# ALL-WAVE RADIO

**APRIL • 1936**

NOISE SILENCER
*for sets with one i-f stage*

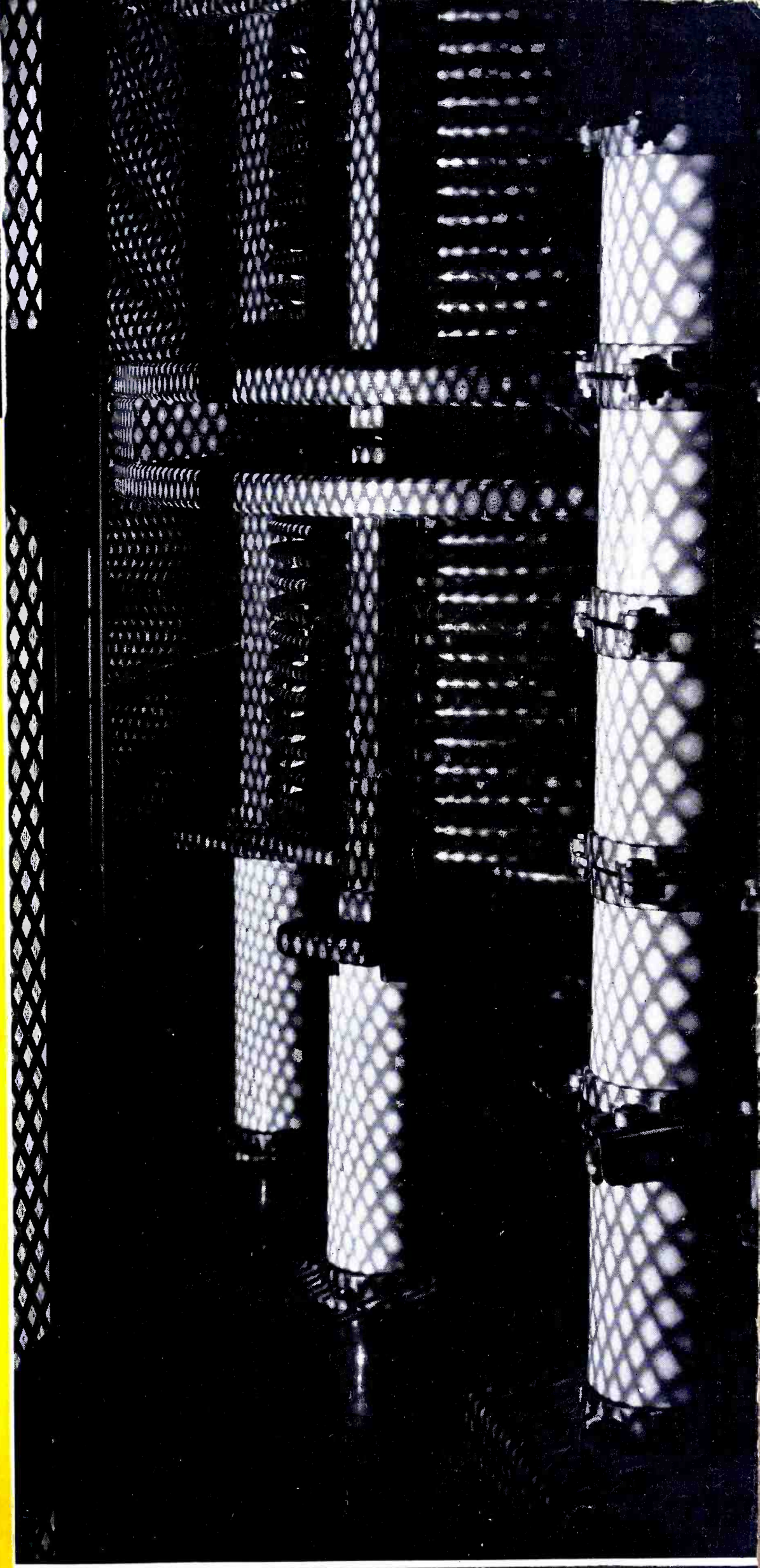
TWO-TUBE XMTR
*for ten, twenty, forty meters*

"CQ FLOOD AREA!"
*read "Beat Note's" version*

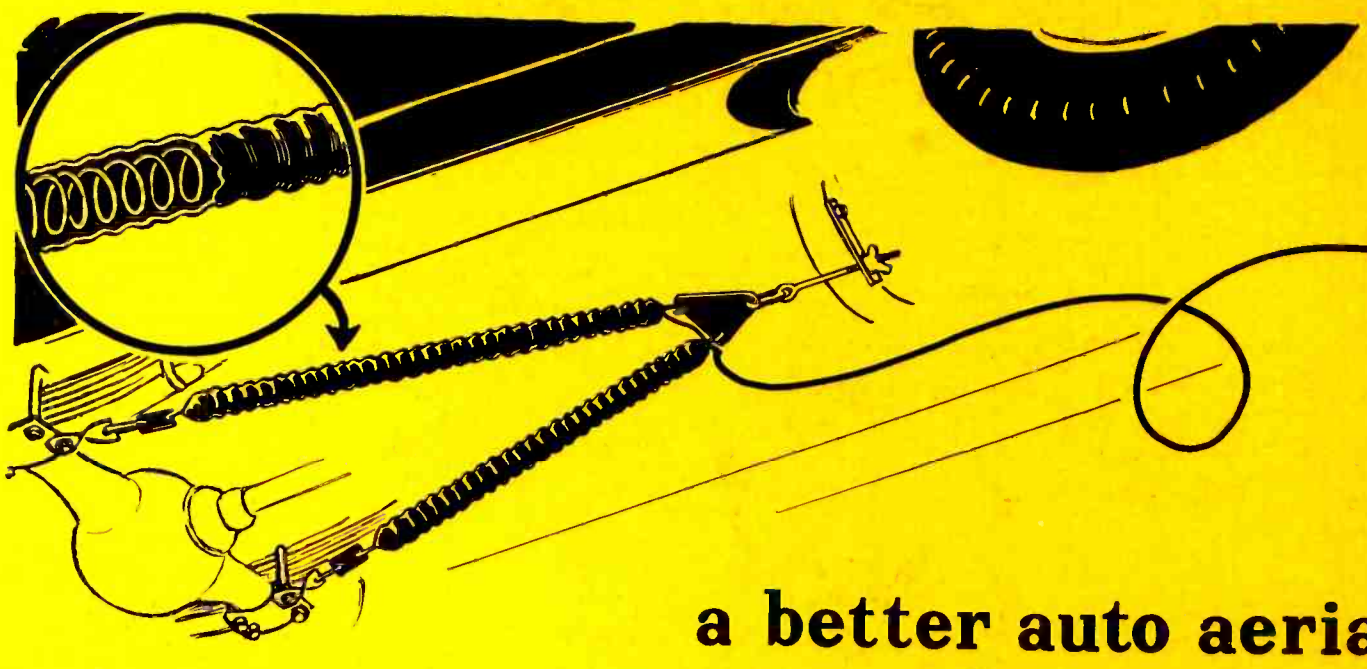
STATION SIGNATURES
*a handy identification list*

"NIGHT-OWL HOOTS"
*a page for the broadcast DXer*

**15c U.S. and CANADA**



THE JOURNAL of WORLD RADIO



# a better auto aerial at a lower price!

- **nothing else like it.**
- **more volume—less interference.**
- **one type fits all cars.**
- **installed in 15 minutes.**
- **good for all cars.**
- **better than any other for "Turret-Top" cars.**
- **protected by patents, A.A. & K., 1920162-1938092.**
- **satisfaction guaranteed.**

More volume results from the use of stiff coiled springs made of 40 feet of heavy wire.

Springs thoroughly protected by moisture, dust, oil and grease proof covering.

Installation is extremely simple and avoids under car mechanism as well as mud and dirt thrown by the wheels.

The famous Lynch Noise-reducing, Impedance-making Coupling System which improves the performance of any auto antenna can be attached very easily.

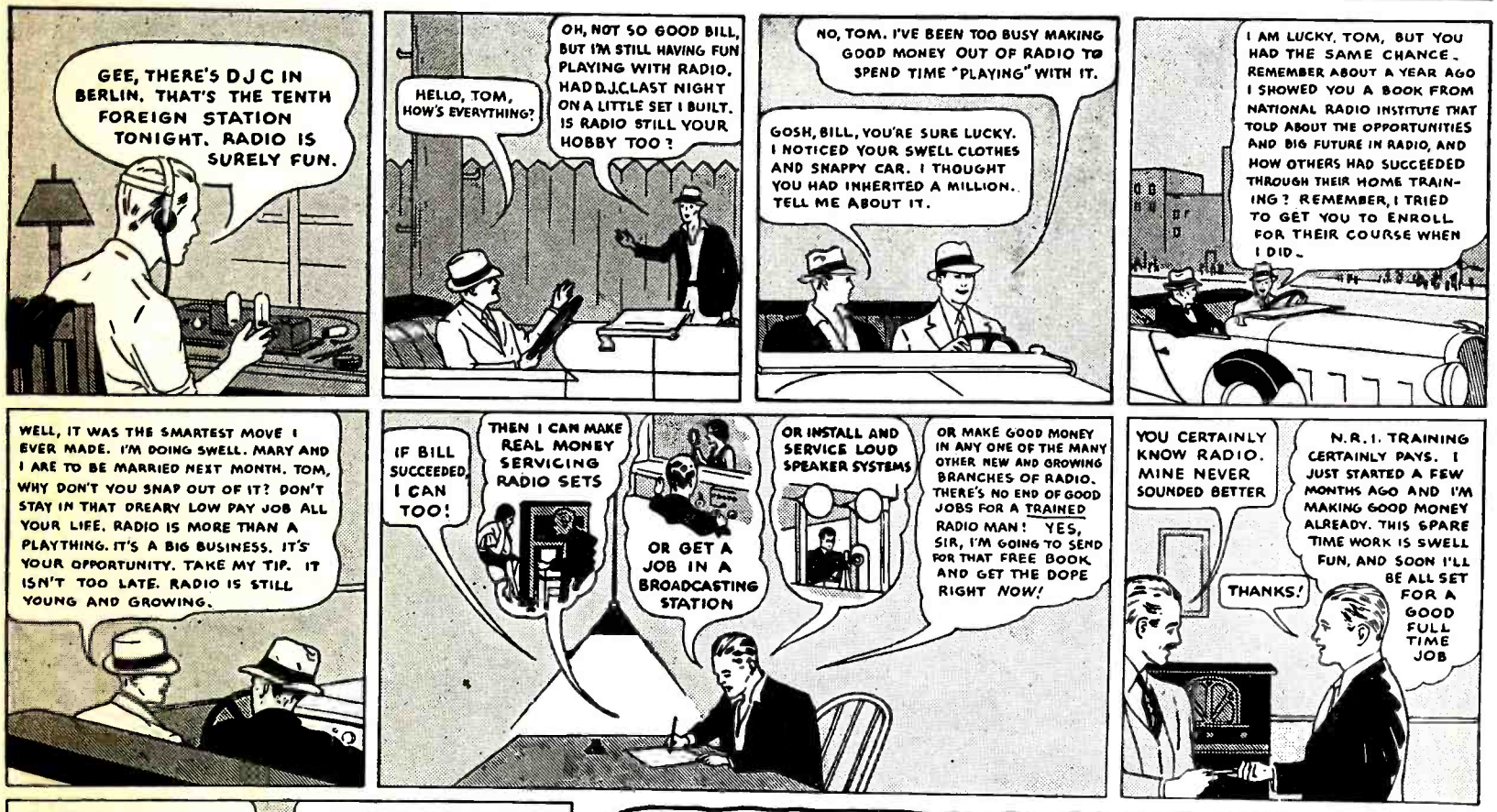
List Price **$3.75**

*See it at your dealers—NOW*

**Arthur H. Lynch, Inc.**
227 FULTON STREET
NEW YORK

***Pioneer of Noise-reducing Aerials***

# How a "Tip" got Tom a Good Job




## . . . . . I will help you start a spare time or full time Radio service business Without Capital

## Many Radio Experts Make $30, $50, $75 a Week

The world-wide use of Radio receivers has made hundreds of opportunities for good spare time or full time Radio businesses. Many of the twenty million Radio sets are only 25% to 40% efficient. I will show you how to cash in on this condition. I will train you to install and service all types of receiving sets in spare time. I'll show you how to make enough money while learning Radio to start your own service business. Clip the coupon. Get my free book, "Rich Rewards in Radio." Read how hundreds of N. R. I. men have made good money in spare time or full time businesses.

### Many Make $5, $10, $15 a Week Extra in Spare Time While Learning

The day you enroll I start sending you Extra Money Job Sheets which quickly show you how to do Radio repair jobs common in most every neighborhood. I give you plans and ideas that have made good spare time money for hundreds of fellows. My Course is famous as "The Course that pays for itself."

### Get Ready Now for a Business of Your Own and Jobs Like These

In just about 15 years, Radio's growth has created over 300,000 jobs. Thousands of opportunities will be opened by new Radio developments. Broadcasting stations use engineers, operators, station managers and pay up to $6,000 a year. Manufacturers employ testers, inspectors, foremen, engineers, servicemen, buyers for jobs paying up to $7,500 a year. Dealers and jobbers, employ servicemen, salesmen, buyers, managers, and pay up to $75 a week. My Free Book tells about these and other opportunities.

### Television, Short Wave, Loud Speaker Systems Included

There is opportunity for you in Radio. Its future is certain. Television, short wave, loud speaker systems, ship Radio, police Radio, automobile Radio, aviation Radio—in every branch, developments and improvements are taking place. Here is a real future for thousands of men who really know Radio—men with N.R.I. training. Get the training that fits you for good pay opportunities and success in this growing industry.

### Find Out What Radio Offers You

I am so sure N. R. I. can train you satisfactorily that I agree in writing to refund every penny of your tuition if you are not satisfied with my Lesson and Instruction Service upon completion. Get my 64-page book of facts. It's free to any ambitious fellow over 15 years of age. It tells you about Radio's opportunities; about my Course; what others are doing and earning. Find out what Radio offers you. No obligation. ACT NOW! Mail coupon in an envelope, or paste it on a 1c postcard.

J. E. SMITH, President
Nat'l Radio Inst. Dept. 6DSI

## HERE'S PROOF THAT N.R.I. MEN MAKE GOOD MONEY

### BUSINESS PAYS $300 A MONTH

"I now have my own Radio business which shows three hundred dollars a month profit—thanks again to N. R. I. The N.R.I. Course is a bargain at many more times than its actual cost."—FRANK REESE, 222 S. 60th St., Philadelphia, Penna.

### $40 to $100 A MONTH IN SPARE TIME

"I am servicing broadcast, auto Radios and electrical appliances in spare time. I have run from $40 as high as $100 a month. My Radio work equals and often exceeds my regular salary."—JOHN J. REIDER, 536 Dayton Ave., St. Paul, Minnesota.

### GET MY FREE LESSON on Radio Servicing Tips


I'll prove that my training is practical, money-making information, that it is easy to understand—that it is just what you need to master Radio. My sample lesson text, "Radio Receiving Troubles—the Cause and Remedy" covers a long list of Radio receiver troubles in A. C., D. C., battery, universal, auto, T. R. F., superheterodyne, all-wave, and other types of sets. And a cross reference system gives you the probable cause and a quick way to locate and remedy these set troubles. A special section is devoted to receiver check-up, alignment, balancing, neutralizing and testing. Get this lesson Free. No obligation. Just mail coupon.

## MAIL THIS for FREE 64 page book

J. E. SMITH, President
National Radio Institute, Department 6DSI
Washington, D. C.

I want to take advantage of your offer. Without obligating me, send me your Free Sample Lesson and your book, "Rich Rewards in Radio." (Please print plainly.)

NAME.....AGE.....

ADDRESS.....

CITY.....STATE.....


# FROM QUAINT OLD Holland— TOMORROW'S Thrilling HEADLINES! as ONLY the NEW SCOTT BRINGS THEM

**MARCH** of a million soldiers breaking the untrodden sod of a new empire—peace pacts — the newest continental dances — death from the air—Olympics—history in the making! It's your world! Get some thrills out of it!

**P-H-I**—Huizen—sends you the news of the world direct from seething Europe! Get it—before it's canned! Broadcast in five languages — English — Dutch — French — German — Spanish. Get it direct with a SCOTT — with a regularity, a diamond clarity, a magnificent undistorted power and a more beautiful true tone than any other radio in the world!

## COMPARE IT IN YOUR OWN HOME

In the privacy of your own home you surround yourself with things you come to cherish—they are an expression of your personality. So it is with your radio. When you have chucked the cares of business for a few hours and come home to relax, the astonishingly small difference in price between the SCOTT and "just another radio" vanishes—the very first night you open up the Sensitivity Control and leap through the tremendous distances of a night charged with the criss-crossing of the million fantastic miracles of radio. You flood your home with the unbelievable cultures of half a hundred nations. The wonder of radio bursts fresh upon you, and the joy of being alive becomes a new and thrilling experience.

## FINEST RECEPTION GUARANTEED

Enthusiastic letters from the thousands of SCOTT owners all over the world testify that no other radio at any price goes so far to complete the enjoyment of a home as the SCOTT. Once you have felt the incomparable thrill of its power, once you have experienced the glories of symphonic music through its crystal clarity, then and only then will you know how it feels to own this magnificent instrument—unqualifiedly guaranteed to outperform any other radio. Then you will know why the internationally famous SCOTT has been the overwhelming choice of engineers, broadcasters, princes, presidents and celebrated musicians in more than 146 countries throughout the world.

### More Verified World Distance Records Than Any Other Radio

**Higher Strictly Class "A" Power**—35 watts. For undistorted concert volume. 5 times average power.

**Highest Useable Sensitivity**—Clearer foreign reception. Less than 1 microvolt sensitivity.

**Bullet-Direct Selectivity** — continuously variable 2 to 16 KC—for foreign stations you have never heard before.

**Double A. V. C.**—keeps world programs at practically even volume.

**Short Wave Station Locator**—instantly locates foreign stations.

**Tonetruth Chamber**—eliminates boom.

**Full Range Hi-Fidelity**—twice tonal range of other high fidelity receivers. 30 to 16,000 cycles.

**More Important Performance Features**—including True Bass Control, Precision Dial Calibration, Allwave Reception, Shadow Meter Tuning, 23 tubes.

**Full Range Hi-Fidelity,** 30 to 16,000 cycles, bringing you every breath-taking overtone of voice and violin, of trumpet and trombone, saxophone, clarinet, oboe and flute, every overtone audible to the human ear! Twice the tonal range of other high fidelity receivers.

Years ahead of mass production receivers. Strictly custombuilt. Engineered to the highest precision standards known. 5-year guarantee. Nationwide installation service. 30-day trial in your own home anywhere in U. S. A.

**Send—NOW**—for the most thrilling story of world-record breaking performance in the history of radio! No obligation whatever. Simply mail the coupon below.


SEND THIS COUPON *TODAY*-DETAILS FREE

**E. H. Scott Radio Laboratories, Inc.**
**4476** Ravenswood Ave., Dept. **31B6** 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.

**4476 Ravenswood Avenue, Dept. 31B6 Chicago, Illinois**

**When in New York visit our beautiful permanent Salon at 650 Fifth Ave., Rockefeller Center**

*Edited by M. L. Muhleman*

# CONTENTS · APRIL · 1936

ALL-WAVE RADIO

VOLUME 2 • NUMBER 4



## COVER

***The final power amplifier tuning unit of WOR's 50-kw transmitter at Carteret, N. J., showing the inductance coils and stacks of condensers. The shadow pattern is cast by the grillwork which serves as the protective enclosure for this equipment.***

*(Photo courtesy Western Electric Co.)*

## FEATURES



## DEPARTMENTS



### GENERAL

PUBLISHED MONTHLY by the Manson Publications Corporation, 16 East 43rd Street, New York, N. Y. Entered as second-class matter August 27, 1935, at the Post Office, New York, New York, under the Act of March 3, 1879. Clarence W. Emerson, President; M. L. Muhleman, Secretary; Edwin W. Lederman, Treasurer.

### SUBSCRIPTIONS

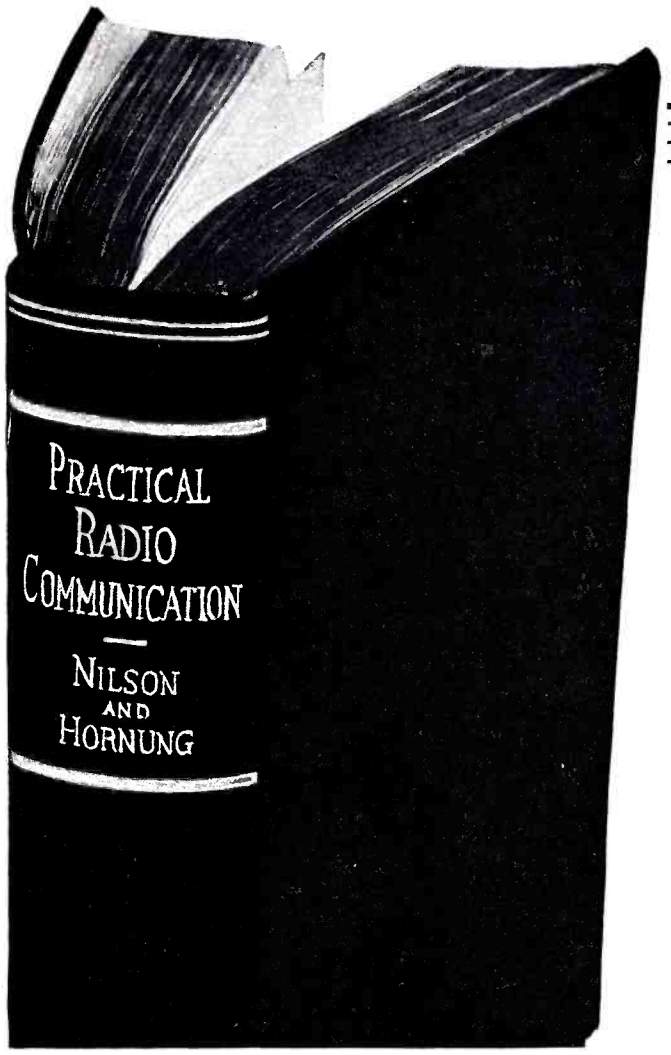
YEARLY SUBSCRIPTION rate: $1.50 in the United States and Canada; $4.00 in foreign countries. Single copy price, 15 cents. Notice of change of address required two weeks prior to publication date, or the 15th day of the month. Notifications received after this date will become effective with second issue.

### ADVERTISING OFFICES

EASTERN ADVERTISING Manager, Clarence W. Emerson, All-Wave Radio, 16 East 43rd St., New York, N. Y.
Midwest Advertising Manager, William C. Shaughnessy, All-Wave Radio, 1357 Greenwood Ave., Wilmet, Ill.

### CONTRIBUTIONS

MANUSCRIPTS ARE submitted at the author's risk and cannot be returned unless accompanied by postage. Notification of the acceptance or rejection of a manuscript is given within two weeks after receipt.




# McGRAW-HILL BOOKS

## to help you advance in radio as a profession or a hobby

### PRACTICAL RADIO COMMUNICATION

***Principles—Systems—Equipment—Operation Including Short-wave and Ultra-short-wave Radio***

**By ARTHUR R. NILSON, Lieutenant (Technicist) (Communications) U.S.N.R. (Retired)**

***and* J. L. HORNUNG, Formerly Radio Instructor, Guggenheim School of Aeronautics, New York University**

**754 *pages*, 6 *x* 9, 435 *illustrations*, *flexible*, $5.00**

**A complete text in practical radio communication based on a theoretical introduction, suitable for self-instruction by the prospective and ambitious radio operator and for reference use by the technician and engineer.**

***Features of this book***

**—covers entire spectrum of radio waves; ultra-short, short-, medium-, and long wave radio transmission and reception.**

**—covers all radio operator's license requirements for all classes of license.**

**—gives especial attention to alternating current engineering principles and their applications in radio transmission and reception.**

**—covers transmitting, receiving, and power generating apparatus for all types of stations.**

**—includes marine, aeronautical, police and amateur radio, with especial attention to broadcasting, and studio and control-room equipment and operation.**

**—written in simple, concise style, with many illustrations, and clear diagrams.**

### Henney's Radio Engineering Handbook

**Editor-in-Chief: KEITH HENNEY, Editor, *Electronics*, assisted by a staff of 28 specialists. *New second edition*, 850 *pages*, 4½ x 7, *fully illustrated*, *flexible*, $5.00. A thorough revision of this authoritative handbook for radio engineers, bringing all material up to date, including much new information and providing additional illustrations and charts. The book offers the engineer technical data on all fields and aspects of radio engineering from discussion of electric and magnetic circuits to sound pictures and aircraft radio.**

### RADIO OPERATING QUESTIONS AND ANSWERS

**By A. R. Nilson and J. L. Hornung, 389 pages, 5½ x 8, 96 illustrations, $2.50. Gives over 600 questions, with answers, typical of those asked on radio operator license examinations, and covering operating essentials of broadcasting, marine, police, aeronautical, and amateur radio.**

## By Zeh Bouck

## MAKING A LIVING IN RADIO

220 pages, 5½ x 8, illustrated, $2.00
A frank, impartial survey of the opportunities in the field of radio today. Covers engineering, operating, servicing, broadcasting, writing, salesmanship, etc., telling what jobs there are, what they pay, how to train for them, how to break into the game, and then get ahead.

Are you interested in—how to determine whether or not radio is your vocation—how to choose a school—what books to buy—how the operator can get a berth—business expansion and engineering careers for the serviceman—breaking into broadcasting, etc? See this new book. Interesting, up-to-date, authoritative, helpful.

**Send money order or check. Do not send currency through the mail. No books sent C.O.D. All prices postpaid.**
**Order from**

**Manson Publications Corp. 200 Fifth Avenue., New York, N. Y.**

# EDITORIAL QUOTES

## BY THE EDITOR

### The New All-Wave Radio

WE ARE PLEASED to present the first issue of the new ALL-WAVE RADIO. We hope you will like it; we are anxious that you do like it, and we will do everything in our power to make you like it.

Even so—this is only the beginning. Rome was not built in a day, and we don't pretend that we are finished with the constructive work. There is a lot still to be accomplished. We prefer not to be hasty so that what we do will be right.

Your constructive criticisms will be of great assistance.

✦

### "Night-Owl Hoots"

WE WISH YOU to meet Mr. Ray La Rocque, the conductor of our newly instituted department for DX broadcast listeners, "Night-Owl Hoots."

Mr. La Rocque has been a DXer in the broadcast band for the last eight years. He is a member of the Quixote Radio Club and the Canadian DX Relay Club. For two years he served as Secretary of the late New England Radio Club.

***RAY LA ROCQUE***
***Chief Night Owl***

Beginning with this issue, "Night-Owl Hoots" will be a regular monthly feature.

Mr. La Rocque will welcome correspondence from readers dealing with DX broadcast reception.

### Disapproving Approvals

IT HAS BEEN our custom in the past to affix a Seal of Approval to each item that passed muster in our laboratory. This was undoubtedly a good idea in that it represented a form of guarantee to the reader that the equipment could be relied upon for the type of service for which it was designed.

However, we have reached the point in our publishing career at which we believe the magazine should stand back of not a few, but all of the receivers, transmitters, etc., described or reviewed each month. Under such a policy the affixing of a Seal of Approval to each and every item in the magazine is nothing short of a superfluous gesture.

We see no reason for the further display of the Seal of Approval, so we have discontinued its use.

✦

### All-Wave Silencer Super

THE MAY ISSUE of AWR will carry complete details of a new all-wave superheterodyne receiver, using metal tubes, with a noise-silencing system built right into the chassis.

This receiver has high-fidelity characteristics, employs i-f transformers with variable coupling, and has an electron-ray tuning indicator.

The article will also carry details on a special type of loudspeaker cabinet having unusual acoustic properties.

◆

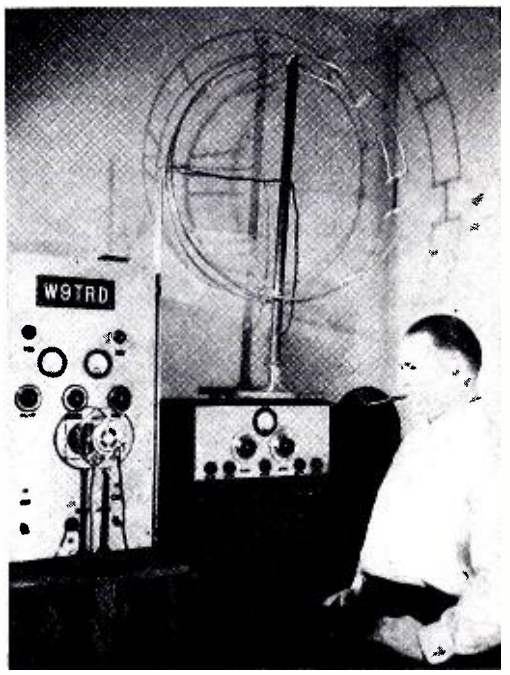
### Five-Meter Beams and Supers

WE HAVE RECEIVED a very interesting letter from Charlie Stimpson, W9TRD, the author of "The Reinartz Rotary Beam for Ten and Twenty Meters"—February ALL-WAVE RADIO.

Says Charlie: "The enclosed picture is the writer gloomily looking at the 5-meter rig. I have worked 150 stations from the same location with this equipment and sure have had a lot of fun.

"The transmitter is a pair of 45's in p-p with linear type osc., modulated by a 2A6 and a pair of 53's in Class B. About 30 watts input.

"The receiver is of special design and represents over a year's work. An impedance-matching network is fed into a stage of r-f using a 954 Acorn kicking another 954 with regenerative control. Two stages of i-f transformer coupled at 3 mc, avc and a pair of 2A5's in the final. You should hear the signals on this receiver. I can take a transceiver as far as five or six miles away with an inside antenna and build up the volume on the loudspeaker so that you can't stay in the room. The 0-10 ma meter is in the cathode of the i-f and acts as a field-strength meter. I can give the comparative field strength of any station on the 5-meter band.




***STIMPSON, BEAMING***

"On top of the receiver is one of the famous loops. Have worked a number of stations with the loop inside. Have found that if the loop is tilted *downward* in the direction of the receiving station, that the signal strength is increased."

And here's some good news—complete constructional details of the 5-meter super used by W9TRD, will appear in an early issue of AWR.

✦

### Doherty High-Efficiency Circuit

IT IS OUR bet that the 'phone men are going to be plenty excited over a new high-efficiency circuit recently perfected by the Western Electric Company. The circuit is simplicity itself but the math. behind its development is colossal.

Whereas in the past 30 to 35 per cent efficiency has been the maximum that could be expected of the linear power amplifier stage in a high-quality transmitter, efficiency as high as 60 to 65 per cent now is a reality with this outstanding improvement in design. From this same standpoint, it is also superior to systems employing high-level modulation.

# TIME

## IS S-L-I-P-P-I-N-G BY

*Act While There Is Still Time Left*

**$2.50 for $1.50**

STARTING WITH THE MAY ISSUE, the price of ALL-WAVE RADIO advances to 25 cents per copy—$2.50 a year, in the United States and Canada.

HERE IS YOUR LAST OPPORTUNITY to subscribe *at the old rate* of $1.50 a year—12 issues. This offer closes April 30th midnight.

ALL YOU NEED DO is to fill out the coupon below (or a good facsimile thereof!) and mail it, together with your remittance, before midnight April 30th.

**USE THIS COUPON**

ALL-WAVE RADIO
16 East 43rd Street,
New York, N. Y.

GENTLEMEN: Please enter my subscription to the *new* ALL-WAVE RADIO at the *old* rate of $1.50 per year, to start with ..... issue. Enclosed find $1.50....Money Order.... Cash....Check.

Name .....

Street .....

City ..... State .....

← **FILL IN AND MAIL TODAY!**

APRIL • 1936 **ALL-WAVE RADIO** VOL. 2 • NO. 4

# RADIO AND THE ATMOSPHERE

**PART 1:**

***Every all-wave listener and amateur will find this series of articles on astronomical and radio phenomena of immense interest and value. Subsequent articles will provide authoritative data on transmission and reception conditions.***

***By J. L. Richey***

**Chief Operator, Overseas Service, A. T. & T.**

LIGHT—the phenomena that Astronomers depend upon practically entirely to determine the characteristics of the heavenly bodies, is made up of electro-magnetic vibrations, having the same physical properties as radio waves.

### *Light and Radio Waves*

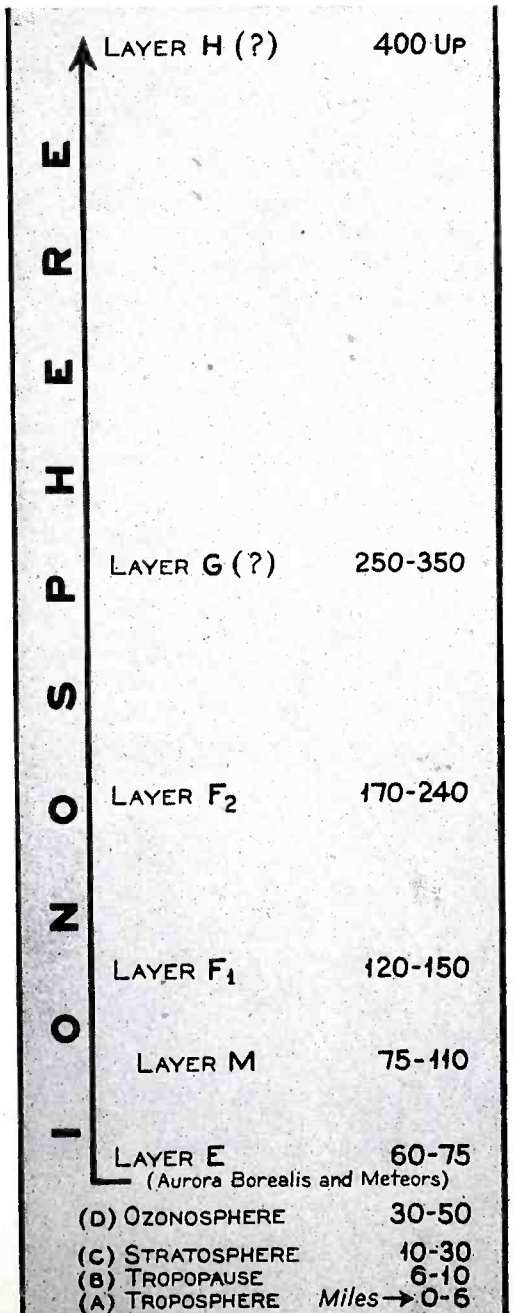
The eye, which picks up these vibrations, can be considered in the same category as a very sensitive radio receiver. The light waves, which affect the eye, are made up of only the colors of the rainbow, i.e., violet, indigo, blue, green, yellow, orange and red, and these are of course, very short in length. So short, in fact that 64,000 waves of violet light, or 32,000 waves of red light could be contained in a space of one inch. There is evidence of electro-magnetic phenomena taking place beyond the violet, and below the red, which the camera and other devices reveal. Our direct view of external nature is made through a very narrow slit of the available spectrum. In spite of the small range of wavelengths to which the eye responds, it is more sensitive than a radio receiver using the highest permissible amplification. I say highest permissible advisedly, because when the amplification of the modern receiver exceeds a certain amount, its inherent noise occults any very feeble radio impulse. The eye, considered as a radio receiver, very ably responds to sources of radiant energy, such as the distant stars, billions upon billions of miles away. This is a very high long distance record, which we people in ordinary radio work will not be able to duplicate for some time yet, since the amount of energy radiated from the distant stars is many, many times greater than that from the most powerful radio transmitter of the present day.

The number of electro-magnetic vibrations per second in light waves is an enormous figure. For instance, in yellow light, it is 5 x $10^{14}$ (five hundred trillion) vibrations per second. There are actually more vibrations per second in yellow light than there are seconds in 15,000,000 years. Contrast this with radio waves used in broadcasting which we are most familiar with, whose frequencies range from 550,000 to 1,000,000 vibrations per second.

The telescope considerably extends the distance range of the eye, the same as the multi-electrode vacuum tube amplifier extends the range of the radio receiver.

Some satisfactory ideas regarding radio phenomena can be obtained by extending our notions of optical phenomena. There will be certain departures in their respective behavior as will be shown later.

Cross section of the earth's atmosphere, divided into man's definitions and observations of its character




### *Early Radio Experiments*

Over thirty-four years ago, when Marconi announced that he had successfully transmitted radio waves across the north Atlantic Ocean, his report was received with a considerable amount of surprise. It was generally believed that radio waves traveled exactly like light waves, that is, in practically straight lines from their source. To those skilled in the science of optics, it could not be seen how the trajectory of these radio waves could be bent over such a long distance to make them return to the earth. It was evident, however, from these results that some sort of guiding influence acted on the radio waves, which prevented them from being lost in outer space. So instead of traveling outward in straight lines, their path was bent sufficiently to follow the rotundity of the earth.

The early experimenters in radio found that it was possible to communicate between points separated by rather high barriers, such as mountains. The question naturally came up, "Did the waves go over or through the hills?" Experiments made with a receiver on shipboard, showed that when located close to a mountainous island, so that the mountain was between the receiver and transmitter, signals were picked up. When the receiver was moved further away, but the mountainous island still acting as a barrier, signals were stronger. Out of the shadow created by the moun-

tains the signals were still stronger. From these experiments it was proved that the waves went over the hills rather than through them, and the process of bending them around these obstacles is called *diffraction*.

The phenomenon of diffraction was called upon to explain how the radio waves leaped over a hill of salt water 130 miles high in going across the Atlantic, but failed to account for the intensity of the signal received. This problem was studied by a number of investigators, and it was found that the phenomena of transmission around the earth could be explained by a theory that the atmosphere has something to do with the transmission as well as the absorption of radio waves.

### The Atmosphere

To get a physical picture of the mechanics of the transmission and absorption of radio waves through the earth's atmospheric envelope, it may be well to discuss some of the characteristics of the atmosphere. It has been found that the earth's atmosphere is composed of four concentric, almost spherical regions. The inner one is called the *troposphere,* and the outer one the *stratosphere.* The lowest part of the troposphere, which is adjacent to the earth's surface, is the densest part, because it is compressed by the weight of the air above it. Although the atmosphere is many hundreds of miles high, one-half of its mass, expressed in terms of weight, lies below a height of four miles. At a height of 25 miles the pressure is 1/400 of that at the sea level, at a height of 50 miles it is 1/160,000th of that at the surface, and at 100 miles it is 1/92,000,000th of an atmosphere, which is probably better than the best vacuum obtained commercially.

The Bell Telephone Laboratories have perfected a device for measuring pressures as low as a trillionth of an atmosphere. Even at this low pressure there are approximately 30 million molecules in each cubic centimeter. The molecules themselves, however, are so small that at this concentration they rarely collide with each other. The number of collisions depend upon the number of molecules per unit of volume and the temperature (i.e., the speed at which the molecules move about).

### The Tropopause

Direct explorations into the atmosphere have indicated that its temperature becomes colder with altitude. The rate at which the temperature drops averages about one degree Fahrenheit for every 300 feet rise, or approximately 17 degrees per mile. Prior to 1902 it was generally supposed that the atmosphere continued to grow continuously colder toward absolute zero (—273°C) the higher up the recorder ascends. DeBort found that above a height of six and one-half miles the temperature ceased to fall. These results were obtained by sending up hundreds of unmanned balloons carrying self-recording thermometers. It was found that there was an increase in temperature with increasing altitude for a certain distance upward. The increase in temperature with height is greater during a summer day, and least during a winter night. The region above the place where the temperature ceases to fall is call the *tropopause.* It is also referred to as the upper atmosphere. The altitude of the beginning of the stratosphere is greater in summer than in winter; it varies with barometric pressure at the earth's surface; and is higher over the equator than over the polar regions. In the middle latitudes the lower part of the stratosphere averages something like 68° below zero Fahrenheit; at the equator it drops as low as 130° below zero Fahrenheit. The temperature of the upper air varies a good deal, both vertically and horizontally, but never shows the consistent vertical drop that characterizes the lower air or *troposphere.* The stratosphere very seldom contains clouds, and has a circulation quite distinct from that of the troposphere.

At the surface of the earth the air is composed of a mixture of nitrogen, oxygen, water vapor and argon, with traces of carbon-dioxide, helium, ozone and other gases. Convection causes the composition of the air to remain fairly well mixed (water vapor excepted) throughout the lower levels, that is from sea level up to approximately the ceiling of the troposphere. In the upper atmosphere there is very little convection, and consequently very little mixture of the gases, in fact there is a sort of gravitational settling and separating process in progress, which causes the heavier gases to predominate in the lower levels, leaving the upper regions to be composed of lighter gases.

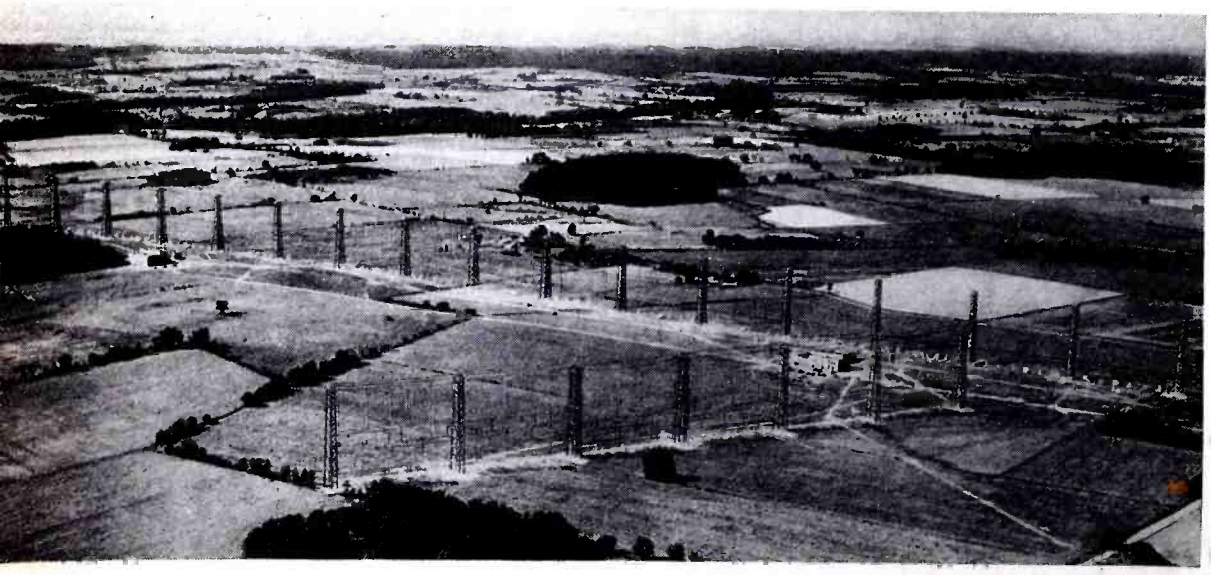
### The Ozonosphere

The effect of the ultra-violet radiations from the sun is to convert some of the oxygen in the upper atmosphere to ozone. The amount generated depends, of course, upon the intensity of the ultra-violet light. Ozone in turn has the peculiar property of absorbing a considerable amount of the ultra-violet light. The energy thus absorbed is converted into heat, and serves to raise the temperature of the ozone, and consequently the upper atmosphere. The height of the ozone layer has been computed to be about 30 to 50 miles. Ordinarily, the atmosphere transmits the energy coming from the sun with but little absorption. It is supposed that the absorption of ultra-violet light by the ozone is the cause of the increased temperature of the upper regions. In the temperate zones, the sun's rays coming through the earth's atmosphere on a slant, will traverse more of it. The ultra-violet light will, therefore, be absorbed more in the temperate zones than over the tropics. This may be the reason why the temperature of the ceiling of the troposphere is colder over the tropics than over the temperate zones.

### Ionization of the Atmosphere

Under the influence of the solar radiations the earth's atmosphere becomes a partial conducter of an electric current. The air is conductive because its molecules are being ionized, i.e., electrons are constantly being detached from neutral molecules. The electrons wander off through the gas as negative ions leaving the residues of the molecules to move about as positive ions. Experimental evidence has shown that as we go outward from the surface of the earth, and as the atmospheric density becomes less and less, there is an increase in the conductivity or ionization of the atmosphere. At a height of six miles, the ionization is about ten times greater than that near the earth's surface.

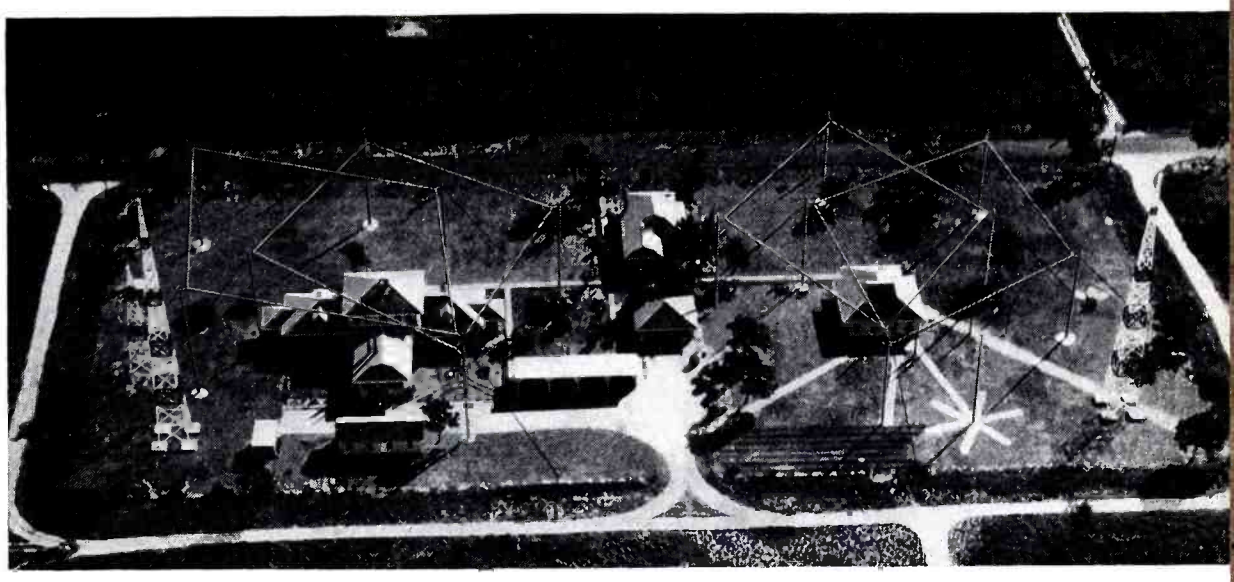
A. T. & T. short-wave radio-telephone transmitting center at Lawrenceville, N. J. In the foreground is the curtain used in transmitting to South America and in the backgorund the antennas for the three short-wave circuits to London.



Scientists have found that ionization of gases can be caused by ultra-violet light and impacts from fast moving particles. This ionization will be constant for a given radiation or emission, and for a given gas content. There will be, however a certain rate of neutralization due to recombination of the positive and negative electrically charged particles, depending upon the pressure and temperature of the gas. As the pressure is reduced the rate of neutralization will decrease and the resultant ionization will be higher. This happens because as the pressure is reduced the charged particles or ions are separated further and further apart and the probability of recombination or neutralization is lessened. As the temperature is increased the motion of these particles is increased, and the rate of neutralization is correspondingly increased. Summing this up, it may be said that the resultant ionization increases with a reduction in pressure, and decreases with an increase in temperature, all other factors being equal.

