AMATEUR EQUIPMENT

RADIO NEWS AND SHORT WAVE RADIO

SPECIAL SHORT-WAVE NUMBER

JUNE

ONCE AGAIN
We Thank You!

THIS issue marks the 17th Anniversary of RADIO NEWS —radio's oldest semi-technical publication. And we, the staff of RADIO NEWS, wish to extend to you, our readers and advertisers, our sincere thanks for your valued patronage which has made this long life possible.

EVER since 1919—a year before regular broadcasting began —when a crystal receiver that brought in a few, weak, nearby stations amidst the roar of static was something to brag about—RADIO NEWS has been the alert observer for tens of thousands of radio men—accurately reporting and describing each new development in the saga of radio progress.

NOW, we stand at the threshold of a new era—the age of television. And again, RADIO NEWS stands prepared to bring you each new development as it springs into being. You may rest assured that so long as the fertile minds of radio experts create new radio devices and theories, RADIO NEWS will report them to you accurately and concisely.

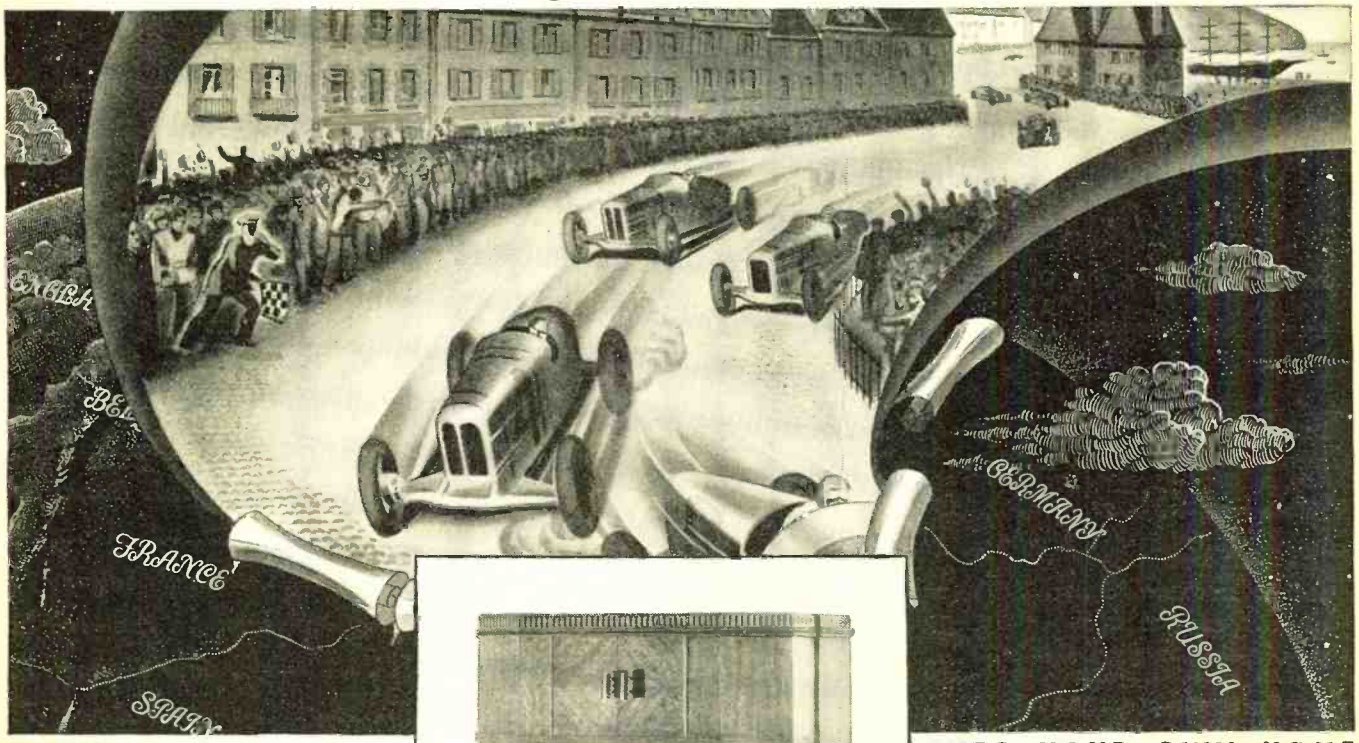
WE consider it a solemn trust to ever aid in the advancement of radio. The past has proven the value of this— many of our readers who were "beginners" 17 years ago are now leaders of the radio industry.

AT this, the beginning of our 18th year, we again pledge to continue our editorial policy of publishing all the important news of every branch of radio—in the same friendly, factual manner as we have always done.

WE like to think of RADIO NEWS not as a commercial proposition but as the "eyes and ears" for our many radio friends. It is *your* publication—without your constant patronage it could not exist. Help us make it even more valuable —by telling your friends and neighbors about the features you like. Only thru this cooperative spirit can we continue to advance—for you, our radio friends, are the backbone of this publication.

Radio News

MADMAN'S MARATHON! through the streets of Diepte — get it direct from France — with a SCOTT!



FROM ALL THE WORLD—

Crowds line the streets — lean from the windows—laughing—excited. Thrill of the year for seacoast Diepte!

You hear the throbbing roar of the racers long before you see them. But here they come! One—two—four—ten—twelve! Frenchmen at a madman's pace—roaring toward us down the crooked crowded streets! Skidding around corners, bumping curbs—missing the crowd by inches—brakes screaming, goggles gleaming — madman's marathon! Car out of control! Look out!—he's going to crash!—Wait—he's straightened out again. Shrieking tires—as the mad pack dodge past him with a deafening roar and rush. Mile after mile this flirting with death—thrills, spills, chills!

The skill and daring of these flying Frenchmen send the blood charging through your veins! Time was when all sporting France flocked to Diepte for this historic yearly event, run through the city itself where the streets are lined with people risking their lives to watch it. Now it's broadcast over all the world — more daring, more hair-raising than even our own Indianapolis Speedway classic.

If you aren't going to France this summer the next best thing is to hear this famous race in your own home — with a SCOTT — direct from T P A Colonial France!

The celebrated custom built SCOTT has made world adventurers of thousands of amateur radio enthusiasts, DX fans, broadcasters, radio stars, famous musicians and Princes and Presidents in more than 146 countries. They have all found the world a more fascinating and friendly place to live because of the astonishingly brilliant worldwide reception the SCOTT gives.

SCOTT *23 tube Full Range Hi-Fidelity Radio with the Laureate Grand Console*

RECORDS GALORE

Owners in U.S.A. alone logged in detail 19,257 programs from 320 foreign stations in a short six months time. Here is a fragment of C. H. Weyrich's list. 4BH and 4BC (both 600 Watts) and 2BL in Australia; KGU and KGMB (250 Watts) Hawaii—all with verifications (see SCOTT News April, 1935, P. 10).

CIRCLE THE WORLD

Argentine—Java—Spain—Germany—England and dozens more! So dependable is SCOTT foreign reception that SCOTT receivers are now being installed in leading American universities to aid students in the study of foreign languages.

Years of planning and research have put the SCOTT years ahead. The SCOTT is, we believe, the only receiver today with a high fidelity overtone range provably 30 to 16,000 cycles. You miss the full beauty of programs if your radio misses those vibrant ringing overtones which alone enable the human ear to distinguish one instrument from another. The SCOTT today gives you domestic programs with pre-microphonic tone truth—achieved with the new exclusive SCOTT Volume Range Expander.

INTO YOUR OWN HOME

YOU ARE INVITED

to compare the SCOTT on a 30-day trial in your own home anywhere in the United States. Nationwide installation. Five year guarantee. Strictly custombuilt to the highest known precision standards. Send today for the illustrated booklet, "PROOF OF CONSISTENT FOREIGN RECEPTION"— one of the most astounding records of worldwide performance in all radio!

Mail the coupon—NOW—for this extraordinary story!

FREE-SEND TODAY FOR DETAILS

E. H. Scott Radio Laboratories, Inc.
4440 Ravenswood Av., Dept. 5K6, Chicago

Send "94 PROOFS" of the SCOTT'S superior tone and DX performance and particulars of 30-day home trial anywhere in U. S. A.

Name .....

Street .....

City ..... *State* .....

E. H. SCOTT RADIO LABORATORIES, INC.

4440 Ravenswood Avenue, Dept. 5K6, Chicago, Illinois

650 Fifth Avenue, New York City • 115 N. Robertson Boulevard, Los Angeles

RADIO NEWS

Edited by LAURENCE MARSHAM COCKADAY

S. GORDON TAYLOR, *Managing Editor*
WILLIAM C. DORF, *Associate Editor*
JOHN M. BORST, *Technical Editor*
JOHN H. POTTS, *Assoc. Tech. Editor*
JOSEPH F. ODENBACH, *Art Editor*

Vol. XVII June, 1936 No. 12

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Coming— Next Month

The July issue will be a special Vacuum Tube number with "dope" on new tubes, tube charts including all types and makes, etc. For the summer broadcast fan there will be a "How to Build" article on a truly portable a.c.-d.c. superhet with built-in antenna. A swell 5-meter "M.O.P.A." rig will be presented with full construction details for the amateur. A little 1-tube amplifier to be added to the 1-tube receiver described in the beginner's series this month will be described in detail. Plus a number of other features for the serviceman, the s.w. fan and the technician.

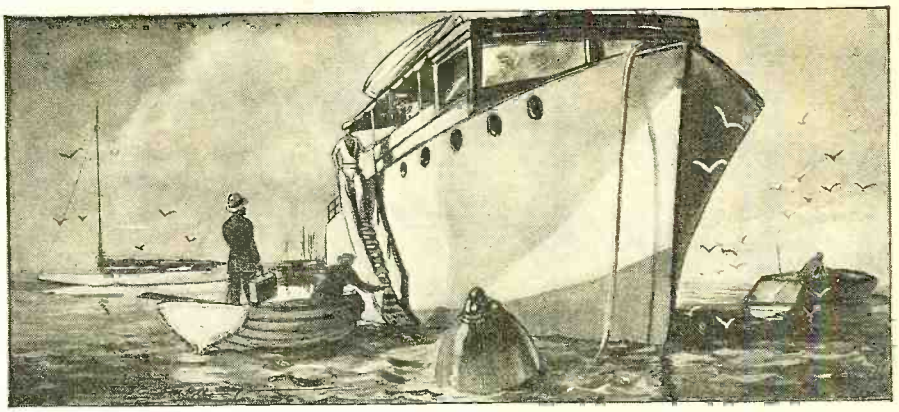
Published Monthly by Teck Publications, Inc., *Washington and South Avenues, Dunellen, N. J.*

EDITORIAL AND EXECUTIVE OFFICES
461 EIGHTH AVENUE, NEW YORK CITY, N. Y.

Lee Ellmaker, *President and Treas.*
B. Holcepl, *Secretary*
H. D. Crippen W. P. Jeffery, *Advertising Management*
Virgil Malcher, 205 W. Wacker Dr., Chicago, *Western Representative*

25c a copy. Subscriptions: $2.50 a year, $4.00 for two years. In Canada and Foreign Countries $3.00 a year, $5.00 for two years. Subscribers are notified that change of address must reach us five weeks in advance of the next date of issue.

Pages From A Serviceman's DIARY



YES! "THAR'S MONEY IN THEM THAR WATERS"

Servicemen located along the seacoasts, rivers and great lakes can render an excellent service to the yachting fraternity if they will specialize during the summer months on installing and repairing radio equipment for boats of all kinds. The problem is usually a special one as each installation needs individual consideration. Radio "on board" certainly offers definite advantages of safety and entertainment in cruising and a profitable line for wide-awake servicemen

FRIDAY—Loaded up for a trip to the yacht harbor, one of our customers suddenly having discovered that the radio on his yacht wasn't working. Had to take along everything to do the job on the spot, since the guests would arrive in the afternoon, all set for a three weeks' cruise. Thought it well to fortify myself with a replacement set just in case I might not have the one part necessary. Arrived at the harbor to find a mechanic struggling with the club launch motor which would turn over two or three times, then "cough" and stop. Finally gave it up, after several attempts, and we loaded everything in a rowboat and set our bearings for the yacht, about a half mile offshore. Pulled alongside in due time, a handsome 80-footer, and the crew gave me a hand in unloading my stuff.

Defective Vibrator

Got to work without delay, putting the soldering iron on the oil-stove flame so as to have it ready. Found the receiver mounted in the most inaccessible place (which owners always select even though we warn them service charges will be high if the set has to be worked on). This was an RCA M-34 auto-radio and the action of moisture on the mounting bolt had caused it to rust the nut firmly in position. Bathed the bolt well with penetrating oil and let it soak while I checked the installation, which proved O.K. Finally loosened the nut and got the set off. (Defective vibrator, as I had expected with such an early model, so installed a replacement). Set now operated but had a bad speaker rattle. Found it couldn't be centered; apparently the cone coil had become warped. Removed the cone from my replacement chassis and installed it. Reconnected everything and finished the installation work, which was *some* difficult job to avoid scratching the cabin woodwork. Went aft to get the skipper, who was busy shaving, and he invited me for lunch. The skipper showed me how he makes a razor blade last a long time by rotating it around the inside of a tumbler, pressing the edges firmly against the glass. After looking at his chopped-up visage, though, I mentally decided that it might be better to economize in some other manner. Had a swell meal, then went on deck, both of us speculating as to whether the club launch was now operating okay or not. Blew a horn several times to signal the clubhouse, ran a special flag up the mast so they could tell which yacht was calling, then waited. What a poor system of communication! Why can't yachts install simple 5-meter phone transmitters and receivers so they can maintain two-way communication with the club or with other yachts? Getting a license for transmitting is certainly no more difficult than obtaining one for operating an automobile. Even 12-year-old children have passed government tests. (Made a mental note to talk over with the boss some way of starting an educational drive on this subject.) However, the club launch finally arrived and I loaded up again for the trip back to shore, a tough job completed.

Stopped off at the clubhouse to fix a Stromberg 642. Complaint—could get only one station! Such trouble sounds serious but requires nothing more than a screw driver to fix. Removed the chassis, found the dial drive was not turning the gang-condenser shaft, tightened the dial set screws, checked the calibration and job was done. Since meals were usually served on the terrace, weather permitting, suggested the installation of an automatic record-changer and P.A. amplifier, the speakers to be located outside the clubhouse. Made arrangements for a temporary installation subject to the approval of the club committee. Picked up another service call from one of the members and moved on.

THESE records from an anonymous serviceman's diary should be of decided interest to veteran servicemen, as well as to those whose experience in the service field is more limited. Written by a man who "knows his stuff," and shot with an occasional outcropping of humor, these items provide many hints not found in text books. More of these pages will appear from time to time.

Spring Is Here!

Turned off the main highway for a long jaunt into the "sticks." Drove slowly, looking for landmarks and reading names on the mail boxes on posts along the road. After a five-mile run without locating my party, pulled over alongside a driveway and called over to a gardener for directions. He answered in such broken English that I couldn't understand him. Was about to give up when a second-story window flew open and a charming blonde head popped out! This lovely lady put me straight in a hurry—the place I sought was only a short distance farther on. "This man understands women," she called out to the gardener, waving a handkerchief as I started off again, feeling as I imagine Stonewall Jackson might have felt if Barbara Frietchie had been a little younger. (Thank goodness I'm in the radio business—I'll have an excuse to make a free inspection call at that place.)

Arrived at last. A large, brick house set well back from the road and surrounded with landscaped gardens. Three sets—same complaint on all—noise! Obviously only horse sense required here. Learned an electric heating pad was being used by an invalid on the second floor. Had the pad disconnected and located trouble in the thermostat. Will have to be replaced. Still more trouble, however, particularly noticeable on a set in the servants' quarters. Found a laundress at work, checked over the electric iron and found the contact points badly pitted. Replaced plug and cleaned points. (All O.K. now.)

On the way back, stopped off at the blonde young lady's home, thanking her again for her help in directing me and offering to check over the radio without charge. "It is really operating very well and we are able to take care of it ourselves, thank you," she said. Seeing I was somewhat taken aback, she asked me to come in and judge for myself. Followed her upstairs to the top floor, meanwhile reminding her that radios were complicated instruments which should not be handled by inexperienced persons. She agreed without further discussion and opened the door of a room at the rear of the house. Got another shock when I saw a beautifully laid-out rack-and-panel transmitter, with two receivers on an operator's table and the walls covered with QSL cards from all over the world. Looked out the back window and saw two 50-foot steel masts supporting horizontal antenna and a vertical half-wave 5-meter antenna fastened to the side of the house. "Guess the joke is on me," I said. "I've heard of expert YL operators, but this is the first time I've had the pleasure of meeting one." She added, "Many more thousands would go in for short-wave radio if more servicemen were available to fall back on when the apparatus failed to perk." She and her brother were both licensed amateurs and had done much of the construction work themselves. Then proceeded to demonstrate her own skill, shooting off a CQ at 35 w.p.m. on i.c.w., using a submarine bug. Established contact with a "K4" in Porto Rico, switched over to phone and then to duplex operation with amazing smoothness. Rattled off a description of the apparatus, which included automatic carrier-level control, cathode-ray, modulation-percentage indicator, frequency meter, monitor, and what not. Noticed a 20-inch vector slide-rule on the table. This girl obviously preferred a slipstick to a lipstick.

Radio News

June, 1936

Some DX HINTS

(for the Beginner)

So many new listeners are being introduced to short-wave reception, via a new all-wave radio receiver, persons who have little idea of the problems of reception on these bands, that this article of timely hints should be of first importance in many a household

By **William H. Fraser**

THESE tips are aimed at the newcomer to the DX pastime, with the hope that all of them may be helpful to some—and some of them helpful to all. They have been gleaned from experience, reading, and at times even a mild flurry of thinking. An effort will be made to pack the meat of these varied researches into one article, making a ready reference for the tyro in the DX sport who does not wish to wade through one or several years' copies of the magazine in order to find this or that item of needed information.

First, let us consider several pointers which apply to short-wave listening (and, incidentally, to long-wave DX too). The importance of an appropriate aerial is always plainly stressed and often rightly so. It is largely a matter of location—dependent on how much (or how little, if you are in a fortune spot) unwanted aerial matter there may be near your receiver, such as power lines, trolley wires or steel buildings. Such metal masses will rob the incoming signal of a portion of its strength. Hence your aerial must be efficient to counteract those losses.

Time Differences

In attempting very distant or transoceanic reception, consideration must be given to differences in time. Thus, when it is noon (Standard Time) in New York City, it is 9 a.m. in Los Angeles, 5 p.m. in Daventry and London, 6 p.m. in Berlin and Rome, 5:30 o.m. in Honolulu, and (the *following* morning) 1 a.m. in Shanghai, 2 a.m. in Tokyo, and 4:30 a.m. in New Zealand. The general rule is that places, 15 degrees of longitude apart, vary one hour in time.

Here is one way of reporting for a QSL (verification card or letter) which has usually brought courteous and generally prompt answer. First, be sure of what you have heard. Don't rush off a glowing letter to German or French stations after catching an odd word or two in their respective languages, and making a hopeful stab at guessing the wavelength! Remember there are certain broadcasts from transmitters on this side of the pond offered in various foreign tongues which you might mistake for foreign transmissions.

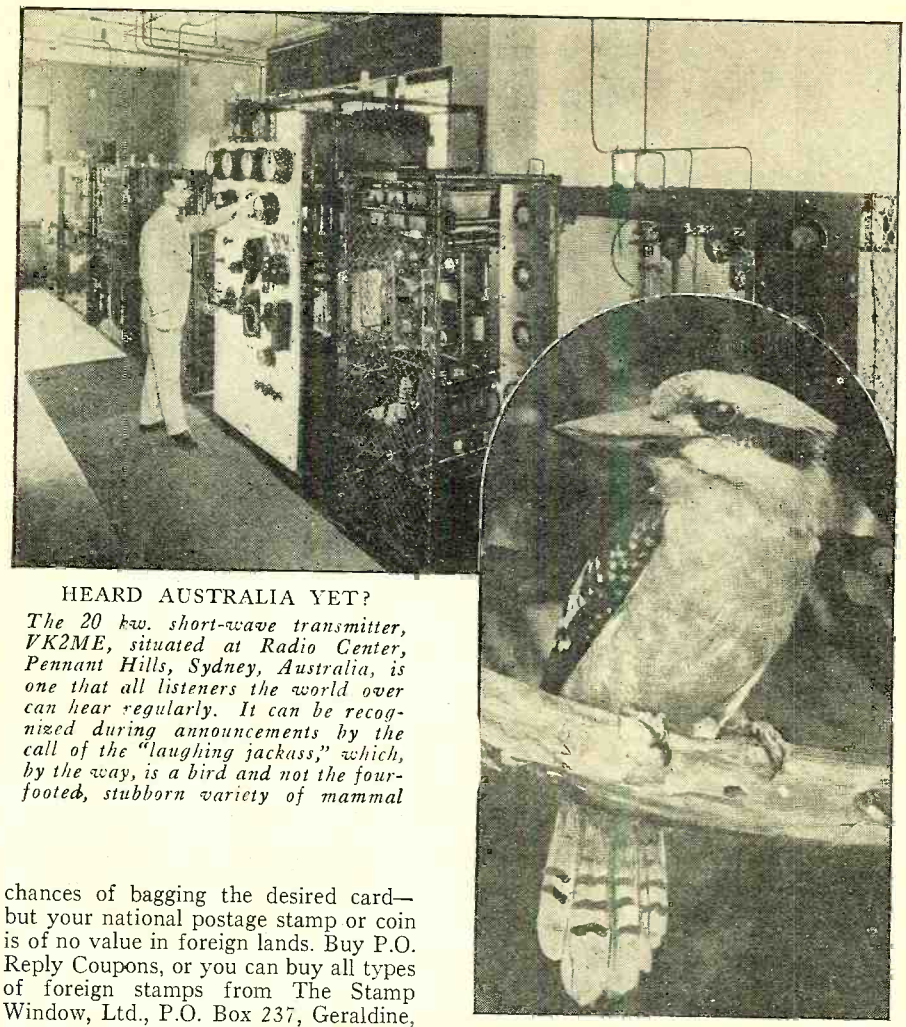
List these facts in your report asking verification:

Call letters, place name, or identifying sound used.
Approximate frequency or wavelength.
The date.
The time (reduced to that of the transmitter's locality).
Names of at least two musical selections heard (or the equivalent of an address, newscast, etc.)
Your airline DX in miles from the station.
Local weather conditions.
Quality of reception: (1) Clarity, (2) Volume, (3) Fading.
Type of receiver and aerial (if any).
DX Club membership, or connection with radio work.

Naturally, you will express pleasure or a word of thanks for the entertainment. Return postage increases your

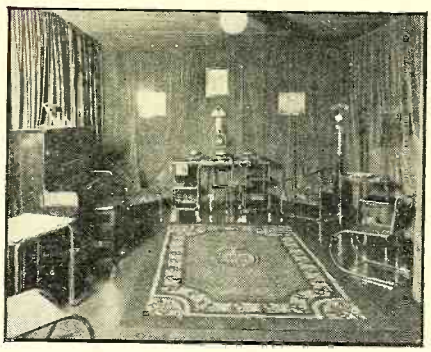
THE THRILL OF A LIFETIME—DX!

Everyone remembers the amazement and pleasure that he experienced with his first DX (long distance) reception, and the short waves will give you plenty of that at any time you listen in if you understand when to listen and how to tune



HEARD AUSTRALIA YET?

The 20 kw. short-wave transmitter, VK2ME, situated at Radio Center, Pennant Hills, Sydney, Australia, is one that all listeners the world over can hear regularly. It can be recognized during announcements by the call of the "laughing jackass," which, by the way, is a bird and not the four-footed, stubborn variety of mammal



A REGULAR STANDBY

This is the studio of the powerful station EAQ at Madrid, Spain, a favorite short-wave broadcaster for many years

chances of bagging the desired card—but your national postage stamp or coin is of no value in foreign lands. Buy P.O. Reply Coupons, or you can buy all types of foreign stamps from The Stamp Window, Ltd., P.O. Box 237, Geraldine, Montana.

Influence of Weather

A dark room is the best for big DX, as it seems to sharpen the sense of hearing. In this connection, some listeners have a separate switch for the dial light. Or, as a desk lamp, one or two of the 2-watt neon glow lights (they fit the standard 110-volt house-lighting socket) provide the ideal illumination for making notes in the log—no glare or waste of power.

Some stations will forward (for postage) an advance monthly schedule of their broadcast activities.

Weather is often the bane of the serious DX hunter, yet at times even its vagaries can be put to worthwhile use. On the short-waves, the coming season of warm weather will bring the best results, especially on the 16-meter, 19, 25 and 31-meter bands. Sometimes damp cloudy days are wonderful for S.W. DX. Or, if you wish to listen to the overseas stations on the long waves, the best results will follow attempts made during the cold seasons. On such transmissions, the most likely hours are naturally those when the signal path is dark.

A general rule as to DX efforts during what seems to be poor radio weather, might be one advising the listener to stick to the short waves at such times—more particularly, frequencies above 7000 kc. Yet here, as in most things, the exception sometimes proves the rule.

Good air conditions for big DX often appear to lie in directional strips across the world. Thus a listener near the Great Lakes may experience a night when he can log most of the European stations yet be unable to hear anything of value from Asia or Australia. Another night the reverse may hold true.

Antennas and Grounds

Some receivers perform better, in the case of signals coming (for the major portion of their travel) across a large body of water, using no ground connection. In other cases, reception has been improved (static noticeably lessened) by disconnecting the usual aerial, and changing the ground wire to the antenna post. Go ahead and experiment! Almost anything is worth a trial—save perhaps such carefree gestures as applying "B" (plate) voltages to the tube filaments. . . . Even the long-bearded experts in this wireless game will at times admit there are a few things yet to be learned.

One of the best DX grounds can be easily made, as follows: a coil of wire, anything from 18 to (*Turn to page* 753)

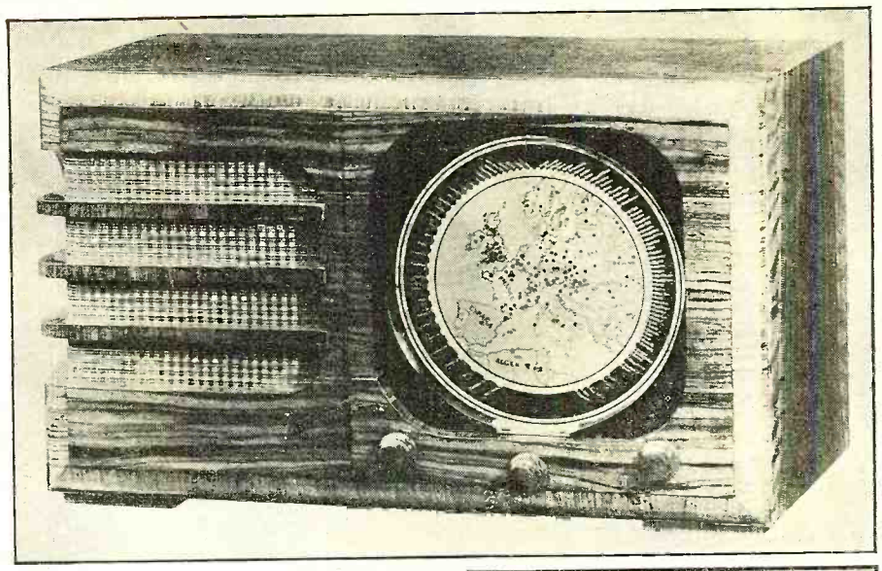
LISTENING TO THE HOME COUNTRIES

At almost any time, day and night, you can hear the British Empire broadcasts and the German broadcasts on short waves. At left: The B.B.C. studios in London, programs of which are heard on the "G" stations. Below: The German broadcast center, whose programs are on the "D" stations

WHAT'S NEW in RADIO

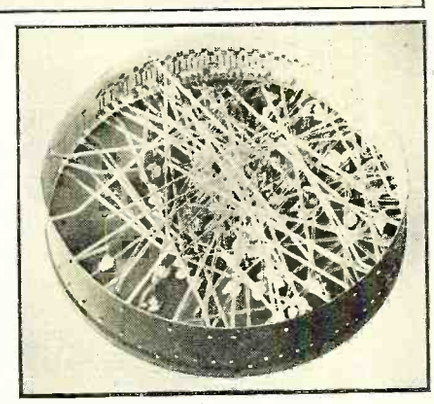
Short-wave listeners and servicemen want to know about the latest receivers now being offered, including the latest types of accessory equipment

By **W. C. Dorf**



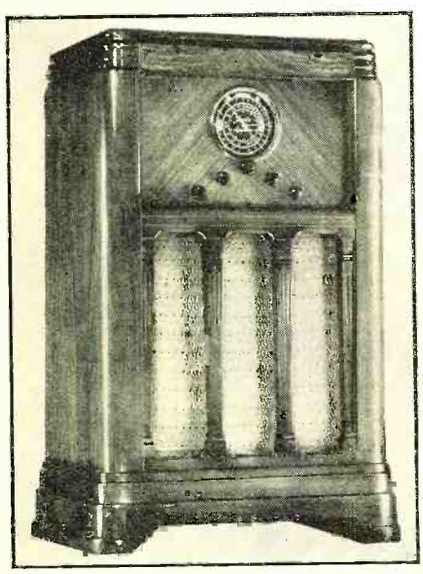
NEW RECEIVER TELLS YOU WHERE SIGNALS COME FROM

The receiver pictured above shows, by luminous dots on a map, where the station you are receiving is located and at the same time lights up the proper spot on the dial calibration around the outside of the circle. This is accomplished by connecting the two points on the dial with special glass or quartz tubes which will energize with light as the tuning control is turned. As each station is tuned in these two spots are illuminated. The somewhat complicated-looking network of glass on the back of the dial is shown at the right



Receiver to Provide True Tone Quality

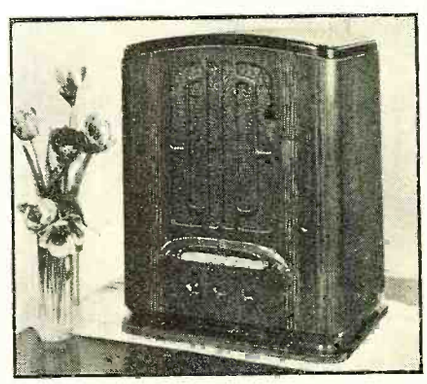
The Lincoln "Symphonic" 20-tube superheterodyne all-wave set shown in the accompanying photograph is housed in a cabinet of special design featuring the Lincoln "Free Floating Speaker Resonator" designed to eliminate all mechanical paths of vibrations to the cabinet and chassis.



This is a separate assembly on which the speakers are mounted and completely insulated from the cabinet.

An Attractive Four-Band All-Wave Receiver

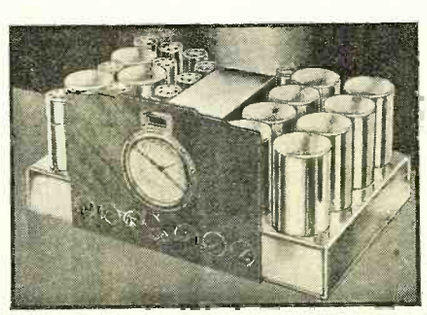
Several design features are incorporated in the new General Electric table model A-82 receiver, of which perhaps the most important are the slide-rule tuning-scale, noise control, automatic "Lo-Note" compensation, metal type tubes in all stages and a highly efficient mechanical and electrical waveband switching mechanism. The set has dual-ratio tuning and air-dielectric trimmer condensers. The tube equipment comprises one 6K7 for the r.f. stage, a 6A8 as a combined first detector and oscillator, one 6K7 for the i.f. stage, one 6H6 for the second detector and a.v.c. control tube,



one 6C5 as a first audio, two 6F6's in the power output stage and a 5Z4 as a rectifier.

Custom-Built Receiver

The McMurdo Silver Corp. "Masterpiece

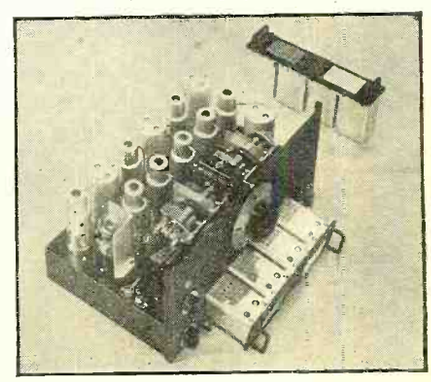


IV-A" receiver is made in two units, the tuner shown here, and a three-tube power amplifier. All told, 14 tubes are employed. A set of this type will be of interest to both the short-wave and broadcast listener because of its wavelength range of 9.4 to 2150 meters covered in five bands, its two pre-selector stages with two 6K7 tubes, a 4½-inch airplane type dial with dual-ratio tuning, a visual tuning indicator and a special 12-inch concert loudspeaker to cover a wide frequency range for high-fidelity reproduction.

Amateur Receiver

The National HRO Junior" communication type receiver utilizes the same type tubes and incorporates all the advanced features of the HRO Senior model, except the tuning meter, crystal filter and the extreme electrical band-spread. It is a 9-tube superheterodyne, has two r.f. preselector stages, air-tuned i.f.'s, c.w. beat oscillator and worm-drive precision condenser with large micrometer dial that has proven so popular among the amateurs.

(*Turn to page* 754)



HEARD AROUND THE WORLD

The towers and transmitter house of "Radio-Nations," the international station of the League of Nations at Prangins, Switzerland, a short distance from Geneva

"RADIO-NATIONS"

(League of Nations Stations)

By R. H. Tomlinson

RADIO-NATIONS came into being during 1929. In September of that year the Assembly of the League of Nations decided to construct a wireless station for the purpose of conducting independent and direct communication between the League and the greatest possible number of its members.

THE utility of placing a means of direct communication by Radio at the disposal of the League of Nations, an international organization responsible for safeguarding and maintaining peace, had been demonstrated in a particularly striking manner in October, 1925, on the occasion of a dispute which nearly led to war between Bulgaria and Greece. Shots were being fired on both sides of the frontier and troops were mobilized. The Council of the League of Nations was informed of the gravity of the situation by a radiotelegraphic communication. On the proposal of M. Briand, at that time President of the Council, it was decided to send the Governments an appeal adjuring them not to break the peace. These telegrams which had to be sent by the ordinary route, through different countries and different telegraphic administrations, were delayed in transmission. Later, after the successful issue of the steps taken by M. Briand, it was learned that the telegrams had arrived only half an hour before the time fixed for launching an offensive. If the telegrams had been delayed another half hour, the general staffs would have been unable to give orders to stop operations.

This dramatic experience provided convincing proof of the necessity of establishing direct means of communication between the League of Nations and every country. The 1925 Assembly selected the plan submitted by the Swiss Government, under which the League of Nations was to pay for the two short-wave transmitters intended for extra-European traffic, and the Radio Suisse, an incorporated wireless telephone and telegraphy company, provided a medium wave transmitter with a power of 50 kw. in the aerial, for European traffic, a certain number of receivers, the necessary ground and buildings required to shelter the transmitting and receiving station and the technical equipment of a central operating office.

Opened in 1932

The station bears the name of "Radio-Nations." It cost approximately 4,000,000 francs, of which 2,400,000 francs were defrayed by the League and over 1,500,000 francs by the Societe Radio-Suisse. On February 2nd, 1932, the date of the opening of the Disarmament Conference, the new station put into service the short-wave transmitters for use for trans-atlantic correspondence. The medium-wave transmitter had already been in operation since 1929 for European communications.

In normal times the station provides for the exchange (direct or by relays), of telegraphic correspondence between the League Secretariat and the delegations at Geneva on the one hand, and the greatest possible number of Governments outside Europe on the other. It may also be utilized for the transmission of the circular telegrams which the Secretariat of the League of Nations sends to the States Members of the League, and for the rapid transmission of important documents to very distant countries. It facilitates communication between the seat of the League of Nations and the States outside Europe and also provides by means of broadcasting, for close contact between the work of the League and world public opinion. Lastly, the station is also utilized for Swiss commercial traffic.

In time of emergency the first of the tasks which the station has to fulfill, is to place the League Secretariat in immediate and constant touch, without the intervention of an intermediary, with the countries threatened with a conflict. The League thus enjoys for its telegraphic traffic an independence equal to that which national stations give to the Governments of the countries to which they belong.

The Station Layout

The Radio-Nations Station consists of four parts, namely: 1. Transmitting station situated at Prangins, near Nyon, about 20 km. from Geneva; 2. Receiving station situated at Colovrex, about 8 km. from Geneva; 3. Central office at Geneva in the Federal Telegraph and Telephone building, in Rue Du Stand, and fourth, the Central Control Office combined with a wireless telephony studio in the League Secretariat building.

The technical conditions of the stations are as follows: The transmitting station consists of two short-wave transmitters permitting of high-speed telegraphic or telephonic transmission. The power of each of the transmitters is 20 kw. One was constructed by the Marconi Company. This transmitter is able to work on wavelengths between 14 and 100 meters. The second was constructed by the Societe Francaise Radio-electricite and can work on wavelengths between 14 and 40 meters.

All the continents of the world may be reached by means of a group of directed aerials. Tests have shown that it is possible to obtain direct telephonic communications with the most distant countries, such as Japan, China and both Americas. From a mechanical point of view, Radio-Nations has been made entirely automatic, so that two or three persons are sufficient to work it. A large heavy oil tank and a reserve installation would make it possible, in time of emergency, to work for two months independently of the Swiss electric system.

The Receivers Employed

The receiving station uses two high speed telegraphic receivers permitting reception up to 200 words per minute, one special receiver used for telephonic communication and a number of different receivers for listening in, so that it is possible to listen to all wavelengths from 10 to 30,000 meters. The receiving aerials consist of a group similar to that used for transmitting and permits reception from every continent.

Since Radio-Nations was put in service in 1932, it has been utilized in several different ways. It was used in keeping direct touch with the League Commission of (*Turn to page* 765)

23-TUBE RECEIVER ENABLES OBSERVERS TO LISTEN-IN On The WORLD

(Scott All-Wave High-Fidelity Receiver)

By S. Gordon Taylor
and
Laurence M. Cockaday

AS THE SUN BEGAN TO RISE

The authors of this article complete an all-night session at the tuning dials after pulling in practically all of the DX stations on the short-wave bands, including foreign "phone" amateurs and short-wave broadcasting stations from Asia, Australia, Europe and Africa.

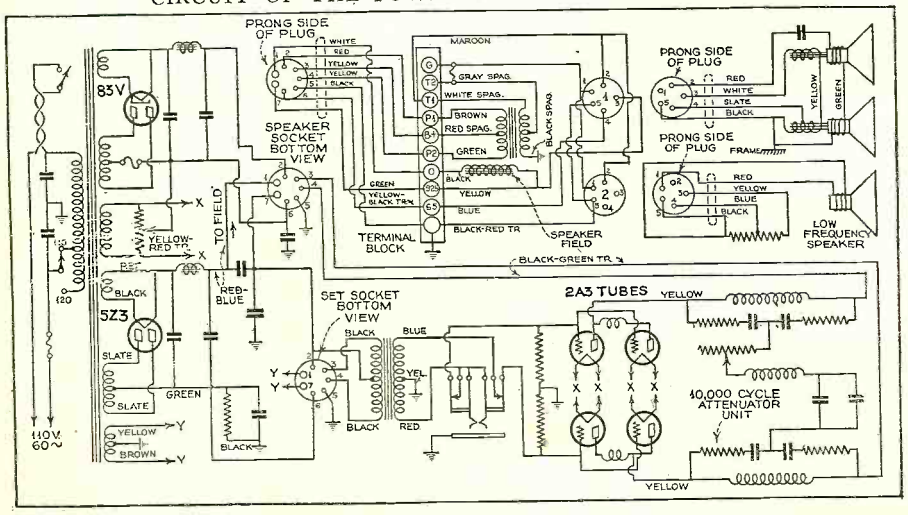
THIS second of a series of two articles describes the results obtained during intensive reception tests on this receiver in our Listening Posts under "suburban" and also under "city" conditions. The article last month told of the technical details of construction, including a circuit analysis, and described some of the electrical features combined in the receiver.

RECEPTION tests on the Scott all-wave-fidelity receiver, made at the Westchester Listening Post, at North Pelham, Westchester County, New York and at the Bronx Listening Post, University Heights, New York City, have been conducted during the period of the last two months in which time there have been all kinds of radio weather—good, bad and indifferent. The receiver has been taken back and forth between these two points during alternate weeks in order to check its reception under these varying conditions in different places. The results obtained were so far above standard that we do not hesitate to recommend the job to anyone who is interested in either high-quality broadcast reception or in long-distance listening on either the broadcast or short-wave bands. Of course broadcast band DX can only be done with real satisfaction on *any* receiver during the winter months, but short-wave DX reception can be accomplished at almost any time of the year with the exception of an occasional day or two when atmospherics and general magnetic conditions are not conducive to really good results. Even at such times the receiver picked up *some* short-wave distance programs at any time it was tuned.

Operating Features

Some of the operating features of the set are the following: High gain with low noise-level; accurate calibration in kilocycles; stable operation with no tendency to "spill over" even at maximum gain; a smooth-operating double-speed dial which operates without backlash; variable selectivity increasing with sensitivity; and an adequate audio tone-control. With these things, really well worked out in a receiver, one is bound to get good reception on DX.

CIRCUIT OF THE POWER PACK AND AMPLIFIER



The receiver was first set up at the suburban Listening Post and the loudspeakers installed in a well-designed cabinet of an earlier model Scott receiver. This included the low-frequency speaker and the two high-frequency speakers. The tone quality on broadcast reception was commended by all who heard it as reproducing programs just as if the listener were in the studio. At this location no attempt was made to listen to transoceanic broadcasts on the 1500-540 kc. band. The regular run of mid-western and west-coast broadcast-band stations were of course heard including American, Canadian, Mexican and Cuban. Even on this transcontinental DX by a careful adjustment of the selectivity-high-fidelity control, high-quality broadcast reception of good entertainment value was attained when static was not excessive. In the matter of selectivity, it can be increased to such a point that even powerful locals can be "tuned through" to get DX stations on the adjacent channels.

DX on All Wavelengths

During tests at the Bronx Listening Post plans were made twice to carry broadcast band reception tests throughout the night but on both occasions the air proved to be burdened with static which made transatlantic and transpacific reception out of the question so far as the 540-1500 kc. range was concerned.

During the tests at this Listening Post, West Coast stations such as KFI, KGO, KPO, KNX, etc., were brought in with real entertainment value on numerous occasions. A good part of the time it was possible to use the receiver adjusted for semi-high fidelity on these stations. Numerous Canadian, Mexican, and Cuban stations were likewise heard. Such stations as WFAA-WPAP, Texas; WCCO, Minneapolis; KOA, Denver, etc., were usually brought in with such strength and with such favorable signal-to-noise ratio as to permit the use of full high fidelity. (*Turn to page* 762)

The DX for the

Conducted by Laurence

LISTENER'S POST IN CURACAO

Johan P. Curiel of Curacao, Dutch West Indies, sends greetings to fellow short-wave fans. He has logged stations from every continent

AS a feature of this special short-wave number the 39th installment of the DX Corner for Short Waves contains an enlarged World's Short-Wave Time-Table for 24-hour use all over the world.

Welcome to Our Organization

The following new Listening Post Observers have been appointed for 1936:

IN THE UNITED STATES

Arkansas: Chester A. Joerger.
California: Bernard L. Wood.
Louisiana: Irving G. Couvillion.
Michigan: Lewis W. Jones.
New Jersey: Morton Dennis Meehan.
New York: Harry J. Potthoff.
Oregon: Jack Frost.
Pennsylvania: Joseph Stokes.

IN OTHER COUNTRIES

Australia: Ron Gurr.
Canada: George L. Loke.
Guatemala: Luis Diez.
India: H. W. Kamen.
Puerto Rico: Jose D. Caro Costas, Jr.

LISTENS AT NIAGARA FALLS

Meet Observer T. L. Grabek, at left, who covers short-wave reporting for upper New York state

Recommendations for Station Reports

To make the work of compiling station reports as efficient as possible it is recommended that our Observers send in reports on post cards at any time during the month that the stations are logged. This allows the work of the editor to be spread out during the month instead of working on an enormous amount of mail around the 30th. Please remember to *keep your information on stations logged specific!* To further classify our recommendations of last month it is thought best that reports be arranged in three ways:

No. 1—New Stations
No. 2—Station Changes
No. 3—Exceptionally Fine "Catches"

No other information than this should be included on the card except the Observer's or listener's name and address and the fact that he is either a Listener or an Observer for his territory. A standard form for this would be the following:

NEW STATIONS

W2XAF, Schenectady, New York, 9530 kc., 31.4 meters, daily 4 p.m. to midnight, E.S.T. (from verifications).

STATION CHANGES

HCJB, Quito, Ecuador, changed frequency from 8900 kc. to 8590 kc., daily 1:30 to 4:30 a.m., E.S.T. (from announcement).

EXCEPTIONALLY FINE CATCHES

HS8PJ, Bangkok, Siam, 10,955 kc., 27.38 meters, Mondays 8 to 10 a.m., E.S.T. (from announcement).

This new form of reporting will enable

HEARD—HOW FAR AWAY?

Below: The verification card of the Detroit 9-meter station. If Observers hear this station outside of the United States kindly report to RADIO NEWS

Affiliated DX Clubs

OUR editors hereby place a standing invitation to reliable DX clubs to become affiliated with the DX Corner, acting as advisors on short-wave activities in promoting short-wave popularity and reception efficiency. A list of associated organizations follows:

International DX'ers Alliance
Newark News Radio Club
Society of Wireless Pioneers
U. S. Radio DX Club
Radio Club Venezolano
World Wide Dial Club
International 6000-12,500 Mile Short-Wave Club
Globe Circlers DX Club
Radio Fellowship
Short-Wave Club of New York
National Radio Club
Universal Radio DX Club
Chicago Short-Wave Club
Mexican League of Radio Experimenters
Monongahela Radio Club
New Zealand DX Club
New Zealand DX Radio Association
Penang Wireless Society
Radio Club of Basel
Radio Short-Wave and Television Experimenters Association

DX listeners wishing to join any of these clubs and associations may write for information to the Short Wave DX Editor. Other clubs who wish to become affiliated should make application similarly. Clubs associated with the DX Corner have the privilege of sending in club notes for publication in RADIO NEWS.

Corner SHORT WAVES

M. Cockaday

us, it is hoped, to get all reports in the issue in which they were intended and will guarantee an up-to-date time-table.

Reports of Listening Post Observers and Other Short-Wave Readers of the DX Corner

Listed in the next column is this month's consolidated reports of short-wave stations heard by our wide world listening posts. Each item is credited with the Observer's surname. This allows our readers to note who obtained the information. If any of our Readers can supply Actual Time Schedules, Correct Wavelengths, Correct Frequencies and any other Important Information (in paragraphs as recommended) the DX Editor, as well as our Readers, will be grateful for the information. On the other hand, readers reading these reports can try their skill in pulling in the stations logged and in trying to get complete information on these transmissions. The report for this month, containing the best information available to date, follows:

Short-Wave Broadcasts in Foreign Languages

OSWALD F. SHUETT, President of the Short-Wave Institute of America, sends in the following information on news broadcasts, and on the short-waves, in various languages:

IN ARABIC

Country	*Call Letters*	*Time—E.S.T.*
France	FYA	11:15 a.m.

IN DUTCH

Germany	DJN, DJB	8:45 a.m.
Germany	DJN	11:15 a.m.

IN FRENCH

France	FYA	4:15 a.m.
France	FYA	8:00 a.m.
France	FYA	11:30 a.m.
France	FYA	1:30 p.m.
Italy	I2RO	2:00 p.m.
France	FYA	3:00 p.m.
France	FYA	7:15 p.m.

IN GERMAN

Germany	DJN, DJB	5:45 a.m.
Germany	DJA, DJN, DJB	10:05 a.m.
Germany	DJC, DJD	12:15 p.m.
Germany	DJC, DJD	4:00 p.m.
Germany	DJA, DJC, DJN	5:45 p.m.
Germany	DJZ, DJD, DJN	9:00 p.m.

IN ITALIAN

France	FYA	2:45 p.m.
Italy	I2RO	6:15 p.m.
Italy	I2RO	7:30 p.m.

IN SPANISH

France	FYA	5:30 p.m.
Spain	EAQ	5:45 p.m.
Germany	DJA, DJN	7:15 p.m.
France	FYA	7:40 p.m.
Germany	DJA, DJN	8:15 p.m.
Germany	DJN	10:30 p.m.

EUROPE

Radio Phillips-Iberica, Madrid, Spain, reported heard on about 6740 kc., daily except Mondays, 6-7 p.m. (Meehan.) Baxter and Andrews say frequency is 6730 kc. Prague, Czechoslovakia, a new station as follows: Frequencies 15.32 mc., 15.23 mc., 11.76 mc., 11.74 mc., 9.5 mc., 6.055 mc. Watch out for them. (Stokes, Andrews.)

SPW, Warsaw, Poland, 13,635 kc., 21.9 meters, reported heard Sundays 5:30-11 a.m., and Mondays, Wednesdays and Fridays 11:30 a.m.-12:30 p.m., E.S.T. (Scheierman, Self, Partner, Shea.)

SM5SD, Stockholm, Sweden, 41.2 meters, reported heard Saturdays 7-8 a.m. (Scheierman.)

AN AMATEUR AND LISTENER

Below: A. S. Maher proudly displays his new 30-watt amplifier. Besides short-wave listening he operates station VK2JZ, shown in the background

MASSACHUSETTS DX CORNER

At right: Some of the receiving apparatus of listener I. Queen of Dorchester, an ardent short-wave fan

IS IT REALLY HJ4ABC?

This station which announces La Voz de Pereira is one that many listeners still insist is HJ4ABC. However, there is another station on 6451, Ibague, Colombia, which uses this call. Does anyone know the correct call of the Pereira broadcaster?

LKJ1, Jeloy, Norway, 9530 kc., now being heard best at 4:45 a.m. (Shea, Mallet-Veale.)

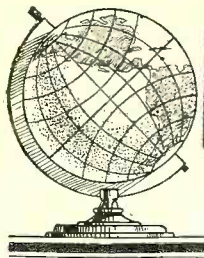
GSC, Daventry, England, 9580 kc., now being heard very strongly 7:30 p.m. (Fritsch, Law, Joerger.)

GSI, Daventry, England, 21,530 kc., reported well heard at 9 a.m., E.S.T. (Lopez, Mallet-Veale.)

GSD, Daventry, England, 11,750 kc., reported heard best 9-10:55 p.m. (Jensen, Tucker, Sands, Pilgrim, DeLaet, Joerger.)

GSF, Daventry, England, 19.8 meters, heard best 9-10 a.m., E.S.T. (Mallet-Veale.)

