pm.
11.8 or 15.16 mc.
South America (Portuguese, Span., Jap.)
4:30-5:30 pm.
11.8 and 15.16 mc.

ENGLAND
4:15-6 pm.
North and Central America
15.31 and 15.14 mc.
South America
15.18 mc.
6:20-8:30 pm.
North America
9.58, 11.75 mc.
South America
9.51 or 15.18 mc.
Central America
9.51 or 15.14 mc.
9:20-11:20 pm.
North America
9.58, 9.51, 11.75 mc.
Central America
9.51 mc.

What Do You Think?

(Continued from page 671)

(Your suggestions are appreciated, doctor. We have carried out your ideas to some extent, at least, by taking all the lessons published in the Radio Amateur Course and reproducing them in book form. The Radio Amateur Course by George W. Shuart is now available from most radio dealers. The course contains chapters on "How The Vacuum Tube Works," "Alternating Current," "Resistance, Inductance and Capacity," "Laws Pertaining to Amateurs," etc. We always welcome constructive criticism and again thank you for your valued letter.

It's your magazine, and if enough readers write to the editors asking for more Amateur Course lessons, we'll do our darndest to fill the order. A post-card will do; just write on it these three words—"More Amateur Course."—Editor.)

S-W's Land Planes in New Army System

(Continued from page 674)

diagram shows; then the airplane automatically starts to lose altitude and follows a pre-determined glide and direction. The various glide paths for different degrees of wind velocity are indicated in Fig. 2.

In the execution of an automatic landing, using the new Air Corps system, it is necessary for the pilot of the airplane to bring the airplane to a definite altitude, determined by a sensitive altimeter, and to place the airplane within the range of radio reception of the ground radio facilities. It is, of course, desirable to place the airplane generally in the direction in which it is expected to land, but this is not necessary as was determined in flight and can be understood by reference to Fig. 1, in which the airplane was actually placed in a position which headed it 180° *away* from the direction of final landing. When the pilot has placed the airplane at a selected altitude in the vicinity (20 miles or less) of the landing field, the master landing switch is closed and the airplane proceeds through the following routine in accomplishing the automatic landing:

A. The selected altitude is automatically maintained and the airplane's heading is changed, so that it flies in the direction of the radio guiding station most remotely located from the landing runway.

B. The altitude control device maintains the proper altitude during the initial approach as just noted. A directional relay interlocks the radio compass and the gyro pilot, thereby causing the change in heading of the airplane. The frequency of the radio compass is automatically set by the interaction of the marker beacon receptor, working in conjunction with the frequency selector. The pilot of the airplane is informed as to the correctness of automatic settings by observing a frequency selector indicator. Through the automatic and cooperative action of these devices, the airplane heads to the compass guiding station farthest from the field. Upon reaching that station the frequency is automatically changed to Station No. 3, where it is again automatically changed to the frequency of Station No. 2, where the frequency is again automatically changed to that of Station No. 1; at the same time the engine throttle is automatically operated by a throttle engine. The throttle engine is interconnected with the altitude control in such a manner, that should the airplane reach its minimum altitude prior to reaching radio Station No. 1, the throttle engine will be so actuated to control the airplane in such a manner that it will maintain accurately the minimum altitude required for the operation of the automatic landing system. After passing Station No. 1, the throttle engine is so actuated that the airplane maintains a selected glide angle and rate of descent until ground contact is made. When ground contact is made, the throttle engine is further actuated by the landing gear switches, which in turn causes the engine to be idled and proper brake application made.

At the present writing, the automatic landing system has been flown so that all of the landings made to date, have been made under cross-wind conditions varying in intensity as high as eleven miles per hour. In at least 50% of the automatic landings made, the air conditions have been moderately rough.

The Sperry gyro-pilot has been used throughout as the automatic flight control feature of the airplane. Certain additions to the pilot have been required to provide for the automatic control of direction.

Short Wave League

HONORARY MEMBERS

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

When to Listen In

M. Harvey Gernsback
All schedules in Eastern Standard Time

SWEDEN . . . One of our correspondents has sent us the latest schedules of short-wave stations in Garbo Land. SM5SX at Stockholm now broadcasts on 15.155 mc. daily from 11 a.m.-5 p.m. and on Sundays from 9 a.m.-5 p.m. SBP at Motala broadcasts daily on 11.705 mc. from 1:20 to 2 a.m., 6-9 a.m., 11 a.m.-1 p.m. SBO, also at Motala, broadcasts on 6.065 mc. daily from 1:30-5 p.m. On Saturdays SBP broadcasts from 1:20-2 a.m. and from 6 a.m.-1:30 p.m. SBO broadcasts from 1:30 p.m.-5 p.m. On Sundays and holidays. SBP is on the air from 3 a.m.-1:30 p.m. and SBO from 1:30-5 p.m.

CANADA . . . A check of the various Canadian short-wave stations has brought the following information. CJRO and CJRX. 11.72 and 6.15 mc. broadcast daily from 6 p.m. to midnight and on Sunday from 5-10 p.m. CFRX at Toronto on 6.07 mc. broadcasts from 7:30 a.m. to 12 midnight daily and 10:30 a.m.-12 midnight on Sunday. CFCX at Montreal on 6.005 mc. is on the air from 7:45 a.m.-1 a.m. daily and on Sunday from 9 a.m.-11:15 p.m. VE9CA at Calgary, Alta., on 6.03 mc. relays station CFCN from 9 a.m.-1 a.m. daily and from 12 noon to 12 midnight on Sundays. VE9HX. Halifax. Nova Scotia, is on 6.13 mc. from 7 a.m. to 11:15 p.m. daily. 11 a.m.-11 p.m. Saturdays and 12 noon-11:15 p.m. Sundays. A letter from CJCX at Sydney. Nova Scotia, on 6.01 mc. informs us that at present the station has no definite schedule but will probably go on a regular schedule some time in March. CRCX at Toronto on 6.09 mc. broadcasts daily, 7:45 a.m.-5 p.m. and Sunday 10:30 a.m.-12 midnight.

ITALY . . . Programs for South and North America on 2RO, Rome. 9.635 mc., are now broadcast simultaneously on IRF, 9.83 and IQY 11.9 mc. in addition to 2RO. Although IQY announces as 11.7, it actually operates on 11.9 mc. Both IRF and IQY are very well heard, although the quality of IQY is not so good.

FRANCE . . . The new Radio Coloniale station mentioned in these columns recently is still experimenting. To date it has been heard testing between 5:30 p.m. to midnight on 6.04 and 9.55 mc. It has also been heard at very great strength on 17.78 mc. around 8:30 a.m., and on 15.13 and 11.845 mc. it has been heard several times around 7:30 a.m.

ECUADOR . . . A letter from HCJB at Quito, Ecuador, says that station broadcasts daily except Monday, on 8.841 mc. and 4.107 mc. from 7-8:30 a.m., 11:45 a.m.-2:30 p.m., and 5-10 p.m. The Sunday schedule is 12 noon-1:30 p.m. and 5:30-10 p.m. Address is P. O. Box 691.

JAPAN . . . The Japanese have been operating on a new schedule since the first of January. A program for the west coast and the Hawaiian Islands is broadcast from 12:30-1:30 a.m. on JZJ 11.8 mc. On this same frequency there is a special program for Japanese listeners in the United States from 7-7:30 a.m. and a program for Australian and South Sea listeners from 8-9:30 a.m. From 6-6:30 p.m., JZJ broadcasts a program in English for the east coast of the United States. JZJ and JZI. 9.525 operate simultaneously from 2:30-4 p.m. with a program for Europe, and from 4:30-5:30 p.m. with a program for South America. JVN or JVM is active from 2-8 a.m. relaying programs from Tokyo to Manchukuo. JVH on 14.6 mc. broadcasts irregularly from 5-11:30 p.m. for Manchukuo and is frequently heard in New York.

(Continued on page 713)

Additions to Station List

Mc.	Call	Location
9.980	COBC	HAVANA, CUBA
9.550	—	RADIO COLONIALE, FRANCE
9.355	HCIETC	QUITO, ECUADOR
9.345	HBL	GENEVA, SWITZERLAND
9.280	HC2CW	GUAYAQUIL, ECUADOR
7.870	HCIRB	QUITO, ECUADOR
7.410	HCJB4	QUITO, ECUADOR
6.465	YV3RD	BARQUISEMETO, VENEZUELA
6.440	TGQA	QUETZALTENANGO, GUATEMALA
6.416	YV6RC	BOLIVAR, VENEZUELA
6.384	VP2LO	STE. KITTS, LEEWARD ISLANDS, B.W.I.
6.290	HIG	TRUJILLO CITY, D.R.
6.255	YV5RJ	CARACAS, VENEZUELA
6.045	XETW	TAMPICO, MEXICO
5.940	PJCI	CURACAO, DUTCH W. INDIES
4.107	HCJB	QUITO, ECUADOR

Short Wave League

(Continued from page 711)

VATICAN CITY . . . HVJ has been heard testing on a new frequency, 11.74 mc., at various times.

GENEVA . . . The League of Nations station at Geneva, Switzerland, broadcasts on HBL 9.345 mc. on Friday, 7:15-8:30 p.m. and on Saturday, 6:45-8 p.m.

ILLINOIS . . . A new station reported is W9XDH in Elgin, Ill., on 12.882 mc. This station is operated by Press Wireless and is heard testing from 2-5 p.m.

CZECHOSLOVAKIA . . . The Prague station was active on 6.03, 6.01, 15.23, 15.32, 9.55 and 11.84 mc. in the last month. Since they change their schedule so frequently, we will not attempt to give their schedule.

SEASONAL CHANGES . . . in frequencies employed by the principal short-wave stations are already noticeable. Daventry, Prague and Tokyo are shifting to the higher frequencies once more with the return of longer days and shorter nights.

After the equinox on the 21st of March, there should be a marked change noticeable in reception on the higher frequency channels.