### *The Ionosphere*

With what has been said about ionization, and from what we know regarding the density and temperature conditions of the upper atmosphere, it is expected that the ionization of the atmosphere from solar influences will be greatest at certain heights. This ionization can be regarded as a great conducting sphere surrounding and enveloping the earth in numerous layers. These electrified regions are called the *ionosphere*. It is natural to suspect that such strata of the conductivity should materially affect the waves of radio signals. In the early days of radio, Kennelly and Heaviside suggested the need for an ionized layer to account for the bending of the radio waves which explain the observed long-distance radio transmission results. In tribute to these men, the ionized region is more generally known as the Kennelly-Heaviside layers, in addition to being referred to as the Ionosphere. The transition from the upper stratosphere atmosphere to the Ionosphere is a gradual one, the ionic density becoming increasingly greater with height, reaching a maximum at a certain elevation, and then decreasing again. Continuing the elevation the ionic density increases again into another layer, the maximum of which is much greater than the lower layer, the second layer gradually falls off in density as the elevation is increased. The lowest layer is called the "E" layer and is approximately 100 kilometers high. The upper layer is called the "F" layer and exists in the region between approximately 200 to 400 kilometers. The cause of the ionization separating into layers of this character is not understood at this time. It has been suggested that the temperature conditions of the upper atmosphere which result in some sort of convection, or the composition of the atmosphere at different levels, may be responsible for this.



**Horizontal rhombic receiving antennas of A. T. & T. station at Hialeah, Florida, for radio-telephone circuits to Bahamas and South and Central American points . . . a front line in radio's battle against the earth's atmosphere.**

Meteor trains and the majority of aurorae have been found to be "E" layer phenomena, the luminosity being due to the ionization, developed in this region. Meteor trains occur at a height of 70 to 135 kilometers, and aurorae show a maximum frequency at a height of 100 to 106 kilometers.

### *Electron Paths*

The atmospheric ionization on the lighted side of the earth is believed to be produced mainly by the ultra-violet light and high speed electrons (called beta rays) coming from the sun. On the dark side of the earth the ionization by solar ultra-violet light is practically non-existent. The ionization that exists there is supposed to be caused for the most part by the beta rays. There is also a certain amount of ionization caused by cosmic rays, ultra-violet light from the stars, and impacts from meteors. When the beta rays arrive from the sun and enter the earth's magnetic influence, they are, because of their electrified nature, either deflected away or captured. The earth's magnetic field is in such a direction that an electron striking it over the side advancing into the sunlight is likely to be deflected away and expelled, while if it strikes that part over the side which follows the motion of the electron's direction of travel, it will be deflected in toward the earth and into a denser part of the magnetic field, with the consequence of the probability of capture becoming greater. The greatest number of these electrons will arrive on the sunset side of the earth and concentrated toward the polar regions. This is verified by visual observations on aurorae (which are believed to be caused by solar electronic emission), which show definitely a greater number of aurorae occurring before midnight than after. The earth's magnetic field in concentrating the oncoming electrons toward the poles, will also bend them around the earth into the dark hemisphere. In doing so more atmosphere is traversed and, therefore, they will not get so close to the earth before being stopped.

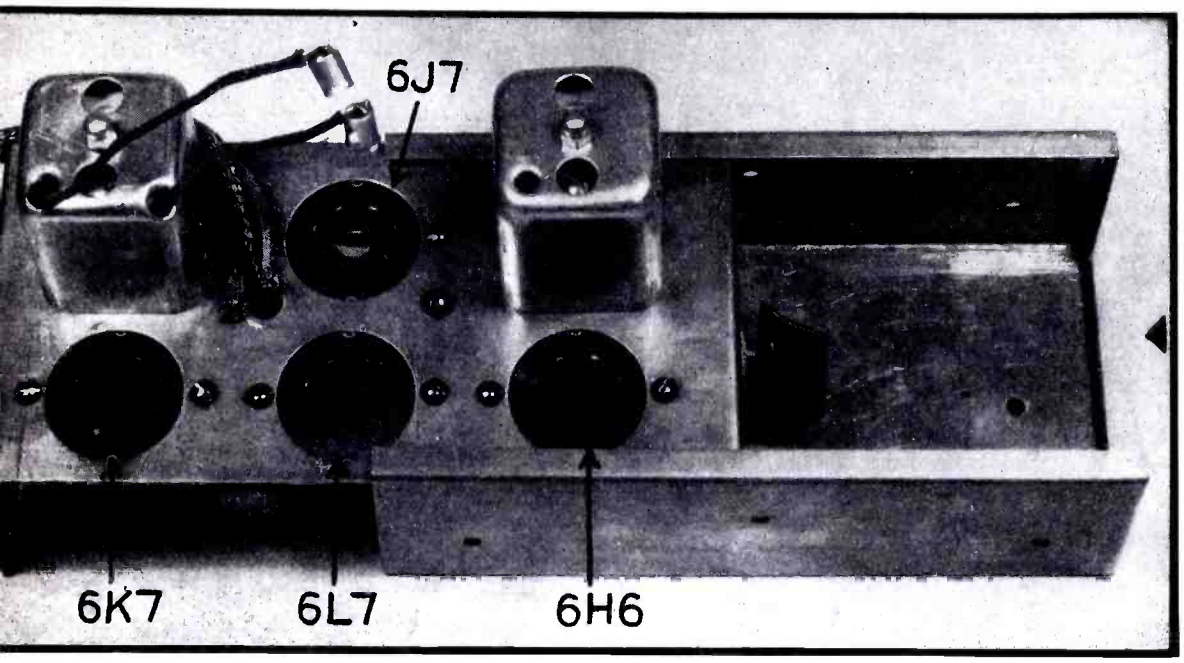
In regard to the ionization caused by meteoric impacts, it has been calculated that over a billion meteors enter the earth's atmosphere daily. The number is increased, sometimes enormously, at times of meteoric showers. Ordinarily, twice as many meteors fall after midnight than before, and twice as many are seen during the latter half of the year as are observed during the first six months. The diurnal maximum occurs between the hours of 2 and 3 A.M.

The virtual height of the "F" layer in the ionosphere undergoes changes for different times of the day, and for the seasons. The "E" layer undergoes very little change in height, although it does change in density. The "F" layer is found closer to the earth's surface in the middle of the day, and at its greatest elevation on the dark side of the earth—on the side just advancing into the sunlight. The "F" layer is closer to the earth in summer than in winter, also the greatest elevation is obtained during the winter nights. The ionized layers on the daylight side of the earth are, in general, denser than the layers on the dark side; this is on account of the greater amount of energy received from the main ionizing source—the sun.

The vertical movement of the layers in the ionosphere in going through a recurrent daily cycle causes the normal changes experienced in radio transmission; their horizontal movement may be the cause of the diurnal variations in the earth's magnetism. The movement of the "E" layer has been detected by observing the afterglows of meteor trains, some of which have lasted more than thirty minutes.

[*Continued next month*]

# FOUR-TUBE SILENCER




The chassis may be slipped out of its case, an arrangement that simplifies mounting and testing.

**By Dana A. Griffen**

**W2AOE**

THAT the disclosure of the noise-silencing principle perfected by J. J. Lamb has aroused a great deal of interest on the part of radio fans, goes without saying. Everyone wants clear reception, but unfortunately the same science that has produced the modern radio receiver has also been busy in other branches of the electrical industry. The resultant clicks, rattles, buzzes, and other noises produced by countless devices that are employed wherever electric power is used have been providing undesired additions to radio programs for years. Noise silencing, by punching "holes of quiet" of extremely short time duration in the program when the noise pulses occur, does a grand job of eliminating them.

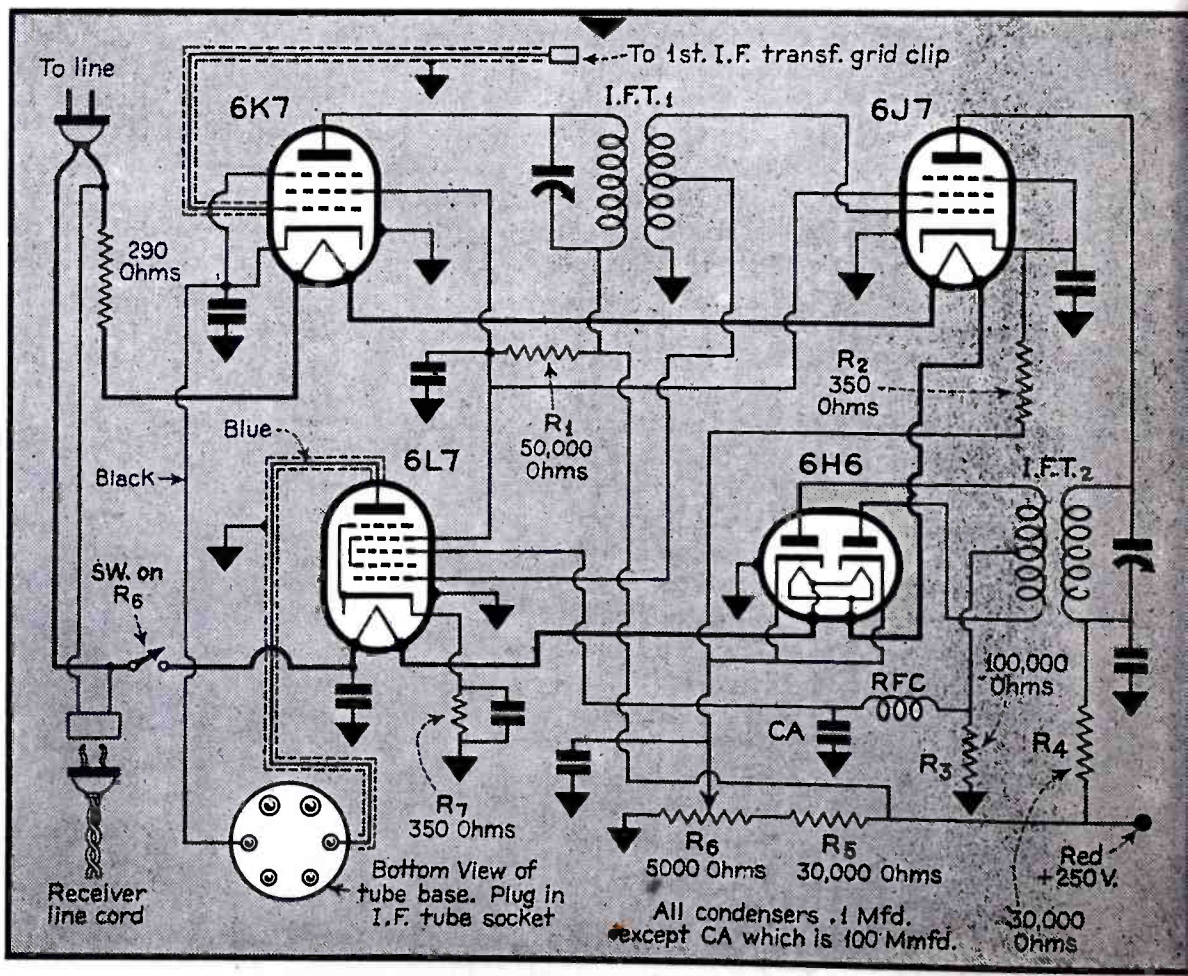
### Co-ordination Necessary

As has been shown in previous issues of ALL-WAVE RADIO, an adapter unit can be applied to superheterodyne receivers to incorporate the necessary quieting action in existing receivers. Unfortunately a number of fans do not appreciate the difference between a piece of equipment that must be properly installed in the heart of the receiver and some simple external doo-dad. Noise silencing cannot be obtained by merely purchasing an adapter unit like a pound of sugar and then connecting it to the receiver in a jiffy and presto—no noise. The receiver and the adapter must be properly co-ordinated by one familiar with service work and possessing the proper equipment. The simplest type of adapter, which paradoxically is used on the more complicated types of receivers (two or more i-f stages) has been successful in every case that has come to the writer's attention. As may be inferred from the above caution as to proper co-ordination, they were not all successful at the start. Enthusiastic attempts at installation by those without a fair knowledge of radio required the aid of a serviceman with an output meter and test oscillator in order to get straightened out.

### Three and Four-Tube Adapters

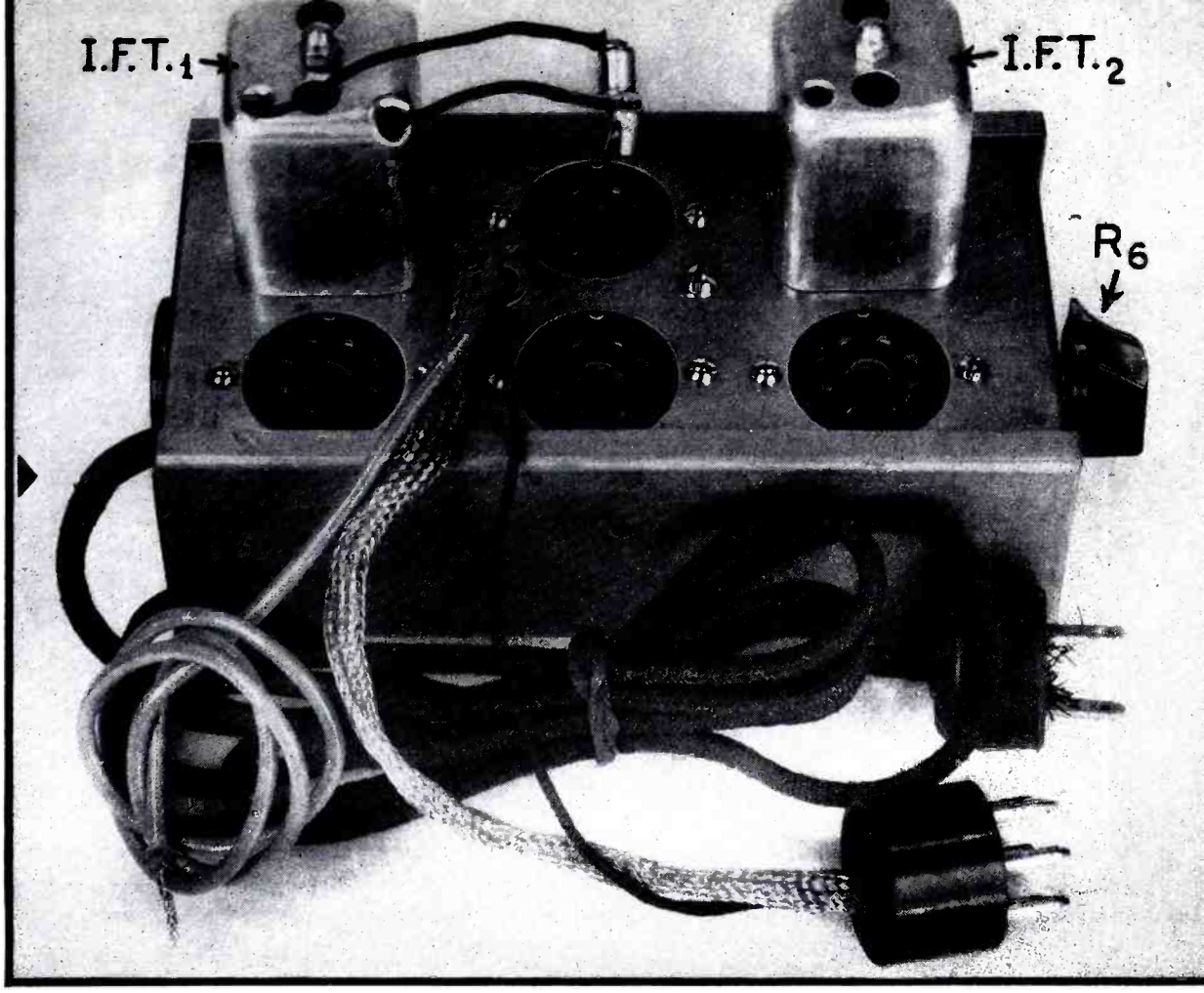
Insofar as silencer adapters go, superheterodynes may be divided into two classes. Those having two or three i-f amplifier stages, which require a three-

Fig. 1. Circuit, with parts values, of the four-tube noise-silencer adapter.



# ADAPTER

## FOR SETS WITH ONE I-F STAGE




The completed four-tube noise-silencer adapter unit.

tube unit, and receivers having only one i-f stage, which require a four-tube adapter. Here we have another paradox. Generally, but not always, the more expensive and complicated two- and three-stage receivers require a less expensive, simple adapter, while the simpler circuits of the sets using one i-f stage require a more costly adapter that must necessarily be carefully designed, if trouble is to be avoided in the installation. The purpose of this article is to describe such an adapter with the reasons for the departure from what one would at first consider logical design.

If we refer back to the February issue of ALL-WAVE RADIO to the three-tube adapter, we find that the 6L7 tube is substituted for the second i-f tube of the receiver. In parallel with the grid of the 6L7 is the grid of the 6J7 noise amplifier. This tube amplifies the noise and signal fed to the two grids from the first i-f stage plate circuit. If only one stage of i-f amplification is available, as can readily be imagined, insufficient output is obtained from the 6H6 rectifier so that the 6L7 tube cannot be "blocked." For this reason silencing cannot be obtained.

The easiest solution at first glance is to add another noise amplifier stage following the 6L7 to produce the required blocking voltage. Unfortunately the avc voltage upsets the apple cart as the sensitivity of the noise amplifier circuit varies as fading signals ride up and down in level. This tends to let noise through when the signal strength slopes off slightly, even though the fading is not apparent due to the avc action. Another difficulty is due to oscillation which may easily occur when the output of the noise stages are fed back to the injector grid of the 6L7.

### *Four-Tube Circuit*

Due to the fact an adapter was wanted that could be readily applied to a wide variety of receivers without these inherent defects, the circuit shown in Fig. I was developed, with excellent results. Two i-f stages are employed in the receiver in place of the one stage ordinarily used, with a single 6J7 noise amplifier and 6H6 rectifier coupled back to the 6L7 second i-f tube. In other words, a stage of i-f was added to the set with the noise silencer section the same as that used in the three-tube unit. The first advantage is that the 6K7 tube used as the first i-f tube closely resembles the i-f tubes used in single-stage receivers insofar as characteristics are concerned. For this reason the avc action of the receiver is the same as it was before the adapter was installed. In some of the latest models, a 6K7 tube is used as an i-f amplifier.

The next important feature was the adjustment of the output of the 6K7 and 6L7 tubes in cascade to equal that of a single 6K7, 58, 6D6, etc., i-f stage. This was accomplished by tapping the grid on the 6L7 down from the 'hot" end of the grid coil so that the signal input is very low. Thus the overall sensitivity of the receiver is left unchanged. As would be expected, the 6J7 grid gets the full voltage in order to obtain maximum "noise output" to supply sufficient negative voltage to the 6L7 injector to block the tube when noise pulses occur. Due to the fact it is not necessary or desirable to have high gain in the 6K7-6L7 combination, the coupling transformer is of the same low Q broad-band type with single winding tuning as is employed between the noise amplifier and rectifier. For this reason, the installation of the unit in high-fidelity receivers will not cut the sidebands as these transformers pass a 30-kc band with ease.

### *Filament and Plate Circuits*

As the remaining portion of the circuit is identical with that used in the three-tube adapter, no further comment is needed. The filaments of the four tubes are connected in series with a resistor type line cord dropping the voltage from 115 to 25 volts. The tubes then get the necessary 6.3 volts each regardless of the filament voltage used in the receiver. A receptacle is provided in the rear of the unit for the receiver line cord plug. When the adapter cord on the unit is connected to the line and the receiver cord plugged into the unit, the a-c switch on the adapter controls the power to both, making it impossible to leave one or the other "on" accidentally. B supply is obtained from the receiver. The negative connection is made by binding the two chassis together. B plus should be tapped off at a well filtered point in the B supply. The plate return of one of the i-f transformers is a good place.

The rather unique mechanical layout

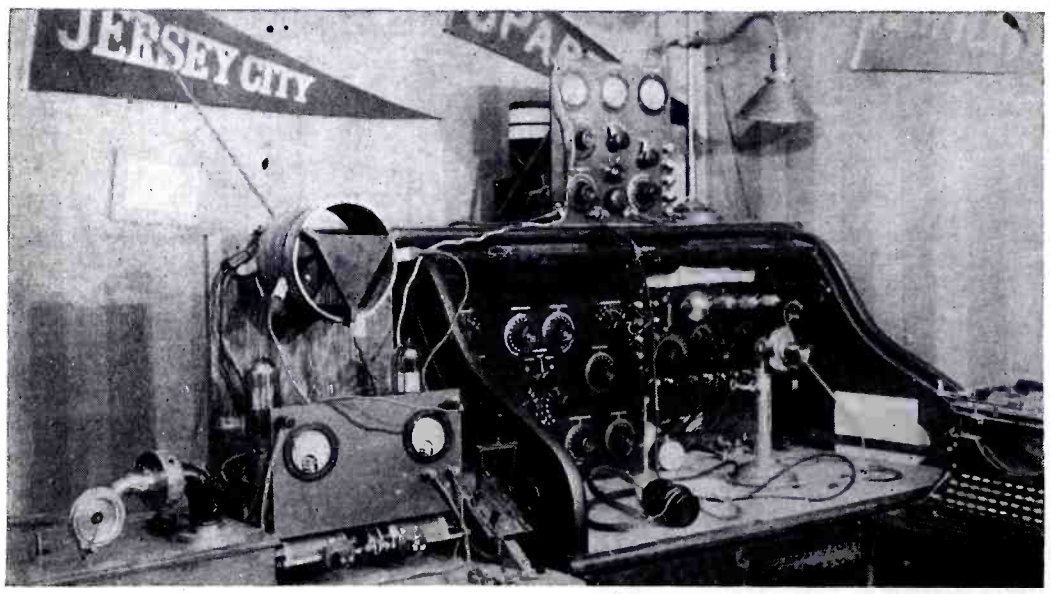
[ *Continued on page 194*]

Operating position of 2WC, now W2WD, showing Grebe receiver at left and, at rear center of table, the "low-loss" regenerative short-wave receiver with two-stage a-f amplifier . . . "home-made" by S. P. McMinn, the owner.

# The Story of Amateur Radio—III

CONCURRENT with the banishment of the old spark transmitter and the beginning of the reign of the vacuum tube as a generator of radio-frequency power for amateur radio telegraphy, there appeared on the air the first few practical radiophone transmitters.

No doubt many of the early radiophone pioneers were inspired by the work of George Eltz and Frank King, who had an arc transmitter in operation in 1911. Be that as it may, amateurs were communicating with each other by voice a good while before the advent of radio broadcasting. Harry Sadenwater, Ernest Amy and George Burghard were talking across New York City on 200 meters. Their signals were many times heard at a distance of 50 miles, a record in those days. The genial Dr. Goldhorn, in Mount Vernon, N. Y., was experimenting with vacuum tube radiophone transmitters of exceedingly low power in 1919, the same time that Dr. Lee DeForest commenced similar experiments from his laboratory at High Bridge.




An early c.w. and 'phone rig owned and operated by Lester Spangenberg. Note the mechanical phonograph pickup with built-in microphone. The large tubes in the transmitter are 203's.

The thrill in the reception of voices by radio for the first time was indescribable. It was uncanny to be listening to radio telegraph signals and suddenly hear the voice of a man in the headphones, or hear the faint strains of music. But, it was all fact, and many amateurs were fascinated by this newly developed form of communication. It was not long before the hearing of music and voices was quite a commonplace thing, and one no longer thought about the wonder of it.

The early radiophone transmitters were as crude as were the early types of spark transmitters, but development was rapid, as it always has been in the amateur field. Voices and music became clear; transmitter powers were increased, and soon the "Phone Aamateurs" were definitely out for DX records, too.

The advent of the radiophone brought on the third important phase of amateur radio, and subsequently the allocation of specific frequencies in the amateur bands for 'phone transmission. Since then the rise of the 'phone amateur has been rapid, and today he is a highly important factor in amateur radio.

### 'Phone or C.W.?

There are those who predict the passing of the radio telegraph amateur in

just the same way that the old-time spark advocate was eliminated from the picture. Amateur radio may eventually be exclusively radiophone, but the chances of this taking place appear very slim, indeed. The outcome rests entirely with the amateurs themselves.

Both the c-w men and the 'phone men are proud of their accomplishments, and both have a right to be. The c-w man is representative of an art that will cease to exist if he passes out of the picture . . . the art of radio telegraphy itself. Proficiency in this art comes only with years of practice, and a "good fist" is a badge of distinction. There was no art to the early efforts of the 'phone men, but they have since made an art of their branch of amateur radio. The experienced 'phone man is easily recognized by the manner in which he handles his station and in the manner in which he carries on conversation.

These two branches of a hobby and a public service are not diametrically opposed to each other. Both factions work side-by-side and often "cross over." As a matter of fact, inter-communication between the c-w and 'phone man is quite a common thing.

And why should there be any antagonism? Since 1919 the c-w and 'phone men have grown up together. Most of the problems of one group have been common to the problems of the other group. Moreover, aside from the fact that many of the old-time c-w men have "gone 'phone" completely, there are large numbers of amateurs who work both c-w and 'phone, as their desires, or communication conditions dictate. The two branches appear too closely bound together ever to be severed or ever for one to snuff the other out of existence.

### *Common Technical Problems*

We have mentioned that the technical problems are common to both the c-w and the 'phone man. The former, of course, has no great interest in modulation systems, but aside from this, problems and the fruits of the solutions to the problems are shared equally. Crystal-controlled oscillators, frequency-doubling systems, matched impedance type antennas, selective transmission and other developments in the field are of as much interest and value to the c-w man as they are to the 'phone man, for all these developments can be used to good effect for either c-w or 'phone work.

These are the reasons why we say that the c-w and the 'phone men have grown up together. Both have shared in the triumphs, both have shared in the difficulties laid at the door of amateur radio by inadequate space in the ether channels. That difficulty in itself is responsible for more of the advancements in amateur radio than all other factors put together. The amateur has had to learn to make good use of the few narrow channels allocated to him. Because of his numbers, the channels have been overcrowded and in consequence studded with a terrific amount of interference.

The amateur won his first battle against this persumably unalterable condition, by turning to the vacuum tube c-w transmitter. He bettered conditions again by using only pure continuous-wave signals, devoid of any form of modulation that would make the signal broad. Again, later, he further improved matters by isolating the self-excited oscillator from the antenna for the purpose of reducing frequency drift and the reduction of spurious radiations. He further improved communication conditions by using crystal-controlled oscillators operating under light load and working to the antenna through a buffer amplifier. With an increase in the number of desirable operating bands, he developed comparatively simply transmitters whereby with a single unit, two or more bands could be worked. This was accomplished through the use of frequency doublers, employed by both c-w and 'phone men.

### *Band Crowding*

But, for all of this good work, interference increased rather than decreased. Since the beginning of the depression, thousands of new amateurs had been opening up in the 20, 40, 80 and 160-meter c-w bands and in the 5, 10 and 160-meter 'phone bands. In the meantime, amateurs with at least one "hitch" behind them, had obtained Class A licenses and were filtering into the 20 and 75-meter 'phone bands.

Conditions became almost intolerable at 20, 40, 75 and 160. Something had to be done about it, and what has been done is still in the process of more doing.

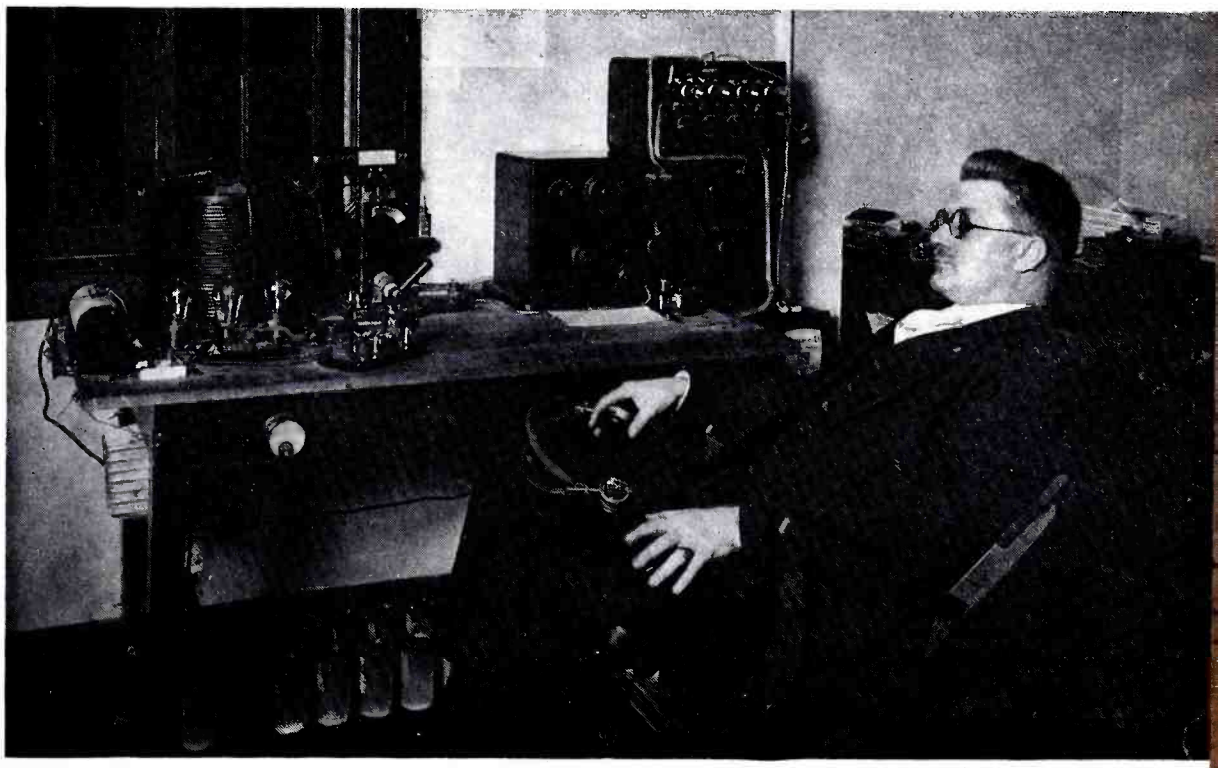
The first important step was the development of the single-signal superheterodyne receiver, a clever ciruit worked out by James Lamb from the original Robinson "Stenode." This receiver used a crystal filter with such a high degree of selectivity that it was possible to eliminate one of the two beats of a c-w signal in a superheterodyne. The filter was also useful in pulling through 'phone signals suffering sideband interference. Since that time, other forms of receivers having very high degrees of selectivity have been devised.

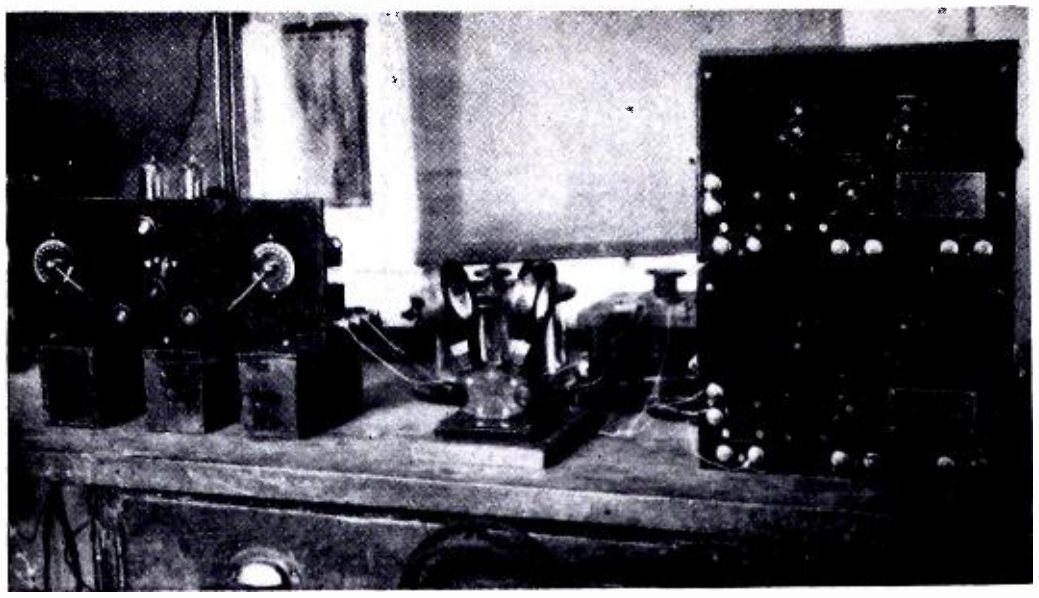
Around this time, many amateurs had commenced experimenting with directional and beam antennas, with the idea in mind that if such radiators could be made sufficiently directional, a large part of the interference from two, and possibly three directions could be reduced or eliminated. This proved to be the case, and the benefits were two-fold; first, when the antenna was used for transmitting, the signal would go out in only one or two directions, and thereby reduce the possibility of interference with signals in the two or three remaining directions; and second, when using the antenna for receiving, signals from other transmitters would be reduced in strength in all but one or two directions.

### *Rotating Beam Aerials*

This was a good starter, but with the opening up of the 5- and 10-meter bands, where antennas of small physical dimensions could be used, many amateurs started playing with rotating radiators, so that selective transmission and reception could be obtained in any desired direction. These systems eventually

**Fred Hill, old 4GL, at Savannah, Georgia. This photo was taken in 1921. Under the table are a batch of electrolytic rectifiers. On the table, to the right, is the Marconi Type 106 receiver. Marconi type 202 tubes were used in the transmitter.**





Neat receiver, with Navy amplifiers, of the vintage of 1919. Note the honeycomb coils and the huge Telefunken variable condensers in the background.

evolved into rotary beam radiators, that transmitted or received only in the direction in which they faced. Theoretically, then, such an antenna would place the transmittesd signal in one area only, thus relieving all other areas of possible interference from this source; and when used for receiving, would pick up signals from one direction only, thus eliminating an enormous amount of possible interference from signals arriving from other directions. Practically, these antennas were not quite as good as in theory, but proved to be remarkably efficient nevertheless.

We may suppose that some day, unless more frequencies are provided, every amateur will use some form of rotary beam aerial, an aerial entirely different than any we know of today, or a refinement of some present form.

### Ham and Broadcast Listener

Since the advent of broadcasting, the amateurs have been beset by still another form of interference, admittedly of their own making, but in most cases not due to any fault of theirs—that is, the interference created by amateur transmitters with the reception of broadcast and short-wave programs.

Nothing has caused the amateur more difficulty than the continuous flow of complaints from broadcast and short-wave listeners. No matter how one may look at the matter, it is a delicate subject for the reason, first, that some amateurs *are* at fault, though their number is small, and, second, because many listeners refuse to consider the amateur's side of the question.

### Types of QRM

Both amateur c-w and 'phone transmitters can create interference with broadcast reception. If the transmitter is close to the receiver, as it is sure to be if it is in an apartment, a condition is created that is known as forced oscillation. The signal or field intensity of the transmitter is so strong that it forces the antenna coil in the receiver to oscillate, not, unfortunately, at the frequency of the signal but at its own natural frequency. Consequently, all preceding circuits are likewise energized and the amateur signal is heard superimposed on a broadcast or short-wave signal. The same thing happens if a receiver is too close to a broadcast station . . . the signal of the broadcast station is superimposed on the signal of another—or possibly heard at a number of places on the dial, depending upon the type of receiver.

The amateur is usually able to eliminate this form of interference for the listener by inserting a wavetrap in the antenna lead-in to the receiver. The wavetrap is tuned to the frequency of the amateur signal and in this manner prevents sufficient energy from reaching the antenna coil to cause forced oscillation.

A similar form of interference can be created by the signal from the amateur transmitter beating with some harmonic of the converter oscillator in the receiver, in which case it is passed through the receiver in the guise of a legitimate signal and may completely fool the listener as to its original frequency or wavelength. This form of interference can also be cured by the use of a wavetrap in the antenna circuit, providing the receiver is well shielded. If it is not, the fault is with the receiver and not the transmitter.

### Image Interference

A third form of interference, over which the amateur has no control whatsoever, is due to image response in a superheterodyne. The average listener has at least a speaking acquaintance with this form of QRM, as it occurs with broadcast stations equally as readily as with amateur transmitters. However, all "off-frequency" transmissions are not necessarily the result of image response. Both amateur and broadcast stations can, and often do, radiate a strong harmonic signal which may fall right in the center of some short-wave band. This is a fault of the transmitter and not the receiver. It can be cured without much difficulty, and once an amateur learns that he is radiating a strong harmonic over considerable distances, he is usually quick to remedy the fault.

A fourth form of interference is caused by the radiation of spurious frequencies, and here again the fault is with the amateur. And again, it is a fault that can be easily remedied.

The amateur is seldom aware of the amount of interference he may be creating locally. Too much depends upon the receivers in his locality. But one thing is sure; if he is hashing up program reception, he will do what he can to eliminate the fault no matter where it may

[*Continued on page 194*]

This elaborate 'phone installation, of 1920 vintage, is a three-tube grid modulated radiophone, used by Earl W. Dannals, as a ham station at Bush Terminal, Brooklyn, N. Y. Old timers will recognize some of the early Navy equipment in this photo.

# RADIO TO EYE SEA DOGS

## FIVE-METER HAM NETWORK SET UP TO GUIDE YACHT RACES

***By S. P. McMinn • W2WD***

***Secretary, Garden City Radio Club***

*"HELLO, W2DKJ Portable. This is W2BRI Portable. Are you ready for position report?" . . . . "OK, W2DKJ Portable reporting B, for Boston, eight zero seven J for John, L for Louisiana. Time six nineteen P.M. All well on board. That is all. Next schedule at seven nineteen. W2BRI signing and standing by."*

✦

That in all probability will be the kind of conversation that will be winging its way through the ether over Long Island Sound and adjacent waters all through the Summer as racing yacht skippers report hourly positions to be relayed within minutes to their home yacht clubs so that an accurate record of every yacht in every race may be kept on a chart hung on the yacht club wall.

### *Yacht, Where Art Thou?*

A record of the kind has been a dream. For years racing yachts have crossed the starting line to disappear in the mists for hours and sometimes for days with never a hint of their whereabouts or what may have befallen them. Not until they cross the finish line has anxiety over their whereabouts been relieved. As a sporting spectacle, long distance yacht racing never has been a spectacle at all because there just hasn't been anything for the rocking chair fleet to look at.

But this summer the picture will change, and radically. Everyone who has any interest at all in any racing yacht in any race may know constantly exactly where that yacht is, and have news of the well-being of those on board. In case of accident to any competitor, the news may be flashed in a moment not only to the home yacht club but to all other competing yachts so that where the necessity exists help may be at hand quickly.

### *Curtis Arnall, Ex Buck Rogers*

Credit for the thought that has already germinated into a full-blown plan of action belongs to Curtis Arnall, himself an ardent yachting enthusiast and a radio amateur at heart, whose voice has become known to millions as Red Davis and Buck Rogers through the commercial programs broadcast by the National Broadcasting Company over coast-to-coast networks.

Visualizing the tremendous stimulus that would be given to both yachting and amateur radio through an alliance of the two with a real purpose behind it, Arnall suggested the idea to Communications Manager F. E. Handy of the American Radio Relay League. Handy, in turn, immediately got in touch with this writer, as Secretary of the Garden City Radio Club, because of the great amount of pioneering experimental work on ultra-high-frequencies that this group of amateurs has carried on both on the ground and in planes.

### *Communications Network*

In consequence, the ground-work of an extensive organization to handle all the long-distance yacht races in and around Long Island has been laid down; a new type of ultra-high-frequency transmitting equipment has been designed, built and tested; a corps of amateur operators throughly qualified by experience for the work has been recruited; and arrangements have been made for suitably located base ground stations. What is likely to be one of the greatest demonstrations of the utilitarian value of amateur radio is ready.

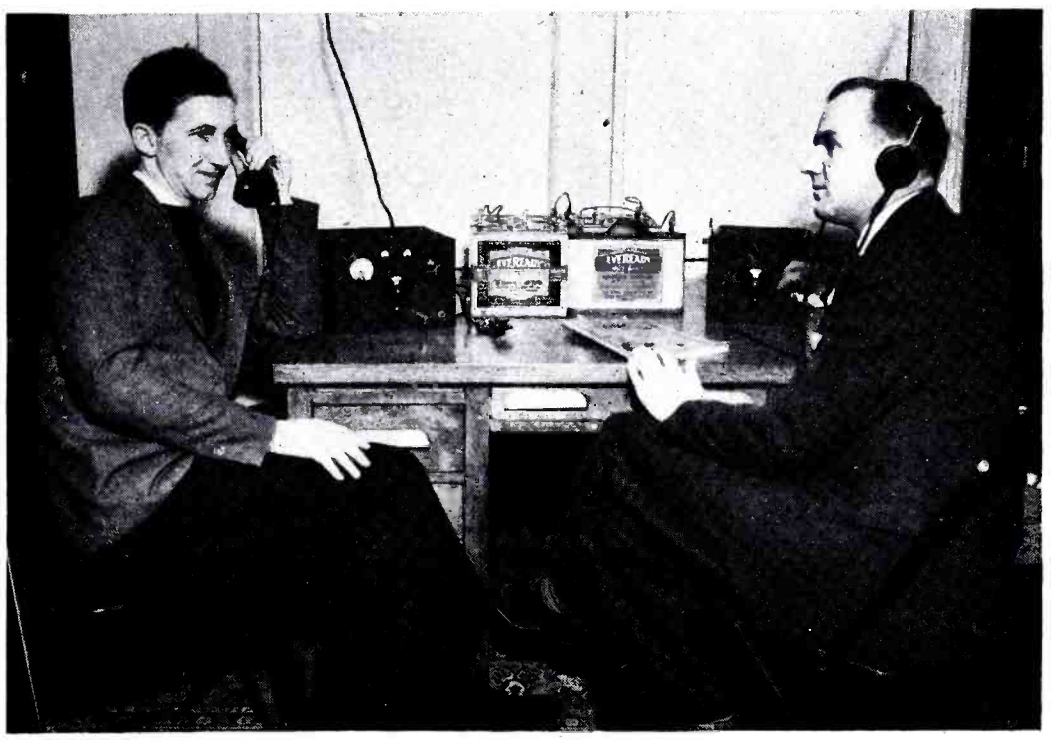
At first blush the task of organizing for the work, of designing and building equipment, of recruiting operators, of locating base stations, appeared colossal. But under the able guidance of Arnall, Dr. L. J. Dunn (W2CLA), Arthur Lynch (W2DKJ), and with the help of the Technical Committee of the Garden City Radio Club, headed by Edward Ruth (W2GYL) and assisted by Harry Lawson (W2IER), difficulties gradually were smoothed away until, as this is written, everything is ready—and the boys are rarin' to go.

### *Fun on Fifty-Six*

Following first conferences, it was early decided that 56 megacycles was the best part of the high-frequency spectrum to rely upon. In the first place, all amateur stations are licensed to operate portable-mobile at this frequency. Secondly a great deal of experience has been gained with the behavior of signals at this frequency. Thirdly, equipment of sufficient power and portability is neither difficult to built nor expensive to finance. Manifestly, considerable relaying of information may become necessary, but it is felt that the organization will be equal to the task.

The plan, in brief, is this: Prior to the start of a race, and most of the races

[*Continued on page 197*]

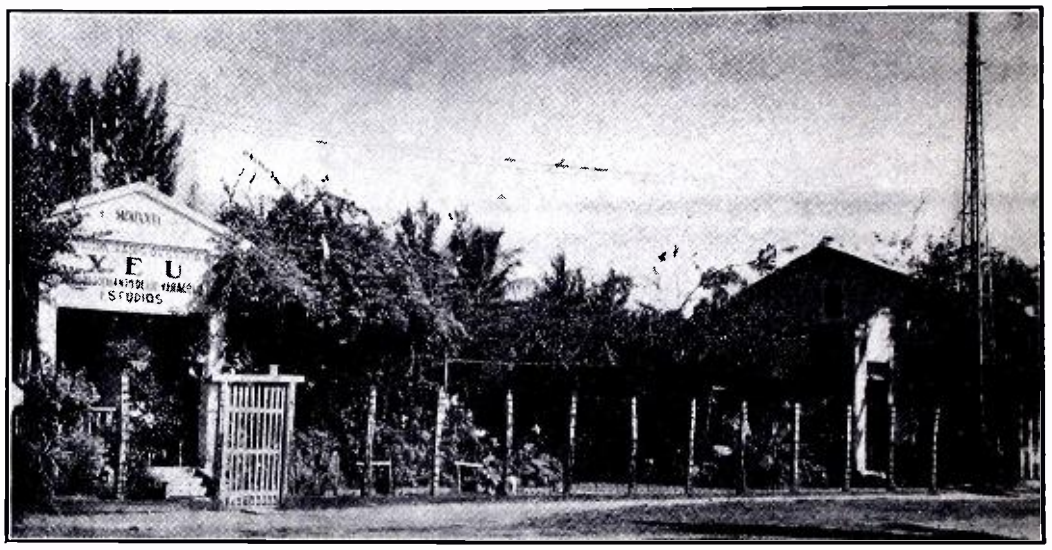


**Transmitting and receiving equipment that will be used in handling communications on 56 mc during the long-distance yacht races in Long Island Sound. Left to right: Ed. Ruth (W2GYL) and Harry Lawson (W2IER).**

# Globe Girdling

## By J. B. L. Hinds

**summer reception to be good . . . the Guatemalan stations . . . the Java string . . . Pontoise calls at last . . . new station additions . . . Radio El Mundo**




This photo appears on the veri card of stations XEU and XEUW, Veracruz, Mexico.

LET us start out this time and talk about reception of radio signals. This is a live subject and one that we are all interested in, but one that is not much discussed.

So the writer, as a layman, with his contact with radio signals since 1924, thought he would make a few comments as to what we might expect in the time spread out ahead of us instead of behind us.

### The Seasons

When we were back in school, (which is quite a spell back with some of us) they told us that once a year the earth moved around the sun and that the path was almost a circle; that half the year the sun is north of the equator or, when we have spring and summer; that the other half of the year it is south of the equator, when we have fall and winter. We then learned that there is a torrid zone and a north and south frigid zone, a north and south temperate zone, and that in these zones *all* the countries of the world lay spread out as you view them on a Mercator map of the world.

And, notwithstanding all the changes that have occurred in this world since

MR. J. B. L. HINDS

those school days, these conditions of seasons and locations remain as explained to us then. Since then radio has come to us and those of us who have followed it closely day to day, season to season, and year to year, have formed opinions of our own from our contact with the elements, as radio has progressed.

### Power Combats the Seasons

Still there are plenty of people in the United States and Canada who sincerely believe that there is no use in trying to tune in a station near the Equator against the elements of the summer or, likewise, London or Europe in December or early January. It does not, however, require a very vivid memory for some of us to recall the time when these conditions were facts. But they are not facts now. Weather conditions did affect reception then, but *power* in radio transmitters has overcome these conditions to a great extent and now numerous reports and lengthy logs of European stations received in these periods in California, Washington, British Columbia and other western states are testimony to that power.

In the days of radio of which I speak, however, G5SW, in Chelmsford, England, a low-powered station, had studios in London, and in the short days in December and up to January 5th we did not expect to hear the toll of Big Ben at 7:00 P.M., E.S. Time, and if one did, everybody thought he had an exceptional receiver. Again, look over your records of the power of the South American stations then and now and you have the answer for that locality. There is no reason for a let-down of signal strength in the months ahead of us. March reception was far ahead of any March for several years. Signals, in our opinion, will hold up well in April and on, unless interrupted locally by severe electrical storms, etc. Signals from Europe will naturally be better this spring and summer, as they always are.

### Summer Reception

South American stations will come to us with better signals on account of their increased power as well as the seasonal change. We may receive more static with signals from the stations in the low lands. But signals from stations in high altitudes should come to us very well, for please bear in mind that Quito, Ecuador lies 9,534 feet above sea level, although nearly on the equator. The

stations of Bogota, Colombia, speak out 9000 feet above sea level and will be heard the year around.