(*Turn to page* 718)



WORLD SHORT WAVE TIME-TABLE

Compiled by LAURENCE M. COCKADAY

Hours of transmission for the World's Short Wave Broadcast Stations

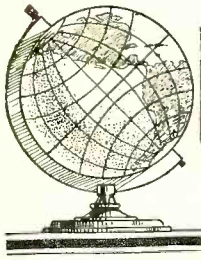
						FILL IN LOCAL TIME					
8	9	10	11	M	1	2	3	4	5	6	7
01	02	03	04	05	06	07	08	09	10	11	12

HOURS OF TRANSMISSION

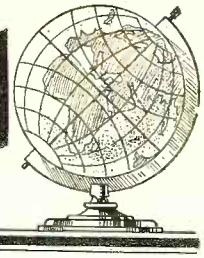
Wavelength Meters	Call Letters	Frequency Kc.	City Country
13.93	W8XK	21540	Pittsburgh, Pa.
13.93	GSJ	21530	Daventry, England
13.94	W2XE	21520	New York, N. Y.
15.93	PLE	18830	Bandoeng, Java
16.86	GSG	17790	Daventry, England
16.87	W3XAL	17780	Bound Brook, N. J.
16.89	DJE	17760	Zeesen, Germany
16.88	PHI	17775	Huizen, Holland
19.43	PRADO	15440	Riobamba, Ec.
19.52	HAS3	15370	Budapest, Hungary
19.56	DJR	15340	Zeesen, Germany
19.57	W2XAD	15330	Schenectady, N. Y.
19.62	LRU	15290	Buenos Aires, Arg.
19.63	DJQ	15280	Zeesen, Germany
19.65	W2XE	15270	New York, N. Y.
19.66	GSI	15260	Daventry, England
19.68	FYA	15244	Pontoise, France
19.71	PCJ	15220	Huizen, Holland
19.72	W8XK	15210	Pittsburgh, Pa.
19.74	DJB	15200	Zeesen, Germany
19.76	GSO	15180	Daventry, England
19.82	GSF	15140	Daventry, England
19.84	HVJ	15121	Vatican City
19.85	DJL	15110	Zeesen, Germany
19.95	RKI	15040	Moscow, U. S. S. R.
20.55	JVH	14600	Nazaki, Japan
20.75	DZH	14460	Zeesen, Germany
21.25	HJ5ABE	14120	Cali, Colombia
22.00	SPW	13635	Warsaw, Poland
22.40	IDV	13393	Asmara, Eritrea
22.73	ORP	13200	Ruysselede, Belgium
22.95	VPD	13075	Suva, Fiji Islands
23.38	CNR	12830	Rabat, Morocco
24.52	TFJ	12235	Reykjavik, Iceland
24.83	CT1CT	12082	Lisbon, Portugal
25.00	RV59(RNE)	12000	Moscow, U. S. S. R.
25.09	ETB	11955	Addis Ababa
25.21	CT1GO	11900	Parede, Portugal
25.25	FYA	11880	Pontoise, France
25.27	W8XK	11870	Pittsburgh, Pa.
25.30	GSE	11860	Daventry, England
25.36	W2XE	11830	New York, N. Y
25.36	W9XAA	11830	Chicago, Ill.
25.38	GSN	11820	Daventry, England
25.40	I2RO	11810	Rome, Italy
25.43	DJO	11795	Zeesen, Germany
25.44	W1XAL	11790	Boston, Mass.
25.49	DJO	11770	Zeesen, Germany
23.53	GSD	11750	Daventry, England
25.58	PHI	11730	Huizen, Holland
25.58	CJRX	11730	Winnipeg, Canada
25.60	FYA	11720	Pontoise, France
25.62	HJ4ABA	11710	Medellin, Col.
27.38	HS8PJ	10955	Bangkok, Siam
27.93	JVM	10740	Nazaki Japan
28.12	CEC	10670	Santiago, Chile
28.14	JVN	10660	Nazaki, Japan
28.76	YBG	10430	Medan, Sumatra
28.98	LSX	10350	Buenos Aires, Arg.
29.04	ORK	10330	Ruysselede, Belgium
29.24	PMN	10260	Bandoeng, Java
29.76	RIR	10080	Tashkent, U.S.S.R.
29.82	DZB	10042	Zeesen, Germany
30.43	EAQ	9860	Madrid, Spain
31.00	CQN	9677	Macao, Asia
31.01	DZA	9675	Zeesen, Germany
31.09	CT1AA	9650	Lisbon, Portugal
31.14	I2RO	9635	Rome, Italy
31.25	HJ1ABP	9600	Cartagena, Col.
31.25	CB960	9600	Santiago, Chile
31.27	HH3W	9595	Port-au-Prince, Haiti
31.27	HBL	9595	Geneva, Switzerland
31.28	W3XAU	9590	Philadelphia, Pa.
31.28	VK2ME	9590	Sydney, Australia
31.28	PCJ	9590	Huizen, Holland
31.28	HP5J	9590	Panama City, Pana.
31.32	LRX	9580	Buenos Aires, Arg.
31.32	VK3LR	9580	Lyndhurst, Australia
31.32	GSC	9580	Daventry, England
31.35	W1XK	9570	Millis, Mass.
31.36	VUB	9565	Bombay, India
31.38	DJA	9560	Zeesen, Germany
31.43	CEC	9545	Santiago, Chile
31.45	DJN	9540	Zeesen, Germany
31.48	W2XAF	9530	Schenectady, N. Y.
31.48	LKJ1	9530	Jeloy, Norway
31.55	GSB	9510	Daventry, England
31.58	PRF5	9501	Rio de Janeiro, Braz.
31.58	HJU	9500	Buenaventura, Colo.
31.61	VK3ME	9490	Melbourne, Australia
31.82	COCH	9428	Havana, Cuba
32.88	HAT4	9125	Budapest, Hungary
32.89	CP6	9120	La Paz, Bolivia
34.18	PNI	8775	Makassar. N. E. I.

						EASTERN STANDARD TIME					
8	9	10	11	N	1	2	3	4	5	6	7
13	14	15	16	17	18	19	20	21	22	23	00
GREENWICH MEAN TIME											

HOURS OF TRANSMISSION



WORLD SHORT WAVE TIME-TABLE



(Continued from the Previous Page)

Hours of transmission for the World's Short Wave Broadcast Stations

8	9	10	11	M	1	2	3	4	5	6	7	FILL IN LOCAL TIME / EASTERN STANDARD TIME	8	9	10	11	N	1	2	3	4	5	6	7
01	02	03	04	05	06	07	08	09	10	11	12	GREENWICH MEAN TIME	13	14	15	16	17	18	19	20	21	22	23	00

Wave-length Meters	Call Letters	Frequency Kc.	City Country	HOURS OF TRANSMISSION
34.19	HCJB	8775	Quito, Ecuador	S S S XM
34.29	ZBW	8750	Hong Kong, China	
34.62	CO9JQ	8665	Camaguey, Cuba	
34.92	YNVA	8590	Managua, Nic.	
35.71	HC2AT	8400	Guayaquil, Ec.	XS
36.50	ZP10	8220	Asuncion, Paraguay	D D D
37.34	CNR	8035	Rabat, Morocco	S
38.20	HC2JSB	7854	Guayaquil, Ecuador	D
38.48	HBP	7797	Geneva, Switzerland	Sa Sa
39.73	TI8WS	7550	Puntarenas, C. R.	D
39.95	JVP	7510	Nazaki, Japan	D D AM
40.51	HJ3ABD	7406	Bogota, Colombia	XS XS D D D
40.65	XECR	7380	Mexico City, Mex.	S
41.20	SM5SD	7281	Stockholm, Sweden	
41.20	HJ1ABD	7281	Cartagena, Colombia	L L L XS
41.61	EA8AB	7210	Tenerife, C. I.	D D
41.80	CR6AA	7177	Lobito, Angola, Afr.	L L L
42.15	HB9B	7118	Basle, Switzerland	W
42.37	VP3MR	7080	Georgetown, B. G.	S S S S V H H V
42.02	PZH	7140	Paramaribo, D. G.	
43.48	HI3C	6900	La Romana, D. R.	D D D D
44.14	HIH	6796	San Pedro, D. R.	AC AC S AC
44.44	JVT	6750	Nazaki, Japan	Z
44.71	TIEP	6710	San Jose, Costa Rica	I D D
45.00	HC2RL	6667	Guayaquil, Ecuador	S S S
45.25	HIT	6630	Trujillo, D. R.	D D D D
45.34	PRADO	6616	Riobamba, Ecuador	T T
45.38	RV72	6611	Moscow, U. S. S. R.	I
45.80	TIRCC	6550	San Jose, Costa Rica	S D D D D
46.01	YV6RV	6520	Valencia, Venezuela	D D D D D
46.08	HIL	6510	Trujillo, D. R.	D D
46.22	HJ5ABD	6490	Cali, Colombia	N
46.28	HI4D	6482	Trujillo, D. R.	XS XS XS XS XS XS
46.50	HJ4ABC	6451	Ibague, Colombia	D
46.53	HJ1ABB	6447	Barranquilla, Col.	D D D S D D D
46.66	HI1S	6430	Puerto Plata, D. R.	D D D
46.80	TIPG	6410	San Jose, Costa Rica	D D D D
47.00	HI3U	6383	Santiago, D. R.	XS XS XS
47.06	YV4RC	6375	Caracas, Venezuela	D D D
47.24	HRP1	6350	San Pedro Sula, D. R.	D D D D
47.51	HIZ	6315	Trujillo, D. R.	S S S I I I I
47.62	YV12RM	6300	Maracay, Venezuela	
47.77	HIG	6280	Trujillo, D. R.	XS
48.12	HRD	6235	La Ceiba, Hond.	
48.12	CO9WR	6235	Sancti Spiritus, Cuba	I I I I I I I
48.15	OAX4G	6230	Lima, Peru	L
48.19	HJ1ABH	6225	Cienaga, Colombia	AM
48.50	HI1A	6185	Santiago, D. R.	D D D D
48.54	XEXA	6180	Mexico, D. F., Mex.	D
48.62	HJ3ABF	6170	Bogota, Colombia	D XS
48.70	CJRO	6160	Winnipeg, Canada	
48.78	CSL	6150	Lisbon, Port.	I I I I I I I
48.78	VE9CL	6150	Winnipeg, Can.	
48.78	CB615	6150	Santiago, Chile	D
48.78	HI5N	6150	Trujillo, D R.	
48.78	HJ2ABA	6150	Tunja, Colombia	D D
48.78	YV3RC	6150	Caracas, Venezuela	D D D D D D D D
48.78	HJ5ABC	6150	Cali, Colombia	D S S XA
48.78	COKG	6150	Santiago, Cuba	D D D D D D D D D
48.86	W8XK	6140	Pittsburgh, Pa.	
48.89	CR7AA	6136	Lourenzo Marques, A.	S S S D D D
48.92	ZGE	6132	Kuala Lumpur, F. M. S.	AE
48.94	COCD	6130	Havana, Cuba	D D
48.94	CT1GQ	6130	Parede, Portugal	S S S XY
49.02	YDA5	6120	Bandoeng, Java	D D D D D
49.02	W2XE	6120	New York, N. Y.	
49.04	HJ1ABE	6116	Cartagena, Col.	XA XA S XS
49.10	CHNX	6110	Halifax, N. S.	D XA XA XA XA XA XA D Sa D D
49.10	GSL	6110	Daventry, England	D D D D D D
49.18	HJ4ABB	6100	Manizales, Col.	XA
49.18	W3XAL	6100	Bound Brook, N. J.	AH
49.18	W9XF	6100	Chicago, Ill.	
49.20	ZTJ (JB)	6098	Johannesburg, Africa	XS XS XS XS D D D D Sa
49.26	CRCX	6090	Toronto, Canada	S S S D D D D
49.32	VQ7LO	6083	Nairobi, Kenya, Afr	E E D D D XS Sa
49.34	HP5F	6080	Colon, Panama	S D XS S S
49.34	W9XAA	6080	Chicago, Ill.	D D D D D D D D D D D D
49.34	ZHJ	6080	Penang, S. S.	XS
49.35	DJM	6079	Zeesen, Germany	D
49.41	OER2	6072	Vienna, Austria	I D D D D D D D D Sa
49.42	VE9CS	6070	Vancouver, B. C.	S S S S S S D D
49.50	W8XAL	6060	Cincinnati, Ohio	D D D D D D D D D D D D

A—Thursday, Sunday
C—Monday, Wednesday, Friday
D—Daily
E—Tuesday, Thursday
F—Friday
G—Tuesday, Thursday, Saturday
H—Wednesday, Thursday, Sunday
I—Irregularly
K—Monday, Friday
L—Wednesday, Saturday
M—Monday
N—Monday, Wednesday, Thursday
P—Except Tuesday, Wednesday
R—Thursday, Friday, Saturday
S—Sunday
T—Tuesday
Th—Thursday
V—Sunday, Wednesday
W—Wednesday
Xth—Except Thursday
Y—Sunday, Monday
Z—Tuesday, Friday
AC—Monday, Thursday, Saturday
AD—Tuesday, Wednesday, Sunday
AE—Tuesday, Friday, Sunday
AF—Saturday, Sunday
AG—Tuesday, Sunday
AH—Monday, Wednesday, Saturday
AL—Except Monday, Sunday
AM—Monday, Thursday
AN—Tuesday, Saturday
Sa—Saturday
XA—Except Saturday, Sunday
XM—Except Monday
XS—Except Sunday
XSa—Except Saturday
XX—Tuesday, Thursday, Friday
XY—Except Tuesday, Sunday

WORLD SHORT WAVE TIME-TABLE

(*Continued from the Previous Page*)

Hours of transmission for the World's Short Wave Broadcast Stations

FILL IN LOCAL TIME											
8	9	10	11	M	1	2	3	4	5	6	7
EASTERN STANDARD TIME											
01	02	03	04	05	06	07	08	09	10	11	12
GREENWICH MEAN TIME											

HOURS OF TRANSMISSION											
D	D	D									
D	D	D									
	D										
XS	XS	XS		Sa					D	D	D
E											
D	D	D	D								
D											D
D	D	D									
D	D	D	D	D	Th	Th					
D	D	D				I	I				
		S	S	S	S					N	N
D	D	D	I								
			Sa	Sa							
D	D	D	D		I						
D											D
				Sa							
D	D	D	D	D							
	E		Th								
Z	Z	Z	Sa								S
D	D	I									
		D	D								
D	D	D									
									S		
XSa	D	Sa	Sa								
D	D	D									
XS	XS										
D	D	S	S								
D	D										
D											
XS	XS								S		
D	D										
D	D	W									
	AH	AH	AH								
AD											
D	D	D	D								
			D	D	D			D	D		
D	D	D	D	D	D	D	D	D	D	D	D

Wavelength Meters	Call Letters	Frequency Kc.	City Country
49.50	W3XAU	6050	Philadelphia, Pa.
49.50	OXY	6060	Skamlebaek, Denmark
49.59	HI9B	6050	Trujillo, D. R.
49.59	GSA	6050	Daventry, England
49.63	HJ3ABI	6045	Bogota, Colombia
49.65	HJ1ABG	6042	Barranquilla, Col.
49.67	VDA	6040	Batavia, Java
49.67	W1XAL	6040	Boston, Mass.
49.67	W4XB	6040	Miami, Fla.
49.67	PRA8	6040	Pernambuco, Brazil
49.75	HP5B	6030	Panama City, Pana.
49.75	VE9CA	6030	Calgary, Alberta, Can.
49.83	DJC	6020	Zeesen, Germany
49.83	XEUW	6020	Mexico City, Mex.
49.85	ZHI	6018	Singapore, Malaya
49.90	HJ3ABH	6012	Bogota, Colombia
49.92	CQCO	6010	Havana, Cuba
49.95	HJ1ABJ	6006	Santa Marta, Col.
49.96	HP5K	6005	Colon, Panama
49.96	VE9DN	6005	Montreal, Canada
50.00	XEBT	6000	Mexico City, Mex.
50.00	RV59	6000	Moscow, U. S. S. R.
50.17	XEVI	5980	Mexico City, Mex.
50.17	HIX	5980	Trujillo, D. R.
50.20	HJ2ABC	5976	Cucuta, Colombia
50.21	XECW	5975	Xantocam, Mexico
50.25	HJN	5970	Bogota, Col.
50.26	HVJ	5969	Vatican City
50.45	FIU	5946	Tananarive, Mad.
50.50	TG2X	5940	Guatemala City, G.
50.59	HJ4ABE	5930	Medellin, Colombia
50.72	HH2S	5915	Port au Prince, Haiti
50.76	HRN	5910	Tegucigalpa, Hond.
51.02	YV8RB	5880	Barquisimeto, Ven.
51.15	HI1J	5865	Trujillo, D. R.
51.28	YV5RMO	5850	Maracaibo, Ven.
51.63	YV7RMO	5810	Maracay, Ven.
51.72	YV2RC	5800	Caracas, Venezuela
51.90	OAX4D	5780	Lima, Peru
52.26	TGS	5740	Guatamala, Guat
52.45	YV10RSC	5720	San Cristobal, Ven.
55.45	ZBW	5410	Hong Kong, China
70.21	RV15	4273	Khabarovsk, Siberia
79.58	HB9B	3770	Basle, Switzerland
80.00	CT1CT	3750	Lisbon, Portugal
85.11	HB9AQ	3525	Lausanne, Switzerland

HOURS OF TRANSMISSION											
			D	D	D	D	D	D	D	D	
				D					D	D	D
										D	D
				XS	XS	S				XS	XS
D	D	Sa	Sa							D	
				D	D			S	S	S	E
D	D	D			D	D	XS	D	D	D	D
				D				I			D
	XS	XS	XS	D	D	D	XS		S	S	D
			D	D	D	D	D	D			
N										D	D
			D	D	D	D		S	S	D	D
	D	D	D	D				D	D	D	
				D							D
D				D						D	D
						D					
		D	D	D	D	D	D	D	D	D	D
					I	I	D	B	D		
						S		C			
S	S	S		D	D	D		D	D		
										D	D
			D								
						D					
	D										
			D	D	D					D	D
				D							XS
				D		S	S	S	D	D	D
				D						D	D
				D	D					D	D
			XS	XS					XS	XS	XS
				D	D					D	D
	S	S	D	D	D	S	S	D	D	D	D
	AN	AN	AN								
										AD	AD
									D	D	D
D	D									D	D
	S							W			
									Th		

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Z—Tuesday, Friday
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AE—Tuesday, Friday, Sunday
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AG—Tuesday, Sunday
AH—Monday, Wednesday, Saturday
AL—Except Monday, Sunday
AM—Monday, Thursday
AN—Tuesday, Saturday
Sa—Saturday
XA—Except Saturday, Sunday
XM—Except Monday
XS—Except Sunday
XSa—Except Saturday
XX—Tuesday, Thursday, Friday
XY—Except Tuesday, Sunday

The DX Corner (Short Waves)

(*Continued from page 715*)

GSG, Daventry, England, 16.8 meters, reported heard from 7-10 a.m. (Ludewig, Lopez.)

TYA, Pontoise, France, 12,215 kc., 24.55 meters, reported heard at 11:55 a.m. (Law, Morgan.) A number of Observers report new calls for the French stations as follows: all at Pontoise, TPA2, 15,243 kc.; TPA3, 11,880 kc.; TPA4, 11,720 kc. (Kentzel, Sahlbach, Dressler, Morgan, Self.)

HAT4, Budapest, Hungary, 9125 kc., reported heard Sundays 6-7 p.m. (Loke, Meehan, Howald.)

HAS3, Budapest, Hungary, 15,340 kc., reported heard best Sundays 9-10 a.m. (Howald, Sahlbach.)

DJA, Zeesen, Germany, 9560 kc., reported heard well at 9 p.m. (Harris, Costa, Munz, Akins, Stabler, Chambers, Law.)

DJN, Zeesen, Germany, 9540 kc., reported heard best 8-9 p.m., E.S.T. (Sahlbach, Harris, Costas, Chambers, Akins, Stabler.)

DJP, Zeesen, Germany, 11,855 kc., reported heard 2 a.m., E.S.T. (Bower.)

DZH, Zeesen, Germany, 14,460 kc., reported heard afternoons and early evenings. (Mallet-Veale, Morgan.)

DZA, Zeesen, Germany, 9675 kc., reported heard 5-7 p.m. (Lawton, Ludewig.)

DJT, Zeesen, Germany, 9.5 meters, 11 a.m.-3 p.m. (Mallet-Veale.)

DZB, Zeesen, Germany, 10,042 kc., reported heard 2-9 p.m., E.S.T. (Mallet-Veale, Shea.)

ORK, Ruysselede, Belgium, 10,030 kc., reported heard well 2:30-4 p.m., E.S.T. (Loke, Harris, Gavin, Stark, Reilly, Adams.)

PCJ, Huizen, Holland, 31.26 meters,

(*Turn to page 722*)

Wavelength-Frequency Conversion Table

(*See next page*)

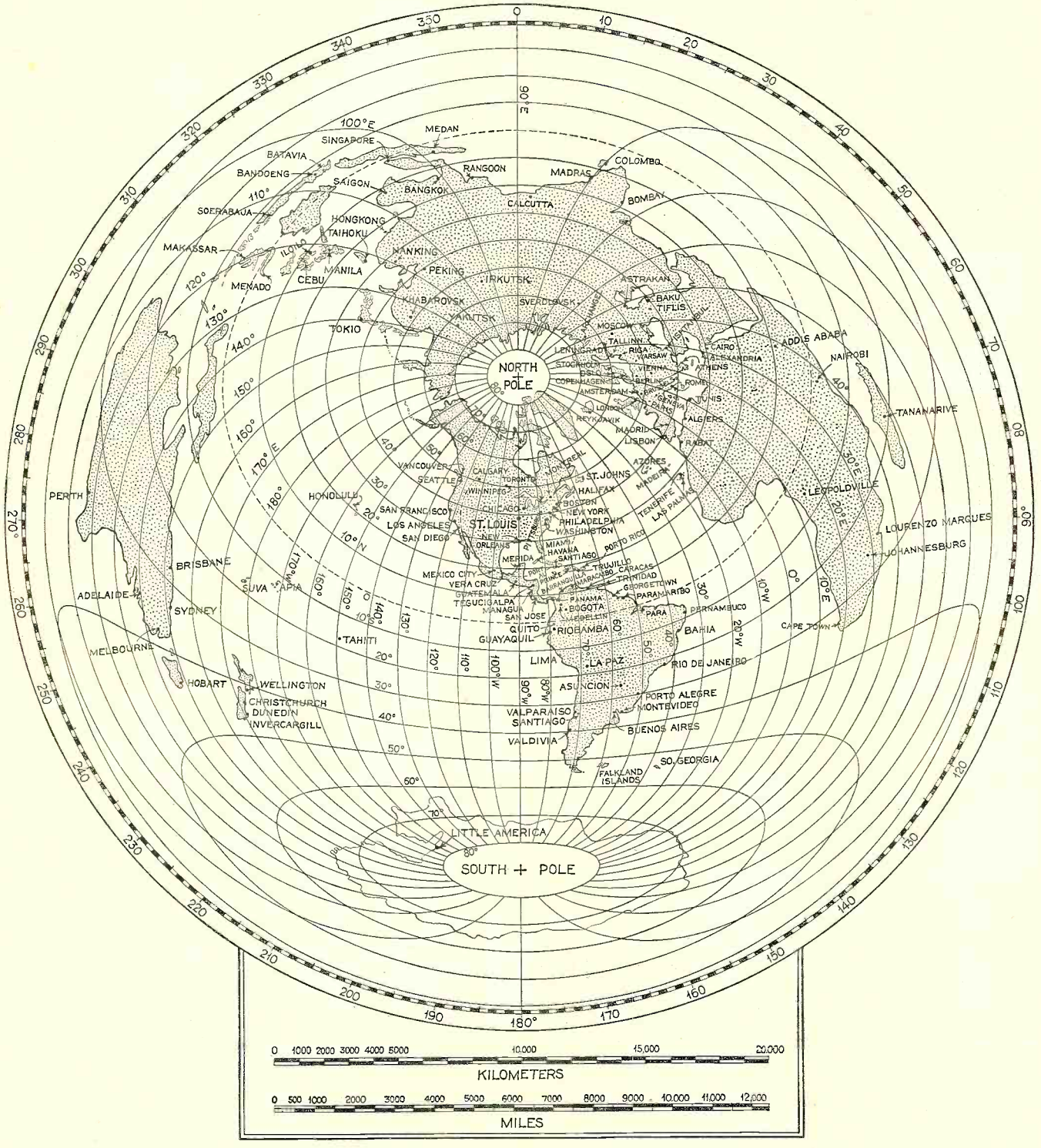
This table was calculated from the conventional figure of 300,000 kilometers-per-second, for the velocity of radio waves as specified by the International Communications Convention held at Madrid in 1932.

The columns marked M and Kc. are interchangeable. For instance, the first column can represent meters and the second kilocycles or vice-versa. Also, the range of the table can be extended by shifting the decimal point in the first column the required number of places. The decimal point in the second column should then be moved the same number of places *in the opposite direction*. Example: the first line can be read 10.1 meters, equivalent to 29,703 kc. or 10.1 kc., equivalent to 29,703 M. Furthermore, 1010 kc. equals 297.03 m. and 10100 kc. equals 29.703 m.

WAVELENGTH-FREQUENCY CHART

M.	KC.	M.	KC.	M.	KC.	M.	KC.	M.	KC.	M.	KC.	M.	KC.	M.	KC.	M.	KC.
10.1	29,703	20.1	14,925	30.1	9,966.7	40.1	7,481.3	50.1	5,988.0	60.1	4,991.7	70.1	4,279.6	80.1	3,745.3	90.1	3,329.7
10.2	29,411	20.2	14,851	30.2	9,933.7	40.2	7,462.6	50.2	5,976.1	60.2	4,983.3	70.2	4,273.5	80.2	3,740.7	90.2	3,326.0
10.3	29,126	20.3	14,778	30.3	9,901.0	40.3	7,444.0	50.3	5,964.1	60.3	4,975.1	70.3	4,267.4	80.3	3,735.9	90.3	3,322.2
10.4	28,846	20.4	14,706	30.4	9,868.5	40.4	7,425.8	50.4	5,953.7	60.4	4,966.9	70.4	4,261.4	80.4	3,731.2	90.4	3,318.5
10.5	28,571	20.5	14,634	30.5	9,836.0	40.5	7,407.3	50.5	5,940.6	60.5	4,958.6	70.5	4,255.3	80.5	3,726.7	90.5	3,314.9
10.6	28,301	20.6	14,563	30.6	9,804.0	40.6	7,399.0	50.6	5,928.9	60.6	4,950.5	70.6	4,249.3	80.6	3,722.0	90.6	3,311.2
10.7	28,037	20.7	14,493	30.7	9,772.0	40.7	7,371.0	50.7	5,917.1	60.7	4,942.3	70.7	4,243.3	80.7	3,717.5	90.7	3,307.6
10.8	27,778	20.8	14,423	30.8	9,740.2	40.8	7,353.0	50.8	5,905.6	60.8	4,934.2	70.8	4,237.3	80.8	3,712.9	90.8	3,303.9
10.9	27,522	20.9	14,353	30.9	9,708.7	40.9	7,335.0	50.9	5,893.9	60.9	4,926.1	70.9	4,231.3	80.9	3,708.3	90.9	3,300.3
11.0	27,273	21.0	14,285	31.0	9,677.4	41.0	7,317.5	51.0	5,882.5	61.0	4,918.0	71.0	4,225.3	81.0	3,703.7	91.0	3,296.7
11.1	27,027	21.1	14,218	31.1	9,646.2	41.1	7,299.3	51.1	5,870.9	61.1	4,910.0	71.1	4,219.4	81.1	3,699.2	91.1	3,293.1
11.2	26,786	21.2	14,151	31.2	9,615.5	41.2	7,281.5	51.2	5,859.4	61.2	4,902.0	71.2	4,213.5	81.2	3,694.6	91.2	3,289.4
11.3	26,549	21.3	14,085	31.3	9,584.7	41.3	7,263.8	51.3	5,847.9	61.3	4,894.0	71.3	4,207.6	81.3	3,690.0	91.3	3,285.8
11.4	26,316	21.4	14,019	31.4	9,554.0	41.4	7,246.3	51.4	5,838.0	61.4	4,886.0	71.4	4,201.7	81.4	3,685.5	91.4	3,282.2
11.5	26,087	21.5	13,954	31.5	9,523.8	41.5	7,228.8	51.5	5,825.1	61.5	4,878.0	71.5	4,195.7	81.5	3,680.9	91.5	3,278.7
11.6	25,862	21.6	13,889	31.6	9,493.6	41.6	7,211.5	51.6	5,813.9	61.6	4,870.1	71.6	4,190.0	81.6	3,676.5	91.6	3,275.1
11.7	25,641	21.7	13,825	31.7	9,463.7	41.7	7,194.2	51.7	5,802.7	61.7	4,862.2	71.7	4,184.1	81.7	3,672.0	91.7	3,271.5
11.8	25,424	21.8	13,761	31.8	9,433.8	41.8	7,177.0	51.8	5,791.6	61.8	4,854.3	71.8	4,178.3	81.8	3,667.5	91.8	3,268.0
11.9	25,210	21.9	13,699	31.9	9,404.4	41.9	7,160.0	51.9	5,780.3	61.9	4,846.6	71.9	4,172.5	81.9	3,663.0	91.9	3,264.4
12.0	25,000	22.0	13,636	32.0	9,375.0	42.0	7,142.8	52.0	5,769.0	62.0	4,838.7	72.0	4,166.7	82.0	3,658.6	92.0	3,260.8
12.1	24,793	22.1	13,575	32.1	9,345.6	42.1	7,125.9	52.1	5,758.1	62.1	4,830.9	72.1	4,160.8	82.1	3,654.1	92.1	3,257.3
12.2	24,590	22.2	13,514	32.2	9,316.6	42.2	7,109.0	52.2	5,747.1	62.2	4,823.1	72.2	4,155.1	82.2	3,649.7	92.2	3,253.8
12.3	24,390	22.3	13,453	32.3	9,288.0	42.3	7,092.2	52.3	5,736.1	62.3	4,815.3	72.3	4,149.4	82.3	3,645.2	92.3	3,250.3
12.4	24,193	22.4	13,393	32.4	9,259.2	42.4	7,075.3	52.4	5,725.2	62.4	4,807.8	72.4	4,143.6	82.4	3,640.8	92.4	3,246.8
12.5	24,000	22.5	13,333	32.5	9,230.8	42.5	7,058.8	52.5	5,714.2	62.5	4,800.0	72.5	4,137.9	82.5	3,636.4	92.5	3,243.2
12.6	23,809	22.6	13,274	32.6	9,202.4	42.6	7,042.2	52.6	5,703.4	62.6	4,792.3	72.6	4,132.2	82.6	3,631.9	92.6	3,239.7
12.7	23,622	22.7	13,216	32.7	9,174.2	42.7	7,025.7	52.7	5,692.6	62.7	4,784.7	72.7	4,126.6	82.7	3,627.5	92.7	3,236.2
12.8	23,437	22.8	13,158	32.8	9,146.4	42.8	7,009.3	52.8	5,682.1	62.8	4,777.0	72.8	4,120.9	82.8	3,623.2	92.8	3,232.7
12.9	23,256	22.9	13,100	32.9	9,118.4	42.9	6,993.0	52.9	5,671.0	62.9	4,769.4	72.9	4,115.2	82.9	3,618.8	92.9	3,229.2
13.0	23,077	23.0	13,043	33.0	9,091.0	43.0	6,976.7	53.0	5,660.0	63.0	4,761.9	73.0	4,109.6	83.0	3,614.4	93.0	3,225.8
13.1	22,901	23.1	12,987	33.1	9,063.4	43.1	6,960.5	53.1	5,649.7	63.1	4,754.3	73.1	4,103.9	83.1	3,610.1	93.1	3,222.3
13.2	22,722	23.2	12,931	33.2	9,036.0	43.2	6,944.4	53.2	5,639.1	63.2	4,746.8	73.2	4,098.4	83.2	3,605.7	93.2	3,218.8
13.3	22,556	23.3	12,875	33.3	9,009.0	43.3	6,928.3	53.3	5,628.5	63.3	4,739.3	73.3	4,092.8	83.3	3,601.4	93.3	3,215.4
13.4	22,388	23.4	12,820	33.4	8,982.0	43.4	6,912.4	53.4	5,618.0	63.4	4,731.9	73.4	4,087.2	83.4	3,597.1	93.4	3,211.9
13.5	22,224	23.5	12,766	33.5	8,955.2	43.5	6,896.5	53.5	5,607.5	63.5	4,724.4	73.5	4,081.6	83.5	3,592.7	93.5	3,208.6
13.6	22,059	23.6	12,712	33.6	8,928.6	43.6	6,880.7	53.6	5,597.0	63.6	4,716.9	73.6	4,076.1	83.6	3,588.5	93.6	3,205.1
13.7	21,898	23.7	12,658	33.7	8,902.0	43.7	6,865.0	53.7	5,586.6	63.7	4,709.5	73.7	4,070.6	83.7	3,584.2	93.7	3,201.7
13.8	21,739	23.8	12,605	33.8	8,875.4	43.8	6,849.3	53.8	5,576.2	63.8	4,702.2	73.8	4,065.0	83.8	3,580.0	93.8	3,198.3
13.9	21,583	23.9	12,553	33.9	8,849.6	43.9	6,833.8	53.9	5,565.9	63.9	4,694.8	73.9	4,059.5	83.9	3,575.7	93.9	3,194.8
14.0	21,429	24.0	12,500	34.0	8,823.4	44.0	6,818.2	54.0	5,555.6	64.0	4,687.5	74.0	4,054.1	84.0	3,571.4	94.0	3,191.5
14.1	21,277	24.1	12,448	34.1	8,797.8	44.1	6,802.7	54.1	5,545.3	64.1	4,680.1	74.1	4,048.5	84.1	3,567.2	94.1	3,188.1
14.2	21,127	24.2	12,397	34.2	8,771.8	44.2	6,787.3	54.2	5,535.0	64.2	4,672.8	74.2	4,043.2	84.2	3,562.9	94.2	3,184.7
14.3	20,979	24.3	12,345	34.3	8,746.4	44.3	6,772.0	54.3	5,524.9	64.3	4,665.7	74.3	4,037.6	84.3	3,558.7	94.3	3,181.4
14.4	20,833	24.4	12,295	34.4	8,720.8	44.4	6,756.8	54.4	5,514.6	64.4	4,658.3	74.4	4,032.3	84.4	3,554.5	94.4	3,178.0
14.5	20,690	24.5	12,245	34.5	8,695.6	44.5	6,741.6	54.5	5,504.5	64.5	4,651.1	74.5	4,026.8	84.5	3,550.3	94.5	3,174.6
14.6	20,548	24.6	12,194	34.6	8,670.4	44.6	6,726.5	54.6	5,494.5	64.6	4,644.0	74.6	4,021.5	84.6	3,546.1	94.6	3,171.2
14.7	20,408	24.7	12,146	34.7	8,645.6	44.7	6,711.3	54.7	5,484.4	64.7	4,636.8	74.7	4,016.1	84.7	3,541.9	94.7	3,167.9
14.8	20,270	24.8	12,097	34.8	8,620.6	44.8	6,696.3	54.8	5,474.5	64.8	4,629.6	74.8	4,010.7	84.8	3,537.7	94.8	3,164.5
14.9	20,134	24.9	12,048	34.9	8,595.8	44.9	6,681.3	54.9	5,464.5	64.9	4,622.6	74.9	4,005.4	84.9	3,533.5	94.9	3,161.2
15.0	20,000	25.0	12,000	35.0	8,571.4	45.0	6,666.7	55.0	5,454.6	65.0	4,615.4	75.0	4,000.0	85.0	3,529.4	95.0	3,157.9
15.1	19,867	25.1	11,952	35.1	8,547.0	45.1	6,652.1	55.1	5,444.7	65.1	4,608.3	75.1	3.994.6	85.1	3,525.2	95.1	3,154.6
15.2	19,737	25.2	11,905	35.2	8,522.8	45.2	6,637.1	55.2	5,434.7	65.2	4,601.2	75.2	3,989.4	85.2	3,521.1	95.2	3,151.2
15.3	19,608	25.3	11,858	35.3	8,498.6	45.3	6,622.5	55.3	5,424.9	65.3	4,594.3	75.3	3,984.1	85.3	3,517.0	95.3	3,148.0
15.4	19,480	25.4	11,811	35.4	8,474.6	45.4	6,608.1	55.4	5,415.1	65.4	4,587.1	75.4	3,978.8	85.4	3,512.8	95.4	3,144.6
15.5	19,355	25.5	11,765	35.5	8,450.6	45.5	6,593.4	55.5	5,405.4	65.5	4,580.1	75.5	3,973.5	85.5	3,508.7	95.5	3,141.4
15.6	19,231	25.6	11,719	35.6	8,427.0	45.6	6,579.0	55.6	5,395.7	65.6	4,573.2	75.6	3,968.3	85.6	3,504.7	95.6	3,138.1
15.7	19,108	25.7	11,673	35.7	8,403.4	45.7	6,564.5	55.7	5,385.9	65.7	4,566.1	75.7	3,963.0	85.7	3,500.5	95.7	3,134.8
15.8	18,987	25.8	11,628	35.8	8,380.0	45.8	6,550.1	55.8	5,376.4	65.8	4,559.2	75.8	3,957.7	85.8	3,496.5	95.8	3,131.5
15.9	18,868	25.9	11,583	35.9	8,356.6	45.9	6,536.0	55.9	5,366.7	65.9	4,552.3	75.9	3,952.5	85.9	3,492.5	95.9	3,128.2
16.0	18,750	26.0	11,538	36.0	8,333.3	46.0	6,521.5	56.0	5,357.1	66.0	4,545.5	76.0	3,947.4	86.0	3,488.3	96.0	3,125.0
16.1	18,633	26.1	11,494	36.1	8,310.2	46.1	6,507.6	56.1	5,347.6	66.1	4,538.6	76.1	3,942.2	86.1	3,484.3	96.1	3,121.8
16.2	18,518	26.2	11,450	36.2	8,287.2	46.2	6,493.5	56.2	5,338.0	66.2	4,531.7	76.2	3,937.0	86.2	3,480.2	96.2	3,118.4
16.3	18,405	26.3	11,407	36.3	8,264.4	46.3	6,479.4	56.3	5,328.6	66.3	4,524.9	76.3	3,931.9	86.3	3,476.2	96.3	3,115.2
16.4	18,293	26.4	11,364	36.4	8,241.6	46.4	6,465.4	56.4	5,319.1	66.4	4,518.0	76.4	3,926.7	86.4	3,472.2	96.4	3,112.0
16.5	18,182	26.5	11,320	36.5	8,219.2	46.5	6,451.6	56.5	5,309.6	66.5	4,511.3	76.5	3,921.5	86.5	3,468.2	96.5	3,108.8
16.6	18,072	26.6	11,278	36.6	8,196.8	46.6	6,437.7	56.6	5,300.2	66.6	4,504.6	76.6	3,916.5	86.6	3,464.2	96.6	3,105.6
16.7	17,964	26.7	11,236	36.7	8,174.4	46.7	6,423.9	56.7	5,291.0	66.7	4,497.7	76.7	3,911.3	86.7	3,460.2	96.7	3,102.4
16.8	17,857	26.8	11,194	36.8	8,152.2	46.8	6,410.1	56.8	5,281.6	66.8	4,491.0	76.8	3,906.3	86.8	3,456.2	96.8	3,099.1
16.9	17,751	26.9	11,152	36.9	8,130.0	46.9	6,396.6	56.9	5,272.4	66.9	4,484.2	76.9	3,901.1	86.9	3,452.2	96.9	3,096.0
17.0	17,647	27.0	11,111	37.0	8,108.2	47.0	6,383.0	57.0	5,263.2	67.0	4,477.7	77.0	3,896.1	87.0	3,448.2	97.0	3,092.8
17.1	17,544	27.1	11,070	37.1	8,086.5	47.1	6,369.4	57.1	5,253.9	67.1	4,471.0	77.1	3,891.1	87.1	3,444.3	97.1	3,089.6
17.2	17,442	27.2	11,029	37.2	8,064.6	47.2	6,356.0	57.2	5,244.7	67.2	4,464.3	77.2	3,886.0	87.2	3,440.3	97.2	3,086.4
17.3	17,341	27.3	10,989	37.3	8,042.8	47.3	6,342.5	57.3	5,235.6	67.3	4,457.6	77.3	3,881.0	87.3	3,436.5	97.3	3,083.3
17.4	17,241	27.4	10,949	37.4	8,021.4	47.4	6,329.0	57.4	5,226.5	67.4	4,451.0	77.4	3,876.0	87.4	3,432.5	97.4	3,080.1
17.5	17,143	27.5	10,909	37.5	8,000.0	47.5	6,315.8	57.5	5,217.4	67.5	4,444.4	77.5	3,871.0	87.5	3,428.5	97.5	3,076.9
17.6	17,046	27.6	10,869	37.6	7,978.7	47.6	6,302.3	57.6	5,208.4	67.6	4,437.8	77.6	3,866.0	87.6	3.424.7	97.6	3,073.8
17.7	16,949	27.7	10,830	37.7	7,957.6	47.7	6,289.3	57.7	5,199.3	67.7	4,431.3	77.7	3,861.0	87.7	3,420.8	97.7	3,070.6
17.8	16,854	27.8	10,792	37.8	7,936.5	47.8	6,276.1	57.8	5,190.3	67.8	4,424.8	77.8	3,856.0	87.8	3,416.9	97.8	3,067.5
17.9	16,760	27.9	10,753	37.9	7,915.5	47.9	6,263.0	57.9	5,181.4	67.9	4,418.2	77.9	3,851.1	87.9	3,413.9	97.9	3,064.4
18.0	16,667	28.0	10,714	38.0	7,894.8	48.0	6,250.0	58.0	5,172.4	68.0	4,411.7	78.0	3,846.2	88.0	3,409.1	98.0	3,061.2
18.1	16,575	28.1	10,676	38.1	7,874.0	48.1	6,236.9	58.1	5,163.4	68.1	4,405.2	78.1	3,841.3	88.1	3,405.2	98.1	3,058.1
18.2	16,483	28.2	10,638	38.2	7,853.4	48.2	6,224.0	58.2	5,154.7	68.2	4,398.8	78.2	3,836.3	88.2	3,401.3	98.2	3,055.0
18.3	16,393	28.3	10,600	38.3	7,832.8	48.3	6,211.1	58.3	5,145.7	68.3	4,392.4	78.3	3,831.4	88.3	3,397.5	98.3	3,051.9
18.4	16,305	28.4	10,563	38.4	7,812.5	48.4	6,198.3	58.4	5,137.0	68.4	4,385.9	78.4	3,826.5	88.4	3,393.7	98.4	3,048.7
18.5	16,217	28.5	10,526	38.5	7,792.2	48.5	6,185.6	58.5	5,128.1	68.5	4,379.6	78.5	3,821.6	88.5	3,389.8	98.5	3,045.6
18.6	16,129	28.6	10,489	38.6	7,772.0	48.6	6,172.3	58.6	5,119.3	68.6	4,373.2	78.6	3,816.8	88.6	3,386.0	98.6	3,042.5
18.7	16,043	28.7	10,453	38.7	7,752.0	48.7	6,160.2	58.7	5,110.7	68.7	4,366.8	78.7	3,812.0	88.7	3,382.2	98.7	3,039.5
18.8	15,957	28.8	10,417	38.8	7,732.0	48.8	6,147.6	58.8	5,102.0	68.8	4,350.4	78.8	3,807.1	88.8	3,378.4	98.8	3,036.4
18.9	15,873	28.9	10,381	38.9	7,712.0	48.9	6,135.0	58.9	5,093.3	68.9	4,354.1	78.9	3,802.3	88.9	3,374.5	98.9	3,033.3
19.0	15,790	29.0	10,345	39.0	7,692.3	49.0	6,122.4	59.0	5,084.6	69.0	4,347.8	79.0	3,797.5	89.0	3,370.8	99.0	3,030.3
19.1	15,707	29.1	10,309	39.1	7,672.3	49.1	6,110.0	59.1	5,076.1	69.1	4,341.5	79.1	3,792.6	89.1	3,367.0	99.1	3,027.3
19.2	15,625	29.2	10,274	39.2	7,653.0	49.2	6,097.4	59.2	5,067.6	69.2	4,335.2	79.2	3,787.8	89.2	3,363.2	99.2	3,024.2
19.3	15,544	29.3	10,239	39.3	7,633.6	49.3	6,085.1	59.3	5,059.1	69.3	4,329.0	79.3	3,783.1	89.3	3,359.5	99.3	3,021.1
19.4	15,464	29.4	10,204	39.4	7,614.2	49.4	6,073.1	59.4	5,050.4	69.4	4,322.7	79.4	3,768.3	89.4	3,355.7	99.4	3,018.1
19.5	15,385	29.5	10,170	39.5	7,594.8	49.5	6,060.6	59.5	5,042.0	69.5	4,316.6	79.5	3,773.5	89.5	3,352.0	99.5	3,015.1
19.6	15,306	29.6	10,135	39.6	7,575.7	49.6	6,048.4	59.6	5,033.5	69.6	4,310.3	79.6	3,768.8	89.6	3,348.2	99.6	3,012.1
19.7	15,228	29.7	10,101	39.7	7,556.7	49.7	6,036.1	59.7	5,025.1	69.7	4,304.2	79.7	3,764.1	89.7	3,344.5	99.7	3,009.0
19.8	15,151	29.8	10,067	39.8	7,537.7	49.8	6,024.1	59.8	5,016.7	69.8	4,297.9	79.8	3,759.4	89.8	3,340.7	99.8	3,006.0
19.9	15,076	29.9	10,033	39.9	7,518.8	49.9	6,012.0	59.9	5,008.3	69.9	4,291.8	79.9	3,754.7	89.9	3,337.0	99.9	3,003.0
20.0	15,000	30.0	10,000	40.0	7,500.0	50.0	6,000.0	60.0	5,000.0	70.0	4,285.7	80.0	3,750.0	90.0	3,333.3	100.0	3,000.0

WORLD DISTANCE CHART No. 8



World Distance Map for Central North America

Compiled by

John M. Borst

ABOVE is shown the eighth exclusive azimuthal-projection map of the world with the center at St. Louis, Mo. It was made in response to many requests by readers living in the Middle West. The distance and direction from St. Louis to any point of the world can be measured off by means of the scales. The easiest way is to use a ruler or a compass and refer to the scale at the bottom. Besides the distance and direction, the map also shows the intervening territory between any point on the globe and St. Louis. So, for instance, the direction from St. Louis to Singapore is nearly straight North, and in the winter the path is always in dark in the vicinity of the north pole, that's why you can hear the 50-meter transmissions in early morning.

The map also can be used to advantage by residents living within 1500 miles of St. Louis in any direction (within the dotted circle). The distance measured from spots within the circle will be only slightly less accurate. The direction however cannot be referred to the degrees on the edge of the map.

Further extensions of the use of the map are possible; you can measure the distance between any two points when the line connecting these two points passes through the dotted circle. This can be done when the points are on the same side of the circle or if they are on either side of it. The network of parallels and meridians for an azimuthal map is the same for any given latitude. Disregarding the map, but using the network, anyone who lives on 38° 38′ North or South latitude could renumber the meridians and locate any desired spot on earth by means of it. The distance and direction are then found in the usual way.

Where to Write for Short-Wave Veri's

(Call Letters, Station Slogans, Addresses)

The short-wave listener often wishes to write a letter to a short-wave station he has heard, especially if it is on the other side of the world, to report on reception and to get a "veri" (verification) of his feat of actually hearing the program. The following list tells him just where to write.