W2XAF and W2XAD are now using two new frequencies, 21.5 mc. from 8 am.-12 n., and 9.55 mc. from 7:30 pm.-12 m.

See page 714 for late news.

New Avenues for Television

DR. D. M. MORANDINI, PH.D.

(Continued from page 661)

dealt with. And there are other disadvantages.

It is not proposed here, therefore, that inventive effort should be concentrated on the elimination of electronic devices by replacing them with positive ray (or ionic) devices. This, even if it should become possible, would constitute only an equivalent method involving by no means less trouble and circumspection than the previous one. There might be, however, another possible alternative: On account of their great masses and, therefore, their more definite nature as individual units, these positive ray particles might, perhaps, be arranged to follow strictly parallel paths and thereby proceed in space as carriers of the picture impulses in their consecutive order. If such be the case, they could, furthermore, be compressed, possibly by means of an enveloping repelling (positive) force applied upon the surface of a pipe-like envelope, while the positive beam itself would proceed within the isolated walls of this cylindrical tube.

Beside this repelling force—and independently of it—there could be a second (negative) force applied along the cylindrical envelope in such a manner that its intensity would be changed periodically, as if a wave were proceeding along the cylinder envelope and providing thereby the necessary acceleration for the propagation of the positive beam of parallel rays within the cylindrical envelope. This pipe-like "conductor" of the picture impulses would have to be evacuated so that the ray particles would not collide with an exceedingly great number of air particles and lose their character thereby. The cylindrical pipe would remind us of a multiple coaxial cable, around the axis of which the cylindrical vacuum container would run, as the innermost portion of the construction. The pipe would be of a flexible cable type.

This "fantastic" device would then transmit images directly, *without scanning and synchronizing*, and would carry all picture elements simultaneously (with the velocity of the accelerated positive ray) to the receiving station. At the receiving end the compressed beam could be expanded and create an image on a luminous screen (an *actual image*, not one which is our interpretation only of short-interval, scanned impulses).

Such a "piped television system" could be arranged for a great number of onlookers, who, at different locations, would want to see the same television program. A bank of positive ray guns would provide for the pick-up. Shifting to other programs could be arranged by means of an automatic switching central station operating like an automatic telephone exchange. At the broadcasting studio each positive ray gun would be equipped with an individual optical focusing device which would focus the scene to be televised upon the gun.

The above brief description of a new televising method not yet invented may seem to be far-fetched. May I point out, however, that all things not yet realized but appearing only in the imagination of some dreamer, look necessarily far-fetched. If I could visualize the actual embodiment of such a system, I would proceed to describe it, instead of giving here visionary hints of its possible realization. I think, nevertheless, that it is worth while to mention such thoughts as this. They may inspire other minds to conceive ideas along similar lines and thus may lead to actual discoveries. It is one of the purposes of technical editorials, I believe, to do just this. This is why I avail myself of this opportunity.

At the *Television Research Society* in Los Angeles, parallel to the present work, we often discuss things that seem to be in the distant future. But even present-day development seemed to be visionary not long ago. I remember well the earlier days of television experimenting, around 1915-1919 in Europe. Instead of radio tubes the inventors then had to depend on selenium cells, etc.; synchronization and scanning was provided for by tiny mirrors rotating on cylindrical drums and minute vibrating mirrors fixed upon galvanometer loops. Time delays caused by the *fatigue* and sluggishness in reaction of the selenium cells were *compensated* by circuits coupled so as to operate impulse receivers on a current-difference principle. Such was the method of Professor Korn, for instance, one of the most famous European pioneers. "In that age"—rapid as television developments were considered to be—no one even dreamed of the present-day advance of the art. We were happy and considered ourselves very successful during these first experiments when the *televised* image of a cross appeared as a sort of a four-sided star, or a triangular something that was nearer to a circle than a three-sided figure!

And what great secrets were the *television sensitizing processes!* They were guarded better than Cerberus watched the entrance of the other world of Greek mythology. Only the *tube-sensitizing secrets* of today seem to be guarded more carefully. Yet, they all become known sooner or later. And I believe it is far better for television inventors without enormous funds to reveal "secrets" in their embryo stage, than to keep them secret in hope of the habitually expected million dollar reward for their perfected invention. This way the "secrets" become public property and are at the free disposal of every capable engineer and experimenter, if not patented within two years after publication.

Infra-red detecting devices—which *see* objects through fog and darkness—had a similar fate recently. Most of them operate with photo-electric cells or thermocouples sensitive in the infra-red range. They detect and locate objects—airplanes for instance—at great distances, utilizing—as television does—energy of the radiant spectrum. Television itself may be applied to this field, and perhaps to the detection of objects at far greater distances. Invisible signals, in this case, could be sent out as reconnoitering beams to be reflected back to the sender from the surfaces of the object to be detected which are at nearly right-angles to the path of the beam. Practically every approaching object presents some such surfaces.

Another field, which thus far has been touched upon only by inventive endeavor, is that of large television receiving screens of the square flat neon-tube type, in which two wire-screens parallel with each other, and consisting of parallel wires perpendicular to the wires of the other screen, are employed for picture reception.

A year ago, in the February, 1937, issue of *Short Wave and Television*, the editorial of Dr. Lee de Forest advocated the return to *mechanical* scanning systems, although with new mechanisms. Some of the ideas therein touched upon advocate electro-mechanical transmission principles which would eliminate scanning, electrical or mechanical, altogether. I agree with one of the conclusions of Dr. de Forest:—*the present elaborate "cathode ray" devices do not appear to me as the real solution for the practical application of television.* Yet the advance made along the "cathodic" line is a more than necessary step on our way to a more practical solution. As the experiments and devices of Farnsworth, Zworykin and of the author show (the latter described in 1932 in *Television News*, and further developed in the August, 1937, number of *Short Wave and Television*), cathode ray devices have a great versatility and are applicable to many purposes in television. But somehow I feel that the "final" practical solution of the television transmission problem will have much less accent placed upon such devices than it has today.

A "synchronization-less and scanning-less" television system would certainly be a most valuable thing. If not along the lines here suggested, it will come by other routes not long after the present highly developed and elaborate transmission methods will have been turned into daily use and made accessible to the average experimenter. Practice will accomplish wonders. Let us, therefore, get television out of the laboratory! The sooner economic and business conditions will permit such a jump, the quicker will unsuspected new avenues of thought and experiment open up before an eagerly waiting army of television fans.

AS WE GO TO PRESS . . . .

W3XAU at Philadelphia now operates from 11 pm.—12 m. on 9.59 mc. TGWA operates on 9.685 or 11.76 mc. Sundays 7:15—10 pm.; Monday, Tuesday, Thursday, 9—11 pm.; Wednesday, 9:30—10:15 pm., Saturday 10 pm.—1 am.; on 15.17 or 17.8 mc. daily from 12:45—1:30 pm.; Sunday, 12 n.—2:45 pm. HVJ, Vatican City is reported on 6.07 mc. and Moscow is reported on 6.055 mc.

How I Became a Telegraph and Radio Operator

L. R. McDonald, W8CW, Ex-W8AZC

● SINCE winning a recent contest in copying continental code, I have had many requests for advice about learning the code.

As a young lad I lived with my parents near "GS" tower, on the Wabash and Pennsylvania railroads at Butler, Indiana. I had learned the code and practiced on a homemade key and sounder.

I put in a good many hours of hard practice, and at the age of fourteen found myself a fairly good railroad operator.

After a time I got to working some of the better commercial wires, but not the fast trunks. The wire I remember best was the old Richmond, Indiana, wire. I remember it so well because it was on this wire that I heard my first *perfect* Morse. The Richmond operator was "Dick" Thomas. I have never met Dick face to face, but ten years after I worked this wire I was visiting the Western Union office in Detroit and heard a man sending. I walked over and said:

"There is only one man in the world who can send like that; your name is Thomas, isn't it?" To which he replied: "Yes, but how do you know? I don't remember you."

I said: "Don't you remember me, Dick, I used to work Richmond wire out of Indianapolis?"

He began to laugh and told me he was Dick Thomas' younger brother, and that Dick had taught him how to send.

Any one may think this incident is exaggerated, but it can be verified by getting in touch with one of the Thomas boys of Richmond, Indiana. I haven't heard from Dick in 19 years, and if he reads this, I hope he will write me. I have always considered his sending as a model for all operators. The reason I mention Dick Thomas is that I always associate him in my mind with Walter Candler. I don't know whether it was Thomas who first told me about Candler, or whether I merely heard about him around the Indianapolis Western Union office, but after a while it seemed that every time a group of top-notch operators got to talking, somebody brought up the name of Candler. I was complaining one day about the rotten wires they always assigned to me, and an old timer suggested I write to Mr. Candler and get him to help me perfect my telegraphing. It seems that he had been doing that very thing for many operators. Candler would take some mediocre operator, who seemed doomed to the slow wires for life, and by showing him the right way, soon had him working the fastest wires. He seemed to put new life into the man.

At this point I want to say the most difficult code work I have ever attempted was on the *amateur radio code* bands. Every one seems to have a system of his own for sending. I cannot make this statement without mentioning that there are many exceptions. The best amateur radio operators I have worked so far are: Ralph Carpenter (W8AA), Saginaw, Michigan; Roy Gardner (W8RF), Detroit, and John Sincock (W9CSI), Marquette, Michigan.

