SHORT WAVE & TELEVISION

The Popular Radio Magazine

RADIO PILOTS SHIPS INTO PORT
SEE PAGE 268

25¢ IN U.S. AND CANADA

HUGO GERNSBACK
EDITOR

★

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

★

SEPT. 1938

NEXT MONTH—

BEGINNING with the October Issue, SHORT WAVE & TELEVISION Magazine will change its name to

RADIO & TELEVISION

This change has been decided upon after mature consideration in order to broaden its field and keep up with the constantly changing art of radio.

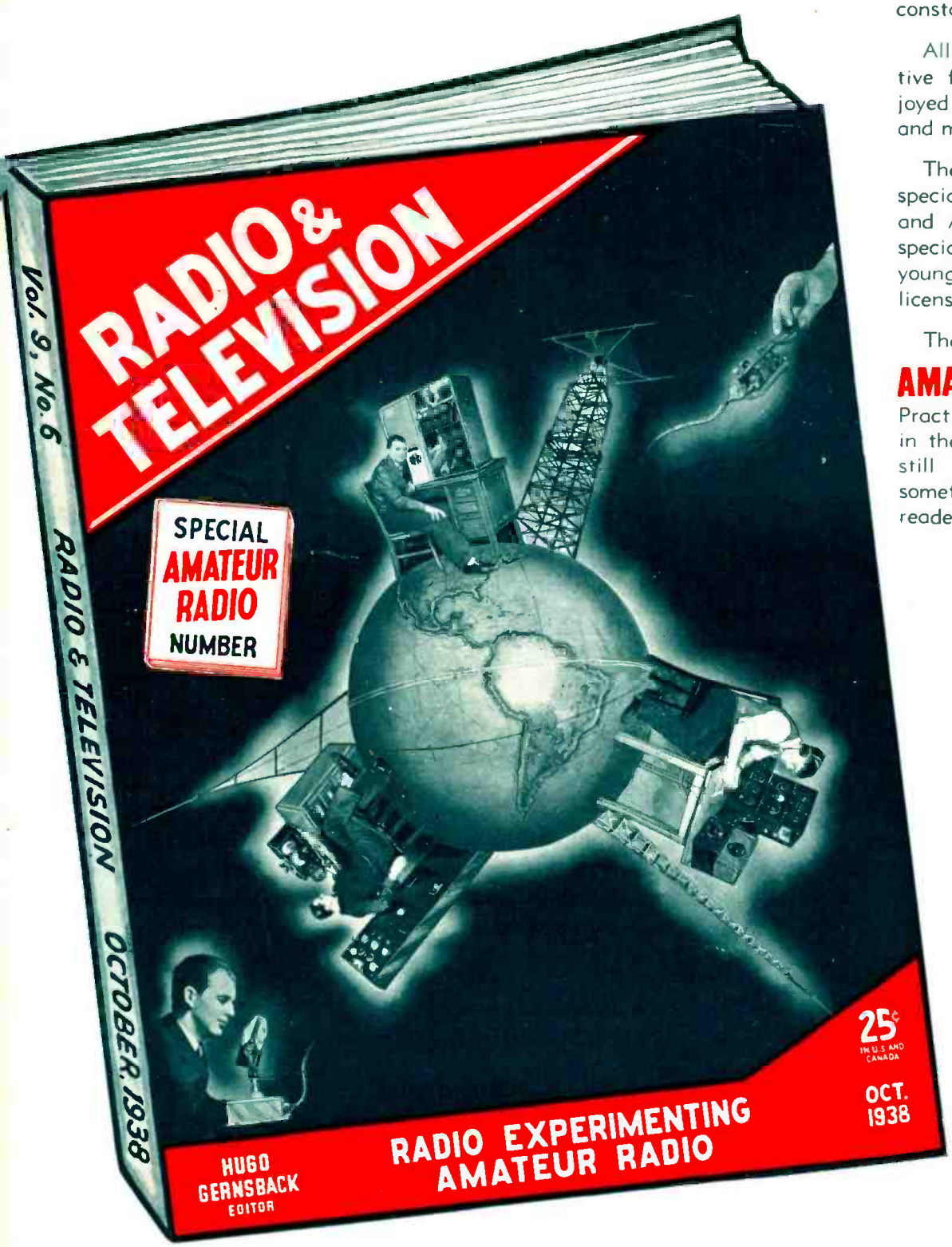
All the interesting and instructive features which you have enjoyed for many years will be retained and many new ones added.

The magazine will, hereafter, specialize in Radio Experimentation and Amateur Radio. It will have special appeal to the thousands of young men who aspire to become licensed hams.

The first issue will be a special

AMATEUR RADIO NUMBER

Practically every outstanding man in the radio field, who was and is still an amateur, will contribute something of interest to every reader.



★

Note the names of these outstanding radio men:

Dr. Lee de Forest
Famous Radio Pioneer and Inventor

E. F. W. Alexanderson
Consulting Engineer, General Electric Co.

E. T. Jones
Manager, Engineering Products Advertising and Sales Promotion, RCA Manufacturing Co.

Austin C. Lescarboura
Radio Pioneer and Public Relation Counsel

C. W. Horn
Director of Research and Development, National Broadcasting Co.

R. A. Heising
Well Known Radio Inventor, Bell Telephone Laboratories

Dr. Frank Conrad
Assistant Chief Engineer, Westinghouse Elec. & Mfg. Co.

R. H. G. Mathews
Active in Amateur Radio Since 1909

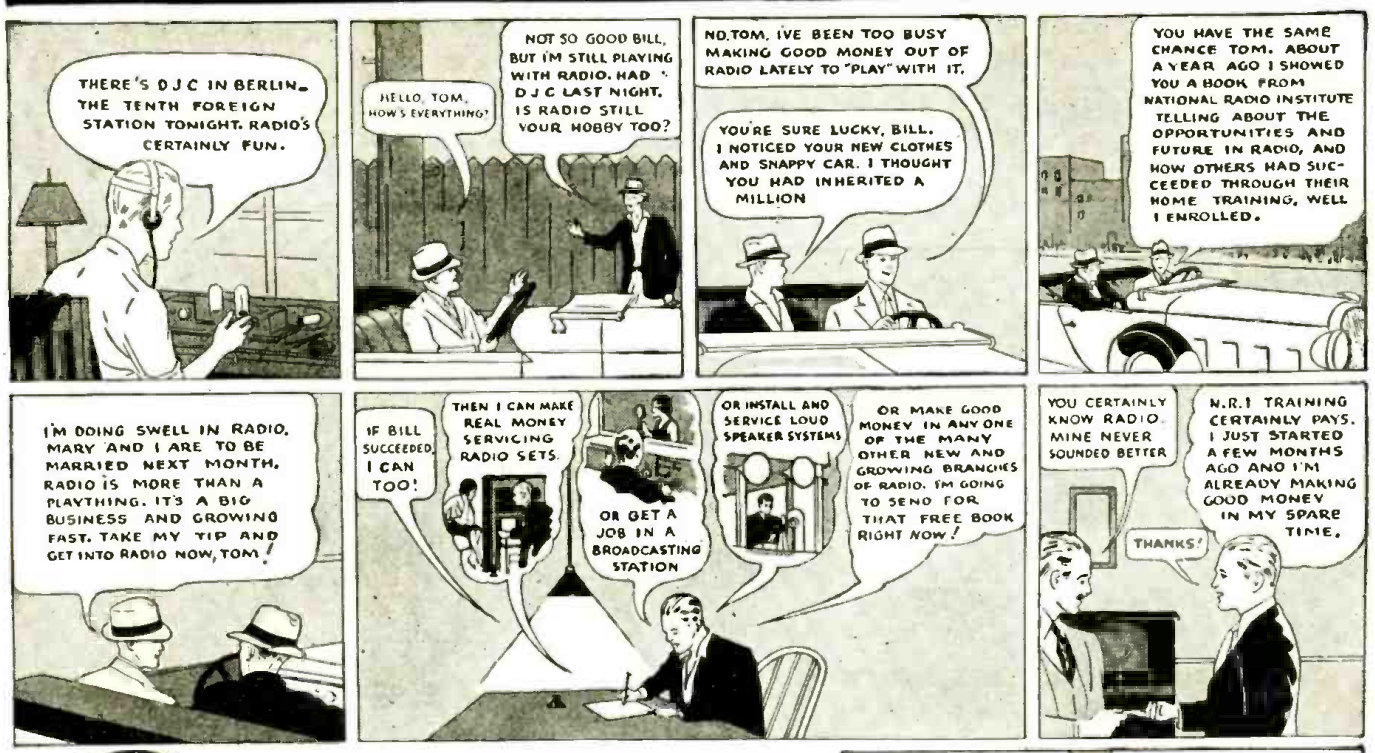
Capt. David Talley
Author of "The Army Radio Amateur Network"

O. B. Hanson
Vice President and Chief Engineer, National Broadcasting Co.

Be sure to order the great October Issue of RADIO & TELEVISION from your newsdealer, as the demand will be unusually heavy due to the special features not heretofore published.

SHORT WAVE & TELEVISION Magazine
The Publishers

How a "Tip" got Tom a Good Job



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Established 1914

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SHORT WAVE & TELEVISION
The Popular Radio Magazine

SEPTEMBER—1938

Vol. IX No. 5

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

In This Issue

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In the Oct. Issue

A Day in the Life of a Busy Amateur, E. E. C. England, VE3QL.

How to Learn the Radio Code Easily, Everett L. Dillard and Frank Collins.

Learning Foreign Languages by Short Waves, Hon. Michael Norton, B.A.

A Communications Receiver of Improved Type—for Hams and Fans, Howard G. McEntee, W2FHP.

New Radio Amateur Course, Martin Clifford.

A Good 5-Meter Receiver, Herman Yellin, W2AJL.

A Modulator for the 35-Watt Transmitter, Harry D. Hooton, W8KPX.

Here is a photo of the modulator to be described by Harry D. Hooton, W8KPX, in the October number. It is especially designed for use with low-powered transmitters.

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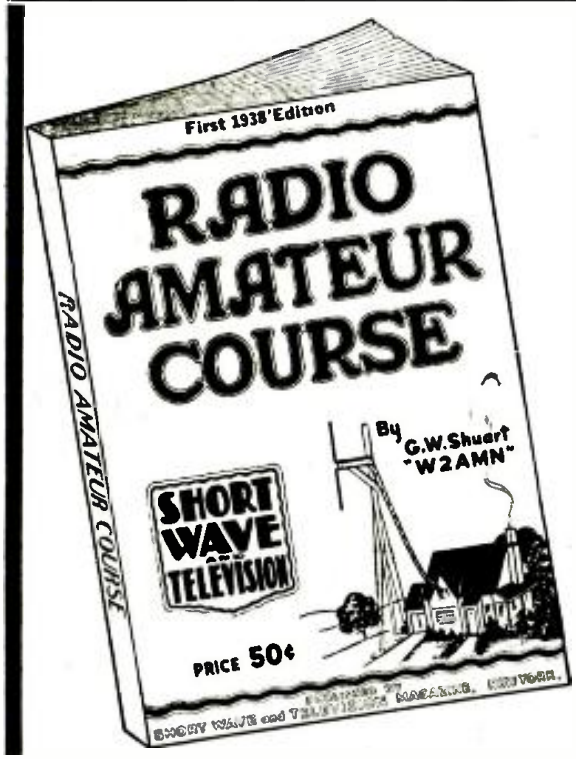

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HUGO GERNSBACK, EDITOR H. WINFIELD SECOR, MANAGING EDITOR

The HIGH FREQUENCY *Broadcasting Station*— 10 Meters and Down!

Everett L. Dillard

Everett L. Dillard, chief engineer, Apex Broadcasting Station, W9XA, Commercial Radio Equipment Co., Kansas City, Missouri. Mr. Dillard is well known for his researches in the high frequency field.

Does the Apex Station solve radio broadcasting's needs for local station expansion?

● SEVERAL years ago the useful range of radio frequencies was considered to be those frequencies below 30 megacycles (10 meters); in other words, wavelengths *higher* than ten meters. All frequencies above this limit were considered as being an unknown quantity and of doubtful commercial worth.

With the continued and necessary expansion for different classes of radio services depending more or less upon local coverage, such as police radio, relay broadcasting, etc., licenses were granted these services by our Government for experimental stations to be operated on frequencies above 30 megacycles, in the hope that what had heretofore been considered as more or less worthless radio territory would prove adaptable for this type of service. The increasing number of these stations during the past three years and their reported successes in providing good local coverage, as well as the simultaneous, noncommercial but nevertheless closely allied work of the radio amateur in two-way communication in the 5-meter band in metropolitan areas, proved definitely *that frequencies above 30 megacycles could be used to provide satisfactory local radio coverage in even thickly populated areas.*

Naturally the radio broadcasting industry, confronted with an already overcrowded condition on standard *broadcast* channels, looked with hungry eyes to this ultra-high frequency band as a possible solution to its needs for more and more broadcast stations, especially those which are classified in the "local" station category. However, good broadcasting service demands more in the matter of signal-to-noise ratio than simple reliable communication service. In the case of communication between police headquarters and car cruiser it is only necessary to have sufficient signal strength at both ends of the circuit to afford intelligible communication. Broadcasting, on the other hand, demands far more than mere intelligibility. Reception of music and voice cannot be marred, even by occasional static or interference, if the entertainment value of the program is to be maintained. This means that music and voice must override all radio "noises," whether man-made or otherwise.

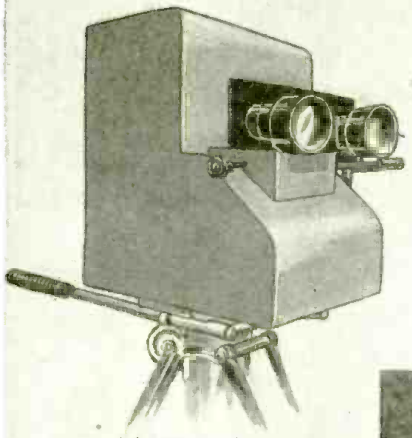
Of the two sources of interference, that originated by *man-made* electrical devices is particularly vicious at these frequencies. Fortunately, nature has not produced, successfully, static that is very potent on the ultra-highs; but auto-ignition and similar disturbances are a problem of considerable magnitude that must be whipped. Can a sufficiently strong signal be developed in metropolitan areas to provide an acceptable high-fidelity broadcast quality reception? That is the problem. The solution lies in compulsory noise suppression at the originating source, the use of high transmitter power, strategic station location, and the use of directive antenna systems. No doubt a combination of all four of the above will be necessary on the *ultra-highs* to produce programs of maximum entertainment value and signals free from interference.

The Federal Communications Commission was quick to see the possibilities of a local broadcast service on the ultra-high frequencies, and established a new type of experimental station known as the High Frequency Broadcast Station—sometimes called an *Apex Broadcasting Station.* Accordingly, the Commission has granted to a number of responsible applicants licenses of an experimental nature to test the merits of local broadcasting on the ultra-high frequencies. Furthermore, in its recent allocation of frequencies from 30 to 300 megacycles, the Commission has generously set aside a number of frequencies on which to operate these experimental stations. No one knows just what the operation of these stations will prove; but if their operation is a success, and it is found that good broadcasting service can be delivered over a limited area, the Broadcasting Industry will no longer need to worry about where to put new "local" stations; for the Commission has wisely set aside an ample number of frequencies to accommodate any necessary expansion for many years to come.

It also appears that the Apex broadcasting frequency bands will provide radio broadcasting channels for those many smaller communities now deprived of radio service, which local service they lack only because of congestion in the regular broadcast band. In all other respects these communities may have the necessary popula-

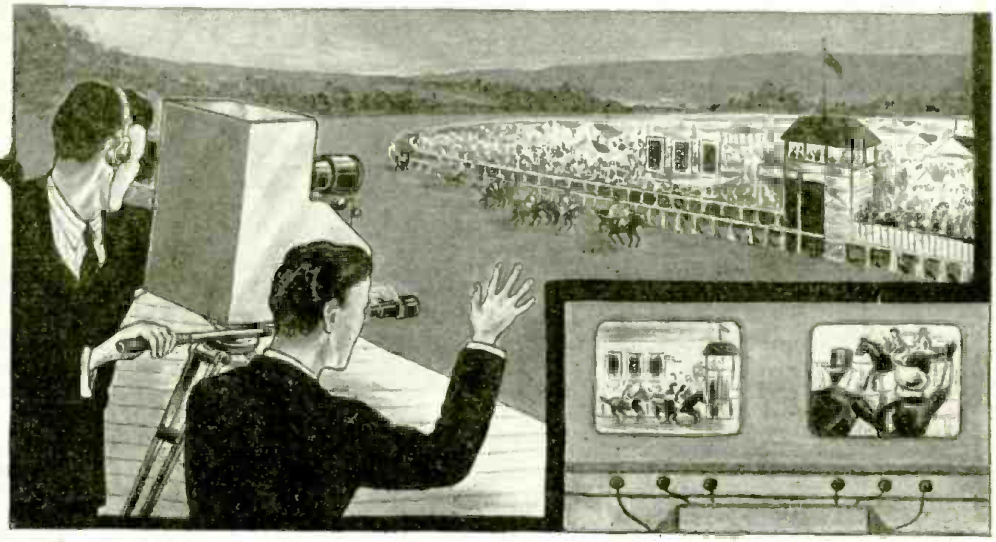
(Continued on page 312)

Twenty-first of a Series of "Guest" Editorials



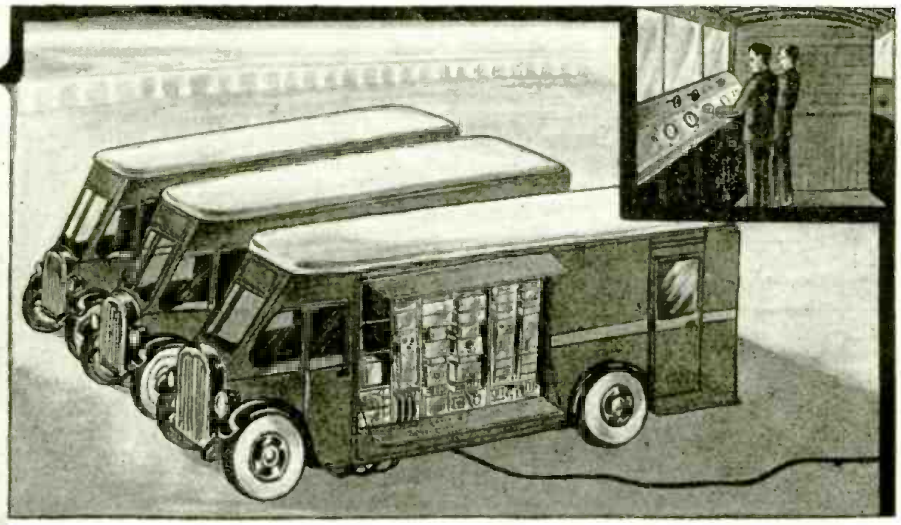
TELEVISING

How the first television broadcast of the famous



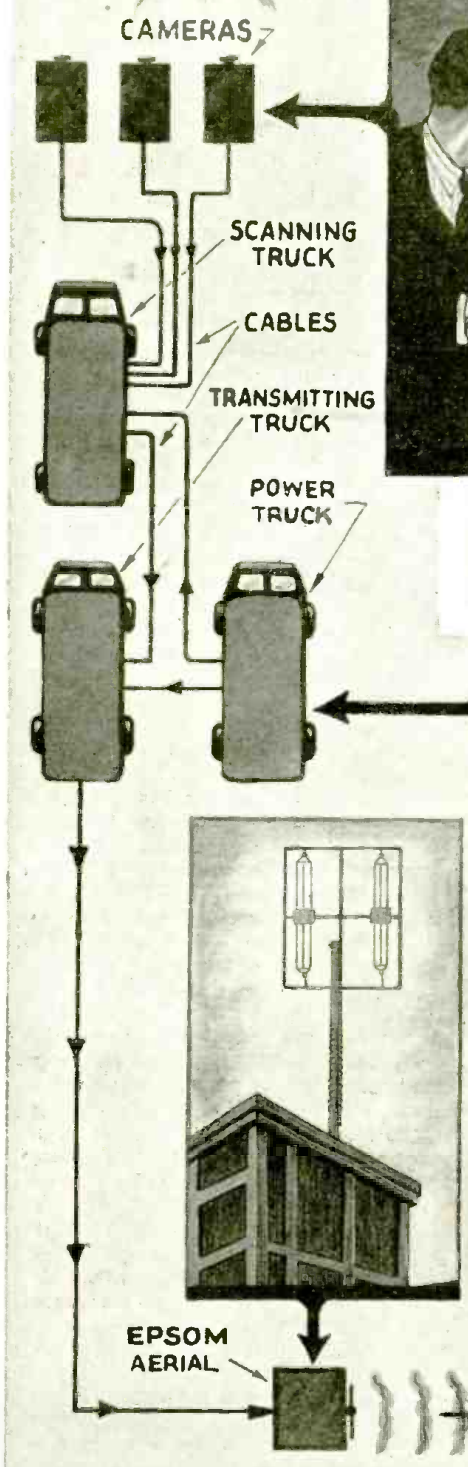
Three television cameras or iconoscopes were set up beside the race course at Epsom—site of the famous English Derby. These cameras were placed at different vantage points for picking up the images.

The mobile television transmitter unit consists of three large trucks. The scanning truck contains equipment for mixing the outputs of the cameras and amplifying the combined signals. It also contains monitoring screens for each of the television cameras. The operator sits in front of the screens where he can see everything being picked up by each of the cameras. On one of the screens appears exactly what is being sent out over the air to television viewers. The other two screens show what the other two cameras are picking up, and by use of a set of fader controls, the operator can fade in either one of these other cameras.



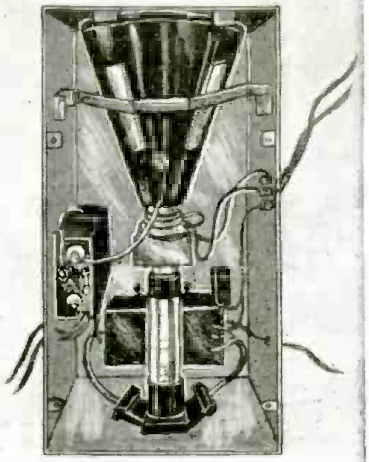
The second truck contains an ultra short wave transmitter which is fed the picture impulses from the scanning truck. A special directional transmitting aerial, used in connection with the transmitting truck, is mounted on a pole on the roof of one of the grandstands and connected by feeder lines to the transmitter.

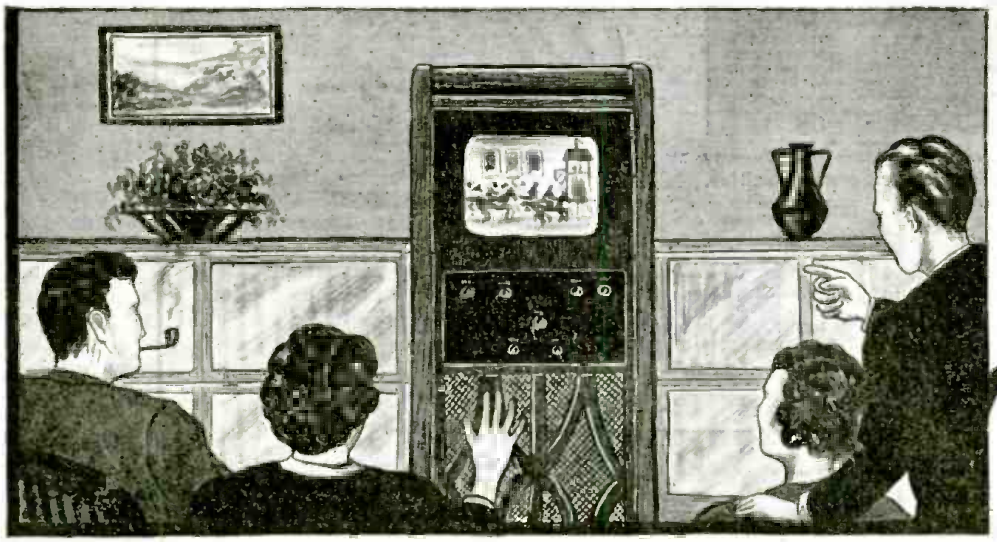
The third truck contains power supply equipment.



the DERBY

English Derby at Epsom was arranged by the B. B. C.

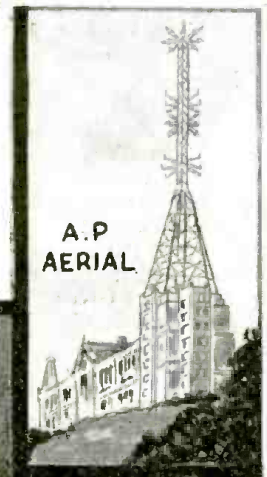


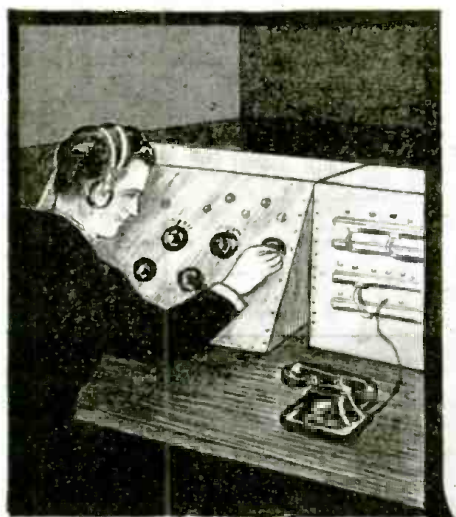


The picture impulses are amplified and converted into radio waves once more at Alexandra Palace and broadcast from the high-powered television transmitter on a wave length of about seven meters, to be picked up and reproduced on the television receivers in the homes of Britishers living within an area of 50 miles of London.

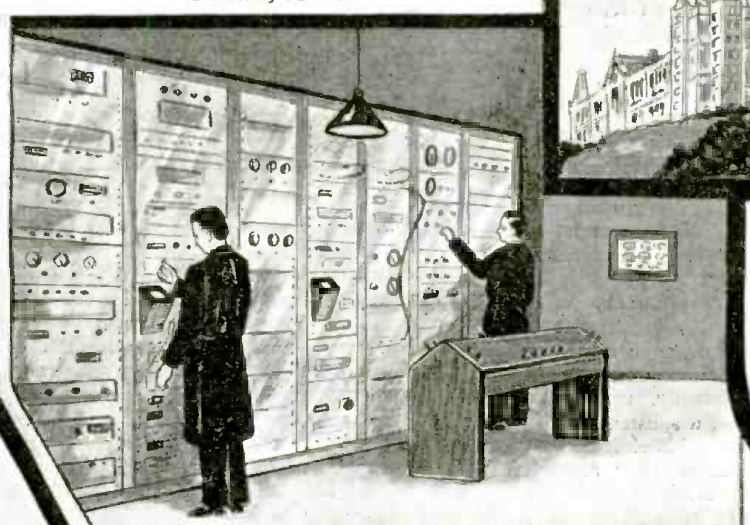
RADIO TRANSMISSION

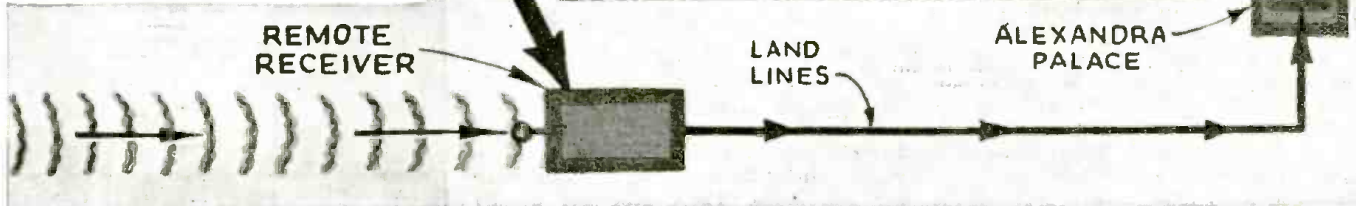
While the range of the television station broadcasting the images of the Derby was nominally expressed as fifty miles, the signals were actually picked up much farther away. As tests in this country have shown, the images are often picked up several hundred miles away and in fact the B.B.C. images were once picked up in South Africa, a distance of six thousand miles! It is safe to say that the Derby images were undoubtedly seen by televiewers equipped with experimental receivers located 150 to 300 miles from the transmitting station.





The signals sent out from the mobile transmitter on ultra short waves are picked up at a remote point by the special receiving equipment shown above. From here the signal impulses go by special telephone cables to the main television transmitting plant at Alexandra Palace in London.





American Broad- *What's Wrong*

Professor Harlow Shapley, Dr. A. E. Kennelly, of Harvard University and Dr. Loring B. Andrews, chairman of WIXAL program committee, at the WIXAL transmitter.

● FEELING that a turn-about is fair play, the United States broadcasters are now sending out elaborate short-wave programs in foreign languages for the benefit of *foreign* listeners, in an effort to keep up with the multi-lingual short-wave broadcasts sent out by the principal short-wave stations of Europe and Asia.

From dawn to midnight, specially prepared programs for the entertainment and education of foreign listeners are shot to the four corners of the world from powerful transmitting plants in different parts of the U. S. From Bound Brook, New Jersey, the National Broadcasting Company sprays programs at Europe and South America in six languages. In New York the Columbia Broadcasting System's short-wave outlet "sounds off" in three languages. At Boston the educational station of the World Wide Broadcasting Foundation sends out a variety of programs from Harvard University classrooms and its own studios in languages ranging from Greek to Scandinavian. And from Schenectady, N. Y., and Pittsburgh, Pa., still other foreign language broadcasts wend their way to distant lands.

Outstanding Educational Program Station

One of the most unusual stations, as far as programs go, is WIXAL, Boston station of the World-Wide Broadcasting Foundation. This is a non-commercial station whose prime purpose is the dissemination of educational and good-will programs. This station was founded by Walter S. Lemmon, engineer and International Business Machines Corporation executive. Mr. Lemmon started the station at his own expense, but subsequently, the Rockefeller Foundation became a substantial backer of the station. Private individuals, including thousands of listeners, have also contributed funds for the station's work. An elaborate program of educational work has been undertaken by the station. Printed literature tying in with broadcast material is sent to interested listeners so that they may get greater benefits from programs. Programs are transmitted in Spanish, French, Greek and Portuguese for the benefit of European and South American listeners. In addition, news broadcasts in several other languages are part of the daily fare from WIXAL. Several New England universities cooperate in the preparation of the programs of the station. The type of material sent out is of a much higher caliber than that which the average

commercial broadcast station would send out. Frequently, classroom lectures are broadcast from New England universities. Phonograph records of these lectures are made so that they may be rebroadcast at an hour which will insure reception in distant countries at a convenient listening time. Another activity of this station in the field of international good-will is the supplying of recorded programs to Latin American broadcasting stations so that they may be broadcast to local audiences throughout Latin America.

NBC's Foreign Language Barrage

The National Broadcasting Company's station, W3XAL, at Bound Brook, N. J., caters to European listeners with one hour daily programs in Italian, German and French, and with five hours of program in English for the benefit of English-speaking Europeans. These programs usually consist of news bulletins and rebroadcasts of American network programs with foreign language announcements replacing the English announcements. South American audiences receive their daily ration of programs in Spanish and Portuguese during our evening hours which, of course, correspond with South America's evening hours. A similar pattern is followed with these programs. News bulletins in Spanish and Portuguese are interspersed with commercial network programs, with foreign language announcements. In addition, special feature programs, designed only for foreign listeners, are broadcast. Advance program sheets, printed in three languages, are sent to the foreign press with complete details of all programs to be broadcast.

The General Electric stations, W2XAF-W2XAD, at Schenectady, have a similar

Left—Miss Carmen Castelo, Spanish-speaking theatrical columnist, broadcasts over W2XE, New York, for South America.

Below—Walter Lemmon, founder and president of WIXAL at Boston.

Short Wave casting— *With It?*

Laura Suarez, Brazilian soprano who appears on programs for South American listeners over W3XAL, Bound Brook, N. J.

Three Spanish-speaking artists participating in a special program from New York, for Argentina's Independence Day, broadcasting over W2XE.

service for Europe and South America. However, when broadcasting to South America, two different programs are sent out simultaneously — one in the Portuguese language and one in the Spanish language. Portuguese is the principal language of Brazil, while most of the people in the rest of South America speak Spanish.

Special Staffs for S-W Programs

Both the National Broadcasting Company and the General Electric Company maintain separate program staffs for *short-wave* activities.

The Columbia Broadcasting System operates a short-wave station in New York City, W2XE. Programs sent over W2XE also follow those of the National Broadcasting Company and General Electric Company in that regular network programs are frequently broadcast with foreign language announcements and, in addition, special foreign language news commentators provide daily news summaries. W2XE also broadcasts a weekly woman's program in Spanish for South America, as well as a weekly theatrical review in Spanish.

Since the entertainment likes and dislikes of people differ from nation to nation, this must be taken into account when devising programs attractive to foreign listeners. There is not much point in broadcasting one of Jack Benny's programs to South America if the South American listeners cannot understand English. On the other hand, foreign listeners expect to hear American music and entertainment when they listen to America, rather than a repetition of the type of program they can tune in from their local radio stations. Trying to strike an average between these two conflicting points naturally requires careful planning.

Announcing the station call at W3XAL's transmitter.

Record of a recent address by President Roosevelt just before it was broadcast to South America over W3XAL. Translations of the speech in several languages were also recorded and rebroadcast.

At the present time, greater emphasis is placed on programs for South American listeners than on those for Europe due to the intensive radio drive which European nations are making for South American favor.

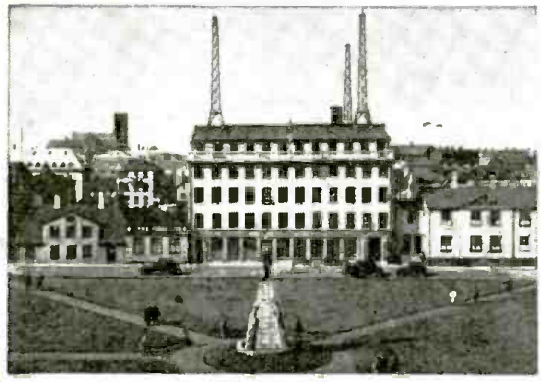
What's Wrong with Our S-W Broadcasts?

Compared to the elaborate broadcasts sent out from Europe by the Government-owned stations, the American efforts in international broadcasting seem puny indeed. However, for Government-operated European stations, the question of operating expense may be completely ignored by the station operators, while in this country, where stations are all operated by private enterprise, with the sale of time on the air for advertising purposes forbidden by the Federal Communications Commission, the question of program expense looms very large in the s.w. station budget.

Nevertheless no one can claim with justice that the United States has developed a first rate plan of broadcasting to foreign listeners. In addition to lack of adequate program material many U. S. short-wave stations suffer from technical defects such as poor quality of transmission, haphazard use of different available s.w. channels without regard to their effectiveness in reaching a particular place at different times of the day and poor maintenance of equipment, causing such annoying faults as high level of hum on carriers and either

(Continued on page 311)

Nini Marshall of station El Mundo, short wave program star of South America? Miss Marshall is famous for her characterization of "Catita," the little working girl, and also "Candida," the Galician maid-servant.



Station TFJ? A nice cool place to spend your vacation, for it's located in Reykjavik, Iceland. Scene on a public square is shown above, the central building with the towers being the telephone and broadcasting building.

Gunnar Paulsson, the Iceland tenor? Numerous entertaining features are broadcast regularly by short wave from Iceland. Local listeners are entertained by long wave broadcasts.

HAVE YOU HEARD—

Tokyo? One of the powerful Japanese short wave transmitting stations, which also carries short wave programs heard by many American DX listeners.

Matilde Broders, the Chilean soprano, who sings exclusively for Radio El Mundo, the famous Buenos Aires short wave station? She is heard on the Toddy programs.

One of the unusual "Biwa" concerts over the Japanese short wave broadcasting stations, by Miss Kyokurei Tanaka and her troupe? The Biwa is a Japanese form of guitar.

Miss Senmaru and her group of songsters on one of the Japanese short wave programs? The instrument seen behind and to the right of the microphone is known as the Samisen and is used to accompany the singers.

TALKING on 1-Meter Waves

C. G. A. von Lindern and G. de Vries

A telephone circuit between Eindhoven and Tilburg, Holland, which uses waves of about one meter (300 mc.) Triode tube transmitters and super-autodyne receivers are used. The directive aerials are of Yagi type.

● RESULTS of experiments made in the Philips' laboratories with waves of about one meter, have shown their practical value for communication purposes. With the collaboration of the Netherlands' postal authorities experimental telephonic connections have been established between Eindhoven and Tilburg.

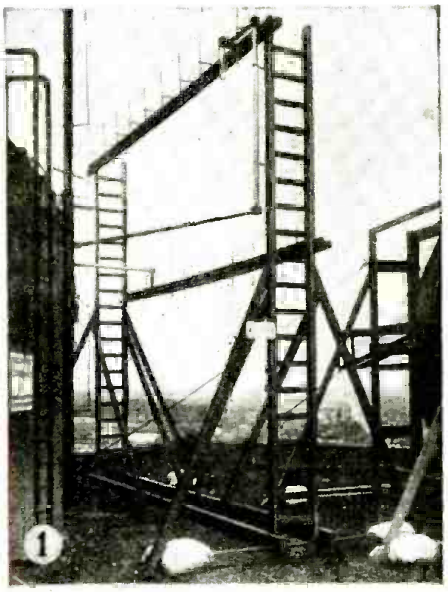
In order to establish dependable radio connections with ultra-short waves, it is an indispensable requirement to be able to see the receiving aerial from the point where the sending aerial is located.

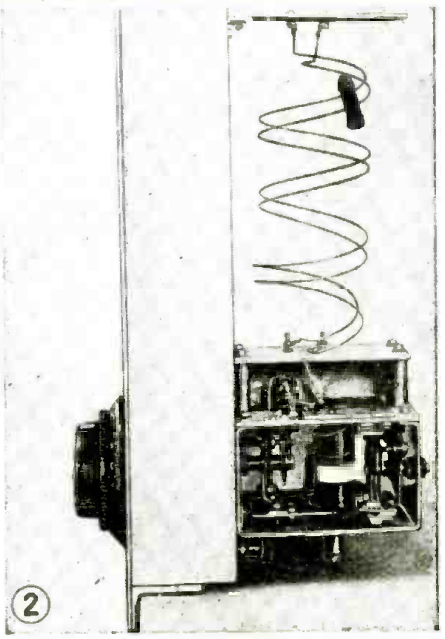
"Seeing" means in this case that the dipoles of transmission and reception have to rise at least ten meters (32 ft.) above all trees and buildings. The Eindhoven aerial is installed at a height of 72 meters (230 ft.) above the ground on the roof of one of the old Philips factories. The Tilburg aerial, which is on the roof of a local plant, was originally only two meters (6.4 ft.) above the building. The direct line of vision was interrupted by trees and the reception at Tilburg was rather weak.

In order to have two equivalent circuits, the receiving aerial at Eindhoven has been mounted two meters (6.4 ft.) lower than the sending aerial. The two transmitters, at Eindhoven and at Tilburg, work on 1.4 and 1.23 meters respectively in order to avoid mutual interference.

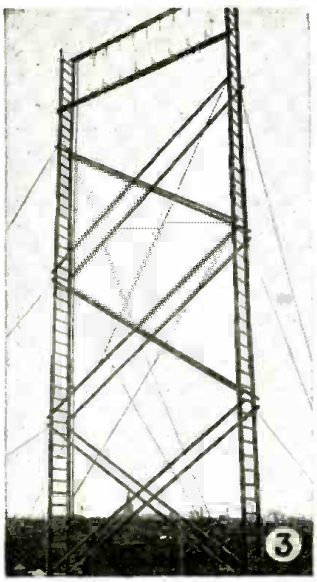
At Eindhoven as well as at Tilburg, aerials of the *Yagi* type are used for transmission and reception. The *Yagi* aerials consist of a number of parallel rods, mounted on a plane, coupled electromagnetically among themselves and also with the dipole which is connected with the transmitter (or receiver). The length of the rods and the inter-distances have been determined by experiments in order to achieve maximum strength. The device functions in such a manner that the signals which arrive from the desired direction, induce in the various rods electrical tensions, the resulting components of which add up in the rod connected with the receiver. By installing another rod (reflector) the signals which reach the receiver may have an amplitude which is 3.5 times greater than in the case of simply using one dipole. It is evident that the same figures may

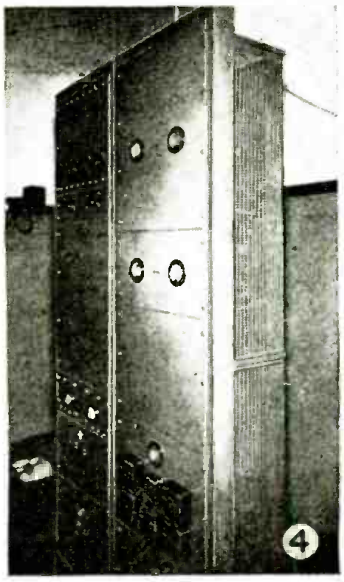
(Continued on page 316)

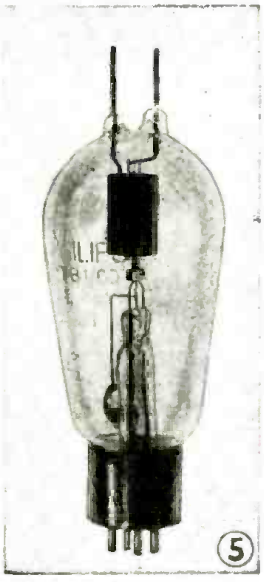


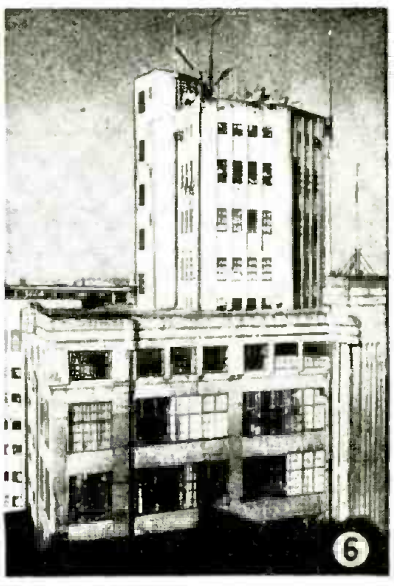


1—shows the aerial arrangement at Eindhoven. 2—is the oscillator-modulator unit of one of the transmitters.

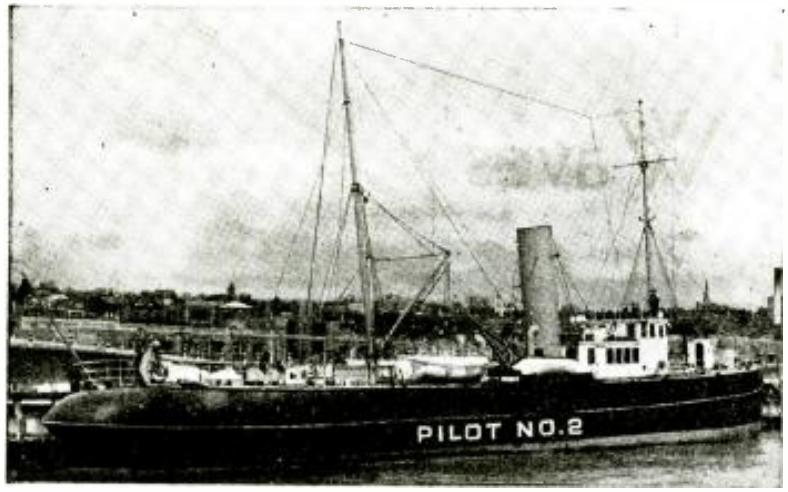








3—Aerials at Tilburg. They are mounted between two ladders. The transmitting aerial is six feet above the receiving aerial. 4—Apparatus at Tilburg. Left-hand panel contains two receivers. The right-hand section is the transmitter. 5—Philips TB 1/60 tube used in the transmitter. 6—The upper aerial is the experimental Yagi type referred to in the article. To the right and lower down may be seen the standard aerial.



Radio Pilots Ships into Port

(Front Cover Feature)

● TOSSING about on the storm-swept fringes of the Atlantic, shut in on all sides by a thick blanket of fog that periodically settles about them, or cruising around outside the lightships on a calm sea under a full moon, the hardy pilots that bring the biggest liners and the smallest tramp steamers into New York Harbor now have the familiar telephone right at their elbows aboard their steamers, *Sandy Hook* and *New York*.

First contact with civilization on this side of the ocean for the incoming steamships and the last contact for outbound vessels, the trim little pilot boat is always a romantic sight.

A glimpse inside the snug wheelhouse of one of these little vessels now reveals a recent development of Bell Telephone Laboratories—the marine radio telephone. The little handset looks and acts just like the familiar telephone we are so accustomed to seeing and using in the home and the office ashore. Even the cheerful tinkle of the telephone bell contributes its assurance to the pilots and crew out there, so while they are actually out of sight of land, they are part and parcel of the United States. And it is just as easy for them to call a number in San Francisco as it is to call their own office ashore in New York City, for the marine radio telephone station operated by the New York Telephone Company on Staten Island serves as a constantly available link with the entire Bell System.

In days gone by, these rugged individuals used to spend as much as a week or ten days cut off from civilization having no other contact with the rest of the world than the passing ships. Even now, each time one of their number goes over the bounding waves in the little dory to board an inbound ship, he takes with him a package of mail for points ashore, to be posted upon the arrival of the vessel he pilots into port. And each time one of the pilots brings a ship out, he carries with him a bundle of newspapers and letters for those he is to join aboard the pilot boat. With the advent of the early radio telegraph a "wireless operator" joined their ranks to tap out Morse signals on his key, accompanied by eery and ear-splitting flashes of blue fire.

Top photo—One of the New York Harbor "pilot" boats equipped with short wave phone, permitting contact with shore or other boats.

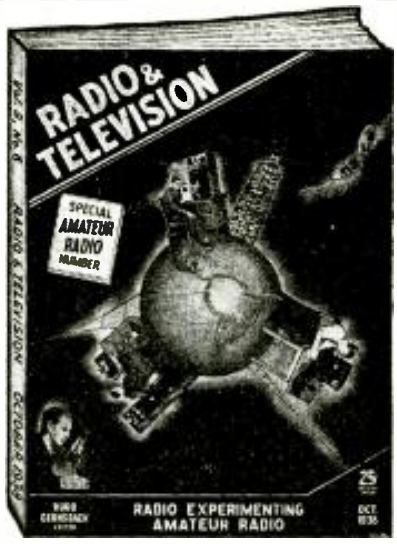
Above—Capt. Woelffing talking on S-W phone aboard pilot boat "Sandy Hook." The boats can be "rung" selectively.

Even the harbor tug-boats have gone "short wave."

Photos courtesy Western Electric Co.

These salty souls on the pilot boat then had telegraph communication with the outside world. With the steady march of improvement in the art, at last came the little

(Continued on page 317)



With the October number, *Short Wave & Television* will change its name to RADIO & TELEVISION. See inside front cover for details.

Can YOU Answer These Radio Questions?

1. What are the wavelengths used in ultra high frequency broadcasting? See page 261.
2. In what simple way were the television scenes of the British "derby" switched from "close-ups" to "long-shots"? See page 262.
3. Can you name at least one defect in American short wave broadcasting? See page 264.
4. What is the Yagi type of ultra short wave aerial and how is it built? See page 267.
5. Are radio code or phone signals used to pilot ships into New York harbor? See page 268.
6. What are the names of the two electric fields surrounding a charged radio antenna? See page 269.
7. What do you have to do in order to win a VAC certificate? See page 275.
8. Can you name three leading S-W "catches" heard during the month? See page 276.
9. How would you connect a loop aerial for short wave reception? See page 287.
10. What is one of the principal features of

(Continued on page 302)

Practical Antenna Theory and Application

Ralph L. Tedesco

The different types of aerials used for amateur transmitting stations, together with their feeder systems, are here described.

● AS most radio amateurs are interested in the maximum power transfer of their transmitter to the antenna system, this article is intended to convey in the most practical manner, some of the theory relating to antenna systems and feeder lines.

