

ANNUAL SHORT-WAVE NUMBER

RADIO NEWS

AND

SHORT WAVE RADIO

SHORT
WAVE
TIME
TABLE

JUNE



SHORT-WAVE DX'ing

A FINE HOBBY FOR
THE WHOLE FAMILY



FOR 1937

**INSTALL A
G-E Auto Radio
IN YOUR CAR!**

ENJOY RADIO PROGRAMS WHEREVER YOU GO

WITH

Safety Tuning



MODEL FA-80
(8 G-E Metal Tubes)

**Stations Hair-lined Tuned . . . At a Flick of the Dial!
Eyes Concentrated on the Road While Driving and Tuning!**

"FLICK . . . There's Your Station." The driver merely turns the dial to approximately the station's dial position . . . and PRESTO! . . . the program comes in instantly. In a "split second," Automatic Frequency Control shifts the station

into its correctly tuned position. Enjoy reception equal in performance to that obtained on finest home-type sets. Arrange, through your nearest G-E Auto Radio Dealer, for a demonstration of this sensational GENERAL ELECTRIC AUTO RADIO.

TWO Additional POPULAR MODELS



MODEL FA-61



MODEL FA-60

There are also two 8-tube G-E Auto Radio models to choose from.

"CUSTOM-BUILT" INSTRUMENT PANEL CONTROLS FOR ALL MAKES OF CARS




They harmonize correctly with interior decorations.

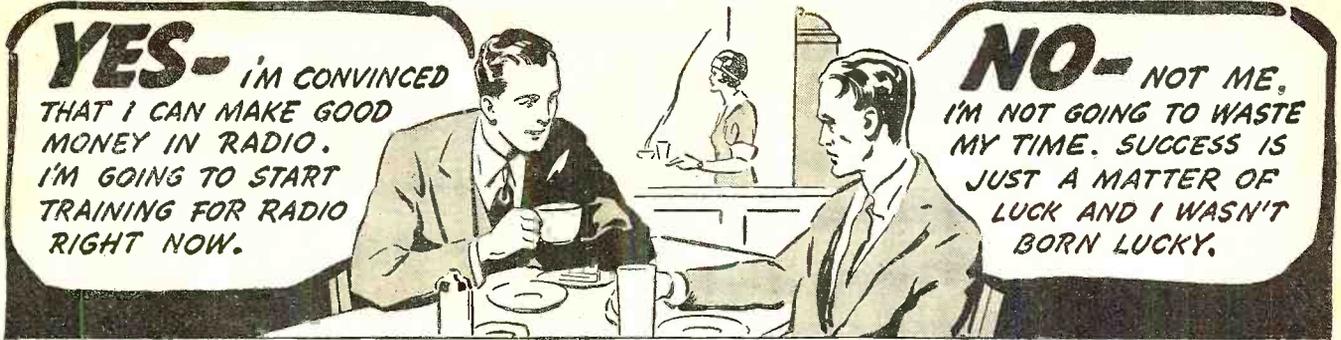
G-E AUTO ANTENNAS FOR HOME-LIKE RECEPTION



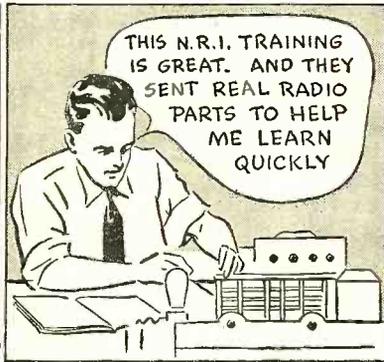

Four new Auto Antennas specially designed for car operation. Easy to install on all cars. Ask for a demonstration.

GENERAL  ELECTRIC
Auto Radio

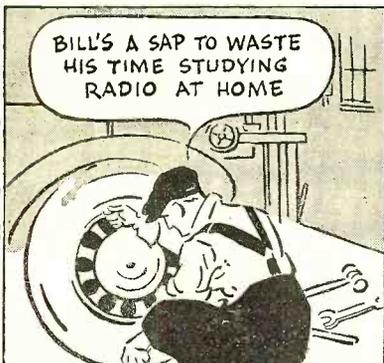
APPLIANCE AND MERCHANDISE DEPARTMENT, GENERAL ELECTRIC COMPANY, BRIDGEPORT, CONNECTICUT



BILL SAID "YES" HE'S MAKING GOOD MONEY IN RADIO NOW



TOM SAID "NO" HE'S STILL WAITING FOR "LUCK"



I WILL TRAIN YOU AT HOME *in Spare Time* FOR A GOOD RADIO JOB



J. E. SMITH, President National Radio Institute

Get My FREE LESSON on Radio Servicing Tips

My sample lesson text, "Radio Receiver Troubles—Their Cause and Remedy" covers a long list of troubles in A.C., D.C., battery, universal, auto, T.R.P., super-heterodyne, all-wave, and other types of sets. 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. Just mail coupon.

MAIL COUPON NOW

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

Do you want to make more money? Broadcasting stations employ engineers, operators, station managers and pay up to \$5,000 a year. Spare time Radio set servicing pays as much as \$200 to \$500 a year—full time servicing jobs pay as much as \$30, \$50, \$75 a week. Many Radio Experts own their own full time or part time Radio businesses. Radio manufacturers and jobbers employ testers, inspectors, foremen, engineers, servicemen, paying up to \$6,000 a year. Radio operators on ships get good pay and see the world besides. Automobile, police, aviation, commercial Radio, and loud speaker systems offer good opportunities now and for the future. Television promises many good jobs soon. Men I trained at home are holding good jobs in all these branches of Radio.

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

Practically every neighborhood needs a good spare time serviceman. The day you enroll I start sending you Extra Money Job Sheets. They show you how to do Radio repair jobs that

you can cash in on quickly. Throughout your training I send you plans and ideas that have made good spare time money for hundreds of fellows. I send you special equipment which gives you practical Radio experience—shows you how to conduct experiments and build circuits which illustrate important principles used in modern Radio sets.

Find Out What Radio Offers You

Mail the coupon now for "Rich Rewards in Radio." It's free to any fellow over 16 years old. It describes Radio's spare time and full time opportunities; also those coming in Television; tells about my training in Radio and Television; shows you actual letters from men I have

trained, telling what they are doing and earning; tells about my Money Back Agreement. MAIL THE COUPON in an envelope, or paste it on a penny postcard—NOW!

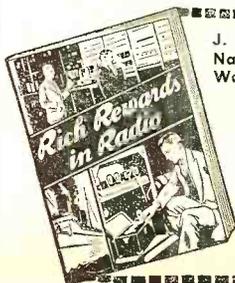
J. E. SMITH, President National Radio Institute, Dept. 7FR Washington, D. C.



J. E. Smith, President Nat. Radio Inst., Dept. 7FR Washington, D. C.

Dear Mr. Smith: Without obligating me, send "Rich Rewards in Radio," which points out the spare time and full time opportunities in Radio and explains your 50-50 method of training men at home in spare time to become Radio Experts. (Please Write Plainly.)

NAME..... AGE.....
 ADDRESS.....
 CITY..... STATE..... 14X-1





Edited by LAURENCE MARSHAM COCKADAY

S. GORDON TAYLOR
Managing Editor

WILLIAM C. DORF
Associate Editor

JOHN M. BORST
Technical Editor

JOHN H. POTTS
Assoc. Tech. Editor

HARRY VIERLING
Art Editor

Vol. XVIII June, 1937

No. 12

Reading Guide to this Issue—

AMATEURS—2, 3, 4, 7, 8, 9, 11, 12, 15, 16, 17, 18, 19, 20, 21, 24, 25, 28, 29, 30
 BROADCAST FANS—1, 2, 4, 7, 8, 10, 11, 13, 21, 29, 30, 31
 DEALERS—1, 4, 6, 8, 18, 25, 26, 29, 30
 DESIGNERS—4, 9, 24, 25, 29, 30
 DX FANS—2, 4, 5, 6, 7, 9, 10, 11, 13, 21, 22, 23, 29, 30
 ENGINEERS—4, 16, 24, 25, 29, 30
 EXPERIMENTERS—2, 4, 8, 9, 12, 15, 16, 17, 19, 20, 22, 24, 25, 29, 30
 MANUFACTURERS—4, 29, 30
 OPERATORS—2, 4, 7, 8, 9, 11, 12, 17, 20, 28, 29, 30
 SERVICEMEN—1, 3, 4, 5, 6, 8, 9, 10, 13, 18, 19, 21, 24, 25, 26, 29, 30
 SET BUILDERS—3, 4, 6, 8, 9, 15, 20, 22, 24, 25, 29, 30
 SHORT-WAVE FANS—2, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 16, 17, 21, 29, 30
 STUDENTS—1, 2, 3, 4, 7, 8, 9, 11, 13, 15, 16, 17, 18, 19, 20, 21, 22, 24, 25, 26, 27, 28, 29, 30
 TECHNICIANS—1, 4, 9, 12, 18, 19, 20, 24, 25, 26, 29, 30

Coming Next Month

THE vacuum-tube voltmeter is recognized as an invaluable instrument in laboratories but its value to servicemen, experimenters and amateurs is less widely appreciated. The July issue will provide constructional details on a good one and will describe its numerous practical applications.

This issue will also contain a review of the inter-office call system equipment now on the market—equipment which is enjoying an unprecedented vogue and represents the latest excursion of the audio amplifier arts into communication fields.

1	Serviceman's Diary.....	Anonymous	708
2	World Distance Map.....		709
3	Short Waves in the Classroom.....	Samuel Kaufman	711
4	What's New In Radio.....		713
5	The DX Corner for Short Waves.....	S. W. D.X. Editor	714
6	World Short-Wave Time-Table.....		716
7	Time Conversion Chart.....		719
8	More About Time Signals.....	The Technical Editor	720
9	Wavelength-Frequency Conversion Chart.....		721
10	Testing a Three-Band Superhet.....	William C. Dorf	722
11	U. S. and World-Wide Mileage Chart.....		723
12	Short-Wave Station List of the World.....		724
13	Low-Priced Super.....	Richard Feeney	727
14	Where to Write for Short-Wave Veri's.....		728
15	The "Quartet" 5- 10-Meter Super (Part 3).....		730
16	Remember May Ninth (5-Meter DX).....	Laurence M. Cockaday	731
17	The "Ham" Shack (Learning the Code).....		732
18	New Stream-Lined "Mike".....	Robert Ames	733
19	C-Bias Supply.....	Orin J. Landis (W8ILN)	733
20	5-Meter Receiver-Transmitter.....	Nat Bishop (W1EYM)	734
21	An Evening With New 500-22,000 kc. Super.....	Everett M. Walker	736
22	The Radio Beginner (Part II).....	John M. Borst	737
23	The DX Corner for the Broadcast Band.....	S. Gordon Taylor	738
24	Designing Resistance-Coupled Amplifiers.....	J. van Lienden	739
25	Building a 60-Watt Amplifier.....	John H. Potts	740
26	The Service Bench.....	Zeh Bouck	742
27	Students' Radio Physics Course.....	Alfred A. Ghirardi	744
28	Q R D?.....	By G Y	746
29	The Technical Review.....		748
30	Free Booklet Service.....		749
31	New Zealand Broadcast Listeners.....		767

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

Lee Ellmaker
President and Treas.

B. Holcepl
Secretary

H. D. Crippen W. P. Jeffery
Advertising Management

Virgil Malcher

205 W. Wacker Dr., Chicago
Western Representative

EDITORIAL AND EXECUTIVE OFFICES

461 EIGHTH AVENUE, NEW YORK CITY, N. Y.

Entered as second class matter at the Post Office at Dunellen, N. J., under the act of March 3, 1879. Copyright, 1937, by Teck Publications, Inc., in U. S. and Canada. All rights reserved. Registration of title of this publication as a trade mark applied for in United States Patent Office. Printed in the United States of America. The contents of this magazine must not be reproduced without permission. We cannot be responsible for lost manuscripts, although every care is taken for their safety.

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

A STUDY OF THE *Technical* DETAILS

A Comparison of Its Overall Fidelity, Selectivity, Sensitivity, Power Output, Tone Balance, 10,000 Cycle Attenuation, Loud Speaker Response, Noise Suppression, and Automatic Gain Control, as shown by proved Laboratory Curves (sent upon request) will prove conclusively that The Philharmonic:

1. Covers a *Greater Wave Length Range*. (3.75 to 2000 Meters.)
2. Has *Finer Tone and Higher Overall Fidelity*. (From 30 to 16,000 Cycles.)
3. Has a *Smoother and More Highly Perfected Continuously Variable High Fidelity Range*.
4. Has *Sharper and More Complete Attenuation at 10,000 Cycles*.
5. Has *Purer and More Perfect Fundamental Bass Response* which is Free from Cabinet Boom and Resonance.
6. Has *More Perfect Tonal Balance* at all degrees of Volume—giving the Same Perfect Reproduction of the Bass and Higher Frequencies at Low as well as High Volumes.
7. Has *Greater Pure Class A Output with Less Harmonic Distortion*.
8. Has *Smoother Loud Speaker Frequency Response* from 30 to 16,000 Cycles.
9. Has a *Higher Degree of Selectivity*, which is Continuously Variable from 2 to 16 Kc.
10. Has *More Perfect Automatic Gain Control Systems* on both R.F. and I.F. Amplifiers.
11. Has *More Usable Sensitivity*.
12. Will Give *Smoother and More Noise-Free Reception* of All Programs, Especially in Difficult Receiving Locations.
13. Has a *More Highly Developed and Distortionless Program Volume Range Expansion System*.
14. Will Give *More Perfect Reproduction from Phonograph Recordings*, Especially the Latest High Fidelity Records.
15. Will Eliminate Phonograph Needle Scratch at Low Volumes, Without Affecting Reproduction of Low, Mid, or High Frequencies in Any Way at Normal or High Volumes.
16. Is *Custom Built with Greater Precision*—And from Higher Quality Parts.
17. Has *More Advanced Engineering Features* Incorporated in Its Design.

MORE, WE BELIEVE, THAN ANY OTHER RADIO RECEIVER IN THE WORLD TODAY.



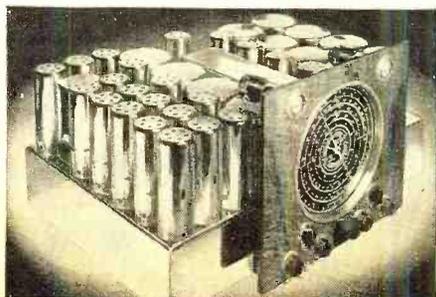
THE NEW SCOTT *Philharmonic*

A REMARKABLE NEW *Custom-Built* RECEIVER THAT *Far Surpasses* ALL PREVIOUS STANDARDS OF DISTANCE, POWER, TONE AND BEAUTY

Scott Research Laboratories have again set entirely new standards of radio performance. The new Scott Philharmonic, with eight new developments, 30 tubes, sharper selectivity, and greater sensitivity, enables you to tune foreign stations from the farthest corners of the earth with greater ease and clarity than ever before. Its tremendous power brings in weak stations that are seldom heard on other receivers. A study of the technical features will tell you that the new Philharmonic is no ordinary receiver, but years

ahead in design, a remarkable achievement in advanced radio engineering. Custom-built by hand with the precision of a fine watch. Guaranteed 5 years. The Scott Philharmonic stands head and shoulders above the field . . . a splendid example of the highly skilled craftsmanship which has won acclaim for Scott Receivers among noted artists, DX enthusiasts, radio engineers, and distinguished persons in the U.S. and 148 foreign countries. Send the coupon NOW for complete details.

GET ALL THE STARTLING DETAILS - • MAIL THE COUPON NOW



E. H. SCOTT RADIO LABORATORIES, INC.
4440 Ravenswood Ave., Dept. 5K7, Chicago, U. S. A.

Please send all details about the new Scott Philharmonic. (No dealers. Sold only direct from Scott Laboratories. 30 day free trial).

NAME _____

ADDRESS _____

SEE AND HEAR THE NEW SCOTT AT STUDIOS IN CHICAGO • NEW YORK • LOS ANGELES

Pages From A Serviceman's DIARY

THURSDAY—Stayed in this morning to clean up some shop work, meanwhile hoping that some calls near each other would come in before I had to go out. So often I start out to one job clear over at the end of town and find on returning, that other calls have just come in from the same section. As a rule, there is a set to be dropped off on the way but there is nothing today.

Checked over a Stromberg 68 chassis first, brought in as "noisy." Noticed plenty of sputtering and popping, so wasted no time in routine tests, tackling the audio transformer first. Connected a high-voltage ohmmeter across the primary and watched the meter. The reading did not remain steady. Probably leakage or electrolysis in the winding but—who cares?—it's got to come out! Had to put in an order for a replacement. We have little trouble with this type and therefore don't keep replacements in stock.

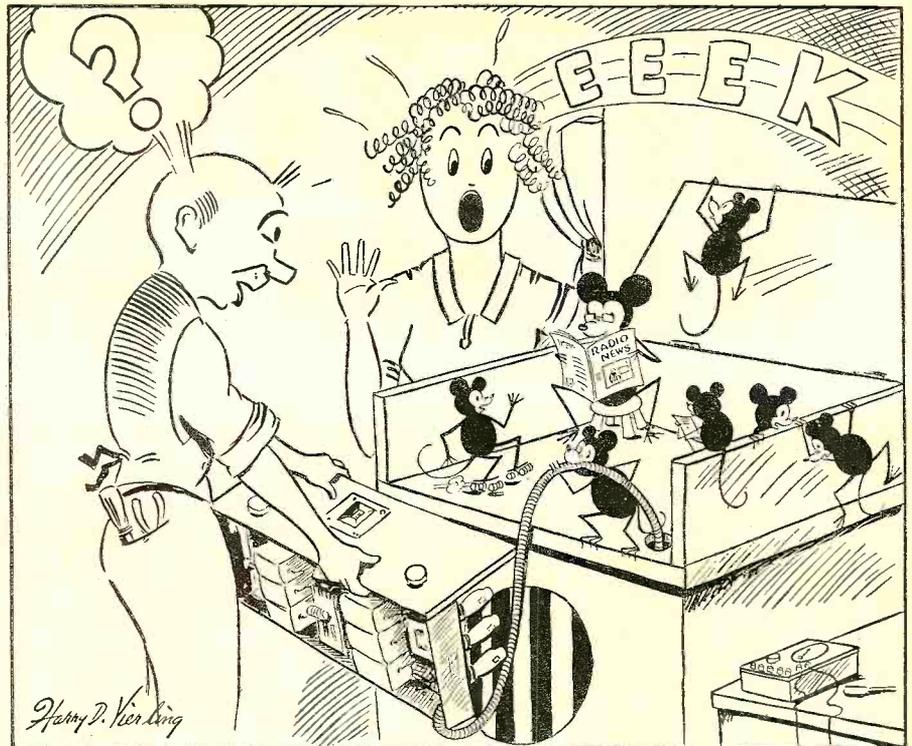
Meanwhile Paul dropped in. He has a swell shop about 20 miles away (a safe distance) and therefore is not a competitor. One of his customers had moved into our section, dragging along an antique Kolster battery set which he used to haul away to the woods in the Summer. Paul got a service call from him—a weird one. The owner's wife complained of strange squeaks and tapping sounds emerging from the receiver, even when it was not operating. Paul pulled the chassis and found a big mouse with six little ones grouped around the battery cable. Apparently they had been feasting on this cable for some time but eventually they got indigestion and passed out. It sounded fishy but Paul had a photo to prove it. Such is Fate! If this mouse



with her sextuplets had been human, their pictures would be in every paper, they would pose for the movies and receive incomes greater than any men of genius. (Perhaps the Editor will present to an astounded World, this record-breaking performance of Nature, the Paul Sextuplets!)

The new P. A. amplifier we had just finished building was on the bench and Paul wanted to hear it perform—or at least I hoped so after I got through rattling off all its features, phase inversion, inverse feed-back and beam-power, output tubes. Picked up a portable turn-table and connected it up, using a record with heavy bass notes so as to give an impressive demonstration. Did it perform? No—it was inexpressibly lousy. Tinny, raspy and hopelessly impossible.

"So this is phase inversion and degeneration," Paul commented, grinning. "No wonder it sounds perverted."



EVEN SERVICEMEN ENCOUNTER SOME "QUEER" EXPERIENCES

They say it's true that "When the cat's away, the mice will play". But this is the first case we have heard about where they played in a radio set. Our serviceman vouches for it, however, and sends in a small photograph as proof.

My luck! Took another look at the pick-up and turn-table, finally locating a repair tag tied to the handle. It had been brought in from a school and our good one had gone out on loan last night. (Paul knew it was pick-up trouble but he likes to kid.)

The phone rang. Hurrah . . . business!

Just Stopped Playing

"My radio has stopped playing," a plaintive voice said, "and I just can't imagine what could have happened. We had new tubes only a year ago and it never stopped before." I got her name and address.

"When did it stop playing?" I asked her.

"Right after I cleaned the room this morning. I turned it on and waited but I couldn't hear a sound. They haven't changed the stations, have they?"

Plans in the Making

"No," I told her. "Perhaps the maid knocked the plug out when she pushed the vacuum cleaner behind the radio." (Yes, I know you haven't a maid and it's 10 to 1 you haven't a vacuum cleaner, either. And, in the latter case, you are about to enjoy membership in a select group termed "Sales Prospects" by our staff, entitled to an

overwhelming, though brief, period of popularity.) I held the wire while she checked over the installation. Yes, the plug had come out.

"The tubes all light and the radio plays lovely now. Thank you so much!" I managed to break in before she hung up with, "Do you use the blower attachment on your vacuum cleaner to clean out the interior of your radio?"

What? No Vacuum Cleaner

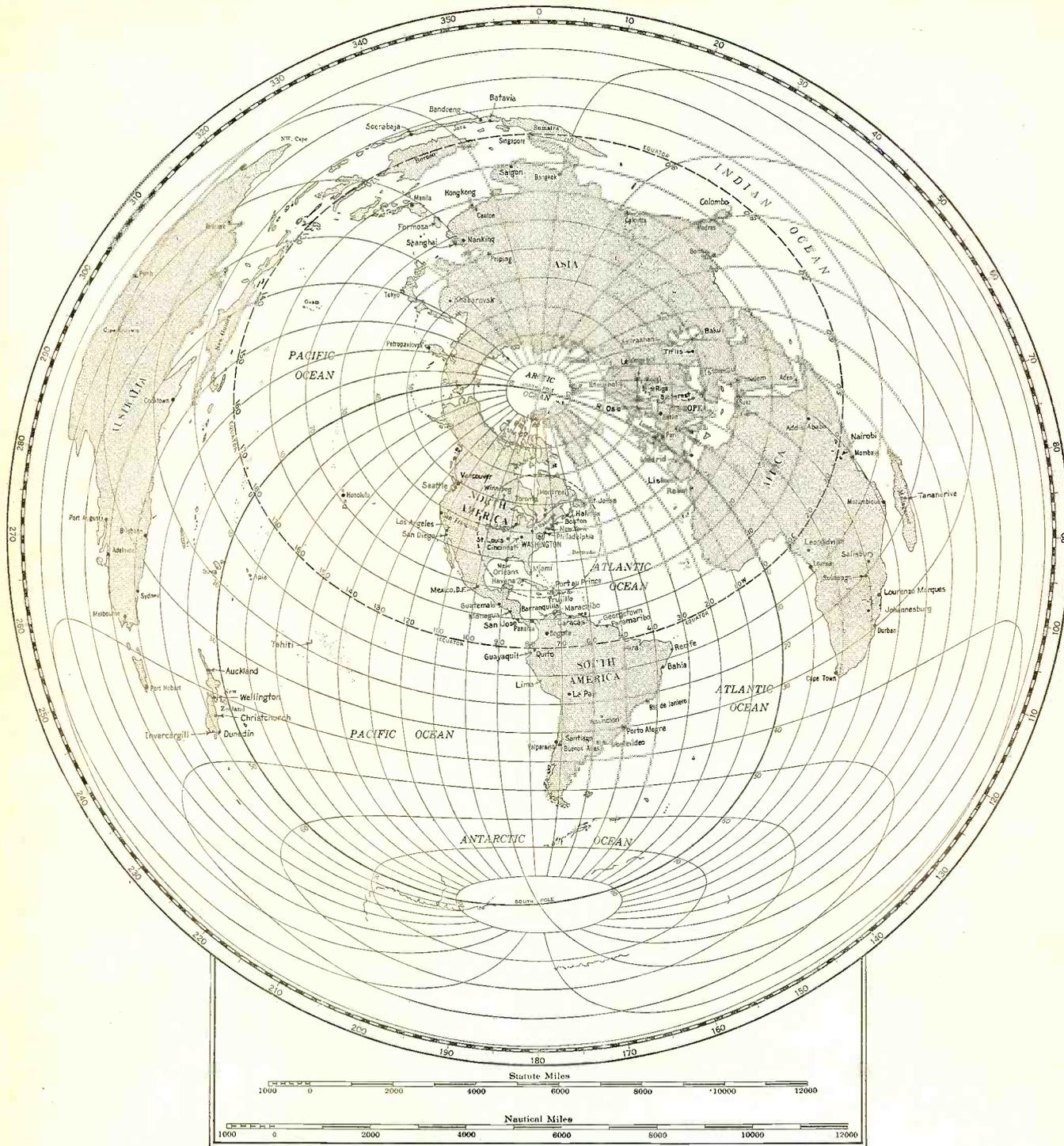
"We haven't any vacuum cleaner now but we're going to get one a little later on. But I wouldn't dare to touch the inside of the radio. I might get a shock."

"It's pretty important to keep the radio clean," I told her. "The filth which accumulates allows disease germs to breed and surely you don't want to expose your family to such dangers. I'll be glad to drop in and show you how to keep it clean without risking a shock." Made an appointment for the afternoon.

Intermittent Fading

Next—a Philco 90. Complaint—intermittent fading. Rather low volume on operating test but as soon as I touched a test prod to the chassis, the set operated normally. Probably an intermittently open-circuited condenser, but what a job to locate! Went over the coupling condensers first, pushing the leads coming out of each condenser until the volume suddenly dropped again. Replaced the .01 mfd. condenser between the detector-amplifier plate and the audio grid. On second thought, replaced the one in the detector-rectifier output also. Too often these mechanical tests of intermittent conditions introduce new troubles. I might have open-circuited a perfectly good condenser while testing. Too bad there is no sure test for such troubles or, if there is, I haven't found one. Have you? Checked all connections in the rest of the set, realigned, and put it on operating test, hoping for the best.

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



WORLD DISTANCE MAP

Herewith, RADIO NEWS presents the ninth of a series of azimuthal projection maps of the world; this one has its center at Washington, D. C., and was prepared by the U. S. Hydrographic office. Great circle distances between Washington and any other place on earth can be accurately measured by referring to the scale in miles printed below the map. At the same time, the line from the center to any spot on earth, when continued will intersect the scale at the edge, showing the direction from which the radio signals arrive. Such information is very useful for those who wish to erect directional aerials. Finally, the map also shows over what part of the earth the waves must travel. For instance; the sig-

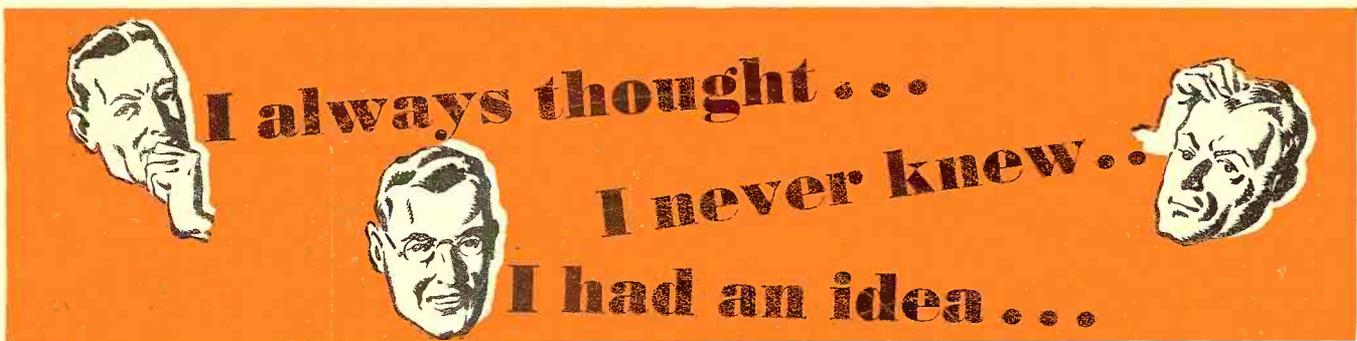
nals from Bandoeng arrive at Washington via the North Polar region. Similarly, most European signals come to us via the North. During the summer, this part is in daylight most of the time which accounts for the successful use of the shorter wavelengths at that time.

Residents of cities within the dotted circle on the map can obtain the distance to different places on earth with but little sacrifice of accuracy.

This type of map is technically known as "oblique zenithal projection with equi-distant proportions," the more popular name is azimuthal projection. The "oblique" indicates that the center is neither at the poles nor at the equator while

equi-distant refers to the proportions in plotting as opposed to the equal area map which retains the areas of countries in the right proportion. The round polar maps shown in atlases are azimuthal projection maps of this equal area type.

Readers might visualize azimuthal projection as follows: Suppose a globe was placed on a plane with the point of contact at the desired center. Then the surface of the globe may be imagined "peeled off" in very many infinitely narrow strips and spread out on the aforesaid plane in the form of a star. It is clear that the countries away from the center have to be stretched sideways which accounts for the distortion of their shape.



Well... here are facts!

MALLORY-YAXLEY
Precision Radio REPLACEMENT
PARTS COST NO MORE THAN
ORDINARY PRODUCTS

THREE service men check the prices of Mallory Condensers, Mallory Vibrators, and Yaxley Volume Controls against the prices of competitive products. All three are surprised to learn — and tickled to death to know — that Mallory-Yaxley products with all their well-deserved prestige and popularity *cost no more than ordinary products.*

Said one—"I always thought that because Mallory-Yaxley had done so much for the service man that I'd have to pay a premium to use their products." Said another—"I never knew that a company big enough to publish a book like the Mallory-Yaxley Radio Service Encyclopedia would charge no more for its products than I pay for those of companies that have done little or nothing to advance the service man's interests."

And the third remarked—"I had an idea that products with the reputation and prestige of the Mallory-Yaxley line just couldn't be priced on a really competitive basis."

So—if you "always thought"; if you "never knew"; if you've "had an idea"—check with your dealer or distributor—through counter or catalogue and get the proof that will make you say: "I'm going to buy Mallory-Yaxley from now on!" And—after you've used these precision replacement parts awhile you'll find that the goodwill and good business they build make Mallory-Yaxley products *actually cost less in the long run!*



No More Time Wasting

when you get a copy of the **MALLORY-YAXLEY RADIO SERVICE ENCYCLOPEDIA** from your distributor.

All the information on Circuits—Schematics, I. F. Peak Frequencies, Transformer Circuits, Condensers, Volume Controls, Vibrators and Tubes—in one book, on one page, on one line for any receiving set.



Use
P. R. MALLORY & CO., Inc.
MALLORY
 REPLACEMENT
 CONDENSERS...VIBRATORS

P. R. MALLORY & CO., Inc.
 INDIANAPOLIS INDIANA
 CABLE ADDRESS—PELMALLO

Use
YAXLEY
 REPLACEMENT
 VOLUME CONTROLS

Radio News

June, 1937

Short Waves in the

CLASSROOM

The growing use of the short waves below 10 meters for short-haul and portable communication is exemplified by the latest experimental applications in college classroom technique. It would not be stretching the imagination too far to prognosticate that ultra short waves may become the most important bands in the frequency spectrum for this purpose

By Samuel Kaufman

THE part that ultra-short waves will eventually play in education was effectively demonstrated under practical conditions recently by the faculty of the General Science Course at the School of Commerce of New York University.

During a two-week period, recently, the students were addressed by guest lecturers and regular instructors who were miles away from the classroom. Yet the use of the high-frequency short-wave transmitting and receiving units permitted a complete classroom session without a visible pedagogue. The series of two-way units even permitted the customary question-and-answer periods after each lecture.

The N.Y.U. demonstration was so timed during the General Science Course that it served to explain radio theory and practice as well as providing a practical communication means to bring lectures into the classroom by remote control.

Precedent Set

There was more significance to the procedure than mere novelty. Educators throughout the nation followed the results of the radio classes, and it is believed that the N.Y.U. demonstration will eventually be used as testimony by educators in demanding a Government grant of a portion of the ultra-short-wave spectrum for exclusive college and university use.

Dr. C. C. Clark, professor of General Science, and Laurence M. Cockaday, Editor of RADIO NEWS and special faculty lecturer, who jointly supervised the tests, were convinced that the plan is workable for virtually every school subject—not science alone.

In all, three two-way short-wave units were used for the remote control classes. One receiving and transmitting station was set up on the lecturer's platform in the N.Y.U. classroom at Washington Square, New York City. The second station was erected in the laboratory of S. Gordon Taylor, Managing Editor of RADIO NEWS, about two miles northward. The third, a portable short-wave radio plant, was installed in Commander Cockaday's automobile which cruised around in an area within a three-mile radius of the classroom.

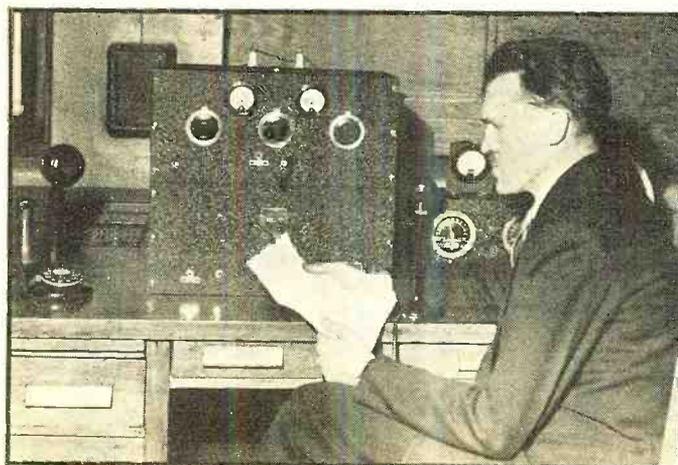
The instructors started each lecture in the classroom and then entered the automobile; the contact with the students remained unbroken, the radioed instruction taking up exactly where the personal teaching switched off. Stops were made at various points and passers-by were invited to hold the telephone-type microphone and headset and talk with the students on scientific topics.

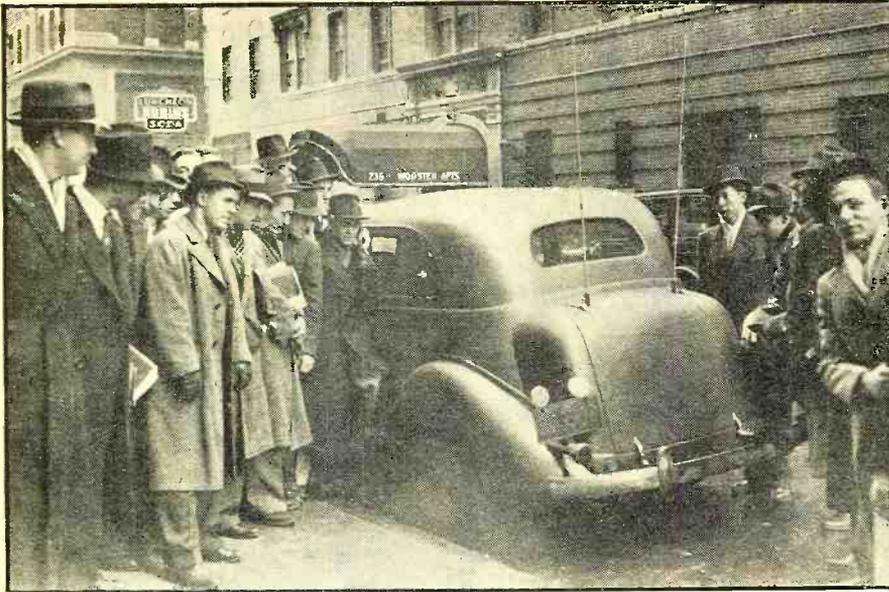
Street Tests

This was in the same manner as broadcast street interviews, the chief difference being that the passersby received ra-

EXPERTS ADDRESS UNIVERSITY CLASSES

A portable ultra-short-wave transmitter installed on the busy executive's desk allows him to tell his story to students in a distant classroom. S. Gordon Taylor is shown lecturing from the RADIO NEWS laboratory.





CONDUCTING STREET INTERVIEW

By means of a portable transmitter-receiver in this car, young people on the street were interviewed from the classroom on what they knew, generally, about science.

dioed answers in lieu of a sponsor's tube of shaving cream.

At various points of each radio session the voice of Mr. Taylor was heard from his midtown laboratory. Each transmitting point was contacted by the other short-wave stations throughout and the "air" was momentarily taken by any of the three points at will. All of the equipment functioned on a frequency of 58.5 megacycles.

Amateurs Participate

N. Y. U. students, including some prominent amateurs, aided in the actual erection and operation of the experimental equipment. The motor car installation was designed by Frank Lester, of the Wholesale Radio Service Company, who is also well known in amateur radio circles through his call, W2AMJ. The student assistants included Harrison Hodge, W2CQR; Perry Driggs, W2EVV, and Monroe Reese, W2GWN. Both Mr. Cockaday and Mr. Taylor are also well known to the explorers of the high-frequency band, their respective calls being W2JCY and W2JCR.

Members of the N. Y. U. faculty interviewed by the writer pointed out that while top men in every professional and commercial field are always anxious to give students the benefits derived from classroom talks, they are often so busy that it is found difficult to arrange personal visits to the school. Now ultra-short waves solve the problem. They bring the lecturer's voice to the classroom through the simple act of installing a light portable transmitter and receiver at his office desk and corresponding equipment in the school.

Questions Answered

Thus the guest lecturer can address the class and even conduct a question-and-answer period; it is on this point that the method differs from a standard broadcast lecture. The use of the small and simple high-frequency sets provide two-way conversation, permitting every student to step up to the microphone and ask a question or request a point in the lecture to be clarified.

of higher learning in the seasons to come.

On the basis of these highly successful applications of ultra-short waves in the N. Y. U. curriculum, educators think it advisable to have a portion of the ultra-high frequency spectrum set aside exclusively for educational purposes.

Supplementing their findings with ample technical data, the pedagogues are understood to be ready to apply for that part of the band lower than 5 meters and running up to present experimental and television channels at 6 and 7 meters.

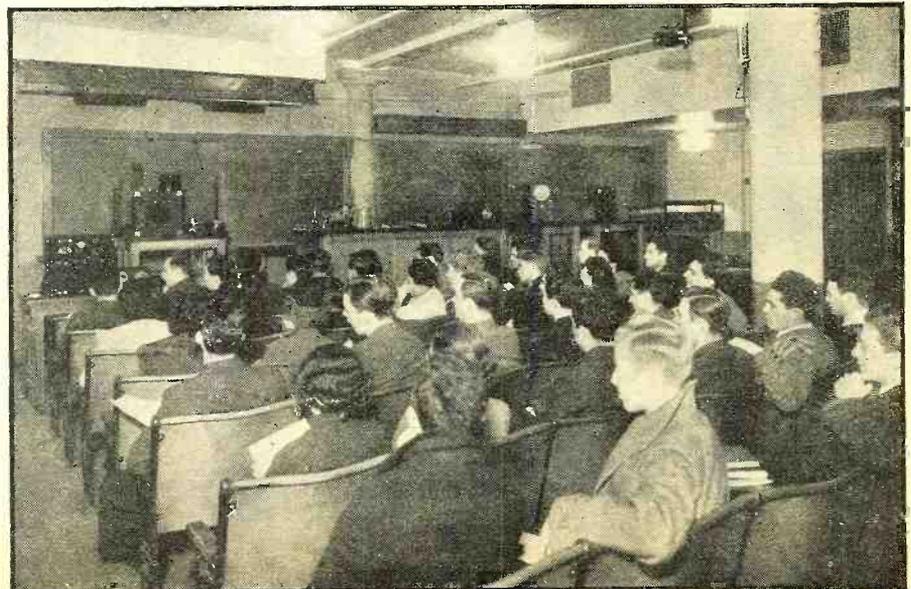
Armed with the factual findings of radio technicians and field coverage experts, the educators will point out in their plea that unsuitability of present video frequencies for television work has been demonstrated clearly during the last six months. One of their prime discoveries is that the picture signals have been received over great distances—much greater than the early television range estimates—and that Heaviside layer reflection is possible on these tiny waves with accompanying interference with services in other cities even a few thousand miles distant! Aside from direct clash with other video transmitters, the disturbing phase-distortion action that comes with reflected waves also seems to prove the impracticability of this band for television, according to the claim of the tutors.

Useful Television Data

The university and college advocates of the plan interviewed by the writer were quick to point out that they were not anxious to shove television aside and to snatch the present video frequencies for themselves. Actually, their findings may save the television participants the costly error of starting on the wrong track and then having to retrace their steps and starting anew. It seems quite definite, they hold, that a future sight-and-sound service should be placed at much higher frequencies than 5 to 7 meters. On the much shorter waves of less than 3 meters, they point out, there probably (Turn to page 745)

THE "INVISIBLE" TEACHER

A Class in the School of Commerce, New York University, listens to their lecturer while he was riding in an automobile in a different part of the city. Note the radio apparatus at the left in the picture.



WHAT'S NEW in RADIO

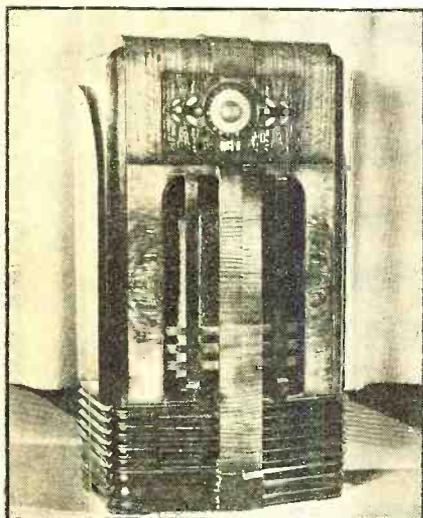
By W. C. Dorf

A Fine Service

A number of Philco automatic tuning models have been made with the stations' call letters printed in the raised Braille system for the blind. Inserted in the station "windows" in the tuning dial, the Braille call letters are "read" as easily by the blind as the customary printed letters are read by those who can see. While Braille raised printing is not regular equipment, the Philco Radio and Television Corporation advises that large public libraries have Braille printing apparatus and those institutions willingly permit their use in printing the station tabs required for such installations. Robert Herr, manager of the parts and service department of this company, points out that automatic tuning, combined with the Braille system, has removed a serious handicap in the enjoyment of radio by the blind.

New 22-Tube Receiver Has Extremely Wide Tuning Range

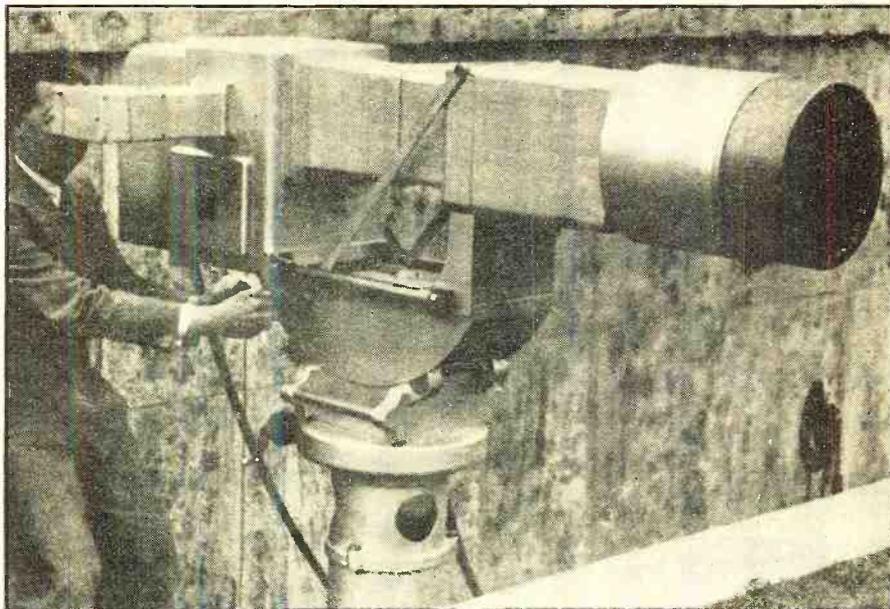
The striking appearance and sturdy construction of the acoustically correct console cabinet housing the new Midwest



"Regal" receiver is readily apparent. The set has six tuning bands, covering a wavelength range from 4½ to 2400 meters, features a new volume expander circuit, electric-power saver, a large 15-inch speaker, in conjunction with two 6-inch speakers to reproduce the middle and high registers, "Dial-A-Matic" tuning (optional equipment) and other new developments.

Reception Improved On Crack Train

A new type of radio set has recently



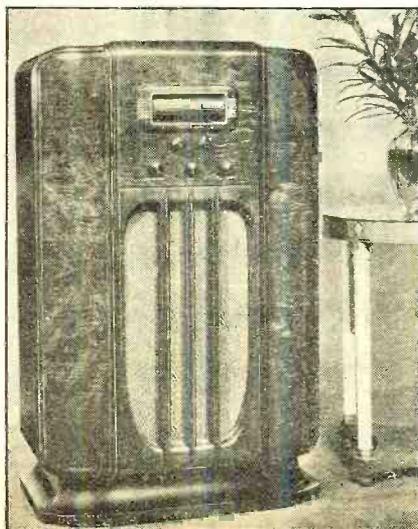
IS THIS ONE OF THE NEW BIG SHORT-WAVE "GUNS"?

When we first looked at this photograph, it looked something like a combination trench mortar and micro-wave beam apparatus but it turned out to be a long-range television camera. If it gained your attention, however, that is our objective, for in this department you will find described some of the newest short-wave sets now coming on the market.

been installed on the crack B. & O. Diplomat Limited which runs between St. Louis, Washington and New York. It was especially designed by engineers of the Crosley Radio Corporation to overcome certain "dead" spots in the Potomac Valley. The 7-tube receiver operates on the 32-volt lighting system. The installation consists of a standard automobile under-car type antenna about 3½ feet long. It is placed horizontally a few inches above the roof and runs lengthwise. No auxiliary equipment or shielding had to be added to eliminate interference.

Covers from 4 to 2000 Meters

This new General Electric 15-tube, 5-band receiver is the latest edition to their very extensive 1937 line of console and table models. It's equipped with the new "Colorama" dial, automatic-frequency control, slide rule tuning scale, high-low speed tuning, and many other new technical advances. Maximum output is 35 watts using two 6L6's in the power stage and the special 15-inch stabilized dynamic speaker contributes its share to the realistic reproduction provided by the set.



Attention! Amateurs!

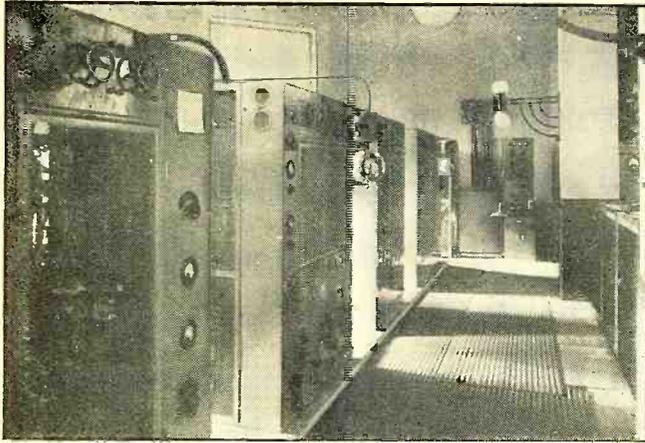
One of the latest receivers to be announced for the communication field is the new Hallicrafter's "Sky-Challenger" nine-tube superhet. A few of the important features incorporated in this set include: a tuning range from 535 to 40,000 kc., electrical band spread, the use of iron core i.f. transformers and optional crystal operation. Four watts power output is provided, using the type 6F6G tube in the last stage.

Audio-Frequency Oscillator

The Triplett model 1260, a.c. operated, audio oscillator is designed to generate a pure sine wave without distortion and harmonics. The output frequencies of the instrument are 100, 250, 500, 1000, 2000, 3000, 4000, 5000, 7500, and 10,000 cycles. Attenuation for the measurement of gain percentage is accurate and impedance is variable.

(Turn to page 760)





HAVE YOU HEARD OLR?

This is the transmitter house and equipment of the Podebrady, Czechoslovakian station which is now a favorite DX hop for short-wave listeners.

THE fifty-first installment of the DX Corner for Short Waves contains the World Short-Wave Time-Table for 24-hour use all over the world and Official Observers' reports of stations heard this month. Consult these two items regularly and make your all-wave set pay big dividends!

Annual Short-Wave Number

This issue of the magazine which is our Annual Short-Wave Number is dedicated to Short-Wave Listeners all over the world. It will be found to be a veritable "tool kit" and short-wave text book all rolled into one, containing the necessary information to give Short-Wave Listeners a good start for an excellent summer of listening-in on the world. We hope our readers will like it.

Credit Where It Is Due

The outstanding reports from Listening Posts this month, those which have contained the most important information regarding schedule changes, new stations, wavelength changes, etc., were those furnished by observers: Eder, Gallagher, Coover, Alfred, Schrock, Hartzell, Moore, Ralat, Ryan, Tallon. Congratulations!

S. W. L.-Fest

On June 5, 1937, the R-9 Listeners League will hold a Short-Wave Listeners get-together at Woodhaven, Long Island,



New York. Door prizes will include an all-wave radio receiver, complete. Tickets can be had at headquarters 7417-87 Avenue, Woodhaven. Everyone is welcome.

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

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

Europe

- TPA2, Pontoise, France, 15,243 kc., 6-11:05 a.m., (Nelson, Devaraj), daily 4-9 a.m., (Ryan, Hartzell).
- TPA4, Pontoise, France, 11,715 kc., 6:15-8 p.m., 10 p.m.-1 a.m., (Kidd, Nelson, Devaraj, Shamieffer, Lopez, Jensen), Slogan: "Radio Colonial".
- TPA3, Pontoise, France, 25.24 meters 5 p.m., (Coover), 11,881 kc., 4-5 a.m., 11:15 a.m.-6 p.m., (Nelson, Eder), 11,880 kc., (Shamieffer, Jensen).
- TYA2, Pontoise, France, 9040 kc., 12-2 a.m., irregular (Gallagher) "Radio Paris", Paris, France, 9060 kc., 2:45 a.m., (Gresham).
- HBL, Geneva, Switzerland, 9595 kc., Saturday 5:30-6:30 p.m., 7-8:30 p.m., (from veri.), (Rudolph, Ryan).
- HBP, Geneva, Switzerland, 7797 kc., Saturday 5:30-6:30 p.m., 7-8:30 p.m., (from veri.), (Rudolph, Lara, Shamieffer).
- HBO, Geneva, Switzerland, 11,405 kc., Monday 3 a.m., (Sahlbach), Saturday until 9 p.m., (Ralat), 11,385 kc., Monday 2-2:30 a.m., (Lopez), desires reports.
- CT1AA, Lisbon, Portugal, 9650 kc., 4-7 p.m., Tuesday, Thursday, Saturday,

WESTERN WORLD STATIONS

At left: The transmitter of Station HJ3ABD transmitting at 6050 and 1110 kc. At right: The verification card of the famous Schenectady station which the call letters W2XAF and W2XAD, with a change in schedule noted.

The DX for the

Conducted by

Laurence

Sunday 7-9 p.m., (Alfred, Hartzell, Dressler, Beck, DeMent, Eder, Yoshimura, Ralat, Smith, Johnson), Slogan: "Radio Colonial", three cuckoo calls with announcements, Address: Radio Colonial, Ave. Antonio d'Aguiar 144, (from veri.)

CSW, Lisbon, Portugal, 9940 kc., 4 p.m., (Alfred, Gresham), 11,040 kc., daily Monday, 4 p.m., (Schrock, Eder, Coover), 4-8 p.m., (Partner), 10,990 kc., 5-6 p.m., (Dressler, Herzog, Smith, Hartzell, Atherton), 7-10 p.m., (Partner, Hartman, Black, Williams, Fallon), (from veri.), Slogan: "Emisora Nacional", Address: National Broadcasting Station.

DJO, Berlin, Germany, 11,795 kc., (Kidel, Randle, Hartman).

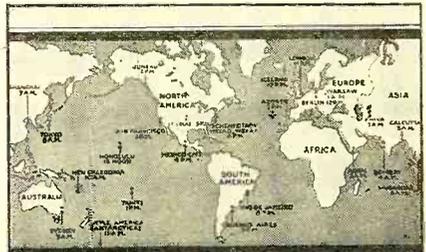
DJL, Zeesen, Germany, 15,110 kc., (Eder, Moore), 8:50 a.m., (Devaraj), daily 8-9 a.m., (Black, Randle, Coover, Ryan), signed 4:15 p.m., (Ralat).

DJQ, Berlin, Germany, 15,280 kc., 4:50-10:50 p.m., (Partner, Eder, Moore), 7-8 a.m., (Herzog, Hartzell, Randle, Shamieffer).

DZG, Zeesen, Germany, 15,360 kc., irreg. 7:30-10 p.m., (Stabler, Hartzell).