Call	Name or Slogan	Address
CB960	"El Praco"	P.O. Box 1342, Santiago, Chile
CEC		Compania Internacional de Radio S.A. Casilla 16-D, Santiago, Chile
CFN, CFU		Consolidated Mining & Smelting Co. of Canada, Ltd., Slate Creek, B. C., Canada
CGA, CJA, etc.		Canadian Marconi Co., P.O. Box 1690, Montreal, Que., Canada
CGP, CZQ, VXX		North-West Telephone Co., 768 Seymour St., Vancouver, B.C., Can.
CHNX	"The Key Station of the Maritimes"	Maritime Broadcasting Co. Ltd., P.O. Box 998, Halifax, N.S., Canada
CJRO, CJRX		Jas. Richardson and Sons Ltd., Royal Alexandra Hotel 155, Winnipeg, Manitoba, Canada
CMB2		Cuba Transatlantic Radio Corp., Havana, Cuba
CNR	"Radio Maroc"	L'Inspecteur General, Directeur de l'Office des Postes, Rabat, Morocco
COCD	"La Voz del Aire"	P.O. Box 2294, Havana, Cuba
COCH		Calle B. No. 2, Vedado, Havana, Cuba
COCO		P.O. Box 98, Havana, Cuba
COKG (CO9GC)		Apartado 137, Santiago, Cuba
CO9JQ		Calle del General Gomez No. 4, Camaguey, Cuba
CO9WR		P.O. Box 85, Sancti Spiritus, Cuba
CP5, CP6, CP7	"Radio Illimani"	Compania Radio Boliviana, Calle Socabaya 231, La Paz, Bolivia
CQN		General Post Office, Macao, Asia
CR6AA	"Radio Eddystone"	P.O. Box 103, Lobito, Angola, Portuguese W. Africa
CR7AA		Gremia dos Radiofilos da Colonia de Mozambique, Caixa Postal 594, Lourenzo Marques, Mozambique
CSL	"Emissora Nacional"	Lisbon, Portugal
CT1AA	"Radio Colonial"	Av. Duque de Avila 86, Lisbon, Portugal
CT1CT	"Estacao Radio Eddystone"	Rua Carvalho Araujo 97 -3 D, Lisbon, Portugal
CT1GL, CT1GO		Radio Club Portugues, Parede, Portugal
CT2AJ		Ponta Delgada, San Miguel, Azores
DAF, DAN		Hauptfunkstelle Norddeich, Norden-Land, Germany
DDBR, DDCP, DDFF, DDFT		North German Lloyd, Pier 42 North River, New York City
DHAO, DHDL, DHEY, DHJZ, DHRL		Hamburg American Lines, Pier 86 North River, New York City
DOAH, DOAI		North German Lloyd, Pier 4, Foot of 58th Street, Brooklyn, N. Y.
DFA, DFB, all Nauen stations		Reichspostzentralamt, Schoeneberger Strasse 11-15, Berlin-Tempelhof, Germany
DJA, DJB, all Zeesen sta.		Reichsrundfunkgesellschaft, Haus des Rundfunks, Berlin-Charlottenburg 9, Germany
EAQ		Transradio Espanola, Apartado 951, Madrid, Spain
FIU	"Radio Tananarive"	Administration des Postes, des Telegraphes et des Telephones, Tananarive, Madagascar
FNSK		French Lines, Pier 88 North River, New York City
FNSM, FTNQ		French Lines, Pier 57 North River, New York City
FQO, FRO, FTA, Ste. Assise stations		Societe Francaise Radio-electrique 79 Bvd. Haussman, Paris (8), France
FYA	"Radio Coloniale"	Bvd. Haussman 98 bis, Paris (8), France
FZR, FZS		Cie. Generale de T. S. F., P.O. Box 238, Saigon, French Indo-China
GAA, GBA, all Rugby sta		Engineer-in-Chief, GPO (Radio Section), Armour House, St. Marins Le Grand, London EC1, England
GBZW, all British ships		International Marine Radio Co. Ltd. Connaught House, 63 Aldwych, London WC2, England
HAS, HAT	"Justice for Hungary"	Research Labs. for Electrical Communication of the Hungarian Post, Gyali-ut 22, Budapest, Hungary
HBL, HBO, HBP, etc.	"Radio Nations"	Information Section, League of Nations, Geneva, Switzerland
HB9B		Radio Club Basle; P.O. Box Basle 1 Switzerland
HCETC	"Teatro Bolivar"	Casilla 134, Quito, Ecuador
HCJB	"La Voz de los Andes"	Casilla 691, Quito, Ecuador
HC2CW	"Ondas del Pacifico"	P.O. Box 1166, Guayaquil, Ecuador
HC2JSB	"Ecuador Radio"	Guayaquil, Ecuador
HC2RL		Box 759, Guayaquil, Ecuador
HH2S		Societe Haitienne de Radiodiffusion Port-au-Prince, Haiti
HH3W		P.O. Box A-117, Port-au-Prince, Haiti
HIG	"Portavoz de la Farmacia Legalidad"	Trujillo, D. R.
HIH	"La Voz del Higuamo"	San Pedro de Macoris, D. R.
HIL		Box 623, Trujillo, D. R.
HIT	"La Voz de la R.C.A.-Victor"	Box 1105 Trujillo, D. R.
HIX		Mr. J. R. Saladin, Director station HIX, Trujillo, D. R.
HIZ		Calle Duarte 68, Trujillo, D. R.
HI1A	"La Voz del Yaque"	P.O. Box 423, Santiago de los Caballeros, D. R.
HI1J		P.O. Box 204, San Pedro de Macoris, D. R.
HI1S	"La Voz de la Hispaniola"	Puerto Plata, D. R.
HI3C	"La Voz de Rio Dulce"	La Romana, D. R.
HI3U	"La Voz del Comercio"	Santiago de los Caballeros, D. R.
HI4D	"La Voz de Quisqueya"	Trujillo, D. R.
HI4V	"La Voz de la Marina"	Calle Duarte 48, Trujillo, D. R.
HI9B	"Broadcasting Hotel Mercedes, Broadcasting Columbus"	P.O. Box 95, Santiago de los Caballeros, D. R.
HI5M	"La Voz del Almacen Dominicano"	Santiago de los Caballeros, D. R.
HJA3		Compania Telefonica de Barranquilla, Apartado Nacional 263, Barranquilla, Colombia
HJB		Marconi's Wireless Telegraph Co. Ltd., Apartado 1591, Bogota, Colombia
HJN	"Radio—emisora Nacional"	Bogota, Colombia
HJU	"La Voz del Pacifico"	Ferrocariles Nacionales, Buenaventura, Colombia
HJ1ABB	"La Voz de Barranquilla"	P.O. Box 715, Barranquilla, Colombia
HJ1ABC	"La Voz de Choco"	Intendencia de Choco, Director of Public Education, Quibdo, Choco, Colombia
HJ1ABE	"La Voz de los Laboratorios Fuentes"	P.O. Box 31, Cartagena, Colombia
HJ1ABG	"La Voz del Atlantico"	Apartado 445, Barranquilla, Colombia
HJ1ABH	"La Voz de Cienaga"	Cienaga, Colombia
HJ1ABJ	"La Voz de Santa Marta"	Santa Marta, Colombia
HJ2ABA	"La Voz del Pais"	Tunja, Colombia
HJ2ABC	"La Voz de Cucuta"	Cucuta, Colombia
HJ3ABD	"Colombia Broadcasting"	Alford Radio, Calle 16 No. 5—40, Bogota, Colombia
HJ3ABF	"La Voz de Bogota"	Apartado Postal 317, Bogota, Colombia
HJ3ABH	"La Voz de la Victor"	Apartado 565, Bogota, Colombia
HJ3ABI		Apartado 513, Bogota, Colombia
HJ4ABA	"Ecos de la Montana"	Medellin, Colombia
HJ4ABB	"Radio Monte Carlo"	Manizales, Colombia
HJ4ABC	"La Voz de Pereira"	Pereira, Colombia
HJ4ABC	"Ecos del Combeima"	Box 39, Ibague, Colombia
HJ4ABD	"La Voz de Castilla"	Medellin, Colombia
HJ4ABE	"La Voz de Antioquia"	Medellin, Colombia
HJ5ABC	"La Voz de Colombia"	Calle 12 no. 235, Cali, Colombia
HJ5ABD	"La Voz del Valle"	Cali, Colombia
HJ5ABE		Cia. Radiodifusora Colombiana, Apartado 50, Cali, Colombia
	"Radiodifusora Cartagena"	Apartado 37, Cartagena Colombia
HKE		Observatorio Nacional de San Bartolomew, Bogota, Colombia
HKV		Ministry of War, Bogota, Colombia
HP5B	"Estacion Miramar"	Apartado 910, Panama City, Panama
HP5F	"La Voz de Colon"	Apartado 405, Colon, Panama
HP5J	"La Voz de Panama"	Cia. de Servicio Publico de Radio S. A., Apartado 867, Panama City, Panama
HRN	"La Voz de Honduras"	Tegucigalpa, Honduras
HRP1	"El Eco de Honduras en San Pedro Sula"	San Pedro Sula, Honduras
HRV	"La Voz de Atlantica"	La Ceiba, Honduras
HRW		Tropical Fruit Importers, La Faba, Honduras
HRY		Tropical Fruit Importers, Tela, Honduras
HVJ	"Radio-Vaticano"	Pontificia Academia della Scienze, Roma-Castino Pio IV, Vatican City
IAC		Radio Maritime Coltano, Pisa, Italy
IRM, IRW, etc.		Societe Italo Radio, Servici Radioelettrici, Via Calabua 46-48, Rome, Italy
I2RO, 2RO	"Prato Smeraldo"	Ente Italiano Audizione Radiofoniche, 5 Via Montello, Rome, Italy
JIA, JIB, JIC		Kokusai-Denwa Kaisha, Tyureki Station, Tyureki, Formosa
JVC, JVD, all Nazaki sta		Kokusai-Denwa Kaisha Ltd., Osaka Bldg., Kojimachiku, Tokio, Japan
JYK, JYR, Kemikawa Stations		Kemikawa Sending Station, Kemikawa Cho, Chiba-Ken, Japan
JZA, TDE, TDD		Manchukuo Telephone and Telegraph Co., Shinkyo, Manchukuo

Call	Name or Slogan	Address
KAX, KBI, etc. Manila stations		Radio Corp. of the Philippines Plaza Moraga, Manila, P. I.
KEB, KEC, etc., Bolinas Stations		RCA Communications, Inc., Pacific Division, 28 Geary St., San Francisco, Calif.
KWN, KWO, etc. Dixon stations		Transpacific Communication Co., Ltd., 140 Monthomery St., San Francisco, Calif.
KZGH, KZGF, etc.		Philippine Long Distance Telephone Co., Manila, P. I.
LKJ1		Dept. of Commerce, Division of Radio Telegraphy, Oslo, Norway
LRU, LRX	"Radio El Mundo"	Maipu 555, Buenos Aires, Argentina
LSL, LSM, all Hurlingham stations		Compania Internacional de Radio, Defensa 143, Buenos Aires, Argentina
LSF, LSX, LSY, Monte Grande Stations		Transradio Internacional, San Martin 329, Buenos Aires, Argentina
OAX4D	"Radio DUSA", "The Voice of Peru"	All American Cables, Casilla 2336, Lima, Peru
OAX4G		Robert Grellaud & Cia., Apartado 1242, Lima, Peru
OER2, OER3		Oesterr. Radioverkehrs A. G., Johannesgasse 46, Vienna, Austria
ORG, ORK, ORP	"Belradio"	Direction des Radiocommunications, Brussels, Belgium
OXY		Statsradiofonien, Heibergsgade 7, Copenhagen, Denmark
PCJ		Philips Radio, Emmasingel, Eindhoven, Holland
PHI		PHOHI Studios, Hilversum, Holland
PI1J		Middelbare Technische School, Oranjelaan 12, Dordrecht, Holland
PLV and other Bandoeng stations		Mr. H. Van der Veen, Engineer-in-Charge, Java Radio Stations, Bandoeng, Java, N. E. I.
PPQ, PSH, all Sepetiba and Maripicu stations.		Compania Telegraphica Brasileira.
PRADO	"El Prado"	Caixa Postal 500, Rio de Janeiro, Brazil Apartado de correos 98. Riobamba, Ecuador
PRA8	"A Voz do Norte"	Avenida Cruz Cabuga 394, Pernambuco, Brazil
RV15	"Far East Radio Station"	Radio Committee, Khabarovsk, Siberia
RV59, RNE		Radio Centre, Solianka 12, Moscow, U.S.S.R.
SM5SD		Lumas Kortvagssandare, Stockholm 20, Sweden
SPW		Polskie Radjo S.A., Kredytowa 1. Warsaw, Poland
SUV, SUX		Marconi Radio Telegraph Co., of Egypt, Box 795, Cairo, Egypt
TFK, TFJ, TEL		Icelandic State Broadcasting, Box 457 Reykjavik, Iceland
TGS		Radiotransmisora de la Casa Presidencial, Guatemala City, Guatemala
TGW, TGWA, TG1X	"Radiodifusora Nacional"	Guatemala City, Guatemala
TG1A	"Ministerio de Fomente"	Guatemala City, Guatemala
TG2X	"La Vox de Policia Nacional"	Guatemala, City, Guatemala
TIEP	"La Voz del Tropico"	Apartado 257, San Jose, Costa Rica
TIGPH	"Alma Tica"	P. O. Box 775, San Jose, Costa Rica
TIPG	"La Voz de la Victor"	Apartado 225, San Jose, Costa Rica
TiRCC	"Radioemisora Catolica Costarricense"	Apartado 40, San Jose, Costa Rica
TI5HH	"La Voz de San Ramon"	San Ramon, Costa Rica
VE9AS		University of New Brunswick, Fredericton, N. B., Canada
VE9BJ		C. A. Munro, Ltd., 16 Simonds St., St. Johns, N. B.
VE9BK		Radio Sales and Service, Ltd., 780 Beatty St., Vancouver, B. C., Canada
VE9CA	"The Voice of the Prairies"	Western Broadcasting Co., Toronto General Trusts Bldg., Calgary, Alberta, Canada
VE9CS		Radio Service Engineers, 734 Davie St., Vancouver, B. C., Canada
VE9DN, VE9DR		Canadian Marconi Co., P. O. Box 1690, Montreal, Que., Canada
VE9EH		The Island Radio Broadcasting Co., Ltd., Charlottetown, P. E. I., Canada
VK2ME		Amalgamated Wireless (Australasia) Ltd., 47 York St., Sydney, Australia
VK3LR		Postmaster General's Dept., Treasury Gardens, Melbourne C2, Australia
VK3ME		Amalgamated Wireless (Australasia) Ltd., Box 1272 L, Elizabeth St. P.O., Melbourne, Australia
VK3XX		501 Royal Parade, Rockville N-2, Melbourne, Australia
VK3ZX		33 Saturn St., Caulfield, Australia
VP1A, VPD	"Radio Suva"	Amalgamated Wireless (Australasia) Ltd., Suva, Fiji Islands
VP3BG		1 Wellington St., Georgetown, Brit. Guiana
VP3MR	"The Voice of Guiana"	Georgetown, Brit. Guiana
VQ7LO		Cable and Wireless, Ltd., P. O. Box 777, Nairobi, Kenya, Africa
VUB, VUY		Indian State Broadcasting Service, Irwin House, Sprott Road, Ballard Estate, Bombay, India
VXX		North West Telephone Co., 768 Seymour St., Vancouver, B. C., Canada
WMI, WOO, etc. Stations at Deal, Lawrenceville and Ocean Gate, N. J.		American Telephone and Telegraph Co., Long Lines Dept., 32 Sixth Ave., New York, N. Y.
WAJ, WEF, stations at Rocky Point		R.C.A. Central Frequency Bureau, 66 Broad St., New York, N. Y.
WVD		Alaskan Telephone Co., 517 Federal Office Bldg., Seattle, Wash.
W1XAL		World Wide Broadcasting Co., 70 Brookline Ave., Boston, Mass.
W1XK		Westinghouse Radio Stations in New England, Hotel Bradford, Boston, Mass.
W2XAD, W2XAF	"The Voice of Electricity"	General Electric Co., 1 River Road, Schenectady, N. Y.
W2XE		Columbia Broadcasting System, 485 Madison Ave., New York, N. Y.
W3XAL, W3XL		National Broadcasting Co., 30 Rockefeller Plaza, New York, N. Y.
W3XAU		WCAU Bldg., 1622 Chestnut St., Philadelphia, Pa.
W4XB		c/o WIOD, News Tower, Miami, Fla.
W8XAL	"The Nation's Station"	Crosley Radio Corp., Cincinnati, Ohio
W9XAA	"Voice of Farmer and Labor"	Chicago Federation of Labor, 666 Lake Shore Drive, Chicago, Ill.
W9XBS, W9XF		National Broadcasting Co., Merchandise Mart, Chicago, Ill.
XBJQ		P.O. Box 2825, Mexico, D.F., Mexico
XEBT	"El Buen Tono"	Apartado 79-44, Mexico D.F., Mexico
XECW	"Del Caballero Xantocam"	Calle del Bajio 120, Xantocam, Mex.
XEDQ		Cia. Radiofonografia, Apartado 197, Guadalajara, Jalisco, Mexico
XEFT	"La Voz de Veracruz"	Ave. Independencia 28, Veracruz, Vera., Mexico
XEUW	"El Eco de Sotavente desde Veracruz"	Ave. Independencia 98, Veracruz, Vera., Mexico
XEVI	"The Voice of the World"	Apartado 2874, Mexico, D.F., Mexico
XEXA		Secretary of Public Education, Mexico, D.F., Mexico
XQAJ		80 Love Lane, Shanghai, China
X1CB		Liga Mexicana de Radio experimentadores, Mexico, D.F., Mexico
YBJ		Chief Engineer, 6th District, Post Telegraph and Telephone Service, Medan, Sumatra, N. E. I.
YNE		Box 830, New Orleans, La.
YNLF	"La Voz de Nicaragua"	Calle 15 de Septembre 206, Managua, Nicaragua
YN1GG	"La Voz de los Lagos"	Managua, Nicaragua
YVQ	"Estacion Nacional de Radio"	Maracay, Venezuela
YV2RC	"Radio Caracas"	Apartado 2009, Caracas, Venezuela
YV3RC	"Radiodifusora Venezuela"	Pasaje Ramella, Caracas, Venezuela
YV4RB		P. O. Box 983, Caracas, Venezuela
YV5RMO	"Ecos del Caribe"	Apartado de Correos 214, Maracaibo, Venezuela
YV6RV	"La Vox de Carabobo"	Valencia, Venezuela
YV7RMO	"Radiodifusora Maracaibo"	P. O. Box 100, Maracaibo, Venezuela
YV8RB	"La Voz de Lara"	Barquisimeto, Venezuela
YV12RM	"Emisora 12 de Julio"	Maracay, Venezuela
ZCK		P. O. Box 200, Hong Kong, China
ZGE		Malayan Amateur Radio Society, Kuala Lumpur, F. M. S.
ZHI		Radio Service of Malaya, 2 Orchard Road, Singapore, F. M. S.
ZHJ		Penang Wireless Society, 40 Park Road, Penang, Straits Settlements
ZP10	"Rueda del Oeste"	Asuncion, Paraguay

The DX Corner (Short Waves)

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reported heard Sunday morning. (D. Smith.)

CT1AA, Lisbon, Portugal, now transmitting on 9650 kc., 31.25 meters, 2 kw., Tuesdays, Thursdays and Saturdays, 4-7 p.m. (Wickham, Sahlbach, Koehnlein, Sands, Loke, Mallet-Veale.) Fletcher says the frequency is 9660 kc.

RV59, Moscow, U. S. S. R., 6000 kc., has an English program at 3 p.m. Wednesdays. They go off the air at 6 p.m. daily. (Bourne, Zarn, Shea.)

ASIA

JVT, Nazaki, Japan, 6750 kc., program now continues as follows: 7-10 p.m., 9:40-9:45 p.m., 10:40-11:10 p.m., 1:50-2:20 a.m., 4-7:30 a.m., 7:30-8 a.m., 5:20-5:40 p.m., E.S.T. (Messer, Seright, Holmgren, Holt, Cigoj, Wolf, Dressler, Parson, Morgan, Frost, Amos, Rodriguez, Hull, Meehan, Gallagher, Pickering.)

JVN, Nazaki, Japan, 10,660 kc., same program as above. (Same Observers.)

JVM, Nazaki, Japan, 10,740 kc., same program as above. (Same Observers.)

JVH, Nazaki, Japan, 14,600 kc., beamed to North America, 12 midnight-1 a.m., E.S.T. (Bourne, Lopez.)

JVD, Nazaki, Japan, 15,860 kc., reported heard 6-8 p.m., E.S.T. (Hull, Pilgrim.)

RV15, Khabarovsk, U. S. S. R., 4273 kc., reported heard 8-11 a.m., E.S.T. (Wolf.)

HS8PG, Bangkok, Siam, 10,955 kc., 27.38 meters, reported heard Mondays only, 8-10 a.m., E.S.T. (Twomey, G. Smith, Howald, Butcher, Godee, Frost, Westman.) Reported heard 10:30-11 a.m., E.S.T. (Moore.) Reported heard 2-3 p.m. (Mallet-Veale.)

ZGR, Federated Malay States, 49.02 meters, has musical programs in the afternoon. (Lawton.)

FZR, Indo-China, 31.49 meters, reported heard broadcasting music at 8 a.m., E.S.T. (Lawton.)

ZBW, Hongkong, China, 8750 kc., 55.45 meters, reported broadcasting simultaneously at 12 midnight. (Law-

(*Turn to page* 756)

SHORT-WAVE STATION LIST

(Wavelength, Frequency, Call, Location, Power and Service)

All Time is Eastern Standard Time

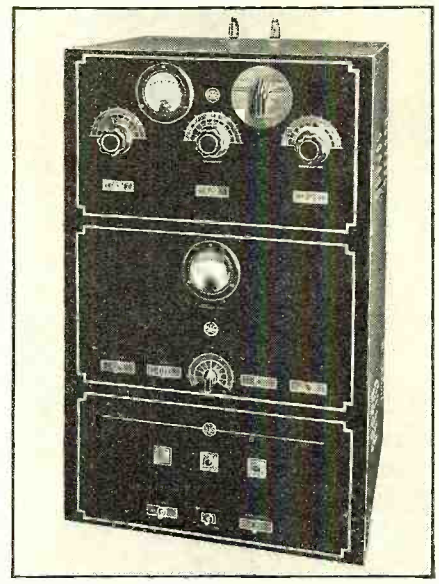
Meters	Kc.	Call	Location	Kw.	Service, etc.
0.75 to 3.49	400,000 to 86,000	.....	Storrs, Conn.	0.5	Exp.
3.49	86,000	W2XDV	New York, N. Y.	....	Exp.
4.88	61,500	W1XAV	Boston, Mass.	....	Exp.; relays WNAC
4.96	60,500	.....	Chicopee Falls, Mass.	0.5	Exp.
5.41	55,500	.....	Chicopee Falls, Mass.	0.5	Exp.
5.41	55,500	W3XKA	Philadelphia, Pa.	....	Exp.; relays KYW
5.41	55,500	W8XKA	Pittsburgh, Pa.	....	Exp.; relays KDKA
6.06	49,500	KGXK	Waikiki, T. H.	0.2	Phone
6.20	48,400	KGXH	Ulupalakua, T. H.	0.2	Phone
6.34	47,300	KGXB	Manawahua, T. H.	0.2	Phone
6.49	46,200	KGXO	Kalepa, T. H.	0.2	Phone
7.25	41,400	LQK	Monte Grande, Argentina	0.1	Exp.
7.31	41,040	LQL	Monte Grande, Argentina	0.1	Exp.
7.32	41,000	W8XH	Buffalo, N. Y.	0.1	Exp.
7.32	41,000	W2XDV	New York, N. Y.	....	Exp.
7.37	40,700	KGXJ	Ulupalakua, T. H.	0.2	Phone
7.40	40,600	W10XFZ	Los Angeles, Calif.	0.1	Exp.
7.58	39,600	KGXA	Manawahua, T. H.	0.2	Phone
7.60	39,473	TY4	La Turbie, France	0.1	Exp.
7.77	38,600	.....	Chicopee Falls, Mass.	0.5	Exp.
7.77	38,600	W8XH	Buffalo, N. Y.	0.1	Exp.
7.77	38,600	W2XDV	New York, N. Y.	....	Exp.; relays WABC
8.02	37,400	KGXC	Manawahua, T. H.	0.2	Phone
9.30	36,144	TYZ	Calenzana, France	0.1	Exp.
8.43	35,600	W8XH	Buffalo, N. Y.	0.1	Exp.
8.43	35,600	.....	Chicopee Falls, Mass.	0.5	Exp.
8.43	35,600	W2XDV	New York, N. Y.	....	Exp.; relays WABC
8.43	35,600	W6XKG	Los Angeles, Calif.	....	Exp.; relays KGFJ
8.67	34,600	W10XFZ	Los Angeles, Calif.	0.1	Exp.
9.50	31,600	.....	Chicopee Falls, Mass.	0.5	Exp.
9.50	31,600	W9XPD	St. Louis, Mo.	0.1	Exp.; relays KSD
9.50	31,600	W2XDV	New York, N. Y.	....	Exp.; relays WABC
9.50	31,600	W8XH	Buffalo, N. Y.	0.1	Exp.; relays WBEN
9.50	31,600	W8XAI	Rochester, N. Y.	....	Exp.; relays WHAM
9.50	31,600	W9XAZ	Milwaukee, Wis.	....	Exp.; relays WTMJ
9.50	31,600	W8XWJ	Detroit, Mich.	0.1	Exp.
9.65	31,100	W10XFZ	Los Angeles, Calif.	0.1	Exp.
9.68	31,000	.....	Chicopee Falls, Mass.	0.5	Exp.
9.80	30,610	IAG	Golfo Aranci, Sardinia	....	Exp.
10.06	29,820	IAF	Fiumicino, Italy	5.0	Exp.
11.49	26,100	GSK	Daventry, England	....	Broadcast
13.45	22,300	GBU	Rugby, England	....	Phone
13.92	21,550	XGBA	Shanghai, China	18.5	Broadcast
13.93	21,540	W8XK	Pittsburgh, Pa.	40.0	Bc.; relays KDKA
13.93	21,540	VK3LR	Lyndhurst, Victoria, Australia	0.6	Broadcast
13.93	21,530	GSJ	Daventry, England	15.0	Broadcast
13.94	21,520	W2XE	Wayne, N. J.	....	Bc.; relays WABC
13.97	21,470	GSH	Daventry, England	20.0	Broadcast
13.98	21,460	W1XAL	Boston, Mass.	5.0	Broadcast
14.01	21,420	WKK	Lawrenceville, N. J.	20.0	Phone to LSN
14.19	21,140	KBI	Manila, P. I.	10.0	Phone
14.20	21,130	LSM	Buenos Aires, Argentina	....	Phone, broadcast
14.24	21,070	PSA	Marapicu, Brazil	10.0	Phone to WKK
14.25	21,060	WKA	Lawrenceville, N. J.	20.0	Phone to England
14.25	21,060	KWN	Dixon, Calif.	20.0	Phone
14.27	21,020	LSN	Hurlingham, Argentina	....	Phone, broadcast
14.37	20,860	EHY	Madrid, Spain	7.5	Phone to Buenos Aires
14.41	20,820	KSS	Bolinas, Calif.	40.0	Phone
14.44	20,780	KMM	Bolinas, Calif.	40.0	Phone
14.47	20,730	LSY	Monte Grande, Argentina	10.0	Phone
14.51	20,680	LSX	Monte Grande, Argentina	12.0	Phone to U. S. A.; occ. bc
14.51	20,680	LSN	Hurlingham, Argentina	....	Phone to Europe; occ. bc.
14.56	20,610	PMB	Bandoeng, Java	60.0	Phone to PCK
14.72	20,380	GBA	Rugby, England	15.0	Phone to ships & LSN
14.90	20,140	DWG	Nauen, Germany	7.2	Phone
14.92	20,100	WQY	Rocky Point, N. Y.	40.0	Phone
14.97	20,040	OPL	Leopoldville, Belgian Congo	9.0	Phone to ORG. mornings
14.99	20,020	DHO	Nauen, Germany	7.2	Phone to S. America
15.02	19,980	KAX	Manila, P. I.	20.0	Phone to Calif.
15.04	19,950	DIH	Nauen, Germany	7.2	Phone
15.08	19,900	LSG	Monte Grande, Argentina	7.0	Phone
15.11	19,850	WMI	Deal, N. J.	....	Phone
15.12	19,840	FTD	Ste. Assise, France	....	Phone
15.14	19,820	WKN	Lawrenceville, N. J.	20.0	Phone to England
15.21	19,720	EAQ	Madrid, Spain	10.0	Phone to Latin America
15.24	19,680	CEC	La Granja, Chile	4.0	Phone to LSR, HJY
15.31	19,600	LSF	Monte Grande, Argentina	7.0	Phone
15.37	19,520	IRW	Rome, Italy	20.0	Phone to S. America
15.50	19,355	FTM	Ste. Assise, France	30.0	Phone
15.51	19,345	PMA	Bandoeng, Java	40.0	Phone; sometimes bc.
15.58	19,260	PPU	Sepetiba, Brazil	13.5	Phone to Ste. Assise
15.61	19,220	WKF	Lawrenceville, N. J.	20.0	Phone to England
15.62	19,200	ORG	Ruysselede, Belgium	8.0	Phone
15.75	19,050	JVC	Nazaki, Japan	....	Phone; sometimes bc.
15.77	19,020	WKW-W2XBJ	Rocky Point, N. Y.	....	Exp., mornings
15.83	18,950	HBF	Prangins, Switzerland	20.0	Phone
15.86	18,910	JVA	Nazaki, Japan	20.0	Phone to Europe; occ. bc.
15.87	18,900	WDS	Rocky Point, N. Y.	....	Phone
15.88	18,890	ZSS	Klipheuvel, S. Africa	5.0	Phone to Rugby
15.91	18,860	WKM	Rocky Point, N. Y.	40.0	Phone
15.93	18,830	PLE	Bandoeng, Java	40.0	Phone to Dixon & Nazaki
16.08	18,670	OCI	Lima, Peru	....	Phone
16.11	18,620	GAU	Rugby, England	15.0	Phone to WM1, VWY
16.11	18,620	GBJ	Bodmin, England	....	Phone to Montreal
16.13	18,600	PDM	Kootwijk, Holland	40.0	Phone
16.18	18,545	PCM	Kootwijk, Holland	40.0	Phone
16.23	18,480	HBH	Prangins, Switzerland	20.0	Phone
16.27	18,440	HJY	Bogota, Colombia	....	Phone to CEC, LSR, OCI, WNC
16.30	18,400	PCK	Kootwijk, Holland	40.0	Phone to Bandoeng
16.36	18,340	ZLW	Wellington, New Zealand	....	Phone to VK2ME, irr.
16.38	18,310	FZS	Saigon, French Indo-China	15.0	Phone to Ste. Assise
16.36	18,340	WLA	Lawrenceville, N. J.	20.0	Phone to GAS
16.39	18,304	GAS	Rugby, England	....	Phone to WLA
16.40	18,296	YVR	Maracay, Venezuela	....	Tests with DFB
16.42	18,270	ETA	Addis Ababa, Ethiopia	3.5	Phone; occ. bc.
16.44	18,240	FRO-FRE	Ste. Assise, France	30.0	Phone
16.46	18,220	KUS	Manila, P. I.	10.0	Phone
16.48	18,200	GAW	Rugby, England	15.0	Phone
16.49	18,190	JVB	Nazaki, Japan	10.0	Phone to Java, P. I; bc
16.50	18,180	CGA	Drummondville, Canada	....	Phone to Rugby
16.55	18,135	PMC	Bandoeng, Java	40.0	Phone; sometimes bc.
16.56	18,115	LSY3	Buenos Aires, Argentina	10.0	Phone; sometimes bc.
16.63	18,040	KQR	Bolinas, Calif.	40.0	Phone
16.65	18,020	KQJ	Bolinas, Calif.	40.0	Transpacific phone
16.67	18,000	KQG	Bolinas, Calif.	40.0	Phone
16.69	17,980	KQZ	Bolinas, Calif.	40.0	Phone
16.72	17,940	WQB-W2XBJ	Rocky Point, N. Y.	40.0	Phone
16.74	17,920	WQF	Rocky Point, N. Y.	40.0	Phone
16.76	17,900	WLL	Rocky Point, N. Y.	20.0	Phone
16.79	17,870	OEV	Vienna, Austria	....	Phone
16.85	17,800	PCV	Kootwijk, Holland	40.0	Phone to Java
16.86	17,790	XGBB	Shanghai, China	....	Phone
16.85	17,790	GSG	Daventry, England	15.0	Broadcast
16.87	17,780	W3XAL	Bound Brook, N. J.	15.0	Broadcast
16.87	17,780	W9XAA	Chicago, Ill.	0.5	Exp.
16.87	17,780	W8XK	Pittsburgh, Pa.	40.0	Bc.; relays KDKA
16.88	17,775	PHI	Huizen, Holland	23.6	Broadcast
16.89	17,760	DJE	Zeesen, Germany	8.0	Broadcast
16.89	17,760	W2XE	Wayne, N. J.	....	Bc.; relays WABC
16.90	17,750	IAC	Coltano, Italy	14.0	Phone; early mornings
16.91	17,740	HSP	Bangkok, Siam	20.0	Phone to JVG
17.00	17,640	GFWV	S.S. Majestic	....	Phone
17.00	17,640	GLSQ	S. S. Olympic	....	Phone
		GDLJ	S. S. Homeric	....	Phone
		GTSD	S. S. Monarch of Bermuda	....	Phone
		GMBJ	S. S. Empress of Britain	....	Phone
17.12	17,520	DFB	Nauen, Germany	7.2	Phone to YVR
17.16	17,480	VWY	Kirkee, India	....	Phone to Rugby
17.33	17,310	W3XAL	Bound Brook, N. J.	20.0	Exp.
17.33	17,310	CZA	Drummondville, Canada	4.0	Phone to ships]
17.34	17,300	VE9BY	London, Ont., Canada	....	Exp.; irr.
17.38	17,260	DAF	Norddeich, Germany	5.0	Phone
17.51	17,130	HAS5	Szekesfehervar, Hungary	20.0	Broadcast
17.51	17,120	WOO	Ocean Gate, N. J.	20.0	Phone
17.56	17,080	GBC	Rugby, England	5.0	Phone
17.74	16,910	JZD	Nazaki, Japan	10.0	Phone to ships
18.00	16,665	DAN	Norddeich, Germany	....	Tests with ships
18.07	16,600	DOAI	S. S. Europa	....	Phone to DAF & WOO
18.23	16,460	DHEY	S. S. Deutschland	....	Phone to DAF & WOO
18.37	16,330	VLK	Sydney, Australia	16.0	Phone
18.40	16,305	PCL	Kootwijk, Holland	....	Phone to Bandoeng
18.44	16,270	WLK	Lawrenceville, N. J.	20.0	Phone to Rugby
18.47	16,240	KTO	Manila, P. I.	40.0	Phone to Dixon
18.50	16,214	FZR3	Saigon, French Indo-China	15.0	Phone to Ste. Assise
18.55	16,162	PSA	Maripicu, Brazil	10.0	Broadcast
18.56	16,150	GBX	Rugby, England	....	Phone to Sydney
18.61	16,120	IRY	Rome, Italy	20.0	Phone
18.71	16,030	KKP	Kahuku, T. H.	40.0	Phone to KWO
18.77	15,985	KQH	Kahuku, T. H.	40.0	Phone
18.81	15,950	PLG	Bandoeng, Java	....	Phone; afternoons
18.89	15,880	FTK	Ste. Assise, France	30.0	Phone to Saigon
18.92	15,855	CEC	La Granja, Chile	0.8	Phone
18.92	15,860	JVD	Nazaki, Japan	....	Phone to Shanghai
19.04	15,760	JYT	Kemikawa-Cho, Japan	5.0	Bc.; exp.
19.05	15,750	JIA	Tyureki, Formosa	10.0	Phone to Nazaki
19.13	15,680	JZA	Tanjoshi, Manchukuo	20.0	Phone to Nazaki
19.16	15,660	JVE	Nazaki, Japan	10.0	Phone to PLE, P.I.; occ. bc.
19.21	15,620	JVF	Nazaki, Japan	20.0	Phone to KWU; occ. bc.
19.35	15,505	CMA3	Havana, Cuba	....	Tests, irr.
19.37	15,490	KEM	Bolinas, Calif.	40.0	Phone
19.39	15,475	KKL	Bolinas, Calif.	40.0	Phone
19.40	15,460	KKR	Bolinas, Calif.	40.0	Phone
19.43	15,440	PRADO	Riobamba, Ecuador	....	Phone; bc.
19.44	15,430	KWE	Bolinas, Calif.	40.0	Phone
19.45	15,420	KWO	Dixon, Calif.	20.0	Phone to Hawaii and Manila
19.52	15,370	HAS3	Szekesfehervar, Hungary	20.0	Broadcast
19.53	15,360	DJT	Zeesen, Germany	....	Exp.
19.54	15,355	KWU	Dixon, Calif.	20.0	Phone to Hawaii
19.56	15,340	DJR	Zeesen, Germany	50.0	Broadcast
19.56	15,340	CT1AA	Lisbon, Portugal	2.0	Broadcast
19.57	15,330	W2XAD	Schenectady, N. Y.	20.0	Broadcast; relays WGY
19.60	15,310	GSP	Daventry, England	....	Broadcast
19.61	15,300	OXY	Skamlebaek, Denmark	....	Exp.
19.60	15,300	CP7	La Paz, Bolivia	1.0	Phone
19.62	15,290	LRU	Buenos Aires, Argentina	7.5	Bc.; relays LR1
19.63	15,280	DJQ	Zeesen, Germany	50.0	Broadcast
19.65	15,270	W2XE	Wayne, N. J.	15.0	Broadcast: relays WABC
19.66	15,260	GSI	Daventry, England	15.0	Broadcast
19.67	15,250	RIM	Tashkent, U. S. S. R.	....	Phone
19.67	15,250	W1XAL	Boston, Mass.	5.0	Broadcast
19.68	15,243	FYA	Pontoise, France	12.0	Broadcast
19.71	15,220	PCJ	Huizen, Holland	20.0	Exp.
19.72	15,210	W8XK	Pittsburgh, Pa.	40.0	Bc.; relays KDKA
19.74	15,200	DJB	Zeesen, Germany	8.0	Broadcast
19.75	15,190	VE9BA	Montreal, Que.	....	Broadcast
19.76	15,180	GSO	Daventry, England	....	Broadcast

19.81	15,140	GSF	Daventry, England	15.0	Broadcast
19.83	15,130	VE9DN	Montreal, Que.	....	Broadcast
19.84	15,123	HVJ	Rome, Italy	10.0	Broadcast
19.85	15,110	DJL	Zeesen, Germany	5.0	Broadcast
19.86	15,104	RAU	Tashkent, U. S. S. R.	20.0	Phone
19.91	15,070	PSD	Maripicu, Brazil	12.0	Phone
19.93	15,055	WNC	Hialeah, Fiorida	0.4	Phone
19.95	15,040	RKI	Moscow, U. S. S. R.	20.0	Phone to WQG, mornings
20.00	15,000	WWV	Beltsville, Md.	1.0	Freq. standard
20.03	14,980	KAY	Manila, P. I.	40.0	Phone to Dixon
20.08	14,940	HJA3	Barranquilla, Colombia	....	Phone to Colombia, Panama, Costa Rica
20.09	14,930	HJB	Bogota, Colombia	....	Phone
20.12	14,910	JVG	Nazaki, Japan	10.0	Phone to Formosa; also bc.
20.23	14,830	WKU-W2XBJ	Rocky Point, N. Y.	40.0	Tests, daytime
20.55	14,600	JVH	Nazaki, Japan	....	Phone to Europe; bc. to N. America & Hawaii
20.56	14,590	WMN	Lawrenceville, N. J.	20.0	Phone to England; daylight
20.64	14,535	HBJ	Prangins, Switzerland	20.0	Phone
20.65	14,530	LSN	Hurlingham, Argentina	....	Phone
20.69	14,500	HPF	Panama City, Panama	0.25	Phone to WNC
20.69	14,500	TGF	Guatemala City, Guat.	....	Phone to WNC
20.69	14,500	TIN	Cartago, Costa Rica	....	Phone to WNC
20.72	14,480	LSN	Hurlingham, Argentina	....	Phone, irr.
20.72	14,480	YNA	Managua, Nicaragua	....	Phone to WNC
20.75	14,460	DZH	Zeesen, Germany	....	Exp.
20.78	14,440	GBW	Rugby, England	15.0	Phone to WNC
20.83	14,410	DIP	Zeesen, Germany	7.2	Exp.
21.25	14,120	HJ5ABE	Cali, Colombia	....	Broadcast
21.54	13,950	YOI	Bucharest, Roumania	....	Broadcast
21.58	13,900	WQP	Rocky Point, N. Y	....	Phone to RNE
21.63	13,870	WIY	Rocky Point, N. Y.	....	Tests, irr.
21.72	13,811	SUZ	Abu Zabal, Egypt	10.0	Phone
21.82	13,740	KKW	Bolinas, Calif.	....	Phone
21.82	13,740	CGA	Drummondville, Que.	....	Phone
21.91	13,690	KKZ	Bolinas, Calif.	40.0	Phone
21.92	13,685	HAT	Szekesfehervar, Hungary	20.0	Broadcast
22.00	13,635	SPW	Warsaw, Poland	20.0	Broadcast
22.04	13,610	JYK	Kemikawa-Cho, Japan	....	Bc. and tests
22.08	13,591	GBC	Rugby, England	....	Phone to CGA & ships
22.08	13,585	GBB	Rugby, England	15.0	Phone
22.12	13,560	JVI	Nazaki, Japan	10.0	Phone to Manchukuo; bc.
22.36	13,420	TIEP	San Jose, Costa Rica	....	Broadcast
22.40	13,390	WMA	Lawrenceville, N. J.	20.0	Phone
22.47	13,350	YVQ	Maracay, Venezuela	20.0	Phone
22.49	13,340	CGA	Drummondville, Canada	....	Phone
22.58	13,285	CGA3	Drummondville, Canada	15.0	Phone to ships
22.66	13,240	KBJ	Manila. P. I.	40.0	Phone
22.68	13,220	GFWV	S. S. Majestic	....	Phone
		GLSQ	S. S. Olympic	....	Phone
		GDLJ	S. S Homeric	....	Phone
		GTSD	S. S. Monarch of Bermuda	....	Phone
		GMBJ	S. S. Empress of Britain	....	Phone
		GLRZ	S. S. Aquitania	....	Phone
		GBZW	S. S. Berengaria	....	Phone
22.71	13,210	FNSK	S. S. Normandie	....	Phone
22.83	13,140	CWH	Cerrito, Uruguay	1.5	Phone
22.89	13,105	IRJ	Rome, Italy	20.0	Phone
22.93	13,075	VP1A	Suva, Fiji Islands	....	Broadcast
22.99	13,050	IBEJ	S. S. Conte Rosso	....	Phone
		IBGI	S. S. Conte Verde	....	Phone
		IBLI	S. S. Conte di Savoia	....	Phone
		ICEJ	S. S. Rex	....	Phone
23.00	13,040	DOAI	S. S. Europa	....	Phone
		DOAH	S. S. Bremen	....	Phone
		DDBR	S. S. Berlin	....	Phone
		DDCP	S. S. Cap Polonio	....	Phone
		DHEY	S. S. Deutschland	....	Phone
		DHJZ	S. S. Hamburg	....	Phone
		DHDL	S. S. Cap Arcona	....	Phone
		DHRL	S. S. New York	....	Phone
		DDFF	S. S. Reliance	....	Phone
		DDFT	S. S. Oceana	....	Phone
23.04	13,020	JZE	Nazaki, Japan	10.0	Phone to ships
23.36	12,840	WOO	Ocean Gate, N. J.	20.0	Phone to ships
23.38	12,830	CNR	Rabat, Morocco	12.0	Bc., Sundays
23.44	12,795	IAC	Coltano, Italy	52.0	Phone
23.47	12,780	GBC	Rugby, England	5.0	Phone
23.54	12,745	DAF	Norddeich, Germany	5.0	Phone to ships
23.66	12,680	YNE	Puerto Cabezas, Nic.	....	Tests
24.20	12,396	CT1GO	Parede, Portugal	7.0	Broadcast
24.38	12,300	ZLW	Wellington, N. Z.	....	Phone
24.40	12,295	ZLT	Wellington, N. Z.	1.0	Phone to Australia
24.41	12,290	GBU	Rugby, England	15.0	Phone
24.45	12,270	RKK	Moscow, U. S. S. R.	20.0	Phone
24.47	12,260	FTN	Ste. Assise, France	30.0	Phone
24.49	12,250	TYB	Pontoise, France	....	Phone to JVH & ships
24.49	12,250	GBS	Rugby, England	....	Phone
24.52	12,235	TFJ	Reykjavik, Iceland	....	Broadcast
24.56	12,215	TYA	Paris, France	15.0	Phone
24.61	12,190	YBJ	Medan, Sumatra	2.5	Phone
24.69	12,150	FQO, FQE	Ste. Assise, France	....	Phone
24.69	12,150	GBS	Rugby, England	15.0	Phone to U. S. A.
24.73	12,130	DZS	Zeesen, Germany	....	Phone
24.73	12,130	DZE	Zeesen, Germany	....	Phone
24.79	12,100	CJA6	Drummondville, Canada	15.0	Tests with VIY-VK3ME
24.83	12,082	CT1CT	Lisbon, Portugal	0.5	Broadcast
24.88	12,060	PDV	Kootwijk, Holland	60.0	Phone
24.93	12,035	DJK	Zeesen, Germany	7.2	Exp.
24.94	12,030	HBO	Prangins, Switzerland	20.0	Phone
24.96	12,020	VIY-VK3ME	Melbourne, Australia	....	Tests with Drummondville
25.00	12,000	RW59	Moscow, U. S. S. R.	20.0	Broadcast
25.02	11,991	FZS2	Saigon, French Indo-China	15.0	Phone to FTK
25.09	11,955	ETB	Addis Ababa, Ethiopia	3.5	Phone, c.w., bc.
25.11	11,950	KKQ	Bolinas, Calif.	40.0	Phone
25.11	11,950	FTA	Ste. Assise, France	30.0	Phone to Saigon
25.26	11,880	FYA	Pontoise, France	....	Broadcast
25.26	11,880	W9XF	Chicago, Ill.	....	Bc.; relays WENR
25.27	11,870	W8XK	Pittsburgh, Pa.	40.0	Bc.; relays KDKA
25.30	11,860	VE9CA	Calgary, Canada	....	Broadcast
25.30	11,860	GSE	Daventry, England	20.0	Broadcast
25.31	11,855	DJP	Zeesen, Germany	50.0	Broadcast
25.34	11,840	KZRM	Manila, P. I.	6.0	Broadcast
25.36	11,835	CHNX	Halifax, N. S.	....	Broadcast
25.36	11,830	W2XE	Wayne, N. J.	5.0	Bc.; relays WABC
25.36	11,830	W9XAA	Chicago, Ill.	0.5	Bc.; relays WCFL
25.38	11,820	GSN	Daventry, England	....	Broadcast
25.40	11,810	I2RO4	Rome, Italy	9.0	Broadcast
25.40	11,810	CRCX	Toronto, Canada	0.5	Broadcast
25.42	11,801	OER3	Vienna, Austria	0.25	Broadcast
25.42	11,800	CO9WR	Sancti Spiritus, Cuba	0.15	Broadcast
25.43	11,795	DJO	Zeesen, Germany	50.0	Exp.
25.45	11,790	HH2T	Port-au-Prince, Haiti	0.1	Tests, irr.
25.45	11,790	TTTR	San Jose, Costa Rica	....	Broadcast
25.45	11,790	W1XAL	Boston, Mass.	0.5	Broadcast
25.46	11,780	VE9DN	Montreal, Canada	....	Broadcast
25.46	11,780	VE9DR	Montreal, Canada	....	Exp.
25.49	11,770	DJD	Zeesen, Germany	8.0	Broadcast
25.51	11,760	XDA	Mexico, D. F., Mexico	....	Exp.
25.53	11,750	GSD	Daventry, England	20.0	Broadcast
25.58	11,730	CJRX	Winnipeg, Canada	2.0	Bc.; relays CJRC
25.57	11,730	PHI	Huizen, Holland	23.6	Bc., winter months
25.60	11,720	FYA	Pontoise, France	12.0	Broadcast
25.63	11,710	HJ4ABA	Medellin, Colombia	0.1	Broadcast
25.68	11,680	KIO	Kahuku, T. H.	40.0	Phone to Bolinas
25.65	11,695	YV2RC	Caracas, Venezuela	1.0	Broadcast
25.71	11,670	PPQ	Sepetiba. Brazil	5.0	Exp.; irr., evenings
25.73	11,660	JVL	Nazaki, Japan	10.0	Phone to Formosa; bc.
25.88	11,595	VRR4	Stony Hill, Jamaica	....	
26.10	11,495	VIZ3	Fiskville, Australia	....	Phone to Drummondville
26.00	11,540	XGR	Shanghai, China	20.0	Phone
26.11	11,490	GBK	Bodmin, England	....	Phone
26.15	11,470	IBDK	S. S. Elettra, Marconi's Yacht	....	Exp.
26.46	11,340	DAN	Norden, Germany	....	Time signals; 7 a.m., 7 p.m.
26.80	11,187	XAM	Merida, Yucatan	....	Phone
26.83	11,180	CT3AQ	Funchal, Madeira	0.05	Broadcast
27.17	11,040	HRW	Tegucigalpa, Honduras	....	Tests with HRY
27.27	11,000	PLP	Bandoeng, Java	3.0	Phone; occ. bc.
27.27	11,000	XBJQ	Mexico, D. F., Mexico	....	Phone; works Hams, irr.
27.30	10,990	ZLT	Wellington, N. Z.	....	Phone to Australia, mornings
27.50	10,910	KTR	Manila, P. I.	20.0	Phone
27.63	10,850	DFL	Nauen, Germany	....	Phone
27.68	10,840	KWV	Dixon, Calif.	20.0	Phone to Hawaii
27.88	10,770	GBP	Rugby, England	15.0	Phone
27.93	10,740	JVM	Nazaki, Japan	20.0	Phone to U. S. A.; bc.; relays JOAK
28.10	10,675	WNB	Lawrenceville, N. J.	0.5	Phone to Bermuda
28.12	10,670	CEC	La Granja, Chile	4.0	Phone; also bc.
28.14	10,660	JVN	Nazaki, Japan	20.0	Bc.; relays JOAK; phone
28.25	10,620	WEF	Rocky Point, N. Y. (Will increase power to 200 kw.)	40.0	Phone to Europe
28.28	10,610	WEA	Rocky Point, N. Y.	40.0	Exp.
28.36	10,578	FYB	Paris, France	....	Time signals; 5:26 a.m., 6:26 p.m.
28.44	10,550	WOK	Lawrenceville, N. J.	20.0	Phone
28.48	10,535	JIB	Tyureki, Formosa	6.0	Phone to Japan
28.50	10,525	VLK	Sydney, Australia	....	Phone
28.76	10,430	YBG	Medan, Sumatra	3.0	Phone; occ. bc.
28.79	10,420	XGW	Shanghai, China	20.0	Phone
28.82	10,410	PDK	Kootwijk, Holland	60.0	Phone
28.82	10,410	LSY	Monte Grande, Argentina	10.0	Phone
28.82	10,410	KES	Bolinas, Calif.	40.0	Phone
28.85	10,400	KEZ	Dixon, Calif.	40.0	Phone
28.87	10,390	KER	Bolinas, Calif.	40.0	Phone
28.87	10,390	GBX	Rugby, England	....	Phone
28.90	10,380	WCG	Rocky Point, N. Y.	40.0	Phone; Exp.
28.92	10,375	JVO	Nazaki, Japan	10.0	Phone to Manchukuo; also bc.
28.98	10,350	LSX	Monte Grande, Argentina	12.0	Phone
29.03	10,335	ZFD	St. George, Bermuda	1.5	Phone; mostly telegraph
29.03	10,330	ORK	Ruysselede, Belgium	11.0	Broadcast
29.13	10,300	LSL2	Hurlingham, Argentina	5.0	Phone to Europe
29.16	10,290	DZC	Nauen, Germany	....	Exp.
29.15	10,290	HPC	Panama City, Panama	....	Phone
29.24	10,260	PMN	Bandoeng, Java	3.0	Phone; occ. bc.
29.34	10,220	PSH	Marapicu, Brazil	12.0	Phone
29.48	10,170	RIO	Baku, U. S. S. R.	....	Phone
29.50	10,163	DOAI	S. S. Europa	....	Phone
		DOAH	S. S. Bremen	....	Phone
		DDBR	S. S. Berlin	....	Phone
		DDCP	S. S. Cap Polonio	....	Phone
		DHEY	S. S. Deutschland	....	Phone
		DHJZ	S. S. Hamburg	....	Phone
		DHDL	S. S. Cap Arcona	....	Phone
		DHRL	S. S. New York	....	Phone
		DDFF	S. S. Reliance	....	Phone
		DDFT	S. S. Oceana	....	Phone
29.59	10,140	OPM	Leopoldville, Belgian Congo	15.0	Phone to ORK
29.76	10,080	RIR	Tiflis, U. S. S. R.	10.0	Phone to RIO & RNE
29.79	10,070	EHY	Madrid, Spain	10.0	Exp.
29.81	10,065	JZB (TDE)	Kanjoshi, Manchukuo	20.0	Phone to JVO
29.84	10,055	ZFB	St. George, Bermuda	1.5	Phone to WNB, day
29.84	10,055	SUV	Abu Zabal, Egypt	10.0	Phone to GAA
29.88	10,042	DZB (DJJ)	Zeesen, Germany	....	Exp.
30.00	10,000	WWV	Beltsville, Md.	....	Standard frequency
30.01	9,990	KAZ	Manila, P. I.	40.0	Phone to PLV, mornings
30.09	9,964	LSL	Hurlingham, Argentina	....	Phone
30.12	9,960	IRS	Rome, Italy	15.0	Phone
30.15	9,950	GCU	Rugby, England	15.0	Phone to U. S. A.
30.21	9,930	YBF	Medan, Sumatra	1.0	Phone
30.21	9,930	HJY	Bogota, Colombia	....	Phone to OCI, CEC
30.23	9,925	JDY	Dairen, Manchuria	....	Phone to Nazaki
30.26	9,905	CGA5	Drummondville, Canada	....	Tests with Rugby
30.32	9,890	LSN2	Hurlingham, Argentina	5.0	Phone
30.40	9,870	WON	Lawrenceville, N. J.	20.0	Phone to England
30.43	9,860	EAQ	Madrid, Spain	20.0	Broadcast
30.49	9,840	FTI	Ste. Assise, France	15.0	Phone
30.49	9,840	JYS	Kemikawa-Cho, Japan	10.0	Bc. and tests
30.50	9,830	LSI	Buenos Aires, Argentina	10.0	Phone
30.52	9,830	IRM	Rome, Italy	25.0	Phone
30.61	9,800	GCW	Rugby, England	15.0	Phone
30.74	9,760	VLJ	Sydney, Australia	3.5	Phone
30.77	9,750	WOF	Lawrenceville, N. J.	20.0	Phone
30.90	9,710	GCA	Rugby, England	15.0	Phone
31.00	9,677	CT1CT	Lisbon, Portugal	0.5	Broadcast
31.01	9,675	DZA (DJI)	Zeesen, Germany	....	Phone
31.06	9,660	CT1AA	Lisbon, Portugal	2.0	Broadcast
31.12	9,640	YDB	Sourabaya, Java	1.0	Bc.; relays YDA
31.12	9,640	HSP2	Bangkok, Siam	....	Broadcast
31.14	9,635	I2RO3	Rome, Italy	20.0	Broadcast
31.18	9,620	DGU	Nauen, Germany	....	Phone to Egypt
31.25	9,600	CB960	Santiago, Chile	0.1	Broadcast
31.25	9,600	XEFT	Veracruz, Mexico	0.02	Broadcast
31.25	9,600	LQA	Buenos Aires, Argentina	....	Phone