The Australian stations are always consistent. Moscow's signals were not heard in the summer in the days of low power on 50 meters, but you will hear them on low frequencies this summer. Notwithstanding that you hear Argentina saying it is now summer there, and that the dust is blowing in Honduras, don't let these be reasons for laying up your receiver for the summer. Keep right at it and you will be surprised at the results you can secure and the number of verifications you can add to your collection.

### *The Guatemalan Stations*

Stations in Guatemala seem to be a live and interesting subject. Since my inclusion of TGX in the list of stations that do not verify, I have received several letters from readers who say they have a very pretty card from TGX, Guatemala, "The Land of Eternal Springtime." The writer also received one with this notation: "Reportando au audicion on 6130 kc." We know TGX is not on 5941 kc or 50.50 meters, its former frequency. Has anyone heard it on 6130 kc during the past few months? Well, here are the latest facts on stations in Guatemala and as to their operation at present. I am in receipt of a letter direct from the licensing authority and as far as the Government of Guatemala is concerned, the following stations are on the air, and are so listed in this issue of ALL-WAVE RADIO:

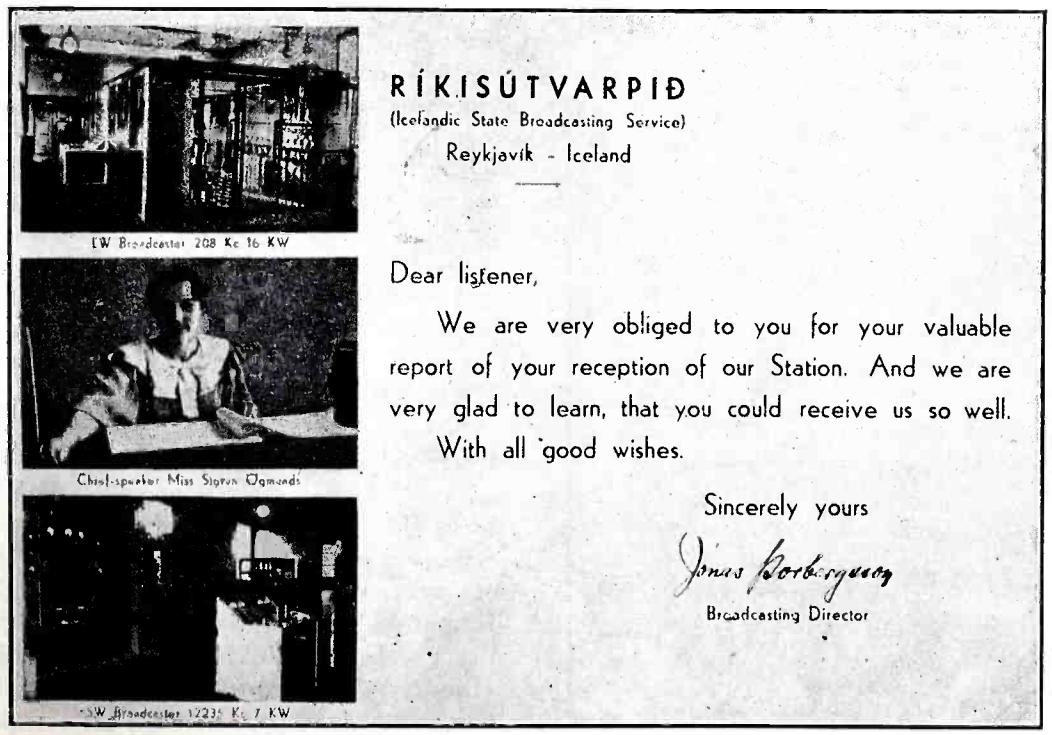
TGW 1210 kc 10,000 watts Ministero de Fomento
TGWA 9540 kc 250 watts Ministero de Fomento


Radio El Mundo is going strong. Try for one of these. See dope on card.

TG2X 5940 kc 250 watts Direction General de las Policia Nacional
TGS 5713 kc 100 watts Oficina Radiotelegrafica de la Casa Presidencial
TGX 1400 kc 50 watts Liberal Progresista

TGX 1400 kc (Long Wave) has a license for the 6130-kc frequency but has *not* tested on that wave nor on any other in some months.

It will be noticed that the TGWA frequencies of 6000 and 12,000 kc have been dropped and TGWA shifted to the experimental channel of TG1X, and the latter call dropped. The two frequencies dropped were pretty well crowded, and it may be that the 9450-kc frequency may yet be vacated for some other less occupied range.




A nice card from TFJ, Reykjavik, Iceland. The young lady is Miss Sigrum Ogmunds, Chief Announcer.

Programs from the high-powered, long-wave TGW are being rebroadcast by TGWA and TG2X. Station TGS broadcasts programs from the studios of TGW on Sundays from 6 to 8 P.M., E.S. Time. Reception reports on these Sunday programs would be appreciated and Mr. C. H. W. Nason, Technical Director, Radiodifusora Nacional TGW, requests that they be forwarded through him at Guatemala City.

### *Jottings*

CO9WR Sancti-Spiritus, Santa Clara, Cuba, is retained in the lists at its old frequency of 11,800 kc as no authentic information has been received of its change to 6290 kc or thereabouts. CO9GC is retained in the list at 6150 kc, and HJ3ABD at 7400 kc for the same reason.

"La Voz de la RCA Victor" Radiodifusora HIT Ciudad Trujillo, Dominica, 6630 kc, bears on its card the familiar RCA Victor emblem, "His Master's Voice."

XEUW's card from Vera Cruz, Mexico, is a pretty photo of its studio and transmitter buildings with aerial towers amid the surrounding gardens.

It is noted that the verification card from HJ1ABE, Cartagena, Colombia is signed by Carlos A. Lemaitre. It is therefore not known if this station has changed hands in its operation or not.

Station XEME, Merida, Yucatan, Mexico, is transferred in this month's list to 8190 kc. Since making the change a verification card received shows a change to 9520 kc. The last time reported heard it was on 8190 kc.

CFU, Rossland, B. C. Canada, furnishes a verification card, and while post marked Rossland, it is headed "Radio Communications Department"; Head office: Trail, B. C. Canada. C.

M. & S. Radio station CFU is located at Rossland, and rebroadcasts news programs originating with CKCD, Vancouver, on 1010 kc and transmits news to their mining camps in the North. CFU operates with 500 watts power.

### The Java Stations

Mr. H. Van der Veen, Engineer-in-charge of the Java Wireless stations, very kindly furnished this department with a complete revised list of these stations, including those broadcasting music. The lists in this issue have been changed accordingly. Attention is called to YDA, 6040 kc, 49.69 meters; YDB, 9650 and 11,875 kc, 31.09 and 25.26 meters respectively, and YDE2 on 4810 kc or 62.37 meters. These are the stations of the Concession Broadcast Company, N. I. R. O. M. The first uses 10 kw power, the second 1 kw on each frequency, and the last named uses but 100 watts. The last mentioned station broadcasts native music only.

The Governmental Telephone Stations, broadcasting musical programs occasionally, and using directional aerials towards Europe, America, Australia or the Far East are at present: PMA, 19,345 kc; PLE, 18,830 kc; PLP 11,000 kc; PMN 10,260 kc, and PLV, 9415 kc. PMA-PLE-PLV transmit with 40 kw power each; PLP and PMN with 3 kw each. From these government stations, PLP and PMN, the N. I. O. R. M. programs on Sunday are relayed. Other Java stations listed as phone (P) are used strictly in phone service.

Mr. Henry Guerrero, Foreign Correspondent of XEBT, Mexico, D.F., advises that steps are being taken to secure a permit to broadcast the call in English each half hour. This would be a step in the right direction and it is hoped that the practice will be put into effect soon. This station is now operating from 10 A.M. to 1:45 A.M. daily. Programs are opened with the Mexican song "Las Mananitas" meaning "The Good Morning Wish," and closed down daily with the selection "Liebestraum"—"A Dream of Love," by Liszt.

The writer has finally received a verification from HC2ET Guayaquil, Ecudor (4600 kc 65.2 meters) and reports indicate that several others also have received them, so we will take them out of the "no veri" class.

### Veri Cards

The latest new card from HI1A, Santiago de los Caballeros, Dominica, is quite an up-to-date affair, giving the power, frequency, time schedule on local time, and stating that local time is 20 minutes in advance of E. S. Time. If all stations would do likewise it would assist materially.

The veri card from TFJ, Reykjavik, Iceland, is a very neat card with photos of transmitters and chief-speaker Miss Sigrun Ogmunds. They regret that since January 12th their transmissions to America on Sundays have been suspended due to some trouble with the transmitter. They are hoping to resume these broadcasts in the near future, at the same time—1:40 to 2:00 P.M. They say their station has been generally well received from Coast to Coast, both in the United States and Canada.

HJ4ABC, Ibague, Colombia, sends the writer one of its new colorful cards showing frequency to be 6451 kc. The station is called "Ecos del Combeima." It is noted that HJ4ABC, Pereira, Colombia, is sending out cards without call shown thereon. "La Voz de Pereira" formerly operated on an assigned frequency of 6230 kc under the call HJ4ABC, with 50 watts power.

A new transmitter with 180 watts power was installed and moved to a frequency of 6080 kc. Meanwhile the call HJ4ABC was officially assigned to Ibaque. It is not known when a new call will be assigned to Pereira. HJ4ABJ on 6230 kc, and also located at Ibaque, is a very low-powered station and doubts are expressed of its ability to be heard at any great distance.

### Additions to Station List

Additions to the lists in this issue are as follows:

| *KC* | *Meters* | *Call* | |
|---|---|---|---|
| 14790 | 20.28 | RIZ | Irkutsk, USSR |
| 14480 | 20.72 | PLX | Bandoeng, Java |
| 12860 | 23.33 | RKR | Novosibirsk, USSR |
| 11875 | 25.26 | YDB | Soerabaja, East Indies |
| 11830 | 25.36 | W9XAA | Chicago, Ill |
| 10940 | 27.43 | TTH | St. Assisse, France |
| 9650 | 31.09 | YDB | Soerabaja, East Indies |
| 9590 | 31.28 | PCJ | Eindhoven, Holland |
| 9580 | 31.31 | LRX | Buenos Aires, Argentina |
| 9500 | 31.58 | HJU | Buenaventura, Colombia |
| 6235 | 4800 | HRD | La Ceiba, Honduras |

HJU was transferred from 9065 KC.

### Pontoise Calls

Assignment of call letters to Radio Coloniale Pontoise are TP2, TP3 and TP4, 15243, 11885 and 11713 kc respectively, according to various sources of information, so they have been inserted in the lists.

The new Honduran station, HRD, located at La Ceiba, and known as "La Voz de Atlantida," is getting out quite well and as we close is using sufficient English for listeners to identify without trouble. It is on 6235 kc and is broadcasting some excellent marimba orchestral music.

Their excellent pianist plays Ted Lewis' popular "Good Night Song" just before closing.

### "No Veri" Stations

The following stations are still delinquent in forwarding verifications: HCETC, Quito; HC2CW Guayaquil; HKV, HJN and HJ3ABI; Bogota; HJ1ABJ, Santa Marta; CT1AA, Lisbon; TIEP, San Jose; XBJQ, Mexico City; HRN Tegucigalpa. It would seem that stations making requests for reports would reply at least after listeners are courteous enough to supply information to the stations and enclose the usual International Reply Coupons. Hundreds of Reply Coupons have been sent to one of the stations mentioned but still no cards sent out and the question of its frequency definitely settled.


**Philatelists will go nuts over the three stamps affixed to these cards. But it is enough to have one of the veries.**

Other new stations heard on the air of late, but not listed in station lists, are "Radio Cartagena" 9600 kc, 31.25 meters, HJ1ABP, P. O. Box 37, Cartagena, Colombia; HP5K, Colon, Panama, on 6005 kc (49.96 m.) and getting out with good signal and requesting reports to be sent to P. O. Box 33, Colon, Panama. They use three chimes which remind you of home and the National Broadcasting Co., and tell you in English who they are and where located, as all Panama stations do.

It is reported that LZA, Sofia, Bulgaria, is testing out on 14970 kc, 20.04 meters, between 3:30 and 11:00 A.M. This is pretty close to the 20-meter amateur band.

### *The Madrid Station*

The Madrid station on about 45 meters which has been broadcasting for a time, sends verification card but no call letters or frequency mentioned. The one received by the writer bore letters "EUA" at top of address side, but it is not known if intended for call or not. The address is Philips Iberica, S.A.E., Paseo de las Delicias (sounds good) No. 71, Madrid, Spain.

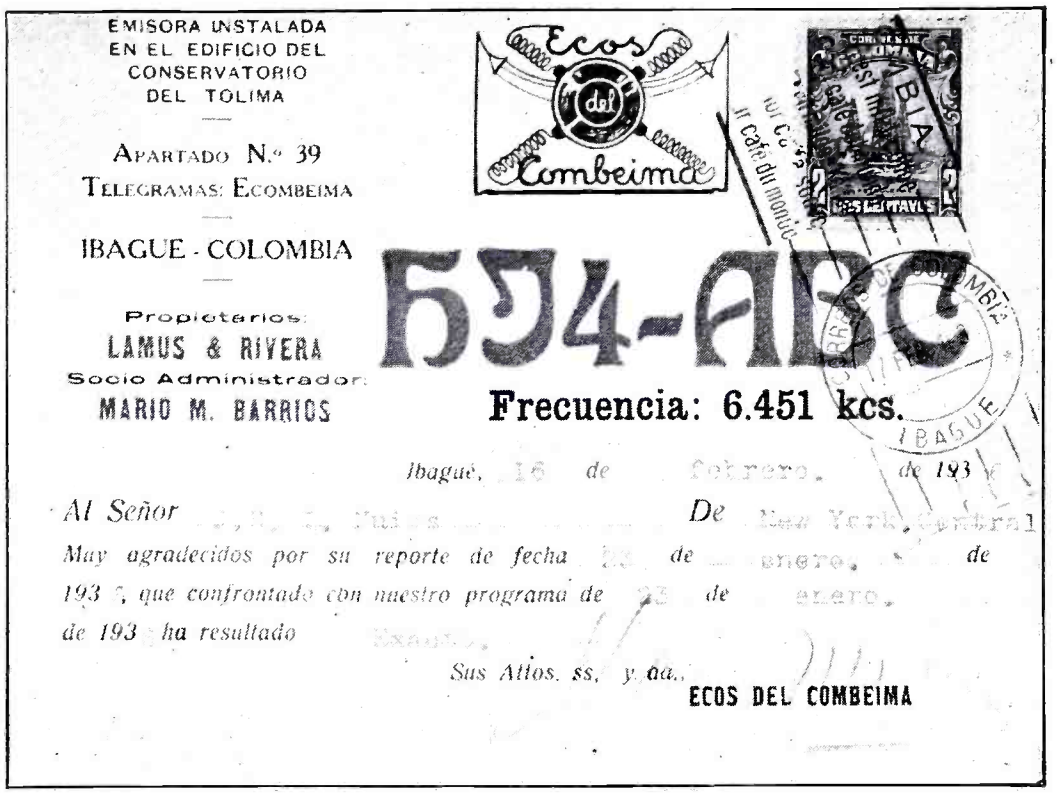
The German Broadcasting station advise that the piano-like identification or interval signal used by them are the notes taken from the opening bars of an old German folk tune, "Ueb immer Treu und Redlichkeit" and are also an imitation of the chimes at the famous Garrison Church, at Potsdam, near Berlin, where Frederick the Great lies buried. The call is produced by an electric clockwork device.

### *Radio El Mundo*

Radio El Mundo, Buenos Aires, Argentina, newly installed, transmits daily with 50- kw power on LR1-1070 kc, on LRX 9580 kc, and on LRU-15,290 kc, each with 5-kw power. These transmitters are operated by Editorial Haynes, Ltd., publishers of El Mundo, (Daily), El Hogar and Mundo Argentino (Weeklies) and claimed to be the largest broadcasting outfit in South America. They maintain seven studios in Buenos Aires. Their verification card is a verification all right, but you must judge by your report sent as to which transmitter's output it covers, as all three frequencies are on the card. No reference is given as to which one you received. The date of reception shows on the card and you know from your report which call letter was reported.

### *Station List Revisions*

In revising our station and address lists monthly, it is our desire and aim to make them as correct as possible. As mentioned before, it is not our practice to change the lists without authentic information nor to insert stations until we are quite sure as to the correct frequency, etc. We will continue to report in these pages such stations as have been heard or reported, and transfer them to the lists as the correct data is received from reliable sources. Each reader can assist in perfecting these lists by checking the information and reporting any errors or omissions. Steps can then be taken to check the reported information. Address all letters pertaining to the lists, to addresses, to unknown stations, and station matters in general, to me at 85 St. Andrews Place, Yonkers, New York. Any questions of a technical nature should be forwarded to Queries Editor, ALL-WAVE RADIO. 16 East 43rd Street, New York, N. Y.




**Red letters, blue printing . . . very attractive, and a swell addition to anyone's collection of veries.**

### *In Appreciation*

I greatly appreciate the interesting reports and letters received from Mr. George L. Bird, Pawhuska, Okla.; Charles A. Preisler, Castle Point, N. Y.; L. M. Clark, Snyder, N. Y.; Walter R. Armstrong, Jr., New Orleans; W. O. Rich, Ririe, Idaho; John Lane Evans, St. Louis, Mo.; Herbert W. Becker, New York City; Lawrence Pilat, Cleveland, Ohio; Douglas Vance, Omaha, Neb.; H. W. Gollinger, Seattle, Wash.; Carl C. Cochrane, West Pittsburgh, Pa.; Leonard J. Bogert, Hillsdale, N. J.; James J. Drew, L. I. City, N. Y.; C. F. Ingels, Jr., Phoebus, Va.; Lawrence W. Clay, Port Hammond, B. C., Canada; J. Joseph Hardy, Roxbury, Mass.; and many others who have assisted by the information furnished and compliments extended. It is these expressions of good will and friendliness, together with your assistance, that gives us an incentive to improve our work.

---

## QUEEN MARY'S MAIDEN VOYAGE TO BE BROADCAST

Broadcasts each evening from the decks of the "Queen Mary" during her maiden voyage from Southampton to New York are being arranged by the British Broadcasting Company in cooperation with the Cunard White Star, Ltd.

Many parts of the ship will be wired for microphones. There will be twenty-eight points available, including main ballroom, first-class dining-room, first-class lounge (for light music, etc.), veranda grill, covering main dance band on sun deck, swimming pool, embarkation deck at Southampton and covering the deck for disembarkation in New York, and crow's nest.

According to present arrangements, the departure from Southampton will be described in commentaries both from ship and shore. On the second night out from Southampton it is proposed to broadcast a feature program, in which listeners will be conducted on a tour of the ship. The program will last forty-five minutes. On each night of this maiden voyage a short "flash" will be included in the news bulletins. It is planned also to include a broadcast of the arrival in New York.

# Night-Owl Hoots

## By Ray La Rocque

***Doc Brinkley splurges . . . all-night stations . . . Guatemala sends coffee (despite Major Bowes) . . . the Aussies break through . . . the Cubans***

THE hobby of DXing on the short waves is now the rage and more and more people who were just ordinary listeners are becoming rabid short-wave fans. There are, however, many thousands of us who still prefer to do our DXing on the good old broadcast band, where it is still quite an accomplishment to log a distant foreign station. It is with the idea of providing a meeting place for pursuers of this captivating hobby that we plan to get together once a month for a little friendly chat about the thrills and enjoyment to be had while the city sleeps and the milkman delivers his milk.

### The Medicine Man Returns

"Doc" Brinkley is again giving, or we should say selling, his medical advice over the air waves, by means of his new XERA on 835 kc. His voice is hurled into space by a power of 300,000 watts every morning over his latest transmitter, and it is said that plans call for a gradual increase in power until one million watts is reached. The Doctor certainly came back with a bang after the Mexican government seized his 150,000-watt XER and destroyed it because of failure to abide by the regulations.

### F.C.C. Revisions

The Federal Communications Commission, it is rumored, will soon begin making a wholesale revision of frequency assignments among the broadcast stations. If and when the change takes place, DXers will find various new targets at which they may shoot. It will then be possible to log many stations which have been blanketed in the past by powerful locals. However, it will also place these locals on top of some stations which are now being heard regularly.

### All-Night Stations

In connection with these changes, we would like to offer a suggestion to the commissioners in charge of the broadcast band in behalf of every DXer in the country. Please, *please,* set aside one channel for the all-night stations who refuse to cease broadcasting at a reasonable hour, but continue 'til daylight practically every morning of the year. Other stations who are unfortunately on the same frequency report that they can no longer get satisfactory results from test programs because of interference from these so-called channel-hogs.

Of course the Commission cannot demand that these broadcasts be discontinued for the stations using the early-morning hours for advertising mixed with phonograph records depend mostly on the revenue obtained from these broadcasts for their existence. As the programs presented by these stations are merely of local interest, placing all such stations on one frequency would not decrease the funds of the station, and would prevent a great deal of rapid-growing feeling of resentment among the stations and DXers of this country.

### TGW on 1210

The all-night stations on 1210 kc have some competition now that TGW has its new 10,000-watt transmitter operating on that frequency every Sunday morning. The programs are broadcast between the hours of 12 and 5 A.M. and are intended to interest we Americans in spending a vacation in Guatemala, "The Land of Eternal Spring," and also to remind us that Guatemalan Coffee is the best in the world — a fact which Major Bowes would probably dispute. Anyhow, if you haven't already logged this station, just give a listen on Sunday morning . . . you can't miss them. Marimba music is featured and all announcements are in English. No return postage need be enclosed for verifications, and samples of coffee are sent gratis to those reporting!

### "Down Under" Stations

Now that the trans-Atlantic stations have practically faded out of the picture, reception will begin improving from points "down under"; that is, Australia and New Zealand. With the many increases in power which have taken place over there since last season, quite a few stations should be heard well in this country. Following is a list of those stations which are most likely to be heard. The frequency in kilocycles is shown in parenthesis. 2CR, Cumnock, Australia (550); 6WA Minding, Australia (560); 2YA, Wellington, N. Z. (570); 3WV Hersham, Australia (580); 1YA, Auckland, New Zealand (650); and 3YA, Christchurch, N. Z. (720).

South Americans are stronger than ever at this time and many can be caught with a selective receiver during the early evening hours. The easiest is LR1, "Radio El Mundo," on 1070 kc, whose new 50-kw transmitter often completely drowns out WTAM. This station often operates until as late as 1:00 A.M.

### Kilocycling Around

XEAQ is a new station across the California border in Rosarito, Lower California, Mexico. They use 1000 watts on 1090 kc and their neat appearing verification card is well worth receiving . . . KFBK's watts reach the east coast with volume to spare. Their signal is stronger than most of the 50 kilowatters! . . . CHNS has moved from 930 to 960 kc and thereby receive our personal nomination for champion frequency changer in the U. S. or Canada. . . . CMBX can be heard every Sunday morning with a program for listeners in this country from 2 to 5 A.M. operating in the vicinity of 1380 kc. They are very prompt in answering requests for verification and send out a card printed in olive green with large 2½-inch red call letters. . . . Some Cubans can be picked up during their regular evening schedules. The most consistent are CMK on 730 kc, CMQ on 880 kc, CMX on 900 kc, CMCF on 815 kc, CMCY on 1030 kc,

[*Continued on page 198*]

# Channel Echoes

## By Zeh Bouck

***to plug or not to plug . . . bacardi cocktails . . . bedtime stories***

**ZEH BOUCK**

***world radio's first critic***

THE principal cultural problem of radio broadcasting remains today the same as has existed for the last decade—that of advertising content. We doubt if there is a reader of these lines who does not writhe daily under the onslaughts on his intelligence perpetrated by the broadcasters in the sponsorship of some product that becomes more and more distasteful to the listener with succeeding programs—thus defeating the purpose of the broadcasts.

At the outset, we wish to state that we consider the American system of sponsored broadcasts a sound method of supporting broadcasts, and as characterized by no fundamental esthetic desiderata. Sponsored programs are here to stay—just as the BBC system is a permanent institution in England. Live and let live—only the trouble is that most of the life is throttled out of our broadcasting mechanism by the misconception upon which the system pyramids. This misconception seems to be shared equally among the chains, the sponsors and the advertising agencies—though its inception may be debited (we almost wrote "credited") to the last named.

The premise is that radio is considered a sort of a magazine, with sound instead of type and printers' ink. A sponsored program is thought of as being divided into an advertising portion and an entertainment portion. It is maintained that the advertising compares with the advertising in a printed periodical and that the entertainment content is the equivalent of non-commercial reading matter. Nothing could be much farther from the truth—in the majority of sponsored programs. If the analogy is to be consistently carried out, the *entire program*—music *et al*—is the advertisement. The entertainment portion is merely an embellishment—the equivalent of the art-work in a printed ad—the pretty gal in the contour revealing disarray that attracts the eye to the advertising message.

The only truly non-commercial matter is the sustaining material, which, as it often costs the station money instead of filling its coffers, seldom rises above the mediocre. If the broadcasting companies desire to abide by this analogy of the sound magazine, they should be made to appreciate the fact that the editorial budget of a publication is no mean item, and the necessity of more consistently supplying sustaining features comparable in quality with the "decorative" part of the better radio advertisements.

In publishing circles, the over-run material, that is carried from the front of the magazines to the "backyard," where it is set up along with advertising matter, is known as "contam"—from contaminate. The idea is that the advertisements, vastly elevated in class and importance, are violated by the presence of this obnoxious non-commercial matter—the bar sinister on the otherwise lily-white escutcheon of lingerie, soap chips and cigarettes that are kinder to the throat or give one a lift. This contempt for such matter may be in part responsible for the contamination of that warped hyperbolic space which some reactionaries still call the "ether."

Obviously, if the entertainment portion of sponsored programs is to approach the admittedly desirable status of non-commercial matter, the advertising content must be reduced to an absolute minimum. Plugs must be confined solely to the beginning and end of a program, and be deprived of any emphasis which might carry over with a bad taste. This has been achieved one hundred percent by General Motors—with the Ford program following a reasonably close second.

*(To be continued)*

✦ ✦ ✦

STATION CO9GC-COKG, Santiago de Cuba, offers a unique verification in the form of a book of recipes for mixing drinks—Bacardi being the prime mover. We wonder if this station wouldn't be interested in some very fine reviews of their programs in ALL-WAVE RADIO every month. *Quién sabe?* White Label won't do. *Carta de oro* only. We don't need the book. We have our own recipes. *Como?* (Cuban papers please copy.)

✦ ✦ ✦

NOTES ON THE present-day trend in the education of youth via radio:

Excellent bedtime story material on any station from five to eight P.M. any day—tommy guns, thugs, punks, gun molls, cattle thieves, dope smugglers, Chink smugglers, racketeers, rods, gangsters, escaped convicts, tear-gas bombs, murder, mayhem, arson, aeronautical crooks, kidnappers, mugs, gamblers and a host of other kindly folk whose two attributes seem to be general nastiness and an incapability of speaking three consecutive words of the English language in the manner taught the kids a couple of hours earlier in school. All of this with the compliments of your child's favorite breakfast food or cathartic (you'll have to take the broadcaster's word that he has a preference in the latter).

Where, oh where is Peter Pan? Peter Pan?—why yes—of course—and starring Freddie Bartholomew. Monday evening, February 24th—from nine to ten, just to make sure that the kids are in bed and asleep.

[*Continued on page 198*]

# The Footloose Reporter

# "HOW'S MY MODULATION?"

***a day in the life of an old-time ham . . . W2FDA***

FOR a long while I've been hearing about the joys of amateur radio. Then, recently, I ran into a wide-eyed crew of young "Hams" perfectly oblivious to the world around them. I decided on the spot that there must be something to a hobby or pursuit that made such rabid fans of men, women and even children.

Personally, there's nothing I'd rather do than sleep nights, and woe to the person who would dare to disturb my early-morning slumber. But I know the true Ham considers a night or an early morning completely wasted if he hasn't been able to get in a few hours' work on the air. So I decided to investigate this game and learn for myself just what the fascination was.

The upshot of this was an introduction to Joseph Appel, W2FDA, of Scarsdale, New York. When he heard that I wanted to learn first hand what made the wheels go 'round an' 'round in the life of a Ham, he invited me to visit his shack.

One of our rainy, blustery days found me on a train bound for Scarsdale, all set to be initiated into the mysteries and thrills of amateur radio.

Joe very kindly met me at the railroad station and we drove to his home, a short distance away. When we arrived at the house Joe suggested we go directly to his shack.

Rather naively, I had associated amateur radio with a shack in the backyard, the attic, or down in the cellar. In other words, a make-shift arrangement stuck off somewhere in an unoccupied part of the house where it would be out of the way, and where the wife wouldn't be reminded too often of the cost of her husband's hobby.

To my surprise I found that Joe has taken over the sun porch of the house for his shack, and has quite a layout. The porch is glass-enclosed and makes a swell spot in which to work.

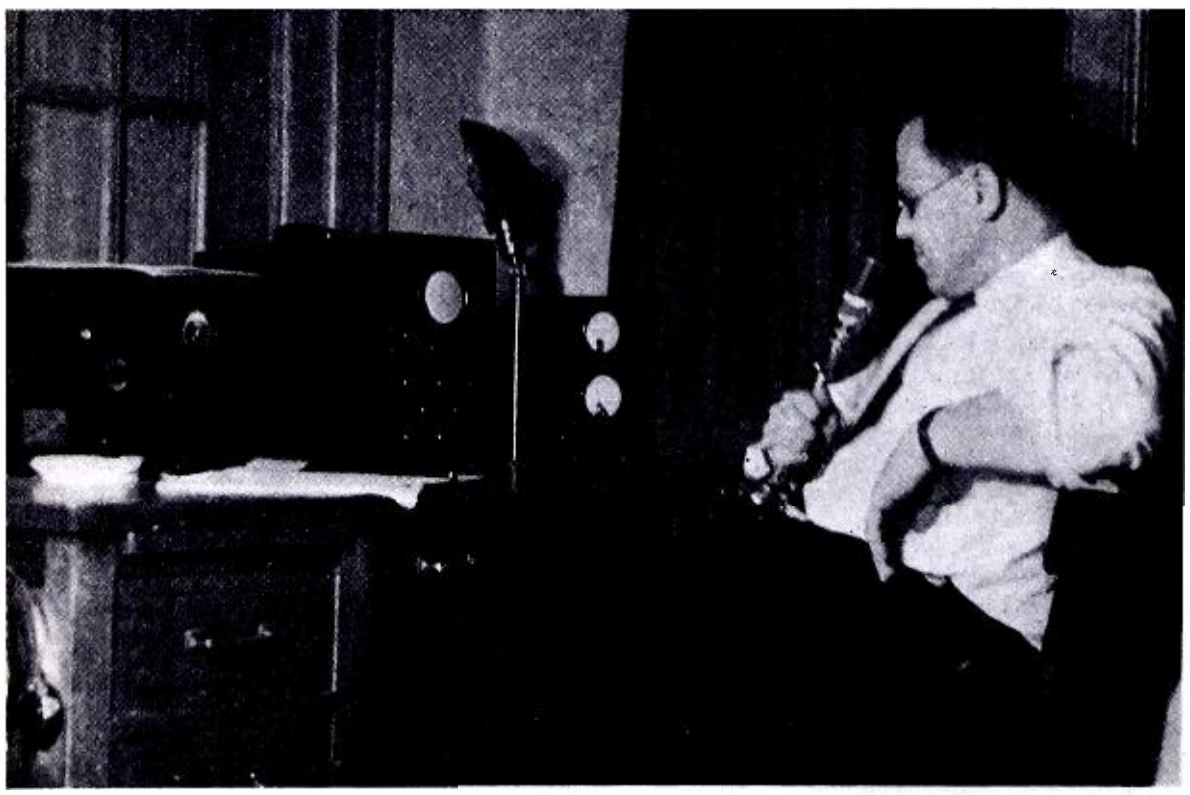
However, Joe was quick to remind me that the average Ham works his rig from the cellar or the attic, just as I had presumed, but he told me that if I thought he had a swell layout, I should "see some of the gorgeous establishments maintained solely for amateur radio." Then he told me about the amateur who, wishing to move his family nearer to a school, kept his eye peeled for "a good radio location." He ended up by renting a house on top of the highest hill in the neighborhood!

In the meantime Joe was circulating me around the shack. He walked me over to a corner in which reposed two complete transmitters. "This," said Joe, "is an RCA ACT-40. At present I'm using it on 160 meters only and it's doing a whale of a good job. Next to it is my original rig, used on 20 meters. It's a 47 crystal with two 46's used as buffer doublers, working into a 203-A in the final stage. I've got an 83 and two 866's in the power supply, and put between 180 and 200 watts into the antenna on 20 meters. The speech equipment is a 57, a 56, a pair of 2A3's and a pair of 800's in class B."

The layout looked neat, so I suggested we shoot a couple of photos. We got that done with and then took a look at the antenna out of doors "It's a Marconi type," said Joe. "I put it up for work on 160 meters, but it's coming down in a few days and up will go a Johnson Q (this is up now). The Marconi job is too directional to suit me, and besides, the 'Q' will give me a lower angle of radiation. Right now I do pretty well to the south, but things aren't so hot out towards the west. The rig lays down a whale of a good signal in the middle west, but the skip is too short. With a lower angle of radiation from the 'Q', I can start pumping something worthwhile into the 6th and 7th districts."

I asked him if his western limit was Chicago.

"Not by a long shot," said Joe. "I've contacted west-coast stations, and, for that matter, have been heard in England, but the results aren't what I've anticipated. Of course, my field pattern—meaning the areas I reach and the relative strength of the signal—is a *composite* affair. First, I have the RCA transmitter, used exclusively on 160 meters. This band has a short skip; that is, the signals are reflected back to earth within a comparatively short distance. There-



**"W2FDA calling W9CPD" . . . Joseph Appel massaging the ether with his voice.**

fore, the RCA job meets practically all my local communication requirements, besides offering me the added advantage of a quick change from 20 to 160 meters by merely switching transmitters. The other part of my composite field pattern," continued Joe, "is represented by the field area of my 20-meter transmitter. This covers, or is supposed to cover, the greater distances afforded by the increased skip distance of a 20-meter signal. At present, the first signal return is in the vicinity of the middle west; the second bounce is probably in mid-Pacific —okay for Honolulu, if it should fall in the right place. With the Johnson 'Q' doublet one-wavelength above ground, I expect to obtain a comparatively low angle of radiation so that the signal will travel farther before reaching the Heaviside layer and will therefore travel farther on the reflection back to earth. This should give me a good signal on the west coast and still give me a shot at the middle west during certain times of the day as the height and the density of the Heaviside layer alters.

"So, you see," he wound up, "I can obtain a fairly uniform *composite* field pattern with the two transmitters, and jump around as I please."

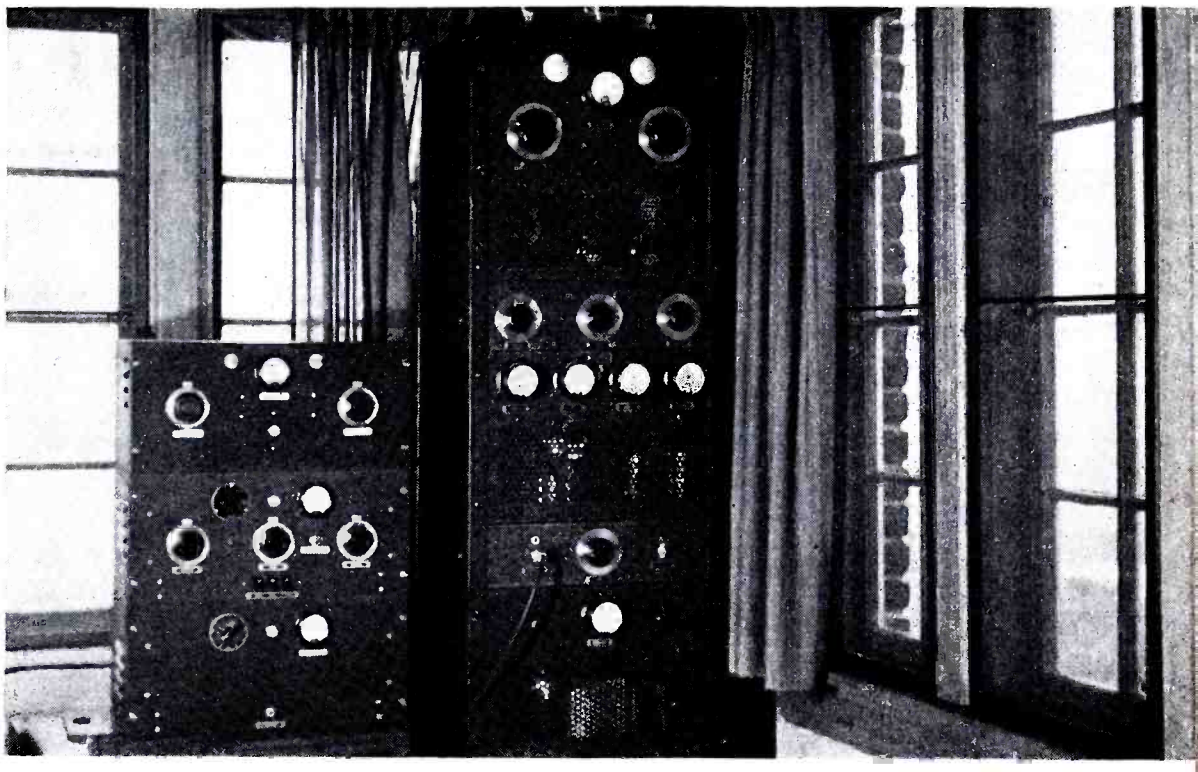
"In simple words," I said, "I guess you mean that by exercising a bit of care in antenna design, and by the selection of the proper frequencies, you can make the radio sky waves do your bidding."

"And why not?" he asked. "There's nothing new about that. A radiating antenna is like a searchlight; you can direct the radio waves against the Heaviside layer at many different angles. Kids do the same thing with sun rays by using a pocket mirror. But we can't move the Heaviside layer, which is like a large electrical mirror, so we do the next best thing and change the angle of the radio waves leaving our antennas so that they will travel skyward at a predetermined angle. The lower the angle of such a radiation the smaller will be the angle of reflection of the wave back to earth."

"Well, it's darned interesting, I'll admit," I put in, "but is it the aim of every Ham to cover as great a distance as possible?"

"Yes and no," Joe said; "there isn't an amateur who doesn't get a kick out of contacting another amateur half-way around the world, but there is more to the game than that. The 'phone amateur is after good quality, the c-w amateur after a clean signal. Some amateurs are interested only in the companionship or good fellowship that Ham radio offers; others are undoubtedly more interested in constantly improving their equipment and the results they obtain.

"Mims, at 5BDB, has an antenna he has dubbed 'The Signal Squirter,' which



**The two transmitters at W2FDA. At the left, the RCA ACT-40, used on 160 meters, and at the right, the home-built 200-watt job used on 20 meters.**

is a rotating beam aerial that gives him selective transmission and reception in any direction. He spent a lot of time working that out. Don Wallace at 6AM, has the tallest aerial mast. He, too, can lay down a signal just about where he wants to. Frank Jones, CO6OM, at Tuinucu, Cuba, has a diamond antenna system that takes up more space than the average amateur has available, and what he can do with his rig is nobody's business. Then, there are fellows like K4DDH and W9PEP who have elaborate remotely-operated equipment that permits them to operate duplex and carry on three-way conversations without taking their carriers off the air.

"All these fellows like to chin with the rest of the gang," Joe continued, "and you'll go a long way before you'll find the equal of Mims and his pal, the Mud Duck, when it comes to rag chewing. They get a big kick out of it, and so does everyone else."

Joe switched on the receiver with its pre-selecter and eased it into the 14-megacycle amateur band. Signals were pouring in, c.w. and 'phone alike. And as he tuned from one signal to another, he continued with his musings on Ham radio.

"A lot of these people are homesick," he said. "A son wants to keep in touch with his mother; a father wants to keep in touch with his son; an XYL gets separated from her side-kick who is off on an expedition or at a mining camp. That's one part of it. They get into the game because they want to keep in touch with someone, or they want the companionship. Then they get the bug so bad that they wouldn't think of giving up Ham radio."

"Maybe you have a girl?" I asked.

Joe laughed. "No, I got into Ham radio through a different door—the same door used by a lot of the boys, incidentally—I'm an old commercial operator and never quite got over it.

"Tuinucu by," said the receiver, "CQ, CQ, CQ, calling CQ," said the receiver. "This is . . . I'm using an 840 in the . . . no, 6CNE and 2TP are out of the band. Roy is on 5 and TP is on ten along with 2FF . . . calling G5NI . . . "

"Hold it," said Joe.

"Isn't that England?"

"Yes, that's W2HFS, in Mount Vernon, calling him. Let's see what comes of this."

Joe swung through the band and shortly we heard G5NI coming back to W2HFS. That puzzled me.

"I thought the G's and the VK's came through in the early morning?"

"The band changes with the seasons," said Joe. "We can bring in the G's in the early evening now. Pretty soon the LU's will be coming up from South America in fine shape, and stations in other sections will either drop out of the picture or show up at other hours. As a matter of fact, we worked LU1DA in the Argentine."

I was surprised at the apparent ease with which W2HFS and G5NI talked to each other over such a stretch of land and water. It seemed as easy as calling across an air shaft or using a local telephone. I was starting to feel the fascination of the game.

"Is it always as easy as that?" I asked Joe.

"When the band is right, it's easy, if there isn't too much interference. Hank —that's W2HFS—doesn't have much trouble. A few nights ago I heard him

[*Continued on page 196*]

# THE "AWR 2-3" XTAL TRANSMITTER

## TEN, TWENTY AND FORTY METERS WITH TWO TUBES AND ONE CRYSTAL

THE two greatest difficulties arising in the design and operation of a multi-stage transmitter are the attainment of sufficient excitation for the final amplifier tube, and the neutralization and stabilization of the several stages used. The latter problem is encountered on any band, whether it be 10 meters or 160 meters. But the problem of excitation, or rather lack of excitation, varies with the band used.

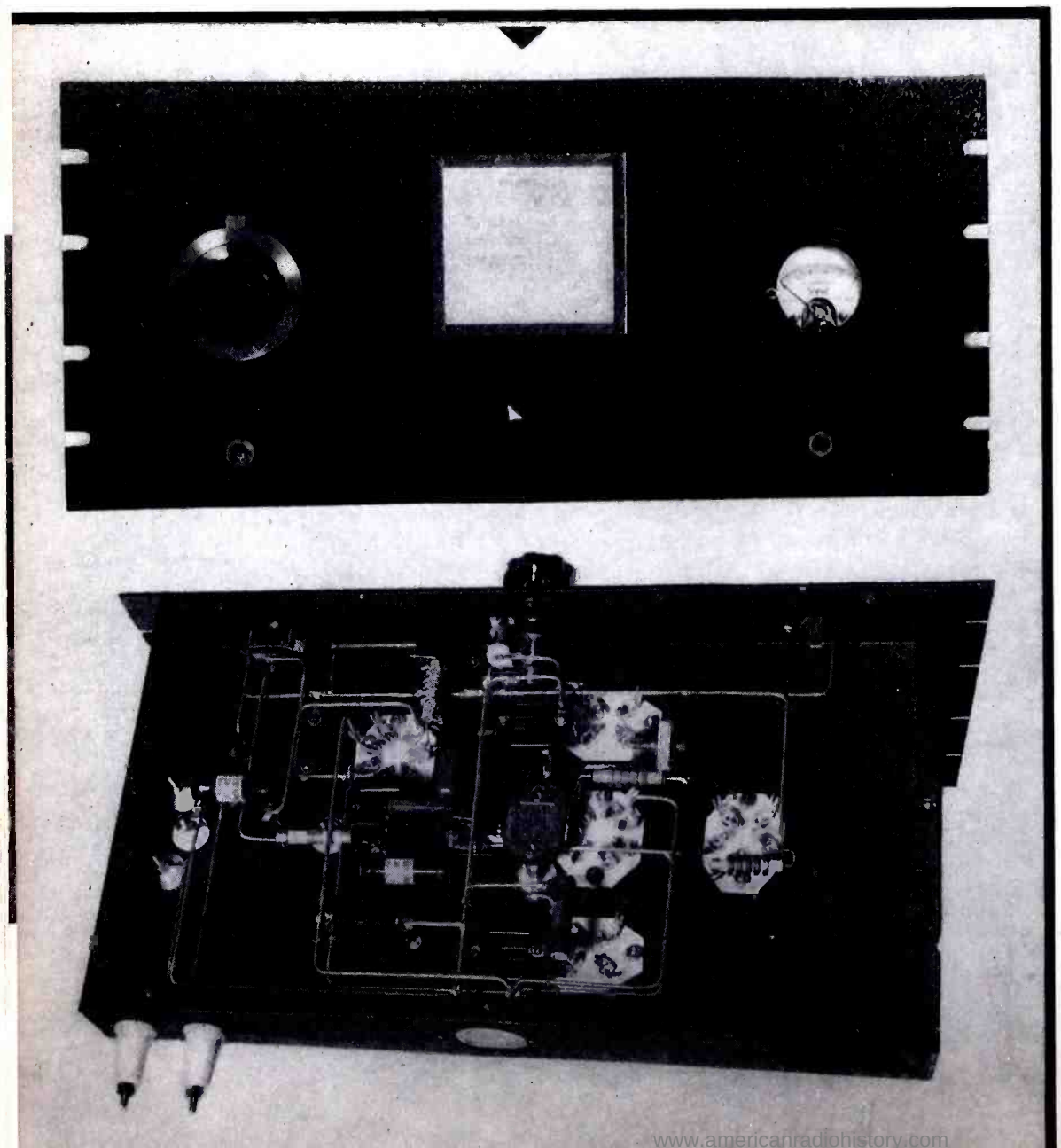
### *Excitation and Stabilization*

It is easy to secure enough excitation on 80 and 160 meters and not particularly hard on 40. When 20 meters is reached most transmitters are somewhat short of excitation and by the time 10-meter operation is attempted the average ham transmitter needs a complete redesign of the r-f section, with proper 10-meter operation as the prime consideration.

Getting complete stabilization and neutralization on 10 meters, and the other ham bands as well, means the discarding of the out-of-date wooden breadboard layout, with the modern shielded, all-metal chassis and panel type of construction taking its rightful place in the amateur field.

This series of ALL-WAVE RADIO transmitter units, of which this is the first, is being designed with the above problems in mind. Rather than attracting the reader's attention with some sensational "scoops" in ideas, we are instead presenting these transmitter units designed according to standard practice, but in the most modern style and dress. What the average amateur, and particularly the newcomer, wants is a nice looking transmitter which he can be proud to show his friends, and one that will work right when he wants to demonstrate its performance.

Front panel and under chassis view of the "AWR 2-3" Crystal Controlled C. W. Transmitter Unit.



### *Standardized Dimensions*

To this end all units are constructed on metal chassis and panels which conform in specifications with standard commercial and commercial-built amateur apparatus. To those unfamiliar with these specifications they are as follows: Panel width 19"; height, a multiple of 1¾", and thickness ⅛". The mounting strips of the rack or cabinet should have the mounting holes located alternately 1¼" and ½" apart. The slots on the panel edges are spaced so as to coincide with the mounting holes. Chassis are 17" in width to fit the racks and panels.

By using standard specifications for the racks, panels and chassis, all the units of the transmitters to be described will be interchangeable, not only with themselves, but with other standard transmitter units, racks and cabinets. The convenience of this type of construction cannot be too highly overestimated. To those oldtimers like ourselves who have struggled through the construction of numberless transmitters using panels and shelves securely bolted to four corner posts, the ease with which a unit may be removed from a new type of transmitter for either repair or replacement with a different type of unit, is a distinct pleasure. It is only necessary to remove four or six panel-mounting bolts, yank out a connection cable or two and slip the unit out onto the work table. A more modern unit may be used for replacement when desired, or all the units of the transmitter may be mounted in a different type or size of rack or cabinet as the spirit so moves.