I find that amateurs generally take pride in a certain "swing" or style. This would do no harm in slow work except that an operator tends to exaggerate his peculiar style all the time, and after a while *no one can read it without guessing!* I recognized Thomas' style of sending because of its perfection. This style business probably had its advantages in the old key and stylus days, but has no place in modern code work, where the *bug* and *mill* (typewriter) have become indispensable tools. The only style that appeals to me as an operator, is *fast, correctly spaced, smooth, rhythmic sending.*

I got tired of commercial work and took a job on the L. E. & W. Railroad at Bennetts Switch, Indiana. After I got there I found out I was "station agent" and "operator." The agent part didn't please me very much, but I was still under age and decided to keep the job. I was reading the official magazine of the Order of Railroad Telegraphers one day and saw the announcement by Walter H. Candler, offering to train operators to become better operators. I remembered the old-time commercial operators talking about Candler, so I wrote Mr. Candler a letter, mentioning a certain "old timer" who had recommended the course. It seems the two had worked a fast bonus wire together at one time. In a short time I was studying the Candler method and wondering how long it would be before I would be able to "work" bonus wires, as I had seen them "worked" in Indianapolis. As I studied this course I found the answer to a lot of riddles that had been perplexing me ever since I started learning the code.

Rudolph Haynes (now a Wabash railroad operator), and I built two complete sending and receiving stations in Butler in 1916. Although we couldn't claim much DX with our Ford Spark coils, and E. I. Co., phones and "cat whiskers," we did manage to work each other consistently.

In 1917 I applied for an amateur license, second class. I never lost contact with the wireless men. I also took the Gernsback wireless magazines of that time and tried to keep myself informed.

In September, 1937, I heard there was to be a code contest at the A.R.R.L. Central Division convention here in Detroit. For ten years I had been engaged in other communication work, with practically no telegraphing, and my *ham* work confined to radiophone communications. I felt the urge to compete in the contest, but decided to attend only as a spectator. Two minutes after I got there I had the "cans" on and was copying in the amateur contest, but not as a contestant. I informed the judges that I held a commercial license and that I did not wish to compete. I copied all through the amateur contest, and my copy was read by spectators, but was not submitted officially to the judges. A special contest for commercial operators was then staged for my benefit, in which I copied 60 words per minute.*

I would like to give a parting word of advice for the young code aspirant. Always try to copy *behind*. Force yourself to do this, even though it appears to slow you up for a time. Here is something I have told a good many beginners, and no one has ever claimed I was wrong. *The day you start reading and copying words instead of letters, is the day you cease being a beginner, and become a real operator.*

*Due to mechanical difficulties with the tape machine, this was the greatest speed at which the code could be transmitted.

To BARTER AND EXCHANGE Advertisers

Beginning with our next (May) issue, the Barter & Exchange Free Ads will be confined solely to transactions covering the purchase or exchange of goods or services.

Any advertisement in which any article or service of a non-commercial nature is offered for cash will be placed in the section headed

FOR SALE
(NON-COMMERCIAL)

at 3c a word.

When mailing copy for this department, be sure to typewrite or print the words in order to make it legible. Count each word, including full name, street address and locality and enclose money order or stamps for the proper amount to avoid delay of insertion.

Advertisements under the heading COMMERCIAL NOTICES (formerly CLASSIFIED ADS) will be 10c a word.

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

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

FOR SALE OR TRADE. NEW American code reader machine with oscillator, 1,000 ft. tape and tubes, cost $22.50 complete. Want tube tester or SW receiver. N. R. Thornton, Somerville, Ohio.

TRADE KODAK AMATEUR PRINTer in very good condition, thermometer, safelight lamp, printing frame, print roller and graduate, for good crystal earphones, code practice oscillator and key. Charles Smejkal, 1607 First Avenue, New York, N. Y.

SWAP: ATWATER KENT MODEL 60 chassis radio. Victor portable phonograph, Guy Rennie clarinet. Will trade above for crystal controlled transmitter. Must be around 50 watts and work phone. David Klersky, Walnut Ridge, Arkansas.

EASTMAN BABY BROWNIE CAMera. Darkroom outfit No. 2. Cost over $3.25. Complete, unused. Sell cash at $2.50 postpaid or what have you. Want Radio Amateurs Handbook, small transmitter diagrams, misc. parts. Richard Simonsen, Blair, Nebraska.

WILL SELL OR TRADE MY I.C.S. stenographic-secretarial course for radio apparatus or any useful articles. For further information write to Joe Lawranowicz, 6619 Hoppensack, Cleveland, Ohio.

HAVE ONE PYTHON SKIN 9 FT. long, make nice wall ornament. What have you? J. T. Wilson, Tamiang Estate, Kwala Simpang, Atjeh, O.K. Sumatra.

ANY S.W.L. WANTING TO EXchange cards with a S.W.L. in Curacao, here is the q.r.a.: Johan P. Curiel, Mundo Nobo No. 143, Curacao, N.W.I.

SWAP YOUR OLD FASHIONED film pack or plate camera for new candid camera, if in at least fair condition. Also want 1200 rpm synchronous motor, sixty line television equipment. G. Black, 12 Lambert Rd., Belmont, Mass.

WANTED: COPY OF RADIO-Craft June 1930, also reliable refrigeration course, must be complete. E. H. Moss, Box 12, Waco, N. C.

TRADE LIONEL U.P. STREAMliner electric train, scale-model, mounted tracks, transf., almost new. Just the thing for the train fan. Trade for G.E. console "37" or what have you? G. Willmert, 1120-N-24 St., Milwaukee, Wis.

FOR SALE: PIONEER ROTARY Converter in A1 shape. Used once. Converts 32 volts DC to 110 volts, AC, 60 cycles, at 300 watts. Take $25 cash. Cost $47. Frank Trippe, Route 1, Hillsboro, N. C.

I HAVE FIVE GOOD GUNS AND would like to trade a couple of them for either a Hallicrafters 'Sky Buddy' or a Raco 'Super-Clipper'. Write for descriptions. Frank Wheeler, Osborne, Kansas.

WILL TRADE USED 19TH AND 20th Century U.S. and foreign stamps for used U.S. and foreign that I need for my collection. What have you? Edw. Tuckermann, Box 33, Hartland, Wisconsin.

WILL TRADE UNPICKED U.S. mission mixture of stamps by pound for used radio parts on basis of 75c per pound for stamps. Will trade any amount for what have you. Eugene Crow, Kiowa, Kan.

SELL, SWAP—SKY BUDDY REceiver 3 months used, heard 5 continents in bad apartment house location; sell for $20 cash or trade for latest Haynes Clipper receiver. Marvin Rothberg, 300 W. B'way, Long Beach, N. Y.

WANTED: HAM RECEIVER, RCA, SW-3, Hallicrafters or something similar. Let's hear from you. Theodor Domby, 3514 Hartford Street, St. Louis, Missouri.

TO TRADE — OVER THOUSAND foreign stamps. Mounted in album, A1 cond. Plenty of mints. Want good typewriter or what have you? A. Belford, 105 West Edgar St., Clay Center, Nebraska.

SWAP—ABOUT 700 STAMPS IN a neat album. U. S. and foreign stamps from almost every country. Want: A new or used carbon microphone or amateur magazines. John Antonio, Box 32, Elkland, Penna.

FAMOUS W2DKJ—W2DLG TRANSmitter used at the Hotel New Yorker and 40 Wall Street. See Short Wave Craft, February, 1935. Including tubes and mike $50.00. McMinn, Secretary, Garden City Radio Club, Garden City, N. Y.

TURNER HIGH FIDELITY 30 watt amplifier. Ideal for modulator or will operate four speakers. List price $185.00, first $60.00 gets it, with tubes. E. Ruth, Fairfield Boulevard, Hempstead, Long Island.

WOULD LIKE TO EXCHANGE S.W.L. cards with any S.W.L., especially those in foreign countries. Just send me one of yours, all mail will be answered. Walter C. Downes, 701 Jefferson Ave., Jeannette, Pa.

WANTED—USED HAYNES RSR or Super Clipper, Doerle D 38. Offers must be reasonable. Amateur printers, what have you to trade or sell? SWL's, QSL's! write—any interesting deal welcomed. Fenton Butler, Box 13, Hertford, N. C.

WANTED—SW3 MUST HAVE 40 and 80 meter coils. Power supply not necessary if A.C. I have Ellen RX-18-AB and good collection stamps to trade. Al Steinberg, 1134 S. W. 7th St., Miami, Florida.

WOULD LIKE TO SWAP S.W.L. card with fella's in U.S. and all foreign countries. Will answer all cards. Send me a carload of cards (QRA). Bud Matheson, 1602 Roosevelt Ave., Indianapolis, Ind., U.S.A.

HAVE 7 TUBE AII STAR SUPER, complete with tubes and 8" speaker —10 to 180 meter coils. Will sell or trade for 16 mm. camera or projector and films. John Mazurek, 3356 Clara, St. Louis, Mo.

WOULD LIKE TO SWAP MY brand new "American" code reader for a "Teleplex" or "Instructograph" code machine. Write Lawrence C. Nesbitt, R.F.D. No. 4, Box 170-A, Asheville, N. C.

WILL SWAP FADA 6 TUBE superhet long and short wave receiver for what have you. I am looking for S.W. receiver for which I will exchange excellent printing. Daniel Platek, 225 Division Ave., Brooklyn, N. Y.

WESTON EXPOSURE METER for movie cameras, model No. 627, photo-electric cell type, for sale $10.00 or exchange for code sending machine, or portable typewriter. Arthur Bennett, 39 Garden St., Valley Stream, N. Y.

I WOULD LIKE TO EXCHANGE picture post cards with SWL's of foreign countries. On receipt of your card, I will send you one of mine. James Turpin, Borden, Indiana, U. S. A.

FOR SALE: ONE COMPLETE set 10 volumes of Audel's Electric Library. Electric Dictionary included free. The first money order of Four Dollars gets this bargain. Chas. Pax, 15½ W. Main St., Freeport, Ill.

SELL—NAT. SW3 110V AC COMplete. Gross 5M super, Superior tube tester, 200 watt and 500 watt xtal CW xmtrs. Write for details. Erwin H. Enos, W2DBF, 369 Linden Blvd., Brooklyn, N. Y.

NATIONAL SW-3, IN PERFECT condition in and out, four sets of coils, power supply, audio amplifier complete for operation $20.00. An exceptional offer. E. Raymond, 6 Wing St., New Bedford, Mass.