31.25	9,600	.....	Cartagena. Colombia	0.7	
31.27	9,595	HH3W	Port-au-Prince, Haiti	0.03	Broadcast
31.27	9,595	HBL	Geneva, Switzerland	18.0	Broadcast
31.28	9,590	VK2ME	Sydney, Australia	20.0	Bc., Sundays
31.28	9,590	PCJ	Huizen, Holland	20.0	Exp.; bc.
31.28	9,590	HP5J	Panama, Panama	0.16	Broadcast
31.28	9,590	W3XAU	Philadelphia, Pa.	1.0	Bc.; relays WCAU
31.31	9,580	GSC	Daventry, England	20.0	Broadcast
31.31	9,580	VE9DR	Montreal, Canada	....	Exp.
31.31	9,580	VK3LR	Lyndhurst, Victoria, Australia	20.0	Broadcast
31.31	9,580	LRX	Buenos Aires, Argentina	7.5	Bc.; relays LR1
31.31	9,580	XGBD	Shanghai, China	18.5	Broadcast
31.35	9,570	W1XK	Millis, Mass.	10.0	Bc.; relays WBZ, WBZA
31.36	9,565	VUY (VUB)	Bombay, India	4.5	Broadcast
31.38	9,560	DJA	Zeesen, Germany	5.0	Broadcast
31.40	9,555	VE9DN	Montreal, Canada	....	Broadcast
31.43	9,545	HH2R	Port-au-Prince, Haiti	0.1	Tests
31.43	9,545	CEC	La Granja, Chile	4.0	Broadcast
31.47	9,540	DJN	Zeesen, Germany	50.0	Broadcast
31.47	9,540	CQN	Macao, Asia	0.5	Broadcast
31.47	9,540	CB954	Santiago, Chile	5.0	Broadcast
31.48	9,530	W2XAF	Schenectady, N. Y.	40.0	Bc.; relays WGY
31.48	9,530	LKJ1	Jeloy, Norway	25.0	Exp.
31.51	9,520	F3ICD	Saigon, French Indo-China	....	Phone
31.51	9,520	XEDQ	Guadalajara, Mexico	....	Bc.; relays XED
31.51	9,520	OXY	Skamlebaek, Denmark	0.5	Broadcast
31.55	9,510	YV3RC	Caracas, Venezuela	0.25	Broadcast
31.55	9,510	GSB	Daventry, England	20.0	Broadcast
31.58	9,501	PRF5	Rio de Janeiro, Brazil	60.0	Broadcast
31.58	9,500	HJU	Buenaventura, Colombia	....	Broadcast
31.58	9,500	XGOX	Nanking, China	....	Broadcast
31.58	9,500	HSP2	Bangkok, Siam	2.5	Broadcast
31.61	9,490	WEF	Rocky Point, N. Y.	40.0	Phone
31.61	9,490	VK3ME	Melbourne, Australia	5.0	Bc., Wed., Sat.
31.61	9,490	KEI	Bolinas, Calif.	20.0	Phone
31.65	9,480	KET	Bolinas, Calif.	40.0	Phone
31.68	9,470	WET	Rocky Point, N. Y.	....	Exp.
31.75	9,450	WES-W2XBJ	Rocky Point, N. Y.	40.0	Exp.
31.75	9,450	TG1X	Guatemala City, Guat.	....	Exp.
31.82	9,428	COCH	Havana, Cuba	0.4	Broadcast
31.86	9,415	PLV	Bandoeng, Java	80.0	Phone; sometimes bc.
31.92	9,400	XDC	Mexico City, Mexico	....	Exp.
32.00	9,375	XDA	Mexico D. F., Mexico	....	Phone
32.15	9,332	CGA4	Drummondville, Canada	15.0	Phone to England
32.27	9,300	YNGU	Managua, Nicaragua	....	Broadcast
32.33	9,280	GCB	Rugby, England	15.0	Phone
32.43	9,250	GBK	Bodmin, England	....	Phone to Drummondville
32.72	9,170	WNA	Lawrenceville, N. J.	20.0	Phone to England
32.76	9,168	YVR	Maracay, Venezuela	....	Phone to Europe
32.87	9,125	HAT4	Budapest, Hungary	20.0	Broadcast
32.89	9,120	CP6	La Paz, Bolivia	....	Broadcast
32.89	9,120	JBK	Kagoshima, Japan	....	Phone
33.15	9,050	TFK	Reykjavik, Iceland	7.0	Broadcast
33.19	9,037	TYA2	Pontoise, France	15.0	Phone to Algeria
33.26	9,020	GCS	England	15.0	Phone
33.30	9,010	KEJ	Bolinas, Calif.	40.0	Phone; relays programs for KGMB
33.43	8,975	VWY	Kirkee, India	....	Phone to England, mornings
33.52	8,950	WEL-W2XBJ	Rocky Point, N. Y.	....	Exp.
33.60	8,930	WEC	Rocky Point, N. Y.	....	Exp.
33.71	8,900	ZLT	Wellington, N. Z.	1.0	Phone to Sydney
33.82	8,870	NPO	Manila, P. I.	....	Time signals, 10 p. m.
33.96	8,830	DDBR	S.S. Berlin	....	Phone
		DDCP	S.S. Cap Polonio	....	Phone
		DDFF	S.S. Reliance	....	Phone
		DDFT	S.S. Oceana	....	Phone
		DHAO	S.S. Hansa	....	Phone
		DHDL	S.S. Cap Arcona	....	Phone
		DHEY	S.S. Deutschland	....	Phone
		DHJZ	S.S. Hamburg	....	Phone
		DHRL	S.S. New York	....	Phone
		DOAH	S.S. Bremen	....	Phone
		DOAI	S.S. Europa	....	Phone
		FNSK	S.S. Normandie	....	Phone
		FNSM	S.S. Paris	....	Phone
		FNTQ	S.S. Ile de France	....	Phone
		GBZW	S.S. Berengaria	....	Phone
		GDLJ	S.S. Homeric	....	Phone
		GFWJ	S.S. Majestic	....	Phone
		GLRZ	S.S. Aquitania	....	Phone
		GMBJ	S.S. Empress of Britain	....	Phone
		VQJM	S.S. Monarch of Bermuda	....	Phone
		VQJP	S.S. Queen of Bermuda	....	Phone
34.00	8,823	YNVA	Managua, Nicaragua	....	Broadcast
34.14	8,790	HJA3	Barranquilla, Colombia	....	Phone
34.14	8,790	TIR	Cartago, Costa Rica	....	Phone to TGA, HJB, WNC, afternoons
34.18	8,775	HCJB	Quito, Ecuador	0.5	Broadcast
34.18	8,775	PNI	Makassar, Celebes	0.3	Phone; occ. bc.
34.21	8,770	RSZ	Irkutsk, U.S.S.R.	....	Phone
34.29	8,750	ZCK	Hong Kong, China	0.25	Bc.; relays ZBW
34.44	8,710	KBB	Manila, P. I.	....	Phone
34.56	8,680	GBC	Rugby, England	5.0	Phone to ships
34.62	8,665	CO9JQ	Camaguey, Cuba	0.2	Broadcast
34.80	8,620	WVD	Seattle, Wash.	....	Tests with Juneau, Alas.
34.80	8,620	HKV	Bogota, Colombia	....	Broadcast
34.88	8,600	YNVA	Managua, Nicaragua	....	Broadcast
35.00	8,570	RW15	Khabarovsk, Siberia	15.0	Broadcast
35.03	8,565	HAT3	Szekesfehervar, Hungary	20.0	Broadcast
35.05	8,560	WOO	Ocean Gate, N. J.	20.0	Phone to ships, irr.
35.29	8,500	JZF	Nazaki, Japan	10.0	Phone to ships
35.42	8,470	DAF	Norddeich, Germany	....	Phone to ships
35.73	8,404	HC2CW	Guayaquil, Ecuador	....	Broadcast
35.80	8,380	IAC	Coltano, Italy	14.0	Phone
36.00	8,328	DOAI	S.S. Europa	....	Phone
		DOAH	S.S. Bremen	....	Phone
		DDBR	S.S. Berlin	....	Phone
		DDCP	S.S. Cap Polonio	....	Phone
		DHEY	S.S. Deutschland	....	Phone
		DHJZ	S.S. Hamburg	....	Phone
		DHDL	S.S. Cap Arcona	....	Phone
		DHRL	S.S. New York	....	Phone
		DDFF	S.S. Reliance	....	Phone
		DDFT	S.S. Oceana	....	Phone
		DHAO	S.S. Hansa	....	Phone
36.50	8,220	ZP10	Asuncion, Paraguay	0.015	Broadcast
36.56	8,205	XEMB	Merida, Yucatan, Mexico	....	Broadcast
36.63	8,190	XEME	Merida, Yucatan, Mexico	....	Bc.; relays XEFC
36.65	8,185	PSK	Rio de Janeiro, Brazil	10.0	Phone
36.95	8,120	KTP	Manila, P. I.	40.0	Phone to Dixon, Calif.
36.95	8,120	KAZ	Manila, P. I.	20.0	Phone to Dixon, Calif.
37.14	8,075	TYB2	Paris, France	....	Phone
37.34	8,035	CNR	Rabat, Morocco	12.0	Bc., Sundays
37.41	8,020	HSJ	Bangkok, Siam	20.0	Phone
37.59	7,980	VLJ	Sydney, Australia	3.5	Phone to Java
37.69	7,960	VLZ	Sydney, Australia	3.5	Phone
38.00	7,890	VPD	Suva, Fiji Islands	0.15	Phone
38.07	7,880	JYR	Kemikawa-Cho, Japan	5.0	Broadcast
38.10	7,870	RXC	Panama City, Panama	....	Phone HJP, afternoons, irr.
38.13	7,867	SUX	Abu Zabal, Egypt	10.0	Phone
38.20	7,854	HC2JSB	Guayaquil, Ecuador	0.5	Broadcast
38.31	7,830	PGA	Kootwijk, Holland	60.0	Phone
38.48	7,797	HBP	Geneva, Switzerland	20.0	Broadcast
38.89	7,715	KEE	Bolinas, Calif.	40.0	Phone: relays programs to KGMB
39.28	7,632	OEJ	Vienna, Austria	....	Phone
39.32	7,630	ZHJ	Penang, F. M. S.	....	Broadcast
39.34	7,626	RIM	Tashkent, U.S.S.R.	20.0	Phone to RKI
39.37	7,620	ETD	Addis Ababa, Ethiopia	3.5	Phone
39.42	7,610	KWX	Dixon, Calif.	20.0	Phone to Hawaii
39.58	7,580	XGO	Shanghai, China	....	Tests; phone
39.66	7,565	KWY	Dixon, Calif.	20.0	Phone
39.68	7,560	EA8AB	Tenerife, Canary Islands	....	Broadcast
39.74	7,550	TI8WS	Puntarenas, Costa Rica	0.12	Broadcast
39.88	7,522	HJA3	Barranquilla, Colombia	....	Phone
39.89	7,520	KKH	Kahuku, T. H.	40.0	Phone
39.95	7,510	JVP	Tokyo, Japan	20.0	Phone
40.00	7,500	RKI	Moscow, U.S.S.R.	20.0	Phone to RIM
40.16	7,470	JVQ	Nazaki, Japan	10.0	Phone to Java, P. I.; also bc.
40.16	7,470	JVO	Nazaki, Japan	10.0	Phone to Java & P. I.
40.16	7,470	HJA3	Barranquilla, Colombia	....	Phone
40.19	7,465	HJP	Bogota, Colombia	....	Bc.; phone to WNC, C. A. & Venez.
40.27	7,450	HJC	Bogota, Colombia	....	Phone
40.30	7,444	HBQ	Geneva, Switzerland	....	Broadcast
40.45	7,415	WEG	Rocky Point, N. Y.	40.0	Phone
40.50	7,407	WEN	Rocky Point, N. Y.	40.0	Phone
40.54	7,400	WEM-W2XBJ	Rocky Point, N. Y.	40.0	Phone; exp.
40.54	7,400	HJQ	Bogota, Colombia	....	Phone to Quito
40.60	7,390	ZLT2	Wellington, N. Z.	1.0	Phone to Sydney, mornings
40.65	7,380	XECR	Mexico D. F., Mexico	20.0	Broadcast
40.71	7,370	KEQ	Kahuku, T. H.	40.0	Phone
41.10	7,300	VK3ZX	Caulfield, Australia	....	Broadcast
41.21	7,281	HJ1ABD	Cartagena, Colombia	....	Broadcast
41.55	7,220	VP3BG	Georgetown, Brit. Guiana	....	Broadcast
41.55	7,220	HAT2	Szekesfehervar, Hungary	20.0	Broadcast
41.80	7,177	CR6AA	Lobita, Angola, Port W. Africa	0.5	Broadcast; phone, C.W.
41.96	7,150	X1CB	Mexico City, Mexico	....	Broadcast
42.02	7,140	PZH	Paramaribo, Dutch Guiana	....	Broadcast
42.02	7,140	OA4R	Lima, Peru	....	Broadcast
42.08	7,130	HKE	Bogota, Colombia	0.138	Broadcast
42.13	7,120	.....	Papeete, Tahiti	....	Broadcast
42.15	7,118	HB9B	Basle, Switzerland	....	Broadcast
42.25	7,100	HJ1ABE	Sincelejo, Colombia	0.1	Broadcast
42.25	7,100	HJ4ABG	Medellin, Colombia	....	Broadcast
42.31	7,090	SM5SD	Stockholm, Sweden	0.03	Broadcast
42.36	7,082	PI1J	Dordrecht, Holland	....	Amateur; sometimes bc.
42.37	7,080	VP3MR	Georgetown, Brit. Guiana	0.05	Amateur; bc.
42.37	7,080	LU5CZ	Buenos Aires, Argentina	....	Amateur; sometimes bc.
42.46	7,074	HJ1ABK	Barranquilla, Colombia	....	Broadcast
42.74	7,020	EAR125	Madrid, Spain	....	Broadcast
42.92	6,990	LKJ1	Jeloy, Norway	1.0	Broadcast
42.98	6,980	I2RO2	Rome, Italy	9.0	Broadcast
43.45	6,905	GDS	Rugby, England	15.0	Phone
43.48	6,900	HI3C	La Romana, D. R.	....	Broadcast
43.73	6,860	KEL	Bolinas, Calif.	40.0	Phone
43.86	6,840	CFA	Drummondville, Canada	....	Phone
44.05	6,810	HIH	San Pedro de Macoris, D.R.	....	Broadcast
44.12	6,800	HCETC	Quito, Ecuador	0.03	Broadcast
44.12	6,800	HI7P	Trujillo, D. R.	....	Broadcast
44.41	6,755	WOA	Lawrenceville, N. J.	20.0	Phone
44.44	6,750	JVT	Nazaki, Japan	20.0	Phone to U. S. A.; bc. relays JOAK
44.51	6,740	WEJ-W2XBJ	Rocky Point, N. Y.	....	Exp.
44.61	6,725	WQO	Rocky Point, N. Y.	....	Phone
44.66	6,718	KBK	Manila, P. I.	40.0	Phone
44.71	6,710	TIEP	San Jose, Costa Rica	....	Broadcast
44.71	6,710	KEF	Bolinas, Calif	40.0	Phone
44.91	6,680	DGK	Nauen, Germany	....	Phone
44.94	6,675	YV4RB	Caracas, Venezuela	....	Broadcast
44.96	6,672	YVQ	Maracay, Venezuela	....	Phone
45.00	6,667	HC2RL	Guayaquil, Ecuador	0.15	Broadcast
45.11	6,650	IAC	Coltano, Italy	14.0	Phone
45.11	6,650	TITE	San Jose, Costa Rica	....	Broadcast
45.25	6,630	HIT	Trujillo, D. R.	....	.....
45.34	6,618	PRADO	Riobamba, Ecuador	....	Broadcast
45.38	6,611	REN (RW72)	Moscow, U.S.S.R.	10.0	Bc.; phone
45.46	6,600	XFA2	Veracruz, Mexico	....	Phone
45.52	6,590	ZEB	Bulawayo, S. Rhodesia	0.5	Phone to ZEA
45.52	6,590	ZEA	Salisbury, S. Rhodesia	0.5	Phone to ZEB
45.80	6,550	HI4D	Trujillo, D. R.	....	Broadcast
45.80	6,550	TIRCC	San Jose, Costa Rica	....	Broadcast
46.01	6,520	YV6RV	Valencia, Venezuela	....	Broadcast
46.08	6,510	HIL	Trujillo, D. R.	....	Broadcast
46.23	6,490	HJ5ABD	Cali, Colombia	0.25	Broadcast
46.50	6,451	HJ4ABC	Ibague, Colombia	....	Broadcast
46.51	6,450	HI4V	Trujillo, D. R.	....	Broadcast
46.51	6,450	HJ1ABB	Barranquilla, Colombia	0.1	Broadcast
46.51	6,450	YN1GG	Managua, Nicaragua	0.1	Broadcast
46.66	6,430	HI1S	Puerto Plato, D. R.	0.045	Broadcast
46.69	6,425	VE9AS	Fredericton, N. B., Canada	....	Broadcast
46.69	6,425	W9XBS	Chicago, Ill.	2.5	Exp.
46.69	6,425	VE9BY	London, Ont., Canada	....	Broadcast
46.69	6,425	W3XL	Bound Brook, N. J.	18.0	Exp.
46.76	6,416	HJA3	Barranquilla, Colombia	....	Phone
46.80	6,410	TIPG	San Jose, Costa Rica	1.0	Broadcast
46.87	6,400	YV9RC	El Valle, Venezuela	....	Broadcast
47.00	6,383	HI3U	Santiago, D. R.	0.025	Broadcast
47.06	6,375	YV4RC	Caracas, Venezuela	0.1	Broadcast
47.17	6,360	TIFA	San Jose, Costa Rica	....	Broadcast
47.19	6,357	HRP1	San Pedro Sula, Honduras	....	Broadcast
47.24	6,350	HRY	Tela, Honduras	....	Tests with HRW
47.39	6,330	YV13RV	Valencia, Venezuela	....	Broadcast
47.39	6,330	JZG	Nazaki, Japan	10.0	Phone to ships
47.51	6,315	HIZ	Trujillo, D. R.	0.02	Broadcast
47.54	6,310	HP5K	Colon, Panama	....	Broadcast
47.62	6,300	YV12RM	Maracay, Venezuela	....	Broadcast

47.77	6,280	HIG	Trujillo, D. R.	....	Broadcast
47.85	6,270	CO9WR	Sancti Spiritus, Cuba	....	Broadcast
48.00	6,250	OCI	Lima, Peru	....	Phone
48.09	6,240	HRV	La Ceiba, Honduras	....	Broadcast
48.15	6,230	OAX4G	Lima, Peru	....	Broadcast
48.19	6,225	HJ1ABH	Cienaga, Colombia	....	Broadcast
48.23	6,220	HJ2ABA	Tunja, Colombia	....	Broadcast
48.40	6,198	CT1GO	Parede, Portugal	0.7	Broadcast
48.50	6,185	HI1A	Santiago de los Caballeros, D. R.	0.05	Broadcast
48.54	6,180	HJ3ABF	Bogota, Colombia	0.1	Broadcast
84.54	6,180	XEXA	Mexico City, Mexico	....	Broadcast
48.70	6,160	CJRO	Winnipeg, Man., Canada	....	Bc.; relays CJRC
48.78	6,150	COKG	Santiago, Cuba	2.4	Bc.; relays CMKB
48.78	6,150	CB615	Santiago, Chile	0.15	Broadcast
48.78	6,150	YV3RC	Caracas, Venezuela	0.25	Broadcast
48.78	6,150	HJ5ABC	Cali, Colombia	0.1	Broadcast
48.78	6,150	HI5M	Santiago de los Caballeros, D. R.	....	Broadcast
48.78	6,150	VE9CL	Winnipeg, Man., Canada	....	Broadcast
48.78	6,150	CSL	Lisbon, Portugal	....	Broadcast
48.78	6,150	HI5N	Trujillo, D. R.	....	Broadcast
48.86	6,140	KZRM	Manila, P. I.	6.0	Broadcast
48.86	6,140	W8XK	Pittsburgh, Pa.	40.0	Bc.; relays KDKA
48.89	6,136	CR7AA	Lourenzo Marques, Mozambique	....	Broadcast
48.92	6,132	ZGE	Kuala Lumpur, F. M. S.	0.18	Broadcast
48.94	6,130	VE9BA	Montreal, Canada	....	Broadcast
48.94	6,130	COCD	Havana, Cuba	0.2	Bc.; relays CMCD
48.94	6,130	HI6Z	Trujillo, D. R.	....	Broadcast
48.94	6,130	LKJ1	Jeloy, Norway	1.0	Broadcast
48.94	6,130	TGXA	Guatemala City, Guat.	0.02	Broadcast
48.96	6,128	YV11RMO	Maracaibo, Venezuela	....	Broadcast
49.02	6,120	XEFT	Vera Cruz, Mexico	0.02	Broadcast
49.02	6,120	VE9HK	Halifax, N. S., Canada	....	Broadcast
49.02	6,120	ZEB	Bulawayo, S. Rhodesia	....	Phone
49.02	6,120	W2XE	Wayne, N. J.	5.0	Bc.; relays WABC
49.02	6,120	YDA5	Bandoeng, Java	1.5	Broadcast
49.06	6,115	HJ1ABE	Cartagena, Colombia	0.05	Broadcast
49.10	6,110	CHNX	Halifax, N. S., Canada	0.2	Bc.; relays CHNS
49.10	6,110	HJ4ABB	Manizales, Colombia	....	Broadcast
49.10	6,110	GSL	Daventry, England	....	Broadcast
49.10	6,110	VUC	Calcutta, India	0.5	Broadcast
49.10	6,110	VE9CG	Calgary, Alberta, Canada	....	Broadcast
49.18	6,100	W9XF	Chicago, Ill.	5.0	Bc.; relays WENR
49.18	6,100	W3XAL	Bound Brook, N. J.	35.0	Bc.; relays WJZ
49.18	6,100	VE9CF	Halifax, N. S., Canada	....	Broadcast
49.20	6,098	ZTJ	Johannesburg, S. Africa	5.0	Broadcast
49.26	6,090	VE9BJ	St. John, N. B., Canada	0.5	Bc.; relays CFBO
49.26	6,090	.....	Colombo, Ceylon	....	Broadcast
49.26	6,090	CRCX	Toronto, Ont., Canada	0.5	Broadcast
49.30	6,085	I2RO1	Rome, Italy	....	Broadcast
49.32	6,083	VQ7LO	Nairobi, Kenya, Africa	1.25	Broadcast
49.34	6,080	VE9EH	Charlottetown, P. E. I.	....	Broadcast
49.34	6,080	HJ4ABC	Pereira, Colombia	....	Broadcast
49.34	6,080	HP5F	Colon, Panama	....	Broadcast
49.34	6,080	CP5	La Paz, Bolivia	....	Broadcast
49.34	6,080	ZHJ	Penang, Straits Settlements	0.05	Broadcast
49.34	6,080	W9XAA	Chicago, Ill.	0.5	Bc.; relays WCFL
49.35	6,079	DJM	Zeesen, Germany	....	Exp.
49.41	6,072	OER2	Vienna, Austria	1.5	Broadcast
49.42	6,070	HP5H	Colon, Panama	0.3	Broadcast
49.43	6,070	HJ1ABF	Barranquilla, Colombia	....	Broadcast
49.43	6,070	VE9CS	Vancouver, B. C., Canada	0.01	Broadcast
49.46	6,065	HJ4ABL	Manizales, Colombia	0.2	Broadcast
49.50	6,060	OXY	Skamlebaek, Denmark	0.5	Broadcast
49.50	6,060	W3XAU	Philadelphia, Pa.	1.0	Bc.; relays WCAU
49.50	6,060	W8XAL	Cincinnati, Ohio	10.0	Bc.; relays WLW
49.57	6,050	HJ3ABD	Bogota, Colombia	0.2	Broadcast
49.57	6,050	GSA	Daventry, England	....	Broadcast
49.57	6,050	HI9B	Santiago de los Caballeros, D. R.	....	Broadcast
49.62	6,045	HJ3ABI	Bogota, Colombia	0.05	Broadcast
49.65	6,042	HJ1ABG	Barranquilla, Colombia	0.15	Broadcast
49.67	6,040	YDA	Tandjongpriok, Java	10.0	Broadcast
49.67	6,040	W4XB	Miami Beach, Fla.	2.5	Broadcast
49.67	6,040	W1XAL	Boston, Mass.	5.0	Broadcast
49.75	6,030	HP5B	Panama, Panama	0.1	Broadcast
49.75	6,030	VE9CA	Calgary, Alberta, Canada	0.1	Bc.; relays CFCN
49.77	6,028	PRA8	Pernambuco, Brazil	3.0	Broadcast
49.83	6,020	XEUW	Vera Cruz, Mexico	0.05	Broadcast
49.83	6,020	DJC	Zeesen, Germany	8.0	Broadcast
49.85	6,018	ZHI	Singapore, F. M. S.	0.09	Broadcast
49.90	6,012	HJ3ABH	Bogota, Colombia	1.2	Broadcast
49.92	6,010	COCO	Havana, Cuba	0.25	Broadcast
49.95	6,006	HJ1ABJ	Santa Marta, Colombia	0.025	Broadcast
49.96	6,005	VE9DN	Montreal, Canada	4.0	Broadcast
49.96	6,005	VE9DR	Montreal, Canada	0.05	Bc.; relays CFCF
50.00	6,000	XEBT	Mexico D. F., Mexico	1.0	Bc.; relays XEB
50.00	6,000	YV4BSG	Caracas, Venezuela	....	Broadcast
50.00	6,000	TGWA	Guatemala City, Guat.	0.2	Broadcast
50.00	6,000	YOI	Bucharest, Roumania	0.3	Broadcast
50.00	6,000	ZEC	Salisbury, S. Rhodesia	...	Broadcast
50.00	6,000	RW59	Moscow, U.S.S.R.	20.0	Broadcast
50.04	5,995	RPT	Tashkent, U.S.S.R.	1.0	Phone
50.04	5,995	WXE	Anchorage, Alaska	0.5	Phone
50.04	5,995	WVD	Seattle, Wash.	0.5	Phone to Alaska
50.12	5,984	TGX	Guatemala City, Guat.	....	Broadcast
50.17	5,980	CT1AA	Lisbon, Portugal	....	Broadcast
50.17	5,980	HIX	Trujillo, D. R.	0.2	Broadcast
50.17	5,980	HJ2ABD	Bucaramanga, Colombia	0.1	Broadcast
50.17	5,980	XEVI	Mexico City, Mexico	....	Broadcast
50.21	5,975	XECW	Xantocam, Mexico	0.01	Broadcast
50.21	5,975	HJ2ABC	Cucuta, Colombia	0.25	Broadcast
50.25	5,970	XEIO	Mexico D. F., Mexico	....	Broadcast
50.26	5,969	HVJ	Vatican City, Italy	10.0	Broadcast
50.28	5,966	HJ1ABC	Quibdo, Colombia	0.1	Broadcast
50.42	5,950	HJN	Bogota, Colombia	....	Broadcast
50.45	5,946	FIU	Tananarive, Madagascar	0.5	Broadcast
50.50	5,940	TG2X	Guatemala City, Guat.	0.2	Police; bc.
50.59	5,930	HJ4ABE	Medellin, Colombia	0.1	Broadcast
50.76	5,910	HH2S	Port-au-Prince, Haiti	0.1	Bc.; relays HH2T
50.93	5,890	JIC	Tyureki, Formosa	6.0	Phone to Japan
50.98	5,885	HCK	Quito, Ecuador	....	Broadcast
51.02	5,880	ETG	Addis Ababa, Ethiopia	3.5	Phone
51.02	5,880	YV8RB	Barquisimeto, Venezuela	....	Broadcast
51.06	5,875	HRN	Tegucigalpa, Honduras	0.4	Broadcast
51.15	5,865	HI1J	San Pedro de Macoris, D. R.	0.05	Broadcast
51.19	5,860	XDA	Mexico D. F., Mexico	....	Phone
51.28	5,850	WNB	Lawrenceville, N. J.	....	Phone
51.28	5,850	YV5RMO	Maracaibo, Venezuela	0.3	Broadcast
51.32	5,845	KRO	Kahuku, T. H.	40.0	Phone
51.46	5,830	TDD (JZC)	Kanjoshi, Manchukuo	....	Phone to Tokio
51.46	5,830	CWD	Montevideo, Uruguay	1.5	Phone
51.50	5,825	HJA2	Bogota, Colombia	....	Phone
51.50	5,825	KZGG	Cebu, Isl of Cebu, P. I.	....	Phone
51.50	5,825	WQN	Rocky Point, N. Y.	40.0	Exp.
51.52	5,823	TIGPH	San Jose, Costa Rica	....	Broadcast
51.63	5,810	YV7RMO	Maracaibo, Venezuela	....	Broadcast
51.72	5,800	KZGF	Manila, P. I.	....	Phone; occ. bc.
51.72	5,800	YV2RC	Caracas, Venezuela	1.0	Broadcast
51.77	5,795	KZGH	Iloilo, P. I.	....	Inter-island phone
51.81	5,790	JVU	Nazaki, Japan	10.0	Phone to Manchukuo, also bc. to JZA-B-C
51.90	5,780	CMB2	Havana, Cuba	....	Tests with Riverhead
51.90	5,780	OAX4D	Lima, Peru	20.0	Broadcast
52.08	5,760	HJ4ABD	Medellin, Colombia	....	Broadcast
52.26	5,740	TGS	Guatemala City, Guat.	0.2	Broadcast
52.36	5,730	JVV	Nazaki, Japan	10.0	Phone to Formosa; bc.
52.45	5,720	YV1ORSC	San Cristobal, Venezuela	....	Broadcast
52.54	5,710	JDZ	Dairen, Manchuria	....	Phone to Nazaki
52.58	5,705	CFU	Rossland, B. C., Canada	....	Phone; bc.
53.00	5,660	CFD	Kenora, Ont., Canada	0.15	Phone
53.00	5,660	CFN	Slate Creek, B. C., Canada	....	Phone
53.00	5,660	CFJ	Red Lake, Ont., Canada	....	Phone
53.00	5,660	XQAJ	Shanghai, China	....	Broadcast
54.05	5,550	I2RO	Rome, Italy	....	Broadcast
54.15	5,540	VXV	Hudson Bay Junction, Sask., Canada	....	Phone
54.15	5,540	VXU	Regina, Sask., Canada	....	Phone
54.30	5,525	TI5HH	San Ramon, Costa Rica	0.2	Broadcast
54.64	5,490	ROI	Sverdlovsk, U.S.S.R.	15.0	Phone
55.15	5,440	RSN	Sverdlovsk, U.S.S.R.	10.0	Phone
55.19	5,435	LSH	Monte Grande, Argentina	....	Phone
55.40	5,415	IAF	Fiumicine, Italy	5.0	Phone
55.45	5,410	ZCK	Hong-Kong, China	....	Bc.; relays ZBW
55.50	5,405	VXX	Sage Creek, B. C., Canada	....	Phone
55.56	5,400	CGP	Prince Rupert, B. C., Canada	....	Phone
55.56	5,400	CZQ	Anyox, B. C., Canada	....	Phone
55.56	5,400	HJA7	Cucuta, Colombia	0.4	Phone
55.56	5,400	HAT	Budapest, Hungary	20.0	Broadcast
55.81	5,375	RSB	Stalinsk, U. S. S. R.	2.0	Phone
56.60	5,300	ZFO	Cat Cay, Bahamas	0.05	Phone
57.03	5,260	YDU3	Medan, Sumatra	....	Broadcast
58.03	5,170	PNY	Bandoeng, Java	2.0	Broadcast
58.71	5,110	KIKB	Bolinas, Calif.	40.0	Phone
58.76	5,105	KEC	Bolinas, Calif.	40.0	Phone
58.94	5,090	TFL	Reykjavik, Iceland	....	Broadcast
59.10	5,077	WCN	Lawrenceville, N. J.	20.0	Phone to England
59.54	5,040	RIR	Tiflis, U. S. S. R.	4.0	Phone to RIM
59.70	5,025	ZFA	St. Georges, Bermuda	1.5	Phone
60.00	5,000	WWV	Beltsville, Md.	1.0	Frequency standard
60.30	4,975	GBC	Rugby, England	5.0	Phone to ships
60.97	4,920	LKJ1	Jeloy, Norway	1.0	Exp.
61.54	4,875	RKF	Moscow, U. S. S. R.	20.0	Phone
61.66	4,865	CGT	Campbell River, B. C., Can	....	Phone
61.66	4,865	VDO	Vancouver, B. C., Canada	....	Phone
61.66	4,865	HJA3	Barranquilla, Colombia	....	Phone
61.98	4,840	CZV	Waterloo Mines, B. C., Can	....	Phone
62.24	4,820	GDW	Rugby, England	15.0	Phone to U. S. A.
62.63	4,790	VE9BK	Vancouver, B. C., Canada	0.25	Phone to ships
62.70	4,785	CZA	Drummondville, Canada	4.0	Phone to ships
63.11	4,753	WOO	Ocean Gate, N. J.	20.0	Phone
63.11	4,753	WOY	Lawrenceville, N. J.	20.0	Phone to England
63.69	4,710	YDU2	Medan, Sumatra	....	Broadcast
65.21	4,600	HC2ET	Guayaquil, Ecuador	....	Broadcast
65.50	4,580	DJG	Zeesen, Germany	....	Exp.
65.93	4,550	WDN	Rocky Point, N. Y.	40.0	Phone
66.15	4,535	WDG	Rocky Point, N. Y.	40.0	Phone
66.40	4,512	ZFS	Nassau, Bahamas	....	Phone
66.59	4,505	CGO	Ocean Falls, B. C., Canada	0.4	Phone
66.59	4,505	CZO	Prince George, B. C., Can.	0.05	Phone
66.59	4,505	CZP	Claydon Bay, B. C., Can.	0.1	Phone
66.81	4,490	VDV	Two Brothers Lake, B. C., Canada	....	Phone
66.81	4,490	VDC	Calgary, Alta., Canada	....	Phone
67.11	4,470	YID	Bagdad, Iraq	....	Broadcast
67.19	4,465	CGA4	Drummondville, Canada	15.0	Phone
67.63	4,436	VDO	Vancouver, B. C., Canada	0.4	Phone
67.72	4,430	VQJM	S. S. Monarch of Bermuda	....	Phone
67.72	4,430	VQJP	S. S. Queen of Bermuda	....	Phone
67.72	4,430	DOA	Doeberitz, Germany	....	Phone to ships
67.72	4,430	GBC	Rugby, England	....	Phone
67.72	4,430	GDLJ	S. S. Homeric	....	Phone
67.98	4,413	GBZW	S. S. Berengaria	....	Phone
		GLRZ	S. S. Aquitania	....	Phone
		GFWV	S. S. Majestic	....	Phone
		GMBJ	S. S. Empress of Britain	....	Phone
		DDBR	S. S. Berlin	....	Phone to WOO, DAF
		DDCP	S. S. Cap Polonio	....	Phone to WOO, DAF
		DDFF	S. S. Reliance	....	Phone to WOO, DAF
		DDFT	S. S. Oceana	....	Phone to WOO, DAF
		DHAO	S. S. Hansa	....	Phone to WOO, DAF
		DHDL	S. S. Cap Arcona	....	Phone to WOO, DAF
		DHEY	S. S. Deutschland	....	Phone to WOO, DAF
		DHJZ	S. S. Hamburg	....	Phone to WOO, DAF
		DHRL	S. S. New York	....	Phone to WOO, DAF
		DOAH	S. S. Bremen	....	Phone to WOO, DAF
		DOAI	S. S. Europa	....	Phone
		FNSM	S. S. Paris	....	Phone
		FTNQ	S. S. Ile de France	....	Phone
		FNSK	S. S. Normandie	....	Phone
68.18	4,400	RRZ	Moscow, U. S. S. R.	1.0	Phone
68.34	4,390	FNSK	S. S. Normandie	....	Phone to Paris
68.89	4,355	IAC	Coltano, Italy	56.0	Phone to ships
69.44	4,320	DAF	Norddeich, Germany	....	Phone to ships
69.85	4,295	WTDV	St. Thomas, Virgin Isl.	0.25	Exp.
69.85	4,295	WTDW	St. Croix, Virgin Isl.	0.25	Exp.
69.85	4,295	WTDX	St. John, Virgin Isl.	0.25	Exp.
70.00	4,283	IBEJ	S. S. Conte Rosso	....	Phone to IAC, WOO
		ICEJ	S. S. Rex	....	Phone to IAC, WOO
		IBLI	S. S. Conte di Savoia	....	Phone to IAC, WOO
		IBGI	S. S. Conte Verde	....	Phone to IAC, WOO
70.21	4,273	RV15	Khabarovsk, U. S. S. R.	20.0	Broadcast
70.22	4,272	WOY	Ocean Gate, N. J.	20.0	Phone
70.59	4,250	HJA3	Barranquilla, Colombia	....	Phone
73.17	4,100	LKJ1	Jeloy, Norway	1.0	Exp.
73.23	4,097	WND	Hialeah, Fla.	0.4	Phone
74.77	4,002	CT2AJ	San Miguel, Azores	0.5	Amateur; bc.
78.95	3,800	ZP11	Asuncion, Paraguay	....	Broadcast
79.56	3,770	HB9B	Basle, Switzerland	....	Broadcast
84.67	3,543	CR7AA	Lourenzo Marques, Mozambique	0.15	Broadcast
85.11	3,525	HB9AQ	Lausanne, Switzerland	....	Broadcast
88.83	3,376	HJA3	Barranquilla, Colombia	....	Phone

A New 50-Watt AMATEUR TRANSMITTER



A "step-by-step" kit with which the amateur may start constructing with a 50-watt unit for c.w., later adding a modulator and a carrier control unit

By **Everett M. Walker (W2MW)**

A NEW kit transmitter, designed by the engineers of the United Transformer Corporation, offers the amateur something modern and flexible in equipment. It provides at small cost a rack-and-panel unit that is "commercial" in appearance. Actually it is, for all of the mechanical work is done including drilling and the mounting of parts. All that has to be done is to follow the schematic wiring diagrams.

The "Unit" System

An interesting feature of the kit is that it is designed so it may be constructed in stages starting with a 50-watt radio frequency unit for c.w. (See Figure 1), then a modulator (See Figure 2) may be added and finally a controlled-carrier unit (See Figure 3). These three units may be mounted one above the other in a steel cabinet when all are assembled. Further, the 50-watt 'phone transmitter virtually becomes a higher-powered unit when the controlled-carrier equipment is added, as this arrangement facilitates operating the Class C tubes in the r.f. unit at higher inputs inasmuch as the input varies in this circuit with speech and the normal rating of the tubes is only momentarily exceeded. With the controlled-carrier system the peak output will be more than 75 watts. This unit employs economical tubes so that the upkeep cost is kept low.

Later on, if the builder desires more power a companion unit may be constructed that will greatly increase the output and put the transmitter in the high-power class. This unit consists of a controlled-carrier Class B linear stage. In addition it includes a power supply unit that will deliver 3,000 volts to the push-pull 852 type tubes used in the Class B linear stage. Also, an antenna tuning unit and cathode-ray oscilloscope in a companion cabinet are available.

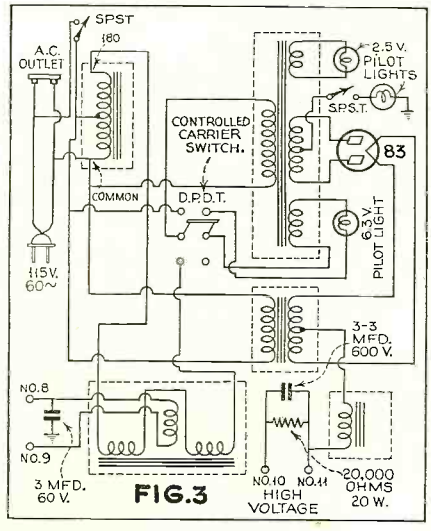


FIG.3

All that is necessary to construct the transmitter units is a soldering iron, some solder, pliers and a screwdriver. The logical unit to start with is the 50-watt c.w. transmitter. Essentially this consists of a 2A5 tube used as a crystal oscillator, a 2A5, which may be used as either straight buffer, doubler or tripler and a pair of type 46 tubes in push-pull in the final stage. The unit is complete, including the power supply for all three stages. One of the interesting features is the novel switching arrangement for controlling the single meter used to measure plate and grid currents in each stage. A O-10 milliammeter is employed with multipliers connected in the switching arrangement so the meter will give the most convenient reading regardless of circuit. For instance the multiplier for the class C stage is twenty, thus making the meter a O-200 milliammeter. For the first buffer grid current the multiplier is 2, thereby providing a O-20 m.a. range. The meter reads current in five circuits.

Front Panel Control

Three tuning controls are provided on the front panel together with switches for cutting out each stage to facilitate tuning. Another feature is the use of a voltage divider to obtain screen current for the crystal oscillator tube. A similar arrangement (*Turn to page* 766)

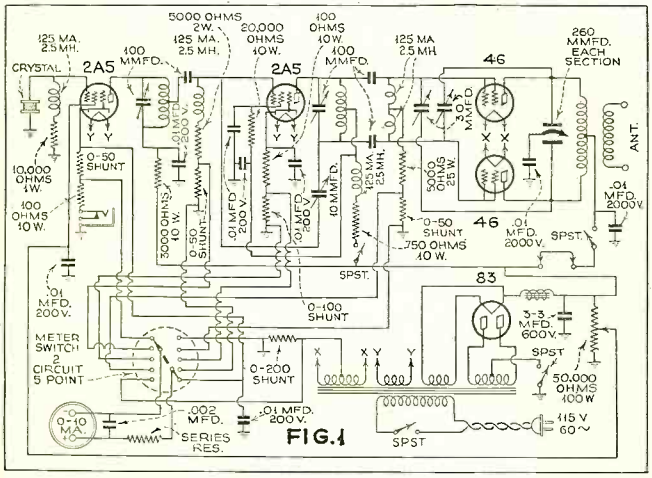


FIG.1

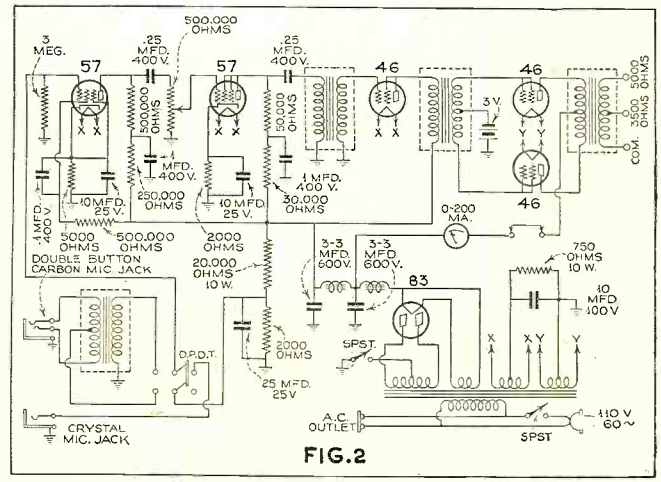
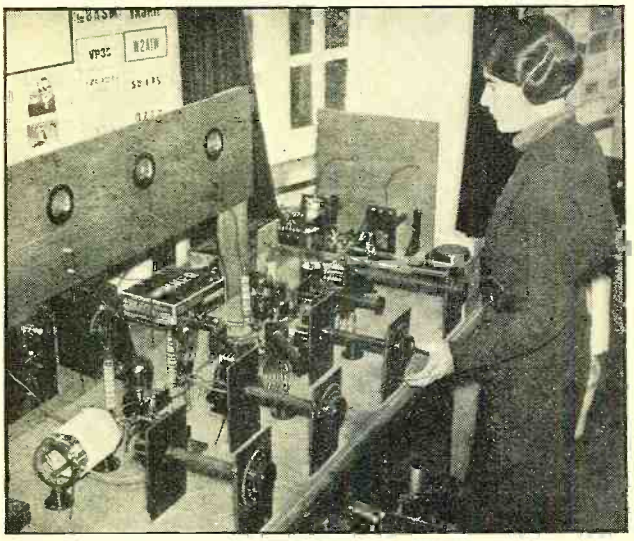


FIG.2



A REAL YL

Miss Nell Corry of Surrey, England, tunes her 10-meter transmitter. Her call is G2YL!

The "HAM" Shack

Conducted by

Everett M. Walker

Editor for Amateur Activities

More Data on the FINAL Amplifier

LAST month we described a medium powered amplifier using an Eimac 150T tube. Since this unit was completed we have had time to do considerable experimental work with it. These tests have shown that such an amplifier offers interesting possibilities on 5 and 10 meters when using the transmitter described in the previous issue as an exciter.

SOME information on the tests and general operating data on the 150T final amplifier unit show that it is extremely flexible. It provides the "ham" with an efficient all-band transmitter. Above all, it makes available a crystal-controlled 5-meter transmitter *that really works!* Anyone who has attempted to get such a transmitter to function can attest to the problems encountered. First, it is difficult to get sufficient driving power to permit modulation on a 5-meter power amplifier. Second, the adjustment is very critical and, third, the placement of the parts to obtain the greatest possible excitation and output is extremely important.

Reviewing some of the features of the amplifier described last month, it will be noted that there are three meters on the front panel: one for grid current, filament voltage and plate current. While it is convenient to have separate meters for grid and plate current, one meter might have been used and jacks provided in each of these circuits. The voltmeter is essential when tubes that have thoriated-tungsten filaments are used, and it should be connected directly across the filament terminals at the base of the tube. The filament in the 150T is rated at 5 volts at 10 amperes. With this high current there is apt to be considerable voltage drop in the leads to the transformer and, therefore, readings at any other point would be in error.

Another point, with tubes of the thoriated-tungsten filament type, the voltage should never go below the manufacturer's rating. Also, it should be maintained at full rating when plate power is applied. Slightly higher voltages are permissible, but never lower. With this particular tube the voltage may be increased to 5.3 volts without damaging the tube. This allows leeway if the filament voltage drops due to the increased line load when the plate current is applied.

Terminal connections are brought to stand-off insulators mounted on the back of the baseboard. The positive high voltage is connected to the switch shown at the right. The use of the switch simplifies adjustment when changing bands and neutralizing.

In both the grid and plate circuits split stator condensers are used. The reasons for using these condensers are twofold. One: they eliminate the necessity for by-pass condensers which is a desirable feature when high plate voltages are used. Two: they provide permanent neutralization which, of course, is desirable in a transmitter where band changing is utilized.

One of the most important things in obtaining high efficiency in an amplifier of this kind is the use of a plate-tank circuit that offers a proper load for the tube used. The constants, of course, will vary with plate voltage, current and frequency. However, in general it might be said that minimum tank-circuit capacities, for frequencies lower than 4 megacycles, should be 50 mmfds. when split stator condensers are used and 15 mmfds. on both 40 and 20 meters. When modulation is used, slightly higher minimum capacities might be necessary.

Also, tubes of the type employed are designed for high-voltage operation. In adjusting such an amplifier care should be taken in noting that the plate does not have to dissipate more than the recommended plate dissipation. While in tubes of this type tantalum is used for the plate which has less tendency to cause gas to form within the envelope on momentary overloads than other metals, it is desirable to keep the plate well within recommended limits. Proper plate dissipation may be determined by noting the color of the anode. A dull red color will denote 150 watts dissipation—the limit. The plate shows a perceptible red color at 100-watts dissipation. However, the manufacturer says these rated values may be exceeded momentarily by more than 400 percent, without impairing the vacuum.

Adjustment of such an amplifier is the same as with other stages in the transmitter described two months ago. Briefly, in review, the first step is neutralization. The excitation stages should be first adjusted for maximum output. The amplifier is link-coupled to the exciter unit. With the plate switch open, the grid circuit should be tuned to resonance, which is indicated by maximum grid current. It should be kept as near as possible to 50 milliamperes. Then attach a neon bulb to one end of the plate-tank circuit and tune the tank condenser until the bulb glows. Unless the amplifier is accidentally neutralized, a decided resonance point will be found. The neutralizing condenser then should be adjusted until there is no radio-frequency energy whatsoever in the plate-tank circuit. The neutralizing condenser may be adjusted with a long stick while excitation is applied. Then retune the plate-tank condenser to make sure the neon bulb does not glow at any other point. If it doesn't, the amplifier is neutralized.

Applying B Voltage

The next step is to apply the plate voltage. It is a wise precaution to reduce it to about 1000 volts and connect a 500-ohm resistor in series with the plate lead. The resistor should, of course, be a husky one, preferably about 200 watts. The plate-tank circuit is then tuned for minimum plate current. Finally the antenna is coupled to the plate tank and tuned to resonance, then the plate voltage (with resistor removed) is stepped up to normal.

In actual practice the amplifier was made to deliver as much as 450 watts into the antenna on 14 megacycles. With 2000 volts at 200 milliamperes applied to the plate (400 watts input) more than 300 watts output was obtained. This is better than 75 percent efficiency, which is unusually good for a Class C amplifier. The high output was obtained with 3000 volts at 200 milliamperes. The tube ran cool at this input, but such high inputs are not recommended for 'phone (continuous) operation. The tube will take 500 watts input with plate modulation, however, without being overloaded.

The amplifier is capable of handling 400 watts input at 28 megacycles efficiently. For 5-meter operation, the plate voltage was dropped to 1000 volts and better than 100 watts output was obtained with the plate current at 200 milliamperes. Although higher inputs were not tried at this frequency, the tube appeared capable of handling more power and ran cool, considering it was being used as a double-final

A SIGN FOR YOUR SHACK

This unique "ham" sign, the overall dimensions of which are 16 inches long by 3¼ inches wide and 3⅛ inches high was carved by a reader who, due to the development of partial paralysis, has resorted to this means of earning a livelihood. The carving is finished in transparent lacquer, preserving the pleasing appearance of the natural wood. These signs, made up to order with any amateur call, cost one dollar each and the name and address of the maker will be supplied on request. A similar carving of your name or monogram may be obtained for the same price

¶ A Department for the amateur operator to help him keep up-to-date

which, of course, is not as efficient as a straight amplifier. However, it would be difficult to drive the grid of the tube at 5 meters with the exciter unit available, so this arrangement was not tried. Suffice to say that a good 5-meter crystal-controlled signal *is possible with this arrangement!*

20-Meter Crystal

Since the article was written last month, tests have been made with a 20-meter crystal in the oscillator circuit. This resulted in increased outputs on both 5 and 10 meters. By using the 53 type tube in the conventional oscillator-doubler arrangement originally described, even greater driving power was possible on the two ultra-high frequency bands. One triode portion of the 53, of course, was tuned to resonate with the crystal; the other is tuned to 10 meters, and all other circuits beyond this to the same frequency. 5-turn coils 1 inch in diameter served for all circuits, i.e., buffer plate, second buffer grid and plate and grid of the 150T amplifier. No. 10 copper wire was used for each.

When tuned up it was possible to drive the 150T at 50 milliamperes grid current at 28,000 kilocycles. Also with this high driving power the final amplifier performed much more smoothly that it did when a 40-meter crystal was used and the grid current was 30 milliamperes.

It was indeed surprising to discover what could be done with this arrangement on 5 meters. It was not possible to drive the 150T grid at 5 meters efficiently. This was due to the use of the 211 in the second buffer stage. This type tube, of course, is not a high-frequency tube. It had a tendency to do all sorts of tricks. Had a 50T or similar type tube been substituted in the second buffer stage it would have been possible to get some driving power on 5-meters. But, we did find that excellent outputs on 56 megacycles could be obtained by using the 150T with somewhat reduced input as a 5-meter doubler.

Furthermore, the unit performed much more efficiently than it did with a 40-meter crystal. As we pointed out last month we were able to get a good signal out with this arrangement, but it appeared to be requiring an exceedingly high input for the output we were obtaining. However, the higher grid excitation when the 20-meter crystal was used, resulted in a big increase in output. Also, the modulation problem was

(*Turn to page* 749)

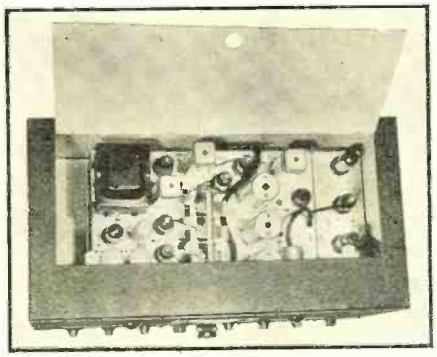
New RECEIVER *has* Complete Coverage

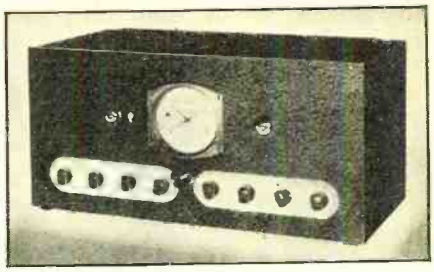
By Donald Ames

A NEW receiver, the ACR-175, incorporating a number of new features, has been announced by the RCA Manufacturing Company, Inc., of Camden, N. J. The receiver is truly an all-wave set. Its range is from 500 to 60,000 kilocycles, which takes in all services (from ships through broadcasting and all amateur bands, including 5 meters). Other features of design include metal tubes and

DETAILS OF CONSTRUCTION

The photograph and diagram, below, show the arrangement of the parts and the circuit for the new all-band receiver





SHIPSHAPE HAM SET

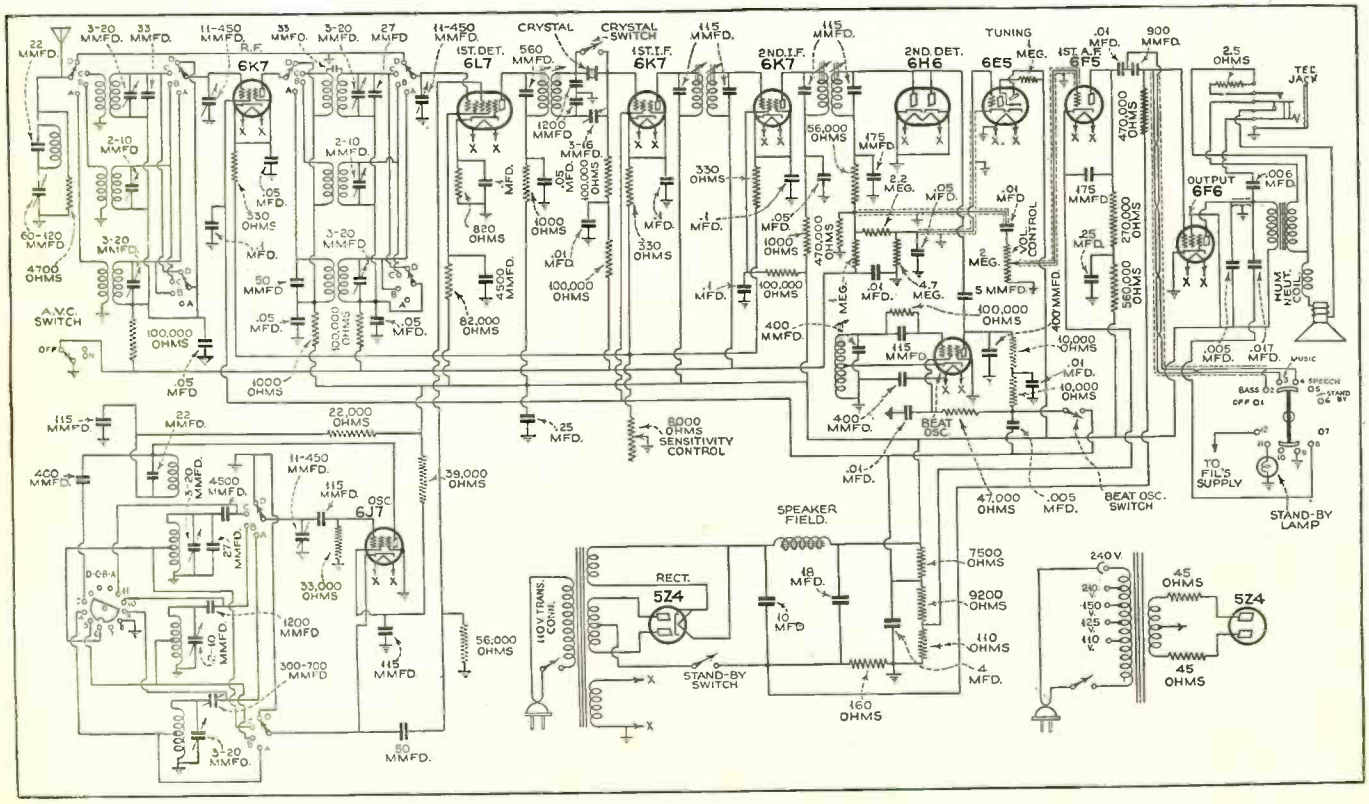
Front view of the ACR 175 receiver, which covers all frequencies from the 5 meter to the broadcast band, inclusive

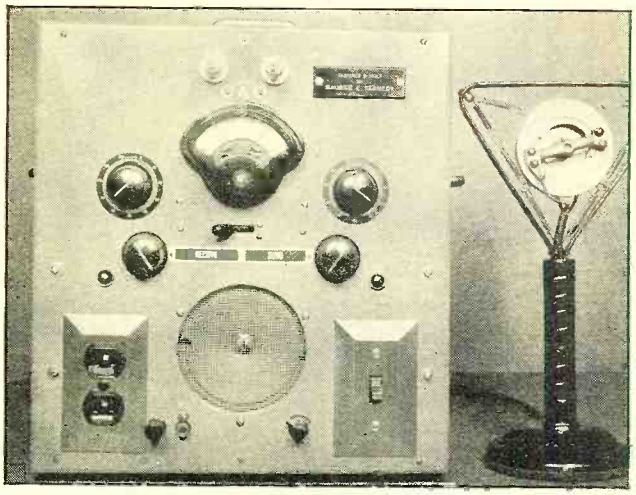
a calibrated signal-input indicator which makes use of an electron-ray-tube tuning indicator.