DJD, Zeesen, Germany, 11,770 kc., daily 4:50-10:45 p.m., (Alfred, Kidd, Coover, Eder, Moore, Law, Ryan, Partner, Randle, Jensen).

DJN, Zeesen, Germany, 9540 kc., daily 12:05-4 a.m., (Alfred, Moore, Rattee, Devaraj, Eder, Randle, Jensen).



New Schedule-W2XAD- March 15th
10 a.m. to 9 p.m. EST

Mr. S. Gordon Taylor

We acknowledge with thanks your communication reporting reception of our short-wave program on the above date from station W2XAF-W2XAD.

W2XAF, operating on a frequency of 9530 kilocycles or 31.48 meters, is on the air daily from 4:00 p.m. until 12:00 p.m. Eastern Standard Time.

W2XAD, operating on a frequency of 15,330 kilocycles or 19.56 meters, is on the air daily from 10:00 a.m. until 3:00 p.m. Eastern Standard Time.

Special transmissions, other than the above, will be announced at sign-off periods on both stations.

Regards E. J. [Signature]

GENERAL ELECTRIC
SCHENECTADY, N.Y., U.S.A.

Corner SHORT WAVES

M. Cockaday

DJA, Zeesen, Germany, 9560 kc., daily 12:05-4 a.m., (Alfred, Eder, Moore, Rattee, Devaraj, Randle), 5-50-11 p.m., (Lopez, Jensen).

DJP, Zeesen, Germany, 11,855 kc., (Randle).

DJC, Zeesen, Germany, 6020 kc., (Law, Moore), daily 4:50-10:45 p.m., (Ryan, Offair, Partner, Randle).

DZA, Zeesen, Germany, 9670 kc., 4-5 p.m., (Shamleffer).

DJR, Zeesen, Germany, 15,340 kc., (Law), 8:45 a.m., (Devaraj, Randle).

DJE, Zeesen, Germany, 16,89 meters, 9 a.m., (Devaraj), 17,760 kc., (Randle).

DZB, Berlin, Germany, 10,042 kc., 7-9 p.m., (Lawton), 4-5 p.m., irreg., (Ralat).

DZC, Zeesen, Germany, 10,290 kc., 5 p.m., (Atherton, Gallagher), 4-5 p.m., (Shamleffer).

DZE, Zeesen, Germany, 12,130 kc., 5 p.m., (Atherton), midnight and 11 a.m., (Howald, Shamleffer).

DZH, Zeesen, Germany, 14,460 kc., 5 p.m., (Atherton, Moore), 9:05 a.m., (Devaraj), Thursday 6-6:15 p.m., (Dressler, Shamleffer).

DJB, Zeesen, Germany, 15,200 kc., (Moore), 19.74 meters, 8:52 a.m., (Devaraj), Sunday, 11:10 a.m.-12:25 p.m., (Ryan, Eder), daily 4:50 p.m., (Hartzell), 4:50-11 p.m., (Partner, Black, Randle, Hamilton).

DJM, Zeesen, Germany, 6079 kc., (Randle).

GSD, Daventry, England, 11,750 kc., (Kidd, Eder), 9 p.m., (Coover), 6-8, 9-11 p.m., (Partner, DeMent, Ryan, Hodgkyns, Dressler, Jensen).



POLISH STATION "VERI"
L.P.O. W. F. Herzog of New York received this card from SPW. The background is bright red and white with black lettering. Don't you wish you had one?

HAT4, Budapest, Hungary, 9125 kc., Sunday 6-7 p.m., (Alfred, Hartzell, Beck), 9135 kc., (from ann.), (Herzog, Dressler, Johnson, Lawton, Piorko, Randle, Ralat, Gossett), Slogan: "Justice for Hungary", Address: Gyali-ut 22.

TFJ, Reykjavik Iceland, 12,230 kc., (Eder), Sunday 1:40-2:30 p.m., (Pior-ko).

ORK, Ruysselede, Belgium, 10,330 kc., 2:30-4 p.m., (Hynek, Rudolph, Sahlbach), daily 1-2:30 p.m., (Ryan).

SPW, Warsaw, Poland, 13,630 kc., 12:30-1:30 p.m. daily, (Schrock, Coover).

PCJ, Eindhoven, Holland, 31,28 meters, 7 p.m., (Coover), 9590 kc., 7-8 p.m., (Herzog), 10:25 a.m., (Devaraj, Moore, Hodgkyns, Eder), 9-11 p.m., (Howald), 15,220 kc., (Piorko, Shamleffer, Elkes, Gallagher), 7-10 p.m., (Dressler), Slogan: "The Happy Station", Address: P. C. J. Studio, Hilversum.

PHI, Huizen, Holland, 17,775 kc., Thursday 9 a.m., (Hartzell), Monday, Thursday, Friday, Saturday, 7:30-9:30 p.m., (Dressler), 10:10 a.m., (Devaraj, Herzog, Piorko).

OER2, Vienna, Austria, 11,780 kc., (Turn to page 718)

GSC, Daventry, England, 21.32 meters, (Coover), 9580 kc., (Eder, DeMent), daily 9-11 p.m., (Ryan, Hodgkyns, Dressler), 12:15-5:45 p.m., 6-8 p.m., (Partner, Jensen).

GSB, Daventry, England, 9510 kc., (Eder, DeMent), daily 3-5 a.m., (Ryan, Hodgkyns, Dressler), 2:15-4:15 a.m., 12:15-5:45 p.m., 6-8 p.m., (Partner, Coover, Jensen).

GSI, Daventry, England, 15,260 kc., (Eder, Law, Sutker, Hodgkyns, Partner).

GSO, Daventry, England, 15,180 kc., (Eder, Hodgkyns), 2:15-4:15 a.m., (Partner), 7 p.m., (Coover).

GSH, Daventry, England, 21,470 kc., 9 a.m.-noon, (Dressler, Hodgkyns), 6-8:45 a.m., 9-12 a.m., (Partner).

GSF, Daventry, England, 15,140 kc., (Dressler, Eder, Hodgkyns), 8 a.m., (Herzog), 4-5:45 p.m., 6-8 p.m., 9-11 p.m., (Partner, Coover, Hamilton, Fallon).

GSG, Daventry, England, 17,790 kc., daily 6-8:45 a.m., (Ryan, Hodgkyns), 10-12 a.m., (Herzog), 2:15-4:15 a.m., (Partner).

RAN, Moscow, U. S. S. R., 9520 kc., 7-9:15 p.m., (Alfred), 9600 kc., (Eder), daily 7-9 p.m., (Dressler, Hartzell, Fallon, Markuson, Sahlbach, Fisher, Rattee, Ryan, Partner, Shamleffer, Atherton, Johnson), reports requested, Address: Radio Centre.

RNE, Moscow, U.S.S.R., 12,000 kc., around midnight, (Gallagher, Moore), 12:30, (Devaraj), Sunday 10:15 p.m., (Fallon).

RKI, Moscow, U.S.S.R., 15,090 kc., Sunday 1 a.m., (Hartzell, Moore, Hendry).

I2RO, Rome, Italy, 9635 kc., daily 6-9:15 p.m., (Alfred, Kidd, Eder, Coover, Herzog, DeMent), 11,810 kc., (Moore), 10 a.m., (Devaraj), 11,810 kc., daily 5-8 a.m., (Ryan, Williams, Shamleffer, Hendry).

I2RO-3, Rome, Italy, 9630 kc., (Eder), daily Sunday, American hour at 6 p.m. Monday, Wednesday, Friday, (Gossett).

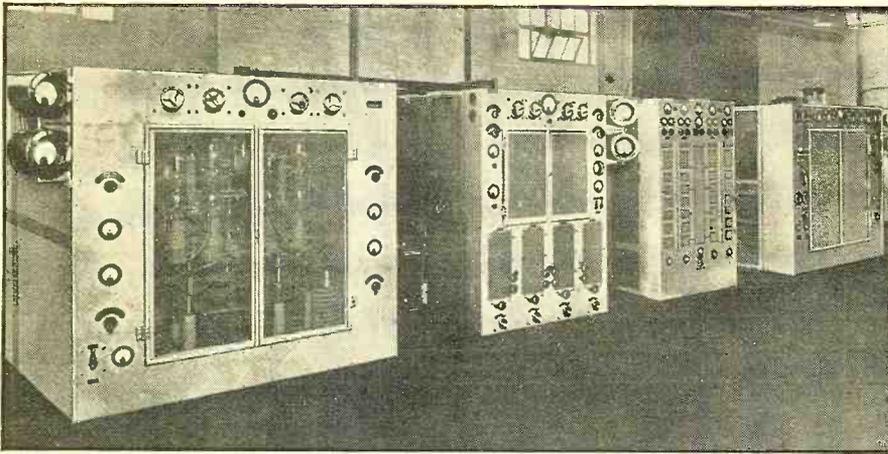
HVJ, Vatican City, Italy, 15,125 kc., (Hendry), 10:25 a.m., (Devaraj).

I2RO4, Rome, Italy, 11,810 kc., daily 9 a.m., except Sunday, (Gossett).

HAS3, Budapest, Hungary, 15,370 kc., Sundays 9-10 a.m., (Hartzell, Devaraj, Piorko), Address: Radio Labor, Gyali-ut 22.

SHIP-SHAPE LISTENING POSTS
At left: The DX corner of Paul R. Leim of Indianapolis, Ind., and at right: Observer H. Kemp of Waterbury, Conn., standing alongside of his receiving position.





The DX Corner (Short Waves)

(Continued from page 715)

(Partner, Herzog, Gledhill, Michaels).
SM5SX, Stockholm, Sweden, 11,710 kc., daily 11 a.m.-5 p.m., (Hynek, Howald), 3 p.m., (Williams).

LZA, Sofia, Bulgaria, 14,970 kc., 3:15-4:02 a.m., (Alfred, Schrock, Beck, Eder), 1-10 a.m., (Howald, Williams), 14,850 kc., (Gallagher, Hendry), Slogan: "Radio Garato".

LKJ1, Jeloy, Norway, 9450 kc., 1-2 a.m., (Alfred), 6 a.m., (Williams, Gallagher).

EA4CL, Madrid, Spain 7030 kc., 8:40 p.m. with news. (Betances.)

EAQ2, Madrid, Spain, 31.65 meters, daily 7:30 a.m., Sunday, Thursday 9:15 p.m., (from ann.), (Hendry), 9480 kc., Monday 7:30 to 9:30 p.m., (Shamleffer, Eder, Atherton, Dressler), desires reports. Address: P. O. Box 951.

EAQ, Madrid, Spain, 30.43 meters, (Coover), daily 5:15 to 9:30 p.m., Saturday 1 to 9:30 p.m., 9860 kc., (from veri.), (Mott, Miller, Fisher), 9680 kc., 6 to 11 p.m., (Ryan, Eder, Hartzell, Elkes, Randle), 9490 kc., (Hamilton), 9520 kc., 7:07 to 8:09 p.m., (Shamleffer, Alfred, Augustine, Fallon, Lueth.) Slogan: "La Voz de Espana." Address: Apartado de Correos, 951, Madrid.

EAJ3, 2:15 to 3:40 p.m., (Gledhill.) "Radio Esquerra," Cataluna, Spain, 7110 kc., irreg., (Betances).

"Radio Requete," San Sebastian, Guipuzcoa, 7250 kc. Daily from 5 p.m. on, (Betances).

OLR, Prague, Czechoslovakia, 9550 kc., (Eder), calls are: **OLR2A**, 6010 kc., **OLR2B**, 6030 kc., **OLR2C**, 6115 kc., **OLR3B**, 9504 kc., **OLR3A**, 9550 kc., **OLR4B**, 11760 kc., **OLR4A**, 11840 kc., **OLR4C**, 11875 kc., **OLR4D**, 11900 kc., **OLR5C**, 15160 kc., **OLR5A**, 15230 kc., **OLR5B**, 15230 kc., **OLR6A**, 21450 kc., **OLR**, 7 to 10 p.m., Monday, Thursday, (from veri.), (Bower), Monday to Thursday, 8 to 9:30 p.m., (Rattee, Scala, Devaraj, Eder, Howald, Partner, Yochimura, Hartman, Randle, Coover, Gallagher). Address: Praha XII, Foschova 16.

OLR2B, Prague, Czechoslovakia, 11,760 kc., desires reports, feminine announcer, (Herman).

OLR3A, Prague, Czechoslovakia, 9550 kc., Monday, Thursday, 8 to 10 a.m., changed to 11,840 kc., 10 to 11 p.m., (Dressler, Shamleffer, Alfred).

OLR4A, Prague, Czechoslovakia, 31.54 meters, 8 p.m., (Ryan), 11,840 kc., asked for reports, (from ann.),

PODEBRADY AGAIN

Another view of some of the transmitting equipment at the 35 kw. OLR station.

(Dressler), Thursday 10:15 to 11 p.m., (Shamleffer, Alfred).

Asia

XGN, Shanghai, China, 17,640 kc., 10 a.m. (Gallagher).

XTC, Shanghai, China, 9,300 kc., 9 a.m. (Gallagher).

XGW, Shanghai, China, 10,420, 9,500 kc., 10 a.m. (Gallagher, Black).

ZOR, Shanghai, China, (Gallagher).

XO5, Shanghai, China, 15,785 kc., Friday 7:20 p.m. (Hartzell) 15,800 kc., (Gallagher).

XGM, Shanghai, China, 17,650 kc., daily 7 to 9 a.m. (Hynek).

ZBW, Hong Kong, China, 9,520 kc., 10 a.m. (Gallagher, Herzog) 6 to 10 a.m. (Moore, Scala, Johnson, Black) 9,525 kc. (Silvius, Williams). Address: P. O. Box No. 200.

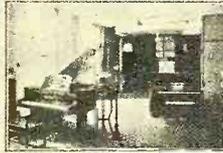
ZEK, Hong Kong, China, 34.29 meters, 7:40 a.m. (Devaraj).

ZBW5, Hong Kong, China, 17,755 kc., weak signals (Lawton).

ZBW3, Hong Kong, China, 9,525 kc., 7:20 a.m. (Alfred) daily 4 to 10 a.m. (Hartzell), 3 a.m. (Sesma, Yoshimura, Jensen, Hendry).

HAVE YOU HEARD HONG KONG?

Another card sent in for reproduction by Observer Herzog of Center Moriches, N. Y. This is a good station to try for in Asiatic DX'ing.



ZBW



HONG KONG



The Hongkong Broadcasting Station thanks you for your communication dated and takes pleasure in confirming your reception of ZBW on 1937

Secretary,
Hong Kong Broadcasting Committee,
Post Office Box No. 200

ZBW2, Hong Kong, China, 6,090 kc., 7 a.m. to 1 p.m. (Sporn).

ZBW4, Hong Kong, China, 15,190 kc. (Hynek).

CQN, Macao, Portuguese China, 9,677 kc., 4 a.m. (Sesma) Monday and Friday, 5 to 8 a.m. (Mellanby).

XTV, Hongkow, China, 9,500 kc., 10 a.m. (Gallagher).

XGOX, Nanking, China, 6,820 kc., 3:20 a.m. (Gallagher) daily 5:30 to 9:40 and Sunday 7 to 9 a.m. (Scala, Black).

XGOW, Nanking, China, 6,820 kc., 7 to 10 a.m. (Sporn).

Radio Philco, Saigon, Indo China, 11,730 kc., 10 a.m. (Gallagher, Devaraj) 6:30 to 9:30 a.m. (Partner, Beck). Address: 211-213 Rue Catinat.

F3ICD (F3ICE?) Saigon, Indo China, 11,730 kc., 10 a.m. to 12:30 p.m. (Sporn).

ZGE, Kuala, Lumpur, Federated Malay States, 6,135 kc., Sunday, Tuesday and Friday (Hodgkyns).

ZH5, Penang, Federated Malay States, 6,080 kc., except Sunday (Hodgkyns) 8:25 a.m., (Devaraj).

ZHI, Singapore, Federated Malay States, 6,012 kc., Sunday, Monday, Wednesday, and Friday (Hodgkyns) 6:30 to 7 a.m. (Lueth) to close down and be replaced by another call (Williams).

JVE, Nazaki, Japan, 15,660 kc., 11:30 p.m. (Gallagher, Moore).

JVL, Nazaki, Japan, 11,660 kc., 11:30 p.m. (Gallagher).

JYP, Nazaki, Japan, 7,510 kc., 2 to 3 p.m. Wednesday and Saturday (Sesma, Chiang, Smith, Moore, Dressler, Nishimori, Sowada, Yamamoto).

JZI, Nazaki, Japan, 9,530 kc. (Gallagher) Wednesday and Saturday 2 to 3 p.m. (Sesma, Chiang, Smith, DeMent) 9 to 10 a.m. (Moore, Howald, Nishimori, Sisbert, Sowada, Markuson, Black, Silvius, Yamamoto).

JVD, Nazaki, Japan, 15,860 kc., heard all hours (Gallagher, Moore).

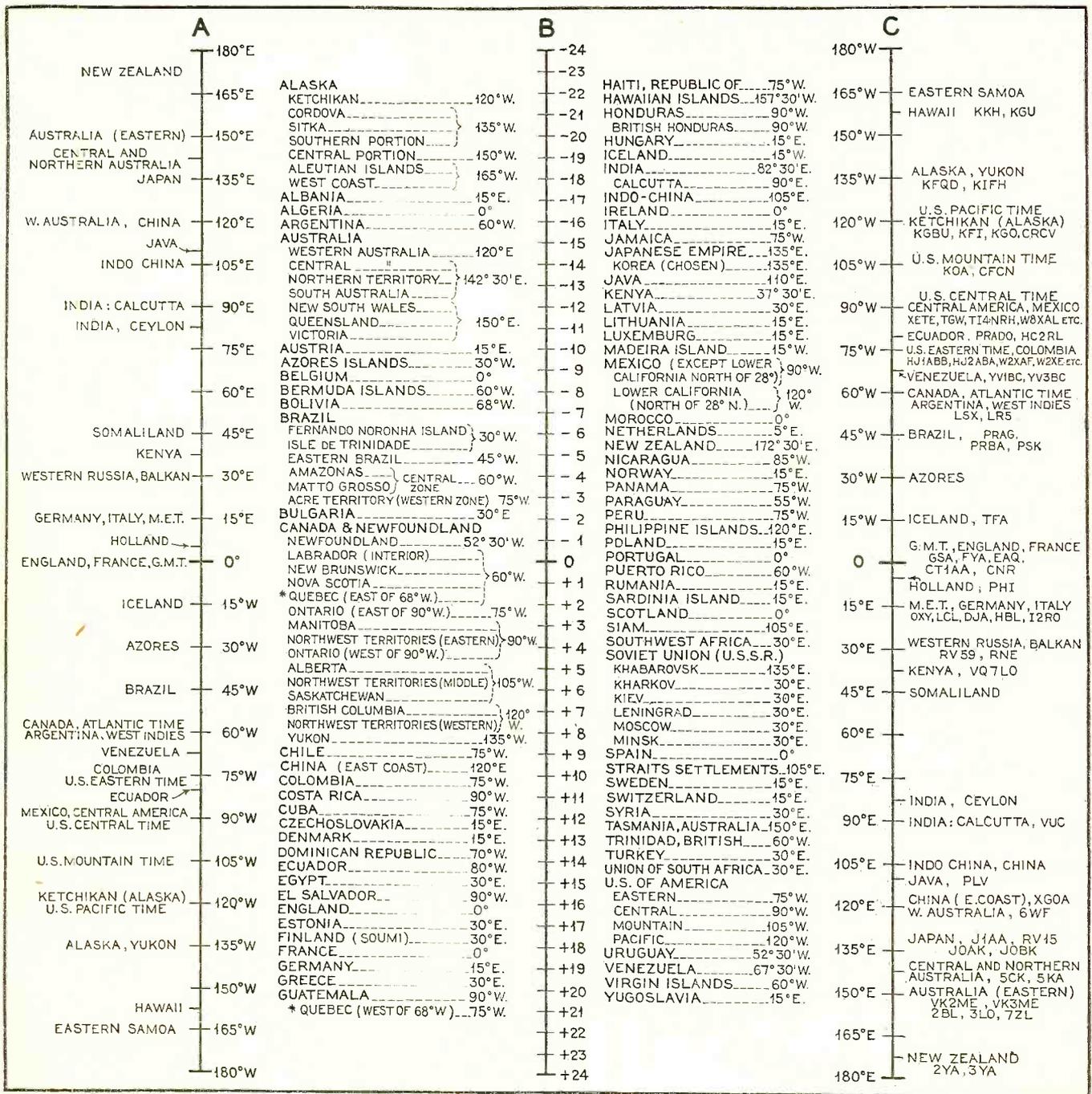
JVI, Nazaki, Japan, 9,525 kc., daily 2:30 to 3:30 p.m. daily 9 to 10 a.m. (from JZJ ann.) (Dressler, Yamamoto).

JVF, Nazaki, Japan, 15,620 kc., (Moore).

JVC, Nazaki, Japan, 16,050 kc., (Black).

JVN, Nazaki, Japan, 10,660 kc., 4 a.m. (Alfred) daily 2 to 3 p.m. (Schrock) 1:30 a.m. (Gallagher) daily 4 to 5 p.m. (Partner, Chiang) daily 6:30 to 7 a.m. (Herzog, Dressler) Saturday

(Turn to page 750)



WORLD TIME CONVERSION CHART

The short-wave or DX listener can, with this chart, instantly determine the time in any part of the world corresponding to any given hour in his own location

How to Convert Foreign Time to Your Local Time

FIRST locate your country, or your section of your country, in the alphabetical list, to find its longitude. Then locate this longitude on line A. Next consult the alphabetical list to determine the longitude of the country whose time you want to find, and locate this longitude on line C. Now lay a ruler or other straight-edge across the chart so that it connects these two points on lines A and C. The point at which it crosses line B shows the time difference between these points. If the hour is preceded by a plus sign, add this figure to the time in your locality. If a minus sign is shown, deduct the hours from your time.

The following concrete example will illustrate the simplicity of the procedure:

Suppose a New York City listener wants to determine the time in New Zealand. He first consults the list (U. S. A.—Eastern Time) and finds his longitude to be 75 degrees West. This he locates on line A. He again consults the list and finds the longitude of New Zealand to be 172 degrees, 30 minutes East (60 minutes equals 1 degree, therefore New Zealand lies 172½ degrees, East). This point is then located on line C. A ruler laid across the chart to connect 75 on line A with 172½ on line C intersects line B at plus 16½ hours. He therefore adds this number of hours to his own time to find the corresponding New Zealand time. Thus if it is 9 a.m. in New York, he finds that in New Zealand the clocks show 1:30 a.m. of the next day.

If he desires to know the corresponding hour in Hawaii he will find it to be his local time minus 5½ hours, or 3:30 a.m. if his local time is 9 a.m.

From the foregoing it is evident that the use of this chart represents an utterly simple method of accurately determining the time in any part of the world, corresponding with that in any other part. If desired, a strip of cardboard may be employed in place of a ruler, pivoting one end on line A in a position corresponding to one's own location so that the straight-edge may be swung through an arc sufficiently long to reach all points on line C. This will still further simplify the use of the chart when finding foreign time corresponding to local time.

More About TIME SIGNALS

The abundance of accurate time signals plus the convenience of modern electric clocks makes it possible for every radio listener to have his clock show correct time to within a second at all times by using his own radio receiving set

By the Technical Editor

THE article appearing in the March issue entitled "Setting your watch by Radio" by Robert Hertzberg has resulted in numerous letters from our readers. Since the preparation of that article the schedule of NAA was changed with the result that many readers were unable to locate the time signals. The revised table published herewith shows the time and frequency of all time signals now transmitted by NAA.

Beat Oscillator Used

These time signals consist of a number of dashes during the 5 minutes preceding the hour shown in the table. The signals are unmodulated so that a beat oscillator is essential for their reception. There are no announcements or call letters given before or after the transmission. The first dash starts at 5 minutes before the hour and is followed by dashes at intervals of one second. Certain dashes have been left out so as to make it easy to determine exactly how many more minutes the signals will last. Figure 1 shows the dashes and the time they appear. Each revolution represents one minute. The final dash starts exactly on the hour; remember that it is the *beginning* of each dash which indicates the time.

The schedule, shown in the table, which was supplied by Mr. M. M. George, Officer

in Charge at NAA, has been checked by the writer by listening tests at all times of the day and over a period of several weeks. In New York City, the transmission on 4390 kc. and on 9425 kc. are received best. During late afternoon and evening the Cuban station COCH operates on 9428 kc. and a beat between this station and NAA becomes audible even on receivers which are not equipped with a beat oscillator. Those living farther away from Arlington, Va., will find the higher frequencies more reliable.

Long Wave Signals

Transmissions on 113 kc. and 64 kc. are easily received even at great distances but they require a special long-wave receiver.

Those who are unable to pick up these signals directly from NAA, often can obtain time signals locally. Some local broadcast stations relay the time signals once or twice a day. A part of the transmission, including the last dash, is rebroadcast daily on the NBC blue network at noon E. S. T. In New York City the signals are relayed by the Municipal Radio Station WNYC as long as the station is on the air every hour on the hour except at 9 a. m. and 11 a. m.

WOR's "Dashes"

Special time signals are also transmitted every hour on the hour by WOR in New York City. These consist of a single dash starting exactly on the hour. No announce-

ments are given concerning the significance of these dashes, since listeners are supposedly well enough acquainted with them. We are informed by the chief engineer, Mr. Poppele that the signals are received from the Arlington Naval Observatory (the same clock which controls NAA) via Western Union special wire. The transmission over the wire plus the time of the closing of relays introduces a slight delay which averages 1/50 of a second. The reliability of these signals is attested by the fact that coastwise ships use them for their navigation.

Accurate Frequency

An additional use of the Arlington Time signals from NAA is suggested by the fact that they are readily identified and occur at regular times. Amateurs and others can use them as frequency markers to calibrate receivers or signal generators. The accuracy of NAA's frequency is within .03 percent for frequencies between 1500 and 6000 kc. and within .02 percent between 6000 and 30,000 kc. as provided by the Madrid Convention in 1932. Besides being used for time signals, the transmitter is employed for weather reports. Immediately after the time signal at 10 a. m. and 10 p. m. E. S. T., a weather report follows which takes the better part of an hour. This is transmitted both by NAA and NSS on several frequencies.

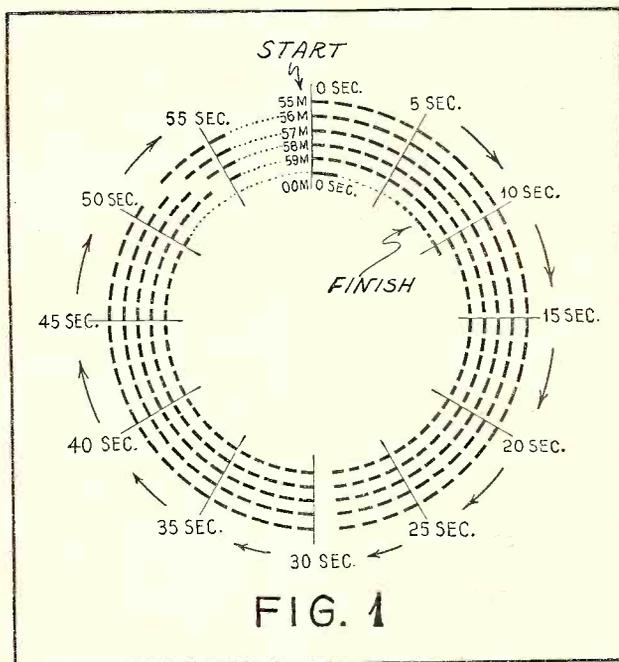


FIG. 1

TIME SIGNALS, NAA

GMT EST	Frequencies
00 7pm	113 9425
01 8pm	113
02 9pm	
03 10pm	64,113 4390, 9250
04 11pm	
05 12 mid	113 9425
06 1am	113 9425
07 2am	113 9425
08 3am	113 9425
09 4am	113 9425
10 5am	113
11 6am	113
12 7am	113
13 8am	113 9425
14 9am	
15 10am	64,113 4390, 9250, 12630, 16820
16 11am	
17 12 noon	113 9425
18 1pm	113
19 2pm	113 9425
20 3pm	113
21 4pm	113 9425
22 5pm	113
23 6pm	113 9425

Wavelength-Frequency Conversion

(see next page)

ACCORDING to a simple law of physics *the product of the wavelength and frequency equals the velocity of the radio wave.* So, in order to convert the one unit to the other, we must divide it into 300,000 which is the officially adopted figure for the velocity of radio waves in kilometers per second.

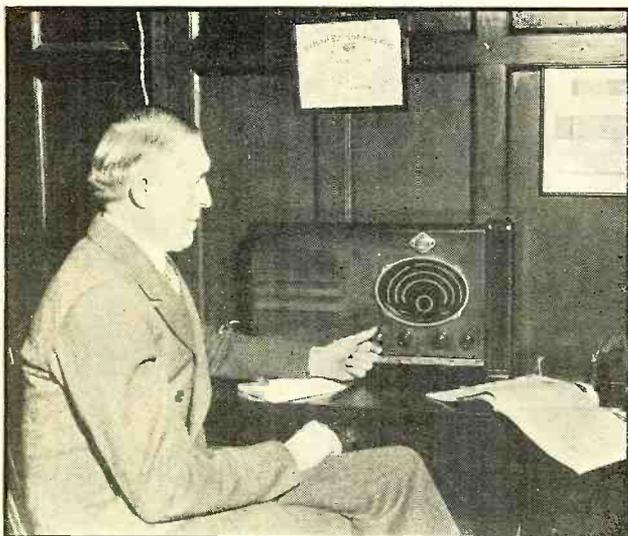
The accompanying table shows the frequency corresponding to wavelengths between 10 and 100 meters. It can be extended, however, by moving the decimal point as needed, in the first column and an equal number of places in the opposite

direction in the second column. For instance, 10.1 meters corresponds to 29,703 kc., then 101 meters is equivalent to 2970.3 kc., 1010 meters to 297.03 kc., and 1.01 meters to 297,030 kc.

When converting kc. to meters, it is also permissible to reverse the reading of the column headings, making the first column kc. and the second meters. Again, the decimal point can be moved as desired. Example: 10.1 kc. corresponds to 29,703 meters; 1010 kc. is equivalent to 297.03 meters, 10,100 kc. to 29.703 meters, etc.

WAVELENGTH-FREQUENCY CHART

M.	KC.	M.	KC.	M.	KC.	M.	KC.	M.	KC.	M.	KC.	M.	KC.	M.	KC.	M.	KC.
10.1	29,703	20.1	14,925	30.1	9,966.7	40.1	7,481.3	50.1	5,988.0	60.1	4,991.7	70.1	4,279.6	80.1	3,745.3	90.1	3,329.7
10.2	29,411	20.2	14,851	30.2	9,933.7	40.2	7,462.6	50.2	5,976.1	60.2	4,983.4	70.2	4,273.5	80.2	3,740.6	90.2	3,325.9
10.3	29,126	20.3	14,778	30.3	9,901.0	40.3	7,444.0	50.3	5,964.2	60.3	4,975.1	70.3	4,267.4	80.3	3,735.9	90.3	3,322.2
10.4	28,846	20.4	14,706	30.4	9,868.5	40.4	7,425.7	50.4	5,952.3	60.4	4,966.8	70.4	4,261.3	80.4	3,731.2	90.4	3,318.5
10.5	28,571	20.5	14,634	30.5	9,836.1	40.5	7,407.3	50.5	5,940.6	60.5	4,958.6	70.5	4,255.3	80.5	3,726.6	90.5	3,314.9
10.6	28,301	20.6	14,563	30.6	9,804.0	40.6	7,389.1	50.6	5,928.9	60.6	4,950.4	70.6	4,249.3	80.6	3,722.0	90.6	3,311.2
10.7	28,037	20.7	14,493	30.7	9,772.0	40.7	7,371.0	50.7	5,917.2	60.7	4,942.3	70.7	4,243.3	80.7	3,717.4	90.7	3,307.6
10.8	27,778	20.8	14,423	30.8	9,740.2	40.8	7,353.0	50.8	5,905.5	60.8	4,934.2	70.8	4,237.3	80.8	3,712.8	90.8	3,303.9
10.9	27,523	20.9	14,353	30.9	9,708.7	40.9	7,335.0	50.9	5,893.9	60.9	4,926.1	70.9	4,231.3	80.9	3,708.2	90.9	3,300.3
11.0	27,273	21.0	14,285	31.0	9,677.4	41.0	7,317.1	51.0	5,882.3	61.0	4,918.0	71.0	4,225.3	81.0	3,703.6	91.0	3,296.7
11.1	27,027	21.1	14,218	31.1	9,646.2	41.1	7,299.3	51.1	5,870.8	61.1	4,910.0	71.1	4,219.4	81.1	3,699.1	91.1	3,293.1
11.2	26,786	21.2	14,151	31.2	9,615.5	41.2	7,281.5	51.2	5,859.3	61.2	4,902.0	71.2	4,213.5	81.2	3,694.5	91.2	3,289.4
11.3	26,549	21.3	14,085	31.3	9,584.7	41.3	7,263.8	51.3	5,847.9	61.3	4,894.0	71.3	4,207.6	81.3	3,690.0	91.3	3,285.8
11.4	26,316	21.4	14,019	31.4	9,554.0	41.4	7,246.3	51.4	5,836.5	61.4	4,886.0	71.4	4,201.7	81.4	3,685.5	91.4	3,282.2
11.5	26,087	21.5	13,954	31.5	9,523.8	41.5	7,228.8	51.5	5,825.1	61.5	4,878.0	71.5	4,195.8	81.5	3,681.0	91.5	3,278.7
11.6	25,862	21.6	13,889	31.6	9,493.6	41.6	7,211.5	51.6	5,813.9	61.6	4,870.1	71.6	4,189.9	81.6	3,676.5	91.6	3,275.1
11.7	25,641	21.7	13,825	31.7	9,463.7	41.7	7,194.2	51.7	5,802.7	61.7	4,862.2	71.7	4,184.1	81.7	3,672.0	91.7	3,271.5
11.8	25,424	21.8	13,761	31.8	9,433.8	41.8	7,177.0	51.8	5,791.5	61.8	4,854.3	71.8	4,178.3	81.8	3,667.5	91.8	3,268.0
11.9	25,210	21.9	13,699	31.9	9,404.4	41.9	7,159.9	51.9	5,780.3	61.9	4,846.6	71.9	4,172.5	81.9	3,663.0	91.9	3,264.4
12.0	25,000	22.0	13,636	32.0	9,375.0	42.0	7,142.8	52.0	5,769.2	62.0	4,838.7	72.0	4,166.7	82.0	3,658.5	92.0	3,260.8
12.1	24,793	22.1	13,575	32.1	9,345.6	42.1	7,125.9	52.1	5,758.1	62.1	4,830.9	72.1	4,160.9	82.1	3,654.2	92.1	3,257.3
12.2	24,590	22.2	13,514	32.2	9,316.6	42.2	7,109.0	52.2	5,747.1	62.2	4,823.1	72.2	4,155.1	82.2	3,649.7	92.2	3,253.8
12.3	24,390	22.3	13,453	32.3	9,288.0	42.3	7,092.2	52.3	5,736.1	62.3	4,815.4	72.3	4,149.3	82.3	3,645.2	92.3	3,250.3
12.4	24,193	22.4	13,393	32.4	9,259.3	42.4	7,075.4	52.4	5,725.2	62.4	4,807.7	72.4	4,143.6	82.4	3,640.7	92.4	3,246.8
12.5	24,000	22.5	13,333	32.5	9,230.8	42.5	7,058.8	52.5	5,714.3	62.5	4,800.0	72.5	4,137.9	82.5	3,636.3	92.5	3,243.2
12.6	23,810	22.6	13,274	32.6	9,202.5	42.6	7,042.2	52.6	5,703.4	62.6	4,792.3	72.6	4,132.2	82.6	3,631.9	92.6	3,239.7
12.7	23,623	22.7	13,216	32.7	9,174.6	42.7	7,025.7	52.7	5,692.6	62.7	4,784.6	72.7	4,126.5	82.7	3,627.5	92.7	3,236.2
12.8	23,437	22.8	13,158	32.8	9,146.6	42.8	7,009.3	52.8	5,681.8	62.8	4,777.0	72.8	4,120.8	82.8	3,623.1	92.8	3,232.7
12.9	23,256	22.9	13,100	32.9	9,118.5	42.9	6,993.0	52.9	5,671.0	62.9	4,769.4	72.9	4,115.1	82.9	3,618.7	92.9	3,229.2
13.0	23,077	23.0	13,043	33.0	9,090.9	43.0	6,976.7	53.0	5,660.3	63.0	4,761.8	73.0	4,109.5	83.0	3,614.3	93.0	3,225.8
13.1	22,901	23.1	12,987	33.1	9,063.4	43.1	6,960.5	53.1	5,649.7	63.1	4,754.3	73.1	4,103.9	83.1	3,610.0	93.1	3,222.3
13.2	22,727	23.2	12,931	33.2	9,036.0	43.2	6,944.4	53.2	5,639.1	63.2	4,746.8	73.2	4,098.3	83.2	3,605.7	93.2	3,218.8
13.3	22,556	23.3	12,875	33.3	9,009.0	43.3	6,928.3	53.3	5,628.5	63.3	4,739.3	73.3	4,092.7	83.3	3,601.4	93.3	3,215.4
13.4	22,388	23.4	12,820	33.4	8,982.0	43.4	6,912.4	53.4	5,618.0	63.4	4,731.8	73.4	4,087.1	83.4	3,597.1	93.4	3,211.9
13.5	22,222	23.5	12,766	33.5	8,955.2	43.5	6,896.5	53.5	5,607.5	63.5	4,724.3	73.5	4,081.5	83.5	3,592.8	93.5	3,208.6
13.6	22,059	23.6	12,712	33.6	8,928.6	43.6	6,880.7	53.6	5,597.0	63.6	4,716.9	73.6	4,076.0	83.6	3,588.5	93.6	3,205.1
13.7	21,898	23.7	12,658	33.7	8,902.0	43.7	6,865.0	53.7	5,586.6	63.7	4,709.5	73.7	4,070.5	83.7	3,584.2	93.7	3,201.7
13.8	21,739	23.8	12,605	33.8	8,875.7	43.8	6,849.3	53.8	5,576.2	63.8	4,702.1	73.8	4,065.0	83.8	3,579.9	93.8	3,198.3
13.9	21,583	23.9	12,552	33.9	8,849.6	43.9	6,833.7	53.9	5,565.9	63.9	4,694.8	73.9	4,059.5	83.9	3,575.6	93.9	3,194.9
14.0	21,429	24.0	12,500	34.0	8,823.5	44.0	6,818.2	54.0	5,555.6	64.0	4,687.5	74.0	4,054.0	84.0	3,571.3	94.0	3,191.5
14.1	21,277	24.1	12,448	34.1	8,797.6	44.1	6,802.7	54.1	5,545.3	64.1	4,680.1	74.1	4,048.5	84.1	3,567.1	94.1	3,188.1
14.2	21,127	24.2	12,397	34.2	8,771.8	44.2	6,787.3	54.2	5,535.1	64.2	4,672.9	74.2	4,043.1	84.2	3,562.9	94.2	3,184.7
14.3	20,979	24.3	12,346	34.3	8,746.3	44.3	6,772.0	54.3	5,524.9	64.3	4,665.6	74.3	4,037.7	84.3	3,558.7	94.3	3,181.4
14.4	20,833	24.4	12,295	34.4	8,720.9	44.4	6,756.8	54.4	5,514.7	64.4	4,658.3	74.4	4,032.3	84.4	3,554.5	94.4	3,178.0
14.5	20,690	24.5	12,245	34.5	8,695.6	44.5	6,741.6	54.5	5,504.5	64.5	4,651.1	74.5	4,025.9	84.5	3,550.3	94.5	3,174.6
14.6	20,548	24.6	12,195	34.6	8,670.4	44.6	6,726.5	54.6	5,494.5	64.6	4,644.0	74.6	4,021.5	84.6	3,546.1	94.6	3,171.2
14.7	20,408	24.7	12,146	34.7	8,645.6	44.7	6,711.4	54.7	5,484.5	64.7	4,636.8	74.7	4,016.1	84.7	3,541.9	94.7	3,167.9
14.8	20,270	24.8	12,097	34.8	8,620.6	44.8	6,696.3	54.8	5,474.5	64.8	4,629.6	74.8	4,010.7	84.8	3,537.7	94.8	3,164.5
14.9	20,134	24.9	12,048	34.9	8,595.8	44.9	6,681.5	54.9	5,464.5	64.9	4,622.6	74.9	4,005.4	84.9	3,533.5	94.9	3,161.2
15.0	20,000	25.0	12,000	35.0	8,571.4	45.0	6,666.7	55.0	5,454.6	65.0	4,615.4	75.0	4,000.0	85.0	3,529.3	95.0	3,157.9
15.1	19,868	25.1	11,952	35.1	8,547.0	45.1	6,651.9	55.1	5,444.7	65.1	4,608.3	75.1	3,994.7	85.1	3,525.2	95.1	3,154.6
15.2	19,737	25.2	11,905	35.2	8,522.8	45.2	6,637.1	55.2	5,434.7	65.2	4,601.2	75.2	3,989.4	85.2	3,521.0	95.2	3,151.2
15.3	19,608	25.3	11,858	35.3	8,498.6	45.3	6,622.5	55.3	5,424.9	65.3	4,594.3	75.3	3,984.1	85.3	3,516.9	95.3	3,147.9
15.4	19,481	25.4	11,811	35.4	8,474.6	45.4	6,607.9	55.4	5,415.1	65.4	4,587.2	75.4	3,978.8	85.4	3,512.8	95.4	3,144.6
15.5	19,355	25.5	11,765	35.5	8,450.6	45.5	6,593.2	55.5	5,405.4	65.5	4,580.2	75.5	3,973.5	85.5	3,508.7	95.5	3,141.4
15.6	19,231	25.6	11,719	35.6	8,427.0	45.6	6,578.9	55.6	5,395.7	65.6	4,573.2	75.6	3,968.3	85.6	3,504.6	95.6	3,138.1
15.7	19,108	25.7	11,673	35.7	8,403.4	45.7	6,564.5	55.7	5,386.0	65.7	4,566.2	75.7	3,963.0	85.7	3,500.5	95.7	3,134.8
15.8	18,987	25.8	11,628	35.8	8,380.0	45.8	6,550.1	55.8	5,376.3	65.8	4,559.2	75.8	3,957.7	85.8	3,496.5	95.8	3,131.5
15.9	18,868	25.9	11,583	35.9	8,356.6	45.9	6,535.9	55.9	5,366.7	65.9	4,552.3	75.9	3,952.5	85.9	3,492.4	95.9	3,128.2
16.0	18,750	26.0	11,538	36.0	8,333.3	46.0	6,521.7	56.0	5,357.1	66.0	4,545.4	76.0	3,947.3	86.0	3,488.4	96.0	3,125.0
16.1	18,633	26.1	11,494	36.1	8,310.2	46.1	6,507.6	56.1	5,347.6	66.1	4,538.5	76.1	3,942.1	86.1	3,484.3	96.1	3,121.7
16.2	18,518	26.2	11,450	36.2	8,287.2	46.2	6,493.5	56.2	5,338.1	66.2	4,531.7	76.2	3,936.9	86.2	3,480.2	96.2	3,118.4
16.3	18,405	26.3	11,407	36.3	8,264.4	46.3	6,479.5	56.3	5,328.6	66.3	4,524.9	76.3	3,931.8	86.3	3,476.2	96.3	3,115.2



ALL SET FOR "ON-THE-AIR" TESTS

The author is shown at his Bronx Listening Post putting the receiver through its operating paces and checking the calls against the latest RADIO NEWS Time-Table.

OBTAINING overseas short-wave broadcast reception is a worthwhile feat on any receiver, but to accomplish this on a table-type, 8-tube, low-cost set is news that many new broadcast and short-wave DX listeners will be interested in hearing about.

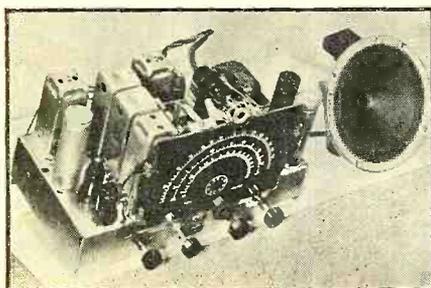
THIS new three-band superheterodyne was put through operating tests at the author's New York City Listening Post over a period of three weeks with over all results that were very satisfactory. It was then loaned to an Official RADIO NEWS Observer who had used a homemade set and who remarked that it was possible to considerably improve his log of short-wave stations and the set had direct appeal to him not only because of its low cost but also for its sensitivity and selectivity.

Logging DX Stations

Checking the station logs, which are too long to report in full here, showed that all the popular Daventry, England, and Zeesen, Germany, stations were easily tuned in with plenty of volume. Japan, France, Holland, Italy, Russia, Mexico, Cuba, and a flock of South and Central American stations were also

THE CABINET REMOVED

Below: A top view of the chassis and loudspeaker, showing the large mirror dial with the tuning eye mounted directly above. At right: The schematic circuit diagram.



Inexpensive 3-BAND Superhet

(Lafayette Model B-81)

By Wm. C. Dorf

logged. An example of its sensitivity on the low wavelengths can be realized by the reception results on the 20-meter "ham" band, G5NI, England, VP9R, Bermuda, and other amateurs in En-

gland, Portugal and Cuba were received and also numerous calls from all nine amateur districts in the United States. The foreign calls were brought in on the loudspeaker. A doublet type aerial was used on these tests.

Broadcast Band Tests

On the broadcast band tests a straight "L" type antenna of approximately 60 feet overall was used. Setting the tone and selectivity control nearly all the way to the left at the sharp position provided the required selectivity for tuning in western stations; southern, mid-west and New England calls were easily logged.

The circuit for the receiver is shown in the accompanying diagram. As mentioned previously, it is an 8-tube set which includes the 6G5 cathode-ray tuning eye, and the 5Z4MG rectifier. Three 6K7 tubes are employed for the r.f. preselector stage, first detector and the i.f. amplifier. A separate type 6C5 is used in the oscillator circuit, a 6Q7 duo-diode triode functions as the second

detector, automatic volume control and audio-amplifier tube and the type 6F6 is utilized as an audio-power amplifier.

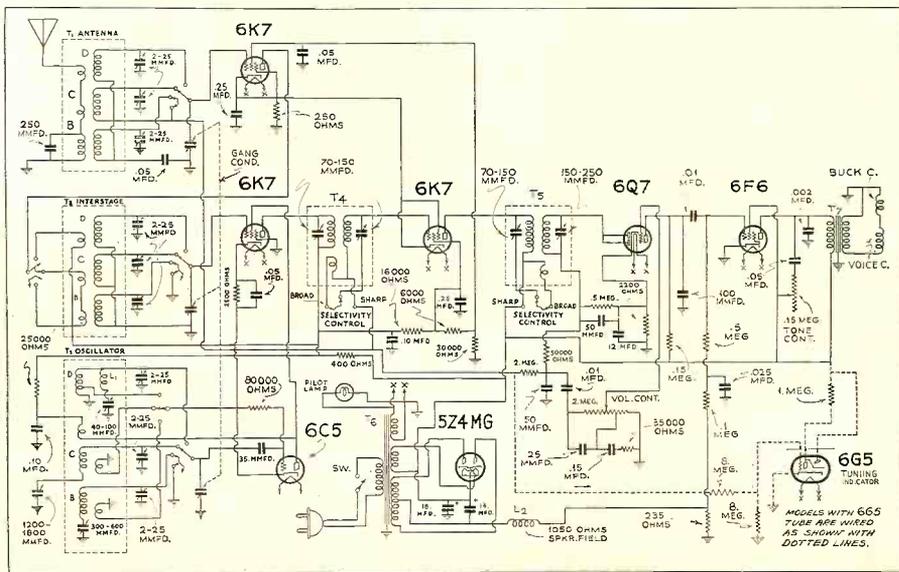
The three wavebands covered by the receiver are as follows: standard broadcast range, top scale on the dial, 528 to 1730 kc.; middle short-wave range on the dial, 1715 to 5800 kc.; the third band, lower scale on the dial, from 5.75 to 18.3 megacycles.

The features of the receiver include a large "mirror" dial, with edge lighting for overall illumination, and a traveling light spot station indicator, a tone expander, bass compensation, automatic dual-speed tuning drive, cathode-ray visual tuning, rubber cushion chassis, and others.

Dual Speed Tuning

The dual-speed tuning drive with the micrometer pointer is very helpful in short-wave tuning. A planetary drive is used which automatically changes from a normal vernier ratio of 8 to 1 when tuning in one direction to a slow ratio of 40 to 1 when the dial rotation is reversed. This style of tuning makes it possible to get high-speed action in tuning from one section of a range to another and permitting a quick shift to the slow motion so that the operator can tune in the desired station "on the nose" or comb the band back and forth for weak signals.