### *Three Bands With Two Tubes*

This first transmitter unit has been designed for a specific purpose; that is, to provide a DX transmitter for 10, 20 and 40 meters which is as simple in construction as possible, but which will put out a crystal controlled T9X signal on all three bands with enough output to snare a good share of DX.

The final design decided upon uses but two tubes, an RK-34 and an RK-25. The RK-34 is a dual tube which has two triodes, similar to a 53 or 6A6, but unlike these two types, it is expressly designed for high-frequency work, with an Isolantite base and plate leads brought out from the top of the tube. The RK-25 is a screen-grid power pentode, also designed for high-frequency transmitter work, and has a nominal rated

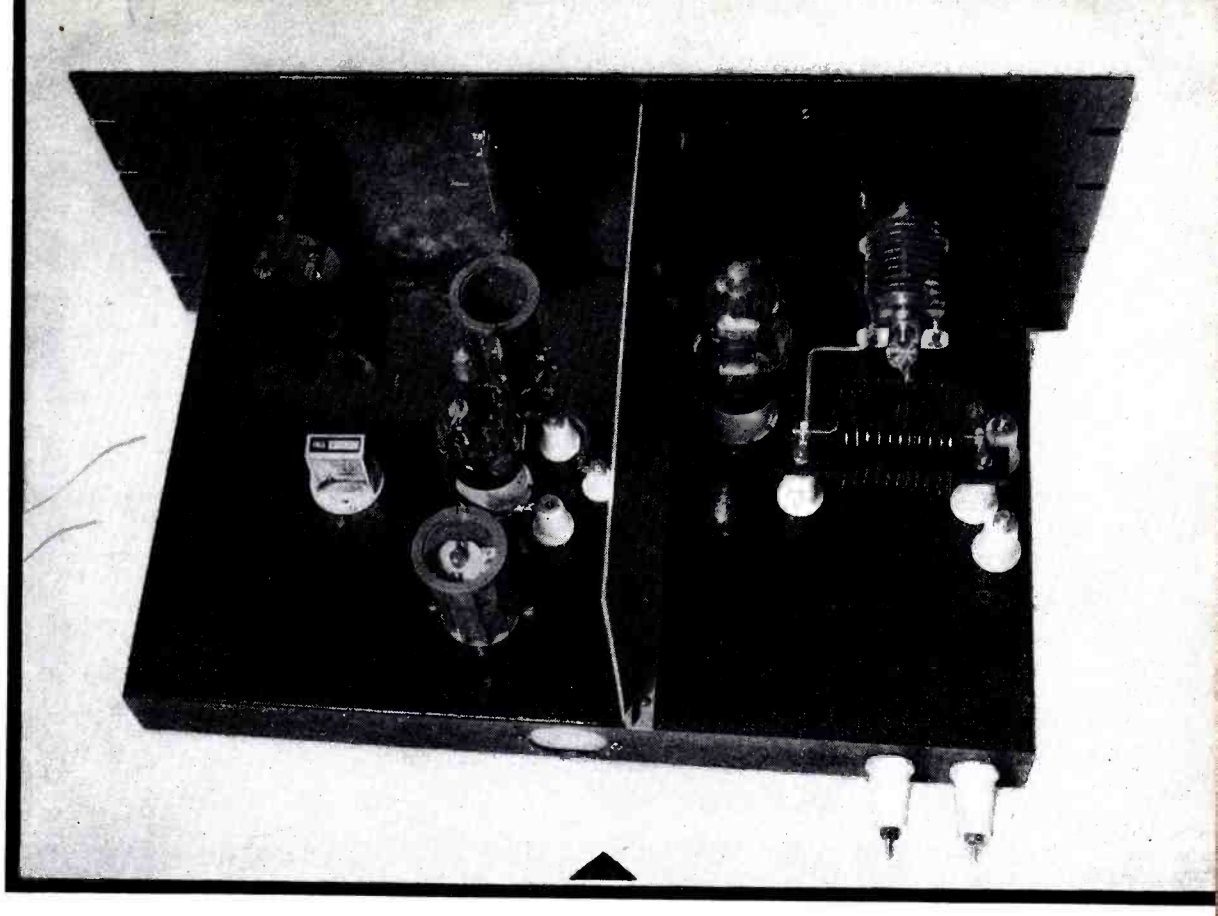
# FOR C. W.

***By***

***Willard Bohlen • W2CPA***

***and***

***Chester Watzel • W2AIF***



Hams-eye view of "AWR 2-3." RK-34 to left; RK-25 to right.

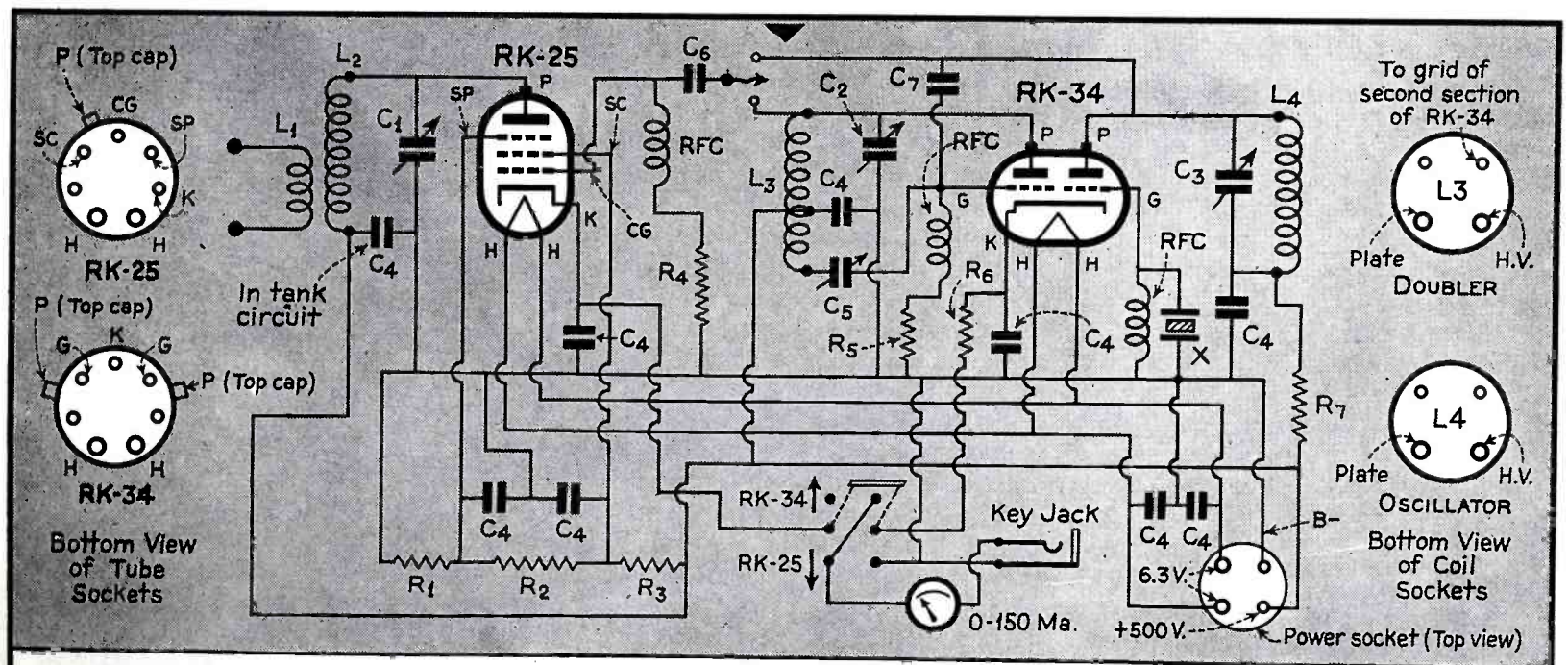
output of 24 watts at a plate voltage of 500. The RK-25 is used as a straight amplifier on all bands, including 10 meters.

One section of the RK-34 is used as the oscillator with a 40-meter crystal and a 40-meter plate coil. For "straight-through" operation on 40 meters the excitation plug is placed in the rear jack and the second section of the tube is unused, its plate coil (next to panel) being removed from the socket. For 20-meter operation the excitation plug is moved to the front jack and the 20-meter doubler coil is plugged into the front coil socket. For 10 meters the excitation plug is left in the front jack but the 20-meter doubler coil is replaced with the 10-meter quadrupler coil. The 40-meter oscillator plate coil (in rear socket) is never changed for operation on any of the three bands, while, of course, the RK-25 amplifier plate coil is changed each time to the proper 10, 20 or 40-meter one.

No neutralization adjustment is necessary on the amplifier tube, it being a screen-grid tube requiring no neutralizing condenser. Only a regeneration condenser for 10-meter operation is provided on the RK-34 section of the transmitter, no neutralization being necessary here as the two sections of the tube never work on the same frequency.

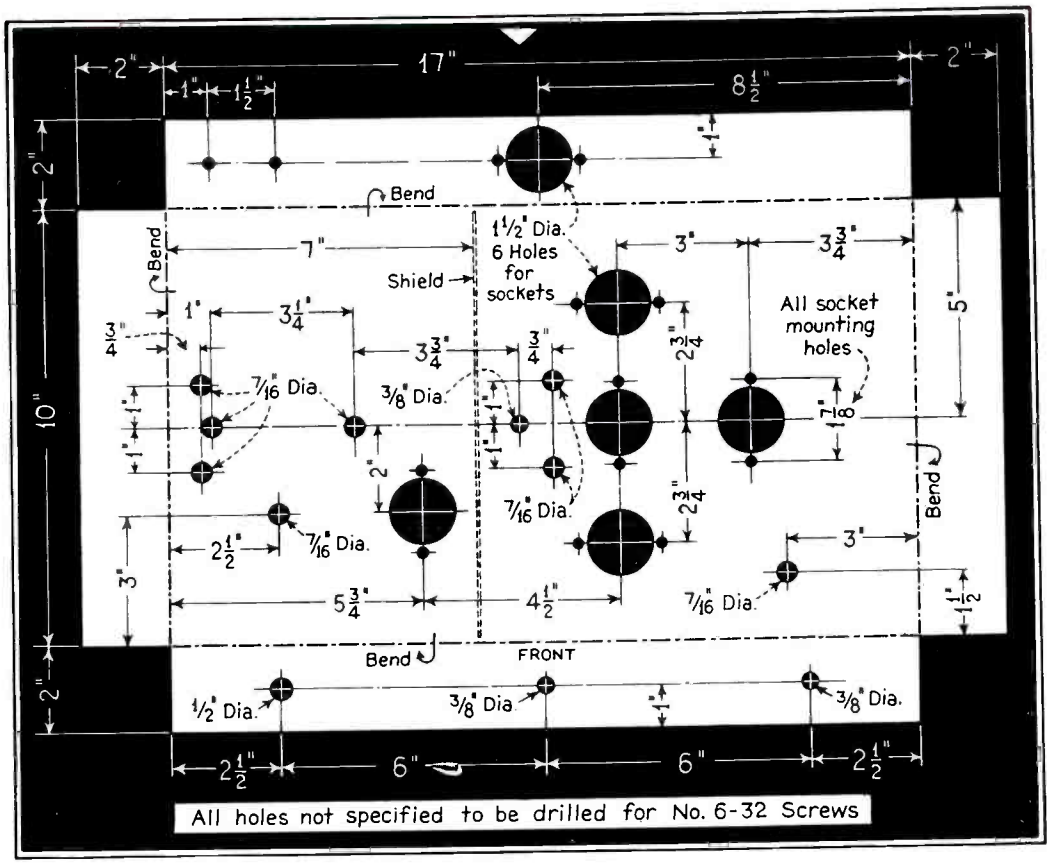
### *DX With 25 Watts*

It can be seen that for 40 meters only two stages are necessary and for 20 and 10 meters, three stages are used. The use of the dual RK-34 makes possible the use of three stages with only two tubes and makes this the simplest three-band transmitter that will work from only one crystal. Although the power output of 25 watts may seem low, it is actually quite sufficient for satisfac-




| | | | | | |
|---|---|---|---|---|---|
| $L_1$ - Antenna coupling coil, 2-4 turns | | $C_1$ - 50 Mmfd | | $R_1$ - 50,000 Ohms, 1 Watt | |
| $L_2$ - 10 Meter coil, 4 turns, 2" dia., No. 12 wire | | $C_2$ - 50 " | | $R_2$ - 100,000 " 1 " | |
| " - 20 " " 11 " " " " " " | | $C_3$ - 25 " | | $R_3$ - 15,000 " 25 " | |
| $L_3$ - 10 " " 4½ " Tapped center, Length ½" | | $C_4$ - .002 Mfd., 600 V | | $R_4$ - 15,000 " 5 " | |
| " - 20 " " 7 " No tap, Length 5/8" | | $C_5$ - 50 Mmfd. | | $R_5$ - 50,000 " 5 " | |
| " - 40 " " 15 " " " " 3/4" | | $C_6$ - 0001 Mfd., 600 V | | $R_6$ - 2000 " 25 " | |
| ( $L_3$ and $L_4$ wound with No. 24 D.S.C.) | | $C_7$ - 00005 Mfd., 600 V | | $R_7$ - 5000 " 25 " | |

Circuit of "AWR 2-3". Tube socket and coil socket connections given at left and right. Parts values below.




**Details of "AWR 2-3" chassis construction.**

tory DX work. The records of the many amateurs in this and other countries who have each worked dozens of countries, and in many cases all continents, with low power of this order, stand back of this statement. We have not had time as yet to run up a DX score with this particular transmitter, but will present next month a more complete log of several weeks' operation so that the builder will have an idea as to what to expect in the line of performance of this little rig.

Before we go into the construction of this transmitter, we will give a few of the entries from the log of a local amateur, Alan Mayhew, W2BYW, to prove what this little rig will do on 10 meters. Al's transmitter is very much like this one in layout, using a pair of 53 doublers to drive a single RK-25 amplifier in the final. The RK-25 is run underloaded, the input being only 20 watts. With this small output into a vertical half-wave doublet these fine reports on the signals were received from five continents. They are as follows:

NORTH AMERICA:—
QSA5-R6-T8 from VE4UY in Western Canada

SOUTH AMERICA:—
QSA4-R5-T9 from LU9BV in Argentina

EUROPE:—
QSA5-R7-T9 from YM4AA in Danzig (east of Germany)

AFRICA:—
QSA5-R6-T9 from FA8BG in Algeria

OCEANIA:—
QSA4-R4-T8 from VK4AP in Australia

W2BYW's log contains many dozens of other good 10-meter DX contacts but these few entries are just a sample. Al's receiver is, incidentally, only the usual regenerative job.

### *Layout of Parts*

In order to get an efficient layout with the short r-f leads so necessary for 10-meter work and to simplify the tuning process when changing bands, the layout shown is used. Looking from the front of the set the socket on the extreme right is for the crystal. The adjacent tube with the two "horns" is the dual RK-34, with the 40-meter oscillator coil in back of the tube and the 10 or 20-meter coil in front. To eliminate long leads from the rear oscillator coil to a condenser mounted on the front panel this condenser is instead mounted right in the coil, and is an air-trimmer.

The front coil—that for the second section of the RK-34—is tuned by the condenser on the bottom of the panel, which is operated by the lower knob. For 20-meter operation this second section of the tube is only doubling and provides sufficient excitation to the RK-25 amplifier tube without regeneration.

For quadrupling to 10 meters, regeneration is necessary in the second section of the RK-34 for efficient operation and sufficient excitation. To make this change to regeneration for 10 meters another air-trimmer condenser is mounted underneath the chassis between the second grid of the RK-34 and an extra prong of the coil socket. When this condenser is once properly adjusted it can be forgotten; plugging in the 10-meter coil then automatically connects the condenser into the circuit and provides the proper degree of regeneration. This eliminates another unnecessary panel control.

The grid excitation plug of the RK-34 is shifted to the proper jack, as explained before, when changing bands. The layout of the amplifier section explains itself, it being merely necessary to plug in the proper 10, 20 or 40-meter plate coil and retune the amplifier tank condenser to resonance when changing bands. Only two tuning adjustments are necessary when changing bands. A calibration chart is provided to log the necessary settings and record any other data desired. This also fills up nicely what would otherwise be a rather blank looking panel.

### *Meter and Jack Switching*

The jack for the key is located at the right of the panel and the switch for changing the meter from the RK-34 to the RK-25 is at the left. The wiring layout for the meter and key jack involved a nice little bit of figuring. The results are quite satisfactory. The frame of the key jack is at ground potential, making unnecessary an insulating washer, always a source of trouble. This also puts the key at ground potential so that no shock will result from handling the metal parts of the key.

When the switch is thrown to the right the meter is connected into the common cathode lead of the RK-34. This automatically opens the cathode circuit of the RK-25 amplifier so that this tube will not heat up and be damaged from high plate current resulting from either lack of excitation or off-resonance tuning of its tank circuit while tuning up the RK-34. In this position of the switch the key will operate the RK-34 tube, which is very handy in making adjustments on the oscillator-doubler sections of the rig. When making adjustments on either tube the key should never be held down for more than a few seconds at a time until the proper adjustments are secured.

With the switch thrown to the left the cathode circuit of the RK-34 is connected directly to ground, leaving this tube continually on, and the meter and key are connected into the cathode of the RK-25 amplifier, permitting proper adjustment of this tube. When all adjustments are finally made for any one band the switch is left in this latter position, and the transmitter turned off and on during communication with an a-c switch which should be placed in the primary leads to the plate power trans-

## LEGEND

*1—Hammarlund MC50SX Tuning Condenser (C1)*
*1—Hammarlund MC50S Tuning Condenser (C2)*
*1—Hammarlund APC25 Air Trimmer (C3)*
*1—Hammarlund APC50 Air Trimmer (C5)*
*3—Hammarlund SWF-4 Coil Forms (L3, L4)*
*3—Hammarlund CHX R-F Chokes (RFC)*
*2—Hammarlund 5-7, 7-Prong Isolantite Sockets (For RK-34 & RK-25)*
*2—Hammarlund 5-4 7-Prong Isolantite Sockets (For Power Cable)*
*1—Hammarlund 5-5 5-Prong Isolantite Socket (For Crystal Holder)*
*1—Triplett 0-150 Mil. D-C Meter with 2-inch Bakelite Case*
*1—Leeds 40-Meter Crystal with Holder*
*1—Raytheon RK-34 Tube*
*1—Raytheon RK-25 Tube*
*1—Ward Leonard 2000-ohm, 25-watt Wire-wound Resistor (R6)*
*1—Ward Leonard 15,000-ohm, 25-watt Wire-wound Resistor (R3)*
*1—Ward Leonard 5000-ohm, 25-watt Wire-wound Resistor (R7)*
*1—Ward Leonard, 15,000-ohm, 5-watt Wire-wound Resistor (R4)*
*1—Ward Leonard 50,000-ohm, 5-watt Wire-wound Resistor (R5)*
*1—IRC 50,000-ohm, 1-watt Carbon Resistor (R1)*
*1—IRC 100,000-ohm, 1-watt Carbon Resistor (R2)*
*9—Cornell-Dubilier .002-mfd., 600-volt Mica Condensers (C4)*
*1—Cornell-Dubilier .0001-mfd., 600-volt Mica Condenser (C6)*
*1—Cornell-Dubilier .00005-mfd., 600-volt Mica Condenser (C7)*
*4—Birnbach 4125J Feedthru Jack Type Insulators*
*2—Birnbach 478J Feedthru Jack Type Insulators*
*1—Birnbach 458 Feedthru Plain Type Insulator*
*5—Birnbach 4125 Plug Type Insulators*
*1—General Radio Type 637-J Knob*
*1—General Radio Type 710-A Dial*
*1—National Size 11C Calibration Frame*
*1—Double pole, double throw Toggle Switch*
*1—Single circuit Phone Jack*
*1—Chassis, 17" x 10" x 2"*
*1—Aluminum Panel, 19" x 8¾" x 1/8"*
*3—Grid Clips*
*2—Rubber Grommets, medium size.*

former. This a-c switch can be located near the key for more convenient control. Keying, of course, takes place in the final stage with the oscillator-doubler tube running all the time the plate power switch is turned on.

### Specifications and Layout Important

The specifications for the values and make of the parts, layout, and coil sizes should be followed exactly. Also the wiring and placement of small parts beneath the chassis should be as shown in the photograph of the bottom of the transmitter. Substitution of parts or other changes is liable to result in unsatisfactory performance. It should be remembered that a 10-meter transmitter is quite a different thing than an 80 or 160-meter one and that most ham transmitters built originally for the lower frequency bands give very poor or no performance on 10 meters. So please be careful in building this rig. Particularly watch out that the r-f leads have the same length and placement as shown so that the coils will hit the bands on the nose.

It will be noted that the heater bypass condensers and dropping resistor to the oscillator shown in the photograph are different than in the parts list. These were experimental and were changed to the proper ones after the photographs were taken. The resistor shown in the photo was too small in wattage rating and smoked in operation. The bottom of the chassis should be left off and the unit raised an inch or two from the table to provide proper ventilation to the resistors, as they are naturally called upon to dissipate a certain amount of heat in operation.

The regeneration condenser, which is the small air-trimmer mounted under the chassis, should be set at full capacity and need never be touched again. The three tuning condensers, including the little condenser in the oscillator, are tuned to resonance as is normal in any stage. The meter will indicate proper resonance of the stages. A small ¼-watt neon bulb should be used to check the tuning.

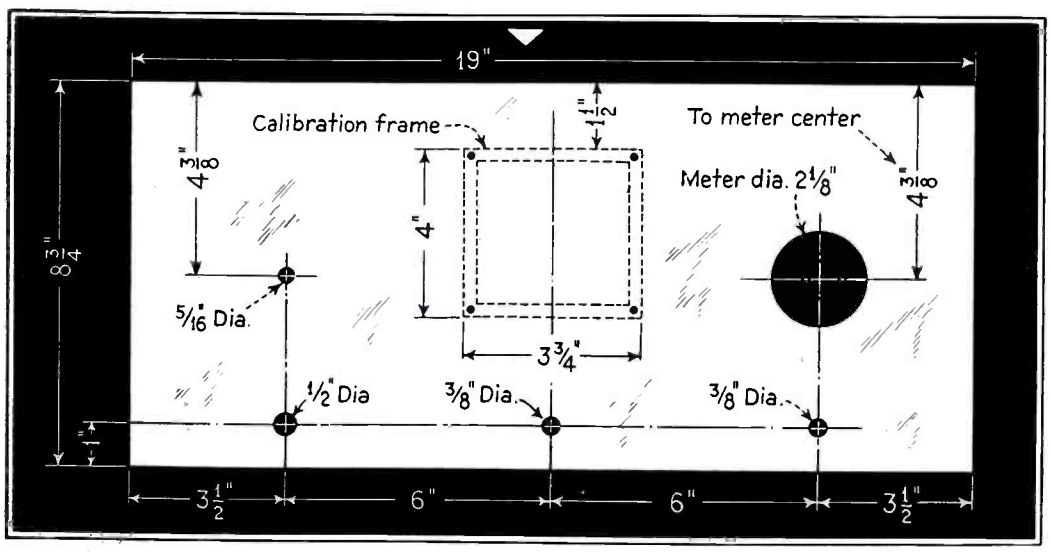
### Preliminary Adjustments

During preliminary adjustment of the transmitter, it is a good idea to use a receiver power supply of around 250 volts or so instead of the full 500-volt transmitter supply. This saves the tubes any unnecessary overloading and was done during the testing of this rig in the laboratory. A 500-volt supply was not available at the time and a 600-volt supply was used for testing after the coils were first adjusted with the 250-volt receiver supply. This 600 volts is, of course, too high and 500 volts or less should be used during normal operation of the transmitter. With the 600 volts the current on the RK-34 ran about 70 mils and on the RK-25 about 50 mils, without load. As the meter reads the *total* current of each tube when switched from one to the other, this reading is, of course, high, The actual individual plate currents are much lower than the total current readings obtained. However, this particular method of reading tube currents is very convenient, making the use of a single switch possible and eliminating "hot" jacks from the panel which are liable to give the operator a nasty shock. The entire panel is completely dead with all parts at ground d-c and r-f potential The panel is of aluminum as a steel panel would cause errors as high as 20 percent in the calibration of the meter.

### Antenna Coupling

Next month we will describe the 500-volt power supply and give further data on the operation of this rig; antenna coupling, etc. The link shown will couple to either a doublet antenna directly or to a separate antenna tuning panel. The proper number of turns and degree of coupling for this link is a matter of experiment with the particular antenna to be used. Only a few turns are necessary.

This transmitter may also be link-coupled to a high-power final amplifier, using a tube such as an 838, 50-T, 150-T, RK-28, etc,. so that power may be increased at any time by merely adding another stage. Increasing power, and adapting the transmitter to phone operation, will be covered in subsequent articles.




**Details of "AWR 2-3" front panel construction.**

# Review of World Radio

***phantom station on 55 meters . . . Australia radio on up-and-up . . . Japan sees independence in uhf invention . . . Brussels checks wandering signals***

### *Ultra-Short Waves Smelt Ores*

TOKYO, JAPAN: Stupendous claims are made by experts, according to the *Nichi Nichi* (a Japanese journal), for an invention of a young Japanese scientist, said to be greater than Galileo, Newton and Edison, which in some unrevealed manner generates ultra-short electromagnetic waves of allegedly such great energy that they can be employed in ways which will revolutionize industry. Its first application is to be in the smelting of ores, in which it reportedly does away with the present elaborate smelting furnaces, and the hydrogenization of coal to produce oil.

As proof that the inventor, Mr. Hideyuki, 31, has something more substantial than a scientific dream, the paper says that he payed out 15,000 Yen in fees to obtain patents in 15 European and American countries. A few weeks ago a roof-raising ceremony was held at a building in Kita Shinagawa Ward, which is being erected at a cost of 500,000 Yen for industrial application of the invention.

It is claimed that the inventor succeeds in smelting ores, mixed with certain special fuel, into a viscid mass. His experimental results have set the metallurgical world agog and have been verified by outstanding international engineers.

The local press states: "By this invention Japan's economic domination of the world and the promotion of the culture and happiness of the Japanese race, leading eventually to the prosperity of the human race, are no longer idle fancies. The invention must be the pride of all mankind. By this invention, and the use of Japan's domestic iron sources, the country will be independent of imported iron, valued roughly at 200,000,000 Yen yearly.

✦ ✦ ✦

### *Anti-Soviet Broadcasts*

MANCHURIA: A so-called phantom station which is supposed to be located in Manchuria is transmitting on 55 meters and is etherizing anti-Bolshevistic propaganda in the Russian language. The station can be identified by the periodic transmissions of Czaristic hymns interspersed freely between the program material.

✦ ✦ ✦

### *Laws Against Man-Made Static*

HELSINGFORS, NEW ZEALAND: The Governor of New Zealand has issued a decree containing 23 articles in reference to the fight against man-made parasitics, making it a misdemeanor, punishable by a fine, for any infractions against the "Static Code." A number of inspectors of the Radio Division have been selected to run down spurious parasitic sources and, when such are discovered, to either take them temporarily or permanently out of service.

The Minister of Commerce in collaboration with local merchants and members of the local radio associations have recently exhibited various electrical devices especially designed to thwart the radiation of atmospherics caused by domestic or utility apparatus.

✦ ✦ ✦

### *Broadcasting In The Holy Land*

JERUSALEM: The first broadcasting station in the Holy Land is soon to be opened, if not already. Delayed in the beginning by unforseen circumstances, the Ramallah transmitter will divide its five-hour air time into equal periods devoted to tri-lingual broadcasts in English, Hebrew and Arabic.

The British Government will control the station. Auditions are held in the Palace Hotel, Jerusalem, where the Government has rented several rooms provisionally. All program material is rigorously censored by the English officials; local politics and other territorial propaganda is said to be held to minimum.

✦ ✦ ✦

### *Broadcast Improvements in Uruguay*

MONTEVIDEO: A campaign is on foot to secure an improvement in local radio broadcasting through a reduction in the number of broadcasting stations and through a partial elimination of the excessive amount of advertising which serves to plague the radio listener. At present, it is rarely possible to listen for more than 2 or 3 minutes to a musical program without an interruption of 6 to 7 minutes of commercial build-up. New regulations are to be drawn up by the Bureau of Radio Communications to effect these needed improvements. (*Vice Consul Aubrey E. Lippencott, Montevideo.*)

✦ ✦ ✦

### *International Catholic Radio Congress*

CZECHOSLOVAKIA: According to information received from the Czechoslovak Press Bureau, the Fourth Universal Catholic Radio Congress will be held in Prague, Czechslovakia, in the first half of May, 1936, to which delegates will be sent from about 30 countries. Representatives of the Czechoslovak Radio Journal, the Director of the Vatican broadcasting stations and other officials will participate.

✦ ✦ ✦

### *French Outlook On Television*

PARIS: While appreciating the importance of the present official experiments in television, the *Syndicat des Industries Radioelectrique* (S. P. I. R.), of France, has pointed out to French listeners that reception of television at home is still a delicate matter, necessitating special equipment, proximity to the transmitting station, and a certain amount of technical knowledge. It will require a further period of experiment before apparatus capable of giving general satisfaction can be sold to the public, and it is emphasized that this apparatus, though different from sound-receiving sets, will not render them obsolete. The Syndicate (as has been done in other countries) consequently urges prospective purchasers of new sets not to delay in the hope of purchasing a combination television and broadcasting receiver at an early date.

✦ ✦ ✦

### *International Listening Post*

BRUSSELS, BELGIUM: An international listening post for checking the frequency stability and wavelength of European short-wave transmitters has been operat-

[*Continued on page 198*]

# The Ham Bands

## By Beat Note

***"calling flood area" . . . receiver nightmare . . . blessed event***

AS we sit here with the cans on, the 1's are burning up the 75-meter band. Yesterday and the day before, and the day before that, the 3's and the 8's were coming into action as rivers overflowed into new territory. The boys outside the flood areas were keeping their filaments warm, ready to open up whenever they were needed. The Lord only knows how many other districts were, and still are involved; no man alive could cover even a tenth of what has been going on and what is still going on.

We've heard our share of emergency traffic from hurricane and earthquake areas, but this is different. There are cities and towns in 14 states that have been ravaged by flood waters. The amateur is up against the toughest proposition he has so far taken upon his shoulders, and doing a remarkable job.

A handful of men, known to the public as "those amateurs," are today and were yesterday and the day before, and the day before that, handling reams of emergency traffic *for the nation.* Many of "those amateurs" haven't seen bed for days; many of "those amateurs" have conked out at the key or the mike. These are the boys who want to know how their modulation is; these are the boys who continually seek RST reports, and this week, if ever before, the public should be damn glad that the Hams *do* keep their stations up to snuff.

We have been listening to strained and husky voices, and to tired fists. We have been listening to remarkable teamwork: flood-area stations are being protected on the air by convoys, one on either side of the flood area station frequency, all set to flash a warning at the first sign of jamming. And we have been following the fortitude of Hams who have fought QRM as thick as soup, with a patience beyond belief, simply, in certain cases, to get back *some* sort of report to a mother or a wife fraught with worry.

We're telling you, that for all the tragedy and the suffering in the flood areas, what the Ham did yesterday, what he is doing today, and what he will more than likely do tomorrow and tomorrow, *is just plain grand.*

✦

NIGHTMARE of a receiver wandering aimlessly in the 75-meter band:

"I can't get through to . . . the children are well . . . Nr. 97, Ck 15 . . . the Red Cross thanks . . . will be marked by four red flares . . . she has an oil stove . . . don't pass that along, it will worry them stiff . . . the river is rising again . . . I've been at it two days and two nights—I've got to get some rest . . . it's ten feet deep around . . . we are surrounded . . . can't get through to Johnstown . . . the bridge went out at . . . flood traffic for Pittsburgh . . . see if you can raise him . . . CQ Holyoke . . . W1BVT on 3960 . . . want to know conditions at Trenton . . . I've got my hook cleaned off and I'm going to get some sleep . . . will contact you again at 1 A. M. . . . try 8CPC . . . I don't want to handle that—I can do more good . . . unidentified man . . . if he has been assigned to Johnstown . . . urgent, Boston.

✦

WE DON'T suppose anyone has ever stopped to dope out the probable value in dollars of emergency traffic handled by amateurs. It is our guess that the actual value of the work done by the Hams in the present crisis will exceed one million dollars.

But the dollar value, which is unimportant anyway, won't amount to a row of pins against the assistance rendered the nation. This can't be measured in dollars and cents.

✦

WE HAVE OFTEN thought of the incongruity of the amateur radiophone set-up, and we thought of it again these past few nights while listening to the flood traffic.

The incongruity lies in the wide sidebands of the average amateur phone transmitter and the ultra-selectivity of the average amateur receiver. What is the particular sense in cutting a wide and handsome sideband when it is going to have its corpulence trimmed in the process of reception?

The odd part about the matter is; if phone hams were to follow standard telephone company audio-frequency practice, there would be less crowding in the bands, less interference and more work accomplished. And receivers would not have to be ultra-selective.

We'll eat a bug if the final results, as far as "quality" is concerned, wouldn't be just as good—if not better.

✦

WE HAVE listened in amazement to the international flavor that has been given W2BSD, New Rochelle, N. Y. A CQ is often followed by announcements in about seven languages. Scandinavian excepted, and ending up, appropriately enough, in American . . . to tip off the local boys.

We would give a Murdock condenser to know if Ted Healy crowds in a lot of "furriners" and has them do their stuff, or if the whole thing is a decoy recording.

Which naturally leads to the thought that some company might make a pretty penny turning out special discs for Hams, including the Scandinavian. All they would need would be a set of "furriners" and a back room.

✦

WE HAVE NEVER really gone in for blessed-eventing, but we know of a certain editor who is expecting a one-kilowatt phone rig almost momentarily. It has been whispered that the youngster will yowl its head off in the 10-meter band, but this is just talk, of course. In any event, we will bet that, somehow or other, the youngster will manage to keep its father up nights.

✦

WHEN THE LITTLE blades of grass break through the soft earth, when the birds start speckling auto tops, and lovers walk hand-in-hand, it is springtime, when everyone is supposed to be happy and care-free.

But spring also has its note of sadness; there are many little groups of Hams here and there who have been wont to conduct sewing circles in the 20-meter band after it has gone dead for the night. Alas, spring has now touched 20 meters and it cuts capers late into the night. The little groups can no longer foregather in this band without jamming the nation. Now, with the scent of life in the air, they must retire to a common meeting place and talk like a couple of girls taking down their hair in the back room.

In all seriousness, we miss them; and two in particular—the old gent with

[*Continued on page 194*]

# Queries

***directional antennas . . . and directions***

### *Question Number 5*

"I am greatly puzzled by the directional effects of my doublet antennas. I have two of these, supposedly directional north-south and east-west. These aerials have been carefully erected (in accordance with right-angle instructions) on compass bearings. The north-south antenna was, of course, designed for South American stations, and the east-west for Europe and the Asiastics. I may add that my location is only a few miles from New York City—in an excellent reception area. Now here's my problem: Japan on all maps is due west of me. But the joker is, I receive the Japanese transmitters on my north-bound doublet—rarely on the east-west antenna!

"To jeopardize still further my faith in the engineers, a friend of mine, with the aid of an excellent map, erected a doublet directional south-west and north-east, for reception of the Australians. He lives only a few doors away, has a somewhat better receiver than I (recently checked by two expert servicemen and found in perfect condition), and yet I get the VKs somewhat better than he on my *east-west* aerial. Since when is Australia east or west of New York? And just to even up matters, my friend does better on the Europeans with his Australian antenna than I can on my east-west doublet!

"Hence I can't help wondering just how much the engineers really know about these things. Do they ever try out what they work out on paper? The only thing that seems to check is better reception from the South Americans on my N.-S. antenna than on the east-west. *A. E. G., Monmouth, N. J.*"

### Answer

Though a Jerseyite, A. E. G. is not the first radio listener from Missouri in reference to the vagaries of directional antennas, and critical of the engineers and their antenna literature. The layman and "expert" alike have been dubious about these matters; and experienced short-wave listeners, who really should know better, have blamed the engineers for what, upon analysis, usually turns out to be the result of the critics' own technical desiderata.

The engineers are correct in what they have to say about the directional properties of antennas. When an engineer works anything out on paper first, the radio fan may rest assured that it is put to practical tests beyond his imagination before he learns about it. However, many of the properties of antennas have been discovered—and the paper work came later.

Equally as reliable as the engineers, in all probability, are the observations of A. E. G. and hosts of other listeners who have had similar experiences. But the engineers have no difficulty in reconciling the apparent discrepancy in conclusions. A. E. G. puts his finger on the crux of the argument when he refers to an "excellent map."

No map is "excellent" for radio directions and distances except for limited distances—or in certain limited directions and from certain limited points. *Other things being equal,* radio waves follow great circle courses—the shortest distances between any two terrestial points. The ordinary map shows great circle bearings and distances only on the equator and meridians—east and west along the equator and north and south along the meridians. Special maps have been designed to show distances from specific points—usually located in the centers of such maps.

These maps have their utility, but for all-around radio uses, and particularly for determining directional properties, the globe should always be employed.

Let us consider the case of Japan. Undeniably, these islands of the Rising Sun lie west of New York—about 8,000 miles. However, the great circle distance from Tokyo to New York is approximately 1200 miles shorter. A signal originating in Japan (other things being equal) shoots up north, above the Arctic Circle, and then comes down on the other side of the globe to New York. In other words, sliding down from close to the north pole, it would naturally be received better on the north-south doublet than on the directionally east-west doublet! Actually, best reception would be had with an antenna directional slightly to the west of north.

A. E. G.'s other problems admit similar solutions. Any large map of the two hemispheres will certainly show Australia to the south-west of New York. But anyone who erects a directional antenna on this basis will not, other conditions again being equal (we'll come to those conditions later), will not be aiming at, say, VK3ME. Again let us refer to the globe. A piece of string stretched the shortest distance between Melbourne and New York will indicate the great circle or radio distance, and its bearing at N. Y. A signal traversing this course will pass through New York going either *east* or *west* (depending on which way it travels around the earth) and would therefore be best received on an aerial directional east-west!

An east-west antenna, as far as radio is concerned, does not point toward Europe—even toward Lisbon, which is practically on the same parallel with New York. An east-west antenna at New York is actually aimed some 1200 miles down the coast of Africa! A north-east directional antenna aims over the great circle course to Europe, which explains why A. E. G.'s friend experiences such

*THE primary purpose of the Queries Dept. is to solve the technical and semi-technical problems of our readers who feel they require such assistance. However, questions, so long as they are related to radio, need not be of a technical nature. Every question will be answered personally—by mail. A self-addressed and stamped envelope should be included. Rather than publish the answers to many questions each month—in a necessarily abbreviated form—we shall select only one or two of general interest which will be elaborated upon and answered in detail. These questions will be numbered, an index will be published periodically, and, in time, your files of this department should prove a valuable reference work.*

*You may ask as many questions as you wish. Aside from exceptional instances, this service is free to all readers, subscribers or otherwise. Where special circuits are required, or considerable research involved, the inquirer will be sent an estimate of the cost before the work is started.*

excellent European reception on his "Australian" doublet!

As we have said, a map is satisfactory for directions north and south, and thus it is that our correspondent is receiving the South American satisfactorily on his north-south doublet.

We have qualified our statements several times with the phrase "other things being equal." By this we had in mind vagaries in skip-distance areas, frequency of transmission, time of day, and seasonal variations. For best reception at a given time (hour and day of the year) from a distant station operating on a given frequency, it may not be sufficient merely to erect an antenna directional toward that transmitter over a great circle course. It is quite possible that some different direction may give better results!

For example, let us return to our Japanese problem. Let us assume that one of Nippon's stations is operating on a daytime frequency—a frequency between 20 and 12 megacycles. During the summer, such a station will probably be best received on the north-south antenna, the signal taking the great circle course across the Land of the Midnight Sun. Reception should be good from early morning until late evening. In the northern hemisphere winter, such a station could not push through the polar night, and would be heard in New York only during a short period around sun-set—while the east-west path is in maximum daylight. Reception would now be had on the east-west doublet.

In contrast, a Japanese station transmitting on a night frequency, in the neighborhood of 7 megacycles, would be received best during the winter on the north-south aerial from late afternoon until after sunrise. In the summer, the directional effect would shift (if the signal was heard at all) to the east-west, with night over the Pacific and six months of daylight above the Arctic Circle.

These factors contribute to the many anomalies besetting DX reception. It will often happen that A will receive a certain station which his radio neighbor B cannot tune in. A few months later, B gets this station while A cannot even pick up a whistle. Owner A may call in a serviceman to find out what is wrong with his set (as did A. E. G.'s friend), because B, who couldn't get that station before, now receives it while A cannot! Of course, the answer probably is that the antennas at A and B have different directional characteristics favorable to this station at different times of the year.

Listeners who receive stations from a certain portion of the globe only during definitely established seasons, usually form the opinion that such reception is inexorably seasonable. In a few instances, this may be so, but often the variation is due to the fact that the signal is now coming from an altered direction which is not favored by the antenna.

There are other factors that contribute to directional distortion. High buildings and metallic hills surrounding the immediate vicinity of reception may cause local warping of the wave-front so that it seems to be coming from a different direction than that established by its actual course of propagation. Discrepancies of this order can be determined only by experimentation, but should be taken into consideration before blaming the theory for the practice.

For the most consistent all-year-round and all-world-round reception, at least two, and preferably three directional antennas should be erected, with the input circuits arranged for instant switching. In determining directions a globe should be employed—preferably nothing smaller than twelve inches in diameter. A piece of string about fifteen inches long completes the indoor equipment. The writer ties a knot close to one end. Place this knot on, say Tokyo, and, with the free hand, bring the string around to, say New York. Maneuver the string slightly to obtain the shortest distance—marking the New York terminal with the thumb-nail, and removing the string held between the thumb-nail and forefinger if the distance is to be measured on the string. (Lay out the string along the equator, to determine the number of degrees of longitude it spans *on the equator*. Multiply the number of degrees by 69.1—or simply 69—for the number of statute miles represented by the length of the section of string.) A few minutes' experimenting will enable you to judge bearings (directions) with more than sufficient accuracy for radio purposes.

As an interesting demonstration of the discrepancy between map bearings and great-circle courses, select any two points in the same parallel but sepa-

[*Continued on page 194*]

***"Will there be war in Europe? . . . the Kiddie Kookie Kadets think not."***

# RADIO PROVING POST

## GENERAL ELECTRIC MODELS A-82, A-87

THE General Electric All-Wave Radio Receivers Models A-82 and A-87 use metal tubes throughout, and embody such features as the "Sentry Box" tuning unit, "Permaliner" air trimmer condensers and "Sliding Rule" tuning dial with automatic vernier.

The Model A-82, illustrated on these pages, is a Table Model. The A-87, which uses the same chassis and speaker type as the A-82, is a Console Model. Therefore, the data to be presented applies to both receivers.

The receiver covers a continuous frequency range from 540 to 19,500 kilocycles and, in addition, the extended long-wave range of 140 to 410 kilocycles. There are four waveband positions, as follows: Band A, 140 to 410 kc; Band B, 540 to 1750 kc; Band C, 1.75 to 6.0 mc; Band D, 6.0 to 19.5 mc. Separate sets of coils are used for each band, and unused coils are progressively shorted out as the waveband switch is turned.

The receiver may be used with the usual type of antenna, or with a V Doublet aerial system. The same antenna and ground binding posts on the Sentry Box unit are used for either type of antenna.

### *Circuit Functioning*

The complete circuit of the receiver is shown in Fig. 1. The signal from the antenna is applied to the control grid of the 6K7 r-f amplifier tube through the antenna coil, the secondary of which is tuned to the incoming signal by the rear section of the main tuning condenser on top of the Sentry Box unit. The secondary of the coil for the band next lower in frequency to the one in use is short-circuited by the band switch to prevent absorption of energy at its resonant frequency, which falls in the next higher band. The primaries of all coils not in use are also short-circuited by the band switch.

The amplified radio-frequency signal is impressed on the control grid of the 6A8 converter and oscillator tube through the r-f coil, the secondary of which is tuned to the signal frequency by the center section of the main tuning condenser. The sensitivity control is in the circuit of this tube and consists of a variable resistor (R-7) in the cathode circuit of the 6A8 tube. When the control knob is turned to the right, the amount of resistance in the cathode circuit of the 6A8 is decreased. There is a consequent decrease in the voltage drop across the resistance left in circuit, and since this voltage is used for biasing the grid of the converter section of the 6A8, the bias is reduced and the gain of the converter section increased. Conversely, as the amount of resistance in the cathode circuit is increased, the bias on the converter grid is increased. This reduces the gain or amplification of the converter section.

In the 6A8 tube the incoming signal is combined with the local oscillator signal which is 465-kc higher in frequency. The local signal is generated by the oscillator elements of this tube and the proper radio-frequency difference is maintained throughout the tuning range by the front section of the main tuning condenser in conjunction with the oscillator coil and padding condensers. The oscillator section of the main tuning condenser, although of the same capacity as the other two sections, is larger physically to permit wider spacing of the plates, thereby reducing the possibility of microphonic feedback howl.

Fig. 2. The General Electric Model A-82 metal tube all-wave receiver. Note sliding rule dial scale. See Sketch B of Fig. 1 for details.

### *I-F and Detector Circuits*

The combination of the signal frequency with the local oscillator frequency in the converter tube produces the intermediate frequency of 465 kilocycles. This particular intermediate frequency is chosen to reduce image response. The intermediate-frequency amplifier consists of a 6K7 tube and two transformers, each with two tuned circuits.

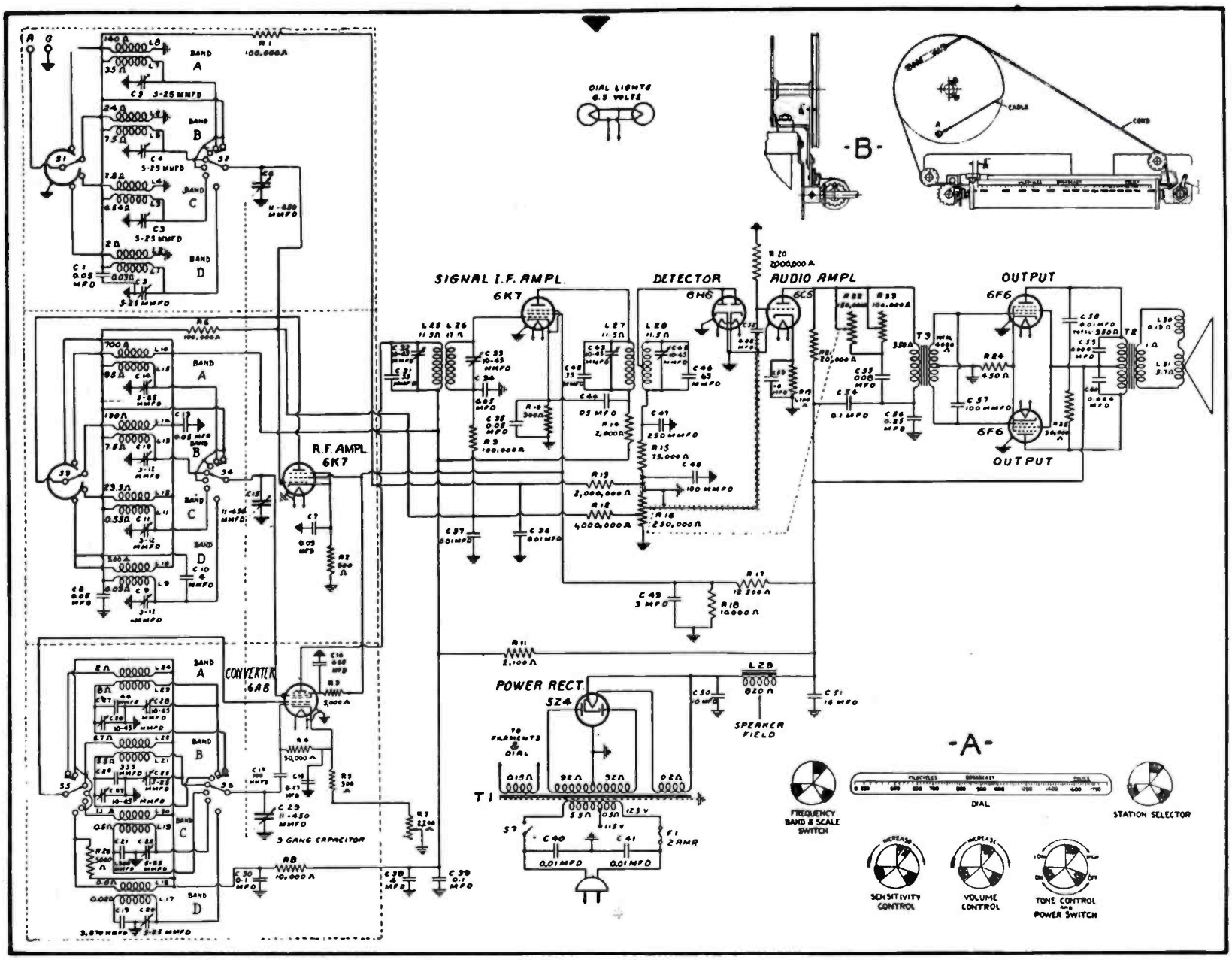



Fig. 1. Diagram and control details of General Electric Model A-82 and A-87 receivers.