A certain amount of reference to fundamental laws and principles will be necessary in order to fully understand the practical application of same, therefore, the accompanying figures and diagrams will be an aid to the beginner.

Hertz Type Aerial

Figure 1-A shows the general make-up of an electro-magnetic wave as it leaves the radiating member. The components of the electro-magnetic wave consist of a magnetic field M and an electro-static field C. Figure 1-A is known as the Marconi type of radiator. Figure 1-B is known as the Hertz type radiator. Note that the wave formation on either type is identically the same, except for the fact that in the Marconi type one-half of the wave formation takes place below the ground, while on the Hertz type both radiating members are above ground; therefore, the entire wave formation takes place above the ground. The Hertz type of antenna is the most popular, and, as it is used for *short-wave* work, our attention will be centered on that particular system. There are various forms of Hertz antenna systems, each having different methods of feeding the antenna proper with adequate and efficient feeder lines. The accompanying figures show how these feeder lines can be applied. See figures 2-A, B, C.

Feeder Line Theory

Feeder lines should transfer power and not radiate.

Radiation of feeder lines is caused by standing waves.

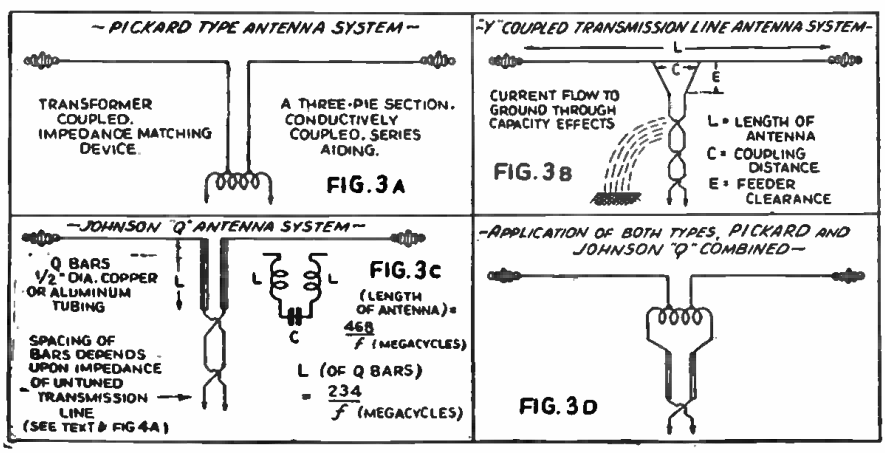
Standing waves are caused by reflection, and reflection is the result of improper termination of the line.

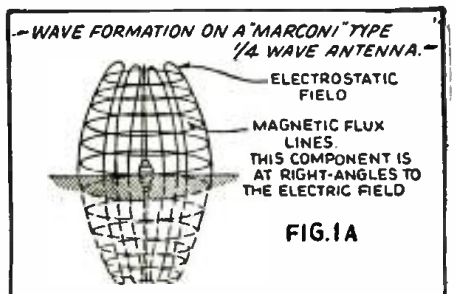
Feeder lines fall into two classifications:

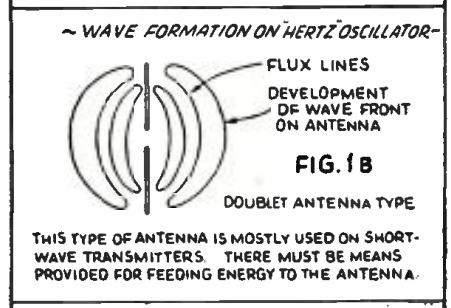
1. Open wire type properly spaced and running parallel with air between them as the dielectric, and wires crossed at intervals, so-called transposed lines. There is also the twisted-pair with other forms of insulation rather than air. They have considerable dielectric losses.
2. Concentric shield conductor, a wire surrounded by a sheath of metal such as tubing or metal braid with either a solid material as the insulating medium, or air. Air of course being the best type.

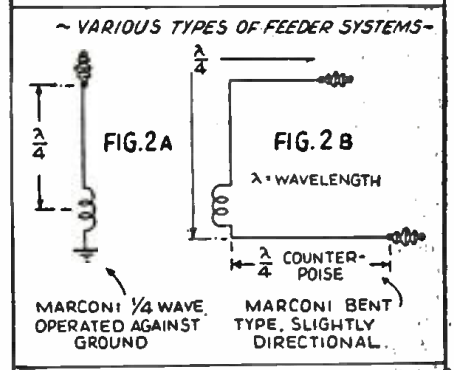
(Continued on page 310)

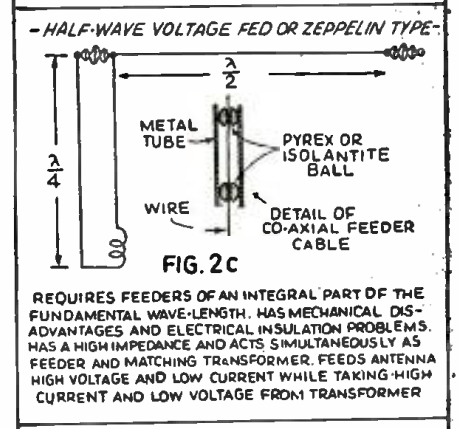
The diagrams below and at the right show some of the principal types of antennas and feeders suitable for amateur stations.

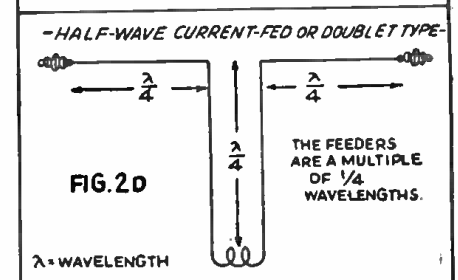












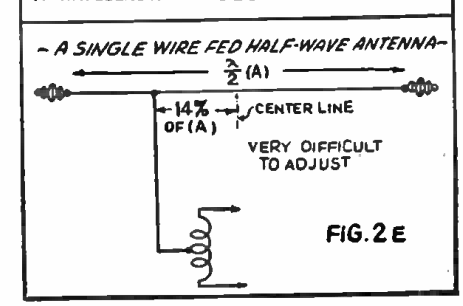


Photo shows new short wave transmitter and receiver carried by mounted English policeman, which keeps him in constant touch with headquarters, mobile police cars and even airplanes. A similar set is used by cavalry officers in the American Army.

Televising a feature play at the NBC studios in New York. The play is "Susan and God," starring Gertrude Lawrence and Paul McGrath. As soon as the NBC television transmitter goes back on the air, which will probably be this fall, other studio plays will be televised, together with film plays and other features.

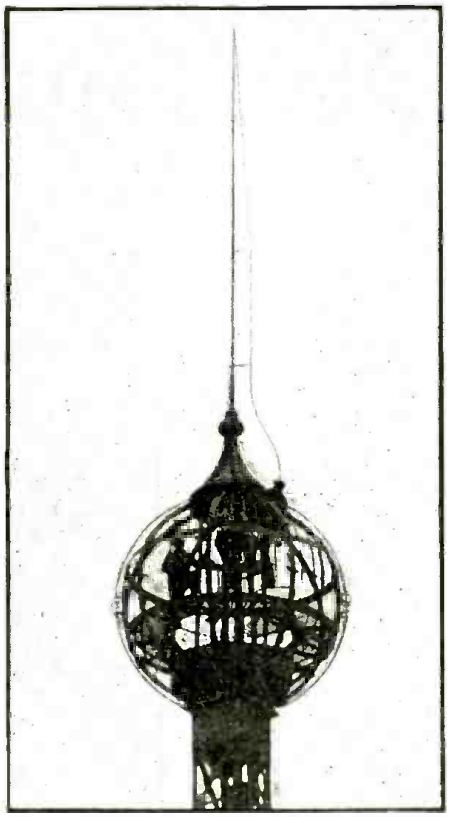
SHORT WAVE FOTO NEWS

Left—Ultra-short wave transmitter operated under the call letters W2XJI by Station WOR. It is installed atop a 24-story building. The operating frequency is 26.3 megacycles and the carrier power is approximately 100 watts.

Left—How book leaves are turned for a television presentation over the NBC system. Each leaf is turned by means of a wire projecting down through the shelf and out of the focus of the television camera. Note the artistic spider - web effect used in this setting.

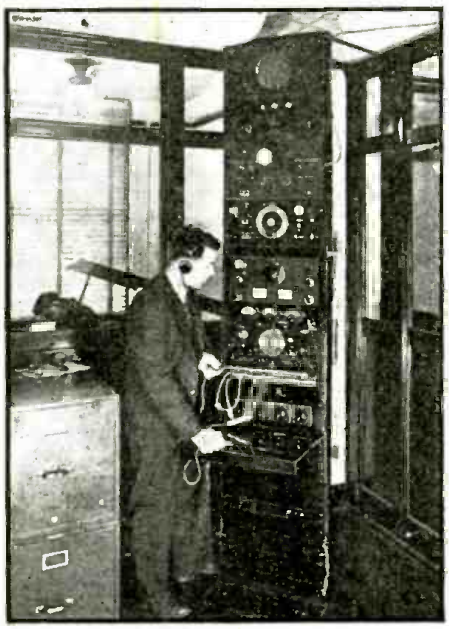
Right — Television in England. This is a shot of a B.B.C. television mobile unit in operation; the television camera is picking up an important English sporting event.

W8XWJ Broadcasts on 7.3 Meters—with 14 Hour Daily Program



Above—Installing vertical radiator and concentric transmission line atop the Penobscot Building—the tallest in Detroit.

Right — W8XWJ's engineering staff: T. Pennebaker, E. J. Kelly, C. H. Wesser and C. Leedy.



Engineer E. J. Kelly checking receiver panel.

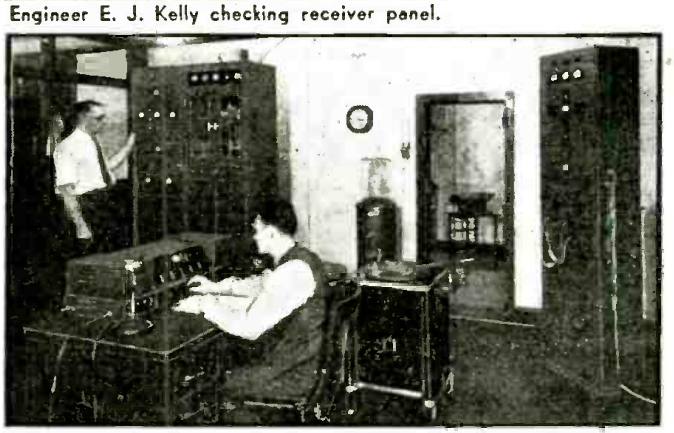
● PROHIBITED from deriving revenue from ultra-high frequency broadcasting, radio stations have operated their ultra-high transmitters for experimental purposes only and with no regard for size or type of audience. In most cases the programs going out over the regular broadcast band have also been fed into the ultra-high transmitters. With comparatively few listeners whose receivers are capable of ultra-high reception and with even these choosing the more familiar standard frequencies, ultra-high frequency broadcasting has had only a small audience. It took W8XWJ, owned by the *Detroit News*, also owner of pioneer broadcasting station WWJ, to change this situation.

W8XWJ began its career as an *ultra-high frequency* station in February, 1936, operating in conjunction with WWJ. It was equipped with a 100 watt transmitter, located on the 44th floor of the Penobscot Building in Detroit, coupled through a ⅞ inch coaxial transmission line to a vertical half-wave radiator on top of the beacon tower 680 feet above the ground.

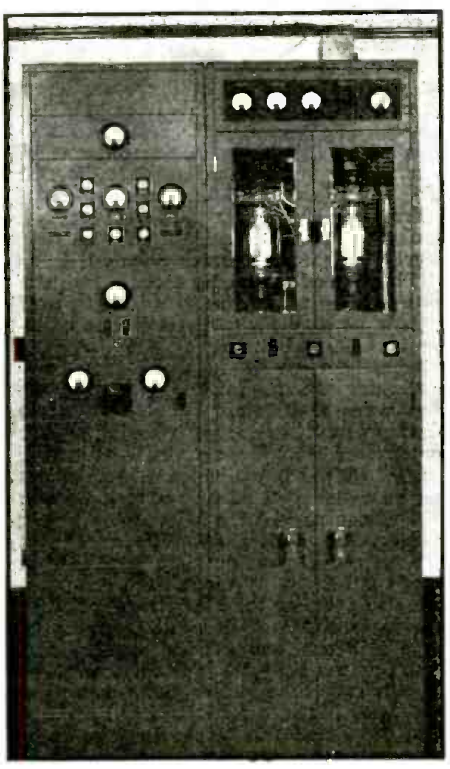
In January, 1938, W8XWJ installed new and more powerful equipment and began operating under an entirely new policy with the aim of building up a large and faithful listening audience. As a principal means of reaching this goal it began broadcasting on a full schedule of 14 hours a day.

A complete program and technical staff

(Continued on page 307)



Left — C. Leedy seated before the control console and C. H. Wesser before the high frequency transmitter.



Right — Close-up of the ultra-high frequency transmitter and 500 watt amplifier.

What Do You

Earl D. Phillips is the "pilot and air engineer" of the Flying Club of Kingston, Ontario, Canada. Receiver used is a National NC-80-X receiver, for short-waves; also he has a Stewart-Warner R-145 and a 5-tube T.R.F. home-built job.

Another Dissenter

Editor,

I just purchased your magazine from a newsstand and find it extremely interesting as well as educational. Let's hope it doesn't turn into a picture magazine!

In this June issue I notice a page titled, "*What Do You Think?*" and I see an article addressed to the Editor by a Mr. Fiege. If agreeable, I'd like to answer Mr. Fiege as follows:—

Well, my smart Naval Reserver, Mr. Fiege, just how do you figure out a way to show proof of a two-way QSO without a QSL? As an experiment I called in quite a few passers-by to listen to some real DX, and 7 out of 10 of those people made the comment that the program was originating from a *local* source and it was only by showing verification by card, stamped and dated with the country's post-marks that I convinced those ordinary BCB listeners that I wasn't pulling a fast one on them. So it isn't such an antiquated thing at that to receive or send SWL or QSL's.

Naturally, we do not get a QSL for a phone call to Chicago or where have you, but you get a bill for it. Personally, here from N.Y.C. I do not SWL or QSL an amateur unless he is in the W5-6 or 7 area or in a foreign country. But as a matter of courtesy, I answer anybody 100% that asks for an exchange of cards.

True, by showing a flock of cards it won't help get a license, but did you ever figure out that by contacting various hams who have good outfits, an embryo ham can learn a lot on what equipment is being used or how he may improve conditions existing at his shack?

Recently I wrote an article for QST concerning the failure of hams to QSL, even when they asked for reports as to whether or not they were "getting out" but couldn't raise an answer. In that article I called those hams a bunch of bum sports and cheap skates. Also I condemned the ham who uses ½ or a kilowatt of power and spends hours talking on the air without a let-up and drowns out anyone who can't outpower his rig. Without any exceptions, that also goes for the Navy "ops" who use a 5 kilowatt battle-wagon (warship) rig on the ham bands, and I'll lay you 100 to 1 it isn't on the logs who was contacted. I've not only called them and QSO'd with them while they did it, but I've ordered them to close down and that as an army operator both in the Signal Corps and Air Corps while operating as an interceptor station.

That would be called real bootlegging in my opinion.

Also, for your information, a genuine SWL card is not made out like a QSL; for instance, between the prefix and the number and the SWL part is a hyphen—re: -W2-SWL—that's clearly enough proving that it is *not* a call letter!

You'll find also that the real ham who hasn't commercial or military operating on the brain and some of their plain crazy regulations, has his shack covered with QSL cards, and is proud of them as an achievement as well as having the well wishes of his host of unseen friends.

By the way, those regular Navy hams in the Canal Zone put out some good QSL's and don't seem to be so modernistic in regards to doing it as the Reserves, when it comes to sending them out! Hi!

L. F. Gallagher,
Ex-W2DTV-W2DIU-WYA5,
(U. S. Air Force Operator),
307 East 17th St.,
New York City, N. Y.

Suppress Those Ignition Waves, Says He!

Editor,

I am a constant reader of your F.B. magazine and an ardent S.W.L. I take great interest in this department and my point in writing you this letter is to bring up a matter which, most certainly is of vital concern to all of the "gang" who are unfortunate, like myself, in that they are residents of cities.

My question is, "Must we poor QRM dodgers always have to contend with these diabolical auto ignition systems?" It does seem that there could be some legislation brought about to rectify this ever annoying source of preventable interference.

Just as that much sought after DXer is announcing his call always seems to be the chosen time for some one to drive his "pesky hack" past the shack. I appeal to you as a fellow enthusiast, "Isn't there sumthin' that kin be done about it?"

I should be very interested to find out just what the rest of our vast number of SWL's have to offer concerning this matter. What do you say, fellows, can't we just get together and lynch these noisy car owners or should we just try to get laws passed making ignition suppressors compulsory?

Franklin Jarvis,
249 Auburn Street,
Auburndale, Mass.

Wants More "Amateur Course"

Editor,

After reading George B. Thompson's letter in the April Short Wave & Television, I thought I would submit my two cents' worth.

I agree with him completely in his plea for more *Amateur Course*. Personally, I know of about five people who would appreciate simply-worded radio theories in such a form. While your other "Amateur Course" was excellent, I would liked to have seen superhet. action, volume expansion, etc., explained more completely.

I think Joe Miller's column is a dandy but would it be possible to give a corner to a forecast of stations likely to be heard for the following month?

How about conducting a vote on whether you should have television articles or not? I think that while this may interest people around New York, where television is being tried, yet more people would rather see constructional articles on receivers, preselectors, etc.

Herb Agnew,
113 Garden Crescent,
Calgary, Alberta,
Canada.

(We're trying to please all of our readers, but we shall be glad to hear more about that "Amateur Course." Television is advancing so fast that we feel most readers will welcome the opportunity to study up on the subject.—Editor.)

A Neat Listening Post

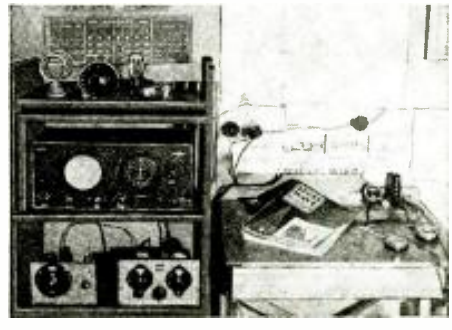
Editor,

Herewith is a picture of my short-wave receiving station. The receiving equipment is mounted in a bookcase frame. The receiver on the second shelf is a Hallicrafter "Sky Buddy". On the lower shelf at the right is a T.R.F. receiver using 2-volt tubes; on the left is a 1-tube set using a dual purpose tube. On the top is a self-excited transmitter that I intend to use as soon as I get my Ham "ticket" (license). I also have a crystal-controlled rig.

I enjoy your magazine very much and buy it at the newsstand. I think the Kink and Question Box departments are swell. I am a member of the *Short Wave League*.

I would be very pleased if you would mention in Short Wave & Television that I would be pleased to correspond or exchange photos of my short-wave listening station with SWL's anywhere.

Donald Winslow,
89 Lewiston Street,
Mechanic Falls, Maine.



A Hallicrafter "Sky Buddy" receiver graces the listening post of Donald Winslow.

Think?

Prize Winner this month—1 year's subscription to S. W. & T. —Theodore Domby, 3514 Hartford St., St. Louis, Missouri. Mr. Domby has a great collection of QSL cards, as the photo shows. A pair of headphones prove useful in landing those elusive DX stations.

From an Ex-Signal Corps Major

Editor,

I have just finished reading Mr. Fiege's letter published in the January issue of SHORT WAVE & TELEVISION, and allow me to congratulate him on being the most egotistical person I have ever heard of. It must be fine for you to think you are so well informed about radio that it is too much trouble to try and help the young boys who are interested in radio.

After reading your article for the second time, I wonder that if there was ever a time in your younger life, that is if you ever had one, that you enjoyed listening in when you were unable to have a real rig, and receive QSL cards from persons you heard, or maybe you are the type that always has been able to have everything you craved; your article would make one think that. You remind me of the kind of a person that has forgotten your younger days, and have gotten to the stage that you find it fun to stick pins in babies or some other mean way of enjoying yourself.

As for you having been in radio for a number of years, I still think you have a lot to learn. These young boys whom you write about, without a doubt save all they are able to save to buy SWL cards and are very proud to be able to send them. As for radio, may I advise you that I have been in it also for a number of years. In 1916 I was Chief Operator on a tanker, and during the World War, which I suppose you were too young to be in, or else had too much money to go, I was a Major in the U. S. Signal Corps, but I am still young enough in mind to try and help young boys just starting in radio.

J. A. BURNS,
New York City.

Travels 25 miles to get S.W.&T.

Editor,

I have been a reader of your publication for two years now, and I want to congratulate you on this fine magazine. I get them about a month behind, but it's worth waiting for. Then I have to travel twenty-five miles to town to get it. I would not be without it. It's R9 from start to finish. Joe Miller's column is "F.B." His tips have added many QSL's to my collection! I always like to read "*What Do You Think?*"

I am a member of the *Short Wave League* and I prize my certificate. My pals desire one, so I am filling in the "Nomination for Membership" form and sending it along.

Well, back to short-waves! I have a new receiver now—the Hallicrafter's "Sky Buddy" and does it wallop in DX! American broadcast S-W stations come in R9—QSA5 on the loud-speaker. My antenna is a doublet in the attic. I've heard 670 amateurs on 20, 40, 80 and 160 meters. I've heard 42 countries, all six continents. Among the countries I've heard are U.S.A. (seven districts), Cuba, Hawaii, Dominican Republic, Java, Brazil, Ethiopia, Arabia, Morocco, Tunisia, Australia, Canada, Chile, Japan, China, Mexico, Venezuela, Egypt and many others.

Up till now my 20 meter log is 400
my 40 meter log is 250
my 80 meter log is 15
my 160 meter log is 5

670 Hams

Broadcast *short-wave* stations, 150; there's lots more I've heard. Only foreign language makes it difficult to understand; for instance, the Latin-Americans. They talk so rapidly, you have to know your Spanish in order to log them.

As I write this letter my receiver is tuned to W3XAL, 16.87 meters. He's putting over a good signal R7, QSA4. The program is a "news bulletin." Well, here is news to me. The mail has just come and I've two veris from Batavia and Java, for PLP, 22.27 meters, and PMN, 29.27—am I proud of these! Yesterday I received SM5SX veri from Stockholm.

Back to Hams—the one I like is W2IXY, operated by Miss Dorothy Hall. She certainly has a swell rig. She comes in R8 on the loud-speaker. I heard her QSO with G2UT, 5YV, 6RF, 2AI. HK5AR and lots more. I would like her QSL.

J. V. DAVIS,
Church Erstone,
Oxfordshire, England.

How to Understand Spanish Speaking Announcers

Editor,

I've only been DXing for the past 8 or 10 months, but I have rolled up some fair DX, considering my noisy location I am unfortunately in. I am using a rebuilt 6 tube superhet, having added a bandspread dial, new communications type cabinet, beat oscillator, and miscellaneous other improvements, and scan the 20 and 40 meter "ham" bands on both C.W. and phone. Here is the 20 meter DX heard: CE, CM (O), CN, CP, CR7, CH1,2, CX, D, EA8,9, EI, ES, F, FA, FB8, FP8, FT4, FY8. G, GM, GW, HA, HB, HC, HH, HI. HK, HP, HR, I, J2, K4, 5,6,7, KAI, LU, LY, NY, OA, OE, OH, OK, ON, OQ5, OX, OZ, PA, PK, PY, SM7, SP, SU, SV, TF, TG, TI, U2,3,9, VE, VK,2,3,4,5,6,7, VO, VP1,2,3,4,5,6,7,9, VS2,7, W10, YI., YN, YR, YS, YV, ZC5, ZE, ZI.1,2,3,4, ZS-T-U1,2,3,4,5,6.

I've also verified the following, but hope more are on the way: CE, CM, CX, D3,4, EA9, F8, G2,5,6,8, GM6,8, GW5, HB9, HC1, HK5, K4,5,6,7, LU1,2.3,4, LY1, NY1, 2, OA4, OK2, ON4, PAO, PY2, VE, VK2,3,4,5,6,7, VP3,5,6, VS7, YR5, YV3, ZL1,2,3,4, ZU6, XE, and W of course.

A few of my "ace" phone veris are VS7GJ and EA9AH, with VK3AL.

I use a 32-foot, 20-meter antenna directional E. & W., and 50 feet off ground. On 40 meters have heard K6, CM, TI, YV, NY and K5, but I DX mostly on 20, as DX is usually much better. This year I have received 141 cards from about 35 countries on the amateur bands to date, and have found that the most interesting and thorough report "brings home the bacon." Incidentally, will exchange dope and cards with any other SWL's.

On closing, I need not say what I think of *S. W. & T.*, because every radio hobbyist knows it *takes the cake*. Also, let me give my 73 to Joe Miller, and may he keep up the precise and snappy DX reporting we all like.

And as to the SWL's who kick about the South American stations for their announcing, I would advise them to invest in a copy of the Spanish alphabet and number list, and to memorize them. I found that it pays!

R. H. NEWKIRK,
Pres., Fargo DX Club,
V.A.C. ('phone-c.w.),
1517 Fargo Ave.,
Chicago, Ill.

Another Brick!

Editor,

Three cheers for Jim Lydon and the "brick" he threw in a recent issue.

I don't believe that there are "quite a few" readers interested in your television articles as long as there is no possibility for them to build a television set.

I am a subscriber of your magazine since 1933; and I would repeat what Jim Lydon wrote, "look over the '34 or '35 magazines."

We are not much interested in television or S.W. diathermy but I think we all are interested in radio. So, why do you never try to give the gang constructional data about the developments in radio circuits: amplified A.V.C., A.F.C., etc?

What about a tiny 50 watt Phone Xmitter using receiving tubes? 73 and best of luck.

DR. R. ESSINGER,
Corseaux, Vand.,
Switzerland.

The Short Wave League

Hugo Gernsback, Executive Secretary

HONORARY MEMBERS

Dr. Lee de Forest — Manfred von Ardenne
D. E. Replogle — E. T. Somerset
John L. Reinartz — Hollis Baird

On the Ham Bands

(with the Listening Post Observers)

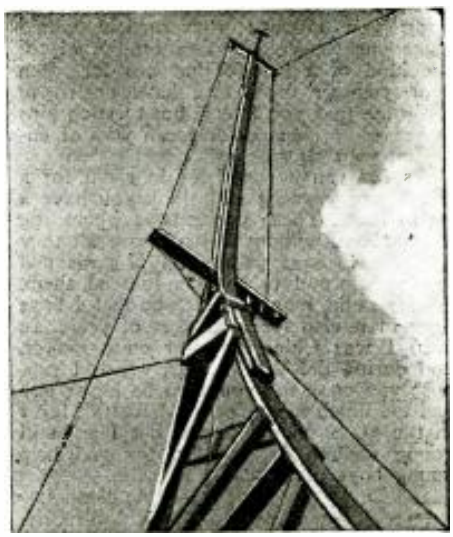
Edited by
Elmer R. Fuller

● WELL, here we are with a new department, provided for the use of hams and fans who wish to see their accomplishments in print and to feel that they are contributing something to the world of short wave radio. Henceforth, this will appear as one of the many features in every issue.

The purpose of these pages will be to provide the reader with the information as to the stations and countries being heard on the amateur bands in all parts of the world. It will serve to tell the amateur where his signals are being heard and how he is being received.

At the present time, twenty-nine observers have been appointed. A short time ago, over a hundred letters were sent out to persons who were believed to be interested in this type of service. Of these, thirty-two replies have been received. Several were sent to foreign countries and have not yet had time to reply. The ones appointed to date, and the states which they represent, are as follows:

Bayer, Ray.....Wisconsin
Bohlender, Homer.....Ohio
Catchim, D. S.....Virginia
Croston, Wilbur.....Ohio
Drake, Walter F.....Pennsylvania
Davenport, E. H.....Vermont
Fitzpatrick, John.....New Jersey
Gallagher, L. F.....New York
Honda, Harry.....California
Haas, Garland A.....Indiana
Herzog, W. F.....New York
Hatcher, Robert.....Virginia
Hernday, Raymond.....Wisconsin
Hartzell, Clarence.....Pennsylvania
Jordan, Thomas P.....Pennsylvania
Kemp, H.....Connecticut
Legge, Roger, Jr.....New York
McKinney, David.....Tennessee
Markuson, Earl S.....Colorado
Newkirk, Rodney.....Illinois
Roehl, Raymond J.....Minnesota
Robinson, Hugh.....Oklahoma
Russell, G. H.....Pennsylvania
Skinner, William.....Michigan
Shepherd, Owen, Jr.....Connecticut
Wood, James R.....Minnesota
Wallen, Dan T.....Colorado
Clarke, Stanley.....Quebec, Canada



A "worm's-eye" view of the 20-meter vertical antenna used by S-W listener Robert Hatcher, Richmond, Va.

Certificate of membership in the "N R H Fraternal Order" sent to listeners by Amando Cespedes Marin.

During the coming month, I would like to add a few more to this list, particularly from the Southwest. This section of our forty-eight states seems to be missing entirely. Send your applications to Elmer R. Fuller, 32 Madison Street, Cortland, New York. All correspondence will be answered personally.

According to information received here from Clarence Hartzell, Observer for Pennsylvania, the Mexican amateur, XE1GE, is only licensed to use the 10-meter band. However, he has been using the 20-meter band for testing. This is because of the inactivity on the 10-meter band at this time of the year. The operator has made an application to the Mexican government to continue to use the 20-meter band for the rest of the summer.

To Robert Hatcher, Observer for Virginia, goes some kind of a record. At least we have never heard of it being done before. On June 6th, in about five hours time, *all continents were heard!* These were all on *phone* except one, Palestine. The stations logged were:—OX2QY on Greenland, K7ACO in Alaska, ON4AN in Belgium, CN8AV in Morocco, ZC6AQ in Palestine, and VK2HS in Australia. Mr. Hatcher reports that these are the best received from each of these countries.

Observer Hatcher also sent us the following report on stations which are now being heard almost every day on 20 meters:

GW5TJ—Wales, often heard around 6 p.m., E.S.T., with power of 150 watts.

Signals are very strong and are found near the high frequency end of the band. QSL's one hundred per cent for correct reports and the usual international reply coupon.

Listening post of Robert Hatcher in Richmond, Va.

GI5QX—Northern Ireland, often heard around 1 a.m., E.S.T. Has power of 50 watts. Also listen for GI2AK, GI2CC and GI8LW.

GM6WD—Scotland, heard about 11:40 p.m., working VP1BA. Has a very good signal. Also, GM5NW, GM6BW, GM8RG, and GM2CC.

EI2L—Irish Free State, came in S5-8 about 5:55 p.m., working West Indies. Also look for EI2J, EI6G, EI8M and EI4L.

In June, the French transmitter, F8ZS, was heard at 1:47 a.m., while calling ZB1J in Malta. The power being used was only 20 watts.

A Portuguese station which may be very easily heard is CT1AY. He is on almost every evening from about 5:30 to 7 p.m. Signals are usually S7-8. He will *not* verify reports of reception.

The Palestine station mentioned above was heard on June 2nd when it was QRM'ing YR5RC. This is one of the very few stations located there and none of them are on phone. So, if you want to log this country, you will have to turn to cw.

Observer Roger Legge, Jr., of Binghamton, New York, reports hearing PK6XX in Dutch New Guiana. It has come through several times and with very good signals between 6 and 7 a.m., E.S.T. The frequency in use is 14.02 megacycles. Mr. Legge also reports that VR6AY is still being heard occasionally on 14.368 megacycles. This was most recently heard at 3:30 a.m., E.S.T. VS2AE has been reported as being heard at 5:30 a.m. on 14.37.

Yours truly purchased a new receiver a short time ago and set out to see just what could be done in two weeks' time on the 20-meter band. The opinion has been expressed by many that the DX could not be pulled in during the summer months when the QRM and QRN is extra heavy. Here are the stations logged during this two-week test period. It includes nineteen countries besides the United States, all five of the Canadian districts, and six of the United States districts.

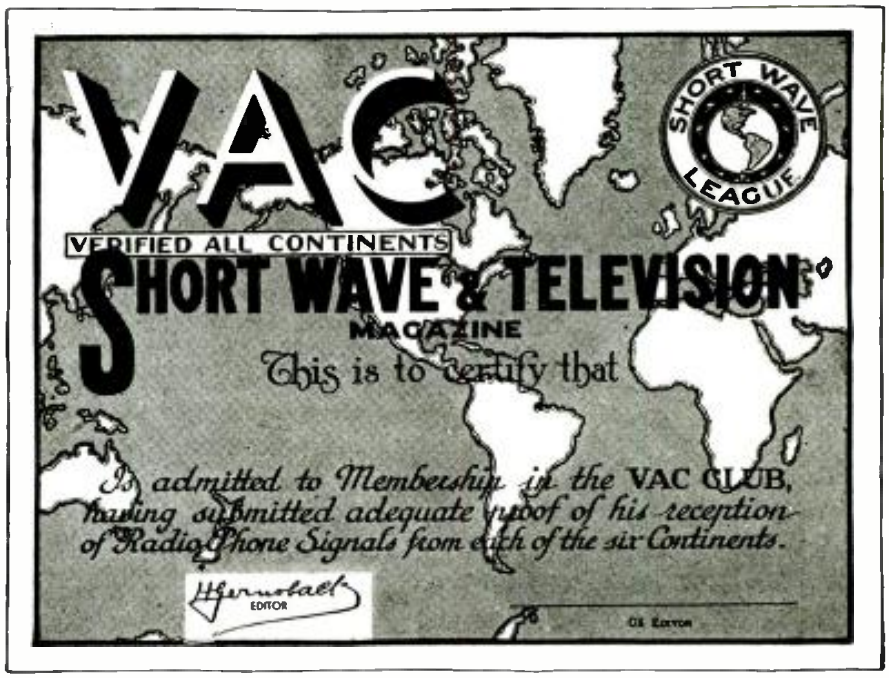
Time	*Call*	*S or R*	*Country*
8:40 p.m.	YV5ABQ	7	Venezuela
11:29 p.m.	CO2LY	9	Cuba
12:39 a.m.	G6BY	6	England
5:30 p.m.	GM6RG	7	Scotland
6:52 p.m.	VP9R	9	Bermuda
10:55 p.m.	HI3N	8	Dominican Rep.
6:19 p.m.	PY2BJ	8	Brazil
7:21 p.m.	VO6D	9	Newfoundland
7:40 p.m.	GW5TJ	6	Wales
5:13 p.m.	CP1QH	7	Bolivia
5:17 p.m.	F3CP	8-9	France
5:19 p.m.	CT1QG	8-9	Portugal
7:14 p.m.	ON4AU	7	Belgium
6:59 p.m.	VP1BA	8	British Hon.
6:34 p.m.	K6OQE	7	Hawaiian Is.
4:38 p.m.	VP3AA	7	British Guiana
4:57 p.m.	PA0AA	6	Netherlands
9:24 p.m.	VE1BK	8	Canada
6:32 p.m.	VE2AA	8	Canada
5:36 p.m.	VE3AHA	7	Canada
12:04 a.m.	VE4UD	9	Canada
12:10 a.m.	VE5ACN	9	Canada
8:09 p.m.	W1HKK	9	United States
12:40 p.m.	W4ECP	7	United States
11:12 p.m.	W5FNA	9	United States
10:50 p.m.	W6OSY	9	United States
11:50 p.m.	W7AKO	8	United States
5:43 p.m.	W8NDN	8	United States
6:58 p.m.	W9SSM	8	United States

10 Meter Tests

A series of daily tests transmissions will be sent out by the stations listed below during the summer months. Their purpose is to obtain data as to the effects of barometric pressure, moon phases, etc., on radio

(Continued on page 311)

Here's the New VAC Certificate



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

● SHORT WAVE & TELEVISION has prepared a handsome VAC (Verified All Continents) certificate which will be issued to all short-wave listeners submitting adequate proof of verification from all continents. To secure a VAC certificate the listener must send in a verification card from each of the continents. The VAC certificate will be issued for verifications of broadcast stations and amateur or commercial stations transmitting voice or music. The certificates will be signed by the DX editor and Hugo Gernsback, Editor-in-Chief of SHORT WAVE & TELEVISION.

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

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

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

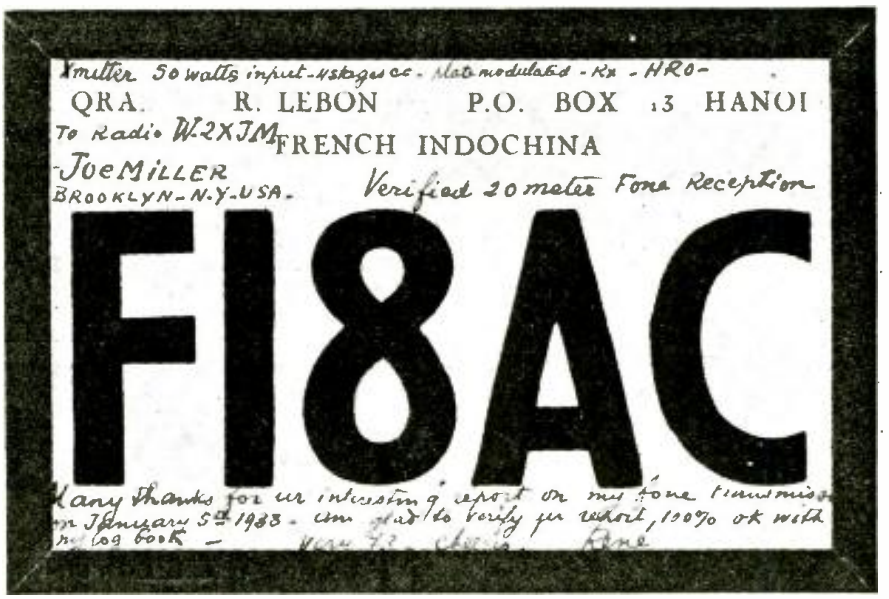
A special seal will be available for attaching to the certificate in the event that a listener has more than one complete set of verifications from all continents. A seal of this type will be issued for each complete set of all continent cards so that as ones VAC collection grows, it may be certified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

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

All entries should be made to the *VAC Editor*, SHORT WAVE & TELEVISION, *99 Hudson Street, New York, N. Y.*

Let's Listen In with

Here's a fine foto of Rene—our DX friend certainly is hale and hearty!



FI8AC—French Indo-China. Rene sends this outstanding QSL, with green letters, orange border.

● MENTION has been requested, and duly deserved, too, of the NAPRI, the National Association for the Prevention of Radio Interference. Requests were made by both G. C. Gallagher and Max P. Fisher, President, and Executive Sec'y, respectively, of the Golden Gate Chapter of the International DXers Alliance (I.D.A.), H.Q. in San Francisco.

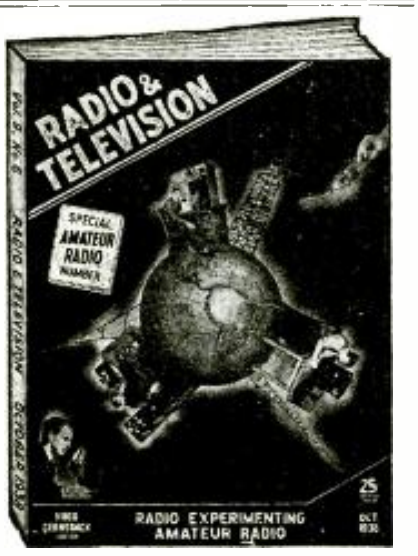
As this is a problem every DXer faces in the daily operation of his rx, little explanation is necessary as to the aims of this fine organization, solely devoted to the purpose of eliminating all man-made QRM, in order to improve world-wide reception.

Mr. Gallagher mentions that his Golden Gate chapter is fully enrolled in this organization, and is sponsoring a campaign to procure state legislation affecting such interference, which he adds "will be similar to legislation in Oregon, Washington, Vermont, the territory of Hawaii, etc."! Maybe we haven't read the papers or mags. lately, so it is with some pleasant surprise that we hear that official cognizance of this increasingly bothersome problem has been taken by state governments! With such achievements already behind it, the NAPRI will undoubtedly do a great deal more to better the reception of *short waves*.

Therefore, we urge DXers everywhere, and to officials of radio clubs, etc., to write Mr. Carter, NAPRI, Flushing, L. I., New York, offering their aid in combating short wave's greatest problem.

FED. MALAY STATES

ZGB, 13.63 mc., at Kuala Lumpur, was heard with an R7-8 signal early this month, at 5:35 a.m., when it was heard with the finest signal strength and clarity ever experienced here. A man was calling what sounded like VVS, which station's carrier was also on, and clearly giving call as "ZGB," but VVS did not answer. The usual slight flutter evident on all Asiatic phones here on the East Coast made intelligibility somewhat less than 100%, but ZGB's signal strength did give us a thrill! "Us" is fitting, as our old DX friend, Murray Buitekant, now the "Bronx Nite-Owl," was keeping a DX watch with us in our ol' DX shack this particular a.m. Watch for ZGB near 5:30-6 a.m., occasionally also heard up to 8 a.m., this in winter. QRA: Radio ZGE-ZGB, Chief Engineer, Kuala Lumpur, Fed. Malay States. Oh, yes! A late tip. When calling, ZGB uses clear speech, but after contacting, reverts to *scrambled* speech, as is usual with commercial phones. ZGB also heard later at 6:45 a.m.



With the October number, *Short Wave & Television* will change its name to RADIO & TELEVISION. See inside front cover for details.

FRENCH INDO-CHINA

FZR3, 16.20 mc., at Saigon, was again heard, after a long absence, at 6:35 a.m. while in contacting with their usual station, FTK, 15.88 mc., at St. Assise, France. FZR3 was using clear speech, as was FTK. This is unusual, as inverted speech is the usual fare, once these two have contacted. FZR3 has an unusually rapid flutter here. This should be of great aid in identification. FTK should be watched, for when FTK is on, FZR3 may be also heard. FTK has an outstandingly powerful signal. 6:35 a.m. is rather early for FZR3, which usually is heard in the vicinity of 8:30 a.m. However, FZR3 is occasionally heard anywhere from 6-8:30 a.m. QRA: FZR3, Centre Radioelectrique de Saigon, Postale Boite 238, Saigon, French Indo-China, this from an FZR3 veri. FZR3 also heard one a.m. at 6:45, when it was Xmting a tone whistle; using several different notes, this used before FZR3 begins foning, so look for the tone whistle, too!

Radio Saigon, now called *Radio Boy-Landry*, was an R5 once, at 5:45 a.m. This catch should be heard this fall. Freq, 11.69 mc.

Joe Miller

"DX" Editor

NETHERLANDS INDIES (JAVA)

Good news!! Java is once again confirming reports on their commercial radiophone stations!! A new Chief Engineer, Ir. P. C. Arends, has answered several of our reports with the usual buff veri card, confirming our reception of YCP and PLQ, and is very obliging, sending us two separate QSLs for differently dated reports on PLQ. The QRA is: Ir. P. C. Arends, Engineer-in-Charge, Java Wireless Stations, Bandoeng, Java, Netherlands East Indies.

PLP, 11 mc., and PMN, 10.26 mc., are rolling in now as never before, PLP reaching R8-9, and PMN a good R6 here, both easy to log.

PLV, 9.415 mc., Bandoeng, the relay station for all other Javanese commercials when contacting the home country, logged at 5:50 a.m., relaying a Xmsn of YBG, 10.43 mc., Medan, Sumatra. PLV is one fone that cannot be missed, always an R7 or better, using the highest power of any commercial fone extant, a full 80 KW.!

PLQ, 10.69 mc., Bandoeng, has been heard at up to R9, in contact with YBG, from 5:50 a.m. up to 6:45 a.m., though PLQ

KA1CS—Philippine Islands—A very unusual card from O. M. Frank; many thanks, OM!

J2NF—Japan—A fine card with deep green letters, on lightly shaded background.

ZU6AM—South Africa—A handsome QSL indeed, red letters on yellow card. Thanks, Jack!

ZE1JY—Southern Rhodesia. Billy sends us a distinctive card in black and white.

has been logged up to 8 a.m., this in winter. PLQ is very active now, so get after it, and watch for YBG, on almost daily, and a FB new country for most all!

ITALIAN AFRICANS

IUD, 18.27 mc., at Addis Ahaba, Ethiopia, was heard at 6:35 a.m., with a good R6-7 signal, calling Massawa, Eritrea, probably through IDU, at Asmara. All the Italian fones use clear speech, except IAC, 17.70 mc., Coltano, Italy, which lately has adopted inverted speech.

Watch also for IUG, 15.45 mc., also at Addis Ahaba, which is heard later in morning, near 9-10:30 a.m.

ITK, 16.385 mc., at Mogadiscio, Italian Somaliland, has been quite active of late, logged at 6 a.m., 7:10 and 7:20 a.m. ITK usually works IAC, always using clear speech.

All the Italian fones QSL through the QRA in Rome often mentioned in these columns.

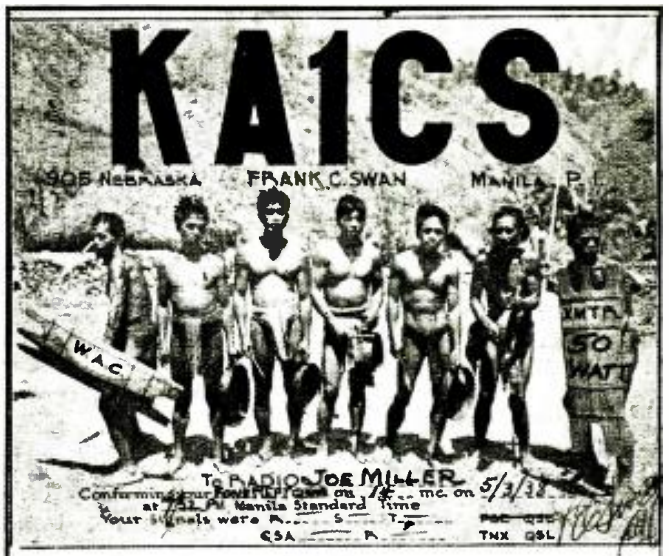
ASIATIC REVIEW

TAIWAN . . . . JIB, 10.535 mc., Taihoku, Taiwan (formerly called Formosa), was once logged at 5:45 a.m., using side-band secrecy. JIB generally contacts some Nazaki fone near this time.

BURMA . . . . VVS, 12.87 mc., Mingaladon, has been very active, usually working VVN, 13.35 mc., Fort St. George, Madras, India. Heard recently at 6-6:15 a.m. several days. VVN has had the better signal, at times reaching R8, while VVS' best was R6.

JAPAN . . . . JVI, 13.56 mc., Nazaki, logged at 6:20 a.m., using inv. speech. JVE, 15.66 mc., also Nazaki, heard at 6:50 a.m. JVO, 10.37 mc., Nazaki, heard daily around 5-7 a.m., in contact with TDE, 10.065 mc., Manchukuo.