Looking at the front panel of the receiver, the extreme (*Turn to page 745*)



WORLD-WIDE SHORT-WAVE STATION LIST

Kc.	Meters	Call	Location	Kw.	Service, etc.	Kc.	Meters	Call	Location	Kw.	Service, etc.
400,000	0.75	W1XEG	Storrs, Conn.	0.5	Experimental	15,620	19.21	JVF	Nazaki, Japan	20.0	Phone to KWU; occ. bc.
60,500	4.96	W8XKA	Pittsburgh, Pa.	0.15	Experimental	15,505	19.35	CMA3	Havana, Cuba	.....	Tests, irr.
55,500	5.41	W8XKA	Pittsburgh, Pa.	0.15	Exp.; relays KDKA	15,490	19.37	KEM	Bolinas, Calif.	40.0	Phone
41,000	7.32	W2XG	New York, N. Y.	0.1	Experimental	15,475	19.39	KKL	Bolinas, Calif.	40.0	Phone
31,600	9.50	W1XKA	Chicopee Falls, Mass.	0.5	Experimental	15,450	19.42	IUG	Addis Ababa, Ethiopia	.....	Phone
31,600	9.49	W8XKA	Philadelphia, Pa.	.....	Exp.; relays KYW	15,420	19.45	XEBM	Mazatlan, Sinaloa, Mexico	.....	Bc.; relays XEBL
31,600	9.49	W8XAI	Rochester, N. Y.	0.1	Exp.; relays WHAM	15,420	19.45	KWO	Dixon, Calif.	20.0	Phone to Hawaii, Manila
31,600	9.49	W8XKA	Pittsburgh, Pa.	.....	Experimental	15,370	19.52	HAS3	Szekesfehervar, Hungary	20.0	Broadcast
31,600	9.49	W8XWJ	Detroit, Mich.	0.1	Exp.; relays WWJ	15,360	19.53	DZG	Zeeseu, Germany	.....	Phone
31,600	9.49	W9XPD	St. Louis, Mo.	0.1	Exp.; relays KSD	15,355	19.54	KWU	Dixon, Calif.	20.0	Phone to Hawaii
26,100	11.49	GSK	Daventry, England	20.0	Broadcast	15,340	19.56	DJR	Zeeseu, Germany	50.0	Broadcast
21,540	13.93	W8XK	Pittsburgh, Pa.	40.0	Bc.; relays KDKA	15,330	19.57	W2XAD	Schenectady, N. Y.	20.0	Bc.; relays WGY
21,530	13.93	GSJ	Daventry, England	15.0	Broadcast	15,320	19.58	OLR5B	Podebrady, Czechoslovakia	25.0	Broadcast
21,520	13.94	W2XE	Wayne, N. J.	.....	Bc.; relays WABC	15,310	19.60	GSP	Daventry, England	20.0	Broadcast
21,520	13.94	JZM	Nazaki, Japan	.....	.....	15,300	19.60	CP7	LaPaz, Bolivia	1.0	Phone
21,470	13.97	GSH	Daventry, England	20.0	Broadcast	15,280	19.63	DJQ	Zeeseu, Germany	5-50	Broadcast
21,460	13.98	W1XAL	Boston, Mass.	5.0	Broadcast	15,280	19.63	LRU	Buenos Aires, Argentina	5.0	Bc.; relays LRI
21,450	13.99	OLR6A	Podebrady, Czechoslovakia	25.0	Broadcast	15,270	19.65	W2XE	Wayne, N. J.	15.0	Bc.; relays WABC
21,420	14.01	WKK	Lawrenceville, N. J.	20.0	Phone	15,260	19.66	GSI	Daventry, England	15.0	Broadcast
21,160	14.18	LSL4	Hurlingham, Argentina	60.0	Phone to London and Rio; day	15,250	19.67	W1XAL	Boston, Mass.	5.0	Broadcast
21,140	14.19	KBI	Manila, P. I.	10.0	Phone	15,243	19.68	TPA2	Pontoise, France	25.0	Broadcast
21,080	14.23	PSA	Marapeu, Brazil	10.0	Phone; broadcast	15,230	19.70	OLR5A	Podebrady, Czechoslovakia	20.0	Broadcast
21,060	14.25	WKA	Lawrenceville, N. J.	20.0	Phone to England	15,220	19.71	PCJ	Huizen, Holland	25.0	Broadcast
21,060	14.25	KWN	Dixon, Calif.	20.0	Phone	15,210	19.72	W8XK	Pittsburgh, Pa.	40.0	Phone
21,020	14.27	LSN6	Hurlingham, Argentina	60.0	Phone to New York; day	15,200	19.74	DJB	Zeeseu, Germany	5-50	Broadcast
20,910	14.35	PSB	Marapeu, Brazil	10.0	Phone	15,190	19.75	ZBW4	Hongkong, China	2.0	Broadcast
20,860	14.37	EHY	Madrid, Spain	7.5	Phone to Buenos Aires	15,180	19.76	GSO	Daventry, England	15.0	Broadcast
20,820	14.41	KSS	Bolinas, Calif.	40.0	Phone	15,180	19.76	JZK	Nazaki, Japan	.....	Broadcast
20,780	14.44	KMM	Bolinas, Calif.	40.0	Phone	15,160	19.79	OLR5C	Podebrady, Czechoslovakia	25.0	Broadcast
20,140	14.90	DWG	Nauen, Germany	.....	Phone	15,150	19.80	YDC	Bandoeng, Java	.....	Broadcast
20,040	14.97	OPL	Leopoldville, Belgian Congo	9.0	Phone to ORG; mornings	15,140	19.81	GSF	Daventry, England	15.0	Broadcast
20,020	14.99	DFZ	Nauen, Germany	.....	Phone to South America	15,123	19.84	HVJ	Vatican City	10.0	Broadcast
19,980	15.02	KAX	Manila, P. I.	20.0	Phone to Calif.	15,110	19.85	DJL	Zeeseu, Germany	5-50	Broadcast
19,820	15.14	WKN	Lawrenceville, N. J.	20.0	Phone to England	15,070	19.91	PSD	Marapeu, Brazil	12.0	Phone
19,720	15.21	EAQ	Madrid, Spain	10.0	Phone to Latin America	15,055	19.93	WNC	Hialeah, Florida	0.4	Phone
19,700	15.23	DFJ	Nauen, Germany	.....	Phone	15,040	19.95	RKI	Moscow, U.S.S.R.	20.0	Phone to WQG, mornings
19,660	15.26	SUY	Abuzabal, Egypt	0.1	Phone	15,000	20.0	WVV	Boltsville, Md.	1.0	Freq. standard; Tue., Wed., Fri., 2-3 p.m. E. S. T.
19,600	15.31	LSF	Monte Grande, Argentina	.....	Phone	14,985	.....	YSL	San Salvador, El Salvador	.....	Phones Mexican stations
19,520	15.37	IRW	Rome, Italy	20.0	Phone to South America	14,980	20.03	KAY	Manila, P. I.	40.0	Phone to Dixon
19,460	15.42	DFM	Nauen, Germany	.....	Phone; sometimes bc.	14,970	20.04	LZA	Sofia, Bulgaria	.....	Broadcast
19,345	15.51	PMA	Bandoeng, Java, D. E. I.	40.0	Phone; sometimes bc.	14,960	20.05	YSL	San Salvador, El Salvador	.....	Phone
19,260	15.58	PPU	Sepetiba, Brazil	12.0	Phone	14,935	20.09	PSE	Marapeu, Brazil	.....	Phone; broadcast
19,220	15.61	WKF	Lawrenceville, N. J.	20.0	Phone	14,910	20.12	JVG	Nazaki, Japan	10.0	Phone to Formosa; broadcast
19,200	15.62	ORG	Russelsede, Belgium	8.0	Phone	14,690	20.42	PSF	Marapeu, Brazil	.....	Phone; broadcast
19,140	15.68	LSM3	Hurlingham, Argentina	60.0	Phone to Madrid, Berlin, Paris; day	14,600	20.55	VJH	Nazaki, Japan	20.0	Phone; broadcast
19,050	15.75	JVC	Nazaki, Japan	.....	Phone; sometimes bc.	14,590	20.56	VMN	Lawrenceville, N. J.	20.0	Phone
19,020	15.77	HS8PJ	Bangkok, Siam	.....	Broadcast	14,535	20.64	HBJ	Prangins, Switzerland	20.0	Phone
18,910	15.86	JVJ	Nazaki, Japan	20.0	Phone to Europe; occ. bc.	14,530	20.65	LSN1	Hurlingham, Argentina	60.0	Phone to New York; morn., eve.
18,890	15.88	ZSS	Klipheuvcl, S. Africa	5.0	Phone to Rugby	14,500	20.69	LSM2	Hurlingham, Argentina	60.0	Phone to Madrid, Berlin, Paris; morn., eve.
18,860	15.91	WKM	Rocky Point, N. Y.	40.0	Phone	14,480	20.72	YNA	Managua, Nicaragua	.....	Phone to WNC
18,830	15.93	PLE	Bandoeng, Java, D. E. I.	40.0	Phone to Dixon and Nazaki	14,460	20.75	DZH	Nauen, Germany	.....	Phone
18,670	16.08	OCI	Lima, Peru	.....	Phone	14,440	20.78	GBW	Rugby, England	15.0	Phone
18,620	16.11	GAU	Rugby, England	15.0	Phone to WM1, VVY	13,980	21.46	VPD2	Suva, Fiji Islands	.....	Experimental
18,600	16.13	PDM	Kootwijk, Holland	40.0	Phone	13,820	21.70	SUZ	Abu Zabal, Cairo, Egypt	20.0	Phone
18,545	16.18	PCM	Kootwijk, Holland	40.0	Phone	13,820	21.70	SU1CH	Cairo, Egypt	.....	Anateur; broadcast
18,480	16.23	HBH	Prangins, Switzerland	20.0	Phone	13,811	21.72	SUZ1	Abu Zabal, Egypt	8.0	Phone
18,405	16.30	PKC	Kootwijk, Holland	40.0	Phone to Bandoeng	13,760	21.80	TYE2	Pontoise, France	12.0	Phone to U. S. A.
18,340	16.36	WLA	Lawrenceville, N. J.	20.0	Phone to GAS	13,690	21.91	KKZ	Bolinas, Calif.	40.0	Phone to Japan, Java
18,310	16.38	FZS	Saigon, French Indo-China	15.0	Phone to France	13,635	22.00	SPW	Warsaw, Poland	20.0	Broadcast
18,270	16.42	IUD	Addis Ababa, Ethiopia	.....	Phone	13,610	22.04	JYK	Kemikawa-Cho, Japan	.....	Experimental; bc.
18,190	16.49	JVB	Nazaki, Japan	10.0	Phone to Java; P. I.; bc.	13,585	22.08	GBB	Rugby, England	15.0	Phone
18,165	16.51	PPZ	Sepetiba, Brazil	20.0	Phone	13,560	22.12	JVI	Nazaki, Japan	10.0	Phone to Manchukuo; also bc.
18,135	16.55	PMC	Bandoeng, Java	40.0	Phone; sometimes bc.	13,337	22.47	YVQ	Maracay, Venezuela	20.0	Phone
18,090	16.58	TYE	Pontoise, France	12.0	Phone to U. S. A.	13,320	22.70	.....	British Ships	.....	Phone
18,040	16.63	KQR	Bolinas, Calif.	40.0	Phone	13,285	22.58	CGA3	Drummondville, Canada	15.0	Phone to ships
18,020	16.65	KQJ	Bolinas, Calif.	40.0	Transpacific phone	13,240	22.66	KBJ	Manila, P. I.	40.0	Phone
17,980	16.69	KQZ	Bolinas, Calif.	40.0	Phone	13,210	22.71	FNSK	S.S. Normandie	.....	Phone
17,940	16.72	WQB	.....	.....	13,140	22.83	CWH	Cerrito, Uruguay	1.5	Phone	
17,920	16.74	WQF	Rocky Point, N. Y.	40.0	Phone	13,050	22.99	.....	Italian Ships	.....	Phone
17,790	16.86	GSG	Daventry, England	15.0	Broadcast	13,020	23.04	JZE	Nazaki, Japan	10.0	Phone to ships
17,785	16.87	JZL	Nazaki, Japan	.....	Bc.; relays KDKA	12,795	23.44	IAC	Coltano, Italy	52.0	Phone
17,780	16.87	W8XK	Pittsburgh, Pa.	40.0	Bc.; relays KDKA	12,885	23.28	NPG	San Francisco	.....	Time signals; 4:55-5:00 p.m. E. S. T.
17,780	16.87	W3XAL	Bround Brook, N. J.	15.0	Broadcast; relays WJZ	12,830	23.38	CNR	Rabat, Morocco	12.0	Phone to France
17,780	16.87	W9XAA	Chicago, Illinois	0.5	Experimental	12,680	23.76	YNE	Puerto Cabezas, Nicaragua	0.1	Phone
17,775	16.88	PHI	Huizen, Holland	23.6	Broadcast	12,630	23.75	NAA	Arlington, Va.	.....	Time signals; 9:55-10:00 a.m. E. S. T.
17,760	16.89	W2XE	Wayne, N. J.	.....	Bc.; relays WABC	12,290	24.41	GBU	Rugby, England	15.0	Phone
17,760	16.89	DJE	Zeeseu, Germany	5-50	Broadcast	12,250	24.49	TYB	Pontoise, France	.....	Phone to JVH, ships
17,755	16.90	ZBW5	Hongkong, China	2.0	Broadcast	12,235	24.52	TFJ	Reykjavik, Iceland	.....	Broadcast
17,750	16.90	IAC	Coltano, Italy	14.0	Phone; early mornings	12,215	24.56	TYA	Pontoise, France	.....	Phone
17,740	16.91	HSP	Bangkok, Siam	20.0	Phone to JVG	12,150	24.69	GBS	Rugby, England	15.0	Phone
17,640	17.00	.....	British Ships	.....	Phone	12,130	24.73	DZE	Zeeseu, Germany	.....	Phone to U. S. A.
17,520	17.12	DFB	Nauen, Germany	.....	Phone to YVR	12,060	24.88	PDV	Kootwijk, Holland	60.0	Phone
17,480	17.16	VVY2	Kirkee, India	.....	Phone to Rugby	12,020	24.96	VK3ME	Melbourne, Australia	.....	Tests with Drummondville
17,310	17.33	W3XL	Bround Brook, N. J.	20.0	Experimental	12,000	25.00	RV59	Moscow, U.S.S.R.	20.0	Bc. and phone
17,265	17.37	DAF	Norddeich, Germany	.....	Phone	11,955	25.09	IUC	Addis Ababa, Ethiopia	3.5	Phone
17,130	17.51	HAS5	Szekesfehervar, Hungary	20.0	Broadcast	11,950	25.11	KKQ	Bolinas, Calif.	40.0	Phone
16,820	17.84	NAA	Arlington, Virginia	.....	Time signals; 9:55-10:00 a.m. E. S. T.	11,900	25.21	KXW1	Mexico, D. F., Mexico	.....	Broadcast
16,665	18.00	.....	German Ships	.....	Phone	11,900	25.21	CT1GO	Paredo, Portugal	0.35	Broadcast
16,305	18.40	PCL	Kootwijk, Holland	.....	Phone to Bandoeng	11,900	25.21	OLR4D	Podebrady, Czechoslovakia	25.0	Broadcast
16,270	18.44	WLK	Lawrenceville, N. J.	20.0	Phone to Rugby	11,895	25.22	HP51	Aquadule, Parama	0.05	Broadcast
16,240	18.47	KTO	Manila, P. I.	40.0	Phone to Dixon	11,895	25.22	XEXR	Mexico, D. F., Mexico	.....	Broadcast
16,120	18.61	IRY	Rome, Italy	20.0	Phone	11,880	25.25	XEXA	Mexico, D. F., Mexico	0.1	Broadcast
16,030	18.71	KKP	Kahuku, Hawaii	40.0	Phone to KWO	11,880	25.25	TPA3	Pontoise, France	.....	Broadcast
15,985	18.77	KQH	Kahuku, Hawaii	40.0	Phone	11,880	25.25	W9XF	Chicago, Illinois	.....	Bc., relays WENR
15,950	18.81	PLG	Bandoeng, Java	.....	Phone; afternoons	11,875	25.26	OLR4C	Podebrady, Czechoslovakia	25.0	Broadcast
15,880	18.89	FTK	Ste. Assise, France	30.0	Phone to Saigon	11,870	25.27				

Kc. Meters Call	Location	Kw.	Service, etc.	Kc. Meters Call	Location	Kw.	Service, etc.
11,840 25.34 OLR4A	Poděbrady, Czechoslovakia	25.0	Broadcast	9,520 31.51 XEME	Merida, Yucatan, Mexico	0.015	Be.; relays XEFC
11,830 25.36 W2XE	New York, N. Y.	10.0	Be.; relays WABC	9,520 31.51 HJ4ABH	Armenia, Colombia	.....	Be.; relays HJ4ABN
11,830 25.36 W9XAA	Chicago, Illinois	0.5	Be.; relays WGBL	9,510 31.55 GSB	Davenport, England	20.0	Broadcast
11,820 25.38 XEBR	Hermosillo, Sonora, Mexico	.....	Be.; relays XEBH	9,510 31.58 HJU	Buenaventura, Colombia	1.0	Broadcast
11,810 25.40 CHCX	Davenport, England	20.0	Broadcast	9,510 31.58 VK3ME	Melbourne, Australia	5.0	Broadcast
11,810 25.40 12R04	Toronto, Canada	0.5	Broadcast	9,504 31.57 OLR3B	Poděbrady, Czechoslovakia	25.0	Broadcast
11,804 25.42 OAX5A	Rome, Italy	25.0	Broadcast	9,500 31.58 PRF5	Rio de Janeiro, Brazil	.....	Broadcast
11,801 25.42 OER2	Ica, Peru	.....	Broadcast	9,500 31.58 HJ1ABE	Cartagena, Colombia	0.05	Broadcast
11,800 25.42 JZJ	Austria, Vienna	1.5	Broadcast	9,493 31.60 XEFT	Veracruz, Ver., Mexico	0.02	Broadcast
11,795 25.43 DJO	Nazaki, Japan	.....	Broadcast	9,490 31.61 KEI	Bolinas, Calif.	20.0	Phone
11,790 25.45 W1XAL	Zeesen, Germany	5.50	Experimental	9,490 31.61 WEF	Rocky Point, N. Y.	40.0	Phone
11,770 25.49 DJD	Boston, Mass.	5.0	Broadcast	9,480 31.65 XEDQ	Guadalajara, Jalisco, Mexico	0.5	Be.; relays XED
11,760 25.51 OLR4B	Zeesen, Germany	5.50	Broadcast	9,480 31.65 KET	Bolinas, Calif.	40.0	Phone
11,750 25.53 GSD	Poděbrady, Czechoslovakia	25.0	Broadcast	9,450 31.75 TGWA	Guatemala City, Guatemala	0.2	Experimental
11,740 25.55 HP5L	Davenport, England	20.0	Broadcast	9,441 31.78 HC2EBA	Guayaquil, Ecuador	.....	Broadcast
11,730 25.57 PHI	David, Panama	0.35	Broadcast	9,428 31.82 COCH	Havana, Cuba	10.0	Broadcast
11,730 25.57 CJRX	Huizen, Holland	23.6	Broadcast; winter months	9,425 31.83 NAA	Arlington, Va.	.....	Time signals; see article on time signals
11,720 25.60 TPA4	Winnipeg, Man., Canada	2.0	Be.; relays CJRC	9,415 31.80 PLV	Bandoeng, Java, D. E. I.	80.0	Phone; sometimes bc.
11,718 25.60 CR7BH	Pontoise, France	12.0	Broadcast	9,360 32.05	Fort de France, Martinique, F. W. I.	.....	Broadcast
11,705 25.63 SM5SX	Lourenço Marques, Mozambique	0.33	Broadcast	9,350 32.09 HSSPJ	Bangkok, Siam	.....	Broadcast
11,680 25.68 KIO	Stockholm, Sweden	.....	Broadcast	9,320 32.15 OAX4I	Lima, Peru	.....	Broadcast
11,670 25.71 PPK	Kaluku, Hawaii	40.0	Phone to Bolinas	9,300 32.26 YNGU	Managua, Nicaragua	.....	Broadcast
11,660 25.73 JVL	Sepeitibi, Brazil	5.0	Phone	9,230 32.54 YNJ	Puerto Cabezas, Nicaragua	0.1	Phone
11,595 25.38 VRR4	Nazaki, Japan	10.0	Phone to Formosa; bc.	9,125 32.87 HAT4	Szekesfeherrar, Hungary	20.0	Broadcast
11,540 26.00 XGR	Stony Hill, Jamaica	.....	Phone to Hialeah, Fla.	9,045 33.17 VVY	Kirkee, India	.....	Phone to England; mornings
11,495 26.10 VIZ-3	Shanghai, China	20.0	Phone	9,040 33.19 TYA2	Pontoise, France	15.0	Phone to Algeria
11,435 26.24 COCX	Piskville, Australia	.....	Phone to Drummondville	8,960 33.48 FVA	Algiers, Algeria	.....	Phone
11,430 26.25 YNE	Havana, Cuba	1.0	Be.; relays CMX	8,945 33.53 HCJB	Quito, Ecuador	0.5	Broadcast
11,385 26.35 HBO	Puerto Cabezas, Nicaragua	0.1	Phone	8,830 33.96	British Ships, French Ships	.....	Phone
11,340 26.46 DAF	Prangins, Switzerland	20.0	Broadcast	8,795 34.11 HKV	Bogota, Colombia	.....	Broadcast
11,280 26.50 HIN	Norddeich, Germany	.....	Phone	8,775 34.18 PNI	Makassar, Celebes, D. E. I.	3.0	Phone; occ. bc.
11,140 26.93	Trujillo, D. R.	0.75	Broadcast	8,710 34.44 KBB	Manila, P. I.	.....	Phone
11,040 27.17 HRW-HRY	German Ships	.....	Phone	8,665 34.62 COBQ	Suva, Fiji Islands	.....	Broadcast
11,000 27.17 CSW	La Ceiba, Honduras	0.1	Phone	8,505 35.27 YNLG	Camaguey, Cuba	0.20	Broadcast
11,000 27.27 ZLT4	Lisbon, Portugal	5.0	Broadcast	8,470 35.42	Managua, Nicaragua	0.5	Broadcast
11,000 27.27 PLP	Wellington, New Zealand	.....	Phone; occ. bc.	8,765 34.23 DAF	German Ships	.....	Phone
10,955 27.38 HSG2	Bandoeng, Java	3.0	Phone; occ. bc.	8,400 35.71 HC2CW	Norddeich, Germany	.....	Phone to ships
10,850 27.65 DFL	Bangkok, Siam	.....	Phone; bc.	8,300 36.14 ZP10	Guayaquil, Ecuador	.....	Broadcast
10,840 27.68 KWV	Nauen, Germany	.....	Phone	8,290 36.19 HRW-HRY	Asuncion, Paraguay	0.015	Broadcast
10,770 27.86 GCP	Dixon, Calif.	20.0	Phone to Hawaii	8,185 36.65 PSK	La Ceiba, Honduras	0.1	Phone
10,740 27.93 JVM	Rugby, England	15.0	Phone	8,120 36.95 KAZ	Marapicu, Brazil	.....	Phone; bc.
10,670 28.12 CEC	Nazaki, Japan	20.0	Phone to U. S. A.; occ. bc.; relays JOAK	8,035 37.34 CNR	Manila, P. I.	20.0	Phone to Dixon, Calif.
10,660 28.14 JVN	La Granja, Chile	0.5	Phone	8,035 37.34 CED	Rabat, Morocco	12.0	Phone; bc.
10,620 28.25 WEF	Nazaki, Japan	20.0	Be.; relays JOAK	7,901 37.98 LSL1	Antofagasta, Chile	0.4	Phone
10,610 28.28 WEA	Rocky Point, N. Y.	40.0	Phone to Europe	7,880 38.07 JYR	Hurlingham, Argentina	60.0	Phone to Rio; night
10,578 28.36 FYB	Rocky Point, N. Y.	40.0	Experimental	7,860 38.12 SUX	Kemikawa-Cho, Japan	5.0	Broadcast
10,535 28.48 JIB	Paris, France	.....	Time signals; 7:55- 8 p. m., E. S. T.	7,854 38.20 HC2JB	Abu Zabal, Egypt	20.0	Phone
10,430 28.76 TYE3	Tyureki, Formosa	6.0	Phone to Japan	7,830 38.31 PGA	Guayaquil, Ecuador	0.5	Broadcast
10,430 28.76 YBG	Pontoise, France	12.0	Phone to U. S. A.	7,810 38.41 YNE	Puerto Cabezas, Nicaragua	0.1	Phone
10,420 28.79 XGW	Medan, Sumatra, D. E. I.	3.0	Phone; occ. bc.	7,797 38.47 HBP	Prangins, Switzerland	20.0	Broadcast
10,410 28.82 KES	Shanghai, China	20.0	Phone	7,740 38.76 CEC	La Granja, Chile	0.5	Phone
10,410 28.82 LSY	Bolinas, Calif.	40.0	Phone	7,620 39.32 IUB	Addis Ababa, Ethiopia	.....	Phone
10,410 28.82 LKZ	Monte Grande, Argentina	10.0	Phone	7,560 39.68 YNLF	Managua, Nicaragua	.....	Broadcast
10,400 28.85 LKZ	Kootwijk, Holland	60.0	Phone	7,550 39.74 T18WS	Puntarenas, Costa Rica	0.12	Broadcast
10,375 28.92 JVO	Dixon, Calif.	40.0	Phone	7,520 39.87 KKH	Kahuku, Hawaii	40.0	Phone
10,370 28.93 EAJ43	Nazaki, Japan	10.0	Phone to Manchukuo; bc.	7,510 39.95 JVP	Nazaki, Japan	20.0	Be.; phone
10,350 28.98 EAJ33	Tenerife, Canary Islands	.....	Broadcast	7,470 40.16 JVO	Nazaki, Japan	10.0	Phone to Java
10,350 28.98 LSN	Caramaca, Spain	.....	Broadcast	7,415 40.45 WEG	Rocky Point, N. Y.	40.0	Phone
10,335 29.03 ZFD	Monte Grande, Argentina	12.0	Phone; also bc.	7,370 40.71 KEQ	Kahuku, Hawaii	40.0	Phone
10,330 29.03 ORK	St. George, Bermuda	1.5	Phone; mostly telegraph	7,380 40.65 XECR	Mexico, D. F., Mexico	20.0	Broadcast
10,310 29.10 PPM	Ruyselede, Belgium	11.0	Broadcast	7,315 41.01 YNLAT	Granada, Nicaragua	.....	Broadcast
10,300 29.13 LSL2	Sepeitibi, Brazil	20.0	Phone	7,288 41.14 VK5DI	Aelaide, Australia	.....	Experimental
10,290 29.16 DZC	Hurlingham, Argentina	60.0	Phone to London, Rio; night	7,281 41.20 SM5SD	Stockholm, Sweden	0.03	Broadcast
10,260 29.24 PMN	Zeesen, Germany	.....	Phone	7,220 41.55 ECN1	Barcelona, Spain	.....	Broadcast
10,250 29.27 LSK3	Bandoeng, Java, D. E. I.	3.0	Phone; occ. bc.	7,200 41.67 YNAM	Managua, Nicaragua	.....	Be.; amateur
10,230 29.33 CED	Hurlingham, Argentina	60.0	Phone to Madrid, Berlin, Paris; night	7,210 41.61 EA8AB	Santa Cruz, Tenerife, C. I.	.....	Broadcast
10,220 29.35 PSH	Antofagasta, Chile	0.4	Phone; bc.	7,200 41.67	San Sebastian, Spain	.....	Broadcast
10,170 29.48 RIO	Marapicu, Brazil	.....	Phone; bc.	7,177 41.80 CR6AA	Lobita, Angola	.....	Phone
10,140 29.59 OPM	Baku, U. S. S. R.	.....	Phone	7,165 41.87	Port. W. Africa	0.5	Be.; C. W., phone
10,080 29.76 R1R	Leopoldville, Belgian Congo	15.0	Phone to ORK	7,100 42.25 FO8AA	Valencia, Spain	.....	Broadcast
10,070 29.79 EDN	Tibis, U. S. S. R.	4.0	Phone to RIO, RNE	7,082 42.36 P11J	Papeete, Tahiti	0.2	Broadcast
10,065 29.81 TDE	Madrid, Spain	10.0	Experimental	7,020 42.73 EGP1	Dordrecht, Holland	.....	Amateur; sometimes bc.
10,055 29.84 ZFB	Kanoshi, Manchukuo	20.0	Phone to JVO	7,000 42.86 EA9AH	Barcelona, Spain	.....	Broadcast
10,055 29.84 SUV	St. George, Bermuda	1.5	Phone	7,000 42.86 PZH	Tetuan, Sp. Morocco	.....	Broadcast
10,042 29.87 DZB	Abu Zabal, Egypt	20.0	Phone to Germany, England	6,970 43.04 HCETC	Paramaribo, Duteh Guiana	.....	Broadcast
10,000 30.00 WVV	Zetsen, Germany	.....	Phone	6,960 43.10 VK8SC	Quito, Ecuador	0.03	Broadcast
9,990 30.03 KAZ	Beitstill, Md.	.....	Standard frequency	6,900 43.48 H12D	Port Hedland, Australia	.....	Broadcast
9,940 30.18 CSW	Manila, P. I.	40.0	Phone	6,860 43.73 KEL	Ciudad, Trujillo	0.1	Broadcast
9,890 30.32 LSN2	Lisbon, Portugal	.....	Broadcast	6,848 43.81 XGOX	Bolinas, Calif.	40.0	Phone
9,860 30.43 EAQ	Hurlingham, Argentina	60.0	Phone to New York; nights	6,805 44.07 H17P	Nanking, China	.....	Broadcast
9,840 30.49 JYS	Madrid, Spain	20.0	Broadcast	6,775 44.38 H1H	Trujillo, D. R.	0.025	Broadcast
9,740 30.80 COCQ	Kemikawa-Cho, Japan	10.0	Be.; tests	6,750 44.44 JVT	San Pedro de Macoris, D. R.	0.15	Broadcast
9,675 31.01 DZA	Havana, Cuba	.....	Be.; relays CMQ	6,730 44.48 H13C	Nazaki, Japan	20.0	Phone to U. S. A.; bc.
9,670 31.02 T14NRH	Zeesen, Germany	.....	Phone	6,718 44.69 KBK	La Romana, D. R.	0.25	Broadcast
9,665 31.04 CT1AA	Heredia, C. R.	.....	Broadcast	6,710 44.71 KEF	Manila, P. I.	40.0	Phone
9,660 31.06 PSJ	Lisbon, Portugal	2.0	Broadcast	6,687 44.86 T1EP	Bolinas, Calif.	40.0	Phone
9,660 31.06 LRX	Marapicu, Brazil	.....	Phone	6,672 44.96 YVQ	San Jose, Costa Rica	.....	Broadcast
9,645 31.10 H113W	Buenos Aires, Argentina	5.0	Be.; relays LRI	6,635 45.22 HC2RL	Maracay, Venezuela	10.0	Phone
9,635 31.14 12R03	Port-au-Prince, Haiti	0.03	Broadcast	6,630 45.25 HIT	Guayaquil, Ecuador	0.15	Broadcast
9,618 31.18 HJ1ABP	Rome, Italy	20.0	Broadcast	6,620 45.32 PRADO	Trujillo, D. R.	0.2	Broadcast
9,610 31.22 YDB	Cartagena, Colombia	0.7	Broadcast	6,575 45.60 HCVT	Riobamba, Ecuador	.....	Be.; Thursdays
9,605 31.23 HP5J	Soerabaya, Java, D. E. I.	1.0	Be.; relays YDA	6,555 45.76 H14D	Ambato, Ecuador	.....	Broadcast
9,600 31.25 CQN	Panama, Panama	0.16	Broadcast	6,550 45.80 T1RCC	Trujillo, D. R.	.....	Broadcast
9,600 31.25 CB960	Macao, Port China	.....	Broadcast	6,545 45.84	San Jose, Costa Rica	.....	Broadcast
9,600 31.25 RAN	Santiago, Chile	0.1	Broadcast	6,545 45.84 YV6RB	Tetuan, Morocco	0.2	Broadcast
9,597 31.26 VK6ME	Moscow, U. S. S. R.	.....	Broadcast	6,540 45.87 YN1GG	Ciudad Bolivar, Venezuela	0.25	Broadcast
9,595 31.27 HBL	Perth, Australia	.....	Experimental	6,520 46.01 YV4RB	Managua, Nicaragua	0.1	Broadcast
9,590 31.28 PCJ	Prangins, Switzerland	20.0	Broadcast	6,520 46.01 HRW-HRY	Valencia, Venezuela	0.3	Broadcast
9,590 31.28 W3XAU	Huizen, Holland	20.0	Exp.; broadcast	6,500 46.15 HIL	La Ceiba, Honduras	0.1	Phone
9,590 31.28 VK2ME	Philadelphia, Pa.	10.0	Be.; relays WCAU	6,500 46.15 YV1RM	Trujillo, D. R.	0.05	Broadcast
9,580 31.31 VK3LR	Sydney, Australia	20.0	Broadcast	6,479 46.31 H18A	Cristo de Aranza, Venezuela	.....	Broadcast
9,580 31.31 GSC	Lyndhurst, Vic., Australia	20.0	Broadcast	6,477 46.33 H14V	Trujillo, D. R.	0.025	Broadcast
9,575 31.34 HJ2ABC	Davenport, England	20.0	Broadcast	6,425 46.67 OAX4K	Lima, Peru	.....	Broadcast
9,570 31.35 W1XK	Cuenta, Colombia	0.25	Broadcast	6,425 46.69 W3XL	Bound Brook, N. J.	100.0	Experimental
9,565 31.36 HP5S	Millis, Mass.	10.0	Be.; relays WBZ, WBZA	6,420 46.73 H11S	Santiago, D. R.	0.02	Broadcast
9,565 31.36 VUB	....., Panama	0.1	Broadcast	6,410 46.80 T1PG	San Jose, Costa Rica	1.0	Broadcast
9,560 31.36 DJA	Bombay, India	4.5	Broadcast	6,400 46.88 YV5RF	Caracas, Venezuela	0.25	Broadcast
9,559 31.38 HJ1ABB	Zeesen, Germany	5.50	Broadcast	6,380 47.02 YV5RF	Caracas, Venezuela	0.1	Broadcast
9,551 31.41 H12Y	Barranquilla, Colombia	1.0	Broadcast	6,375 47.10 HRW-HRY	La Ceiba, Honduras	0.1	Phone
9,550 31.41 OLR3A	Port-au-Prince, Haiti	0.03	Broadcast	6,365 47.14 YV1RH	Maracaibo, Venezuela	.....	Be.; relays YV1RF
9,540 31.47 LKJ1	Poděbrady, Czechoslovakia	25.0	Broadcast	6,360 47.17 T1FA	San Jose, Costa Rica	.....	Broadcast
9,540 31.47 DJN	Jelov, Norway	1.0	Broadcast	6,350 47.24 YNH6	Boon, Nicaragua	0.1	Phone
9,535 31.46 JZJ	Zeesen, Germany	5.50	Broadcast				
9,530 31.48 W2XAF	Nazaki, Japan	.....	Broadcast				
9,525 31.49 ZBW3	Schenectady, N. Y.	40.0	Be.; relays WGY				
	Hong-Kong, China	2.0	Be.; relays ZBW				

Kc. Meters Call	Location	Kw.	Service, etc.	Kc. Meters Call	Location	Kw.	Service, etc.
6,350 47.24 YNJ5	Waspoak, Nicaragua	0.1	Phone	6,025 49.79 HJ1ABJ	Santa Marta, Colombia	0.025	Broadcast
6,350 47.24 YNJ7	Wapam, Nicaragua	0.1	Phone	6,020 49.83 DJC	Zeesen, Germany	5-50	Broadcast
6,357 47.20 HRF1	San Pedro Sula, Honduras	0.075	Broadcast	6,020 49.83 KEUW	Veracruz, Ver., Mexico	0.25	Broadcast
6,340 47.32 YNE	Puerto Cabezas, Nicaragua	0.1	Phone	6,015 49.88 KEW1	Mexico, D. F., Mexico	0.25	Broadcast
6,340 47.32 HIX	Trujillo, D. R.	0.02	Broadcast	6,012 49.90 HJ3ABH	Bogota, Colombia	0.25	Broadcast
6,330 47.39 JZG	Nazaki, Japan	10.0	Phone to ships	6,010 49.92 VP3MR	Georgetown, British Guiana	0.25	Amateur; bc.
6,310 47.54 HIZ	Trujillo, D. R.	0.02	Broadcast	6,010 49.92 COCO	Havana, Cuba	25.0	Broadcast
6,300 47.62 YV4RD	Maracaay, Venezuela	0.1	Broadcast	6,010 49.92 OLR2A	Podebrady, Czechoslovakia	0.075	Be.; relays CFCF
6,280 47.77 HIG	Trujillo, D. R.	0.05	Broadcast	6,005 49.96 CFCX	Montreal, Quebec	4.0	Broadcast
6,280 47.77 COHB	Saneti Spiritus, Cuba	0.15	Broadcast	6,005 49.96 VE9DN	Montreal, Quebec	1.0	Be.; relays XEB
6,270 47.84 YV5RP	Caracas, Venezuela	0.025	Broadcast	6,003 49.97 XEBT	Mexico, D. F., Mexico	0.1	Broadcast
6,260 47.92 OAX4G	Lima, Peru	0.025	Broadcast	6,000 50.00 HJ1ABC	Quibdo, Colombia	0.3	Broadcast
6,250 48.00 YV5RJ	Caracas, Venezuela	0.025	Broadcast	6,000 50.00 YOI	Bucharest, Roumania	20.0	Broadcast
6,243 48.05 HIN	La Ceiba, Honduras	0.25	Broadcast	6,000 50.00 TGWA	Moscow, U.S.S.R.	0.2	Broadcast
6,235 48.11 HRD	Valera, Venezuela	0.2	Broadcast	6,000 50.00 FIQA	Guatemala City, Guatemala	0.2	Broadcast
6,225 48.19 YV1RG	Coro, Venezuela	0.2	Broadcast	5,980 50.17 HIX	Tananarive, Madagascar	1.0	Broadcast
6,205 48.35 YV1RI	Mexico, D. F., Mexico	0.1	Broadcast	5,980 50.17 HVJ	Trujillo, D. R.	10.0	Broadcast
6,200 48.39 XEXS	Santiago, Cuba	2.4	Be.; relays CMKB	5,955 50.38 HJN	Vatican City	10.0	Broadcast
6,198 48.39 COKG	Ciudad, Trujillo	0.025	Broadcast	5,955 50.38 RPT	Bogota, Colombia	1.0	Broadcast
6,190 48.47 H1A	Santiago de los Caballeros, D. R.	0.05	Broadcast	5,950 50.08 HJ2ABD	Tashkent, U.S.S.R.	0.1	Phone
6,164 48.67 OAX1B	Chiclayo, Peru	0.3	Be.; relays OAK1A	5,950 50.08 HP5K	Bucaramanga, Colombia	1.0	Broadcast
6,150 48.70 CJRO	Winnipeg, Man., Canada	0.025	Be.; relays CJRC	5,940 50.50 TG2X	Colon, Panama	0.2	Broadcast
6,150 48.78 FT4AJ	Tunis, Tunisia	Experimental		5,925 50.64 HH2S	Guatemala City, Guatemala	0.2	Police; bc.
6,156 48.73 YV3RD	Caracas, Venezuela	1.0	Broadcast	5,917 50.71 YV4RH	Port-au-Prince, Haiti	0.1	Be.; relays HHT2
6,150 48.78 CB615	Santiago, Chile	0.15	Broadcast	5,917 50.71 YV1RV	Valencia, Venezuela	0.25	Broadcast
6,150 48.78 H15N	Santiago de los Caballeros, D. R.	0.1	Broadcast	5,890 60.84 YV3RA	Maracaay, Venezuela	0.25	Broadcast
6,150 48.78 HJ1ABU	Pereira, Colombia	0.1	Broadcast	5,882 51.00 ZEA	Barquisimeto, Venezuela	0.325	Broadcast
6,150 48.78 VE9CL	Winnipeg, Man., Canada	0.325	Broadcast	5,850 51.02 IUA	Salisbury, So. Rhodesia	0.325	Broadcast
6,148 48.80 ZEB	Bulawayo, So. Rhodesia	40.0	Be.; relays KDKA	5,875 51.06 HRN	Addis Ababa, Ethiopia	0.4	Phone
6,140 48.86 W8XK	Pittsburgh, Pa.	0.33	Broadcast	5,865 51.15 H11J	Tegucigalpa, Honduras	0.4	Broadcast
6,137 48.88 CRTAA	Lourenzo Marques, Mozambique	0.35	Broadcast	5,850 51.28 YV1RB	San Pedro de Macoris, D. R.	0.04	Broadcast
6,133 48.91 XEXA	Mexico, D. F., Mexico	0.2	Be.; relays CMCD	5,850 51.28 YV1RB	Maracaibo, Venezuela	0.3	Broadcast
6,132 48.92 CT1GO	Pareda, Portugal	1.0	Broadcast	5,845 51.32 KRO	Kahuku, Hawaii	40.0	Phone
6,130 48.94 COCD	Havana, Cuba	1.0	Broadcast	5,830 51.46 TDD	Shinkio, Manchukuo	0.025	Phone to Tokyo
6,130 48.94 LKJ1	Jeloy, Norway	1.0	Broadcast	5,830 51.46 CWD	Montevideo, Uruguay	1.5	Phone
6,130 48.94 VP3BG	Georgetown, British Guiana	0.15	Broadcast	5,830 51.46 TIGPH	San Jose, Costa Rica	1.0	Broadcast
6,128 48.96 OAX7A	Cuzco, Peru	1.0	Broadcast	5,830 51.46 TIX2	San Jose, Costa Rica	0.5	Broadcast
6,125 48.98 CX44	Montevideo, Uruguay	1.0	Broadcast	5,800 51.72 YV5RC	Caracas, Venezuela	1.0	Broadcast
6,122 49.01 HJ3ABX	Bogota, Colombia	0.025	Broadcast	5,800 51.72 KZGF	Manila, P. I.	10.0	Phone; occ. bc.
6,122 49.01 OAX4P	Huancayo, Peru	1.0	Broadcast	5,790 51.81 JVU	Nazaki, Japan	10.0	Phone to Manchukuo; also bc.
6,122 49.01 OAX6A	Arequipa, Peru	1.5	Broadcast	5,780 51.90 OAX4D	Lima, Peru	20.0	Broadcast
6,120 49.02 YDA5	Bandoeng, Java, D. E. I.	0.12	Broadcast	5,780 51.90 HJ4ABD	Medellin, Colombia	0.025	Broadcast
6,120 49.02 KEPW	Mexico, D. F., Mexico	0.2	Broadcast	5,758 52.10 YNOP	Managua, Nicaragua	0.025	Broadcast
6,120 49.02 XEFT	Veracruz, Veracruz, Mexico	0.2	Broadcast	5,735 52.31 HC1PM	Quito, Ecuador	0.3	Phone to Formosa; bc.
6,120 49.02 HP2Z	Panama City, Panama	10.0	Be.; relays WABC	5,730 52.36 JVV	Nazaki, Japan	10.0	Phone to Formosa; bc.
6,120 49.02 W2XE	Wayne, N. J.	0.025	Broadcast	5,713 52.51 TGS	Guatemala City, Guatemala	0.2	Broadcast
6,117 49.04 XEUZ	Mexico, D. F.	0.025	Broadcast	5,710 52.54 YV2RA	San Cristobal, Venezuela	0.75	Broadcast
6,115 49.06 XECU	Guadalajara, Mexico	1.0	Broadcast	5,705 52.59 CFU	Rossland, B. C., Canada	0.025	Phone; bc.
6,115 49.06 HJ1ABB	Barranquilla, Colombia	25.0	Broadcast	5,670 52.91 DAF	Norddeich, Germany	0.1	Phone
6,115 49.06 OLR2C	Podebrady, Czechoslovakia	20.0	Broadcast	5,555 54.00 YNE	Puerto Cabezas, Nicaragua	0.1	Phone
6,110 49.10 GSL	Daventry, England	2.0	Broadcast	5,500 54.55 T15HH	San Ramon, Costa Rica	0.2	Broadcast
6,110 49.10 VE9HX	Halifax, N. S., Canada	0.2	Be.; relays CHNS	5,490 54.64 ROI	Sverdlovsk, U.S.S.R.	15.0	Phone
6,109 49.10 VUC	Calcutta, India	0.5	Broadcast	5,435 55.19 LSH	Monte Grande, Argentina	0.025	Phone
6,108 49.11 HJ4ABB	Manizales, Colombia	20.0	Be.; relays WJZ	5,415 55.40 PMY	Bandoeng, Java, D. E. I.	0.45	Phone; bc.
6,100 49.18 W3XAL	Bound Brook, N. J.	5.0	Be.; relays WENR	5,170 58.03 HRW-	La Ceiba, Honduras	0.1	Phone
6,100 49.18 W9XF	Chicago, Illinois	20.0	Be.; relays WENR	5,140 58.37 PMY	Bandoeng, Java, D. E. I.	0.6	Broadcast
6,100 49.20 YTC	Belgrade, Yugoslavia	2.5	Broadcast	5,110 58.71 KIKB	Bolinas, Calif.	40.0	Phone
6,098 49.20 ZTJ	Johannesburg, S. Africa	5.0	Broadcast	5,105 58.76 KEC	Bolinas, Calif.	40.0	Phone
6,097 49.20 HJ4ABE	Medellin, Colombia	0.1	Broadcast	5,025 59.70 ZFA	Hamilton, Bermuda	1.5	Phone
6,090 49.26 ZBW2	Hong-Kong, China	2.0	Be.; relays ZBW	5,000 60.00 WVV	Beltsville, Md.	1.0	Frequency Standard; Tue., Wed., Fri.; noon, 1 p.m.
6,090 49.26 HJ4ABC	Ibague, Colombia	0.5	Broadcast	5,000 60.00 ZUD	Pretoria, S. Africa	0.025	Experimental
6,090 49.26 CRCX	Toronto, Ont., Canada	1.25	Broadcast	4,975 60.30 GBC	Rugby, England	5.0	Phone to ships
6,085 49.30 HJ5ABD	Nairobi, Kenya, Africa	0.05	Broadcast	4,820 62.24 GDW	Rugby, England	15.0	Phone to U. S.
6,083 49.32 VQ7LO	Penang, Straits Settlements	0.05	Broadcast	4,795 62.56 VE9BK	Vancouver, B. C.	0.25	Broadcast
6,080 49.34 ZHJ	La Paz, Bolivia	20.0	Be.; relays WCFL	4,753 63.11 WOY	Lawrenceville, N. J.	20.0	Phone
6,080 49.34 CP5	Chicago, Illinois	5-50	Experimental	4,753 63.11 WOO	Ocean Gate, N. J.	20.0	Phone
6,079 49.35 DJM	Zeesen, Germany	0.2	Broadcast	4,610 65.08 YN37	Wapam, Nicaragua	0.1	Phone
6,075 49.38 HP5F	Colon, Panama	0.2	Broadcast	4,610 65.08 YN35	Waspoak, Nicaragua	0.1	Phone
6,075 49.38 YV1RD	Maracaibo, Venezuela	0.5	Broadcast	4,610 65.08 YNE	Puerto Cabezas, Nicaragua	0.1	Phone
6,073 49.37 CQN	Macao, Asia	0.01	Broadcast	4,610 65.08 YNH6	Boom, Nicaragua	0.1	Phone
6,070 49.42 VE9CS	Vancouver, B. C., Canada	0.01	Broadcast	4,605 65.16 HRW-	La Ceiba, Honduras	0.1	Phone
6,070 49.42 CFRX	Toronto, Ontario	1.0	Broadcast	4,600 65.22 HC2ET	Guayaquil, Ecuador	0.4	Broadcast
6,070 49.42 HJ3ABF	Bogota, Colombia	0.1	Broadcast	4,465 67.19 CFA2	Drummondville, P. Q., Canada	15.0	Phone
6,067 49.45 VPB	Colombo, Ceylon	0.025	Broadcast	4,355 68.89 IAC	Coltano, Italy	56.0	Phone
6,065 49.46 NEXR	Mexico, D. F., Mexico	0.5	Broadcast	4,278 70.21 RV15	Khabarovsk, U.S.S.R.	20.0	Broadcast
6,060 49.50 OXY	Skamlebaek, Denmark	10.0	Be.; relays WLW	4,107 73.05 HC1B	Quito, Ecuador	0.5	Broadcast
6,060 49.50 W3XAL	Cincinnati, Ohio	10.0	Be.; relays WCAU	4,100 73.17 LKJ1	Jeloy, Norway	1.0	Experimental
6,060 49.50 W3XAU	Philadelphia, Pa.	1.0	Broadcast	4,097 73.23 WND	Hialeah, Fla.	0.4	Phone
6,050 49.50 HJ3ABD	Bogota, Colombia	0.025	Broadcast	4,002 74.77 CT2AJ	San Miguel, Azores	0.5	Amateur; bc.
6,050 49.59 NEXF	Mexico, D. F., Mexico	0.15	Broadcast	4,000 75.00 CT3AQ	Funchal, Madeira	0.1	Broadcast; exp.
6,050 49.62 XETW	Mexico, D. F., Mexico	2.5	Be.; relays WIOD	3,175 94.48 YN37	Wapam, Nicaragua	0.1	Phone
6,045 49.62 HJ1ABG	Barranquilla, Colombia	0.1	Broadcast	3,175 94.48 YN35	Waspoak, Nicaragua	0.1	Phone
6,040 49.65 HJ1ABJ	Miami Beach, Fla.	0.1	Broadcast	3,175 94.48 YNH6	Boom, Nicaragua	0.1	Phone
6,040 49.67 W4XB	Santiago de los Caballeros, D. R.	0.1	Broadcast	3,170 94.48 YNE	Puerto Cabezas, Nicaragua	0.1	Phone
6,040 49.67 H10B	Boston, Mass.	5.0	Broadcast	3,800 78.95 ZP11	Asuncion, Paraguay	0.025	Broadcast
6,040 49.67 W1XAL	Tandjongpriok, Java, D. E. I.	10.0	Broadcast	3,770 79.56 HB9B	Basle, Switzerland	0.025	Broadcast
6,040 49.67 YDA	Medellin, Colombia	0.025	Broadcast	3,525 85.11 HB9AQ	Lausanne, Switzerland	0.025	Broadcast
6,033 49.72 HJ4ABP	Podebrady, Czechoslovakia	25.0	Broadcast	3,376 88.83 HJ43	Barranquilla, Colombia	0.025	Phone
6,030 49.75 OLR2B	Panama, Panama	0.1	Broadcast	3,330 92.88 YDV2	Bandjermasin, Borneo, D. E. I.	20.0	Broadcast
6,030 49.75 HP5B	Calgary, Alberta, Canada	0.1	Be.; relays CFCN	3,040 98.68 YDA	Tandjongpriok, Java, D. E. I.	10.0	Broadcast
6,030 49.75 VE9CA	Mazatlan, Mexico	0.025	Broadcast				

International Short-Wave Congress

Vienna, Austria—An international congress for short-waves in physics, biology and medicine is to be held at Vienna from the 12th to the 17th of July, 1937. Lectures and demonstrations will be held of the application of short-waves to physics, biology and medicine. In addition there will be excursions and sight seeing tours. Those who wish to attend can obtain further information from the Austrian State Tourist Dept., 630 Fifth Avenue, New York City, or direct from Oesterreich-

ische Verkehrsbureau, Friedrichstrasse 7, Vienna I, Austria.

Radio Station at Tunis

Paris, France—The Minister of Foreign Affairs has been authorized to use a credit of 10 million francs for the establishment of a broadcasting station at Tunis. The station is destined to serve the Mediterranean countries.

French Radio Show

Paris, France—The annual radio show will be held at the Neo-Parnasse Palais from May 14 to May 30 by the associated electrical industries.

Radio and the Law

Washington, D. C.—Due to the intervention of the RMA, the radio and automotive trades and broadcasters in Idaho, the auto-radio bill in Idaho has been killed. The bill, introduced by Senator R. E. Whitten, would prohibit the use of radio receivers in automobiles operated within the state of Idaho. A "luxury" tax bill, introduced in the Oklahoma legislature, proposed a 10 percent excise sales tax on radio and other articles. This bill has been killed. In Arizona a bill has been introduced which would prohibit the use of short-wave receivers in automobiles.

Low-Priced SUPER for Young DX'ers (Knight 8-Tube)

By Richard Feeney



GETTING INITIATED INTO S.W. DX'ING

Here is a simple receiver that is ideal for the beginner to use in conjunction with the RADIO NEWS Short-Wave Time-Table to enable him to become accustomed to tuning in foreign DX stations on the short waves at the times indicated.

THE short-wave DX Editor's daily mail bag contains a surprising number of inquiries, asking for information on very low-priced, all-wave sets suitable for shortwave DX'ing. This type of inquiry is submitted, mostly by new readers, especially the younger element, who are anxious to get started in this hobby with an inexpensive set, the object-in-view, of becoming Official RADIO NEWS Short-Wave Listening Post Observers.

THIS test report on a table-model 3-band super, concerns just such a set for the beginner in short-wave DX'ing, not only because of its low price, but also because it can and does bring in easily, short-wave stations from the Old World, Central and South American calls, Japan and others.

Installing the Receiver

Installing the receiver at a Bronx Listening Post for the operating tests was a simple matter. The light blue lead coming out of the back of the set was attached to the aerial and the black lead to a suitable ground; the line cord was connected to a 110 volt 60 cycle power source and with a flick of the line switch to the "on" position, the set was ready to be put through its operating paces. However, before outlining the results of the tests, it may be best, to first, describe the features of

the receiver, the type of circuit, the type of tubes employed, their functions, etc.

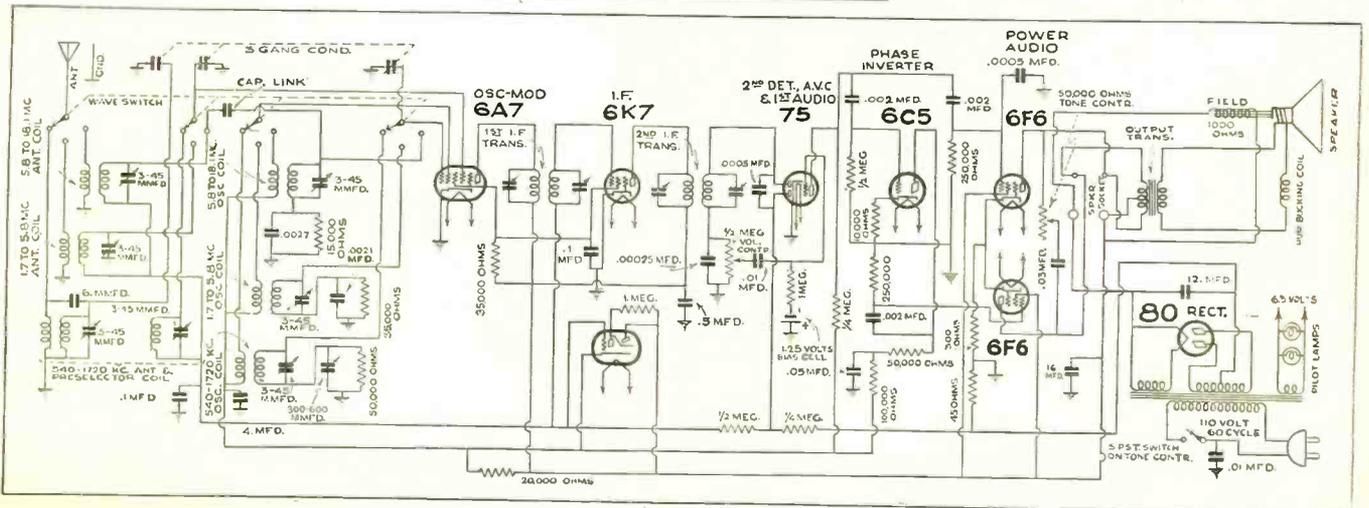
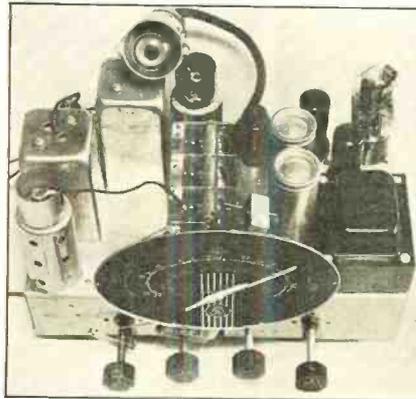
The set utilizes eight tubes, which includes a 6G5 tuning indicator eye and an 80 type rectifier. A reference to the circuit diagram will show that a type 6A7 is used as a combination first-detector and oscillator, followed by a type 6K7 for the intermediate-frequency amplifier, which is coupled to a type 75 tube, functioning as a second detector, a.v.c. and audio-amplifier. This tube is followed by a 6C5, used as a phase-inverter, and the output stage employs

two 6F6's in a push-pull circuit. The receiver's intermediate frequency is 465 kc. Metal type tubes are used in all stages except for the second detector and rectifier.

Continuous Range

The set covers a continuous tuning range, in three bands, from 17 to 550 meters. The large, attractive oval, airplane, multi-colored dial is divided into three sections, each section calibrated in a different color. As the band selector switch is adjusted, a colored spot, the same color as the dial scale in use will appear on the dial face. The top section is calibrated in kilocycles from 1730 to 540 kilocycles and the two other sections in megacycles from 1.7 to 5.8 and 18.3 to 5.8 megacycles. The most popular and generally received short-wave stations are grouped into bands and are indicated on the dial as the 19, 25, 31 and 49 meter ranges.