TRADE, SELL RAY BURNS CARtooning course. One Porter chemistry set No. 5. Also $2.50 Rubber chemistry set. No. 2 Brownie enlarging camera model b. Trade for radio equipment, sell cheap. James Logsdon, 310 5th St., Corbin, Ky.

HAVE 20 METER CW TWO TUBE transmitter, Three tube all wave receiver. Both in excellent condition. will sell for $14. or trade for something. Geo. Golubowsky, Box 97, Washington, Pa.

WANTED: A GOOD 2 OR 3 TUBE short wave receiver as Elgin III or Buddy II. Write or phone Thomas Combs, 1201 Woodland Ave., Bluefield, W. Va.

FOR TRADE:—250 WATT TRANSmitter; 1000 volt, 500 mil D.C. generator; E flat saxophone; set of drafting instruments. What have you? A. J. Filiponis, W1GYH, 14 Norwood St., Fitchburg, Mass.

(Continued on opposite page)

Short-Wave Broadcasting In India

(Continued from page 668)

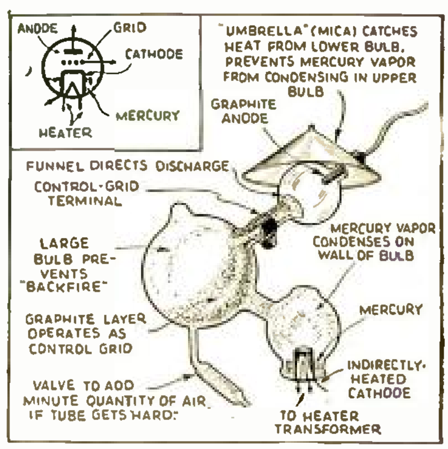
meter and 90-meter bands for broadcasting.

An unusual requirement in receiving sets for India which deserves special mention is provided for by the special receivers that have been developed by the Research Department of All-India Radio for community reception in Indian villages. These receivers are mounted in metal cases and padlocked. No controls appear outside the box. The receiver is left tuned to the *local* station. (This is one way to prevent the public from hearing propaganda speeches from other countries.) A clockwork time-switch turns the set on and off at the correct time for the "Village Hour."

The new rectifier tube used in the India S-W transmitters is of the so-called *gas-filled type.*

A number of the new gas-filled rectifier tubes have, in addition to the customary cathode and anode, a special control grid, which is used to adjust the ignition voltage of the rectifier within wide limits. This effect is procured with very small power consumption, low grid voltages and small grid currents.

The vapor pressure of the mercury in the cold state is a few thousandths of a millimeter. The central bulb has been arranged to increase the back-firing safety-factor of the new rectifier tube.



Details of the Philips Rectifier tube used in the new India S-W Transmitters are shown above

Let's Listen In With Joe Miller

(Continued from page 679)

CHINA

XRCY, 14.65 mc., Shanghai, reported by Harry Honda, W6, calling KBY, Manila, around 3 a.m. Harry adds XRCY is probably a temporary Xmtr. set up by the Japanese army, using the Xmtr. left by the Chinese, which was probably a CW station.

Also reported is XTV, 9.50 mc., Canton calling Hankow at 4:15 a.m., XTK on 9.08 mc. is the Hankow Xmtr. Too bad one cannot write for veris to the Chinese commercials any more.

JAPAN

Again Harry Honda comes to the fore with data that JZG, 6.35 mc., Nazaki, broadcasts weather reports to Japanese ships at sea at 4 a.m., E.S.T. JZG also reported testing from 1:30 a.m., immediately after JZJ had closed its Overseas Broadcast.

Harry also reports JVH, 14.60 mc., being used at 7 a.m., relaying news and market reports to Manchukuo and Formosa. Harry reports that JZL, 17.785 mc., will definitely be the Overseas Broadcaster to Eastern N. A. & S. A. during the Spring season, 4:30-5:30 p.m.

BECHUANALAND

ZNB, 5.90 mc., Mafeking, discontinued their daily broadcast on Oct. 31, '37, due to expense incurred by the broadcasts. Late news states that finances have been taken care of and ZNB is again broadcasting; 6-7 a.m.; 1-2:30 p.m.

TAHITI

FO8AA, 7.10 mc., at Papeete, is still carrying on, heard quite well several times lately. Harry Kentzel, W2, gives a tip to be used in locating this nice catch, located in the thick of the 40 meter amateur band. Harry suggests tuning for Guadalajara, Mexico, also on 7.10 mc., and after latter station signs off, FO8AA can be heard on that spot. This of course for their regular Tues. and Fri. transmissions, when heard from 11 p.m., to as late as 12:30 a.m.

SIBERIA

RV15, 4.27 mc., Khabarovsk, Siberia, right on the Pacific Coast north of China, is coming through nicely daily, heard well as early as 4:30 a.m. Surprising to all is the type of program emanating from this remote spot, as the usual fare seems to be on the grand scale, with large orchestras, and a choir of male and female voices that really is excellent. According to Miss Rowena Meyer, genial chief editor at the station, RV15 transmits English programs every even day of the month at 4 a.m.

RV15 may be heard by any S-W "fan", if equipped with a well-calibrated receiver, providing conditions are good. Best signal from 5-6 a.m.

Address reports to: Miss Rowena Meyer, Radio Committee, Station RV15, Khabarovsk, U.S.S.R.

SIAM

HSP5, Phyathai, Bangkok, is a new phone in Siam, according to a letter from our friend Sangiem Powtongsook, and "works on a wave-length around 37 meters." or 8.11 mc.

HSP5 is used to contact ZGB, Kuala Lumpur, Fed. Malay States, at 9:40 p.m., daily, and with Saigon whenever there is

BARTER and EXCHANGE FREE ADS (continued)

HAVE: GHIRARDI "RADIO Physics Course," 49 tube, SWC 1935. QRA's all VE's. Eldon Meredith, Lorne Park College, Port Credit, Ontario, Canada.

TRADE N.R.I. COURSE WITH complete experimental equipment plus additional Television and P.A. system lessons. For camera Duo 620 or other with F3.5 or F4.5 Astigmat lens. E. Stultz, 539 S. Market St., Galion, Ohio.

SELL: NEW "ACE" 1-2 TUBE all-wave battery receiver ready to work, bought for $3.00, will sell for $2.00 postpaid. Write for bargain radio parts list. Alexander Podsteny, 217 Pine St., Philadelphia, Pa.

WANTED—SHORT WAVE REceiver and transmitter, either in one set or separate. Complete outfit needed. Will pay cash, or trade chemical and microscopical equipment. Send details. Paul B. Phillips, 2401 Englewood Ave., Durham, Nor. Car.

MUST DISPOSE OF DOERLE AC-5 (1936), complete with 5 sets coils. Would trade for good 8 or 10 power binoculars. What am I offered? George Kubiskie, Rte. No. 1, Milford, Ohio.

TRADE OR WHAT? QST's, SOME 1928 and 1929, nearly all 1926 and 1927. Want large cabinet or parts, also 1936 Sky Rider S9 A-1 condition used little. Who'll give $45.00? W9BAC, Box 56, Dollar Bay, Mich.

SWAP OR SALE PARAGON stamp album; 800 diff. foreign, 200 diff. U.S., 1000 U.S. duplicate stamps 1880 to date. Want National SW-3, parts or what have you? Kenneth McLain, R.R. No. 3, Arcanum, Ohio.

WANTED—TUBE TESTER: PREfer Triplett 1210-A for octal tubes or other. Trade or sell 125 watt Class B Xfors and RK-20 and RK-37. Could use oscillator. W7EMQ, K. L. Dragoo, Box 623, Rock Springs, Wyo.

WOULD LIKE TO EXCHANGE operating notes with SWL owners of Sky Buddy receivers. Bob Pastorino, 326 E. Kingsley St., Ann Arbor, Mich.

HAVE A BOX CONVERTER; Utah; Crosley Dynamic speaker; Hammarlund 2 gang; single 13 plates; 2 Acme Audio; Plenty other radio parts. Want A.C. short wave 5 tuber. C. Hofmann, 946 East 167 Str., New York.

WILL TRADE AN EILEN 7C 5 tube with coils for a Candler or an Instructograph code practice instrument. Albert Smith, 1112 East Second Ave., Mitchell, South Dakota.

TRADE—G.E. VARIABLE SPEED turntable, crystal pickup, Eastman folding autographic Kodak—Size 2¾ x 4¼ for B.C. set—8 or 10 tube superhet — chassis — tubes — speaker. Good make, condition. Ralph Hitsman, 600 S. Boston St., Galion, Ohio.

WILL SWAP 2 TUBE RCVR. 57-56, crackle chassis, ruby indicator, airplane dials, fone-spkr. S.W., spkr. coils, for C.W. practice machine, or sell rcvr. for $8. Robt. Truhlar, 709 W. 61st Place, Chicago, Illinois.

ULTRA 5T COMMUNICATIONS receiver, ideal for SWL or ham. Used one month. Like new. Sell $10.00 or trade for good battery set. Write for details. James C. Moulton—W3GCX—4912 Quebec Street, NW, Washington, D. C.

SHORT WAVE LISTENERS IN United States or foreign countries. Send me one of your SWL cards and I will send you one of mine promptly. QRA John Fitzpatrick, 18 First Street, Port Reading, New Jersey, U. S. A.

TO SWAP, MORE THAN 1500 stamps (no junk) mostly sets, commemoratives, real value $45.00, for transmitter components—var capacitor—xtal—Super-Gainer or what have you. Charles A. Piche, VE2IZ, 4327 Parthenais St., Montreal, Que., Canada.

TRADE — FOREIGN COINS 42 from 20 countries for low power code xmitter or parts. Ira J. Shannon, 227 4th St., N. W., Mason City, Iowa.

RECEIVER — 57-56 — SW3 CABinet, Hammarlund vernier dial, XP53 coils, isotex sockets, etc. Separate power supply on electralloy chassis, unused, unwired $9.50 postpaid. George Nichols, 160 Tracy Ave., Waterbury, Conn.