The output of the i-f amplifier is applied to the 6H6 diode rectifier, which is a combined detector and automatic volume-control tube. The direct-current component of the rectified signal produces a voltage drop across the resistor R-16. This voltage drop provides automatic bias for the r-f and i-f amplifier tubes and the converter section of the 6A8, and so gives automatic volume control action. Full automatic bias is applied to the r-f amplifier tube, while a part of this voltage, from a tap on R-16, is applied to the converter tube and i-f amplifier which handle somewhat larger signal voltage than the r-f amplifier.

The manual volume control (also R-16) selects the amount of audio signal applied through the coupling condenser C-52 to the grid of the 6C5 audio amplifier tube, and thus regulates the output of the receiver. This is a dual control, the second or low-note compensation section acting to preserve proper balance between high and low audio frequencies as the volume is changed, by means of a variable resistor (R-22) in series with a condenser (C-55) across the primary of the interstage audio transformer. The tone control consists of a variable resistor (R-23) connected in parallel with the low-note compensation section of the volume control, so as to permit attenuation of the higher audio frequencies as desired.

### *Class AB Pentode Amplifier*

The output of the 6C5 tube is coupled to the grids of the push-pull 6F6 output pentodes by means of a resistance-capacity network working into the interstage audio transformer. These pentodes are operated Class AB, an unusual arrangement, but one that provides excellent results. (See article, "A Resistance-Coupled Class AB Modulator," by Maurice Apstein, page 76, February ALL-WAVE RADIO, for explanation of pentode operation).

The plate circuits of the 6F6 output pentodes are suitably matched to the electrodynamic loudspeaker by means of a stepdown output transformer. The loudspeaker has a voice-coil impedance of 5 ohms at 400 cycles. The effective diameter of the cone is 9¼ inches—10¼ inches overall.

The undistorted output of the receiver is 5 watts, the maximum output is 7 watts.

The alignment frequencies of the receiver are: Band A, 140 and 410 kc; Band B, 580 and 1740 kc; Band C, 6000 kc; Band D, 18,000 kc.

The power consumption of the set is 105 watts when used on a 105 to 130-volt, 50 to 60-cycle line. The maximum power consumption on other line frequencies is 110 watts.

A front view of the receiver is shown in Fig. 2. The location of the various controls is shown in sketch A of Fig. 1

### *Receiver Controls*

The Station Selector has an automatic vernier. The drive ratio for fast tuning is 5.5 to 1, and for slow tuning, 55 to 1. The automatic vernier action is available through approximately one revolution of the tuning knob. At the end of one revolution, a small metal peg engages the main drive mechanism and a further turning of the tuning knob automatically provides fast scale coverage. The vernier action is available on any por-

[*Continued on page 195*]

# Backwash

**A PAGE GIVEN OVER TO THE EXPRESSIONS AND OPINIONS OF READERS**

### *EX-2QR*

*Editor,* ALL-WAVE RADIO:

We note with interest the article on page 58 of the February issue, and at this stage of the game it is quite amusing to see our old station picture. Since the original conception of 2QR, as with all amateurs and experimenters, many things have gone over the dam. I have now opened quite a laboratory here in Florida and am again tremendously interested in radio amateur and experimental work.

H. H. ROBINSON,
CORAL GABLES, FLA.

*(If you decide to go on the air again, we hope you can wangle a two-letter call out of the FCC. The three-letter ones are tongue twisters and fist benders.—*THE EDITOR).

◆

### *Nazaki Tests*

*Editor,* ALL-WAVE RADIO:

I have received a letter and QSL card from JVN, Nazaki, Japan, dated February 3, 1936. In this letter the Chief Engineer says:

"We have the pleasure of informing you that we are carrying out overseas broadcasting tests between 2100 and 2200 GMT every Monday and Thursday on JVP (7510 ks) and JVN (10,660 kc) for the east coast of North America to find out the most suitable frequency and time for this work.

"We intend to open the daily service on the same hour with this test schedule in the near future, if the result be good. Therefore, the report of your receiving condition will be very useful for that purpose.

"We are very much obliged to you if you will kindly try to receive this test and write us your receiving conditions and suggestions on this subject.

"If you have any friends on the east coast of North or South America, please tell them to try to receive it and let me know the receiving conditions which are quite important for improving our overseas broadcasting to your satisfaction."

*Signed: S. Keeremocby, C.E.*

Perhaps the publishing of this will benefit us all in the future.

ROY T. DENKLER,
LOUISVILLE, KY.

*(Right you are—and many thanks for the data.—*THE EDITOR).

### *Liberty Does It*

*Editor,* ALL-WAVE RADIO:

I am quite pleased with what I have seen of your magazine and hope you keep up the good work.

One suggestion—couldn't each article be so arranged that it was set up in one place so that it would not be necessary to turn to the back. Liberty does it successfully—why couldn't you?

S. S. HOLMES,
SYDNEY, C. B., CANADA.

*(Of all the things to pick on, and you pick on that! Just about the last thing we would have expected. But the suggestion is a perfectly reasonable one, and we appreciate it. The reason we don't follow Liberty in this type of make-up is the same reason why some ten thousand other magazines don't—we have never been convinced that the one advantage gained is sufficient to over-ride the numerous disadvantages of this type of make-up.—*THE EDITOR.

◆

### *Rose To Worcester*

*Editor,* ALL-WAVE RADIO:

Thought I would express my appreciation to you and Mr. J. R. Worcester for the article, 'Improved S. W. Set," in the December issue of AWR. I have built this set and am well pleased with it. It exceeded my expectations in selectivity, stability, etc. It is very stable. That choke and condenser method of controlling the r-f stage works to perfection.

A. M. CAREY,
DODGE CITY, KAN.

*(Thanks for the report. Now it will be our job to haul out a few more stunts that will make you rebuild the set—just to keep you in trim.—*THE EDITOR.).

◆

### *Flying Colors*

*Editor,* ALL-WAVE RADIO:

May I compliment you on your layout and subject material? At last, a not-too-technical magazine for not-too-technical people, and yet, one that is not elementary in make-up.

VERNON N. WILLIAMS,
*S. S. North Haven,*
PAN AMERICAN AIRWAYS EXPEDITION,
HONOLULU, T. H.

*(Quite the nicest compliment we have received. Thanks.—*THE EDITOR).

### *First Letter*

*Editor,* ALL-WAVE RADIO:

Today I have bought my second copy of AWR and decided to let you know that I am very enthused over the entire contents of the magazine—so far.

Incidentally, this is the first letter I ever wrote to a radio magazine, although I have been buying radio magazines for the past three years. I can say that yours has all the rest of them beaten.

I know you have a hard time pleasing everyone and I am not going to ask you for very much, but, if possible, I would like to ask that you do not waste very much space on fellows who are sending you pictures of their listening posts, for the purpose of exhibiting them in your magazine. There is so much news about all kinds of interesting radio items and stations that I think you could use far better than satisfying someone's "showmanship."

H. ORLAW,
EDMONTON, ALTOONA, CANADA.

*(You can count on this much—we won't permit useless material to crowd out interesting and valuable data. We judge as best we can, but the reader is the final judge. Many thanks.—*THE EDITOR).

◆

### *U. S. Radio DX Club*

*Editor,* ALL-WAVE RADIO:

Thought the readers of AWR would be interested in learning that the United States Radio DX Club has started up under a new system. This Club will publish bulletins containing both Broadcast and Short-Wave tips of help to any DXer.

Information concerning membership and a free bulletin will be sent to anyone on request.

FRANK WHEELER,
ERIE, PENNA.

*(More data, please, and your complete address. Erie, Pennsylvania, is not sufficient. Let's have some dope on the purpose of the Club, which appears to have a different address.—*THE EDITOR.

◆

### *Swell Sheet*

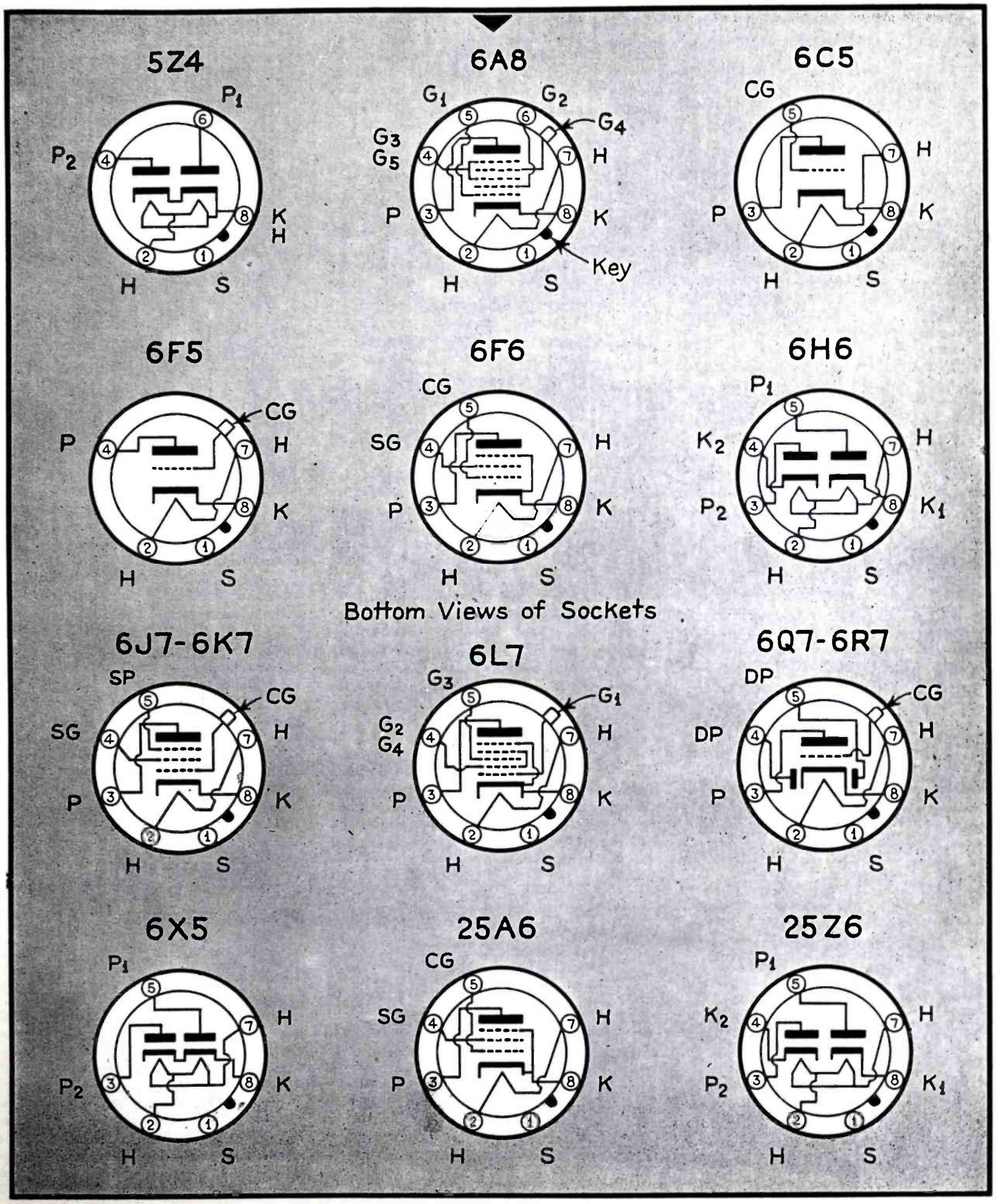
*Editor,* ALL-WAVE RADIO:

I wish to express my thanks to you for the magazine ALL-WAVE RADIO.

[*Continued on page 193*]

# METAL-TUBE SOCKET CONNECTION CHART

**HANDY CHART FOR AMATEURS AND SET BUILDERS, GIVING THE BOTTOM VIEW SOCKET TERMINAL LAYOUTS AND ELEMENT CONNECTIONS FOR THE COMPLETE LINE OF ALL-METAL TUBES**



# On The Market

## RCA ACR-175
## Amateur Communications Receiver

THIS RECEIVER employs a superheterodyne circuit with a continuous frequency range from 500 to 60,000 kc, (5 to 600 meters) in four ranges. Each range employs a separate set of coils.

The tuning dial is calibrated in megacycles and the amateur bands are clearly marked. There are two tuning knobs; one with a ratio of 20 to 1 and the other with a ratio of 100 to 1.

The dial permits the positive logging of stations of any frequency without resetting to a reference point. The main scales are calibrated in megacycles and are traversed by a double-ended pointer, one end of which also covers a coarse scale of nine equidistant divisions serving as a vernier index. A slightly longer single-ended pointer simultaneously traverses a vernier scale of 100 divisions spaced equidistant around the entire circumference of the dial, this pointer making a complete revolution per vernier index division. Thus, any station can be logged accurately by noting in sequence the band letter, vernier index scale number and vernier scale number.

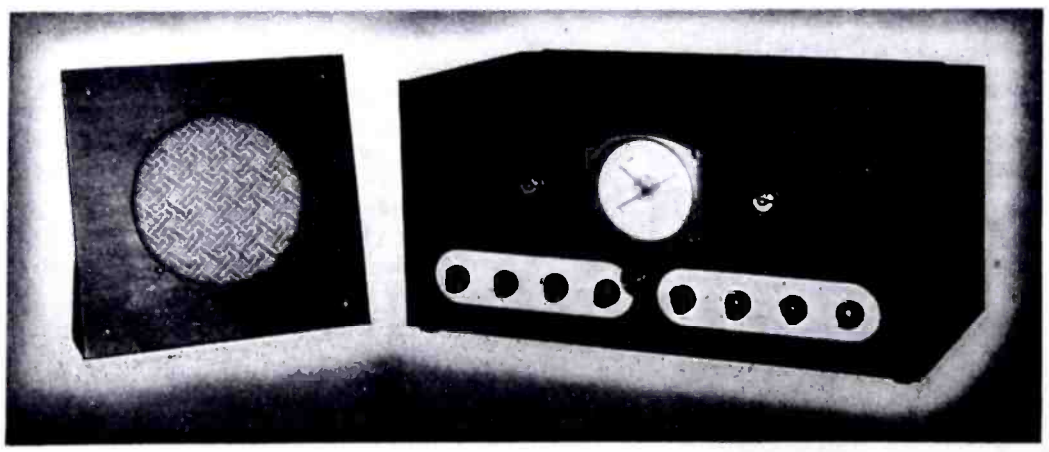
The receiver employs 11 tubes as follows: 6K7 r.-f. (in use between 500 and 15,500 kc); 6L7 first detector; 6J7 high-frequency oscillator; 6K7 first i.-f.; 6K7 second i.-f.; 6H6 second detector, avc; 6J7 beat-frequency oscillator; 6F5 intermediate a-f voltage amplifier; 6F6 power pentode; 6E5 tuning indicator, and 5Z4 high-voltage rectifier.

A rejection filter is placed in the antenna circuit to minimize interference from stations operating near the i-f frequency (460 kc). Iron-core transformers in the i-f amplifier provide high gain and selectivity. A quartz crystal, having special orientation and dimensions, assures excellent single-signal response. An electron-ray tube serves the dual function of tuning meter and indicator for measuring the strength of incoming signals.

The lower row of controls on the front panel are as follows: (1) Combined power, tone control and standby switch; (2) calibrated signal-input control; (3) selectivity (crystal phasing) control; (4) avc on-off switch; (5) dual-ratio tuning control; (6) range switch; (7) audio gain control; (8) beat oscillator on-off switch; (9) calibrated heterodyne control.

The receiver is completely self-contained with the exception of the loudspeaker, which is in a separate cabinet. This is an 8-inch dynamic which is coupled to the 6F6 pentode.

The set has an undistorted output of 2 watts—maximum output 4½ watts. *All-Wave Radio.*



The RCA ACR-175 Amateur Communcations Receiver

◆

## New Browning 35 With Metal Tubes

SINCE THE original Browning 35 single-control, all-wave kit receiver was designed and placed on the market a large number have been built and put into service all over the world.

The new Browning 35 is designed for either glass or metal tubes. In the latter case 8 tubes are used instead of 7, as the diode which is employed as a second detector (6H6) is a separate entity from the triode used as the first audio amplifier, whereas, in the glass type of tube the diode second detector and the first audio amplifier are combined in the 2A6 or 75. The 6A8 is used as a pentagrid converter instead of the 6A7. This is one of the best of the metal tubes and is somewhat superior to its glass predecessor due to the fact that it is less noisy in its mixing operation.

The beat-frequency-oscillator circuit in the new Browning 35 has been greatly improved. The oscillator coupler itself has been redesigned so that a knob is provided which gives manual vernier control of the beat-note by varying a small air dielectric tuning condenser. The signal from the beat oscillator is fed into one of the diode elements of the 6H6 instead of into the i-f amplifier. In actual operation this circuit has the advantage that strong signals do not over-ride the beat-frequency oscillator. Oscillator hiss is reduced and a perfectly steady beat-note is obtained.

The Browning 35 with metal tubes

The appearance of the new Browning 35 has been improved by means of a large dial escutcheon. As will be noted from the picture, this escutcheon has the graduations for the vernier tuning pointer as well as marking the positions for the band-selector switch.

Most of the changes made from the original Browning 35 are minor ones and in the nature of refinements rather than fundamental alterations in circuit design and layout. In fact the Tobe Super-Tuner around which the set was designed has undergone no changes whatever, as the efficiency over all bands covered is such that the overall sensitivity of the receiver is one microvolt or less. *All-Wave Radio.*

◆

## High-Voltage Transmitting Condensers

SUBSTANTIAL reductions in list prices of round-can oil-filled transmitting condensers are announced by Aerovox Corporation, Brooklyn, N. Y.

Aerovox round-can transmitting condensers are available in 1000, 1500 and 2000 volt ratings, and capacities of 1 and 2 mfd for all three voltage ratings, and an additional 4 mfd for the 1000-volt rating. These units are standard Aerovox grade, with the usual label, voltage rating and guarantee. *All-Wave Radio.*

## Three New Transmitting Tubes

RCA RADIOTRON has announced a new pentode, a high-mu triode and a half-wave high-vacuum rectifier.

The 804 is a pentode transmitting tube intermediate in power output to the 802 and 803. It has a maximum plate dissipation of 40 watts in Class C telegraph service. This new tube is for use as an r-f power amplifier, frequency multiplier, oscillator, or suppressor-grid, grid, or plate-modulated amplifier. It can be operated at maximum ratings for frequencies as high as 15 mc. Maximum d-c plate voltage is 1250. The filament draws 3 amps at 7.5 volts.

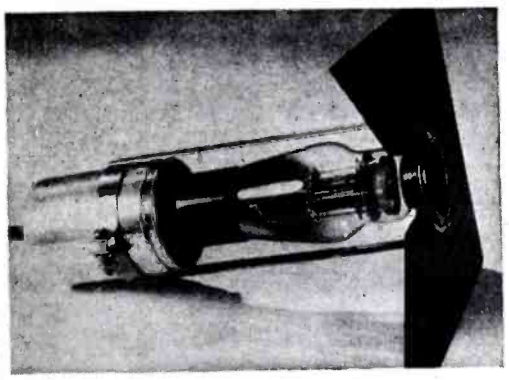
The 805 is a high-mu transmitting triode with plate lead out of the top. It is intended for use as an r-f power amplifier, oscillator or Class B a-f amplifier. The grid of this tube is designed so that the amplification varies with the amplitude of the input signal. This feature facilitates the design of Class B amplifiers to give high output with low distortion. As an r-f amplifier or oscillator, the 805 may be used at maximum ratings for frequencies as high as 30 mc. The maximum plate dissipation in Class C telegraph service is 125 watts. Maximum d-c plate voltage is 1500. The filament draws 3.25 amps at 10 volts.

The 836 is a half-wave, high-vacuum rectifier tube for use in high-voltage rectifying devices to supply d-c power. A feature of this new type is its excellent voltage regulation characteristics. The peak inverse voltage is 5000 maximum; peak plate current, 1.0 ampere; average plate current, 0.25 ampere. The heater draws 5 amperes at 2.5 volts. *All-Wave Radio.*

◆

## Electron-Eye Tuning Indicator

A SIMPLE unit, readily installed for only a few dollars, brings electron-eye tuning to any set. Known as the Taco Tuning Indicator, this self-contained unit makes



Taco Tuning Indicator

use of the 6E5 or electron-eye tube and obtains its power supply from the radio set itself, through a five-wire cable connecting with various circuits. The installation is nothing more intricate than cutting or drilling a hole in the set panel for the neat bezel ring for the "window" through which the tube target is viewed, and mounting the bracket behind the panel.

For precise tuning the set operator views the electron-eye target of the 6E5 tube through the bezel window. When the set is sharply tuned for a given signal, the black segment of the luminous green circle is reduced to minimum width if not entirely disappeared. This "closed eye" condition indicates maximum resonance.

The Taco Tuning Indicator is manufactured by Technical Appliance Corp., 17 East 16th St., New York City. *All-Wave Radio.*

◆

## Arcturus Introduces 6N6 and 6R7 'Coronet' Tubes

THE ARCTURUS Radio Tube Company, Newark, N. J., announces the addition to its line of the types 6N6 "Coronet" and 6R7 "Coronet" Metal Tubes.

The type 6N6 "Coronet" is a duplex-triode power output tube, permitting circuit simplicity and its special characteristics rank it among the most efficient tubes for P. A. Systems and regular amplifier work.

The tube operates without C bias, precluding the need for bias resistor with its necessary filter network. Because the grid does not draw current, since an automatic bias is applied within the tube, the input impedance is high and the tube needs no special driving equipment such as is necessary for class "B" operation.

The 6N6 has a good overload characteristic, no grid current being detected even when the tube is overloaded 60% above its rating. 15-volts input produces 4 watts output with a total distorion of about 5% when worked into 7000 ohms. 7 watts output can be obtained with a distortion of only 9%. This tube can be used in push-pull and permits the use of resistance coupled input since the tubes have a high impedance.

The 6R7 "Coronet" is a duplex-diode triode, somewhat similar to the type 75 but has a mutual conductance of 1900 and a mu of 16. *All Wave Radio.*

◆

## Intensifier Screen for 6E5

A SPECIAL color filter disc placed before the 6E5 electron-eye tube greatly augments the contrast between luminous ring and dark segment for quicker and more critical observation in the latest model Taco Tuning Indicator. Known as the intensifier screen, the disc is held by means of two sharp prongs at the inside end of the escutcheon shadow box. Smaller variations in the dark segment can now be observed, making for still finer tuning in any set in which the tuning indicator may be mounted. The intensifier screen is now a regular feature of the Taco Tuning Indicator offered by the Technical Appliance Corp., 17 E. 16th St., New York City. *All-Wave Radio.*

◆

## New Wholesale Radio Catalog

A NEW 64-page catalog featuring a large assortment of radio receivers, public-address amplifiers and systems, radio service replacement parts, electrical appliances and electrical refirgerators, has been brought out by Wholesale Radio Service Co., Inc., of New York.

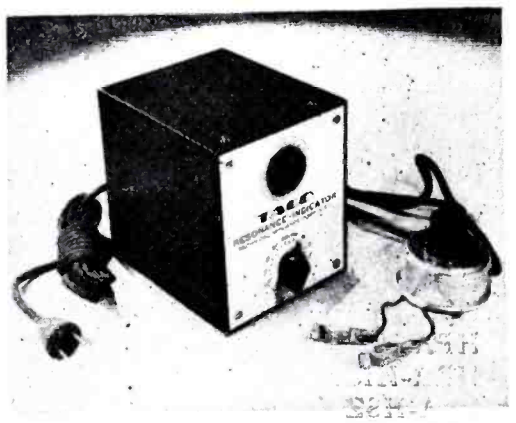
The book measures 7 by 10 inches and is printed in rotogravure in three colors. Copies are obtainable free of charge from Wholesale Radio's main office at 100 Sixth Avenue, New York, and at the following branch offices: 901 West Jackson Blvd., Chicago, Ill.; 430 West Peachtree St., N.W., Atlanta, Ga.; 219 Central Avenue, Newark, N. J.; 542 East Fordham Road, Bronx, N. Y. *All-Wave Radio.*

◆

## Handy Resonance Indicator

OF OUTSTANDING usefulness to amateurs and set owners is the Taco Resonance Indicator now offered by Technical Appliance Corp., 17 E. 16th St., New York City.

Making use of the 6E5 electron-eye tube, this compact metal-cased device serves many important functions. It indicates degree of resonance for accurate tuning of set or individual r-f and i-f circuits. Ideal means of aligning stages. May be used as output meter. Checks for "opens" or



Taco Resonance Indicator.

"shorts" in component parts and circuits. Permits of matching condensers and indicates capacity values. Checks audio fidelity. As a bridge indicator, in place of galvanometer, it eliminates danger of burnouts yet provides critical visual indication.

Employs two 6H6 metal tubes in conjunction with 6E5 electron-eye tube. One 6H6 is used in voltage-doubling circuit to supply necessary plate power for 6E5. Other 6H6 operates as linear diode detector, the rectified signal of which is amplified by triode section of 6E5 and applied to control element of latter's electron-ray section. One 6H6 and the 6E5 are housed in attractive metal case measuring 4½ x 5⅜ x 5⅜ inches. Second 6H6 mounts on external metal case provided with test leads and clip. Long connection cord with rubber plug for 110-volt supply.

Luminous disk with variable dark segment, provided by 6E5 electron-eye tube, is seen through recessed shadow-box opening in upper part of engraved face plate. Below is knob controlling sensitivity.

Ideal means of tuning in weakest signals for those engaged in record-breaking broadcast and short-wave reception. *All-Wave Radio.*

# WORLD RADIO STATION-CALL PREFIXES

## Prefixes Used by Commercial and Broadcast Radio Stations

| | |
|---|---|
| CAA-CEZ | Chile |
| CFA-CKZ | Canada |
| CLA-CMZ | Cuba |
| CNA-CNZ | Morocco |
| COA-COZ | Cuba |
| CPA-CPZ | Bolivia |
| CQA-CRZ | Portuguese Colonies |
| CSA-CUZ | Portugal |
| CVA-CXZ | Uruguay |
| CYA-CZZ | Canada |
| D | Germany |
| EAA-EHZ | Spain |
| EIA-EIZ | Irish Free State |
| ELA-ELZ | Liberia |
| EPA-EQZ | Persia |
| ESA-ESZ | Estonia |
| ETA-ETZ | Ethiopia |
| F | France |
| G | United Kingdom |
| HAA-HAZ | Hungary |
| HBA-HBZ | Switzerland |
| HCA-HCZ | Ecuador |
| HHA-HHZ | Haiti |
| HIA-HIZ | Dominica |
| HJA-HKZ | Colombia |
| HPA-HPZ | Panama |
| HRA-HRZ | Honduras |
| HSA-HSZ | Siam |
| HVA-HVZ | Vatican City |
| HZA-HZZ | Hedjaz |
| I | Italy & Colonies |
| J | Japan |
| K | U. S. & Possessions |
| LAA-LNZ | Norway |
| LOA-LWZ | Argentina |
| LXA-LXZ | Luxemburg |
| LYA-LYZ | Lithuania |
| LZA-LZZ | Bulgaria |
| M | Great Britain |
| N | United States |
| OAA-OCZ | Peru |
| OEA-OEZ | Austria |
| OFA-OHZ | Finland |
| OKA-OKZ | Czechoslovakia |
| ONA-OTZ | Belgium & Colonies |
| OUA-OZZ | Denmark |
| PAA-PIZ | Netherlands |
| PJA-PJZ | Curacao |
| PKA-POZ | Netherlands Indies |
| PPA-PYZ | Brazil |
| PZA-PZZ | Surinam |
| R | U.S.S.R. |
| SAA-SMZ | Sweden |
| SOA-SRZ | Poland |
| STA-SUZ | Egypt |
| SVA-SZZ | Greece |
| TAA-TCZ | Turkey |
| TFA-TFZ | Iceland |
| TGA-TGZ | Guatemala |
| TIA-TIZ | Costa Rica |
| TKA-TZZ | France & Colonies |
| U | U.S.S.R. |
| VAA-VGZ | Canada |
| VHA-VMZ | Australia |
| VOA-VOZ | Newfoundland |
| VPA-VSZ | British Colonies |
| VTA-VWZ | British India |
| VXA-VYZ | Canada |
| W | United States |
| XAA-XFZ | Mexico |
| XGA-XUZ | China |
| XYA-XZZ | British India |
| YAA-YAZ | Afghanistan |
| YBA-YHZ | Netherlands Indies |
| YIA-YIZ | Iraq |
| YJA-YJZ | New Hebrides |
| YLA-YLZ | Latvia |
| YMA-YMZ | Danzig |
| YNA-YNZ | Nicaragua |
| YOA-YRZ | Roumania |
| YSA-YSZ | El Salvador |
| YTA-YUZ | Yugo-Slavia |
| YVA-YWZ | Venezuela |
| ZAA-ZAZ | Albania |
| ZBA-ZJZ | British Colonies |
| ZKA-ZMZ | New Zealand |
| ZPA-ZPZ | Paraguay |
| ZSA-ZUZ | South Africa |
| ZVA-ZZZ | Brazil |

## Prefixes Used by Amateur C. W. and Phone Radio Stations

| | |
|---|---|
| AC4 | Tibet |
| AR | Syria |
| CE | Chile |
| CM | Cuba (cw) |
| CN8 | Morocco |
| CO | Cuba ('Phone) |
| CP | Bolivia |
| CR4 | Cape Verde |
| CR5 | Portuguese Guinea |
| CR6 | Angola |
| CR7 | Mozambique |
| CR8 | Portuguese India |
| CR9 | Macao |
| CR10 | Timor |
| CT1 | Portugal |
| CT2 | Azores |
| CT3 | Madeira |
| CX | Uruguay |
| D4 | Germany |
| EA | Spain |
| EI | Irish Free State |
| EL | Liberia |
| EP, EQ | Iran (Persia) |
| ES | Estonia |
| ET | Abyssinia (Ethiopia) |
| F3 | France |
| F8 | France |
| FA3, FA8 | Algeria |
| FB8 | Madagascar |
| FD8 | Togo (French) |
| FE8 | Cameroons (French) |
| FF8 | French West Africa |
| FG8 | Guadeloupe |
| FI8 | Franch Indo-China |
| FK8 | New Caledonia |
| FL8 | French Somaliland |
| FM8 | Martinique |
| FN8 | French Indies |
| FO8 | French Oceania, Tahiti |
| FP8 | St. Pierre & Miquelon |
| FQ8 | Fr. Equatorial Africa |
| FR8 | Reunion |
| FT4 | Tunisia |
| FU8 | New Hebrides |
| FY8 | French Guyane |
| G | Great Britain |
| GI | Northern Ireland |
| HA | Hungary |
| HB | Switzerland |
| HC | Ecuador |
| HH | Haiti |
| HI | Dominican Republic |
| HJ, HK | Colombian Republic |
| HP | Panama |
| HR | Honduras |
| HS | Siam |
| HZ | Hedjaz |
| I | Italy |
| J | Japan |
| K4 | Porto Rico, Virgin Islands (U. S.) |
| K5 | Canal Zone (U. S.) |
| K6 | Guam, Hawaii, Midway Island, Samoa (U. S.) |

| | |
|---|---|
| K7 | Alaska |
| KA | Phillipine Island (U. S.) |
| LA | Norway |
| LU | Argentina |
| LX | Luxembourg |
| LY | Lithuania |
| LZ | Bulgaria |
| MX | Manchukuo |
| N | U. S. Naval Reserve Stations |
| NX | Greenland |
| NY | Canal Zone |
| OA | Peru |
| OE | Austria |
| OH | Finland |
| OK | Czechoslovakia |
| OM | Guam |
| ON | Belgium, Bel. Congo |
| OZ | Denmark |
| PA | Netherlands |
| PI | Netherlands |
| PJ | Curacao |
| PK | Neth. Indies |
| PX | Andorra |
| PY | Brazil |
| PZ | Surinam |
| SM | Sweden |
| SP | Poland |
| ST | Sudan |
| SU | Egypt |
| SV | Greece |
| TA | Turkey |
| TF | Iceland |
| TG | Guatemala |
| TI | Costa Rica |
| U, UE, UK, UX | U.S.S.R. |
| VE | Canada |
| VK | Australia |
| VO | Newfoundland |
| VP1 | British Honduras |
| VP2 | Antigua, St. Kitts-Nevis |
| VP3 | British Guiana |
| VP4 | Trinidad & Tobago |
| VP5 | Cayman Islands, Jamaica, Turks & Caicos Islands |
| VP6 | Barbados |
| VP7 | Bahamas |
| VP8 | Falkland Islands, South Georgia |
| VP9 | Bermuda |
| VQ2 | Northrn Rhodesia |
| VQ3 | Tanganyika |
| VQ4 | Kenya |
| VQ5 | Uganda |
| VQ6 | British Somaliland |
| VQ8 | Mauritius |
| VQ9 | Seychelles |
| VR1 | Gilbert & Ellice Islands |
| VR2 | Fiji Islands |
| VR3 | Fanning Island |
| VR4 | Br. Solomon Islands |
| VR5 | Tonga Islands |
| VR6 | Pitcairn Island |
| VS1, VS2, VS3 | Malaya |
| VS4 | North Borneo |
| VS5 | Sarawak |
| VS6 | Hong Kong |
| VS7 | Ceylon |
| VS8 | Bahrein Island |
| VS9 | Maldive Islands |
| VU | India |
| W | United States |
| XE | Mexico |
| XU | China |
| YA | Afghanistan |
| YI | Iraq |
| YL | Latvia |
| YM | Danzig |
| YN | Nicaragua |
| YR | Roumania |
| YS | Salvador |
| YT, YU | Jugoslavia |
| YV | Venezuela |
| ZA | Albania |
| ZB1 | Malta |
| ZB2 | Gibraltar |
| ZC1 | Transjordania |
| ZC2 | Cocos Islands |
| ZC3 | Christmas Island |
| ZC4 | Cyprus |
| ZC5 | Palestine |
| ZD1 | Sierra Leone |
| ZD2 | Nigeria, Cameroons (British) |
| ZD3 | Gambia |
| ZD4 | Gold Coast, Togoland (British) |
| ZD6 | Nyasaland |
| ZD7 | Saint Helena |
| ZD8 | Ascension |
| ZE1 | Southern Rhodesia |
| ZK1 | Cook Islands |
| ZK2 | Niue |
| ZL | New Zealand |
| ZM | Western Samoa |
| ZP | Paraguay |
| ZS, ZT, ZU | South Africa |
| ZU9 | Tristan da Cunha |

# RADIO AND THE FLOODS

THE DISASTROUS floods which have ravaged the richest and most intensively populated sections of the United States gave the broadcasting industry one of the greatest opportunities in its history. The industry seized the opportunity instantly. It demonstrated, in circumstances that could hardly be more dramatic, the superiority of radio in giving news of the disaster to the public far ahead of any other medium.

### *Day and Night*

Day and night in all the flood-torn states, news broadcasters read bulletin after bulletin. Millions of listeners, fearful for their safety, sat tensely beside their receivers while the story of the ravaging waters was unfolded. The way in which both radio stations and their audiences responded to this supreme task of news reporting was reflected in many letters received by Transradio Press Service, which supplied the majority of the stations in the dozen stricken states with their flood coverage.

Many of the stations in the flood area stayed on the air long after regular closing time to give their audiences the latest news of the disaster, in many cases warning them of the flood's approach. Others, like WJAS Pittsburgh, themselves fell victims of the inundation, but carried on with batteries after the power had ceased.

A few of the reports from broadcasting stations in the heart of the vast flood area will convey some idea of the drama and the devotion to public service that stations felt in the hour of crisis.

"WBRE has been on the air almost constantly since the flood began, and 95% of the time has been devoted to flood bulletins, to assisting flood sufferers to get in touch with one another and assisting the Red Cross," S. R. Baltimore wrote Transradio. "If you want to know how radio stacked up with the newspapers, I wish you could ask our average Wyoming Valley citizen. Right now radio would be aces high!"

Edward J. Stackpole, Jr., president of WHP and the Telegraph newspapers in Harrisburg, Pa., said: "The prestige of radio stations in Harrisburg has been enhanced tremendously as a result of the manner in which they kept the public informed of the minute-to-minute developments as the flood waters rose and inundated business and residential districts."

### *Rapid-Fire Flood News*

Frank Megargee of WGBI Scranton, Pa., said: "It seemed to me we did nothing but broadcast news all the time. The audience was demanding it as fast as we could receive it. It was impossible to wait until our regular news periods. We brought the flood news to our listeners way ahead of the newspapers."

Many scoops were scored by WEST Easton, according to station manager. W. A. Kirkwood. "WEST went on the air almost continuously with Transradio flashes on the flood, in addition to giving comprehensive summaries on the four regular news periods."

One of the most outstanding jobs of coverage in the Pennsylvania area was done by WEEU Reading, which often used as many as six 5-minute periods of flashes within an hour.

In Buffalo, Roy L. Albertson mobilized his staff at WBNY on the first day of the disaster, when a record blizzard hit

[*Continued on page 199*]

# In Writing For Veries...

## ADDRESSES OF PRINCIPAL SHORT-WAVE STATIONS BY COUNTRY

### AFRICA

| | |
|---|---|
| CNR | Director General des Postes, Rabat, Morocco. |
| CR6AA | Estacao Radio Difusora, Caixa Postal 103, Lobito, Angelo, Portuguese West Africa. |
| ETA-ETB ETD-ETG | Thore Bostrom, Chief Engr., Ministere Postes Intercontinental Radio Station, P. O. Box 283, Addis Ababa, Empire D'Ethiopia. |
| OPL-OPM | Radio Leopoldville, Congo Belge, Africa. |
| SUV-SUX | P. O. Box 795, Cairo, Egypt. |
| VQ7LO | P. O. Box 777, Nairobi, Kenya Colony, Africa. |
| ZSS | Overseas Communications, Kodak House, Shortmarket St., P. O. Box 962, Capetown, So. Africa. |
| ZTJ | African Broadcasting Co., Ltd., P. O. Box 4559, Johannesburg, Transvaal, South Africa. |

### ASIA, OCEANIA AND FAR EAST

| | |
|---|---|
| CQN | Government Broadcasting Station CQN, Postmaster General, Post Office Bldg., Macoa (Portuguese), China. |
| FZS | Postale Boite 238, Saigon, Indo-China. |
| HSJ-HSP | Government Post & Telegraph, Radio Technical Section, Bangkok, Siam. |
| Java Stations | H. Van der Veen, Engineer, Java Wireless Stations, Bandoeng, Java. |
| "JV" & "JZ" Stations | International Wireless Telephone Company of Japan, Osaka Bldg., Kojimachiku, Tokyo, Japan. |
| "JY" Stations | Radio JYR, Kemikawa-Cho-Chiba, Ken, Japan. |
| KAY et al. | Philippine Long Distance Telephone Co., Manila, P. I. |
| PMY | Radio Station PMY, Nillmy Bldg., Bandoeng, Java, Netherland Indies. |
| RV15 | Far East Radio Station RV-15, Khabarovsk, USSR. |
| VK2ME | Amalgamated Wireless, Ltd., Wireless House, 47 York St., Sidney, N.S.W., Australia. |
| VK3LR | Australian Broadcasting Commission, G.P.O. Box 1686, Melbourne, C. I. Australia. |
| VK3ME | Amalgamated Wireless, Ltd., P. O. Box 1272-L, Melbourne, Australia. |
| VPD | Amalgamated Wireless, Ltd., Suva, Fiji Islands. |
| VUC | Indian State Broadcasting Service 1 Garstin Place, Calcutta, India. |
| VUY-VUB | Indian State Broadcasting Service, Irwin House, Sprott Road, Ballard Estate, Bombay, India. |
| XGW | Radio Administration, Sassoon House, Shanghai, China. |
| YBG | Radio Service, Serdangweg 2, Sumatra, Dutch East Indies. |
| YDA | H. Van der Veen, Engineer, Java Wireless Stations, Bandoeng, Java. |
| ZBW | Station ZBW, Hong Kong Broadcasting Committee, P. O. Box 200, Hong Kong, China. |
| ZGE | Radio ZGE, Kuala Lumpur, Malaya States. |
| ZHI | Radio Service Company, Broadcast House, 2 Orchard Road, Singapore, Malaya. |
| ZHJ | Radio Station ZHJ, Radio Society of Penang, Penang, Malay Straits. |
| ZLT-ZLW ZLR | Supt. Post & Telegraph, G.P.O., Wellington, New Zealand. |

### CANADA

| | |
|---|---|
| CGA-CJA, et al. | Marconi Station, Drummondville, Quebec, Canada. |
| CJRX-CJRO | Royal Alexander Hotel, Winnipeg, Manitoba, Canada. |
| VE9BJ | Capitol Theatre, St. Johns, N. B., Canada. |
| VE9BK | 780 Beatty St., A. M. Jagoe, Mng'r, Vancouver, B. C., Canada. |
| VE9CS | 743 Davie St., Vancouver, B. C., Canada. |
| VE9DN | Canadian Marconi Co., Box 1690, Montreal, Quebec, Can. |
| VE9CA | Toronto General Trusts Building, Calgary, Alberta, Canada. |
| CRCX | Rural Route No. 4, Bowmanville, Ontario, Canada. |
| VE9HX | P. O. Box 998, Halifax, N. S., Canada. |

### CUBA, MEXICO, CENTRAL AMERICA AND WEST INDIES

| | |
|---|---|
| CMA-3 CMB-2 | Cuba Transatlantic Radio Corp., Apartado No. 65, Havana, Cuba. |
| CO9GC | Laboratorio Radio-Electrico, Grau y Caminero, Apartado 137, Santiago, Cuba. |
| CO9JQ | Estacion Experimental de Onda Corta-CO9JQ, Calle del General Gomez, No. 4, Camaguey, Cuba. |
| CO9WR | P. O. Box 85, Sancti-Spiritus, Santa Clara, Cuba. |
| COCO | P. O. Box 98, Havana, Cuba. |
| COCD | "La Vox del Aire, S. A.," P. O. Box 2294, 25 y. g. Vedado, Havana, Cuba. |
| COCH | Estacion COCH, Calle B, No. 2 Vedado, Havana, Cuba. |
| HI1A | Radiodifusora HI1A, P. O. Box 423, Santiago de los Caballeros, R. D. |
| HI3C | Radiodifusora HI3C, Sr. Roberto Bernado, Prop., La Ramona, R.D. |
| HI3U | Radiodifusora HI3U, Puerto Plata, R. D. |
| HI4D | Radiodifusora HI4D, "La Voz de Quisqueya," Ciudad Trujillo, R. D. |
| HI4V | Radio HI4V, La Voz de la Marina, P. O. Box 824, Ciudad Trujillo, R. D |
| HI5E | Radiodifusora Ozama, Ciudad Trujillo, R. D. |
| HI5N | Radio HI5N, La Voz del Almacen Dominicano, Santiago de los Caballeros, R. D. |
| HH2T HH2S | Societe Haitienne de Radiodiffusion, P. O. Box 103, Port-au-Prince, Haiti. |
| HH3W | Radiodifusora HH3W, P. O. Box A117, Port-au-Prince, Haiti. |
| HIH | Radio HIH, "Las Voz del Higuamo," San Pedro de Macoris, R. D. |
| HIL | Radio HIL, Apartado 623, Ciudad Trujillo, R. D. |
| HIX | Radio HIX, J. R. Saladin, Director of Radio Communication, Ciudad Trujillo, R. D. |
| HI1J | Radiodifusora HI1J, Apartado 204, San Pedro de Macoris, R. D. |
| HIT | La Voz de la RCA-Victor, Apartado 1105, Ciudad Trujillo, R. D. |
| HIZ | Radiodifusora HIZ, Calle Duarte No. 68, Ciudad Trujillo, R. D. |
| HP5B | Radio HP5B, P. O. Box 910, Panama City, Panama. |
| HP5F | La Voz de Colon, Hotel Carlton, Colon, Panama. |
| HP5J | La Voz de Panama, Apartado 867, Panama City, Panama. |
| TGS | Radio TGS, Casa de Presidencial, Guatemala City, Guatemala. |
| TGX | Radiodifusora TGX, Director M. A. Mejicano Novales, 11 Avenue N. 45, Guatemala City, Guatemala. |
| TGW | Radiodifusora Nacional TGW, Republic de Guatemala. |
| TG2X | Direccion general de la Polica Nacional, Guatemala City, Guatemala. |
| TIPG | Radio TIPG, Perry Girton, Prop., Apartado 225, San Jose, Costa Rica, C. A. |
| TI8WS | Radio TI8WS, "Ecos de Pacifico," Sr. Abel Salazar F, Apartado 75, Puntarenas, Costa Rica. |
| TIEP | "La Voz del Tropico," Apartado 257, San Jose, Costa Rica, C. A. |
| TIGPH | Radiodifusora TIGPH, "Alma Tica," Apartado 775, San Jose, Costa Rica. |
| TIRCC | Radioemisora Catolica Costaricense, Apartado 1064, San Jose, Costa Rica, C. A. |
| HRN | Radio HRN, La Voz de Honduras, Tegucigalpa, Honduras. |
| HRP1 | Manuel Escota, Director y Gerente, San Pedro Sula, Honduras. |
| VPN | Station VPN, Nassau, Bahama Islands. |
| WTDV-WTDX | Donald S. Boreham, Supt. of Public Works, St. Thomas, Virgin Islands. |
| WTDW | H. N. McKenzie, Supt. of Public Works, Christiansted, St. Croix, Virgin Islands. |
| XAM | Director General de Correos, Merida, Yucatan, Mexico. |
| XBJQ | Radiodifusora XBJQ, P. O. Box 2825, Mexico D. F., Mexico. |
| XDA-XDC | Secretaria de Communicaciones, Mexico, D. F. |
| XEBT | El Buen Tono, S.A., Apartado 79-44, Mexico, D. F. |
| XECR | Estacion Difusora XEVI, P. O. laciones Exteriories, Mexico, D. F. |
| XECW | Radio XECW, Del Caballero Santokan, Bajio 120, Mexico, D. F. |
| XEFT | Radio XEFT, La Voz de Vera Cruz, Av. Independencia 28, Vera Cruz, Mexico. |
| XEUW | Radiodifusora XEUW, Av. Independencia 98, Vera Cruz, Mexico. |
| XEME | Radiodifusora XEME, Calle 59 Num. 517, Merida, Yucatan, Mexico. |
| XEVI | Estacion Difusora XEVI, P. O. Box 2874, Mexico, D. F. |
| XEXA | Secretaria de Educacion Publica, Mexico, D. F. |
| YNA | Tropical Radio Telegraph, Managua, Nicaragua, C. A. |
| YNIGG | La Voz de Los Lagos; Radiodifusora YNIGG, Managua, Nicaragua, C. A. |
| YNLF | Radiodifusora YNLF, c/o Ing, Moises Le Franc Calle 15 de Set No. 206, Managua, Nicaragua. |
| YNVA | Radiodifusora YNVA, Managua, Nicaragua. |

### EUROPE

| | |
|---|---|
| 2RO | 5 Via Montello, Rome, Italy. |
| CSL | Radio CSL, Emissora National, Lisbon, Portugal. |
| CT1AA | Antonio Augusto de Aguair, 144, Lisbon, Portugal. |
| CT1CT | Oscar G. Lomelino, Rua Gomez Freire 79-2 D, Lisbon, Portugal. |
| CT1GO | Portuguese Radio Club, Parede, Portugal. |
| SPW | Radio SPW, Polski Radio Warsaw, Warsaw, Mazowiecka 5, Poland. |
| DAF | Hauptfunkstelle Nordeich, Norden-Land, Germany. |
| DJA, et al. | German Short Wave Station, Broadcasting House, Berlin, Germany. |
| Dutch Phones | Parkstaat 29, S'Gravenhage, Holland. |
| EAQ | Estacion EAQ, P. O. Box 951, Madrid, Spain. |
| EA8AB | Radio Club Tenerefe, Alvarez de Lugo 1, Santa Cruz de Tenerife, Canary Islands. |
| EHY-EDM | Piy Margall 2, Madrid, Spain. |
| English Phones | Engineer-in-Chief's Office (Radio Branch), G.P.O. Armour House, London, E. C. 1. |
| English Ships | Connaught House, 63, Aldwych, London, W. C. 2, England. |
| TFJ | Icelandic State Broadcasting Service, P. O. Box 547, Reykjavik, Iceland. |
| French Phones | 166 Rue de Montmartre, Paris, France. |
| G6RX | Rugby Radio, Hillmorton, Warwickshire, England. |
| GSA-GSH, et al. | British Broadcasting Corporation, Broadcasting House, London, W. 1, England. |

[*Continued on page 186*]

# Station Signatures...

## IDENTIFICATION SIGNALS OF SHORT-WAVE BROADCAST STATIONS

15370 19.52 HAS3 — See 9120 kc.