The wide frequency coverage is obtained by means of four bands ranging from: one, 500 to 1690 kilocycles; two, 1690 to 6200 kilocycles; three, 6200 to 15,450 kilocycles, and, four, 15,450 to 60,000 kilocycles. A stage of radio-frequency amplification, employing a 6K7 type tube, is used on all but the ultra-high-frequency range. On this band, the r.f. stage is cut out, the antenna being switched, for direct coupling, to the first detector tube. The inductances of this circuit consists of a short length of bus bar.

Another feature that will interest the amateur is the calibrated signal-input indicator. This makes use of the electron-ray tuning "eye" which is connected in the second detector circuit. Its action is dependent upon the signal strength at this point, when used in conjunction with a calibrated signal-input control. The method of operation is simple. It consists of tuning a signal to exact resonance, then, by reducing the calibrated control until the deflection on the cathode-ray tube is $\frac{1}{16}$th of an inch wide, noting the microvolt reading on the calibrated control. This method is effective for 'phone carrier measurement where the signal is constant. For telegraph signals accurate measurements may be made by adjusting the calibrated

(*Turn to page* 759)



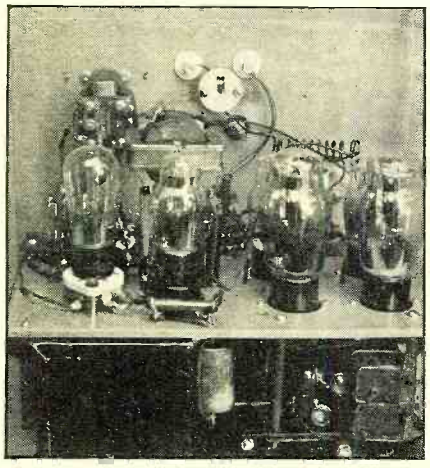


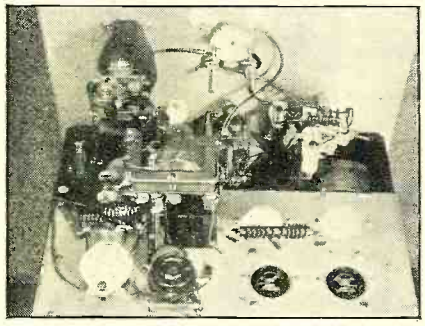
THE FINISHED UNIT

Ready portability and neat appearance are outstanding features of this compact combination. An inside view is shown below

How to Build a 5-METER X'MITTER RECEIVER

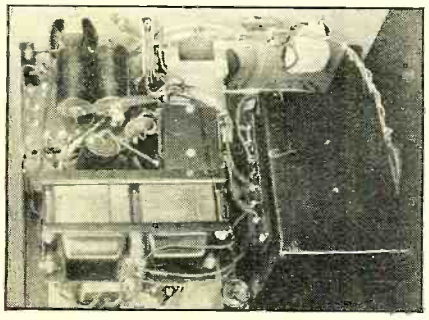
By **Maurice E. Kennedy**
W6KQ, W6BGC





THE INTERIOR LAYOUT

The arrangement of parts above the shelf is shown immediately above, while the view below shows the lower rear half of the front panel and the under side of the shelf



FOR the amateur with limited means, the 5-meter band offers an excellent opportunity to build inexpensive equipment that will give the constructor many hours of operating satisfaction.

At the present state of the art, distances on the ultra-high frequencies are limited, due to the apparent lack of refraction or bending of the transmitted sky wave. With rare exceptions 5-meter communications are limited to the extent of the station's ground wave which attenuates rapidly a few miles past the horizon, and in view of this phenomena it would appear that high power on the 5-meter band is of limited value and that an efficient low-powered transmitter with a suitable antenna should normally be as effective as the high-cost, high-powered transmitter with most of its energy headed for Mars or interstellar space.

Employs Receiving Tubes

Practically all of the so-called receiving set power tubes have been used or tried on the higher frequencies in the past, and in designing this transmitter the type 45 was selected as the most suitable for push-pull operation.

For stability, a straight oscillator should not be modulated over 50 or 60 percent, and two type 2A3's are more than adequate as modulators and final amplifiers.

A type 56 tube is used as a super-regenerative detector in the receiver, and a 56 is also used in the first audio stage.

After pricing suitable metal boxes to house the equipment, we decided to attempt building a substitute which turned out even better than we anticipated. A description follows for those who desire to build a similar housing.

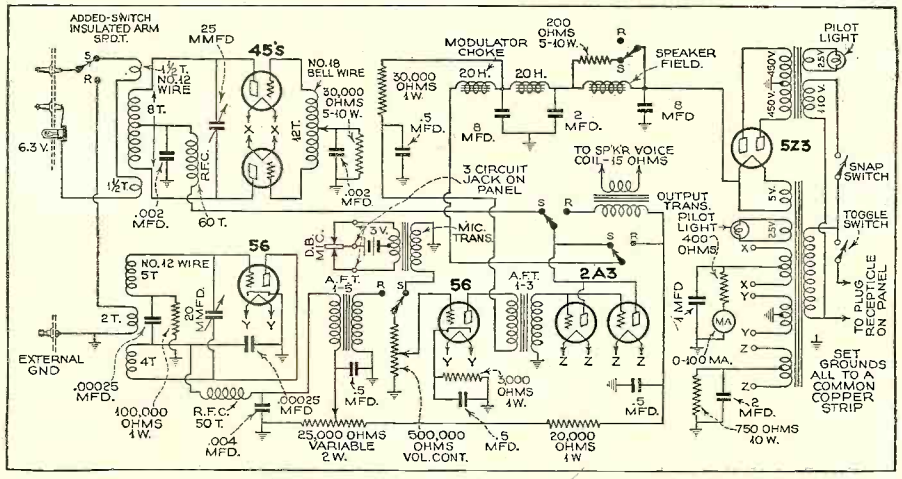
A small, sturdy, wooden box was obtained from a local grocery store and covered with 28-gauge sheet metal at the cost of but a few cents. The edges of the sheet metal were soldered together and all rough spots filed smooth. Four 3-inch ventilator holes were cut in the back with an expansion bit to permit circulation of air to the tubes, and a square piece of galvanized window screen large enough to cover all four openings was tacked to the inside of the back of the box. This helps prevent dust from reaching the inside of the set and adds to the finished appearance of the case.

Two coats of aluminum paint inside and out give the metal-clad box the appearance of a metal shop product.

For convenience in carrying, brass handles from the dime store were bolted to the top and sides. Four rubber feet also from the dime store were screwed into the bottom to prevent the sharp edges from scratching the table top.

The panel should be cut to fit the open or front side of the box, and in this case, measures 14 inches wide by 14¾ inches high. The panel was ob-

(*Turn to page* 766)



THE SELF-CONTAINED P. A. SYSTEM INSTALLED IN A HOSPITAL
Musical programs from the air, phonograph records, and announcements can be distributed throughout a building to other similar units that can be operated by anyone after only simple instructions.

Servicemen! ***Architects!***

Here is a New Idea in

SOUND SYSTEMS

(For Schools, Hospitals, Hotels, etc.)

By E. Jay Quinby

A BRAND-NEW idea in electrical sound-reproducing systems is embodied in a new self-contained **unit** that can be used in hospitals, schools, hotels and department stores in distributing programs from microphones, from phonograph records or direct from a receiver incorporated in the unit. The new cabinet sound-system was developed by the Bell Telephone Laboratories and is being introduced by the Western Electric Company. Servicemen and sound experts should be able to get a number of good ideas from a description of it. The device certainly opens a new field of usefulness where a compact and complete sound system is to be installed without in any way interfering with a building's structure.

A Two-Way System

A special feature of the system is that it provides "talk-back" facilities. Sound not only may be sent out for reproduction over distant loudspeakers, but the same loudspeakers may in turn be used as microphones for picking up sound which is transmitted back to the central point. In many types of service, the "talk-back" feature has special importance, in that it offers a means for overhearing in the central office what is happening at any loudspeaker location. For example, the principal of a school may listen to the work in any classroom, or the proprietor of a department store may overhear transactions between personnel and patrons in any department he desires.

In hotels, the system not only supplies entertainment to guest rooms in the form of radio programs and recorded selections, but it may also be employed to amplify and distribute music from the hotel's own orchestra. Moreover, it may be used for paging throughout public rooms and corridors.

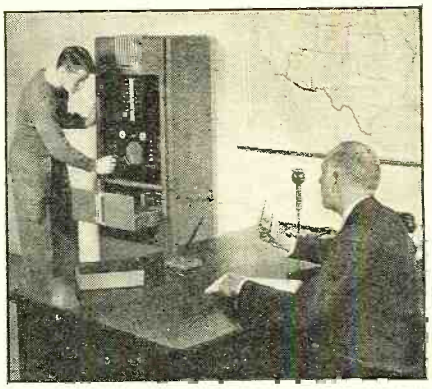
In hospitals, it likewise serves for paging doctors throughout the institution. The talk-back circuit makes it possible for a doctor to talk with the main office over the nearest loudspeaker extension. Radio programs and recorded selections furnish diversion in rooms where convalescent patients are located.

As an aid in teaching music and the languages, the sound system brings special recordings right to the classroom, as well as providing distribution of radio programs throughout the building. Announcements may be made and fire drills directed from the principal's office. Music may be furnished for gatherings in the auditorium, and the amplifying facilities may be employed to reinforce speakers' voices.

1 or 2 Channel Systems

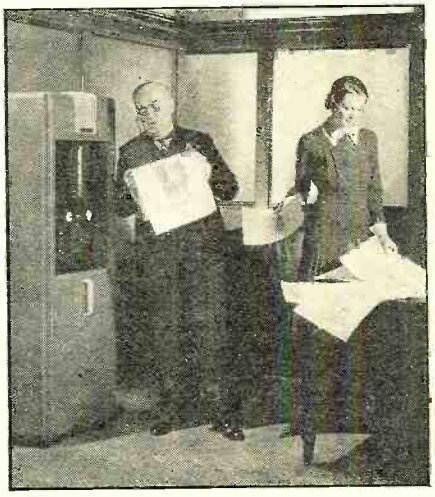
Two variations of the program sound system are available, the first arrangement providing for a single program, and the second for the choice of two simultaneous programs. In the first case, one amplifier and in the second, two are used. Switching facilities include as many as 60 keys for controlling the loudspeaker or headphone extensions. These keys are mounted in groups of 20, and may be wired so as to control each extension individually or several extensions in groups, as required.

The radio receiver is of the high-fidelity type, covering a band of frequencies ranging from 520 to 23,000 kilocycles. This wide band includes not only domestic broadcast stations but also police, aircraft and amateur stations as well as foreign short-wave broadcasting stations. Automatic volume control eliminates to a great extent the fading of foreign short-wave stations. The two-speed electric phonograph is mounted in a retractable drawer. This may be pulled out for convenient operation or closed up flush with the front of the cabinet as desired. (*Turn to page* 749)

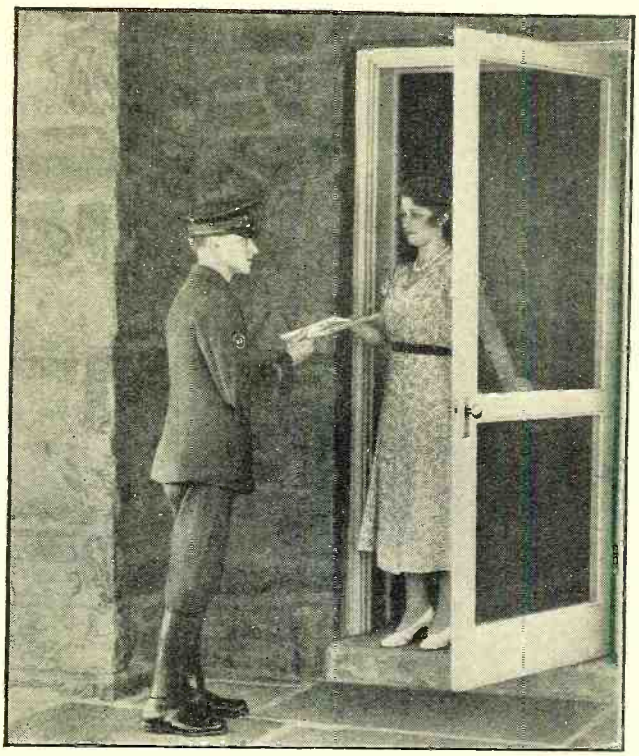


INSTALLED IN A SCHOOL

IN A HOTEL



IN A DEPARTMENT STORE



ALL DOORS OPEN TO THE W. U. MESSENGER

"SELLING

Many independent servicemen, after advertising "splurges" with the usual clusion that this is just a means for large successful organizations use this They have learned that well-planned service a lot easier and quicker, but in How do they get these results?

By A. A. Ghirardi

Part

ONLY individual enterprising aggressiveness and effort can win under present conditions in the radio servicing industry. Your competitors may pay the same wages, have approximately the same overhead expenses, observe the same working hours, and do just as good service work as your shop does—at comparable prices. This means that as far as your prospective customers are concerned, they can have their service work done just as satisfactorily by your competitor's shops as they can by yours. What can you do to steer their business over to yourself? Under such conditions, the largest volume of business will likely go to the service shop which is *best known in the community!* In today's competitive fight for profitable business, there is one extra added advantage you can secure, if you will but get busy to create it. You must MAKE YOUR TRADE PREFER TO DO BUSINESS WITH YOU! You can establish a reputation for good work, fair prices and square dealing; and maintain a close feeling of friendly relationship between the prospects in your community and YOU, by sufciently frequent mailings of well-prepared friendly, human, snappy little messages to a selected list of prospects (and also to your own steady customers). "Direct-mail" advertising is that which is *delivered* directly to the *customer or prospective customer* by mail. Though much advertising is sent through the mails, most of it is seen by the recipients and, if interesting enough, is read. Direct-mail is comparatively easy to check up on for returns.

Material prepared for direct-mail can sometimes be effectively distributed by hand. Western Union messengers have been successfully used for this purpose. Using other methods, the personal touch of a letter or post-card is lost and it is not given the attention that direct mail receives.

SAMPLES OF MAILING PIECES
The accompanying cards have all brought real results

No "Success" Formula for D-M Advertising

No simple "success" formula can be glibly handed out for direct-mail advertising. Remember that always! There are no "circuit diagrams" that will enable one to construct a sure-fire promotional campaign. Advertising is a technique of trial and error—but, *many of the errors can be avoided by following a few general principles and benefitting by the tested experience of others!*

Fields for Direct-Mail

There are five fields in which properly-prepared direct-mail campaigns can be of definite business-getting value to the radio serviceman. They are:

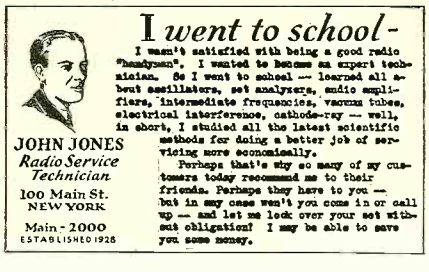
1. For securing new customers.
2. Good-will contacting of present customers immediately after servicing their receivers.
3. Good-will "reminder" contacting of past customers.
4. Sale of special services such as noise-reducing systems, phonograph attachments, etc.
5. Securing household appliance service work.

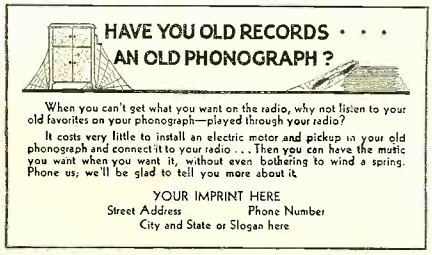
The wide-awake serviceman plugs all five of these angles, for each one can be turned into a revenue producer.

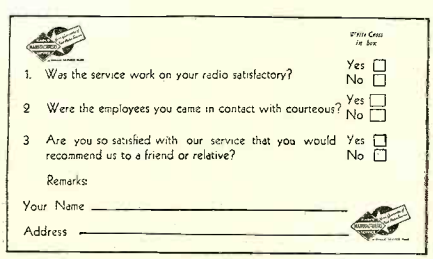
What to Send

Cost must naturally be kept down as much as possible in order to make your advertising pay. The total cost depends on many factors—the "format" (that is, the postcard, folder, letter, blotter, station log, etc.), postage cost, cost of list, addressing cost, etc.

Though not usually as impressive as some of the other formats, the postcard







SERVICE"

making a few misguided direct-mail disappointing results, come to the con- throwing away good money. Yet most scheme and get real results from it. campaigns not only make selling sets and many cases do the whole selling job! What are their secrets?

and T. S. Ruggles

Four

often "pulls" better for radio servicemen. It is also the best "buy" in postage, for it goes first-class for one cent in the U. S. A. If you have a fairly long story to tell, your best format will probably be a "form letter". A multigraphed or "offset processed" letter is more expensive than a mimeographed letter, but is far superior in appearance. You can probably get just as good results if you start your letters with, "Dear Friend," as if you go to the expense of a personal fill-in for each one. You will find organizations listed in your telephone directory, who will quote you rates on multigraphing and addressing.

Folders are used extensively, but are generally too expensive for the average serviceman to prepare himself. Many good ones can be obtained at a cost of about $1.00 per 100 from leading radio and tube manufacturers. Blotters do not get the attention of the prospect that they did years ago. Good station logs are effective. Novelties too often fail to sell what they are intended to sell—the prospect's attention is diverted by interest and curiosity to the novelty itself, rather than to the sender.

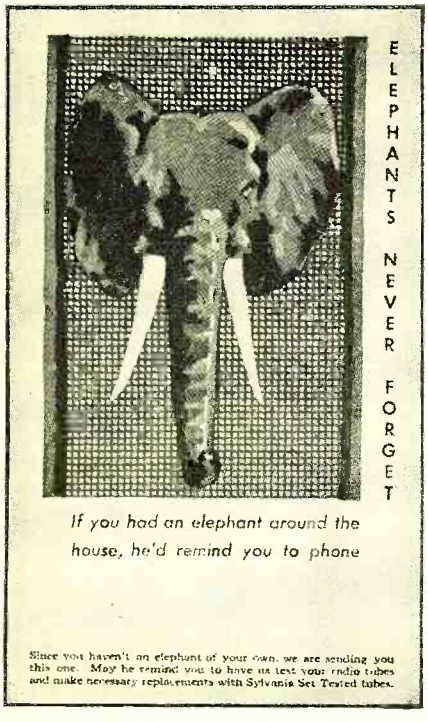
Preparing the Literature

First of all, *plan* your advertising. Study the different formats you feel will serve your pocketbook and your purpose best. Then work out a consistent, logical plan, coordinating your direct-mail advertising with whatever other advertising or merchandising you do. Don't jump from one thing to another in hit-or-miss fashion. You will accomplish nothing that way.

Your direct-mail pieces must have "attention-value" if you expect them to register on the minds of people. Without being offensive, or too "high-pressure," they must make a striking impression in a flash. That impression may come from an attention-getting heading, the message (idea content), or the physical appearance of the advertising; preferably (*Turn to page* 765)

RESULTS COME ROLLING IN

A well-planned direct-mail advertising campaign or sales promotion plan does bring results, and when the morning's mail brings you many "returns" and actual orders you too will find that the effort spent is well worth the care necessary in the preparatory work you must do



New

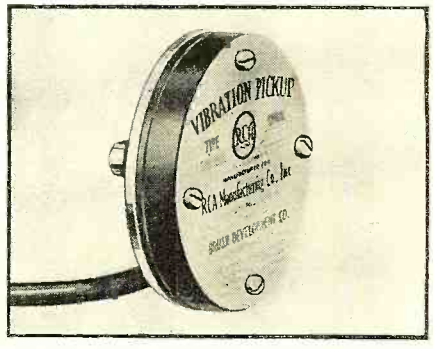
VIBRATION PICK-UP

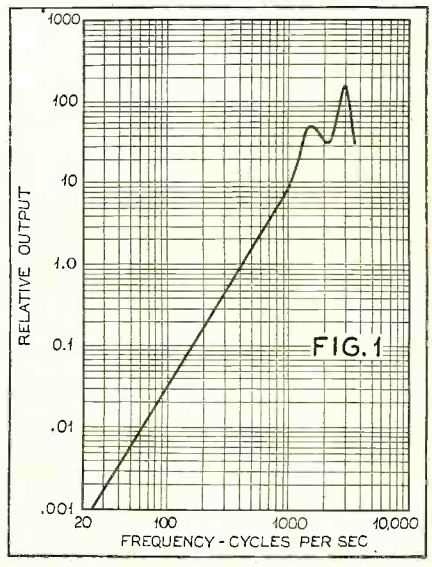
By John H. Potts

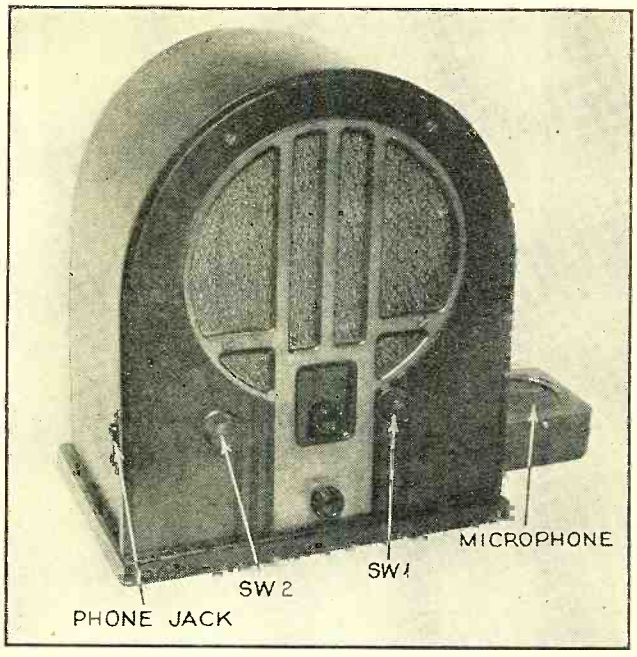
WHEN Rochelle salt crystals are placed under mechanical strain, an electric charge appears on their surfaces. This charge is proportional to the amount of bending, and if the bending is vibratory in character the electric charge will likewise vary at the identical rate. This phenomenon is utilized in the new Vibration Pickup just announced by the RCA Manufacturing Company.

With this small instrument the location of sources of mechanical noise in machinery, the causes of vibration in motors, buildings, foundations, and even the relative smoothness of several surfaces may be determined. The direction in which the vibration travels is likewise obtainable.

The construction is quite simple. A square crystal is supported at three corners by viscoloid mountings, leaving the fourth corner free to vibrate. With this mechanical design the danger of breakage of the crystal under very severe vibration is remote (*Turn to page* 759)







THE REVAMPED RECEIVER

As shown here, this standard receiver serves as a radio, a hearing aid and a telephone amplifier. Radio programs may be heard through either the loudspeaker or earphone, as desired

Construction Details of a Home Built

Those who are hard-of-hearing radio receiver, revamped to serve the conversation of family and

By Samuel

RECENT developments in microphones and vacuum tubes enable the construction of a finer hearing aid in a more compact form than has been possible heretofore. The Piezo-Astatic (rochelle salt) crystal microphone offers fidelity of sound reproduction exceeding that of the finest carbon microphone and has the advantage of being perfectly quiet in operation. This microphone has a much higher output level than any with comparable fidelity and quietness of operation, and in conjunction with the recent development of high-gain audio amplifier tubes, makes practical the construction of a hearing aid of very superior features, without high cost.

Since the most useful form of such an aid is that which combines a telephone amplifier and also a radio for entertainment, such a combination unit will be described here.

In choosing a radio receiver for this work, the author selected one that would supply 6.3 volts for the filament of a 79 tube, which is added to serve as a two-stage microphone amplifier. The receiver chosen was a Philco 84-B mantel type, a.c. operated and employing an 80 rectifier and type 42 output tube. The choice of an output tube with high gain is important, and the 42 is one of the best. The 79 tube offers the highest gain possible from one tube without complicated hook-ups.

The crystal microphone has the advantage of requiring no input transformer. This is important, as hum is hard to eliminate and a transformer would add to the difficulty.

In the earlier combination radio and hearing aid, described on page 81 of the August, 1934, issue, we used a radio set from which the loudspeaker had been removed, but this time we will retain the loudspeaker, the microphone being mounted outside the cabinet in a position enabling a telephone receiver to be placed on it when used to amplify telephone conversation.

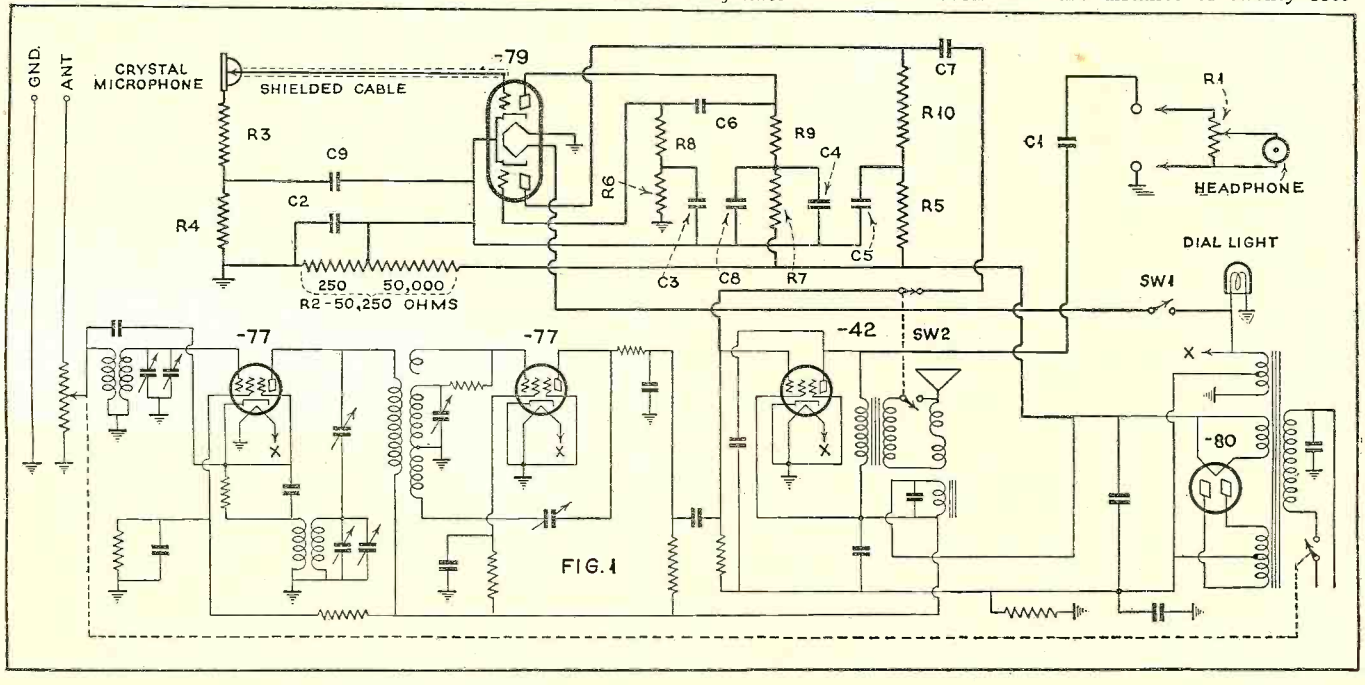
Using the Loudspeaker

If we are to use the loudspeaker, means must be provided to connect the hearing aid and loudspeaker alternately; if both are on at the same time a squeal will result, due to acoustic feedback. This alternate connection is accomplished with a two-circuit switch (SW2), in a manner that eliminates the possibility of connecting both at once.

Use of the 79 as a two-stage resistance-coupled voltage amplifier, with the simple hook-up shown, provides a tremendous gain, and the output of the crystal microphone, after being amplified through this tube and also the 42 output tube, gives all the volume it is possible to use; the limiting factor being the acoustic feedback from the earpiece, even from the distance of twenty feet

THE SCHEMATIC DIAGRAM

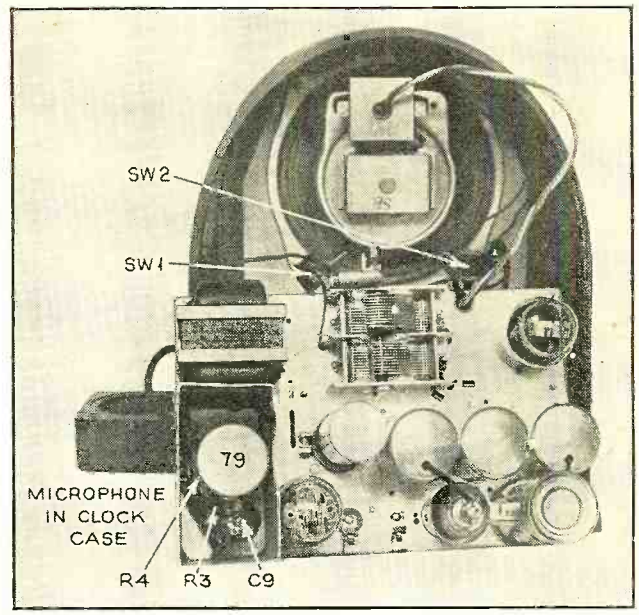
Figure 1. This is the circuit of the Philco Model 84-B receiver with the additions, as made by the author, shown in heavy lines



Combination Receiver and Hearing Aid

will find joy in this standard also as a hearing aid to reproduce friends with volume and clarity

B. Simer



TOP VIEW OF CHASSIS

The parts which were added are marked; note the construction of the shield for the 79 tube

which is the length of the earphone connecting cord supplied. Incidentally, a good test for sensitivity and gain in the finished job is to see that the feedback does occur from the earphone at twenty feet.

Changes to Be Made

The one great difficulty in a high-gain amplifier to be operated from a.c. lines is a.c. hum, which is hard to reduce to a point practical for headphone operation with only the amount of filtering provided on these small sets. However, if the hum in the set is no more than the average to begin with and care is taken to avoid shorts that place unnecessary load on the filter. the hum in the finished job will be negligible when the earpiece volume is controlled with a potentiometer type volume control, equivalent to the one described in the parts list.

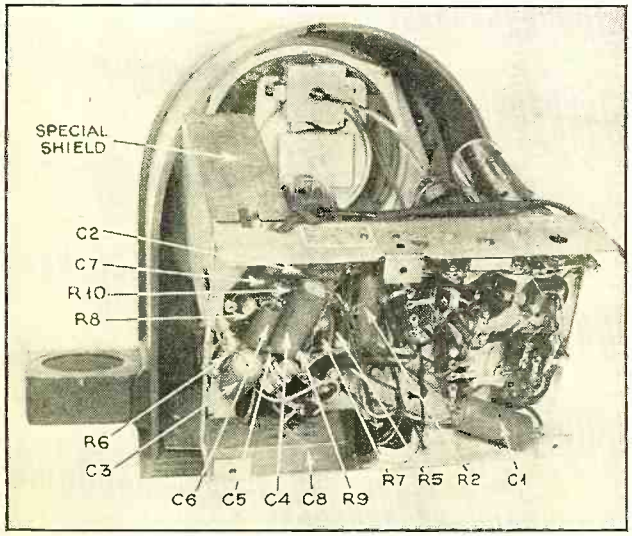
Removing the radio from its cabinet, unsolder one lead of the speaker voice coil from the output transformer secondary. Later a switch will be connected here. Also connect the .5-mfd. condenser, C1, from the 42 plate circuit to one side of the twin phone jack; the other side of the jack can go to the chassis.

We find a space at the right-hand end of the chassis, behind the power transformer, measuring approximately 2 inches by 4 inches, with nothing beneath the chassis excepting a dual by-pass condenser which can easily be shifted to a position under the power transformer and thus out of the way.

Cut a hole in the chassis behind the power transformer with its center 1 inch from the end and 2¼ inches from the rear, and install a six-prong wafer socket and tube shield from the 79 tube. Obtain the filament power by running a line from the top of the dial light through a s.p.s.t. rotary switch, S1, to one filament connection, and the other side of the filament can be grounded to the set chassis which forms the return side of the filament circuit. This s.p.s.t. switch will be located on the right-hand side of the tuning dial in the space between the tuning condenser and the power transformer. Its use is to cut out the hearing aid when local room noise interferes with the enjoyment of the radio program. It will be found that this switch will not stop the hearing aid immediately; the cathode of the 79 tube requires perhaps thirty seconds to cool down after the filament power is cut. When the switch is turned on, the 79 will heat up and start to operate in much less time.

The wiring diagram, Figure 1, must be followed closely, and all filtering included, as shown. The filtering shown is the minimum required. The writer uses the point-to-point method of installing the 79 tube resistors and condensers, allowing them to be supported by their own leads.

VIEW FROM BELOW



The bias for the 79 tube is obtained from the drop in the 250-ohm section of resistor R2, which is filtered by the 10-mfd., 25-volt tubular dry electrolytic condenser, C2.

To mount the microphone, purchase a one-dollar Gilbert alarm clock and remove the mechanism, drill two holes for 8-32 mounting screws in the bottom of the case, for mounting, and also a ⅜-inch hole to pass the microphone shielded connecting cable. This ⅜-inch hole is drilled through inside the base of the case so the cable will not be visible when mounted. Drill one hole through each of the sides and the top of the clock case for screws to hold it together after the microphone is installed.

To mount the microphone, use a Mason jar opener made by Auburn Rubber Corporation. Cut a hole 1½ inches in diameter in the center of the opening and a notch ½ inch square in the side. This can be slipped on the microphone with the notch fitting over the boss of the microphone case through which the cable is brought out.

Installing Microphone

Lay a disc of ½-inch thick by 3¾-inch diameter sponge rubber (cut out of a kneeling pad) in the back of the clock case, pass the microphone connecting cable through the hole and lay the microphone on top of the rubber. Lay a piece of thin ornamental cloth over the microphone, then place a ⅛-inch-thick bakelite or hard rubber ring with a 2¼-inch hole and 3¾ inches in outside diameter, on top of the cloth. Replace the clock case front and hold it in place with three 6-32 by ⅜ inch long, round-head screws through the holes drilled in the sides and top.

Mount the clock case at the right-hand end of the radio cabinet in a horizontal position with the microphone facing up. This permits the telephone receiver to be placed on the microphone to amplify telephone conversations and does not interfere with the operation of a crystal microphone, as this type operates equally well in all positions.

Three holes are drilled in the side of the radio cabinet to permit the microphone to be mounted, two for the 8-32 mounting screws and one, ⅜ inch in diameter, to pass the microphone cable. The insulation on (*Turn to page 763*)

PRACTICAL RADIO CONSTRUCTION

There is no better way for the beginner to study radio than to "learn by doing." The receiver shown here is the one described in this article

Practical Construction of The Radio

The first article of this series described radio waves, a tuned crystal and diode vacuum tube tion of vacuum tubes is

Part 2—Triode

By **John M.**

THE little receiver described last month employed a vacuum tube as a diode detector. The present article will be devoted to describing minor changes in this receiver so as to employ the same tube as a much more efficient detector, providing louder signals and reception from greater distances. Before proceeding it will be best to review briefly the action of a vacuum tube.

A vacuum tube consists of a closed bulb of glass or metal wherein several metallic elements are placed. The simplest type ("diode") has two such metallic elements, a filament and a metal plate. When the filament is heated, electrons—the smallest known negatively charged particles—will be thrown off the filament wire. The heating of the filament is to no other purpose than to obtain a source of free electrons in this manner.

What happens to the electrons? When enough of these negative particles leave the filament, the filament itself becomes positive. When this occurs the electrons tend to rush back to the filament unless a stronger attraction is provided elsewhere in the tube. The entire action of a vacuum tube hinges on the controlled movement of these electrons. The presence of air hampers this movement and for that reason the air is pumped out of the tube during manufacture, hence the name "vacuum" tube.

The Diode Tube

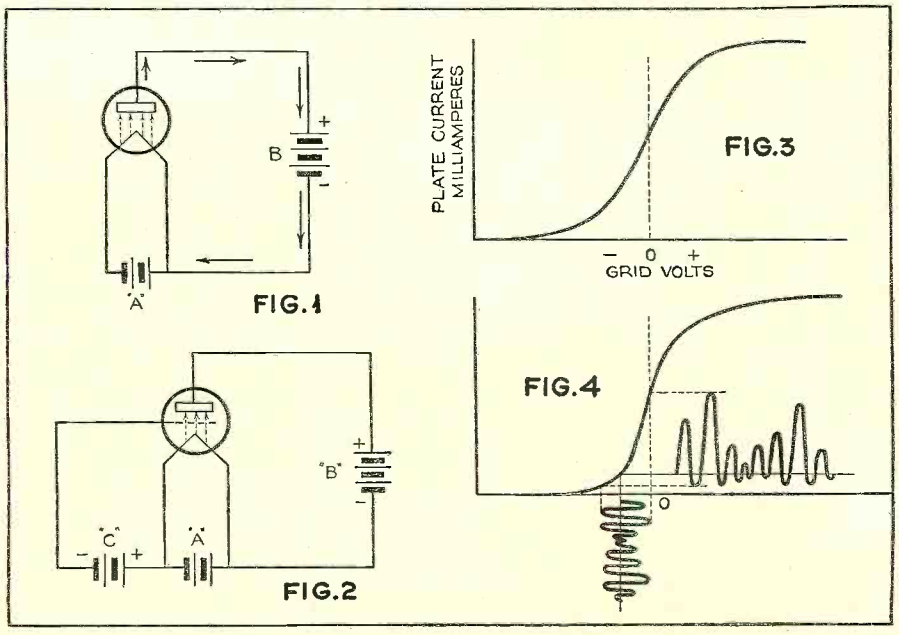
When a metal plate is nearby, and the metal plate is insulated, some of the electrons will settle down on the plate until it becomes negatively charged, in which condition it will repel other electrons. If the metal plate is connected to the filament, the electrons which went to the plate will return to the filament because the filament is positive (lacking in negative electrons). Thus an electric current will flow from the filament, through the vacuum to the plate and then through the wire back to the filament.

Suppose we go a step further and by inserting a battery, "B," between plate and filament, make the plate positive with respect to the filament (Figure 1). Then the electrons will be attracted to the plate and pass through the battery and back to the filament. The current obtained in this way is much larger than without a battery, the amount depending on the voltage between plate and filament. If, on the other hand, the plate were made negative with respect to the filament (by reversing the battery connections), the plate would repel the electrons and practically no current would flow in the plate circuit. This type of tube is called a "diode" and is a device which conducts electricity in one direction only.

The first property is utilized in the use of such a tube as a detector (or rectifier). Since it conducts in one direction only, the negative half of an alternating voltage does not produce any current and alternating currents are therefore converted into direct current.

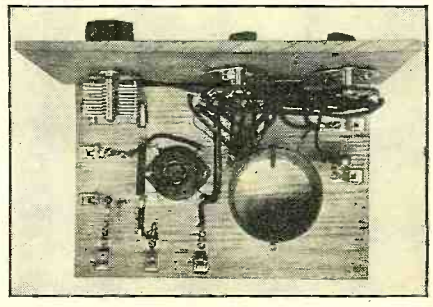
The Triode Tube

Introduction of a third element (making the tube a "triode") opens up new possibilities for the tube. When a "grid," consisting of a metal spiral or a mesh of wires, is placed between the plate and filament and the plate is made positive, it is possible to control the plate current by applying small voltages on the grid. This works as follows. Since the grid is much closer to the filament



ARRANGEMENT OF PARTS

This view shows the way the parts are laid out on the baseboard



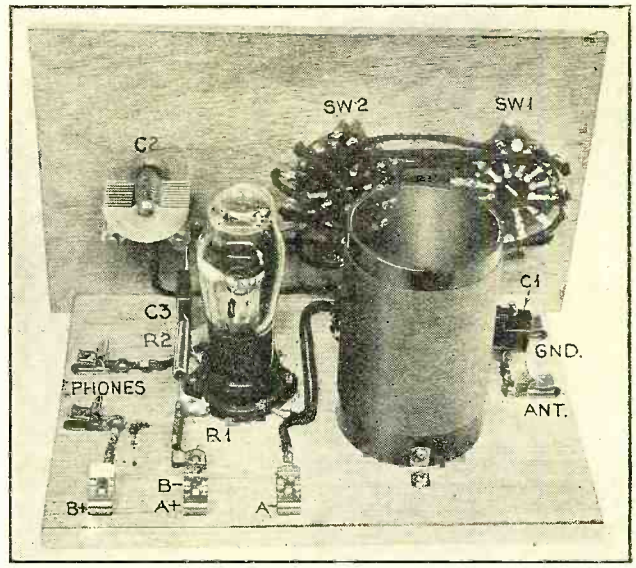
and Instruction for

Beginner

appeared in the May issue. It receiver circuit and operation of detectors. This month the opera- discussed in greater detail

V.T. Receiver

Borst



THE ONE-TUBE TRIODE RECEIVER

This is the completed model of the receiver described in this article. It is the same receiver described last month with minor changes which result in louder signals and greater sensitivity

than is the plate, it has a greater effect on the electrons which are just emerging from the filament. When the grid is made negative, even a few volts, it may completely cancel the attracting power of the positive plate. On the other hand, reducing the negative voltage appiled to the grid, will allow electrons to pass through the grid on their way to the plate. As long as the grid does not become positive, there will be no current in the grid circuit and it will take no power to control the larger power in the plate circuit.

To illustrate a tube's properties or characteristics the radio man resorts to the use of curves. One such curve showing the plate current for different grid voltages while the plate voltage is constant, is shown in Figure 3. Note that there are two bends in the curve. The upper bend is present because there is a maximum "saturation" current which exists when all the electrons emitted by the filament are travelling to the plate. There is a different saturation current for each plate-voltage and each filament voltage, because a higher filament voltage will cause a greater emission and a higher plate voltage will exert a greater pull on the electrons, which is necessary to overcome the "space charge," which is a charge of the cloud of electrons themselves. This charge also limits the maximum plate current.

Plate Detection

There are several ways in which a tube can be made to detect (rectify). In the article last month we said that an ideal detector would be a device which is conductive only in one direction. However, a perfect detector has not been developed to date. Nevertheless this rectifying action can be performed and utilized even though the rectifier is not perfect.

The most simple way to use a tube as a rectifier or detector would seem to be to give the grid a steady negative voltage (as in Figure 2) so that the operating point is on a sharp bend of the curve. Figure 4 illustrates what happens when a signal voltage is applied to the grid. While the grid voltage varies up and down, the plate current will go up and down too but it responds much better in one direction than in the other because of the bend in the characteristic. The plate current now closely resembles the rectified current as shown last month and this current when passing through the phones will reproduce the original sound.

Grid Detection

The difference between the above described system and that of last month's system is that it is much more sensitive because the tube when used as a triode, serves as an amplifier as well as a detector. The increased power is supplied by the B-battery with the grid acting as a valve to control it, while in the diode system the received signal itself must supply the power for the phones.

There are, however, (*Turn to page* 764)

CONSTRUCTION DETAILS

Figures 8 and 9 are repeated from last month to provide information on the construction of the coil, and on the wiring. The numbers on switches and coil correspond with those in the circuit diagram of Figure 5

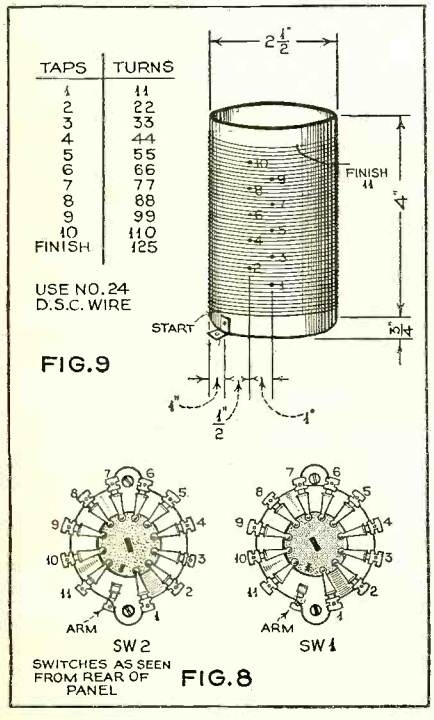


FIG. 9

FIG. 8

THE COMPLETE CIRCUIT

Figure 5. It is important that the beginner learn to read and understand schematic circuits such as this, as most published radio circuits are presented in this form

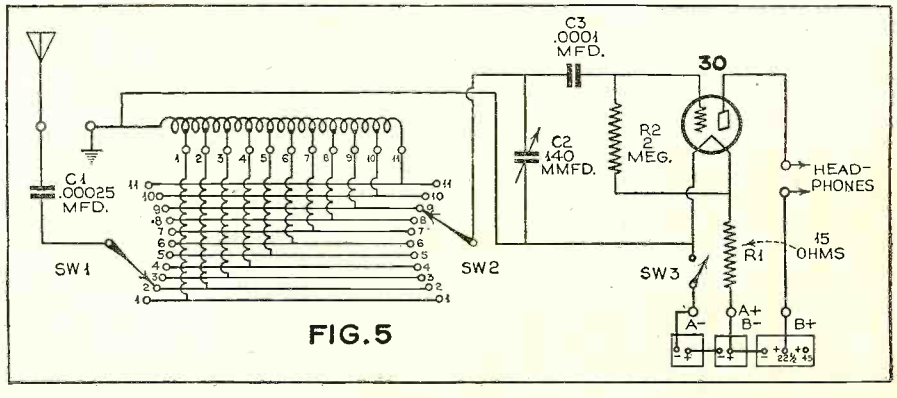


FIG. 5

The RADIO WORKSHOP

¶ Items of interest for beginners, experimenters and radio constructors.

Conducted by **The Associate Editor**

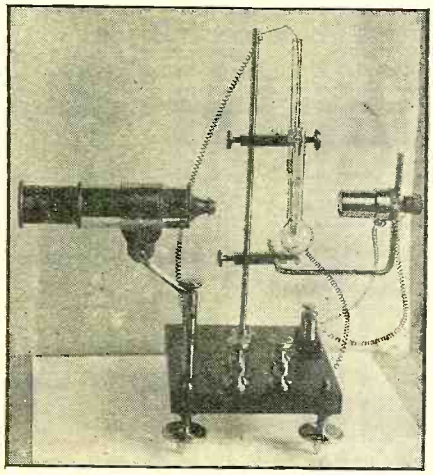
Ultra-Sensitive Capillary Voltmeter

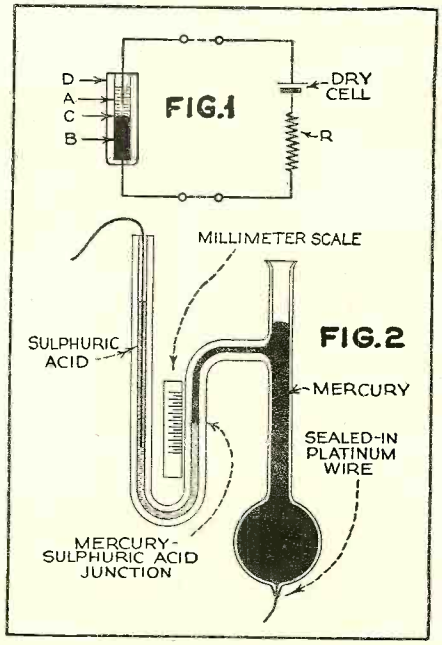
Radio experimenters should find the capillary voltmeter described below a handy little instrument for measuring small changes in d.c. voltage. It is a simple device to build, and is inexpensive, the complete parts and materials costing about one dollar.

Many years ago a Professor Lippmann discovered the very interesting fact that when a difference in potential was applied to two different liquids in contact, there was a very noticeable tendency to affect the surface tension, especially when the action took place within a glass tube of very fine bore as in a capillary tube. A reference to the drawing in Figure 1 shows the liquids represented by "A" for a diluted sulphuric acid and "B" for the mercury, "D" is the glass tube and "C" the junction of the two liquids. The liquid columns and the junction are shown in series with a dry cell and a large resistance, which form the test circuit. The resistance is used simply to cut down the amount of current flowing from the cell.

When a current passes through the two liquids in this manner, the junction moves in proportion to the voltage applied. Thus a means is at hand for the measurement of very small differences in electrical potential.

The capillary electrometer tube shown in Figure 2 will cost about seventy-five cents. It comes all ready with a sealed-in platinum wire and may be purchased from Eimer and Amend, New York, N. Y., or any large drug supply company.





If you have a magnifying glass and a flashlight bulb around the shop, they can be mounted in line as illustrated in the photograph, so that the junction of the liquids may be seen clearly. It will be necessary to use the bulb behind a piece of frosted glass.

It is a simple matter to accurately calibrate the instrument. The scale of the standard electrometer tube is graduated in 1/10 millimeters and with such a scale, .001 part of a volt will move the mercury-sulphuric acid junction no less than ten scale divisions.

The scale can be very nicely cut into a flat piece of celluloid (the kind used on automobile curtains) by the aid of a good straight-edge and an old safety razor blade. After this, the marks made by the safety razor blade may be filled with white ink and permitted to dry. The scale is mounted beside the electrometer tube as illustrated in the sketch.

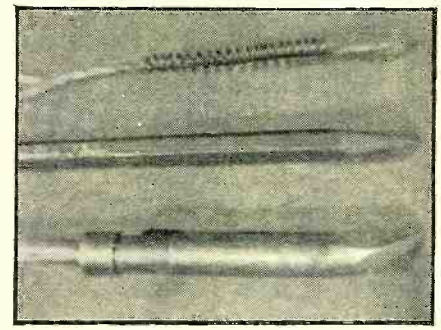
The sulphuric acid solution, of which but a small amount is needed, is produced by adding, very slowly, one part of sulphuric acid to ten parts of water. Only a very small amount of mercury will be needed, because the bore of the tube is very small. Warning—The sulphuric acid must be dropped into the water and it should be done very slowly—do not under any conditions add the water to the acid. Use a glass rod for stirring. It will be obvious, of course, that the inertia of the mercury and sulphuric acid columns will not permit the device to be used in connection with alternating current. For direct current this little instrument may be used in any case where a simple, reliable voltmeter of great sensitivity is required.

The really ingenious experimenter could arrange the instrument in such a way that an image of the mercury-sulphuric acid junction would be thrown on the wall. This would add greatly to the utility of the device, since the reading could be observed without the necessity of peeking through the magnifier.

RAYMOND F. YATES,
Lockport, N. Y.