WANTED — A SECOND HAND S.W. transceiver, transmitter, or receiver, battery operated, phone or C.W. Also used car radio. Have banjo, mandolin. State price wanted. Percy Alg, 704 3rd St. N. E., Minot, N. Dak.

SELL SILVERTONE MODEL 93 S-50997 8-tube, with dynamic speaker. Price $20.00 f.o.b. Goodman. Cost originally about $100.00. Used about 5 years, good shape. Ship anywhere freight or express charges collect. S. E. Stafford, Illinois Central System, Goodman, Miss.

I WILL TRADE U. S. STAMPS for stamps of foreign countries, with readers outside of the United States. I will be glad to answer all letters promptly. Steve Finnegan, Main St., Clear Lake, Iowa.

OFFER GROSS 46 TRANSMITter, All-Star Senior complete, D.C. Generator, 500 V., also parts. Send for list. Above for sale or trade. Carl Soendlin, W8QQZ, Logan, W. Va.

WILL TRADE BACK NUMBERS Radio Craft, Radio News, new issues Short Wave & Television for set new Hammarlund coils or type 30 tubes, or sell at 10c. Joseph Homczyk, 215 West 5th St., Mt. Carmel, Pa.

WILL TRADE 17 ISSUES OF Popular Mechanics for 1 or 2 tube short wave set or Hammarlund plug-in coils 4 prong type or what have you. Joseph Weinzapf, 1918 Evansdale, Toledo, Ohio.

WANTED — MODULATION Transformer P.P. 2A5 to 4-46 P.P. parallel type, 1000 volt plate transformer, driver transformer. Will trade 2 button Universal hand mike, phono pickup, sign brushes, stamps, camera. Frank Sewell, 1210 N. College, Tyler, Texas.

FOR SALE: ONE ALL-STAR Junior 5 tube receiver, coils (10 to 270 meters) good bandspread, excellent beat-oscillator, 6" Utah dynamic speaker, slightly used tubes. Kit cost $30. Sacrifice for $20. Donald Johnson, Kimball, S. Dak.

SELL OR EXCHANGE NEW Packard Lektro-Shaver and $70.00 1938 RCA Model 67M3 auto radio, with two speakers and chassis separate, for used Hallicrafters or good transmitter. G. H. Burkhart, Box 202, Woodsfield, Ohio.

I HAVE AN RTI RADIO AND television course to swap for a Doerle A.C.5 or similar short wave radio or a code machine. Paul Weland, Arnolds Park, Iowa.

WILL SWAP 14 COPIES OF THE Modern Mechanix Jan. 1937 to Feb. 1938 for a 5 meter battery receiver. Magazines are in A-1 shape. Geo. M. Radenheimer, Sr., Box 162, Excello, Ohio.

HARVEY 80-T TRANSMITTER, 5 bands, tubes, 3 xtals, complete $125.00. McMurdo 5BX receiver $27.00. 5 meter transreceiver 2-42s and 80, $12.00. Jimmy Kelly, East McKeesport, Pa.

WANT PORTABLE TYPEWRITer. Have magazines, radio parts, stamps, covers, etc. Will exchange lists. Want cuts and type. Also have servicing data. M. Feigenbaum, 42 Jefferson Street, Yonkers, N. Y.

FOR SALE—LIONEL STANDARD gauge passenger train, like new; cost $65.00, will sell with track and station for $19.95. Also a pair of remote control switches, cheap. Allen Gerhard, 656 Franklin Ave., Palmerton, Penna.

FOUR TUBE AC-DC SHORTwave receiver complete with dynamic speaker, coils, tubes, drilled chassis, undrilled panel in kit form for $10. Does the work of five, guarantee. Paul Wilkens, 412 6 Ave. S., Clinton, Iowa.

SWAP 15 WATT PHONE RIG using Astatic D104, 6C8, 6L6, 6L6, 6L6 complete for set of orchestra drums in good condition. W2HAP, David Jashnoff, 1132 Forest Avenue, Far Rockaway, N. Y.

FOR SALE: 4 TUBE S.W. REceiver, complete with tubes, power supply and coils covering from 16 to 200 meters. First $13 takes it. John Davison, 205 Edgar Rd., Webster Groves, Mo.

TRADE 700 WATT, 110 V. 60 cycle, A.C. gen. and exciter which will also deliver 12 v. at 10 amp. Also a 250 V, 50 ma. by six volt MG. for Xmitter power and modulation parts. W7FUW, Lakeview, Oregon.

SHORT WAVE LISTENERS AND picture post card collectors in U.S.A. and foreign, will be glad to exchange cards. Donald Tener, 917 N.W. Second Ave., Ft. Lauderdale, Fla.

3 TUBE RCA BATTERY REGENerative set. Professional looking panel. No plug-in coils. Want 1 or 2 tube 110 volt D.C. set or 22 calibre rifle. Albert Hartman, 419 91st Street, Brooklyn, N. Y.

WILL SELL OXFORD 8" DYnamic speaker with cord and plug, 2500 ohm, universal coupling transformer and instruction sheet, perfect condition, price $2.25. Mailing charges extra. H. J. Gehl, 1734 Fairfax Ave., Cincinnati, Ohio.

SELL "NATIONAL SW3" REceiver with tubes, power supply, 20 meter coils, "DX Specials" headphones, like new. Complete, ready to operate. Winner of 43rd SW&T Trophy award. J. V. Hellmann, 47-07 39th Street, Long Island City, N. Y.

SKY-BUDDY, SIX MONTHS OLD, perfect condition $20.00. Fred Kramer, 214 So. 21st St., Maywood, Ill.

FOR SALE—A SIX-TUBE DELuxe Doerle, complete with coils to cover 9½ to 555 meters. Good condition. Will take best cash offer. Anthony J. Gisolfi, 131 N. Chestnut Ave., Scranton, Pa.

WANTED — ANY TELEVISION equipment such as neon tubes, cathode ray tubes, photoelectric cells, scanning disks, etc. Let me know what you have and the price. Oliver Fretter, 28 Linden Street, Westerly, R. I.

WILL TRADE AN EILEN SW radio model RX-17 7 tube complete with all coils used very little for Auto Radio or radio apparatus. Write for more details. E. Deombert Jr., 609 Henryetta Ave., Gillespie, Ill.

WILL SWAP: ONE DEVELOPING and printing outfit. Everything for making pictures up to 4" x 5" including instruction book. For radio parts or what have you? S. Zajkowski, 100 No. 2nd St., Harrison, N. J.

HAVE GOOD TENOR BANJO. Will trade for Bug in good condition or SW receiver with electrical bandspread A.C. or battery. J. V. Baumgardner, 430 W. Block St., El Dorado, Ark.

WANTED, A USED CODE MAchine with tapes. Trade a 1936 Ford Philco auto radio used very little for good ham receiver or phone transmitter. Robert R. Combs, Allendale, Mo.

WILL ANYBODY HELP ME COLlect sample QSL and SWL cards? Any will be appreciated. TNX. Wm. E. Sampson, Jr., 2208 Floyd Avenue, Richmond, Va.

HAVE REMINGTON NO. 6 TYPEwriter, Burwood 35 mm. projector, Eastman vestpocket camera, Readrite analyzer, Readrite oscillator, Columbia portable phonograph. Want phone transmitter, communication receiver, 5 meter equipment, or what. Box 61, Catawba, N. C.

AC-DC 2½ TO 560 METER REceiver, excellent condition. Set uses 4 latest type tubes. Factory guarantee still in effect. Best cash offer takes it. Information on request. Tommy Thomas, Jr., 2042 Ravenwood Ave., Dayton, Ohio.

WANTED: AUTOMOBILE ADS prior to 1929. Will pay up to 15c for each ad accepted. For information, write: Malcolm McGregor, 1326 College Street, Scranton, Penna.

FLASH! $24.00 BUYS 1938 Ultra Stratosphere 10 "Trans-receiver" 2½-4,000 meters. Complete with tubes and coils. Used month. Like new. Cost $34.90. In original carton. Write Clement Schmitt, 815 N. Lafayette Ave., Evansville, Ind.

WANTED, SHORT WAVE SET, preferably SW-3, for "Baby Cyclone" airplane engine and all wave portable radio. Malcolm Burnett, 733 Second Ave., N.E., Camas, Wash.

50 SW PARTS $1.00, 100 PARTS $1.50. No junk. Value greatly exceeds price asked. Stamp for list. speakers $1.00, Xtal xmitter $2.00, Supreme 851PL tube tester $15.00. Want Hallicrafter receiver. W7GPP, 1308-F, The Dalles, Oregon.

SELL, SWAP, INSTRUCTOgraph with ten rolls tape, electric turntable with pick-up 110 V., two telephone single button mikes, Oliver typewriter. Want Sky-Buddy Rcvr. Must be in good shape. John Podrasky, 119 C. Street, Johnstown, Pa.

WANT EIGHT TUBE COMPLETE Meissner kit. Must be cheap. Sell complete set of five (17-560 m.) Hammarlund four-prong coils—$1.75 post-paid; Hammarlund 140 mmfd. Midline Midget—$1.00 pp. Dean Cooper, 17 So. 17th St., Fort Dodge, Iowa.

I WANT TO BUY OR SWAP FOR any receiver, meters, transmitting and receiving parts or anything you may have concerned with Radio. Bob Kelly, Box 98, Minoa, N. Y.

WOULD LIKE TO SWAP NAtional FB-7A, SW band spread coils 10 to 160 meters for general coverage coils for same. These coils like new and work fine. Write: Ernest Stearns, 24 Church St., Franklinville, N. Y.

SWAP FOR TRANSMITTER parts or sell reasonable. Dayrad tube tester; Hickok analyzer (5 good meters); Wireless Egert signal-generator; Phonovox pick-up; Radio-phono cabinet, motor, pick-up; Majestic power pack 7BP6, G-2 speaker. W9YCF, Auburn, Indiana.