Employing two 6F6's in a push-pull output circuit, the set is capable of providing five watts power output, which is delivered to an eight-inch electro-dynamic (Turn to page 749)



Where to Write for Short-Wave Veri's

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

Call	Name or Slogan	Address	Call	Name or Slogan	Address
Europe			CANARY ISLANDS		
AUSTRIA OER2		Oesterr. Radioverkehrs. A. G. Johannesgasse 4b, Vienna, Austria	EAJ43	Radio Club Tenerife	Apartado 225, Santa Cruz de Tenerife, Canary Islands
BELGIUM ORG. ORK, etc.	Belradio	Direction des Radiocommunications, Brussels, Belgium	EGYPT SUV, SUX, etc.		Marconi Radio Telegraph Co. of Egypt, P.O. Box 795, Cairo, Egypt
BULGARIA LZA	Radio Garato	Sofia, Bulgaria	ETHIOPIA IUA, IUB, etc.		Ministerio della Marina, Direzione Centro R.T. Autonomo R. Marina, Roma, Italy
CZECHOSLOVAKIA OLR		Czechoslovak Short-Wave Station, Prague, Czechoslovakia	KENYA VQ7LO		Cable and Wireless, Ltd., P.O. Box 777, Nairobi, Kenya, Africa
DENMARK OXY		Stats.radiofonien, Heibergsgade, 7, Copenhagen, Denmark	MADAGASCAR FIQA, FIU		Administration des Postes, des Telegraphes et des Telephones, Tananarive, Madagascar
FRANCE TPA2, TPA3, TPA4	Radio Coloniale	Radio Coloniale, Boulevard Haussmann 98bis, Paris 8, France	MOZAMBIQUE CR7AA, CR7BH		Gremio dos Radifolios da Colonia de Mozambique, Caixa Postal 594, Lourenco Marques, Mozambique
French phones		Administration Francaise des P.T.T., Direction du Service de la T.S.F., 5 Rue Froidevaux, Paris 14, France	FRENCH MOROCCO CNR	"Radio Maroc"	Rabat, Morocco
FNSK	S.S. Normandie	French Lines, Pier 88, foot of W. 48th Street, New York, N. Y.	SPANISH MOROCCO	Radio Guardia Civil	Sgt. Lorenzo Gomez Benitez, Chief of Radiotelegraph Service of the Guardia Civil, Tetuan, Spanish Morocco
Other French ships		French Lines, Pier 57, Hudson River, New York, N. Y.	EA9AH	Radio Tetuan	Apartado 124, Tetuan, Spanish Morocco
GERMANY DJA, DJB, etc.		Reichsrundfunkgesellschaft, Haus des Rundfunks, Berlin-Charlottenburg 9, Germany	RHODESIA ZEA, ZEB		P.O. Box 792, Salisbury, Southern Rhodesia
German phones and ships		Reichspostzentralamt, Berlin-Tempelhof, Germany	UNION OF SOUTH AFRICA ZTN		African Broadcasting Co., Ltd., P.O. Box 4559, Johannesburg, South Africa
HUNGARY HAS, HAT	"Justice for Hungary"	Research Labs. for Electrical Communication of the R. Hungarian Post, Gyali-ut 22, Budapest, Hungary	ZSS		Overseas Communications of South Africa, Ltd., Box 682, Capetown, South Africa
ICELAND TFJ, TFB, TFL		Icelandic State Broadcasting, Box 547, Reykjavik, Iceland	ZUD		Chief Engineer, G.P.O., Pretoria, South Africa
ITALY I2RO	"Prato Smeraldo"	Station 2RO, 5 Via Montello, Rome, Italy	North America		
IAC		Radio Maritime Coltano, Pisa, Italy	CANADA		
IRM, IRW, etc.		Societe Italo Radio, Servizi Radio Elettrici, Via Calabria 46-48, Rome, Italy	CFN, CFU		Consolidated Mining and Smelting Co. of Canada, Ltd., Slate Creek, B. C., Canada
Italian ships		Italian Lines, 1 State Street, New York, N. Y.	CGA, CJA, etc.		Canadian Marconi Co., P.O. Box 1690, Montreal, Que., Canada
NETHERLANDS PCJ		PCJ Studios, Hilversum, Holland	CGP, CZQ, VXX		North-West Telephone Co., 768 Seymour St., Vancouver, B. C., Canada
PHL		PHOH Studios, Hilversum, Holland	CFX, VE9DN, CFRX		Same as CGA
PIJ		Middelbare Technische School, Oranjestraat 12, Dordrecht, Holland	CHNX, VE9HX		The Rogers-Majestic Corp., Toronto, Ont., Canada
NORWAY LKJ1		Dept. of Commerce, Division of Radio Telegraphy, Oslo, Norway	CJRO, CJRX		Maritime Broadcasting Co., Ltd., Lord Nelson Hotel, Halifax, N. S., Canada
POLAND SPW		Polskie Radio S.A., Mazowiecka 5, Warsaw, Poland	CRCX		Jas. Richardson & Sons, Ltd., 155 Royal Alexandra Hotel, Winnipeg, Man., Canada
PORTUGAL CSL, CSW, CTIAA	"Emisorã Nacional"	Rua do Quelhas 2, Lisbon, Portugal	VE9BJ		Canadian Broadcasting Co., 805 Davenport Road, Toronto, Ont., Canada
CTICT	"Estacao Radio Eddystone"	144, Lisbon, Portugal	VE9BK		Admiral Beatty Hotel, St. John, N. B., Canada
CTIGO	Radio Club Portugues	Rua Carvalho Araujo 97-3 D, Lisbon, Portugal	VE9CA	"The Voice of the Prairies"	Radio Sales Service, Ltd., 780 Beatty St., Vancouver, B. C., Canada
SPAIN EAQ	"La Voz de Espana"	Paredes, Portugal	VE9CS		Western Broadcasting Co., Ltd., Toronto General Trusts Bldg., Calgary, Alberta, Canada
SWEDEN SM5SX		Transradio Espanol, Apartado 951, Madrid, Spain	VE9EB		1001 Stock Exchange Bldg., Vancouver, B. C., Canada
SWITZERLAND HBL, HBO, HBP, HB9B	Radionations	Royal Technical University, Stockholm, Sweden	MEXICO XEEM, XEBT	"El Progonero del Pacifico"	Mazatlan, Sinaloa, Mexico
UNITED KINGDOM *GSA, GSB, etc.	Empire Short-Wave Station	Prangins, Vaud, Switzerland	XECR	"El Buen Tono"	Apartado 79-44 Mexico D.F., Mexico
Rugby stations		Radio Club Basel, Postfach 1, Basel, Switzerland	XEDQ		Departamento de Publicidad de la Secretaria de Relaciones Exteriores, Mexico D.F., Mexico
U.S.S.R. RV59, RNE, etc.		British Broadcasting Co., Broadcasting House, London W1, England	XEFTC	"Guadalajara, the City of Eternal Spring"	Cia. Radiofonografica, Apartado 197, Guadalajara, Jalisco, Mexico
VATICAN STATE HVJ	Radio Vaticano	Engineer-in-Chief, GPO (Radio Section), Armour House, St. Marins le Grand, London EC1, England	XEUW	"La Voz de Veracruz"	Av. Independencia 28, Veracruz, Vera, Mexico
YUGOSLAVIA	Radio Beograd	Miss Inna Marr, Radio Centre, Soianka 12, Moscow, U.S.S.R.	XETW	"La Voz de Yucatan desde Merida"	Calle 59 517, Merida, Yuc., Mexico
Africa ANGOLA CR6AA		Pontificia Accademia della Scienze, Roma-Castino Pio IV, Citta del Vaticano	XEWI	"El Eco de Sotavente desde Veracruz"	Av. Independencia 98, Veracruz, Vera, Mexico
		Mitosa Velikog 16, Belgrade, Yugoslavia	XEXA	"Aguila Azteca desde Mexico"	Apartado 8403, Mexico D.F., Mexico
		P. O. Box 103, Lobito, Angola, Portuguese West Africa		"Mi Voz al Mundo desde Mexico" "The Voice of the World"	Apartado 2874, Mexico D.F., Mexico

Call	Name or Slogan	Address	Call	Name or Slogan	Address
DOMINICAN REPUBLIC			DUTCH EAST INDIES		
HIG	"Portavoz de la Farmacia Legalidad"	Ciudad Trujillo, D. R.	PLV, PLP, etc.		Goevernements Radio Dienst, Bandoeng, Java
HIH	"La Voz de Higuamo"	San Pedro de Macoris, D. R.	YDA		N.I.R.O.M. Tandjong Priok, Java
HIJ		Apartado 623, Ciudad Trujillo, D. R.	FEDERATED MALAY STATES		
HIK	"La Voz del Partido Político Dominicano"	Apartado 48, Ciudad Trujillo, D. R.	ZGE		Malayan Amateur Society, Kuala Lumpur, F. M. S.
HIJ	"La Voz de la RCA-Victor"	Apartado 1105, Ciudad Trujillo, D. R.	ZHI		Radio Service Co. of Malaya, Singapore, Malaya
HI1A	"La Voz del Yaque"	Calle Duarte 68, Ciudad Trujillo, D. R.	FORMOSA		
HI1J		Apartado 423, Santiago de los Caballeros, D. R.	JIA, JIB, JIC		Kokusai-Denwa Kaisha, Tyureki Station, Tyureki, Formosa
HI1S	"La Voz de la Hispaniola"	Apartado 204, San Pedro de Macoris, D. R.	INDIA		
HI2D	"La Voz de la Association Catolica"	Santiago de los Caballeros, D. R.	VUB, VUC		All-India Radio, Bombay, India
HI3C	"La Voz de la Feria"	Ciudad Trujillo, D. R.	VWY, VWZ, etc.		India Radio and Cable Communication Co., Poona 6, Kirkee, India
HI3U	"La Voz del Comercio"	Apartado 123, Santiago de los Caballeros, D. R.	JAPAN		
HI4D	"La Voz de Quisqueva"	Ciudad Trujillo, D. R.	JV and JZ stations		Overseas Section, Broadcasting Co. of Japan, Atagoyama, Chiba Ken, Japan
HI4V	"La Voz de la Marina"	Apartado 771, Ciudad Trujillo, D. R.	SIAM		
HI5N	"La Voz del Almacén Dominicano"	Apartado 195, Santiago de los Caballeros, D. R.	HSJ, HSP, HS8PJ		Post and Telegraph Dept., Bangkok, Siam
HI7P	"Radio-emisora del Diario El Comercio"	Ciudad Trujillo, D. R.	SIBERIA		
HI8A	"La Pa-Doc en el Air"	Apartado 1312, Ciudad Trujillo, D. R.	RV15	The Frunze Station	Radio Committee, Khabarovsk, Siberia
HI8Q	"La Voz de los Muchachos"	Emisora Carta Real, Avenida Espana 12, Ciudad Trujillo, D. R.	STRAITS SETTLEMENTS		
HI9B	Hotel Mercedes	Apartado 95, Santiago de los Caballeros, D. R.	ZHJ		Penang Wireless Society, 4 Park Road, Penang, Straits Settlements
HAITI			Oceania		
HH2R, HH2S		Soc. Haitienne de Radio-difusion, P.O. Box A-103, Port-au-Prince, Haiti	AUSTRALIA		
HH3W		P.O. Box A-117, Port-au-Prince, Haiti	VK2ME, VK3ME		Amalgamated Wireless, Ltd., 47 York St., Sydney, Australia
Asia			VK3LR		Box 1686, G.P.O., Melbourne C2, Australia
CHINA			VK6ME		Amalgamated Wireless, Ltd., Perth, Western Australia
CQN			FIJI ISLANDS		
XGOX		Govt. Broadcasting Station, General Post Office, Macao, Portuguese China	VPD		Amalgamated Wireless, Ltd., Suva, Fiji Is.
ZBW		The Central Broadcasting Administration, Nanking, China	PHILIPPINE ISLANDS		
		P.O. Box 200, Hongkong, China	KAX, KBI, etc.		Radio Corp. of the Philippines, Plaza Moraga, Manila, P. I.
			SOCIETY ISLANDS		
			FO8AA	"Radio Oceanic"	Radio Club de Tahiti, Papeete, Tahiti
			* Does not verify		

THE constructional article on the "Quartet" 5-10-meter superheterodyne was published in the March issue, with some comments on adjustment and operation in the April issue. Since the constructional article has appeared, some minor changes have been made which are considered worth while passing along to those who have constructed the receiver.

The first of these was to take the two audio tubes off the stand-by switch. In the original model when the stand-by switch was thrown, a considerable crash was heard in the headphones or speaker but when this switch is used to break the supply of only the tubes ahead of the second detector, this was eliminated.

The other changes made all involve the beat-frequency oscillator. In the model receiver, the beat-frequency oscillator was cut out of the circuit when the stand-by switch was thrown to the "phone" position, but inasmuch as it is frequently advantageous to use the beat oscillator in the "phone" as well as the "c.w." positions, this change was made so that now this oscillator may be used in all types of reception and when not required, is turned "off" by means of its own switch SW2.

The B. F. Oscillator

Although the beat-oscillator circuit was thoroughly shielded in the model described before, there was, nevertheless, enough direct pick-up to make it unnecessary to provide any actual coupling between the beat oscillator and the i.f. circuit. In fact, the unintentional coupling was greater than needed. By by-passing the heater of the 6J7 tube with a .01 condenser right at the socket, extraneous coupling was reduced to an extremely low value with the result that a small coupling condenser consisting of a pair of twisted wires had to be connected from the 6J7 plate to the detector diode plate. This provides much better operation and the result is that the beat-frequency oscillator provides a good usable beat on all signals regardless of their level. In this connection, care must be exercised to avoid

Improving The QUARTET 5-10 Meter Super By Chester Watzel Willard Bohlen S. Gorden Taylor Laurence M. Cockaday Part Three

too much coupling. If the "magic eye" shows a sizable change as the beat oscillator is turned off and on, it is an indication of too much coupling. When the coupling is properly adjusted, the "magic eye" will show just a very slight movement as the

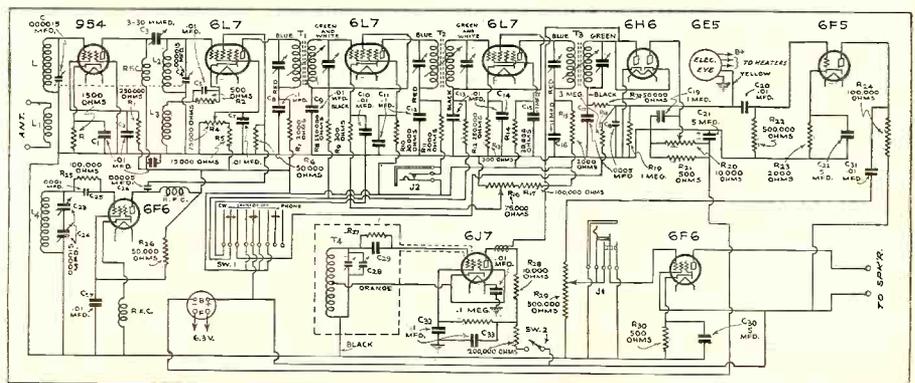
b.o. switch is turned on. Further advantage was found in reducing the voltages applied to the beat-oscillator tube by inserting a 200,000 ohm resistor in the B supply lead on the tube side of the switch SW2.

The revised circuit, showing these changes, appears herewith.

One constructor liked the operation of the receiver better when the output of the 6F6 r.f. oscillator was taken off at the cathode of the 6F6 rather than at the plate. In the model receiver this did not make any difference but constructors may wish to try it for themselves. To do this it is only necessary to connect the coupling condenser, C26, direct to the cathode terminal of the tube socket rather than the plate terminal. Those who are so inclined, may likewise desire to try different values for R6 although this again showed no improvement in the model.

Varying R. F. Coupling

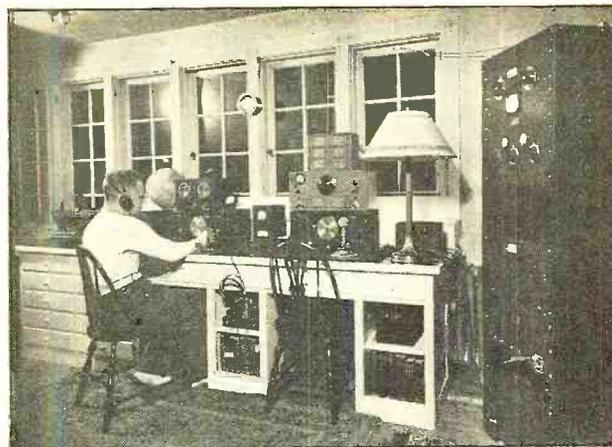
One point not included in the original article concerned the method of varying the coupling in the r.f. transformer. Before this can be done it is necessary to loosen one of the two set screws found at the lower ends of the bakelite frame of each
(Turn to page 767)



Remember MAY 9th!

This was the date of the first actual proof, last year, that 5-meter signals could travel long distances. The following article outlines some researches and theories formed regarding these possibilities.

By Laurence M. Cockaday



WHERE THE 5-METER TESTS WERE CONDUCTED.

The author is shown in his ultra-high-frequency station, W2JCY, which is also the 5-meter Net-Control station for the New York metropolitan district of the Naval Communications Reserve.

RIGHT now is the time for 5-meter men who are interested in the possibilities of DX on the 56-60 megacycle band to prepare themselves and their equipment for the coming summer season. It will be remembered that May 9 was the date last year when 5-meter stations in the Eastern part of the United States were able to communicate with many stations in the middle West. At my own station on this date we had six contacts of this nature and during the following weeks received reports of being heard from twenty-two ultra-high-frequency stations, North, West, and South in the United States and in Canada at distances of between 800-1200 miles. Also, our signals were heard in England by Cecil Mellanby on the same date, who sent in an exact log of what was said, matching with the log of our station, and following this at various times down to the present. Each month following, since then, I have been conducting researches on ultra-high-frequency transmission and reception to determine how the signals travel and when such results were reproducible. Some of this data and the ideas gleaned from it may be helpful or stimulating to other 5-meter amateurs.

So far, the greatest distance results have been from England and our 5-meter signals have been reported there rather consistently each month, at the

period of full moon, by six different listeners. Reports have come in on reception of these signals at the rate of one or two each month from other short-wave observers with 5-meter equipment. W2JCY now conducts a series of 15 minute test transmissions on 58.15 megacycles, every Saturday morning at 10:30 a. m. E.S.T.; every Saturday evening at 11:30 p. m. E.S.T.; every Sunday at 1 a. m. E.S.T. and at 9 a. m. E.S.T. Transmissions are on I.C.W. and on telephony and are conducted especially for Mellanby at Pwllheli, North Wales, and a group of British listeners organized to report on these tests. I have heard signals on Sunday mornings from G5BY three times and G6DH once and am now trying to communicate with them for a two-way 5-meter contact. Reports on these schedules from any distant points will be very much appreciated.

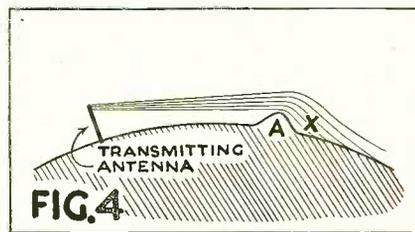
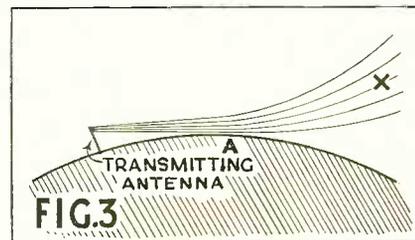
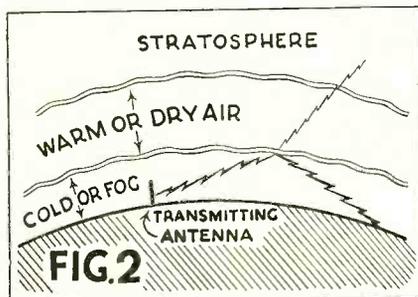
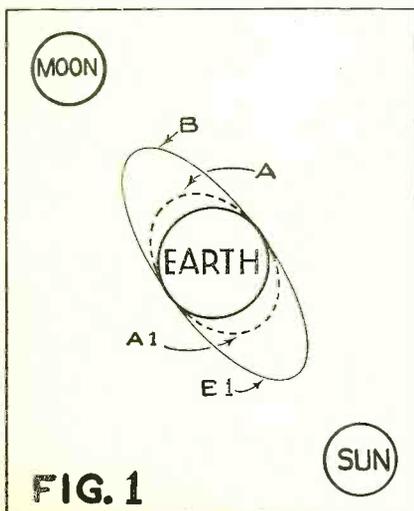
To show that these 5-meter signals can be heard with relatively simple equipment I might mention that our last report from England was from a listener at Whitley Bay, England, and his receiver was a 2-tube 5-meter transceiver!

The last year, however, has definitely proven that ultra-short-waves of these frequencies do travel farther than the optical ranges and they can curve around objects. It might be interesting to outline the results of a few of our experiments and what they seem to indicate. It has been pretty definitely proven that these 5-meter signals can be heard in the shadow on the opposite side of hills although with somewhat reduced signal strength. A glance at Figure 4 will show such an effect with

the hill at A and the "shadow" at X. It is believed that the waves are bent by diffraction and that some of them go down into the "shadow" in somewhat the same way that light waves can be diffracted over a sharp ruled edge or by a grating.

Another effect that has been noted in transmission and reception with airplanes is that when flying at a considerable height and also at some considerable distance beyond the optical range, the signal increases in strength as the height above ground increases, to a point where the signal is stronger than the inverse-square law of direct transmission would indicate! This is shown in Figure 3 where the maximum signal strength is found at point X. Here again, it is believed that diffraction (and possibly some reflection) at the earth's surface increases the signal strength at the point X.

Still another condition by which distance DX can be accomplished at irregular periods is illustrated in Figure 2. These transmissions may be anywhere from 100 miles to 300 or 400 miles in length and do not cover transmissions of greater than 500 miles. This effect is believed to be due to refraction or reflection in the lower (Turn to page 765)



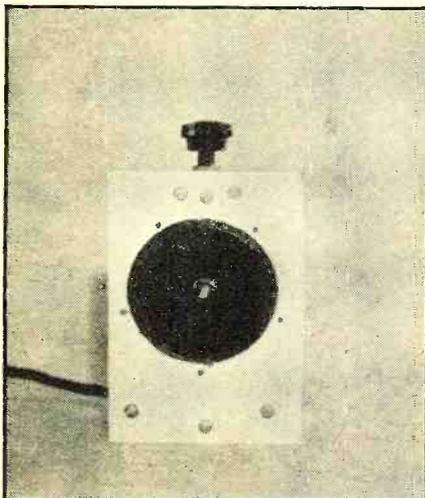


MAINTAINED FLOOD SCHEDULE
Pictured above is Roland Young, W9NLP of Chicago, who kept a 24-hour schedule during the recent flood with Louisville, Ky. Examining the logs are Lt. Comdr. R. H. G. Mathews, U.S.N.R. and Ulmer Turner, W9UG.

Learning the CODE

THE problem of learning the telegraph code is, and probably will continue to be, the principal obstacle in keeping many potential amateurs from qualifying for licenses. Many listeners have sufficient technical knowledge to meet the license requirements, but the bugaboo in most cases is mastering the art of telegraphy. Many have written to RADIO NEWS in the past asking how to go about it. The problem has been complicated by the Federal Communication Commission's recent change in the speed requirement to 13½ words a minute.

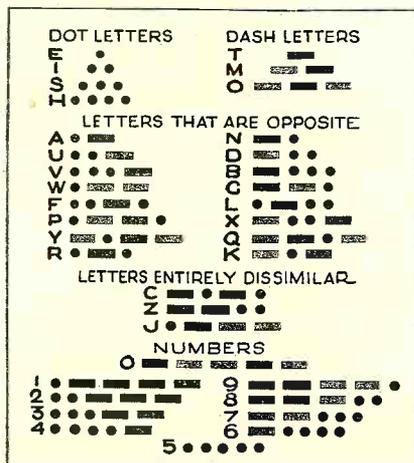
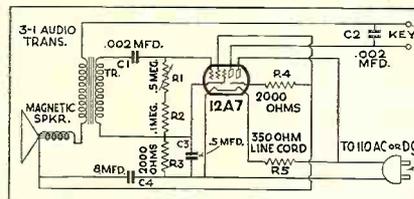
FEW instructors agree on the best procedure to learn the code. The writer in the past has helped a number of persons learn the code. To go about it, the first requirement is to master the Continental alphabet. Only a few hours are necessary to learn the code equivalents of the letters and numbers. This is of course the essential starting point. One learns



that letter "a" is "dot-dash," etc. The ultimate goal is to learn to think in the code equivalent of the letter! That is, when "dot-dash" is heard in the earphones, it should not be necessary to go through the reasoning process by thinking: "Dot-dash—now that is 'a.'" By the time this is reasoned out, the sender probably would have sent two or three more letters and the receiver would be completely lost.

The point is: Learning the code is like learning a new alphabet—a sound alphabet. When "dot-dash" is heard it should not be necessary to think of the "dot and dash" as such, but actually as the letter "a." It should have the same effect on the mental process as if a speaker said "a." When one learns to "think" in the code equivalents of the letters, he has mastered the art of telegraphy. Reduced to its simplest terms, it is like learning a new set of ABC's.

To arrive at this goal requires weeks and sometimes months of practice. Usually a younger person grasps it much more quickly than an older person. But once the alphabet is mastered, copying is like listening to someone spell a series of words and speed is limited only by the accuracy of the ear in recording the dots and dashes and the speed at which the receiver can write.



The 'HAM'

Conducted by
Everett M. Walker
 Editor for Amateur Activities

Shack

A GOOD "FIST"
The ability to transmit by key and code is an important part of amateur procedure.

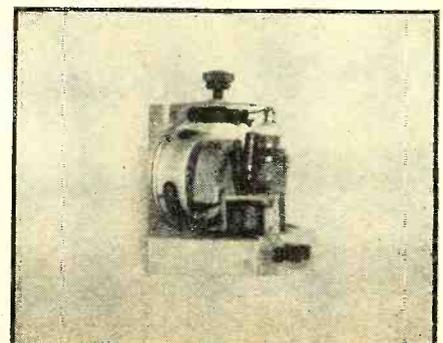
In learning the Continental alphabet some instructors have found it simpler to learn all of the dot letters first, then all of the dash letters, then all of the combinations of dots and dashes that are similar; i.e., for instance, "d" (dash-dot-dot) and "u" (dot-dot-dash), etc. Others prefer learning the code in the manner of learning the ABC's. The writer has found the former method to be a little quicker than the latter, but actually there is not much difference. For the benefit of the beginner starting from scratch, these dot, dash and opposite combinations are illustrated here.

After the alphabet is mastered—that is, the dot-and-dash equivalents of the letters are memorized—the next step is to convert them into signals by means of a key. This is best done by taking the practice set, whether it be a key and buzzer or audio oscillator, and sending from a newspaper or magazine for a half hour at a time. Most important in this procedure is careful sending. Speed should not be a consideration at first. Each letter should be formed very carefully on the key, the dots being short and sharp, the dashes equivalent to about three dots and a slight pause between each letter.

Learning Alone

Sending to one's self by this method is the first step in actually learning the new alphabet. It will be found after several hours of practice it will no longer be necessary to think: "'a' is dot-dash." When the letter "a" is to be sent, the hand will automatically form the dot-dash equivalent.

When the operator has reached the stage where he believes himself capable of copying the sending of another person, he may listen in on the amateur telegraph bands and have a try at discovering what he can read. Don't be discouraged if at first only a letter here and there is identified. This represents real progress and it will be only a question of time before more and more letters are identified, then whole words, finally sentences. Learning the code sort of proceeds in stages. The potential operator usually finds himself believing that he is making very poor progress and gets somewhat discouraged. Then, quite suddenly, his speed will take a jump. He might find himself stalled at say five words a minute for as much as a week, then he



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

suddenly will find he can copy as much as ten words a minute accurately, and so on.

If the potential operator is fortunate in having someone who knows the code to help him by sending to him for half an hour or so at a time, or has a friend learning the code at the same time, progress will be made more rapidly. But, there are hundreds of amateurs and some commercial operators who have been self-taught.

Don't Use a "Bug"

One important suggestion is that the potential operator does not attempt to learn on a "bug" key. In the first place, under the present regulations it is necessary to qualify in sending at the same time the license code test is taken. The keys supplied by the Radio Supervisors are straight keys. Furthermore, it is much easier to learn to operate a "bug" key skillfully after the code is mastered.

The present code requirement for an amateur license is 13½ words a minute. This means approximately 67 characters a minute. A perfect copy is necessary, and the operator contemplating taking the examination should be able to copy at least seventy characters (letters and numbers) a minute with ease.

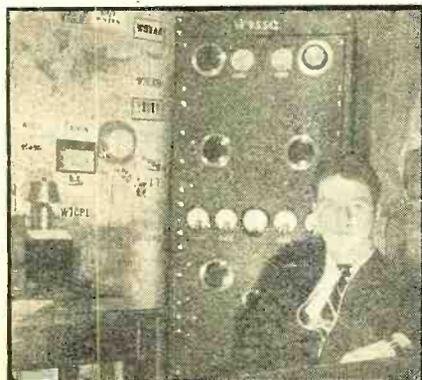
After one overcomes the barrier in learning the code equivalents of the letters, the matter of speed merely becomes a matter of practice. Like everything else, constant and diligent practice is necessary. After all, one cannot expect to copy a fast speed of sending without having learned to coordinate at that speed. Even the experienced operator can improve his speed by sending to himself or practicing copying at a speed either beyond or near his maximum.

Tone Oscillator Needed

While on the subject of learning the code, as stated above, good tools are necessary. A good key is important and a means of conveying the code sounds to the ear are essential. Something that will deliver a sharp, crisp tone is very helpful in mastering the dot-and-dash language. An excellent audio oscillator that is simple to construct and costs little has been designed by William Filler, W2AOQ, of the Terminal Radio Company, New York City.

The gadget uses a small loudspeaker, a

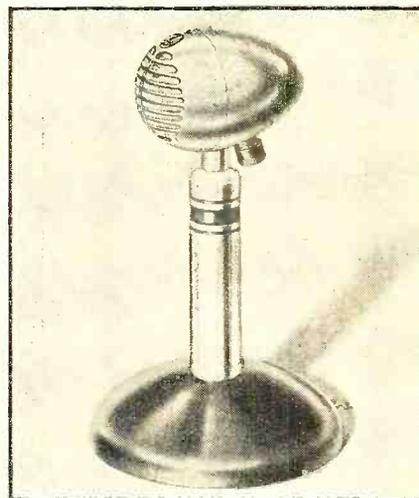
NINTH DISTRICT REPRESENTED
The amateur station W9SSQ, of Stanton Cleary, of Marquette, Mich., is pictured below.



New
"Streamlined" Microphone

By Robert Ames

THE "aerodynamic" is the newest addition to the microphone family. The product recently announced by the RCA Commercial Sound Section is of the pressure-operated type designed to a variety of p.a. and "ham" applications. It boasts a frequency range of 100 to 6000 cycles and is adapted to both voice and music. Special features in construction make the device particularly suited for outdoor jobs; the instrument is not affected by adverse climate conditions. The "aerodynamic" mike weighs but a pound and a half and easily fits the hand. It functions at an impedance of 250 ohms and is fully



NEW AERODYNAMIC MIKE

shielded against a.c. and r.f. fields; no external excitation or power is needed.

single tube, an audio transformer and a few resistances and operates directly from the 110-volt lighting lines. It is all contained on a chassis four inches square and one inch high. The most interesting feature of this little unit is the use of a 12A7 tube which serves as both rectifier and oscillator tube. The filament is heated directly from the lighting lines, the voltage being reduced to the proper value by means of a 350-ohm resistor line cord.

The circuit for the oscillator portion of the unit is conventional. A 3-to-1 audio transformer is the integral unit. The secondary terminals are connected across the grid and cathode of the tube with a .002 mfd. by-pass condenser connected in series with the grid lead. Across the grid and cathode terminals of the tube are connected two resistances: one is 100,000 ohms fixed

and the other a 500,000-ohm variable. This latter resistor provides a means for varying the pitch of the oscillator.

The key is connected in series with the oscillator plate and is by-passed by a .1 mfd. condenser. The primary of the audio transformer is connected on one side to the plate through the key, and to the loudspeaker. The speaker in turn is connected to the screen element of the 12A7.

The unit is exceptionally easy to construct. It is not essential that the loudspeaker be incorporated in the chassis construction, nor is it necessary that the unit be mounted on a metal chassis. But this combination provides a compact unit that may be moved about at will. In order to save space in the oscillator built by Filler, a bracket was mounted to provide space for

(Turn to page 745)

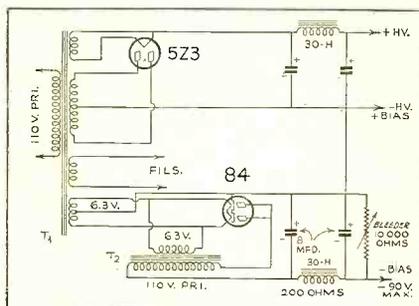
Economical
C-BIAS Supply

By Orin J. Landis
(Radio W8ILN)

AMATEURS should find considerable interest in the following description of a C-bias unit for satisfying the grid requirements for amplifiers, modulators and buffers in their transmitters. That the system is simple and economical is self-evident from the diagram.

The high-voltage, power-supply section is conventional in all respects, T1 having one filament winding to supply the primary of T2, which is a small filament transformer hooked up backwards, so that the usual 110 volts primary becomes the secondary, supplying 110 to 120 volts to the half-wave rectifier.

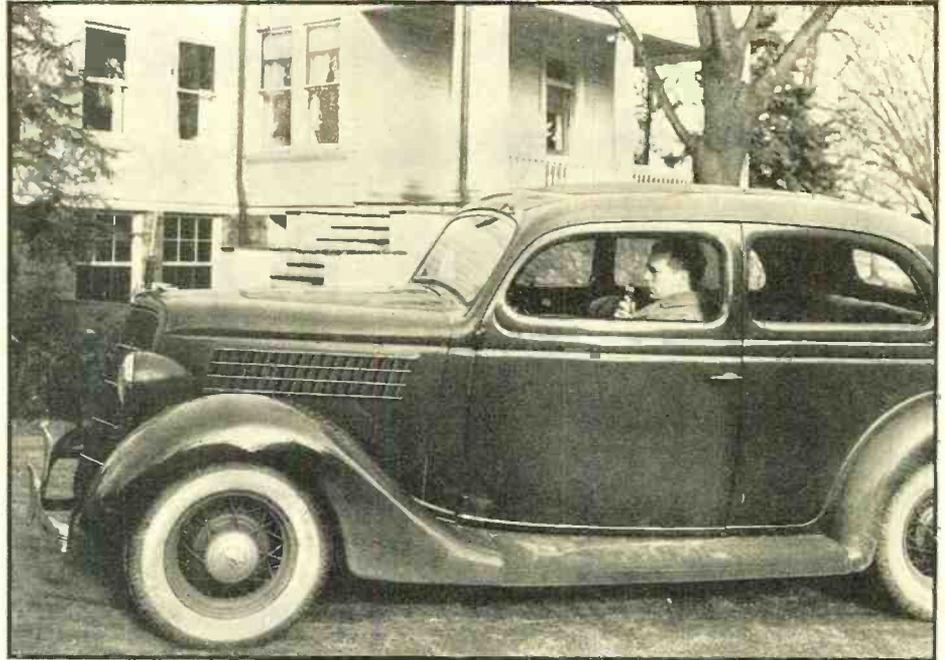
This system provides an isolated and steady source of bias voltage, unaffected by any variation of plate current. A further advantage is that the available voltage to the rectifier is more nearly the correct value for bias supply than the usual



half-wave system connected to one side of the high-voltage power transformer, which may be anywhere from 300 volts up, and which requires higher voltage filter condensers, after which you have to throw away at least 2/3 of the rectified d.c. voltage before you can get down to the usual value of bias potential.

The circuit as outlined will supply a bias voltage variable up to about 90 volts at 30 mils, having few, if any, of the disadvantages found in the more conventional systems.

The circuit shown utilizes a 6.3-volt to 110-volt transformer, in conjunction with a 6.3-volt rectifier, but, of course, the same idea can be used with a 2.5-volt or 5-volt transformer and an appropriate rectifier. Carrying the idea still further, a 220-volt primary to filament transformer as a source of the relatively high bias required of Class C amplifier operation, might be worth a thought or two by the Ham Fraternity.



Here's An Effective 5-Meter Combination
RECEIVER-X'MITTER
For Portable and Mobile Use

By Nat Bishop (W1EYM)

PORTABLE and mobile operation on the five meter band has become increasingly popular because government regulations allow such operation by properly licensed amateurs, and because highly efficient radiators can be erected in a small space. Transceivers, which have been so widely used for portable work, while they have advantages from the standpoint of cost and weight, are not a satisfactory solution for effective portable work for several reasons among which are bad "hash" radiation, limited sensitivity in the receive position, antenna coupling difficul-

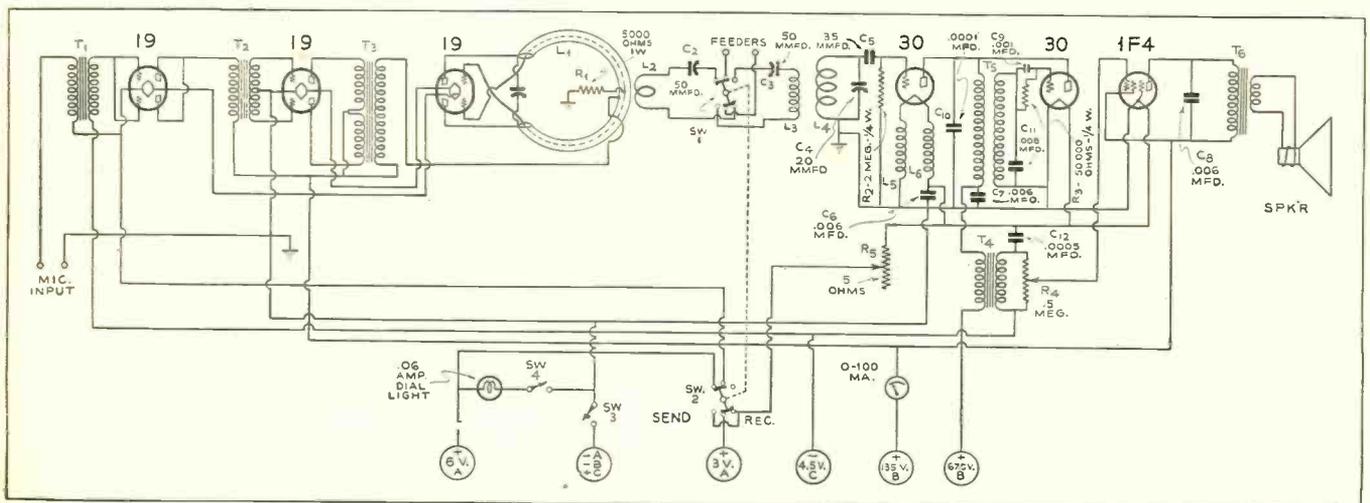
THE author is shown above with the rig in operation, using a quarter-wave antenna rod mounted on the radiator cap of the car. The other view shows the unit, with batteries and speaker in the lower compartment, set up on the car seat ready for use.

Units similar to the one to be described are not the final answer for amateur portable 5 meter work as we may shortly expect to see an increasing use of stabilized (M.O.P.A. or Crystal Control) transmitters used in this field. Their performance is so far superior to the transceiver, however, that they may well be considered a step in the right direction.

ties, etc. These difficulties are avoided by the use of a separate transmitter and receiver and if break-in operation is satisfactory, the drain on the power supply is no greater than a transceiver.

When first considering the design of a portable station the writer followed the procedure outlined in the first article of this series (in the January issue) and wrote down a list of requirements or

FIGURE 1—THE COMPLETE SCHEMATIC CIRCUIT DIAGRAM



specifications. They were as follows:

1. *Power Supply*

The equipment will be used under a wide variety of operating conditions such as portable, portable mobile, portable marine or portable aircraft. Therefore, it must have an independent power supply.

2. *Antennas*

The unit should be capable of operating efficiently into half or quarter wave antennas fed by short zepp, twisted pair or concentric line. Only one antenna will be used at each installation.

3. *Transmitter*

The unit must have a power output of at least one watt and be capable of complete modulation. The stability provided by a well designed modulated oscillator would be satisfactory for present conditions. Sufficient gain should be provided to allow complete modulation when using a "close talking" single button microphone. Such a microphone is essential for portable aircraft work and its sensitivity is somewhat less than the usual telephone type single button hand set.

4. *Receiver*

a. *Sensitivity:* Maximum obtainable with three tubes.

b. *Selectivity:* Maximum obtainable with three tubes.

c. *Power Output:* Sufficient to drive a good permanent magnet dynamic speaker.

d. *Noise Reduction Ability:* Maximum obtainable without too much distortion. Car and plane operation makes this an essential factor.

The outcome of the specifications outlined is the unit shown here, the schematic of which appears in Figure 1. Photos of the chassis, top and bottom, were shown on page 527 of the March issue.

Starting from the power input terminals it will be noted that 6 volts is used for the transmitter filament supply (series connected) and 3 volts for the receiver. This allows a saving of approximately one watt in filament power as no series resistor is required while transmitting. Naturally, the A battery life is increased by using four instead of two dry cells.

The transmitter portion of this unit is the conventional unity coupled circuit using a type 19 tube, and as a matter of fact started life as a commercial transceiver. The feeder series condenser C2 is useful for varying the load on the oscillator without changing the physical position of the pickup coil.

The receiver portion of the



THE REAR-TOP VIEW

The transmitter and receiver are entirely separate circuits, the former at the left and the receiver at the right. The receiver portion was described in detail in the March issue, page 527.

unit is the battery operated receiver described in the March issue. Its total filament current is but 240 ma. The total plate current runs under 15 ma.

The interruption frequency is permanently adjusted to as low a frequency as possible in order to give good selectivity and ignition noise reduction and still give acceptable quality. Regeneration is controlled entirely by the feeder series condenser C3.

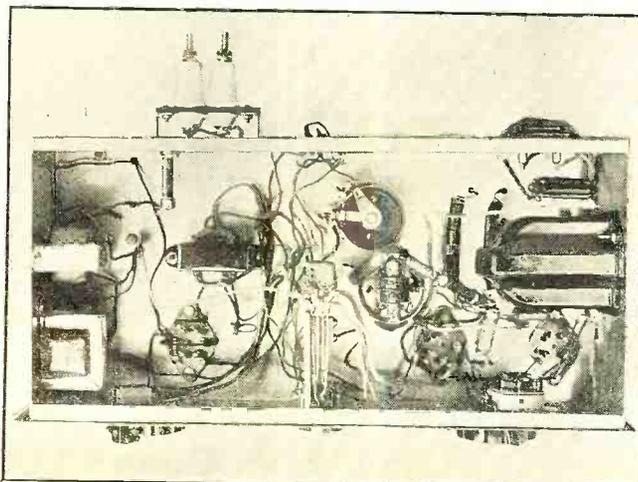
The Jensen 6-inch permanent magnet speaker has excellent sensitivity, and the output volume is ample for all conditions of operations except "portable aircraft." In this case headphones are used.

Construction data

The send-receive switch not only changes over the feeders but switches the A-plus lead from 6 to 3 volts. This arrangement gives maximum battery life as the A battery current never exceeds .24 amps. A 60-ma. dial lamp is provided for the receiver dial and is operated by the snap switch S4. The main

UNDER THE CHASSIS

The main receiver parts underneath are shown in this illustration of the bottom view.



on-and-off switch S3 cuts the A-minus leads. The plate current meter M gives a continuous check on operation and helps in adjusting the antenna loading on the transmitter. Normal B current on transmit (no modulation) runs about 40 milliamps.

The electrical specifications of the unit are given by the schematic and parts list of Figure 1. As to mechanical layout, all tuning condensers are mounted on a bakelite strip running the entire length of the chassis. Control shafts run through bushings on the front panel and connect to the condenser shafts through flexible couplings. All the equipment shown on the schematic with the exception of the microphone and speaker is mounted on the chassis. Antenna and battery connections are on the rear of the chassis. Microphone and

headset jacks are on the front. Immediately above the headset jack is the dial light switch. The receiver volume control is on the left and the on-off switch on the right. The top controls from left to right are receiver tuning, receiver antenna tuning, receive-transmit switch, transmitter antenna tuning and transmitter tuning. Batteries and loud-speaker are mounted in the compartment under the chassis and the whole unit is mounted in a veneer case with hinged cover.

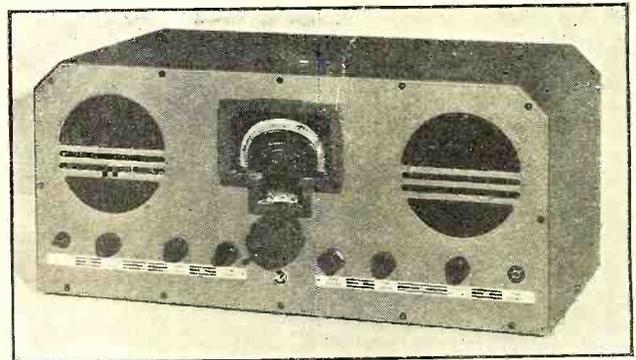
The unit has been tested under all conditions of operation; namely, marine, mobile, aircraft and portable and has come up to expectations in all cases. The antenna used in the car is a quarter-wave rod mounted on the radiator cap. Twisted pair in shielded loom serves as a transmission line and in spite of the fact that the transmission line runs under the hood, the ignition noise is not bothersome even on weak signals. (Note: No suppressors used.) The plane test was conducted by Ralph Bray (W1CDR), who used a trailing 1/2-wave antenna with 1/4-wave zepp feeders. On board the yacht, the antenna was a J type, fed with twisted pair. In this case, the antenna was about 40 feet above deck and the reliable range appeared to be about twenty miles. For portable work a 1/2-wave antenna is mounted on the case and fed with 1/4-wave zepp feeders.

At the conclusion of this series of articles describing various units that have been constructed for experimental purposes at my own station, I wish to repeat a statement made earlier in this series which was to the effect that the circuit that you can make work the best is the best circuit for you. In other words, it may be possible for you to obtain equivalent results using other (Turn on page 764)

An Evening Spent with a 500-22000 KC. SUPERHET

(The R.C.A. Model ACR-155)

By Everett M. Walker



COMMUNICATIONS TYPE RECEIVER

Its flexibility of control make it suitable for amateur, short-wave or broadcast DX reception.

TEN years ago amateurs and short-wave listeners by necessity had to construct their own receiving sets. Few sets meeting their requirements were available, and those that were, were beyond the reach of most pocketbooks. But today, the situation is different. Receivers are available over a wide price range. They meet the requirements of the most exacting amateur or listener. By and large they are superior to the average "home rolled" receiver and certainly mechanically, electrically and in appearance are a valuable accessory to the station or listening post.

CHOICE of a receiver depends largely upon the type of service in which it is to be used. For communication work there are a number of very definite requirements. It should have adequate sensitivity with a low noise level; it should cover a wide band of frequencies and if used for amateur work, spread the amateur bands over a large number of dial divisions; it should have adequate selectivity for both 'phone and c.w. reception and it should be easy to operate with all the controls conveniently placed so that the operator does not have to open the top or reach around to the back of the set to make

an adjustment.

A relatively inexpensive receiver that meets these requirements is the ACR-155 recently announced by R.C.A. This is a less expensive and simplified version of the ACR-175 announced by R.C.A. last year. It has many interesting and new features that make it an excellent performer in the amateur station.

It is inclosed in an attractive two-tone fine gray-wrinkle finish cabinet and has labeled controls and a white dial. The cabinet itself is 24 3/8-inches long, 10 7/8-inches high and 12 3/8-inches deep. The set weighs forty-eight pounds.

A superheterodyne circuit is employed

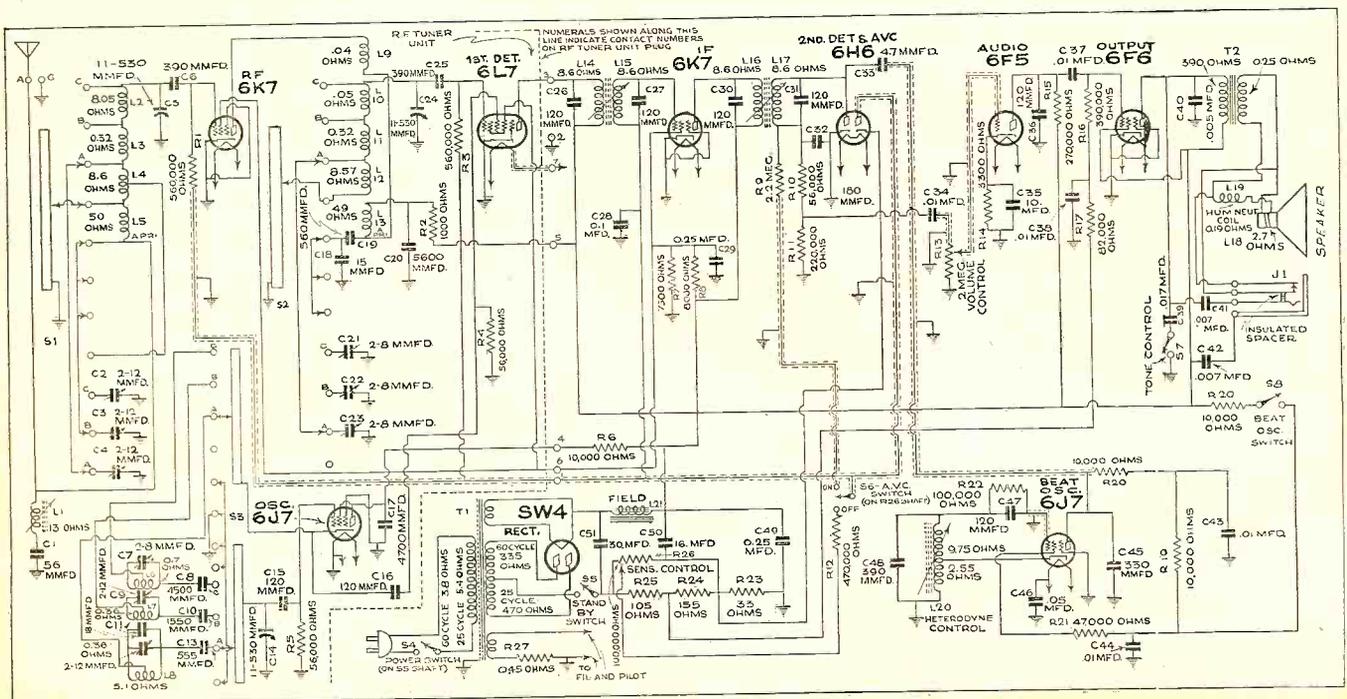
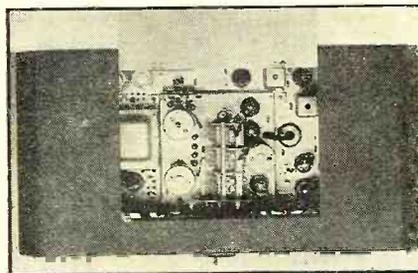
with one tuned radio-frequency stage which is designed to provide a high signal-to-image ratio and a high signal-to-noise ratio. Special precautions have been taken in the design of the high-frequency oscillator circuit to provide stability and freedom from frequency drift with line voltage variations.

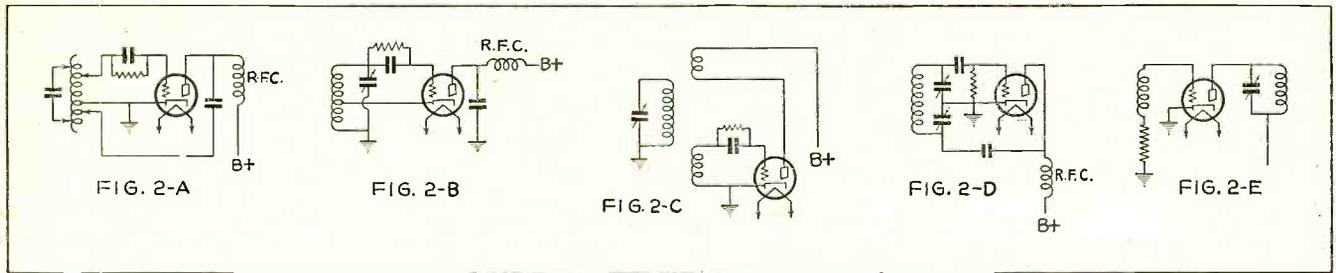
Circuit Details

The receiver employs nine metal tubes and has a frequency range of 520 to 22,000 kilocycles (continuous) in three band ranges. These are A—520 to 1,720 kilocycles which includes standard broadcasting and police stations; B—1,720 to 6,300 kilocycles, which includes the 160 and 80 meter amateur bands, police and aviation stations; and C—6,300 to 22,000 kilocycles, which includes the 40 and 20 meter amateur bands, police and short-wave broadcasting stations. The nine tubes used are: two 6K7s as radio-frequency and intermediate-frequency amplifiers; two 6J7s as frequency converter and beat frequency oscillator; one 6L7 as the first detector; one 6H6 as the second detector and automatic volume control; one 6F5 as an audio amplifier; (Turn to page 764)

WITH THE COVER OPEN

The tuner sub-assembly is revealed.