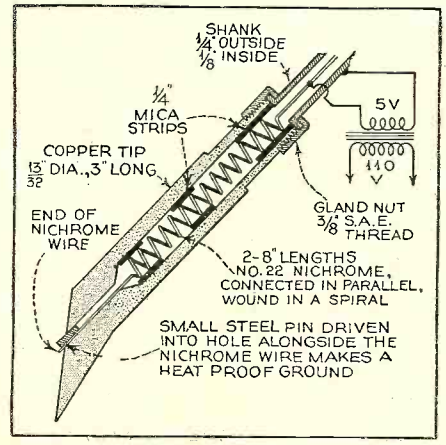
Home-Made Low-Voltage Soldering Iron

Here is a soldering iron kink that I think everyone will be interested in. Due to the delicate wire employed in the heating



element of 25 watt soldering irons, I have had the annoying experience in the last year of replacing three broken elements in my iron. I came to the conclusion that it was about time I replaced the element with a winding of heavier wire to work from low voltage. The accompanying sketch and photo shows my completed home-made iron working from a special step-down 5 volt, 10 ampere transformer. For small soldering jobs lasting only a short time, the iron can work directly from a 6 volt storage battery. The line connecting cord to the battery should be heavy enough to carry a large amount of current, something in the neighborhood of 6 to 10 amperes.

The following notes will be helpful in the construction of the iron. The heating element was made from two 8 inch pieces of No. 22 nichrome wire. The 2 pieces were wound on a 3/32 inch mandrel, forming a short, stiff, self-supporting spiral having an outside diameter of 3/16 inch. The tip was machined from a piece of 13/32 inch copper rod. The gland nut was machined from 3/8 inch cold rolled steel and screws directly on to the copper



Attention! Experimenters

THE "Radio Workshop" is a department which caters especially to the experimenter. Send your ideas, kinks and hints to the editor of this department, and wherever possible include a simple but clearly defined drawing or a photograph of the idea. All ideas published will be paid for at regular space rates.

tip. The photograph illustrates the small size of the iron alongside of the pencil shown in the middle of the photograph.

The finished iron weighs only a few ounces, heats up very rapidly and handles any light radio soldering job with ease.

O. SWANSON,
Spokane, Wash.

More Than One Use for Condensers

It is not generally known that a condenser can be used as a voltage-dropping device for lighting from one to several tubes directly from 110 volts a.c. line supply. This method has some advantages over the line-cord dropping resistor. It does not develop any heat and it saves power. The required capacity for a given tube can be calculated as follows. Suppose one 6.3-volt tube requiring .3 ampere is to be heated directly from a 115-volt, 60-cycle line. What is the size of the required condenser?

The total impedance of the circuit should be:

$$Z = \frac{115}{.3} = 383 \text{ ohms}$$

The resistance of the filament itself is:

$$R = \frac{6.3}{.3} = 21 \text{ ohms}$$

The required capacitive reactance is then:

$$X_C = \sqrt{383^2 - 21^2} = 372.4 \text{ ohms}$$

and the capacity is:

$$C = \frac{1{,}000{,}000}{2\pi f X_C} = \frac{1{,}000{,}000}{376.8 \times 372.4} =$$

6.96 microfarads

The nearest commercial value, 7 microfarads may be used. It should be a paper condenser of at least 200 volts d.c. rating and the right capacity is important.

There is very little difference in the required capacity when another tube is to be added. Up to three tubes can probably be connected in series with 7 mfd.

With an 8 mfd. condenser in series you can light nine 6.3-volt type tubes operating on .3 ampere such as the type 39, 43, 44, 75, 77, 78, etc, or one 25Z5 and five ordinary tubes or one 25Z5, one 43 and one other 6.3-volt tube.

A single 2-volt .06-amp. tube requires 1.33 mmfd. *Don't use electrolytics.*

JOHN BORST,
New York City, N. Y.

Cutting Bakelite Tubing

In winding coils on various sizes of bakelite and hard rubber tubing I ran up against the difficulty of cutting the tubing straight. Previously I would saw it to the best of my ability as governed by arm and eye. Results in many cases were not so good and quite often necessitated additional work of filing or sawing.

I found the remedy in simply pasting a straight-edged piece of paper around the form to provide a guide line for the entire circumference of the tube.

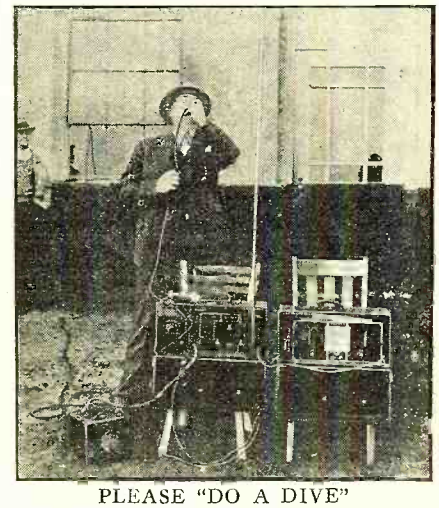
RICHARD FEENEY,
New York City, N. Y.

Tells

How It Feels *to* STUNT

By Stanley Kent

MAJOR AL. WILLIAMS



PLEASE "DO A DIVE"

Announcer conversing with Major Williams from the field by means of portable ultra-high-frequency transmitter. The complete conversation is made audible to the spectators through the loudspeakers of a public-address system

HOW a flyer maneuvers and how he feels when he does so is being told to airport crowds by Major Al Williams, noted aviator, while actually in the air by means of a novel arrangement of radio and loudspeaking equipment. The apparatus, employing ultra-high frequencies, is being used for the first time in an airplane.

Major Williams demonstrates difficult aerial maneuvers and explains them to the spectator below as he goes along. He has already given this demonstration at the Miami air races and is repeating it at other airports throughout the country. His plane is a Curtis-Hawk equipped with a Western Electric ultra-high-frequency radio transmitter and receiver of the type ordinarily used to equip police cars for two-way communication with headquarters.

The transmitter has a power of five watts and operates on 35.6 megacycles, compared to the standard aviation band of 3 to 6 megacycles. Williams has obtained from the Federal Communications Commission a special license which permits him to operate in this experimental band for educational purposes.

The ultra-high-frequencies enable him to use an extremely short antenna on his plane, a wire running from the back of the fuselage to the top of the vertical fin. It measures only six feet in length whereas the conventional airplane antenna is 35 feet long. His receiver is modified from the standard police type so that he can wear headphones as he twists and turns.

On the ground is located a similar transmitter, and a receiver of the type used in police headquarters or precinct stations. The antenna is a vertical steel rod about seven feet high, a so-called "fish-pole" antenna.

Once in the air, Williams converses with the announcer on the ground and both ends of the conversation are amplified out over the field by means of loudspeakers. For example, the announcer asks:

"Al, will you please do a dive ending with a vertical loop?" Williams replies: "I am now 5,000 feet up. I push the stick forward and we go into a dive. I gain speed rapidly. I am now falling at a rate of 260 miles an hour and at about 500 feet above the field I pull back the stick slowly. We climb quickly then slower and finally by returning the stick to a neutral position we are now flying upside down."

Few, if any, channels are available in the longer wave bands, already crowded by a wide variety of uses. Ultra-high frequency radio waves travel in a straight path like light and are particularly efficient for the short-range operation required in Williams' demonstrations, during which he will always be within sight of the air field. Use of the ultra-high frequency channel demands extremely sharp tuning and all the units in Williams' radio equipment are crystal-controlled for this purpose.

New Use for a Knitting Needle

Here is a simple kink for a neutralizing or aligning tool. Obtain a hardwood or a bone knitting kneedle about ¼ inch in diameter. The length is generally 12 to 14 inches, cut it down to about 6 inches, and then with the aid of a sharp knife or a razor blade, whittle the end (in the case of a wooden needle) to a screw driver edge. If a bone needle, it can be ground down. The latter type needle holds its edge better and was found to be best for this work.

FRANK MCLAUGHLIN,
Jersey City, N. J.

Information for Changing Meter Scales

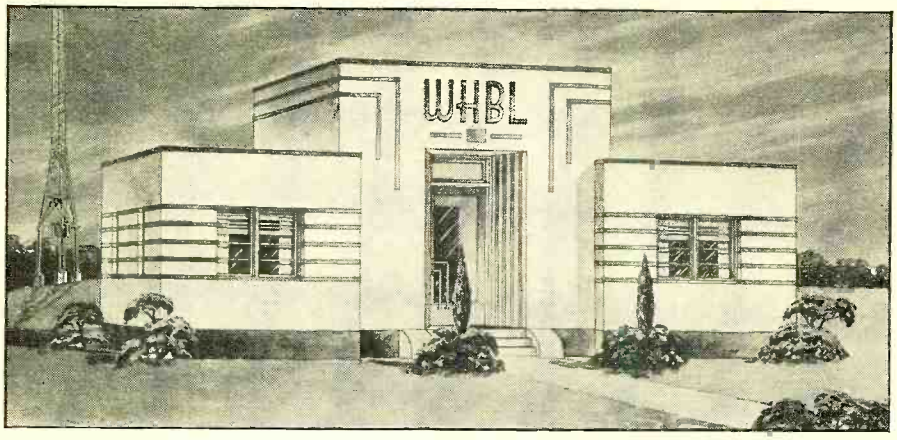
Recently I had occasion to change the range of a small meter, the divisions remaining the same but requiring new figures. I successfully accomplished this and retained the original dial by applying a little carbona cleaning fluid on a cloth and rubbing it over the figures until there was no trace of the numerals. This should be done carefully so that the divisions are not erased. The new figures can be penned in with black India ink.

A. R. DAVES,
Brooklyn, N. Y.

Pepping Up Old TRF Sets

I offer the following successful kinks to my fellow experimenters for improving old tuned radio-frequency receivers. First, I remove the primary windings from the r.f. coils and substitute for them, r.f. chokes with an inductance value of from 40 to 80 millihenries, depending upon the particular type of tube employed. The chokes are mounted inside the coil forms as shown in

(*Turn to page* 761)



WHBL'S NEW STATION

WHBL will soon put a new transmitter on the air to replace the present one. The new transmitter house is shown at the left. The latest R.C.A. 500-watt equipment will be used for full-time operation on 1410 kc.

AN ILLINOIS L.P.O.

(Right) D. Floyd Smith, Greenville, Ill., works at the building construction trade when he can spare time from his DX activities

THE DX CORNER

S. GORDON TAYLOR

(For Broadcast Waves)

THE "Best Bets" list which appears in this department monthly during the DX season is this month being discontinued for the summer. The "DX Calendar" is also much reduced in size, which is natural. During the summer months the DX Corner will be devoted largely to quotations from Observers' reports, including items of personal interest, dope on station changes, etc. Observers are particularly invited to send in information of this nature.

Readers desiring appointment as Official Broadcast Band Listening Post Observers would do well to take advantage of the summer slack to send in their applications so that they can be appointed and be "all set" when autumn rolls around and the broadcast band once more opens up for real DX reception. Address applications to the editor of this department and in your letter of application include a brief summary of your DX accomplishments and tell what equipment you are using. There are no dues and no other obligations involved except an agreement to submit a monthly report, if appointed, of your best DX catches and including information which will be of interest to other DX listeners.

Radio Clubs—Attention!

On behalf of the New Zealand DX Radio Association, Observer Eric W. Watson, 37 Chancellor St., Shirley, Christchurch N-1, N. Z., extends an invitation to DX and short wave clubs throughout the world to forward particulars of their clubs to be published in "Tune In", the monthly magazine of this New Zealand club. In return would like to have particulars of his club published in the bulletins of other clubs. These particulars were given in some detail in the DX Corner of the January, 1936, issue of RADIO NEWS, pages 407, 408 and 439.

Observer Watson would also like to carry on personal correspondence with Official RADIO NEWS Listening Post Observers, particularly those in Switzerland, Sweden and South America. He will be particularly interested in correspondence concerning DX and amateur activities. He also specifies that he will answer all letters received *from either sex*.

The recent special broadcast from KNX dedicated to New Zealand DX'ers was heard well in New Zealand although static blurred the latter part. The voice of Mrs. Dora Newcomb, Californian representative of the NZDX Radio Association, was clearly heard—not without a thrill of pride by the officials at the Association's headquarters.

DX Calendar

The DX broadcasts listed below are those which are expected to continue at least to the end of May according to replies received to inquiries sent to the stations. Most of them are expected to continue throughout the summer although, of course, there may be some changes in present plans. The times given are Eastern Standard Time. If readers of this department desire that these programs be continued throughout the summer it will be helpful if they will write to the stations listed asking that the programs be continued.

Thursdays—	
8:30-9:30 p.m.	**1420 kc., KCMC, Texarkana, Ark., 1 kw. (Radio News) (tips)**
Saturdays—	
12:01-12:30 a.m.	980 kc., KDKA, Pittsburgh, Pa., 50 kw. (tips)
5-6 a.m.	1370 kc., WMFO, Decatur, Ala., .1 kw. (NNRC)
7-8 a.m.	1210 kc., WSBC, Chicago, Ill. .1 kw., (NNRC)
Sundays—	
1 a.m.	640 kc., KFI, Los Angeles, Calif., 50 kw. (tips)
1-1:15 a.m.	**1420 kc., KGGC, San Francisco, Calif. (Radio News) (tips)**
Monthly—	
1-2 a.m.	815 kc., CMCF, Havana, Cuba, .25 kw. (11th & 21st each month)
1:30-2 a.m.	1060 kc., WJAG, Norfolk, Neb., 1 kw. (tips) (2nd Friday)
2-2:20 a.m.	**1420 kc., WJBO, Baton Rouge, La., .1 kw. (Radio News) (2nd Saturday)**
2-4 a.m.	1420 kc., WJBO, Baton Rouge, La., .1 kw., (1st Sunday)

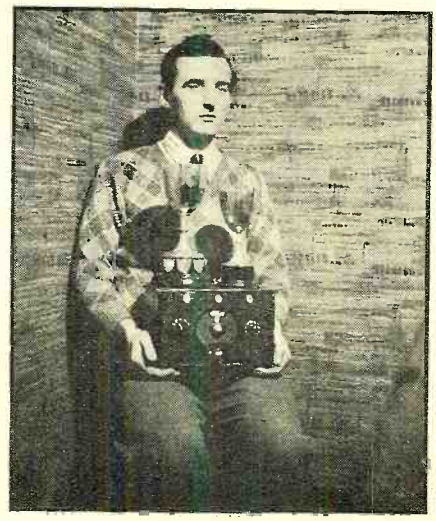
Our Readers Report—

Observer Tyndall (Burlington, Vt.): Am pleased to say that the verification just received from KDON makes my total verifications an even 1300. The season is nearing the close but I still hope to hear a few more mornings' decent DX before hanging up the phones.

Observer Kalmbach (Cheektowaga, N. Y.): Reception conditions have been terrible recently

A BRITISH OBSERVER

Official L.P.O. Coales, Southsea, England, holding his version of the "R.N. Tenatuner". Atop it is (left) cup earned by Observer Coales as winner of the British I.D.A. Summer S.W. Contest, 1935. The smaller cup he won at cricket



Official RADIO NEWS Broadcast Band Listening Post Observers

United States

Alabama: Ray Wood
Arkansas: James Halsey
California: Eugene S. Allen, Frank D. Andrews, Roy Covert, Bill Ellis, Henry Evansmith, Randolph Hunt, Walter B. McMenamy, Radio Fellowship, George C. Sholin, Warren E. Winkley
Connecticut: Fred Burleigh, James A. Dunigan, Stanley Grabowski, Joseph J. Mazel, R. L. Pelkey
District of Columbia: Geo. Day Cockrell, Jr.
Illinois: Herbert H. Diedrich, H. E. Rebensdorf, D. Floyd Smith, Raymond S. Swenson, Donald C. Truax
Indiana: Earl R. Roberts
Iowa: Donald Barnes
Kansas: Dudley Atkins III, T. R. Grosvenor, Vernon Rimer
Louisiana: Aubrey V. Deterly, Wilbur T. Golson
Maine: Danford Adams, Floyd L. Hammond, Roger Williams
Maryland: William L. Bauer, Louis J. McVey, William Rank, Frank Zelinka
Massachusetts: William W. Beal Jr., Walter C. Birch, Russell Foss, Simon Geller, Warren C. Reichardt, Evan B. Roberts
Missouri: M. F. Meade
Minnesota: Floyd Biss, Walter F. Johnson
Mississippi: Mrs. L. R. Ledbetter
Montana: R. W. Schofield
Nebraska: Bud Crawford, John Havranek
New Jersey: Robert F. Gaiser, Morton Meehan
New York: Jacob Altner, Murray Buitekant, Paul J. Crowley, Ray Geller, Edward F. Goss, John C. Kalmbach, George J. Karesh, Harry E. Kentzel, Maynard J. Lonis, Harold Mendler, Robert C. Schmarder, R. H. Tomlinson, William Wheatley
North Dakota: O. Ingmar Oleson
Ohio: Stan Elcheshen, A. J. Parfitt, Donald W. Shields
Oregon: David Hunter
Pennsylvania: Robert W. Botzum, Stanley Brus, Robert H. Cleaver, Harry M. Gordon, Edward Kocsan, Warren Routzahn, Francis Schmidt, Joseph Stokes, Paul V. Trice
Rhode Island: Spencer E. Lawton
South Dakota: Mrs. A. C. Johnson
Texas: Isaac T. Davis, Thomas H. Housenfluck, E. L. Kimmons
Vermont: Henry T. Tyndall, Jr.
Virginia: C. C. Wilson
Washington: W. Russell DuCette, Jack Staley
West Virginia: Clifford Drain

Foreign

Alaska: S. A. Tucker
Australia: Albert E. Faull, George F. Ingle, Aubrey R. Jurd
Canada: Bernard J. Clancy, John W. Ker, Ernest W. Law, Art Ling, Philip H. Robinson
Cuba: Rafael Valdes Jiminez
England: R. T. Coales, F. R. Crowder, Charles E. Pellatt, J. S. Phillips
Germany: Reginald Pick
Japan: A. T. Yamamoto
New Zealand: Alexander N. Chalmers, L. W. Mathie, R. H. Shepherd, Eric W. Watson
South Africa: A. E. Lyell
Switzerland: Dr. Max Hausdorff
Turkey: A. K. Önder

with static R9 and signals weak. This season has been very poor as compared with the 1934-35 season. This season I have added only 75 stations as compared with 250 last year. WBNY now operating on a regular schedule 10 a.m.-2 p.m. and 3 p.m.-midnight daily.

Observer Lonis (Hannibal, N. Y.): Of the TP's, 1YA and 4YA have been putting in the loudest signals. These two together with 2CO have been the most consistent.

Observer Schmarder (Syracuse, N. Y.): Recent reception has been rather poor and except for the F.C.C. frequency check schedules no important DX has been heard. Chalk up another complete state for my log. On March 13th I logged KOH of Reno, Nevada, the only station not previously heard in that state. Our local WSYR has found a location for their new transmitter and will boost their power to 1 kw. on or about June 1st.

Observer Crowley (Rochester, N. Y.) found DX conditions during March much more favorable than did many other DX'ers. He succeeded in logging 16 European stations and 5 South Americans during this month. He reports further, "XER now utilizes 300 kw. and to the best of my knowledge still does not verify. The signal is so strong in Rochester that the nearby Canadian, CRCT is sometimes pushed right out of the picture. Can anybody tell me what Spanish-speaking station operates on 917 kc.?"

Observer Wheatley (New York City): I was fortunate enough to pull in LR8 on their DX for the GCDXC on March 15th and sent them a report. Verifications in from LR1, and LR4, the latter being only a Thank You Card. Why don't stations wake up to the fact that when a DX'er writes for a verification, he expects one, not a Thank You Card or letter. LR1 can be heard every night behind WTAM and LR4 can be heard for 5 or 10 minutes after WBZ signs off. The TA's seem to have disappeared entirely and according to reports the TP's are beginning to put in their signals, although the only one heard here was 4YA.

Observer Goss (New York City): Transatlantic reception is practically dead now, with only occasional faint signals from Fecamp on 1113 kc. Transpacific stations are not showing up as well as last spring. Of these 1YA and 4YA are the best, but even these are seldom good enough to copy. The South Americans have been heard rather well at times in the early evenings, particularly LS4, 670 kc.; LR6, 870 kc.; PRE3, 1225 kc. and PRF4, 1222 kc. Others heard occasionally include LR5, LR1, LS2. TIPG, 625 kc., Costa Rica, is heard regularly.

Observer Altner (New York City): DX signals have been strong but Old Man Static never seems to let up. XEWZ, 1150 kc. is on every Sunday from 2 to 5 a.m. EST. CMBX, 1080 kc. is on 1 to 5 a.m. every Sunday. WHIS, 1410 kc. is on every Sunday after 2 a.m. My log now stands at 582 stations verified.

Observer Tomlinson (Port Chester, N. Y.): Have been having trouble hearing TP's due to a leaky street circuit nearby. In spite of this one morning I was able to hear KGMB, 4YA and 3GI. TA's are dead although during the second week of March, due to some freak conditions, they were all over the dial during the early evening but not a peep in the early morning. Verifications recently received: HAE2, 1250 watts, Hungary; CX34, 500 watts, Uruguay; Koenigsberg, 2 kw., Germany. HHK is on 915 kc. instead of 920 and is heard well at 8 p.m. EST Fridays.

Observer Kentzel (Averill Park), N. Y.: I recently received my rarest broadcast band verification. This is from CNR, Rabat, Morocco, 601 kc. I heard and reported their special of

(*Turn to page* 761)

Backstage in Broadcasting

PATTI CHAPIN

LANNY ROSS AND WINIFRED CECIL

ALEXANDER GRAY

¶ At Home and Abroad

By Samuel Kaufman

DURING radio's earlier days, many pioneers in the game predicted that Florenz Ziegfeld, the Great Glorifier of the stage, would develop into a master broadcasting showman. Before his death, the creator of the famous "Ziegfeld Follies" did bring a series to the air and, to this day, it is remembered as an outstanding job. And now, the new series entitled "The Ziegfeld Follies of the Air," on CBS Saturdays, well lives up to the high standards of showmanship set by the man it's named after. The full hour program, sponsored by the makers of Palmolive Soap, replaces the "Beauty Box Theatre" musical comedy adaptations. The new program stars Fannie Brice, noted Broadway comedy star; Benny Fields and Patti Chapin, two of the best-known radio vocalists, and Al Goodman's Orchestra. There are also occasional guest stars. In addition to comedy and music, a serialized drama is worked into the program.

WINIFRED CECIL, the new leading lady of Lanny Ross's Maxwell House Show Boat program (NBC, Thursdays), although a newcomer to the American airlanes, has a record of European concert achievements that classifies her as a star of long standing. A native American, Miss Cecil studied at the Curtis Institute of Music in Philadelphia and with prominent tutors in Europe. She did radio and concert work abroad, earning popular followings in England, France, Germany and Spain. Lanny Ross chose her for the leading feminine rôle of his series after auditioning many talented young singers.

BRITISH short-wave transmissions have done quite a lot towards establishing some London performers on a par with our own radio headliners in the estimate of American listeners. So much so, as a matter of fact, that we now find four former B.B.C. stars in the U. S. A. appearing on our own networks. They are Ray Noble, the orchestra leader, and Al Bowlly, vocalist, both on the CBS Coca-Cola program; Jack Hylton, another baton wielder, on CBS for Standard Oil of Indiana and NBC for Realsilk hosiery, and Beatrice Lillie, the comédienne, who is a frequent guest star on both networks. How long will it take before some more of the B.B.C. stars will be enticed over here by the lure of a fat salary from a sponsor? Just as Hollywood seems to land the best of foreign movie names for the American film studios, the American chains are striving to corner the world market on radio entertainment. When will alert American sponsors try to import Henry Hall, Charlie Kunz, Harry Roy and Carroll Gibbons —all top-notch dance conductors—and John Tilley, comedian?

ALEXANDER GRAY, the stage and screen baritone, who has been absent from the network schedules for a long time, has returned in a blaze of glory as star of one of the ether's new hit programs, the Chrysler "Airshow" on CBS, Thursdays. He shares billing honors with Charles Hanson Towne, the columnist, who serves as a commentator, and Mark Warnow's concert orchestra. A clever commercial twist has been injected into this automobile-sponsored show by naming the male octette the "Chrysler Eight" and the female sextette the "Chrysler Six." Gray was a protegé of Florenz Ziegfeld and appeared in many Broadway stage successes before going to Hollywood.

MISS BIDU SAYAO, Brazilian coloratura soprano and radio favorite of both South America and Europe, recently visited New York and, between concert

Heard Across the Seas

BEATRICE LILLIE

BIDU SAYAO

JOHN TILLEY

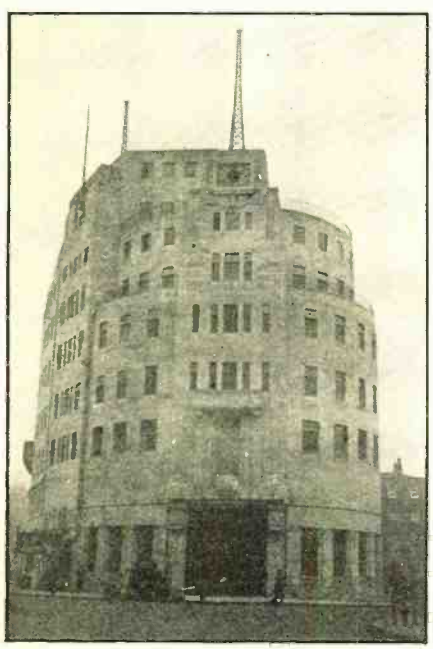
EDDIE DOWLING AND
RAY (MRS. DOWLING) DOOLEY

engagements, found time to appear on station WOR, Newark. She returned to Paris for a spring engagement at the Opera Comique and, following a summer visit to Brazil, expects to return to the U. S. A. Though still in her twenties, the Brazilian radio artist has appeared in the leading opera houses of France, Italy, Spain and Brazil.

ANOTHER famous "Mr. and Mrs." team has been added to the radio stellar line-up. This time it's Eddie Dowling and Ray Dooley, who, along with Burns and Allen, Block and Sully, Jack Benny and Mary Livingstone, Fred Allen and Portland Hoffa, rank as one of the hit husband-and-wife radio teams. Dowling and Dooley, 'tis claimed, originated the modern heckling type of humor. They've been noted stage headliners for years. Their series is heard on NBC Tuesdays, sponsored by the Elgin National Watch Company. Benny Goodman's orchestra and Helen Ward, songstress, also

(*Turn to page* 749)

BROADCASTING HOUSE,
LONDON, ENGLAND



THE SERVICE BENCH

tells YOU Something about

Summer Lines

. . .

Eliminating Noise

. . .

Wholesale Racket

. . .

Service Sales

FIGURE 5

Conducted by Zeh Bouck, *Service Editor*

BEATING THE "WHOLESALE" RACKET

There are few servicemen dealers who are not confronted with the problem raised by the fact that their customers can purchase radio parts and sets at prices far below the list prices which persons not associated with the trade are supposed —and rightly so—to pay. We feel that the following advertisement, of Becker's Music Shop, Philco distributors for Evanston, Ill., sums up the situation and at the same time offers a solution that will be well worth study by every radio serviceman!

AN OPEN LETTER TO RADIO BUYERS

About one-half of Evanston's families have "wholesale" connections—the other half buy at "retail." So if you buy a radio through retail sources, almost invariably someone will say, "Gee, I could have got it for you wholesale." "Wholesale" connections are remarkably plentiful and convenient, it seems. But buying "wholesale" often costs more than buying retail, especially in radios, automobiles or refrigerators.

If you prefer to buy at wholesale prices, you need not buy outside of Evanston. And the privilege is extended to everyone. Right here at 801 Dempster Street you may buy any radio at 25% to 40% off list! Our profit on this basis is very slim, of course. The extra bonus we receive for large-volume purchases and cash discounts constitutes our profit. But frankly, we'd prefer to sell on this basis. As with any "wholesale" purchase, the seller is relieved of a lot of responsibility. There are no liabilities. No grief and bother at the seller's expense if things go wrong, as they often do. It is for you to choose whether you wish to pay wholesale prices or retail prices—and since we sell you either way, we want you to know that we are a "two-price store." An explanation is in order before you can decide which plan is the more desirable—

The Wholesale Way

If you buy the "wholesale" way:

1. Your guarantee is limited to the manufacturer's guarantee on defective parts.
2. Defective tubes or parts are replaced free during the 90-day guarantee period, but service is charged for.
3. Radio is not subject to exchange. It must be accepted as shipped from the factory. No trade-ins are allowed.
4. Terms are arranged only on a restricted basis.
5. Noise reducing antennas and installations are charged for—which, if properly done, with full equipment and lightning protection may cost from $12.00 to $20.00.
6. No free calls are made. Adjustments, replacements are all charged for.

However, if you prefer to buy the retail way, you receive the following benefits—

1. A generous allowance is made for your old radio. Radio parts, tubes, etc., are guaranteed unconditionally for six months. Service is free—day or night—and you are assured service by experts the day called.
2. We install without charge and without skimping, complete noise reducing antennas, etc., with any radio that lists for $75.00 or more (standard aerials on lower priced receivers).
3. Each radio is tested and checked before delivery. It is balanced to highest efficiency—or rejected if it cannot be made to perform at maximum.
4. Exchange privileges if radio selected is not so suitable in your location as some other model. Foreign reception at its best —WITH FULL AUDIBLE VOLUME guaranteed. We give all the time necessary to instruct you in short-wave tuning.
5. Terms to suit—at lowest possible rates.

So there we have explained frankly the difference between two ways of buying your next radio. You may buy it wholesale or retail. Buy your next radio here with confidence—wholesale or retail. Sincerely yours, BECKER'S MUSIC SHOP. (We think that tells the story. Put it up to your own customers the same way!—*Editor.*)

THE DAY'S WORK

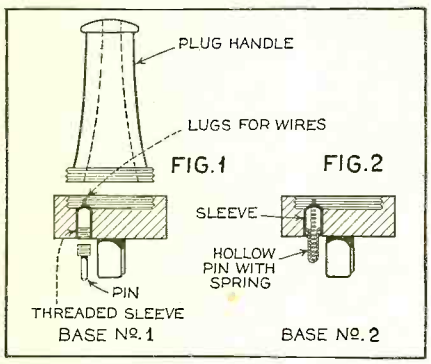
A group of radio manufacturers have recently agreed to discontinue the use of "blanked out" octal sockets. But the radio serviceman for many years to come will be confronted with the problem encountered in testing such receivers. Boring through the blanked holes, or carrying along a truck-load of adapters have been alternative solutions to the difficulty. However, William Dickering, of Vancouver, B. C., sends us the sketches of Figures 1 and 2, which describe a universal plug.

Both bases are drilled for the full com-

"WINDOW AND COUNTER" CONTEST

RADIO NEWS is offering five cash prizes of $10.00, $5.00, $4.00, $3.00 and $2.00 every month for photographs of interesting *window* and *counter* displays in service shops—and retail stores, in which radio service is a part of the business. While establishments of any size may be entered, RADIO NEWS will be partial to the successful small enterprise and the "up-and-coming" one-man business. Photographs of window displays are best taken with plenty of light on the display side of the glass, but shielded from the lens, care being observed to station the camera so as to reduce as far as possible reflections from across the street. However, photographic excellence will be subordinated, in this contest, to the quality of the display itself. Send in your contribution with a description of the display, and, if possible, an informal snapshot of yourself, to—

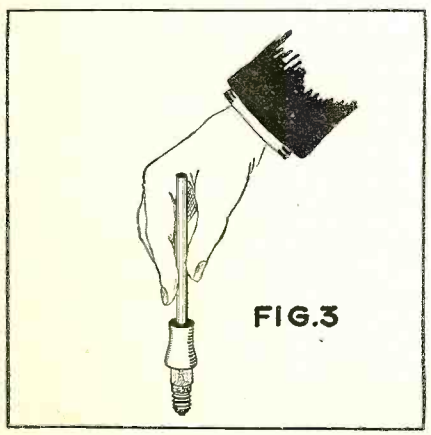
Yours for better servicing,
—*The Service Contest Editor.*



plement of octal pins. Base number 1 is the easier to construct. Threaded sleeves are inserted into the holes, and the required number of pins are screwed into the correct holes. Base 2 presents a somewhat more complicated construction, but its use is simplified. Hollow pins, with internal springs, are inserted in each hole. Pins hitting the blanks are forced up into the base, while those over the socket holes insert themselves to make contact. Fairly strong springs should be used.

Getting at Those Pilot Lamps!

"Here is a kink for the serviceman who has scraped his knuckles, to the accompaniment of profanity, in fishing for pilot lamps. The illustration of Figure 3 is almost self-explanatory. The handle consists of a convenient length of pencil. Wrap a piece of Goodyear inner tube patching, 1¼" by 1¼", around the end of the pencil, so that half of the rubber extends, forming a hollow cylinder. A coating of rubber cement over the end of the pencil and the seam completes the job."—*Steven S. Erickson, Evans, Ill.*



A Baffling Case of Noise

The case-book of every serviceman carries at least one instance of noise that was responsive to steps on the floor. Usually, when the set has been eliminated (by running a twisted pair directly from the cut-out box to the radio, and opening the entire house-wiring circuit), this has been traced to BX rubbing against a gas pipe or water pipe. Ralph S. Harrison, of the Radio Service Laboratory, Barnesville, Ohio, reports a case in this category sufficiently baffling to justify description. Everything but ripping up the floor was resorted to without disclosing the source of the trouble. The noise was finally discovered to vary when a ceiling light was turning on or off at a wall switch. Inspection of the switch, however, showed nothing wrong, and the dome light itself appeared to be equally without blame. Leaving the radio turned on, the light was again tackled, and the noise ceased as the screws holding the fixture to the ceiling were loosened—and the problem was solved! The electrician who had installed the fixture had employed screws of excessive length. When the fixture was up tight against the ceiling, these screws were long enough to go through and just make contact (a perfect microphone!) with the BX.

Atwater-Kent No. 465 Q

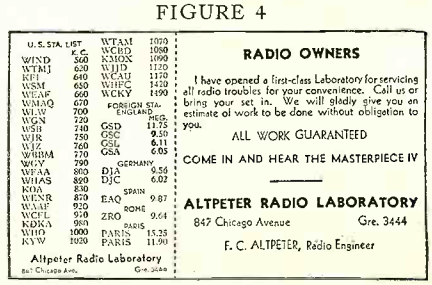
"I have encountered several of these receivers with the identical trouble—the only fault I have to find with this excellent rural set. This is a 2-volt, battery-operated receiver. The trouble develops suddenly and is characterized by distortion or motor-boating—similar to that caused by low B or incorrect C voltages. Sometimes it blocks altogether. No ordinary test will show anything wrong with the set or tubes. If the finger is held to the grid caps of the tubes, a signal will come through. It will also operate when a B eliminator is substituted for the plate battery. A logical guess located the trouble in the tubular electrolytic by-pass condenser across the B-plus 135 volts to ground. Replacing with another 8 mfd. condenser repaired the set. The condenser removed was neither shorted nor open, but the capacity had dropped to only a fraction of its rating and leakage was high. The prevalence of this trouble with the model mentioned is due to mechanical injury caused by the clamp which holds the condenser to the chassis. The condenser is usually flattened out of shape."—*O. Ingmar Oleson, Ambrose Radio Service, Ambrose, N. Dakota.*

SERVICE SALES

F. C. Altpeter, of the Altpeter Radio Laboratory, sends us the card shown in

(*Turn to page* 749)

FIGURE 4



Servicemen's PRIZE CONTEST

Announcement of Awards

Zeh Bouck
Service Editor

FIRST PRIZE
A Serviceman's Dream Come True

Figure 1, believe it or not, shows only *a section* of the Goodway radio shop, concerning which its proprietor, Earle C. Good, writes: "This set-up is the result of eleven years in the radio sales and service game, and was designed with the idea of practicability. The overhead lights are placed six inches in from the front edge of the bench. This position throws less shadow from the operator on his work, and at the same time is far enough forward to prevent glare. However, for night work, we find the goose-neck fixtures more restful on the eyes.

"Our test equipment is complete, and is portable. We have found that it is often more practical to take the apparatus—and occasionally a separate power supply—to the inoperative radio than to reverse the procedure. To each of our experts is allotted an assortment of tubes placed in recessed panels. These tubes are painted red, with the type number printed in white. The red tube in a receiver stands out like a sore thumb, to remind the serviceman that this is a shop tube and is not to be left in the customer's radio.

"The work bench is surfaced with Masonite. Two universal dynamic speakers are mounted in the wall (one of which can be seen at the right). These are fed from universal input transformers and cascaded field resistors, thus adapting the speakers to any input and field requirements. The drawers are used for additional tools, and also contain compartments for the orderly storage of spare parts, such as by-pass condensers, resistors, filter condensers, etc. At the end of each week these compartments are restocked, providing an additional check on the components employed in the past week's work. The spool cabinet, under the left end of the bench, contains radio hardware.

"Any radio repairman who has worked all day standing on a concrete floor—or any other hard floor, for that matter—

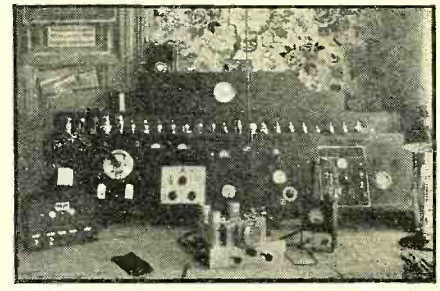


FIGURE 2

will appreciate the genuine comfort afforded by the slatted cat-walk shown in the photograph. This is made of 2½-inch by ¾-inch Idaho spruce—a very tough wood, but with sufficient spring in it to reduce greatly that all-in-from-the-waist-down feeling that so often accompanies an all-day session on a non-resilient floor."

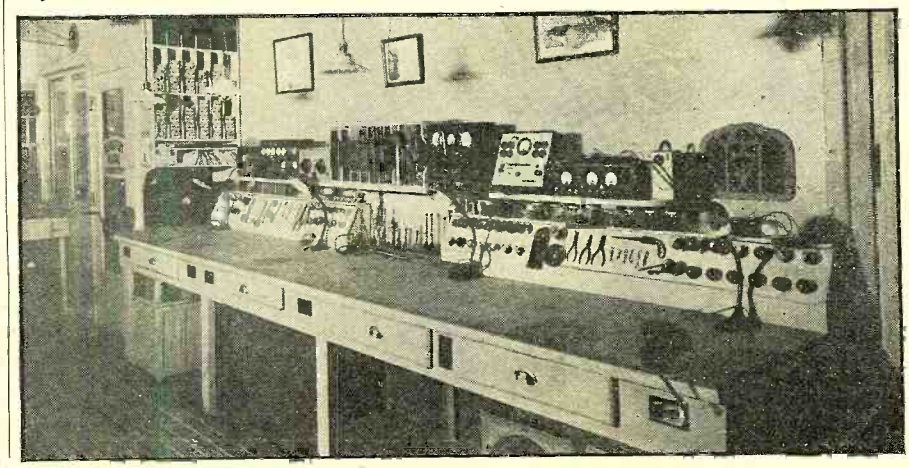
SECOND PRIZE
A Belgian Service Shop

The proprietor of the Radio Service Station (Figure 2), Anvers (Antwerp), Belgium, learned the radio service business in the United States and transplanted American methods to the other side of the briny. His experience in the U. S. A. has stood him in good stead with his European practice, as American radios are very numerous in Belgium, comprising approximately 30% of the sets used. The equipment consists of a.c. and d.c. meters in the power-line circuits, a combination volt-ampere-milliampere-ohmmeter, tube checker, analyzer, two oscillators and an output meter. We like to feel that at least some measure of our second prize winner's success may be attributed to the fact that he has been a reader of RADIO NEWS for seven years!

THIRD PRIZE
A "Case" for RCA-Victor

The letterhead of the Case Radio and

FIGURE 1



THIS MONTH'S WINNERS

FIRST PRIZE—To Earle C. Good, of the Goodway Radio, Public Address and Sound System, Ephrata, Pa.—$10.00 for equipment, layout, and all the other details that contribute to efficient, modern servicing.

SECOND PRIZE—To The Radio Service Station, 37 Rue Schul (Harmonie), Anvers, Belgium—$5.00 for compactness—showing what can be done in the way of complete equipment, in a minimum of space, without overcrowding.

THIRD PRIZE—To Rupert Case, of the Case Radio and Electric Service, Stockton, Kansas—$4.00 for a highly creditable bench, topped with a familiar display that creates customer confidence.

FOURTH PRIZE—To H. E. Becker, Becker Radio Service, Grand Ledge, Michigan—$3.00 for an effective balance between shop and portable equipment.

Congratulations and thanks from RADIO NEWS *and its thousands of servicemen readers!*

FIGURE 3

Electric Service states that they specialize in RCA and Zenith radios, and Figure 3 indicates the manner in which the former is boosted. Their stationery also indicates activity in "Electrical Wiring and Supplies." Mr. Rupert Case writes: "The bench (which measures ten feet long by four feet deep), as well as the main panel, are made of pressed wood. Tools, spare parts and tubes are neatly arranged in a show-case. The speakers are mounted behind galvanized hail screening. A main feature of the layout is the snap-on arrangement which permits the test equipment to be removed instantly for servicing in the field. An air compresser for cleanning sets, and various power supplies, are mounted under the bench. The condenser tester is of the neon lamp design and was constructed in the shop. Tubes are checked with a Supreme model 80 De Luxe counter tester. (*Turn to page* 761)

FIGURE 4

RADIO PHYSICS COURSE

ALFRED A. GHIRARDI

Lesson 53. Resonance

FIGURE 1 shows a common tuning arrangement employed in radio receivers. We will assume that the passing radio waves from some station cut across an antenna, and induce a voltage in it of a frequency of say 500,000 cycles per second. This voltage sends an alternating current through the circuit which consists of the antenna, the primary P of the radio-quency, is .00025 microfarads; and that the the capacitance C_A which exists between the antenna wires and the ground. A slightly higher e.m.f. (e) will be induced in the secondary winding "S" of the tuning coil by transformer action. Let us take a practical case and suppose that the e.m.f. (e) induced in S is one millivolt (.001 volt); that the secondary winding has an inductance of 300 microhenries; that the capacitance of the tuning condenser C, adjusted to produce resonance at this frequency, is .00025 microfarads; and that the total ohmic resistance of the secondary coil and condenser is 10 ohms.

The conditions are shown in (A) of Figure 1. The secondary coil and condenser circuit are usually connected across the input circuit of a vacuum tube as shown. It might be supposed on first thought that the secondary of the tuning coil and the condenser form a parallel circuit, but this is not so. The voltage in the tuned circuit is induced in the windings of the secondary coil, and therefore is considered to be in series with the windings. The induced voltage (e) may be represented as being supplied by an a.c. generator developing an e.m.f. of .001 volt, in series with the secondary coil and tuning condenser as shown at (B).

The question of series and parallel connections is troublesome at times in tuned circuits. Whether the connections are series or parallel depends on the location of the e.m.f. with respect to the impedances. Suppose we connect a resistance across a battery. Is the resistance in series or in parallel with the battery? The e.m.f. in this case is in the battery, and anything that is connected across the terminals of the battery is in series with the e.m.f. This will be evident by actually drawing the circuit diagram of this condition.

If we connect two impedances or resistances across the terminals of the battery, these two are in parallel, but the two of them are in series with the battery. If we substitute a generator for the battery, the same rule holds. The e.m.f. is in the generator, and anything that is connected across the output terminals of the generator is in series with the e.m.f. of the generator. If we connect two impedances across the terminals of the generator, these two impedances are in parallel but the two are in series with the e.m.f. In determining whether the connection is series or parallel, it is well to regard the source of the e.m.f. as a pump and the impedances, or rather admittances, as pipe lines. The pump forces a certain amount of water through the system. If the same amount of water is forced through two or more sections of the pipe system (two or more impedances) they are connected in series. If the sections of the pipe system are so connected with respect to the pump that the water can divide, the sections are in parallel. The electrical pump may consist of a primary battery, a storage battery, a magneto, a generator or dynamo, the secondary of a transformer, a microphone, a phonograph pick-up, a thermo-couple or the plate-filament circuit of a vacuum tube, etc.

At resonance, the current is in phase with the induced e.m.f. in the secondary winding, since the resistance is the only obstacle to the passage of the current under these conditions. An induced e.m.f. (e) of .001 volt in S will therefore send a rapidly surging current of $I = \frac{E}{R}$ or $.001 \div 10 =$ .0001 ampere through the circuit from one

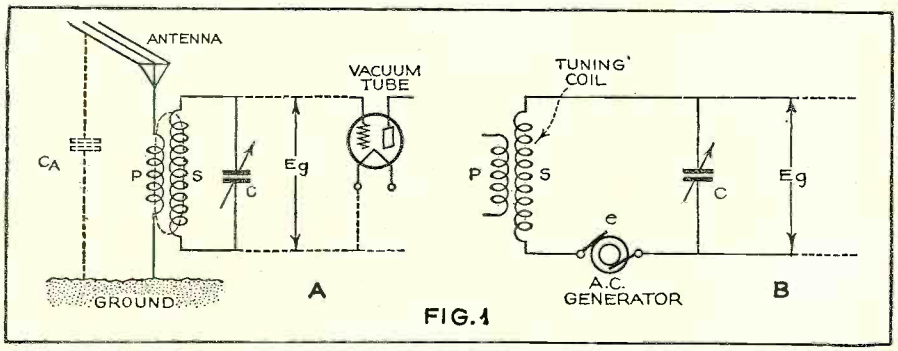


Figure 1. Series resonance in the tuned circuit of a radio receiver (acceptor circuit).

condenser plate through the coil to the other plate and back again. From the table in Article 166, we find the capacitive reactance of a .00025 mfd. condenser at a frequency of 500,000 cycles to be 1,273.8 ohms. Therefore, since .0001 ampere is flowing into this condenser, the voltage E_G across its terminals is equal to:

$E_G = IX_C = .0001 \times 1{,}273.8 = .13$ volt

Since the reactance of the secondary coil must also be equal to 1,273.8 ohms at resonance, the voltage actually existing across its terminals must also be equal to .13 volt.

It is thus seen that, by means of resonance, the voltage E_G actually applied to the grid circuit of the vacuum tube is greatly increased over what it would be if the induced voltage (e) developed in the secondary coil by electromagnetic induction from the primary were applied directly to the grid circuit of the vacuum tube. In that case E_G would only be equal to .001 volt. Actually we find it is .13 volt, or 130 times as much. This example illustrates the great advantage gained by tuning the secondary winding of the radio-frequency transformer in a radio receiver, since the volume of sound depends upon the strength of the voltages applied to the grid circuits of the amplifier tubes. *By tuning, it is possible to have a much higher voltage developed across either the con-*

denser or the inductance, than is impressed on the two in series by the e.m.f. induced from the primary winding by electromagnetic induction. The ratio of E_G to e is called *the gain* of the tuned circuit. Since E_G is equal to $2\pi f L I$ and E is equal to $I \times R$, the *gain* is equal to:

$$\frac{E_G}{e} = \frac{2\pi f L I}{I R} = \frac{2\pi f L}{R}$$

This expression for the "gain" indicates that, to obtain greatest efficiency from a tuned circuit, it is essential that the ratio of the inductive reactance to the resistance of the coil should be made as large as possible. Thus the tuning coils in radio receivers are designed to have as low resistance as practical, consistent with other controlling factors such as physical size, cost, etc.

The Service Bench

(*Continued from page 745*)

Figure 4, which he distributes among customers and prospects. The well-worded advertising portion can be torn off along the perforated line, and the convenient call list—containing both long and short-wave listings—is retained as an effective reminder of where efficient radio service can be obtained.

A Hot-Weather Sideline

Electric fans are a logical summer sideline to the radio service business, and the unique appearance and features of the Samson product (Samson United Corporation, Rochester, N. Y.) provides sales appeal that is not wholely dependent upon the thermometer. This fan, illustrated in Figure 5, has molded rubber blades (in walnut and pastel shades), which, while sufficiently rigid to deliver a steady, strong current of air, are flexible and cannot injure the fingers—thus eliminating the unsightly guard essential on conventional fans. The trade designation is the "Safe-Flex" fan.

Backstage

(*Continued from page 743*)

have a lot to do with the musical proceedings.

IF the picture of Broadcasting House accompanying this item looks dark, you can blame it on one of two things—or on both of them. The "things" are (1) the writer's ability as a photographer and (2) the winter fog of London. As a matter of fact, it was what looked like a real sunny day that prompted our standing at the entrance of All Souls' Church with a kodak aimed at the Portland Place radio palace which serves as the spearhead for all B.B.C. transmissions, including the "G" stations' short-wave features. Well, it's been some time since this picture was snapped, but, through constant listening to B.B.C. Empire transmissions, the structure has remained as vivid in our memory as if our visit to it was only yesterday. Due to the fact that all transmissions are in English, the B.B.C. short-wave offerings enjoy a tremendous following in the U. S. A. And the program directors are alert to add new ideas from time to time that demonstrate excellent showmanship. For example, there's the current "Who's in Town Tonight" series, heard Saturdays. Persons in various unusual walks of life are drawn to the microphone for interviews that are fresh and crisp. Here's an idea for American broadcasters to follow.

DESPITE the fact that European short-wave programs seem to show an utter disregard for time schedules, there are certain phases of the foreign leisurely broadcasting method that American listeners think could well be followed by stations in this country. Because American programs start and end on split-second schedule, it is often necessary to condense musical scores, and this is a practice many music lovers deplore. If a program does not end conveniently on the scheduled moment abroad, the musicians just keep on playing past their time. But while music lovers approve this method, the idea cannot very well be copied in the U. S. A., where there are paying sponsors to account to for any infringement on "bought" time by a preceding musical program. The leading symphonies and other concert groups of London, Paris, Vienna and Rome have earned great popularity with American short-wave fans.

THE subject of international copyright of short-wave and broadcast-band programs shows promise of being one of the main topics to be considered at the International Copyright Convention in Brussels in September. Preparatory to the convention, the Board of Trade in England has a departmental committee considering questions regarding the rediffusion of copyright works and the fees that can be claimed by authors and composers. Suggestions have been made to clarify the terms of the copyright convention regarding broadcasting and the rediffusion of radio programs by any methods. The government of Belgium has proposed to add a paragraph providing that, subject to any stipulation to the contrary, any authorization to broadcast a work shall not include permission to record it.

Final Amplifier

(*Continued from page 729*)

greatly simplified. Unless a modulated doubler-amplifier is biased correctly it will give downward modulation. The adjustment of the bias is quite critical. With the higher grid driving power, this tendency was reduced.

It was found, too, that with the arrangement shown it is not necessary to go to the elaborate precautions we did at first to obtain a 5-meter inductance. As described last month, copper rods were used with a "shorting" bar. However, it was found that there was very little reduction in output when a bar fixed with plugs was connected directly across the two coil insulators. The 5-meter inductance thereby was provided by the leads to the condenser. It resonated at 5 meters with about ⅛ of the capacity of the tank condenser.

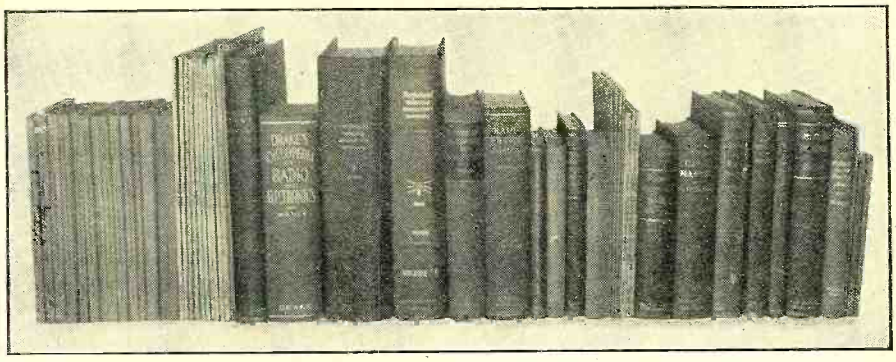
It is important to point out here that if the transmitter is to be used on 28 and 56 megacycles, the leads to the tube and tank circuit must be kept as short as possible. If they are too long, they will make it impossible to hit resonance in the 5-meter band.

New Idea in Sound Systems

(*Continued from page 731*)

The cabinet is 5 feet 4 inches high, 2 feet wide and 16 inches deep, and its exterior has been designed along modernistic lines so as to present an attractive appearance in office or foyer.

Besides the built-in microphone facilities, additional microphones may be located in offices or nearby halls or ball rooms as required. Controls are arranged so that announcements may be made over any one or any group of loudspeakers or, in emergency, over all of them regardless of whether they are turned "on" or "off" at their respective locations.



THE TECHNICAL REVIEW

CONDUCTED BY ROBERT HERTZBERG

Radio Receiving and Television Tubes, by J. A. Moyer and J. F. Wostrel. Third edition, McGraw-Hill Book Co., 1936. The new edition of this textbook on tubes has been completely revised and brought up to date. The text covers a discussion of the principles of operation of all tubes, their applications as amplifiers, detectors, oscillators, etc., and gives the characteristics of all receiving tubes.