(Continued on page 305)



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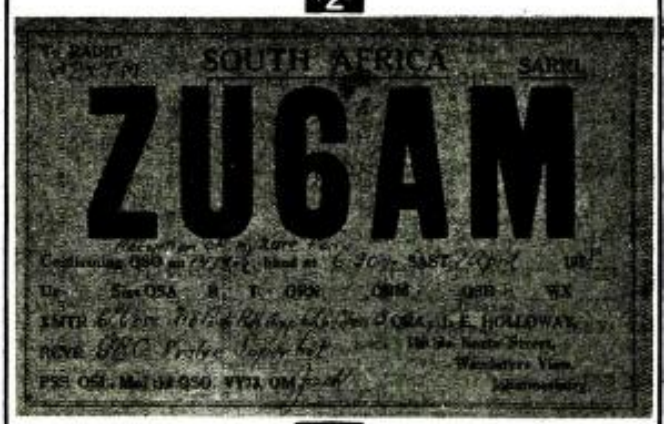

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4

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	**W1XKA**	**BOSTON, MASS.**, 9.494 m., Addr. Westinghouse Co. Daily 5 am.-12 m., Sun. 7 am.-12 m. Relays WBZ.
31.600	**W1XKB**	**SPRINGFIELD, MASS.**, 9.494 m., Addr. Westinghouse Co. Daily 5 am.-12 m., Sun. 7 am.-12 m. Relays WBZ.
31.600	**W3XEY**	**BALTIMORE, MD.**, 9.494 m., Relays WFBR 4 pm-12 m.
31.600	**W2XDV**	**NEW YORK CITY**, 9.494 m., Addr. Col. Broad. System, 485 Madison Ave. Daily 5-10 pm.; Sat. and Sun. 12.30-5, 6-9 pm.
31.600	**W9XHW**	**MINNEAPOLIS, MINN.**, 9.494 m. Relays WCCO 9 am.-12 m.
31.600	**W3XKA**	**PHILADELPHIA, PA.**, 9.494 m., Addr. NBC. Relays KYW 9 am.-10 pm.
31.600	**W5XAU**	**OKLAHOMA CITY**, 9.494 m., Sun 12 n-1 pm., 6-7 pm. Irregular other times.
31.600	**W4XCA**	**MEMPHIS, TENN.**, 9.494 m. Addr. Memphis Commercial Appeal. Relays WMC.
31.600	**W8XAI**	**ROCHESTER, N. Y.**, 9.494 m., Addr. Stromberg Carlson Co. Relays WHAM 7.30-12.05 am.
31.600	**W8XWJ**	**DETROIT, MICH.**, 9.494 m., Addr. Evening News Ass'n. Relays WWJ 6-12.30 am., Sun. 8 am-12 m.
31.600	**W9XPD**	**ST. LOUIS, MO.**, 9.494 m., Addr. Pulitzer Pub. Co. Relays KSD.
26.450	**W9XA**	**KANSAS CITY, MO.**, 11.33 m., Addr. Commercial Radio Eqpt. Co. Testing after August 1st.
26.400	**W9XAZ**	**MILWAUKEE, WIS.**, 11.36 m., Addr. The Journal Co. Relays WTMJ from 1 pm.
26.300	**W2XJI**	**NEW YORK, N. Y.**, 11.4 m., Addr. Bamberger Broad. Service, 1440 Broadway. Relays WOR 8 am.-1 am.
26.100	**W9XJL**	**SUPERIOR, WIS.**, 11.49 m. Relays WEBC daily.
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.
25.950	**W9XUP**	**ST. PAUL, MINNESOTA.** 11.56 m. Relays KSTP.
21.550	**GST**	**DAVENTRY, ENG.**, 13.92 m., Addr. (See 26.100 mc.) Irregular at present.
21.540	**W8XK**	**PITTSBURGH, PA.**, 13.93 m., Addr. Grant Bldg. Relays KDKA 6.45-9 am. Exc. Sun.
21.530	**GSJ**	**DAVENTRY, ENG.**, 13.93 m., Addr. (See 26.100 mc.) 5.45 am.-12 n.
21.520	**W2XE**	**NEW YORK CITY**, 13.94 m., Addr. Col. Broad. Syst., 485 Madison Ave. Daily exc. Sat. and Sun. 6.30-9 am. Sat. and Sun. 7 am.-12 n.
21.500	**W2XAD**	**SCHENECTADY, N. Y.**, 13.95 m., General Electric Co., 7-11 am.
21.470	**GSH**	**DAVENTRY, ENG.**, 13.97 m. (See 26.100 mc.), 5.45 am.-12 n.
21.450	**DJS**	**BERLIN, GERMANY**, 13.99 m., Addr., Broadcasting House. 12.05-11 am.
21.420	**WKK**	**LAWRENCEVILLE, N. J.**, 14.01 m., Addr. Amer. Tel. & Tel. Co. Calls S. Amer. 7 am.-7 pm.
21.080	**PSA**	**RIO DE JANEIRO, BRAZ.**, 14.23 m., Calls WKK daytime.
21.060	**WKA**	**LAWRENCEVILLE, N. J.**, 14.25 m. Addr. (See 21.420 mc.) Calls England morning and afternoon.
21.020	**LSN6**	**BUENOS AIRES, ARG.**, 14.27 m., Addr. Cia. Internacional de Radio. Works N.Y.C. 7 am.-7 pm.
20.860	**EHY-EDM**	**MADRID, SPAIN**, 14.38 m., Addr. Cia Tel. Nacional de Espana. Works S. Amer. mornings.
20.700	**LSY**	**BUENOS AIRES, ARG.**, 14.49 m., Addr. Transradio Internatl. Tests irregularly.
20.380	**GAA**	**RUGBY, ENG.**, 14.72 m. Calls Arg., Brazil mornings.
20.040	**OPL**	**LEOPOLDVILLE, BELGIAN CONGO**, 14.97 m. Works ORG morn.
20.020	**DHO**	**NAUEN, GERMANY**, 14.99 m., Addr. Reichspostzenstralamt. Works S. Am. mornings.
19.900	**LSG**	**BUENOS AIRES, ARG.**, 15.08 m., Addr. (See 20.700 mc.) Tests irregularly.
19.820	**WKN**	**LAWRENCEVILLE, N. J.**, 15.14 m., Addr. A. T. & T. Co. Calls England daytime.
19.680	**CEC**	**SANTIAGO, CHILE**, 15.24 m., Addr. Cia. Internacional de Radio. Calls Col. and Arg. daytime.
19.650	**LSN5**	**BUENOS AIRES, ARG.**, 15.27 m., Addr. (See 21.020 mc.) Calls Europe daytime.
19.620	**VQG4**	**NAIROBI, KENYA**, 15.28 m., Addr. Cable and Wireless, Ltd. Calls London 7-8.30 am.
19.600	**LSF**	**BUENOS AIRES, ARG.**, 15.31 m., Addr. (See 20.700 mc.) Tests irregularly.
19.480	**GAD**	**RUGBY, ENG.**, 15.4 m. Calls VQG4 7.30-8 am.
19.355	**FTM**	**ST. ASSISE, FRANCE**, 15.5 m. Calls S. America mornings.
19.345	**PMA**	**BANDOENG, JAVA**, 15.51 m. Works Holland 5.30-11 am.
19.260	**PPU**	**RIO DE JANEIRO, BRAZ.**, 15.58 m., Addr. Cia. Radiotel. Brasileira. Works France mornings.
19.220	**WKF**	**LAWRENCEVILLE, N. J.**, 15.6 m., Addr. A.T.&T. Co. Calls London and Paris daytime.
19.200	**ORG**	**RUYSSELEDE, BELGIUM**, 15.62 m. Calls OPL mornings.
19.160	**GAP**	**RUGBY, ENG.**, 15.66 m. Calls Australia 1-8 am.
19.020	**HS8PJ**	**BANGKOK, SIAM**, 15.77 m. Mondays 8-10 am.
18.970	**GAQ**	**RUGBY, ENG.**, 15.81 m. Calls S. Africa mornings.
18.890	**ZSS**	**KLIPHEUVEL, S. AFRICA**, 15.88 m., Addr. Overseas Comm. of S. Africa, Ltd. Calls GAU 6.30-7 am.
18.830	**PLE**	**BANDOENG, JAVA**, 15.93 m. Calls Holland 6-11 am.
18.680	**OCI**	**LIMA, PERU**, 16.06 m. Tests with Bogota, Col.
18.620	**GAU**	**RUGBY, ENG.**, 16.11 m. Calls N. Y. daytime. Calls ZSS 6.30-7 am.
18.480	**HBH**	**GENEVA, SWITZERLAND**, 16.26 m., Addr. Radio Nations. Sun., 10.45-11.30 am.
18.345	**FZS**	**SAIGON, INDO-CHINA**, 16.35 m. Works Paris early morning.
18.340	**WLA**	**LAWRENCEVILLE, N. J.**, 16.36 m., Addr. A.T.&T. Co. Calls England daytime.
18.310	**GAS**	**RUGBY, ENG.**, 16.38 m. Calls N.Y. daytime.
18.299	**YVR**	**MARACAY, VENEZ.**, 16.39 m. Works Germany mornings.
18.250	**FTO**	**STE. 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	
17.810	—	**ROME, ITALY.** 16.84 m., Addr. (See 2RO, 11.81 mc.) Relays 2RO to 6 pm. irregularly.
17.810	**TPB3**	**PARIS, FRANCE**, 16.84 m. Addr. (See 15.245 mc.) 8.30-10 am.
17.800	**TGWA**	**GUATEMALA CITY, GUAT.**, 16.84 m., Addr. Ministre De Fomento. Irregular.
17.790	**GSG**	**DAVENTRY, ENG.**, 16.86 m., Addr. B.B.C., London. 1 m-3.15 am., 5.45 am.-12 n., 12.20-6, 6.17-8.30 pm.
17.785	**JZL**	**TOKYO, JAPAN**, 16.87 m. 6-6.30 pm. 12.30-1.30 am.
17.780	**W3XAL**	**BOUND BROOK, N. J.**, 16.87 m., Addr. Natl. Broad. Co. 8 am.-8 pm.
17.770	**PHI2**	**HUIZEN, HOLLAND**, 16.88 m., Addr. (See PHI, 11.730 mc.) Daily except Wednesday, 7.25-9.30 am., Sun. 6.25-9.30 am.
17.760	**DJE**	**BERLIN, GERMANY**, 16.89 m., Addr. Broadcasting House. 12.05-10 am.; also Sun. 11.10 am-12.25 pm.
17.760	**W2XE**	**NEW YORK, N. Y.**, 16.89 m., Addr. Col. Broad. System, 485 Madison Ave. Irregular.
17.755	**ZBW5**	**HONGKONG, CHINA**, 16.9 m., Addr. P.O. Box 200. 4-10 am. Irregular.

End of Broadcast Band

17.741	**HSP**	**BANGKOK, SIAM**, 16.91 m. Works Germany 6-7 am., 8-9 pm. Works JVE 11 pm.-6 am.
17.650	**XGM**	**SHANGHAI, CHINA**, 17 m. Works London 7-9 am.
17.520	**DFB**	**NAUEN, GERMANY**, 17.12 m. Works S. America, near 9.15 am. Works Siam 6-7 am., 8-9 pm.
17.480	**VWY2**	**KIRKEE, INDIA**, 17.16 m. Works London 7.30-8.30 am.
17.310	**W2XGB**	**HICKSVILLE, L. I., N. Y.**, 17.33 m., Addr. Press Wireless, Box 296. Tests 9.30-11.30 am. except Sat. and Sun.
17.280	**FZE8**	**DJIBOUTI, FR. SOMALILAND, AFR.** 17.36 m., Phones Paris near 8 am. Tests 1st Thurs. in the month, 8-8.30 am.
17.120	**WAQ**	**OCEAN GATE, N. J.**, 17.52 m., Addr. A.T.&T.Co. Works ships irregularly.
17.080	**GBC**	**RUGBY, ENG.**, 17.56 m. Works ships irregularly.
16.835	**ITK**	**MOGADISCIO, ITAL. SOMALILAND**, 18.32 m. Calls IAC around 9.30 am.
16.270	**WLK**	**LAWRENCEVILLE, N. J.**, 18.44 m., Addr. A.T.&T. Co. Works S. Amer. daytime.
16.270	**WOG**	**OCEAN GATE, N. J.**, 18.44 m., Addr. A.T.&T. Co. Works England late afternoon.
16.240	**KTO**	**MANILA, P. I.**, 18.47 m., Addr. RCA Comm. Works Japan and U. S. 5-9 pm. and early am. irreg.
16.233	**FZR3**	**SAIGON, INDO-CHINA**, 18.48 m. Calls FTK 6-9 am.
		KAHUKU, HAWAII, 18.71 m., Addr. RCA Comm. Works Dixon 3-10 pm.
15.880	**FTK**	**ST. ASSISE, FRANCE**, 18.9 m. Works Saigon 6-9 am.
15.865	**CEC**	**SANTIAGO, CHILE**, 18.91 m. Calls Peru daytime irregular.
15.810	**LSL**	**BUENOS AIRES, ARG.**, 18.98 m., Addr. (See 21,020 mc.) Works London mornings and Paris afternoons.
15.660	**JVE**	**NAZAKI, JAPAN**, 19.16 m. Works Java and Siam early am.

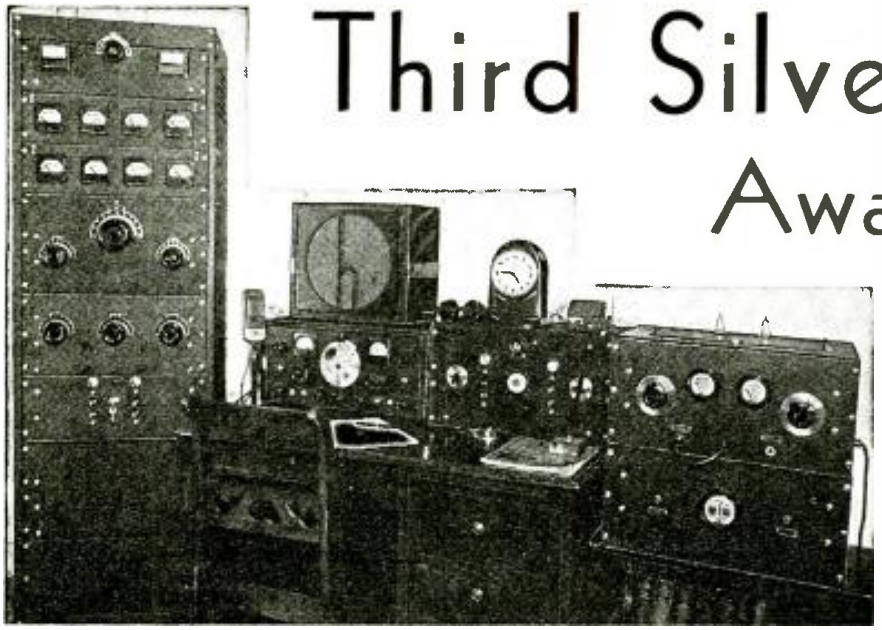
(Continued on page 280)

All Schedules Eastern Standard Time

Third Silver Trophy Awarded To

Alvin Abrams

W2DTT, New York



Above—Crackerjack "ham station" owned and operated by Alvin Abrams, W2DTT, New York City. To say the least, great credit must be given Mr. Abrams for the very neat workmanship exemplified in the construction of the transmitter and the other apparatus. The receiver is a Hallicrafter model SX17.

Alvin Abrams, W2DTT, owner and operator of the "ham station" shown in the photo above. Mr. Abrams' motto is — "If it's worth building at all, it's worth building well."

Trophy Awarded for best HAM STATION Photo of the Month

This beautiful silver trophy stands 11¾" high and is to be awarded monthly by SHORT WAVE & TELEVISION magazine for the best photo of a Ham station. The silver statue stands on a handsome bakelite base on which is a silver plate. The name of the winner will be engraved on this plate before the trophy is sent to him. See rules on page 315.

Mr. Abrams, a progressive New York radio amateur, has a snappy station.

● HEREWITH photos of my "ham station" located in New York City. This station has been licensed and in operation since 1932. Some time ago I decided that a new and larger transmitter should be built and the photo shows the results of this plan. The apparatus shown, exclusive of the Hallicrafter receiver, is home-made, and quite a lot of time was spent in assembling the parts so that they would have that "commercial" appearance. The finish has a lot to do with the final appearance of the transmitter and other apparatus, but nowadays it is relatively easy to obtain a good finish, as panels are available with a factory lacquer on them.

The transmitter at the left of the photo is a "rack and panel" job; it includes apparatus for 20 to 160 meter phone and a c.w. job rated at 500 watts input on code, and 400 watts input on phone.

Altogether, the transmitter has six chassis. The bottom one contains the final amplifier power-supply and relays, while the second one holds the audio driver, modulator and driver power-supply. The exciter and modulator power-supplies and start-stop controls are built on the third chassis. The exciter unit is on the fourth and the final amplifier on the fifth deck. The antenna tuning unit is the sixth or uppermost.

The pre-amplifier and monitor are built into a separate cabinet and this is shown on the right-hand side of the desk.

The audio equipment consists of a Velotron microphone coupled to a 6U7 pentode, a 6N7 phase inverter and a pair of 6C5 triodes in push-pull, terminating in a 500 ohm line. This line connects to a pair of 6A3's which drive the Amperex ZB-120 zero-bias modulators.

The exciter uses a 6F6 pentode oscillator, capacitively coupled to a 6L6 amplifier, doubler or quadrupler, capacitively coupled to a pair of 807's in parallel.

(Continued on page 315)

Mc.	Call	
15.620	JVF	NAZAKI, JAPAN, 19.2 m. Works Cal. near 5 am. and 8 pm.
15.550	CO9XX	TUINICU, ORIENTE, CUBA, 19.29 m., Addr. Frank Jones, Central Tuinicu, Tuinicu, Santa Clara. Broadcasts irregularly evenings.
15.450	IUG	ADDIS ABABA, ETHIOPIA, 19.44 m. Works Rome 9-10.30 am.
15.415	KWQ	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

15,340	DJR	BERLIN, GERMANY. 19.56 m., Addr. Br'dcast'g House. 8-9 am., 4.50-10.45 pm.
15.330	W2XAD	SCHENECTADY, N. Y., 19.56 m., Addr. General Electric Co. Relays WGY 11.30 am.-6 pm.
15.320	OLR5B	PRAGUE, CZECHOSLOVAKIA. 19.58 m. Addr. (See 11.840 mc.) Sun., Wed., Sat. 5-5.10 pm.; Mon., Tues., Thurs., Fri. 6.55-9.55 pm.; Sun. 5.55-8.55 pm.
15.310	GSP	DAVENTRY, ENG., 19.6 m., Addr. (See 26.100 mc.) 12.17-1.15, 4.15-6, 6.17-8.30 pm.
15.300	XEBM	MAZATLAN, SIN., MEX., 19.61 m., Addr. Box 78, "El Pregonero del Pacifico." Irregularly 9-10 am., 1-2, 8-10 pm.
15.300	—	ROME, ITALY. 19.61 m., Addr. (See 2RO, 11.81 mc.) Relays 2RO to 9 pm. irregularly.
15.290	LRU	BUENOS AIRES, ARG., 19.62 m., Addr. El Mundo. Relays LRI, 7-9 am.
15.280	HI3X	CIUDAD TRUJILLO, D. R., 19.63 m. Relays HIX Sun. 7.40-10.40 am. Weekdays 12.10-1.10 pm.
15.280	DJQ	BERLIN, GERMANY, 19.63 m., Addr. Broadcasting House. 12.05-10 am., 4.50-10.45 pm. Also Sun. 11.10 am-12.25 pm.
15.270	W2XE	NEW YORK CITY, 19.65 m., Addr. (See 21.520 mc.) Daily except Sat. and Sun., 12 n-5 pm., Sat. & Sun. 1.30-5 pm.
15.260	GSI	DAVENTRY, ENG., 19.66 m., Addr. See 26.100 mc.) 12.17-4, 9.17-11.20 pm.
15.252	RIM	TASHKENT, U.S.S.R., 19.67 m. Works RKI near 7 am.
15.250	WIXAL	BOSTON, MASS., 19.67 m., Addr. University Club. Daily 1-2 pm., Sun. 10 am.-12 n. Tues., Thurs. 3.30-5.30 pm.
15.245	TPA2	PARIS, FRANCE, 19.68 m., Addr. 98 Bis. Blvd. Haussmann. "Paris Mondial" 5-10 am.
15.230	HS8PJ	BANGKOK, SIAM, 19.7 m. Irregularly Mon. 8-10 am.
15.230	OLR5A	PRAGUE, CZECHOSLOVAKIA, 19.7 m. Addr. (See OLR4A, 11.84) Sun., Wed., Sat. 5-5.10 pm.; Mon., Tues., Thurs., Fri. 6.55-9.55 pm.; Sun 5.55-8.55 pm.
15.220	PCJ2	HUIZEN, HOLLAND, 19.71 m., Addr. N. V. Philips' Radio Hilversum. Tues. 12.30-2 am., Wed. 9.30-11.30 am.
15.210	W8XK	PITTSBURGH, PA., 19.72 m., Addr. (See 21.540 mc.) 9 am.-7 pm.
15.200	DJB	BERLIN, GERMANY, 19.74 m., Addr. (See 15.280 mc.) 12.05-11 am., 4.50-10.45 pm. Also Sun. 11.10 am.-12.15 pm.
15.190	LYZ4	LAHTI, FINLAND. 19.75 m. Addr. Oy Suomen Yleisradio Ab., Lahlen Yleisradioasema, Lahti. Irregular 12.30-1.30 pm.
15.190	ZBW4	HONGKONG, CHINA, 19.75 m., Addr. P. O. Box 200. Irregular. 11.30 pm. to 1.15 am., 3-10 am.,
15.180	GSO	DAVENTRY. ENG., 19.76 m., Addr. (See 26.100 mc.) 1-3.15 am., 4.15-6, 6.17-9 pm.
15.170	TGWA	GUATEMALA CITY, GUAT., 19.77 m., Addr. (See 17.8 mc.) Daily 10.45-11 am.; Sun. 10.45 am.-6 pm.
15.160	XEWW	MEXICO CITY, MEXICO, 19.79 m., 12 n.-12 m., irregular.
15.160	JZK	TOKYO, JAPAN, 19.79 m. 12.30-1.30 am., 2.30-4, 4.30-5.30, 6-6.30 pm.
15.160	VUD3	DELHI, INDIA, 19.79 m., Addr. All India Radio. 1.30-3.30 am., 8.30-10.30 pm.
15.155	SM5SX	STOCKHOLM, SWEDEN, 19.79 m., Daily 11 am.-5 pm., Sun. 9 am.-5 pm.
15.150	YDC	BANDOENG, JAVA, 19.8 m., Addr. N. I. R. O. M. 6-7.30 pm., 10.30 pm.-2 am., Sat. 7.30 pm.-2 am., daily 5.30-10.30 am.
15.140	GSF	DAVENTRY, ENG., 19.82 m., Addr. (See 26.100 mc.) 1-3.15, 5.45 am.-12 n., 4.15-6, 6.20-8.30 pm.
15.130	TPB6	PARIS, FRANCE. 19.83 m., Addr. "Paris Mondial," 98 Bis Blvd. Haussmann. 6-8.15 pm.
15.130	WIXAL	BOSTON, MASS., 19.83 m., Addr. World-Wide B'cast'g Foundation. University Club. 10-11 am., Mon.-Fri.
15.120	HVJ	VATICAN CITY, 19.83 m., 10.30-10.45 am., except Sun., Sat. 10-10.45 am.
15.110	DJL	BERLIN, GERMANY, 19.85 m., Addr. (See 15.280 mc.) 12 m.-2, 8-9 am., 10.40 am. to 4.30 pm. Sun. also 6-8 am.
15.080	RKI	MOSCOW, U.S.S.R., 19.87 m. Works Tashkent near 7 am. Broadcasts Sun. 12.15-2.30 pm. Daily 7-9.15 pm.

End of Broadcast Band

15.055	WNC	HIALEAH, FLORIDA, 19.92 m., Addr. A.T.&T. Co. Calls Central America daytime.
14.980	KAY	MANILA, P. I., 20.03 m., Addr. RCA Comm. Works Pacific Is. Mornings.
14.960	PSF	RIO DE JANEIRO, BRAZIL, 20.05 m., Works with Buenos Aires daytime.
14.950	HJB	BOGOTA, COL., 20.07 m. Calls WNC daytime.
14.940	PSE	RIO DE JANEIRO, BRAZIL. 20.08 m., Broadcasts Wed. 3.45-4.15 pm.
14.940	HII	CIUDAD TRUJILLO, D. R., 20.08 m. Phones WNC daytime.
14.940	HJA3	BARRANQUILLA, COL., 20.08 m. Works WNC daytime.
14.920	LZA	SOFIA, BULGARIA, 20.10 m., Addr. Radio Garata. Mon., Tues., Thurs., Fri. 11.30 am.-2.45 pm., Wed. 11.30 am.-4.45 pm., Sat. 11.30 am.-5 pm., Sun. 2 am.-5 pm. Daily except Sun. 5-6.30 am.
14.845	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. Irregular.
14.653	GBL	RUGBY, ENGLAND, 20.47 m. Works JVH 1-7 am.
14.640	TYF	PARIS, FRANCE, 20.49 m. Works Saigon and Cairo 3-7 am, 12 n.-2.30 pm.
14.600	JVH	NAZAKI, JAPAN, 20.55 m. Broadcasts irregularly 5-11.30 pm. Works Europe 4-8 am.
14.590	WMN	LAWRENCEVILLE, N. J., 20.56 m., Addr. A.T.&T. Co. Works England morning and afternoon.
14.535	HBJ	GENEVA, SWITZERLAND, 20.64 m., Addr. Radio Nations. Broadcasts Sun. 1.45-2.30 pm., Mon. 1.30-1.45 am.
14.530	LSN	BUENOS AIRES, ARG., 20.65 m. Addr. (See 20.020 mc.) Works N. Y. C. afternoons.
14.500	LSM2	BUENOS AIRES, ARG., 20.69 m., Addr. (See 21.020 mc.) Works Rio and Europe daytime.
14.485	TIR	CARTAGO, COSTA RICA, 20.71 m. Works Central America and U. S. A. daytime.
14.485	YSL	SAN SALVADOR, SALVADOR, 20.71 m. Irregular.
14.485	HPF	PANAMA CITY, PANAMA, 20.71 m. Works WNC daytime.
14.485	TGF	GUATEMALA CITY, GUATEMALA, 20.71 m. Works WNC daytime.
14.485	YNA	MANAGUA, NICARAGUA, 20.71 m. Works WNC daytime.
14.485	HRL5	NACAOME, HONDURAS, 20.71 m. Works WNC daytime.
14.485	HRF	TEGUCIGALPA, HONDURAS, 20.71 m. Works WNC daytime.
14.480	IBS	ROME, ITALY, 20.7 m. Works Eritrea and Addis Ababa 6.30-7.30 am.
14.470	WMF	LAWRENCEVILLE, N. J., 20.73 m., Addr. A.T.&T. Co. Works London and Paris daytime.
14.460	DZH	ZEESEN, GERMANY, 20.75 m., Addr. (See 15.360 mc.) Irregular.
14.440	—	RADIO MALAGA, SPAIN, 20.78 m. Relays Salamanca 8.15-8.45 pm. Sometimes 2-4 pm.
14.440	GBW	RUGBY, ENG., 20.78 m. Works U.S.A. afternoons.
14.166	PIIJ	DORDRECHT, HOLLAND, 21.15 m., Addr. (See 7.088 mc.) Sat. 12 n.-12.30 pm.
14.004	EA9AH	TETUAN, SPANISH MOROCCO, 21.4 m. Apartado 124. News at 4.30 and 7.15 pm. Relays Salamanca from 5.40 pm.
13.990	GBA	RUGBY, ENG., 21.44 m. Works Buenos Aires late afternoon.
13.820	SUZ	ABOU ZABAL, EGYPT, 21.71 m. Works with Europe 11 am.-2 pm. Works GBB daily at 11 am.
13.690	KKZ	BOLINAS, CALIF., 21.91 m., Addr. RCA Comm. Irregularly.
13.635	SPW	WARSAW, POLAND, 22 m. Daily 6-8 pm. Sat. & Sun. 6-9 pm.
13.630	ZGB	KUALA LUMPUR, F.M.S. 22 m. Works Java, VVS, VVN and Siam, 6.30-8 am.
13.585	GBB	RUGBY, ENG., 22.08 m. Works Canada afternoons. Works SUZ at 11 am.
13.415	GCJ	RUGBY, ENG., 22.36 m. Works Japan and China early morning.
13.410	YSJ	SAN SALVADOR, SALVADOR, 22.37 m. Works WNC daytime.
13.390	WMA	LAWRENCEVILLE, N. J., 22.4 m., Addr. A.T.&T. Co. Works England morning and afternoon.
13.380	IDU	ASMARA, ERITREA, AFRICA, 22.42 m. Works Rome daytime.
13.350	VVN	FT. ST. GEORGE, MADRAS, INDIA, 22.46 m. Works VVS, Burma, near 7 am.
13.345	YVQ	MARACAY, VENEZUELA, 22.48 m. Works WNC daytime.
13.285	CGA3	DRUMMONDVILLE, QUE., CAN., 22.58 m. Works London and ships afternoons.
13.330	IRJ	ROME, ITALY, 22.69 m. Works Tokyo 5-9 am., irregularly.
12.870	VVS	MINGALADON, BURMA, 23.30 m. Works ZGB, VVN, and Siam, 6.30-7.30 am.
12.862	W9XDH	ELGIN, ILL., 23.32 m. Press Wireless, Tests 2-5 pm.
12.840	WAQ	OCEAN GATE, N. J., 23.36 m., Addr. A.T.&T. Co. Works with ships irregularly.
12.830	CNR	RABAT, MOROCCO, 23.38 m., Addr. Director General Tele. & Teleg. Stations. Works TYA, Paris 6-7 am., 2.30-4 pm.
12.800	IAC	PISA, ITALY, 23.45 m. Works Italian ships mornings.
12.780	GBC	RUGBY, ENG., 23.47. Works ships irregularly.
12.325	DAF	NORDDEICH, GERMANY, 24.34 m. Works German ships daytime.
12.290	GBU	RUGBY, ENG., 24.41 m. Works N. Y. C. evenings.
12.250	TYB	PARIS, FRANCE, 24.49 m. Irregular.
12.235	TFJ	REYKJAVIK, ICELAND, 24.52 m. Works Europe mornings. Broadcasts Sun. 1.40-2.30 pm.
12.215	TYA	PARIS, FRANCE, 24.56 m. Works French ships in morning and afternoon.
12.200	——	TRUJILLO, PERU, 24.58 m., "Rancho Grande." Address Hacienda Chiclin. Irregular.
12.150	GBS	RUGBY, ENG., 24.69 m. Works N. Y. C. evenings.
12.130	DZE	ZEESEN, GERMANY, 24.73 m., Addr. (See 15.360 mc.) Tests irregular.
12.120	TPZ	ALGERS, ALGIERS, 24.75 m. Calls Paris near 6 am., and 2.30-4 pm.
12.060	PDV	KOOTWIJK, HOLLAND, 24.88 m. Tests irregularly.
12.060	RNE	MOSCOW, U.S.S.R., 24.88 m. Daily 6-7 am., 12.15-1 pm., 8-9.15, 10-11 pm., also Sun. 6 am.-1 pm.
11.991	FZS4	SAIGON, INDO-CHINA, 25.02 m. Phones Paris irregular.

(Continued on page 282)

All Schedules Eastern Standard Time

DX Receiving Aerials

● UNDOUBTEDLY one of the most important aspects of radio as a hobby is to be found in the widespread appeal of short-wave listening and DXing. With the number of powerful short-wave broadcasting stations always increasing, DXing has become a real art. Today the average SWL is usually possessed of highly efficient receiving equipment; but, in many cases, the results obtained are scarcely as good as could reasonably be expected, largely because of the fact that very little thought is given to the problem of erecting a really efficient receiving aerial.

Assuming that no further improvement can be made in the receiver itself, the DX fan should turn his attention to the choice of a good aerial. At once he is faced with a difficulty, which arises from the fact that there is *no best all-wave aerial;* since any length of free wire in space acts as an interceptor of radio frequency energy at one fundamental frequency and the harmonics of that frequency.

Secondly, it must be remembered that every aerial is possessed of *directional* qualities. Actually, the *vertical* aerial is the *least* directional of all; and, under ordinary circumstances, when absolutely in the clear, it is omni-directional, that is, it will receive signals equally well from all directions.

However, it is usually impossible to erect any aerial absolutely in the open, and therefore even vertical aerials do become possessed of definite directional qualities. As the average SWL is unable to measure the directional qualities of an aerial, it is better for him to construct one in accordance with theory, and trust that it will function as desired.

Simple Half-Wave Doublet

The simplest of all aerials is the single half-wave doublet, as shown in diagram 1. This should have a length equal to one-half

The principal types of effective "DX" aerials for short wave reception are illustrated at the right. The "V" type aerials present new possibilities for "DX" hounds; two or more, facing in different directions, could be arranged with a switch to cut in the desired one.

the wavelength in metres of the band on which reception is most desired. Of course, signals on wavelengths greatly removed from the resonant frequency of this aerial will be received; but it will only function really well at or near its natural wavelength.

As regards its directional qualtities, the single half-wave doublet is directional *broad-side*—i.e., at right angles to the axis of the wire. Accordingly it should be situated with this fact in mind—with its broad-side facing the more-difficult-to-log stations.

Improving the Half-Wave Doublet

The half-wave doublet may be greatly improved by altering its length and/or by varying the method of connecting the lead-in.

The *Johnson Q* is an example of this, having two quarter-wave halves with a quarter-wave matching stub (see diagram 2).

The Johnson Q operates only on the frequency for which it is designed; and care must be taken to ensure that the quarter-wave sections are exactly the required length. A convenient formula for calculating the length of any half-wave aerial is—

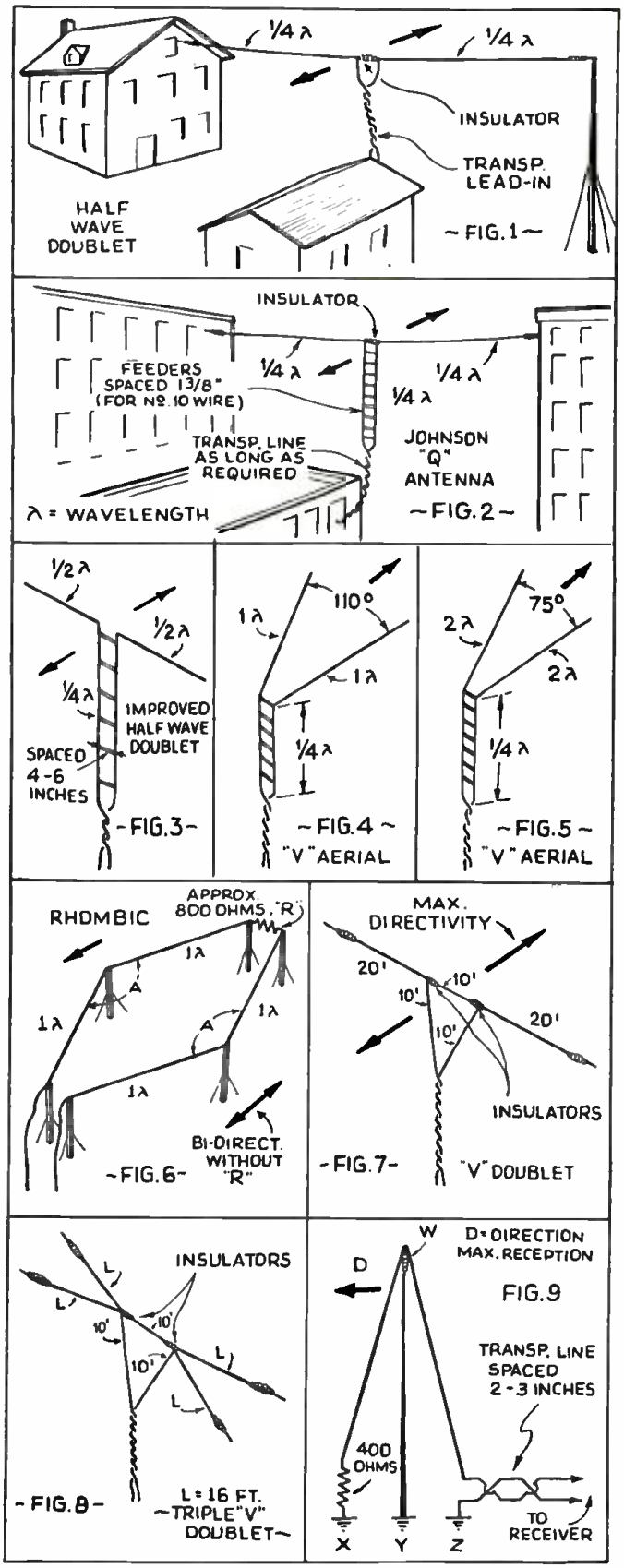
$$L = M \times 1.56$$

Where L equals Length in feet and M equals wavelength in metres.

Johnson Q Data

Wavelength (Metres)	*¼-wave Feeder Section.*	*½-wave Aerial (in 2 ¼-wave halves)*
10 m. Amateur band	8 ft.	16 ft. 1½ in.
20 m. Amateur band	16 ft. 5 in.	32 ft. 11 in.
40 m. Amateur band	32 ft. 9 in.	65 ft. 4 in.
19 m. B/C band	15 ft. 4 in.	30 ft. 7 in.

(Continued on page 300)



Mc.	Call	
11.970	HI2X	CIUDAD TRUJILLO, D. R., 25.07 m., Addr. La Voz de Hispaniola. Relays HIX Tue. and Fri. 8.10-10.10 pm.
11.955	IUC	ADDIS ABABA, ETHIOPIA, 25.09 m. Works IAC around 12 m.
11.950	KKQ	BOLINAS, CALIF., 25.1 m. Tests irregularly evenings.
11.940	FTA	STE. ASSISE, FRANCE, 25.13 m. Works Morocco mornings and Argentina late afternoon.

25 Met. Broadcast Band

11.910	CD1190	VALDIVA, CHILE, 25.2 m., P. O. Box 642. Relays CB69 10 am.-1 pm., 11 am.-10 pm.
11.900	XEWI	MEXICO CITY, MEXICO, 25.21 m., Addr. P. O. Box 2874. Mon., Wed., Fri. 3-4 pm., 9 pm.-12 m. Tues. and Thur. 7.30 pm.-12 m., Sat. 9 pm.-12 m.
11.895	HPSI	AGUADULCE, PANAMA, 25.22 m. Addr. La Voz del Interior. 7.30-9.30 pm.
11.885	TPA3	PARIS, FRANCE, 25.24 m., Addr. (See 15.245 mc.) 1-4 am., 10.15 am.-5 pm.
11.885	TPB7	PARIS, FRANCE, 25.24 m. (See 15.245 mc.) 8.30-11 pm.
11.870	W8XK	PITTSBURGH, PA., 25.26 m., Addr. (See 21.540 mc.) 7-11 pm.
11.860	YDB	SOERABAJA, JAVA, 25.29 m., Addr. N. I. R. O. M. Sat. 7.30 pm. to 2.30 am., daily 10.30 pm. to 2 am.
11.860	GSE	DAVENTRY, ENG., 25.29 m., Addr. (See 26.100 mc.) Irregular.
11.855	DJP	BERLIN, GERMANY, 25.31 m., Addr. (See 15.280 mc.) Irregular 11.35 am.-4, 7-10.45 pm.
11.840	KZRM	MANILA, P. I., 25.35 m. Addr. Erlanger & Gallinger, Box 283. 9 pm.-10 am. Irregular.
11.840	CSW	LISBON, PORT., 25.35 m. Nat'l Broad. Station. 11.30 am.-1.30 pm. Irregular.
11.840	OLR4A	PRAGUE, CZECHOSLOVAKIA, 25.35 m., Addr. Czech Shortwave Sta., Praha XII, Fochova 16. Daily 1.55-4.40 pm. Irregular. 8-10 pm.
11.830	W9XAA	CHICAGO, ILL., 25.36 m., Addr. Chicago Federation of Labor. Irregular 7 am.-6 pm.
11.830	W2XE	NEW YORK CITY, 25.36 m., Addr. Col. Broad. System, 485 Madison Av., N.Y.C. 5.30-10 pm.
11.826	XEBR	HERMOSILLA, SON., MEX., 25.37 m., Addr. Box 68. Relays XEBH. 1-4 pm., 9 pm.-12 m.
11.820	GSN	DAVENTRY, ENG., 25.38 m., Addr. (See 26.100 mc.) Irregular.
11.810	2RO	ROME, ITALY, 25.4 m., Addr. E.I.A.R., Via Montello S. Daily 5-8.45 am., 10 am.-9 pm.
11.805	COGF	MATANZAS, CUBA, 25.41 m., Addr. Gen. Betancourt 51. Relays CMGF. 2-3, 4-5, 6-11 pm.
11.805	OZG	SKAMLEBOAEK, DENMARK, 25.41 m. Addr. Statsradiofonien. Irreg.
11.800	JZJ	TOKYO, JAPAN, 25.42 m., Addr. Broadcasting Co. of Japan, Overseas Division. 7-7.30, 8-9.30 am., 2.30-4, 4.30-5.30 pm.
11.795	DJO	BERLIN, GERMANY, 25.43 m., Addr. (See 15.280 mc.) 7.15-11 pm.
11.790	—	VIENNA, AUSTRIA, 25.45 m. Irreg.
11.790	WIXAL	BOSTON, MASS., 25.45 m., Addr. (See 15.250 mc.) Mon., Wed., Fri. 3.30-5.30 pm., Sat. 5-5.30 pm., Sun. 2-4.30 pm.
11.780	HP5G	PANAMA CITY, PAN., 25.47 m., Addr. Box 1121. Heard till 12 m.
11.770	DJD	BERLIN, GERMANY, 25.49 m., Addr. (See 15.280 mc.) 10.40 am.-4.30 pm., 4.50-11 pm.
11,760	TGWA	GUATEMALA CITY, GUAT., 25.51 m. (See 17.8 mc.) Irregular 10-11.30 pm. Sun. 6-11.30 pm., irregular.
11.760	OLR4B	PRAGUE, CZECHOSLOVAKIA, 25.51 m., Addr. (See 11.840 mc.) Irregular.
11,750	GSD	DAVENTRY, ENG., 25.53 m., Addr. B.B.C., London. 1-3.15 am., 12.17-4.00 pm., 6.17-8.30, 9.17-11.20 pm.
11.740	COCX	HAVANA, CUBA. 25.55 m. P. O. Box 32. 6.55 am.-1 am. Sun. till 12 m. Relays CMX.
11.740	HVJ	VATICAN CITY, 25.55 m. Testing irregular.
11.730	XETA	MONTEREY, MEX. 25.57 m., Addr. Box 203. Relays XET, 12 n.-2 pm.
11.730	PHI	HUIZEN, HOLLAND, 25.57 m., Addr. N. V. Philips' Radio.
11.730	WIXAL	BOSTON, MASS., 25.57 m., Addr. World-Wide B'cast'g. Foundation, University Club. Daily exc. Sat. and Sun. 8-10 pm.
11.720	CJRX	WINNIPEG, CANADA, 25.6 m., Addr. James Richardson & Sons, Ltd. Daily 6 pm.-12 m., Sun. 5-10 pm.
11.718	CR7BH	LAURENCO MARQUES, PORTUGUESE E. AFRICA, 25.6 m. Daily 12.05-1, 4.30-6.30, 9.30-11 am., 12.05-4 pm., Sun. 5-7 am., 10 am.-2 pm.
11.715	TPA4	PARIS, FRANCE, 25.61 m., (See 15.245 mc.) 6-8.15 pm., 8.30-11 pm.
11.710	SBP	MOTALA, SWEDEN, 25.63 m., 1.20-2.05, 6-9 am., 11 am.-1 pm., Sat. 1.20-2 am., 6 am.-1.30 pm., Sun. 3 am.-1.30 pm.
11.710	YSM	SAN SALVADOR, EL SALVADOR, 25.63 m., Addr. (See 7.894 mc.) Irregular 1.30-2.30 pm.
11.700	HP5A	PANAMA CITY, PAN., 25.65 m. Addr. Radio Teatro, Apartado 954. 10 am.-10 pm.
11.700	CB1170	SANTIAGO, CHILE, 25.65 m. Addr. P.O. Box 706. Relays CB89 6 pm.-12 m.

End of Broadcast Band

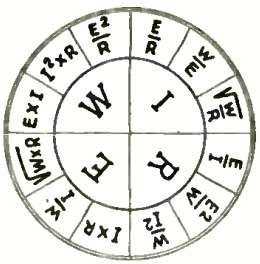
11.690	—	SAIGON, INDO-CHINA, 25.66 m., Addr. Radio Boy-Landry, 17 Place A. Foray. 11 pm.-1 am., 5.30-9.15 am.
11.680	KIO	KAHUKU, HAWAII, 25.68 m., Addr. RCA Comm. Irregularly.
11.595	VRR4	STONY HILL, JAMAICA, B. W. I., 25.87 m. Works WNC daytime.
11.560	VIZ3	FISKDALE, AUSTRALIA, 25.95 m., Addr. Amalgamated Wireless of Australasia Ltd. Tests irregularly.
11.530	SPD	WARSAW, POLAND, 26 m., Addr. 5 Mazowiecka St. 6-8 pm., Sat. & Sun. 6-9 pm.
11.500	XAM	MERIDA, YUCATAN, 26.09 m. Irregular 1-7.30 pm.
11.500	PMK	BANDOENG, JAVA, 26.09 m. Tests irregularly.
11.413	CJA4	DRUMMONDVILLE, QUE., CAN., 26.28 m. Tests irregularly.
11.402	HBO	GENEVA, SWITZERLAND, 26.31 m., Addr. Radio Nations. Sun. 7-7.45 pm., Mon. 1-1.15 am.
11.050	ZLT4	WELLINGTON, NEW ZEALAND, 27.15 m. Works Australia and England early morning.
11.040	CSW	LISBON, PORTUGAL, 27.17 m., Addr. Nat. Broad. Sta. 1.30-5 pm.
11.000	PLP	BANDOENG, JAVA, 27.27 m. Relays YDB. 6-7.30 p.m., 5.30-10.30 or 11 am. Sat. until 11.30 am.
10.970	OCI	LIMA, PERU, 27.35 m. Works Bogota, Col., evenings.
10.960	—	TANANARIVE, MADAGASCAR, 27.36 m., Addr. (See 9.53 mc.) 12.30-45, 3.30-4.30, 10-11 am.
10.910	KTR	MANILA, P. I. 27.41 m. Phones ships 6-10 am.
10.840	KWV	DIXON, CALIF., 27.68 m., Addr. A.T.&T. Co. Works with Hawaii evenings.
10.770	GBP	RUGBY, ENGLAND, 27.85 m. Works Australia early morning.
10.740	JVM	NAZAKI, JAPAN, 27.93 m. Works U.S.A. 2-7 am.
10.680	PLQ	BANDOENG, JAVA. 28.09 m. Works Javanese Isles and other Asiatic phones 6-8.30 am.
10.675	WNB	LAWRENCEVILLE, N. J., 28.1 m., Addr. A.T.&T. Co. Works with Bermuda irregularly.
10.670	CEC	SANTIAGO, CHILE, 28.12 m. Irregular.
10.660	JVN	NAZAKI, JAPAN, 28.14 m. Broadcasts daily 2-8 am. Works Europe irregularly at other times.
10.600	ZIK2	BELIZE, BRIT. HONDURAS, 28.25 m., Tues., Thurs., Sat. 7.30-7.45 pm.
10.550	WOK	LAWRENCEVILLE, N. J., 28.44 m., Addr. A.T.&T. Co. Works S. A. nights.
10.535	JIB	TAIHOKU, TAIWAN, 28.48 m. Works Japan around 6.25 am. Broadcasts, relaying JFAK 9.05-10 am., 1-2.30 am. Sun. to 10.15 am.
10.520	VLK	SYDNEY, AUSTRALIA, 28.51 m., Addr. Amalgamated Wireless of Australasia Ltd. Works England 1-6 am.
10.430	YBG	MEDAN, SUMATRA, 28.76 m. Calls Java 5.30-6.30 am.
10.410	PDK	KOOTWIJK, HOLLAND, 28.8 m. Works Java 7.30-9.40 am.
10.410	KES	BOLINAS, CALIF., 28.8 m., Addr. RCA Communications. Irregular.
10.370	JVO	NAZAKI, JAPAN, 28.93 m. Works TDE 3-8 am.
10.370	EAJ43	TENERIFFE, CANARY ISLANDS, 28.93 m. Relays Salamanca, Spain, 2-4, 5-9.45 pm.
10.350	LSX	BUENOS AIRES, ARG., 28.98 m., Addr. Transradio International. Tests irregularly.
10.330	ORK	RUYSSELEDE, BELGIUM, 29.04 m. Broadcasts 1.30-3 pm. Works OPM 1-3 am., 3-5 pm.
10.300	LSL2	BUENOS AIRES, ARG., 29.13 m., Addr. Cia. Internacional de Radio. Works Europe evenings.
10.290	DZC	ZEESEN, GERMANY, 29.16 m., Addr. (See 15.360 mc.) Irregular.
10.260	PMN	BANDOENG, JAVA, 29.24 m. Relays YDB 5.30-10.30 or 11 am., Sat to 11.30 am.
10.250	LSK3	BUENOS AIRES, ARG., 29.27 m., Addr. (See 10.310 mc.) Works Europe and U.S.A. afternoons and evenings.
10.230	CED	ANTOFAGASTAN, CHILE, 29.33 m. Tests 7-9.30 pm.
10.220	PSH	RIO DE JANEIRO, BRAZIL, 29.35 m., Addr. Box 709. Broadcasts 6-9 pm.
10.160	RIO	BAKOU, U.S.S.R., 29.5 m. Works Moscow 10 pm.-7.30 am.
10.140	OPM	LEOPOLDVILLE, BELGIAN CONGO, 29.59 m. Works Belgium 1-3 am. and 3-5 pm.
10.080	RIR	TIFLIS, U.S.S.R., 29.76 m. Works Moscow 12 m.-8 am.
10.065	TDE	SHINKYO, MANCHUKUO, 29.81 m. Works JVO 3-8 am.
10.055	ZFB	HAMILTON, BERMUDA, 29.84 m. Works N.Y.C. irregular.
10.055	SUV	ABOU ZABAL, EGYPT, 29.84 m. Works Europe 1-6 pm.
10.042	DZB	ZEESEN, GERMANY, 29.87 m., Addr. Reichspostzenstralamt. Irregular.
9.990	KAZ	MANILA, P. I., 30.03 m., Addr. RCA Communications. Works Java early morning.
9.980	COBC	HAVANA, CUBA, 30.04 m., Addr. P. O. Box 132. Relays CMBC 6:55 a.m.-12:30 a.m.
9.950	GCU	RUGBY, ENGLAND, 30.15 m. Works N.Y.C. night time.
9.940	JDY	DAIREN, MANCHUKUO, 30.18 m. Relays JQAK daily 7-8 am. Works Tokyo occasionally in early am.
9.930	HKB	BOGOTA, COL., 30.21 m. Works Rio evenings.
9.890	LSN	BUENOS AIRES, ARG., 30.33 m., Addr. (See 10.300 mc.) Works N.Y.C. evenings.
9.870	WON	LAWRENCEVILLE, N. J., 30.4 m., Addr. A.T.&T. Co. Works England nights.
9.865	COCM	HAVANA, CUBA, 30.41 m., Addr. Transradio Columbia, P. O. Box 33. 7 am.-12 m. Relays CMCM.
9.860	EAQ	MADRID, SPAIN, 30.43 m., Addr. Post Office Box 951. 7.30-8, 8.40 9 pm.
9.830	IRF	ROME, ITALY, 30.52 m. Works Egypt afternoons. Relays 2RO, 6-9 pm.
9.800	LSI	BUENOS AIRES, ARG., 30.61 m., Addr. (See 10.350 mc.) Tests irregularly.
9.790	GCW	RUGBY, ENGLAND, 30.64 m., Works N.Y.C. evenings.
9.760	CSW	LISBON, PORTUGAL, 30.74 m. Addr. Nat. Broad. Sta. 5-8 pm.
9.760	VLZ-VLK	SYDNEY, AUSTRALIA, 30.74 m., Addr. Amalgamated Wireless of Australasia Ltd. Works Java and New Zealand early morning.