15243 19.68 FPA2 — See 11713 kc.

15220 19.71 PCJ — *Interval:* Metronome, 80 beats per minute. *Closing:* Netherlands National Anthem.

15121 19.84 HJV — *Call:* "Landetur Jesus Christus." *Interval:* Clock ticking. Station known as "Radio Vaticano."

14100 21.25 HJ5ABE — *Interval:* Bugle calls.

13075 22.95 VPD — *Call:* "Radio Suva calling." *Closes:* "God Save The King." Station known as "Radio Suva."

12830 23.38 CNR — See 8035 kc.

12000 25.00 RNE — See 6000 kc.

11885 25.23 TPA3 — See 11713 kc.

11810 25.38 2RO4 — See 9635 kc.

11800 25.40 HJ4ABA — *Call:* "Ecos de la Montana."

11790 25.43 W1XAL — *Call:* "Station W1XAL, Boston."

11730 25.57 PHI — *Call:* In seven languages. *Interval:* Metronome with 80 beats per minute. *Closing:* Netherland's National Anthem.

11720 25.60 CJRX — *Call:* Station CJRX, Winnipeg, Manitoba."

11713 25.62 TPA4 — *Call:* "Allo, ici Paree, station d'etat Radio Coloniale." *Interval:* Three tones ("F" in Morse). Opens and closes with anthem "La Marseillaise."

10740 27.93 JVM — See 10660 kc.

10660 28.14 JVN — *Interval:* Chimes and gongs, irregular. *Closing:* Selection "Kimigayo."

10350 28.98 LSX — *Call:* "Ellie-Essay-Aixey B-way-nos-eyeries."

10330 29.04 ORK — *Call:* "Ici Bruxelles Post Colonial Belge." *Interval:* Uses a carrillon. *Closing:* "Brabanconne."

9860 30.43 EAQ — *Call:* (Spanish) "Eay-Aye-Coo"; (English) "This is EAQ, Madrid, Spain." *Closing:* Good night greetings in Spanish, French and English, followed by "Himno de Riego" with their own programs. Closing with International Broadcast Club, London: Ted Lewis' "Good Night Melody."

9650 31.09 CT1AA — *Call:* "Aqui Estacoa Radio Coloniale Lisboa." Announcements in Portuguese, French, English; sometimes in Spanish and German. In English: Radio CT1AA (short a) Lisboa. *Interval:* "Cookoo" Signal (2 notes G, E, repeated three times). Station known as "Radio Coloniale Lisboa."

9635 31.13 2RO — *Call:* "Radio Roma Napoli." *Interval:* Bird Call (singing). *Closing:* Puccini's "Hymn to Rome"; also "Royal March" and "Giovinezza" on American Hour.

9595 31.27 HBL — See 7797 kc.

9590 31.28 VK2ME — *Call:* "You are listening to VK2ME, Sydney, the short-wave experimental station of the Amalgamated Wireless, Australasia." Gives time of day often; clock chimes each quarter hour. Clock strikes at hour. *Interval:* Call of Kookaburra bird. *Closing:* "God Save The King."

9565 31.36 VUB — *Call:* "This is the Bombay station of the Indian Broadcasting Service," followed by indication of Indian Standard Time. *Interval:* "Bombay Calling." *Closing:* "God Save The King."

9560 31.40 DJA — *Call:* "Hier der Deutscher Kurzwellensender"; English: "Hello dear friends in North America." *Interval:* Notes from a music box. *Closing:* The two German national anthems.

9515 31.53 LKJ1 — *Call:* "Hallo On-zlo-her." *Interval:* Six piano notes.

9510 31.55 VK3ME — *Call:* "You are listening to VK3ME Melbourne, the short wave experimental station of the Amalgamated Wireless, Australasia." *Closing:* "God Save The King."

9501 31.56 PRF5 — *Call:* "Pay-air-effie sinko, La Voz do Brazil." English; "PRF5 short-wave station of the Government of Brazil." *Interval:* Three-note gong. *Closing:* Brazillian national anthem.

9428 31.81 COCH — *Call:* "Estacion de Onda Corta C-O-C-Ahchie. Vedado Habana, Cuba."

9120 32.88 HAT4 — *Call:* "Hallo Itt Radio Budapest." *Interval:* Musical box melody. Comes on the air with bells ringing. Also announces in English; gives meters and kilocycles. Station known as "Radio Budapest."

8775 34.19 HCJB — Opening selection (record), March "Patria." *Call:* "HCJB 'La Voz de los Andes'." English; HCJB; H as in Harry, C as in Chicago, J as in Jones, and B as in Broadcast. *Interval:* Fournotes on gongs. *Closing:* Ecuadorian National Anthem. Mentions "Westinghouse" quite often in Spanish program.

8750 34.29 ZBW — *Call:* "This is station ZBW, at Hong Kong."

8657 34.54 YNVA — *Closing:* "Bugles and drums.

8035 37.33 CNR — *Call:* "Ici Radio Moroc en Robat." *Interval:* Metronome, 60 beats per minute.

7797 38.47 HBP — *Call:* "This is the Wireless Station of the League of Nations, Geneva, Switzerland."

7282 41.20 HJ1ABD — Station known as "Ondas de la Heroica." *Closing:* "Stars and Stripes Forever."

6701 44.71 TIEP — *Call:* "La Voz del Tropico."

6635 45.00 HC2RL — *Opens* and *closes* with Ecuadorian National Anthem. Station known as "Quinta Piedad."

6620 45.31 Prado — *Opening:* Station chimes. *Announces:* "Estacion el Prado en Rio-bamba Ecuador."

6520 46.01 YV6RV — Station known as "La Voz de Carabobo." *Interval:* Four chimes. Bugle calls near closing. Taps and off.

6447 46.51 HJ1ABB — *Announces:* "La Voz de Barranquilla en Columbia Sur America." Three chimes identification like NBC. One chime between advertisements. *Closing:* Selection "La Golondrina."

6385 46.99 TIPG — *Closing:* Selection "Parade of the Wooden Soldiers." Station known as "La Voz de la Victor."

6375 47.10 YV4RC — *Closing:* Record, "Blue Danube March" (Jesse Crawford). Station known as "Ecos del Avila."

6357 47.19 HRP1 — *Call:* "El Eco de Honduras en San Pedro Inla Centro Americano."

6235 43.00 OA4XG — *Closing:* Selection "Good Night Sweetheart."

6198 48.40 CI1GO — *Call:* "Estacio Radio Club Portugues." Announcements in English, Portuguese and French.

6185 48.50 HI1A — *Call:* "Aqui la Voz de Yague." *Interval:* gong. *Closing:* Selection "Anchors Aweigh."

6170 48.62 HJ3ABF — *Call:* "Estacion de Radiodifusora 'Hache-Jota-tresbe-efe'." *Closing:* Selection "Good Night Sweetheart." Station known as "La Voz de Bogota."

6165 48.66 YV3RC — *Call:* "Aqui Radiodifusora Venezuela en Caracas." *Interval:* Two chimes, pause, two bells. Station known as "Radiodifusora Venezuela."

6150 48.78 CJRO — *Call:* "Station CJRO, Winnipeg, Manitoba."

6140 48.86 W8XK — *Closing:* Selection "Stars and Stripes Forever."

6130 48.92 XEXA — *Closing:* Selection "March of the Toys."

6130 48.92 COCD — *Call* (English): "you are listening to COCD, Habana, Cuba, on 6130 kc." *Closing:* Selections "Smoke Gets in Your Eyes" and Ted Lewis' "Good Night Melody."

6120 49.02 W2XE — Announces in five languages. *Closing:* "Star Spangled Banner."

6115 49.06 HJ1ABE — *Closing:* "Aloha" on Organ. Station known as "La Voz de los Laboratorios Fuentes."

6110 49.10 HJ4ABB — *Call:* "Hegui radiodifusora HJ4ABB en Manizales." Uses bells.

6080 49.34 CP5 — *Opening:* Gong, one stroke and then chimes. Station known as Radio Illimani.

6070 49.42 OER2 — *Call:* "Hier Radio Wein." *Interval:* Metronome, 60 beats per minute.

6065 49.45 HJ4ABL — *Closing:* Selection "Himno de Carnaval de Manizales."

6060 49.50 OXY — *Call:* "Kalundborg Kobenhavn og Danmarks Kortbolge sender." *Opens:* One gong stroke. *Closing:* Selection Der er et yndigigt land" "There is a winsome land."

6060 49.50 VQ7LO — *Call:* "This is VQ7LO, Nairobi station of the East Africa Broadcasting Company calling." *Closing:* Good night greeting and "God Save the King."

6050 49.59 GSA, etc. — *Call:* "London calling you." *Interval:* Bow bells at short periods. Big Ben strikes at hour according to arrangement of program.

6040 49.67 PRA8 — *Call:* "Radio Club de Pernambuco, La Voz de Norte." *Interval:* Siren (fades in and out).

6040 49.67 W1XAL — *Call:* "Station W1XAL, Boston."

[*Continued on page 186*]

6030 49.75 HP5B — *Call:* "Estacion Marimar de la Radio Panama." In English, "This is station HP5B in Panama City in the Republic of Panama. One of several slogans used—"Where the land is divided so the world could be united." *Closing:* Spanish and English selection "A Happy Good Night"; also "Good Night Sweetheart."

6030 49.75 VE9CA — *Call:* "Your station is Calgary, the Voice of the Prairie, in the Province of Alberta."

6020 49.83 XEUW — *Closing:* Selection "Las Mananitas." Station known as El Eco de Sotavento desde Veracruz."

6012 49.85 HJ3ABH — Station called "La Voz de Victor." *Interval:* Three chime notes.

6010 49.92 COCO — *Call* (English and Spanish): English, "This is station COCO, Habana, Cuba; P. O. Box 98."

6000 50.00 XEBT — *Interval:* Three blasts on horn. Sounds like the old time rubber bulb auto horn. Also rooster crowing at times. Siren whistle heard occasionally, is used before announcement of persons missing. Station known as "De El Buen Tono."

6000 50.00 RN59 — *Call:* "This is Moscow calling." Plays "Internationale" at *opening* and *closing.*

5985 50.13 XEVI — *Closing:* Selection "Ah Sweet Mystery of Life." Station known as "My Voice to the World from Mexico."

5980 50.17 HIX — *Call:* "Hache-I-Ekis en Santo Domingo." *Interval:* Bells.

5941 50.50 TGX — *Closing:* Selection "Ah, chimes.

5930 50.60 HJ4ABE — *Call:* "Compania Radiodifusora de Medellin," Ahchie-jay-quatro-ah-bay ee. *Interval:* Morse letter "M" (—.). Four chimes like NBC, last note higher.

5885 50.98 HCK — *Call:* "Radiodifusora del Estado."

5875 51.11 HRN — English announcement at times. "This is station HRN, Tegucigalpa, capital city of Honduras; H for Honduras, R for Radio and N for Navy." *Closing:* Selection Ted Lewis' "Good Night Melody. Station known as "La Voz de Honduras."

5850 51.28 YV5RMO — *Opening:* One stroke of gong. *Call:* "Aqui Estacion YV5RMO Maracaibo Ecos del Cariba." *Interval:* One stroke on gong followed by run of notes C, E, G, C. *Opening and closing:* Extract from "Blue Danube March" (Jesse Crawford).

5820 51.50 TIGPH — *Closing:* Selection "Good Night Melody." Station known as "Estacion Alma Tica."

5800 51.72 YV2RC — *Call:* "Aqui Cia Anomonia Venezuela"; also "Radio Caracas." *Interval:* Four chimes; opens and closes programs with station's official "1BB March." It is not the Venezuelan anthem as many believe. Bugle calls and whistles just before closing. Station known as "Broadcasting Caracas."

# In Writing For Veries

[*Continued from page 184*]

| | |
|---|---|
| HAS-HAT | Director Radio, Hungarian Post, Gyali St. 22, Budapest, Hungary. |
| HB9B | Radio Club, Box 1, Basle, Switzerland. |
| HBL-HBP et al. | Information Section, League of Nations, Geneva, Switzerland. |
| HVJ | Radio HVJ, Castine, Pio IV, Vatican City, Vatican. |
| IAC | Coltano Radio, Piza, Italy. |
| IRM-IRW IRG-IQA | Italo Radio, Via Calabria N. 46/48, Rome, Italy. |
| LKJ1 | Ministere Du Commerce, Administrator des Telegraphes, Oslo, Norway. |
| OER2 | Radio OER2, Vienna, Austria. |
| ORK-ORG | Director de Communications, Bruxelles, Belgium. |
| OXY | Statsradiofonien Heibergsgade 7, Copenhagen, Denmark. |
| PCJ | Philips Radio PCJ, Eindhoven, Holland. |
| PHI | Phillips Radio PHI, Huizen, Holland. |
| PI1J | Radio Station PI1J, Dr. M. Hellingman, Owner and Operator, Dordrecht, Holland. |
| Pontoise | Minister des Postes, Boulevard Haussman, 98 Bis., Paris, France. |
| RNE-REN RV59 | Radio Centre, Solianka 12, Moscow, USSR. |

## SOUTH AMERICA

| | |
|---|---|
| CEC | Cia Internacional de Radio, Casilla 16-D, Santiago, Chile. |
| CB960 | Radiodifusora CB960, Casilla 1342, Santiago, Chile. |
| CP5 | Radio CP5, Casilla 637, La Paz, Bolivia. |
| El Prado | Apartado 98, Riobamba, Ecuador. |
| HC2AT | Radiodifusora HC2AT, P. O. Box 872, Guayaquil, Ecuador. |
| HC2ET | Estacion Radiodifusora del Diario El Telegrafo HC2ET, P. O. Box 824, Guayaquil, Ecuador. |
| HC2CW | Radiodifusora HC2CW, Casilla 1166, Guayaquil, Ecuador. |
| HC2JSB | Ecuador Radio Station HC2JSB, Juan S. Behr, Prop., Guayaquil, Ecuador. |
| HC2RL | Estacion HC2RL, P. O. Box 759, Guayaquil, Ecuador. |
| HCJB | Estacion HCJB, Casilla 691, Quito, Ecuador. |
| HCK | Radiodifusora Del Estado, HCK, Quito, Ecuador. |
| HJA7 | Radio HJA7, Cucuta, Colombia. |
| HJ1ABB | Radio HJ1ABB, Apartado 715, Barranquilla, Colombia. |
| HJ1ABC | Radiodifusora HJ1ABC, La Voz de Quibdo, Quibdo, Colombia. |
| HJ1ABD | Estacion HJ1ABD, Cartagena, Colombia. |
| HJ1ABE | Radio HJ1ABE, Apartado 31, Cartagena, Colombia. |
| HJ1ABG | Radio HJ1ABG, Apartado 674, Barranquilla, Colombia. |
| HJ1ABJ | "La Voz de Santa Marta." Radio HJ1ABJ, Santa Marta, Colombia. |
| HJ1ABK | Radiodifusora HJ1ABK, Apartado 580, Barranquilla, Colombia. |
| HJ2ABA | "La Voz Del Paiz," Tunja, Boyaca, Colombia. |
| HJ2ABC | Pompilio Sanchez, Cucuta, Colombia. |
| HJ2ABD | Hector McCormick, Prop., Radiodifusora HJ2ABD, Calle 2A, No. 1205, Bucaramanga, Colombia. |
| HJ3ABD | Colombia Broadcasting, Apartado 509, Bogota, Colombia. |
| HJ3ABF | Radio HJ3ABF, Apartado 317, Bogota, Colombia. |
| HJ3ABH | "La Voz de La Victor," Apartado 565, Bogota, Colombia. |
| HJ3ABI | Apartado 513, Bogota, Colombia. |
| HJ4ABA | Emisora HJ4ABA, "Ecos de la Montana," Medellin, Colombia. |
| HJ4ABB | Radio Manizales, Apartado 175, Manizales, Colombia. |
| HJ4ABC | Radiodifusora HJ4ABC, "La Voz de Pereira," Pereira-Caldas, Colombia. |
| HJ4ABD | Radiodifusora HJ4ABD, La Voz de Citia, Medellin, Colombia. |
| HJ4ABE | Radiodifusora de Medellin, Medellin, Colombia. |
| HJ4ABC | Radiodifusora HJ4ABC, Ecos del Combeina, Apartado 39, Ibague, Colombia. |
| HJ4ABL | "Ecos de Occidente," P. O. Box 50, Manizales, Colombia. |
| HJ5ABC | "La Voz de Colombia," Radiodifusora HJ5ABC, Cali, Colombia. |
| HJ5ABD | "La Voz del Valle," Cali, Colombia. |
| HJ5ABE | Radiodifusora HJ5ABE, Apartado 50, Cali, Colombia. |
| HJB | Marconi Telegraph Co., Apartado 1591, Bogota, Colombia. |
| HJN | Ministero de Correos y Telegraph, Bogota, Colombia. |
| HJU | La Voz del Pacifico, Buenaventura, Colombia. |
| HJY | All-American Cables, Inc., Bogota, Colombia. |
| HKE | Observatoria Nacional de San Bartolome, Bogota, Colombia. |
| HKV | Radiodifusora HKV, Radio Dept. —War Ministry, Government of Colombia, Bogota, Colombia. |
| LSN-LSL, et al. | Compania Internacional, 143 Defensa, Buenos Aires, Argentina. |
| LSX | Transradio Internacional, San Martin 329, Buenos Aires, Argentina. |
| LRU-LRX | Radio El Mundo, Calle Maipu, Buenos Aires, Argentina. |
| OAX4D | Radiodifusora OAX4D, All-American Cables, Inc. (L. N. Anderson, Mgr.), Calle de San Antonio 677; Casilla 2336, Lima, Peru. |
| OAX4G | Radiodifusora OAX4G, Roberto Grellaud, Avda. Abancay 915-923, Lima, Peru. |
| OCI-OCJ | All-America Cables, Inc., Lima, Peru. |
| PPU-PPQ, et al. | Caixa Postal 500, Rio de Janeiro, Brazil. |
| PRA8 | Radio Station PRA8, Radio Club of Pernambuco; "The Voice of the North," Pernambuco, Brazil. |
| PRF5-PSK | Comp. Radio Internacional Do Brazil, P. O. Box 709, Rio de Janeiro, Brazil. |
| VP3MR | Radio Station VP3MR, No. 1 Wellington St., Georgetown, British Guiana. |
| YV2RC | Apartado Correos 2009, Caracas, Venezuela. |
| YV3RC | Radiodifusora Venezuela YV3RC, Caracas, Venezuela. |
| YV4RC | Estacion S.A.R., Apartado 983, Caracas, Venezuela. |
| YV5RMO | Radio YV5RMO, Box 214, Maracaibo, Venezuela. |
| YV6RV | "La Voz de Carabobo," Radio YV6RV, Valencia, Venezuela. |
| YV8RB | Radiodifusora YV8RB, "La Voz de Lara," Barquisimeto, Venezuela. |
| YV10RSC | Radiodifusora YV10RSC, "La Voz del Tachira," San Cristobal, Venezuela. |
| YV12RM | Emisora 24 de Julio, Maracay, Venezuela. |
| YVQ-YVR | Servicio Radiotelegraphico, Maracay, Venezuela. |
| ZP10 | Radio Prieto ZP10, Asuncion, Paraguay. |

## UNITED STATES

| | |
|---|---|
| Dixon Stations | 140 Montgomery St., San Francisco, Cal. |
| W1XAL | World-Wide Broadcasting Corp., University Club, Boston, Mass. |
| W1XK | Hotel Statler, Boston, Mass. |
| W2XAD-W2XAF | General Electric Co., Schenectady, N. Y. |
| W2XE | 485 Madison Ave., New York, N. Y. |
| W3XAU | 1622 Chestnut St., Philadelphia, Pa. |
| W3XL-W3XAL | 30 Rockefeller Plaza, New York, N. Y. |
| W4XB | Isle of Dreams Broadcasting Corp., Radio W4XB, Herald Bldg., Miami, Florida. |
| W8XAL | Crosley Radio Corp., Cincinnati, Ohio. |
| W8XK | Grant Bldg., Pittsburgh, Pa. |
| W9XAA | Navy Pier, Chicago, Ill. |
| W9XF- | 20 N. Wacker Drive, Chicago, Ill. |
| W9XBS WVD | Radio WVD, 517 Federal Office Bldg., Seattle, Wash. |

# SHORT-WAVE STATION LIST

**BROADCAST STATIONS INDICATED BY DOTS • PHONE (P) • EXPERIMENTAL (E) • HOURS IN E.S.T.**

| KC | Meters | Call | Location | Time |
|---|---|---|---|---|
| 21540 | 13.92 | W8XK | • Pittsburgh, Pa. | 7-9 A.M. |
| 21530 | 13.93 | GSJ | • Daventry, England | 6:00-8:45 A.M. |
| 21520 | 13.94 | W2XE | • Wayne, N. J. | 7:30-11 A.M. Daily |
| 21500 | 13.95 | NAA | Washington, D. C. | (E) Time signals |
| 21420 | 14.01 | WKK | Lawrenceville, N. J. | (P) Phones LSN - PSA daytime; HJY - OCI-OCJ irregular |
| 21160 | 14.19 | LSL | Buenos Aires, Arg. | (P) Phones GAA mornings; DFB-DHO PSE-EHY irreg. |
| 21140 | 14.19 | KBI | Manila, P. I. | (P) Tests and relays P. M. irregular |
| 21080 | 14.23 | PSA | Rio de Janeiro, Brazil | (P) Phones WKK-WLK daytime |
| 21060 | 14.25 | KWN | Dixon, Calif. | (P) Phones afternoon irregular |
| 21020 | 14.29 | LSN | Buenos Aires, Arg. | (P) Phones WKK-WLK daily; EHY, FTM irregular |
| 20860 | 14.38 | EHY | Madrid, Spain | (P) Phones LSM-PPU-LSY mornings |
| 20860 | 14.38 | EDM | Madrid, Spain | (P) Phones LSM-PPU-LSY mornings |
| 20835 | 14.40 | PFF | Kootwijk, Holland | (P) Phones Java days |
| 20830 | 14.40 | PFF | Kootwijk, Holland | (P) Phones Java days |
| 20825 | 14.41 | PFF | Kootwijk, Holland | (P) Phones Java days |
| 20820 | 14.41 | KSS | Bolinas, Calif. | (P) Phones Far EastA.M. |
| 20380 | 14.72 | GAA | Rugby, England | (P) Phones LSL mornings; LSY-LSM-PPU irregular |
| 20040 | 14.97 | OPL | Leopoldville, Belgian Congo, Africa | (P) Tests with ORG mornings and noon |
| 20020 | 14.99 | DHO | Nauen, Germany | (P) Phones PPU-LSM-PSA-LSL-YVR A.M. |
| 19987 | 15.01 | CFA | Drummondville, Que. | (P) Phones North America irregular |
| 19980 | 15.02 | KAX | Manila, P. I. | (P) Phones KWU evenings; DFC-JVE A.M.; early A.M. |
| 19820 | 15.14 | WKN | Lawrenceville, N. J. | (P) Phones GAU A.M. |
| 19720 | 15.21 | EAQ | Madrid, Spain | (P) Relays & tests A.M. |
| 19680 | 15.24 | CEC | Santiago, Chile | (P) Phones OCI-HJY afternoons |
| 19600 | 15.31 | LSF | Buenos Aires, Arg. | (P) Phones and tests irregularly |
| 19530 | 15.36 | EDR2 | Madrid, Spain | (P) Phones LSM-PPU-YVR mornings |
| 19530 | 15.36 | EDX | Madrid, Spain | (P) Phones LSM-PPU-YVR mornings |
| 19520 | 15.37 | IRW | Rome, Italy | (P) Phones LSM-PPU mornings. Broadcasts irregularly |
| 19500 | 15.40 | LSQ | Buenos Aires, Arg. | (P) Phones daytime irregularly |
| 19355 | 15.50 | FTM | St. Assisse, France | (P) Phones LSM-PPU-YVR mornings |
| 19345 | 15.52 | PMA | Bandoeng, Java | (P) Phones PCK-PDK early mornings |
| 19270 | 15.57 | PPU | Rio de Janeiro, Brazil | (P) Phones DFB-EHY-FTM mornings |
| 19235 | 15.60 | DFA | Nauen, Germany | (P) Phones HSP-KAX early mornings |
| 19220 | 15.61 | WKF | Lawrenceville, N. J. | (P) Phones GAS-GAU mornings |
| 19200 | 15.62 | ORG | Brussels, Belgium | (P) Phones OPL A.M. |
| 19140 | 15.68 | LSM | Buenos Aires, Arg. | (P) Phones DFB-FTM-GAA-GAB A.M. |
| 18970 | 15.81 | GAQ | Rugby, England | (P) Phones ZSS A.M. |
| 18960 | 15.82 | WQD | Rocky Point, N. Y. | (E) Tests LSY irreg. |
| 18950 | 15.83 | HBF | Geneva, Switzerland | (E) Phones So. A. A.M. |
| 18920 | 15.85 | WQE | Rocky Point, N. Y. | (E) Programs, irreg. |
| 18910 | 15.86 | JVA | Nazaki, Japan | (P) Phones and tests irregularly with Europe |
| 18890 | 15.88 | ZSS | Klipheuvel, So. Africa | (P) Phones GAQ-GAU mornings |
| 18830 | 15.93 | PLE | Bandoeng, Java | (P) Phones PCV mornings early; KWU evenings |
| 18680 | 16.06 | OCI | Lima, Peru | (P) Phones CEC-HJY days; WKK-WOP noon |
| 18620 | 16.11 | GAU | Rugby, England | (P) Phones VWY-ZSS early A.M.; Lawrenceville, daytime |
| 18545 | 16.18 | PCM | Kootwijk, Holland | (P) Relays and phones Java early A.M. |
| 18540 | 16.19 | PCM | Kootwijk, Holland | (P) Relays and phones Java early A.M. |
| 18535 | 16.20 | PCM | Kootwijk, Holland | (P) Relays and phones Java early A.M. |
| 18480 | 16.23 | HBH | Geneva, Switzerland | (E) Relays to N. Y. mornings irreg. |
| 18440 | 16.25 | HJY | Bogota, Colombia | (P) Phones CEC - OCI noon; music irreg. |
| 18410 | 16.29 | PCK | Kootwijk, Holland | (P) Phones PLE-PMC early A.M. |
| 18405 | 16.30 | PCK | Kootwijk, Holland | (P) Phones PLE-PMC early A.M. |
| 18400 | 16.31 | PCK | Kootwijk, Holland | (P) Phones PLE-PMC early A.M. |
| 18388 | 16.31 | FZS | Saigon, Indo-China | (P) Phones FTK early mornings |
| 18340 | 16.36 | WLA | Lawrenceville, N. J. | (P) Phones GAS A.M. |
| 18310 | 16.38 | GAS | Rugby, England | (P) Phones WLA-WMN mornings |
| 18295 | 16.39 | YVR | Maracay, Venezuela | (P) Phones DFB-EHY-FTM mornings |
| 18270 | 16.42 | ETA | • Addis Ababa, Ethiopia | Daily 7 A.M.-3 P.M. Wed. 4:50-5:30 P.M. |
| 18250 | 16.43 | FTO | St. Assisse, France | (P) Phones LSM-LSY mornings |
| 18220 | 16.46 | KUS | Manila, P. I. | (P) Phones Bolinas nights |
| 18200 | 16.48 | GAW | Rugby, England | (P) Relays and phones N. Y. irreg. |
| 18190 | 16.49 | JVB | Nazaki, Japan | (P) Phones Java early mornings |
| 18180 | 16.51 | CGA | Drummondville, Que. | (P) Phones GBB A.M. |
| 18135 | 16.54 | PMC | Bandoeng, Java | (P) Phones PCK-PCV & broadcasts early A.M. irreg. |
| 18115 | 16.56 | LSY3 | Buenos Aires, Arg. | (E) Phones DFB-FTM-GAA-PPU A.M.; evening broadcasts occasionally |
| 18075 | 16.59 | PCV | Kootwijk, Holland | (P) Phones PLE early mornings |
| 18070 | 16.60 | PCV | Kootwijk, Holland | (P) Phones PLE early mornings |
| 18065 | 16.61 | PCV | Kootwijk, Holland | (P) Phones PLE early mornings |
| 18060 | 16.61 | KUN | Bolinas, Calif. | (P) Phones Manila afternoons and nights |
| 18040 | 16.63 | GAB | Rugby, England | (P) Phones LSM noon |
| 18020 | 16.65 | KQJ | Bolinas, Calif. | (P) Phones afternoons; irregular |
| 17980 | 16.69 | KQZ | Bolinas, Calif. | (E) Tests and relays to LSY irreg. |
| 17940 | 16.72 | WQB | Rocky Point, N. Y. | (E) Tests with LSY,A.M. |
| 17920 | 16.74 | WQF | Rocky Point, N. Y. | (P) Phones Ethiopia irregular |
| 17900 | 16.76 | WLL | Rocky Point, N. Y. | (E) Relays to Geneva and Germany, A.M. |
| 17850 | 16.81 | LSN | Buenos Aires, Arg. | (P) Phones S. A. irreg. |
| 17790 | 16.86 | GSG | • Daventry, England | 6-8:45 A.M., 9:00 A.M.-12:00 noon |
| 17780 | 16.87 | W3XAL | • Bound Brook, N. J. | 9 A.M., 5 P.M. Daily |
| 17760 | 16.89 | W2XE | • Wayne, N. J. | 11 A.M.-1 P.M. Daily |
| 17760 | 16.89 | DIE | • Zeesen, Germany | 8:05-11:00 A.M. and exp. |
| 17750 | 16.91 | IAC | Piza, Italy | (P) Phones and tests to ships A.M. |
| 17740 | 16.91 | HSP | Bangkok, Siam | (P) Phones DFA-DGH-KAY early A.M. |
| 17710 | 16.94 | CJA-3 | Drummondville, Que. | (P) Phones Australia and Far East early A.M. |
| 17699 | 16.95 | IAC | Piza, Italy | (P) Phones and tests to ships A.M. |
| 17545 | 17.10 | VWY | Poona, India | (P) Phones GAU-GBC-GBU mornings |
| 17520 | 17.12 | DFB | Nauen, Germany | (P) Phones PPU-YVR-KAY mornings |
| 17480 | 17.16 | VWY | Poona, India | (P) Phones GAU-GBC-GBU daytime |
| 17260 | 17.37 | DAF | Nordenland, Germany | (P) Phones ships A.M. |
| 17120 | 17.52 | WOO | Ocean Gate, N. J. | (P) Phones ships daytime |
| 17120 | 17.52 | WOY | Lawrenceville, N. J. | (P) Phones England irregularly |
| 17080 | 17.56 | GBC | Rugby, England | (P) Phones ships daytime |
| 16910 | 17.74 | IZD | Nazaki, Japan | (P) Phones ships irreg. |
| 16305 | 18.39 | PCL | Kootwijk, Holland | (P) Special relays and phones irreg. |
| 16300 | 18.44 | WLK | Lawrenceville, N. J. | (P) Phones England irreg. |
| 16240 | 18.47 | KTO | Manila, P. I. | (P) Phones JVE-KWU evenings |
| 16214 | 18.50 | FZR | Saigon, Indo-China | (P) Phones FTA-FKT early A.M. |
| 16117 | 18.62 | IRY | Rome, Italy | (P) Phones Cairo, Asmara and others, broadcasts A.M. and early P.M. |
| 16050 | 18.69 | JVC | Nazaki, Japan | (P) Phones Hong Kong early A.M. |
| 16030 | 18.71 | KKP | Kahuku, Hawaii | (P) KWU afternoons and evening. Tests JVF - KTO - PLE mornings |
| 15930 | 18.83 | FYC | Pontoise, France | (P) Phones 9:00 A.M. and irreg. |
| 15880 | 18.89 | FTK | St. Assise, France | (P) FZR-FZS-LSM-PPU-YVR mornings |
| 15360 | 18.90 | JVD | Nazaki, Japan | (P) Phones Shanghai early A.M. |
| 15860 | 18.90 | CEC | Santiago, Chile | (P) Phones OCJ A.M. |
| 15810 | 19.02 | LSL | Buenos Aires, Arg. | (P) Phones GAA mornings; PSE-PSF afternoons |

# Short-Wave Station List

| KC | Meters | Call | Location | Time |
|---|---|---|---|---|
| 15760 | 19.04 | JYT | Kemikawa-Cho, Japan | (E) Tests KKW-KWE-KWU evenings |
| 15740 | 19.06 | JIA | Chureki, Japan | (P) Phones Nazaki early A.M. |
| 15700 | 19.11 | WJS | Hicksville, L. I., N. Y. | (P) Phones Ethiopia irregular |
| 15670 | 19.15 | WAE | Brentwood, N. Y. | (E) Tests afternoons |
| 15660 | 19.16 | JVE | Nazaki, Japan | (P) Phones PLE early A.M.; KTO evenings |
| 15625 | 19.20 | OCJ | Lima, Peru | (P) Phones CEC days |
| 15620 | 19.21 | JVF | Nazaki, Japan | (P) Phones KWO-KWU after 4 P.M. |
| 15595 | 19.24 | DFR | Nauen, Germany | (E) Tests and relays mornings irreg. |
| 15505 | 19.36 | CMA-3 | Havana, Cuba | (P) Phones and tests irregularly |
| 15490 | 19.37 | KEM | Bolinas, Calif. | (P) Phones Java and China; irregular |
| 15475 | 19.39 | KKL | Bolinas, Calif. | (P) Phones Manila and Japan; irregular |
| 15460 | 19.41 | KKR | Bolinas, Calif. | (P) Phones Manila and Japan; irregular |
| 15430 | 19.44 | KWE | Bolinas, Calif. | (P) Tests JYK-JYT-PLE evenings |
| 15415 | 19.46 | KWO | Dixon, Calif. | (P) Phones JVF evenings |
| 15410 | 19.47 | Prado | ● Riobamba, Ecuador | 5:00-7:00 P.M. Sunday |
| 15370 | 19.52 | HAS3 | ● Budapest, Hungary | Sunday 9-10 A.M. |
| 15360 | 19.53 | DJT | ● Zeesen, Germany | 11 P.M.-1 A.M. |
| 15355 | 19.54 | KWU | Dixon, Calif. | (P) Phones Japan, Manila and Java evenings |
| 15340 | 19.56 | DJR | ● Zeesen, Germany | 1:30-3:30 A.M. |
| 15330 | 19.56 | W2XAD | ● Schenectady, N. Y. | 2-3 P.M. Weekdays; Sunday 10:30 A.M.-4 P.M. |
| 15305 | 19.60 | CP7 | La Paz, Bolivia | (E) Relays CP4 tests daytimes |
| 15290 | 19.62 | LRU | Buenos Aires, Arg. | (P) 6 A.M.-10 P.M. Daily |
| 15280 | 19.63 | DJQ | ● Zeesen, Germany | 12 A.M.-3 A.M. |
| 15270 | 19.64 | W2XE | ● Wayne, N. J. | 1-6 P.M. |
| 15260 | 19.66 | GSI | ● Daventry, England | 12:15 P.M.-5:45 P.M. |
| 15252 | 19.67 | RIM | Tashkent, USSR. | (P) Phones RKI early mornings |
| 15243 | 19.68 | TPA2 | Pontoise, France | 7-11 A.M. |
| 15220 | 19.71 | PCJ | ● Eindhoven, Holland | Sunday 8:30-11:00 A.M.; Tues. 3-6 A.M.; Wed. 7-11 A.M. |
| 15210 | 19.72 | W8XK | ● Pittsburgh, Pa. | 9 A.M.-7 P.M. |
| 15200 | 19.74 | DJB | ● Zeesen, Germany | 3:50-11 A.M. |
| 15180 | 19.76 | GSO | ● Daventry, England | 12:15-5:45 P.M. |
| 15140 | 19.82 | GSF | ● Daventry, England | 9 A.M.-12 noon |
| 15121 | 19.84 | HVJ | ● Vatican City, Vatican | 10:30-10:45 A.M. |
| 15110 | 19.85 | DJL | ● Zeesen, Germany | 4:00-6:00 A.M. |
| 15055 | 19.92 | WNC | Hialeah, Fla. | (P) Phones daytime |
| 15040 | 19.95 | RKI | Moscow, USSR. | (P) Phones RIM early A.M. |
| 15040 | 19.95 | HIR | Ciudad Trujillo, R. D. | (P) Phones WNC days |
| 14980 | 20.03 | KAY | Manila, P. I. | (P) Phones DFC-DFD-GCI early A.M.; KWU evenings |
| 14940 | 20.06 | HJB | Bogota, Colombia | (P) Phones WNC-PPU-YVQ days |
| 14935 | 20.07 | PSE | Rio de Janeiro, Brazil | (P) Phones LSL-WLK day irreg.; EDM-EHY 8 A.M. |
| 14920 | 20.11 | KQH | Kahuku, Hawaii | (P) Tests irregularly |
| 14910 | 20.12 | JVG | Nazaki, Japan | (P) Phones Formosa irregular |
| 14845 | 20.19 | OCJ2 | Lima, Peru | (P) Phones HJY and others daytime |
| 14800 | 20.27 | WQV | Rocky Point, N. Y. | (E) Tests Europe irreg. |
| 14790 | 20.28 | RIZ | Irkutsk, USSR. | (P) Calls RKI 9:30 A.M. |
| 14770 | 20.31 | WEB | Rocky Point, N. Y. | (E) Tests with Europe; irregular |
| 14730 | 20.37 | IQA | Rome, Italy | (P) Phones Japan and Egypt; sends music at times |
| 14710 | 20.39 | IRG | Massawa, Eritrea, Africa | (P) Tests with JVH 5 to 7 A.M. |
| 14690 | 20.42 | PSF | Rio de Janeiro, Brazil | (P) Phones LSL-WLK-WOK daytime |
| 14653 | 20.47 | GBL | Rugby, England | (P) Phones Nazaki early A.M. |
| 14620 | 20.52 | EHY | Madrid, Spain | (P) Phones LSM mornings irreg. |
| 14620 | 20.52 | EDM | Madrid, Spain | (P) Phones PPU-PSA-PSE mornings |
| 14600 | 20.55 | JVH | Nazaki, Japan | (E) Phones DFB-GTJ-PCJ-TYB early mornings and B.C. music |
| 14590 | 20.56 | WMN | Lawrenceville, N. J. | (P) Phones England days |
| 14550 | 20.60 | HBJ | Geneva, Switzerland | (E) Relays to Riverhead daytime |
| 14530 | 20.65 | LSN | Buenos Aires, Arg. | (P) Phones PSF-WLK-WOK irreg. |
| 14485 | 20.71 | TIR | Cartago, Costa Rica | (P) Phones WNC days |
| 14485 | 20.71 | TIU | Cartago, Costa Rica | (P) Phones WNC days |
| 14485 | 20.71 | YNA | Managua, Nicaragua | Phones WNC daytime |
| 14485 | 20.71 | HPF | Panama City, Panama | (P) Phones daytime |
| 14485 | 20.71 | HRM | Tela, Honduras | (P) Phones WNC days |
| 14485 | 20.71 | TGF | Guatemala City, Guatemala | (P) Phones WNC days |
| 14480 | 20.72 | PLX | Bandoeng, Java | (P) Phones Europe irreg. |
| 14470 | 20.73 | WMF | Lawrenceville, N. J. | (P) Phones England daytime |
| 14460 | 20.75 | DZH | ● Zeesen, Germany | 12-2 P.M. |
| 14440 | 20.78 | GBW | Rugby, England | (P) Phones Lawrenceville daytime |
| 14410 | 20.80 | DIP | Zeesen, Germany | (E) Experimental; 12-4:30 P.M. |
| 14236 | 21.07 | HB9B | ● Basle, Switzerland | Monday, Thursday, Friday 4-6 P.M. |
| 14200 | 21.20 | W10XFB | The Schooner "Morrissey" | (E) Irregular |
| 14100 | 21.25 | HJ5ABE | ● Cali, Colombia | 11:00 A.M.-12 noon daily Sun. 6:00-10:30 P.M. |
| 13900 | 21.58 | WQP | Rocky Point, N. Y. | (E) Test daytime |
| 13820 | 21.70 | SUZ | Cairo, Egypt | (P) Phones DFC-DGU-GBB daytime |
| 13780 | 21.77 | KKW | Bolinas, Calif. | (P) Special relays; tests afternoon and evening |
| 13745 | 21.83 | CGA-2 | Drummondville, Que. | (P) Phones Europe irreg. |
| 13738 | 21.82 | RIS | Tiflis, USSR. | (P) Tests with Moscow irregular |
| 13720 | 21.87 | KLL | Bolinas, Calif. | (P) Special relays; tests afternoon and evening |
| 13690 | 21.91 | KKZ | Bolinas, Calif. | (P) Tests Japan and Java early A.M.; days Honolulu |
| 13667 | 21.98 | HJY | Bogota, Colombia | (P) Phones CEC afternoons |
| 13635 | 22.00 | SPW | ● Warsaw, Poland | 11:30 A.M.-12:30 P.M. Mon., Wed., Fri. |
| 13610 | 22.04 | JYK | Kemikawa-Cho, Japan | (E) Tests irregular A.M. |
| 13585 | 22.08 | GBB | Rugby, England | (P) Phones CGA3-SUV-SUZ daytime |
| 13560 | 22.12 | JVI | Nazaki, Japan | (P) Phones Manchukuo irregularly |
| 13465 | 22.28 | WKC | Rocky Point, N. Y. | (E) Tests and relays; irregular |
| 13435 | 22.33 | WKD | Rocky Point, N. Y. | (E) Tests and relays; irregular |
| 13415 | 22.36 | GCJ | Rugby, England | (P) Tests with JVH afternoons |
| 13390 | 22.40 | WMA | Lawrenceville, N. J. | (P) Phones GAS-GBS-GBU-GBW daily |
| 13380 | 22.42 | IDU | Asmara, Eritrea, Africa | (P) Phones Italy; early A.M. and sends music |
| 13345 | 22.48 | YVQ | Maracay, Venezuela | (P) Phones WNC-HJB days |
| 13285 | 22.58 | CGA3 | Drummondville, Que. | (P) Phones England days |
| 13240 | 22.66 | KBJ | Manila, P. I. | (P) Phones nights and early A.M. |
| 13220 | 22.70 | IRJ | Rome, Italy | (P) Phones Japan 5-8 A.M., and works Cairo days |
| 13180 | 22.76 | DGG | Nauen, Germany | (P) Relays to Riverhead days |
| 13075 | 22.95 | VPD | ● Suva, Fiji Islands | Mon. to Fri. inc. 12:30-1:30 A.M. |
| 13020 | 23.04 | JZE | Nazaki, Japan | (P) Phones ships irreg. |
| 13000 | 23.08 | FYC | Paris, France | (P) Phones CNR A.M. |
| 12985 | 23.11 | DFC | Nauen, Germany | (P) Phones KAY-SUV-SUZ early A.M. |
| 12865 | 23.32 | IAC | Piza, Italy | (P) Phones ships irreg. |
| 12860 | 23.33 | RKR | Novosibisk, USSR. | (P) Daily, 7 A.M. |
| 12840 | 23.36 | WOO | Ocean Gate, N. J. | (P) Phones ships days |
| 12830 | 23.37 | HJC | Barranquilla, Colombia | (P) Phones HJB-HPF-WNC days |
| 12830 | 23.38 | HJA-3 | Barranquilla, Colombia | (P) Phones HJB-HPF-WNC days |
| 12830 | 23.38 | CNR | ● Rabat, Morocco | Special broadcasts irreg. |
| 12830 | 23.38 | CNR | Rabat, Morocco | (P) Phones FYR-TYB-FTA irreg. days |
| 12800 | 23.44 | IAC | Piza, Italy | (P) Phones ships and tests Tripoli, irreg. |
| 12780 | 23.47 | GBC | Rugby, England | (P) Phones VWY early A.M. |
| 12396 | 24.20 | CT1GO | ● Paredo, Portugal | Sun. 11:30 A.M.-1 P.M., 7:15-8:30 P.M.; Tues. to Fri. 7:15-8:30 P.M. |
| 12394 | 24.21 | DAF | Nordenland, Germany | (P) Phones ships irreg. mornings |
| 12300 | 24.39 | PLM | Bandoeng, Java | (P) Phones 2ME near 6:30 A.M. |
| 12295 | 24.40 | ZLU | Wellington, N. Z. | (P) Phones ZLJ early A.M. |
| 12290 | 24.41 | GBU | Rugby, England | (P) Phones Lawrenceville days |
| 12280 | 24.43 | KUV | Manila, P. I. | (P) Phones early A.M. |
| 12250 | 24.49 | TYB | Paris, France | (P) Phones JVH-XGR and ships irreg. |
| 12235 | 24.52 | TFJ | Reykjavik, Iceland | (P) Phones England days |
| 12235 | 24.52 | TFJ | ● Reykjavik, Iceland | English broadcast each Sunday, 1:40-2:00 P.M. |
| 12220 | 24.55 | FLJ | Paris, France | (P) Phones ships irreg. |
| 12215 | 24.56 | TYA | Paris, France | (P) Algeria days |
| 12130 | 24.73 | DJS | ● Zeesen, Germany | 7-9 P.M. |
| 12060 | 24.88 | PDV | Kootwijk, Holland | (P) PLE - PLV - PMC early mornings |
| 12055 | 24.89 | PDV | Kootwijk, Holland | (P) PLE - PLV - PMC early mornings |
| 12050 | 24.90 | PDV | Kootwijk, Holland | (P) PLE - PLV - PMC early mornings |
| 12035 | 24.93 | HBO | Geneva, Switzerland | (E) Relays programs & phones irreg. |
| 12020 | 24.95 | VIY | Rockbank, Australia | (P) Tests CJA6 early A.M. and evenings |
| 12100 | 24.79 | CJA | Drummondville, Que. | (P) Tests VIY early A.M. and evenings |
| 12000 | 25.00 | RNE | ● Moscow, USSR. | Sundays 6-7 A.M., 10-11 A.M.; Wed. 6-7 A.M. |
| 11991 | 25.02 | FZS | Saigon, Indo-China | (P) Phones FTA - FTK early A.M. |