The book might be classed as "intermediate"; i.e., it is not as thorough as some of the engineering texts on tubes, yet covers the ground without going into higher mathematics. It will be found useful by everyone who expects to use tubes. The order wherein the material is arranged might call for some criticism, but it appears justified because it is more likely to keep the reader interested. After a brief introduction which explains some of the fundamentals of tubes, the authors discuss the construction of them. Materials and methods of construction of cathodes, grids, plates, and their sealing into the bulb are explained. Chapter III deals with the fundamental laws of electricity and radio circuits. Then follows a chapter on vacuum-tube action. Beginning with the phenomenon of emission, this leads up to the characteristics of each type of tube, including mercury-vapor rectifiers, gas-triodes, glow lamps, pentodes, screen-grid tubes, magnetrons, etc. Obviously this is a very long chapter. Then follow chapters on radio meters and measurements, and on testing vacuum tubes. Chapter VII, entitled "Vacuum Tube Installations," gives customary circuits wherein tubes are employed. The next chapters go into each function more thoroughly and deal with the vacuum tube as detector, as rectifier, amplifier and oscillator. Television tubes are covered in another chapter; the various cathode-ray tubes, the iconoscope and the kinescope are described. Industrial applications of vacuum tubes are illustrated and explained. These include photocell control devices, relays, regulators, etc. A table of tube characteristics is included.

The authors have managed to be fairly well up to date. Data on the first crop of metal tubes is included, also the acorn tubes. Strangely enough, there is a circuit and discussion on the old "Triple Twin Tube," but nothing on its descendants, the 2B6 and 6B5.

Cathode-Ray Tubes and Allied Types. Technical Series TS-2, published by RCA Manufacturing Co. This booklet gives the characteristics and other useful data on cathode-ray tubes and the special rectifiers and gas triodes that are used with them. Besides a summing up of the characteristics and curves, there is considerable useful information on the construction of power supply and sweep circuit and the application of the oscillograph. Readers who expect to use cathode-ray tubes will find this book a useful addition to their reference library.

La Radio? . . . Mais c'est très simple!, by A. Aisberg, Société des Editions Radio, Paris, 1936. Curiosus had an uncle by the name of Radiol, a radio engineer. Curiosus learned from Radiol quite a lot about radio, so now in his 18th year he is an accomplished amateur and experimenter. Ignotus, 14 years old, is anxious to learn from Curiosus. The book consists of the conversation between the two lads with animated drawings. In these conversations Curiosus manages to explain all the complications of radio without using mathematics yet retaining accuracy. It covers all the newest tubes and circuits, including a.v.c., variable selectivity, etc. A reader needs to know the fundamentals of physics only. The numerous drawings in the margin illustrate the action by means of ingenious analogies. A decidedly worth-while book for readers of all ages who wish to understand radio and who can read French.

An Absolute Determination of the Ohm, by Harvey L. Curtis, Charles Moon and C. Matilda Sparks. Part of the Journal of Research of the National Bureau of Standards, Volume 16, January, 1936. This 82-page booklet should be of interest to physicists and advanced students of physics and electricity. The extremely complicated methods used in the measurement are described in detail, and all the mathematical derivations are given in full.

Units of Weight and Measure; Definitions and Tables of Equivalents. Miscellaneous Publication M121 of the National Bureau of Standards, Washington, D. C. A 68-page booklet of considerable reference value. Includes both customary United States and metric units, with numerous conversion tables that save the user a great deal of time. Incidentally, page 63 reveals the little-known fact that the metric system has been legal in the United States since 1866.

Standard Time Zones of the United States. Miscellaneous Publication M155 of the National Bureau of Standards, Washington, D. C. The standard time zone boundaries of the United States, with adjacent parts of Canada and Mexico, correct as of October, 1935, are shown in a large map which makes a useful and decorative wall display. The map is printed in light blue on a white background, with the time zone boundaries in red and each zone provided with a clock dial showing at a glance the difference in time between zones.

Review of Articles Appearing in the March, 1936, Issue of the Proceedings of the Institute of Radio Engineers

The Secondary Emission Multiplier, by V. K. Zworykin, G. A. Morton and L. Malter. Complete technical data on the most sensational tube development of recent months—multiplier phototubes having amplification factors of several million and designed to replace the conventional phototube and accompanying amplifier systems. The perfection of these tubes will undoubtedly bring about a profound change in vacuum-tube amplifier technique.

Review of Broadcast Reception in 1935, by R. H. Langley. A concise review of technical and merchandising achievements of the year past.

Radio Developments During 1935, by C. M. Jansky. Deals with the broadcasting side of the industry.

A Review of Radio Communication in the Fixed Services for the Year 1935, by C. H. Taylor. A Review of Radio Communication in the Mobile Services, by Clifford N. Anderson; Progress in Allied Fields to Radio, by O. H. Caldwell. Further review articles whose titles are self-explanatory.

An Experimental Television Receiver Using a Cathode-Ray Tube, by Manfred von Ardenne. Description of a laboratory type receiver which has proved very successful in reproducing images broadcast from Berlin. Photographs of television pictures as received by the equipment indicate that high-quality results are obtained.

Losses in Twisted-Pair Transmission Lines at Radio Frequencies, by C. C. Harris. This interesting paper reveals that losses in the popular types of twisted-pair lines are extremely high, and that open-wire or air-spaced types of lines are much superior at frequencies above one or two megacycles.

Present Practice in the Synchronous Operation of Broadcast Stations as Exemplified by WBBM and KFAB, by L. McC. Young. This paper briefly covers the history of synchronization of broadcast stations in the United States and abroad.

Grid Temperature as a Limiting Factor in Vacuum-Tube Operation, by I. E. Mouromtseff and H. N. Koazanowsku. Description of a method of determining the grid dissipation at which primary or thermionic emission from the grid takes place.

Terrestrial Magnetism and Its Relation to World-Wide Short-Wave Communications, by Henry E. Hallborg. The functioning of short-wave circuits is found to be closely related to the geographical distribution of terrestrial magnetic activity. Europe is shown to be more favorably located geographically and diurnally than the United States with respect to interference of this kind.

Low-Frequency Transmission Over Transatlantic Paths, by H. H. Beverage and G. W. Kendrick. Continous records of field intensity taken at several receiving points and on various types of antenna systems are compared, and evidence of incoherent low-frequency fading is found.

A Study of Ground-Wave Radio Transmission, by R. C. Higgy and E. D. Shipley. The excellent agreement between the value of ground-wave field intensities (observed in Ohio) and the Sommerfield theory is described. The application of this theory in predicting signal intensities is also indicated.

An Analysis of Distortion in Class B Audio Amplifiers, by True McLean. The more important defects of Class B audio-frequency amplifiers are classified and examined in detail. A general method of determining harmonic components introduced by curvature and asymmetry of the combined plate-current curves of a pair of tubes is given, with a tabulation of results in a practical case.

Notes on Piezo-Electric Quartz Crystals, by Isaac Koga. The chief characteristics of quartz plates cut at various angles to the crystal axes are described, with special attention to the effect of temperature on frequency of oscillation. Particularly stable oscillators using two crystals in a single circuit are also described.

Review of Contemporary Literature

Scophony Television. Electronics, March, 1936. Details of a high-definition system developed in England and using a "split focus" optical arrangement and a double image Kerr cell.

Plastics, by Herbert Chase. Electronics, March, 1936. This interesting and well-illustrated article describes the mechanical and electrical properties of phenolic, urea, cellulose acetate and styrol materials commonly used in electronic apparatus.

Ballast Tubes. Radio Engineering, March, 1936. A suggested solution of the pilot-light problem in a.c.-d.c. receivers.

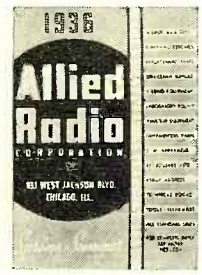
Variable Selectivity and the I. F. Amplifier, by W. T. Cocking. The Wireless Engineer (London), March, 1936. A highly mathematical paper dealing with the design of i.f. transformers for variable selectivity.

Microphone Characteristics for P. A. Service, by C. J. Brown. Service, March, 1936. A good review of the available types of microphones, written from the practical standpoint.

Free Bulletins

Information on Sound Equipment

The latest Webster catalog outlines their 1936 line of public-address amplifiers, speakers and phonograph equipment. This book is a handy reference catalog for sound engineers and servicemen. Free copies are available by addressing requests to RADIO NEWS, 461 Eighth Avenue, New York City.



Catalog of Radio Supplies

Allied Radio Corporation has just released its new 136-page spring and summer catalog, listing radio receivers, sound systems, test instruments, amateur supplies, kits, etc. Copies can be ordered free of charge from RADIO NEWS, 461 Eighth Avenue, New York City.

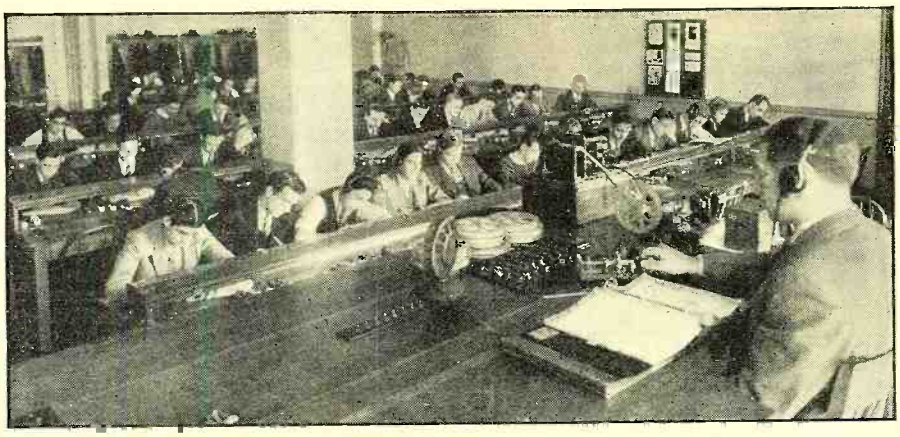
Transmitter Bulletins

The Collins Radio Company's Model 45A and 30FXC short-wave transmitters, of 40 and 175 watts telephone rating, respectively, are described in two beautiful bulletins which show all details of construction. Copies of these folders are available free of charge to amateur and broadcast station engineers through RADIO NEWS, 461 Eighth Avenue, New York City.

New Radio Catalog

A new spring catalog of radio receivers, P. A.

(*Turn to page* 755)



QRD? QRD? QRD?

CONDUCTED BY GY

AGAIN the amateur operators come to the front-page news with their heroic efforts put forth bringing news to the outside world during the terrific flood which inundated such a large part of the East Coast and vicinity. The short, staccato messages which came through told only of the hardships and needs of the flood victims, but nothing was said of the 48-hour straight watches stood by men and boys to bring aid. Nothing was said of dying power, of fear for their own lives and of tired lips relaying messages or of sleepless fingers pushing a key until they seemed to operate by some subconscious, automatic effort.

A FEW of the outstanding hams who did yeoman work were George H. Walter, W2HYP, in New York and Gerald D. Coleman, Naval Reserve, in Johnstown. Since the beginning, when a few wireless operators got together and formed the ARRL back in 1912, these men have aided greatly in the forwarding of mercy msgs, giving vital news toward the succoring of human lives and pioneering on wavelengths which commercial interests did not think so hot, and took the congestion out of the air. There were only a few thousand ops in the organization at the time we entered the War and for its brief (?) duration all amateur stations were shut down by the government. After hostilities ended there was a terrific boom in amateur operating, until the organization has today a membership of over 40,000.

Strange stories can be told of some of the experiences of the amateur operator. They became relay stations for the friends and relatives of those who were on the Byrd Expedition and the interception work they carried through to successful ends will make good reading. Another thrilling incident is related by Frank Lester, W2AMJ, who succeeded in contacting some Brazilian hams during the time of the Dyott Expedition looking for the River of Doubt. Constantly msgs were exchanged by Lester, some of which were relayed to the New York *Times* newspaper. Then for a period of two weeks nothing was heard from South America. Not a bit of information came through from the exploring party and fears were being felt for their lives. Then one night, after Lester had been on watch for many, many hours, he decided to go out with a friend for a breath of air. Upon his return he was called by another ham in Long Island who told him that Brazil had been calling him for the past couple of hours while he was away from his key. Well, it wasn't long before he contacted them and through the ether came a 190-word message telling of the capturing and rescuing of the expedition! This msg was relayed to the *Times* which could only have gotten the news through the amateur medium. Others more romantic can be told, but for lack of space it is impossible to chronicle them all. Suffice to say, L'il Willie Ham is strutting his stuff.

The Heading this month shows classes receiving code instruction at the R.C.A. Institutes, New York City.

Bernie J. Fold, an amateur of long standing, has just recently completed a standard transmitter which, for its simplicity and effectiveness, is about the finest job ye Ed has ever seen in any one's apartment. As he remarked, "It's a case of whether your parents are to live with your radio or whether the radio is to dominate the whole house." He got his first class ticket as a commercial operator many years ago and has stepped right along from the Century Buzzer, the spark coil and a 1-kw. synchronous job up to the tube x'mtr. He has remained in the field watching each new development although he has been kept busy practicing law. He sez that his years as an amateur have been one of unalloyed pleasure and as a former member of the Brooklyn Radio Club he has done everything in his power to further the cause of the ham op. One of the finest things he thinks radio has done for a person is the case of a chap, Dick Noble, W2DBQ, who had nothing to do but sit all day in a wheel chair. One day he wrote to one of the ham mags and was referred to the B.R.C., which took him under their wings and made him a full fledged amateur. Members were even delegated to carry him down to their meetings and a new life opened for him, which to this day is the brightest spot on the escutcheon of that club. Bernie Fold, in his capacity of Lt. JG. USNR, suggested that if any hams wish to become members of the United States Naval Reserve, to please write to him at 145 West 71st Street, New York City, and he will send them the necessary data. He states that there is a trip every year called a cruise for fifteen days with pay, free training courses, and many other features which should appeal to the average ham. So give him a howl, me lads.

If any op wishes to write a book, get away from his frau or beat the collectors, his opportunity is just around the corner, that is, if the Department of Commerce can get the necessary funds. The idea is to

dot the Pacific Ocean with gigantic rafts to guide the airliners to and from the Philippines and the States. These rafts would house three or four men with a radio station built on it, a rescue boat and weather recording instruments. The bill has already been introduced, so hold your breath and keep your fingers crossed.

One of our enthusiastic fans dropped into the office of ye Ed t'other day and gave vent to his feelings by taking us to task because of the amount of space which has been given to the ARTA organization since its inception. 'Tis true, me lads, 'tis true, but it has been the policy of this colyum to print the truth and nothing but, and we have believed that the ARTA has always been the organization for the radio operator and technician, because it stood for the only strong union means to pull the ops together into a united whole for the benefit of morale, efficiency and greater wage earnings. Years ago we investigated and found that the men behind it were white men and against great handicaps were honestly trying to form an organization for the benefit of the operators. There were paragraphs on end printed when we did not believe some of their policies were sound, and then again, we did boost other ideas. Only a short time ago we devoted quite a bit of space knocking the living daylights out of the organization when they held a convention behind closed doors. We wanted the unadulterated information and news and not that which is handed to the press for publication—and we are getting it! We recently received from the head office of the ARTA an apology, and the inside dope is also being handed out. But we cannot delve into the minds of the men who make up the rank and file to find out if they have any grievances, fancied or otherwise. If there are actions going on which are undercover, it is only fair to the man and to other operators to write in to this column and "spill the beans" which you all can rest assured will be sifted down to the very bottom and the truth found. This column is for you and by you, so it is up to you to give it all the cooperation to make it a truthful and clean news-getter, for the benefit of all. We do our best, but it is a true saying "Every one knows who killed the man but the police."

But now that we have boosted the Ham Op, may we not also be frank and do a tiny bit of knocking. Due to the fact that there is little real organization of the amateur and due to the childishness of a few, it seems that during any national catastrophe when the air should be controlled by a few key stations as in commercial operating during an SOS, Some L'il Boy Blue decides to jam up the ether. Of course, it is only the last-few-years type who cause such a muddle, so if these chaps will permit the older and wiser old timers to take them in hand, we know that they will get somewheres for their own good. So with a ge....73....GY.

DX Hints

(*Continued from page 710*)

22 gauge or the like, is wound on a 2- or 3-foot length of copper pipe, of which the diameter may be anywhere between or near 1 and 2 inches. Bury the assembly well down in moist earth. One fault with the usual cold-water pipe ground is that there may be an insulating gasket in a pipe connection between your ground wire and earth. Almost any metallic mass buried in moist ground will make a good "ground". An old clothes boiler, automobile radiator, hot water tank—all are good.

All joints in aerial and ground leads must be carefully made and soldered to insure both a strong mechanical and electrical contact. The

(*Turn to page 762*)

WHAT'S NEW IN RADIO

WILLIAM C. DORF

(*Continued from page* 711)

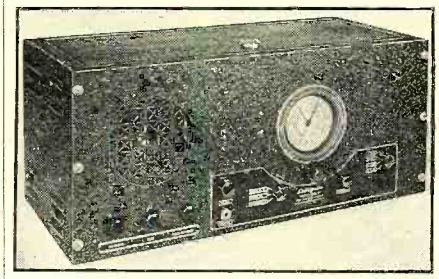
24-Tube Radio-Phono Combination

This attractive console cabinet houses the new Midwest Royale 24-tube, all-wave receiver and latest type automatic record-changing phonograph. It can play eight records successively without attention. The receiver is made up of two units, the tuning chassis employing 13 tubes and the

power amplifier unit, which utilizes 11 tubes. Some of the important features include: high-fidelity reproduction with triple speakers (one bass and two tweeters), 40 watts power output and an extremely wide tuning range of 4½ to 2400 meters in six bands.

Amateur Receiver Available in Kit Form

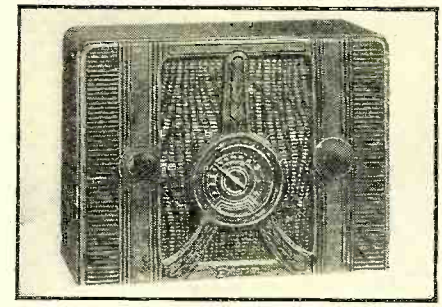
The Wholesale Lafayette "Professional" 9-tube superheterodyne uses an r.f. pre-selector stage on all bands. It includes automatic as well as manual volume control, has a beat-frequency oscillator for code reception and is equipped with mechanical bandspreading. The set can be obtained in either kit or completely as-



sembled form and the feature of the kit is its pre-assembled tuning unit. The tube combination is as follows: a type 6D6 as r.f. amplifier, a 6C6 as mixer a 41 as an oscillator, 6D6 for the first i.f. amplifier, and a 6B7 second i.f. amplifier, diode detector and a.v.c. tube, a 6C6 audio-amplifier, 42 power output tube, a 76 b.f. oscillator, and an 80 type rectifier. Wavelength coverage 9.7 to 560 meters.

Personal Receiver

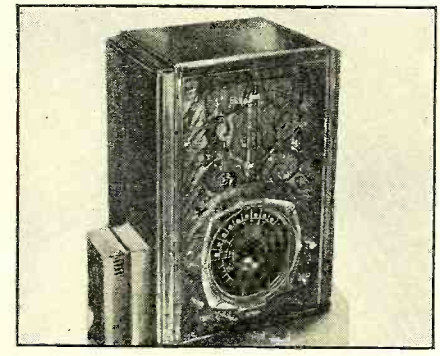
The Emerson model 118 a.c.-d.c. set uses 5 tubes, has a tuning range from 180 to 550 meters and is equipped with a built-in antenna and an electro-dynamic speaker. The tube equipment comprises: one 6D6,



one 6C6, one 43, one 25Z5, one 2VR and a 215 metal ballast tube.

Receiver with 8-Inch Tuning Dial

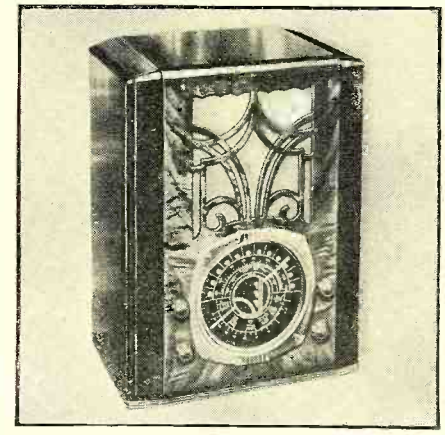
At first glance the most apparent refinement offered by this new Allied Knight 7-tube receiver is the 8-inch dial with "Index Reference" tuning, a method of reference points, clearly marked bands and zone locations to simplify tuning. Metal tubes are employed throughout. It is a three-



band receiver, tuning range of 17 to 565 meters, has triple-tuned i.f. transformers and many other features.

Employs 8 Metal Tubes

This attractive Federated "Acratone" 8 tube superheterodyne has a number of features to recommend it to short-wave and broadcast listeners. It offers a continuous wavelength range from 17 to 565 meters, 5 watts power output using two 6F6's in a



push-pull output stage, a 28 to 1 ratio tuning control, and an 8-inch dial with an illuminated scale calibrated in both kilocycles and megacycles.

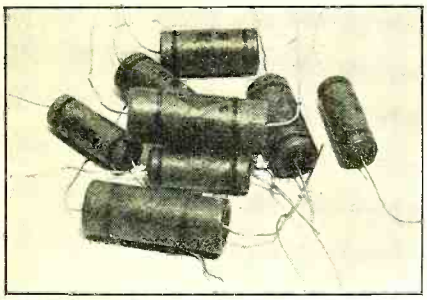
Latest Instrument for the Serviceman

An announcement was recently received from the Jackson Electrical Instrument Company of their new universal d.c. "Multi-Meter" which servicemen should find extremely useful, for point to point

testing. Also especially applicable as a general purpose meter for amateurs, experimenters and sound engineers. Its specifications follow: d.c. volts—0 to 5, 50, 500 and 1000; 1000 ohms per volt and resistance ranges—½ to 500 and 200 to 500,000 ohms.

Tubular Condensers

The Tri-Jay Products Co. introduces a line of tubular by-pass condensers mounted in cardboard tube containers. They are



compact, highly impregnated and wax sealed (not paraffin) and are available in sizes from .0001 to 1.0 mfd. and in standard voltage ratings for amplifier and receiver requirements.

Uses Rear Bumper For Auto Radio Antenna

With the F & H Radio Laboratories' special bumper insulators and bolts it is now possible to use the rear bumper of your car as a motor-car radio antenna. The installation only requires a few minutes and is accomplished by removing the rear bumper bolts and inserting in their place the insulating bolts and the spacer insulators provided, to completely insulate the bumper from the body of the car. The equipment comes complete with a shielded lead-in which can be run along the frame channel of the motor car up to the radio set. Although the bolts and insulators

(*Turn to page* 768)

The Technical Review

(*Continued from page* 751)

equipment, replacement parts, and electrical appliances has been issued by Wholesale Radio Service Co. Copies are obtainable free of charge from RADIO NEWS, 461 Eighth Avenue, New York City.

Latest Catalog

The newest edition of the Radolek catalog contains 160 pages devoted to a large assortment of radio supplies, and besides includes much helpful technical information. Copies may be had free of charge from RADIO NEWS, 461 Eighth Avenue, New York City.

RADIO NEWS Booklet Offers Repeated

For the benefit of our new readers, we are repeating below a list of valuable technical booklets and manufacturers' catalog offers, which were described in details in the January, February, March, April and May, 1936, issues. The majority of these booklets are still available to our readers free of cost. Simply ask for them by their code designations and send your requests to RADIO NEWS, 461 Eighth Avenue, New York, N. Y. The list follows:

Ja2—Radio Parts Catalog, of Insuline Corporation of America. Free.

Ja3—Book Circulars of Alfred A. Ghirardi. Free.

Ja4—Latest Wholesale Radio Service Co. Catalog—listing receivers, sound equipment, amateur and service replacement parts, etc. Free.

F1—Catalog of Radio Parts. The National Co., Inc. Free.

Mh1—Sound Equipment catalog. Inter-World Trading Corp. Free.

Mh2—Radio Parts catalog of Bud Radio, Inc. Free.

Mh3—Amateur Equipment catalog of Wholesale Radio Service Co., Inc. Free.

Mh4—Tube Tester Booklet of Supreme Instruments Corp. Free.

A1—Condenser Replacement Manual of P. R. Mallory Co., Inc. Free to servicemen.

A2—"Your Future in Radio", 32-page book of Sprayberry Academy of Radio. Free to readers seriously considering a modern education in radio.

A3—Radio Capacitor Catalog of Solar Mfg. Co. Free.

My1—Information on a new antenna system. Technical Appliance Corp. Free.

My2—Condenser bulletin of Cornell-Dubilier Corp. Free.

My3—Free. Instructive bulletins on measuring resistance and proper use of resistors to extend meter ranges. Aerovox Corp.

My4—Free. Folders on Polyiron core coils. Aladdin Radio Industries, Inc.

My5—1936 condenser catalog. Sprague Specialties Co. Free.

Just Out! 1936 "Radio Handbook"

THE 1936 edition of the "Radio Handbook," published by the Pacific Radio Publishing Company, surpasses the '35 edition in the number of pages (total 360 pages) with more informative data, charts, and tables, and constructional details accompanied by circuit diagrams of low- and high-powered transmitting circuits and also complete data on short-wave receivers from a one-tube set to a deluxe crystal-filter superheterodyne. Latest information is given on antenna systems. The fundamentals of radio are explained and there is a chapter on learning the code, with rules governing amateur radio stations and operators. It is an unusually fine reference book and should have a place in every amateur or experimenter's radio library. The price of the book is one dollar ($1.00) and any reader desiring a copy can obtain same by forwarding his remittance to RADIO NEWS, 461 Eighth Avenue, New York City.

The DX Corner (Short Waves)

(Continued from page 722)

ton, Sahlbach, Self, Howald, Gaiser.) Observer Houghton says that their times on the air are Tuesdays and Wednesdays, 6-10 a.m., Mondays and Thursdays 3-7 a.m., Saturdays 6-11 a.m. and daily, 11:30 p.m.-1:15 a.m., E.S.T.

YBZ, Menado, Celibes, N. E. I., 7860 kc., reported heard. (Law.)

YDO5, Sourabaya, Java, N. E. I., 2.930 megacycles, reported heard at 8:30 p.m., E.S.T. (Sahlbach.)

PNI, Makassar, N. E. I., 8770 kc., reported heard 3:40 a.m., E.S.T. (Chambers.) Reported heard 10 a.m. (Moore.)

AFRICA

ETB, Addis Ababa, 11.955 megacycles, reported heard Sundays 4:30-4:50 p.m., E.S.T., with news reports, music, etc. This station announces that listeners should send in reports of reception to RADIO NEWS. (Hull, Frost, Meehan, Leroi, Rogan, Pettis.)

IDV, Asmara, Eritrea, 22.40 meters, reported transmitting war news. (Lawton.)

VQ7LO, Nairobi, Kenya, Africa, 49.31 meters, reported heard regularly. (Godee.)

SUV, Cairo, Egypt, 10,055 kc., reported heard late afternoons. (Gavin.)

SUZ, Cairo, Egypt, 21.7 meters, reported heard 11:30 a.m.-1 p.m., E.S.T. (DeLaet.)

EA8AB, Santa Cruz de Tenerife, Canary Islands, 7210 kc., 41.6 meters, reported heard daily 8:15-9:15 a.m. (Gaiser.)

NORTH AMERICA

W1XAL, Boston, Mass., 11,790 kc., reported heard, educational programs, news, music, 4 p.m., E.S.T. (Joerger.)

VE9DR, Montreal, Canada, reported heard on 6005 kc. from 8 a.m.-12:30 or 1 p.m. relaying CFCF. (Belanger.)

W9XAA, Chicago, Ill., 11,830 kc., reported heard 9:15-10 a.m. and 10-11 p.m., E.S.T. (Amos.) Other listeners report transmissions start at 8 a.m. and run throughout the day. (Stark, Howald, Adams, Reilly, Bower, Pilgrim, Holt.)

W2XE, New York, N. Y., 15,270 kc., reported heard as late as 12 noon in India. (Wadia.)

W2XAD, Schenectady, N. Y., 15,330 kc., reported heard in Africa with a fine signal. (Mallet-Veale.)

IF THEY'RE THERE— HE GETS 'EM!

Official Observer Harry E. Kentzel, Averill Park, New York, who certainly steps out on short-waves

The following high-frequency transmissions have been reported by observers:

W8XAI, Rochester, N. Y., 31.6 megs., 9.48 meters, is heard rebroadcasting WHAM 11 a.m.-5 p.m. (Amos, Bower, Parcells.)

W8XWJ, Detroit, Mich., 21.6 megs., 9.48 meters, reported heard 6:15 a.m.-12 noon, 2-5 p.m. and on Sundays 2:30-7:30 p.m., E.S.T. (Wickham, Parcells.)

W9XG, Chicago, Ill., 28 megs., reported heard 8:30-9 p.m., broadcasting television pictures. (Davis.)

W2XDV, New York, N. Y., 31.6 megs., reported heard Saturdays 4-5 p.m., E.S.T. (Amos.)

W1XER, Boston, Mass., 31 megs., 500 watts, reported heard. (Neal, Cummins.)

W9XPD, St. Louis, Mo., 31.6 megs., reported heard 1-4 p.m., E.S.T. (Howald.)

W6XKG, Los Angeles, Cal., 35.6 megs., reported heard daily all day long. (Howald.)

W9XBY, 1530 kc., has a DX tips program Friday evenings 6:30-7:30, E.S.T. (Ludewig.)

XERA, Mexico City, Mexico, 6180 kc., 49 meters, reported heard 7:45-8 a.m. and 8 p.m.-12 midnight. (Hynek, Sahlbach, Gavin.) Observer Bower says the frequency is 6170 kc.

XECR, Mexico City, Mexico, 7380 kc., 20 kw., reported heard Sundays 6-7 p.m. (Hynek, Miller, Howald, Coover.)

XEMO, Tijuana, Mexico, reported

COOL IN EL SALVADOR

Introducing Jose Rodriguez Rivas of Cojutepeque, El Salvador who is not only an Official Observer for RADIO NEWS *but the representative of the I.D.A. for that territory*

EFFICIENT WESTERN POST

Bruce Holmgren of Highland Park, Illinois swears by (not at) RADIO NEWS *and his G.E. model K-80 receiver to get the best results for short-wave listening*

heard on about 6015 kc. irregularly, 7-12 p.m., E.S.T. (Moore.)

XEUW, Vera Cruz, Mexico, 6020 kc., reported heard 6-11 p.m. (Holt.)

XEME, Mexico City, Mexico, 9520 kc., reported heard 7-8:30 p.m., E.S.T. (Gavin, Betances.)

XEBT, Mexico City, Mexico, reported heard on 6000 kc. with 1 kw. (Gavin, Nelson.)

COCH, Havana, Cuba, 9425 kc., reported heard 8:30 p.m.-12 midnight. (Amos, Coover, Law, Fritsch, Immicke.)

COKG, Santiago, Cuba, reported heard 9-10 a.m., 10:30-11:30 a.m., 1:30-3 p.m., 4:30-10:11 p.m., 12 midnight-2 a.m., E.S.T. (Hynek, Millen.) Self says the frequency is 6145 kc.

CO9JQ, Camaguey, Cuba, 9665 kc., reported heard daily except Saturdays and Sundays, 5:30-9 p.m., E.S.T., irregularly to 10 p.m. (Mormon, Amos, Rodriguez, Behr, Scala, Davis, Hynek.)

CO9WR, Sancti, Spiritus, Cuba, 6235 kc., reported heard 8:30-10:05 p.m., E.S.T. (Rodriguez, Lamb, Millen, Danforth.)

HH2S, Port-au-Prince, Haiti, 5915 kc., 100 watts, 49 meters, reported heard daily except Sunday, 7-10 p.m. They are also reported daily except Sundays 1-2 p.m., E.S.T. (Kentzel, Bastien, Bower, Winand, Seright, Gavin.)

HI3U, Santiago, D. R., 6383 kc., reported heard 6:30-8:15 p.m. (Rodriguez, Seright, Coover, Fritsch, Kemp.) Seright reports them on 9612 kc., daily except Sundays, 7-8 p.m., and Sundays 12-1 p.m., E.S.T. Observers Richardson and Gavin say frequency is 9595 kc.

HI3U, Santiago, D. R., 6385 kc., reported heard daily except Sunday 5:30-8 p.m. (Winand.)

HI1J, San Pedro de Macoris, D. R., 5865 kc., reported heard 12-2 p.m., 6:30-9 p.m., E.S.T. (Wilkinson.)

HIL, Trujillo, D. R., 6510 kc., reported heard 6-9 p.m., E.S.T. (Kentzel.)

HI4V, Trujillo, D. R., 6450 kc., reported heard 9:45 p.m., E.S.T. (Rodriguez.)

HI9B, Trujillo, D. R., 6050 kc., reported heard irregularly 5-11 p.m., E.S.T. (Hynek, Millen, Shea, Betances, Anca.)

HIW, Trujillo, D. R., 11,040 kc., reported heard irregularly 5:50-9 p.m. (Lamb.)

HIT, Trujillo, D. R., 6630 kc., 45.25 meters, reported heard daily except Sundays 12:30-2 p.m., 6-9 p.m., and on Saturdays from 11 p.m.-1 a.m. with a DX program. (Bower, Trzuskowski, Lamb, Dressler, Atkinson, Akins, Grabek, Jensen, Scala, Kentzel, Gallagher, Meehan, Millen, Messer, Danforth, Miller, Seright.)

HRD, La Ceiba, Honduras, 6235 kc., reported heard daily except Sundays 8-10:45 p.m. (Butcher, Danforth, Betances, Anca, Mormon.) Observers Winand, Miller, Dressler say the call is HRV. Observer Shea reports the call as HRB.

HRN, Tegucigalpa, Honduras—5910 kc. is now the correct frequency, having moved from 5875 kc.—reported heard 9:30 p.m., E.S.T. (Williamson, Dittmann, Holt, Lowe.)

YNVA, Managua, Nicaragua, 8590 kc., reported heard 8-10 p.m. daily. (Winand, Shea, Butcher.)

TG2X, Guatemala City, Guatemala, 5940 kc., reported heard except Saturdays 8-10 p.m., E.S.T., and on Saturdays 8-11:15 p.m. (Amos.)

TIPG, San Jose de Costa Rica, 6410 kc., 6-10 p.m., E.S.T. (Amos.)

HP5B, Panama City, Panama, 6030 kc., 49.75 meters, reported heard 7-

(*Turn to page* 760)

CROSSED CAPTIONS
SCRAMBLED IDENTITIES

This is really the picture of Boris Scheierman of Stockholm, Sweden, Official Observer for that country for our magazine. This photograph was run earlier with a caption that stated it was Dwight Williamson of Dayton, Ohio. Apologies to all concerned

SHORT-WAVE PAGE

SEVERAL months ago the short-wave listeners drifted up to the 14-megacycle amateur band and discovered a new field! Listeners interested in hearing the usual cross-talk of the amateurs were delighted and then others had their attention attracted by DX possibilities. Then came the flood!

IT was and continues to be a known fact that signals radiated from every corner of the world may be tuned in on the amateur 20-meter band. Comparatively low-powered transmitters have been heard round the world. With due consideration to the time of day that the tuning was "going on" it was a simple matter to tune in amateur stations from Asia, Africa, Australia and Europe. South American countries never before heard on any short-wave broadcasting band were picked up.

Just at this time when all of us realized how interesting these amateur operators were, *a disaster rushed upon our country. The American amateurs, sixty-some-odd thousand strong, now had a wonderful opportunity to prove their worth!* For the entire period of the Johnstown flood calamity, we were at our receivers, listening attentively to their activities. We may say now that our opinion of the amateur is entirely unbiased and we can readily see how many obstacles are cast in their path.

During the long and weary night hours amateurs did some excellent work, but far more could have been accomplished if this powerful army was organized! All wanted to help! Few knew just what to do! And some, not knowing what to do, caused considerable interference to the experienced operators who were doing such wonderful work in communicating with the stricken areas.

Hundreds of instances rush through our mind, but space does not permit us to cite them all. Here are just a few examples. During this trying period the only known outlets from the stricken city of Johnstown were amateur stations W8FRC and W8KRF. The former station, operated by Gerald Coleman, brought the word to a listening world that the waters were taking their toll of life and property. The latter station, operated by Milton Hanson and ably assisted by W8EHR, Theodore Campbell, was in operation for hours and days at a time. W8KRF, had only one crystal; that was 1960 kc. All ingoing and outgoing messages had to be delivered and received through this channel! Any amateur who listened on this band knew, and if he did not, he *should* have known, that if the entire band was a seething mass of heterodynes, 1960 kc. *must be kept clear.* Was that frequency free of interference? NO! Amateurs that had never employed that frequency "moved" there and, pitiful to relate, caused QRM or interference beyond belief!

The boys in Johnstown begged and implored the stations *not* carrying traffic to "please close down," as messages, not rubber stamped affairs but calls for aid, army orders, words to a loved one, must reach the outside area! Some stations did as requested and others *did not!* Here is the point we want to bring out. Can an army be led without a commander? Can a navy maneuver without a flagship? Then how can sixty thousand amateurs proceed without a leader? If there was one, where was he? It is considered correct to offer constructive ideas when criticizing. We make the following suggestions:

Every large city or district should have a leader—call him Master, Commander, District Superintendent or what you will. He should appoint several amateurs to see that his orders are carried out. These lieutenants should have the telephone numbers of the amateurs living in that particular territory. If he has not a telephone, all amateurs should be obliged to get in communication with the lieutenant. The amateurs who are in the distressed area should then be informed that such and such a station will be on watch for his signals. The main point is that messages *from* the stricken area should be given *first* consideration at all times.

Such a thing as petty jealousy and publicity seeking does not exist in the real amateur's code of honor. Quietly he goes about his mission and when a line appears about him in a periodical it only proves that he has accomplished a worthy deed. We heard the work that the amateurs were doing and many who did wonders have as yet not had a single word devoted to them. W8KRF and W8EHR were, in our humble opinion, two shining lights in the entire and never-to-be-forgotten calamity.

There are times when we wonder if some amateurs have a decent receiver! And if they have one, do they ever listen on their own frequency? During the height of the "flood traffic" a few amateurs threw their carriers on the air, testing and causing interference. This is bad enough when

there is no need for amateur aid, but a thousand times worse when the frequencies are so sorely needed.

We sincerely hope that in the event the amateur fraternity is called upon again to render aid, they will be organized to distribute their services to the best advantages. Of course, *the main trouble is that the phone bands are too crowded and should be widened!*

Now to the short-wave notes. Overseas broadcasts from the Japanese short-wave stations are being carried on over JVN, 10.66 meg., and JVP, 7.51 meg., from 4 to 5 p.m., on Monday and Thursday. JVN has been an exceptionally strong signal, but JVP is erratic. Mr. S. Kuramochi, chief of the engineering department, says, "If the results are good, we intend to open a daily service at this same hour." Reports are requested and the address is: Kokusai Denwa Kaisha, Ltd., 1 Chome, Uchisaiwaicho, Kojimachiku, Tokyo, Japan.

Edward Startz, the world-known announcer of the Netherlands stations, informs us that besides the regular programs which are radiated over PHI-PCJ, every Sunday special programs will be broadcast on 9.59 meg. (PHI) from 7:30 to 8:30 a.m. and 7 to 8 p.m. PHI, on 11.73 meg., will also be on the air from 1 to 2 p.m.

"Radio Caracas" is the new name of YV2RC, 5.08 meg. The march with which "Radio Caracas" starts and closes their programs is not the Venezuelan Anthem but is the "IBC," this station's official theme song.

VP3MR, 7.08 meg., British Guiana, has a new schedule, Tuesday and Thursday 5 to 6 p.m., Saturday 5:25 to 6:45 p.m., Sunday 9 to 10 a.m. Address reports to: The Manager, Bookers Drug Store, P.O. Box 17; Georgetown, Demerara, British Guiana.

HJ1ABT, 9.60 meg., "Radiodifusora Cartagena," had been heard between 2 and 4 a.m. transmitting test programs. English announcements add to the enjoyment of this station's programs. Reports are requested. Address P.O. Box 37, Cartagena, Colombia, South America.

On 6.64 meg., HIT broadcasts excellent programs from 6 to 8:30 p.m. They identify themselves as "La Paz de RCA-Victor" and sign off with the playing of "Victory." Address P.O. Box 1105, Trijillo City, Dominican Republic.

Every Monday night from 10:30 to 11:30 p.m. HI3C, 6.90 meg., La Romona, Dominican Republic, will broadcast a special program to the members of short-wave organizations. They sign off with the playing of "Sousa's March."

HJU, Buena Ventura, Colombia, continues to be heard testing on 9.60 meg. from 6 to 7 p.m. and 9 to 10 p.m.

VPD, 13.07 meg., Suva, Fiji Islands, has been heard every night (or should we say every morning?) except Sunday, from 12:30 to 1:30 a.m.

The British Broadcasting Corporation has brought two new frequencies into service and GSN ("N" for nation), 11.82 meg., Daventry has been heard every morning from 1:15 until 3:30 a.m. with an R-8 signal. GSJ ("J" for Justice), 13.93 meg, was active during the fall months, then closed down, but is now back in the B.B.C. service and heard on transmission number 2 from 6 to 8:45 a.m.

OER2 is operating on 6.07 meg. every week-day from 9 a.m. to 5 p.m. and on Saturday until 6 p.m. with a power of 1.5 kw. This station, rarely heard in the United States, would appreciate reports. Address Osterr Radio-verkehrs, A. G. Johannesgasse, 4 B, Wienl, Austria.

We have not devoted space to foreign amateurs heard here in the eastern part of the United States, but if we have sufficient requests for this material we will gladly be guided by our readers' comments.

New Receiver

(*Continued from page 729*)

control until the light-green area of the "eye" begins to flicker. The calibrated input scale reads in microvolts for all frequencies up to 15,000 kilocycles. For measurements on the two higher frequency amateur bands it is necessary to multiply the dial reading by ten.

Another feature that will interest the amateur is the incorporation of a crystal filter providing up to 50-cycle selectivity. The receiver itself is mounted in a crackle-finish cabinet 22 inches long, 10½ inches high and 11½ inches deep. It has six controls in addition to tuning control on the front panel. The power supply is self-contained, but the loudspeaker is external. A tabulation of the specifications of the receiver follow:

Circuit: Superheterodyne, 460 kilocycle intermediate with iron-core transformers and automatic volume control.
Tubes: Ten in all: three 6K7s as r.f. and i.f. amplifiers; two 6J7 oscillators; one 6L7 first detector; one 6H6 second detector and A.V.C.; one 6F5 first audio; one 6Ff audio output; one 6E5 tuning and signal strength indicator; one 5Z4 rectifier.
Dial: Calibrated in megacycles with amateur bands indicated; it incorporates mechanical band-spread with two vernier scale providing three digit logging of stations.
Controls: Combined power, tone control and stand-by switch; calibrated signal-input control; selectivity (crystal phasing) control; A.V.C. on-off switch; tuning dial; range or band switch; audio gain control, beat oscillator on-off switch; calibrated heterodyne control.
Speaker: Eight-inch dynamic, semi-mounted. Audio output is 4½ watts.

The incorporation of the 5-meter band in a receiver of this type undoubtedly will herald a new era in ultra-high-frequency operation. Of course, with 460 kc. intermediate, tuning at 56 megacycles will be much sharper than with the broad-tuning type super-regenerative sets now commonly used. Therefore, when signals with frequency modulation are received, some distortion will result. However, signals that are free from frequency modulation will be heard as clearly as those on the lower frequencies. With the trend toward master-oscillator power-amplifier (m.o.p.a.) and crystal-controlled transmitters on 5 meters, selective receivers of the general coverage type undoubtedly will find wide application. With receivers of this type in use it should encourage amateurs on this band to stabilize their transmitters. At the same time this will make more room on this band (which already is 4000 kilocycles wide—the widest available to the amateur for 'phone operation).

Vibration Pick-up

(*Continued from page 733*)

yet high sensitivity is attained. The rated output is approximately ¼ volt for 1/1000 of an inch of movement at 250 cycles per second.

The frequency range is from 10 to 3000 cycles, and is substantially square law in form, as shown in Figure 1. Motions recurrent in character may be shown visually on a cathode ray oscillograph for study and analysis.

Since the end of the mounting cone is tapped, a prod may be easily attached. When so used the unit is held in the hand and the prod pressed firmly against the vibrating member. However, since the unit is light (it weighs but 8 ounces) it may be clamped directly even to light parts without changing the amplitude and frequency of vibration—the most convenient and satisfactory method of use.

This device should be of considerable value to servicemen as well as for use in physical, mechanical and sound laboratories. From the data it presents, greater efficiency, quieter operation and longer life of machinery should be obtainable. In building construction, improved sound insulation should result, reducing nerve strain and increasing the efficiency of workers.

The DX Corner
(Short Waves)

(*Continued from page 757*)

10:30 p.m., E.S.T. (Foshay, Law, Immicke.)

HP5K, Colon, Panama, 6005 kc., 49.96 meters, reported heard 7:30-9 a.m., 12 noon-1 p.m. and 6-9 p.m., E.S.T. (Foshay, Lawton, Marmon, Church.)

HP5J, Panama City, Panama, 9590 kc., reported heard 12 noon-8 p.m., E.S.T. (Lopez, Coover, Bissell.)

SOUTH AMERICA

VP3MR, Georgetown, British Guiana, 7074 kc., reported heard, except Sunday, 4:30 to 8 p.m., E.S.T., and on Sundays 7:30 to 9 pm. (Meehan, N. C. Smith.

VP3BG, Georgetown, British Guiana, 7200 kc., reported heard during evenings and on Sundays until 8 p.m., E.S.T. (Shea, Wickham.) This station also is heard on the amateur 14-megacycle band at the low-frequency end.

HJU, Buena Ventura, Colombia, 9500 kc., 1000 watts, reported heard 12 noon to 2 p.m. and 8 to 11 p.m., E.S.T., on Wednesdays and Fridays. (Danforth, Wilkinson, Graham, Kentzel, Moore, Williams, Pilgrim, Frost, Davis, Behr, Howald, Gavin, Fletche,r Cox, Jensen, Stabler, Atkinson.) Observer Richardson says he heard them 5 to 8 p.m., E.S.T.

HJN, Bogota, Colombia, 5970 kc., reported heard 8 to 11 p.m., E.S.T. (Amos.)

HJB, Bogota, Colombia, reported heard on 14,950 kc. calling New York at 2 p.m. (Hynek.)

HJ1ABJ, Santa Marta, Colombia, reported heard on 6006 kc., 1 to 2 a.m. (Loke, Morman.)

HJ1ABC, Cucuta, Colombia, 9600 kc., 31.25 meters, reported heard 2 to 11 p.m., E.S.T., announcing in English and Spanish. (Sahlbach.)

HJ1ABP, Cartagena, Colombia, 9600 kc., reported on the air 7:30 p.m. to 11 p.m., E.S.T. (Rodriguez, Danforth, Fritsch, Bower, Anca, Moore, Jensen, Pilgrim, Lopez, Holt, Cox, Davis, Amos, Betances, Gavin, Butcher.) Some Observers reported this station as HJ1ABB, HJ1ABE, and HJ1ABC.

HJ3ABD, Bogota, Colombia, is reported now transmitting on about 6065 kc. and heard as late as 12 midnight. (Foshay.)

HJ3ABF, Bogota, Colombia, 48.5 meters, reported heard as late as 11:35 p.m., E.S.T. (Costes.)

HJ3ABH is reported as changing frequency to 6375 kc. (Moore.)

HJ3ABI, Bogota, Colombia, is reported now to be transmitting on 6070 kc., approximately, and heard 8 to 10 p.m., E.S.T. (Smith.)

HJ4ABD, Medellin, Colombia, 5770 kc., reported heard at 9 p.m., E.S.T. (Rodriguez.)

HJ4ABC, Ibague, Colombia, 6451 kc., reported daily evenings 8 to 10, E.S.T. (Foshay, Anca.) Observer Wynand says the frequency is 6457 kc.

La Voz de Pereira, 6070 kc., reported heard 9:30 to 11 a.m., 6:30 to 9:30 p.m. (Foshay, Moore.) This is a station that many Observers still report at HJ4ABC.

HJ4ABE, Medellin, Colombia, 5930 kc., reported heard 6 to 10 p.m. (Amos, Adams, Howald, Shea.)

HJ5ABC, in Colombia, 6145 kc., reported heard 7:30 to 8:30 p.m., E.S.T. (Moore.)

YV4RC, Caracas, Venezuela, 6375 kc., 47 meters, reported daily except Sundays 6 to 10 p.m., E.S.T. (Wilkinson.)

YV9RC, El Valle, Venezuela, 6400 kc., reported heard 9:50 p.m., E.S.T. (Rodriguez.)

LSX, Montegrande, Argentina, 10,350 kc., reported heard irregularly around 8 p.m., E.S.T. (Pickering, Dressler.)

LRX, Buenos Aires, Argentina, 9580 kc., reported heard irregularly evenings around 9:30 to 11 p.m., E.S.T. (Hynek.)

LRU, Buenos Aires, Argentina, 15,290 kc., reported heard with test programs 5:30 to 6:30 p.m. and also 8 to 9 p.m., E.S.T. (Chambers, Adams, Gallagher, Hull, Bower.)

CEB, Antofagasta, Chile, 10,230 kc., reported heard signing off at 6:15 p.m., E.S.T. (Rodriguez.)

CEC, Santiago, Chile, 9545 kc., reported heard 7:15 to 8 p.m. (Herz.)

CB960, Santiago, Chile, 9600 kc., reported heard until 11:15 p.m., E.S.T. (Pilgrim.)

HCJB, Quito, Ecuador, has again changed frequency to 8590 kc. and is heard daily 1:30 to 4:30 a.m., E.S.T., according to Observer Gaiser.

OCEANIA

VK3LR, Lyndhurst, Australia, 9580 kc., reported heard 12 midnight to 1 a.m. and 5 to 7 a.m., E.S.T. (Howald, Frost, Parsons, Gallagher, Stabler.)

VK3ME, Melbourne, Australia, 9590 kc. (some listeners say 9490 kc.), reported heard from 4:15 a.m., E.S.T., on daily. (Ludewig, Howald, J. Frost, Parsons, Rodriguez, W. E. Frost, Bissell, Sahlbach.)

VK2ME, Sydney, Australia, 9590 kc., 31.28 meters, reported heard 5 to 9 a.m., E.S.T. (Sands, Ludewig, Gallagher, Wolf, Howald, N. C. Smith.)

ZLT, Wellington, New Zealand, 11,000 kc., reported heard testing 12:30 to 4 a.m., E.S.T. (Hull.)

VPD, Suva, Fiji Islands, 13,070 kc., reported heard 12:30 to 1:30 a.m., E.S.T. (Gaiser, Shea, Akins, Chambers, Gallagher, Moore, Reilly, Howald.)

KBI, Manila, Philippine Islands, 21,140 kc., reported heard testing with music on Sundays 4 to 6 p.m., E.S.T. (Hull.)

KKVP, Honolulu, Hawaii, reported heard on about 16,050 kc., 12 midnight to 2 a.m., E.S.T. (Markuson.)

KTO, Manila, Philippine Islands, reported heard on about 16,200 kc., 12 midnight to 1 a.m., E.S.T. (Markuson.)

Readers Who Are Awarded "Honorable Mention" for Their Work in Connection with This Month's Short-Wave Report

W. J. Thomas III, Dr. Max Hausdorff, N. C. Smith, F. G. Carmichael, L. M. Jensen, F. T. Reilly, R. C. Messer, E. L. Frost, James E. Moore Jr., R. C. Ludewig, Edward DeLaet, A. Belanger, Joe Stokes, Frank Andrews, Arthur Church, Kenneth Dressler, Oliver Amlie, Eddie C. Zarn, Harry Wolf, J. T. Atkinson, H. Kemp, R. O. Lamb, G. L. Harris, Thomas Worden, D.R.D. Wadia, L. Stabler, William Koehnlein, George C. Akins, Jack Bews, Fred Cox, Donald Bissell, Charles Holt, Lewis Miller, Bruce Holmgren, Alvin H. Behr, Wade Chambers, Arthur B. Coover, S. A. Tucker, George Danforth, Sidney G. Millen, Harold F. Lower, Leo Herz, Roy L. Christoph, Dan C. Morgan, A. F. Dittmann, L. E. Williams, C. W. Bourne, Thomas P. Jordan, Clayton D. Sands, M. J. Markuson, J. F. Fritsch, Harry E. Kentzel, Thaddeus L. Grabek, Frank Wheeler, Robert Homsher, Eric Butcher, M. Michaelson, Raymond S. Swenson, L. C.