(Continued on page 284)

All Schedules Eastern Standard Time

Radio Kinks

Each month the Editor will award a 2 year subscription for the best kink submitted. All other kinks published will be awarded eight months' subscription to 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.



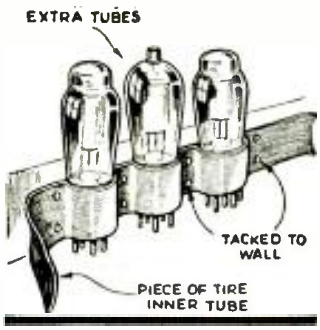
Ohm's Law

1st Prize

This is one of the cleverest reference charts for Ohm's Law which we have ever seen. Each quadrant of the circle gives one unknown quantity and three formulas for finding it. Thus, W equals EI, I^2R or $\frac{E^2}{R}$

Similarly, where I, R or E are unknown, they may be found by reference to the chart. —*Manuel Madridano.*

Spare Tubes

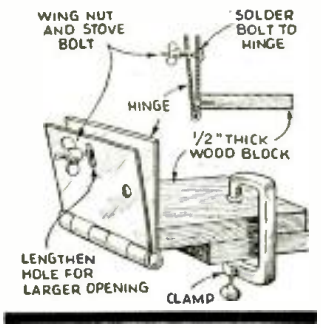


A simple kink for storing spare tubes is to keep a strip of rubber from an old inner tube tacked on the wall, as shown. Spare tubes are slipped into the loops of the tubing, out of harm's way.—*Anthony French.*

Cleans Teeth, Too

A tooth brush can be a very handy tool around the workbench. It can be used to clean solder from inside of coils and to remove dust from between prongs of tubes and sockets. Dust adhering to chassis and coil windings is also easily removed. If the handle is made of a plastic it can be bent by placing in hot water. Then the handle may be used to get into out of the way places in radio equipment.

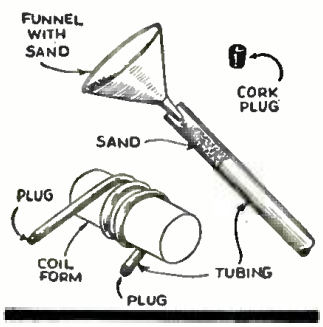
We would advise a separate brush for cleaning the teeth, however.—*Joseph Lisains.*



A Nice Vise

A makeshift vise can be fashioned from an old shutter hinge; one having a length of 3" should be satisfactory. A small piece of wood ½" thick and an inch long is used to mount the hinge as shown in the drawing. Flat headed wood screws of about 1" length may be used to secure the hinge to the block. A 10/24 machine screw and a wing-nut complete the assembly. The wood block can be secured to the bench by means of a C clamp. This vise is useful for all kinds of small work.—*F. J. Link.*

Coil Winding

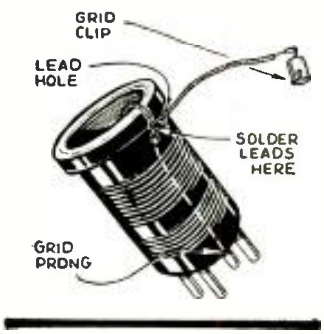


When winding transmitter inductances from copper tubing, the tubing may be wound without danger of collapsing or kinking if a cork is placed in one end of the tube and sand poured into the other end, filling the tube completely. The other end should then be corked, too.

The sand exerts an equal internal pressure against the walls of the form upon which the tubing is wound and the result is a coil without kinks. Of course, the sand should be removed when winding is completed. *Donald E. A. Rose.*

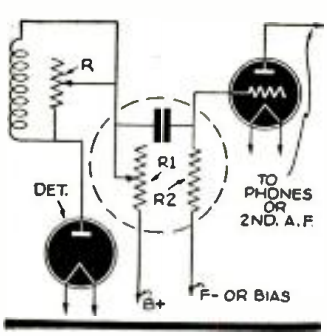
Grid Leads

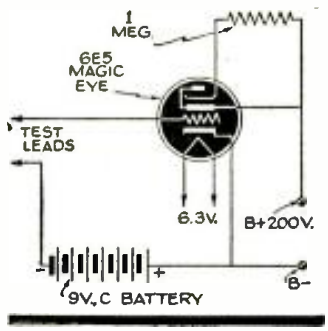
Receivers using plug-in coils and tubes with the grid lead coming to a cap at the top of the tube can be benefited by this kink. A separate lead is brought out from the grid prong of the plug-in coil to the top of the coil and attached to a grid clip. In this way the connection from the grid coil to the tube is made more direct, than when bringing a separate connection from the coil socket up through the chassis to the grid cap of the tube.—*John Winegard.*



Regeneration Control

A supplementary regeneration control for a detector stage is shown in the sketch. R1 is made variable and is used as a supplement to the normal regeneration control R. R1 has the advantage that it adjusts the voltage on the detector tube plate. To operate, set R1 until the set is about to go into regeneration and then use R as the vernier control. It will be found that R1 will also tend to act as an audio volume control, which is useful in certain conditions.—*Merle V. Hoover.*

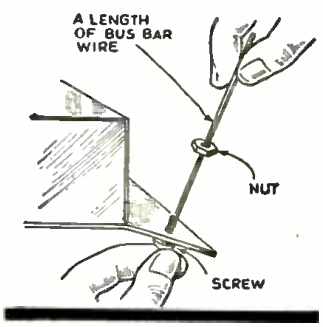




Continuity Tester

Another use for the 6E5 tuning tube is as an insulation and continuity tester. The tube is hooked up, as shown in the diagram, and the two test prods are connected to the object whose insulation is to be tested. If the shadow pattern closes, it is an indication that the insulation is poor, but if the shadow remains open, the insulation is good. When using the device for continuity tests, if the continuity is O.K., the shadow pattern should close up.—*J. M. Shank.*

A Nutty Idea



The experimenter often has difficulty in starting a nut on a machine screw, especially when the screw is located in an out of the way position. This simple kink is a great time-saver in this case. Slip the nut on a length of bus bar wire and, holding it at the upper end of the wire, place the far end of the bus bar on the machine screw as shown. Release the nut and it will slide down to a position where it may be started by spinning it with another piece of wire or a long handled screwdriver.—*Ray Kailbuorn.*

Mc.	Call	
9.760	——	SAIGON, INDO-CHINA, 30.72 m., Addr. 17, Place A. Foray. "Radio Boy-Landry." Heard 6-9.15 am.
9.750	WOF	LAWRENCEVILLE, N. J., 30.77 m., Addr. A.T.&T. Co. Works London and Paris night time.
9.720	COCQ	HAVANA, CUBA, 30.85 m. Addr. 25 No. 445, Vedado, Havana, 6.55 am.-1 am. Sun. till 12 m.
9.710	GCA	RUGBY, ENGLAND, 30.9 m. Works S. A. evenings.
9.700	FZF6	FORT DE FRANCE, MARTINIQUE, 30.9 m., Addr. P. O. Box 136. 11.30 am.-12.30 pm., 6.15-7.50 pm.
9.690	TI4NRH	HEREDIA, COSTA RICA, 30.94 m., Addr. Amando C. Marin, Apartado 40. Sun. 7-8 am. Tues., Thurs., Sat. 9-10 pm.
9.685	TGWA	GUATEMALA CITY, GUAT., 30.96 m. Daily 10-11.30 pm.; Sun. 6-11.30 pm.
9.675	DZA	ZEESEN, GERMANY, 31.01 m., Addr. (See 10.042 mc.) Irregular.
9.660	LRX	BUENOS AIRES, ARG., 31.06 m., Addr. El Mundo. Relays LR1, 9.30 am.-11.30 pm.
9.650	CS2WA	LISBON, PORTUGAL, 31.09 m., Addr. Radio Colonial. Tues., Thurs. and Sat. 3.30-6 pm.
9.650	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 7 am.-11 pm.
9.635	2RO	ROME, ITALY, 31.13 m., Addr. (See 11.810 mc.) Daily 3-6 pm.
9.630	HJ7ABD	BUCARAMANGA, COL., 31.14 m. 10 am.-12 n., 4-11 pm.
9.625	JFO	TAIHOKU, TAIWAN, 31.16 m. Relays JFAK irreg. 4-10 am.
9.616	HJIABP	CARTAGENA, COL., 31.20 m., Addr. P. O. Box 37. 11 am.-1 pm., 5-11 pm., Sun. 10 am.-1 pm., 3-6 pm.
9.615	ZRK	KLIPHEUVAL, SOUTH AFRICA, 31.2 m., Addr. P. O. Box 4559, Johannesburg. Daily, exc. Sat. 11.45 pm.-12.50 am. Daily exc. Sun. 3.20-7.20, 9-11.45 am., Sun. 3.30-4.30 or 4-5, 5.30-7, 9-11.45 am.
9.607	HP5J	PANAMA CITY, PANAMA, 31.23 m. Addr. Apartado 867. 12 n. to 1.30 pm., 6-10.30 pm.

31 Met. Broadcast Band

9.600	RAN	MOSCOW, U.S.S.R., 31.25 m. Daily 7-9.15 pm.
9.595	HBL	GENEVA, SWITZERLAND, 31.27 m., Addr. Radio Nations. Irregular.
9.590	VUD2I VUD3	DELHI, INDIA, 31.28 m. Addr. All India Radio, 8.30-10.30 pm., 1.30-3.30 am., 7.30 am.-12.30 pm.
9.590	PCJ	HUIZEN, HOLLAND, 31.28 m., Addr. (See 15.220 mc.) Sun. 2-3, 7-9.25 pm., Tues. 1.45-3.40, 7-10.15 pm., Wed. 7-9 pm.
9.590	VK6ME	PERTH, W. AUSTRALIA, 31.28 m., Addr. Amalgamated Wireless of Australasia, Ltd. 6-8 am. exc. Sun.
9.590	VK2ME	SYDNEY, AUSTRALIA, 31.28 m., Addr. Amalgamated Wireless of Australasia, Ltd., 47 York St., Sun. 12 m.-2 am.; 4.30-8.30 am.; 11.30-am.-1.30 pm.
9.590	W2XE	NEW YORK, N. Y., 31.28 m., Addr. CBS, 485 Madison Ave., Irregular.
9.590	W3XAU	PHILADELPHIA, PA., 31.28 m. Relays WCAU Mon., Thurs., Sat. 12 n.-12 m.; Tues., Fri., Sun. 11 pm.-12 m.; Wed. 9 pm.-12 m.
9.580	GSC	DAVENTRY, ENGLAND, 31.32 m., Addr. B. B. C., Portland Pl., London, W. 1, 9.17-11.20 pm.
9.580	VLR	MELBOURNE, AUSTRALIA, 31.32 m. Addr. Box 1686, G. P. O. Daily 3.30-8.30 am. (Sat. till 9 am.) Sun. 3-7.30 am. Daily exc. Sat. 9.35 pm.-2.15 am.
9.580	OAX5C	ICA, PERU, 31.32 m. Radio Universal 6-10 pm.
9.570	KZRM	MANILA, P. I., 31.35 m., Addr. Erlanger & Galinger, Box 283. Sun. 3-10 am. Daily exc. Sat. 4.30-7 pm., 11.15 pm.-12.15 am. Daily exc. Sun. 4-10 am.
9.570	WIXK	SPRINGFIELD, MASS., 31.35 m., Addr. Westinghouse Electric & Mfg. Co. Relays WBZ 6 am. to 12 m. Sun. 7 am.-12 m.
9.560	DJA	BERLIN, GERMANY, 31.38 m., Addr. Broadcasting House. 12.05-11 am., 4.50-10.45 pm.
9.550	TPBII	PARIS, FRANCE, 31.41 m. Addr. (See 15.245 mc.) 1-3 am., 10.15 am.-5 pm.
9.550	W2XAD	SCHENECTADY, N. Y., 31.41 m., General Electric Co., 6.30-10 pm.
9.550	OLR3A	PRAGUE, CZECHOSLOVAKIA, 31.41 m. (See 11.840 mc.) Mon., Tues. 4.40-5.10 pm.
9.550	XEFT	VERA CRUZ, MEX., 31.41 m. 10.30 am.-4.30 pm., 10.30 pm.-12.30 am.
9.550	YDB	SOERABAJA, JAVA, 31.41 m., Addr. N.I.R.O.M. Daily exc. Sat. 6-7.30 pm., 5.30 to 10 am. Sat. 5.30-11.30 am.
9.550	VUB2	BOMBAY, INDIA, 31.41 m., Addr. All India Radio. 1-3.30 am.
9.540	DJN	BERLIN, GERMANY, 31.45 m., Addr. (See 9.560 mc.) 4.50-10.45 pm.
9.540	VPD2	SUVA, FIJI ISLANDS, 31.45 m., Addr. Amalgamated Wireless of Australasia, Ltd. 5.30-7 am.
9.535	JZI	TOKYO, JAPAN, 31.46 m., Addr. (See 11.800, JZJ) Irregular.
9.535	HB9D	ZURICH, SWITZERLAND, 31.46 m., Addr. Radio Club of Zurich, Post Box Zurich 2. Sun. 9-11 am., Thur. 1-3 pm.
9.530	W2XAF	SCHENECTADY, N. Y., 31.48 m., Addr. General Electric Co. 3-11 pm.
9.530	ZHO	SINGAPORE, MALAYA, 31.48 m., Mon.-Fri. 12.40-1.40 am., Sat. 12.25-1.40 am., 10.40 pm.-1.10 am. Irreg. 5.40-9.40 am.
9.526	XEDQ	GUADALAJARA, GAL., MEXICO, 31.49 m. Irregular 7.30 pm. to 12.30 am.
9.525	ZBW3	HONGKONG, CHINA, 31.49 m., Addr. P. O. Box 200. 11.30 pm. to 1 am., 3-10 am.
9.525	LKJI	JELOY, NORWAY, 31.49 m. 5-8 am.
9.523	ZRH	ROBERTS HEIGHTS, S. AFRICA, 31.5 m., Addr. (See ZRK, 9.606 mc.) Daily exc. Sun. 5-7.30 am.; Sun. 5.30-7 am.
9.520	HJ4ABH	ARMENIA, COLOMBIA, 31.51 m. 6-10 pm.
9.520	OZF	SKAMLEBOAEK, DENMARK, 31.51 m., Addr. Statsradiofonien, Heibergsgade 7, Copenhagen., 2-6.40, 8-11 pm.
9.520	YSH	SAN SALVADOR, EL SALVADOR 31.51 m., Addr. (See 7.894 mc.) Irregular 6-10 pm.
9.510	GSB	DAVENTRY, ENGLAND, 31.55 m., Addr. (See 9.580 mc.—GSC) 1-3.15 am., 1.30-6, 6.17-9, 9.17-11.20 pm.
9.510	HJU	BUENAVENTURA, COLOMBIA, 31.55 m., Addr. National Railways. Mon., Wed. and Fri. 8-11 pm.
9.500	VK3ME	MELBOURNE, AUSTRALIA, 31.58 m., Addr. Amalgamated Wireless of Australasia, 167 Queen St. Daily except Sun. 4-7 am.
9.500	XEWW	MEXICO CITY, MEX., 31.58 m. Addr. Apart. 2516. Relays XEW. 6 pm.-12 m.
9.500	——	LAHTI, FINLAND, 31.58 m., Addr. Finnish Broadcasting Co. 2-5 pm.
9.500	HS8PJ	BANGKOK, SIAM, 31.58 m. Thursday, 8-10 am.
9.488	EAR	MADRID, SPAIN, 31.6 m., Addr. (See 9.860 mc.) 7.30-8.30 pm. Mon., Tues., Thur., Sat. at 9.30 pm. also.

End of Broadcast Band

9.460	ICK	TRIPOLI, N. AFRICA, 31.71 m. Works Rome, 5.30-7 am.
9.445	HCODA	GUAYAQUIL, ECUADOR, 31.77 m. Irregularly till 10.40 pm.
9.428	COCH	HAVANA, CUBA, 31.8 m., Addr. 2 B St., Vedado. 7 am.-1 am.
9.415	PLV	BANDOENG, JAVA, 31.87 m. Works Holland 5.30-9 am.
9.380	—	TANANARIVE, MADAGASCAR, 31.96 m. Addr. Le Directeur des PTT, Radio Tananarive, Administration PTT. 12.30-12.45, 3.30-4.30, 10.11 am.
9.355	HCIETC	QUITO, ECUADOR, 32.05 m., Addr. Teatro Bolivar, Thurs. until 9:30 p.m.
9.345	HBL	GENEVA, SWITZERLAND, 32.08 m., Addr. Radio Nations Fri. 7:15-8:30 p.m., 6:45-8 p.m.
9.330	CGA4	DRUMMONDVILLE, CANADA, 32.15 m. Works England irreg.
9.330	OAX4J	LIMA, PERU, 32.15 m., Addr. Box 1166, "Radio Universal." 12 n.-3 pm., 5 pm.-1 am.
9.290	HIG	CIUDAD TRUJILLO, D. R., 32.29 m. 7.10-8.40 am., 11.40 am.-2.10 pm., 3.40-8.40 pm.
9.280	HC2CW	GUAYAQUIL, ECUADOR, 32.31 m., 11.30 am.-12.30 p.m., 8-11 pm.
9.280	GCB	RUGBY, ENGLAND, 32.33 m. Works Canada and Egypt evenings and afternoons.
9.200	COBX	HAVANA, CUBA, 32.59 m. Addr. San Miguel 194, Altos. Relays CMBX 7 am.-12 m.
9.180	ZSR	KLIPHEUVEL, SOUTH AFRICA, 32.66 m. Phones London late afternoon.
9.170	WNA	LAWRENCEVILLE, N. J., 32.72 m. Works England evenings.
9.150	YVR	MARACAY, VENEZUELA, 32.79 m. Works with Europe afternoons.
9.125	HAT4	BUDAPEST, HUNGARY, 32.88 m., Addr. "Radiolabor," Gyali-ut, 22, Sun. and Wed. 7-8 pm., Sat. 6-7 pm.
9.120	YCP	BALIKPAPAN, DUTCH BORNEO, 32.88 m. Phones Bandoeng 5.30-7.30 am.
9.100	COCA	HAVANA, CUBA, 32.95 m., Addr. Galiano No. 102. Relays CMCA 9 am.-12 m.
9.060	TFK	REYKJAVIK, ICELAND, 33.11 m. Works London afternoons.
9.030	TYA2	PARIS, FRANCE. 33.2 m. Works TPZ2 near 2 am. and 4-5 pm.
9.020	COBZ	HAVANA, CUBA, 33.26 m., Radio Salas Addr. P. O. Box 866, 7:45 am.-12.40 am. Irreg. 12.30-2 am. Relays CMBZ.
9.020	GCS	RUGBY, ENG., 33.26 m. Works N. Y. C. evenings.
9.010	KEJ	BOLINAS, CAL., 33.3 m. Relays NBC and CBS programs in evening irregularly.
8.967	VWY	KIRKEE, INDIA, 33.43 m. Works with England 1.30-3 am.
8.965	COKG	SANTIAGO, CUBA, 33.44 m. Addr. Box 137. 9-10 am., 11.30 am.-1.30 pm., 3-4.30, 5-6, 10-11 pm., 12 m.-2 am.
8.960	TPZ2	ALGIERS, ALGERIA, 33.48 m. Works TYA2, near 2 am. and 4-5 pm.
8.841	HCJB	QUITO, ECUADOR, 33.5 m. 7-8.30 am., 11.45 am.-2.30 pm., 5-10 pm., except Mon. Sun. 12 n.-1.30 pm., 5.30-10 pm.
8.840	ZMBJ	S.S. AWATEA, 33.92 m. Steamer out of New Zealand. Saturday at 11 pm. Phones Australia early am. irregularly.
8.775	PNI	MAKASSER, CELEBES, N.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.
8.730	GCI	RUGBY, ENG., 34.36 m. Works India 8 am.
8.700	HKV	BOGOTA, COLOMBIA, 34.46 m. Tues. and Fri. 7-7.20 pm.
8.660	GBC	RUGBY, ENG., 34.56 m. Works ships irregularly.
8.665	COJK	CAMAGUEY, CUBA, 34.64 m., Addr. Finlay No. 3 Altos. 5.30-6.30, 8-11 pm., daily except Sat. and Sun.
8.665	W2XGB	HICKSVILLE, N. Y., 34.64 m., Addr. Press Wireless, Mon. to Fri. News at 9 am. and 5 pm.
8.580	YNPR	MANAGUA, NICARAGUA, 34.92 m. Radiodifusora Pilot.
8.560	WAQ	OCEAN GATE, N. J., 35.05 m. Works ships irregularly.
8.380	IAC	PISA, ITALY, 35.8 m. Works Italian ships irregularly.

(Continued on page 286)

All Schedules Eastern Standard Time

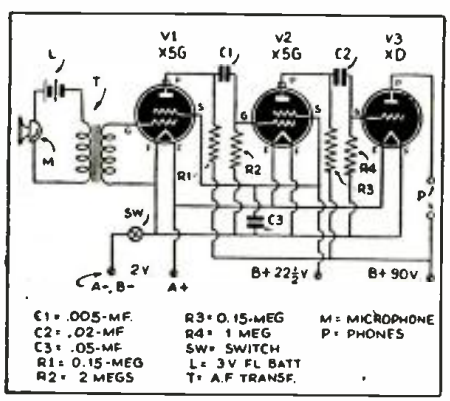
New Experiments with Radio Apparatus

Each month we will award 2 prizes, the first—2 years' subscription, the second—1 year's subscription, for the best non-radio uses of ordinary radio parts and radio instrumentalities.

1st Prize—2 yrs'. Subscription

Deaf-Aid V.T. Amplifier

● AN amplifier of the resistance-coupled type, suitable for use with a deaf-aid instrument, is shown in the accompanying diagram. The microphone may be a carbon grain or other suitable type and the battery for it can be one of the new compact types, giving 3 to 4½ volts. The transformer coupling the mike to the first amplifier tube may be a 3 to 1 audio type, or it may be a microphone coupling transformer with a fairly low impedance primary. A set of the special Hi-vac tubes, indicated in the diagram, or any of the low voltage battery type tubes may be used. The Hi-vac tubes of the midget type save quite a little space. The batteries may be arranged in a special cloth belt, provided with pockets, so as to fit around the waist. Where desirable, the phone used in the output circuit of the last



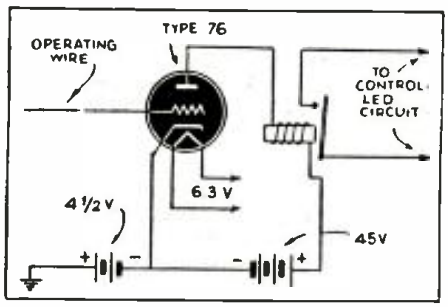
Amplifier circuit for Deaf-Aid Instrument.

tube may be one of the new extremely small miniature headphones. These are now available on the market with a sufficiently high impedance to operate directly in the plate circuit. Extra small a.f. transformers may be picked up at radio supply stores, or if a small one is not available, one could reduce the weight of the ordinary transformer by cutting away part of the core, or by rearranging the coils on a new core made of soft iron wire.—B. B. TRINE.

2nd Prize—1 yr's Subscription

Sensitive Relay

● I AM submitting a sketch of a sensitive relay circuit. This relay is actuated by simply touching the operating wire while standing on the ground. Such a circuit can

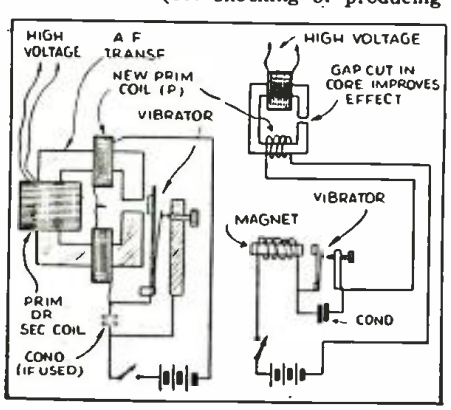


Touching the operating wire sets off the relay and the alarm on other device.

be used for an ultra-sensitive burglar alarm, by placing the fine operating wire on a door knob, window sill, etc., so that the relay is set off when the wire is touched. Even when a very high resistance connection is made between wire and ground, it will be found that this system works successfully.—ROBERT SMITH.

Induction Coil from Transformer

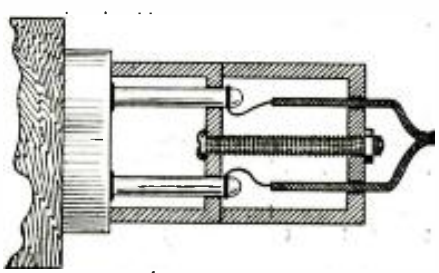
● MANY experimenters have an old a.f. transformer lying about, and the accompanying sketch shows how an improvised induction coil (for shocking or producing sparks) may be made from this transformer. A piece of the iron core is cut away so as to leave a gap and opposite this gap the iron button of the vibrator is mounted. For the primary winding, a small coil may be wound on each leg of the transformer core, each comprising about 50 turns of No. 18 insulated magnet wire. The voltage induced in the secondary can be increased by connecting a small condenser across the vibrator. Best results are usually obtained with batteries as the exciting power, although low-voltage a.c. from a step-down transformer may be employed. The size of the condenser connected across the vibrator may be about 0.1 to 0.25 mf.—H. S.



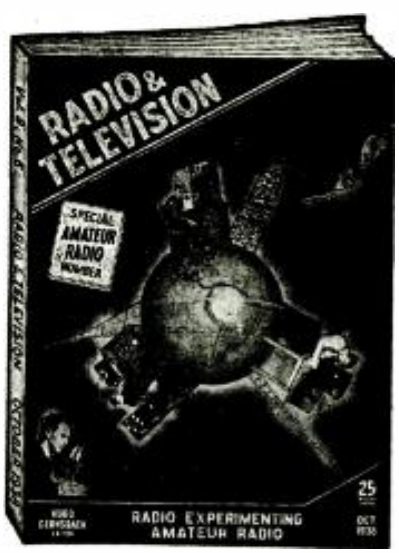
Induction coil made from an A.F. transformer.

An Emergency Plug

● I FOUND, by removing the pins from an old 4-prong tube base, the holes were spaced O.K. for the pins on a corn popper. I then sawed off a piece of the first tube base, so that the pins would stick out of the holes about one-eighth of an inch. Next, I slipped a pair of closely fitting lugs on the ends of the pins and soldered them there. The cord is attached to these.—FRANK L. PULASKI.



An emergency plug for electrical apparatus



With the October number, *Short Wave & Television* will change its name to RADIO & TELEVISION. See inside front cover for details.

Mc.	Call	
8.185	PSK	RIO DE JANEIRO, BRAZIL, 36.65 m. Irregularly.
8.036	CNR	RABAT, MOROCCO, 37.33 m. Works Paris irreg. in afternoons.
7.901	LSL	BUENOS AIRES, ARGENTINA, 37.97 m. Works Brazil at night.
7.894	YSD	SAN SALVADOR, EL SALVADOR, 37.99 m., Addr. Dir. Genl. Tel. & Tel. 7-11 pm.
7.870	HCIRB	QUITO, ECUADOR, 38.1 m. La Voz de Quito. 9-11 pm.
7.860	SUX	ABOU ZABAL, EGYPT, 38.17 m. Works with Europe, 4-6 pm.
7.854	HC2JSB	GUAYAQUIL, ECUADOR, 38.2 m. Evenings to 11 pm.
7.797	HBP	GENEVA, SWITZERLAND, 38.48 m., Addr. Radio-Nations.
7.780	PSZ	RIO DE JANEIRO, BRAZIL. 38.54 m. Phones 6-11 pm. irregularly.
7.715	KEE	BOLINAS, CAL., 38.89 m. Relays NBC and CBS programs in evening irregularly.
7.680	YBZ	MENADO, CELEBES, N.E.I., 39.04 m. Phones PNI and Bandoeng, 5.30-7 am.
7.626	RIM	TACHKENT, U.S.S.R., 39.34 m. Works with Moscow in early morning.
7.610	KWX	DIXON, CAL., 39.42 m. Works with Hawaii, Philippines, Java and Japan, nights.
7.560	FZE9	DJIBOUTI, FRENCH SOMALILAND. 39.66 m. Phones Paris early am.
7.540	RKI	MOSCOW, U.S.S.R., 39.76 m. Works RIM early am.
7.520	KKH	KAHUKU, HAWAII, 39.87 m. Works with Dixon and broadcasts irregularly nights.
7.510	JVP	NAZAKI, JAPAN, 39.95 m. Irreg.
7.410	HCJB4	QUITO, ECUADOR, 40.46 m., 7-9.30 pm. irregularly.
7.390	ZLT2	WELLINGTON, N. Z., 40.6 m. Works with VLZ near 4 am.
7.380	XECR	MEXICO CITY, MEX., 40.65 m., Addr. Foreign Office. Sun. 6-7 pm.
7.220	HKE	BOGOTA, COL., S. A., 41.55 m. Tues. and Sat. 8-9 pm. Mon. and Thurs. 6.30-7 pm.
7.200	YNAM	MANAGUA, NICARAGUA, 41.67 m. Irregular at 9 pm.
7.177	CR6AA	LOBITA, ANGOLA, PORT. WEST AFRICA. 41.75 m.. Wednesday and Saturday 2.45-4.30 pm.
7.100	FO8AA	PAPEETE, TAHITI, 42.25 m., Addr. Radio Club Oceanien. Tues. and Fri. 11 pm.-12.30 am.
7.088	PIIJ	DORDRECHT, HOLLAND, 42.3 m., Addr. Dr. M. Hellingman, Technical College. Sat. 11.10-11.50 am.
6.990	XEME	MERIDA, YUCATAN, 42.89 m., Addr. Calle 59, No. 517, "La Voz de Yucatan desde Merida." Irregular.
6.980	KZGG	CEBU ISLAND, P. I. 42.95 m. Phones Manila near 4 am.
6.977	XBA	TACUBAYA, D. F., MEX., 43 m. 9.30 am.-1 pm., 7-8.30 pm.
6.905	GDS	RUGBY, ENG., 43.45 m. Works N.Y.C. evenings irregularly.
6.860	KEL	BOLINAS, CALIF., 43.70 m. Tests irregularly, 11 am.12 n., 6-9 pm.
6.805	HI7P	CIUDAD TRUJILLO, DOM. REP., 44.06 m., Addr. Emisoria Diaria de Commercio. Daily exc. Sat. and Sun. 12.40-1.40, 6.40-8.40 pm. Sat. 12.40-1.40 pm. Sun. 10.40 am.-11.40 am.
6.790	PZH	PARAMIRABO, SURINAM. 44.16 m.. Addr. P. O. Box 18. Daily 6.06-8.36 am., Sun. 9.36-11.36 am. Daily 5.36-8.36 pm.
6.775	HIH	SAN PEDRO DE MACORIS, DOM. REP., 44.26 m. 12.10-1.40 pm., 7:30-9 pm. Sun. 3-4 am., 4.15-6 pm., 4.40-7.40 pm.
6.765	WOA	LAWRENCEVILLE, N. J., 44.41 m., Addr. A.T.&T. Co. Works Eng. evenings.
6.760	JVT	NAZAKI, JAPAN, 44.44 m., Addr. Kokusai-Denwa Kaisha, Ltd., Tokyo. Irregular.
6.730	HI3C	LA ROMANA, DOM. REP., 44.58 m., Addr. "La Voz de la Feria." 12.30-2 pm., 5-6 pm.
6.720	PMH	BANDOENG, JAVA, 44.64 m. Relays NIROM programs. 5.30-9 am.
6.690	TIEP	SAN JOSE, COSTA RICA, 44.82 m., Addr. Apartado 257. La Voz del Tropico. Daily 7-10 pm.
6.675	H8Q	GENEVA, SWITZERLAND, 44.94 m. Addr. Radio-Nations. Sun. 1.45-2.30 pm.
6.672	—	—— 44.94 m., relays Salamanca, Spain, 7-9.45 pm.
6.672	YVQ	MARACAY, VENEZUELA, 44.95 m. Irregular.
6.650	IAC	PISA, ITALY, 45.11 m. Works ships irregularly.
6.635	HC2RL	GUAYAQUIL, ECUADOR, S. A., 45.18 m., Addr. P. O. Box 759. Sun. 5.45-7.45 pm., Tues. 9.15-11.15 pm.
6.630	HIT	CIUDAD TRUJILLO, D. R., 45.25 m., Addr. "La Voz de la RCA Victor," Apartado 1105. Daily exc. Sun. 12.10-1.40 pm., 5.40-8.40 pm.; also Sat. 10.40 pm.-12.40 am.
6.625	PRADO	RIOBAMBA, ECUADOR, 45.28 m. Thurs. 9-11.45 pm.
6.558	HI4D	CIUDAD TRUJILLO, D. R., 45.74 m. Except Sun. 11.55 am.-1.40 pm.
6.550	XBC	VERA CRUZ, MEX., 45.8 m. 8.15-9 am.
6.550	TIRCC	SAN JOSE, COSTA RICA, 45.8 m., Addr. Radioemisora Catolica Costarricense. Sun. 11 am.-2 pm., 6-7, 8-9 pm. Daily 12 n.-2 pm., 6-7 pm., Thurs. 6-11 pm.
6.545	YV6RB	BOLIVAR, VENEZUELA, 45.84 m., Addr. "Ecos de Orinoco." 6-10.30 pm.
6.520	YV4RB	VALENCIA, VENEZUELA, 45.98 m. 11 am.-2 pm., 5-10 pm.
6.516	YNIGG	MANAGUA, NICARAGUA, 46.02 m., Addr. "La Voz de las Lagos." 8-9 pm.
6.500	HIL	CIUDAD TRUJILLO, D. R., 46.13 m. Addr. Apartado 623. 12.10-1.40 pm., 5.40-7.40 pm.
6.490	HIIL	SANTIAGO DE LOS CABALLEROS, D. R., 46.2 m., Addr. Pres., Trujillo 97, Altos., 5.40-7 pm.
6.470	YNLAT	GRANADA, NICARAGUA, 46.36 m., Addr. Leonidas Tenoria, "La Voz del Mombacho." Irregular.
6.465	YV3RD	BARQUISIMETO, VENEZUELA, 46.37 m. Radio Barquisimeto, irregular.
6.450	HI4V	SAN FRANCISCO DE MACORIS, D. R., 46.48 m. 11.40 am.-1.40 pm., 5.10-9.40 pm.
6.440	TGQA	QUEZALTENANGO, GUATEMALA, 46.56 m. Mon.-Fri. 9-11 pm., Sat. 9 pm.-1 am., Sun. 1-3 pm.
6.420	HIIS	SANTIAGO, D. R., 46.73 m. 11.40 am.-1.40 pm., 5.40-7.40, 9.40-11.40 pm.
6.416	YV6RC	BOLIVAR, VENEZUELA, 46.73 m. Radio Bolivar.
6.410	TIPG	SAN JOSE, COSTA RICA, 46.8 m., Addr. Apartado 225, "La Voz de la Victor." 12 n.-2 pm., 6-11.30 pm.
6.400	YV5RH	CARACAS, VENEZUELA, 46.88 m. 7-11 pm.
6.388	HI8J	LAS VEGAS, D. R., 46.92 m., Irreg.
6.384	VP2LO	STE. KITTS, B.W.I. 46.96 m. ICA Service Labs, Box 88, Daily 4-4.45 pm., Sun 10-10.45 am. and irreg. at other times.
6.380	YV5RF	CARACAS, VENEZUELA, 46.92 m., Addr. Box 983. 6-10.30 pm.
6.370	TI8WS	PUNTARENAS, COSTA RICA, 47.07 m., Addr. "Ecos Del Pacifico", P. O. Box 75. 6 pm.-12 m.
6.365	YVIRH	MARACAIBO, VENEZUELA, 47.18 m., Addr. "Ondas Del Lago." Apartado de Correos 261. 6-7.30 am., 11 am.-2 pm., 5-11 pm.
6.360	HRPI	SAN PEDRO SULA, HONDURAS, 47.19 m. 7.30-9.30 pm.
6.350	JZG	NAZAKI, JAPAN, 47.22 m. Relays Tokyo 5-7.30 am. irreg. Phones ships early am.
6.340	HIIX	CIUDAD TRUJILLO, D. R., 47.32 m. Sun. 7.40-10.40 am., daily 12.10-1.10 pm., Tues. and Fri. 8.10-10.10 pm.
6.335	OAXIA	ICA, PERU, 47.33 m., Addr. La Voz de Chiclayo, Casilla No. 9. 8-11 pm.
6.324	COCW	HAVANA, CUBA, 47.4 m., Addr. La Voz de las Antillas, P. O. Box 130. 6.55 am.-1 am. Sun. 10 am.-10 pm.
6.310	HIZ	CIUDAD TRUJILLO, D. R., 47.52 m. Daily except Sat. and Sun. 11.10 am.-2.25 pm., 5.10-8.40 pm. Sat. 5.10-11.10 pm. Sun. 11.40 am.-1.40 pm.
6.300	YV4RD	MARACAY, VENEZUELA, 47.62 m. 6.30-9.30 pm. exc. Sun.
6.295	OAX4G	LIMA, PERU, 47.63 m., Addr. Apartado 1242, Daily 7-10.30 pm.
6.290	HIG	TRUJILLO CITY, D. R., 47.67 m. 7.10-8.40 am., 11.40 am.-2.10 pm., 3.40-8.40 pm.
6.280	COHB	SANCTI SPIRITUS, CUBA, 47.77 m., Addr. P. O. Box 85. 9-11.30 am., 12.30-1.30, 4-7, 8-11 pm.
6.270	YV5RP	CARACAS, VENEZUELA, 47.79 m., Addr. "La Voz de la Philco." Daily to 10.30 pm.
6.255	YV5RJ	CARACAS, VENEZUELA, 47.18 m.
6.243	HIN	CIUDAD TRUJILLO, D. R., 48 m., Addr. "La Voz del Partido Dominicano." 12 n.-2 pm., 6-10 pm.
6.235	HRD	LA CEIBA, HONDURAS, 48.12 m., Addr. "La Voz de Atlantida." 8-11 pm.; Sat. 8 pm.-1 am.; Sun. 4-6 pm.
6.225	YVIRG	VALERA, VENEZUELA, 48.15 m. 6-9.30 pm.
6.210	——	SAIGON, INDO-CHINA, 48.28 m., Addr. Radio Boy-Landry, 17 Place A. Foray. 4.30 or 5.30-9.15 am.
6.210	TG2	GUATEMALA CITY, GUAT., 48.28 m., Addr. Dir. Genl. of Electr. Commun. Relays TGI Mon.-Fri. 6-11 pm., Sat. 6 pm.-1 am. Sun. 7-11 am., 3-8 pm.
6.205	YV5RI	CORO, VENEZUELA, 48.32 m., Addr. Roger Leyba, care A. Urbina y Cia. Irregular.
6.200	HI8Q	CIUDAD TRUJILLO, D. R., 48.36 m. Irregular.
6.200	ZGE	KUALA LUMPUR, FED. MALAY ST., 48.36 m. Sun., Tue. and Fri. 6.40-8.40 am.
6.185	HIIA	SANTIAGO, D. R., 48.5 m., Addr. P. O. Box 423. 7 am.-5 pm.
6.171	XEXA	MEXICO CITY, MEX., 48.61 m., Addr. Dept. of Education. 7-11 pm.
6.156	YV5RD	CARACAS, VENEZUELA, 48.71 m. 11 am.-2 pm., 4-10.40 pm.
6.153	HI5N	MOCA CITY, D. R., 48.75 m. 6.40-9.10 pm.

49 Met. Broadcast Band

6.150	CJRO	WINNIPEG, MAN., CANADA, 48.78 m., Addr. (See 11.720 mc.) Daily 6 pm.-12 m., Sun. 5-10 pm.
6.150	ZPI4	VILLARRICA, PARAGUAY, 48.75 m. 5-6 pm.
6.147	ZRD	DURBAN, SOUTH AFRICA, 48.8 m., Addr. (See ZRK, 9.606 mc.) Daily exc. Sat. 11.45 pm.-12.50 am.; Daily exc. Sun. 3.30-7.30 am., 9 am.-3.45 pm.; Sun. 5.30-7, 9-11.30 am., 12 n.-3.20 pm. Also 4-5 am., 3rd Sun. of month.
6.147	ZE8	BULAWAYO, RHODESIA, S. AFRICA, 48.8 m. Mon., Wed., and Fri. 1.15-3.15 pm.; Tues. 11 am.-12 n.; Thurs. 10 am.-12 n. Sun. 3.30-5 am.
6.145	HJ4ABE	MEDELLIN, COL., 48.79 m. La Voz de Antioquia. 11 am.-12 n., 6-10.30 pm.
6.140	W8XK	PITTSBURGH, PA., 48.86 m., Addr. Westinghouse Electric & Mfg. Co. Relays KDKA 11 pm.-12 m.
6.137	CR7AA	LAURENCO MARQUES, PORT. E. AFRICA, 48.87 m. Daily 12.05-1, 4.30-6.30, 9.30-11 am., 12.05-4 pm., Sun. 5-7 am., 10 am.-2 pm.
6.130	VP3BG	GEORGETOWN, BRIT. GUIANA. 48.94 m, From 5 pm. on.
6.130	COCD	HAVANA, CUBA, 48.94 m., Addr. Box 2294. Relays CMCD 7 am.-1 am.
6.130	VE9HX	HALIFAX, N. S., CAN., 48.94 m., Addr. P. O. Box 998. Mon.-Fri. 7 am.-11.15 pm., Sat. 11 am.-11 pm., Sun. 12 n.-11.15 pm. Relays CHNS.
6.130	LKL	JELOY, NORWAY, 48.94 m. 11 am.-6 pm.
6.125	CXA4	MONTEVIDEO, URUGUAY, 48.98 m., Addr. Radio Electrico de Montevideo., Mercedes 823. 10 am.-12 n., 2-8 pm.
6.122	HJ3ABX	BOGOTA, COL., 49. m., Addr. La Voz de Col., Apartado 26-65. 12 n.-2 pm., 5.30-11 pm.; Sun. 6-11 pm.
6.122	HP5H	PANAMA CITY, PAN., 49 m., Addr. Box 1045. 10 am.-1 pm., 5-11 pm.

(Continued on page 318)

All Schedules Eastern Standard Time

Aerial Mast Made From a Ladder

● RECENTLY a picture appeared in a foreign radio magazine showing a novel antenna mast constructed from a ladder. An amateur version of such a ladder mast is shown in the accompanying pictures.

Fig. 1 shows an easy way to erect a mast made from a ladder of any desired length, in which the ladder is anchored against one end of a house. If the ladder is not very high, the extra guy ropes will probably not be necessary, the ladder being held against the building by means of two iron bolts, with their ends bent into a U-shape, as shown in the picture.

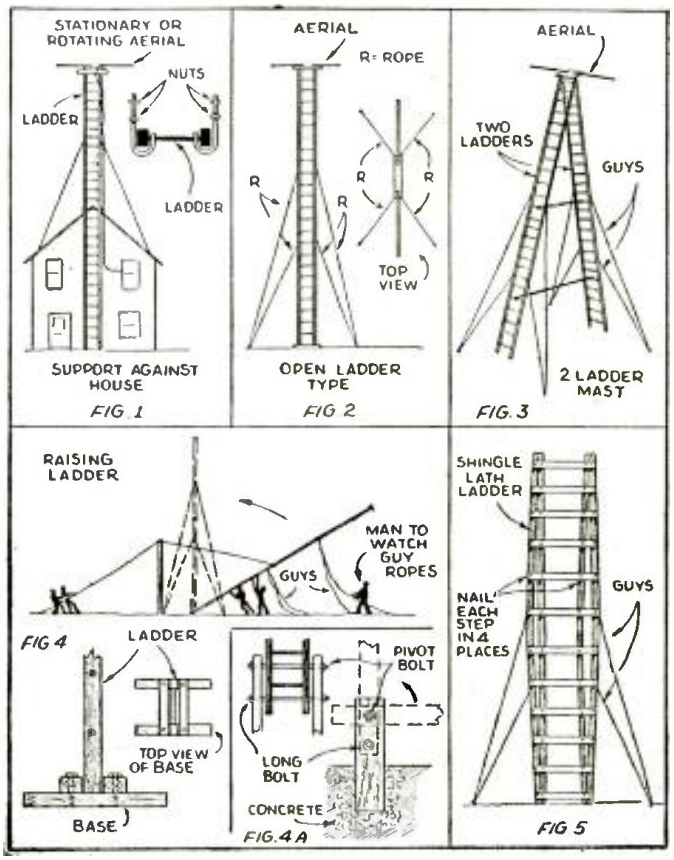
The great advantage of this ladder mast is that the experimenter can easily climb to the top of it in order to make changes in the antenna. Such changes occur quite frequently in the life of a radio experimenter. Hi!

Fig. 2 shows another type of ladder mast which is anchored "in the open" by means of guy ropes and cables. A word of caution is necessary if the builder intends to use wire cable for the guys—they should be broken up into short sections by means of insulators. Make sure that the length of any section is not a half or quarter of the wavelength being used by the station, or there will be considerable absorption of the energy in the guy wire sections. We also might mention that it is assumed the ladder, in any case, is to be made of wood.