# Short-Wave Station List

| KC | Meters | Call | Location | Time |
|---|---|---|---|---|
| 11955 | 25.09 | ETB | ● Addis Ababa, Ethiopia | Wed. 4:50-5:30 P.M. irregular |
| 11950 | 25.11 | KKQ | Bolinas, Calif. | (P) Relays programs to Hawaii eve. |
| 11940 | 25.13 | FTA | St. Asise, France | (P) Phones FZS - FZR early A.M. |
| 11935 | 25.14 | YNA | Managua, Nicaragua | (P) Cent. and S. A. stations, days |
| 11885 | 25.23 | TPA3 | Pontoise, France | 4-5 A.M., 11:15 A.M.-6 P.M. |
| 11875 | 25.26 | YDB | ● Soerabaja, Java | 5:30-11:30 A.M.; 5:45-6:45 P.M.; 10:30 P.M.-1:30 A.M. |
| 11870 | 25.26 | W8XK | ● Pittsburgh, Pa. | 5-9 P.M. |
| 11860 | 25.29 | GSE | ● Daventry, England | 9 A.M.-12 noon |
| 11855 | 25.31 | DJP | ● Zeesen, Germany | 2-4 A.M. |
| 11830 | 25.36 | W2XE | ● Wayne, N. J. | 5-10 P.M. daily |
| 11830 | 25.36 | W9XAA | ● Chicago, Ill. | Daily 11 A.M.-9 P.M. |
| 11820 | 25.38 | GSN | ● Daventry, England | 1:15 A.M.-3:20 A.M. |
| 11810 | 25.40 | 2RO4 | ● Rome, Italy | 8:15-9 A.M.; 9:15-11 A.M.; 11:30 A.M.-12:15 P.M. |
| 11800 | 25.40 | HJ4ABA | ● Medellin, Colombia | 11:30 A.M.-1 P.M.; 6:30-10:30 P.M. |
| 11800 | 25.42 | CO9WR | ● Sancti-Spiritus, Cuba | 4-6 P.M.; 9-11 P.M. |
| 11795 | 25.43 | DJO | ● Zeesen, Germany | 5-7 A.M. |
| 11790 | 25.43 | W1XAL | ● Boston, Mass. | Sunday 3-4:45 P.M.; Mon. to Fri. inc. 5-6 P.M. |
| 11770 | 25.49 | DJD | ● Zeesen, Germany | 11:35 A.M.-4:25 P.M. |
| 11750 | 25.53 | GSD | ● Daventry, England | 12:15-5:45 P.M.; 6-8:05 P.M.; 10-11:05 P.M. |
| 11730 | 25.57 | PHI | ● Huizen, Holland | Sat. & Sun. 8:30-11 A.M. Mon., Thurs., Fri., 8:30-10:30 A.M. |
| 11720 | 25.60 | CJRX | ● Winnipeg, Manitoba | Week days 8:00 P.M.-12 M.; Sun., 3-10 P.M. |
| 11713 | 25.62 | TPA4 | Pontoise, France | 6:15-9 P.M.; 11 P.M.-1 A.M. |
| 11630 | 25.68 | KIO | Kahuku, Hawaii | (P) Phones Far East early A.M. |
| 11660 | 25.73 | PPQ | Rio de Janeiro, Brazil | (P) Phones WCG-WET-LSX evenings |
| 11660 | 25.73 | JVL | Nazaki, Japan | (P) Phones Taiwan evenings |
| 11570 | 25.93 | HH2T | Port-au-Prince, Haiti | (P) 7-10 P.M. daily |
| 11538 | 26.00 | XGR | Shanghai, China | (P) Tests irregularly |
| 11500 | 26.09 | XAM | Merida, Mexico | (P) Phones XDF-XDM-XDR irreg. |
| 11495 | 26.10 | VIZ3 | Rockbank, Australia | (P) Tests CJA4 early A.M. |
| 11413 | 26.28 | CJA4 | Drummondville, Que. | (P) Phones VIZ3 early A.M. |
| 11385 | 26.35 | HBO | Geneva, Switzerland | (E) Phones and relays irregular |
| 11275 | 26.61 | XAM | Merida, Mexico | (P) Phones XDR-XDM irregular |
| 11050 | 27.15 | ZLT | Wellington, N. Z. | (P) Phones VLZ early mornings |
| 11000 | 27.27 | PLP | Bandoeng, Java | (P) Phones early A.M.; broadcasts 6:30-10 A.M. |
| 11000 | 27.26 | XBJQ | ● Mexico D. F., Mexico | 8:15-10:30 P.M. irreg. |
| 10975 | 27.35 | OCI | Lima, Peru | (P) Phones CEC - HJY days |
| 10975 | 27.35 | OCP | Lima, Peru | (P) Phones HKB early evenings |
| 10940 | 27.43 | FTH | St. Assise, France | (P) Phones So. America irreg. |
| 10910 | 27.50 | KTR | Manila, P. I. | (P) Phones DFC early A.M. irreg. |
| 10850 | 27.63 | DFL | Nauen, Germany | (P) Relays programs aftternoons irreg. |
| 10840 | 27.68 | KWV | Dixon, Calif. | (P) Phones Japan, Manila, Hawaii, A.M. |
| 10790 | 27.80 | YNA | Managua, Nicaragua | (P) Phones So. America days, irreg. |
| 10770 | 27.86 | GBP | Rugby, England | (P) JYS and XGR irreg.; Phones VLK early A.M. & P.M. |
| 10740 | 27.93 | JVM | ● Nazaki, Japan | 4-7:30 A.M. irregular; 12-1 A.M. Daily; Mon. & Thurs. 4-5 P.M. |
| 10675 | 28.10 | WNB | Lawrenceville, N. J. | (P) Phones ZFB daytime |
| 10670 | 28.12 | CEC | Santiago, Chile | (P) Phones HJY - OCI daytime |
| 10670 | 28.12 | CEC | ● Santiago, Chile | Daily except Thurs. and Sat. 7-7:20 P.M.; Thur. & Sun. 8:30-9 P.M. |
| 10660 | 28.14 | JVN | Nazaki, Japan | (P) Phones JIB early A.M.; Relays JOAK irreg. |
| 10660 | 28.14 | JVN | ● Nazaki, Japan | 4-7:30 A.M., irregular; Daily 12-1 A.M.; Mon. & Thurs. 4-5 P.M. |
| 10620 | 28.25 | WEF | Rocky Point, N. Y. | (E) Relays program service irregularly |
| 10620 | 28.25 | EHX | Madrid, Spain | (P) Phones CEC and EHZ afternoons |
| 10610 | 28.28 | WEA | Rocky Point, N. Y. | (E) Tests Europe irreg. |
| 10550 | 28.44 | WOK | Lawrenceville, N. J. | (P) Phones LSN - PSF - PSH-PSK nights |
| 10535 | 28.48 | JIB | Tawian, Japan | (P) Phones JVL - JVN early mornings |
| 10520 | 28.52 | VK2ME | Sydney, Australia | (P) Phones GBP - HVJ early A.M. |
| 10520 | 28.52 | VLK | Sydney, Australia | (P) Phones GBP - HVJ early A.M. |
| 10520 | 28.52 | CFA-4 | Drummondville, Que. | (P) Phones N. Am. days |
| 10440 | 28.74 | DGH | Nauen, Germany | (P) Phones HSG - HSJ - HSP early A.M. |
| 10430 | 28.80 | YBG | Medan, Sumatra | (P) Phones PLV - PLP early A.M. |
| 10420 | 28.79 | XGW | Shanghai, China | (P) Tests GBP - KAY early A.M. |
| 10420 | 28.79 | PDK | Kootwijk, Holland | (P) Phones PLV A.M., and special programs irreg. |
| 10415 | 28.80 | PDK | Kootwijk, Holland | (P) Phones PLV A.M., and special programs irreg. |
| 10410 | 28.82 | PDK | Kootwijk, Holland | (P) Phones PLV A.M., and special programs irreg. |
| 10410 | 28.82 | KES | Bolinas, Calif. | (P) Phones S. A. and Far East irreg. |
| 10400 | 28.85 | KEZ | Bolinas, Calif. | (P) Phones Hawaii and Far East irreg. |
| 10390 | 28.87 | KER | Bolinas, Calif. | (P) Phones Far East, early evening |
| 10380 | 28.90 | WCG | Rocky Point, N. Y. | (E) Programs, irreg. |
| 10375 | 28.92 | JVO | Nazaki, Japan | (P) Manchuria and Dairen early A.M. |
| 10370 | 28.93 | EHZ | Madrid, Spain | (P) Phones EHX days |
| 10350 | 28.98 | LSX | ● Buenos Aires, Arg. | Near 10 P.M. irregular; 6-7:15 P.M. daily |
| 10335 | 29.03 | ZFD | Hamilton, Bermuda | (P) Phones afternoons |
| 10330 | 29.04 | ORK | ● Brussels, Belgium | 2:30-4:00 P.M. |
| 10310 | 29.10 | PPM | Rio de Janeiro, Brazil | (P) Tests New York and B.A. evenings |
| 10300 | 29.13 | LSQ | Buenos Aires, Arg. | (P) Phones GCA - HJY - PSH afternoons |
| 10300 | 29.13 | LSL | Buenos Aires, Arg. | (P) Phones GCA - HJY - PSH afternoons. Broadcasts irreg. |
| 10290 | 29.15 | DIQ | Zeesen, Germany | (E) Phone and program service irreg. |
| 10290 | 29.15 | DIQ | ● Zeesen, Germany | Used irregularly |
| 10290 | 29.15 | HPC | Panama City, Panama | (P) Phones C. A. and S. Am. daytime |
| 10260 | 29.24 | PMN | Bandoeng, Java | (P) Tests VLJ early A.M.; broadcasts 6:30-10 A.M. |
| 10250 | 29.27 | LSK3 | Buenos Aires, Arg. | (P) Afternoons |
| 10220 | 29.35 | PSH | Rio de Janeiro, Brazil | (P) Phones LSL-WOK evenings; special pgm. service irreg. |
| 10170 | 29.50 | RIO | Baku, USSR. | (P) Phones RIR - RNE early A.M. |
| 10160 | 29.53 | HSG | Bangkok, Siam | 11 P.M.-3 A.M. News irreg. |
| 10140 | 29.59 | OPM | Leopoldville, Belg-Congo | (P) Phones ORK afternoons |
| 10080 | 29.76 | RIR | Tiflis, USSR. | (P) Phones RIM-RKI 7-11 A.M. |
| 10070 | 29.79 | EHY | Madrid, Spain | (P) Phones YVR afternoons |
| 10055 | 29.84 | ZFB | Hamilton, Bermuda | (P) Phones WNB days |
| 10055 | 29.84 | SUV | Cairo, Egypt | (P) Phones DFC-DGU-GCA-GCB days |
| 10042 | 29.87 | DZB | ● Zeesen, Germany | 2-4 P.M. |
| 10040 | 29.88 | HJA3 | Barranquilla, Colombia | (P) Tests early evenings irreg. |
| 9990 | 30.03 | KAZ | Manila, P. I. | (P) Phones JVQ-KWX-PLV early A.M. |
| 9966 | 30.08 | IRS | Rome, Italy | (P) Tests irregularly |
| 9950 | 30.13 | GBU | Rugby, England | (P) Phones WNA evenings |
| 9930 | 30.21 | HKB | Bogota, Colombia | (P) Phones CEC - OCP - PSH - PSK afternoons |
| 9930 | 30.21 | HJY | Bogota, Colombia | (P) Phones LSQ afternoons |
| 9890 | 30.33 | LSN3 | Buenos Aires, Arg. | (P) Phones WOK-WLK; broadcasts evenings irregular |
| 9870 | 30.40 | WON | Lawrenceville, N. J. | Phones and tests; England irreg. |
| 9870 | 30.40 | JYS | ● Kemikawa-Cho, Japan | 4-7 A.M. irregular |
| 9860 | 30.43 | EAQ | ● Madrid, Spain | Saturday 12-2 P.M.; daily 5:15 to 9:30 P.M. |
| 9840 | 30.47 | JYS | Kemikawa-Cho, Japan | (E) Tests irregular |
| 9830 | 30.50 | IRM | Rome, Italy | (P) Phones JVP - JZT - LSX-WEL A.M. |
| 9810 | 30.58 | DFE | Nauen, Germany | (P) Relays and tests afternoons irreg. |
| 9800 | 30.59 | GCW | Rugby, England | (P) Phones Lawrenceville eve. and nights |
| 9800 | 30.59 | LSI | Buenos Aires, Arg. | (P) Relays very irreg. |
| 9760 | 30.74 | VLJ | Sydney, Australia | (P) Phones PLV - ZLT early A.M. |
| 9760 | 30.74 | VLZ | Sydney, Australia | (P) Phones PLV - ZLT early A.M. |
| 9750 | 30.77 | WOF | Lawrenceville, N. J. | (P) Phones GCU irreg. |
| 9710 | 30.88 | GCA | Rugby, England | (P) Phones LSL afternoons |
| 9700 | 30.93 | LQA | Buenos Aires, Arg. | (P) Tests and relays early evenings |
| 9675 | 31.00 | DZA | ● Zeesen, Germany | 5-7 P.M. |
| 9650 | 31.09 | CT1AA | ● Lisbon, Portugal | Tues., Thurs., Sat., 4:30-7 P.M. |
| 9650 | 31.09 | YDB | ● Soerabaja, Java | 5:30-11:30 A.M.; 5:45-6:45 P.M.; 10:30 P.M. to 1:30 A.M. |
| 9635 | 31.13 | 2RO3 | ● Rome, Italy | Daily 1:30-5 P.M.; Fri. and Sun. to 5:30 P.M.; Mon., Wed., Fri., 6-7:30 P.M.—American Hour; Tues., Thurs., Sat., 6-7:45 P.M., So. American Hour. |

# Short-Wave Station List

| KC | Meters | Call | Location | Time |
|---|---|---|---|---|
| 9630 | 31.15 | CFA5 | Drummondville, Que. | (P) Phones No. America days |
| 9620 | 31.17 | DGU | Nauen, Germany | (P) Phones SUV A.M. Relays irreg. |
| 9620 | 31.17 | FZR | Saigon, Indo-China | (P) Phones Paris early A.M. |
| 9600 | 31.25 | CB960 | ●Santiago, Chile | 7 P.M.-12 Midnight |
| 9600 | 31.25 | XEFT | ●Vera Cruz, Mexico | Same as 6120 KC. |
| 9595 | 31.27 | HBL | ●Geneva, Switzerland | Saturday 5:30-6:15 P.M. First Monday each month 4-6 P.M. |
| 9595 | 31.27 | HH3W | ●Port-au-Prince, Haiti | 1-2 P.M., 7-8:30 P.M.; Sunday 12-1 P.M. |
| 9590 | 31.28 | W3XAU | ●Philadelphia, Pa. | Sun. 12-7 P.M.; Weekdays 12-8 P.M. |
| 9590 | 31.28 | VK2ME | ●Sydney, Australia | Sundays 1 A.M.-3 A.M.; 5:00-9:00 A.M.; 9:30-11:30 A.M. |
| 9590 | 31.28 | HP5J | ●Panama City, Panama | 11:30 A.M.-1 P.M., 7:00-10 P.M.; Sundays 6:30-10:30 P.M. |
| 9590 | 31.28 | PCJ | ●Endhoven, Holland | 7-8 P.M. to N. America |
| 9580 | 31.31 | GSC | ●Daventry, England | 12:15-5:45 P.M., 6-8:05 P.M., 10-11:05 P.M. |
| 9580 | 31.31 | VK3LR | ●Melbourne, Australia | Mon., Tues., Wed., Thur., 3:15-7:30 A.M.; Fri., 10:30 P.M.-2 A.M.; Sat., 5-7:30 A.M. |
| 9580 | 31.31 | LRX | ●Buenos Aires, Arg. | 6 A.M.-10 P.M. daily |
| 9570 | 31.33 | W1XK | ●Boston, Mass. | Weekdays, 7 A.M.-1 A.M. Sunday 8 A.M.-1 A.M. |
| 9565 | 31.36 | VUY VUB | ●Bombay, India | 11:30 A.M.-12:30 P.M., Wed. & Sat.; Sunday, 7:30-8:30 A.M. |
| 9560 | 31.38 | DJA | ●Zeesen, Germany | 12 A.M.-3:50 A.M.; 8:05 A.M.-11 A.M.; 4:55 P.M.-10:45 P.M. |
| 9545 | 31.44 | HH2R | ●Port-au-Prince, Haiti | 7-10 P.M. daily |
| 9540 | 31.45 | DJN | ●Zeesen, Germany | 12 A.M.-3:00 A.M.; 3:50-11 A.M.; 4:55-10:45 P.M. |
| 9530 | 31.48 | W2XAF | ●Schenectady, N. Y. | Weekdays 4 P.M.-12 midnight; Sundays, 4:15 P.M.-12 midnight |
| 9515 | 31.53 | LKJ1 | ●Jaloy, Norway | 5-8 A.M., 11 A.M.-6 P.M. daily |
| 9510 | 31.55 | GSB | ●Daventry, England | 1:15-3:20 A.M.; 12:15-5:45 P.M.; 6-8:05 P.M. |
| 9510 | 31.55 | VK3ME | ●Melbourne, Australia | Mon. to Sat., 4:30-7:00 A.M. |
| 9501 | 31.56 | PRF5 | ●Rio de Janeiro, Brazil | 4:45-5:45 P.M. daily; 9-10:45 P.M. irreg. |
| 9500 | 31.58 | HJU | ●Buenaventura, Colombia | 5-11 P.M. daily |
| 9490 | 31.61 | KEI | Bolinas, Calif. | (P) Phones Indo-China and China A.M. |
| 9490 | 31.61 | CQN | ●Macoa, China | Mon. & Fri., 5-8 A.M. |
| 9480 | 31.65 | PLW | Bandoeng, Java | (P) Phones Australia early A.M. |
| 9480 | 31.65 | KET | Bolinas, Calif. | (P) Phones WEL evenings & nights |
| 9470 | 31.68 | WET | Rocky Point, N. Y. | (E) Tests LSX-PPM-ZFD evenings |
| 9460 | 31.71 | ICK | Tripoli, Africa | (P) Phones Italy A.M. |
| 9450 | 31.75 | TGWA | ●Guatemala City, Guate. | Daily ex. Sun. 12-2 P.M., 8-9 P.M., 10 P.M.-12 A.M.; Sun., 12-5 A.M. |
| 9430 | 31.80 | YVR | Maracay, Venezuela | (P) Tests mornings |
| 9428 | 31.81 | COCH | ●Havana, Cuba | Week days 8 A.M.-12 midnight; Sundays 12-1 P.M., 8-10 P.M. |
| 9415 | 31.86 | PLV | Bandoeng, Java | (P) Phones PCV-PCK-PDK-VLZ-KWX-KWV early A.M. |
| 9400 | 31.92 | XDR | Mexico City, Mexico | (P) Phones XAM irreg. days |
| 9385 | 31.97 | PGC | Kootwijk, Holland | (P) Phones East Indies nights |
| 9375 | 32.00 | PGC | Kootwijk, Holland | (P) Phones East Indies nights |
| 9370 | 32.02 | PGC | Kootwijk, Holland | (P) Phones East Indies nights |
| 9330 | 32.15 | CGA4 | Drummondville, Que. | (P) Phones GCB-GDB-GBB afternoons |
| 9280 | 32.33 | GCB | Rugby, England | (P) Phones Canada afternoons |
| 9240 | 32.47 | PDP | Kootwijk, Holland | (P) Phones East Indies nights |
| 9235 | 32.49 | PDP | Kootwijk, Holland | (P) Phones East Indies nights |
| 9180 | 32.68 | ZSR | Klipheuvel, S. Africa | (P) Phones Rugby afternoons reasonally |
| 9170 | 32.72 | WNA | Lawrenceville, N. J. | (P) Phones GBS-GCU-GCS afternoons |
| 9147 | 32.79 | YVR | Maracay, Venezuela | (P) Phones EHY afternoons |
| 9120 | 32.88 | HAT4 | ●Budapest, Hungary | 600-7:00 P.M. Sundays |
| 9110 | 32.93 | KUW | Manila, P. I. | (P) Tests and phones early A.M. |
| 9091 | 33.00 | CGA-5 | Drummondville, Que. | (P) Phones Europe days |
| 9020 | 33.26 | GCS | Rugby, England | (P) Phones Lawrenceville afternoons |
| 9010 | 33.30 | KEJ | Bolinas, Calif. | (P) Relays programs to Hawaii eve. |
| 8975 | 33.42 | CJA5 | Drummondville, Que. | (P) Phones Australia nights, early A.M. |
| 8975 | 33.43 | VWY | Poona, Ind. | (P) Phones GBC - GBU mornings |
| 8950 | 33.52 | WEL | Rocky Point, N. Y. | (E) Tests with Europe irreg. |
| 8950 | 33.52 | W2XBJ | Rocky Point, N. Y. | (E) Tests irregularly |
| 8930 | 33.59 | WEC | Rocky Point, N. Y. | (P) Phones Ethiopia irregular |
| 8900 | 33.71 | ZLS | Wellington, N. Z. | (P) Phones VLZ early mornings |
| 8830 | 33.98 | LSD | Buenos Aires, Arg. | (P) Relays to New York early evenings |
| 8790 | 34.13 | HKV | Bogota, Colombia | (E) Tests early evenings and nights |
| 8790 | 34.13 | TIR | Cartago, Costa Rica | (P) Phones Cent. America daytime |
| 8790 | 34.13 | HKV | ●Bogota, Colombia | 6:00-11:00 P.M. irregular |
| 8775 | 34.19 | HCJB | ●Quito, Ecuador | Sunday 4-10:45 P.M.; Tues. to Sat., inc., 7-10 P.M. or later |
| 8775 | 34.19 | PNI | Makasser, D. E. I. | (P) Phones PLV early mornings |
| 8760 | 34.35 | GCQ | Rugby, England | (P) Phones ZSR afternoons |
| 8750 | 34.29 | ZBW | ●Hong Kong, China | 130-3:15 A.M., 6 A.M.-12 noon |
| 8740 | 34.35 | WXV | Fairbanks, Alaska | (P) Phones WXH nights |
| 8730 | 34.36 | GCI | Rugby, England | (P) Phones VWY afternoons |
| 8680 | 34.56 | GBC | Rugby, England | (P) Phones ships and New York daily |
| 8663 | 34.62 | CO9JQ | ●Camaguey, Cuba | 7:45-9:00 P.M. weekdays |
| 8657 | 34.54 | YNVA | ●Managua, Nicaragua | 7:30-10 P.M. daily |
| 8650 | 34.68 | WVD | Seattle, Wash. | (P) Tests irregularly |
| 8560 | 35.05 | WOO | Ocean Gate, N. J. | (P) Phones ships days |
| 8500 | 35.29 | JZF | Nazaki, Japan | (P) Phones ships irreg. |
| 8470 | 35.39 | DAF | Nordenland, Germany | (P) Phones ships irreg. |
| 8400 | 35.71 | HC2AT | ●Guayaquil, Ecuador | 8:00-11:00 P.M. ex. Sun. |
| 8404 | 35.70 | HC2CW | ●Guayaquil, Ecuador | 7:30-11 P.M. ex. Sunday |
| 8380 | 35.80 | IAC | Piza, Italy | (P) Phones ships irreg. |
| 8190 | 36.65 | PSK | Rio de Janeiro, Brazil | (P) Phones LSL-WOK evenings and special programs |
| 8190 | 36.65 | XEME | ●Merida, Yucatan, Mex. | Daily 10 A.M.-3:30 P.M., 5:30-11 P.M. |
| 8155 | 36.79 | PGB | Kootwijk, Holland | (P) Phones Java irreg. |
| 8140 | 36.86 | LSC | Buenos Aires, Arg. | (P) Tests evenings and nights irreg. |
| 8120 | 36.95 | KTP | Manila, P. I. | (P) Phones KWX-KWV-PLV-JVQ A.M. |
| 8110 | 37.00 | ZP10 | ●Ascunsion, Paraguay | 8:00-10:00 P.M. |
| 8075 | 37.15 | WEZ | Rocky Point, N. Y. | (E) Program service P. M.; irregular |
| 8035 | 37.33 | CNR | Rabat, Morocco | (P) Phones France nights |
| 8035 | 37.33 | CNR | ●Rabat, Morocco | Special broadcasts irreg. |
| 7970 | 37.64 | XGL | Shanghai, China | (P) Tests early mornings |
| 7968 | 37.65 | HSJ | Bankok, Siam | (P) Tests early A.M. |
| 7960 | 37.69 | VLZ | Sydney, Australia | (P) Phones ZLT early A.M. |
| 7920 | 37.88 | GCP | Rugby, England | (P) Phones VLK irreg. |
| 7900 | 37.97 | LSL | Buenos Aires, Arg. | (P) Phones PSK-PSH evenings |
| 7890 | 38.02 | CJA-2 | Drummondville, Que. | (P) Phones Australia nights |
| 7880 | 38.05 | JYR | Kemikawa-Cho, Japan | (E) Tests and relays irregularly |
| 7860 | 38.17 | SUX | Cairo, Egypt | (P) Phones GCB afternoons |
| 7855 | 38.19 | LQP | Buenos Aires, Arg. | (P) Tests evening irreg. |
| 7854 | 38.19 | HJ2JSB | ●Guayaquil, Ecuador | 9 A.M.-1:30 P.M., 6-11:15 P.M. |
| 7840 | 38.27 | PGA | Kootwijk, Holland | (P) Phones Java irreg. |
| 7835 | 38.29 | PGA | Kootwijk, Holland | (P) Phones Java irreg. |
| 7830 | 38.31 | PGA | Kootwijk, Holland | (P) Phones Java irreg. |
| 7797 | 38.47 | HBP | ●Geneva, Switzerland | 5:30-6:15 P.M. Saturdays; First Monday each month 6-7 P.M. |
| 7790 | 38.49 | YNA | Managua, Nicaragua | (P) Phones Cent. & So. America daytime |
| 7780 | 38.56 | PSZ | Rio de Janeiro, Brazil | (P) Tests LSX early evenings |
| 7770 | 38.61 | PDM | Kootwijk, Holland | (P) Special relays to E. Indies |
| 7760 | 38.66 | PDM | Kootwijk, Holland | (P) Special relays to E. Indies |
| 7740 | 38.76 | CEC | Santiago, Chile | (P) Phones evenings to 8:30 P.M. |
| 7735 | 38.78 | PDL | Kootwijk, Holland | (P) Special relays to E. Indies |
| 7730 | 38.81 | PDL | Kootwijk, Holland | (P) Special relays to E. Indies |
| 7765 | 38.63 | PDM | Kootwijk, Holland | (P) Special relays to Dutch Indies |
| 7715 | 38.89 | KEK | Bolinas, Calif. | (P) Relays programs to Hawaii seasonally |
| 7669 | 39.11 | TGF | Guatemala City, Guat. | (P) Phones TIU-HPF daytime |
| 7626 | 39.31 | RIM | Tashkent, USSR. | (P) Phones RKI early mornings |
| 7620 | 39.37 | ETD | ●Addis Ababa, Ethiopia | Irregular |
| 7610 | 39.42 | KWX | Dixon, Calif. | (P) Phones KKH nights; KAZ-KTP-PLV-JVT-JVM A.M. |
| 7565 | 39.66 | KWY | Dixon, Calif. | (P) Phones Shanghai early mornings |
| 7550 | 39.74 | TI8WS | ●Puntarenas, Costa Rica | 5:30-6:30, 7:30-9:30 P.M. |
| 7520 | 39.89 | KKH | Kahuku, Hawaii | (P) Tests KEE evenings; Phones KWX-KWV nights |
| 7518 | 39.90 | RKI | Moscow, USSR. | (P) Phones RIM early mornings |
| 7510 | 39.95 | JVP | Nazaki, Japan | (P) Tests Point Reyes early A.M.; broadcasts Mon. and Thurs. 4-5 P.M. |

| KC | Meters | Call | Location | Time |
|---|---|---|---|---|
| 7500 | 40.00 | CFA-6 | Drummondville, Que. | (P) Phones N. America days |
| 7470 | 40.16 | JVQ | Nazaki, Japan | (P) Relays and phones early A.M.; broadcasts Monday and Thursday, 4-5 P.M. |
| 7470 | 40.16 | HJP | Bogota, Colombia | (P) Phones HJA3-YVQ early evenings |
| 7445 | 40.30 | HBQ | Geneva, Switzerland | (E) Relays special B.C. evenings irreg. |
| 7430 | 40.38 | ZLR | Wellington, N. Z. | (P) Phones VLJ early mornings |
| 7400 | 40.45 | WEM | Rocky Point, N. Y. | (E) Special relays evenings |
| 7400 | 40.50 | HJ3ABD | ●Bogota, Colombia | 12 noon-2 P.M., 8:00-11:00 P.M. |
| 7390 | 40.60 | ZLT-2 | Wellington, N. Z. | (P) Phones Sydney 3-7 A.M. |
| 7385 | 40.62 | OEK | Wein, Austria | (P) Tests early evenings very irreg. |
| 7380 | 40.65 | XECR | ●Mexico City, Mexico | Sundays 7-8 P.M.; occasionally later |
| 7370 | 40.71 | KEQ | Kahuku, Hawaii | (P) Relays programs evenings |
| 7282 | 41.20 | HJ1ABD | ●Cartagena, Colombia | 11:15 A.M.-1:15 P.M., Sun. Weekdays 7:15-9:15 P.M. |
| 7211 | 41.60 | EA8AB | ●Santa Cruz, Canary Is. | Mon., Wed., Fri., 3:15-4:15 P.M. |
| 7177 | 41.80 | CR6AA | ●Labito, Angela, Africa | 2:30-4:30 P.M., Wed. & Sat. |
| 7118 | 42.13 | HB9B | ●Basle, Switzerland | Mon., Thurs., Fri., 4-6 P.M. |
| 7100 | 42.25 | HKE | ●Bogota, Colombia | Monday 6-7 P.M.; Tues. and Friday 8-9 P.M. |
| 7080 | 42.37 | PI1J | ●Dordrecht, Holland | Sat. 10:10-11:10 A.M. |
| 7080 | 42.37 | VP3MR | ●Georgetown, Br. Guiana | Sun. 7:45-10:15 A.M.; Weekdays 4:45-8:45 P.M. |
| 7074 | 42.48 | HJ1ABK | ●Barranquilla, Colombia | 3-6 P.M. Sunday |
| 7000 | 42.86 | PZH | ●Paramaribo, D. Guiana | S. A. Sun. 9:45-11:45 A.M.; Mon. & Fri. 5:45-9:45 P.M.; Tues. and Thurs. 2:45-4:45 P.M., 8:45-10:45 P.M.; Wed. 3:45-4:45, 5:45-9:45 P.M.; Sat. 2:45-4:45 P.M. |
| 6990 | 42.92 | JVS | Nazaki, Japan | (P) Phones China mornings early |
| 6950 | 43.17 | WKP | Rocky Point, N. Y. | (E) Relays programs evenings |
| 6905 | 43.45 | GDS | Rugby, England | (P) Phones WOA-WNA-WCN evenings |
| 6900 | 43.48 | HI5E | ●Ciudad Trujillo, R. D. | 6-10 P.M. |
| 6900 | 43.48 | HI3C | ●La Romana, R. D. | Daily 12-2 P.M., 5-9 P.M.; Sat. 12 midnight to 2 A.M. |
| 6895 | 43.51 | HCETC | ●Quito, Ecuador | 8:15-10:30 P.M. ex. Sun. |
| 6890 | 43.54 | KEB | Bolinas, Calif. | (P) Tests KAZ - PLV early A.M. |
| 6880 | 43.60 | CGA-7 | Drummondville, Que. | (P) Phones Europe days |
| 6860 | 43.73 | KEL | Bolinas, Calif. | (P) Tests KAZ - PLV early A.M. |
| 6845 | 43.83 | KEN | Bolinas, Calif. | (P) Used irregularly |
| 6830 | 43.92 | CFA | Drummondville, Que. | (P) Phones N. Amer. nights |
| 6814 | 44.03 | HIH | ●San Pedro de Macoris, R. D. | Sunday 3-4 A.M. 12:30-3 P.M. 4-5 P.M. Week days 12:15-2 P.M. 7-8:30 P.M. |
| 6760 | 44.38 | CJA-6 | Drummondville, Que. | (P) Phones Australia early A. M. |
| 6755 | 44.41 | WOA | Lawrenceville, N. J. | (P) Phones GDW-GDS-GCS evenings |
| 6750 | 44.44 | JVT | Nazaki, Japan | (P) Phones JOAK irregular; Phones Point Reyes at times |
| 6750 | 44.44 | JVT | ●Nazaki, Japan | 1:45-2:15 A.M. 4-7:45 A.M. 5-5:20 P.M. 7-7:15 P.M. 9:45 P.M. 11:45 P.M. |
| 6725 | 44.60 | WQO | Rocky Point, N. Y. | (E) Tests evenings irreg. |
| 6720 | 44.64 | YVQ | Maracay, Venezuela | (P) Phones and relays N. Y. evenings |
| 6720 | 44.64 | YVQ | ●Maracay, Venezuela | 8-9 P.M. Saturdays |
| 6718 | 44.66 | KBK | Manila, P. I. | (P) Phones A. M. seasonally |
| 6701 | 44.71 | TIEP | ●San Jose, Costa Rica | 7:00-10:00 P.M. daily |
| 6690 | 44.84 | CGA-6 | Drummondville, Que. | (P) Phones Europe irregularly |
| 6680 | 44.91 | DGK | Nauen, Germany | (P) Relays to Riverhead evenings irreg. |
| 6650 | 45.11 | IAC | Piza, Italy | (P) Phones ships irreg. |
| 6635 | 45.00 | HC2RL | ●Guayaquil, Ecuador | 5:45-7:45 P.M. Sunday, 9:15-11:15 P.M. Tues. |
| 6630 | 45.25 | HIT | ●Ciudad Trujillo, R.D. | 12:10-1:40 P.M., 6:10-8:40 P.M. ex. Sun. Sat. DX 11:40 P.M.-12:40 A.M. |
| 6620 | 45.31 | Prado | ●Riobamba, Ecuador | Thursday 9:00-11:15 P.M. |
| 6610 | 45.38 | REN | ●Moscow, USSR | 1:00-5:00 P.M. irregular |
| 6590 | 45.50 | HI4D | ●Ciudad Trujillo, R.D. | 12:15-2:00 P.M., 5:00-8:00 P.M. except Sun. |
| 6550 | 45.81 | TIRCC | ●San Jose, Costa Rica | Daily 12-2 P.M. 6-7 P.M. Thrus. Extra 7-10 or 11 P.M. Sunday 11 A.M.-1 P.M. 8-10 P.M. |
| 6520 | 46.01 | YV6RV | ●Valencia, Venezuela | 10:30 A.M.-1:30 P.M., 5:30-9:30 P.M. daily |
| 6503 | 46.10 | HIL | ●Ciudad Trujillo, R.D. | 12-2 P.M., 6-8 P.M. |
| 6490 | 46.30 | HJ5ABD | ●Cali, Colombia | 7:00-10:00 P.M. ex. Sun. |
| 6475 | 46.34 | HI5N | ●Santiago de los Caballeros, R.D. | 7-10 P.M. |
| 6451 | 46.50 | HJ4ABC | ●Ibague, Colombia | 7-10 P.M. ex. Sunday |
| 6450 | 46.51 | HI4V | ●Ciudad Trujillo, R.D. | 11:40 A.M.-1:40 P.M., 5:10-6:40 P.M. daily |
| 6447 | 46.51 | HJ1ABB | ●Barranquilla, Colombia | 1145 A.M.-1:00 P.M., 5:30-10:00 P.M. daily |
| 6425 | 46.69 | W9XBS | ●Chicago, Ill. | Not regular. Usually Tuesday and Thursday 1:00-5:00 P.M. |
| 6420 | 46.70 | HI1S | ●Puerto Plata, R.D. | 11:40 A.M.-1:40 P.M. 5:40-7:40 P.M. |
| 6420 | 46.70 | W3XL | ●Bound Brook, N. J. | No regular schedule |
| 6415 | 46.77 | HJA3 | Barranquilla, Colombia | (P) Phones HJA2 evenings |
| 6400 | 46.88 | YN1GG | ●Managua, Nicaragua | Daily 1:00-2:30 P.M. 7:00-10:00 P.M. |
| 6385 | 46.99 | TIPG | ●San Jose, Costa Rica | 6:00-11 P.M. |
| 6383 | 47.02 | HI3U | ●Puerto Plata, R.D. | 6-9:30 P.M. |
| 6375 | 47.10 | YV4RC | ●Caracas, Venezuela | 4:30-10:30 P.M. |
| 6357 | 47.19 | HRP1 | ●San Pedro de Sula, Honduras | 8 P.M.-12 A.M. |
| 6330 | 47.39 | JZG | ●Nazaki, Japan | 5:00-7:00 A.M. irregular |
| 6315 | 47.50 | HIZ | ●Ciudad Trujillo, R.D. | Daily 11:30 A.M.-2:45 P.M., 5:30 P.M.-9 P.M. Sat. to 10 & 11 P.M. |
| 6300 | 47.62 | YV12RM | ●Maracay, Venezuela | 6:30-9:30 P.M. ex. Sun. |
| 6280 | 47.77 | HIG | ●Ciudad Trujillo, R.D. | 6-9:35 P.M. daily |
| 6275 | 47.81 | HJ1ABH | ●Cienaga, Colombia | Broadcasts and phones. Irregular evenings |
| 6235 | 48.10 | OCM | Lima, Peru | (P) Phones afternoons |
| 6235 | 48.00 | OAX4G | ●Lima, Peru | 7-10 P.M. daily |
| 6235 | 48.00 | HRV | ●La Ceiba, Honduras | 8-11 P.M. ex. Sun. |
| 6230 | 48.15 | HJ4ABJ | ●Ibague, Colombia | 8:00-11 P.M. |
| 6198 | 48.40 | CT1GO | ●Paredo, Portugal | Sunday 11:30-1:00 P.M. 7:15-8:30 P.M. Tues. to Fri. inc. 7:15-8:30 P.M. |
| 6185 | 48.50 | HI1A | ●Santiago de Caballeros, R. D. | Daily 11:40 A.M.-1:40 P.M., 7:40-9:40 P.M. |
| 6170 | 48.62 | HJ3ABF | ●Bogota, Colombia | 11 A.M.-2 P.M. 6-11 P.M. |
| 6165 | 48.66 | YV3RC | ●Caracas, Venezuela | 10:30 A.M.-1:30 P.M. 4:30-10:00 P.M. |
| 6150 | 48.78 | HJ5ABC | ●Cali, Colombia | Daily 11:00 A.M.-12 noon, 7:00 P.M.-10:00 P.M. Sunday 12-2 P.M. |
| 6150 | 48.78 | HJ2ABA | ●Tunja, Colombia | 1:00-2:00 P.M. & 7:00-10:00 P.M. |
| 6150 | 48.78 | CJRO | ●Winnipeg, Manitoba | Weekdays 7:30 P.M.-12 noon. Sundays 3:00-10:00 P.M. |
| 6150 | 48.78 | CB615 | ●Santiago, Chile | 12-1 P.M. 8:30-9:30 P.M. |
| 6150 | 48.78 | CO9GC | ●Santiago, Cuba | 12:00 A.M. Sat.-2:00 A.M. Sunday. Friday 7:30 A.M.-11 P.M. |
| 6150 | 48.78 | CSL | ●Lisbon, Portugal | 7:30-8:30 A.M. 2:30-7:00 P.M. |
| 6140 | 48.86 | W8XK | ●Pittsburgh, Pa. | 9:00 P.M.-1:00 A.M. daily |
| 6135 | 48.90 | HJ4ABP | ●Medellin, Colombia | 6-10:30 P.M. |
| 6130 | 48.92 | ZGE | ●Kuala Lumpur, S.S. | Sun., Tues, Fri. 6:40-8:40 A.M. |
| 6130 | 48.92 | XEXA | ●Mexico City, Mexico | 8-11:30 A.M. 3-6 P.M. 7-11 P.M. |
| 6130 | 48.92 | TGX | ●Guatemala City, Guat. | Irreg. |
| 6130 | 48.92 | COCD | ●Havana, Cuba | Sunday 11 A.M.-2:00 P.M. 7:00-10 P.M. Weekdays 11:30 A.M. to 11 P.M. |
| 6130 | 48.92 | LKJ1 | ●Jeloy, Norway | 10:00 A.M.-6:00 P.M. |
| 6120 | 49.02 | XEFT | ●Vera Cruz, Mexico | Mon. to Fri. 11 A.M.-4 P.M. 7:30 P.M.-12 Midnight. Sat. 11 A.M.-4 P.M. 6:30 P.M.-12 Midnight. Sun. 11 A.M.-4 P.M. 9 P.M.-Midnight |
| 6120 | 49.02 | W2XE | ●Wayne, N. J. | 10-11 P.M. |
| 6115 | 49.06 | HJ1ABE | ●Cartagena, Colombia | Daily 11 A.M.-12:30 P.M. 4-5 P.M. Monday 7-9:30 P.M. 10:30-11:30 P.M. Tues. to Fri. 7-9:30 P.M. Sat. 6-8 P.M. Sunday 9 A.M.-2 P.M. |
| 6110 | 49.10 | HJ4ABB | ●Manizales, Colombia | 11:00 A.M.-1:00 P.M. 5:00-8:00 P.M. |
| 6110 | 49.10 | VUC | ●Calcutta, India | Mon. 8-9 A.M. Wed. 10:30-11:30 A.M. |
| 6110 | 49.10 | VE9HX | ●Halifax, Nova Scotia | 4-10 P.M. |
| 6110 | 49.10 | GSL | ●Daventry, England | 10-11:05 P.M. |
| 6100 | 49.18 | W9XF | ●Chicago, Illinois | Sun., Tues., Thurs., Fri. 9 P.M.-2 A.M. Mon., Wed., Sat. 1-2 A.M. |
| 6100 | 49.18 | W3XAL | ●Bound Brook, N. J. | Mon., Wed., Sat. 4:00 P.M. 12:00 A.M. |
| 6095 | 49.22 | CRCX | ●Bowmansville, Ont. | Sun. 12 noon-12 A.M. Mon. to Sat. 6 P.M.-12 A.M. |
| 6090 | 49.26 | VE9BJ | ●St. John, N.B. | 5:00-11:00 P.M. |
| 6090 | 49.26 | ZTJ | ●Johannesburg, S. Africa | 11:45 P.M.-12:30 A.M. 3:30-7:00 A.M. 9 A.M.-4:45 P.M. |
| 6085 | 49.30 | 2RO1 | ●Rome, Italy | Mon., Wed., Fri. 6-7:30 P.M. American Hour |
| 6080 | 49.34 | W9XAA | ●Chicago, Ill. | Daily 11 A.M.-9 P.M. |
| 6080 | 49.34 | ZHJ | ●Penang, S.S. | 6:40-8:40 A.M. |
| 6080 | 49.34 | HJ4ABC | ●Pereira, Colombia | 9:30-11 A.M. 6:30-9:30 P.M. daily |
| 6080 | 49.34 | CP5 | ●LaPaz, Bolivia | 8:00-9:00 P.M. daily |
| 6080 | 49.34 | HP5F | ●Colon, Panama | Daily ex. Sunday 11:45 A.M.-1 P.M.; 7:45-10 P.M.; Sun. 10:45 A.M.-11:30 A.M.; 4-6 P.M. |