The Radio Beginner

Part Eleven—Oscillators and Mixers

By John M. Borst

BEFORE going over to the actual construction of the superheterodyne, it is necessary to understand the function of two devices which are new to followers of this series.

A superheterodyne receiver consists usually of one or more radio-frequency amplifier stages, an oscillator, a mixer, one or more intermediate-frequency amplifier stages, a detector, and an audio amplifier. Since the i.f. amplifier works on the same principle as the r.f. amplifier, all parts but the mixer and oscillator have been explained.

It was stated in Part Eight that the function of these two devices is to change the frequency of the incoming signal by the creation of beats between its carrier and a locally generated signal.

Oscillators

Radio men find frequent use for oscillators, so beginners will find it worth while to learn as much as possible about them. It was explained in previous articles how amplification of a tube can be increased by means of feedback. Now when the amount of feedback is above a critical value, the tube goes into oscillation. In Figure 1, a typical oscillator is shown. When the plate coil (the "tickler") is large enough

THIS series is presented for beginners who desire to obtain a working knowledge of radio and those who have some theoretical knowledge but lack practical experience.

and brought close enough to the grid coil, the tube will "oscillate"; that is, it will generate an alternating current at a frequency determined by the size of the condenser C and the coil L. By changing the coil and condenser, an oscillator can be made to generate currents of any frequency.

There are several different ways of obtaining the necessary feedback to make a tube oscillate and each has its advantages. It is not within the scope of this article to discuss the merits of all of them, but the most important types are shown in Figure 2. Most oscillator circuits are called by the name of a radio engineer who contributed to its development. Figure 2A shows the "Harley" circuit, which is generally recognized by the tapped coil. The location of the taps here regulates the feedback. A variation of this circuit, also known as the Dow circuit, is shown in Figure 2B. The only difference is the ground connection, which has been moved to the plate

tap. Figures 2C and 2D show the Meissner oscillator and the Colpitts oscillator, respectively.

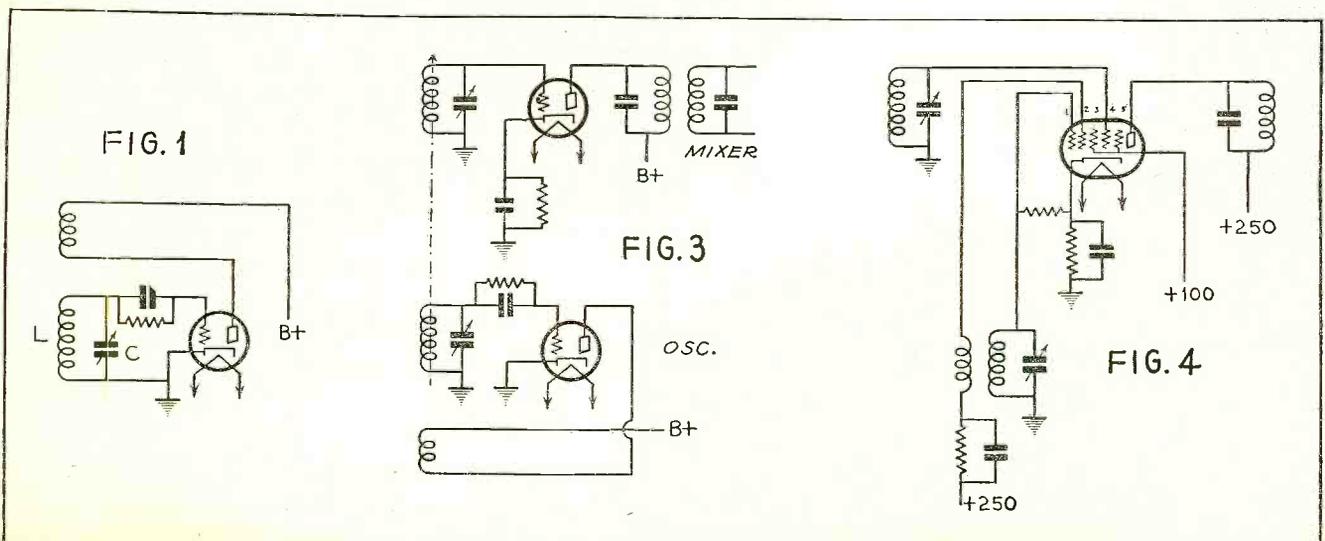
There is no particular reason why the tuned circuit cannot be in the plate circuit and the tickler to the grid. Whenever considerable power is required, as in transmitters, this procedure is followed. Figure 2E shows a typical oscillator of this type, the so-called TNT oscillator. There is usually enough coupling between the grid and plate coil to keep the tube oscillating.

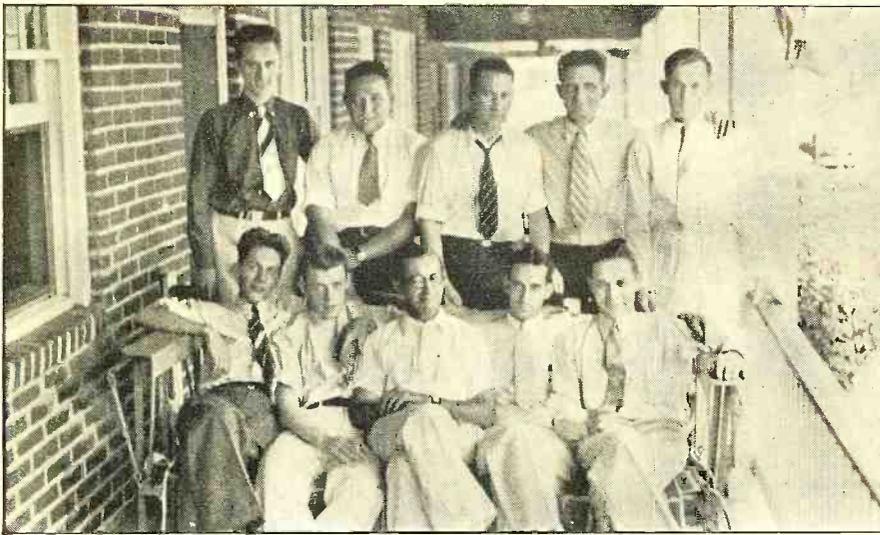
Besides getting a tube to oscillate, it is usually important to keep it working at the same frequency as long as the values of L and C are not changed by the operator. This means that the coil and condenser should be well constructed so as not to vary, and also that the tube voltages should be kept constant, since they too cause slight variations of the frequency.

The Mixer

A tube, working as an amplifier, should not generate sums and differences of the frequencies applied to its grid. This is a form of distortion which radio men try to avoid. Consequently, when the sums and differences are wanted, as in the mixer of a superheterodyne receiver, it should be op-

(Turn to page 759)





THE DX CORNER

S. GORDON TAYLOR
(For Broadcast Waves)

DX CALENDAR MAY

BELOW are given lists of special DX broadcasts which are scheduled for May. The initials following an item indicate the organization to which the program is dedicated and where a RADIO NEWS special has been arranged for by an Observer, his name is given in the schedule.

Don't fail to tune in the RADIO NEWS specials on this list and as many others as possible—and above all, don't fail to report to each station tuned in, giving them as much information as you can concerning their signal strength, fading, quality, etc. Where verifications are desired it is always desirable to enclose return postage.

Hours shown are Eastern Standard Time and are all a.m. unless otherwise indicated.

Day Hour	Kc. Call	State Kw.	Club
7 1-3	1210 WFOY	Fla. .1	R. News Truax
8 3:10-3:30	1370 KWYO	Wyo. .1	R. News Atkins
10 2-2:20	1420 WJBO	La. .1	R. News Golson
11 1:20-1:40	1313 KCKN	Kans. .1	R. News Meade
16 3-4	1430 KECA	Calif. 1	All DX Clubs Atkins

PERIODIC

Thursdays—8:45-9 p.m., 1320 kc., WORK, York, Pennsylvania, 1 kw., (NRC)

Fridays—5 a.m., 1000kc., KFVD, Los Angeles, Calif., 25 kw., (R. News) (Atkins) (tips)
Midnight, 980 kc., KDKA, Pittsburgh, Pa., 50 kw., (Ed. Lips)

Sundays—12:45 a.m., 1470 kc., WLAC, Nashville, Tenn., 5 kw., (Cappie Hadley) (tips)
1:15 a.m., 640 kc., KFL, Los Angeles, Calif., 50 kw., (tips)
1:30-1:45 a.m., 1360 kc., KGER, Long Beach, Calif., 1 kw., (R. News) (Atkins) (tips)

TUNING FOR TRANS-PACIFIC DX

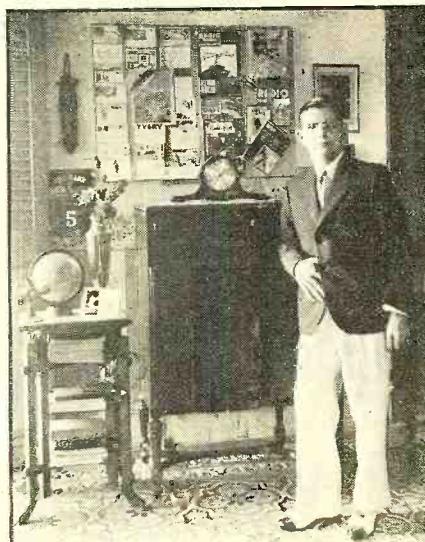
HERE is a guide for DX'ers who want to go after the T.P.'s which are now in season. These are the stations from across the Pacific reported heard by observers this Spring, up to the time this issue went to press. The initials represent the observers who reported each station and the station having the largest number of initials after it is the station that is the most generally heard. The initials stand for Observers as

follows: (H) Hunt, California; (H2) Hesterman, Saskatchewan; (L) Lonis, New York; (T) Tomlinson, New York; (R) Routhahn, Pennsylvania; (R2) Rebensdorf, Illinois; (B) Black, Pennsylvania; (C) Crawford, Nebraska; (K) Kruse, Iowa; (T2) Truax, Illinois. Look for these stations between 2 and 6 a.m. (your own local time). The Hawaiians come through earliest, around 2 to 3 a.m. The others come in after 4 a.m., and in early May will be best in most sections of the country around 5 a.m.

Kc.	Call	Country	LPO's
570	2YA	New Zealand	H,R
580	3AR	Australia	L
590	JOAK1	Japan	H
600	4QN	Australia	H,H2
610	2FC	Australia	H,H2
650	1YA	New Zealand	H,L,R,T,R2,K
660	XGOA	China	H
670	2CO	Australia	H,H2,L
690	JOBK1	Japan	H
700	2NR	Australia	H,L,R2
710	7NT	Australia	H,H2,L
720	3YA	New Zealand	H,L,T
730	JOCK1	Japan	H
740	2BL	Australia	L

DX IN THE TROPICS

The well-appointed listening post of Sergio Gonzales at Camaguey, Cuba.



A DX "GET-TOGETHER"
The Baltimore Chapter of the NNR. Reading from left to right the members are: (standing)—Carroll Weyrich, Barney Ahman, Tom Kelly, L.P.O. Lou McVey, Dixon Russell; (seated)—Martin Howard, James Bruns, Lloyd S. Hahn, L.P.O. William L. Bauer, Philip Hahn.

Official RADIO NEWS Broadcast Band Listening Post Observers

United States

- California: Frank D. Andrews, Dudley Atkins III, Okie Clark, Randolph Hunt, Don Ronk, George C. Sholin, Warren E. Winkley
- Connecticut: Stanley Grabowski
- Illinois: H. E. Rebensdorf, Floyd D. Smith, Donald C. Truax
- Iowa: Clifford Kruse
- Kansas: T. R. Grosvenor
- Louisiana: Wilbur T. Golson
- Maryland: William L. Bauer, Louis J. McVey, John E. Quintrell, Jr., Frank Zelinka.
- Massachusetts: William W. Beal, Jr., Carl L. Horton, Warren C. Reichardt
- Minnesota: Carl & Anne Eder
- Missouri: M. F. Meade, Ray W. Sahlbach
- Nebraska: Bud Crawford
- New Jersey: Erroll R. Birnie, Jack H. Brown, Robert F. Gaiser, Jack B. Schneider
- New York: Carl Forestieri, Ray Geller, Arthur B. Johnson, John C. Kalmbach, Jr., Harry E. Kentzel, Maynard J. Lonis, Robert C. Schmarder, R. H. Tomlinson, Nicholas Woytall
- Ohio: Stan Elcheshen, A. J. Parfitt, Jack Thomas, Norman Glover
- Pennsylvania: Thomas Black, Robert W. Botzum, Robert H. Cleaver, Harry M. Gordon, John Kaemarcik, Edward Koesan, J. Warren Routhahn, Francis Schmidt, Stephen G. Spicer
- Rhode Island: Spencer E. Lawton
- South Dakota: Mrs. A. C. Johnson
- Texas: Isaac T. Davis
- Virginia: C. C. Wilson
- Washington: Albert L. Bunch, H. J. McClain, Anthony C. Tarr
- Wisconsin: Arthur Seidenschwartz

Foreign

- Alaska: S. A. Tucker
- Australia: Aubrey R. Jurd
- Canada: Bernard J. Clancy, Charles Hesterman, John W. Ker, Ernest W. Law, Fred Smith
- England: Alfred T. Anderson, R. T. Coales, D. Mason, Gledhill, Charles E. Pellatt, J. S. Phillips
- France: R. Touvenin
- Germany: Reginald Pick
- Hawaii: L. R. Giddings
- Japan: A. T. Yamamoto
- Morocco: T. E. Gootec
- New Zealand: Alexander N. Chalmers, Eric W. Watson
- Scotland: Simon M. Cartin

Kc.	Call	Country	LPO's
750	JFAK	Japan	H
750	KGU	Hawaii	R,T,B,R2,C,T2
770	3LO	Australia	H2,L
770	JOHK	Japan	H
780	JOJK	Japan	H
790	4YA	New Zealand	H,L,T,B
800	4QG	Australia	H2,L
810	JOJK	Japan	H
830	JOJK	Japan	H
830	3GI	Australia	H
870	JOAK2	Japan	H
870	2GB	Australia	L
910	4RK	Australia	H2
920	JOCK	Japan	H
950	2UE	Australia	H
950	JOOG	Japan	H
980	JOXK	Japan	H
990	JOCK2	Japan	H
1020	JOFG	Japan	H
1050	JOIG	Japan	H
1060	JOIG	Japan	H
1080	JOIG	Japan	H
1120	4BC	Australia	H2
1320	KGMB	Hawaii	L,R,T,T2
1380	4BH	Australia	H2
1400	KHBC	Hawaii	H2,R,T,R2,T2

(Turn to page 756)

Designing Resistance-Coupled AMPLIFIERS

(Amplifiers with Pentodes)

By J. van Lienden

Part One

THE response characteristic of resistance-coupled amplifiers is essentially flat in the middle region of frequencies where the effect of condensers C, C_c and C_d (see Figure 1) and the tube capacitances is negligible.

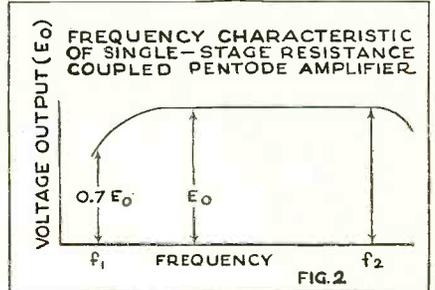
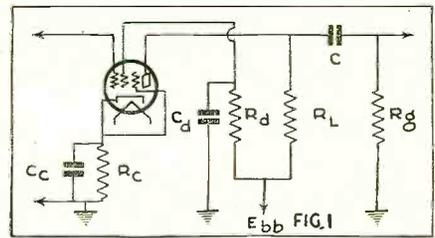
Circuit Constants

The low-frequency response in these amplifiers is dependent on the coupling and by-pass condenser sizes, while the high-frequency response is determined by the size of the plate resistor and the tube capacitances. This implies that by a suitable choice of constants a

desired range can be covered. Furthermore, troubles due to motor-boating can be reduced by regulating the gain at low frequencies. For this reason the use of self-bias and a series screen resistor is more desirable than fixed voltages, since better control is had over the low-frequency response and also since it provides an automatic compensation for differences in tubes and varying plate supplies.

Use of the Chart

The accompanying chart, prepared by RCA engineers, gives the required cir-



cuit constants for different plate supplies. In each case, use of these constants will result in a response curve similar to Figure 2, where output at f1 = 100 cycles is 30 percent lower per stage, than the output at medium frequencies. If the (Turn to page 745)

RESISTANCE-COUPLED AMPLIFIER CHART FOR PENTODES

PLATE-SUPPLY VOLTAGE (E _{bb}) - Volts ¹	90						180					
	0.1		0.25		0.5		0.1		0.25		0.5	
PLATE RESISTOR (R _L) - Megohms	0.1	0.25	0.5	0.25	0.5	1	0.1	0.25	0.5	0.25	0.5	1
GRID RESISTOR (R _g) - Megohms ²	0.37	0.44	0.44	1.1	1.18	1.4	0.44	0.5	0.5	1.1	1.18	1.4
SCREEN RESISTOR (R _d) - Megohms	1200	1100	1300	2400	2600	3600	4700	5500	5500	1000	750	800
CATHODE RESISTOR (R _c) - Ohms	0.05	0.05	0.05	0.03	0.03	0.025	0.02	0.05	0.02	0.05	0.05	0.05
SCREEN BY-PASS CONDENSER (C _d) - μf	5.2	5.3	4.8	3.7	3.2	2.5	2.3	2	2	6.5	6.7	6.7
CATHODE BY-PASS CONDENSER (C _c) - μf	0.02	0.01	0.006	0.008	0.005	0.003	0.005	0.0025	0.0015	0.02	0.01	0.006
BLOCKING CONDENSER (C) - μf	17	22	33	23	32	33	28	29	27	42	52	59
VOLTAGE OUTPUT (E _o) - Peak volts ³	41	55	66	70	85	92	93	120	140	51	69	83
VOLTAGE GAIN ⁴												

PENTODE TYPES: 6C6, 6J7, 57

PLATE-SUPPLY VOLTAGE (E _{bb}) - Volts ¹	300						600 (max.)					
	0.1		0.25		0.5		0.1		0.25		0.5	
PLATE RESISTOR (R _L) - Megohms	0.1	0.25	0.5	0.25	0.5	1	0.1	0.25	0.5	0.25	0.5	1
GRID RESISTOR (R _g) - Megohms ²	0.44	0.5	0.53	1.18	1.18	1.45	2.45	2.9	2.95	0.48	0.53	0.53
SCREEN RESISTOR (R _d) - Megohms	500	450	600	1100	1200	1300	1700	2200	2300	200	250	300
CATHODE RESISTOR (R _c) - Ohms	0.07	0.07	0.06	0.04	0.04	0.05	0.04	0.04	0.04	0.09	0.08	0.08
SCREEN BY-PASS CONDENSER (C _d) - μf	8.5	8.3	8	5.5	5.4	5.8	4.2	4.1	4	11.5	11.1	10.5
CATHODE BY-PASS CONDENSER (C _c) - μf	0.02	0.01	0.006	0.008	0.005	0.003	0.005	0.003	0.0025	0.02	0.01	0.006
BLOCKING CONDENSER (C) - μf	55	81	96	81	104	110	75	97	100	90	140	150
VOLTAGE OUTPUT (E _o) - Peak volts ³	61	82	94	104	140	185	161	350	240	77	100	112
VOLTAGE GAIN ⁴												

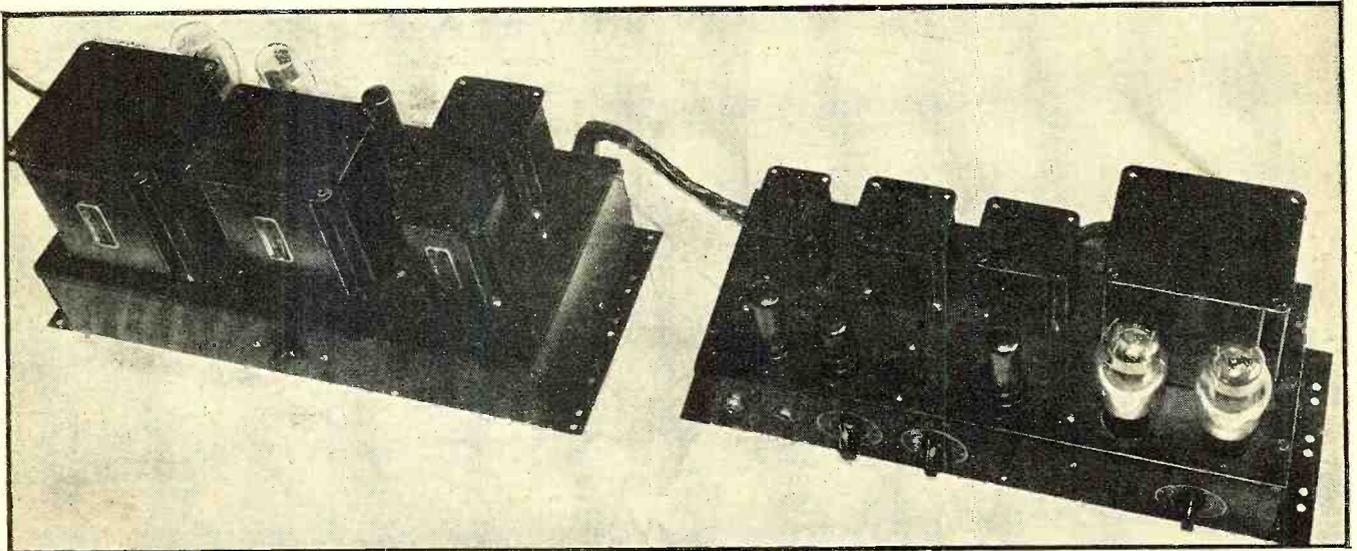
PLATE-SUPPLY VOLTAGE (E _{bb}) - Volts ¹	90						180					
	0.1		0.25		0.5		0.1		0.25		0.5	
PLATE RESISTOR (R _L) - Megohms	0.1	0.25	0.5	0.25	0.5	1	0.1	0.25	0.5	0.25	0.5	1
GRID RESISTOR (R _g) - Megohms ²	0.37	0.5	0.6	1.18	1.1	1.35	2.6	2.8	2.9	0.44	0.5	0.6
SCREEN RESISTOR (R _d) - Megohms	2000	2200	2000	3500	3500	3500	5000	6000	6200	1000	1200	1200
CATHODE RESISTOR (R _c) - Ohms	0.07	0.07	0.06	0.04	0.04	0.04	0.04	0.04	0.04	0.08	0.08	0.07
SCREEN BY-PASS CONDENSER (C _d) - μf	3	3	2.8	1.9	2.1	1.9	1.5	1.55	1.5	4.4	4.4	4
CATHODE BY-PASS CONDENSER (C _c) - μf	0.02	0.01	0.006	0.008	0.007	0.003	0.004	0.003	0.003	0.02	0.015	0.008
BLOCKING CONDENSER (C) - μf	19	28	29	26	33	32	22	29	27	30	52	53
VOLTAGE OUTPUT (E _o) - Peak volts ³	24	33	37	43	55	65	65	85	100	30	41	46
VOLTAGE GAIN ⁴												

DUPLIX-DIODE PENTODE TYPES: 2B7, 6B7, 6B8

PLATE-SUPPLY VOLTAGE (E _{bb}) - Volts ¹	300						600 (max.)					
	0.1		0.25		0.5		0.1		0.25		0.5	
PLATE RESISTOR (R _L) - Megohms	0.1	0.25	0.5	0.25	0.5	1	0.1	0.25	0.5	0.25	0.5	1
GRID RESISTOR (R _g) - Megohms ²	0.5	0.55	0.6	1.2	1.2	1.5	2.7	2.9	3.4	0.45	0.6	0.65
SCREEN RESISTOR (R _d) - Megohms	950	1100	900	1500	1600	1800	2400	2500	2800	350	500	350
CATHODE RESISTOR (R _c) - Ohms	0.09	0.09	0.08	0.06	0.06	0.08	0.05	0.05	0.05	0.1	0.1	0.1
SCREEN BY-PASS CONDENSER (C _d) - μf	4.6	5	4.8	3.2	3.5	4	2.5	2.3	2.8	6.6	7	7
CATHODE BY-PASS CONDENSER (C _c) - μf	0.025	0.015	0.009	0.015	0.008	0.004	0.006	0.003	0.0025	0.03	0.02	0.01
BLOCKING CONDENSER (C) - μf	60	89	86	70	100	95	80	120	90	72	130	120
VOLTAGE OUTPUT (E _o) - Peak Volts ³	36	47	54	64	79	100	96	150	145	43	59	67
VOLTAGE GAIN ⁴												

¹ Voltage at plate equals Plate-Supply voltage minus voltage drop in R_L and R_c. For other supply voltages differing by as much as 50% from those listed, the values of resistors, condensers, and gain are approximately correct. The value of voltage output, however, for any of these other supply voltages equals the listed voltage output multiplied by the new plate-supply voltage divided by the plate-supply voltage corresponding to the listed voltage output. The 600-volt conditions are maximum.

² For following stage (see Circuit Diagram).
³ Voltage across R_g at grid-current point.
⁴ At 5 volts (RMS) output. Gain at full output is somewhat less than the listed values.



AT LEFT: THE COMPLETE POWER PACK. AT RIGHT: THE FINISHED 60-WATT AMPLIFIER CHASSIS.

Build This 60-Watt Amplifier Utilizing “NEGATIVE FEEDBACK”

Negative feedback is a process of coupling a portion of the output alternating voltage of an amplifier into some preceding circuit in such manner that it opposes the original voltage. Since the phase relations are the reverse of those required for regeneration, negative feedback is termed “degeneration”.

By John H. Potts

MOST of us know that regeneration increases gain, but likewise increases distortion and creates instability. Negative feedback or “degeneration” has precisely the opposite effect. Hum, noise and distortion originating in the output stage may be reduced to a fraction of that present in conventional designs and the overall frequency response may be corrected to any desired degree.

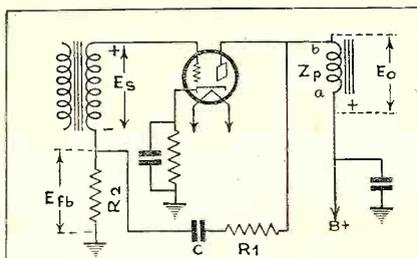
Improves Performance

Though negative feedback has been applied commercially to audio amplifiers since 1933, its use has been largely limited to communication systems and high-power P. A. apparatus where the advantages listed above are of paramount importance. In radio receivers the distortion inherent in loudspeakers and other sections of the receiver rather than that remaining in the audio system of well-designed instruments has been considered the limiting factor in true reproduction. However, recent investigations indicate that negative feedback minimizes “hangover” distortion in speakers, without power loss, and gives greater clarity and crispness of reproduction. This improvement is particularly evident when pentode output tubes are employed and is already having a far-reaching influence on receiver, amplifier and loudspeaker de-

signs. Negative feedback likewise corrects phase distortion, which, though of little consequence in ordinary radio re-

ceivers, causes serious trouble in television amplifiers.

Figure 1 shows a typical negative-feedback circuit. When a signal voltage E_s is applied to the grid of an amplifying tube, it is amplified and reproduced across the plate load, Z_p . Over the positive half-cycle of the input signal, the plate current increases and the voltage drop across Z_p increases, making point b more negative with respect to point a . If a portion of the voltage across Z_p is coupled back in series with the grid voltage, E_s , it will buck or oppose in phase the input voltages and consequently reduce the output voltage.



- E_s = SIGNAL INPUT VOLTAGE
- E_{fb} = FEEDBACK VOLTAGE
- E = OUTPUT VOLTAGE WITHOUT FEEDBACK = GE_s
- E_o = OUTPUT VOLTAGE WITH FEEDBACK
- G = GAIN OF TUBE AND CIRCUIT WITHOUT FEEDBACK

$$\frac{E_{fb}}{E} = \frac{R_2}{\sqrt{(R_1 + R_2)^2 + X_c^2}} = \text{FEEDBACK RATIO} =$$

$$\frac{R_2}{R_1 + R_2} \text{ WHEN } X_c \ll \text{THAN } R_2$$

$$E_o = \frac{GE_s}{1 - G \frac{E_{fb}}{E}}$$

Reduces Distortion

In the circuit shown, assuming a normal gain of 10 without feedback, the output voltage would be 20 for a signal input of 2 volts. Now let us feed back 10 percent of the output voltages by selecting a combination of R_2 , C and R_1 which will give a 1 to 10 feedback ratio. This will occur when R_1 equals 9 times R_2 if the blocking condenser C has negligible reactance at any audio frequency. The output voltage may now be determined from the formula:

$$1 - \text{gain} \times \text{feedback ratio} = \text{output voltage with feedback.}$$



*It's always
Clear Signals*

with the
**Centralab
Selector Switch**

With their definite, non-wiping "bull-dog" contacts—they assure CLEAR SIGNALS, no matter how complicated the switch assembly may be.

Wherever a "multiple-contact" is indicated be sure to use a CENTRALAB SELECTOR Switch for best results.



Used for

- TONE SWITCHES
- WAVE BAND SWITCHES
- LOCAL DISTANCE SWITCHES
- HIGH FIDELITY SWITCHES
- INPUT OUTPUT REVERSAL SWITCHES
- SHORT WAVE LOW LOSS
- ISOLANTITE SWITCHES

Centralab

DIVISION OF GLOBE UNION, INC.
MILWAUKEE, WIS.

**"BUT—What Can
CREI Training
Do For Me?"**



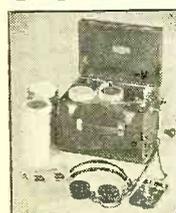
CREI offers a complete course in Practical Radio Engineering, written for the man who is serious about getting ahead in Radio. It can help you to progress from the "mechanic" stage to that of an expert specialist. It gives up-to-the-minute advanced instruction on modern radio apparatus, so you can look at it with the eyes of the engineers who design it, and appreciate the results they are trying to obtain. If you realize the importance of training for success, send for our Free Booklet that describes our courses and your future in detail.

FREE!
New, illustrated
Booklet—
"Practical
Future to Prac-
tice Radio Eng-
ineering."

RIGHT NOW—WRITE NOW!

Capitol Radio Engineering Institute
Dept. RN-6, 14th & Park Rd. N.W., Washington, D.C.

CODE—TAPES FOR EVERY NEED

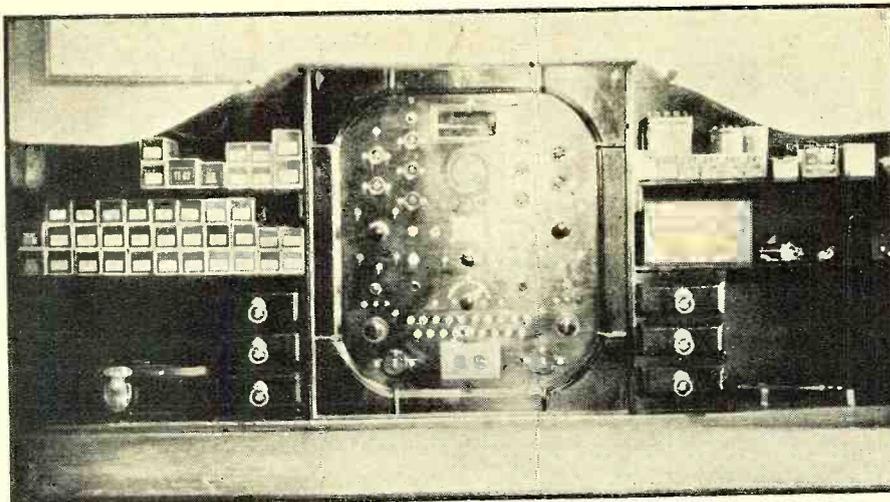


For Example: Airways Tapes
On Weather, Maps, APOBS,
Winds Aloft

You can easily learn or improve your code—typical messages are sent you by the INSTRUCTOGRAPH. Practice any time at any speed desired. You may buy or rent at low cost. Send for full information today to—**INSTRUCTOGRAPH CO.** Dept. NR-6, 912 Lakeside Pl., Chicago, Ill. Representatives for Canada: Radio College of Canada, 853 Bay St., Toronto

We Also Handle—

HALLICRAFTER and R.M.E. SHORT WAVE RECEIVERS—MICROPHONES—VIBROPLEXES—TAYLOR TUBES. Cash or Terms



A NEAT SERVICE WORK-BENCH WHICH COSTS, INCLUDING ALL EQUIPMENT, LESS THAN FIFTY DOLLARS!

THE SERVICE BENCH

Service Contracts . . . Low Cost Service Shop . . . Auto Radio Noise . . . Service Kinks . . . 5Z3 Replacements . . . Servicing Majestics . . . Service Business Methods . . . Manufacturers' Co-operation . . . Book Review . . .

Conducted by Zeh Bouck, Service Editor

WE have at various times in this department published service contracts employed by various servicemen readers of RADIO NEWS. That this system is becoming more popular—and more practical—is indicated by the increased correspondence we receive concerning this method of charging for service work. Servicing by contract is exactly what the expression implies—for a stated sum, usually payable in advance, the serviceman contracts to keep the customer's receiver in perfect condition, without further charge, over a period of time—one year as a rule. In the majority of instances this charge is all-inclusive, and covers parts as well as labor.

SERVICING by contract is necessarily a gamble, and many servicemen complain that they have lost at the game. Life insurance is also a gamble—but the insurance companies make money! Service by contract is nothing more or less than radio insurance, and the trouble with the servicemen who have lost money on the idea lies in the fact that they have not followed the precepts of the insurance companies.

No insurance company could survive—unless luck was with them—if they insured only one or two persons. It takes hundreds—even thousands—of policies to make it possible for the insurance company to depend upon the law of averages (as determined by actuary mathematics) and make money. Similarly, the contract system of radio servicing may well spell a loss if only two or three contracts can be secured. With half a handful of contracts it is quite possible that one set, giving an unusual amount of trouble, will put the entire enterprise in the red. *Unless the serviceman is sure that he can secure at least ten service contracts within a reasonable length of time, he should not go in for servicing by contract.* The possibility of this can readily be determined by putting the idea up to your customers as a tentative proposition.

Also, no insurance company would insure a man who expected to die momentarily. The customer most interested in radio insurance will be that person who has reason to believe that his receiver will act up in the near future—or is already out of order. Such customers are "bad risks." The insurance company makes certain that the prospect is in good physical condition, by pains-taking examination, before a policy is issued. The serviceman should do the same thing, and issue the contract only

after he is satisfied that the receiver is in good operating condition. If necessary, he should first service the set at his usual rates before assuming the responsibilities imposed by the contract. Some servicemen do service and repair the receiver, but include the charge for this in the contract fee. This is quite all right *so long as the same flat contract rate is not offered to all customers.* Such a procedure would be obviously unfair—clients with good receivers (sets requiring no preliminary service) receiving the short end of the deal.

As a matter of fact, the same rate should not apply to all receivers—any more than it would be practical for life insurance companies to charge the same premium to all policy holders. A person in relatively poor physical condition is rated up—and pays more for his life insurance. The premium also increases with age. Careful inspection of a radio receiver will indicate, to an extent, the probability of its developing trouble within the period of insurance or contract. If the receiver is of a notoriously troublesome make, or if it has been previously serviced with inferior parts, it is a less desirable risk. It should be "rated up," and the contract fee made, say, six dollars instead of five dollars which might have been the price on another receiver. Also, old sets, like old folks, are more likely to develop difficulties—and the rate should be raised accordingly.

**THIS MONTH'S
SERVICE SHOP**

Our Heading photo shows the shop designed and constructed by Harry A. Norman of 2256 Woodberry Avenue, Baltimore, Md. The significant feature concerning this installation is the fact that it cost Mr.

(Turn to page 758)

**RCA ALL
THE WAY**

RCA Radio News

RCA Manufacturing Company, Inc. • Camden, New Jersey
A Service of the Radio Corporation of America

**EVERYTHING IN
RADIO-MICROPHONE
TO LOUDSPEAKER**

To the consumer, RCA means high quality performance at low cost... To the radio man, RCA means easier selling, higher profits

GET NEW CATALOG FREE!

*It's a 32-page Illustrated Booklet on
RCA Test Equipment, Accessories, Parts*



Here it is—hot off the press! A valuable, 32-page illustrated catalog telling about RCA's complete line of test equipment, accessories and parts. Will prove extremely useful to you in service work. Ask your RCA parts distributor how you can get

yours absolutely free—but ask him *today*, before the rush for this fine booklet exhausts his supply!

You Can Make Extra Profits With This New RCA Extension Speaker

There are lots of people who would like to have an extra loudspeaker for use in their playroom, den, porch or garden. And this new RCA extension speaker is ideal!



STOCK NO. 9695

Not only is it light and portable—but it provides excellent tone. In a beautifully carved cabinet it will enhance the appearance of any room. And it costs only \$9.50 list.

Take it with you on service calls. Demonstrate its great usefulness to your customers. It will prove a fine aid to extra profits. Comes complete with 6-inch P.M. speaker, universal matching transformer and switch.

New Radio Program Provides Free Radio Instruction... Free Prizes

RCA, in cooperation with your local RCA tube or parts distributor, is sponsoring a new, weekly radio broadcast on 50 stations from coast to coast, solely for the benefit of radio service men. This fine new program

teaches radio technicalities. Keeps you up-to-the-minute on latest radio developments. Shows the way to more service jobs. Tells how to make sales.

Not only does this program teach—but it offers a chance to win valuable prizes as well. Your local RCA parts distributor will give you full details on request. Ask him today. Tune in for the next broadcast.

The RCA Radiotron Spring "Check-Up" Plan Gives Old Radios New Life... And Means More Service Jobs!

The RCA Radiotron Spring "Check-Up" Plan consisting of a 10-point radio check-up service costing \$1.50 exclusive of parts, is of interest to 73% of the homes in your community, for that many have a radio.

Check-ups are part of American life. People are used to automobile and dental check-ups. Hence they can see the wisdom of a radio check-up. And the RCA Check-Up means giving weak, worn-out radios new life and vigor—restoring to them "new set" tone and performance!

Service men will find, as others have, that the check-up promotes sales of service and parts, new sets and other appliances that they stock. Moreover, they visit sick radios on the basis of "service"—not "sales". And that's a valuable point in their favor. In addition, they get paid for the service they render and, at the same time, are afforded an opportunity to help their customers select other merchandise they may need.

Service Men Get Selling Help from RCA

In order to help you sell this service RCA Radiotron is running full column advertisements in *The Saturday Evening Post* and *Collier's* every other week... newspaper ads in over 100 cities... and features the check-up with commercials on a full hour radio program every Sunday. And in all cases YOU are mentioned as the man for the consumer to call in! Besides this, Radiotron also offers you several mailing pieces for your own use—mailing pieces that will produce results. Get some. Use them. Back up this Plan. It will pay you well! Also ask your jobber for details of the new auto radio check-up.

Facts Prove RCA All The Way Means Better Radio

Radio holds many thrills in store for listeners every day. But there's no radio thrill that compares with the thrill of owning a set that gives you the benefits of RCA All The Way reception. And only with an RCA Victor radio can you get this reception!

Here are five facts offering strong proof that RCA All The Way means better radio. Read them. Then have your nearest RCA Victor dealer give you an actual demonstration of radio that's RCA All The Way—from the microphone in the studio to the receiving set in your home.

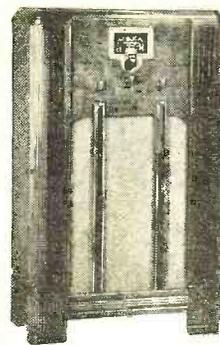
1 Through the National Broadcasting Company, one of the RCA family, RCA creates and broadcasts the majority of network programs.

2 The actual broadcasting of many programs is done with RCA equipment. More than half the broadcast power on the air is RCA installed.

3 From practical experience in radio communication with 47 foreign countries and ships on all seas, RCA knows how to build superb short wave broadcasting and receiving equipment.

4 RCA is the only company that does everything in radio—from original research to broadcasting.

5 RCA is the only company that makes everything in radio—from microphone to receiving sets.

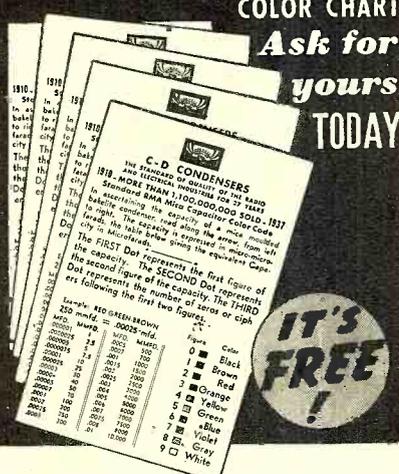


RCA Victor 1937 radios (Model 6K-1 shown here, \$52.95) range in price from \$20.00 up. Including such outstanding RCA Victor features as Magic Brain, Magic Eye, Magic Voice, Metal Tubes and many others, they are today, more than ever, radio's greatest values!

New Tube Manual!

The RC-13 Manual on RCA Radio Tubes gives service men complete information on all receiving tube types including Metal and G-Series tubes. Get your copy from your RCA tube distributor.

It's here, Fellers
STANDARD RMA MICA CAPACITOR
COLOR CHART
Ask for
yours
TODAY



IT'S FREE!

A real honest-to-goodness color chart for simple and quick identification of mica condenser capacities. Fits conveniently into your vest pocket.

No ham . . . serviceman . . . or engineer can afford to be without one. Eliminates expensive guesswork and irritating delays.

These color code charts are obtainable only from your authorized C-D distributors.

CORNELL-DUBILIER CORPORATION
1018 Hamilton Blvd., So. Plainfield, N. J.

CORNELL DUBILIER

LEARN RADIO
the Easy way
with Ghirardi's Complete
RADIO PHYSICS COURSE
972 Pages \$ 4.50 1113us.
only 4.00

This is the world's greatest collection of radio knowledge all in one huge, 4-pound volume—Ghirardi's famous course used by thousands of students in 82 different countries. With this one book you can quickly master RADIO, ELECTRICITY and SOUND. Clear! Up-to-date! Complete! Inexpensive!

PARTIAL LIST OF SUBJECTS
Sound, Speech and Music. Electron Theory. Electrical Current. Electrical Units. Ohm's Law. Batteries. Magnetism. Electromagnetism. Electromagnetic Induction. Inductance. Condensers. Alternating Current Circuits. Filters. Electrical Measuring Instruments. Electromagnetic Radiations. The Broadcast Station. The Receiving Station. Vacuum Tubes. Radio Frequency Amplifiers. The Power Supply Unit. Electric Receivers. Auto and Aircraft Receivers. Phonograph Pickups. P.A. Systems. Short-Wave Reception. Photoelectric Cells. Television. The Antenna and Ground. Testing and Servicing. Sound Motion Pictures. Appendixes. 836 Self-Review Questions for Study.

MAIL NOW! Money-back Guarantee.

Radio & Technical Publ. Co.
45 Astor Place, New York, Dept. RN-67
 Enc. and \$4 for RADIO PHYSICS COURSE postpaid. (Foreign \$4.50)
 Please send Free Circular "P".

Name.....
Address.....

RADIO PHYSICS COURSE

ALFRED A. GHIRARDI

Lesson 62—Filters

A STUDY of the filter circuit at A in Figure 1 discloses the fact that there are two complete filter circuits here. This combination is known as a band-pass filter because it passes only a narrow band of some predetermined frequencies. For instance, the low-pass filter may prevent any frequencies getting through above 1000 cycles and the high-pass filter may prevent any frequencies getting through below 500 cycles. Therefore, the frequencies transmitted would be limited to those lying between 500 and 1000 cycles as shown at (B).

filter circuits shown here is really nothing more than the general circuit shown in (D) of Figure 1, but with one or more of the inductances or condensers left out.

In Parallel or Series

A study of (D) shows that the series resonant circuits allow one particular frequency to flow through them more easily than any other. The parallel resonant circuits across the line impede one frequency only, and allow all others to flow right through them, thus by-passing them across. The circuits are so designed that the one frequency which gets through the series

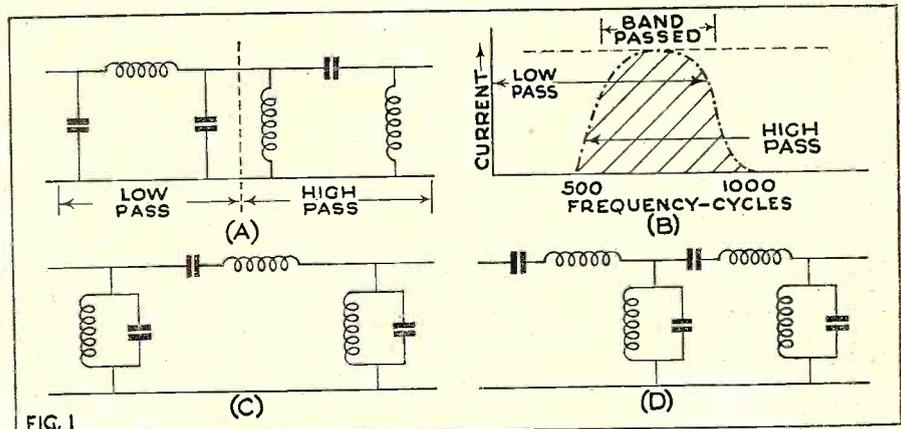


FIG. 1. (A) Combination of single "Pi" low-pass and high-pass filters to give the band-pass effect shown at (B). A practical combined band-pass "Pi" filter is shown at (C). A T-type band-pass filter is shown at (D).

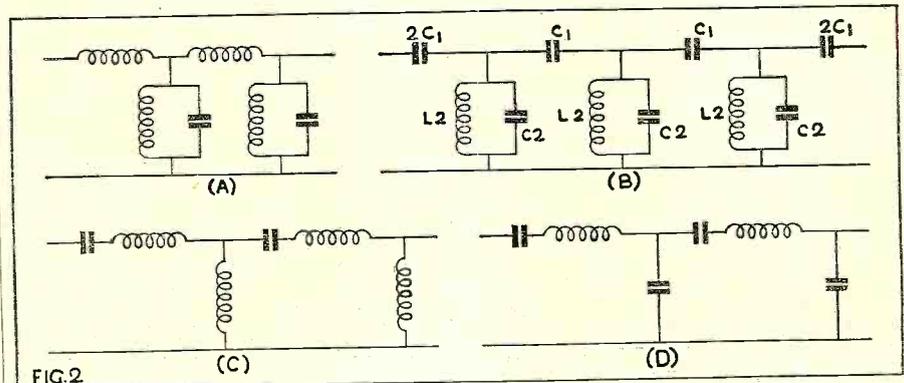


Figure 2. Four commonly used band-pass filter circuits.

The circuit at (A) is made up of two "pi" section filters. It is not necessary to make separate filters since the various parts can be combined into a single filter section as shown at (C), and the same results obtained. This may also be made up of two T-section filters in the same way as shown at (D).

resonant circuits is the only one not short-circuited by the parallel resonant circuits.

How They Are Used

The type shown at (D) will pass two separate bands of frequencies. This makes it objectionable for use in many applications where only a single band is to be passed. Usually it is necessary and desirable to pass only one band of frequencies rather than two, and since it also takes less apparatus, the filter circuits of Figure 2 are the ones which are most generally encountered in ordinary band-pass filter work. A little study will show that each of the

Every tuned circuit in the ordinary tuned-radio-frequency radio receiver is really a one-section filter, but in this case it is a band-pass filter designed to pass currents of one particular small band of frequencies around that to which it is tuned, and block all others. Intermediate-frequency transformers in superheterodyne receivers are designed for the same purpose, and in carrier-telephone work, filters of all three types are widely used. Various special forms of band filters and band selectors will be studied later in future lessons in connection with radio receivers.

The "Ham" Shack

(Continued from page 733)

mounting the "pitch" control resistor over the chassis. There should be no difficulty in duplicating this oscillator if the wiring diagram is followed carefully.

One of its features is that it may be operated from either alternating or direct current. In addition to being an excellent device for practicing the code, it has many other uses. For those who already know the code but have decided to take up the "bug key" method of transmission, it is a good idea to practice sending until the mechanical key is mastered on an oscillator such as this rather than to go on the air and flabbergast fellow amateurs with five-dot "h's." It is surprising what may be learned about your own fist from listening to your own sending for a while.

Another use is as a tone modulator for a 5-meter transmitter. The output of the oscillator may be fed directly to the grid of the speech-input tube ahead of the modulators, or the loudspeaker may be placed fairly close to the microphone. In using it for modulating an ultra-high-frequency transmitter, care should be taken to prevent over-modulation.

The list of parts for the audio oscillator follows:

- One 3:1 audio transformer, TR
- One 7-prong socket
- One .002 mfd. condenser, 400 volts rating, C1
- One .1 mfd. condenser, 400 volts rating, C2
- One .5 mfd. condenser, 200 volts rating, C3
- One 8 mfd. condenser, 200 volts rating, C4
- One .5 meg. potentiometer, R1
- One .1 meg. 1/2-watt resistor, R2
- One 2,000-ohm, 1-watt resistor, R3
- One 2,000-ohm, 1-watt resistor, R4
- One 350-ohm line cord, R5
- One 12A7 tube

CALLS HEARD

By Joseph John Binder, Jr., 3756 North 11th Street, Milwaukee, Wis., on 10 meters: ZS1H, VU1AN, ZU5X, J5CC.

On 20 meters: ZB1E, J5CC, U1BL, D4ARR, F8EB, PA0JV, G5MP, G6NJ, LY1J, YM4AA, OK1BC, OZ7ON, E16F, YL2BB, Y11Y, EA4BM, UE3EL, PK1MN, YN1HS, OA4J.

On 40 meters: VK3ZW, VK3UH, ZL1KB, ZL2L, VK5MK, X18A, XE1AA, FM8D, HP1A.

By Homer Bohlender, RR2 Brookville, Ohio, on 10 and 20 meters: XE1G, CE1AR, K5AF, EA3DQ, HI7G, EA8AF, K7PO, VE9AL, TI3AV, NY2AE, VK2NO, VK4JX, TI2RC, HI5X, VK3KK, VP9G, G5NI, VO1J, VK7JB, VO3Y, EA4AO, HI2K, YV5AK, OA4R, CO8YB, VP4TH, LU8AB, CE3DW, VP6YB, PY2AK, LU5CZ, TI5JJ, VE1EA, ON4VK, G6DII, HI6P, VE2EE, HI6G, G2MV, VE3HF, VP7NA, PY1DK, VE4NI, HH3PA, YV3AD, VE5HN, CO7CX, EI2J, XE2AH, K6FRN, HI1C, UC1FG, HH2B, CO5RY, LU6AP, F8DW, HP1A.

By Gideon R. Brainerd, Jr., 1000 West Fifth Avenue, Gary, Ind., on 20 meters: VE5TV, LU1UA, LDUIHL, VP3BG, VP6PK, VP6YB, VP7NA, XE2RD, VP9R, HI5X, HI7G, G5MI, YN1SH, CO2JJ, K6NTV, CO2LL, CO2KY, CO2HY, CO2WZ, CO2XF, ZU6P, CO2RA, CO2KT, CO2EG, CO2MH, CO2MC, CO6OM, HC1BGC, CO7HF, VO1I, XE3XF, XE3AQ, XE3HC, TI3EA, XE3AG, TI2FG, XE3AG, HI3V, OA4N, OA4CM, HP1A, VP6FO, PYZZT, HC3AQ, HC3BGC, YV5ABE, YV5AK.

By Lloyd Ludwig, 235 Hamilton Ave., Elyria, Ohio, on 20 meters: WIADM, WI1BS, WIHKK, WI1UG, WI1ZA, W2GNT, W2CII, W2CRB, W2CHA, W2DVU, W3EO, W3EUT, W3IR, W3DOP, W3NU, W4DZH, W4MN, W4WA, W4KP, W4ARE, W5AHK, W5AGP, W5FSA, W5CYC, W5DVE, W6CFJ, W6HAX, W6EXL, W6IBX, W6LMS, W7DX, W7FU, W7CZY, W7DUZ, W7AOF, W8RL, W8GET, W8PUK, W8NKL, W8GEF, W9DGY, W9NGZ, W9RBB, W9SPS, W9DEG, W9SYH, W9AOZ, W9CET, VP3VG, VP6YB, VP9R, PYROO, PY8AD, LU6KE, HH2V, HH2T, HI5X, HI7G, ZE2JC, K6JLV, K6NDZ, VO1I, TI2RC, HK3JA, HK3RC, OA4AI, OA4AK, OA4C, OA4R, YV5AS, XE1AG, XE1GK, XE1AS, XE2HE, XE2FC, XE2BJ, XE4BC, VE4MO, VE4UD, VE4GU, VE4VH, VE4QV, VE4FH, VE4NT, VE4HD, VE9AS, CO2HY, CO2KY, CO2JG.

CO2KC, CO2JM, CO2LL, CO2MT, CO2WZ, CO2JJ, CO2KL, CO2MH, CO2RA, CO2QY, CO2EG, CO6OM, CO7HF, CO7AS, CO8RO, CO8YD, VE1GH, VE1CR, VE1FG, VE1EC, VE1GP, VE1JA, VE1AU, VE1AR, VE2AA, VE2JJ, VE2AM, VE2EX, VE3YY, VE3DF, VE3ZV, VE3GO, VE3DA, VE3CD, VE4JP, VE4TS, VE4SA, and VE4LH.