Fig. 3 shows a strong mast made from two ladders, arranged in letter A fashion. A few guy ropes or cables are necessary to prevent side swaying of mast.

One method of erecting a fairly long ladder mast is shown in Fig. 4. A stub-pole is erected at one side of the mast. By means of a rope and pulley (or block and fall) the ladder is pulled up into position, aided by several men pushing upward under the ladder, as shown in the picture. The guy ropes are all tied

(Continued on page 307)

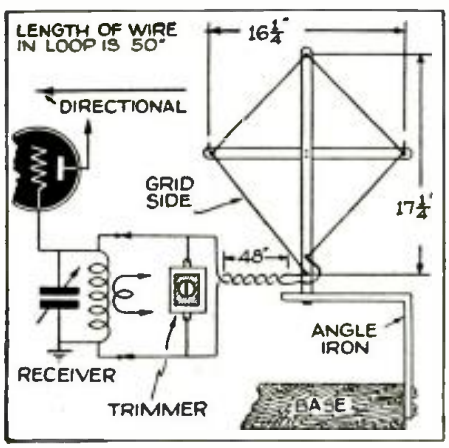


Right—Several types of aerial masts which can be easily built around a ladder as a base. The principal feature is that the ladder enables the operator to change short wave aerials easily.

Loop Antenna for 16 to 35 Meters

● HEREWITH are the construction details of an antenna which has shown such good qualities both here and at the "stations" of some of our SWL friends that we think it worthy of being passed on to others of our widespread fraternity. Primarily, it is designed to cover the frequencies between 16 and 35 meters, increasing the selectivity on the 16, 19, 25 and 31 meter sw broadcast bands together with the much overcrowded 20-meter amateur band, and acting successfully in the decreasing of static and over-all background noise. Its small size will not allow it to tune above the aforementioned frequency without the aid of a loading coil. Since the regular antenna covers the 49-meter band to our satisfaction, we dispensed with the loading coil and confined the loop to its resonant frequencies.

As can be seen from the accompanying diagram, the antenna is very easy to build, consisting of but a single loop of stranded, insulated, lead-in wire 50" long. However, it need not be insulated, nor lead-in wire, although stranded wire works somewhat better than solid. The twisted lead-in used here is four feet long, but tests have shown that the length is not critical. Needless to say, it should be as short as possible to avoid too much capacity in the tuning circuit and thereby prevent resonance over full coverage. A small trimmer condenser of the compression type is hooked across the loop *at the receiver end* to facilitate tuning of the loop.



Here is a loop aerial for short-wave reception.

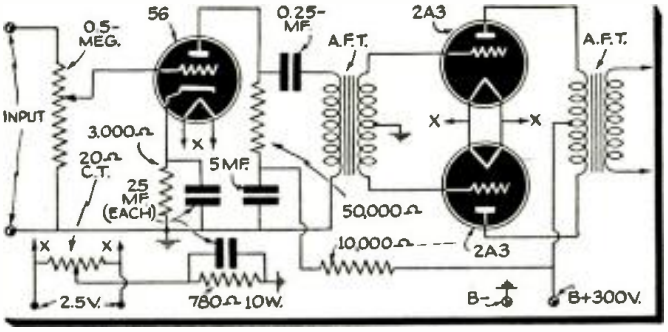
To tune the loop: First, connect any length of wire to the receiver and tune in a weak station. Then without touching any of the controls, disconnect the wire and hook in the loop *as shown in the diagram.* Second, using an insulated screwdriver, vary the condenser across the loop until the signal is loudest. Once this condenser is set, it needs no further adjustment, unless coils are changed.

Concerning the directional qualities—greatest signal strength on weak signals was noted when the *grid side of the loop* was toward the station being received.

An unfailing test for resonance is to grasp the grid side of the loop with the hand; if the loop is tuned properly, the signal will show a *marked decrease* in strength, whereas if it is not at resonance, grasping the loop will result in a *slight increase.* It is important that the loop resonate if optimum results are to be obtained.

This novel antenna has received many worthy compliments from SWL and ham visitors here at the "station" and several of them have built duplicates with gratifying results.—FRANK H. TOOKER.

Question Box

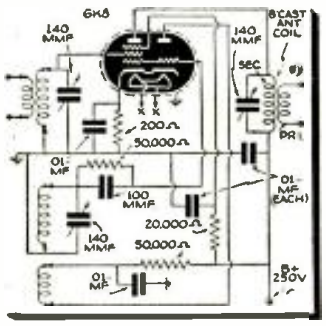


Push-Pull 2A3 Audio Amplifier—1146

Push-Pull 2A3 Audio Amplifier

I have input and output transformers for a pair of 2A3's or 45's in push-pull. I would like to know if these could be used with any metal tubes. If so, will you print the diagram? Otherwise, please print the diagram for the 2A3's.—Max Welton, Holland, Mich.

A. There are no metal tubes available at present which have on output impedance anywhere near that of the 2A3 or 45, so we believe it is best for you to use 2A3 tubes in your amplifier. Shown in the diagram is a 2-stage audio amplifier using a 56 tube as the first A.F. amplifier, transformer coupled to a pair of 2A3 tubes in push-pull. Note that the primary of the input transformer is connected in a parallel plate feed arrangement to prevent any D.C. flow in the input transformer primary. This will give better quality of reproduction. The 2A3 tubes are connected for class AB operation, and with a power supply having good regulation, can deliver about 10 watts with very little distortion.



An Efficient Converter—1147

SW Converter

I wish you would publish the circuit of an efficient short-wave converter, preferably one using a single tube, for use with a broadcast receiver. It should be capable of tuning in all of the principal short-wave bands.—Ralph Brown, Philadelphia, Penna.

A. A converter making use of the new 6K8 tube is shown. Ordinary 4-prong plug-in coils are used with it. For coil data, refer to the Question Box page of the March, 1938, issue of SHORT WAVE & TELEVISION. To improve efficiency, use has been made of a broadcast antenna coil in the output circuit of the converter. The secondary of this coil is connected to the plate circuit of the 6K8 while the primary connects with the broadcast receiver. For ordinary short-wave use, an intermediate frequency of about 1500 kc. is ideal. The broadcast receiver should be tuned to this frequency, and the 140 mmf. condenser shunting the broadcast antenna coil adjusted for maximum noise level in the receiver's output. This operation should be performed with the converter's oscillator plug-in coil removed from the socket and aerial and ground connected.

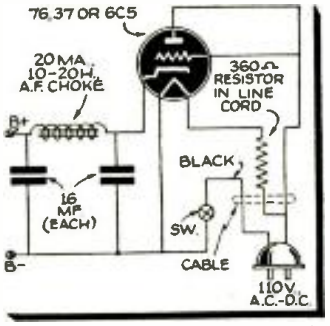
It is not advisable to gang the oscillator and the detector tuning condensers unless the constructor is willing to go to the trouble of removing turns from the oscillator coil to get the tuning condensers to track properly. Of course it is essential for good reception that the broadcast receiver have adequate sensitivity and selectivity by itself.

The broadcast antenna coil could be replaced with a 465 kc. I.F.T., and the converter fed directly into an I.F. amplifier of this frequency.

A Simple Power Supply

Please print a diagram of a half-wave rectifier, using a tube such as a 76, which will be suitable for use with the one-tube set of George W. Shuart which appeared in the April issue of SHORT WAVE & TELEVISION. *This receiver employs one 6F8G tube.—Harold J. Gould, Toronto, Ont., Can.*

A. A universal power supply for operation on A.C. or D.C., to be used in conjunction with this receiver, is shown. The rectifier tube may be a 76, a 37 or a 6C5. The plate voltage for the receiver is taken from the B+ and B- terminals of the power unit. With the simple filter system shown, very little trouble from hum should be had. The voltage delivered by this power supply will be approximately 100 to 110 volts when used on an A.C. power line, and approximately 90 volts when used on D.C. power. A separate 6.3 V. filament transformer should be used for the 6F8G heater when the receiver is operated from 110 volts A.C. When operated from D.C., a 185 ohm resistor in series with the 110 volt line will drop the voltage to the proper value.



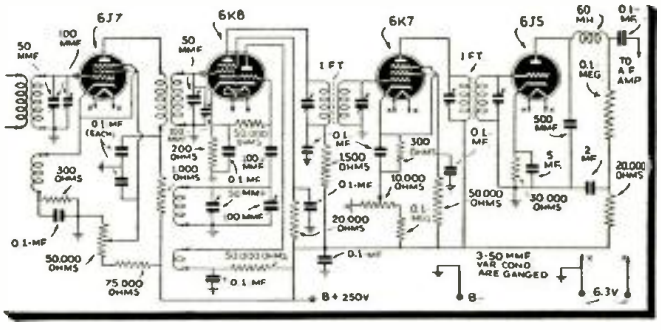
A Simple A.C.-D.C. Power Supply—1148

A Good 10-Meter Receiver

Will you please publish the circuit of a 10-meter receiver using 6.3 volt tubes, which will give "hot" performance on the 10-meter band. I leave the circuit to your judgment.—Edward Ottney, Peterboro, Ont., Can.

A. We believe a superheterodyne receiver employing a stage of regenerative preselection should fill the bill nicely. The circuit we have drawn makes use of a 6J7 tube as the regenerative preselector and one of the new 6K8 triode-pentode tubes as first detector and oscillator. A single stage of intermediate frequency amplification using 465 kc. iron core transformers should give sufficient gain and selectivity, particularly as the second detector is of the power detection type making use of the 6J5 tube. No automatic volume control is employed in this receiver. The volume is controlled by the 10,000 ohm potentiometer in the cathode circuit of the 6K7 I.F. tube. Although this receiver is especially good on 10 meters, it will also give fine results on any of the other bands, provided suitable plug-in coils are used. The antenna stage makes use of 6-prong plug-in coils and the detector and oscillator circuits make use of 4-prong coils of the standard type, made for use with 140 mmf. tuning condensers. The 3-50 mmf. tuning condensers are ganged and provide *bandspread*, whereas the 3-100 mmf. condensers are brought out to separate controls and are used for *band-setting*.

We have not shown an audio amplifier for this circuit. As it stands, it may be used with a pair of headphones. However, any good audio amplifier of one or two stages may be attached to it for loudspeaker reception. A standard A.C. power supply may also be used with it. A beat oscillator could be incorporated in the receiver.



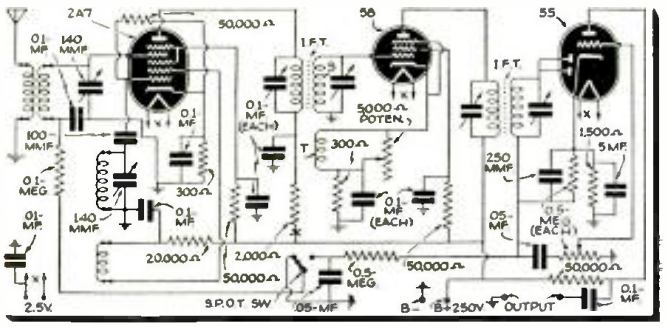
A Receiver for 10-Meter Reception—1149

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.

3-Tube Superheterodyne Receiver

Please print a diagram of a superhet using a 2A7 as first detector, a single iron core I.F. stage with regeneration control using a 58 tube and a 55 as second detector, A.V.C. and first stage of audio. The set should use 4-prong coils covering 10 to 550 meters using 140 mmf. ganged tuning condensers and have an R meter in the A.V.C.—Jack Falato, Hackensack, N. J.

A. We have drawn a diagram employing regeneration in the I.F. stage. It will be necessary to add a third winding to the first I.F. transformer. This is the winding marked T. T may consist of about 100 turns of No. 26 D.S.C. wire wound on a 5/8" form mounted close to the winding S of the first I.F. transformer. Regeneration is controlled by a 5000 ohm potentiometer. The S.P.D.T. switch is used for turning the A.V.C. on or off, as desired. The A.V.C. has been applied only to the 2A7 tube, as it is impractical to use it on the I.F. stage when regeneration is employed. For this reason, we doubt whether an R meter would be very effective in this receiver. However, a 0 to 15 ma. meter may be connected at point X for this purpose. Due to the limited A.V.C. action the meter will only deflect on fairly strong signals. In addition the reading of the meter will not be reliable as different settings of the regeneration control will result in different R readings on the meter. It would require an elaborate circuit using more tubes to get it to work properly.

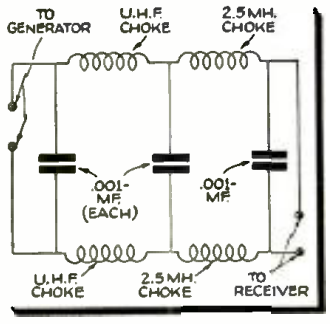


A 3-Tube Superhet Using 2.5 Volt Tubes—1150

Due to space limits we cannot publish all diagrams requested. The editor selects those of greatest interest to all readers. If a diagram you requested has not been published, please bear this fact in mind.

Curing Genemotor Hash

I have a genemotor power supply which develops a nasty squeal in my 5-meter receiver and, to a lesser extent, in a broadcast receiver. What can I do to eliminate this noise?—Earl A. Raesly, Belvidere, N. J.



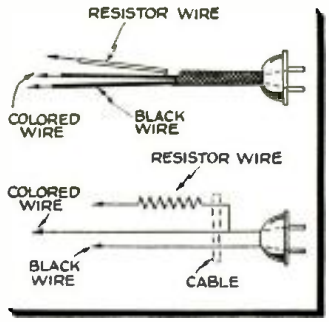
Curing Genemotor Noise—1151

A. A condition of this kind can be remedied by inserting an extra filter system between the genemotor and the receiver filter system. The extra filter should have a high R.F. impedance. Such a filter is shown in the diagram. As will be seen, it consists of several R.F. and ultra high frequency chokes connected in series, together with several mica by-pass condensers. A little experimentation in the values of these by-pass condensers is necessary to achieve complete elimination of the noise. This extra filter system should preferably be mounted as close to the genemotor as possible. If the genemotor is mounted in a shielded container, it will aid matters considerably.

Line Cord Connections

Most circuits for A.C.-D.C. receivers show a resistor-type line cord for supplying the heaters of the tubes of the receiver. Generally a diagram will show only two connections to a power cord, but a resistor line cord has three wires. Where does the third wire go and how is each of the wires connected into a circuit?—Louis Oberdoester, Allentown, Pa.

A. The schematic and pictorial sketches of a line cord, shown here, should clarify this problem for you. The resistor wire is usually covered with a white asbestos insulation and the end of it is tipped with an eyelet. The resistor wire is always connected in series with the heaters of the tubes in a receiver and the black wire is used as the common B− return lead. The power switch is usually placed in series with this black wire. The colored wire connects to the plate of the rectifier tube.



Resistor Line-Cord Connections—1152

A 3-Tube T.R.F. Receiver

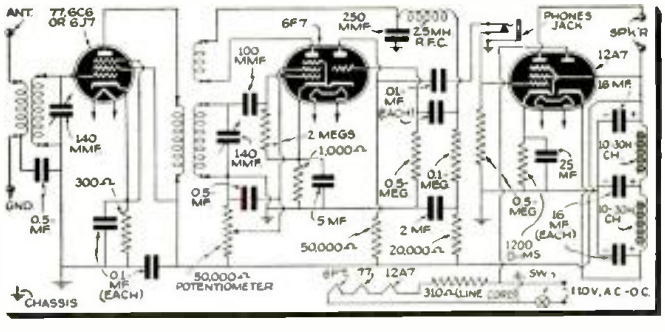
Will you please print the best circuit to use with the following tubes: A 77 as R.F. amplifier, a 6F7 as a detector and first A.F. amplifier, and a 12A7 as second A.F. amplifier and rectifier. —Gene DePalma, Flushing, N. Y.

A. The most satisfactory circuit for each of these tubes is shown. It makes use of 4-prong plug-in coils in the antenna stage and 6-prong plug-in coils in the detector stage. An A.C.-D.C. circuit is used in this receiver for simplicity's sake. Regeneration is controlled by a 50,000 ohm potentiometer which varies the screen voltage on the 6F7 pentode. A headphone jack is also included in the plate circuit of the first A.F. amplifier. The output transformer for the loudspeaker should have a primary impedance of 13,000 ohms to properly match the 12A7 tube. Coil data for this receiver may be found on the Question Box page in the March, 1938, issue of SHORT WAVE & TELEVISION.

With the amount of filtering shown in the power supply circuit little hum should be evident, even on the headphones. It is essential that the receiver chassis be ungrounded. It may be grounded through the 0.5 mf. condenser but *not* directly. If this is not done the line fuses in the house may be burned out.

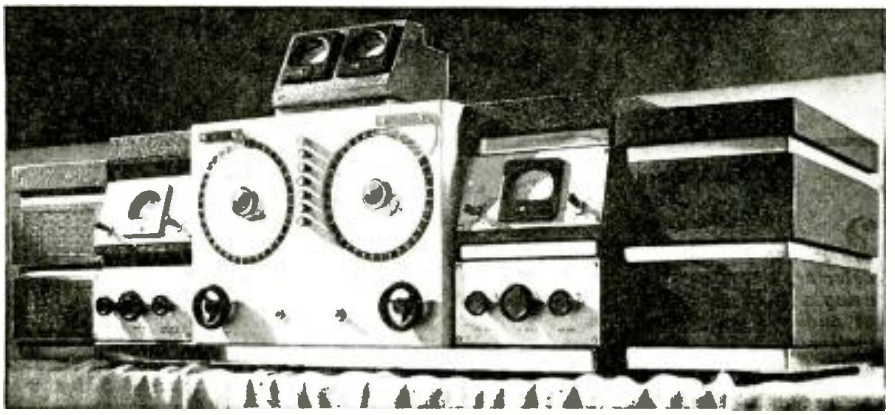
A speaker field (3000 ohms) may be connected from cathode of the diode section of the 12A7 tube to chassis to provide proper excitation.

The two 140 mmf. tuning condensers may be ganged to simplify tuning. If this is done, however, a 15 mmf. trimmer condenser should be shunted across the antenna section.



3-Tube A.C.-D.C. Dual-Purpose-Tube Set—1153

New Short-Wave Apparatus



Diversity Receiver for Hams

● DIVERSITY reception is not entirely new to radio engineers. Commercial radio stations have built diversity receiving systems at great expense, with striking improvements in the quality of short wave reception. Briefly, the advantages of diversity reception is in the practical elimination of fading effects, and a considerably higher average signal-to-noise ratio than can be obtained from any single receiver.

Diversity systems consist usually of individually tuned receivers, each connected to a separate antenna, the second detector outputs of which are tied together across a common load, and the signals combined after rectification, with the resulting audio output equalling the average of all receivers.

This type of diversity receiving system is satisfactory for commercial use where reception is mostly on a single frequency for hours at a time—but highly unsatisfactory for amateur communications work, when the individual tuning is entirely too complicated and time consuming to be practical.

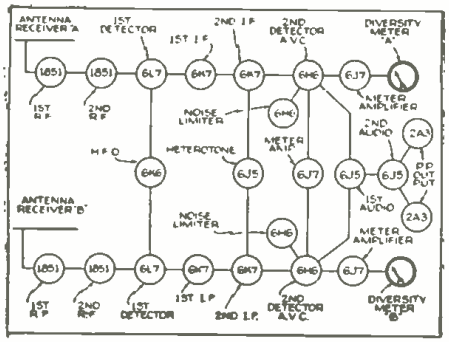
The new Skyrider diversity offers diversity reception in practical form for amateur operation for the first time. It is a single control *dual diversity receiving system*, consisting of two complete R.F., I.F. and second detector circuits, with a common R.F. heterodyne oscillator, common A.V.C. and one audio amplifier. A block diagram showing the tube functions is shown.

The principal advantages of diversity reception as demonstrated by this new receiver are:

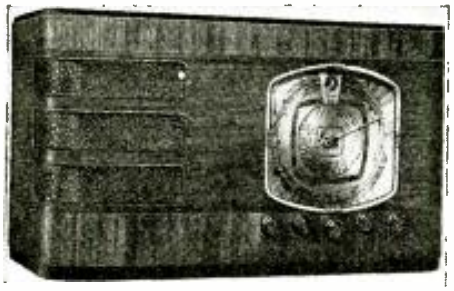
1. The reduction of fading to negligible proportions.
2. An increase of average signal strength over any single receiver.
3. Improvement of signal-to-noise ratio over any single receiver.
4. Reduction of heterodyne beat note interference.

(Continued on page 318)

Block diagram, showing the various tube functions.



New Items to Interest Fans and Hams



12-TUBE SUPERHET

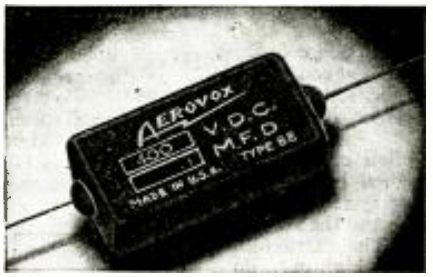
● A NEW 4-band 12-tube superhet receiver has been announced by the Wholesale Radio Service Company. The receiver is available in both A.C. and A.C-D.C. models and tunes from 13 to 130 meters and from 173 to 555 meters. In addition, a long-wave band for picking up European stations covers the range from 835 to 2050 meters. The receiver has a stage of r.f. preselection on all bands.

This article has been prepared from data supplied by courtesy of Wholesale Radio Service, Inc.

RUBBER CONDENSERS

● PAPER condensers molded in live rubber jackets are the latest development of Aerovox. It is claimed that there is less absorption of moisture during the manufacturing process of this type of condenser than with the ordinary molding process. In addition, there is no need for high pressures during the molding operation and the paper section does not alter its electrical characteristics. The units are available in capacities up to .25 mf., 200 volt rating; .1 mf., 400 volt rating; .05 mf., 600 volt rating and .01 in 1000 volt rating.

This article has been prepared from data supplied by courtesy of Aerovox Corporation.



COIL-WINDER

● A PROFESSIONAL type coil-winder suitable for use by the amateur has recently been released in an improved model. The machine will take coil forms up to 7 inches in diameter and 7 inches in length. Fourteen different winding speeds are available to conform to different wire gauges. A revolution counter is also built into the unit.

This article has been prepared from data supplied by courtesy of Miami Laboratories, Inc.

LOW-VOLTAGE C-R TUBE

● A NEW low-voltage cathode-ray tube of the high vacuum electrostatic defection type has been announced by RCA. This tube (the 902) has a 2-inch fluorescent screen and will operate with voltages from 400 to 600 volts. It may be interchanged with the 913 C-R tube if the voltage supply is 400 volts or higher.

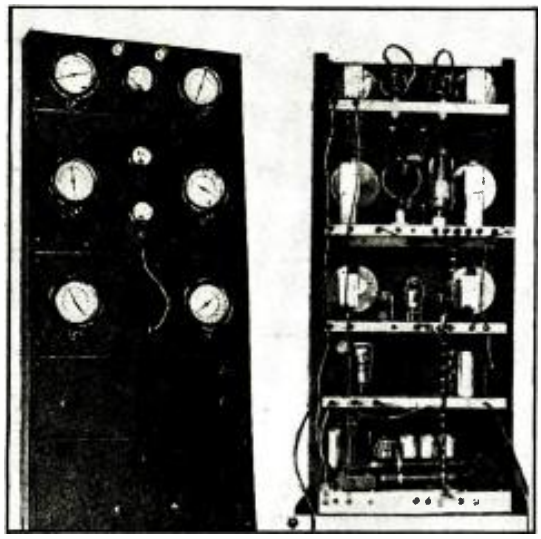
Giving a bright image at low voltages, the tube is especially suited for use in portable oscillographs.

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

"CAPACITOR" BOOK

● A NEW book entitled "Electrolytic Capacitors" has been published by Cornell-Dubilier containing reliable information on the theory, construction, characteristics and applications of electrolytic capacitors. It contains information valuable to all radio enthusiasts.

This article has been prepared from data supplied by courtesy of Cornell-Dubilier Electric Corporation.



Front and rear views of transmitter.

Suppressor-Grid Controlled C.W. and Phone

M. N. Beitman

● TO the ham, the other fellow's transmitter is always of interest. We are continually rebuilding or changing our rig and a hint or a helpful suggestion goes a long way in getting better results. While the transmitter described is quite conventional, it does have features and adaptations that mark it as a good all-around job for phone and c.w. work. By using several crystals and plug-in coils W9WAF claims to have worked some real DX. So let us give the rig the once over.

Beginning with the crystal oscillator and following right through to the power supply, we note economy as the keynote. An inexpensive type 59 tube served as an excellent oscillator and by means of the switch can be made to operate on the crystal's natural frequency or may be tuned to the second harmonic. Link coupling comes in handy since the oscillator and final are located on different decks. The 0-100 ma. meter is connected to a plug and may be used to measure either the oscillator plate current or the final tubes grid current.

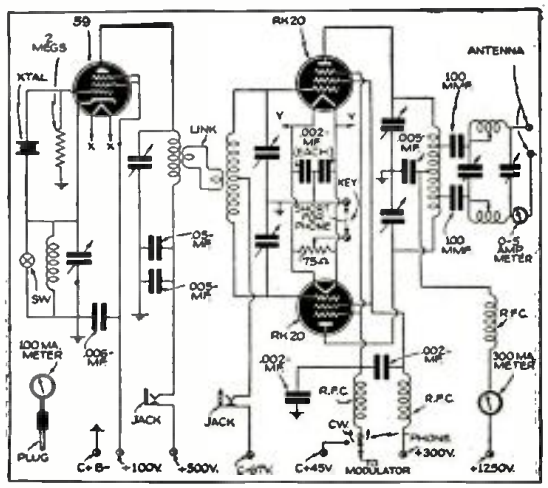
The final stage uses a pair of RK-20's in push-pull; with 1250 volts on the plates you get c.w. input of 150 watts, phone input of 40 watts. Notice how the circuit constants are altered when the switch is changed from c.w. to phone transmission or back. For phone the suppressor grid has a negative C bias of 45 volts, while for c.w. the C bias is positive 45 volts.

The complete data for the coils for all bands can be obtained from any handbook. The special antenna coupling system is completely described in the handbooks and really does help to put the soup into the antenna.

The modulator uses a 57 as a triode, a 56, and a 2A5 pentode in the output stage. This arrangement gives plenty of gain for a crystal mike and has five watts audio output for suppressor modulation. This is a bit on the lean side and a push-pull output stage would help matters.

Now let us turn to the artistic and mechanical make-up of the rig. You will note that this is a real rack and panel job. All the variable condensers are controlled by illuminated airplane dials; switches controlling the power supply have indicating bull's eyes; and there are feeder insulators for the antenna connection.

(Continued on page 302)



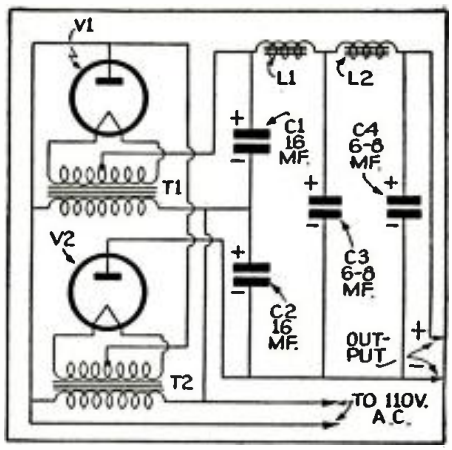
Right — Diagram of transmitter, which is of simple design and construction.

A Cheap Voltage Doubler

● HEREWITH I give instructions for building a single-phase, half-wave voltage-doubler rectifier operating on the 115 volt A.C. lines without the use of a high-voltage transformer. The only transformers necessary being two center-tapped filament transformers reconstructed as described below. You can see readily that the circuit is not a new one, but I am sure that it will appeal to many short-wave enthusiasts who are limited financially and happen to have a couple of single-diodes lying around.

For small sets, whose over-all high-voltage drain is in the near vicinity of 30 milliamperes, the output voltage runs about 250 volts D.C. from 115 volts A.C. input. This milliamperage will very easily accommodate any of the 2 and 3 tube sets built by the amateur experimenter; even being sufficient to drive a small power tube included in the circuit. There is no doubt in my mind but that this is the cheapest high-voltage supply which can be built, considering the output that is obtainable. It is also universal—as the circuit is equally adaptable to both the 25Z5 double-diode, or to two single-diodes of the 81 type.

Concerning the transformers that are needed for the filament supply: there is no reason why anyone cannot rewind a couple of cheap bell transformers to the needed specifications and with satisfactory results. It is only necessary to remove the original secondary winding and replace it with heavier wire to the proper voltage by the cut-and-try method, or if an A.C. voltmeter is at hand, so much the better. The winding is then taken off again, counting the number of turns so that the center-tap can be accurately placed.



Simple circuit for Voltage Doubler.

Concerning the circuit diagram: V1 and V2 are single-diode tubes of the 81 type; T1 and T2 are the filament transformers made to the above simple specifications; C1 and C2 are electrolytic condensers with a capacity of 16 mf. each. It is important that these condensers be as large as possible, as they must carry the total voltage obtainable at the output of the rectifier. It is equally important to note that a dual condenser cannot be used at this point if the two condensers incorporated have a common ground, as they must be wired into the circuit as shown in the diagram. C3 and C4 are condensers commonly used in rectifier filter circuits and have a value of 6 to 8 mf. each; L1 and L2 are the iron-core power choke inductances of 30 henries each. The lower the resistance of these two units the higher will be the D.C. output. This rectifier was successfully built and tested by the author.—FRANK H. TOOKER.

Here's the "5-in-4" receiver "under test."

Build This "5 in 4" All-Wave

This receiver is of reasonable first cost and operates on 110 volts, A.C. By the use of modern tubes, four tubes do the work of five. Plug-in coils are used and the set operates a loud-speaker.

● EVER since the early days when *broadcast radio* was in its swaddling clothes, the three- or four-tube circuit using a tuned-radio-frequency stage, a regenerative detector and one or two stages of audio has been a popular and highly efficient type of receiver. After the advent of the screen-grid, pentode and duo-triode tubes, the circuit was still further improved until today the "t.r.f." set of modern design is, beyond a doubt, the best for the beginner ham or fan who wishes to avoid the intricacies of building and adjusting a good superheterodyne.

Ideal Set for Beginner

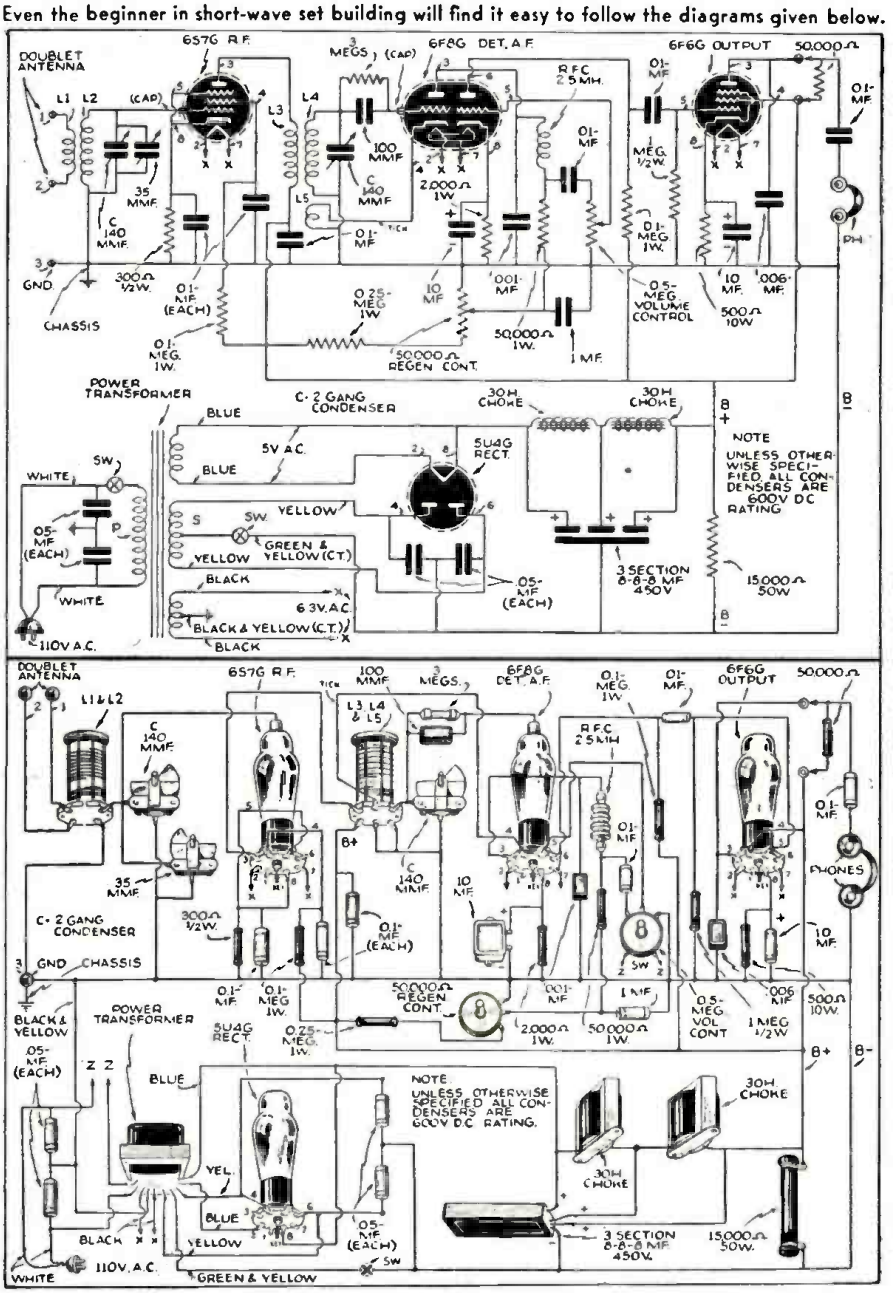
The 4-tube t.r.f. receiver to be described here is designed especially for the experimenter who has had little or no experience in radio construction. The circuit has been kept as simple and straightforward as possible and only easy-to-get parts of standard manufacture have been used throughout. Plug-in coils simplify the band-changing problem and give a flexibility obtainable by no other method. A detachable shield covers the r.f. coil, eliminating shielding difficulties and presenting a more finished appearance to the chassis.

The schematic diagram, fig. 1, shows the circuit which consists of a 6S7G as tuned-radio-frequency stage, a 6F8G as a combination regenerative detector and first audio and a 6F6G as pentode output tube; the rectifier is a 5U4G. With the exception of the 6F6G, all of the above tubes are of rather recent release, the 6S7G being a new r.f. and i.f. pentode similar to the 6K7 but having a heater drain of only 0.15 amperes; the 6F8G is a new dual-triode having *two separate* cathodes. This tube was featured by W2AMN on page 686 of the April number. The 5U4G is similar in characteristics to the older 5Z3 and is certain to find a wide application in both *short wave receivers* and *transmitters*. All of the tubes are of the new standard octal-base type.

Vernier Dial Gives Razor-Sharp Tuning

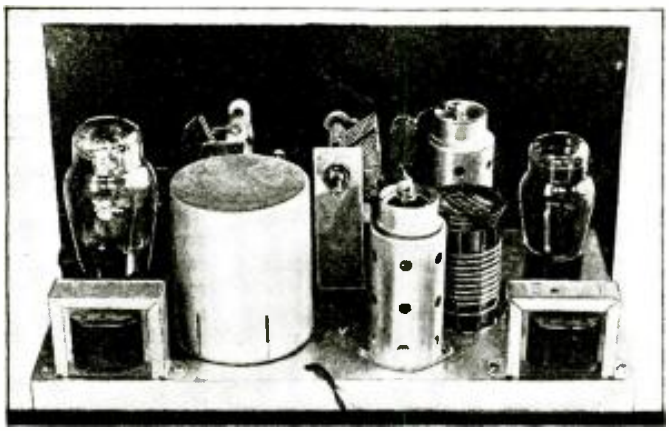
The set is, as the photographs and drawings show, built up on a 7 x 12 x 1¾ inch chassis and a 7 x 14 inch steel panel. Both are supplied as standard with the specified cabinet. The various controls on the front, left to right, are as follows: Regeneration control, tuning dial, audio volume control and, at the upper right of

Even the beginner in short-wave set building will find it easy to follow the diagrams given below.



T. R. F. Receiver

Harry D. Hooton, W8KPX



The rear view of the receiver, reproduced at the right, shows the very neat arrangement of the parts. Note the shielded R.F. coupling coil at the left center.

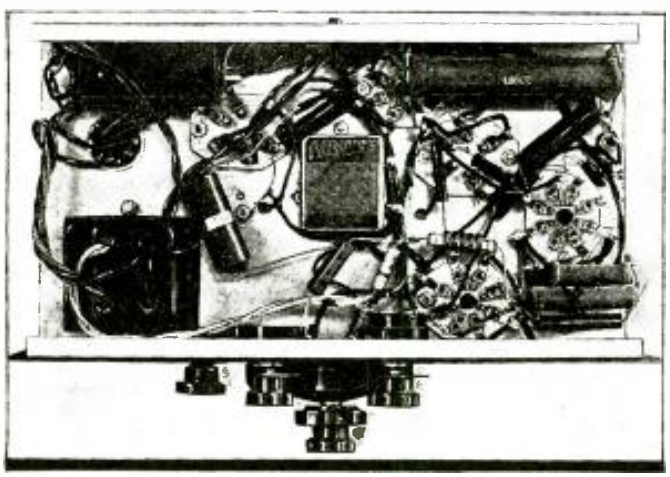
the dial, the 35 mmf. r.f. trimmer condenser. The airplane dial used on this receiver is rather interesting, inasmuch as it mounts directly on the front of the panel, no larger circular cut-out being required. The dial ratios of 30:1 and 165:1 permit actual *razor-edge* adjustments on *any* signal no matter how weak or long distant it may be.

The actual construction of the receiver is not at all difficult but in order to do a good job the work should be done slowly and carefully. Lay out the various lines on the chassis and panel as shown in Fig. 2. Draw out the outlines of the socket holes and the transformer cut-out with a sharp-pointed instrument such as a scriber; never use an ordinary lead pencil for this purpose as the sharp point will wear away, giving rise to inaccuracies. Drill and cut *all* of the holes before mounting any of the parts; metal dust or filings, once imbedded in the isolantite insulation of the sockets and tuning condensers, is almost impossible to remove and is certain to cause heavy r.f. losses if not an actual short-circuit. Make certain that the holes for the coil sockets are large enough to permit the coils to be changed without having the prongs come in contact with the metal chassis. All burs and sharp points of metal should be removed with a file and steel wool or sandpaper before the parts are mounted.

Keep Leads Short!

Keep the wiring, especially the "hot" leads from the grids and plates of the 6S7G and 6F8G tubes to the coil sockets and tuning condensers, as *short* and *direct* as possible. Use a clean, hot and well-tinned iron and rosin-core solder and *sweat* each joint thoroughly to insure a good connection. Avoid the use of metal clips and lugs; these are unsatisfactory soon after the surface becomes oxidized and oxidization starts the moment that copper comes in contact with the atmosphere. It is not necessary to keep the audio and power wiring leads as short as that of the r.f. portion,

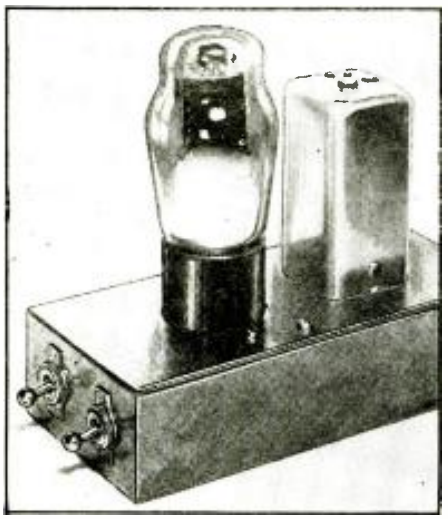
(*Continued on page* 303)



The bottom view of the receiver discloses no unusual amount of intricate construction, and the set can be built by practically any one after a careful study of the text and diagram.

A Beat-Frequency Oscil-

It Helps to Locate Those Weak DX Stations



The complete beat-frequency oscillator.

● THE widespread use of *all-wave* receivers has resulted in a large number of their users becoming enthusiastic short-wave listeners. Hunting for faint DX signals requires not only a certain amount of skill, but is greatly facilitated by the use of proper auxiliary equipment. When tuning a receiver, the louder stations are readily heard because of their greater signal strength. The weaker stations, generally the better "catches," are barely perceptible. This is especially true when turning the dial rapidly. If, as is quite often the case, the station merely has its carrier on the air, with no signal modulating it, the listener will be unaware of its presence. Foreign stations have not the same regard for split-second timing of programs that American stations have, so that between programs and even during programs there are frequent gaps during which the carrier is unmodulated.

A device that will indicate the presence of a carrier, even though unmodulated, therefore, becomes an extremely useful gadget for the short-wave receiver. For use in superheterodyne receivers such a gadget is a *beat-frequency oscillator*. It is incorporated in all communication receivers, but unfortunately is found in practically none of the short-wave supers used for short-wave broadcast reception. A beat-frequency oscillator can be built into an existing receiver, but since most set owners dislike the thought of diving into a complicated receiver to make the necessary additions, a separate self-contained unit is desirable. Thus no changes are necessary to the receiver proper.

How the Device Works

Before going into the description of the beat-frequency oscillator constructed by the writer, it might be well to briefly state the principles of its operation. The tremendously high frequencies encountered in the intermediate amplifier of a superhet are generally in the order of 456,000 cycles per second. Since the human ear usually responds to a maximum of about 20,000 cycles, it would be impossible for one to hear such frequencies. When the carrier frequency is modulated by speech or music, it is the variations in carrier strength that are intelligible to the ear. But when the carrier is unmodulated, the difficulty in recognizing the signal is evident. If the output of a local oscillator is mixed with the signal, the two signals will interact to give the phenomena of "beats"; that is, a third signal will result, whose frequency is the difference in frequency between the incoming signal and the locally generated signal. The radio enthusiast is probably aware that the same phenomena occurs in the input circuit or first detector of the superhet, where a variable high frequency oscillator beats with the incoming signal to produce a fixed frequency intermediate frequency, which is then amplified by the intermediate frequency amplifier, before being detected for the second and final time. The local fixed frequency to beat with the intermediate frequency is generated by the beat-frequency oscillator. By mak-

Diagram for the beat oscillator.

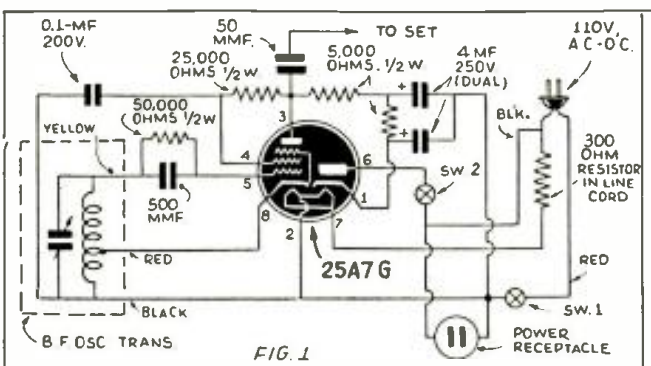


FIG. 1

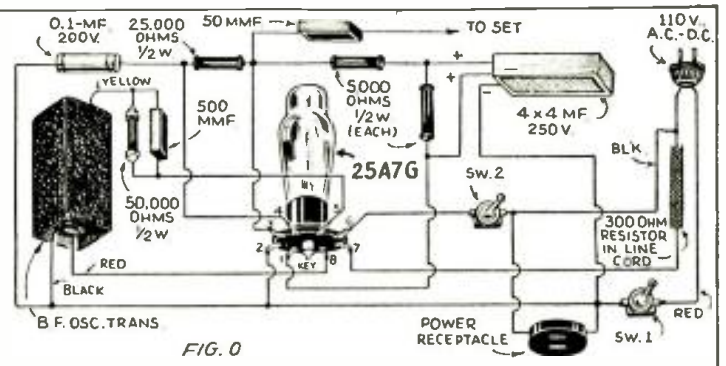


FIG. 0

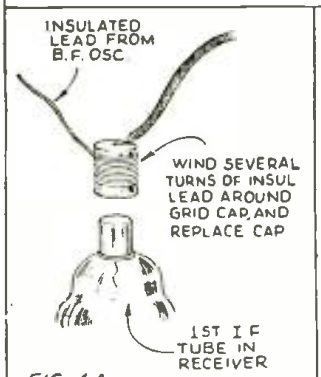


FIG. 1A

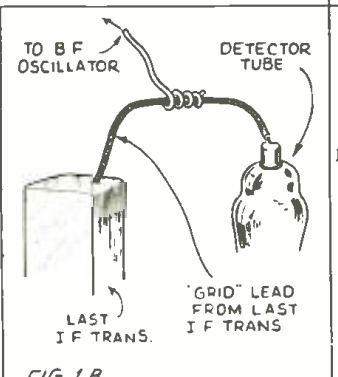


FIG. 1B

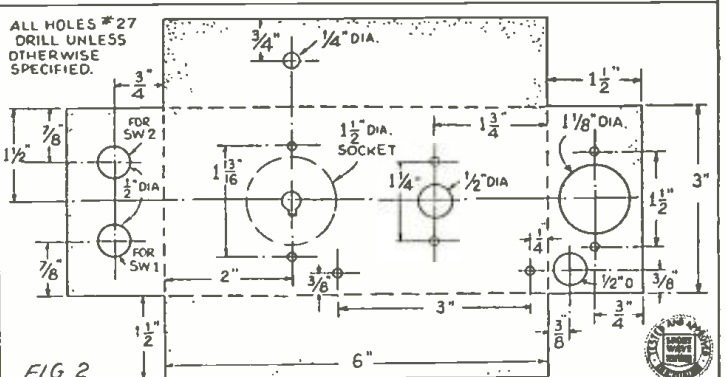


FIG 2

lator

Herman Yellin, W2AJL

ing the beat oscillator frequency about one kc. different from the I.F. frequency, the beat frequency of one kc. (1000 cycles) will be a high-pitched whistle, pleasing to the ear and easily recognizable. Thus weak stations can easily be picked up merely by listening for the high-pitched whistle. When the whistle is heard, the beat-frequency oscillator is turned off — and there is your station.

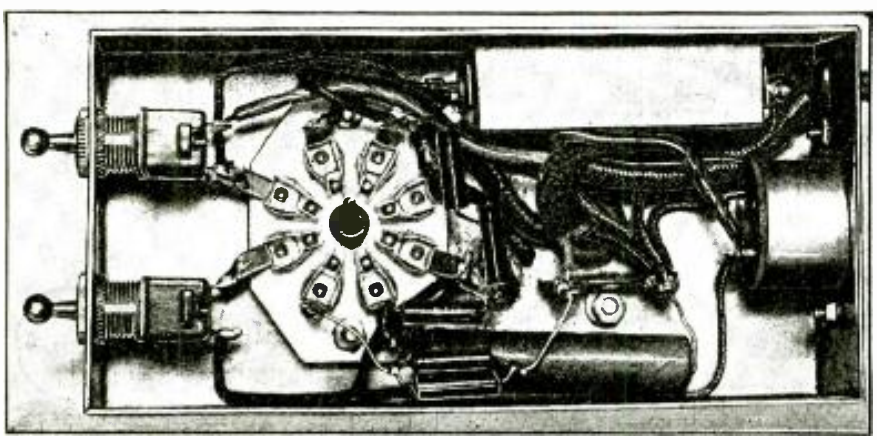
B.F.O. Brings in Code, Too

When listening to c.w. (code) stations the beat-freq. oscillator is an absolute necessity, since without it the code signals could not be heard. A beat-freq. oscillator is thus seen to have two uses. Not only is the reception of weak DX phone stations facilitated by its use, but one can eavesdrop on the amateur bands. The SWL desirous of learning the code may take his choice of any one of a number of slow-sending code stations. Incidentally there are a number of amateur stations sending code lessons on regular schedules.