# Short-Wave Station List

| KC | Meters | Call | Location | Time |
|---|---|---|---|---|
| 6079 | 49.35 | DJM | ● Zeesen, Germany | 3-4:55 P.M. |
| 6070 | 49.42 | VE9CS | ● Vancouver, B.C. | 6:00-7:00 P.M. Sunday 1:45 P.M.-1:00 A.M. |
| 6070 | 49.42 | HH2S | ● Port-au-Prince, Haiti | 7-10 P.M. daily |
| 6070 | 49.42 | OER2 | ● Vienna, Austria | 9:00 A.M.-5:00 P.M. Saturdays until 6:00 P.M. |
| 6065 | 49.45 | HJ4ABL | ● Manizales, Colombia | 11:00 A.M.-12 noon Sat. to 5:30, 5:30-7:30 P.M. |
| 6060 | 49.50 | W3XAL | ● Cincinnati, Ohio | Daily ex. Sun. 6:30 A.M.-8 P.M., 11 P.M.-2 A.M.; Sun. 8 A.M.-8 P.M., 11 P.M.-1:30 A.M. |
| 6060 | 49.50 | HJ4ABD | ● Medellin, Colombia | 6-11 P.M. ex. Sun. 10:30 A.M.-1 P.M. |
| 6060 | 49.50 | W3XAU | ● Philadelphia, Pa. | 8-11 P.M. daily |
| 6060 | 49.50 | VQ7LO | ● Nairobi, Kenya Colony, Africa | 5:45-6:15 A.M., 11 A.M.-2 P.M. |
| 6060 | 49.50 | OXY | ● Skamleback, Denmark | 1-6:30 P.M. Sunday 10 A.M.-6:30 P.M. |
| 6050 | 49.59 | GSA | ● Daventry, England | 6-8:05 P.M. |
| 6050 | 49.59 | HI9B | ● Santiago de los Caballeros. R. D. | Sunday 12-1 A.M., 6:30-10 P.M. |
| 6043 | 49.65 | HJ1ABG | ● Barranquilla, Colombia | 11:30 A.M.-2 P.M., 5:30-11 P.M.; Sat. to 12:30 A.M.; Sunday 11 A.M.-3 P.M., 5-8 P.M. |
| 6040 | 49.67 | PRA8 | ● Pernambuco, Brazil | 9:30-11:30 A.M., 2:30-8:30 P.M. |
| 6040 | 49.67 | YDA | ● Tandjonprick, Java | 5:30-11:30 A.M., 5:45-6:45 P.M., 10:30 P.M.-1:30 A.M. |
| 6040 | 49.67 | W4XB | ● Miami, Florida | Sun. 11:30 A.M.-2:30 P.M., 9:30-10:30 P.M.; Mon., Wed., Sat., 12-2:30 P.M., 8:30-10:30 P.M.; Tues., Thurs., 12-2:30 P.M., 9:30-10:30 P.M.; Friday, 12-2:30 P.M., 9-10:30 P.M. |
| 6040 | 49.67 | W1XAL | ● Boston, Mass. | Sun. 5-7 P.M.; Mon., Tues., Thurs., 7-9 P.M. |
| 6030 | 49.75 | HP5B | ● Panama City, Panama | 12 noon-1 P.M., 8-10:30 P.M. |
| 6030 | 49.75 | PGD | Kootwijk, Holland | (P) Phones Java and E. Indies irreg. |
| 6030 | 49.75 | VE9CA | ● Calgary, Alberta, Canada | 7 P.M.-1 A.M. |
| 6025 | 49.79 | PGD | Kootwijk, Holland | (P) Phones Java and E. Indies irreg. |
| 6020 | 49.83 | PGD | Kootwijk, Holland | (P) Phones Java and E. Indies irreg. |
| 6020 | 49.83 | DJC | ● Zeesen, Germany | 11:35 A.M.-4:55 P.M., 4:55 P.M.-10:45 P.M. |
| 6020 | 49.83 | XEUW | ● Vera Cruz, Mexico | 10 P.M.-1 A.M. daily |
| 6012 | 49.85 | HJ3ABH | ● Bogota, Colombia | 11:30 A.M.-2 P.M., 6-11 P.M., Sun. 4-11 P.M. |
| 6011 | 49.89 | HJ1ABC | ● Quibdo, Colombia | Sun. 3-5 P.M., 9-11 P.M.; Mon. to Sat., 5-6 P.M.; Wed., 9-11 P.M. |
| 6010 | 49.92 | ZHI | ● Singapore, S. S. | Mon., Wed., Thurs. 5:40 8:10 A.M.; Sat. 10:40 P.M.-1:10 A.M. |
| 6010 | 49.92 | COCO | ● Havana, Cuba | Week Days 10:30 A.M.-1:30 P.M., 4 P.M.-7 P.M.; Sunday 10:30 A.M.-1:30 P.M., 4:10 P.M. |
| 6006 | 49.95 | HJ1ABJ | ● Santa Marta, Colombia | 11 A.M.-1 P.M., 7-10:30 P.M.; Sun., 1-2 A.M. |
| 6005 | 49.96 | VE9DR | ● Montreal, Que. | Used irregularly |
| 6005 | 49.96 | VE9DN | ● Montreal, Que. | Used irregularly |
| 6000 | 50.00 | XEBT | ● Mexico City, Mexico | 10 A.M.-1:45 A.M. |
| 6000 | 50.00 | RV59 | ● Moscow, USSR. | 2-6 P.M. daily |
| 5980 | 50.17 | HJ2ABD | ● Bucaramanga, Colombia | Daily 11:30 A.M.-12:30 P.M., 6-10 P.M. |
| 5980 | 50.17 | HIX | ● Ciudad Trujillo, R. D. | Mon. to Sat., 11:10 A.M.-12:40 P.M., 4:40-5:40 P.M.; Tues. & Fri. also 8:10-10:10 P.M.; Sunday 7:40-9:40 A.M. |
| 5980 | 50.17 | XECW | ● Mexico City, Mexico | 4-4:45 P.M., 10-12 M. |
| 5975 | 50.20 | XEVI | ● Mexico City, Mexico | Sun. 1-2:15 P.M.; Mon., Wed., 3-4 P.M.; Tues. & Thurs. 7:30-8:45 P.M., 10:30 P.M.-12 M.; Fri. 3-4 P.M., 9 P.M.-12 M.; Sat. 9-10 P.M. |
| 6970 | 50.25 | HJ2ABC | ● Cucuta, Colombia | 11 A.M.-12 noon, 6:30-9:00 P.M. |
| 5969 | 50.26 | HVJ | ● Vatican City, Vatican | 2-2:15 P.M., Sunday 5-5:30 A.M. |
| 5960 | 50.30 | YNLF | ● Managua, Nicaragua | 6-11 P.M. |
| 5950 | 50.42 | HJN | ● Bogota, Colombia | 8-10:45 P.M. irregular |
| 5940 | 50.51 | TG2X | ● Guatemala City, Guat. | Daily 4-6 P.M.; Mon., Thurs., Sat., 9-11 P.M. |
| 5930 | 50.60 | HJ4ABE | ● Medellin, Colombia | 11 A.M.-12 noon, 6-10:30 P.M. |
| 5920 | 50.68 | HH2S | ● Port-au-Prince, Haiti | 7-10 P.M. |
| 5900 | 50.85 | YVBRB | ● Barquisimeto, Venezuela | 12-1 P.M., 6-10 P.M. |
| 5885 | 50.98 | HCK | ● Quito, Ecuador | Mon. & Fri. 9-11 P.M. |
| 5880 | 51.02 | ETG | ● Addis Ababa, Ethiopia | Used irregularly |
| 5875 | 51.11 | HRN | ● Tegucigalpa, Honduras | Week Days 12-1:30 P.M., 6-7:30 P.M., 8-9:30 P.M.; Sun., 3-5 P.M., 6-7:30 P.M., 8-10:00 P.M. and later |
| 5865 | 51.15 | HI1J | ● San Pedro de Macoris, R. D. | Daily 11:40 A.M.-1:40 P.M., 6:10-8:40 P.M. |
| 5853 | 51.20 | WOB | Lawrenceville, N. J. | (P) Phones ZFA P.M. |
| 5850 | 51.28 | YV5RMO | ● Maracaibo, Venezuela | 11:30 A.M.-1 P.M., 5:30-10:00 P.M. |
| 5845 | 51.33 | KRO | Kahuku, Hawaii | (P) Tests early mornings |
| 5825 | 51.50 | HJA2 | Bogota, Colombia | (P) Phones HJA3 afternoons irreg. |
| 5820 | 51.50 | TIGPH | ● San Jose, Costa Rica | 7 P.M.-12 midnight |
| 5800 | 51.72 | KZGF | Manila, P. I. | (P) Tests A.M. irreg. |
| 5800 | 51.72 | YV2RC | ● Caracas, Venezuela | 8:30 A.M.-9:30 P.M. Sundays; 11:15 A.M.-1:30 P.M., 4:30-9:30 P.M. week days |
| 5790 | 51.81 | JVU | Nazaki, Japan | (P) Phones JZC early mornings |
| 5780 | 51.90 | CMB-2 | Havana, Cuba | (P) Phones and tests irregularly |
| 5780 | 51.90 | OAX4D | ● Lima, Peru | 9-11:30 P.M. Wed., Sat. |
| 5760 | 52.08 | HJ4ABD | ● Medellin, Colombia | 10:30 A.M.-1 P.M., 6-11 P.M. |
| 5750 | 52.17 | XAM | Merida, Mexico | (P) Phones XDR - XDF early evenings |
| 5730 | 52.36 | JVV | Nazaki, Japan | (P) Phones JZC early A.M. |
| 5720 | 52.45 | YV10RSC | ● San Cristobal, Venez. | 11 A.M.-12 N., 6-8:30 P.M. |
| 5713 | 52.51 | TGS | ● Guatemala City, Guat. | 6-9 P.M.; Sun. 6-8 P.M. |
| 5705 | 52.59 | CFU | Roseland, Canada | (P) Phones CFO and CFN evenings; news 8:30-8:45 P.M. |
| 5670 | 52.91 | DAN | Nordenland, Germany | (P) Phones ships irreg. |
| 5500 | 54.55 | TI5HH | ● San Ramon, Costa Rica | 3:30-5 P.M., 8-9:30 P.M. daily |
| 5445 | 55.10 | CJA7 | Drummondville, Que. | (P) Phones Australia early A.M. |
| 5435 | 55.20 | LSH | Buenos Aires, Arg. | (P) Relays LR4 and tests evenings |
| 5410 | 55.45 | ZBW | ● Hong Kong, China | 1:30-3:15 A.M., 6 A.M.-12 N. |
| 5400 | 55.56 | HJA7 | Cucuta, Colombia | Phones irregularly; broadcasts music in evening at times |
| 5400 | 55.56 | HJA7 | ● Cucuta, Colombia | Monday 4-8 P.M. |
| 5395 | 55.61 | CFA7 | Drummondville, Que. | (P) Phones No. America irregular |
| 5260 | 57.03 | WQN | Rocky Point, N. Y. | (E) Program service; irregular |
| 5140 | 58.37 | PMY | Bandoeng, Java | (E) Phones and relays programs 4:45-10:45 A.M., 5:45 P.M.-2:15 A.M. |
| 5110 | 58.71 | KEG | Bolinas, Calif. | (P) Phones irregularly evenings |
| 5080 | 59.08 | WCN | Lawrenceville, N. J. | (P) Phones GDW evenings seasonally |
| 5025 | 59.76 | ZFA | Hamilton, Bermuda | (P) Phones WOB evenings |
| 5040 | 59.25 | RIR | Tiflis, USSR. | (P) Phones afternoons irregular |
| 5015 | 59.82 | KUF | Manila, P. I. | (P) Phones Bolinas; irregular |
| 4975 | 60.30 | GBC | Rugby, England | (P) Phones ships afternoon and nights |
| 4905 | 61.16 | CGA8 | Drummondville, Que. | (P) Phones GDB - GCB afternoons |
| 4820 | 62.20 | GDW | Rugby, England | (P) Phones WCN-WOA evenings |
| 4810 | 62.37 | YDE2 | ● Solo, D. E. I. | 5:30-11:30 A.M., 5:45-6:45 P.M., 10:30 P.M.-1:30 A.M. |
| 4795 | 62.56 | VE9BK | ● Vancouver, Canada | Week days 11:30-11:45 A.M., 3-3:15 P.M., 8-8:15 P.M.; Sat. 7:30-7:45 P.M. |
| 4752 | 63.13 | WOY | Lawrenceville, N. J. | (P) Tests irregularly |
| 4752 | 63.13 | WOO | Ocean Gate, N. J. | (P) Phones ships irreg. |
| 4752 | 63.13 | WOG | Lawrenceville, N. J. | (P) Phones Rugby irreg. |
| 4600 | 65.22 | HC2ET | ● Guayaquil, Ecuador | 9:15-10:45 P.M. Wed. & Sat. |
| 4555 | 65.95 | WDN | Rocky Point, N. Y. | (P) Tests Rome and Berlin evenings |
| 4550 | 65.93 | KEH | Bolinas, Calif. | (P) Phone; irreg. |
| 4510 | 66.52 | ZFS | Nassau, Bahamas | (P) Phones WND daily; tests GYD - ZSV irregular |
| 4465 | 67.19 | CFA2 | Drummondville, Que. | (P) Phones No. Amer.; irregular days |
| 4348 | 69.00 | CGA9 | Drummondville, Que. | (P) Phones ships and Rugby evenings |
| 4320 | 69.40 | GDB | Rugby, England | (P) Phones CGA8 and tests evenings |
| 4295 | 69.90 | WTDV | St. Thomas, Virgin Is. | (E) Weather reports, 8 A.M.-12 Noon; 3-6 P.M. |
| 4295 | 69.90 | WTDW | St. Croix, Virgin Is. | (E) Weather reports, 8 A.M.-12 Noon; 3-6 P.M. |
| 4295 | 69.90 | WTDX | St. John, Virgin Is. | (E) Weather reports, 8 A.M.-12 Noon; 3-6 P.M. |
| 4272 | 70.20 | WOO | Ocean Gate, N. J. | (P) Phones ships afternoons and eve. |
| 4272 | 70.20 | WOY | Lawrenceville, N. J. | (P) Tests evenings |
| 4250 | 70.65 | RV15 | ● Khabarovsk, USSR. | 1:30-9:00 A.M. |
| 4002 | 75.00 | CT2AJ | ● Ponta Delgada, Azores | Wed. and Sat. 5-7 P.M. |
| 3770 | 79.60 | HB9B | ● Basle, Switzerland | Mon. Thurs. Fri. 4-6 P.M. |
| 3310 | 90.63 | CJA8 | Drummondville, Que. | (P) Phones Australia A.M. |

## BACKWASH

[*Continued from page 178*]

I've looked a long time for a magazine like it and I'm surely glad to have found it. I can only say that I wish I had found it sooner than I did.

I am mostly interested in the short-wave section, but not *one* page misses my eye. It's a swell sheet and I've told all my friends about it.

ISIDORE VERNIZZI,
STRASBURG, OHIO.

*(Thanks for the lift. You haven't seen anything yet. We've just finished oiling up the machinery and will start the old word factory going in no time now.*—THE EDITOR.).

✦

### Discovery

*Editor,* ALL-WAVE RADIO:

Just a few lines to you in regards to your ALL-WAVE RADIO magazine. I have been an s-w listener for five years and have had all sorts of short-wave receivers. I have also been reading numbers of different radio magazines. I purchased your magazine last week for the first time and have found it to be the most constructive one I have ever read . . . everything the s-w listeners want to know is right in there, ond I am certainly going to recommend it to all my friends.

PAT HALLAHAN,
BROOKLYN, N. Y.

*(Glad you discovered* AWR. *Hope your friends like it, too. But, for Pete's sake, Pat, and the rest of you,* AWR *can't be perfect. No magazine is. How about some criticisms, too? We'd appreciate them.*—THE EDITOR).

✦

### Outstanding

*Editor,* ALL-WAVE RADIO:

Have just finished reading my third copy of AWR and can frankly say I think it *the outstanding* radio magazine.

Of particular interest to me is and has been your discussions of metal tubes, "The Radio You Buy," and "Channel Echoes," by Zeh Bouck. "Queries" is splendid; also "The Radio Proving Post." The analysis of the Bosch 575-F was of particular interest to me . . . I'm something of a Bosch fan.

These are a very few of the things I more than liked in AWR—there's not a dry line in the magazine. May success and prosperity be yours.

GIL FISHER,
PLACERVILLE, CAL.

*(We trust that you will have no objections to our mentioning to our readers that Placerville, California, is or was also known as Old Hangtown. It is on the old (still existent?) Pony Express Route to Lake Tahoe. There is something about this that intrigues us—probably the contrast that is presented by the Pony Express and Radio. The old pioneer incessantly fought time and distance; radio has annihilated time and brought the whole immediate world into everyone's home. Old Hangtown and Shanghai touch hands.*—THE EDITOR).

✦

### Midnight Oil

*Editor,* ALL-WAVE RADIO:

You are certainly putting out a fine radio magazine, and one that I am glad to recommend to my friends. Here's to your continued success with its publication. One of the fine features of the magazine is the page for readers to express their opinions.

Why not sponsor an All-Wave Radio Club and some sort of contest for the best DX list for a given period, or the best "Dug Out" or "Listening Post?"

How about a "Midnight Oil DX Club?" In the old days at school we used to burn the midnight oil trying to make x equal y. Now we burn the midnight oil trying to tune in XYZ, so to speak.

JOHN L. HOWE,
IRVINGTON, N. J.

*(Thanks for the kind words and the good ideas. We have something of the sort on tap, but the plans are not as yet completed. We hope to break it very soon.*—THE EDITOR).

✦

### Intrepid DXer

*Editor,* ALL-WAVE RADIO:

It is 65 miles to the nearest newsstand, and it takes too long to get my copies of AWR that way—so here's my subscription.

I have been interested in short-wave radio for a good many years and have through those years read about every U. S. magazine relating thereto. AWR, as Zeh Bouck would say, is there without drivel or bunk.

BRUCE H. HART,
PINE RIVER, MINN.

*(Thanks for the Roses. Pleased to have your sub., but you're getting soft! What's 65 miles to a real DXer? Seriously, we wouldn't travel that distance for anything less than a half interest in RCA.*—THE EDITOR.)

✦

### 45,561 U. S. HAMS

There are 45,561 amateur radio stations licensed by the Federal Communications Commission at the end of the last fiscal year, June 30, 1935, the FCC stated in its report to Congress.

## NOISE SILENCER ADAPTER

[*Continued from page 155*]

was resorted to by the necessity of making it possible to install the unit easily in a wide variety of receivers. The chassis slides out of the box like a drawer. This makes it possible to first mount the box in any desired position, and then slide the chassis into place. Two screws at the rear then hold the chassis firmly in position. The two essential requirements are; first, to keep the leads to the i-f socket and transformer as short as possible, and second, to make the shaft of the threshhold potentiometer available as a panel control. In cases where it is impossible to bring the shaft out directly, one of the new flexible couplings which enable one to "turn a corner" with a shaft is a handy thing to have. Naturally, each type of receiver has different requirements and it would be impossible to describe them here.

### *Noise Silencing on Strong Signals*

Many types of receivers having one i-f stage do not employ a sensitivity or r-f gain control. The avc action of the receiver prevents blocking on loud signals and the volume is adjusted by a control in the audio system. Best noise silencing action is obtained if the signal input is not too high. When strong signals are tuned in, particularly on the 50-kw broadcasters, the threshhold adjustment must be made so that the bias on the noise amplifier and rectifier is high, otherwise the signal will block itself out. With high bias on these tubes, fairly large noise pulses will come through before silencing action takes place. This condition can easily be remedied by the installation of a 1000-ohm potentiometer across the antenna and ground posts of the receiver, connecting the antenna lead-in to the arm. It is then possible to reduce the signal input so that the noise action can be made far more effective.

Of course, many fans have little or no trouble on the regular broadcast band and loud short-wave stations, so in such cases this addition is not necessary.

### *Natural Static*

Little has been said in regard to the effect of the adapter on natural static. With the summer season coming on the user of the silencer will find that when the lightning flashes across the sky the loudspeaker will no longer attempt to leap into his lap. A short gap of "silence" is the worst thing that can occur. No claim is made that man-made or natural static will be eliminated completely. However, the silencer will enable the listener to "salvage" programs that would otherwise be nerve-wracking to listen to.



## THE HAM BANDS

[*Continued from page 173*]

the grey beard and his diplomatic pal from Scarsdale.

◆

SOME TIME BACK we read with gusto a book titled, "Fun In Bed." It gave us a lot of good ideas, but we have since learned that for rip-roaring belly laughs, there is nothing like the fun one can have with a mal-adjusted Lamb Noise Silencer. It is simply and absolutely the berries for creating all sorts of queer tricks for the enjoyment and edification of visitors and transient Hams. It has Bob Burn's Bazooka beaten all hollow.

We are now working on a book titled, "Mary Had a Little Lamb Noise Silencer—and *Boy* Did She Have Fun!"

## QUERIES

[*Continued from page 175*]

rated by 75 or more degrees of longitude, and some distance north or south of the equator, such as New York City and Istanbul, Turkey. Such points are directly east or west of each other. Plot a great circle course between them with the string on the globe, and note the angle which the string makes with the parallel at the two points (either one of which may be taken as the receiving point), and the arc it makes with the parallel.

## HAM HISTORY

[*Continued from page 158*]

lie. All he usually asks is a bit of co-operation from the listener.

*(This completes the series of three articles on the Story of Amateur Radio. There will follow a number of articles dealing with the technicalities and technique of the art, together with some interesting sidelights on learning the code and getting started as a Ham. We are sure you will find these articles interesting and instructive, even though you may have no intentions of becoming an amateur.*—THE EDITOR).

[*Continued from page 177*]

tion of the scale. It is only necessary to tune slightly beyond the desired point on the scale and then reverse the knob rotation. The scale coverage provided by the slow-action mechanism is sufficient to provide vernier action over most of the individual short-wave bands.

The Station Selector control is free of play and backlash, but is rather stiff in operation when used for fast tuning. However, one habitually resorts to the vernier action for most tuning, and in this ratio the knob moves with comparative ease.

The Band Selector and Scale Switch is also stiff, as most of these switches are. When changing from one wave-band to another, the straight-line tuning scale revolves and brings the proper scale into position. The mechanism is shown in sketch B of Fig. 1. The sketch to the left shows that the dial scales are on a long, narrow cylinder. This cylinder is geared to the Band Selector knob so that a turn of the knob will also revolve the cylinder, bringing the proper scale into position. The pointer controlled by the tuning knob travels horizontally along the complete length of each scale. Once the operator becomes used to the functioning of this unique mechanism, tuning is comparatively easy.

### *Receiver Calibration*

The receiver is very accurately calibrated and has negligible frequency drift. This is no doubt due to the fact that all trimmer and padder condensers are of the air-dielectric type. We had no difficulty in determining stations in the medium short-wave bands by the direct reading of frequencies on the dial scale. It is not possible, of course, to read frequencies with a high degree of accuracy on the shorter wave-bands due to the slow motion of the single dial pointer.

The receiver has good avc action and is practically free from image response. Selectivity is excellent and so is sensitivity.

The three controls below the tuning scale are smooth and easy in operation. The Sensitivity Control is handy for the purpose of reducing background noise when tuning between stations. It is also effective in reducing certain forms of station interference when the signal being received has a comparatively high level.

The Volume Control is well graduated and its compensating effects at low volume levels are apparent. It is quiet in operation.

The Tone Control provides quite a wide range of high-frequency attenuation and, aside from its value in permitting the operator to adjust frequency response to suit the program, serves to reduce background noise on weak-signal reception when it us turned to the low-frequency position.

This receiver has exceptionally fine tone and clarity of response. Much of this is no doubt due to the Class AB pentode output stage, and to the dimensions of the loudspeaker—large for the average table model set. Full undistorted output can be handled without the slightest trace of microphonics, speaker rattle or cabinet vibration. This speaks well for the general design of the receiver, and knocks into a cocked hat the belief held by many that the all-metal type tube can't take it. If anything, the functioning of the set suggests that the metal tube is doing a better job than the glass type would under identical conditions.

### *Reception Reports*

The 140 to 410-kc band brought in the usual batch of weather forecast and aircraft beacon stations. Nothing unusual about this band.

On the standard broadcast band range, 36 stations were logged in the late afternoon. On the scale of the A-82, this is equivalent to 0.6 station per dial division. In the early evening, 86 stations were brought in between 550 and 1500. This is equivalent to 1.5 stations per scale division. KFI was tuned in free of interference later in the evening.

The 49-meter band brought in a host of stations, some of which were: Prado. OAX4G, YV3RC, CO9GC, W9XF, W8XK, W4XB, XEBT and HVJ. One sitting during an evening brought in a total of 48 stations in and near this band.

At 31 meters we had JAO (code) on the edge of the band and FZR (code) right in the band. Some of the broadcast stations received were; W1XK, W2XAF, VK3ME, CT1AA, YDB, 2RO, GSB, DJA and COCH.

In the 25-meter band we had Italy, England, Germany, RPT (code,) W8XK, HH2T, CO9WR, HJ4ABA and KIO.

In the vicinity of the 20-meter amateur band we had KWU, WMN, HRX7 and, in code, JNF-J.

A few of the stations picked up in the 20-meter amateur band were; CO7CX, G5ML, G5NI, HI5X, HP1A, NY2AE, VE1VT, VE3GS, VE4CP, VE4GL, VE5OT and YN1OP. We also had VE4AW, in Calgary, who was perfectly intelligible through rather bad QRM, yet he was testing *in a whisper!*

A scattering of stations were picked up in the frequencies between 15 and 19 megacycles. These were, LSQ (LSL according to list), KKP, KWO, OEV, GAA and PCY. Also the broadcast stations W2XE and W3XAL.

The receiver proved itself conclusively to be A-1 in operation.

## FOOTLOOSE REPORTER

[*Continued from page 167*]

cracking riddles with K6LJB, in Honolulu."

The receiver said, "How's may modulation?" and I nearly jumped out of my seat.

"*That's* it!" I yelled; "that's the thing I hear when I listen in."

Joe laughed. "What's so terrible about it?" he wanted to know.

"Why, I exclaimed, "it's about the only thing the amateurs talk about."

Joe shook his head. "You can't say it's that bad. And it's not the joke people think it is. After all, it's the only way we can tell what sort of signals we are putting on the air. If a station is over-modulating, the sidebands are rough and the voice of the operator spills over into the band and causes interference. No ham wants his sidebands splashing into other signals, so he tries to keep a weather eye on his percentage of modulation. The average Ham is so careful, as a matter of fact, that he doesn't modulate the carrier as much as he should to get the full effect of the available carrier power at the receiving end."

Joe inclined his head toward a cathode-ray oscillograph on the operating table. "Some of us who are lucky enough to own oscillographs can tell accurately what per cent we are modulating our carrier wave, or by tieing it in with the receiver, we can tell how much the other fellow is modulating. Of course, these oscillographs run into money, but a chap who has one is always glad to check and report on received signals for a fellow Ham. So you see," he concluded, "all that talk on the air about modulation isn't just to pass the time or make conversation. Some Hams almost weep when they learn that their carriers are being over-modulated."

Joe pushed up the gain control on the receiver and we heard a female voice singing a call. It was set to the tune of "Oh, we're drinking number one, drink 'er down." She started;

*"Calling CQ, CQ, CQ, calling CQ,*
*Calling CQ, CQ, CQ, calling CQ.*
*This is W9KCL*
*And my name is Annabelle,*
*And I'd like to get a call from some of you."*

Joe roared. "Not bad. There's a lot of good ones. W6CNE ends up by saying, 'Out in Hollywood where the Stars shine in the daytime'."

The receiver said, "CQ . . . this is W9CPD calling."

Joe said, "Let's hop on that fellow."

And then it came back to me suddenly that there was a transmitter as well as a receiver. But it seemed foolish to believe that the fellow would answer.

Joe flipped a switch and nothing happened. Joe talked to the microphone and still nothing happened. There was nothing but Joe's voice:

"Calling W9CPD, calling W9CPD . . . this is W2FDA; F-Florida, D-Delaware, A-Alabama; W2FDA, at Scarsdale, New York, K please."

Joe wasn't talking into the mike—he was talking *at* it. I had the odd feeling that he was just talking to himself and —against my better judgment—that the whole thing was impossible. I grabbed the camera and took a shot of him sitting there with the mike practically in his lap.

Then he reached over and flipped the switch again. The receiver burst into life and the background noise bit into my ears. No signal. I held my breath waiting for that answer. It seemed incredible that it would come. Then suddenly the background noise was cut off sharply and I knew that a carrier had been put on the air and had taken hold of the avc in the receiver. Then it came:—

"Calling W2FDA, W2FDA . . . W9CPD right back. You're badly hashed up here. Your signal is about an R6. Will you hang on while I change my antenna coupling? QRX old man."

We stood by until W9CPD came back and there followed a bit of rag chew about the rigs, the weather and, of course, modulation. When Joe signed off, he made a record of the QSO in the station log book.

It was an interesting and exciting experience, and I called for more. During my stay that evening we talked with NY2AE, HI5X, W6AWD and W7KF. This was some real DX and it just about knocked me out of my seat. Joe sensed my excitement a number of times and grinned.

"Okay," I said, "old stuff to you, but very new to me. I grant you it's the nuts and I shall go home and tell the wife to clear out the living room as we're going to crack riddles with a guy in Honolulu. It couldn't be crazier than this."

"It's such a screwy game that none of us can give it up," Joe laughed. "It gets into your blood like the sea does. I know an old c-w fellow who tried to swear off and he went around tapping out the code on everything in sight . . . railings, tableware, lunch counters, and even on his own knee. He had to come back!"

"Well," I said, "I'd better beat it for that train back to the city before I get too sold on this thing. I haven't got a sun porch, let alone a cellar or an attic."

"Don't let that worry you," laughed Joe; "lots of fellows mount their transmitters in closets or under kitchen ranges."

"What about in a desk?" I asked. "Couldn't you build a compact rig to fit into a desk?"

"You *had* better go," Joe laughed. "I don't want it said I was the one who sold you on this game."

So I went.

But it's darned interesting . . .

W. R. HYNES

# RADIO TO EYE SEA DOGS

[*Continued from page 159*]

take place over a week-end, the Garden City Radio Club will assign a radio operator and equipment to each yacht in the race. Accompanying the fleet there is to be a power boat on which there will be a radio operator and somewhat more powerful radio equipment.

It is to be the duty of the radio operator aboard each yacht to stand-by at designated schedule times for instructions from the control station aboard the power boat. Upon being told to do so, each operator aboard a yacht will report to the control station giving his position in secret code. Thus only the control station on the power boat will know where any of the yachts in the race may be. Such secrecy is necessary in order to prevent giving unfair advantage to any skipper.

### *The Idea Grows*

So much for the mobile stations. At strategic points around Long Island and on the New York and Connecticut shores, moderately powered base stations will be established. Most of these are already in existence and in daily operation in the hands of experienced operators. It is with these stations that the control station on the power boat will communicate, relaying reports as they are received from competing yachts. The land stations in turn will relay such reports to operators who will be stationed, with transmitting and receiving equipment, at each home yacht club that may have a yacht in the race being covered.

There will never be any difficulty in maintaining communication between competing yachts and their control station aboard the accompanying power boat. Similarly, communication between the power boat and land stations should not present any insurmountable difficulty for the reason that none of the yachts will ever get any very great distance from land and the power boat will quite likely be nearer land stations than any of the yachts.

Land relaying may present some difficulties because of intervening buildings and other interference, but here the problem is simple of solution because, if radio facilities break down hopelessly, there are always the land lines to fall back on.

### *Natural Hazards Reduced*

Aside from the practical value of such an ultra-high-frequency network in stepping up the interest in yacht racing, the availability of radio facilities will function to greatly reduce the natural hazard of long-distance racing. Bad weather has been known to blow yachts far off courses; accidents to racing equipment have left yachts and their crews at the mercy of the elements; and calm, the least hazardous of troubles that beset amateur sailors, may result in yachts being long over-due with resultant anxiety to many. With the possibility of constant communication, all these things become less terrifying.

The mobile equipment that is to be used may be any that the operator assigned to a yacht owns and regularly operates, provided only that it measures up to the requirements as established by the Technical Committee of the Garden City Radio Club. Such requirements are not rigid and are designed only to ensure reliable communication without danger of break-down at critical periods.

### *Typical Transmitter*

An ideal type of transmitter has been designed by Edward Ruth and built for experimental purposes. It is unusually compact considering that it has a rated input of 20 watts, normally, and may be used for either voice or ICW. Three tubes are used. A single 6A6 serves as the r-f end with another 6A6 as a Class A driver for a third 6A6 which operates as a Class B modulator. Power is supplied by a bank of heavy-duty Eveready B batteries, filaments being lighted either from the yacht's 6-volt storage battery or from a Hot-Shot. The same batteries are used on both transmitter and receiver. No transceivers will be used because of the great amount of QRM they broadcast.

### *Special Antenna*

A specially designed antenna has been developed. It consists of a half-wave di-pole radiator with a quarter-wave matching stub fed through a transmission cable which may be any necessary length without introducing appreciable losses. Thus the antenna and feeders are a perfectly straight line occupying minimum space and unlikely to cause any interference with yacht-racing gear.

Inasmuch as there are yacht races over practically every week-end during the summer and well into the Fall it is expected that the organization will be kept tolerably well busy.

To operators who have the necessary equipment and who can qualify for the work, assignment to a yacht during one of the races represents an opportunity for an interesting vacation coupled with the chance to ride a hobby in a real race and under conditions that will call for judgment, sportsmanship, and good fellowship.

## CHANNEL ECHOES

[*Continued from page 165*]

SPEAKING OF grammar, is there some good and vital reason why our commercial broadcasters must violate its elementary principles—why few announcements are heard that are not replete with split infinitives and adjectives used where every eight-year-old child is taught to employ an adverb? Such and such a soap powder "washes cleaner"—for instance?

Is it that the broadcasters are "talking down" to their audience, thus prostituting radio's vast possibilities for cultural and painless educational progress? Or is it possible that the advertising agencies and others responsible for the scripts are unaware of their solecisms? After all, they display an abysmal ignorance of other considerations even more intimately associated with ordinary intelligence.

## NIGHT-OWL HOOTS

[*Continued from page 164*]

latter succeeds remarkably in ruining WGY's signal . . . Jack Zeigin, Publicity Director at WIBM, advises that their supply of verification cards has been exhausted and that he is working on a design for a new card. . . . Stations in the Republic of Chile have new call letters as a result of the latest South American Convention held at Buenos Aires. The old prefix of CE has been dropped entirely and CB has been substituted. The call letters will consist of CB followed by the frequency in kilocycles with the final zero dropped. For example CB90 on 900 kc, and CB109 on 1090 kc.

News and information from readers will be both welcome and appreciated. Let's make this a real meeting next month.

## WORLD RADIO

[*Continued from page 172*]

ing for some time at Brussels. Case records already on file show that short-wave stations have not yet attained the frequency precision of regular broadcast transmitters, of which the greater majority are crystal-controlled.

An example of some of the reported "checking" is as follows: HVJ (Vatican City) 50.3 meters shows certain wavelength variations, but nothing like Pernambuco's Radio Club transmitter which varied between 6010 and 6038 kc in the course of a month. Lisbon (CSL), normally operating near 48.78 meters, was suddenly discovered on 48.37 meters; a notice sent to the station caused engineers to make the necessary adjustments.

The Brussels Authority will issue frequency graphs on any of the world's short-wave broadcasting stations. This step is, fortunately, in conformity with the Lucerne Plan for short waves which will be discussed (the policing part) at the next telegraphic conference to be held in Cairo sometime during 1936.

◆ ◆ ◆

### *Radio Developments in Australia*

MELBOURNE: Listener's licenses continue to increase, the total in force now exceeding three-quarters of a million. The total, 754,250, represents more than 47.57 percent of the total dwellings.

Outstanding in the development of the National broadcasting system is in equalized remote-pickup telephone lines having a frequency range from 35 to 10,000 cycles.

The cable steamer Faraday is now about to complete the laying of a submarine telephone cable connecting the island State of Tasmania with the mainland of Australia, thus providing for the former to be linked with the world telephone system, and for the transmission of programs for broadcasting. (*World-Radio.*)

◆

### *Changes in New French Short-Wave Outlet*

SOME CHANGES have been made in the construction plans of the new French short-wave station, Radio-Coloniale, according to information received in Washington at the French embassy.

"The location of this station, which has not yet been definitely determined, will be in the central part of France," Ambassador de Laboulave has been advised, "and the installations will comprise two inter-changeable emission transmitters of 100 kilowatts each. One of these transmitters will work on the strength of 50 kilowatts on the following wavelengths: 19 meters, 60; 19 meters, 65; 25 meters, 10; 25 meters, 60. The other transmitter will work on 31 meters with a power of 100 kilowatts.

"The antennas, which can be coupled with either one or the other of these transmitters, will number six."

◆

### *Detroit's New Short-Wave Station*

THE DETROIT NEWS' new short-wave station, W8XWJ, went on the air for the first time with its regular service on January 29. It operates on 31,000 kilocycles with 100 watts power. The transmitter, which is of the high-fidelity type and ultra-modern in design, is one of the few of its kind in this country and first in Michigan.

A. B. Allen, short-wave editor of the *Detroit News*, in writing of the station says:

"Although the power rating of 100 watts is comparatively low, it is believed that the signals will reach the far corners of the earth due to the frequency to be employed and the effective antenna system which will be erected over 600 feet above the street in downtown Detroit."

✦

### *Naval Time Signals on Three Frequencies*

TIME SIGNALS from the United States Naval Observatory in Washington are broadcast daily by short-wave through the Naval radio station at Arlington, Va. The broadcasts occur at 11:58 A. M. and are on the following frequencies: 8,150 and 12,225 and 16,300 kilocycles.

The broadcasts start with a series of one-second signals preliminary to sending the noon signal, which lasts exactly three-tenths of a second and starts at noon sharp after a period of ten seconds of silence.

The time signals are sent out by the automatic transmitters controlled from the Naval Observatory and are based upon intricate astronomical calculations. They give the exact Eastern Standard Time accurately to within one-thousandth of a second.

## RADIO AND THE FLOODS

[*Continued from page 183*]

Buffalo and the Pennsylvania Railroad was frantically trying to reroute its trains eastward through that city. Besides covering the big local story, WBNY issued a constant flow of flood bulletins and reported a record breaking number of phone calls.

WNBF Binghamton went on the air at 3:30 Monday March 18th., and stayed on for 66 hours. "Practically all commercial work was discontinued," said manager Cecil D. Mastin. "We had two operators at each of the six telephones. WNBF was the only means of news communication in this part of the country and it is impossible to estimate the number of calls we received."

### *New England Flashes*

In New England, independent stations generally were able to provide more frequent news on the disaster than the network outlets. WHDH and WCOP Boston were flashing constantly as the floods spread through Massachusetts. WHDH went on the air at least every fifteen minutes and frequently interrupted sustaining programs with bulletins. WCOP gave a special Red Cross flood relief program—the first in that section—and reported a tremendous response.

In Virginia, WLVA Lynchburg reported that: "Outside of each five 15-minute newscasts daily, we ran an approximately additional half hour, split into five minute flash periods in order to give complete coverage of national conditions."

As far South as WSPA Spartanburg and WSOC Charlotte, the flood news was so vivid and dramatic as to arouse greater listener interest than any other news story in months.

### *Spot Broadcasts from Schenectady*

Residents in the Mohawk and Hudson river valleys and others within the range of stations WGY, W2XAF, and W2XAD, were kept in intimate touch with March flood conditions of the rivers through "spot" broadcasts made possible with the use of General Electric's portable short-wave equipment.

The portable apparatus was used on several occasions to broadcast from scenes of the floods. A one-watt "pack" set was

used in one instance when the announcer, operating from a rowboat, described the picture on one inundated Schenectady street near the Mohawk. At Rotterdam and Aqueduct, near Schenectady, 50-watt portable equipment was used to describe first hand the plight of the towns' citizens who, in some instances, were leaving their homes in boats.

At Albany, N. Y., General Electric engineers, in co-operation with one of the capital's newspapers, used all their short-wave sets to put on a program from newly-formed banks of the Hudson river as it flooded low sections of the city.

In another broadcast, an announcer riding in the General Electric radio car, from which it is possible to carry on two-way conversation, described scenes along the rising Mohawk as the car was parked on the Western Gateway bridge between Schenectady and Scotia, N. Y.

### *Independent Power*

During the broadcasts, engineers did not have to worry about their power supply because the G-E facilities have independent power sources. Dry cell batteries are used to run the "pack" radio set; a gasoline-driven generator supplies power to the 50-watt transmitter and receiver; and the generator in the radio car furnishes electricity for the auto's communication apparatus.

### *Emergency Orders*

General Electric service shops, warehouses, local offices, and works were kept busy nights and over the week-end of March 21 and 22, caring for emergency orders resulting from flood damage. Some 34 experienced repair men were added to the force at the Pittsburgh service shop, being sent from Schenectady, Chicago, Cleveland, Newark, New York, and Buffalo construction forces; a half dozen went to Hartford; and others to the New England district. The Schenectady, Lynn, Philadelphia, Pittsfield and other plants had forces available over the week-end to care for rush shipments of motors, transformers and other complete equipment, for parts, and for work on emergency repairs.

The G-E service shop at Pittsburgh had a maximum of 10 feet of water on the first floor at the height of the flood there. Word was received by F. P. Wilson, manager of the Contract Service Department at Schenectady, that the water had receded by Friday, March 20, that operation of the ovens had been started, and that the shop was in condition for handling the work necessary in drying out, checking and otherwise servicing motors, transformers and other equipment—work which was required before utility and manufacturing plants could resume normal operations.

All local offices, warehouses and service shops throughout the flooded area received many calls for emergency service. In many cases it was necessary to contact still other warehouses or shops to locate equipment which would more exactly meet the rush demands of some particularly important job, and there were frequent instances of speedy deliveries from remote warehouses or works. Reports received at Schenectady showed that there had been many cases of exceptionally fast work, particularly when the water supplies of cities and towns were threatened.

### *Appeals by Radio*

One of the interesting services was in connection with a short-wave radio appeal, asking for a 125-horsepower induction motor required for the pumping station of the town of Tarentum, Pa., in the Pittsburgh area. A. G-E employee at Schenectady heard the appeal at his home Saturday afternoon. He notified the G.-E. office in that city; contact was established with Tarentum and the need confirmed; and the required motor was promptly sent from Schenectady by truck.

Four drums of Transil oil were delivered to a customer at Johnstown, Pa., as the result of another radio appeal. The call was heard by Station W8DYY at Cleveland, and a telegram sent from there to Schenectady. That office knew the oil was in stock at Cleveland, so telegraphed to that city. It was shipped from there to Johnstown the same day.

A hospital at Hartford, Conn., appealed for a generator—it had only two lanterns. A 150-kw generator was located at Schenectady, loaded on a truck that night, and delivered for service at 3 a.m. next morning.

The Pittsfield works received a telephone request for bearings for a motor on Saturday. Pittsfield delayed the order to Schenectady, which knew that such bearings were to be had from the New York City warehouse. The bearings were sent by special delivery mail from New York that day.

There were numerous instances where submerged motors were received at service shops Friday night and delivered on Sunday—after being disassembled, cleaned, dried out, treated with insulating varnish, and baked. There were still many other pieces of equipment received Saturday, similarly serviced, and delivered Monday.

In addition to the many jobs which were cared for in the G-E shops there were, of course, even more which were attended to by the utilities and industrial plants themselves. Hundreds of letters were sent out by the G-E to industries in the flooded areas, giving recommendations on the servicing of equipment which had been submerged—telling how to dry out motors, how to give direct-current motors their particular treatments, how to replace oil in transformers, etc. Radio, too, was pressed into service, with announcements broadcast so that those facing emergencies would know that service was available through the week-end, and through the 24-hour day.

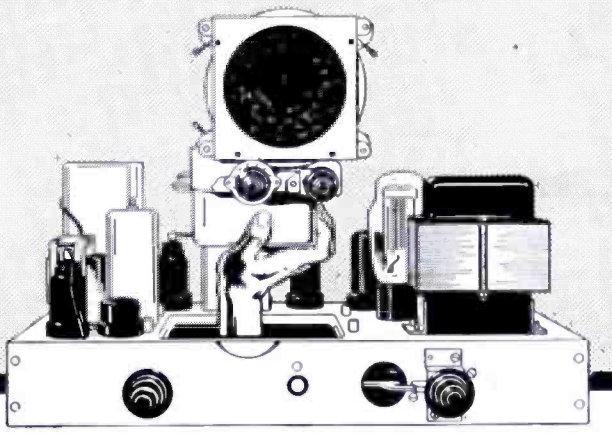







HUGHES PRINTING CO.
EAST STROUDSBURG, PA.

# NEW *and* STARTLING



**METAL TUBES** *plus the* **CENTROMATIC UNIT** *in the* **NEW 1936 AMERICAN-BOSCH RADIO** *hand you all these definite advances*

- More long and short wave stations to enjoy.
- Better, clearer, purified tone.
- Greater freedom from noise—BETWEEN stations and ON stations.
- Tuning made easier on both long and short wave.
- Surpassing dependability resulting from 90% less wiring—104 fewer soldered connections.
- Extra performance from new metal tubes.

SO MANY good radios! But the CentrOmatic Unit in the new American-Bosch helps you choose the best!

You not only can hear the difference which CentrOmatic Engineering introduces. You can actually *see* the difference! The chassis—as you can see—has a separate unit on which are centralized all the sensitive radio elments; armored and insulated from internal set noises.

That's why CentrOmatic Radio is so free from noise. That's why you can get more long and short wave stations. That's why even short wave tuning is so accurate and easy. That's why tone is so pure and rounded out. *That's why CentrOmatic Engineering means more to your enjoyment than metal tubes alone.* In American-Bosch CentrOmatic Radio you get both.

**Model 595M** — High Fidelity 10 tube, 11 tube performance, American, police and foreign, plus U. S. weather band, superheterodyne Console radio, with exclusive combination of new metal tubes and American-Bosch CentrOmatic construction. Range 540 to 18,500 Kilocycles and long wave U. S. weather band 150 to 350 Kilocycles. **$169.50**

**Model 565W**—6 tube, 9 tube performance, American, police and foreign superheterodyne Consolet with new metal tubes. Range: standard broadcast 540 to 1540 Kilocycles; police and short wave 1540 to 4200 Kilocycles; short wave 5900 to 18,200 Kilocycles. **$49.95**

**UNITED AMERICAN BOSCH CORPORATION**

**Springfield** **Massachusetts**

American-Bosch Radio is licensed under patents and applications of R. C. A. and Hazeltine Corp.

# AMERICAN-BOSCH CentrOmatic RADIO

# QUALITY INSIDE AS WELL AS OUTSIDE... *That's the Secret of Midwest's Leadership*

*Only Radio with Six Wave Bands Covering* 4½ *to* 2,400 METERS !


## 18 Tubes

· METAL OR GLASS ·

**6 WAVE BANDS**

**80 Advanced Features**

18 Tubes and 6 wave bands are but two of the 80 advanced features that include every worthwhile advantage, that even the most critical radio technician and enthusiast could ask for. Some of the other exclusive features are: Station Finder Button, enabling "hams" to secure CW—Silencer Button, which silences the set between stations—38 Tuned Circuits give Maximum Selectivity—4 Gang Condensors—Reinforced Capacitors and Pre-aged Intermediate Frequency Transformers prevent drift, etc. The balance of the 80 features are described in detail on pages 12 to 21 inclusive, of the new FREE 40-page catalog.

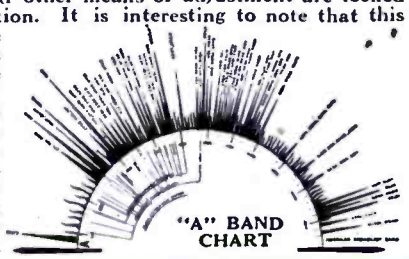
Before you buy any radio, write for the free 40-page 1936 catalog, and learn about the successful Midwest Laboratory - To - You policy that saves you 30% to 50%, that gives you 30 days free trial in your own home. No middlemen's profits to pay. You buy at wholesale price, direct from Laboratories . . . making your radio dollar go twice as far. You can order your 1936 Midwest radio from the new 40-page catalog with as much certainty of satisfaction as if you were to come yourself to our great laboratories.


## SAVE UP TO 50% *Direct from Midwest Laboratories*

ONCE again, Midwest demonstrates its leadership by offering the world's most powerful super deluxe 6-tuning range radio. It is a master achievement ...today's most highly perfected, precisely built, laboratory tested unit. It is a radio-musical instrument that will thrill you with its marvelous super performance...glorious new acousti-tone...crystal-clear "concert" realism...and magnificent foreign reception.

**Only Midwest Gives 6 Tuning Ranges (4½ to 2400 Meters)**

Midwest is the only radio in the world that positively covers every possible and useful wave band. Accurately made, precisely assembled, rigidly tested, this 18-tube Super De Luxe radio assures the brilliant super performance that radio "hams" and enthusiasts demand. The 18 tubes permit of advanced circuits making it possible to use the tremendous reserve power, and to exert the sustained maximum output of the powerful new tubes. These sets are vibration tested, many times, until "creeping screws" and other means of adjustment are locked permanently in position. It is interesting to note that this is the only home receiver that is "aged." All shrinkage and drift are completely eliminated by the use of such features as reinforced capacitors, pre-aged intermediate frequency transformers, as well as elaborate pre-aging tests and processes.


"A" BAND CHART

*Today's Greatest Radio Value*

**$77.45** COMPLETE *with 18 Tubes and* GIANT THEATRE-SONIC SPEAKER

**TERMS** AS LOW AS $5.00 DOWN

The Midwest "A" band chart, illustrated at left, shows how the perfect reception of the Midwest equalizes the widely varying powers assigned to those fortunate stations enjoying cleared channel and semi-cleared channel broadcasting. These stations come in clearly and with equal volume. The short wavering lines indicate that many stations are operating on the same wave length. These stations are useful only when one of them is located close to your set. Charts, illustrating the stations that can be secured on the five additional bands, are pictured on pages 20 and 21 of the Midwest catalog.

You save 30% to 50%. . . you get 30 days FREE trial. . . . as little as $5.00 down puts a Midwest radio in your home. You are triply protected with a One-Year Guarantee, Foreign Reception Guarantee and Money-Back Guarantee. Write for FREE 1936 catalog. See for yourself that this super radio will out-perform sets costing two and three times as much.

MIDWEST QUALITY RADIOS SINCE 1920

## MAIL COUPON TODAY *for* FREE 30-DAY TRIAL OFFER *and* 40-PAGE FOUR COLOR CATALOG

**MIDWEST RADIO CORPORATION, Dept. 128L, Cincinnati, Ohio.**

Without obligation on my part, send me your new FREE catalog, complete details of your liberal 30-day FREE trial offer, and FREE Miniature Rotating 18-tube Dial. This is NOT an order.

Name .....

Address .....

Town ..... State .....

Check ☐ if interested in a Midwest All-Wave Battery Radio

User-Agents Make Easy Extra Money

Check Here for details ☐