Short Wave in the Classroom

(Continued from page 712)

would never be a possibility of Heaviside reflection.

Such a move would automatically open up many channels for telegraphy and telephony on the vacated frequencies for occasional vital services like the planned educational transmissions, army and navy communications, aircraft signalling and high-fidelity sound broadcasting.

In all, the possibilities for education through the use of high frequencies and portable apparatus are such that a small share of the ultra-short waves should be definitely reserved for these institutions.

3 Band Super

(Continued from page 722)

left-hand knob is the tone and selectivity control, the next knob the band switch, the next the tuning control and the last knob the "on-off" switch and volume control. The tone control knob, advanced all the way to the right, cuts in the high-fidelity switch, an arrangement whereby over-coupling takes place in the intermediate-frequency circuits, thus allowing the passage of high-frequency notes and eliminating side-band cutting.

Resistance-Coupled Amplifier Design

(Continued from page 739)

same degree of attenuation is desired at some other low frequency, F, multiply all capacity values of the chart by 100/F.

The upper frequency, f_2 , where the response begins to drop, is determined by R_L . If R_c is larger than R_L , f_2 is 20,000 cycles for a plate load of .1 megohm, 10,000 cycles for a load of .25 megohm and 5,000 cycles for a plate load of 0.5 megohm. Therefore, to obtain good high-frequency response, low values of plate load are desirable. The above values apply when normal tube capacitances are present.

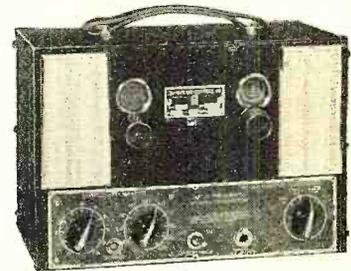
A Tip to Burglars

New York, N. Y.—Engineers of the Signaphone Co. recently demonstrated an improved burglar alarm system employing invisible light and the photocell. The lamp employed is an ordinary 32 c.p. automobile lamp with a reflector and filter which passes only the invisible infra-red rays. The rays are then bent around corners and made to cross passages by special mirrors. Finally the light ray falls upon a photo-cell, connected to an amplifier which may be made to control any electric device. When a burglar interrupts the beam, the amplifier may be caused to operate a bell, dial a number and call the police or do anything desired. The beam has been used successfully over a distance of 1800 feet.



Leakage

with the Clough-Brengle
MODEL OD-A
Signal Generator



MODEL OD-A

Reduces to a minimum all those stray which are so prevalent in ordinary signal generators at high frequencies. Greater and more uniform attenuation at all frequencies. Twenty-five inch micro-vernier scale on each band, hand calibrated against fundamental frequency standard for the ultimate in performance. Fundamental output continuously variable from 100 kc to 30 mc. Built-in 400-cycle sine wave audio generator. Separate compartment for batteries gives additional freedom from stray r-f currents. Accuracy 1/2 of 1% over all bands.

MODEL OD-A R-F Signal Generator complete, less batteries.....\$32.50
(\$5.00 down, \$4.50 per month)

Also available for 110v a-c operation.

MODEL OC-A complete, ready to operate.....\$34.50
(\$5.00 down, \$4.83 per month)

Write for additional information on this unique instrument and on the entire line.

Mail Coupon Now!

The CLOUGH-BRENGLE CO

2813 W. 19th St., Chicago, Ill.

Please send additional information on the MODEL OD-A.

Name

Address

City

State

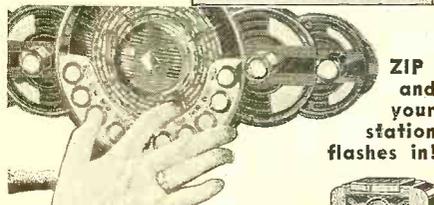
MIDWEST.
FACTORY TO YOU
SAVES 50%



18 TUBES For the Price of 10

Why be content with an ordinary 6, 8, 10, or 12-tube set when you can buy an 18-tube deluxe Midwest for the same money—direct from the factory, at half the cost! Not a cut-price set, but a more powerful super-performing radio in a big, exquisitely designed cabinet.

Only **\$39.95** AND UP
(LESS TUBES)



ZIP and your station flashes in!

Your radio enjoyment is doubled with Dial-A-Matic Tuning* (*optional), the amazing new Midwest feature that makes this radio practically tune itself. Zip! . . . Zip! . . . Zip! . . . stations come in instantly, automatically, perfectly . . . as fast as you can push buttons.

30 DAYS FREE TRIAL
You have a year to pay . . . terms as low as 10c a day . . . you secure privilege of 30 days free trial in your own home.
SEND FOR FREE 40-PAGE CATALOG

Dept. P-11 Midwest Radio Corp., Cin'fi, O.

MIDWEST RADIO CORPORATION
DEPT. P-11 CINCINNATI, OHIO

Send me your new FREE 40-page catalog.

Name _____

Address _____

Town _____ State _____

User Agents Make Easy Extra Money. Check Here for details.

Doing a world-wide job . . .

little giant

SOLAR

COMPACT Dry Electrolyte CAPACITORS

So small . . . efficient . . . completely equalling standard sizes in dependability! All usual capacities; two ratings, 450 v.w. and 200 v.w. You won't believe your eyes!

SOLAR MFG. CORP.
599-601 Broadway, New York, N. Y.

Descriptive literature upon request.

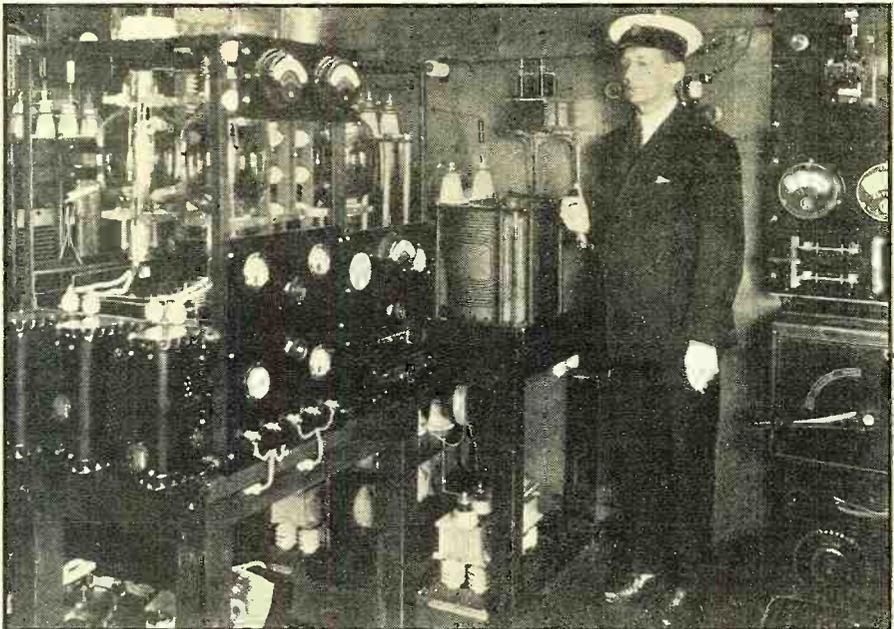
RADIO COURSES

RADIO OPERATING: Prepare for Gov't License Exam. **RADIO SERVICING:** Including Short Wave **AMATEUR CODE**

ELECTRONICS **TELEVISION**

Day and Evening Classes—Booklet Upon Request

NEW YORK Y.M.C.A. SCHOOLS
7 W. 63rd Street, New York City



QRD? QRD? QRD?

CONDUCTED BY GY

WE often wonder why, with so many commentators, newspapers and columnists warning seamen to make sure there is radio installed and an operator to man it before taking a ship to sea, men continue to ship out on veritable coffins with no regard for life or limb.

THE latest lucky break for a non-radio-equipped ship is reported by the S.S. *Tela*, which sighted the almost completely burnt hulk of the schooner *Morse*. The *Tela* was on its way to Philadelphia from Puerto Barrios, Honduras, when she saw the plight of the *Morse* and Captain D. M. McDonald sent a boat over to the doomed ship. Five of its crew were rescued, including the skipper of the *Morse*. There was no radio apparatus aboard her and if it hadn't been for the God-sent *Tela* they would all have perished. Reminds us of China—life is so cheap!

Following through with this thought on proper radio equipment is the cancelled SOS transmitted by the S.S. *Shawnee* of the Clyde-Mallory Line on her way to New York from Florida. Her Number 2 hold having broken out in flames during the night, Captain Chelton radioed his distress at 07:05 but at 08:20 cancelled it, due to having the fire under control. Carbon monoxide gas which had been pumped into the hold effectively smothered the fire. We admire Captain Chelton for wishing to protect the lives of his passengers and crew in taking this precautionary measure while still fighting the fire. Within one hour after the transmission of the distress signal, there were seven vessels surrounding the *Shawnee*, and when the S.S. *Peten* arrived on the scene in response to the SOS he "found the *Shawnee* surrounded by vessels ready to help." This shows the comparative safety at sea with radio equipment aboard and, if there is some action taken by seamen who value their lives, there will be radio equipment installed on every vessel that leaves an American port!

The oldest operator of them all—Marconi on his yacht *Electra*—still conducts experiments on ultra-short waves. Heading photo shows him conducting his latest experiments.

We do not envy the life of the average shipping master. The continual hazards

that confront them when out on the "bounding main" is plenty of reason why so many of them settle down to a life of *terra firma* and chickens, and we mean the "feathery" kind. If it isn't fire or storm, it's currents or rocks or something else that gives them the jitters. Here's a new one that came to the front pages recently. A Japanese whaleboat flashed an SOS when it struck a huge whale off the coast of Yokohama, sprung a bad leak and was sinking. We wonder what happened to the poor whale? Almost like the man who bites the dog—that's news!

At a recent conference called by the FCC, automatic radio SOS signal devices were shown and discussed by the radio manufacturers, telegraph companies, steamship companies and the ARTA. This bugaboo has at last reared its head to the point where the FCC is considering installing this mechanism on cargo vessels only, since passenger boats will be required to carry a full complement of radiops to insure a continuous 24-hour traffic watch. If installed, this device would do away with two of the three watches now maintained aboard ship, requiring but one radioman to do the work. Tests have been conducted on this type of automatic sender with the aid of the Coast Guard and the Bureau of Standards. In my own personal opinion, these tests have not included a practical demonstration to prove whether or not it will operate in the face of heavy static or atmospheric interference. Automatic signal senders have been installed on foreign vessels for the past few years, but they have not proven 100 percent efficient. Under the radio regulations of the Convention held in Madrid, there would have to be one radiop aboard a vessel so equipped, as it provides "signal shall be followed immediately, whenever possible, by the actual distress call sent out by the radiop," which is some consolation.

The U. S. Navy Department, Hydrographic Office, Washington, D. C., has pub-

lished the 1937 edition of "Radio Aids to Navigation" (H.O. 205). For the seagoing operator this book contains very valuable information such as complete details of all DF stations, radio beacons, stations sending "wea" bulletins, storm and navigational warnings and time signals. In addition, it contains information on distress, emergency and safety TFC, medical advice by radio, "regs" on the use of radio in territorial waters and, last but not least, a copy of the international Morse code. Also, conventional signals less the oil-tankish swing developed by some operators to show their individuality. The time and frequency of the simultaneous time-signal transmissions from NAA and NPG have been modified. The schedule is as follows:

14:55 to 15:00 G.M.T.—NAA 64, 113, 9250*-12,630kc.; NPG 42.8, 113, 8770, 12,885 kc.

02:55 to 03:00 G.M.T.—Same as above except NAA adds 4390 kc.

*—Not keyed on this schedule Sunday. Instead of dampening the ardor of "hams" eager to go to sea, Karl Baarslag's "SOS to the Rescue" seems to have increased it, according to this letter: "I had ideas of being a ship radiop, but only after reading the above book did it deepen my ambition." And then to make doubly sure it would be OK, he reads RADIO NEWS and this column and now he can't be held back from the trials, tribulations and uncertainty of having three meals a day, just to pound brass on the ocean wavelets. Which goes to show you what reading will do for you, if that reading is inspirational and in the right direction.

Our Westcoaster says: That a broadcaster conducted an "Open Forum" recently for the discussion of public interest questions and they invited steamship owners and marine locals to send representatives to conduct a debate—the public having the right to ask any question and be given an answer by either or both speakers. It was brought out and accepted by both sides that the delegates of the unions tell their members one thing and across a conference table tell the employers another story. It was the belief that eventually negotiations would resolve themselves into an open man-to-man discussion between the actual workers and employers. . . . That attempts to get a radio station for "Voice of Labor" failed because "Applicant was an alien." What place do foreign aliens have as representatives of American laborers? Rawther a difficult question to answer, eh what? . . . Why hasn't ARTA taken steps to curtail the abuse of the Third Class telephone and telegraph licenses as used in the airways? There is no justification for the employment of a full-time operator on a Third Class ticket. ARTA could make representations to FCC and get results. . . . ARTA is apparently *not* making any efforts to clean up the method of assignments. Many Second Class men get jobs and First Class ops stay on the beach! All are not equal, it is true, but it might lead to making a good op as bad as a bum operator. Why don't some of the delegates offer suggestions or study plans and ideas to improve the assignment method and policy? Most delegates have lots of ideas on how to cure the political situation and present a "united front" to the employers and political groups. If the ARTA has turned into a political organization, then it should have planks and aims. Perhaps system and uniformity of rules are what is needed.

As we freely reprint comment challenging our views, we believe it is not amiss to "pull our light from under the bushel" occasionally. Here is a boost that

(Turn to page 755)

IT SOUNDS CRAZY

... but any National Union Service Specialist will tell you

IT'S TRUE!

"You guys must be crazy . . . you advertise everything but radio tubes!" We've heard that often. . . . And it's true . . . we do tell you about other things. Important things! Seven years ago we knew that Radio Service was going to be an industry. We knew you fellows would need the best doggoned tubes you could get. We made 'em. Then we knew you'd need testers, analyzers, etc., etc. We decided to *give* 'em to you. We've given 90,648 pieces of equipment to Service Specialists who buy National Union tubes as this issue of Radio News goes to press. Right now, today, we're giving instruments made by all leading manufacturers. 'Course we don't talk about tubes in our ads! We tell you what you can get to build your service business. That's what

has always counted most with National Union. We know if your business grows you just can't help but sell more tubes . . . and if we've helped to make it grow, you're going to sell National Union tubes. You fellows who've been growing with us all these years know there's none better anyway.

"NUTS"? No, National Union hasn't got a screw loose. *We're selling ideas for better service business and more of it.* Your growth comes first. We're making that growth possible. Are you one of the smart lads who's cashing in on the National Union service specialist plan? You'd better find out why National Union means so much more than radio tubes to top notchers in the chassis-chasing game everywhere.

WE'LL BE AT BOOTHS 104-105 NATIONAL TRADE SHOW CHICAGO, JUNE 10-11-12-13

FIND OUT! SEND COUPON!

National Union Radio Corp., 570 Lexington Ave., New York, N. Y. RN637
Who is the nearest N. U. Distributor? I want to hear all about what N. U. is doing for Radio Service Specialists.

Name

Address

City State



Be a RADIO EXPERT - Learn AT HOME

RADIO SPECIALISTS NEEDED

Modern receivers with their complicated circuit systems have knocked out the old time cut-and-try radio fixer. Trained men with up-to-the-minute knowledge are needed to service these new sets.



FREE

OF EXTRA COST

To start you making money without delay we equip you with this Circuit Analyzer and Point to Point Resistance Tester.

HERE IS YOUR OPPORTUNITY

Your possibilities of making money and getting ahead are limited only by your ability and skill—but you must know more than the other fellow. You must be a radio service specialist, as R.T.A. can train you.

PRACTICAL TRAINING AT HOME

Our home study course is practical "shop and bench" training combined with a thorough set of practical lessons prepared by an experienced Radio service engineer. Four working outfits are also furnished.

MAKE SPARE TIME MONEY

Our training is complete and practical. We show you how to make money almost from the start. The course can easily be made to pay its own way. Investigate now, write for free book of details.

WHAT R.T.A. STUDENTS SAY

Norwood, Ohio.
I have connected with a large firm as Radio Service Manager and wish to extend my thanks for your help.
Joseph Rapien, Jr.

Yorkville, Ohio.
From Aug. 1 to Dec. 7, 1936, I repaired 163 radios and put up 43 aeris which is very good for part time work while studying your course.
Chas. Koerber.

RADIO TRAINING ASS'N OF AMERICA
4525 Ravenswood Ave., Dept RN-76, Chicago, Ill.



FREE! THREE MONTHS' SUBSCRIPTION TO SYLVANIA NEWS!

Thousands of service men, from coast to coast, have been using Sylvania News* daily . . . not merely to find out what's going on in radio-service, but to earn extra money, through knowing their job better! That's why we're making this special FREE offer—for a limited time only. We want you to start using Sylvania NEWS as a real business-getter—a genuine profit-maker—just as soon as possible!

You'll get many a technical tip from every issue. You'll find yourself remembering some little hint on your very next job. And the sooner you start receiving Sylvania NEWS, the sooner you'll start using it on many of the calls you make!

QUICK! MAIL FREE-OFFER COUPON

It costs you nothing but a three-cent stamp to take advantage of this offer. Tear out the coupon below. Fill in (print plainly, please) and mail it to us. You'll start receiving Sylvania News and "Technical Section" with the very next issue!

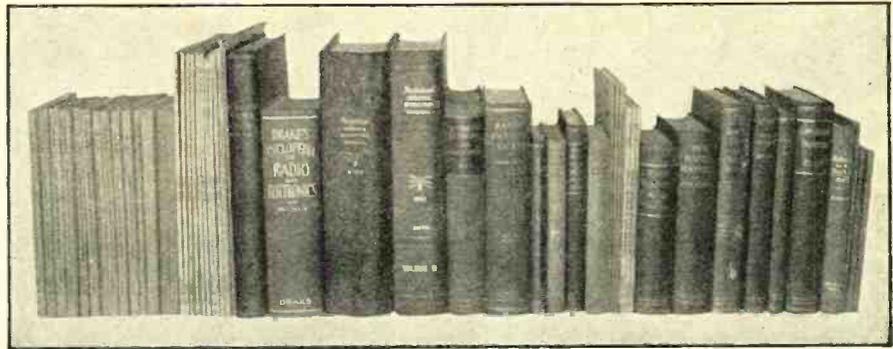
* Sylvania News is the official "house magazine" of Hygrade Sylvania Corporation, Emporium, Pa.

SYLVANIA THE SET-TESTED RADIO TUBE

Hygrade Sylvania Corporation RN-67 Emporium, Pa.

Please send without obligation a FREE 3-months' subscription to "SYLVANIA NEWS." I am (check below) Experimenter Amateur Call Serviceman Employed by Dealer Independent

Member Service Organization.....
 Name
 Address
 City State.....
 Name of jobber.....
 Address



THE TECHNICAL REVIEW

CONDUCTED BY THE TECHNICAL EDITOR

Communication Engineering, by W. L. Everitt. Second edition. McGraw-Hill Book Co., 1937. This is a book intended to be used as a text in engineering colleges or for self-study. Besides covering the subject of radio communication, the author discusses several subjects connected with wire communication; the title of the book implies this. The second edition differs considerably from the first, chapters have been added, some were enlarged and rewritten, while it became necessary to delete the chapters on vector algebra and on measurements. Among the new material is a chapter on equalizers, another on electromagnetic coupling and additions to the chapters on Class B and Class C amplifiers, detection, modulation and radiation. The new edition has been brought quite up-to-date as is evidenced by the use of the new standards recently introduced by the A.S.A. There are new definitions of the different kinds of distortion, for instance.

The treatment differs from that of many authors; Mr. Everitt shows the complete derivation of equations, which, he says, will show the reader what methods to follow in similar problems. Also, the order of the material is quite different from others. In general the text is clear and covers many subjects which are generally omitted in books on radio-communication. A list of the chapter headings follows: I, The Function of Networks; II, Network Theorems; III, Resonance; IV, The Infinite Line; V, Reflection; VI, Filters; VII, Coupled Circuits; VIII, Impedance Transformations; IX, Equalizers; X, Bridge Circuits; XI, Inductive Co-ordination; XII, Unilateral or Control Impedances; XIII, Modulation and Demodulation; XIV, Vacuum-Tube Detectors; XV, Class A Audio-Frequency Amplifiers; XVII, Radio-Frequency Amplifiers for Transmission (Classes B and C); XVIII, Oscillators; XIX, Radiation; XX, Electromechanical Coupling.

Aligning Philco Receivers, by John F. Rider, published by John F. Rider, 1937. A compilation of all the alignment data on all Philco receivers. The book contains an introduction which gives the necessary information for properly interpreting the material which follows. All Philco models are arranged by model numbers and information is given regarding the location of trimmers, the order of procedure, where to connect the generator, how to set the controls and what adjustment to make at what frequency.

Kenyon Amateur Transmitter Manual, issued by Kenyon Transformer Co. Besides being a catalog of transformers and chokes, this manual contains numerous tables, diagrams and miscellaneous information, useful to amateurs. There are wire tables, decibel charts, charts for resistors in parallel, Ohm's law, etc., as well as

some articles on modulation and r.f. amplifiers.

The International Broadcast and Sound Engineer, 1937 Year Book; edited by Al J. Bernaert, published by J. Davey, Velt-hem (Belgium). A collection of articles taken from recent technical journals showing representative progress in different countries. An editorial briefly reviews the recent technical advances and shows a bibliography. The text is in English, with short summaries in French, Spanish, Italian, German, Dutch and Swedish.

Review of the Proceedings of the Institute of Radio Engineers for March, 1937

Automatic Tuning, Simplified Circuits and Design Practice, by D. E. Foster and S. W. Seeley. Discussions of improvements in a.f.c. system. A new discriminator is described which can serve simultaneously as detector.

Frequency Errors in Radio-Frequency Ammeters, by J. D. Wallace and A. H. Moore. This paper discusses from a theoretical standpoint the various frequency errors in thermal ammeters, describes methods of calibration of current-measuring instruments at radio frequencies and furnishes some data as to the accuracy of commonly used instruments at frequencies up to 100 mc.

Ultra-Short-Wave Propagation Along the Curved Earth's Surface, by Paul von Handel and Wolfgang Piister. The penetration of ultra-short-wave radiation beyond the range of optical sight is dependent on the diffraction and refraction of the rays. Proceeding from an analogy to optics, the diffraction is calculated by various methods.

Review of Contemporary Literature

THE following are reviews of articles appearing in recent issues of technical magazines; the name of the magazine and its date are given after the title of each article. Copies of these articles are not included under the "Free Booklets"—they are available from your book-dealer or direct from the publishers. Addresses of publishers will be furnished on request.

Movable Anode Tubes, by E. D. McArthur, Electronics, March, 1937. Description of a new tube with a movable plate which may be used for translating mechanical displacement into a plate-current variation.

The Strobotron—II, by A. B. White, W. B. Nottingham, H. E. Edgerton, K. J. Germeshausen; Electronics, March, 1937. This, and the first article on the subject in the February Electronics, describe a new cold cathode gas-discharge tube, containing

an anode, cathode and two grids. The tube is designed for stroboscope work.

Tuning the Type 814-A Amplifier; The General Radio Experimenter, March, 1937. A description of equipment to tune an audio-amplifier circuit to the frequency employed in bridge measurements so as to increase sensitivity.

Quartz and Tourmaline, by P. Modrack; The Wireless Engineer, March, 1937. A treatise on the properties of crystals and the different cuts employed for piezo-electric purposes.

Equipment and Methods Used in Routine Measurements of Loudspeaker Response, by S. V. Perry; Radio Engineering, March, 1937. Describing equipment and methods used in the laboratory for routine measurements of this kind.

Should You Choose Radio Engineering as a Career? by F. D. Merrill; QST, April, 1937. This article advises the student to find out whether he has the necessary aptitude for the work before starting for college. The author explains what qualities are needed for success in radio engineering.

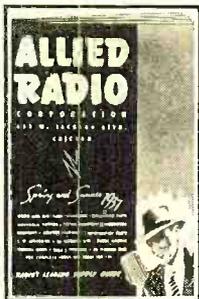
Automatic Frequency Control, Acrovov Research Worker, February, 1937. A review of the different methods, explaining the actions of the circuit.

Free Bulletins on Power Equipment

The Pioneer Gen-E-Motor Corp. has just brought out a series of six circulars describing in detail the following products: portable gas-electric power plants, "Gen-E-Motor" B power supplies, rotary converters, dynamotors and gasoline engine driven centrifugal pumps. Readers interested in this type of equipment can obtain any one of these circulars by simply indicating the product he is most interested in and sending their requests to RADIO NEWS, 461 Eighth Avenue, New York City.

156 Page Radio Catalog

The Allied Radio Corp. announces the release of a new Spring and Summer Catalog. It contains descriptive data on all kinds of radio equipment of interest to servicemen, amateur, and any one interested in radio, i.e. receivers, parts, "ham" apparatus, P. A. systems, testing instruments, etc. Copies can be ordered free of charge from RADIO NEWS, 461 Eighth Avenue, New York City.



1937 Radio Catalog

Servicemen and dealers can obtain a free copy of Modell's latest catalog on standard radio receivers by simply sending their request to RADIO NEWS, 461 Eighth Avenue, New York City.

New Catalog on P. A. Equipment

The United Sound Engineering Company presents their new catalog No. 107, describing their complete line of public-address systems. Servicemen and dealers can obtain a free copy of this catalog by writing to RADIO NEWS, 461 Eighth Avenue, New York City.

A Valuable Tube Chart

Through the courtesy of the Arcturus Radio Tube Company, RADIO NEWS is able to offer free copies of the latest Arcturus wall chart of tube characteristics to bona fide servicemen, amateurs and engineers. The information is very complete and is compiled for quick reference. Requests should be forwarded on your letterhead or your call letters indicated, to RADIO NEWS, 461 Eighth Avenue, New York City.

RADIO NEWS Booklet Offers Repeated

For the benefit of our readers, we are repeating below a list of valuable technical booklets and manufacturers' catalog offers, which were described in detail in the December, 1936, January, February, March, April and May, 1937, issues. The majority of these booklets are still available to our readers free of cost. Simply ask for them by their code designations and send your request to Radio News, 461 Eighth Avenue, New York, N. Y. The list follows:

- D4—Public Address Bulletin of United Sound Engineering Co. Free.
- F2—Speaker Bulletin. Free. Wright-DeCoster, Inc.
- F3—Instrument Catalog of Weston Electrical Instrument Corp. Free to servicemen, dealers and engineers.
- F4—Free Condenser and Resistor Catalog. Aerovox Corp.
- F5—New Centralab Parts Catalog. Free.
- F6—Triad Tube Manual. Free to servicemen, dealers and engineers.
- Mh1—Parts Catalog. Tobe Deutschmann Corp. Free.
- Mh2—Free Test Equipment Catalog. Clough Bregle Co.
- Mh3—Engineering Bulletin on 6L6 Tube. Ken-Rad Tube and Lamp Corp. Free to engineers and servicemen.
- A11—Free 56 page Catalog. Montgomery Ward & Co.
- A12—Parts Catalog. Hammarlund Mfg. Co. Free.
- A13—McGraw-Hill Publishing Co. General catalog listing radio text books. Free.
- My1—Free service booklet. Readrite Meter Works.
- My2—Folder on small motor-driven "Handee" tool. Chicago Wheel & Mfg. Co. Free.
- My3—Resistor catalog. International Resistance Co. Free.
- My4—Instrument manual. Supreme Instruments Corp. Free.
- My5—D. Van Nostrand Company's general book catalog. Free.
- My6—Free volume control guide. Central Radio Laboratory.
- My7—Latest parts catalog free. Wholesale Radio Service Co.
- My8—Condenser catalog. Solar Manufacturing Company. Free.

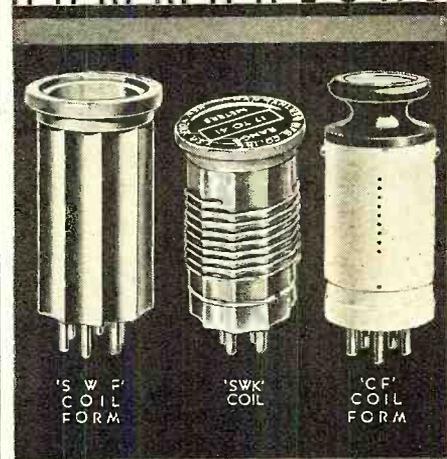
Low-Priced Super

(Continued from page 727)

type speaker. Additional features include an r.f. pre-selector circuit, a continuous tone control, automatic volume control, and an electric tuning eye. This 6G5 tuning eye or "Teleye" as it is called assures maximum accuracy in tuning. With this tuning aid, the receiver can be silently tuned between station calls, simply by adjusting the volume control to the minimum position and rotating the tuning knob to the desired station until the ends of the green inverted "V" of the tuning eye are closest together. The volume control is then adjusted to the desired amount of volume.

Checking the operating notes, showed that the ham bands were the first, to be given the once over, and the reports indicated that many amateur calls were received from the different districts. The log on police and aircraft bands showed that a number of cities responded with announcements. Short-wave broadcast programs were logged from several English and German stations, also Rome, Italy, EAQ of internal war-ridden Spain, San Jose, Costa Rica, and Cuba, Canadian, Central and South American calls. The antenna used for the test was an inverted "L" type well insulated and an extremely long one, about 150 feet overall including the lead-in.

HAMMARLUND



COIL FORMS for EVERY PURPOSE

In the laboratory or home workshop—wherever precision receivers, transmitters and miscellaneous equipment are being developed or built for ultra-short waves, short waves or the broadcast band—HAMMARLUND coil forms are always the choice! Such is the unanimous approval because only in HAMMARLUND coil forms will be found the advanced design, craftsmanship and finest materials, affording the required outstanding efficiency! For instance, the popular priced moulded forms are of XP-53 dielectric—the remarkable new low loss insulating material, that is so rugged, durable, and has such an unusually low power factor. They are natural in color—no artificial coloring to cause losses, and groove-ribbed for air-spaced windings. Flange grips for easy handling. Meter indexes for wave-length inscriptions. Special threaded shelf moulded inside for "APC" air condenser for fixed tuning or band spread. Made with four, five and six prongs. For transmitting, a jumbo XP-53 coil is available. Completely wound XP-53 coils are made, too, to cover from 10 to 560 meters.

Ceramic forms of extruded Isolantite for efficient high-frequency reception under all conditions are also made by HAMMARLUND. Has a recessed black enameled wooden handle with removable paper disc; non-skid surface, and numerous holes for windings. Four, five and six prongs. For ultra-high frequencies, HAMMARLUND has developed special Isolantite coil forms 1 1/8" in diameter, with non-skid surface and plenty of winding holes.

Get the "tops" in results by using HAMMARLUND coil forms! Send for new "37" catalog with further details.

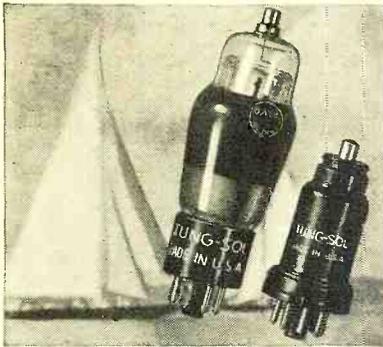
MAIL COUPON NOW!

HAMMARLUND MFG. CO., INC.
424-438 W. 33d St., N. Y. City

Please send me copy of new "37" HAMMARLUND catalog.

Name.....
Address.....
City..... State..... RN-6

HAMMARLUND'S 25th YEAR



Smooth Sailing with TUNG-SOL

Every retail advantage which the radio dealer has ever hoped to find is included in the TUNG-SOL CONSIGNMENT PLAN: No cash investment at any time—an adequate, up-to-the-minute stock—full-profit protection—and remittance only after tubes are sold.

You may have the required qualifications to join the thousands of Tung-Sol Retail Agents who are making real money selling radio tubes. Write for name of your nearest Tung-Sol wholesaler.

TUNG-SOL
Tone-flow radio Tubes
TUNG-SOL LAMP WORKS, INC.
Radio Tube Division, NEWARK, N. J.

RIDER BOOKS



ALIGNING PHILCO RECEIVERS—New! Authentic instructions for aligning ANY of the 8,000,000 Philcos. Over 160 pp. Only \$1.00

SERVICING SUPERHETS
Revised edition just published shows how to make superheterodyne repairs quickly. 288 pp., \$1.00

CATHODE-RAY TUBE AT WORK—Complete, practical, written for servicemen. Information on Oscillograph, etc. 336 pp., 450 ill., \$2.50

- "AN HOUR A DAY WITH RIDER" BOOKS**
- ON AUTOMATIC VOLUME CONTROL will speed up your AVC work. 96 pp.—65 ill.—hard cover—60c
 - ON RESONANCE & ALIGNMENT. You need this! 96 pp.—48 ill.—hard cover—60c
 - ON D-C VOLTAGE DISTRIBUTION IN RADIO RECEIVERS. How d-c voltages are led to tube elements, etc. 96 pp.—69 ill.—hard cover—60c
 - ON ALTERNATING CURRENTS IN RADIO RECEIVERS—Out in March—60c

ORDER YOUR COPIES TODAY

JOHN F. RIDER, Publisher 1440 Broadway, New York City

by the Publisher of



PLANTAS Y ESTUDIOS
"LA ARRIAGA"
OFICINA EN MARACAIBO
TELÉFONOS Nos.
33

Ondas del Lago

Y. V. I. R. F. y Y. V. I. R. H.

1120-360 Kc.

MARACAIBO, VENEZUELA - AMÉRICA SUR

PROPIETARIO:
NICOLÁS VALE QUINTERO
DIRECCIÓN CABLEGRÁFICA:
"LAGONDA"
APARTADO DE CORREOS 261

Y V I R H

Confirmamos *Virgil L.* de *Marion, India* por le que se ha iniciado de nuestra transmisión efectuada el 28 de *abril* de 1936, en la hora de 9.00.

Agradecemos su valiosa información y esperamos que sus futuras comunicaciones sean igualmente interesantes.

D. "ONDAS DEL LAGO"

G. Nouel
G. Nouel, Director Técnico.

PANORAMA 8774

The DX Corner (Short Waves)

(Continued from page 718)

urday 10 to 12 p.m. (Partner, Nishimari, Devaraj, Ryan, Lawton, Yamamoto).

JVM, Nazaki, Japan, 10,740 kc., 4 a.m. (Alfred) 1 a.m. (Gallagher, Moore, Nishimari), 19,740 kc. daily 2:30 to 3:30 p.m. (from ann.) (Elkes, Smith).

JZK, Nazaki, Japan, 15,160 kc., 4 to 5 a.m. (Alfred, Nishimori, Williams).

JVU, Nazaki, Japan, 5,790 kc., 10 p.m. (Gallagher).

JVH, Nazaki, Japan, 14,580 kc., daily 10 to 11 p.m. (from ann.) (Sporn) 6 p.m. (Gallagher) 14,600 kc., Sunday 2 a.m. (Hartzell, Moore, Nishimori, Devaraj) 9:30 p.m. (Moore, Black) 14,640 kc., 2 to 4 a.m. (Augustive, Williams).

JZJ, Nazaki, Japan, 11,800 kc., daily 4 to 5 p.m. (Alfred, Coover) heard 2 to 3 p.m. (Schrock, Gallagher, Black, Partner, Sesma) daily 12 to 1 a.m. (Chiang, DeMent) Saturday 9 a.m. (Hartzell, Moore, Shalback) daily 9 to 10 a.m. (from ann.) (Dressler, Howald, Nishimori, Sisbert, Herzog, Sowada, Silvius, Elkes) daily 2:30 to 3:30 p.m. (Smith, Jensen, Fallon, Yamamoto, Williams).

JIB, Tyureki, Formosa, 10,530 kc., 11:30 p.m. (Gallagher) 3:28 a.m. (Rudolph).

J2AA, Tokyo, Japan, 6,510 kc., heard with recordings (Moore) 6,480 kc., 1:30 to 2:15 a.m. (Gallagher).

HS8PJ, Bangkok, Siam, 19020 kc., 10 a.m. (Gallagher) Monday 8 to 10 a.m. (Gledhill, Devaraj, Williams).

YUB, Bombay, India, 31.36 meters, 11:25 a.m. (Devaraj).

VUC, Calcutta, India, 31.36 meters, 10:40 a.m. (Devaraj).

VPB, Colombo, Ceylon, India, 48.7 meters, daily 8:30 to 11:30 a.m. Saturday until 12 noon (Smith).

YDB, Soerabaya, Java, Dutch East Indies, 9,650 kc., 10 a.m. (Gallagher, Codec, Moore) Sunday until 11 a.m. (Howald, Devaraj, Eder, Markuson, Gallagher).

YDC, Soerabaya, Java, Dutch East Indies, 15,150 kc., 6:12 p.m. (Smith) daily 3:30 to 9 a.m. (Schrock) 1:20 a.m. (Devaraj).

MARACAIBO'S VERIFICATION
Card received by Observer V. L. Gassett of Marion, Ind., verifying his reception of that station.

YDA, Soerabaya, Java, D. E. I., 98.68 meters (Godee) 6:50 a.m. (Devaraj) 3,100 kc. (Gallagher).

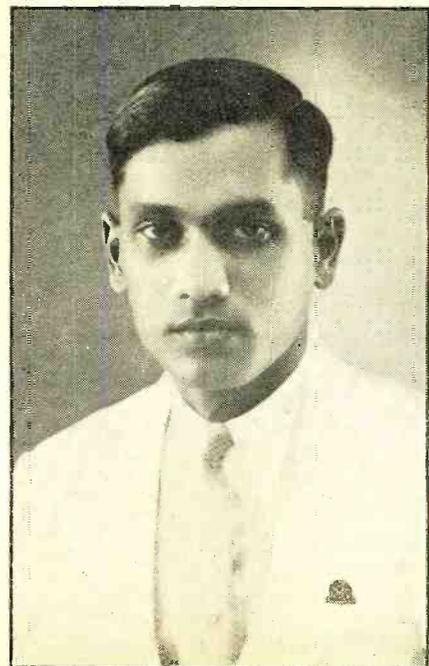
PMY, Bandoeng, Java, D. E. I., 58.03 meters (Godee) 10:15 a.m. (Devaraj) 5,150 kc. (Gallagher).

PLV, Bandoeng, Java, D. E. I., 10,260 kc., daily from 6 p.m. (from ann.) (Sporn) 9,420 kc., 10 a.m. (Gallagher, Black, Jensen).

PLP, Bandoeng, Java, D. E. I., 11,000 kc., Wednesday 6 p.m. (Hartzell, Godee, Smith) until 10 a.m., Sunday 11 a.m. (Howald, Eder, Black, Lueth, Gallagher).

PMN, Bandoeng, Java, D. E. I., 10,260 kc., Wednesday 6 p.m. (Hartzell, Smith) until 10 a.m., Sunday 11 a.m. (Howald, Devaraj) 5 to 11 a.m. (Partner, Gallagher).

GREETINGS FROM SINGAPORE
Meet Official Observer C. R. Daveraj. He sends greetings from Singapore to all our short-wave readers.



Oceania

VK3LR, Melbourne, Australia, 9,580 kc. (Sesma). Series of tests being run. Reports requested (Herzog, Eder) 6 to 7 a.m. (Dressler, Black). Signs at 8:30 a.m. (Gossett, Randle) uses a bird call for first 10 minutes (Gallagher).

VK3ME, Melbourne, Australia, 9,510 kc., (Sesma) heard signing at 7 a.m. (Alfred, Eder) 3:30 a.m. (Gallagher, Markuson, Law) 6 to 7 a.m. (Dressler, Gossett, Hendry).

VK2ME, Sydney, Australia, 10,530 kc., 4:07 a.m. (Rudolph) 7:40 a.m. (Devaraj), 9,590 kc. (Randle) Sunday 1 a.m. (Gallagher).

VK6ME, Perth, Australia, 9,595 kc., heard early mornings (Schrock) off air (Nelson).

ZMBJ, Limer Awatea, 8,840 kc., best on Saturday and Sunday (Schrock). Wednesday 6:48 to 7:20 a.m., 175 miles from Auckland, New Zealand. Only broadcast at sea. (Eder) 13,200 kc., (Block, Kentzel, Fallon, Gallagher).

KZYL, Schooner "Latitude," Manila Harbor, Philippine Islands, 14,200 kc., (Jensen).

ZLT, Wellington, New Zealand, 12:15 a.m. (Gallagher) 11:050 kc. (Ryan).

VPD2, Suva, Fiji Islands, 8,710 kc., (Eder) signs at 7 a.m. with "God Save the King." Daily except Sunday, 8,200 kc., (DeMent) 9,520 kc., (Eder).

VPD, Suva, Fiji Islands, 8,720 kc., (Nelson) 13,070 kc., 9 a.m. (Gallagher).

FO8AA, Papeete, Tahiti, 7,100 kc., Tuesday and Friday 11 to 12 p.m. Slogan: "Radio Oceanic." (Partner).

Canada

CHNX, Halifax, N. S., Canada, 6,110 kc., daily 5 to 12 p.m. (Ryan).

VE9HX, Halifax, N. S. Canada, 6,110 kc., heard singing at 2:10 a.m. (Alfred).

CFCX, Montreal, Canada, 49.96 meters, daily 8 a.m. to 1 p.m. (Ryan).

CFRX, Toronto, Canada, 6,070 kc., relays CFRB (Sekach) signed at 12:05 a.m. (Moore, Fallon, Augustive). Address c/o CFRB, Toronto, Ontario.

CRCX, Toronto, Canada, 6,090 kc. (Kidel).

CJRO, Winnipeg, Canada, 6,150 kc., (Law) daily 6 to 11 p.m., (Ryan).

CJRX, Winnipeg, Canada, 11,720 kc., (Kield, Law) daily 6 to 11 p.m. (Ryan).

North America

Mexico

XEPW, Mexico City, Mexico, 6,120 kc., 11 p.m. (Gallagher, Beck). Slogan: "The Voice of Mexico City."

XECU, Mexico City, Mexico, 6,120 kc., 12 to 4 a.m. (from veri.) (Sporn).

XECW, Mexico City, Mexico, 6,040 kc., (Rudolph).

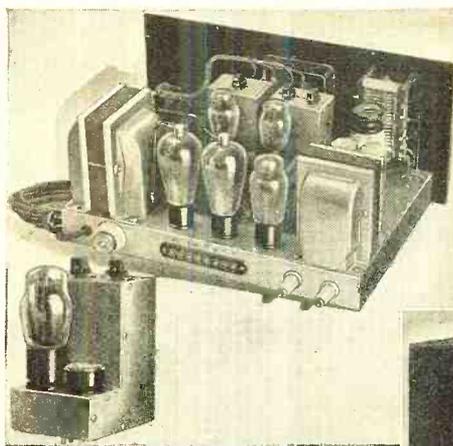
XEBT, Mexico City, Mexico, 6,000 kc., (Beck) 6 to 12 p.m. (Rudolph).

XEFC, Mexico City, Mexico, 9,400 kc., (from ann.) (Beck).

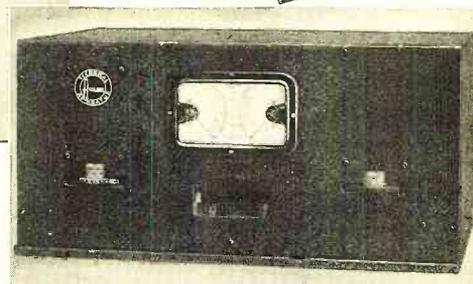
KEYU, Mexico City, Mexico, 9,600 kc., 1 to 2 a.m. Desires reports. (Markuson, Beck, Lueth) 8 p.m. and on (Umstead). Address: Napopi No. 60.

XEXA, Mexico City, Mexico, 6,182 kc., 8 to 10 p.m. (Alfred) 7 to 11 p.m. Hynek, Sesina) 6,170 kc., (Howald) 6,130 kc., schedule 6 to 12 p.m. (Ortiz, Fallon).

XEWI, Mexico City, Mexico, 11,900 kc., 7 to 8 p.m. (Alfred) Monday, Wednesday and Friday 2 to 4 p.m., Saturday 8 to 11 p.m. (from veri.) (Sporn, Kasynsky) 60,120 kc., (Beck, Hartzell, Sesina, Coover, Hendry).



**THE
TRANSMITTER
HIT OF
1937**



● 60 Watts CW output on 20, 40, 80 and 160 Meter Amateur Bands—40 watts on 10-meters. About 20 watts on 'phone may be obtained when used with correct Audio Amplifier. No larger than ordinary receiver—weighs only 60 lbs. Fool-proof switching arrangement compels correct switching sequence both during tuning up procedure and in actual operating service. Plug-in crystal and doubler stages—completely self contained; allow very rapid band changes. Offers best possible shielding between stages. And at *Wards* this rig costs you only \$97.50; Monthly Payment Terms!

**MONTGOMERY
WARD**

CHICAGO • BALTIMORE • ALBANY • ST. PAUL
DENVER • KANSAS CITY • PORTLAND • OAKLAND
JACKSONVILLE • FT. WORTH

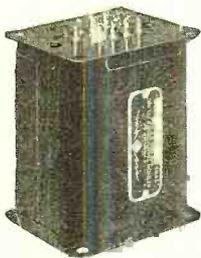
ONLY \$9 DOWN, \$8 A MONTH

Write today concerning details on this miracle transmitter and other Ham equipment. Address Dept. RN-7, Radio Engineering, Chicago. *Wards* sensational radio catalog is also yours for the asking; mail coupon for your free copy TODAY.

MONTGOMERY WARD Dept. RN-7
Please send me a copy of your 1937 Radio Catalog.
Name.....
Street and No.....
City.....
State.....

Will Your Present Audio And Power Units Be Obsolete Ten Years From Today?

1937



1947

The new Kenyon line of audio and power components includes a number of Universal Transformers which entirely eliminate obsolescence.

KEN-O-TAP

IS THE PRACTICAL SOLUTION TO THE MODULATION PROBLEM

KEN-O-DRIVE

IS THE MODERN ANSWER TO CRITICAL DRIVER OPERATION

KEN-O-DYNE

IS THE MODERN METHOD OF MATCHING OUTPUT TUBES TO SPEAKERS

KEN-O-LINE

IS THE EFFICIENT COUPLING DEVICE FROM UNIVERSAL LINE

KENYON TRANSFORMER CO., INC.

840 Barry St., New York, N. Y.
Export Department: 25 Warren St., New York, N. Y.
Cable Address: Simontrice, N. Y.

Train for

**ELECTRICITY
IN 12 WEEKS AT COYNE**

The Big Coyne Shops in Chicago have a world-wide reputation for training ambitious fellows for their start in this big-pay field in only 12 weeks. Then you get lifetime graduate employment service. By my new plan YOU can take advantage of our wonderful method of learning-by-doing NOW—no need to lose time and money while you strive and save to raise the necessary tuition.

**"ARRANGE TO FINANCE
YOUR TUITION"**



I have a plan where many get training first. Then they have over a year to pay for their training in easy monthly payments starting 5 months from the day they start school. If you will write to me at once I will send you complete details of this sensational new plan, together with the Big Free Illustrated Book telling all about COYNE and how many earn while learning and training you can get there without book study or useless theory. *H. C. Lewis*

COYNE ELECTRICAL SCHOOL

500 S. Paulina Street, Dept. A7-81, Chicago, Illinois
MR. H. C. LEWIS, President
Dpt. A7-81, 500 S. Paulina St., Chicago, Ill.

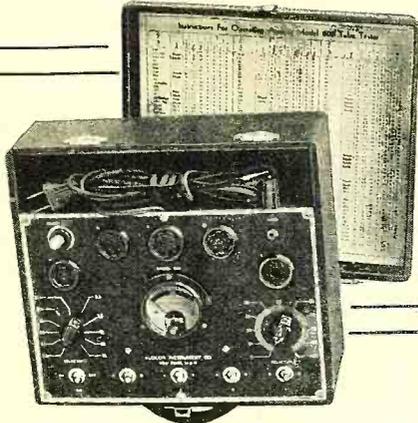
Send me all details of your "pay-tuition-after-graduation" plan and your big FREE catalog.
NAME.....
ADDRESS.....
CITY..... STATE.....

PARTS PRICES SLASHED!

Complete stock of fine-quality replacements for Short Wave—P. A.—Ham and Service work at big savings. Why carry expensive stocks? Use our RUSH shipment plan.

BOND RADIO COMPANY
13137 Hamilton Ave., Detroit, Michigan

VALUE PLUS . . .
Elgin 800 Tube Tester

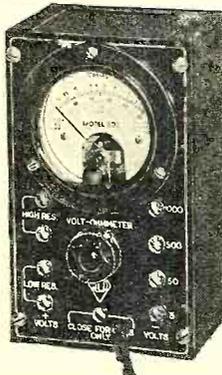


- Tests All Tubes Including Metal
- D'Arsonval Moving Coil Meter
- English Reading "Good""Bad" Scale
- Separate Section Tests
- Accurate Tests on All Tubes
- Portable Leatherette Covered Case
- Compact—Can be Carried Anywhere
- Requires But Two Settings For Tests
- Combination Short Test and Meter Fuse
- Chart For Testing All Tubes

Complete Net Dealer's and Serviceman's Price..... **\$11.50**

MODEL 801
Volt-Ohmmeter

A sensitive, compact and accurate volt-ohmmeter that will be the busiest instrument in your "lab," or out on jobs. DC voltage readings -0.5-50-500 and 1000-resistance readings from 1/2 to 500 and 200 to 500,000 ohms. Will read from 0 to 1 Ma. Low resistance range direct reading. Meter has 1000 ohm per volt sensitivity. Battery is self contained. Panel is clearly lettered. Compensator provided for zero adjustment. Complete with test prods. Measures only 5"x3 1/4"x2 1/2".



DEALER'S NET PRICE **\$5.75**
WITH BATTERY AND TEST PRODS.
Send for circular describing our complete line.

TRY-MO RADIO CO., INC.
85N CORTLANDT ST. N. Y. C.

READ Like an Expert
SEND CODE

Learn Quickly at Home—Get Real SPEED

It's easy, fascinating, to become a good op. with the NEW ALL ELECTRIC MASTER TELEPLEX Code Teacher to help you. Only instrument ever produced which records your sending in visible dots and dashes—then sends back to you at any speed you desire. Also sends practice work, recorded by an expert. That is why so many schools teaching code prefer Teleplex, why thousands agree this method is surest and quickest.

We furnish Complete Course, lend you Master Teleplex, give you personal instruction with a MONEY-BACK GUARANTEE. Low cost. Send today for booklet RN-6; no obligation.

TELEPLEX CO.

72-76 Cortlandt St. New York City

RADIO ENGINEERING

RCA Institutes offer an intensive course of high standard embracing all phases of Radio. Practical training with modern equipment at New York and Chicago schools. Also specialized courses and Home Study Courses under "No obligation" plan. Catalog Dept. RN-37.

RCA INSTITUTES, Inc.

75 Varick St., New York 1154 Merchandise Mart, Chicago
Recognized Standard in Radio Instruction Since 1909



A GREAT DX'ER
Seated at his listening post, Observer Warren D'Orsay, of Sydney Mines, Nova Scotia, pulls in signals from the short-wave bands from the far corners of the earth.

XETW, Mexico City, Mexico, 6,110 kc., heard signing at 12:06 a.m. (from ann.) (Alfred) 8 p.m. to 1:15 a.m. Relays XEFO, (Partner). Address: P.O. Box No. 8403.

XEUZ, Mexico City, Mexico, 6,240 kc. Requests reports, heard as late as 2:30 a.m. (Alfred) 6,120 kc., (Law) Saturday 1:15 to 5:00 a.m. (Moore). (Kosynsky) uses airplane motor, train, sounds and sirens. (Beck, Eder) daily 8 p.m. to 1:15 a.m., 6,115 kc., (Partner, Markuson, Kentzel). Slogan: "Radio Nacionales." Address: P.O. Box No. 2641.

XEFT, Veracruz, Mexico, 9,505 kc., 9 to 10 p.m. (Alfred, Schrock) 6,120 kc., heard irreg. (Partner) 9,460 kc., Beck) 8 to 12 p.m. and irreg. (Rudolph, Sesina) (Betances) 9,490 kc., (Shamleffer). Slogan: "Voice of Veracruz."

XEUW, Veracruz, Mexico, 6,020 kc., daily until 12:30 p.m. (Markuson) 6,130 kc. (Law) 8 to 12 p.m. (Rudolph, Sesina).

XEBN, Mazatlan, Sinolea, Mexico, 15,360 kc., heard irreg. (Gallagher).

XEPA, Mazatlan, Sinolea, Mexico, 6,110 kc., (Gallagher).

XEDC, Mazatlan, Sinolea, Mexico, 6,110 kc., heard irreg. (Gallagher).

XERE, Mazatlan, Sinolea, Mexico, 11,800 kc., (Sesina).

XEBH (?) 11,910 kc., (Jensen).

XEDG, Guadalajara, Mexico, 9,480 kc., relays XED (Beck) schedule 7 p.m. to 1 a.m. and irreg. (Rudolph) desires reports (Sesina, Betances). Address: Calle 16 to Septiembre 164. Apartado 197.

XETU, Guadalajara, Mexico, 6,110 kc., (Beck, Sesina).

XEBM, Mazatlan, Sinolea, Mexico, 15,440 kc., Sunday, noon to 4:30 p.m., heard also irreg. (Partner) 7 a.m. and 1 p.m. (Moore, Beck). Address: Avenue Angel Flores, 156 Altos.