WANT GOOD PRESELECTOR, books on radio, used ham-band crystals; have, 6" speaker in case (new), power pack (new), and good foreign stamps. All good equipment, no junk. Louis Sclez, 357 South First, Ishpeming, Mich.

MOTOR GENERATOR — BUILT for U. S. Navy, 1 H.P. D.C. 110 volt motor, direct current generator 600 volts, 830 mils. Good, sturdy job. Sell or trade. Want typewriter, radio goods. Menler, 563 West 184th St., New York City.

(Continued on page 718)

BARTER and EXCHANGE FREE ADS (continued)

TO TRADE OR SELL USED LaSalle Higher Accountancy course for a good oscillator with output meter. Baylog's Radio Service, 11 Oak St., New Brunswick, N. J.

WILL SWAP—1 COMPLETE RCA Spiderweb antenna UHF legs and all. Up only two weeks. Want 10 meter Johnson Q in good condition. Every letter answered. David Bulkley, 85 Griffen Ave., New Rochelle, N. Y.

WILL TRADE U. S. AND FOREIGN stamps for radio parts. I have old U.S., coronations, covers. Can use good mike and 6 volt to 250 volt 100 mil. B. Supply. H. A. Schornstein, Roseburg, Oregon.

TRADE OR SELL 4 TUBE A.C.-D.C. receiver. Sell 1937 Bicycle like new with all features. Price when new $35.65. Will sell or trade for good S.W. receiver. Louis Oberdoester, 402 Ridge Ave., Allentown, Pa.

SELL: ONE UNCASED TRANSMITTING transformer 2300 volts C.T. at 2¼ K.W. Weight 100 pounds. Primary 110 or 220 volts A.C. 60 cycle. $20.00. W3GGM, RD No. 3, West Chester, Pa.

SELL OR SWAP 2 REGULAR telephone mikes, 1 Kellogg handmike. 1 directional ant. for top of rec. Also four 43 plate xmitter var. conds. Strongly made. Walter Juranic, P.O. Box 36, Red Hook, N. Y.

SWAP PHILCO ALLWAVE aerial kits, new tubes in factory cartons, electric clock. Want folding or miniature camera—2¼x3¼ or smaller; f.6.3 or faster. Also No. 2 box camera. Roy Barry, St. Marys, W. Va.

WANTED, A ONE OR TWO CYL. garden tractor in any condition, also Fordson differential assembly. Cash, or will swap 6 tube auto radio or radio parts. M. Jewell, 8 Fells Rd., Wellesley, Mass.

WILL SELL: NO. 5 UNDERWOOD upright typewriter 5 mos. old, new, good condition $35.00 ($46.00 model). John B. Masaryk, 2132 W. 22nd Place, Chicago, Ill.

FOR SALE: ALL NUMBERS OF the proceedings of "The Institute of Radio Engineers" year 1937. If you have anything to trade, write: Roberto Iglesias, P. O. Box 863, Havana, Cuba.

HAVE 10 GENERAL ELECTRIC motors, 1/20 h.p. 110 volts A.C. Want transmitter parts or what have you? Will take cash $2 each, $18 for all ten. Maurice Twilley, Pittsville, Maryland.

ONE GOOD USED WESTON 0-1.5 MA meter. Also $5 Gilbert Electric Eye Set without sensitive relay. Sell or trade. Make offer. Need 60 ft. ¼" copper tubing. Paul Bahr, 1205 W. 10th, Marion, Ind.

WILL TRADE COMPLETE CHICAGO Technical College Builders course in good condition for All Wave Signal Generator or small S.W. receiver. J. T. Kelly, 778 W. 7 St., San Pedro, Calif.

WANTED: GOOD CAMERA, RECEIVER or transmitter. Have 1936 model 385 Supreme Diagnometer and all wave Signal Generator and many parts for complete serviceman's layout. Swap or sell. Write W9ZJW, 1329 S. 10th, Manitowoc, Wisc.

SWAP WATCH PARTS: 200 NEW crystals; 250 hands (part new); 10 s. works; 14 l. works; and box parts for used radio course; test instruments and service man. R. N. Mummey, 424 Walker St., Bellefontaine, Ohio.

WILL TRADE OR SELL OLD 3-tube Atwater Kent type TA. One of the first radios made, good working condition. Set and tubes. Make an offer. John F. Mummert, 1035 S. Queen Street, York, Pa.

TRADE 7 TUBE DENTON SHORT wave set complete with cabinet and beat frequency oscillator. Kit has almost all tubes. Trade for 16mm DeVry projector. Must be O.K. Anton J. Cindel, 587 West 177 St., N.Y.C.

HAVE USED $75.00 SMALL drum set. Swap for candid camera or 7 band 7 tube receiver. Or what have you? Will also accept alto sax as trade. Rhodell Stephen, 3943 McGraw No. 31, Detroit, Mich.

MUST SELL AN ALL STAR ALL wave receiver—almost new—10 to 560 meters—good beat note oscillator, tubes included. Bargain at $20.00. Geo. Shiers, 17401 Schenely Ave., Cleveland, O.

WILL TRADE FOR MICROPHONE or Baldwin or Trimm headphones 28 consecutive issues of S.W.C.&T. Have 100 issues of miscel. radio magazines. Have radio parts for trades. Paul Shneyer, 201 South 2nd St., Brooklyn, N.Y.

SELL: GENERAL ELECTRIC Auto Radio—B-40, perfect condition $15.00. Exchange or Sell: Correspondence course (used) in Hotel Management, complete, texts and exams. 300 parcelpost stamps. Want communications receiver. J. R. Hanson, Rome State School, Rome, N. Y.

NOTICE SWLS. SEND ME YOUR SWL and I'll send you mine or would like to correspond with SWLs, answer guaranteed. Carey W. Sullivan, 506 Ohio St., Georgetown, Ohio.

WILL TRADE: $84 CLARINET, metal, used only few times for new Super Clipper, Sky Buddy, Doerle model D-38, or what have you? Will trade back if not satisfied. Ralph M. Wolfe, 459 Riverview, Monroe, Mich.

SELL SW RECVR., 58,58,56,56, PP2A5S R.F. and det. shielded, National variable dials, crackle finish 9x12 chassis, audio and power supply separate. 10" speaker. Jones preselector. 8 coils, misc. parts. J. Musgrove, 708 4½ St. N. E., Calgary, Canada.

WILL TRADE NEW SUPER-Nettel-II, 2.8 Tessar, Contax shutter, red, yellow filter, Eveready case; for new Corona Silent, or 6x6 Rolleiflex. Wm. Hector, 1222 So. Lawndale Ave., Chicago, Ill.

NATIONAL SW4 "THRILL BOX" rewired for AC operation. With tubes and power pack. Range 18-560 meters. Cost $55. Swap for Rider's Manuals, tube tester or signal generator. Edwin Ritter, 890 Bryce Rd., Kent, Ohio.

WANTED: GOOD CANDID CAMERA and 16 mm. movie camera and projector. Have selection of transmitter and public address equipment. Jerome Kleker, 4254 North Sacramento Avenue, Chicago, Ill.

FOREIGN POSTCARD COLLECTORS. Send picture postcard from your locale in exchange for two attractive views from here. Prompt reply. Address reply. Address Anton Monte, 3278 Fulton, Cleveland, Ohio, U.S.A.

COMPLETE PROFESSIONAL STATION with 25 watt phone xmitter and All-Star receiver, all like new, ready to QSO. Sell or trade for 16 mm printer or other movie equipment. W8MZG, 156 Western, Benton Harbor, Mich.

TRADE: BEEDE 0-1 MILMETER, Weston Thermo-Galvanometer 425 model Weston 506 model, 0-200 volts. Micrograph speed key. 76-76-12A7 5 meter receiver. 2 tube Air Roamer. Gerald S. Kofsky, 202 So. 2nd St., Brooklyn, N. Y.

SWAP OR SELL: SUPREME 85 tube tester. RCA SWA-2 short wave converter. Universal model XX double button mike. Jewell 574 voltohmmeter. Want xmtr. or what have you? Harry Faulkner, 903 W. Grimes, Fairfield, Iowa.

WANTED: READRITE MODEL 430 or 431 tube tester or some other make. Give particulars. All letters answered. A. R. Miller, 1616 N. 16 St., Lafayette, Indiana.

TRADE NEW NATIONAL N dial, used 204-A, 500 DC mill Jewell, 15 AC Amps Jewell, set LaSalle Extension U law books. Want manuals, dual speed phono motor test equipment. M. Snavely, 1014 Cedar St., Elkhart, Ind.

FOR SALE: ALL STAR SENIOR communications receiver black crackle panel; complete, coils and tubes; 8 inch dynamic speaker; 10-560 meters; built in B.F.O. circuit. Price $17.50. Jack Kerwin, 141 Philip Street (Rear), Albany, N. Y.

EILEN 7C RECEIVER WITH 5 tubes and speaker, coils for $9.00 (nine dollars) call or write John McLean, 4124 29th St., Long Island City, N. Y.

WANTED: A GOOD SHORT wave receiver for 110 or 220 volt DC; automatic record changer; broadcast-receiver for 110 or 220 volt DC, 6 or more tubes; crystal mike. Kn. Langaa-Jensen, OZ8J, Jernbanepladsen, Faaborg, Denmark.

TRADE: 4-8 WATT AMPLIFIER with speaker and tubes, factory wired Elgin III with tubes. American Elec. Co. handset; for Sky-Chief, Sky-Buddy, R-S-R Clipper or what have you. Joe Thomas, 318 S. 10 St., Quincy, Ill.

CANADIANS: HALLICRAFTER Super Skyrider, '37, 9 metal tubes, factory seal guarantee, like new. Perfectly calibrated, aligned; also complete log all SW stations included. Must sell immediately $65.00 cash. H. Orlaw, 138-W. Hastings St., Vancouver, B. C.