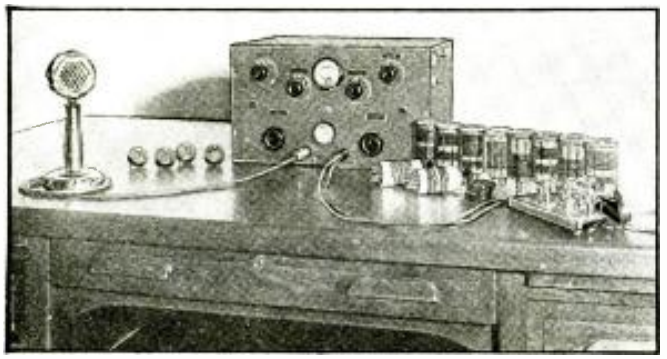
In adding a beat-freq. oscillator to a superhet, it is often undesirable to impose any additional drain on the power-supply of the receiver. Many broadcast short-wave receivers are unable to furnish the additional power, slight as it is. Frequently the additional drain on the power-supply will throw the receiver off its calibration. The present design of beat-freq. oscillator therefore has its own *built-in* power supply, operative on either a.c. or d.c. Rather than use separate tubes for the oscillator and rectifier, one of the newer dual-purpose tubes was employed. This tube is the 25A7G, an octal base tube having in one envelope a pentode section and a diode rectifier section. The two sections are entirely separate, having individual cathodes. A 300 ohm resistor built into the line cord drops the 110 volts to 25 volts. The chassis can be made from a piece of sheet metal 6" x 9". 1½" square pieces are cut from the corners and sides of the chassis bent as shown by the dashed lines. All holes and their sizes are clearly shown on the drawing. The hole for the tube socket should be made large enough for the tube base to fit through. This is done so that there will be no gap between the socket and the bottom of the tube base. A gap will prevent the tube from making adequate contact with the socket springs.

It will be noticed that a 110 volt outlet has been provided on the rear of the chassis. This enables the user to plug his short-wave receiver into the beat-freq. oscillator unit and thereafter turn on the "BFO" and the receiver at the same time SW-1 on the "BFO" unit controls the line

(Continued on page 309)



Bottom view of the oscillator.



The complete portable transmitter with "mike" and wave-change coils.

Portable

This phone transmitter operates on 160, 80, 40, 20 and 10 meters. Coil data is given for all these bands. The construction cost is nominal. Band-change made in 30 seconds.

● THE object kept in mind when contemplating construction of this portable transmitter, was to incorporate enough power output on all bands to enable one to compete with the present day QRM, and still keep the physical size within *portable* limits.

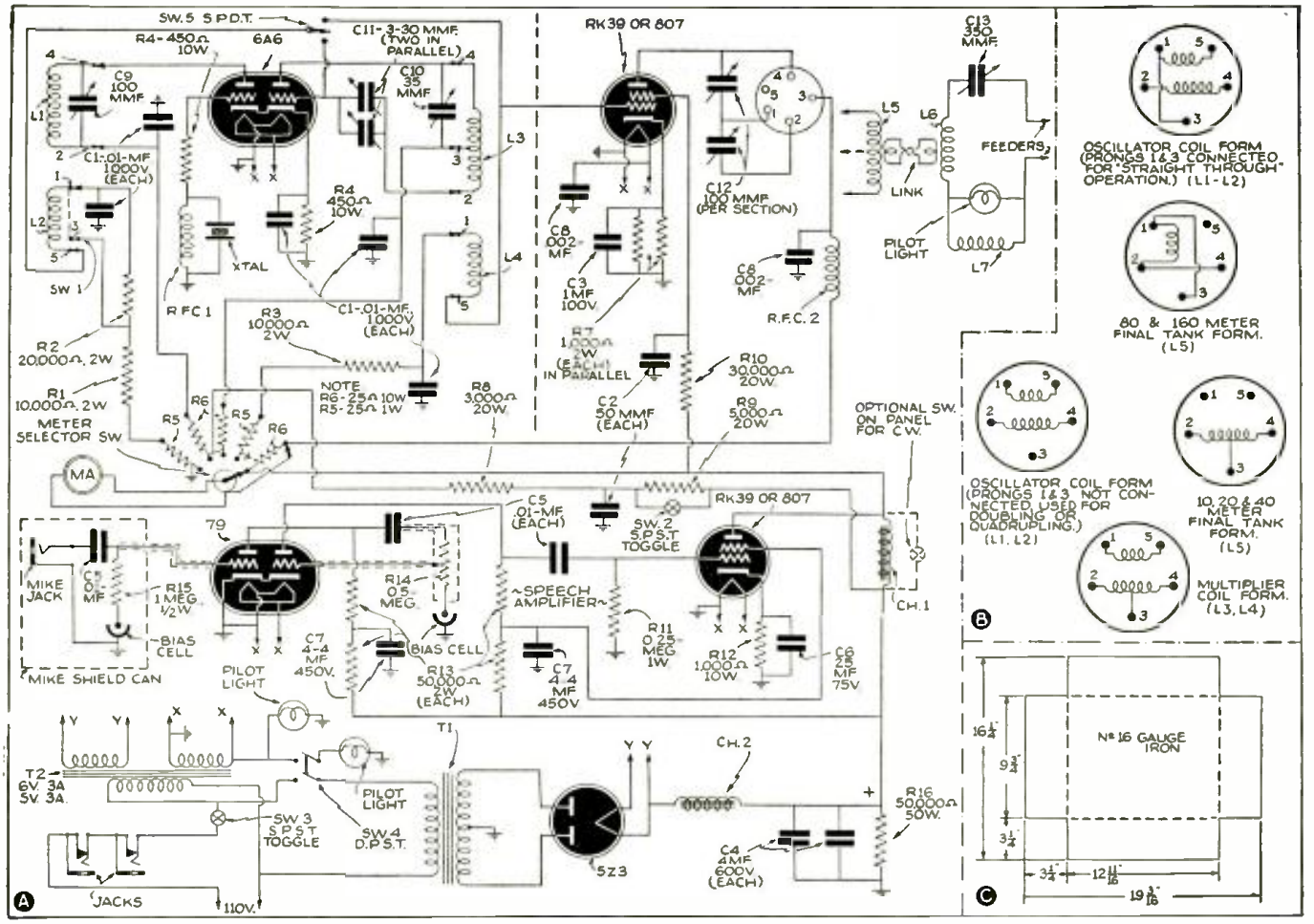
The metal cabinet measures 8 by 10 by 14 inches. The power output is between 25 and 30 watts on all bands. Band-changing can be accomplished in about 30 seconds. The inductive coupling between stages minimizes the number of tuning controls, but still delivers ample excitation to the final amplifier. All R.F. current readings are accomplished with the meter selector switch, thereby eliminating bulky jacks and plugs or additional meters. All tuning adjustments are brought through the front panel with the exception of the oscillator condenser, which is mounted within the oscillator coil form. The crystal plugs in from the front for additional convenience.

Construction Details

Care should be exercised to properly shield the complete *speech amplifier* and to shield the *final amplifier* from the preceding stages, as shown in the photographs. The microphone jack shield contains the bias cell, coupling condenser, and grid resistor for the first triode of the 79 tube. The tube itself is completely shielded both below and above the chassis. A large size shield can is cut off in order to make a shield can for the gain control. The leads to the gain control and from the microphone jack to the grid of the 79 (first triode) are also shielded. The 79, 5Z3, and both RK-39's are mounted below the chassis about one inch.

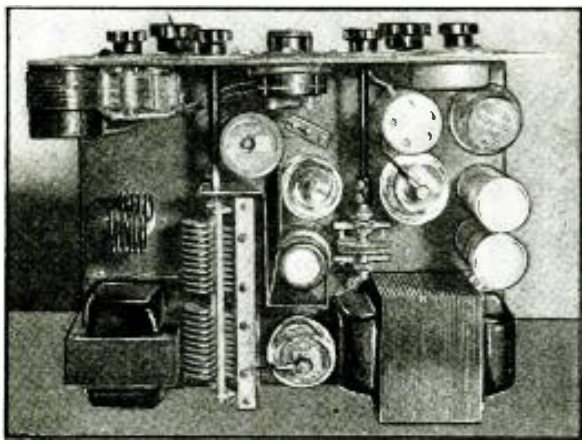
A number of meter selector switches were tried until the present one was employed. The first type used was of the receiving type and would arc over occasionally. The present switch is of the band-switching type and has a 1,000 volt spacing between contacts. However, if it is desired to take the readings in the cathode instead of the plate leads one of the smaller type would be quite satisfactory. The windings of the power transformer, modulation and filter chokes oppose each other in order

Wiring diagram of 30-watt portable transmitter.



30-Watt Xmitter

J. E. Striker, W6MOV, W6OPG



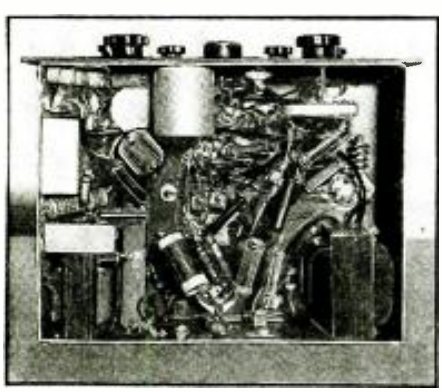
Top view of transmitter, removed from its metal case.

to eliminate the possibility of induced hum.

Switch No. 1 is merely a connection between prongs No. 1 and No. 3 on the 160 and 80 meter oscillator coil forms. When switch No. 5 is in the *up* position the bias resistor R 1 is in the grid circuit of the RK-39. When the switch is in the *down* position R 3 is then the bias resistor for the RK-39. To enable the final amplifier to have the correct bias at each position, a portion of the resistance R 2 is shorted out by this means. If this particular arrangement is not done the final amplifier will be excessively biased when the R.F. section is operating *straight through*. However, when it is desired to *double* in the low frequencies, such as from 160 meters to 80 meters, the connection can be left on the coil form. There is no lack of excitation on any of the bands, due to the fact that the beam type tube seems to be dependent upon voltage and current for maximum efficiency, rather than drive to the grid. 2 ma. is all that is necessary to drive the beam tube to full output, but when it is used as a modulated amplifier it is best to have about 4 or 5 ma.

The communication switch is preceded by the filament switch, so that it would be impossible to apply the plate voltage without the filaments being turned on.

To accomplish the most necessary item in a phone transmitter (correct L-C ratio) an automatic switching arrangement is incorporated within the final tank coil forms. As can be seen in figure No. B, the 10, 20 and 40 meter coils are wound between prongs No. 2 and No. 4, with the center tap connected to prong No. 3. The 80 and 160 meter coils are wound between prongs No. 1 and No. 2. Prongs No. 1 and 3 are connected together as are prongs No. 2 and 4. One stator of the final tank condenser is connected to prong No. 2 of the final tank coil socket, while the other stator is connected to prong No. 4. The rotor is connected to the socket prong No. 1. The 80 and 160 meter coils are not center-tapped as are the 10, 20 and 40 meter coils. Greater output was obtained by center-tapping the 10, 20 and 40 meter coils and by end-feeding the 80 and 160 meter coils. Through this system there is no compromise on any band as far as "Q" is concerned. When the 160 or 80 meter coil is inserted, there is an available 200 mmf. as the two sections are placed in parallel. When using the 40, 20 and 10 meter coils the final tank condenser is then in split-stator or series position with maximum capacity of 50 mmf. and minimum capacity of 6.5 mmf.



Bottom view of transmitter.

The pilot light in the center of the front panel is in series with the antenna circuit and is used as a modulation and tuning indicator. To keep the light from burning out, it is necessary to shunt it with about 12 turns of No. 20 wire on a form approximately ¼ inch in diameter. A 6.3 volt light is used. The pilot light on the right side of the panel is the filament indicator. The one on the left side operates simultaneously with the communication switch (SW. No. 4). SW. No. 2 is mounted on the rear of the chassis. Two jacks (closed-circuit type) are used. One in the front of the panel and one in the rear. These are connected in series with the SW. No. 4. The one in front is used to insert the key while the one in the rear can be used for a remote control. Keying the primary in this manner worked quite well when using one of the better crystals. There was no chirp noticeable whatsoever. If, however, it is desired to key faster than 20 words per minute it

(*Continued on page* 301)

Home S-W Diathermy Apparatus

● THE accompanying picture shows one of the latest types of home short wave diathermy apparatus. The picture shows the two electron pads placed in their proper position for application to the chest. The apparatus shown is especially intended for operation at home by the average person. The weight is about 40 lbs. The cabinet stands 21" high x 14" wide and 11" in depth. The deep heat therapy produced by these short wave diathermy machines is effective in the relief of many human ailments; with the machine illustrated, actual tests have shown that a very strong heat effect can be produced in the hand, foot, leg or arm within a few minutes.

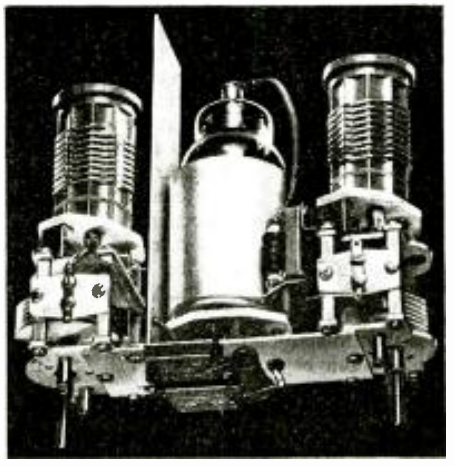
The difference between the modern short wave diathermy apparatus and the older type of diathermy machine lies in the fact that in the new system, the current is oscillating at many hundred thousand cycles per second and the heat effects are more deeply penetrating.

The home apparatus shown operates on a wave length of 15 meters and the approximate output is 200 watts. The improved circuit makes use of a single self-rectifying power tube, and the tubes carry a factory guarantee of 1000 hours of life. The oscillator may be tuned for different frequencies by means of a single dial and can be adjusted for mild or strong effects. The short wave diathermy apparatus is built on a special chassis and encased in a brown Dupont fabrikoid case, handsomely finished.

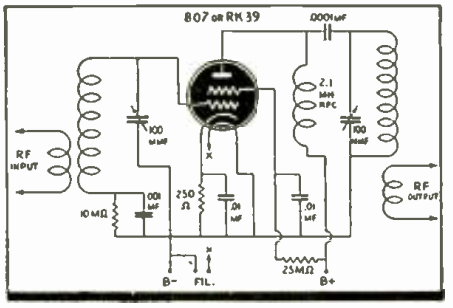
(This article has been prepared from data supplied by courtesy of the Scientific Diathermy Corporation.)

Home S-W Diathermy apparatus in use for chest treatment.

New Transmitter Kit



The new buffer-driver unit.



Basic circuit of the BD-40 kit.

● A NEW buffer-driver foundation kit for use with the PA-300 foundation kit has been announced by Hammarlund as the second in a series of amateur transmitter kits. The new unit, known as the BD-40, employs either an 807 or an RK-39 beam tetrode tube. It can be used either as a 40-watt output stage for a low-powered compact transmitter or as a driver for a higher-powered stage, such as the PA-300.

The kit includes everything necessary for assembly, including all hardware. As the photo shows, all the component parts are mounted either on a base plate which is fastened to the two tuning condensers or on brackets also attached to the two condensers. The wiring diagram shows the fundamental circuit employed.

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

TINY ELECTROLYTICS

● A NEW metal-cased electrolytic condenser of extremely small size with an insulating jacket has been marketed by Aerovox. It is provided with 3½-inch pigtail leads and the protective jacket is spun over the end of the metal can so that these leads cannot possibly short to the can.

The condenser is available in capacities

of 4 to 40 mf., and in working voltages of from 100 to 450.

This article has been prepared from data supplied by courtesy of Aerovox Corporation.

BOOK REVIEW

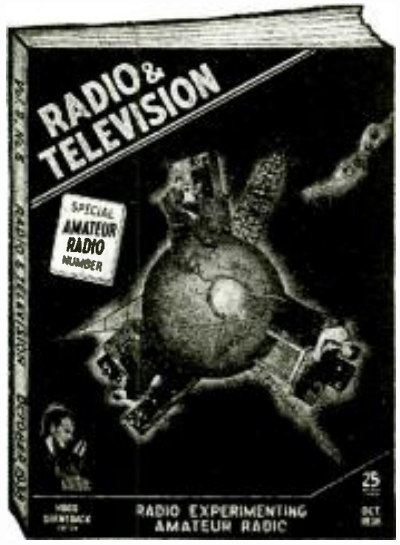
FREQUENCY CONTROL WITH QUARTZ CRYSTALS, Engineering Bulletin E-6. Published by the Bliley Electric Co., Erie, Pa.

This is a very valuable booklet of twenty-eight pages which every ham and serious radio experimenter should have for careful study. Many valuable diagrams are given and the complete story of the quartz crystal in its rôle of a frequency stabilizer is set forth so that anyone can readily understand it. The effects of temperature on crystals, various modes of vibration, different types of crystal holders, etc., are given.

We then come to a valuable section dealing with crystal-control oscillators, low frequency oscillators, frequency standards, primary and secondary standards of frequencies, the multi-vibrator, etc. No radio library is complete without this authoritative treatise on quartz crystals.

PRACTICAL RADIO MATHEMATICS, a Booklet for Home Study, by M. N. Beitman, B.S., 20 pages, illustrated, heavy paper covers. Published by Supreme Publications, Chicago, Ill.

This is a very useful treatise on the mathematics of radio for the home-study student. Numbers, fractions, decimals and the simplest basic formulas are first explained. The author then describes the meaning of such prefixes as milli and micro, radio examples of Ohm's law, how rectifier circuits are calculated, the calculation of wattage, etc. The calculation of resistance in series and parallel circuits, the calculation of inductive reactance, tables and formulas for calculating the different values of the decibel, etc., are also given fully.



With the October number, *Short Wave & Television* will change its name to RADIO & TELEVISION. See inside front cover for details.

PRINCIPLES OF RADIO, Keith Henney. Size 5¾" x 8", 300 pages—illustrated, cloth bound, 496 pages. Published by John Wiley & Sons, N. Y.

This is the third edition of one of the best known hand-books on radio technical matters. It is a book which can be highly commended to those just entering the radio field and who wish to obtain a complete treatment of the subject. The opening chapters deal with the all-important fundamentals of electricity, the electron, the electric current, volts, amperes, watts, etc.

Then the author takes up the simple elements of curve plotting, Ohm's law, detection and measurement of voltage and current, how ammeters and voltmeters work and the measurement of resistance. Other important topics are—production of current by batteries, magnetic laws, alternating and direct current, coupled circuits, the meaning of self-inductance and the measurement thereof, the transformer and how it works, etc. The theory of condensers and series and parallel connections of these units are discussed, also the properties of alternating current circuits, what impedance means, as well as an explanation of capacitive and inductive reactance.

Resonance, high-frequency resistance, distributed capacity and the properties of coils and condensers in radio circuits are explained clearly. The vacuum tube is allotted a liberal portion of the text and the elementary action of the grid and plate is clearly delineated. The use of the VT as an amplifier is explained with diagrams and clearly-written text. The various types of amplifier circuits, including the push-pull, Class B, and others are covered. Also the design of A.F. amplifiers, high frequency amplifiers, band-pass receivers, AVC, etc.

Rectifiers and power-supplies are described. Also oscillators and transmitters are described in detail. Antennas, transmission, especially short-wave transmission, anti-fading antenna systems, automobile aerials and a section especially devoted to facsimile and television transmission and reception are included.

LIE DETECTOR TESTS, William Moulton Marston. Stiff cloth covers, size 6" x 9", 180 pages. Published by Richard E. Smith Co., New York City.

Every student of science and criminology will find this book tremendously interesting and valuable. All of the various types of lie detectors are discussed and the ones finally found reliable are described. The reviewer found this book so interesting, especially in the chapter dealing with the Hauptmann case, that he could hardly lay it down.

A section is given which will prove interesting to police officials and the more technically inclined readers. A number of interesting graphs or charts of respiration and blood pressures are reproduced to show what happens when a subject attempts to lie. After reading this book it would seem that tomorrow everyone having to handle money or important documents in civilian and government bureaus will most likely have to pass a lie detector test, before they are finally appointed to the job. This, for the very good reason that actual tests showed that 33% of the employees in one bank had, at one time or another, taken money that did not belong to them.

This latest book on the science of lie detection (pardon us, "deception tests") as applied to banks and various other businesses, as well as for court cases of all kinds, makes most interesting reading.

HANDBOOK OF CHEMISTRY AND PHYSICS—22nd Edition, Editor-in-Chief—Charles D. Hodgman, M.S. Flexible leatherette covers; gold stampings; size 4½" x 6¾"; 2,070 pages, gilt edges. Published by Chemical Rubber Co., Cleveland, Ohio.

The science and radio student will find this handbook of the greatest value, containing as it does a tremendous amount of information in cyclopedic form on mathematics, chemistry and physics, tables covering all of the usual trigonometric functions, as well as logarithms and antilogs. The chemical tables are very elaborate and cover a considerable section. The elaborate table on physical constants of inorganic compounds, together with the table giving the constants of organic compounds, is worth the price of the book alone.

Other tables giving the properties of commercial plastics, the common names of chemicals and formulas, etc., are contained therein. The heat of formation and solution are covered in tabular form. The specific gravity for different concentrations of solutions such as acetic acid, aluminum chloride, aluminum sulphate, etc., are given. Tables for sulphuric acid, tannic acid and zinc sulphate are given, including ethyl alcohol.

Tables on the "properties of saturated steam" are included; also elaborate tables covering the specific resistivity of various metals. The basic laws and formulas for electricity and magnetism are presented for handy reference, as well as all types of tables and values for the various units of measurements, including the metric system.

The section on radio includes many basic formulas for calculating capacity and inductance, the various values of LC, data on radio tubes, including tables giving complete data on various television and commercial vacuum tubes—information not found in the average text-book.

Transmitting tube data is also tabulated, as well as different types of gaseous rectifiers, and diagrams are given of the various tube base connections.

Valuable recipes for various cements and other similar mixtures are given, including graining solutions, grinding mediums, glass silvering formulas, etc.

A tremendous compilation of scientific data covering every conceivable branch of pure and applied science, thoroughly indexed, is here presented in a single volume. All in all, it forms a book which should certainly find a place on every student's library table.

DX Receiving Aerials

(Continued from page 281)

Wavelength (Metres)	*¼-wave Feeder Section.*	*½-wave Aerial (in 2 ¼-wave halves)*
25 m. B/C band	19 ft. 10 in.	39 ft. 7 in.
31 m. B/C band	24 ft. 6 in.	49 ft.
49 m. B/C band	38 ft. 2½ in.	76 ft. 5 in.

The spacing of the feeders in the quarter-wave matching stub is rather critical, and the line must be kept taut. Each side of the line must be of the same length, and must be symmetrical with respect to the ground. Any bends must be gradual if losses are to be reduced to a minimum. In addition the transposed transmission line must be kept at right angles to the aerial for a distance at least equal to one-third of the total length of the aerial.

A further variation of the half-wave doublet is effected by increasing the length of each section of the aerial to a half wavelength (i.e., the total length is equal to a full wavelength). As in the case of the Johnson Q the twisted lead-in is attached not to the centre of the aerial, but to a quarter-wave matching stub, in which the wires are spaced from 4 to 6 ins. apart. (See diagram 3.)

This aerial will also function very efficiently on a wavelength equal to twice its total length in metres. Thus if designed for 20 m. reception, it will give good results on 40 m.

The directional qualities of both these improved half-wave doublets are much the same as those of the simple half-wave doublet, being, if anything, more pronounced—there is less endwise pick-up.

The "V" Antenna

Next to the single wire aerial, the easiest to construct for directional effects is the "V." Two examples of this are shown in diagrams 4 and 5. In diagram 4 the side wires are a full wavelength in length, and form an angle of 110 degrees: they are connected to a quarter-wave matching stub (as in diagrams 2 and 3). In diagram 5 the side wires are longer, each two wavelengths, and the angle is accordingly less, 75 degrees.

These "V" aerials are extremely directional—bi-directional.

"V" Antenna Angles

(Setting out the angle between the two legs of a "V" aerial for various leg lengths.)

Leg-Length (in Wavelengths)	*Angle*
½ wavelength	160 degrees
1 wavelength	110 degrees
1½ wavelengths	90 degrees
2 wavelengths	75 degrees
3 wavelengths	65 degrees
4 wavelengths	50 degrees

Diamond, or Rhombic Antenna

A considerable improvement on the "V" aerial is the diamond, or rhombic aerial shown in diagram 6. This is simply a "V" aerial backed up against another "V."

The diamond aerial should not be tilted in any plane. In other words, the poles should be the same height, and the plane of the aerial should be parallel with the ground. Tilting the aerial merely interferes with its directional qualities.

In constructing the diamond it is important to consider the angle A, which varies with the length of the sides (see following table).

Diamond Antenna Angles

Length of Sides (in Wavelengths)	*Angles (see diagram 6)*
1 wavelength	60 degrees
1½ wavelengths	80 degrees
2 wavelengths	95 degrees
3 wavelengths	115 degrees
4 wavelengths	125 degrees

If the terminating resistance, R (diagram 6), is included, the diamond aerial is not critical with respect to frequency, and gives an evenly good performance over a wide range. In this respect it is much superior to the aerials previously discussed. With the inclusion of R the aerial is uni-directional as indicated in diagram 6.

With the elimination of the resistor (R), we have a tuned diamond aerial which is quite suitable for U.H.F. work. It is bi-directional (diagram 6).

The "V" Doublet

The "V" doublet (diagram 7) is probably the best aerial for all-wave reception. It differs from the elementary doublet, which tends to favor certain frequencies and reject others.

The "V" doublet is coupled to the transmission line by the converging "V." This makes the doublet respond uniformly to a wider range of shortwave signals; and the "V" matches the doublet more perfectly to the transmission line, so that the signal transfer is smooth. The reason for this is simple. At the top, where the spacing is wide, the characteristic impedance is high and comparable to that of the doublet, at the bottom, where the wires are close together, it is low to match the low impedance of the transmission line.

The "V" doublet illustrated in diagram 7 will give reasonable results between 16 and 50 metres, with the optimum response on 16 and 25 metres.

The "Triple V" Doublet

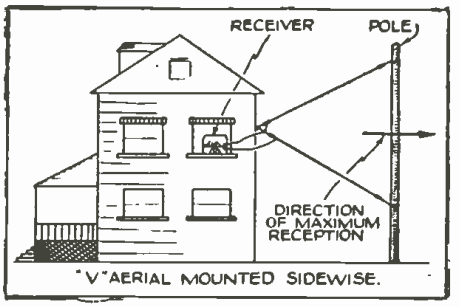
The "Triple V" doublet shown in diagram 8 is essentially the same as the standard "V" doublet of diagram 7. Its chief advantage lies in the fact that it requires less space—having a span of only 40 feet, instead of the 50 feet required by the "V" doublet.

As in the case of the "V" doublet the dimensions given in the diagram are designed to give good performance over the short-wave broadcast bands.

The Inverted "V"

The inverted "V" aerial (shown in diagram 9) consists of a wire supported in the form of an inverted "V" by a tall pole. One end of the wire is grounded through a none-inductive resistor of 400 ohms, whilst the other end is fed to a transmission line, which is transposed at convenient intervals.

(Continued on page 320)



An idea! Erect the "V" aerial sidewise—the maximum reception lies in the direction of the open "V."

Portable 30-Watt Xmitter

(Continued from page 297)

would be advisable to provide a well insulated switch to short out the modulation choke so that surges through same would not cause arcing at the base of the 5Z3 rectifier tube.

If these details are followed out in accordance with the above data there shouldn't be any of the usual *bugs* found in most circuits, as they have actually been ironed out in practise and not just on paper. The reports on quality have been most gratifying and with a number of measuring devices employed from time to time, it was proven that 100% modulation was obtainable without a trace of audible distortion. Numerous foreign countries have been *worked* on 10 and 20 meter phone, with R reports exceeding all expectations.

Operating Instructions

For 160 meter operation insert crystal, oscillator coil, and final tank coil. Place SW. No. 5 in the *straight through* or *up* position. There is no trick in tuning up the transmitter for anyone familiar with such apparatus, as there are only three readings necessary. It is not advisable to load the final past 80 ma. About 5 ma. excitation is plenty and in fact the crystal will have to be slightly de-tuned to keep from overdriving the final amplifier. Oscillator current should be about 35 ma.

For 80 meter operation the above can be followed through in the same manner, if it is desired to do so. However, an 80 meter crystal is necessary.

If it is preferred to double to 80 meters with a 160 meter crystal it will be necessary to place SW. No. 5 in the *double* or *down* position. Then, of course, the second triode of the 6A6 is brought into play as a doubler and tuned up in the conventional manner.

For 40 meters the instructions would be the same as that of 80 meters.

For 20 meter operation a 40 meter crystal can be used or an 80 meter crystal with the second triode of the 6A6 picking up the 4th harmonic.

On 10 meters a 40 meter crystal is used with the second section of the 6A6 picking up the 4th harmonic. SW. No. 2 is in the *on* position, thereby raising the voltage slightly to the 6A6. C11 will have to be adjusted until ample output is obtained to properly excite the final amplifier. This condenser is the most critical adjustment in the complete circuit. It controls the regeneration of the multiplier section of the 6A6. It was found best to adjust this so that maximum output was obtained without the circuit "taking off," and then very slightly reducing the capacity. With the crystal removed there should be no trace of R.F. whatsoever. It is further advisable to make this adjustment with the plate and screen voltage off the final amplifier. After this procedure is completed once, it need not be necessary to ever adjust C11 again. In fact, it is advisable to place the transmitter in operation on the 10 meter band first. The antenna coil and condenser (L5 and C13) need not be used on any band, provided the antenna is of the doublet or some other untuned type. Where a Marconi or Zepp type antenna is desired, the final tank coil can be linked to the antenna coil with two turns on each coil.

The plate current on the 6A6 should not exceed 40 ma. and the voltage should be kept under 300 (measured between cathode and plate).

It was found that cheaper makes of 6A6 tubes would not function at all in the oscillator-multiplier section of transmitter. There has been no instability in the oscillator, even though regeneration is employed.

The final amplifier operates quite well loaded to 80 ma. on each of the above mentioned bands. No neutralization is necessary on this type of tube on any band. Minimum current on 10 meters is 14 ma. and graduates down to 8 ma. on 160 meters.

The reason for connecting the two 1,000 ohm resistors (R7) in parallel was that the inductive type didn't function properly on 10 meters. In order to obtain a resistor with a four or five watt rating, these two non-inductive types were connected in this manner.

Not being able to obtain a padding condenser with the correct voltage rating the two small trimmers were placed in parallel. When one alone was used it would arc over occasionally, as the plates were too close together when it was adjusted to the required amount of capacity.

Parts List

AEROVOX (Condensers)

C1—.001 mf. 1000 v. oil
C3—1 mf. 100 v. paper
C4—4 mf. 600 v. oil
C6—25 mf. 75 v. electrolytic
C7—4-4 mf. 450 v. electrolytic
C8—.002 mf. mica

HAMMARLUND

C9—100 mmf. variable condenser, type APC-100
C10—35 mmf. variable condenser, type MC35-S
C11—30 mmf. trimmer condenser (2 in parallel)
SWF coil forms, as required
CF5 coil forms, as required

(Continued on page 307)

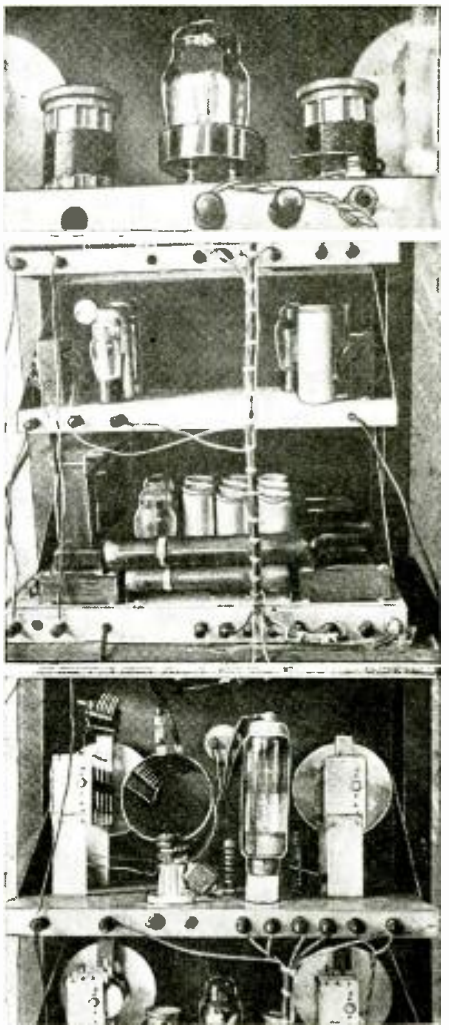
Coil Data

		160	80	40	20	10	
Oscillator L1	Number of turns	48	30	15			
	Wire size	26	22	18			
	Spacing btw. turns	None	None	None			
	Space btw. L1 & L2	¼ In.	5/16 In.	5/16 In.			
Frequency multiplier Grid L2	Number of turns	62	34	18			
	Wire size	28	26	24			
	Spacing btw. turns	None	None	None			
Frequency multiplier plate L3	Number of turns		42	23	13	7	
	Tap from top of coil		18	13	7	4	
	Wire size		20	20	18	18	
	Spacing btw. turns		None	None	Diam. of wire		
	Space btw. L3 & L4		¼ In.	¼ In.	⅜ In.	⅜ In.	
Final Grid L4	Number of turns		31	17	14	7	
	Wire size		26	24	20	18	
	Spacing btw. turns		None	None	Diam. of wire		
Final Plate L5	Number of turns	45	30	21	11	6	(1⅝ In.
	Wire size	20	20	18	18	14	outside
	Spacing btw. turns	None	Wire diam.				diam.)
Antenna L6	35 Turns No. 20 wire on a 2 inch form. Tap every 12 turns.						

10 meter final tank coil (L5) is air-wound and self-supporting. Three old tube prongs were soldered on the coil ends and center-tap and spaced the same as prongs 3, 4 and 5 would be on a regular 5 prong coil form. 20 meter final tank coil (L5) is wound on a Hammarlund form No. CF-5. 10 meter multiplier coils (L3 & L4) are also on form No. CF-5. All other coils are on the regular 5 prong coil form No. SWF-5. The SWF-5 coil form has provisions for inside mounting of C9 Hammarlund part No. APC-100.

Suppressor-Grid Control

(Continued from page 291)



Three photos above show respectively—rear view of crystal oscillator; modulator and power-pack; complete view of final amplifier.

Parts List for Transmitter

1—Low-loss 7-prong socket
3—Low-loss 5-prong sockets
1—SPST toggle switch
2—closed circuit jacks
4—four-prong sockets for coils
1—phone plug
1—0-100 ma. Triplett meter
1—0-300 ma. Triplett meter
1—crystal of selected frequency
1—SPST switch, rotary type
1—6-terminal strip
3—r.f. chokes, transmitting type
1—2 megohm, 1 watt resistor
1—75 ohm center-tapped resistor
1—0-5 amp. r.f. ammeter
1—.006 mf. mica condenser
1—.005 mf. mica condenser
1—.05 mf. 600 v. condenser
4—.002 mf. mica condensers
1—.005 mf. 2000 v. condenser
2—.0001 mf. 1000 v. mica condensers

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

Can YOU Answer These Radio Questions?

(Continued from page 268)

the new 6F8G dual triode tube, especially for T.R.F. receivers? See page 292.

11. How would you connect a beat oscillator; what is its purpose? See page 294.

12. How can regeneration be made use of in a crystal controlled oscillator for a transmitter? See page 296.

Build This "5 in 4" All-Wave T. R. F. Receiver

(Continued from page 293)

but these leads should not be excessively long. The various paper and mica condensers and fixed resistors are mounted directly on the parts themselves, being held in place by their own tinned leads.

Although the diagram does not show this, most of the *negative* connections, wherever this is practical, are brought out to a *single spot* on the chassis. This type of construction eliminates the losses and noise due to eddy currents which would result if the connections were made to several different points.

Be sure that the paper condensers are of good quality, especially the 0.1 mf. blocking condenser between the 6F6G plate and the crystal headphones; a small amount of direct current leakage through this condenser will damage the crystal phone elements beyond repair. Unless otherwise specified all paper dielectric condensers used in this receiver are of 600 d.c. *working* volts rating.

When the wiring has been completed, place the coils and tubes in their respective sockets and turn the regeneration control full-on. The detector circuit is now checked for oscillation by placing a finger on the fixed plates of the detector tuning condenser; if everything is correct, a loud click will be heard in the headphones immediately upon making the contact and another when the finger is removed. If no click is heard, this indicates a lack of oscillation and it may be necessary to *reverse* the tickler connections to the 6F8G cathode, or increase the detector plate voltage by reducing the value of the fixed resistor in series with the regeneration control and the "B"-plus of the power supply. If the detector seems to be operating, connect the doublet antenna leads to the receiver as shown in fig. 1 and turn up the audio volume control about three-fourths way full-on. Adjust the regeneration control until a slight hissing sound is heard in the phones, rotate the dial for a signal and set the r.f. trimmer condenser for best reception. The maximum sensitivity is obtained when the 50,000 ohm potentiometer is adjusted *just below* the point where oscillations begin.

Either a doublet or a plain single wire may be used for the antenna. If a single wire is used, the most efficient length for all-wave operation will be around 75 feet.

List of Parts

HAMMARLUND (Condensers)

1—Split-stator tuning condenser, 140 mmf. per section, MCD-140-M
1—Midget tuning condenser, 35 mmf., MC-35-S
1—Set 4-prong "XP-53" plug-in coils, SWK-4
1—Set 6-prong "XP-53" plug-in coils, SWK-6
1—Midget r.f. choke, 2.1 mh., CH-X
1—Detachable coil shield, CS-3
1—4-prong isolantite socket, S-4
1—6-prong isolantite socket, S-6
2—8-prong isolantite sockets, S-8
2—Aluminum tube shields, TS-50

I.R.C. (Resistors)

1—Fixed resistor, ½ watt, 300 ohms
1—Fixed resistor, 1 watt, 2,000 ohms
2—Fixed resistors, 1 watt, 100,000 ohms
2—Fixed resistors, 1 watt, 50,000 ohms
1—Fixed resistor, ¼ watt, 1 megohm
1—Fixed resistor, ¼ watt, 3 megohms
1—Fixed resistor, 1 watt, ¼ megohm
1—Volume control, 50,000 ohms (with A.C. switch)
1—Volume control, 500,000 ohms
1—Wire-wound resistor, 10 watts, 500 ohms
1—Wire-wound resistor, 50 watts, 15,000 ohms

AEROVOX (Fixed Condensers)

2—0.1-0.1 mf. paper condensers, dual type, 600 volts
1—0.1 mf. paper condenser, 600 volts (see text)
2—0.01 mf. paper condensers, 600 volts
1—1 mf. paper condenser, shielded type, 400 volts
2—0.05-0.05 mf. paper condensers, dual type, 600 volts
1—Dual electrolytic condenser, 10-10 mf., 50 w.v.
1—Triple electrolytic condenser, 8-8-8 mf., 450 w.v.
1—Mica condenser, with wire leads, 0.0001 mf.
1—Mica condenser, with lugs, 0.006 mf.
1—Mica condenser, with lugs, 0.001 mf.

R.C.A. (Radiotron Tubes)

1—6S7G tube
1—6F8G tube
1—6F6G tube
1—5U4G tube

JEFFERSON ELECTRIC CO. (Transformers)

1—Power transformer with 600 volt c.t., 5 volt and 6.3 volt windings. Type 463-411
2—Filter chokes, 30 henries, 50 ma., type 466-590

MEISSNER MFG. CO.

2—Bakelite sockets, spring-mounting type

BUD RADIO, INC.

1—Steel, crackle finished cabinet, 7 x 14 x 18 inches, No. 995, with chassis and panel to match. See text

CROWE

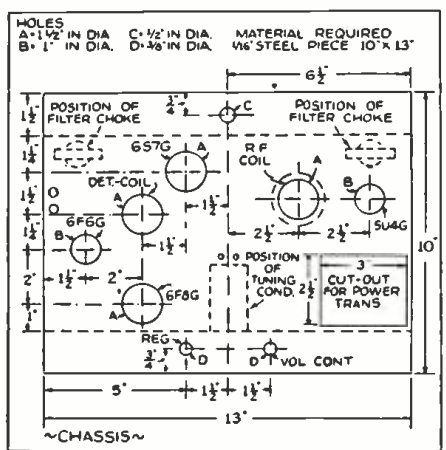
1—"Front-o-panel" dual ratio dial. Type 525
3—Notched pointer knobs

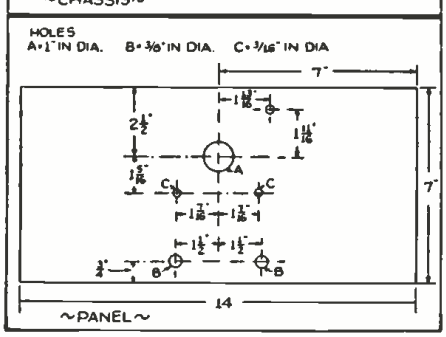
BRUSH DEVELOPMENT CO.

1—Pair crystal headphones. Type "A"

MISCELLANEOUS

Tip-jacks, hook-up wire, solder, etc.





Dimensions of chassis and panel.

Television Terms Explained

(concluded)

POSITIVE POLARITY OF TRANSMISSION—The opposite of "Negative Polarity Of Picture Transmission." In this case, where the light on the image being scanned and reproduced *increases*, the power in the antenna also *increases*, and where the light *reduces*, on the image, the power in the antenna also reduces.

—R—

RADIO FREQUENCY TELEVISION SIGNAL—The completely modulated R.F. carrier wave of a television transmitter when such modulation includes all video, synchronizing, and blanking signals.

RAIN—A term descriptive of the appearance of rain when a signal is being televised which has a poor signal-to-noise ratio. The splotches producing the effect of rain are caused by static, thermal agitation, and other disturbing factors that have an amplitude comparable to the all-too-weak television signal.

—S—

SCANNING—The process of an orderly dissection of a televised picture into minute elemental areas of varying light intensities, each element occurring at both the transmitter and receiver in a logical order, which, when reconstructed, will give the complete picture.

SCANNING FIELD—The area of the picture frame traversed by the scanning spot either in the operation of image dissection or scanning in the picture tube or in the reproduced television image.

SCANNING GENERATOR—The circuit employing a vacuum tube which is used to generate the linear saw-tooth wave necessary for both the vertical and horizontal scanning motions of the scanning spot on the cathode ray screen.

SCANNING INTERFERENCE — A disturbance in the television picture caused by cross-talk between scanning and audio frequency channels.

SINGLE SIDE-BAND TRANSMISSION—Transmission of voice or other intelligence with only one side band and the carrier in contrast to the more common system using Double Side-Band Transmission.

SYNCHRONIZATION — A means whereby the scanning spot at the receiver is made to keep in step with the scanning spot of the transmitter.

—T—

TELECINE TRANSMISSION — The process whereby a film is used for the subject to be televised.

—V—

VERTICAL BLANKING IMPULSE—The same as "Field Frequency Blanking Impulse."

VERTICAL SYNCHRONIZING IMPULSE—The same as "Field Frequency Synchronizing Impulse."

* * *

Supplemental Television Information

The Federal Communications Commission has specifically defined the various classes of Visual Broadcast Stations, namely, Television and Facsimile, as follows:

1030—The term "visual broadcast station" means a station carrying on the broadcasting of images for general public reception. There are two classes of visual broadcast stations, namely: television broadcast stations and facsimile broadcast stations.

1031—The term "television broadcast station" means a station licensed for the transmission of transient visual images of moving or fixed objects for simultaneous reception and reproduction by the general public.

1032—The term "facsimile broadcast station" means a station licensed to transmit images of still objects for record reception by the general public.

Quoting from the same general bulletin of the FCC: "(b) A license for a television broadcast station will authorize the use of two adjacent frequencies in any one group. The *lower* carrier frequency shall be for *visual* broadcast and the *higher* carrier frequency for the *aural* broadcast."

* * *

It should be mentioned that while both a sight and sound station are thus incorporated under one license, these are actually *two separate transmitters*. By this means the FCC has provided the combination of both sight and sound to the same program, thus adding to the enjoyment of the public. Both stations are licensed under the one group of call-letters assigned. Thus, W9XAL is the call-letter designation of both First National Television's ultra-high frequency television and sound stations.

* * *

OSCILLOGRAM—A permanent record of the pattern appearing on the screen of an oscillograph in the observation of transient phenomena.

Let's Listen In with Joe Miller

(Continued from page 277)

PHILIPPINES . . . . KAZ, 9.99 mc., Manila, logged using inv. speech at 5:35 a.m., with an R8 signal.

OTHER NEWS

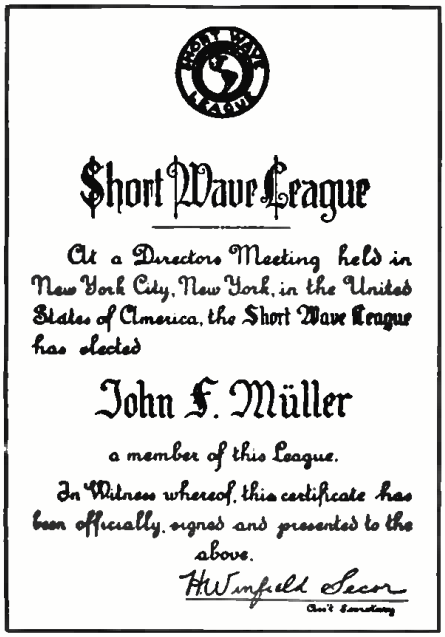
FINLAND . . . . The QRA of the Lahti broadcaster on 9.50 mc. will have to be altered, as we have received word from England that the correct QRA is: Oy. Suomen Yleisradio AB., Lahden Yleisradiosema, Lahti, Finland. No call letters known. Sked is, wkdays, 1-1:45, 5-6 a.m., and 10 a.m.-5 p.m. This station may also use 11.78 mc. when not operating on this schedule.

NEW ZEALAND . . . . ZLT4, 11.05 mc., at Wellington, logged at 5:30 a.m., rather late for ZLT4, an "early a.m." signal, while in contact with VLZ, 9.76 mc., Sydney, Australia. Both R7-8 sigs.

LATE FLASHES

From Ashley Walcott, we learn that China has reorganized its radio service as follows: XTJ, 11.69 mc., XTK, 9.08 mc., at Hankow; XTR, 9.40 mc., and XTS, 11.44 mc., at Swatow; and XTV, 9.48 mc., Canton, phone each other, 4:30-9:30 a.m. XTV uses XRB phoning KWV at 9:15 or 9:30 a.m.

YDB, Socrabaia, Java, 15.30 mc., heard from 1-2 a.m.



This handsome certificate is presented FREE to all members of the SHORT WAVE LEAGUE. The full size is 7¼" x 9½". See page 310.

HAM STARDUST

Activity on the ham bands has quieted down gradually since the DX contest and not much of DX interest is to be heard these hot days.

We have done very little dial-twisting of recent weeks, and are certainly enjoying our outdoor "fling" in a big way, and hope you all are having a swell time, too!

It is when cooler days come as harbingers of the cold seasons ahead that we will again give much time or thought to DXing, and guess you all feel the same about it, eh wot? Yet we must keep at it a bit in order to have some material for this ol' "colyum."

Reports plainly show that the other DXers feel as we do, judging from the paucity of DX logs submitted. If this continues—but we know it won't—we'll actually have to fall back on our own DX for a "colyum," blime, hi!!

Here's what we have:

ASIA

J7CB, 14085, Japan, was logged at 3:30 a.m., calling "Ye Ed," as arranged by friend Shigeo, J3FI, but, as usual of late, data rec'd too late for publication. We have already logged J7CB before, too bad Shigeo didn't know that. Tnx anyway, OB!

J7CR, 14280, also was heard, at 3:20 a.m., fair signal, ann'd as "Canada-Russia." Max Fisher, W6, also reports J7CR, but on 14156. J2KN, 14500, also by Max.

PK3LC, our FB friend Clement, was logged lately, at 6:10 a.m., though condx were poor. That's some DX you've worked there on 15 watts, OM. Congrats.!

PK1JR, 14330; PK1MX, 14330; PK1ZZ, 14300; PK2WL, 14120; PK1RI, 14350; PK4JD, 14090; PK4DG, 14348, all reported by our English DXer, Ian Jamieson, of Manchester. All above PKs in Java.