XEBR, Hennesilo, Sonora, Mexico, 11,820 kc., 1 to 4 p.m. daily, 9 p.m. to midnight, relays XEBH (from veri.) (Partner, Beck, Eder, Markuson, Umstead, Shamleffer). Address: P.O. Box No. 68.

XEME, Merida, Mexico, 8,190 kc., daily 9:30 a.m. to 2 p.m. and 5:30 to 10 p.m. (Rudolph).

United States

W2XAD, Schenectady, New York, 15,330 kc., 12:20 p.m. (Sutker) daily 9:55 a.m. to 4 p.m. (Ryan, Devaraj, Randle).

W2XAF, Schenectady, New York, 9,530 kc., (Kidel) 3:45 p.m. (Sutker) daily 4 to 11 p.m. (Ryan, Randle).

W2XE, New York, New York, 21,500

kc. (from ann.) daily 6 to 7 p.m. (Dressler) 21,520 kc., 7:30 to 12 a.m., 6 to 7 p.m., 17,760 kc., 12 to 1 p.m., 15,270 kc., 1 to 6 p.m. 11,830 kc., 7 to 10 p.m., 6,120 kc., 10 to 11 p.m. (Partner, Randle).

W3XAL, Bound Brook, New Jersey, 17,780 kc., 12:30 p.m. (Sutker) daily 9 a.m. to 4 p.m. (Ryan, Devaraj, Randle).

W3XL, Bound Brook, New Jersey, 6,425 kc., heard testing 2:30 a.m. (Se-kach).

WHJ, Hialeah, Florida, 9,355 kc., (from ann.) 8 p.m. (Kentzel).

W1XK, Millis, Massachusetts, 9,570 kc., 4 p.m. (Sutker).

W1XAL, Boston, Massachusetts, 11,790 kc., (Kield) Tuesday and Friday 7:30 to 9:15 p.m. (Ryan) 6,040 kc., Monday, Tuesday, Friday and Sunday, Scala, Randle). Address: University Club.

W1XK, Springfield, Massachusetts, 9,470 kc., (Kield, Law, Liljegren).

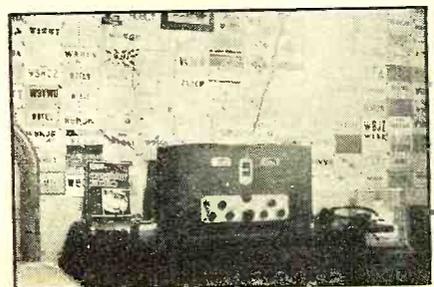
W9XAZ, Milwaukee, Wisconsin, 26,400 kc. experimental station (Randle) daily 11 a.m. to midnight (from veri.) (Salazar).

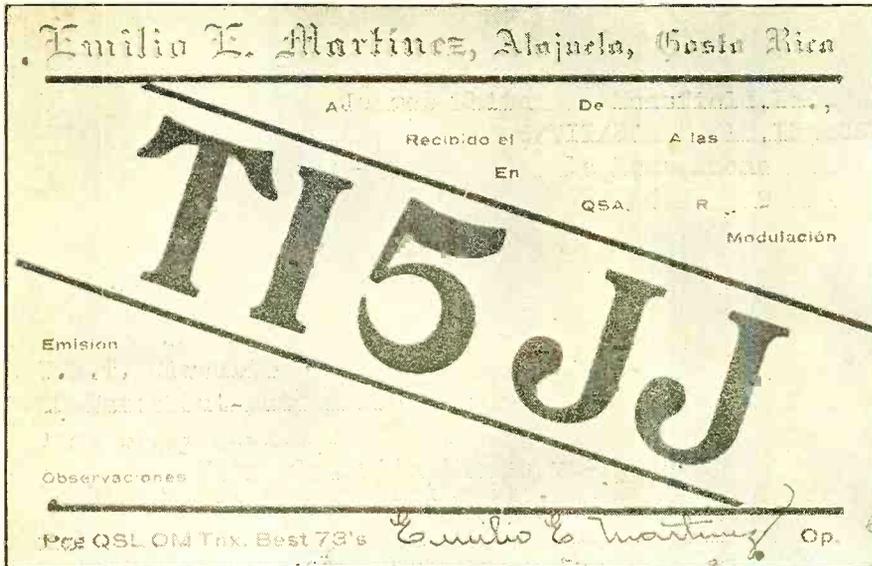
W9XJL, Wisconsin, 31,600 kc., signed at 4 p.m. (Randle).

W3XES, Baltimore, Maryland, 35,600 kc., schedule 9 a.m. to 5 p.m. (Randle).

EUREKA, CALIFORNIA!

The DX corner of Dick Allen, observer for California. The name of his town is a good one for short-wave listening as it means "I have found thee" and we are wondering whether Dick says this every time he pulls in a new station.





FOR RAPID TURNOVER

Profits come from turnover . . . Merchandise sold, not merchandise bought and collecting dust on the shelf. Get into the Sound Business right . . . with the fastest moving line.

WEBSTER-CHICAGO'S ALL-PURPOSE SOUND SYSTEM

FOR BOTH 6 V. D.C. AND 110 V. A.C. IDEAL FOR SOUND TRUCKS

This new 30 Watt system has the advantage of being usable anywhere and under all conditions. Only change necessary is to plug in right power pack. All necessary accessories are included, the phonograph turntable being an integral part of the amplifier cabinet.

With this one system dealer can accommodate all demands for rentals.

30 WATTS UNDISTORTED OUTPUT

System includes: 4-Stage 30 Watt High Gain Amplifier

Crystal Microphone
Two Heavy Duty P.M. Speakers



MODEL MP 530

Dual Electronic Mixing System. Mixes microphone and phonograph

For audiences of any size to 10,000 people.



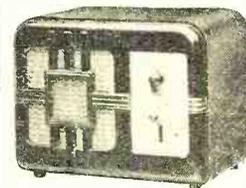
WEBSTER-CHICAGO'S

INTER-COMMUNICATION SYSTEMS AC-DC OPERATION

Webster-Chicago offers four types, two types for two-station installations, and two types for multi-station installations (up to 10 points). All types have—

- No hum or noise
- Adjustable volume control
- Beautiful plastic cases
- Natural voice reproduction
- Sensitive pick-up

MODEL OCM ... 1 to 10 STATIONS



With this system each station can talk to each other station. System can be started with two or more stations and additional stations added, one or more at a time, to 10. A sales repeater for dealer.

SPECIAL SALES HELPS

All kinds of productive dealers helps available free of charge—write for more information.

WEBSTER-CHICAGO

- Strict Dealer Policy
- Fully Licensed
- Time Payment Plan

WEBSTER-CHICAGO
Section JN6, 5622 Bloomingdale Ave., Chicago, Ill.
Please send me more information on.....
..... I am also interested in.....
Name.....
Address.....
City..... State.....

W3XEY, Baltimore, Maryland, 31,600 kc., (Randle).

W3XAU, Philadelphia, Pennsylvania, 9,590 kc., (Kield) 12,550 kc., (Beck) daily 4 to 11 p.m. (Ryan).

W8XX, Pittsburgh, Pennsylvania, 15,210 kc., 6:30 p.m. (Alfred, Kruger) 11,870 kc., (Kield, Sutker) daily 9 a.m. to 6 p.m. (Ryan).

KWE, Bolinas, California, 7-7:20 p.m. (Gresborn).

KEE, Bolinas, California, 7,615 kc., 12:15 a.m. (Alfred).

KEL, Bolinas, California, 6,860 kc., 12:15 a.m. (Alfred).

W6XKG, Los Angeles, California, 25,950 kc., 24 hours a day (from ann.). (Turner, Randle, Augustive, Garzkowski).

WJJD, Chicago, Illinois, 12,250 kc., 6-6:30 p.m. (Alfred).

W9XAA, Chicago, Illinois, 11,830 kc., (Kield, Millen).

WSXAL, Cincinnati, Ohio, 6,000 kc., (Kield) 4:30 p.m. (Sutker) daily 8 a.m.-7 p.m. (Ryan).

W8XWJ, 8,490 kc. (Randle).

W9XPD, St. Louis, Missouri, (Randle).

Africa

FYA (?), Africa, 12120 kc., 11-1 a.m., (Howald), 8960 kc., 1:30-3:12 a.m., (Beck, Augustine), Slogan: "Radio Algiers".

VQ7LO, Nairobi, Kenya, Africa, 49131 meters, signing 2:30 p.m. on week days, (Smith).

EA8AE, Canary Islands, around 20 meters, 9-25-9:30 p.m. Friday, (Shamleffer).

EAJ43, EDR3, Tenerife, Canary Islands, 10370 kc., signed 4:15 p.m., (Ralat), 8:30-10 p.m., (Lueth), 9-11 a.m., (Smith).

EHZ, Santa Cruz, Canary Islands, 6-8 p.m., (Williams).

EA9AH, Tetuan, Spanish Morocco, 7020 kc., (Piorko, Mott, Betances).

"Guardia-Civil", Tetuan, Spanish Morocco, 6140 kc., 4:50 p.m., (Betances).

CR7AA, Laurence Marques, Portuguese West Africa, 6137, 11718 kc., 10-11 a.m., reports desired, (Partner).

CR7BH, Laurence Marques, Mozambique, Africa, 11718 kc., 10-11 a.m., (Westman), 9:33-11 a.m., (Silvius, Gallagher).

ZEA, Salisbury, Southern Rhodesia, 5882 kc., Sunday 3:30-5 a.m., Monday 1:15-3:15 p.m., Tuesday 11-12 a.m., Wednesday 1:15-3:15 p.m., Thursday 10-12 noon, Friday 1:15-3:15 p.m., (from veri.), (Westman).

ZEB, Bulawayo, Southern Rhodesia, 6140 kc., same schedule as ZEA, (Westman).

IUG, Addis Ababa, Ethiopia, 15450 kc., daily around 8:30 a.m., (Hartzell).

ZNB, Mafeking, Union of South Africa, 50.84 meters, daily 2-3 a.m., 1-2 p.m., (Kueger), owned by the British Bechuanaland Protectorate Govt.

ZNC, Mafeking, Union of South Africa, 50.84 meters, portable station, (Kruger), owned by the British Bechuanaland Protectorate Govt.

ZNIA, Kalahari Desert, Union of South Africa, 42 meters, 5 watts input, (Kruger).

OPM, Leopoldville, Belgian Congo, Africa, 10,40 kc., 2:30 a.m., (Gallagher).

ZTJ, Johannesburg, Union of South Africa, 6091 kc., Daily 11 p.m., 2:30 a.m., 3:15-7 a.m., 9:11-30 a.m., noon-3 p.m., (Mellanby, Williams).

CR7AA, Laurence Marques, Mozambique, 11718 kc., daily 4:30-6:30 a.m., 9:30-11 a.m., 12-4 p.m., (from ann.), (Certenback), Address: P. O. Box 594.

FT4AJ, Tunis, Tunisia, 6150 or 6145 kc., 7-20 p.m., program of Newark Radio Club, (Kosynsky).

COSTA RICA HEARD FROM

Listener James White of Mansfield, La., sends in this verification card of T15JJ of Alajuela.

CNT, Bizeste, Tunisia, 6180 kc., 5-6:15 p.m., bell used for identification, (Piorko), Address: P. O. Box 72.

Central America

TITG, San Jose, Costa Rica, 9410 kc., signed at 12:15 a.m. (Alfred).

TI4NRH, Heredia, Costa Rica, 9670 kc., (Hartzell); 9600 kc. (Fallon); until 1 a.m. (Turner).

TIEP, San Jose, Costa Rica, 6700 kc., 1:05 a.m. (Alfred); 4 p.m. (Coover); 6650 kc., 10:30 p.m.-1:30 a.m.; sign with organ selection of "Little Pal", (Moore, Black, Rattee, Eder); 7-11 p.m. (Gossett, Ralat). Slogan: "La Voz del Tropico".

TIPG, San Jose, Costa Rica, 6410 kc., until 11:30 p.m. (Alfred, Eder, Rattee).

TIOW, Port Lemon, Costa Rica, 6850 kc. (Beck). Address: P. O. Box No. 45.

TIMS, Puntarenas, Costa Rica, 11790 kc., signs at 9:30 p.m. (Schrock, Eder); 5090 kc. (Gallagher).

TILF, San Jose, Costa Rica, 5910 kc., daily 6 p.m. on (Betances). Slogan: "Para Ti".

TIGPH, San Jose, Costa Rica, 5839 kc. (Eder, Hartman). Address: P. O. Box No. 800 (from veri).

TILS, San Jose, Costa Rica, 5900 kc., 11 p.m. (Atherton); signed at 10:51 p.m. (Moore, Alfred).

TI8WS, Puntarenas, Costa Rica, 7500 kc., 8-9 p.m. (Beck). Address: P. O. Box No. 75.

YNLF, Managua, Nicaragua, 6540 kc., 8-8:50 p.m. (Alfred); 7560 kc., (Partner, Jensen). Slogan: "La Voz de Nicaragua".

YNLG (YNYA), Managua, Nicaragua, 8590 kc., daily 7:30-8 p.m. (Schrock, Atherton). "Slogan: "Ruben Dario". Address: Franquissia, No. 250.

YNOP, Managua, Nicaragua, 5750 kc. (Eder); 9:30 p.m. (Ralat); 5758 kc. (Betances). Slogan: "Radiofusora Bayer".

TGWA, Guatemala City, Guatemala, 9450 kc., Sunday 12-5 a.m., week days 7-11 p.m. (Alfred, Herzog).

TG2X, Guatemala City, Guatemala, 5920 kc. (Eder).

TG1, TG2, Guatemala City, Guatemala, 6225 kc., wants reports, (Fallon). Address: Director General of Electrical Communications, Guatemala City.

HRD, La Ceiba, Honduras, 48.11 meters, 8 p.m. (Coover); 6235 kc., schedule 8-12 p.m. (Gledhill, Eder).

HP5K, Colon, Panama, 6000 kc. (Eder); daily 7:30-9 a.m., 12 noon-1 p.m., 6-9 p.m. (from veri), (Markuson).

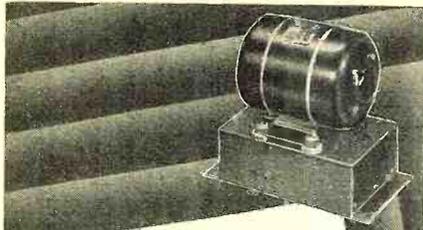
HP5J, Panama City, Panama, 9590 kc., daily 7-7:15 p.m. (Alfred); 9615 kc. (Hartzell, Ralat). Slogan: "La Voz de Panama". Address: P. O. Box No. 867.

HP5B, Panama City, Panama, 6030 kc., 7-10:30 p.m. (Alfred, Coover); 5-10 p.m. daily. (Scala, Williams). Slogan: "Mira Mar". Address: P. O. Box No. 910.

HP5L, David, Panama, 11740 kc., 9-9:30 p.m. (Alfred, Partner).

HP5I, Aguadulce, Panama, 11900 kc., 8:45 p.m. (Atherton); daily 8-12 p.m. (Millen); three gong notes every half hour, 11895 kc., reports appreciated (from veri), (Oxrieder, Partner). Slogan: "Voz del Interior".

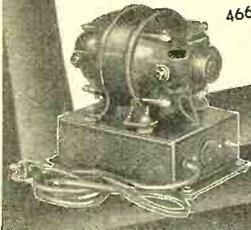
HP5A, Panama, (Rudolph). Slogan: "Voice of the Isthmus".



**DYNAMOTORS
CONVERTERS
GEN-E-MOTORS**

Radio engineers have learned from experience that Pioneer Gen-E-Motor Corporation's dynamotors, gen-e-motors and converters provide the last word in dependable power supply units for air craft, police, marine and auto radios and public address systems. They are available in a wide range of capacities for every requirement. Designed and constructed to give maximum long life and service. Light weight and compact. For complete information write

PIONEER GEN-E-MOTOR CORPORATION
Dept. No. R-3F
466 West Superior Street
Chicago, Ill.



**I can show YOU
how to "POUND BRASS"
like a CHAMPION
and TAKE it, too**



It's EASY the Candler Way

IN just a few weeks you can acquire code skill with Walter Candler's personalized and scientific training. Code champion McElroy teaches the CANDLER System at Harvard College. It's the correct way to learn. Ask any skilled operator. The CANDLER System so develops your natural sound consciousness, that you send and receive code as easily as you talk and listen. You'll see progress every day the CANDLER way. Don't delay!

Send for FREE Book of Facts

CANDLER SYSTEM CO.
Asheville Dept. N-6 North Carolina

T. R. McElroy
WORLD'S CHAMPION RADIO TELEGRAPHER
175 Congress Street, Boston, Mass.

MAC KEY, new model @ \$9.50
MAC KEY DELUXE @ \$15.00
MAC CORD @ 1.00
MAC CASE @ \$3.95
MAC OSC @ \$3.95 ac-dc oscillator tone control
if u hv Mac Key wri me to xmy ipt & drsb ifn.
All my stuff emcy god best pduts obl. 73 Mac.

**RADIO
ENGINEERING.**

broadcasting, aviation and police radio, servicing, marine radio telegraphy and telephony, Morse telegraphy and railway accounting taught thoroughly. Engineering course of nine months' duration equivalent to three years of college radio work. School established 1874. All expenses low. Catalog free.

Dodge's Institute, Oak St., Valparaiso, Indiana

HIX, HI1X, HI2X, HI3X, Trujillo City, Dominican Republic, 11960 kc., (from ann.), signed 9:30 p.m., (Alfred), 6340 kc., (Eder, Moore), replaced by HI1X, (Markuson, Beck, Herzog, Gallagher, Augustine), 15280 kc., (HI3X), (Garzkowski).

HI2X, Ciudad Trujillo, Dominican Republic, 11900 kc., (Markuson, Beck, Eder), Sunday 5 a.m., (Hartzell), 9 p.m., (Coover, Gallagher), daily until 11 p.m., (Luette, Augustine).

HI3X, Trujillo, 15280 kc., Sunday 7-11 a.m., (Augustine, Gorzkowski).

COCX, Havana, Cuba, 11435 kc., 6 p.m.-1 a.m., (Alfred), 11600 kc., (Kidd, Eder, Moore, Randle), Slogan: "La Voz del Radio Philco", Address: P. O. Box 32.

COCO, Havana, Cuba, 6010 kc., (Eder, Law), 11900 kc., 10 p.m., (Lueth, Coover, Randle), 12100 kc., (Gossett, Immicke), Address: P. O. Box 98.

COCH, Havana, Cuba, 9428 kc., 6:58 a.m.-12 midnight, (Alfred, Eder, Coover, Moore, Law), Daily, 1-10 p.m., (Ryan, Liljgren, Unger, Jensen), Slogan: "Cuba the Evergreen Land".

COCQ, Havana, Cuba, 9750 kc., 7 a.m.-1:30 a.m. (of next day), (Alfred, Coover, Kidel, Eder, Moore, Law, Liljgren), 8820 kc., (Herzog), Sunday 2 a.m., (Turner), 9800 kc., (Randle, Jensen).

COHE, Sancti Spiritus, Cuba, 6280 kc., 9-10 p.m., (Alfred, Eder), Address: P. O. Box 85.

COKG, Santiago, Cuba, 620 kc., 5-6 p.m., 9:30-10:30 p.m., daily, Sunday 12:01-1 a.m., (Alfred, Betances), Slogan: "Emisoras Grava", Address: P. O. Box 137.

COJQ, Camaguey, Cuba, 8665 kc., irregular in evenings, (Schrock).

COVD, Havana, Cuba, 48.92 meters, 11:45 p.m., (Smith), 6130 kc., 1-2 a.m., (Hartzell).

CMJ, Havana, Cuba, 8700 kc., signed 12 p.m., (Moore), Address: Pan American Airways, Aerodromo, San Julian, Guane.

CO9WR, Sancti Spiritus, Cuba, 6280 kc., daily 4-5 p.m., (Ryan).

ZFD, St. George, Bermuda, 10335 kc., 11:15 p.m., (Alfred, Gresham, Moore, Howald).

ZFA, St. George, Bermuda, 5025 kc., 11:15 p.m., (Alfred, Moore, Howald).

ZFB, Hamilton, Bermuda, 10035 kc., 7:45 p.m., (Hartzell).

HI2S, Port au Prince, Haiti, 5920 kc., (Eder).

HH3W, Port au Prince, 9645 kc., daily 7 p.m., (Hartzell), 9595 kc., 1-2 p.m., (Lawton).

HHSW, Port au Prince, 5915 kc., until 9:30 p.m., (Ralat).

HH2R, Radio Fort de France, Port de France, Martinique, French West Indies, 9440 kc., 8-9 p.m., (Alfred), 5-9 p.m. nightly, (Partner, Moore, Sahlbach), 11:30 a.m.-12:30 p.m., 6:15-7:15 p.m., 8-9 p.m., (Oxieder), 7000 kc., (from veri), (Ralat).

PJCI, Curacao, Netherlands West Indies, 5925 kc., 7-12 p.m., (Labega, Ralat).

South America

PRADO, Riobamba, Ecuador, 6620 kc., 9-11:30 p.m. on Thursday, (Alfred, Coover), Slogan: "Estacion el Prado", Address: P. O. Box No. 98.

HCJB, Quito, Ecuador, 20 meter band, 10:45 p.m., working amateurs, (Atherton).

HCYT, (H3VT?), Ambata, Ecuador, 6570 kc. (Moore).

HC2RA, Guayaquil, Ecuador, 9443 kc., daily except Sunday, 8-9 p.m., (Schrock, Gallagher, Alfred), Slogan: "La Voz de Alma".

HC2RL, Guayaquil, Ecuador, 6658 kc., Tuesday 9:15-11:15 p.m., Sunday 5:45-7:45 p.m., (Alfred, Howald, Eder), 6635 kc., (Markuson), Slogan: "Quinta Piedad", Address: P. O. Box No. 759.

HCT8A, Ecuador, 9450 kc., (Rudolph).

OAX4G, Lima, Peru, 6260 kc., 8:30 p.m. (Lara), Slogan: "Radio Greenland", Address: P. O. Box No. 1242.

OAX41, Lima, Peru, 9300 kc., wants reports, 6 p.m. (Lara, Eder, Moore), 9:50 kc., 6 p.m.-1 a.m., (Partner); three chimes (Beck), 9340 kc. (Amstead), Slogan: "Radio Internacional", Address: P. O. Box No. 1166.

OAX41, Lima, Peru, 9335 kc., daily 7-11 p.m. (Alfred); three chimes (Beck, Hendry), Slogan: "Radio Internacional", Address: P. O. Box No. 1166.

OAX4D, Lima, Peru, 5780 kc., (Eder); schedule—Wednesday and Saturday 9-11:30 p.m. (Alfred, Bower), Slogan: "Radio Dusa", Address: All American Cables.

OAX4J, Lima, Peru, 9335 kc., schedule—8-midnight, (Schrock); 9800 kc., (Gallagher); 9360 kc., (Markuson); 9450 kc., (Rudolph, Millen, Partner), Slogan: "La Voz del Lima, Peru"; "Radio Nacional", Address: P. O. Box No. 1166.

OAX5B, Ica, Peru, 11890 kc., daily 9-11 p.m. (Schrock); 7:30 p.m. (Lara); 11800 kc., (Gallagher, Moore).

OAX1A, Chiclayo, Peru, 6150 kc., 8 p.m. (Lara); schedule—8-11 p.m., (Rudolph, Partner), Slogan: "Radio Delcas"; "La Voz de Chiclayo".

OAX42, Lima, Peru, 6090 kc., relays OAX4A, (Nelson); 9092 kc., 7-11:30 p.m., (Kentzel, Gallagher).

OAX4P, Huancayo, Peru, 6125 kc., near 8 p.m., (Moore).

OAX1B, Chiclayo, Peru, 6170 kc., near 8 p.m., (Moore), Slogan: "La Voz de Chiclayo".

LRX, Buenos Aires, Argentina, 9660 kc., (Eder); schedule—7-11 p.m. (from veri), (Schrock, Alfred, Tynan); 1 a.m. (Howald, Ralat, Williams), Slogan: "Radio el Mundo", Address: Calle Maipu 555.

LXS, Buenos Aires, Argentina, 10350 kc., Thursday 7:15 p.m., (Hartzell), Slogan: "Transradio Buenos Aires", Address: San Martin 329.

LRU, Buenos Aires, Argentina, 15280 kc., (from veri), (Tynan), Address: Calle Maipu No. 555.

PPQ, Rio de Janeiro, Brazil, 11670 kc., testing 6:7:30 p.m. (Liljgren), Address: Cia Radio Telegraphica Brasileira, Caixa Postal 500.

PRF5, Rio de Janeiro, Brazil, 9501 kc., Monday to Saturday 1:45-2:45 p.m., (from veri), (Alfred); daily 4:45-5:45 p.m., (Ralat, Hendry), Address: Manager of the Radio Division, Dept. of Propaganda.

PRA-8, Pernambuco, Brazil, 6040 kc., (Williams).

CB960, Santiago, Chile, 9600 kc., 8 p.m., (Lara, Herzog); 10 p.m. (Ralat), Address: Casilla No. 1542.

CB615, Santiago, Chile, 12295 kc., daily 9 a.m.-1 p.m. and 4-8 p.m. (Lara); 12350 kc., (Gallagher, Beck, Howald, Partner, Lueth); 6150 kc., (Markuson), Slogan: "Radio Service", Address: P. O. Box No. 761.

CEC, Santiago, Chile, 10670 kc., around 9 p.m., (Gallagher, Hartzell, Black).

CEM, Amelinas, Chile, 8890 kc., 8:12 p.m., (Millen, Moore).

CEB, Santiago, Chile, 12300 kc., 10-11 p.m., (Markuson).

CP6, La Paz, Bolivia, 9120 kc., 8:12 p.m., (Kosynsky).

CP7, La Paz, Bolivia, 15300 kc., around 6 p.m., (Partner).

CXA4, Montevideo, Uruguay, 6125 kc., daily 10-12 a.m. and 3-9 p.m. (Lara).

CXA2, Montevideo, Uruguay, 6000 kc., testing, (Lara).

CX18, Montevideo, 25 meters, 11 p.m. (Ralat).

HJ1ABE, Cartagena, Colombia, 9500 kc., (Kidd, Eder, Schrock); daily 7-11 p.m. (Alfred); except Sunday 11:30 a.m.-1 p.m., (Sesma, Coover, Moore); 9600 kc., 7:10-7:25 p.m. (Liljgren, Beck, Shamleffer, Unger, Randle, Williams, Jensen), Slogan: "La Voz de los Laboratorios Fuentes", Address: P. O. Box No. 31.

HJ1ABP, Cartagena, Colombia, 9600 kc., (Kidd); 9610 kc., (Eder); Saturday 10-11 p.m. (Alfred); works 20 meters "hams", (Dressler, Coover); Sunday 5:45 a.m., (Hartzell, Moore, Piorco, Coover); 6042 kc., (Rudolph); requests reports, (Unger, Gossett); daily 7-9 a.m., 11 a.m.-1 p.m., 5-10:30 p.m., Sunday 11 a.m.-1 p.m., 3-6 p.m. (from veri), (Immicke, Jensen), Slogan: "Radio Cartagena", Address: P. O. Box No. 87.

HJ1ABB, Manizales, Colombia, 6120 kc., daily until 11 p.m. (Markuson); 6:30-7:30 p.m. on Monday (Beck, Shamleffer), Slogan: "La Voz de Barranquilla", Address: P. O. Box No. 715.

HJ1ABG, Barranquilla, Colombia, 6040 kc., 12 midnight, (Moore).

HJ1ABC, Quito, Colombia, 600 kc., until 12 p.m. (Moore, Williams).

HJ1ABJ, Santa Marta, Colombia, 6025 kc., until 9 a.m. and Sunday 7:20 a.m. (Ralat).

HJ4ABH, Armenia, Colombia, 9520 kc., (Eder); 8:15 p.m., wants reports, (Lara, Alfred); schedule—8-11 a.m., 6-10 p.m. (Rudolph), Sunday 7-10 p.m. (Dressler, Shamleffer), Slogan: "La Voz de Armenia".

HJ4ABU, Pereira, Colombia, 6140 kc., 9 p.m. (Lara), Slogan: "La Voz de Pereira".

HJ4ABP, (HJ4ABO), Medellin, Colombia, 6030 kc., daily 8 a.m.-11 p.m. (from veri), (Alfred); Saturday 11-12 p.m. (Fallon).

HJ4ABB, Manizales, Colombia, 6110 kc., Tuesday 9 p.m. (Alfred); daily until 10 p.m., (Markuson), Slogan: "Radio Manizales".

HJ4ABL, Manizales, Colombia, 6100 kc., six gongs before announcements., 7 p.m.-1 a.m. (Alfred), Slogan: "Ecos de Occidente", Address: P. O. Box No. 50.

HJ4ABA, Medellin, Colombia, 11710 kc., daily 11 a.m.-noon, (Ryan).

HJ4ABD, Medellin, Colombia, 5780 kc., (Beck).

HJ8ABX, Bogota, Colombia, 6120 kc., (Elder), 9 p.m. (Lara, Beck), Address: P. O. Box No. 2065.

HJ3ABH, Bogota, Colombia, 6012 kc., until 12 p.m. (Alfred, Beck), Address: P. O. Box No. 565.

HJ3ABD, Bogota, Colombia, 6050 kc., (Alfred); sign at 11 p.m. (Moore, Beck), Slogan: "Emisora Nueva Granada"; "Colombia Broadcasting S. A.", Address: P. O. Box No. 509.

HJ2ABC, Cucuta, Colombia, 31.33 meters, 6 p.m. (Coover); Thursday and Friday nights on 9572 kc., (Shamleffer); daily 6-10 p.m. (Dressler).

HK4JB, Andes, Antioquia, Colombia, 19 meters, (Ralat), Slogan: "Ecos del San Juan en Andes"; "La Voz del Sur-Oeste Antioqueno".

HKB, Bogota, Colombia, 9930 kc., 10 p.m. (Gallagher).

HKV, Bogota, Colombia, 8790 kc., 9 p.m. (Gallagher).

HJU, Buenaventura, Colombia, 31.55 meters,

Monday 8:20 p.m. (Smith); 9510 kc. (Beck, Shamleffer, Jensen). Slogan: "The Voice of the Pacific."

YV1RH, Maracaibo, Venezuela, 6860 kc. (Kidd); 6390 kc. (Eder); 9 p.m. (Lara); 11:30 p.m. (Moore); 6360 kc. (from veri). (Atherton, Anca, Lopez). Slogan: "Emisora Philco"; "Ondas del Lago". Address: P. O. Box No. 261.

YV5RC, YV2RC, YV1BC, YV5RA, Caracas, Venezuela, 5800 kc. (Eder); 8 p.m. (Lara); Call changed (from veri). (Anca); war news (Liljegren); daily 4-9:30 p.m. (Cindel, Hodgkyns, Ralat, Smith, Coover).

YV5RB, YV3RC, Caracas, Venezuela, 6150 kc. (Eder); daily 4-9 p.m. (Ryan).

YV4RH, Valencia, Venezuela (Moore); 5920 kc., signed at 12:40 a.m. (Fallon, Hendry). Slogan: "Radio Valencia."

YV4RD, Maracay, Venezuela, 6300 kc. (Eder); call changed (from veri). (Anca); 6520 kc., 8-10:30 p.m. (Lawton, Ralatt). Slogan: "La Voz de Aragua."

UV5RP, (YV5RQ), Caracas, Venezuela, 6270 kc., is off air temporarily. (Schrock); 9:30 a.m. (from veri). (Coover). Slogan: "La Voz de la Philco". Address: P. O. Box No. 508.

YV1RB, YV1RA (YV5RMO), Maracaibo, Venezuela, 5850 kc., signed at 10:10 p.m. with "Strike Up the Band!". (Alfred, Gledhill); call changed (from veri). (Anca, Eder, Shamleffer, Michaels). Slogan: "Ecos del Zulia".

YV3RC, YV5RD, Caracas, Venezuela, 6135 kc., 9-10 p.m., four gongs before announcements. (Alfred); call changed (from veri). (Anca); 6160 kc. (Hartzell, Ralat).

YV6RV, YV4RB, Valencia, Venezuela, 6520 kc., one gong before announcements, until 9:30 p.m. (Alfred); call changed (from veri). (Anca, Eder); starts 5:30 p.m. (Ralat, Michaels); three chimes before station call. (Randle). Slogan: "La Voz de Carabobo".

YV8RB, YV3RA, Barquisimeto, Venezuela, 5880 kc., 8-9 p.m. (Alfred); schedule—noon-1 p.m., 6-10 p.m. daily (Rudolph, Anca, Michaels). Slogan: "La Voz de Lara".

YV1RL, Maracaibo, Venezuela, 5930 kc. (Gallagher); 5900 kc., 8-9 p.m. (Oxrieder, Kentzel); daily 5-10 p.m. (Betances, Randle, Garzkowski). Slogan: "Radio Popular". Address: P. O. Box No. 247.

YV1RY, Venezuela, 6150 kc., signs at 10:15 p.m. (Schrock).

YV4RA, Venezuela. (Randle). Slogan: "La Voz de General Electric."

YV9RC, YV5RH, Venezuela, call changed (from veri). (Anca).

YV4RC, YV5RF, Caracas, Venezuela, 6375 kc., call changed (from veri). (Anca); 5:45 p.m. (Ralat). Slogan: "Ecos del Contie".

YV2RA, San Cristobal, Venezuela, call changed (from veri). (Anca, Michaels); 5710 kc., 750 watts, they want reports (letter from station to your Editor). Slogan: "La Voz de Tachira". Address: Apartado 37, San Cristobal, Venezuela.

YV1RG, Valera, Venezuela, 6230 kc. (from veri). (Herzog, Hodgkyns). Slogan: "Radio Valera".

YV5RG, Maracaibo, Venezuela, 6400 kc., Sunday 11:30 p.m. (Ralat).

YV7RMO, YV1RE, YV1RD, Venezuela, call changed (from veri). (Anca, Michaels).

YV15RV, Venezuela, 5910 kc., 5:40 p.m. (Gledhill).

YV1RI, Carro, Venezuela, 6320 kc., 8 p.m., late, experimental. (Labega, Shamleffer); 6210 kc. (from veri). (Betances). Slogan: "Radio Carro".

YV1AP, Maracaibo, Venezuela. (Beck).
YV11RB, YV6RB, Bolivar, Venezuela, 6545 kc., call changed (from veri). (Anca); 8 p.m. (Ralat). Slogan: "Ecos del Orinoco".

West Indies

H1N, Trujillo, Dominican Republic, 6240 kc., to 2 a.m., (Gallagher, Coover, Kidd, Eder), 9:30-10:15 p.m., (Moore, Randle), 12500 kc., Saturday 7-10:30 p.m., reports desired. (Gossett, Beck, Alfred, Gorzkowski, Williams). Slogan: "La Voz del Partido Dominicano"; "Radio Nacional".

H1A, Trujillo, Dominican Republic, 6480 kc., 11-12 p.m., (Gallagher), 6450 kc., (Schrock, Shamleffer), 3-15 j.m., (Ralat), wants reports. Slogan: "La Fa Doc en el Aire"; Address: P. O. Box 1312.

H1S, Santiago, Dominican Republic, 6420 kc., irreg. Around 10 p.m. calling amateurs. (Schrock), Sunday 5 a.m., (Hartzell).

H18Q, Trujillo City, Dominican Republic, 6206 kc. (Betances).

H12D, Trujillo City, Dominican Republic, 6900 kc., (from veri), (Alfred). Slogan: "La Voz de la Accion Catolica".

H1H, San Pedro de Macoris, 6796 kc., signed at 6:38 p.m., (Alfred, Eder), Slogan: "La voz del Higuanon".

H1T, Trujillo, Dominican Republic, 6630 kc. (Kidel), 7 p.m., (Coover).

H13U, Santiago de los Caballeros, Dominican Republic, 6015 kc., 5-15 p.m., (Ralat). Slogan: "La Voz de Comerces".

H11J, San Pedro de Macoris, Dominican Republic, 5850 kc., signed 1:45 a.m., (Gledhill, Eder).

H19B, Santiago de los Caballeros, Dominican Republic, 5885 kc., (Ralat), Slogan: "Broadcasting Hotel Mercedes".

H11A, Santiago, Dominican Republic, 6185 kc., Saturday 9:45 p.m., (Hartzell).

H14D, Trujillo, Dominican Republic, 6550 kc., Daily 11 a.m.-1 p.m., (Ryan, Ralat).

H15N, Moca, Dominican Republic, 6150 kc., (Betances).

Readers Who Are Awarded "Honorable Mention" For Their Work In Connection With This Month's Short-Wave Report

H. Ruppert, Howard G. Kemp, Elmer Duncan, Warren D'Orsay, H. Acosta y Lara, Dwight B. Jones, Virgil Gossett, James White, C. R. Devaraj, Clarence Hartzell, Kenneth Dressler, Spencer E. Lawton, Enrico Scala, Jr.; R. B. Oxrieder, A. Anca, Edward De Laet, Fred Atherton, Grace M. Beck, J. R. Hodgkyns, Harold E. Schrock, Robert L. Blanchard, Jr., J. J. Doyle, Jack Neal, W. G. Odenwalder, Norman Gertz, R. Jensen, P. L. Patrick, M. J. Markuson, Leo A. Wasnieski, Arlo Graham Greer, James Walsh, Jr., H. Mallet-Veale, W. Harman Kidd, Wells Gresham, R. Connell, John B. McGowan, Joseph Campbell, Joseph E. Soos, Joseph Rudolph, C. R. Wilson, Thos. F. Tynan, W. G. Odenwalder, R. F. Shamleffer, Erroll R. Birnie, Fletcher W. Hartman, George J. Munz, Donald Kay Becker, Manfred Johnson, Carl Watson, H. A. Robinson, Byron Silvius, Gilbert L. Harris, C. Mellanby, Owen Franklin Neel, William Ross, James Liddell, Howard W. Oliver, A. Kabatoff, Thomas Walczak, Albert Michaels, Thos. Randle, F. James Christie, Fr. Sisbert, Eric Gertenbach, J. Wendell Partner, Werner Howard, Arthur B. Coover, Inz. P. Pioroko, W. F. Herzog, Harry Lueth, G. Hampton Allison, Rudolph Kure, F. W. Dodge, Manuel Ortiz, R. T. Merkel, N. C. Smith, B. Kashimoto, Oscar Jaime, Jr., A. Shirley Brown, John Lindebert, Jr., Herman Ruppert, Herman H. Forester, J. Weiss, John J. Kernan, M. J. Markuson, William R. Goetz, William Buchanan, John Felluns, Li Chi Chiang, Irving Sporn, Wade Chambers, Harold W. Bower, Joe Novak, Ralph Dahm, Harry Lueth, Roy E. DeMent, Frank Sekach, Sydney Millen, Leon Stabler, Leslie Mott, Barry Sesma, Lionel White, E. M. O. Godee, Albert Michaels, Anton J. Cindel, E. W. Turner, Bob Sawada, Shokichi Yoshimura, Jorge Ralat, Thos. Elkes, Peyton Black, James E. Moore, Jr., Carl & Anne Eder, Roland J. Rattee, M. Nishimori, Olof Liljegren, Joseph A. Ryan, Jerry M. Hynek, B. F. Herman, H. Westman, Mike Kruger, G. C. Gallagher, Fred W. Alfred, Harrison Meliman, Gilbert L. Harris, Bob Snyder, Thomas P. Jordan, Clyde Criswell.

QRD?

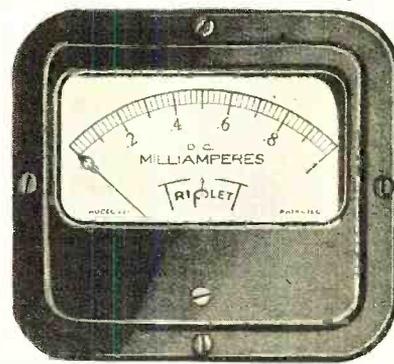
(Continued from page 747)

we cannot keep to ourselves, so we hope our readers will lend their indulgence: "Due to being to sea, I did not get my copy of RADIO NEWS, so when another operator got in touch with me by radio, he thought so much of the QRD column that he took 40 minutes to transmit the whole column, word for word. . . . Yes, you are right about being the first to let the world know about ARTA and to boost it along. . . . and I do hope you will continue to keep us posted on what is really going on there. . . . I have been away from the States since last September on a long voyage to the Orient and have been out of touch with affairs. I am surely sorry and depressed at how things are being run. I understand ARTA is out on strike on the East Coast, in direct violation of contracts signed with the shipowners. This just burns me up! A union's honor should be just as reliable as a trustworthy individual's and no contract should be broken! I can't blame shipowners if things have come to such a pass that a contract means nothing if the union wants to strike." And that is that, me hearties, so with this for a night-cap we sign off, ge . . . 73 . . . GY.

Tenth Birthday of A.C. Tubes

Newark, N. J.—At the Arcturus Tube plant they recently celebrated the tenth birthday of the original standard Base A.C. Tube which was developed by this company in February 1927. These first tubes, as old-timers will recall, were made in 6 standard 15 volt types.

Instruments by
TRIPLITT
A Guarantee of
Precision and
Reliability



The 4" Square . . . One of Triplitt's large line of electrical measuring instruments. Others available in two, three and five inch sizes and in all standard ranges. Economically priced.



TRIPLITT FACTORY—BLUFFTON, OHIO

The new Triplitt factory was designed especially for the manufacture of precision instruments. Every modern facility and the very latest equipment make it outstanding.

The factory has daylight construction, it is air-conditioned throughout, with temperature and humidity controlled. Especial measures have been taken to keep out dust, lint and microscopic particles . . . the enemies of precision.

The latest equipment makes possible the most modern processes for ageing, relieving strains and stresses of materials and making the fine adjustments in assembly necessary for producing precision instruments. With this background it is easy to understand that "Instruments by Triplitt" . . . is a guarantee of precision and reliability.

WRITE FOR CATALOG



The Triplitt Electrical Instrument Co.
156 Harmon Ave., Bluffton, Ohio

Please send me more complete information on . . . Triplitt 4" Square Instruments.

. . . I am interested in . . .

Name

Address

City State



A NEW
**BEGINNER'S
RIG**
USING
**STANCOR
TRANSFORMERS**

● A 40 watt transmitter for c.w. operation that can be built for less than \$40.00 . . . including tubes, crystal and meter. Crystal control . . . capacitive coupled . . . only 2 tuned circuits using the new 6L6G and the new Taylor T20. . . It's one of the simplest and most dependable beginner's rigs ever designed.

FREE
Schematic Drawings on Request

**STANDARD
TRANSFORMER
CORPORATION**

850 Blackhawk Street Chicago

SUCCESSFUL SERVICING

For Professional Servicemen
Men looking toward the future, realize the importance of technical training, in understanding the problems that new, intricate equipment presents. RSI advanced home-study training in Radio Service and Public Address work is the "Key" to Successful Servicing.

Study At Home—As Low As \$5 Mo.
RSI gives you latest instruction on what goes into modern receivers, and basic knowledge of how complex circuits work. It familiarizes you with various types of vacuum tubes and how they operate . . . it helps you progress from the "mechanic" stage to that of an expert specialist.



**WRITE TODAY FOR
FREE BOOK**

RADIO SERVICE INSTITUTE

Dept. RN6--3308 14th St., N. W.--Wash., D. C.

CARRY YOUR TESTER— IN YOUR POCKET

The new, pocket-size multimeter is convenient to carry, simple to operate and has many features never before available.

MEASURES—Microamperes—Milliamperes—Ampere in 5 ranges.

VOLTS—0/5/50/500/1000 Four Ranges.

SENSITIVITY—2000 ohms per volt.

OHMMETER—0/500—center of scale is 6 ohms—permits accurate readings down to several hundredths of an ohm. Current drain of only several milliamperes.

OHMMETER—0/50,000/1,000,000 ohms with large division spacing. Available in complete or in "Build Your Own" Kit Form.

Price—Quality—Appearance—Astounding

Write for free bulletin 408 and see for yourself.

Dept. N-5 **RADIO CITY PRODUCTS CO.**

88 PARK PLACE, NEW YORK CITY

ELECTRICAL ENGINEERING

For those who can't afford the time and expense of a 4-year college course, Bliss offers a condensed **ONE YEAR** residence training, combining essential Theory and Practice. 45th year. **CATALOG ON REQUEST!**

**BLISS ELECTRICAL
SCHOOL**
1476 Takoma Ave., Washington, D. C.

The DX Corner (Broadcast Band)

(Continued from page 738)

AUSTRALIAN CHANGES

Observer Hunt lists the following recent changes and additions in the Australian station list. Two new stations have been announced—2BS, Bathurst Broadcasting Ltd., Keppell Street, Bathurst, N. S. W., 1500 kc., 100 watts and 2MZ, Northern Broadcasting Ltd., Inverell, N. S. W., 1170 kc., 2 kw. This latter station replaces 2LB. 3LR is the new call for the former 3WR on 1260 kc. 4TO, Townsville, has been changed from 1170 to 1160 kc.

A GOOD SUGGESTION

Observer Atkins suggests that observers write to stations that have been putting on DX tips broadcasts this season, thanking them for their cooperation. This is one of the surest ways of inducing stations to take up such activities again next season. It is a particularly important move because from all reports many stations that have been broadcasting DX tips have not been receiving the response of previous years due to the relatively unfavorable DX conditions that have existed throughout this season. Observer Atkins gives the names of executives of three stations that have been putting on regular weekly broadcasts, for the convenience of those who may wish to write to them. They are as follows:

Mr. Ray Appleby, Radio Station KEHE, 2nd and Vermont Avenue, Los Angeles, Calif.

Mr. Emmett Moore, Radio Station KFVD, Wilshire and Mariposa, Los Angeles, Calif.

Mr. H. W. Cole, Radio Station KGER, P.O. Box 5340, Los Angeles, Calif.

ONE FOR THE LOG

Observer Truax reports the following: WFOY, 1210 kc., 100 watts, St. Augustine, Florida, will dedicate a special program to RADIO NEWS observers on May 7, 1 to 3 a.m., E.S.T. This is a new station and this broadcast will therefore, be welcomed by most DX'ers.

OBSERVER CLANCY EARNS AWARD

In connection with the RADIO NEWS special put on by WJBO on the morning of February 7, Chief Engineer Golson reports that the one-year subscription to RADIO NEWS which was offered to the most distant listeners reporting this broadcast goes to Observer Clancy of Lethbridge, Alberta, Canada.

It is a pleasure to make this award to Observer Clancy.

An interesting side light on this broadcast is found in the following quotation from the letter received from Chief Engineer Golson: "The special veri cards gave out due to the great number of listeners-in and we had to have more printed which delayed the mailing of the veri's but all cards and letters are or will be answered post paid by this station and RNLPO."

WITH THE CLUBS

New Zealand DX Radio Association

"Do you want dope hot from the press on radio stations down under in Australia and New Zealand? You can get it direct in the Quarterly Call Book issued by the NZDXRA for 25c per copy. This



40 VERI'S OVER 3500 MILES

Mrs. E. Salt, Christchurch, N. Z., has established an enviable record as a broadcast band DX'er by logging and verifying more than 40 stations 3500 or more miles distant.

call book gives full operating schedules of all N. Z. and Australian stations, both BB and SW. Also, a bulletin is issued monthly by the association which lists all changes which occur in between issues of the call book. This bulletin service costs 25c a year and U. S. A. stamps are accepted as payment. Bulletin subscriptions are available only to members of our association but any interested DX'er may obtain a life membership for 65c."

ERIC W. WATSON,
Headquarters Secretary,
37 Chancellor Street,
Christchurch, N1, New Zealand.

Universal DX Club

"This is a non-profit-making organization, membership in which is open to DX'ers with dues of \$1.00 per year. All members receive the club bulletins which are issued twice a month from September 1 to June 1 and monthly during June, July and August. Each bulletin consists of seven pages full of information useful to the DX'er, whether he be a novice or an expert. For further information, address: Universal DX Club, 345 Maple Avenue, Oradell, N. J."

H. HAWKINS,
Publicity Manager.

National Radio Club

The officers of the National Radio Club cordially invite readers of RADIO NEWS to become members of this thriving DX organization. The club issues a 6-page weekly bulletin alive with DX tips, SW information, etc., from September 1 to May 1, and monthly during the summer. There is no initiation fee and membership dues are \$1.25 per year. For further information, address: R. L. Weaver, President, 603 Market Street, York, Pa.

G. L. BRODE, SR.,
Assistant Publicity Director.

NOTES FROM READERS

Observer Tomlinson (Port Chester, N. Y.): "March 11, 12 and 21 the T.A.'s broke through for the first time since early January. Spring reception of T.P.'s absent except for one morning so far. Even the S.A.'s are spotty but some new ones identified are Radio Cartagena, 1400 kc., announced as HJ1ABC—HJ1ABR at 2 a.m. and asked for reports; HJ3ABX on 1050 kc. heard at 8:30 p.m. Others heard are CX28, 1090 kc.; LR6, 870 kc.; LR5, 830 kc.; LS4, 870 kc.; LS2, 1190 kc. and LRI, 1070 kc.—all heard between 8:30 and 10:30 p.m."

Observer Lonis (Hannibal, N. Y.): "I get a kick out of seeing pictures of observers in the DX Corner and would like to see more of them, also more reproductions of foreign verification cards. On Sunday, March 7, the

T. P.'s came in quite strong here. (His list is included with others in the T.P. list shown elsewhere in this department.—Ed.)

Observer Birnie (Newark, N. J.): "Following are some station schedules which have come to my attention: XEAA, 920 kc., Mexicali, B.C., daily 11 a.m.-11 p.m., announces in English at 2, 3, 8 and 10 p.m., E.S.T. KLAH, 1210 kc., DX program first Tuesday each month at 5 a.m., E.S.T. CMCD, 950 kc., Havana, 1-3 a.m., E.S.T., every Sunday. CMBN, 1070 kc., Havana, 2-3 a.m., E.S.T., every Sunday."

Observer Routsahn (York, Pa.): "T.A. reception practically nil now. T.P. reception improving rapidly and heard best after 4:30 a.m. S.A.'s still coming through with LR1 bust and LR4 also good sometimes. Reception from the west coast has been very good at times this year. The latest U. S. stations to take the air are KROY, 1210 kc.; KVG B, 1370 kc.; KRMC, 1310 kc. and WAIR, 1250 kc."

Observer Black (Pittston, Pa.): "March 18 I heard a Colombian station on 960 kc. at 6:30 p.m. Three chimes were heard followed by 'Estacion HJ1—Colombia.' It was very weak with deep fading. I would appreciate any information on this station. It was not YVIRC. The night of March 17 was a freak night for the Cubans and S.A.'s. No less than 27 Cubans and 5 S.A. stations were heard between 6 and 10 p.m. CMCI, 1110 kc. has an English program every night, 11-1:30 a.m. This station now uses 1000 watts and will verify all correct reports."

Observer Quintrell (Seat Pleasant, Md.): "WDAY, 940 kc., Fargo, N. D., has a DX program the third Wednesday of each month, 12:30 a.m., E.S.T. These are novel programs which will interest DX'ers and the station will verify if return postage is included with reports. Senor E. Parro, chief engineer of XEP, states that their's is the only high-fidelity transmitter in his part of the country. The power is 500 watts. KGIW, 1420 kc., puts on regular DX programs each Tuesday, Thursday and Saturday mornings starting at 2 a.m., E.S.T."

Observer Rebensdorf (Harvard, Ill.): "Have not been DX'ing much this season. Lacking light lines. I have always used an automobile radio set for DX work and have found it rat or discouraging. It was rumored that light lines would be brought into this area this season in which case I had hoped to get a new and better receiver but the light lines failed to materialize. Recently, after joining the UDXC, became interested in some of their contests and am now losing as much sleep as during other seasons. Heard a few T.P.'s during March, including KHBC, 1YA, 2NR and KGU."

Observer Truax (Aurora, Ill.): "XEFO, 940 kc., broadcasts an English program daily, 11 p.m.-1 a.m., E.S.T. Static has been terrific here—a regular summer level. On the whole I believe this season has been the noisiest in my experience."

Observer Meade (Kansas City, Mo.): "We do not seem to have any luck with the T.A.'s and T.P.'s but have added 60 American, Canadian, Mexican, Cuban and Porto Rican stations to the log since Christmas. I am going to try to organize the DX'ers of Kansas City into a club and if successful, will probably affiliate with some national club. We are moving to a new and less noisy location and hope to install a 100-foot vertical cage antenna for broadcast reception. A friend is getting wonderful results with such an aerial."

Observers Anne and Carl Eder (Willmar, Minn.): "KRMC, 1310 kc., Jamestown, N. D., new station heard testing and verified report. KVG B, 1370 kc., Great Bend, Kansas, heard testing equipment. WNEL, 1290 kc., San Juan, P. R., heard on frequency check Friday morning March 12 at 3:30-3:50 a. m. (Some frequency check lists show this station schedule for Saturday.) KFND, 1200 kc., Nampa, Idaho, dedicated their March frequency check to Radio News, and a card of thanks was mailed to them."

Observer Clark (Merced, Calif.): "XEC, Tijuana, B.C., replaces NEFL on 1150 kc., the latter station having been deleted. XEC signs off about 1:30 a.m. They play many American recordings and will verify correct reports. KVL of Seattle, Wash. has changed its call letters to KEEN."