McCormick, J. Lunn, Eric W. Watson, Charles E. Pellatt, James Lynch, Richard H. Graham, Caleb Wilkinson, Joseph Trzuskowski, Donald Smith, L. W. Leroi, Frank C. Barrett, Richard Suratt Jr., Dwight Williamson, Albert Pickering, Jenner Bastien, G. C. Gallagher, Jose L. Lopez, Jerry M. Hynek, R. W. Sahlbach, E. W. Law, Isaac T. Davis, Robert Barnes, Charles Parcells, Morgan Foshay, Jose Rodriguez R., Harold J. Self, Randolph Neal, Boris Scheierman, Ted Stark, Fred A. Pilgrim, Enrico Scala Jr., Victor D. Seright, E.M.O. Godee, D. Thwaites, Harold W. Bower, F. M. Parmeter, R. S. Houghton, Melton and Gilpin Amos, A. J. Hull Jr., Robert F. Gaiser, Augusto Anca, Manuel E. Betances, H. Westman, J. Wendell Partner, Vincent S. Cigoj, George H. Fletcher, Clarence Norman, Malcomb L. Gavin, Werner Howald, C. H. Wesser, Walter F. Johnson, Laurent Gagnon, D. W. Parsons, Frank Sakely, George James Ellsworth, Stanley E. Armsby, A. Monaghan, W. H. Capell, Frank Nosworthy, I. Queen, Johan P. Curiel, R. Lawton, R. Bern, J. Y. Pa, Lawrence E. Grant, H. E. Rebensdorf, A. S. Mather, Robert Roger, N. M. Pettis, Flavio C. Mascarenhas, J. S. Phillips, C. W. Twomey, Stanley J. Zuchora, Howard Adams Jr., John Monckton, Leinard Trickle, W. E. Frost, Fred C. Lowe Jr., George Munz, Earle R. Wickham, H. F. Drake, A. T. Hull Jr., B. L. Cummins, Jose D. Caro Costas Jr., H. Francis Shea, James Brown, P. C. Richardson, Anton J. Cindel, Chester A. Joerger, Luis Diez A., J. L. Marcum, Arthur Immicke, Irving G. Couvillion, W. J. Humphries, Bernard Shoneborger, Ron Gurr, Garland Haas, Morton Dennis Meehan, H. W. Kamen, George L. Loke, Jack Frost, V. W. Slaughter, Douglas S. Catchim, R. C. Owen, Bernard L. Wood, Manno Nelson Jr.

The DX Corner (Broadcast Band)

(*Continued from page* 741)

January 8th. CMCB, 1230 kc., 150 watts, Havana, sends out a nice letter of verification. This station's address is: Happy Joe Sabritos, Radio Chain, Bacardi Building, 305, Havana, Cuba.

Observer Kimmons (Austin, Texas): The "R.N. Trap Circuit Tenatuner" was constructed the first week of this month and words can not express how much this tuner boosts the signals. 100-watt stations in Vermont and Maine were heard that I have been trying for 4 years to get. I would not be afraid to bet that at least 75 new stations would have been logged if this tuner had been used since the beginning of the present season. Summer static is already very bad here in Texas.

Observer Phillips (Cambridge, England): Have had another good month of listening. Radio Ile de France has shifted from 1348 kc. to 1360 kc. where it has a clear channel. Radio Beziers, a Paris station, is going to move into the center of France. EAJ15, 3 kw. (to be increased to 4.5 kw.) is now operating on 1020 kc. along with Barcelona. Hamburg now has a fanfare of trumpets to announce the opening of programs, the reveille of the German navy being played. Bremen gives a few bars of an old folk song for the opening. The private station at Salonica which closed in 1934 is again on the air on 1285 kc. from 17:00-20:00 GMT weekdays, and from 11:30-13:00 GMT Sundays. Reports to this station should be addressed: Association des Sansfilistes Saloniciens, 37 rue Condouriotis, Salonica, Greece. A new station in Czechoslovakia using 30 kw. on 392 kc. will open some time in May. A French program heard on 731 kc. at 13:30 GMT should not be mistaken for Marseilles PTT as this program comes from Seville, Spain. From 23:30 to 00:30 in winter and from 22:30 to 23:30 GMT in summer Radio Toulouse will give Arabian and other oriental music. This can also be heard from Radio Maroc, 601 kc.

Observer Mathie (Hawkes Bay, N. Z.): The TP's mentioned by Observer Shields (Ohio) in the DX Corner, January issue, RADIO NEWS, as being unidentified on 640, 670, 790, 870 and 1020 kc. would be 5CK, 2CO, 4YA, 2GB and 2KY respectively. FFZ, 1400 kc., Shanghai, China, states that they are using 1 kw. and broadcast daily as follows: 4:30-6 GMT, popular program; 10:30-12 GMT, popular program; 12-13 GMT, course of French and Chinese studies; 13-15 GMT, classical program. The address is Radio Station FFZ, Administration Municipale, 135 Route Frelupt, Shanghai, China.

Service Contest

(*Continued from page* 747)

"The writer will be glad to furnish additional data to anyone sufficient interested to drop him a line." (Suggest enclosing a self-addressed and stamped envelope.—*Editor.*)

FOURTH PRIZE

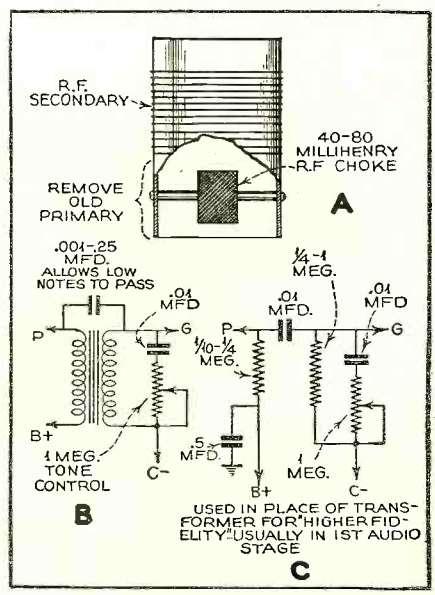
H. E. Becker sells electrical appliances as a side-line. Concerning the service bench illustrated in Figure 4, he writes: "The foundation of this bench is a davenport frame, which I was about to discard when the idea struck me. Legs and a top completed the conversion. Remove eight bolts, and the legs are off—for convenient transportation. The panel is of mahogany varnished pressed wood. The bench top is of the same but heavier material. This bench is amply provided with all useful meters, different ranges being secured with convenient selector switches. All a.c. and d.c. voltages associated with radio receiver operation are available. The equipment consists of an all-wave oscillator, tube tester and Universal push-button analyzer. The shelf is on casters, and is used mostly for sets awaiting service or delivery. Additional shelf room, not shown in the photo, provides orderly space for spare parts, tubes, etc.

"I have a front room in the house with a private entrance and a sliding door to the living room. Lotsa fun! I am a telegraph operator, and this is my side-line and hobby." (This davenport idea is a good one—but we know several servicemen who would take it as an invitation to lie down on the job.—*Editor.*)

Radio Workshop

(*Continued from page* 739)

drawing "A". Next I connect a small bypass condenser having a capacity from .001 to .25 mfd. from the plate to grid terminal of the audio-frequency transformers. See diagram "B." This provides a path for the lower frequencies which are usually cut off in the earlier model sets. The proper capacity of the bypass condensers must be determined by experimenting. Third, I add a tone control, usually a 1 megohm potentiometer and a .01 condenser combination connected across the secondary of the output a.f. transformer.



Sometimes I install new tapped dual-band r.f. coils and if the set is very powerful, I substitute for the first a.f. transformer a resistance-coupled stage as in diagram "C".

Sets revamped in this way have plenty of pep without any loss in selectivity and the tone is much improved.

HARRY D. HOOTON,
Beach Hill, W. Va.

DX Hints

(*Continued from page 753*)

metal surfaces to be joined should be scraped or filed to a clean, uniform brightness. Fasten firmly together. For best results and permanency add all three finishing touches—solder, tape and paint.

An outdoor aerial should be at right angles to a nearby power line, railway or the like. Aerial wire is better if stranded and enamelled. If a shielded lead-in is employed, the shielding must be well grounded.

Suppose you fear or suspect that your aerial is too long for the station tuned in, or the receiver in use, but do not wish to do a job of roof-climbing after midnight. Here is a quick way to decrease the aerial's effective length: put a 100 mmfd. fixed condenser in series with your lead-in wire.

Inspection should be made from time to time of the outdoor portions of your aerial system. Insulation is all-important. Remember that even the wet wood of a roof or house wall forms a partial conductor, eager to steal those vital microvolts from the incoming signal.

Give all tube-prongs a light sandpaper cleaning several times per year. Keep variable condenser plates free of dust—applying the same care to exposed resistor surfaces and similar gear.

Such minor attentions may appear insignificant, taken separately. Adopted collectively, they may reward you with the long-awaited logging of Shanghai or Africa.

The non-technical broadcast listener is often apt to forget that headphones sometimes will bring in a weak DX signal where in some cases loudspeaker reception might be unsatisfactory. If your receiver has no phone jack, a suitable adapter can be made or purchased.

For the utmost success in DX dialing, it is not enough to "tune slowly," always. Rather, you must move the condenser control over one (or one-half) point on the dial scale, leaving it motionless there for a half minute or longer, depending on air conditions. Fading, atmospherics and the like may completely blank out a faint signal, which may come in with fair strength after a short wait.

The various DX Clubs are a real help to the enthusiastic nighthawk listener. They provide, generally at nominal cost, a valuable exchange of hard-to-get information—tips, station changes, schedules, special DX programmes, and perhaps best of all, the sporting spirit of competition which makes one try to acquire a better log than the other fellow.

By all means, consult the Short-Wave Time-Table in this magazine for your "regular" short-wave listening-in. It will save you time and insure you getting real results out of your receiver! Also consult the listeners reports in The DX Corner to see if you can better the records other listeners are making.

It is trite to say, keep a log. But it makes a fine reference.

Anyone with an all-wave set is missing an opportunity for a lot of pleasure and satisfaction if they do not try a twist at the fascinating high frequencies—a plunge into the earth-girdling short waves. Looking around me it seems that everyone and his auntie are doing it. Here one can recapture the thrills of early days in radio—*multiplied tenfold!*

To such as may be hesitating on the brink of this plunge, the advice of a confirmed addict will invariably be, "Go ahead—you'll never regret it!" To get the full mixture of joy, exasperation and surprises from the game, start off by building a small short-wave receiver for yourself. Every schoolboy nowadays has the necessary diagram for just the best circuit very clearly in his mind, right where the algebra should be!

You may by some miracle get by without once mastering a jigsaw puzzle and face posterity with a certain assumed air of calmness. But never will you be able to look your grandchildren in the optics if you failed, during the nineteen-thirties, to throw together a two or three-tube blooper, and (with the aid of the plumber, the postman and Miss Nextdoor) drag in "Rah-de-oh Rom-ah" by brute force and some ear-stretching.

Take this tip (or reject it) as one dabbler's opinion based on experience: the average converter does not give as pleasing results as a decidedly haywire, home-carved straight short-waver. (Using an equal number of tubes.)

It is generally admitted that converters are temperamental. However, when a converter is properly designed and constructed, it *is* good!

Perhaps the author is a bit prejudiced against the converter, due to certain memories attending his own unforgettable launching into the short waves via that route. Including the fun (?) of building the necessary filament transformer, of which the combined weight and dimensions tended to over-balance a large brick home. Not that the transformer gave trouble. It was instead one small, unsuspected but guilty fixed condenser lurking in that first mysterious kit of radio parts. At that dim date your consultant did not know how to test such a gadget, so (confession is good for the soul, if not for the record) the traitorous "triple-0-5" sent the receiver volume control to glory by way of the cremation pathway. Let it pass, though, like the condenser did the plate voltage.

Later the converter showed a marked partiality for the code songs of NAA, five assorted North American 'phones, a lesser group of *hamfones,* plus WOO, WQN and XDA. One winter evening it hopped the big pond to the tight little isle, and proudly strutted back with GSA replete with words and music. Neither of us has so far recovered from that surprise!

A general working rule for short-wave radio reception, as regards the best time of day for the various bands, would be: below 30 meters during daylight, and above that wavelength at night. The "World Short-Wave Time-Table" revised monthly in RADIO NEWS, will provide specific information on when to listen for each station.

There is little point in trying to *tell* anyone just how sharp the tuning is on short-wave reception, as it is one of those facts capable of being grasped properly only by personal experience. However, if the newcomer to the high-frequency channels, after building or buying the first receiver, can control or at least faintly moderate his eagerness to bring Australia "pounding in" till after the first evenings tuning . . . there is a gradual means of approach to the full realization of this extremely sharp tuning.

Also, listen in on 20, 80 and 160 meters for the Amateur Stations and see what a "kick" you can get out of their conversations. You may think at first that these "Ham" voices are talking English; then a few moments later begin to question your rash assumption—because of much that you will hear, it may seem as if the boys are making sport of the alphabet, with a pronounced liking for the letter Q.

The translation of a few of their short abbreviation forms follows:

yl—*young lady*
R9—*very loud*
sk—*end of message*
om—*old man*
xmitter—*transmitter*
qsl—*verification*
sked—*schedule*
qrm—*interference*
qrt—*stop sending*
Aussie—*Australian ham*
cans—*headphones*
hid—*poor operator*
ow—*old woman*
Zedder—*N. Zealand ham*

cq—*general call*
hi—*laughter*
cw—*code (continuous wave)*
xyl—*wife*
qra—*address*
shack—*radio room*
qrl—*busy*
qrn—*static*
qrx—*stand by*
bcl—*broadcast listener*
cul—*see you later*
op—*operator*
qso—*2-way communication*
73—*best regards*
88—*love and kisses*

Instead of saying "sk" (end of transmission), friend ham may throw it into a vocal imitation of the code characters for those two letters (...—.—) thus: dit dit dit dah dit dah. Or if he is in a more exuberant frame of mind and oral output, his rendering of sk may be something like "diddely bump de bump." In like manner "hi" (laughter) becomes dit-dit-dit-dit, dit-dit.

Incidentally, if the broadcast fan is in a rush to put the new short-waver into operation, this may be managed without the expense and delay of erecting a second aerial. To the short-wave receiver antenna terminal attach a length of hook-up wire, long enough to reach the lead-in of the long-wave receiver's aerial. Twist a short length of the short wire several times around the lead-in. Do NOT make a metal-to-metal contact of any sort between the two wires. This is known as a capacity coupling.

Later, a separate short-wave aerial system may be used, since directional experiments often lead to surprisingly helpful results.

You are now prepared to forsake sleep, society and sordid business for the serious (though hilarious) job of accomplishing the all-wave fanatic's ambition.

23-Tube Receiver

(*Continued from page 713*)

From the standpoint of the broadcast band DX fan the tests at the Bronx listening post demonstrated that this receiver offers a really remarkable degree of selectivity. For instance, it was possible a good deal of the time to tune in the Cuban station understandably on 715 kc. while WOR, the strongest local station, was going full blast on 710 kc. In numerous other instances,

stations operating on "split" frequencies were tuned in, but this case was especially noteworthy because of the tremendous signal received from WOR.

Before leaving the subject of broadcast band reception it is interesting to note that Edward Goss, one of the RADIO NEWS Official Broadcast Band Listening Post Observers, located in Brooklyn, New York City, has attained the "World-Wide" degree offered by the International DX'ers Alliance with a duplicate of the receiver used in these tests. To qualify for this degree it is necessary to tune in and verify 540-1500 kc. broadcast reception from all continents of the world. R. H. Tomlinson, another Official Observer located at Portchester, New York, who has been operating one of these receivers during the winter has likewise heard and verified reception from an amazing number of transatlantic and transpacific broadcast stations.

On the short waves the receiver certainly shines for its ability to pull in distance and produces strong signals with a minimum amount of noise. As an indication of this ability we are listing below a number of 20-meter amateur phone stations heard during the last two days before this article was written. In Cuba: CO6OM, CO8YB, CO2HY, CO2SB, CO9GC (all heard better than R9); in Costa Rica: TI2AV, TI2RC, TI3AV (all better than R8). Stations NY2AE and HP1A, Panama, heard regularly (R9). HI5X, in the Dominican Republic, was heard R9+. In Mexico: XE2AH, XE3AG, XE1G, XE2FC, XE2AH, XE3G were all heard above R8. CE1BY, believed to be in Chile, was received R5 to R7 with some fading. In Canada: VE1DR, VE3EO, VE3UR, VE4DU, VE4FI, VE4MB, VE5BK, VE5HI, VE5HN, VE5OT (all R8 to 9). K6JLV, in Hawaii, was heard Saturday night at 3 a.m. (R8+). In the afternoon of the same day the following English amateur phone stations were heard R5 to R9+: G6LK, G5ML, G6QS, G5JO. During these same two days the following Australian amateurs were heard on phone: VK2UC, VK2AC, VK2NY, VK2NH, VK2NO, VK2OD, VK2EW, VK3AP, VK3QS (R5 to R9). It will be noted that we have not included any of the American amateurs as even the 6's and 7's were too numerous to record here. Also remember that this was only two days' reception and we note, looking at the past logs, hearing amateurs on phone from every continent and from over fifty different countries.

In order to show world coverage of short-wave stations from the New York area on this receiver, an examination was made of the logs of both the Westchester and Bronx listening posts. The list that follows gives only those stations that were positively identified during the two-months' period. There were hundreds of other stations logged but either due to difficulties of language or possibly due to the fact that a large number of them were special transmissions their location and identity were not confirmed so we are not listing them here.

Kc.	*Call Letters*	*City, Country*
21540	W8XK	Pittsburgh, Pa.
21530	GSI	Daventry, England
21520	W2XE	New York, N. Y.
17790	GSG	Daventry, England
17780	W3XAL	Bound Brook, N. J.
17760	DJE	Zeesen, Germany
15370	HAS3	Budapest, Hungary
15340	DJR	Zeesen, Germany
15330	W2XAD	Schenectady, N. Y.
15290	LRU	Buenos Aires, Argentina
15280	DJQ	Zeesen, Germany
15270	W2XE	New York, N. Y.
15260	GSI	Daventry, England
15244	FYA	Pontoise, France
15220	PJC	Huizen, Holland
15210	W8XK	Pittsburgh, Pa.
15200	DJB	Zeesen, Germany
15180	GSO	Daventry, England
14150	GSF	Daventry, England
15110	DJL	Zeesen, Germany
15041	RKI	Moscow, U. S. S. R.
14600	JVH	Nazaki, Japan
13635	SPW	Warsaw, Poland
13200	ORP	Ruysselede, Belgium
13075	VPD	Suva, Fiji Islands
12235	TFJ	Reykjavik, Iceland
12000	RV59 (RNE)	Moscow, U. S. S. R.
11900	CT1GO	Parede, Portugal
11880	FYA	Pontoise, France
11870	W8XK	Pittsburgh, Pa.
11860	GSE	Daventry, England
11830	W3XE	New York, N. Y.
11830	W9XAA	Chicago, Ill.
11820	GSN	Daventry, England
11810	I2RO	Rome, Italy
11795	DJO	Zeesen, Germany
11770	DJD	Zeesen, Germany
11750	GSD	Daventry, England
11730	PHI	Huizen, Holland
11730	CJRX	Winnipeg, Canada
11720	FYA	Pontoise, France
11720	HJ4ABA	Medellin, Colombia
10740	JVM	Nazaki, Japan
10670	CEC	Santiago, Chile
10660	JVN	Nazaki, Japan
10260	PMN	Bandoeng, Java
10042	DZB	Zeesen, Germany
9860	EAQ	Madrid, Spain
9660	CT1AA	Lisbon, Portugal
9635	I2RO	Rome, Italy
9595	HH3W	Port-au-Prince, Haiti
9595	HBL	Geneva, Switzerland
9590	W3XAU	Philadelphia, Pa.
9590	VK2ME	Sydney, Australia
9590	PCJ	Huizen, Holland
9590	HP5J	Panama City, Panama
9580	VK3LR	Lyndhurst, Australia
9580	GSC	Daventry, England
9570	W1XK	Millis, Mass.
9560	DJA	Zeesen, Germany
9540	DJN	Zeesen, Germany
9530	W2XAF	Schenectady, N. Y.
9510	GSB	Daventry, England
9500	HJU	Buenaventura, Colombia
9490	VK3ME	Melbourne, Australia
9428	COCH	Havana, Cuba
8775	HCJB	Quito, Ecuador
8750	ZCK (ZBW)	Hongkong, China
7854	HC2JSB	Guayaquil, Ecuador
7797	HBP	Geneva, Switzerland
7281	HJ1ABD	Cartagena, Colombia
7118	HB9B	Basle, Switzerland
7080	VP3MR	Georgetown, Brit. Guiana
6900	HJ3C	La Romana, D. R.
6796	HIH	San Pedro, D. R.
6750	JVT	Nazaki, Japan
6710	TIEP	San Jose, Costa Rica
6667	HC2RL	Guayaquil, Ecuador
6616	PRADO	Rio Bamba, Ecuador
6611	RV72	Moscow, U.S.S.R.
6550	TIRCC	San Jose, Costa Rica
6520	YV6RV	Valencia, Venezuela
6490	HJ5ABD	Cali, Colombia
6482	HI4D	Trujillo, D. R.
6451	HJ4ABC	Ibague, Colombia
6447	HJ1ABB	Barranquilla, Colombia
6383	HI3U	Santiago, D. R.
6375	YV4RC	Caracas, Venezuela
6350	HRT1	San Pedro Sula, D. R.
6315	HIZ	Trujillo, D. R.
6300	YV12RM	Maracay, Venezuela
6320	OAX4G	Lima, Peru
6225	HJ1ABH	Cienaga, Colombia
6188	HI1A	Santiago, D. R.
6180	HJ3ABF	Bogota, Colombia
6160	CJRO	Winnipeg, Canada
6150	YV3RC	Caracas, Venezuela
6150	HJ5ABC	Cali, Colombia
6132	ZGE	Kuala Lumpur, F. M. S.
6130	COCD	Havana, Cuba
6120	W2XE	New York, N. Y.
6116	HJ1ABE	Cartagena, Colombia
6110	CHNX	Halifax, Nova Scotia
6110	GSL	Daventry, England
6100	W3XAL	Bound Brook, N. J.
6100	W9XF	Chicago, Ill.
6090	CRCX	Toronto, Canada
6083	VQ7LO	Nairobi, Kenya
6080	HP5F	Colon, Panama
6080	W9XAA	Chicago, Ill.
6079	DJN	Zeesen, Germany
6072	OER2	Vienna, Austria
6070	HH2S	Port-au-Prince, Haiti
6060	W8XAL	Cincinnati, Ohio
6060	W3XAU	Philadelphia, Pa.
6060	OXY	Skamlebaek, Denmark
6050	GSA	Daventry, England
6045	HJ3ABI	Bogota, Colombia
6042	HJ1ABG	Barranquilla, Colombia
6040	VDA	Batavia, Java
6040	W1XAL	Boston, Mass.
6030	HP5B	Panama City, Panama
6020	DJC	Zeesen, Germany
6018	ZHI	Singapore, St. Settlements
6012	HJ3ABH	Bogota, Colombia
6010	COCO	Havana, Cuba
6006	HJ1ABJ	Santa Marta, Colombia
6000	RV59	Moscow, U. S. S. R.
5980	HIX	Trujillo, D. R.
5976	HJ2ABC	Cucuta, Colombia
5950	HJN	Bogota, Colombia
5930	HJ4ABE	Medellin, Colombia
5880	YV8RB	Barquisimeto, Venezuela
5875	HRN	Tegucigalpa, Honduras
5850	YV5RMO	Maracaibo, Venezuela
5800	YV2RC	Caracas, Venezuela
5780	OAX4D	Lima, Peru
5720	YV10RSC	San Cristobal, Venezuela
4273	RV15	Khabarovsk, U. S. S. R.

Hearing Aid

(*Continued from page 735*)

the microphone cable must be maintained. If the bare shielding braid of this cable comes in contact with the chassis, the amplifier will motorboat.

An 8-mfd. dry electrolytic condenser, C8, is shown at one of the 79 plate load resistor ends. This was necessary to overcome oscillation. It may be slipped into the space under the power transformer at the right-hand front of the chassis.

Make an additional shield for the 79 tube and its No. 1 triode filter circuit (which is located above the chassis) of 1/16-inch sheet iron, 6½ inches by 12 inches, formed into a rectangular tube 2⅛ inches by 3¾ inches by 6½ inches long and soldered at the lap. This is held in place around the 79 tube by strapping to the chassis at the bottom. It can also be soldered to the chassis at the bottom corner for added rigidity. A notch must be filed in the bottom of this shield to allow the microphone cable to pass through to the 79 grid. This shield is necessary to avoid hum pick-up from the 80 rectifier, which is very close.

Next, a Yaxley two-circuit rotary switch (SW2) is placed on the opposite side of the tuning condenser from the power transformer. Leads are soldered to the end of the voice coil connecting wire at the output transformer and

to the terminal on the transformer, and the leads are brought down and soldered to one circuit of this two-circuit switch so the loudspeaker will operate when this side of the switch is closed. The other side of the switch is wired in series with the lead from the 79 tube output to the 42 grid. Thus, when the loudspeaker is in operation, the hearing aid is off, and vice versa. This avoids the squeal which would occur if both the the loudspeaker and the hearing aid were on at the same time.

The hearing aid should now operate satisfactorily. No hum should be audible with the earpiece volume control half-way advanced, at which point acoustic feedback is likely to start unless the earpiece is pressed against the ear. The user should take a position ten or more feet from the set for best results when using the maximum power as a hearing aid.

Holes are drilled in the radio cabinet front for the two switches, at about the height of the tuning knob and in a position to bring the right-hand switch between the tuning condenser and the power transformer. The left-hand switch should be set over far enough to avoid the tuning condenser. Two inches from the tuning condenser shaft is about right for the right-hand switch and three inches for the left-hand switch.

Cut a hole in the left-hand end of the cabinet at the front for the phone jack—it can be mounted in place with 6-32 screws and nuts.

The earpiece used is a Trimm Featherweight of 1000 ohms or higher resistance. The Trimm miniature, also, is very good where hearing loss is not too great. If the miniature is used, it should be 2000 ohms resistance and should be used with a hard-rubber, individually-molded earpiece to get the proper fit for the ear and maximum benefit. The headphone volume control is in the headphone cord as a matter of convenience.

Such a device as this should not be accessible to children and should be used with caution at all times. The user should turn the volume down at the earpiece control when close to the microphone, before manipulating the switches, while dialing the telephone or while he is removing and replacing the telephone receiver. This is to avoid excessively loud sound such as might occur during these operations, due to the high amplification. When the user has formed the habit of retarding the volume on approaching and adjusting the set, this is not hard to avoid. It should be made a point that no one except the individual who is hard of hearing is to use the earpiece and that no one else is to attempt to manipulate the switches or tune the radio while such individual is using the earpiece. To protect the earpiece from unnecessary abuse, always turn the volume control off when it is not in use.

The changes we have made in this radio should not have affected the radio itself except for a slight reduction of loudspeaker volume. This reduction of volume is so slight that it is negligible. If a large reduction has occurred, the radio should be checked over and re-balanced. It will be found that the two-circuit switch for loudspeaker-hearing aid change-over has in reality three positions. The third position is midway between; and in this position the loudspeaker and hearing aid are both off, the radio music going to the headphone only. This makes it possible to eliminate the 79 tube filament switch and substitute a tone control in its place, if desired.

Parts List

One Philco receiver, model 84-B
One Astatic Microphone Co. crystal microphone
One Trimm Featherweight headphone (1000 ohms d.c. resistance or more)
C1—Tubular by-pass condenser, .5 mfd., 400 volts
C2—Tubular dry electrolytic condenser, 10 mfd., 30 volts
CC3, C4, C5—Tubular by-pass condensers, .25 mfd., 400 volts
C6, C7—Tubular by-pass condensers, .05 mfd., 400 volts
C8—Cardboard-case, dry-electrolytic condenser, 8 mfds., 500 volts
C9—Tubular dry electrolytic condenser, 25 mfds., 30 volts
R1—Centralab "Modu Plug" volume control, potentiometer type, 20,000 ohms (with 20 ft. cord)
R2—Two 5-watt resistors in series, 50,000 and 250 ohms
R3—Metallized resistor, 5 megohms
R4, R5, R6, R7—Metallized resistors, 50,000 ohms, ½ watt
R8, R9, R10—Metallized resistors, .25 megohm, ½ watt
SW1—H. & H. rotary snap switch, s.p.s.t.
SW2—Yaxley two-circuit rotary switch
One type 79 tube
One 6-prong wafer type socket with tube shield
One special shield (see text)
One Gilbert alarm clock case
One Auburn Rubber Co. fruit jar opened (for microphone mounting)
Two small knobs
One bakelite ring, ⅛ inch thick, 2¼-inch hole, 3¾-inch outside diameter
One sponge rubber, ½ inch thick by 3¾-inch diameter
One twin phone jack
Miscellaneous hardware
Cost approximately $60, complete at list prices

The Radio Beginner

(*Continued from page 737*)

several reasons why the above described method of operation (Figure 2) is not popular for small sets. In the first place it requires an extra "C" battery and it is necessary to know the exact location of the sharpest point of the bend for a given plate voltage, so as to get most efficient detection.

A second system which does not require a "C" battery is more practical for a simple receiver. This makes use of a grid condenser and a grid leak. The circuit is shown in Figure 5. The grid-leak resistor, R2, is connected to the positive side of the filament, making the grid slightly positive and as a result a considerable plate current will flow when no signal is coming in. When the grid is driven more positive by a signal (the positive half of a cycle), electrons will be attracted by the grid itself and will charge the grid-condenser C3, the grid side of it becoming negative. During the next half-cycle (negative) no electrons can be attracted and the grid cannot get rid of its charge except through the grid leak R2. This takes a relatively long time and while a current is flowing through the resistor, there is a voltage drop across it making the grid negative except at the peak of the positive half cycle. In this way the bias adjusts itself to a point where detection takes place.

Proper proportioning of the grid condenser and grid leak are necessary, so the charge will leak off at the required rate. Suppose, for instance, that the grid resistor has a very high value, it will take very long before the charge leaks off and during that time, the grid may stay so far negative that the tube is inoperative. On the other hand, if the resistance is too small there may not be enough bias and the tube will be insensitive.

This circuit is used in the revised receiver presented this month and makes the signals much louder. For detection purposes a rather low plate voltage ("B" battery) will be satisfactory. It works well with only 22.5 volts. Since a standard 45-volt "B" battery is required for use with units to be described in future articles of this series, the parts list shows such a battery rather than the 22.5-volt type. There is, of course, no objection to using a smaller capacity battery with 22.5 volts maximum for this month's receiver.

The complete circuit of the new unit is shown in Figure 5.

Changing the old circuit to the new one is simple. The connections to the coil and the tap switches remain the same; nearly all changes are made at the tube socket. First mount another Fahnestock clip at the right-hand back corner of the baseboard. This will become the B+ terminal. Disconnect and remove the leads to the phone jacks and to the plate and grid of the tube.

There is a wire which runs from the filament switch to tap 3 or 4 of the coil. Disconnect this wire from the coil and connect it to the ground wire. This connects the negative side of the filament to ground.

Connect the B+ Fahnestock clip to the nearest phone clip. The other phone clip is connected to the plate terminal of the socket. The grid condenser, C3, is connected from the stationary plates of the tuning condenser (one of the outside terminals) to the grid terminal of the tube socket. Then connect the grid leak, R2, from the grid terminal to the positive filament terminal. That's all.

When hooking up the set, note the correct polarity of the batteries and connect them as shown in Figure 5.

The parts list for last month's diode-detector receiver is repeated below. The additional parts required for this month's change are listed separately.

C1—Aerovox mica condenser type 1467, .00025 mfd.
C2—Hammarlund "Star" midget variable condenser, 140 mmfd.
R1—15 ohm filament resistor.
SW1, SW2—Yaxley one-gang 11 point switches, non-shorting, type 1211
SW3—S.P.S.T. toggle switch.
Bud 2¾-inch dial.
Bakelite coil form, 2½ inches in diameter, 4 inches in length.
Magnet wire, ¼ lb., number 24, double silk covered.
6 Fahnestock clips, 1 inch overall
2 small angle brackets (for mounting the coil).
1 baseboard, wood, 6 inches by 9 inches, ½-inch thick.
1 panel, wood, 10 inches by 6 inches, ¼-inch thick.
1 pair of Acme headphones, 2000 ohms.
1 Eby base-mounting socket, 4 prong.
2 Burgess "Little Six" dry cells.
1 type 30 tube.

Additional parts list for change over to triode detection:

C3—Aerovox, type 1467 mica condenser, .0001 mfd.
R2—IRC carbon resistor, 2 megohms.
1 Fahnestock clip
1 Burgess standard 45-volt B-battery, tapped at 22½ volts.

Selling Service

(*Continued from page 733*)

from all at once. Put *punch* into your "copy". The desired force can usually be given by just the addition of a simple cartoon or photograph. Remember the old Chinese proverb, "One picture is worth a thousand words". Just cover over the illustration in each of the direct-mail pieces illustrated in this article. Notice how "flat" the plain printed message looks without the illustration.

Make your message a "personal" one. Experience and tests definitely show that the "personalized" advertising pieces—messages straight from the writer to the reader—are the ones that produce results. Tell your prospects about *your* shop, *your* services, about Y-O-U!

Try to make your direct-mail piece *different* by putting in that little indefinable "twist" that will put it over. Tie in your message with important local, national, or international events if possible. In the spring, tie in with the housewife's urge for a thorough clean-up and going-over of everything in the house. Offer a 6-point inspection service for her radio set. In the fall, tie in with football game and election broadcasts. Forthcoming broadcasts of boxing contests, international events, operatic concerts, etc., can all be used as interest-getting reasons for having sets repaired and tubes replaced.

Make sure that your literature is a clean-cut tidy job and that it is not overcrowded in appearance and is easy to read. Many campaigns make or break very often on their neatness, their tidy appearance—or their lack of it. If you use postcards, rotate the color of the stock used in each mailing.

The discriminating serviceman can select skillfully prepared direct-mail pieces from the assortment offered at very low prices by the various radio manufacturers. However, make sure that the predominating interest in the direct-mail piece selected for use is *your* service. The manufacturer's name should not be spread all over the literature you send out. And, remember, manufacturers' literature cannot entirely take the place of your own individualized advertising about your own service.

If you do use manufacturers' folders or postcards, be sure that your personal imprinting is well done—a rubber stamp is false economy—have it printed!

Make up your prospect list carefully and intelligently by selecting from a hand-picked list of actual, potential prospects—those who should be buying your services, and are in a financial position to pay, if they do buy. Nothing kills a direct-mail campaign quite as effectively as a poor list of prospects. Remember that *mailing to a small selected list "often", is better than mailing to a larger list picked at random, "seldom"*. One very valuable part of your mailing list will naturally consist of your past customers—both recent and old.

Try to get your present customers to cooperate by giving you the names of their friends. You may also consult city and county governmental records, city directories, telephone directories, lists of church, club or lodge members, employee lists of local plants or firms, exchange of lists with local non-competing businesses, social notes or news items in local newspapers, club publications, local movie theatre mailing lists, etc. A complete catalog and price list of City, County and State Directories and Gazetteers published in North America may be obtained on application to the Association of North American Directory Publishers, 524-528 Broadway, New York City.

A guessing contest in your window (or local theatre) requiring all contestants to fill in their names, addresses and information about their radio sets, will give you an excellent list. Likewise a local "radio noise and interference" survey. Take pains to build up a good list, and when you get it, keep it on cards or on stencil plates—and keep it up to date. If you are in a position to make large mailings fairly frequently, consider the purchase of a postcard printing and addressing machine (such as the Cardvertiser put out by the Elliott Addressing Machine Co. of Cambridge, Mass., or the Addressograph and Multigraph Machines of the Addressograph-Multigraph Corp. of Cleveland, Ohio).

Do not fail to check the accuracy of names and addresses before using a new list. Your local postmaster will correct your local mailing list twice a year, for 1 cent per name, plus postage for the return of the list. Print the standard "Return Postage Guaranteed" over your name and address in the upper left hand corner of the postcard or envelope. Then you will be able to eliminate from your list all those names to which mail is undeliverable.

Addressing of the postcards or envelopes may be done by hand in ink, with a typewriter, or by an addressing machine. The former is somewhat more personal, but it should be done by a person who has a good legible handwriting. Addressing is worth approximately $2.00 per 1000 names. Incorrect spelling of names, or the incorrect use of Mr., Mrs., and Miss, causes resentment and lessens the possibility of favorable reception, interest and action.

You can obtain all the important and current postal regulations briefed and indexed in a small 20-page handy reference booklet by sending 10 cents in stamps or coin to the Direct Mail Advertising Association, Hotel Pennsylvania, New York City.—*Alfred A. Ghirardi, author Modern Radio Servicing. T. S. Ruggles, specialist in direct mail advertising.*

Radio-Nations

(*Continued from page 712*)

Enquiry on the Sino-Japanese conflict. At this time and also during the Bolivia and Paraguay disputes, nearly all the telegrams were handled by Radio-Nations.

The Secretariat of the League of Nations has used the Radio-Nations station for short-wave overseas broadcast service, intended for the public of these overseas countries, which is often little or ill-informed of the League's activity. This broadcast service, for which the Information Section of the Secretariat is responsible, with the technical cooperation of the Transit Section and which was placed under the supervision of a special broadcasting committee, was inaugurated on September 25th, 1932, by Sir Eric Drummond, at that time Secretary-General. Broadcasts have taken place regularly once a week, on Saturdays, from 5:30 to 6:15 p.m., E.S.T., in English, French and Spanish, on wavelengths of 31.3 meters and 38.47 meters. Lately other waves have been added. These broadcasts generally take the form of bulletins on the current work of the League of Nations, prepared by the Information Section of the Secretariat. From time to time, distinguished men who happen to meet at Geneva in connection with the League meetings are requested to speak before the microphone of Radio-Nations. Mr. Henderson, President of the Disarmament Conference; Lord Lytton, Chairman of the Commission of Enquiry in Manchuria; M. del Vayo, Chairman of the Chaco Commission; M. de Valera, M. Politis, Mr. Wilson, Mr. May and many others have been heard on these broadcasts. This service has met with considerable success. In eighteen months, the Information Section has received 17,000 letters from listeners all over the world. Relays of the most important transmissions have been made frequently in Dublin, Sydney, New York, Buenos Aires, Rio de Janeiro and Toulouse.

The broadcasting service of the Information Section has replied and is replying regularly to all the letters and postcards received from listeners. It endeavours by this correspondence, and by sending publications, the text of talks, to arouse an increasing interest in the League of Nations in its hearers. As regards the development of the service, the Information section has studied the problem inter alia in the light of suggestions and advice given by listeners themselves in response to an inquiry undertaken by radio, and in the light of the remarks made by several "analysts" and commentators of the chief American and European wireless stations who have studied the organization of Radio-Nations.

Amateur Transmitter

(*Continued from page 727*)

is provided in the buffer stage. This facilitates keying in the oscillator circuit. The 46 tubes do not draw current when excitation is removed so they are ideal in a transmitter with oscillator keying. This arrangement of tubes and bias facilitates break-in operation and does not require the use of batteries.

The next logical addition if the builder is interested in 'phone operation is the addition of the speech amplifier-modulator unit. This also has many features. One of them is the provision for use of either crystal or double button types of microphones. Individual plugs are provided for each. The power unit supplies the necessary current for a carbon microphone. And, of course, a phonograph pick up may be connected to the "crystal" plug for modulation testing. The speech amplifier-modulator is mounted in a panel and chassis similar to the r.f. unit and is designed to fit in a steel cabinet directly under the transmitter. However, each may be mounted in separate dust-proof cabinets if desired and separated from each other. It has a 96 DB gain over-all and more than 25-watts of audio power which is sufficient to modulate the r.f. unit 100 per cent. It employs a type 57 pentode connected first stage resistance-coupled to another 57 triode connected which in turn is resistance coupled to a 46 Class A driver. This drives a pair of 46s in Class B. Gain control, plate current meter and power switches are mounted on the front panel. The unit is so wired that the power plug for the r.f. unit may be connected to the modulator, which contains its own power supply, and the transmitter may be turned on and off by the plate and filament switches on the modulator.

Still later a third unit may be added to convert the two for controlled-carrier operation. This unit mounts directly under the modulator and has a switch for changing from either straight carrier to variable carrier. It contains all of the necessary equipment for this arrangement including the necessary auto-transformer and "variator." This system of controlled-carrier is simple and effective. The method, of course, is quite simple. The controlled carrier is obtained by taking advantage of the varying plate current of the Class B modulator tubes. This varying current is employed to vary the class C input in proportion to the amount of modulation power at a given instant so that regardless of volume level the modulation of the carrier is always 100 per cent.

These three units offer the amateur an all-around, medium-powered transmitter with most all of the modern innovations. All three may be mounted in a steel cabinet to lend a "commercial" appearance. And the cost is kept small by virtue of the fact that the builder does most of the costly work. The whole unit costs less than $150.

If more power is desired the 852 unit already mentioned may be added. When using such an amplifier in conjunction with a controlled-carrier driving unit, far greater outputs may be obtained than those driven by a constant carrier. For instance, with this particular unit, the normal Class B carrier would be only about 80 watts. However, with the variable carrier the effective carrier would be in the vicinity of 200 watts. The reason, of course, is the plate load may be greatly increased on audio peaks which give the higher output, but at the same time during pauses between words or drop in level of modulation the input drops and the ratings of the tubes would not be continuously exceeded. In effect, this arrangement increases the efficiency of the Class B linear stage from average of about 30 per cent to better than 60 per cent. Even higher efficiency may be obtained with careful adjustment.

5-Meter X-Mitter Receiver

(*Continued from page 730*)

tained from a local lumber yard, and it is quarter-inch, hard-tempered "Masonite."

After smoothing the edges, drilling the larger holes, and cutting the 4¼ inch opening for the small dynamic speaker, the panel was thoroughly sanded and given three coats of gray paint. Each coat of paint was given ample time to dry and was rubbed down with oil and fine sand paper before applying the next coat. The panel is very rigid, and when finished has the appearance of gray lacquered metal.

The supporting shelf or sub-panel was also cut from quarter inch Masonite, and after cutting the holes for the wafer sockets, the sub-panel was painted gray and firmly fastened to the back of the panel with metal brackets.

The author built the described transmitter-receiver with low-cost receiving tubes and parts; most of them were resurrected from the ham station junk box. The complete circuit is shown on page 730.

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The microphone input transformer, for instance, is an old 5 to 1 audio transformer with the primary removed and a 500-turn winding center tapped at 250 turns substituted.

The filter choke and modulator choke is an old B eliminator twin 20-20 henry choke.

Care should be taken with the radio-frequency portions of both the transmitter and receiver, and all leads should be as short as possible. To accomplish this, the author found it necessary to mount the variable condensers back two inches from the panel with bakelite shafts extending through the panel to the tuning dials.

All coils except the transmitter's grid coil were wound with No. 12 enamelled wire on a ½-inch diameter metal rod, and when removed the coils have a slightly larger diameter due to the springiness of the wire.

The number of turns for each coil is specified in Figure 1, and the exact spacing of the turns will vary slightly with the length of connecting leads, tubes, and condensers used.

In the equipment described the turns on the receiver coils were spaced the diameter of the wire, and the space between the plate and grid coils is ¾ inch. The 2-turn antenna coil is placed in this space between the plate and grid tuning coils.

The transmitter coils are somewhat harder to wind, and the grid coil may require one or two changes to place the transmitter on the spot in the band that you desire to operate.

The grid coil in this case is wound with 12 turns of No. 18 annunciator (Bell) wire on a 2½-inch length of ⅜-inch diameter bakelite tubing. The turns are spaced approximately ⅛ inch and the tap taken off at the exact center connects through the grid resister and condenser to ground.

The plate coil is wound in the same manner as the receiving coils but the turns are spaced approximately 3/16 inch. This plate coil is 2 inches in length and has 8-turns of No. 12 wire, tapped at the exact center for the plate supply connection.

The antenna coil for the transmitter may be one 3-turn coil at least 1¼ inches in diameter and placed around the center of plate coil, or two coils of ¾-inch diameter and 1½ turns each, placed one at each end of the plate coil.

The multi-contact send-receive switch is of the common Federal telephone anti-capacity type of 4-pole double-throw switches.

To this switch was added an insulated extension as shown in Figure 2 which adds a single-pole double-throw, insulated antenna switch.

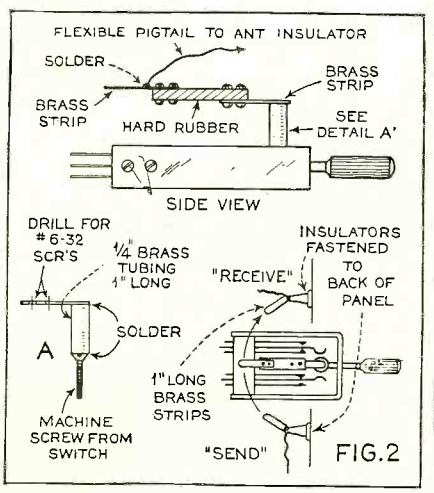


FIG. 2

If good quality filter condensers are used the mere throwing of this switch from send to receive is sufficient each time the audio amplifier is changed from the receiver to the speech amplifier for the transmitter. If inexpensive filter condensers are used it is advisable to place a small switch in the primary of the plate transformer to be opened just before changing the main switch, as the plate voltage will rise sufficiently in the few seconds the load is off to endanger the filter condensers.

The antenna coils are so terminated as to adapt this unit to any of the popular low impedance fed 5-meter antenna systems.

Absolute resonance in the transmitter is accomplished by tuning the plate condenser and coil to the fixed grid coil as indicated by a minimum reading of the (0-100) milliammeter.

If the transmitter is slightly low in frequency the turns on the grid coil should be spaced farther apart and the condenser again turned to resonance. If the transmitter is too high in frequency the grid coil turns should be closer together.

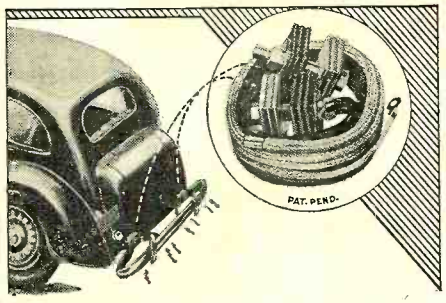
Not being satisfied with the reports of "R-9, excellent quality" from nearly all stations worked we made a frequency run on the transmitter over the speech frequencies with an audio oscillator and cathode-ray oscilloscope to find that practically no distortion was present at 60 to 70 percent modulation, and at 100 percent modulation the frequency "wobbulation" was negligible.

Maurice E. Kennedy, Technical Director, KFSG.

What's New

(*Continued from page 755*)

have been especially designed to fit Chevrolet and Ford cars, they are also applicable to many other makes.



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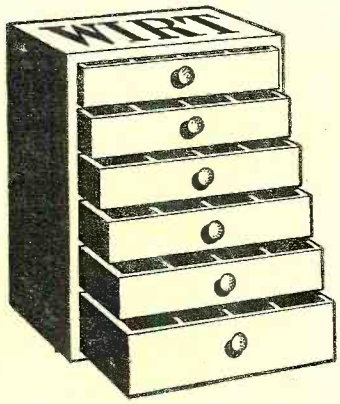

partitions, it makes an unusually handy container for resistors. It can be obtained free with the purchase of a selected assortment of 100 Wirt carbon resistors which are packed in the cabinet for shipment. The resistors, subjected to rigid test, are made up in an assortment of values to take care of practically all servicing requirements.

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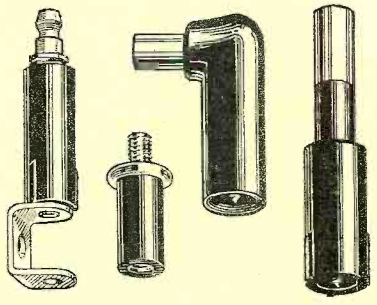

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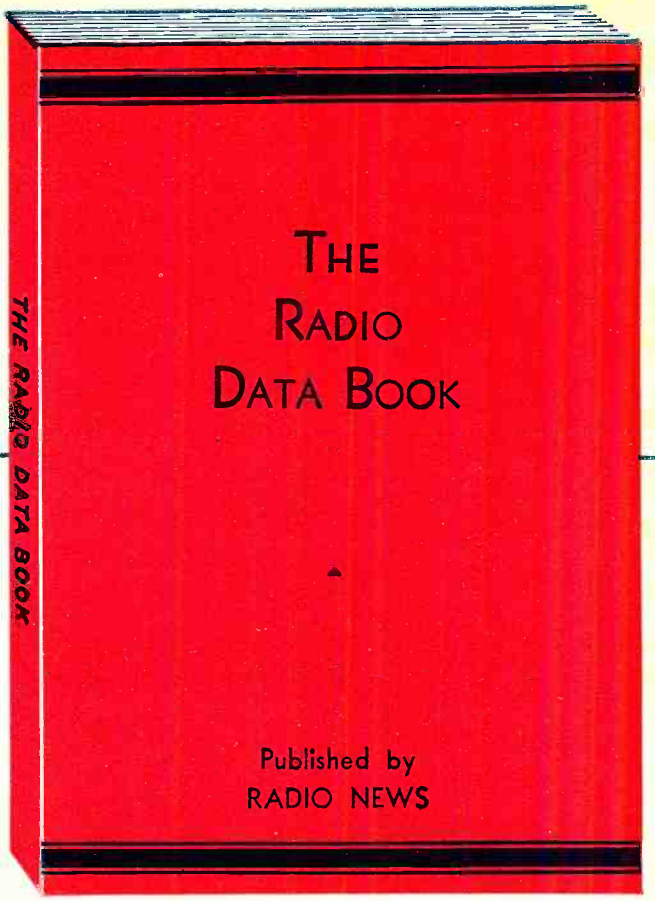

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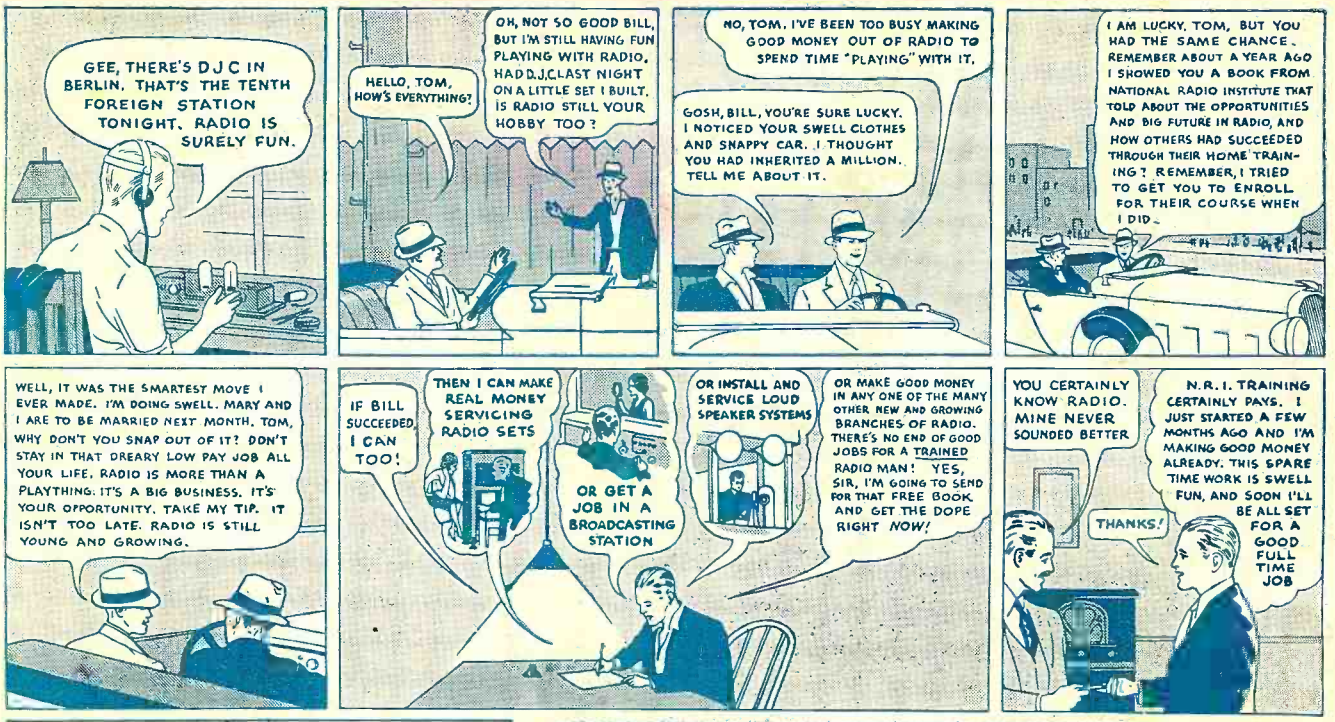

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