Ian also reports VS1AI, 14090, Singapore; VS7GJ, 14120, Ceylon; VU2DR, 14120, India; KA1BH, 14140, Philippines, all FB DX, OM!

PK6XX, with the New Guinea Expedition, is being widely reported, on 14020, and also, operating commercial, on 11.355 mc. News as to where to write for veris will be given in next issue. Tnx to Ashley Walcott for above.

Max Fisher reports KA7EF, 14122, on the island of Negros, Philippines, at 1 a.m.

AFRICA

We cert got ourselves one grand thrill a coupla Sats. ago, when friend Murray was twiddling the dials of the SX17 on test here, and at 4:30 p.m. the surprise of our still young lives occurred when, on an R7 carrier, we heard an OM giving his call as FB8AH, Tananarive, Madagascar!!

That was indeed a shock, but what a pleasant one, hi! We still *do* get a kick outa hearing real good DX, but the way FB8AH came in, whew!! Must be our rhombic, or somep'n. FB8AH ann'd as "FB8 America Honolulu, in Tananarive, Madagascar," and freq. was 14380.

Another very pleasant surprise was the logging of our friend, F. Paul Bour, FB8AB, also of Tananarive, one morning, at the unusual time for Africa, here on East Coast, 7:35 a.m., freq. was 14348. We had already logged FB8AB on 10 meters one noon, last fall, when he was actually on 20 meters, so Paul decided to give us the opportunity of logging his 20 meter signal, but this time, on 20 meters, hi! So he rushed us an air-mail from Madagascar, telling us he was going to give us a call for four successive days, twice per day, 11 p.m. and 7:30 a.m., but, as South Africans long ago died out near 11 p.m., and it was only a rare occurrence when South Africans were heard around 7:30, we had little hopes of hearing Paul calling us. But we did manage to get him through, though C.W. was bad at times. Many tnx to you, Paul, OM, you've certainly shown us the

(Continued on page 306)

Let's Listen In with Joe Miller

(Continued from page 305)

true amateur spirit, always willing to help the other fellow!

Paul also adds that he would be pleased to get a "young and smart ham knowing thoroughly all about repairs on receivers that would like to come over here and work partnership with me, here." Paul sez he has quite a lot to do there. Here's a chance for adventure, if any of you OMs are interested.

As regards above Special, that also came too late for publication, sorry.

Other Africans: CN8MA, 14115; CN8AV, 14110; CN8AM, 14100. Max Fisher, es Ye Ed, these in Morocco.

CN8AX, 14300; CN8AN, 14030; CN8AY, 14290, all by Ian Jamieson, England.

Some other Africans reported by Ian: FT4AG, 14310; FT4AK, 14360; FT4AM, 14140, in Tunis.

FA3FB, 14160; FA8QC, 14380; FA8CC, 14280, in Algeria.

VQ4SNB, 14084; VQ4KTB, 14180; in Kenya Colony. ZE1JA, 14320, Southern Rhodesia. SU1MW, 14310, 14120, Egypt.

ZS3F, 14105, Southwest Africa, reported by Max Fisher, W6.

That's all for Africa. Now, some European DX:

YU7AY, 14170, Yugoslavia; U3BC, 14100, U.S.S.R.; ZB1L, 14140, Malta; SP1MX, 14040; OK1LV, 14170, OK1SZ, 14300, Czecho-Slovakia; HA1G, 14070, HA1K, 14380, HA2P, 14150, HA6C, 14160, HA7L, 14170, all in Hungary. Also reported, an unusual catch, is CT3AN, on *7090*, in the Madeiras. All these reported by Ian Jamieson, who also adds to this imposing list: TF2Z, 7120, Iceland. Two other Maltese fones heard, ZB1T, 14030, and ZB1E, 14370. In Luxembourg, LX1AI, 14040, and LX1TW, 14070.

YR5CF (freq. var.), YR5FP, 14360; YR5BQ, 14090; YR5TI, 14300; YR5PC (L.F.); YR5VV, 14140; YR5KW, 14130; YR5AA (freq. var.), all in Roumania.

All these FB Europeans logged by Ian. Come agn, OB! Also logged was K7AOC, 14150, Alaska.

We hope you'll like this attempt at a column, though admittedly not our best. Please send in any reports on DX to Ye Ed by first of month.

Have you sent for your VAC certificate, at last available? It's a "beaut," es will enhance any wall! We are numbering certificates in order of their issuance, so be one of the VAC pioneers, es get your certificate now, with a low number!

Closing now, CU next month,

JOE MILLER.

Here's Your Button

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

SHORT WAVE LEAGUE

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

W8XWJ Broadcasts

(Continued from page 271)

was selected. the members of which devote their time exclusively to the operation of W8XWJ. All program material is arranged and produced independently of WWJ.

Programs at W8XWJ are conducted on a four point basis, emphasizing public service, educational features, fine music and spot news. In this last department the station has the valuable assistance of the "Early Bird," the radio-equipped *Detroit News* plane, and also the big radio field car. With these facilities W8XWJ is amply equipped for spot broadcasts from the scene whenever a big news event breaks.

Many educational and cultural forces have already been linked to the station. From Wayne University and the University of Detroit, lectures and debates are broadcast, as well as plays presented by the colleges' drama departments. Many civic agencies have become part of the broadcasting scheme and the Detroit Board of Commerce has a regular program in which the business affairs of the city are discussed. Fine music is a feature of the programs every afternoon and evening.

In January, when W8XWJ inaugurated its new policy, new studio facilities were added and reception rooms and offices entirely revamped. Its frequency was changed from 31.6 to 41 megacycles. The 100 watt transmitter was replaced by a new 16B transmitter and a 500 watt 88A amplifier, with a frequency response of from 40 to 12,000 cycles. The associated speech input equipment consists of standard type 23B high fidelity broadcast type. A 110A amplifier is also included in the audio.

By means of diversity receiving antennas, two modified communication receivers and a specially designed mixing system, it is possible to feed radio pick-up from the mobile units as well as other sources into the speech system and the transmitter.

Carl H. Wesser, chief engineer of W8XWJ, has been in charge of the station since its inception. His engineering staff includes R. T. Pennebaker, E. J. Kelly and C. E. Leedy. Wellington Granzow is the program director of the station.

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

Aerial Mast Made From a Ladder

(Continued from page 287)

in place before the ladder is raised to the vertical position, and these are anchored to stakes or pipes driven into the ground as soon as the mast has been raised.

The foot of the ladder mast may be anchored in any one of several ways. A couple of methods are shown in the picture. The ladder may be a regular factory-built job or it may be home-made and constructed from old material one has on hand. If the ladder is not too long, it can be built from one- by two-inch shingle lath and the steps made from two or three pieces of the same material.—*H. W. S.*

NEW CATALOG

● A NEW catalog, listing its complete line of receiving type condensers and giving full technical data and ratings for each one, has been published by Solar. Printed in five colors, the catalog also describes a new capacitor analyzer and resistance bridge.

Our readers' technical service can supply copies of the catalog. Ask for bulletin 108A.

The article has been prepared from data supplied by courtesy of Solar Mfg. Corp.

Portable 30-Watt Xmitter

(Continued from page 301)

BUD
C13—.00035 mmf. variable condenser

I.R.C. (Resistors)
R1—10,000 ohms, 2 watts
R2—20,000 ohms, 2 watts
R3—10,000 ohms, 2 watts
R4—450 ohms, 10 watts
R5—25 ohms, 1 watt
R6—25 ohms, 10 watts
R7—1000 ohms, 2 watts (2 connected in parallel)
R8—3000 ohms, 20 watts
R9—5000 ohms, 20 watts
R10—30,000 ohms, 20 watts
R11—.25 meg., 1 watt
R12—1000 ohms, 10 watts
R13—50,000 ohms, 2 watts
R14—.5 meg. potentiometer
R15—1 meg., ½ watt
R16—50,000 ohms, 50 watts

SANGAMO (Condensers)
C2—.00005 mf. mica
C5—.01 mf. mica

CARDWELL
C12—Dual 100 mmf. variable condenser

Miscellaneous
SW2—SPST toggle switch
SW3—SPST toggle switch
SW4—DPST switch
SW5—SPDT midget knife type switch
SW6—DP5T, band-switching type, 1000 v.
CH1—modulation choke 20 h. at 200 ma., 300 ohms
CH2 filter choke, swinging type, 25 to 6 h., 100 to 500 ma., 55 ohms
T1—Pwr. Transf., 1450 v., c.t. at 250 ma.
T2—6.3 volts, 3 amp.; 5 volts, 3 amp. filament transformer

FREE—FIFTEEN 10¢ PUBLICATIONS

featuring construction of the most popular short-wave receivers and transmitters

with a One-Year's Subscription to Short Wave & Television

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

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

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

When mailing us your subscription, use the special coupon on this page. Select your 15 projects by their serial numbers. We accept money orders, cash, checks or new U.S. stamps (no foreign stamps or currency accepted). If you send cash or stamps register your letter against possible loss.

JUST LAST MONTH, THESE 15 PROJECTS, IF BOUGHT SINGLY, WOULD COST YOU $1.50. YOU CAN NOW GET THEM *ABSOLUTELY FREE!*

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

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

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

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

HOW TO MAKE A FIXED-BAND 6-TUBE SUPERHET. This short-wave "fan" receiver tunes over a wide band of frequencies without coil switching or changing. It's a real performer. It operates directly from 110 V. A.C. and has band-spread.....No. 5

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

A Beat-Frequency Oscillator

(Continued from page 295)

voltage, lighting the filament of the 25A7G and turning on the receiver. Switch SW-2 turns on the "BFO" itself whenever it is needed.

With all parts mounted as shown in the photo, the two switches are close enough to the socket, so that the socket terminals can be bent over and the two terminals that connect to the switches will just reach the switch terminals, thus eliminating any wire between them. An insulated strip, having three lugs, serves as junction points for the 5000 ohm resistors and also to keep the *circuit ground* away from the chassis. By keeping the chassis insulated from the "BFO" circuit, there is no danger of blowing fuses, which could happen if the chassis were connected to ground and the line plug reversed on d.c. or with the grounded side of the a.c. line connected to the plate of the rectifier section of the 25A7G. This necessitates the use of a ground to the chassis in order to obviate any *body capacity* effects. A wire from the receiver chassis to the "BFO" chassis will suffice. Many users will probably fasten the "BFO" directly to the receiver chassis, in which case the wire connection between the two chassis will be unnecessary.

As mentioned previously, the line cord comes with a built-in dropping resistor and it should be made certain that it has a value of 300 ohms. A word of warning concerning the resistor cord—since the resistance is distributed along the entire length of the line cord, the line cord must not be cut in order to shorten it; the entire length must be used. In operation it will be warm, but not too hot to touch. Try to keep it in a ventilated place. The resistor cord comes with three leads. The heavier lead is the resistor lead and connects to one side of the filament of the 25A7G. The other two leads are connections from the line plug, the black lead coming from the same prong of the plug as the series resistor and the red lead connecting to the other side of the line. This red lead, through switch SW-2, connects to the other side of the filament.

Connection of the Oscillator to Receiver

When wired, the unit is ready for installation and adjustment. The resistor cord is plugged into the 110 volt line and receiver line cord is plugged into the receptacle provided on the "BFO" unit. If the receiver switch is left on the "ON" position, switch SW-1 will turn on the receiver and light the 25A7G filament. A lead should be provided from the plate of the 25A7G through the 50 mmf. mica condenser. Incidentally, this might well be of the adjustable trimmer type, although not strictly necessary. If adjustable, it might prove advantageous to vary the coupling between the "BFO" and the receiver. However, this unit is not at all critical with respect to coupling. This lead feeds the beat oscillator frequency into the receiver and can be connected to one of several places. The simplest way is to remove the grid cap of the first I.F. tube and wind the insulated feed wire several times around the grid cap, making sure the wire itself does not make contact with the grid. The grid cap is then replaced. The lead should not be allowed to go near the receiver high frequency oscillator, or there will be some detuning of the receiver, resulting in its calibration being shifted.

A more satisfactory method of coupling would be to connect the "BFO" lead to the grid terminal of the last I.F. transformer. A direct connection is not necessary. The beat-freq. oscillator lead is merely twisted half a dozen times around the lead in the receiver which goes from the *grid terminal* of the last I.F. transformer to the grid of the detector tube, if a triode is used. If the receiver employs a diode second detector, the I.F. transformer will be connected to the diode plate.

Once the beat-freq. oscillator is connected, it is ready for its adjustment. A short-wave broadcast station is tuned in on the receiver. Next the "BFO" switch SW-2 is turned on. This applies plate voltage to the oscillator, which will generate a signal whose frequency will depend on the setting of the trimmer condenser on the "BFO" transformer. This trimmer should now be adjusted so that the frequency generated by the "BFO" differs from the receiver intermediate frequency by approximately 1000 cycles. Slowly adjust the trimmer, using an *insulated* screwdriver, until a squeal as loud as the broadcast station signal is heard. The broadcast station will then become unintelligible. For a closer adjustment of the trimmer—with the "BFO" on, a c.w. telegraph station should be tuned in and the trimmer very slowly varied for the most pleasing tone.

Parts List

I.R.C.
2—5000 ohm, ½ watt resistors
1—25,000 ohm, ½ watt resistor
1—50,000 ohm, ½ watt resistor

HAMMARLUND
1—BFO transformer (STBO-465)
1—Octal socket

AEROVOX
1—4 x 4 mf. 250 v. electrolytic (type PBS) condenser
1—.0005 mf. mica condenser
1—.00005 mf. mica condenser
1—.1 mf. 200 v. paper condenser

RCA
1—25A7G tube

KORROL
1—chassis 6" x 3" x 1½"

MISCELLANEOUS
2—SPST toggle switches
1—300 ohm resistor line cord
1—female AC receptacle

Practical Antenna Theory and Application

(Continued from page 269)

The open wire type is the most popular among amateurs because of simplicity and cost.

For an efficient working line it must have these characteristics: A low ohmic resistance such as given by copper, mechanical rigidity, and strength; and must be so placed as to avoid coming into contact with any grounded object. In order for the line to function properly electrically, it must be balanced to ground, must have a minimum of leakage across the supporting units spacing the wires and should not have any appreciable standing waves. To acquire that condition, it is necessary to match your line to the radiation impedance of your antenna. It is assumed that the average antenna has a radiating resistance of about 75 ohms.

Surge Impedance

A line having a length of more than one or two wave-lengths of the antenna, has what is known as a characteristic or *surge impedance*, whose value is determined by the ratio of inductance to capacity per unit length of the line. In other words, the characteristic impedance of the line is a function of *both* inductance and capacity.

Both the capacity and the inductance is determined by the physical components of the line such as the size of the conductors and the spacing between them, when working at high frequencies. For maximum power transfer to the antenna through this line, it is important that the line meets with the following requirements.

It is of greatest importance that the line be properly terminated, or matched with the impedance that it is working into. Now that can be accomplished several ways (9 methods, see diagrams). However, line impedances can be calculated to save time and material. For instance, the formula for a two-wire line having air as the dielectric is Z; the impedance of the line, is equal to the constant 277 × log 10 of twice the separation distance of the wires, divided by the diameter of the wire in inches or millimeters;

$$Z = 277 \times \log_{10} \frac{2S}{D}.$$

(S and D being expressed of course in the same terms, i.e., either inches or mm.)

Here are a list of wires generally used with different spacing, providing various characteristic impedance values:

Wire Size B&S	Spacing of wires in inches				
Surge impedance of wires	2	3	4	5	6
		in ohms			
No. 14	500	550	575	600	625
No. 12	475	510	550	575	600
No. 10	440	490	520	550	575

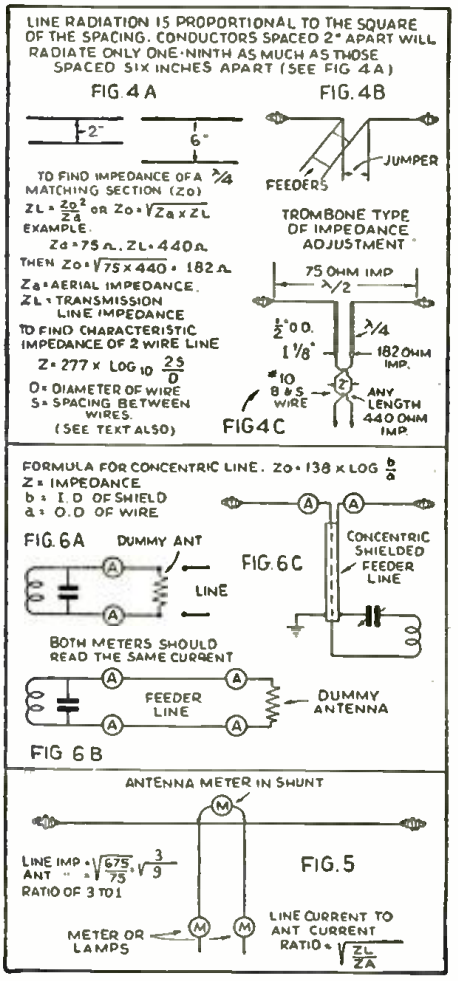
Note that a line made up of No. 10 B&S copper wire spaced 2" apart has an impedance of 440 ohms. Also note that your antenna has an impedance of only 75 ohms at center. You can readily see that some means must be employed to bring the line impedance down to the antenna resistance. One of several methods are herein described. If your line was connected directly to your antenna without matching you would get a loss of over 3 db., representing a total loss of 50% or more of your energy in your transmitter. You certainly would not tolerate that if you were aware of it. This is figured by the ratio of voltage in-put to voltage out-put. Then you would have standing waves on your feeder line to further increase your losses and hinder proper power radiation from your antenna system.

It is possible to construct a line with a twisted pair of wires with some form of insulation that is a solid dielectric, but that method introduces too much loss in the line. Then the line can be made exactly ½ wave-length or some multiple of a half wave-length and due to the standing wave on the line, would make the in-put impedance of the line appear to be 75 ohms, regardless of the surge impedance of such a line.

This type of feeder is not very efficient, because the actual power lost in the line itself is considerably higher than the mismatched condition of direct-connected line to antenna.

The job of making the line length an integral multiple of the fundamental of the antenna is not an easy one either.

The most practical method both from a mechanical and electrical standpoint is where you use some form of energy transfer device, such as a Pickard transformer for coupling the current point of the antenna to the line by a step-down of current ratio (see diagrams) or the application of the "Y" connected feeder system. The "Y"



Further details of "Ham" aerials described by the author.

connected system makes use of the fact that somewhere along the antenna, starting at the center, which has an impedance of 75 ohms, there must be a point from that center that has a similar value of impedance to that of the line feeding it. That is due to the current and voltage relation being different because of standing waves on the antenna itself. Then by attaching the feeders at that point we should find a place that would be suitable as a proper matching position for the feeder line, and thereby obtain the condition where the feeder for the antenna works into the correct impedance relation.

Reasons for terminating line to its characteristic impedance:

1. It makes the line impedance independent of frequency and line length.
2. It makes the transfer of power from generator to load with the highest possible efficiency.

Zepp

A Zepp feeder has a high impedance. The line is cut to an odd quarter-wave and acts simultaneously as a feeder and matching transformer, feeding the antenna with a high voltage and low current, while taking a high current and a low voltage from the transmitter.

Transposed feeders have the advantage of symmetrical electrical layout, such as even distribution of capacity to ground.

All three dimensions must be correct for proper power transmission.

Adjustment of plate tank coupling regulates impedance match of power to line for proper loading. (See fig. 3-B.)

This antenna system (see fig. 3-C) is adjusted by a ¼ wave section that terminates the feeder line, this adjustment being made to match up with the "characteristic" impedance of the line used. For instance: No. 10 B&S wire spaced 2" apart has an impedance of 440 ohms. The proper termination of the line to antenna through the ¼ wave section for a 75 ohm antenna impedance, would be 182 ohms characteristic impedance of the ¼ wave section.

Short-Wave League

(Continued from page 275)

reception and transmission at the high frequencies.

Short Wave Listeners' reports may be sent to G. A. Clayton, Winscombe, Somerset, England. Accurate and useful reports will be answered with a special QSL eard. No reply postage needs to be included. Your reports should contain the following:—Time (in terms of G.M.T. or E.S.T.), R.S.T., type of QSB (if any), working conditions, phase distortion, type of receiver used, and details of the antenna used. Send reports on reception of G6BW, G6VK and GM6RG to the above address. Send reports of others to the stations themselves.

The following stations are co-operating in these test transmissions:—

W1DKQ, W1KTF, W1JTG, W2GO, W2GHU, W2JKQ, W2AZB, W2JAS, W2JAB, W2JCY, W3CBT, W3EOZ, W3FIL, W3GSV, W3GZN, W4CDG, W4CYB, W4CYU, W4EDD, W4EPX, W5EB, W6NLS, W6NCR, W8DST, W8AHC, W8LUQ, VE1BR, VE2CP, XE1GE, TI2FG, CO7CX, K6MVV, HI7G, HI3N, YV1AP, VK3KX, SV1CA, K4FKC, EI5F, EI8J, EI9J, G2ZV, G5BM.

Transmissions are sent out daily at the following times which are Eastern Standard:—

Sundays—5 a.m., 7 a.m., 9 a.m., 11 a.m., 1 p.m., 5 p.m.
Mondays—7:30 a.m., 8:30 a.m., 10 a.m., 1 p.m.
Tuesdays—7:30 a.m., 8:30 a.m., 10 a.m., 1 p.m., 4 p.m.
Wednesdays—7:30 a.m.
Thursdays—7:30 a.m., 8:30 a.m., 10 a.m., 1 p.m., 5 p.m.
Fridays—7:30 a.m., 8.30 a.m., 10 a.m., 1 p.m., 3 p.m.
Saturdays—9 a.m., 11 a.m., 1 p.m., 3 p.m.

So let's see if we cannot give these tests some help. The transmissions will all be on the 10-meter amateur band between 28.268 megacycles and 28.460 megacycles. Be sure to make your reports complete. They are of little or no use if they are not.

Every observer is urged to send in a photograph of his post and of himself. Each month the best ones will be printed and all of them if possible. This month the post of Robert Hatcher of Richmond, Virginia, has been selected.

Although it is heard on a broadcast band and not an amateur phone, TI2NRH is as interesting as most hams. This station has just recently celebrated its tenth anniversary. A special certificate (see July issue) was issued to all who reported correctly reception of this station. The regular verification certificate is shown on this page. It is nine by twelve inches and printed in red and blue on white paper. It is certainly worth the time and cost of the international reply coupon to obtain one. The one shown here is through the cooperation of Sergeant Douglas S. Catchim, Listening Post Observer for the State of Virginia.

The reports of several more observers could be used, especially in the southwestern part of our country. Send your applications for appointment to Elmer R. Fuller, 32 Madison Street, Cortland, New York.

What's Wrong With Our S-W Broadcasting?

(Continued from page 265)

over or *under* modulation. Any listener can verify these facts for himself. On the other hand, the European stations pay more attention to technical perfection with happier results for the listener. About the only claim to fame American short-wave broadcasting has is in the number of different stations there are on the air—about 11 in the United States—several of which can operate on 2 frequencies simultaneously. The trouble arises from the fact that s.w. stations are a financial liability rather than an asset to most station operators. Yet the station operators will not admit this fact, as it might be an opening wedge for government operation of s.w. broadcasting, which could easily lead to government operation of all broadcasting. With the politicians in control of broadcasting it would probably be necessary to make it a criminal offense *not* to listen to the radio. Otherwise most people would junk their radios and run (not walk) for the nearest movie.

The High Frequency Broadcasting Station

EVERETT L. DILLARD

(Continued from page 261)

tion, local interest, and public spirit capable of supporting a local broadcast station enterprise.

There has been the prediction of many radio engineers that eventually all of the nation's 100 watters, the so-called "local" stations will be shifted to Apex frequencies, permitted to use greater power and, as a result, actually do a better job of providing entertainment over restricted areas than they are doing at the present time. If this is ever done, six valuable radio channels will be made available for coverage of rural districts by either several high powered regional or even "cleared-channel" super-powered broadcasters. Whether or not this will ever take place is, of course, problematical—although there is every reason to believe that once Apex frequencies have been time-tested and proven, present-day local stations will be only too glad to seek refuge from increased interference by relocating in the Apex band.

High frequency broadcast stations now operate on several ultra-high frequency channels. The four lowest frequencies assigned for this purpose are: 25,950, 26,050, 26,100, 26,150 kilocycles. The next higher frequency group of channels are: 26,400, 26,450, 26,500 and 26,550 kilocycles. The majority of the Apex broadcasters now licensed or having construction permits to build, are licensed to operate on the next higher group of frequencies, which include 31,600, 35,600, 38,600 and 41,000 kilocycles. Still another higher frequency group of four more channels is also assigned for high frequency broadcasting, namely: 40,300, 41,200, 41,600 and 41,800 kilocycles.

The first two lower frequency groups of four frequencies each are licensed for *amplitude modulation* only. High-fidelity aural broadcasting will be common on these channels, where a maximum allowable range of audio frequencies to be transmitted is 15,000 cps. (cycles per second). Even our so called *high-fidelity* stations on 1530 and 1550 kilocycles hardly claim a wider modulation frequency range than 10,000 cps. Both *amplitude* and *frequency* modulation may be used on frequencies of 31,600 kilocycles and above with 200 kilocycles as the maximum band width where frequency modulation is used.

High frequency broadcast stations are seldom licensed for an output power rating of greater than 1,000 watts, and most of these stations operate with power below this maximum value, in view of the difficulty at the present state of design of constructing and operating higher-powered transmitters at these frequencies.

These assignments as given above appear to be reasonably permanent until October 13, 1938. After that date the Commission has specifically set aside a larger number of high frequency channels. These will be licensed in two bands: a lower and a higher frequency band. The lower frequency band will extend from 25,025 to 26,975 kilocycles, with channels located 25 kilocycles from each other. This will provide 79 broadcast channels. In addition to this lower frequency band the Commission has also set aside, effective as of the same date, 75 more high frequency broadcast channels between 41,020 and 43,980 kilocycles. In this higher frequency assignment the separation of channels will be 40 kilocycles.

It is significant that on January 27, 1938, the FCC granted twenty-five *ultra-high frequency* channels in the new 41-44 megacycle broadcast band for the use of colleges, universities and other non-profit educational agencies. Of further significance is the fact that these licenses, which will be granted as educational high-frequency broadcast stations, will not be classed in the experimental category. Waiving the experimental clause on these stations, the Commission has this to say: *"Each station shall furnish a non-profit and non-commercial broadcast service,"* and

goes on further to state that these channels are *not* assigned on an experimental basis.

This is one of the first times that the Commission has ever assigned frequencies above 30 megacycles for other than experimental licenses. This grant, coming as it does at the crucial moment of development in ultra-high frequency broadcasting, is regarded by those of the industry as a distinct progressive step forward, for unquestionably the liberal use of these frequencies by educational institutions of America will do much to spur on public interest in reception of these frequencies. Once public interest is aroused, it remains only a matter of time for the receiving set manufacturers to produce radio sets capable of receiving these stations; and that appears to be the biggest obstacle for the moment, in the development of the *ultra-highs*. Starting at 41,020 kc. and ending at 41,980 kc., 25 adjacent channels, each separated by 40 kc., have been set aside and allocated for assignment to these non-commercial high frequency educational broadcast stations.

Just what the Apex broadcasters can and will do remains to be seen. Ten years from now will mean a different story in radio broadcasting as we know it today, for surely, by then, television will be an accepted commercial proposition; and television, demanding as it does the use of companion ultra-high frequencies adjacent to the Apex bands, will require new radio sets capable of giving good performance on the ultra-high frequencies. Is it not logical, then, that Apex broadcasters located on channels adjoining the television frequencies will enjoy and share with television the popularity of the ultra-highs? The high frequency broadcast station will provide a new type of "local" radio service that has even greater advantages than the present-day system with but very few of its disadvantages.

The amateur, the short wave listener, and the public in general can do much to aid in the development of ultra-high frequency broadcasting. Everyone who possesses a radio receiver capable of tuning to these frequency bands should make it a point to listen to these stations and channels regularly and report freely to the stations observations on reception.

Imagine, if you can, a band free from summer static and interstation interference, where even a higher fidelity of transmission is possible than that now obtained in the regular broadcast band. That should be broadcasting at its best!

The Apex frequencies promise all of these. Only time, hard work, and listeners' co-operation will tell the story.

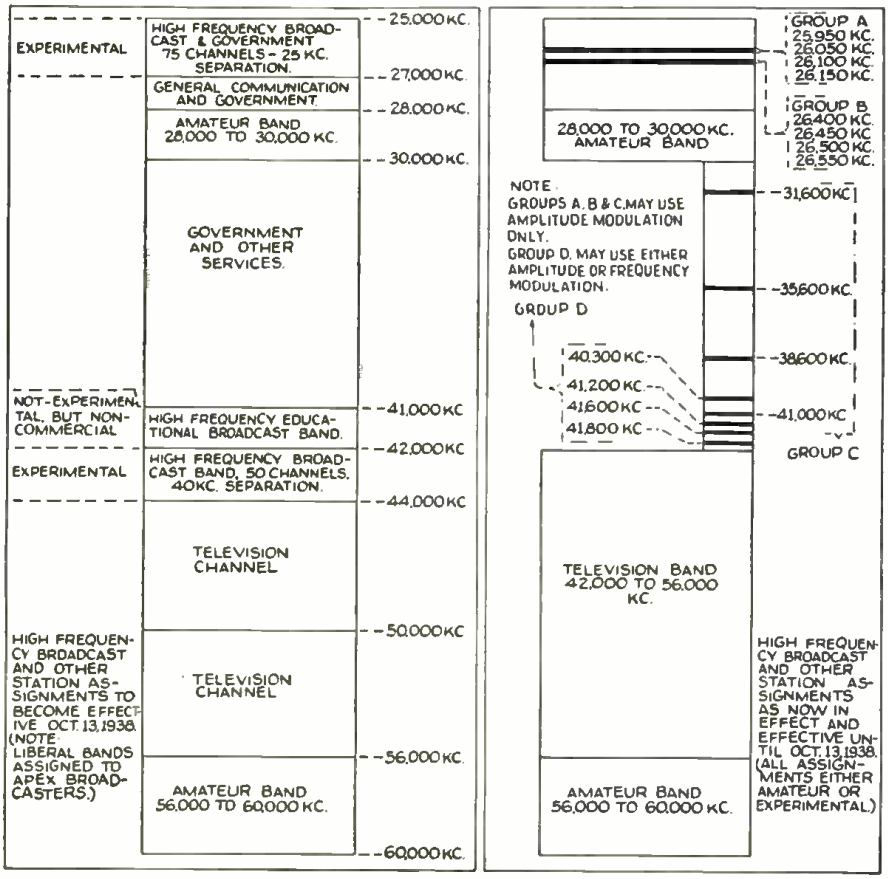


Chart showing the high frequency allocations.

"CQ"

When I was showing a local BCL my rig, and was explaining the tank coil, he asked me if it was this device that stored the energy for the rig. He also asked my aunt why I looked disgusted.—CHARLES MOURMOURIS

"CQ"

There is a girl I've heard of who became so interested in Ham radio that instead of using mere bath salts, she would use nothing but genuine Bliley crystals in her bath water!?X?—PAUL RUNNING.

"CQ"

On a test to find out what we knew of scientific subjects the teacher asked:

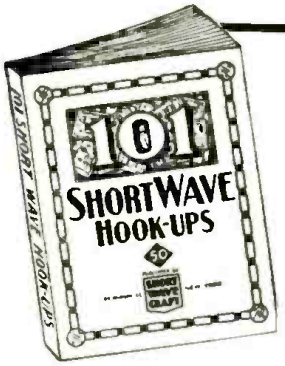
"What is a Wheatstone Bridge?"

One bright student put on his paper: "A Wheatstone Bridge is a dental filling!"

—J. S. JACKSON, JR.

. . . . THESE OUTSTANDING SHORT WAVE BOOKS ARE *Now Available* AT YOUR DEALER!

YOU *buy* parts, tubes, kits, accessories from your local radio dealer—that's what countless thousands of short-wave fans do. Now through a nation-wide distribution service our numerous books are available at your favorite radio dealer—right where you buy other radio equipment. It's more convenient, saves time and you can inspect the books before you buy. *Ask your dealer to show you all the books advertised on this page—they're always in stock.*



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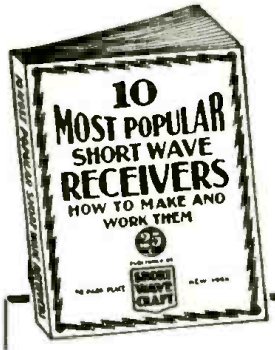

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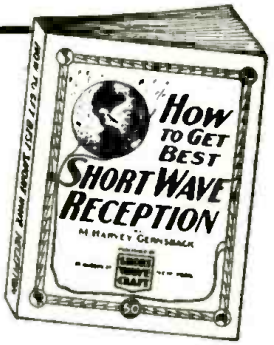

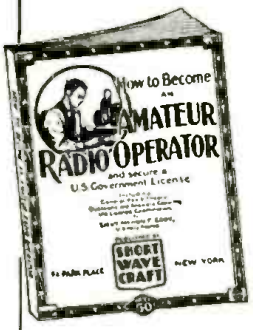

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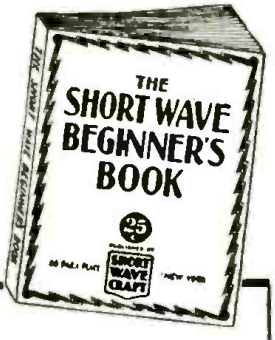

THE SHORT WAVE BEGINNER'S BOOK

Here is a book that solves your short wave problems—leading you in easy stages from the simplest fundamentals to the present stage of the art as it is known today. It is the only low-priced reference book on short waves for the beginner.

75 Illustrations
40 Pages

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For convenience the publishers list below dealers in all parts of the world where our books are available. On your next shopping trip be certain to examine these volumes. You're sure to want them for your technical library.

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Seattle Radio Supply Co., Seattle
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WISCONSIN
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AUSTRALIA
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Third Silver Trophy Award

(Continued from page 279)

The final is an Amperex HF-200 single-ended stage.

A Hallicrafter SX17 Super Skyrider is used for receiving, and this set has assisted me greatly in "working" nearly 30 countries.

A doublet ¾ wave—¼ wave antenna is used for receiving and transmitting and is connected by means of a low-loss, double-pole double-throw relay, actuated by the *start* control on the transmitter.

Rules for Trophy Contestants

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

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

The winner of the fourth trophy award will be announced in the Oct. issue, and the closing date for that contest is Aug. 10.

The judges of the contest will be the Editors of SHORT WAVE & TELEVISION. In the event of a tie, duplicate prizes shall be awarded to the contestants so tying.

Note These Important Rules

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

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

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

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

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

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

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

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

COMMERCIAL NOTICES 10¢ A WORD

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

ADVERTISING AGENCIES

ADVERTISE: 24 WORDS IN 250 newspapers $10. Lists free. Advertising Service Bureau, 4515-S Cottage Grove, Chicago.

AGENTS WANTED

300% PROFIT SELLING GOLD Leaf Letters for Store Windows; Free samples. Metallic Co., 416 North Clark, Chicago.

BUSINESS OPPORTUNITIES

"PROFITS"—STAMPING IDENtification keychecks, outfits furnished. Name, address on sample 25c. Bohn Co., Box R. 86, Wilkes-Barre, Penna.

CORRESPONDENCE COURSES

500,000 USED CORRESPONDENCE Courses and Educational Books. Sold. Rented. Exchanged. All subjects. Satisfaction guaranteed. Cash paid for used courses. Complete details and bargain catalog free. Send name. Nelson Company, 3282 Manhattan Building, Chicago.

INSTRUCTION

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

MAKE YOUR OWN ELECTRIC fuse plugs. Model and instructions $1.00. W. Stonebraker, 6006 Harney, St. Louis, Mo.

MISCELLANEOUS

LEARN CODE! FREE COURSE sent with practice kit (buzzer; key resembling standard type) and manual with experimental diagrams, valuable formulae, data. 25c coin. W8IWR, 13501 Cormere Ave., Cleveland, Ohio.

TOOLS, DIES, AND SOME FINished stock for manufacturing a household product that any man with some executive ability can with proven results have success. Stamp please. Irvin Depoy, Muncie, Indiana.

OPERATE PROFITABLE CLIPping bureau. Starting copy—25c. Bohn Co., Box 86 A.A., Wilkes-Barre, Pa.

HAVE AUTOMATIC VIBRO razor new, American Flyer typewriter new, the Rocket Stencil letter duplicator new, Stephenson Laboratory foot correction course and featherweight arch making, with working material, cost $150.00. Dr. Earl Ward Pierce, Eye training course, in 15 lessons, cost $20.00. 96 violin lessons from the U. S. School of Music, all in good shape. Want small electric motor, electric table lamp, radio, kitchen heater, mantle clock or cash. F. Miller, 459 S. Joliet St., Joliet, Ill.

3½ INCH TR. 0-125 VT. A.C. Voltmeter, 0-10 A.C. Ammeter, $2.75 each, Weston D.C. 0-7 and 0-140 Voltmeter, 2¼" with 9 pt. D.P. Switch $2.75. Nat'l. MB27-4 Stg. T.R.F. chassis and Thord. 45 P.P. Pack. $7.50. 10" MUTER DYN. SPKR. $3.00 Victor 72" Hi-Fi Orthophonic Horn. Mag. and Acoustic Pick-ups. $10.00, plus express. $400.00 RCA battery Superhet—$25.00. Harry Ackerson, Ramsey, N. J.

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

MODELS

$9.85 FOR A COMPLETE METAL working lathe. Other new and used work shop equipment. Stamp please. Depoy Model Shop, Muncie, Indiana.

OFFERED FOR SALE

TODAY'S BIGGEST VALUE. Beautiful hand finished wood birthday folders assorted shapes and colors, 25c each, 5 for one dollar. Star Cards, % D. Stadtegger, Rte. 1, Box 99, Chowchilla, California.

STEER HORNS FOR SALE, SIX to eight feet spread. Polished and mounted. Free photo. Lee Bertillion, Mineola, Texas.

FOR SALE—BRAND NEW PAtrician Model Man's Waterman fountain pen; cost $10; will sell for $5. Albert Banick, 3742 77th Street, Jackson Heights, N. Y.

PATENT ATTORNEYS

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

PETS

BULMOSTIFF PUPPIES—REAL Guards. Useful, intelligent companions $10.00 and $12.00. Paul Muenchow, Merrill, Wisconsin.

QSL—CARDS—SWL

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

QSL CARDS, 300 FOR $1.00. Quality printing. Free samples. Miller Printing Co., 399 Thirteenth Ave., Columbus, Ohio.

RADIOS

ONE TUBE BATTERY LOUDspeaker radio. Simple, inexpensive. Wiring diagram, parts list 50c. Maurice Fowler, Blairsburg, Iowa.

SHORT WAVE RECEIVERS

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

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

TELEVISION

TELEVISION EQUIPMENT SINCE 1927. Arthur Pohl, 2123 Hubbard, Detroit, Mich.

TOOLS

USED POWER TOOLS, WORKshop equipment—direct owner prices. Buy or sell through our service. Latest lists, 20c. Toolisting, Box 481-T, Zanesville, Ohio.

WANTED TO BUY

POWER TOOLS, WORKSHOP equipment wanted. Hundreds cash buyers, your own prices. Toolisting, Box 581-T, Zanesville, Ohio.

FOR SALE (NON COMMERCIAL) 3¢ A WORD

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

SELL HALLICRAFTERS SKY Chief $28, original price $45. Excellent condition. Mechanical bandspread. Covers amateur bands 20 to 160 meters, foreign, police, etc., and broadcast. Dimitry Boldysh, 42 Irion Street, Waterbury, Connecticut.

10 TUBE SUPERHETERODYNE 15-550 meters, 4 tube Audio Amplifier 10" speaker, metal tubes, crystal control, noise silencer circuit, Tobe tuner, Aladdin Polyiron coils, price $50. H. Nielsen, 350 7th St., Brooklyn, N. Y.

FOR SALE: ULTRA STRATOSphere Trans-Receiver 10 tubes short wave sending and receiving with mike and key jack, has tuning eye 2½ to 4000 meters, used about 3 months, gets European stations on loud speaker and all amateur bands. Have coils 2½ to 550 meters bands only. Sale price $25.00. Carl Jensen, 211 East 200 St., Bronx, N. Y.

OFFICIAL DOERLE AC-5. Excellent condition. $15. Write Howard Davis, Box 260, Thornwood, N. Y.

SW3 $9.00, SKY BUDDY $19.00, PR-10 $29.00. W9ARA, Butler, Missouri.

BARTER AND EXCHANGE — FREE!

NO ADVERTISEMENT TO EXCEED 35 WORDS, INCLUDING NAME AND ADDRESS

Space in this department is not sold. It is intended solely for the benefit of our readers, who wish to buy or exchange radios, parts, phonographs, cameras, bicycles, sporting goods, books, magazines, etc. As we receive no money for these announcements, we cannot accept responsibility for any statements made by the readers.

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

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

WILL TRADE LIONEL ELECTRIC train, midget box camera, invisible ink powder or formula, instructions how to resilver mirrors, how to etch on glass, also how to make artificial marble. Bill Schroeder, 803 Wisconsin, Peoria, Illinois.

HAVE: WURLITZER GUITAR, boy's cloth bound books, want S.W. radio or kit. Must be A.C. or what have you? Swap lists. Joseph Kubik, 37 Pine St., Ct. Barrington, Mass.

WILL TRADE "RADIO SERVICE Business Methods" by Rider (unread; List $2.00) for a 6L6. Also stamp collection, 500 stamps for a 40 or 80 meter crystal. Jim O'Rourke, 2019 So. Nicollet, Sioux City, Ia.

WILL SELL OR TRADE COMmemorative coins for other coins. What have you? R. R. Manistee, Farmer Cafe, Lynchburg, Va.

HAVE POPULAR AND CLASSIcal piano books and pieces, 23 Popular Mechanics, "BB" gun, microscope, pin game, radio parts, ukelele, for photo enlarger, photographic equipment, or what have you? Henry Zimmerman, 4316 W. Kamerling Ave., Chicago, Illinois.

HAVE 7 ISSUES RADIO NEWS (July 1937—Jan. 1938) Taylor tube manual, 34 lessons Radio and Television, Baby Brownie camera. Would like a good microscope or what have you? Sylvester Panagapko, Renwer, Manitoba, Can.

TRADE 15 TUBE RCA 5 BAND console radio model K-15, RCA 143 table model 3 band receiver perfect condition for commercial type communications receiver, transmitting equipment or? M. W. Shellhamer, 258 Brown St., Tamaqua, Penna.

WILL SWAP NEW UNUSUAL different match covers for unused stamps any kind. I'll send covers you return stamps as you feel a fair swap. Satterthwaite, 544 Colonial Ct., Toledo, Ohio.

OSCILLOSCOPE, MODEL 65, Signal generator, Rendix Dayrad, practically new. Trade for good camera with fast lens or what have you. S. M. JOHNSON, 711 S. Dundee St., South Bend, Ind.

WANTED SHORT WAVE SET. Have old magazines, camera lens, etc. Robert Pinnix, R.F.D. No. 1, Box 357, Winston-Salem, N. C.

HAVE MODEL A ARGUS CANDID camera also case. Would like 4 or 5 tube A.C.-D.C. short wave receiver. F. Sanchez, CCC F137 Co. 1249, Coeur D'Alene, Idaho.

(Continued on page 317)

Talking on 1-Meter Waves

(Continued from page 267)

also be applied to the *sending* aerial. In order to determine this increase when working with a *Yagi* receiving aerial, a thermocouple is placed in the dipole on the receiving side. By successively inserting and removing rods, which give the aerial its directive qualities, the above mentioned factor can be easily measured. The transmitter can be gauged in a similar manner. By measuring the field at a great distance, one also finds that the rate of amplification runs as high as 3.5.

Next the variation of field intensity with the distance is measured. The sensitivity of the receiver should be calibrated by means of a signal of known intensity; for this purpose a generator is employed with an antenna of which the radiating part is short compared with the wavelength, while a horizontal plate acting as a condenser at the foot of the dipole produces a uniform distribution of current in the vertical part. The current in this vertical element can be determined from the capacity and the potential of the condenser, measured with a voltmeter containing a very small tube (diode).

In experiments which deal with *ultra-short* waves, the inductance and the capacity of the wires which connect the transmitter with the aerial play an important role. From the very first experiments coaxial feeders were used. In such wires, which are about 20 meters (64 ft.) long, the loss is 50% at the most. But hoar frost and snow interrupt transmission completely, and in damp weather the losses are also high. Therefore, the feeder has been protected against wet weather, and the dipole has been placed in a glass tube, while all the apparatus are kept inside at a proper temperature. By this method the difficulties seem to have been overcome.

In the transmitter, triode tubes are used. They are constructed in such a manner that they normally are able to generate waves of about *one meter*. Our picture shows one of these tubes, in which the outlets of grid and plate are placed in the upper part and are supported and isolated by *glass columns*. The filament is mounted in the usual manner. The dimensions are such that the damping due to the time the current requires in passing through, is not prohibitive even at very high frequencies.

In order to obtain a transmitter which can be regulated easily, a symmetrical installation is employed, with proper heating current conductors. This enables the transmitter to work at various wavelengths in a simple manner, with the best possible results.

The modulation is effected by variation of the plate voltage. The modulator is equipped with a balanced amplifier and has six tubes. By this type of modulation the frequency is subject to variations. In order to keep these variations sufficiently small, an LC circuit with small losses is used. This circuit replaces the more expensive and less robust crystal which is used in stabilizing the frequency of longer waves.

For the reception of ultra-short waves there are several possibilities. One may use super-regeneration, super-heterodyne and super-autodyne (super self-heterodyne) receivers. It is desirable that the power be supplied from alternating current lines, and it is also advisable to use modern ultra-short wave apparatus of the low-loss type. Everything considered, the choice goes to super-autodyne receivers.

As mixing tubes very small triodes are used, in which the time the electrons require

for passage is rather short. These tubes also have a lower capacity than ordinary tubes. They can, therefore, produce waves much shorter than are used in our case.

The *receiving* aerial is like the *sending* aerial—a *Yagi* type, and it is connected by means of a coaxial feeder with the receiver. The picture of the oscillator-modulator shows the two wires wound as a spiral (Lecher system). In the upper part one can see the bridge which makes it possible to tune the frequency of the Lecher system to the frequency which is received.

The receiver may be tuned by employing the following means:

(1) Modifying the length of the Lecher system by means of the bridge;

(2) Displacing the connecting point of the coaxial feeder which comes from the aerial;

(3) Varying the coupling between the coils.

The intermediate frequency amplifier, because of the great width of its frequency band, is quite different from an I.F. amplifier employed for broadcast reception. Neither the frequency of the transmitter or of the receiver oscillator is absolutely stable. It is necessary to employ for the intermediate frequency amplifier a bandwidth of 400 kc. with an I.F. of about 7500 kc. This can be done without great difficulty. If desired, the usual automatic volume control can be added.

The intensity of the carrier wave which is used in the transmission from Tilburg to Eindhoven is recorded in the following manner:

The continuous current which is furnished by the detector of the receiver passes through, besides the coupling resistance on the way to the output tube, a second resistance. After amplification by means of a D.C. amplifier (two pentodes in push-pull) the drop in voltage in the last resistance furnishes enough energy to feed a calibrated milliammeter.

It has been established that it is possible to install, without further precaution, receiver and transmitter side by side; the interference is negligible.

Radio Pilots Ships into Port

(Continued from page 268)

radio telephone to tugs, fishing trawlers, oil tanks and other inshore vessels.

And now the pilots can pick up the phone and tell the operator ashore to connect them with any number of their choosing. In New York City, Captain James E. McCarthy, supervisor of the pilot boats and himself a veteran of more than 40 years in the pilot service, picks up the office phone that he uses in his other daily routine—and calls one of his pilot boats. Likewise, other vessels in the vicinity of New York which are thus equipped may talk with any desired points in the Bell System or with each other through the medium of the marine radio telephone station on Staten Island. And when they proceed to other vicinities, there are other shore stations to handle their calls and link them with the Bell System, for marine radio telephone stations are also in operation at Boston, Miami, Los Angeles, San Francisco and Seattle, and another is under construction at Norfolk.