WANTED SW-3 WITH COILS, battery operated using 2-volt tubes. Must be in first class condition. H. B. Lyon, Homestead, Fla.

WILL SELL 8-TUBE MILLER Super 16-550 meters. A.V.C. manual switch, beat osc., volume control, band switch, tone control, stand-by switch. $25.00. Write for picture and information. Alvin Beal, Box 625, Fontana, Calif.

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

WANTED—FOR CASH, R.S.R. Super Clipper, 7 tubes, 7 bands, good condition if used much. Give full particulars and lowest price. John A. Ladue, President Hotel, Long Beach, N. Y.

TRADE: USED RADIO SERVICING & Merchandising Course for used Code Course, or what have you. Jos. Wolfe, Box 251, Cromwell, Conn.

SWAP OR SELL, '29 GRAHAM Paige, Hydraulic brakes, Guaranteed passed present safety inspection. Desire swap for good radio test equipment. Communicate—Frank Ziecina, 2928 West 40 Street, Chicago.

HALLICRAFTER 7 TUBE 1937 Sky Chief, practically new, condition perfect. Will sell for $32.50 with set of Baldwin Type C headphones. Milton Lippin, 214 East 54 St., Brooklyn, N. Y.

SWAP PERLMAN ALLWAVE oscillator, wood working tools, electric clippers, golf clubs. Numerous articles including courses radio others. Want allwave receiver, test equipment, manuals. Small Briggs Stratton similar engine. Or what have you? Glenn Watt, Chanute, Kans.

SHORT WAVE LISTENERS IN U.S.A. and foreign countries. Would like to swap my S.W.L. card for one of yours. I will send mine by return mail. Lew Molteol, 519 21 St., Union City, New Jersey.

HAVE VIOLIN HAND MADE IN Germany, 50 years old, to sell or swap for xmitter parts or what have you? For more information write to Pauline White, Pittsville, Md.

WANTED SHORT WAVE EQUIPMENT receiving or transmitting. Will trade or buy. Don Bishop, Blue Rapids, Kansas.

WANTED: A DB-20 by RME SIGNAL Amplifier, slightly used but in good condition. B. W. Nestlerode, 309 So. Walnut St., Freeport, Ill.

WILL TRADE RADIO RECEIVING or transmitting parts, or sets, new, for better class U.S. stamps. What have you? Major Fred Kline, Kent, Ohio.

WANTED TO BUY ONE 600 watt A.C. Generator, and also one complete 160 meter phone transmitter of not more than 20 watts. Jimmie L. Mitchell, Route No. 3, Princeton, Kentucky.

SWAP OR SELL—ASTATIC D-104 crystal hand mike and two metal tube preamplifier to 200 or 500 ohm line. Want Weston Exposure meter. Make offer. Address Edward H. Runyan, 7111 Maysday Ave., Parma, Ohio.

WILL TRADE STAMPS AND covers for small receiver or 5-meter transceiver. Have large collection, so what have you? Would also like to correspond with you foreign radio enthusiasts. John B. Russell, Colfax, Wisconsin, U.S.A.

INVENTOR WILL SELL OR barter his $50.00 Corona portable 1937 model typewriter, worth $40.00 as it is. Kindly send me your offer. Write, Philip Diamond, 92 Woodruff Avenue, Brooklyn, New York.

HAVE A '37 MODEL FLYER BIcycle, a good tennis racket and a small Baby Brownie camera. What kind of short wave equipment am I offered? All letters answered. Robert Perry, 3201 Dale St., Flint, Michigan.

HAVE 38" STRONG UNUSED wooden rack, 8" dynamic speaker, back issues Radio World, Radio News, Short Wave Craft, stamp collection. Want small printing press, receiver or what have you. Ray McIntosh, 87 E. Wyoming Ave., Melrose, Mass.

WANT HAM RECEIVER SUITable 20 meters, Have Frank Holten & Co. trumpet, when bought cost over $100. Alex "Zeke" Radesky, Box 346, Suffern, N. Y.

FOR TRADE FINE GUITAR OR 3-a Kodak F.6.3. lens Compound shutter for a Doerle or other short wave receiver A. C. Gerhold, 113-18 Atlantic Ave., Richmond Hill, L. I.

SELL OR SWAP—3 TUBE AC Powertone 5-10 mtr. Transceiver (42-42-80) DeJong .00014 mfd. 3 gang Bandspread cond. 17-200 meter coil unit to match. Some used parts. Interested in xtals. W8PGF, Homer, Mich.

AUDIO OSCILLATOR FOR CODE practice. Uses 1 tube, WD12. Mounted on (red) metal chassis. Batteries required: 1 4½ volt C, 1 45 volt B. Exchange, with tube, without phones, key, for 1 tube SW set. Albert Hartman, 419 91st Street, Brooklyn, N. Y.

SHORT WAVE LISTENERS ES Hams in U.S.A. es foreign countries. Like to ship one of my S.W.L. crds in exchange for urs. 73's es the QRA is—Joseph Zuk, 513 West Susquehanna Ave., Philadelphia, Penna.

WILL TRADE A FOLDING KOdak, uses No. 122 film and an RCA Institutes Inc., Radio Course Copyrighted 1930 for a good all-wave receiver. Would like Sky Buddy. Howard Carlson, Box 25, Arthur, Iowa.

a call. HSJ, 7.968 mc., Bangkok, is used only when HSP5 is unavailable.

Sangiem adds a few notes in re our magazine, which he says is very popular in Siam. Sangiem's letter and photo appeared in the Dec. issue. He adds that many Siamese like to read our columns, and that the HS8PJ announcer likes our DX columns, and highly praises us. We certainly are pleased to hear this, and only hope we can continue delivering the goods, hi! Many thanks to you, Sangiem, for your continued courtesy, and our very 73 to you all 'way out there in Bangkok!

A note here: HS8PJ is now on 9.50 mc., as the B.B.C. complained to Bangkok, that HS8PJ was QRMing GSB, on 9.51 mc., throughout India!

AUSTRALIA

9MI, the motor-ship "S. S. Kanimbla," on 6.01 mc., and operating out of Australia, has been heard several times, with a good signal here, at about 7 a.m. 9MI, which should be listed as VK9MI, but prefix dropped in announcements, is scheduled to operate on Sun., Wed. and Thurs., from 6:55-7:30 a.m., but has been reported on other days of the week. Broadcasts are announced by a woman, and consist of recordings. Signal can be easily logged. As the ship courses between Australia and New Zealand, one should request in his report that the location of the ship, when heard, be given, as, in this way, one may be able to get a New Zealand veri, if ship was at or near that country.

Address reports to: "S. S. Kanimbla," McIlwraith and McEacharn, P.O. Box 255C, Melbourne, C1, Australia.

* * HAM STARDUST * *

● THE past month, though expected to be rather dull in DX, was surprisingly active, with the 20 meter band *wide-open* nearly every afternoon, about 3 or 4 times weekly! Africans, and more Africans, have been "logged" during these productive afternoons, and, considering we have but two afternoons weekly in which to DX, we do feel that what we missed was very little, hi!

From South Africa, mostly between 11:15-12 midnite, the following were logged: ZT1R, 14000; ZT5S, 14255; ZU5Z, 14130; ZT6AL, 14060; ZT1M, 14065; ZS6AJ, 14070; ZS3F, 14100, 14320; ZS1S, 14335; ZS1AX, 14265; ZU5M, 14050; ZT6AM, 14095; ZT2Q, 14135; ZU5L, 14130; ZU6AM, 14120.

Others in Africa are VQ4KTB, 14140, Kenya Colony, 4:20 p.m., a FB catch QSOing ZE1JR, OQ5AA, 14080, 11:16 p.m., ZE1JR, 14110, at 11:56 p.m., this in Southern Rhodesia.

Then, a flock of French Moroccans, all heard between 2-5 p.m., mostly around 14100. Here they are: CN8MN, 14110; CN8MU, 14105; CN8MA, 14100; CN8AV, 14100; CN8AG, 14144; CN8MT, 14080; CN8AM, 14095; CN8AL, 14320.

Other 20 meter DX here: CT2AB, 14340, Azores, at 7:58 a.m., VS7GJ, 14110, Ceylon, at 7:45 a.m.; ZP2AC, 14145, Paraguay and CX3BL, 14140, Uruguay, one Sun. at 4:20 a.m.; Radio Malaga in Spain on 14450 at 2 p.m.

Now for our reporters: Harry Kentzel reports ZU6AF, 14350, ZU5G, ZU5Q, 14290, ZT5S.

Chris D. Jaffe: W4, reports FB8AB, Madagascar, 14380, at 5:43 a.m.

Ted Bottema, W2, reports: ZT1R, ZT1M, ZS3F, ZU6P, ZU6AF, ZS5M, ZU5L, ZS2N, ZS6AJ, also OQ5AA. FB, Ted!

Albert Pickering, Jr., W2, reports: ZT1R, 14020, and ZU5Z.

Ralph Gozen, W2, reports ZU5Z, ZS1AX,

ZE1JR, ZS1J, 14090, ZT6N, 14100, ZS1B, 14080, FB, Ralph!

Irv. Goodeve, W8, who signs himself the Celery City DXer, being in Kalamazoo, hi, runs in a sweet list also, as: ZU5Z, ZS5M, ZU5M, ZT5S, ZT6AL, ZU6AF, ZS6AJ, ZS5J, ZS1B, ZS2N, ZS2X, ZU6N, ZU6E, and FB8AB, also FB8AF, 14000, last heard 9:15 p.m. F.B. OM! Irv. wants a crack at FR8VX, well, there's the Special, OT, go to it!

Irv. lately logged a new one, VK4HN, at Port Moresby, Papua, the 1st phone from that land. VK4HN was on 14300, QSOing KA1MH at 9:15 a.m. Irv. also reports a batch of 20 meter VK's, as early as 5:20 and as late as 9:40 a.m. unusual to hear these at all during January.