Pilot boats transmit to shore stations on 2198 kc. (136 meters); receive from shore stations on 2590 kc. (115.8 m.); and work *intership* direct on 2739 kc. (109 m.).

BARTER and EXCHANGE FREE ADS (continued)

SWL'S AND HAMS—I WOULD like to exchange SWL cards and correspondence in U.S.A. and foreign countries. Will answer immediately. QRA John Jenkins, Jr., 423 Hill Ave., Glen Ellyn, Ill., U.S.A.

WANTED USED UNIVERSAL Clipper, Natl. SW3 with coils, etc. Have four tube battery radio with speaker, also 180 volt power packs. Swap for what have you? Richard Daly, 2098 Carroll Ave., St. Paul, Minn.

WANT—1 SHORT WAVE Receiver. Will swap Argus camera and case, also complete drafting set and 5 photography magazines of recent issue and printing frame. Seymour Albin, 255 Quincy Ave., New York, N. Y.

SWAP, PHILCO OSC. MODEL 088, Supreme model 333. Want Osc. and oscillograph and Riders six, seven and eight, or will buy the above, write Cornelius, W9JAJ, 116 East Platt, Maquoketa, Iowa.

HAVE A GOOD MEDICAL MICroscope. Worth $100. 12000V.—25 Ma. transformer, 6V Dynamotor. Want good phone xmitter and s.w. receiver, testing equipment or what have you? E. Rusconi, 6942 Ave. K., Houston, Tex.

I HAVE CRYSTALS, POWER supplies, 5 meter equip., transmitters 40, 80, 160. Need tube tester and test equip. anything. What do you have? M. S. Muse, 805 N. Mabey, Sherman, Texas.

TRADE FOR SERVICE INSTRUments—35 watt 6L6 amplifier, 2 tube transceiver, moviematic camera takes movies and snaps 16mm. All in good working order. C. H. Duncan, 231 Peachtree St., Rock Hill, S. C.

WANT CAMERA, BINOCULARS, National SW3, trade Western Electric cradle phone with cradle. 5 tube 2 band superhet kit. Dynamic speakers. 110 volt 1/20 HP motor, Weston meters. M. Simon, Box 441, Gary, Indiana.

WILL SWAP MEISSNER PUSHbutton remote control unit for latest (1937-1938) television books or short wave transmitting equipment, or what have you? S. Preston, 37 Avon Place, Staten Island, New York.

MOTIOGRAPH 35 MM CINE PROjector. 500 watt lamp, f:2 lens. Provisions for motor. Excellent mechanical condition. Want Leica A camera or what have you? Write anyway. P. O'Donnell, 83 Sagamore Ave., Atlantic, Mass.

SWAP THREE .001 VARIABLE condensers out of Rad. 28, three .0005 var. condensers out of Rad. 20, for what have you in radio line? Newell Kelly, 208 Congress St., East McKeesport, Pa.

LOOK: FOREIGN SW LISTENers. Wish to correspond with you. All letters answered. Also want to join foreign radio clubs. Raymond Kastl, 465 Douglass St., San Francisco, California, U. S. A.

HAVE 8 TUBE CUSTOM-BUILT broadcast receiver—portable. In carrying case. Has built in speaker, Weston meter 0-5 volts, Thordarson audio transformers. Want Sky Buddy or similar receiver. Asa Collins, 6555 Kansas Ave., Los Angeles, Calif.

WANTED: ANY KIND MOTION picture equipment 8 mm or 16 mm. films, cameras, projectors, splicers, rewinds, etc. Have radios, amplifiers, low powered transmitters, etc., to trade or will buy. Johnny Newsome, Box 725, Wake Forest, North Carolina.

ONE E. S. C. O. GENERATOR D.C. 500 volts at 2 amps. 12V. at 5.25 amps. with rheostat. Trade for test equipment or what am I offered? Lew Milam, 1450 Market St., San Diego, Cal.

WANTED: LAFAYETTE 5 METER receiver. Must have power supply. Would like speaker also, but is optional. Will pay cash or trade. Melvin Roppelt, 130 S. Bouldin St., Baltimore, Maryland.

HAVE 1928 MECHANICAL Brunswick console phonograph, cost $125.00 and 36 records. Like new. Wanted—SW receiver, code course. SWL equipment or what? Robert Parker, Box 41, Ogden, Utah.

WILL TRADE FOR REC. OR RAdio parts, Camera, Voightlander 116, f4.5, 1 to 250th sec. With leather case. In excellent condition. K. Scanlan, 2003 LaBranch, Houston, Texas.

HUNDREDS OF RADIO CHASSIS, most of the popular makes up to 1933, less speakers and tubes. Will exchange for what have you? E. Cohen, % Radio Shop, 624 E. 6th St., New York City.

S. W. RECEIVER 4 OR 5 TUBES or test equipment wanted. Have drafting kit complete with "T" square triangles and curves and some cash. Paul Martin, 703 Madison St., Brooklyn, N. Y.

SWL'S OF THE U. S. A. AND other countries: Let's swap SWL cards. All cards answered. Norman Braun, 13306 Harvard Avenue, Cleveland, Ohio.

WANT—SERVICING INSTRUments, typewriter and Riders manuals. Will buy or trade for: tubes, Philco ant., Mag., Dyn., P.M. Sp'k'rs., port. amplifier, 2-band A.C. radio, Isolantite coils. Warren Preehl, New Richmond, Wisc.

I QSL 100%—SEND ME UR SWL card, I'll reply with 5 100% foreign QSL QTH's. Oversea SWL's: will carry correspondence with u; trade stamps; Harry Honda, 429 North Fremont Ave., Los Angeles, California, U. S. A.

WANTED—LATE COMPLETE Sprayberry general radio course or any other radio courses or books. Send details. Trade for meters, generators, parts, etc., or what do you want? S. J. Nicewicz, 79 Church St., Broad Brook, Conn.

WILL SWAP GUITAR IN GOOD condition for a 25-50 watt cw transmitter or pay cash. Must be in good condition and cheap. Send photo and so will I. Lucien Giutaro, Sturgeon Falls, Ont., Canada.

HAVE AN 8 TO 10 WATT TRANS. complete with xtal, mike and tubes. Want movie camera, Proj., DX receiver, etc. What am I offered? Write A. Razzanda, Fayette City, Pa.

HAVE HALLICRAFTER 1937 SKY Chief model receiver. Will swap for test equipment. Receiver in good condition, used very little. Wm. D. Coggin, Conales, Ga.

SWL'S IN ALL PARTS OF THE world. I will exchange your cards for mine I QSL 100%. QRA Jack Johnston, 60 Court St., Medford, Mass., U. S. A.

WILL SWAP A SHURE BROS. mike desk type, also a 5 tube A.C. radio like new for a short wave receiver or what have you? Walter A. Richards, R. 3, Box 18, New Lisbon, Wis.

WANT: HAYNES RSR COMPL w. 5-555M coils, tubes, spkr. good cond. State your price! Will swap parts for B. Elim. For inform. write to: J. Mueller, 1883 So. Blvd., Bronx, N. Y.

WILL TRADE OLD TYPE AMERican adding machine that doesn't print numbers on paper for a still usable used crystal of any frequency with holder. Paul Bahr, 1205 W. 10th St., Marion, Ind.

HAVE: TEN METER PHONE transmitter with 5 tubes complete, 2 tube Doerle, transceiver using 19 etc. Want: Test instruments, typewriter, dynamotor, head phones, tubes, Kodak or what have you? Barnett Mitchell, W4EZI, Route 4, Selma, Alabama.

TRADE NOVELVIEWER SET with 4 roll films, cost $1.00. Want these books: "101 Short Wave Hook-Ups," "How to Get Best Short Wave Reception," "10 Most Popular Short Wave Receivers." Alexander Podstepny, 217 Pine St., Phila., Pa.

SWAP CARTER GENEMOTOR 6V. 4½A input 250V. 50 ma. output with filter, for test kit or meters also auto vibrator transformer and 1-4 gang condenser, coils and shields. Fuller, 709 Ferndale, Lansing, Michigan.

SWAP ONE 125 ML. "PYREX" Florence flask for radio parts. Cannot answer all letters. R. Sexton, 1329 E. 4th St., Charlotte, N. C.

WOULD LIKE TO SWAP P.A. equipment or parts, amplifiers for what have you? Send for list. Clara & Frank, Roxholder, P. O. Box 292, Centerville, Calif.

HAVE NATIONAL SW-3 COMplete, also portable 25 watt cw transmitter with motor generator. Want a good candid camera or PA system, or what have you? A. C. Hecht, Jr., W5FWI, Box 92, Aspermont, Texas.

WANTED—PEN-PALS INTERested in radio or what, send your QSL or SWL card answer 100%. Write in French or English. QRA Maurice Dubreuil, Pine Grove Restaurant, Lavaltrie, Que., Canada.

SWAP: BOSCH AMPLIFIER with two Bosch speakers in cabinets; new Shure mike and three section mike stand. Two radios. Also radio parts. What have you? Richard Kelley, 1034 Elm St., Franklin, Penna.

WILL TRADE AN UP-TO-DATE Lincoln Engineering radio course for a key, milliammeters, ham manuals, radio magazines, or a mandolin. What have you to trade? Leo Gruetzmacher, Thayer, Kansas.

HAVE VAR. AND FIXED CONDS., crystals, dry rectifier type A-10, .8-1.0 amps. 2x3 tube resistors, toggle switch, and good fountain pen. Want "B" eliminator. Write Bill Sule, Box 98, Smithville, Ont., Canada.

I HAVE ONE AIRLINE RADIO 9 tubes, 2 speakers, 1932 model, not in working order. One table model cabinet. Will trade, Loren Hart, Vinton, Iowa.

WANTED: MOTION PICTURE equipment. Can make any kind of 8 mm. titles to trade for what have you? John C. Newsome, Box 725, Wake Forest, North Carolina.

YOUR SWL CARD WILL BE APpreciated for my collection. Joseph Neuman, 2224 Woodstock Avenue, Swissvale, Pa.

TRADE RME69 AND DB20 PREselector same as new, latest model, for a Contax or Leica camera. N. B. Thornton, Somerville, Ohio.

SWAP CHEMICALS AND EQUIPment for any radio parts of value. Also notice SWL's. I will swap cards with anyone in U. S. and foreign countries. QRA Jack Spencer, 513 W. La. Ave., Ruston, La., U. S. A.

SWAP: GROSS 3 TUBE SHORT wave battery receiver metal cabinet with $20.00 B current supply lots valuable parts for ½ in. electric drill or what have you? Jensen, 211 East 200 St., Bronx, N. Y.

SWAP ¾ METER TRANSMITTER with Acorn tube, mike, ready to use, with antenna; for record changer 110 V.A.C., candid camera, 5 meter trans, or. All letters answered. Albert Winnett, 237-27 Davenport Ave., Belleross, L. I., N. Y.

SWAP: A SINGLE BUTTON CARbon microphone for a signal type R-63 telegraph key. Write for descriptions of the microphone. Leland E. Patience, Box 165, Leicester, Mass.

WILL SWAP SWL CARDS AND photo with anyone. Send yours and I'll send mine. QRA: Malcolm E. Purden, Jersey Ridge Road, Mayaville, Kentucky.

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

WANT .22 RIFLE, ALSO BLANK guns. Will swap chemicals for pocket watch. M. Konon, 48 Edwards St., Patchogue, N. Y.

TRADE STRATOSPHERE 10 Receiver, 6 months old complete with coils and hand mike. P. Silver, Woodbridge, New Jersey.

WANTED—GOOD, USED 6L6G tube, 40 meter x'tal. Have movie projector, electric train 0 ga., 5" dynamic speaker, new, several new tubes. Harry Wood, Route 1, Waverly, Washington.

WILL TRADE GOOD 0-5 VOLTS D.C. meter with zero adjustment for single or double button mike or what have you? Donald St. Germain, 6217 25 Ave., Kenosha, Wisconsin.

WANTED: CODE MACHINE with tapes. Swap Packard Lectro Shaver, rectified dynamic speaker or state lowest cash price. Tom Killeen, 567 Walnut St., Elizabeth, N. J.

WILL SWAP A SMALL SHORT wave receiver covering 16 to 217 meters. With all tubes and coils. Want to trade for used Master Teleplex in good condition. D. W. Hawkins, 113 Lang St., Marlin, Tex.

SWAP TENOR BANJO, PORTable phonograph, small PA system, Memo camera takes 50 pictures for 50c, double button mike, for portable 5 meter transceiver, typewriter with small type (standard). Alfred O. King, 7417 87th Ave., Woodhaven, L. I., N. Y.

TRADE: KODAK CAMERA, NO. 2 Model "C." Want radio parts or license manual and other literature. All letters answered. B. C. Murray, Box 116, Ilion, New York.

WANTED—BACK COPIES RADIO magazines, a correspondence course, or A.C. battery charger. I have large speaker, earphones, good parts, small radios, power pack and analyzer parts. Clyde Hyde, R. R. No. 3, Brazil, Ind.

WANTED: TRANSCEIVER USING 2-19 and 1-30 tubes. Also carbon mike or handset. Have back issues American Boy, Open Road for Boys mag, stamps, radio parts. Leonard Makela, 1129 16th Ave. E., Hibbing, Minnesota.

WILL TRADE NATIONAL SW3, coils 13-70 meters, power pack and amplifier, tubes and 35 dff. S W & T for Sky Buddy or similar "ham" superhet. F. Zallavetz, W2LKE, 894 Rogers, Pl., Bronx, N. Y.

HAVE "UNIVEX" 8 MM MOVIE camera, projector, films. Would like Sky Chief, Doerle D-38, Eilen RX-18-AB, or other good Ham receiver. Write Tom Cullen, 22 Simpson Ave., Wallingford, Conn.

HAVE ONE PAIR OF DICTOgraph, Type AD3 earphones (value $8.00), one Boy Scout signaling set, will trade for Elgin Air Roamer III or? Write Thomas Combs, 1201 Woodland Ave., Bluefield, W. Va.

COLLECTORS OF STAMPS AND snaps. To swap Malayan and foreign stamps, Oriental postcards and snaps for those of urs. Replies assured. Would appreciate ur SWL card. Joo Hye, P. O. Box 126, Ipoh, FMS.

WANTED: SKY BUDDY, SUPER Clipper, etc. Will trade 40 power telescope cost $33.00 in fine condition. Paul E. Trued, Tribune, Kansas.

(Continued on page 318)

BARTER and EXCHANGE FREE ADS (continued)

WILL TRADE 5 TUBE HALLICRAFTERS SW receiver using type 6D6, 6D6, 6C6, 42, 80 tubes. For 750 volt 200 mill xmitting power supply, milliammeters, or other xmitting equipment. Oiva Saukkola, 440 Elm Street, Fitchburg, Mass.

I HAVE A BIKE, VARIABLE condensers, micas, tubes—receiving, microphone, audios, etc. I will answer all letters, foreign or U. S. A., if stamps are provided for postage. Albert Sparks Wittlinger, 51-3 Salem St., Newark, N. J.

SWAP A GILBERT 150 POWered microscope, a Gilbert optical kit, Lionel Electric train, stamp album with 250 stamps for Sky Buddy or similar receiver. Arthur Andrews, 315 E. 7th St., Anaconda, Mont.

WUD LIKE TO SWAP CRDs with fellas es YL's in New Zealand es Australia. W1 ans all crds. QRA Tony Moravec, Jr., 1610 S. Allport St., Chicago, Ill., U. S. A.

WANTED TO SWAP FOR BELL & Howell 8 mm movie equipment. Have 1938 Philco 3XX $154 receiver as well as ham gear etc. All letters answered. Fred P. Strother, W4FBK, FitzPatrick, Alabama.

HAVE FOR SWAP A COMMUNIcations superhet, tunes 16-545 meters; all-wave superhet kit; short wave equipment; test equipment; radio books and magazines. Wanted: Portable typewriter. John J. Vilkas, 1515 So. 49th Court, Cicero, Illinois.

SWAP—AN AMPERITE MICROphone model SRO-80 in good condition for an A.C. short wave receiver 5 to 550 meters or 16 mm movie camera. Harry Goldman, 488 East 139th St., Bronx, New York City, N. Y.

WANTED RECORDING EQUIPment. Have transmitters to swap as well as many parts. C. Kowalski, 1239 Kinsmoor Ave., Fort Wayne, Ind.

WANTED—GUITAR IN GOOD condition. Have—RCA Spiderweb ant., W.E. 211, photographic eqpt., and 150 lbs. of popular mags. Write: David Bulkley, 85 Griffen Ave., New Rochelle, N. Y.

WILL SWAP: CROSLEY, 127 TEN tube set in A1 condition, and a large no. of radio parts for a Kelsey 5x8 printing Press. Everett S. Brothers, P. O. Box 10, Marietta, Ohio.

WANTED: 2 456 KC. I.F. TRANSformers. Have several speakers and power trans. Write for particulars. All mail answered. A. C. Alatary, 8 Syivan Ave., Metuchen, N. J.

TRADE ALL KINDS OF PARTS like speaker, tuning dials, etc. Write to me for your parts. Some parts were never used. So hurry OM's. SWL Post, Louis Oberlocster, 402 Ridge Avenue, Allentown, Pa.

ENOUGH EQUIPMENT FOR 50 watt complete rig for some machine shop tools. Will give better end of bargain. H. Knapp, 4818 S. Elizabeth, Chicago, Ill.

WANTED—USED CANDLER Junior code course complete, must not be soiled. Will pay cash to best offer. Also wish to swap SWL cards. QRA—N. W. Hostings, P. O. Box 325, Middletown, N. Y.

SWAP: TEN METER MOBILE transmitter-receiver; Barr Transceiver, tubes; Gross CB25, complete; five meter AC or mobile transmitter, receiver; Mallory 200 volt packs; 6 volt eight inch speakers (dynamic). W1-JOM, 40 Wayland Street, Roxbury, Mass.

I HAVE 16 COPIES OF National Geographic Magazine to swap for what have you? Write for list. Enclose postage for answer. Geo. W. Dad-Pearsons, 302 S. Granite St., Prescott, Arizona.

WILL SWAP 4:75x19 TIRE, TUBE and wire wheel, RCA motor and turntable, Weston model 506 0-100 D.C. milliammeter. What have you to offer? Write Jack Israel, 319 Peshine Ave., Newark, N. J.

HAVE 5 TUBE NATIONAL REceiver short wave, coils, 12" magnetic speaker, lightweight phones used by Airline, Aviation pictures. Swap for candid or motion picture equipment. Letters answered 100%. J. Adamson, TWA, 70 East 42nd St., N. Y. C.

WANTED: 2 TUBE KADETTE radio, Radiola 86 phono-radio with home recording, 8mm camera F.1.9 lens. Have nearly complete files 1932 radio mags. Also how to make. State wants. Will exchange. Larry Otis, 615½ Front St., Norwalk, Calif.

5 TUBE A.C. BROADCAST SET no cabinet. Stamps for collectors, microscope, 3 tube Raco, 1 tube Philmore, sw coils. Want musical instrument or radio service or receiving equipment. Albert Hartman, 5713 5th Avenue, Brooklyn, N. Y.

SWL'S AND HAMS IN CANADA and foreign countries, please send me your card. I will QSL 100%. I will also swap fotos. QRA—Earle L. Hoare, 83 Preston St., Halifax, N.S., Canada.

WILL TRADE TEN TUBE A.C. superhet, with tubes and speaker, A.V.C., tuning meter, and P.P. pentode output for complete phone transmitter, good multi-meter or set analyzer. R. L. Davis, Williamstown, Penna.

TRADE—22 TARGET RIFLE, telescope sight, micrometer mounts, excellent condition; accuracy test—five shots in three eighths inch at 50 yards, for FR7X complete or similar receiver. H. W. Trimble, DOD, Fredricktown, N. J.

WANTED, ONE TWO GANG 140 mmfd. variable condenser, one 35 mmfd. variable. I also want the following tubes, one 6K7, 6J7, 6C5 and 6F6. Exchange all kinds of radio parts. Douglas Breedlove, Braggs, Oklahoma.

RCA RADIOLA TWO TUBES (30's), Model 3A. Six tube American Bosch Model 66 Cruiser. Short wave equipment. Ham supplies. Exchange for 2 or 3 tube xtal transmitter, or? Walter O. Shivers, 472 3rd Ave., Macon, Ga.

WANTED—LATHE—SWAP TEST equipment, manuals, quartz lamp, cameras, s.w. receiver, gold watch, diamond, rare coins and medals, Rochelle Salt Crystals, cash and other goods. Denmark, 81 W. 172 St., N.Y.C.

SHORT WAVE LISTENERS IN all countries. Would like to exchange SWL cards with anybody. QRA. Fred A. Walt, 5 Pennington Street, Hindley, Nr. Wigan, Lancashire, England.

WILL TRADE ONE SHURE CRYSTal mike with cord and stand for well known camera, enlarger, or other photographic equipment. H. B. Ellis, 120 So. Cherry St., Richmond, Va.

WILL SWAP NEW T55 NEVER used and 2 4.4. heavy duty Aerovox oil filters, unused, for A.C. broadcast or s.w. revr. Inquiries invited. A. Dembiec, 811 Jefferson, Cleveland, O.

WILL TRADE BRAND NEW RAdio Technical Institute's complete authorized Radio Servicing course, perfect condition, for anything radio. J. H. Hood, 37 Club Drive, Greenville, South Carolina.

WANTED A USED B.F. AUDIO oscillator and a vacuum tube volt meter, Triplett preferred but not necessary. Give make, model and cash price and condition when answering. R. I. Gardner, 2689 L St., San Diego, Calif.

SWAP $35 QUALPENSATOR, 2 tube A.C. short wave set, speakers and microphones. Would like to have transmitter, transceiver or good short wave set. All letters answered. Steve Novota, Jr., 406 S. Plum St., Moweaqua, Ill.

SWL'S, THE BOYS OF "CAMP Spotswood Radio Club" would like to swap cards with boys in U.S. and foreign countries. We QSL 100%. Pres. Chuck Cox, CCC Company 1387, Camp N.P.-3, Elkton, Va.

WILL EXCHANGE 10X15 JONESGordon printing press, 18 fonts type and misc. printing equipment for radio equipment or microscope. What is offered? Richards, 137 South Terrace Ave., Mt. Vernon, N. Y.

WANTED TO BUY A GOOD used Hallicrafters Sky Buddy and Sky-Chief. Please send complete details. Jose A. Garcia, Trinidad alta 23, Santiago de Cuba, Cuba.

WILL SWAP POSTAL CARDS, documentary and American from 1879 up; for stamps or small short wave receiver. Roy Harding, Minneapolis, Kansas.

WILL SWAP SET OF AMERIcan Edition Encyclopedia Britannica for Sargent Streamliner '39, new Sky Buddy, new Ace, Do-All (Ultra model), Eilen RX-20 or what have you? William Beebe, 27 North Monroe, Columbus, Ohio.

HAVE EIMAC 50-T AND RCA 872-As. Remington No. 5 typewriter, 75 watt phone xmitter, Winchester-Springfield 30-06, Navy night-day glasses. What have you? Baro, 35 Whitaker Ave., Rumford, R. I.

5 METER TRANSCEIVER, USES 30-33 tubes. Will swap for meters, transmitting tubes or what have you? Built by W7GHW and W7FZB. Write Martin C. Derksema, W7WZB, 2207 East McGraw Street, Seattle, Wash.

TRADE ONE RACO R9 SIGNAL Booster and Preselector for small portable SW receiver or like. Helmut Giese, 225 Division, Port Washington, Wis.

Diversity Receiver for Hams

(Continued from page 290)

Needless to say, with these advantages, this receiver provides a quality of reception that is unequalled by any single receiver.

Another advantage of this new set, aside from its *diversity action*, is in the Infinite Rejection Circuit embodied in it.

It is rather generally understood that selectivity can only be increased to a certain practical degree beyond which phone reception becomes unintelligible. This practical limit of selectivity is not great enough to prevent adjacent channel interference.

However, with the Infinite Rejection Circuit, an interfering signal may be completely eliminated. It is so designed that, with a single control, the "rejection slots" may be moved in unison from 20 kc. off resonance to within 3 kc. of the signal being received, and simply by tuning the rejector to the offending signal, it can be entirely eliminated.

To provide the maximum flexibility and versatility in operation, the power supply and audio amplifier are supplied as separate units.

The component parts of the system are constructed of heavy gauge, flame-welded metal, sturdy channel construction, finished in black crystal. The channels themselves are finished in chromium, contrasting with the black crystal. The instrument panels are "alumilited," a satin aluminum finish.

Features

Diversity reception throughout its tuning range.

6 bands covering from 545 kc. to 62 mc. and there are 23 tubes in the complete system.

Separate "Diversity Action" meters.

Average sensitivity of better than 1 microvolt.

2 stages of R.F. amplification in each receiving section.

500 and/or 1,000 cycle Hetrotone oscillator for c.w. reception.

Audio amplifier output of 10 watts. (Tuner only 50 milliwatts.)

Carrier average output meter.

Current equalizing meter.

Infinite adjacent channel rejector.

Separate electro-mechanical band-spread control.

This article has been prepared from data supplied by courtesy of the Hallicrafters, Inc.

World S-W Stations

(Continued from page 286)

Mc.	Call	
6.120	W2XE	NEW YORK CITY, 49.02 m., Addr. Col. B'cast. System, 485 Madison Ave. 10.30-11.30 pm.
6.117	XEUZ	MEXICO CITY, MEX., 49.03 m., Addr. 5 de Mayo 21. Relays XEFO 1-3 am.
6.115	OLR2C	PRAGUE, CZECHOSLOVAKIA, 49.05 m. (See 11.49 mc.)
6.110	XEPW	MEXICO CITY, MEX., 49.1 m., Addr. La Voz de Aguila Azteca desde Mex., Apartado B403. Relays XEJW 11 pm.-1 am.
6.110	VUC	CALCUTTA, INDIA, 49.1 m. Daily 2.06-4.36 am., 6.36 am.-12.06 pm.; Sat. 10.06 pm.-2.06 am., Sun. 7.36 am.-12.36 pm.
6.110	VPB	COLOMBO, CEYLON, 49.1 m. Daily 7-9.30 am; Sun. 6.30-9.30 am.
6.108	HJ6ABB	MANIZALES, COL., 49.14 m., Addr. P. O. Box 175. Mon.-Fri. 12.15-1 pm.; Tue. and Fri. 7.30-10 pm.; Sun. 2.30-5 pm.
6.100	YUA	BELGRADE, JUGOSLAVIA, 49.18 m. 12.45-2.30, 4-8 am., 1-6 pm.
6.100	W3XAL	BOUND BROOK, N. J., 49.18 m., Addr, Natl. Broad. Co. 8.25 pm.-12 m.
6.100	W9XF	CHICAGO, ILL., 49.18 m., Addr. N.B.C. 4-6.50 pm., 1.05-2 am. Sun. 1-5.50 pm.
6.100	——	NOUMEA, NEW CALEDONIA, 49.18 m., Radio Noumea, Addr. Charles Gaveau, 44 Rue de l'Alma. 2-3.30 am., exc. Sun. and Mon.
6.097	ZRK	KLIPHEUVEL, S. AFRICA, 49.2 m., Addr. S. African Broad. Co., Johannesburg. Daily 12 n.-4 pm., Sun. 12 n.-3.20 pm.
6.097	ZRJ	JOHANNESBURG, S. AFRICA, 49.2 m. Addr. S. African Broad. Co. Daily exc. Sat. 11.45 pm.-12.50 am.; Daily exc. Sun. 3.15-7.30, 9-11.30 am. (Sat. 8.30-11.30 am.) Sun. 3.30-4.30 or 4-5 am., 5.30-7, 9-11.30 am.
6.095	JZH	TOKYO, JAPAN, 49.22 m., Addr. (See 11.800 mc., JZJ.) Irregular.
6.090	CRCX	TORONTO, CAN., 49.26 m., Addr. Can. Broadcasting Corp. Daily 7.45 am.-5 pm., Sun. 10.30 am.-12 n.
6.090	ZBW2	HONGKONG, CHINA, 49.26 m., Addr. P. O. Box 200. Irregular.
6.085	HJ5ABD	CALI, COLOMBIA, 49.3 m., Addr. La Voz de Valle. 12 n.-1.30 pm., 5.10-9.40 pm.
6.083	VQ7LO	NAIROBI, KENYA, AFRICA, 49.31 m., Addr. Cable and Wireless, Ltd. Mon., Fri. 5.30-6 am., 11.15 am.-2.15 pm., also Tues. and Thurs. 8.15-9.15 am.; Sat. 11.15 am.-3.15 pm.; Sun. 10.45 am.-1.45 pm.
6.081	YV1RD	MARACAIBO, VEN., 49.32 m. 6-11 pm.
6.080	W9XAA	CHICAGO, ILL., 49.34 m., Addr. Chicago Fed. of Labor. Relays WCFL irregular.
6.079	DJM	BERLIN, GERMANY, 49.34 m., Addr., Broadcasting House. Irregular.
6.077	OAX4Z	LIMA, PERU, 49.35 m. Radio National 7-11 pm.
6.075	VP3MR	GEORGETOWN, BRI. GUIANA, 49.35 m. Sun. 7.45-10.15 am.; Daily 4.45-8.45 pm.
6.070	HJ3ABJ	BOGOTA, COL., 49.42 m., La Voz de Bogota.
6.070	CFRX	TORONTO, CAN., 49.42 m. Relays CFRB 7.30 am.-12 m., Sun. 10 am.-12 m.
6.070	VE9CS	VANCOUVER, B. C., CAN., 49.42 m. Sun. 1.45-9 pm., 10.30 pm.-1 am.; Tues. 6-7.30 pm., 11.30 pm.-1.30 am. Daily 6-7.30 pm.
6.069	——	TANANARIVE, MADAGASCAR, 49.42 m., Addr. (See 9.53 mc.) 12.30-12.45, 3.30-4.30, 10-11 am., Sun 2.30-4.30 am.
6.065	SBO	MOTALA, SWEDEN, 49.46 m. Relays Stockholm 1.30-5 pm.
6.060	—	TANANARIVE, MADAGASCAR. 49.5 m., 12.30-12.45, 3.30-4.30, 10-11 am.
6.060	W8XAL	CINCINNATI, OHIO, 49.5 m., Addr. Crosley Radio Corp. Relays WLW Tues., Fri., Sun. 5.45 am.-12 n., 11 pm.-2 am.; Wed. 5.45 am.-12 n., 9 pm.-2 am.; Mon., Thurs., Sat. 5.45 am.-2 am.

Mc.	Call	
6.060	W3XAU	PHILADELPHIA, PA., 49.5 m. Relays WCAU Tues., Fri., Sun. 12 n.-11 pm.; Wed. 12 n.-9 pm.
6.057	ZHJ	PENANG, FED. MALAY STATES, 49.51 m. 6.40-8.40 am., except Sun., also Sat. 11 pm.-1 am.
6.054	HJ6ABA	PEREIRA, COL., 49.52 m. 9.30 am.-12 n., 6.30-10 pm.
6.050	HP5F	COLON, PAN., 49.59 m., Addr. Carlton Hotel. Irregular.
6.045	XETW	TAMPICO, MEXICO, 49.6 m. Irregular 7-11 pm.
6.042	HJ1ABG	BARRANQUILLA, COL., 49.65 m., Addr. Emisora Atlantico. 11 am.-11 pm.; Sun. 11 am.-8 pm.
6.040	W4XB	MIAMI BEACH, FLA., 49.65 m. 1-3 pm., 9 pm.-12 m. Relays WIOD.
6.040	W1XAL	BOSTON, MASS., 49.65 m., Addr. University Club. Irregular.
6.040	YDA	TANDJONGPRIOK, JAVA, 49.65 m., Addr. N.I.R.O.M., Batavia, 10.30 pm.-2 am.; Sat. 7.30 pm.-2 am.
6.033	HP5B	PANAMA CITY, PAN., 49.75 m., Addr. P. O. Box 910. 12 n.-1 pm., 7-10.30 pm.
6.030	VE9CA	CALGARY, ALTA, CAN., 49.75 m. Thur. 9 am.-1 am.; Sun. 12 n.-12 m.
6.030	OLR2B	PRAGUE, CZECHOSLOVAKIA, 49.75 m. (See 11.875 mc.) Thurs. 4.45-5.10 pm.; Wed. 5.15-5.40 pm.
6.023	XEUW	VERA CRUZ, MEX., 49.82 m., Addr. Av. Independencia 98. 8 pm.-12.30 am.
6.020	DJC	BERLIN, GERMANY, 49.83 m., Addr. (See 6.079 mc.) 10.40 am.-4.30 pm.
6.017	HI3U	SANTIAGO DE LOS CABALLEROS D. R., 49.85 m. 7.30-9 am., 12 n.-2 pm., 5-7 pm., 8-9.30 pm.; Sun. 12.30-2, 5-6 pm.
6.015	PRA8	PERNAMBUCO, BRAZIL, 49.84 m., Radio Club of Pernambuco, 6-9 pm.
6.012	ZHP	SINGAPORE, MALAYA. 49.89 m. 5.40-9.40 am., irregular.
6.010	OLR2A	PRAGUE, CZECHOSLOVAKIA. 49.92 m., Addr. (See OLR, 11.84 mc.) Thurs. 4.45-5.10 pm.; Wed. 5.15-5.40 pm.
6.010	COCO	HAVANA, CUBA, 49.92 m., Addr. P. O. Box 98. Daily 7.55 am.-12 m., Sun. until 11 pm.
6.010	VK9MI	S. S. KANIMBLA, 49.92 m. (Travels between Australia and New Zealand). Sun., Wed., Thurs. 6.55-7.30 am.
6.010	CJCX	SYDNEY, NOVA SCOTIA, 49.92 m. Relays CJCB 7 am.-1 pm., 4-8 pm.
6.007	ZRH	ROBERTS HEIGHTS, S. AFRICA, 49.94 m., Addr. (See ZRK, 9.606 mc.) Daily exc. Sun. 10 am.-3.30 pm.; Sun. 9 am.-12 n., 12.15-3.15 pm. Daily exc. Sat. 11.45 pm.-12.50 am.
6.007	ZRJ	JOHANNESBURG, S. AFRICA. 49.94 m., Addr. S. African Broadcast. Co., 3.30-4 pm. exc. Sun.
6.005	HP5K	COLON, PAN., 49.96 m., Addr. Box 33. La Voz de la Victor. 7-9 am., 10.30 am.-1 pm., 5-11 pm.
6.005	CFCX	MONTREAL, CAN., 49.96 m., Can. Marconi Co. Relays CFCF 6.45 am.-12 m.; Sun. 8 am.-10.15 pm.
6.005	VE9DN	DRUMMONDVILLE, QUE., CAN., 49.96 m., Addr. Canadian Marconi Co.
6.004	RV59	MOSCOW, U.S.S.R., 49.97 m. Irregular.
6.002	CXA2	MONTEVIDEO, URUGUAY, 49.98 m. Addr. Rio Negro 1631. Relays LS2, Radio Prieto, Buenos Aires. 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, CURACAO, 50.47 m., Mon., Wed., Fri. 6.36-8.36 pm., Sun. 10.36 am.-12.36 pm.

Mc.	Call	
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 5-10 am. irregular.
5.885	HI9B	SANTIAGO, D. R., 50.95 m. Irregular 6-11 pm.
5.875	HRN	TEGUCIGALPA, HONDURAS, 51.06 m. 1.15-2.16, 8.30-10 pm.; Sun. 3.30-5.30, 8.30-9.30 pm.
5.855	HI1J	SAN PEDRO DE MACORIS, D. R., 51.25 m., Addr. Box 204. 12 n.-2 pm., 6.30-9 pm.
5.853	WOB	LAWRENCEVILLE, N. J., 51.26 m., Addr. A.T.&T. Co. Works Bermuda nights.
5.845	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.
5.830	TDD	SHINKYO, MANCHUKUO, 51.46 m. Works Tokyo 5-10 am., irreg.

(Continued on following page)

World S-W Stations

(Continued from preceding page)

Mc.	Call	
5.825	TIGPH	SAN JOSE, COSTA RICA, 51.5 m., Addr. Alma Tica, Apartado 800. 11 am.-1 pm., 6-10 pm. Relays TIX 9-10 pm.
5.813	TIGPH2	SAN JOSE, COSTA RICA, 51.59 m., Addr. Senor Gonzalo Pinto, H.
5.800	YV5RC	CARACAS, VEN., 51.72 m., Addr. Radio Caracas. Sun. 8.30 am.-10.30 pm. Daily 7-8 am., 10.30 am.-1.45 pm., 3.45-9.30 pm.
5.790	JVU	NAZAKI, JAPAN, 51.81 m. Works JIC and TDD irregular.
5.758	YNOP	MANAGUA, NICARAGUA, 52.11 m. 8-9.30 pm.
5.740	YV2RA	SAN CRISTOBAL, VENEZUELA, 52.23 m., Addr. La Voz de Tachira. 11.30 am.-12 n., 5.30-9 pm., Sun. till 10 pm.
5.740	TGS	GUATEMALA CITY, GUAT., 52.23 m. Irregular.
5.735	HCIPM	QUITO, ECUADOR, 52.28 m. Irregular 10 pm.-12 m.
5.145	OKIMPT	PRAGUE, CZECHOSLOVAKIA, 58.31 m., Addr. (See OLR, 11.84 mc.) Fri. 4.45-5.10 pm.; Sat. 5.15-5.40 pm.
5.145	PMY	BANDOENG, JAVA, 58.31 m. 5.30-11 am.
5.077	WCN	LAWRENCEVILLE, N. J., 59.03 m. Addr. A.T.&T.Co. Works England late at night irregularly.
5.025	ZFA	HAMILTON, BERMUDA, 59.65 m. Works N.Y.C. irregularly at night.
5.000	TFL	REYKJAVIK, ICELAND, 60 m. Works Europe night time irreg.
4.995	VUD2	DELHI, INDIA, 60.06 m., Addr. All India Radio. 7.30 am.-12.30 pm.
4.975	GBC	RUGBY, ENG., 60.3 m. Works ships irregularly.
4.905	VUB2	BOMBAY, INDIA, 61.16 m. Addr. All India Radio, 7 am.-12.30 pm.
4.900	HJ3ABH	BOGOTA, COL., 61.19 m., Addr. Apartado 565. 12 n.-2 pm., 6-11 pm.; Sun. 12 n.-2 pm., 4-11 pm.
4.880	HJ4ABP	MEDELLIN, COL., 61.44 m. 8-11 pm.
4.842	HJ3ABD	BOGOTA, COL., 61.95 m., Addr. La Nueva Granada, Box 509. 12 n.-2 pm., 7-11 pm., Sun. 5-9 pm.
4.820	GDW	RUGBY, ENG., 62.24 m. Works N.Y.C. night time irregularly.
4.800	HJ1ABE	CARTAGENA, COL., 62.46 m., La Voz de los Laboratorios Fuentes. Addr. Box 31. Daily 8.30 am.-11 pm., Sun. 10 am.-9 pm.
4.780	HJ1ABB	BARRANQUILLA, COL., 62.72 m. La Voz de Barranquilla. Addr. P. O. Box 715. 11.30 am.-1 pm., 4.30-10 pm.
4.772	HJ1ABJ	SANTA MARTA, COL., 62.85 m. 11.30 am.-2 pm., 5.30-10.30 pm. except Wed.
4.752	WAQ	OCEAN GATE, N. J., 63.1 m., Addr. A.T.&T. Co. Works ships irregularly.
4.740	HJ6ABC	IBAGUE, COL., 63.25 m. 7 pm.-12 m.

DX Receiving Aerials

(Continued from page 300)

This aerial is sharply directional from "X," as shown in the diagram. It is particularly suitable for reception from a given station or direction.

The length of the "V" portion of the aerial determines the wavelength at which greatest signal strength is obtained. Data for construction is given in the accompanying chart.

Where Length of Side Equals ¾ Wavelength

W.L. (Met.)	*Height (W-Y)*	*Base (X-Z)*	*Wire (X-W-Z)*
17	39' 3½"	28' 2½"	83' 7"
20	43' 3½"	32' 9½"	98' 3½"
25	59' 1"	41' 3½"	123'

Where Length of Side Equals 1¼ Wavelengths

17	54' 1"	83' 7½"	139' 6"
20	65' 7½"	98' 3½"	164'
25	82'	124' 9½"	205'

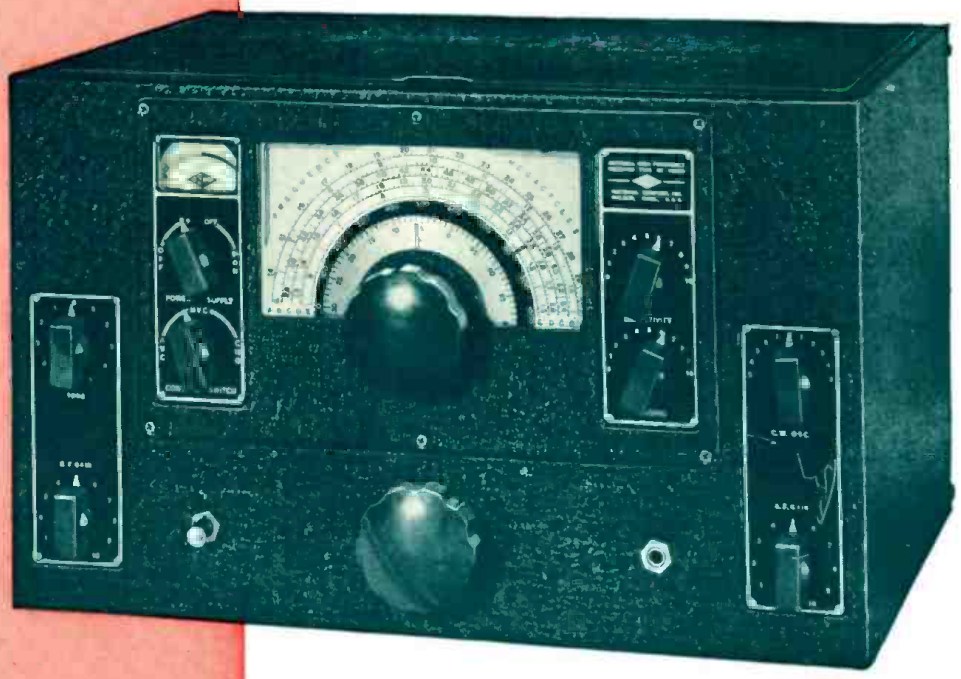
—Courtesy Australasian Radio World.

• 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.)

The NC-100X in new dress

NC 100-XA



National's policy of constant improvement in its products is well illustrated by the recent redesign of the mechanical details of the NC-100X Receiver.

THE NEW DIAL has direct reading scales for each band, calibrated in megacycles. An additional vernier dial reads to one part in a thousand, for accuracy in logging.

THE COIL-CHANGE MECHANISM is ganged to the dial pointer, which moves radially to point directly to the proper scale. The movable coil system and the electrical circuit are unchanged, as experience has shown them to be high in efficiency and sound in design.

THE SIGNAL-STRENGTH METER is new and takes the place of the less convenient "magic eye" formerly used

THE NEW CABINET has been completely restyled. Its clean simple lines are free from gadgets and superfluous trim. The new NC-100XA is a straight high-performance job, stripped for action.

THE PRICE will be no higher, for the time being.

NATIONAL COMPANY, INC., MALDEN, MASS.

RCA Research is the Basis of Radio in the Home!

Today's magnificent reception has been developed by years of patient work in RCA Laboratories

Most of us can recall the early crystal sets, when the marvel of hearing music by wireless first startled the world. Poor quality of reception was offset by the wonder of the achievement.

A year before these crude receivers came into public use RCA had already established a laboratory for developing radio reception for the home. From this humble beginning great things have come. Today, hundreds of trained RCA engineers devote their time to this work. Research in RCA laboratories has produced, or inspired, virtually all important advances in the quality of home receiving instruments.

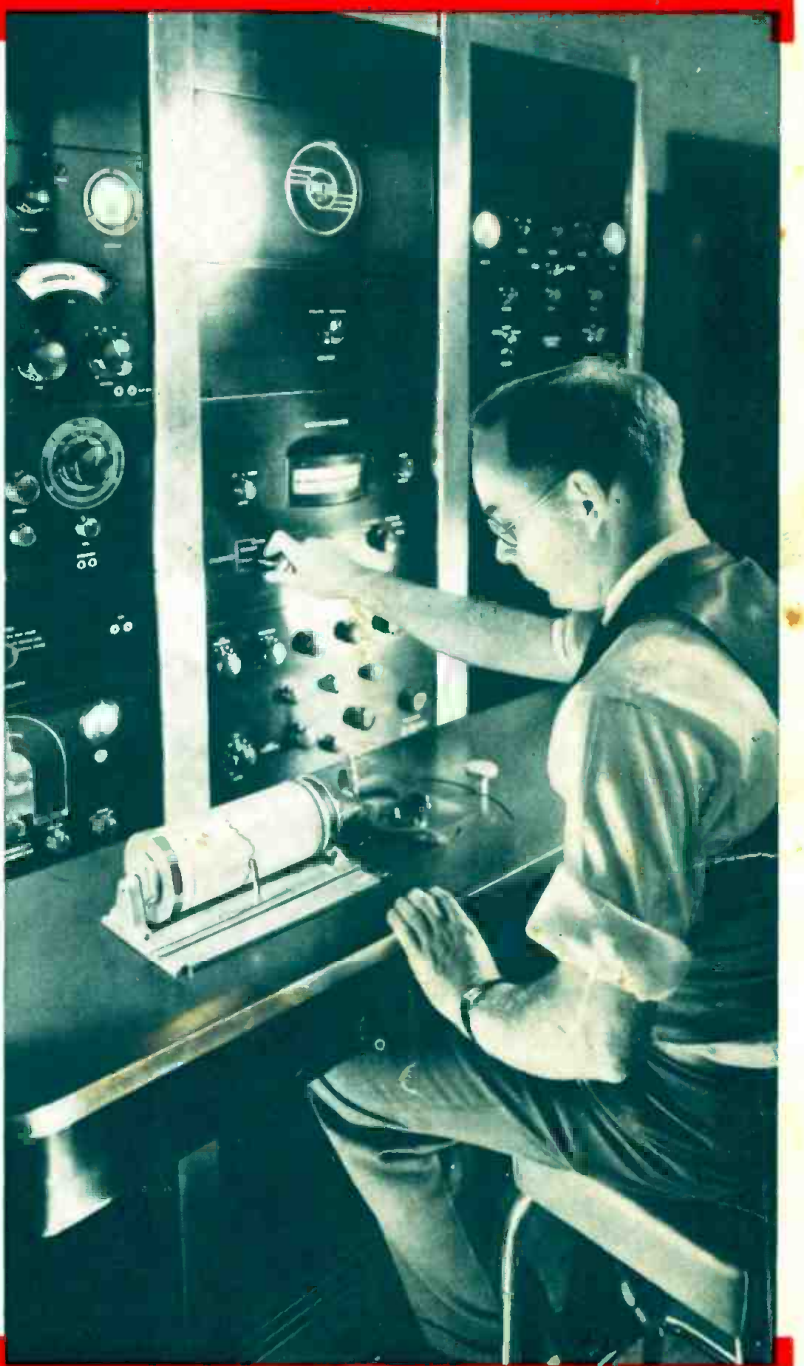
An all-inclusive business

Similarly, swift, direct radio communication with 43 foreign nations, and with ships at sea, is a result of RCA research. Other results include revolutionary improvements in the recording and reproduction of sound on records and motion picture films; indispensable new aids to police and aviation, to science and industry. And, thanks to years of unremitting study by RCA engineers, the new arts of television and facsimile now give promise of rendering important public services.

The Radio Corporation of America has invested millions of dollars in research to make radio—and the by-products of radio—more efficient and more economical, and to give to the United States, in every phase of radio development, undisputed world leadership.

•

Scene in RCA laboratory as engineer operates control board of device for recording tone quality of radio receiving instruments. This is but one of the many intricate pieces of equipment used in developing the fine quality of RCA Victor radios.



Listen to the Magic Key of RCA, presented every Sunday, 2 to 3 p. m., E. D. S. T., over NBC Blue Network

Radio Corporation of America

RADIO CITY, N. Y.

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RADIOMARINE CORPORATION OF AMERICA NATIONAL BROADCASTING COMPANY