From Europe we have some very FB reports from Bill Edwards, of Bristol, and Ian Jamieson, of Manchester, England.

Ian reports: FB8AF and FB8AH, AH on 14370; FR8VX, 14340; ZE1JA, 14320, So. Rhodesia; ZT1R, ZS1AX, ZS3F, in So. Africa; VQ4CRE, 14300, Kenya; and OQ5AA, all in afternoons E.S.T.

Bill Edwards reports these Africans: SU1RK, 14300 and SU1GP, 14000, Egypt, CN8AR, 14285; CN8MT; CN8MB, 14150; CN8AI, 14285, in French Morocco, FA3JY, 14120 in Algeria, and ZS1AX, So. Africa.

ASIATICS

Chris Jaffe, W4, reports: VS7RF, 14340, VS7GJ, 14130, Ceylon, near 6 a.m., J2MI, 14100, Japan, 3:13 a.m., PK1GL, 14280, Java, 9:22 a.m., HS1BJ, 14070, Siam, 8:25 a.m., all FB DX, OM!

Ian Jamieson reports: XZ2EZ, Burma, 8 a.m., QSO F8XT, while on 14350; VS7GJ, 14130, 9 a.m., using 25 watts; VU2CQ, 14130, India, 5:30 a.m., using 300 watts now; KA1ME, 14130, Philippines, at 6 a.m., nice lot o' DX, Ian!

Irv. Goodeve reports KA1CS "Canada-Shanghai," 14290, Manila, at 9:40 a.m.

Murray Buitekant reports FI8AC, on 14050, in French Indo-China, at 8 a.m., a sweet catch, OT! Irv. Goodeve reports a handsome QSL from FI8AD.

Harry Honda, W6, relays some data on 20 meter phones, reported to him by Frank Taylor, VK6, West Australia. These are now active, so look for them in the early a.m.'s!

ZL2BI, ZL3NP, L.F. end of 20 metre band, New Zealand.

Inside the American phone band, 14150-14250, the following KA's in the Philippines: KA1AP, AT, CS, DH, DT, EG, EK, FD, HS, ME, MC, MD, MH, MN, KA20V.

These in L.F. end 14000-14150: VK7CL, KV, RY, YL, in Tasmania. FB8AH, FI8AC, PK1BX, GL, TR, MD, MO, MX, PK, RL, VL, VN, VY, ZZ, PK2VD, VM, WL, PK3AL, CD, BD, WI, PK4DG, TD, TE, VG, WS, PK6CI, PK8? All these in Java; VU2LL, India; VS7GT, RA, RF, Ceylon.

Other 20 meter DX:

Bill Edwards reports: I1LM, 14120, I1IY, 14320; I1IT, 14355; I1MX, 14150; I1WY, 14285; I1IE, 14390; I1II, 14285, all in Italy.

Also YT7KP, 14185, Jugo-Slavia; CT2AB, 14350, CT2BC, 14355, Azores; ES5D, 14300, Esthonia; SV1NK, 14020, Greece; SP1DE, 14020, Poland, EA3SI, 14185, Spain.

Ian Jamieson reports: UX5KF, 14380 approx., at 8 a.m., and doesn't know who 'tis, hi! Sounds good, too! Also, Ian reports: YL2CC, LSH.F. Latvia: YT7KP, OK1SZ, 14050, Czecho-Slovakia; LY1X, LY1HB, both 14135, Lithuania; OZ1I, H.F. end, OZ5BW, L.F. end, in Denmark, SV1RX, 1CA, 1KE, 1NK, all in Greece, alternating on both ends of 20 meter band, except 1RX on L.F. end.

Ian also reports CT2AB and 2BC, ES5C, and ES5D from 11 a.m. on.

Chris Jaffe reports SV1KE, 14275, and SV1NK, 14020, around 4 p.m.

On 75 meters, Ian hears FA3QV, on 3590 kc., Algeria, around 3 p.m. Adds the FA3 also heard FB on 20 & 40. Ian says that ON4HS schedules U.S. & Canadian phones on 75 meters at 6 p.m. Also adds that the following are good "sigs" on 75 meter phones, and that U. S. DXers should look for them in the evenings. Here goes: GM5NW, GM6SR, Scotland; ON4HS, ON4FOR, Belgium; OZ4HF, OZ2D, OZ2EA, OZ7X, in Denmark; F8MG, France; EI6F, EI8L, EI8J, EI9D, in Ireland; G2XV, G2PO, G5CJ, England, and GM5IM, besides several North Africans.

Perhaps a few of these might be heard, so let's give it a try, it's a new DX band!

On 10 meters, following DX logged: CN8MA, ZS6T, ZT6AK, CN8AV, I1IT, HR5C, ZE1JR. The band is open, but usually not "hot," as it was last Oct.-Nov. We look forward to increased activity on this most interesting band during March!

Chris Jaffe reports U3FB, Russia, at 9:30 a.m.

Ian Jamieson reports these 10 meter catches: ZE1JR, ZT6J, VU2CQ, FA3JY, CN8AV, CN8AJ, heard between 9-11:30 a.m. Also OK3VA and OK2NB, 9-10 a.m.

Ralph Gozen reports ZS6T, ZE1JR, VU2CQ.

A last minute report: W1IFK, our friend Ed Murphy, Stamford, Conn., reports FR8VX, Reunion Island, testing 6:45-7 p.m., Suns., several weeks in a row, with a good signal. This on 14440 kc.!

Look for above listed Africans, as Morocco, Egypt, Algeria, in afternoons, 2-6 p.m., and same for above Europeans. Asiatics should be heard in March, beginning at 6:30-7 a.m.

REVIEW OF '38 SKYRIDER

By Our DX Editor, Joe Miller

● THIS excellent all-around communication receiver was tested in our DX shack during the past month, and after putting it through all its paces, we feel that we have here one of the very best DX receivers on the market today, and that the claims made for the Skyrider are certainly no "bunk"!

Concerning sensitivity, this set compared more than favorably against our old reliable T.R.F. Regen. on which we do most of our DX, bringing in weak, distant stations intelligibly, when unintelligible on the T.R.F., and that, OMs, is a recommendation for any DX set!

Selectivity:—Very good, with a total of 3 controls to be used in different variations of selectivity. Signals that are badly QRM'd can be brought in clearly, through the use of the crystal, with a variable phasing control which is invaluable, and a *broad-sharp* selectivity switch.

Of course, the dial merits special mention. Wheel (inertia) dials are used, and can be spun halfway around by a mere spin of a finger, the ultimate in fatigueless tuning! Band-spread is very fine, and the 20 meter band can actually be stretched from 260-740, or a total of almost 500 degrees, on a 1000 degree dial! The 20 meter band is best covered by setting the main dial at 14,500 on the marker.

Then the tone quality must be mentioned. This is very good, as the receiver is equipped with an excellent 12 inch permanent magnet speaker, and we often prefer the fine music of a local, to "plowing thru" the QRM for DX!

Calibration is good, and one can easily locate most any DX station with ease.

A tone-control, beat oscillator, oscillator pitch control, "S" meter, single or doublet aerial provisions, send and receive switch, 'phone jack on panel, AVC *on* and *off* control, and separate R.F. and A.F. gain controls—all combine to make this a really excellent and modern DX receiver, one which we would choose for our own DX shack.

BOOK REVIEW

FUNDAMENTALS OF RADIO, Frederick Emmons Terman. Stiff cloth covers; 6½"x9¼"; 458 pages; 278 illustrations; published by McGraw Hill Book Co., New York City.

The first part of the book deals with radio wave propagation, transmitters, the fundamental elements of radio circuits and includes a valuable section on inductance.

Among the interesting subjects taken up later are—band pass filters, fundamental actions taking place in vacuum tubes, how the grid works, the action occurring in triodes and pentodes, beam tubes, variable mu tubes, etc.

It seems we can never read enough on vacuum tube amplifiers and the author has included a refreshing treatment on this important subject, including the cause of noise, hum and microphonic effects in amplifiers. Power amplifiers are also discussed at length, with tables of representative tubes suited for this purpose.

An important chapter covers vacuum tube oscillators, with fundamental circuits, and the action taking place in these circuits. Crystals and the important part they play in oscillator control circuits are included. Important subjects dealt with in the latter part of the book are—modulation, the vacuum tube detector, radio transmitters and receivers, propagation of radio waves, antennas, radio aids to navigation, television and acoustics.

RADIO AMATEUR COURSE, George W. Shuart, W2AMN; stiff paper covers; 6½"x9½"; 144 pages; profusely illustrated; published by Short Wave & Television Magazine, New York City.

Every student of short-wave radio who aspires to become a licensed amateur, should certainly read this Radio Amateur Course book by Mr. Shuart. The lessons are arranged in progressive style and the elements of electricity and the basic actions taking place in vacuum tube detectors and amplifiers are clearly explained.

Not only are these basic subjects described with simple diagrams and clearly written text, but wherever necessary analogs, such as water pump and valve systems, are shown which make the subject of the action in radio circuits so simple that practically anyone can understand them.

As we proceed with the series of lessons or chapters, we come to the study of a vacuum tube as a regenerator and oscillator; How class A, B & C amplifiers work, the MOPA—or master oscillator and power amplifier, etc. Then we come to such important subjects as antennas and feeders for amateur stations; how to select the proper tubes for low-power exciter stages, and the fundamentals of amplitude modulation. Later we find—power supplies for amateur sets, including bridge rectifier circuits; short-wave receivers of different types, including the super-heterodyne. Plenty of diagrams are included so that the student who finishes this course will find himself ready to answer the questions propounded by the license authorities.

Ultra high frequency receivers are described and also U.H.F. transmitters. Several first-class transmitters and receivers are described with complete constructional details, photographs and diagrams, so that the embryo "ham" can build the apparatus for his station.

Index to Advertisers

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

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

NATIONAL NC-80X

NATIONAL COMPANY, INC.
Malden, Mass.