Observer Atkins (Los Angeles, Calif.): "KFI will be on the air all night during the next Trans-Pacific flight of Miss Earhart. The KEHP tips broadcasts will be discontinued about May 1 but the KGER and KFVD tips will stay on at least until June and may continue all summer with short-wave news."

Observer Hesterman (Saskatoon, Sask.): "The Mexicans seem to have partaken of a heaving load of 'Jumping Beans' as some of them seem to show up on different frequencies two or three times a month, popping up like rabbits out of a conjurer's hat. The old Westinghouse model 124 receiver which I have been using for years is about to become a stand-by receiver as I am acquiring one of the new Westinghouse 15-tube models. I expect great things from it as it has many of

the important new refinements including iron-core r.f. transformers, air-tuned i.f.'s, etc."

Observer Law (Edmonton, Alberta): "I have found this season to be the worst in the past three years so far as atmospheric static is concerned but in spite of this have been able to increase the log by some 245 stations including many 100 watters at distances up to 2500 miles. Strange as it may seem, the high-powered Mexican stations have hindered reception a great deal way up here in Alberta and I hope that the Canadian-U. S.-Mexican conference scheduled for June will help to clear up the situation."

Which Way Does Current Flow?

"So goes the electron—so goes the current" is the title of an article in the *Radio Engineer*, a magazine published by the Commercial Radio Equipment Co. of Kansas City. The trouble all started with Benjamin Franklin who "guessed" which way electric currents flow and adapted the wrong direction: from positive to negative. Since then, we have found out that electrons flow from the cathode to the plate of a tube and continue on their way in a direction opposite to our old notions. It is about time we drop the old convention and stick to the electron theory which says that current flows from the negative to the positive terminal of the generator.

The confusion due to the two conventions once nearly made your Technical Editor miss getting a job with the Western Electric Co. just because the interviewing W. E. engineer did not seem acquainted with the electron theory.

The John Scott Awards

Philadelphia, Pa.—The City Trusts of the City of Philadelphia granted the 1937 John Scott Awards to Dr. W. D. Coolidge and Mr. Irving Langmuir, director and associate director of the G.E. Research Laboratory and to Dr. E. A. Graham of the School of Medicine of Washington University at St. Louis. With each award went a certificate, a copper medal and \$1000 in cash. The award to Dr. Coolidge was based on his application of a new principle in X-ray tubes; to Dr. Langmuir for his physical and chemical discoveries resulting in improved gas-filled incandescent lamps; and to Dr. Graham for his application of the X-ray to the study and diagnosis of gall bladder conditions.

Now It's a Salt-Shaker

New York, N. Y.—A new dynamic microphone, nicknamed the "salt-shaker," has been developed by the Bell Telephone Laboratories. It is a light-weight microphone which can be changed from a directional to a non-directional type by the removal of a close fitting disk-ring which serves as a directional baffle.

WBZ Applies for 500 Kw.

Boston, Mass.—Radio Station WBZ, the Boston outlet of the NBC blue network, and owned by Westinghouse, has filed application with the F.C.C. for an increase in power from 50 kw. to 500 kw. At the same time, the station plans to remove the transmitter from Illis, Mass., to Provincetown, Mass., at the eastern tip of Cape Cod, and to employ a new directional antenna.

5T4

New York, N. Y.—A new metal full-wave rectifier tube, the 5T4, has been released by RCA. This tube is the metal equivalent of the 5Z3. The filament requires 5 volts at 2 amperes. The maximum a.c. volts per plate is 450 volts (r.m.s.), while the maximum output current is 250 ma. These values are for circuits employing condenser-input filters.

Why

DO INCREASING THOUSANDS OF DEALERS Pay Cash FOR RAYTHEON TUBES?



Because thousands of dealers know that (1) RAYTHEON is the tube with great consumer acceptance and fair list prices that insure faster turnover . . . (2) RAYTHEON is the tube that is not sold at cut prices, insuring full profit . . . (3) RAYTHEON is the tube that needs no apologies or explanation, due to its long established quality.

These facts are the reasons why increasing thousands are finding RAYTHEON the safest and most profitable cash tube investment.

ASK YOUR JOBBER

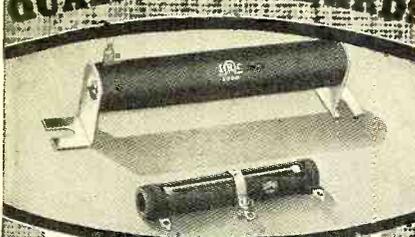


RAYTHEON PRODUCTION CORPORATION

420 Lexington Ave. New York, N. Y.	55 Chapel Street Newton, Mass.
445 Lake Shore Drive Chicago, Illinois	555 Howard Street San Francisco, Cal.
415 Peachtree St., N. E. Atlanta, Ga.	

RAYTHEON IS THE MOST COMPLETE LINE—ALL TYPES OF GLASS, OCTAL BASE, METAL, RESISTANCE AND AMATEUR TRANSMITTER TUBES.

Setting New
QUALITY STANDARDS



IRC Cement Coated Power Wire Wound Resistors have **PROVED** their superiority in **EVERY** mechanical and electrical characteristic. In addition to universal acceptance in Radio, hundreds of the largest industrial users specify them exclusively.

NOTE THE FEATURES
Moisture-proof Longer Life
Lower Surface Temperatures
No Chipping or Breakage
Greater Load Capacity

International Resistance Co.
401 N. Broad St., Phila., Pa.



CEMENT-COATED
WIRE WOUNDS

MILLION TUBE TESTER



FEATURES

1. Emission
2. Metal Tubes
3. Shorts Hot
4. Leakage Hot
5. Resistance
6. Electrolytics
7. By-Pass Condensers
8. Neon Alignment

MODEL CN
\$9.95
NET

Here's what the Service Men say about the New Million Tube Tester! "Most valuable purchase of test equipment we made during the last year." "It shows up weak tubes better than my expensive _____ tester."

If your jobber cannot supply you—order direct—20% deposit required on C. O. D. orders. Tear out this ad and send it to us **NOW** for complete information on the entire Million line.

MILLION RADIO AND TELEVISION LABORATORIES
363 W. SUPERIOR ST., CHICAGO, ILL.

AMAZINGLY EASY WAY
to Get Training in
ELECTRICITY

MANY \$30-\$40-\$50 A WEEK EARN

Learn by doing in Coyne Shops in 90 days on actual equipment. Get New Low Cost Room and Board Plan... Part-time Employment Service... Lifetime employment service after graduation. You don't need advanced schooling or previous experience. ALL details in my New Free Book. Send the coupon TODAY.

COYNE ELECTRICAL SCHOOL

H. C. LEWIS, President,
500 S. Paulina Street, Dept. A7-82, Chicago, Ill.
Send Big FREE Book on how I can get Practical Training in Electricity.

Name..... Age.....
Address.....
City..... State.....



BE CERTAIN THAT YOU'RE GETTING THE MOST OUT OF YOUR RADIO... CALL US TO INSPECT IT ONCE EVERY SIX MONTHS... WE GUARANTEE ALL WORK...

We Recommend NATIONAL UNION RADIO TUBES for BEST RADIO PERFORMANCE



... Call us in to inspect your radio and tune it up. We guarantee our work on all make sets. Low charges, quality workmanship.

We Recommend NATIONAL UNION RADIO TUBES for BEST RADIO PERFORMANCE

FIGURE 4
The blotter is about the best of the semi-permanent sales messages. These are two of a series prepared for the serviceman by National Union.

THE SERVICE BENCH

(Continued from page 742)
Norman less than \$50.00! Despite this low cost, all essential equipment is on hand. We offer this layout as an encouragement to the prospective serviceman who is appalled at the high cost of getting started. The man who is a good enough technician to service radios can, if forced by economy, do wonders with a milliammeter and a handful of resistors!

THE DAY'S WORK

Edward Scribner, of Schoharie, N. Y., sends the following notes on eliminating noise in 1937—

Ford Auto Radios

"Motor noise is a familiar complaint with these installations. The following routine will usually clear up the difficulty: 1—Try changing the generator condenser from one side of the cut-out to the other. 2—Sometimes it is better to eliminate the condenser supplied to be connected across the ignition switch to the dash. 3—Move the transmission-line antenna lead to various positions at the left of the car near the brake. You will generally find that there is some inductive pickup that can be eliminated. The line usually works best when tucked up as far as possible near the motor wall. 4—A condenser grounded to the speedometer and connected to either side of the resistor or fuse sometimes helps. 5—Inspect the ground on the oil pressure unit in the motor block. 6—A grating noise like a loose connection can usually be traced to faulty condensers on the oil and gas indicators, located respectively on the motor and on the gas tank. The condenser supplied by Ford for the gas tank is only .05 mfd. A .5 mfd capacity may be needed, especially when using fish-pole aerial, such as the Tobe Auto-Pole, mounted on the rear bumper. 7—Condensers from the oil and gas indicating instruments to ground are often beneficial. 8—If a buggy whip aerial is employed, shield the aerial side of the antenna filter (Phantom Filter with Arvin) through the door jam. This prevents pick-up inside the metal car. 9—If a transmission line is used, lengthen this if necessary (if the manufacturer says that so doing will not affect reception) so that the antenna transformer can be located as closely as possible to the aerial. Arvin says you can lengthen their transmission lines. 10—Make sure that the aerial transformers are perfectly grounded. If a long transmission line is employed the shield should be grounded at the middle to the frame of the car. 11—Balance the radio-frequency and detector circuits for the antenna used. This usually improves reception 75 percent." Thank you, Mr. Scribner!

An Improved Scriber

"A scriber of some kind is an absolute necessity when metal panels or chassis are being laid out. However, many experi-

menters do not have this tool. Figure 1 shows how the author improvised a scriber from an old mechanical pencil and a steel phonograph needle. If the needle is too large for the lead channel, a large sewing needle, or a small nail, will serve equally well—though the steel phonograph needles designed for soft playing will usually fit

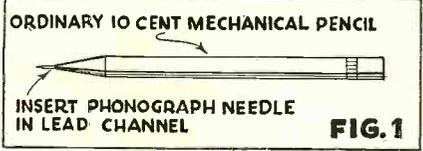


FIGURE 1
A handy scriber with a renewable point.

okay. This scriber has the advantage that, when the point becomes dulled, it is only necessary to replace it with a new one."—Harry D. Hooten, Beech Hill, West Va.

5Z3 Replacements

George Boy, of George's Radio Service, New York City, comments on J. O. Roberts' suggestion, in this department for March, that 5Z3s be replaced with 5W4s or 5Z4s. Mr. Boy's preference is the 5Y3G for replacement on grounds of convenience.

Majestic Models 90, 91, 92, 100

"An ordinary 600-watt screw-in type of heater element can be used as a temporary substitute for the ballast resistor found in the above mentioned receivers. Such a heater can be purchased at most electrical stores for 35 cents. A regular house lighting socket is used for mounting the heating unit, which is connected in series with the receiver power supply. The writer uses this for shop testing of these receivers, thus eliminating the necessity of dismantling the regular ballast when removing the chassis from the cabinet.

Majestic Models 50, 51, 52

"When the receiver is inoperative, with no voltage on the plate of the second detector, and the other plate voltages low, the cause is usually a shorted 1. mfd condenser which connects from the junction of the audio-frequency transformer primary and the 25,000-ohm voltage dropping resistor. When this condition is found, replace the above-mentioned resistor as well as the condenser, since the resistor is often damaged by the excessive current flowing through it following the failure of the condenser. It should be replaced even though it may test okay on an ohmmeter.

"When the receiver is inoperative on the lower frequencies, check for shorting of the variable condenser plates on the oscillator section. The spacing is very close on these models."—Howard J. Shurby, North Canton, Ohio.

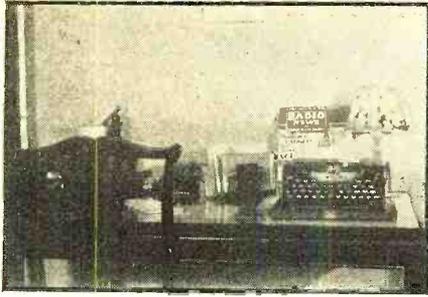


FIGURE 2

The service office of a Pennsylvania serviceman which keeps the records out of the soldering paste.

THE SERVICE DESK

A service desk is just as important as a service bench. Without the former, the latter cannot be utilized to its full efficiency. By "service desk" we mean a place quite apart from the shop, where notes and records are kept, bills prepared, letters written. This idea is adequately exemplified in the photograph of Figure 2 which shows the "commercial department" of Ralph Mellon's service business in Pottstown, Pa. We should have recognized the photo as worth publishing, even if Mr. Mellon hadn't propped up the copy of RADIO NEWS behind the typewriter!

Business Reply Envelopes

The business reply envelope—which costs the mailer nothing—has been widely employed in almost every field of business except radio servicing. However, it is just as effective in building up a service clientele according to George A. Popdavid, Canton, Ohio, who leaves several of the envelopes shown in Figure 3—one for the customer himself and a few spares for friends. As Mr. Popdavid correctly reasons, "Because the envelope costs nothing to mail, the first moment trouble shows in the radio, it goes into the letter box." Our editorial preference would be for a business reply card—rather than envelope. This will make things still easier for the customer (a little oil of this sort works



FIGURE 3

Making it easy for the customer is always a sound sales psychology. This business reply envelope helps.

marvels!), particularly in the back is printed as follows—

Kindly call to examine my radio at
 (Please state date and time) or at your earliest convenience (cross out if you have preference as to time).
 Name
 Address
 RUSH () (Check here if urgent.)

The manufacturers are continuing their consistent effort to boost service sales. National Union has just released a series of—

Radio Star Blotters

We show two of these in Figure 4. There are twelve in all, each carrying the picture

of a different star and a different sales message. These blotters can be obtained from your jobber with your own imprint at a very moderate cost. By mailing one blotter at a time, every two weeks, you will keep your name and business before the eyes of the recipients every day for at least one full year!

Spot Announcements

RCA has prepared a series of thirteen spot announcements, each lasting fifty seconds, on a single record which can be obtained through RCA Radiotron wholesale distributors. Ten seconds—in a one minute broadcast—is left for a local announcement of the radio serviceman's name and address. The "spots" are enacted by professional talent of the highest order and dramatize common radio troubles, and suggesting that the best solution is to call upon a local dealer or serviceman. This record is a bet that should not be overlooked by a serviceman operating in an area covered by a favorite small or medium powered broadcasting station.

SERVICEMEN'S BOOK REVIEW

Modern Radio Servicing, A. A. Ghirardi, Radio Technical and Publishing Co., 45 Astor Place, N. Y. C. 1300 pages, 706 illustrations, \$4.00. This book is a liberal education in radio servicing, and should be on the book-shelf of every serviceman, regardless of experience and training. To the lad in the early stages of the game, it will be of constant aid—and to the old timer, it is exactly what he needs for an occasional brushing up. To both old and new timer it will always be a valuable reference work. Read in conjunction with a good radio text, such as Hennev's Principles of Radio, it provides a real home-study course in radio servicing. It is also highly to be recommended as supplementary reading to any more formal method of study.

The Radio Beginner

(Continued from page 737)

erated on the curved portion of its characteristic; that is, as a detector. This is why the name "first detector" is often applied to the mixer. Any of the usual detector circuits can be employed.

Coupling the Mixer and Oscillator

It is necessary to apply the signal of the oscillator and the incoming signal to the grid of the mixer tube. Both of these signals are supplied by tuned circuits and so we have the problem of coupling the two circuits without making the tuning of one circuit affect the tuning of the other. Figure 3 shows the simplest arrangement, which used to be employed. The coils of the tuned circuits are in inductive relation. There is considerable interaction between the circuits if this arrangement is used and it has therefore been abandoned. The next improvement was to make the coupling less and therefore the interaction less by placing a small coupling coil in the cathode lead of the mixer and coupling this to the oscillator; or, there might be a small condenser between the oscillator plate and the mixer grid. There are, however, more improved ways.

Electron Coupling

When a multi-element tube is used as mixer, the incoming signal can be applied to the control grid and the oscillator to some other element such as the screen or

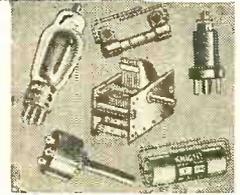


156 Pages of Interest For Every Serviceman, Dealer, Amateur & Builder

Send for this new Spring 1937 ALLIED Radio Catalog—it's packed with Everything in Radio at lowest prices! 10,000 exact duplicate and replacement parts; 53 new Knight Radios; Amateur transmitting and Receiving gear; Set-Builders' kits; Test instruments; Public Address; books, tools, etc.—Radio's Complete Supply Guide!

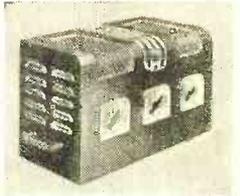
OVER 10,000 PARTS

ALLIED's new Catalog includes more than 10,000 exact duplicate and replacement parts for repairing or building any circuit. SERVICEMEN: Make ALLIED your "Silent Partner"—your headquarters for standard and special radio equipment. RADIO BUILDERS: Write for Free Parts Lists for building any circuit described in any radio publication—see pages 123-4-5 of the new ALLIED Catalog for the latest Build-Your-Own kits!



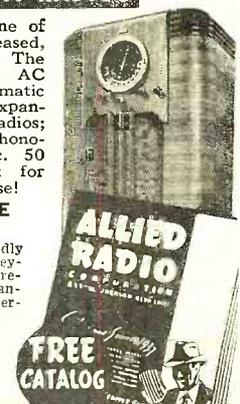
NEW SOUND SYSTEM

See the newly designed Knight Sound Systems—8 to 60 watts—permanent, portable and mobile. for 110 volt, 6 volt, and universal operation. Featuring the exclusive "Calibrated Output Indicator", higher fidelity, greater dependability, and beautiful new cases—at new low prices. Here are tremendous money-saving, profit-making opportunities!



50 NEW KNIGHT RADIOS

The famous Knight line of Radios has been increased, improved, and refined: The sensational 11 Tube AC Superhet with Automatic Dialing, AFC, Tone Expansion, etc.; new plastic radios; portable battery sets; phonoradio combinations, etc. 50 great models—a set for every purse and purpose! **FASTEST SERVICE LOWEST PRICES** You'll like our fast, friendly service and our low, money-saving prices. Our vast resources, our modern merchandising methods, our super-efficient shipping department, enable us to bring you Radio's Greatest Values! Fill all your needs from the new ALLIED Catalog—send coupon today!



ALLIED RADIO Corp.

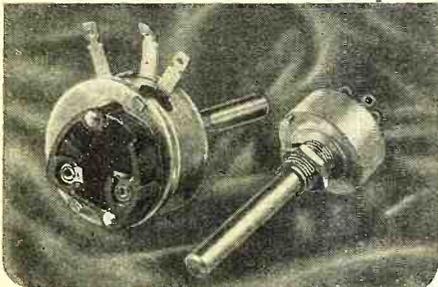
833 W. Jackson Blvd., Dept. 1-F
 Chicago, Ill.

Send me your NEW Spring 1937 Catalog.
 Send me parts lists for
 Name
 Address
 City State

Utah

Velvet ACTION

VOLUME CONTROLS



SIMPLIFY REPLACEMENT SERVICE

It's EASY to get parts that give complete satisfaction with less expense and installation labor. Just say "UTAH" to your jobber! Write department RN6 for catalog.

- Vitreous Enamel, Carbon and Wire-wound Fixed Resistances • Variable Resistances • Push-button, Tap and Jack Switches • Jacks and Plugs

CARTER DIVISION

UTAH RADIO PRODUCT CO.

CHICAGO, U. S. A.

TORONTO Ontario, Canada
BUENOS AIRES (Ucoa Radio Products Co.)
5 YEARS OF LEADERSHIP

FREE BOOK of Opportunity

Instructive facts about



TELEVISION

RADIO

SOUND RECORDING

Complete, practical instruction. Earn room and board while learning. Coach railroad fare allowed to Los Angeles.

NATIONAL SCHOOLS

National Schools, Dept. 6-RN,
4000 So. Figueroa St., Los Angeles, Calif.

NAME..... AGE.....
ADDRESS.....
CITY..... STATE.....

CRYSTAL HEAD PHONES

SOUND CELL MICROPHONES

Information on request

THE BRUSH DEVELOPMENT CO.
3311 PERKINS AVE. - CLEVELAND, OHIO

HEADSETS

Choose the world-famous Trimm Featherweight

TRIMM RADIO MFG. CO.

1770 BERTEAU AVENUE, CHICAGO, ILL.

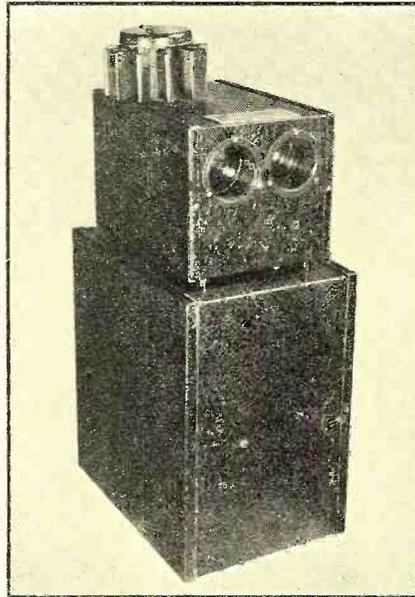
WHAT'S NEW IN RADIO

WILLIAM C. DORF

(Continued from page 713)

New Self-Contained Phototube Relay

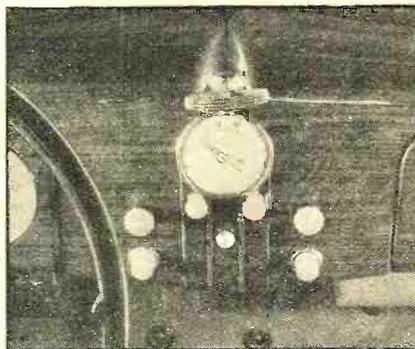
The Teletouch Corporation has just introduced a new phototube relay with a built-in power supply. No separately-mounted light source is required as it



utilizes the light reflected from a passing object. It is merely necessary to plug it in the usual power outlet and aim in the desired direction. Passing objects can cause either a bell to ring or any other electrical operations to be performed.

1937 Ford Car Radio

The accompanying photograph shows the instrument radio control panel of the new 6-tube Ford automobile receiver. The large illuminated tuning dial matches the other instruments on the dash. The chassis is mounted underneath the dash, the in-

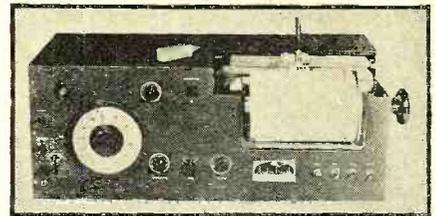


visible "ear-line" speaker is located above the windshield so that the sound is distributed to the occupants of the rear seat as well as to those in front.

An Automatic Recorder for A. F. Characteristics

A self-contained a.c. operated instrument for producing automatically a graphic record of the audio-frequency characteristics of a radio receiver, an a.f. amplifier, loud-speaker, transformers, microphone or audio pick-up device has recently been developed by the Tobe Deutschmann Corporation.

This new instrument, known as the "Audi-O-Graph," comprises a beat-frequency oscil-

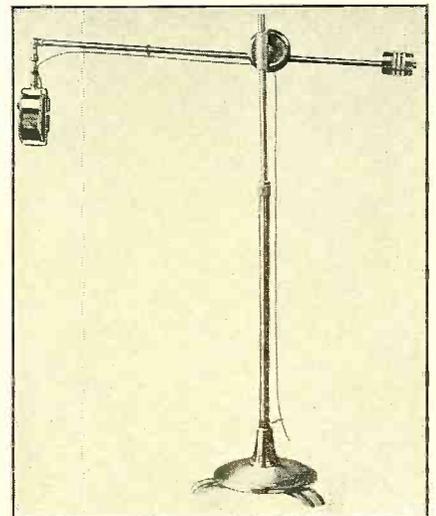


lator, a 1000-cycle r.f. oscillator, a calibrated standard crystal microphone and a means of connecting the input of the recorder to any portion of the audio system under test if the microphone is not used, a suitable audio-frequency amplifier to insure ample voltage, a motor-actuated dynamically controlled pen, a recording chart holder directly connected to the control shaft of the beat-frequency oscillator employed for generating audio-frequencies, and record charts calibrated in cycles per second vs. decibels.

Because of the practical manner in which the "Audi-O-Graph" has been designed to quickly produce permanent and accurate records of audio-frequency characteristics under both laboratory and field conditions, it should be a valuable tool for the manufacturer who must have accurate information about the performance of his product.

Of Special Interest to Studios

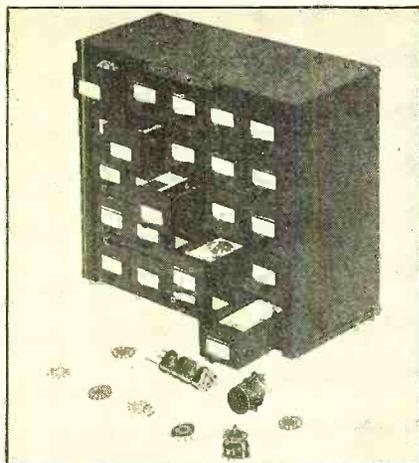
With a slight pressure of the hand, the new Amperite microphone boom stand can be silently adjusted to a vertical or horizontal position. This means the microphone can be placed easily and quickly and in any desired position, without any noise. For horizontal adjustment a special ball clutch is used and for vertical operation a friction



clutch is utilized. A stand of this type would be especially useful where microphones have to be placed in unusual positions. It can be had in chrome or gun-metal finish.

Something New in Kits

The Central Radio Laboratories, manufacturers of the popular Centralab radio components, have found that switch requirements vary so greatly that it is virtually impossible for a jobber to maintain a complete stock of assembled switches and they are therefore making selector switches for the trade in knocked-down form. The illustration shows their new "switchkit," a 25 drawer, steel cabinet containing sufficient parts to assemble 35 switches. The



assortment of parts included, however, is sufficient to assembly 161,700 different types of switches. The cabinet, made of heavy sheet steel, measures 9¼ by 17¾ by 19 inches.

Phonograph Pick-ups

The Audak Company introduces two new "Micromatic" pick-ups, models AT21 and AT26, for 12- and 18-inch records, respectively. The manufacturer advises that not only do these new units provide a wide-range response, but are designed to have a



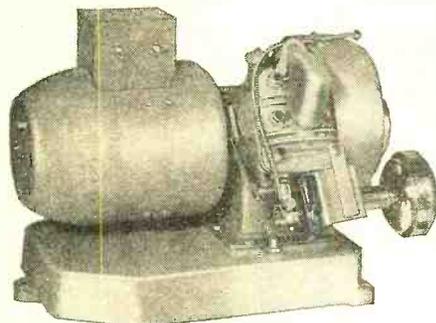
smooth and rising characteristic at the low end, beginning at 300 cycles and gradually increasing to 10 db. at 70 cycles, compensating for the attenuation in recording at



the low end. Above 300 cycles they are said to be substantially flat.

Home-Made Electricity for the Rural Home

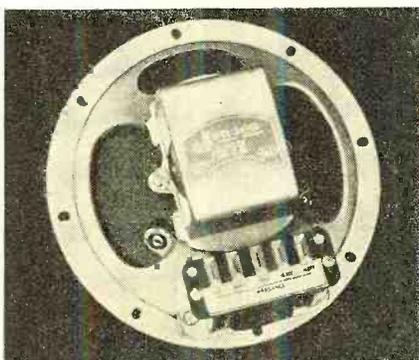
The Pioneer Gen-E-Motor Corp. announces their new "Red Top Gas-O-Lectric" combination a.c.-d.c. power plant. This all-purpose power unit not only pro-



vides power for lighting, and operating radio sets and electrical appliances, but in addition it can keep storage batteries fully charged. The specifications show that these new power plants are available as follows: 110 volt a.c.; 300 watts and 6, 12, or 32 volt d.c. up to 325 watts for battery charging. The generator is mounted solidly on the crank case of the engine. Additional advances include: an automatic push-button starter with auxiliary rope-pull starter for use when the battery is dead. Remote control and also filter and ignition

shielding for radio operation are also available.

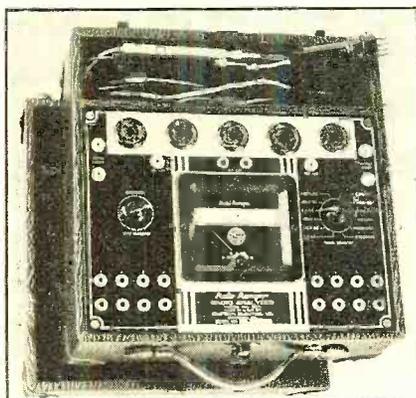
New Reproducer Features Universal Input Transformer



The Jensen Radio Mfg. Co. announces a new series of loudspeakers equipped with an adjustable impedance matching transformer. Two types are available, one to match the conventional plate impedance values and the other unit designed to match line to speaker. Connection to the various impedance taps can be made easily and quickly by a flexible lead and pin jack. This new universal transformer is also available without speaker.

New Analyzer Announced

A radio analyzer with a meter having a rotating scale mechanism was recently announced by the Simpson Electric Com-



pany. This new development simplifies and expedites testing, since only the meter range desired appears on the dial. The mechanism is so designed that when the selector switch is moved to the twelve positions marked, the proper scale comes into view for the circuit cut in. A greater degree of flexibility, convenience and accuracy in scale reading is thus secured.

Non-Spill Utility Cabinets

Orderly storing of small parts is necessary for the efficient operation of any radio repair shop or factory. The new Yawman and Erbe cabinet shown has six 1-inch drawers at the top and three 2-inch drawers at the bottom and measures 6½ inches wide, 14½ inches high and 3½ inches deep. Partitions to divide the cabinet drawers into two or three compartments are also available.

Thyratrons and Grid-Glow Tubes

Bloomfield, N. J.—Several types of thyratrons and grid-glow tubes are described in a bulletin issued by Westinghouse. Tubes are now available which have a high grid circuit resistance so that they may be operated directly from photo electric tubes.

DON'T MISS THIS OPPORTUNITY TO Equip WESTON at today's low prices



(Above) Model 669 Vacuum Tube Voltmeter, essential to complete your test equipment. Used with or without test oscillator . . . measures gain per stage, r.f. amplitude in oscillator circuit of superhets, makes all tests on AVC circuits, P.A. systems, and all measurements where high frequency is a factor. Direct reading . . . measures without guesswork or confusing adjustments. Price, \$45.00 net in U.S.A. (Carrying case extra.)

Model 692 . . . a real laboratory oscillator, at a serviceman's price. All wave, triple shielded, built to do a precision aligning job on any and all receivers. Price today, \$45.00 net in U.S.A. (Carrying case extra.)

Far-sighted servicemen recognize the economy . . . the *added profits* . . . which good instruments bring home. For when you buy good instruments, you don't buy instruments *so often* . . . you're rarely stuck with an obsolete, last-year's model. That's why more and more servicemen are standardizing on WESTONS. They want the same dependability, the same flexibility and the same long years of service which manufacturers and scientists insist upon, *and get*, from WESTON Instruments. The opportunity is available for you to get WESTON test instruments . . . thoroughly equip with these precision test tools . . . at today's low prices. See your jobber today, or return coupon for complete literature.



Model 772 Analyzer. Sensitivity 20,000 ohms per volt . . . resistance ranges readable up to 30 megohms . . . current indications as low as ½ microampere. Price, \$46.50 net in U.S.A.



Model 771 Checkmaster . . . tube checker plus continuity tester. Has 3 voltage and 3 current ranges, and resistance ranges for point-to-point and continuity testing. Price, \$45.00 net in U.S.A.

Weston Electrical Instrument Corporation, 615 Frelinghuysen Avenue, Newark, N. J.
 Rush me complete data on WESTON Radio Instruments.
 Name _____
 Address _____
 City _____ State _____

Learn RADIO from REAL RADIO ENGINEERS!

HERE THEY ARE



Kendall Clough
Chief Engineer,
Clough-Bright
Company.
E. E. Gramer
Vice President
in Charge of
Engineering,
Standard Trans-
former Co.
Karl E. Hassel
Chief Research
Engineer,
Zenith Radio
Corp.
F. H. Schnell
Radio Engineer,
Grinow Radio
Dr. G. M.
Blackburn
Production Dept.,
E. R. Mallory
and Co.

Many R-T-I Trained Men Earn up to \$75 a Week and More

These industry appointed engineers, who work for large radio manufacturers, will super-
vise your training at home, and
get you ready for good-pay jobs
in Radio Broadcasting, Installa-
tion, Servicing, Public Address
System and Photo Electric Cell
work. Also for coming activity
in Television. Opportunities for
properly trained men better than
ever before. Earn while you
learn. Some make \$5 and \$10 a
week extra in spare time one
to two weeks after starting.
Many earn up to \$75 a week in
full time jobs, or their own busi-
ness. Some even more. No
other training like mine. Get the facts if you want
a better job. Write now for my free book.

RAY D. SMITH, President.

RADIO AND TELEVISION INSTITUTE
Dept. 4-A, 2150 Lawrence Avenue, Chicago, Ill.

MAIL COUPON FOR FREE BOOK

RAY D. SMITH, President
Radio and Television Institute (R-T-I)
2150 Lawrence Ave., Dept. 4-A, Chicago, Ill.

Without obligating me, send new FREE Book about
spare-time and full-time Radio opportunities and
how I can train for them at home.

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

NOKOIL SPEAKERS

Make the Perfect
TALK-BAK* Systems



**5" Special
Talk-Bak*
Speaker**

Model 482 T.B.

Only **\$4.82** List

The 5" model shown above is the most popular, but these speakers which are designed especially for Talk-Bak* Systems can be had in other sizes.

Write for general catalog, special information and drawings on Talk-Bak* Systems.

Ask for the name of our nearest distributor. Wright-DeCoster distributors are always anxious to co-operate.

WRIGHT-DECOSTER, Inc.
2255 University Ave., St. Paul, Minnesota
Export Dept.—M. Simons & Son Co., New York
Cable Address: "Simontrice".
Canadian Office: Associated Sales Co., Guelph, Ont.

* Copyrighted.



CARRYING THE GOSPEL OF MODERN SERVICE

David E. Johnson, Sales Manager (left) and Vice President Willis of the Bendix Products Corporation giving a cordial send-off to technician Timothy Murphy at the wheel of the first of a fleet of educational cars which will cover the country as a part of the Bendix Day-Rad campaign to promote modern service methods. Each of these cars is equipped with a complete array of the most modern radio testing and service equipment.

The Radio Beginner

(Continued from page 759)

suppressor grid. If this is done, the only link between the two circuits is the electron stream. In this condition, they do not influence each other's tuning. If the bias is correct and the oscillator voltage is large enough, the sums and difference frequencies will be obtained in the plate circuit. In this connection there is still a small capacity coupling between the circuits in addition to the electron coupling. This is caused by the small capacity between the grids.

The Pentagrid Tube

In recent years a special tube has been developed to perform the functions of both oscillator and mixer and provides electron coupling between the two circuits. At the same time it has a screen between the respective grids so as to minimize capacity coupling; furthermore, the designer does not have to worry about the strength of the oscillator signal.

This tube contains five grids; therefore the name "pentagrid." Its action is best understood by first considering the cathode and the first two grids as a regular triode. They can be made to oscillate by any of the usual oscillator circuits. When this is done, the combination of cathode and two grids acts as a cathode emitting an interrupted or modulated electron stream.

The third and fifth grids form the electrostatic screen, while the third grid serves as "control grid" for the incoming signal. The circuit is shown in Figure 4. This is the arrangement to be used in the construction of the superheterodyne in this series.

The above described circuit works well, but at very high frequencies there is still some slight interaction. Therefore a new tube has been developed which does away with this objection. This is a hexode (six-element tube); it is purely a mixer tube, therefore a separate oscillator is required. It has two control grids, shielded from each other by screen grids; there is also a suppressor grid. This makes the whole tube equivalent to a pentode which can amplify and mix two signals without interaction between the respective tuned circuits.

RADIO BEGINNERS!

All installments of "The Radio Beginner" which have appeared to date are included in the new book "34 Lessons In Radio And Television"—together with other valuable data on radio and television which could not be included in the original lessons due to space limitations. Make sure you get a copy—see our special offer on Page 763—RADIO NEWS

Negative Feedback

(Continued from page 741)

is pronounced possibly because the speaker acts as a generator during such transient periods and the voltage developed reappears in the output-transformer primary where it is opposed by the negative-feedback action.

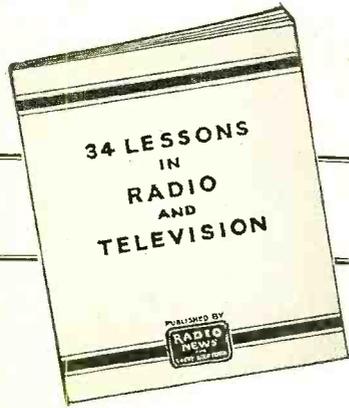
The amplifier circuit shown in Figure 2 is one developed by engineers of the Kenyon Transformer Company and successfully incorporates negative feedback circuits. It was submitted for test to the RADIO NEWS laboratory and was found to deliver more than its rated output of 60 watts. The character of reproduction was noticeably more crisp and clear than is usually obtained from less well designed apparatus employing 6L6 tubes.

As shown, this is a 5-stage amplifier with the input circuit arranged so the full gain of over 100 db may be employed for low-level, high-impedance microphones, or transformer input for high-level operation, when the full gain is not required. A 6C5 triode feeds the push-pull 6N7 driver stage which in turn furnishes power to the push-pull, beam-power 6L6 output tubes, operating in Class AB2, with fixed grid bias. The screen supply voltage is controlled by a 6N7, with both sections in parallel, giving excellent regulation—an important factor in obtaining maximum power output.

Feedback is employed from the 500-ohm output through R10, R15 and C11 so that the overall performance of all transformer-coupled stages is improved. This enables the use of relatively low-priced components with excellent results. Additional control

HERE IT IS!

The Instruction Book That
Thousands of Radio News
Readers Asked Us To
Publish!



GIVEN FREE!

With a Subscription for 11 Months
Radio News at \$2

"34 Lessons in Radio and Television" will guide you, step by step, in clear, easy-to-understand language, from the elementary theories of radio and electricity to the intricate problems involved in constructing modern radio receivers. You learn how to build carefully-designed, high-efficiency receivers—and understand how and why they work! You find out how vacuum tubes operate—what radio frequency, audio-frequency, regeneration and automatic volume control mean and what they accomplish—how to become a radio amateur—and all of the other information you have always sought!

In addition, this book covers the History of Television to date—Television with Kerr Cells—Scanning Disk Television—Cathode-Ray Tubes in Television—Television Receiver Design—and Present-Day Television.

You can obtain a copy of "34 Lessons in Radio and Television"—a large 8" by 11" book—*absolutely free* by placing a new or renewal subscription today for 11 issues of RADIO NEWS at \$2. Act Now—the supply is limited!

MAIL THIS COUPON TODAY!

Radio News, Dept. 376
461 Eighth Ave., New York, N. Y.
Enclosed find \$2. Enter my subscription for the next 11 issues of Radio News and send me "34 Lessons In Radio and Television" free of charge. (Canada and Foreign \$2.50).

Name.....

Address.....

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

If you are a serviceman, please check here ()

in the driver stage is obtained by feeding back from the grids of the 6L6 tubes to the input of the 6N7 driver.

The type 83 rectifier furnishes the plate voltage, giving adequate output with good regulation. The type 82 is employed in a half-wave circuit to provide C bias for the 6L6's.

The fidelity characteristics obtained with the circuit as shown in Figure 2 are indicated in curve A of Figure 3. In our tests this was found most satisfactory, but there are occasions where it may be found desirable to modify the low or high-frequency response in order to compensate for deficiencies in speakers or microphones. In Figure 4A, two small chokes are shown placed in the circuit so that the feedback voltage, at low frequencies, may be decreased. With R27 set for minimum resistance, the response characteristic of Figure 3B is obtained. Similarly, the high-frequency end may be raised by cutting in capacity across R18, as indicated in Figure 4B. Our tests showed that the action of the low-frequency booster varied somewhat at different output levels so that it is better adapted for transmitter modulation purposes than for ordinary P. A. applications.

It is no simple job to employ negative feedback over more than one stage and a circuit which operates successfully with some types of transformers may be ineffective with others. The transformer leakage inductance has a decided effect on the operation in such circuits. The designers recommend shunting a 5,000 or 10,000-ohm resistance across the 500-ohm line when the voice-coil terminals are used in order to reduce phase shift.

Curve C in Figure 3 illustrates the results secured when the high and low-frequency boosters are adjusted for maximum correction. The dotted curves show the characteristics at intermediate position of the booster controls.

The general layout of the apparatus is shown in the photographs. It should be carefully followed by constructors in order to avoid induction hum.

In arranging the feedback circuits, the blocking condensers C10, C11, and C12 should be kept between the feedback resistors as indicated in Figure 2, with the outer foil at lowest potential, otherwise oscillation may occur at some inaudible frequency. The 6L6 sockets should have high-grade insulation to avoid flashover. Glass type 6L6 tubes were used in the original model.

Parts List

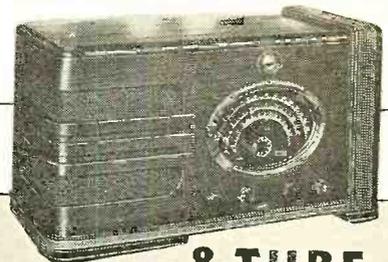
- CO—.02 mfd, paper condenser, 600 volt
- C1—25 mfd. electrolytic condenser, 35 volt
- C2—2 mfd. electrolytic condenser, 450 volt
- C3—4 mfd. electrolytic condenser, 450 volt
- C4—.02 mfd. paper condenser, 600 volt
- C5, C8—10 mfd. electrolytic condenser, 35 volt
- C6, C7—.0005 mfd. mica condenser
- C9, C26—.005 mfd. mica condenser
- C10, C12—.01 mfd. paper condenser, 400 volt
- C13, C14—.1 mfd. paper condenser, 600 volt
- C11—.0075 mfd. paper or mica, 400 volt
- C15, C16, C17, C18, C19, C20, C21, C22—8 mfd. electrolytic condenser, 450 volt
- C23, C24, C25—.010 mfd. mica condenser
- R1—5 megohm, 1 watt fixed carbon resistor
- R2, R9—5000-ohm, 1 watt fixed carbon resistor
- R3, R4, R5, R11—250,000 ohm, 1 watt fixed carbon resistor
- R6—250,000 ohm volume control
- R7, R8—50,000 ohm, 1 watt fixed carbon resistor
- R10—300,000 ohm, 1 watt fixed carbon resistor
- R12, R13—25,000 ohm, 1 watt fixed carbon resistor
- R14—500,000 ohm, 1 watt fixed carbon resistor
- R15, R20, R21, R22—100,000 ohm, 1 watt fixed carbon resistor
- R16, R19—75,000 ohm, 1 watt fixed carbon resistor
- R17, R24—20,000 ohm 50 watt wire wound resistor
- R18—50,000 ohm, 1 watt fixed carbon resistor
- R23—100,000 ohm, 1 watt fixed carbon resistor
- R25—1000 ohm, 5 watt wire-wound resistor

NOW Lafayette GIVES YOU A DUAL POWER MOBILE P.A. SYSTEM...



HERE'S the most versatile P. A. System ever built. Operates on either 6 volt storage battery or 110 volts A.C. without changes and without separate Power Packs. Use it in a sound truck or carry it into an auditorium. Plays recordings, uses any modern mike. Supplies field for two dynamic speakers. Get out of the small money Class! Here's the "Open Sesame" to extra profits. Get your share of "sound money" now.

This and other LAFAYETTE SOUND SYSTEMS are described in our new Spring catalog. Use coupon below.



Lafayette 8 TUBE SUPERHET

TOP RADIO VALUE of the YEAR!

In every detail—"Beam-spot Dial", Automatic Volume Control, Electro-dynamic speaker, fine cabinetry—a great receiver.

Convince yourself of this splendid buy on a 30-day FREE TRIAL in your own home.

Complete with tubes, cabinet, etc. Nothing else to buy **\$39.75**

More Than 35 Other Lafayette Receivers in FREE Catalog



FREE CATALOG

Get this new Free catalog 68-2F7 NOW. Bulging with bargains on auto radios, P. A., receivers and parts. You can't do without it.

WHOLESALE RADIO SERVICE CO. INC.
NEW YORK, N. Y., CHICAGO, ILL., ATLANTA, GA.
100 SIXTH AVENUE 901 W. JACKSON BLVD. 430 W. PRITCHETT ST. N. W.
BRONX, N. Y. NEWARK, N. J. JAMAICA, L. I.
342 E. FORDHAM RD. 219 CENTRAL AVE. 90-08 144th STREET

WHOLESALE RADIO SERVICE CO., Inc.
100 Sixth Avenue, New York, N. Y.

Rush Free New Spring Catalog No. 68—2F7.

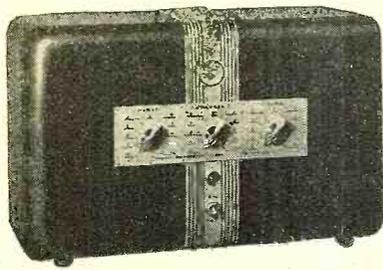
Name.....
Address.....
City..... State.....

MAIL NOW!



The Type

20-C AMPLIFIER



20 Watts Output
Dual Mike Input
Electric Eye Monitor

Modern in appearance and performance.

A complete line of sound systems for every application illustrated in U. S. E.'s new 16 page catalog.

Write for new Catalog No. 107 and proposition.

United Sound Engineering Company
Manufacturers of Electronic Equipment
2237 University Ave., St. Paul, Minn.

Licensed by arrangement with E. R. P. I. under patents owned and controlled by A. T. & T. and Western Elec. Co., Inc.

- R26—1000 ohms, 25 watt adjustable wire-wound resistor
- R27—Yaxley dual 100,000 volume control, audio grid taper
- T1—Kenyon type T-1 or T-2 microphone transformer, 400, 300, 200, 100, 50-ohms to grid
- T2—Kenyon type T-251 push pull input transformer
- T3—Kenyon type T-255 Class AB interstage transformer, push pull input to push-pull 6L6 grids
- T4—Kenyon type T-319 push-pull output transformer, 6L6 Class AB2, 60 watts, 3800 ohms, to 500, 200, or 15. 8, 4 ohms
- T5—Kenyon type T-216 power transformer; pri. 115 v., 60 cycles. 520-80-0. 520 v., 250 ma., 5 v. 3 a., 2.5v. 3a., 6.3 v. 3 a., 6.3 v. 3 a.
- L1—Kenyon type T-510 swinging choke, 6-19 H., 300-30ma., 125 ohms
- L2, L3—Kenyon type T-153 filter choke. 30 H., 90 ma., 350 ohms
- L4, L5—Kenyon type KC-200, filter choke, 20 H., 65 ma., 200 ohms
- 3 type 6N7 metal tubes
- 1 type 6C5 metal tube
- 2 type 6L6G tubes
- 1 type 83 tube
- 1 type 82 tube
- 1 amplifier chassis, 17 x 8 x 3-5/8 inches
- 1 power supply chassis, 17 x 6-3/4 x 3-5/8 inches
- 1 SPST line SW
- Yaxley 6 point, single deck, rotary switch
- Single closed circuit jack
- 3-contact switching jack

Mobile Rig

(Continued from page 735)

types of circuits, but as I stated in the first article, half of the battle is to decide just what you want or expect in the way of performance and then set out to get it. Let these articles, therefore, represent one person's attempt to solve specific problems rather than a "sales talk" on any particular circuit.

List of Parts

- Mic—Universal Handi-Mike
- T1—Microphone transformer
- T2—Interstage transformer, Par. 19 plates Class A to PP19 grids Class B
- T3—Modulation transformer, Class B 19 plates to RF load
- T4—Good audio trans, at least 3/1 step up
- T5—G. E. or RCA part No. 3637
- T6—Output transformer, Pentode output to voice coil (included with speaker)
- L1—2T 1/4 inch copper tubing, 2 inches diam. Inner coil No. 14 R. C.
- L2—1T No. 10 or 12 2 inches diam.
- L3—4T 1 inch diam., No. 12 enameled (mounted on C4)
- L4—4T 1 inch diam., No. 12 enameled (mounted on C4)
- L5—60T, No. 20 enameled on 3/8 inch dowel
- L6—60T No. 20 enameled on 3/8 inch dowel
- C1—25 mmfd. midget variable
- C2—50 mmfd. midget variable
- C3—50 mmfd. midget variable
- C4—20 mmfd. midget variable
- C5—35 mmfd. mica
- C6—.006 mfd. mica
- C7—.006 mfd. mica
- C8—.006 mfd. mica or paper
- C9—.001 mfd. mica
- C10—.0001 mfd. mica
- C11—.008 mfd. mica or paper
- C12—.0005 mfd. mica
- I.—.06 amp. dial light
- Sp—Jensen 6-inch p.m. speaker
- S1—DPDT switch (ganged with S2)
- S2—DPDT switch (ganged with S1)
- M—Meter, 0-100 ma.
- S3—SPST snap switch
- S4—SPST snap switch
- R1—5,000 ohms, 1 watt
- R2—2 meg., .25 watt
- R3—50,000 ohms, .25 watt
- R4—.5 meg. volume control
- R5—5 ohm rheostat
- 4 No. 6 dry cells
- 3 45v. B batteries
- 1 4.5 volt C battery

New Superhet

(Continued from page 736)

one 6F6 as the power-output pentode and a 5W4 rectifier.
Everything necessary for the operation

of the receiver with the exception of headphones is contained in the unit. It has a built-in power supply, and a dynamic loudspeaker mounted on the front panel. Incidentally the speaker has a hum-neutralizing coil, which makes the receiver practically hum free. The speaker and power pentode are capable of delivering two watts of undistorted power output and 4.5 watts maximum.

All controls are mounted on the front panel and located conveniently to the hand when the arm is resting on the table. These controls include, of course, the tuning control, which is mounted directly in the center, and (from left to right across the bottom of the cabinet) beat frequency oscillator "on-off" switch; heterodyne control for the beat frequency oscillator; power and standby switch; audio volume control; band selector; tone control, and combined sensitivity and automatic volume control switch. A phone jack is mounted at the extreme right of the front panel.

The dial is one of the interesting features of the receiver. It is calibrated in megacycles with a separate calibration spread dial for logging. The amateur bands are indicated on the main scale. It is described as a selector type and derives its name from the fact the scale automatically changes for each of the three bands when the band selector switch is turned. The "calibration spread" dial is geared to the main dial and is immediately under the band scale. A large tuning knob for operating a 100 to 1 ratio controlling mechanism is used. A crank also is provided on the tuning knob to facilitate covering a band rapidly when desired.

The intermediate frequency transformers are the magnetite-core type and tuned to 460 kilocycles. They are condenser tuned and designed to provide freedom from frequency shift due to atmospheric changes. Another electrical feature of interest is the incorporation of a separate rejection filter in the antenna circuit to minimize interference from stations operating near the intermediate frequency. Other electrical features include the use of air dielectric trimmers in the antenna, radio-frequency amplifier, detector and oscillator circuits; the mounting of the heterodyne oscillator in a specially shielded assembly to eliminate harmonics, and antenna terminal arrangement to permit the use of a transmission line antenna.

While the front panel has the appearance of having two speakers, actually one is incorporated in the set. A blank speaker grille was provided by the designers in order to secure symmetry, but a second loudspeaker may be connected to a station monitor or some other device if desired.

The receiver was put to a practical test at the author's station. It performed exceptionally well alongside several others. With the transmitter operating on 20 meters, more than a dozen contacts were had in a short time with a high degree of success. The majority of these stations were in the United States. After testing the receiver's performance under practical operating conditions, a few minutes were spent in listening for distant amateur signals. Among those heard in less than a half-hour period were: HI71, C6OM, YV3AD, G5NI, VE1VR, HI5X, PY2ER, G6XR, G6JF, CO2WZ, and YV3ABE. This is the order in which the signals were heard. The time was late in the afternoon, so no stations at any great distance westward were logged, although hundreds of 4's, 5's, and 9's were heard.

Later in the evening the receiver was tried on 40- and 80-meter c.w. and 75-meter 'phone bands. Its sensitivity and selectivity compared favorably with the average modern receiver. In the few min-



Introducing new developments for entirely new applications

Fully described in supplement to technical bulletin 536. Send for your copy.

	List Price
Type A 3500 interstage—3000-5500 kc. range	\$ 4.00
Type A 3502 diode—3000-5500 kc. range	4.00
Type C 3550 BFO—3000-5000 kc. range	2.50
Type U 100 interstage—13,250 kc.	2.00
Type L 150 inductance tuned converter—262 kc.	2.50
Type L 250 inductance tuned diode—262 kc.	2.50
Type L 101 inductance tuned converter—465 kc.	2.50
Type L 200 inductance tuned diode—465 kc.	2.50
Type S 101 converter—465 kc.	2.50
Type S 200 diode—465 kc.	2.50
Type G 1601 air tuned converter—1600 kc	10.00
Type G 1609 air tuned interstage—1600 kc.	10.00
Type G 1604 air tuned diode—1600 kc.	10.00
Type G 1605 air tuned silencer—1600 kc.	8.00
Type GH 1601 air tuned band expansion converter—1600 kc.	12.50
Type GH 1600 air tuned band expansion interstage—1600 kc.	12.50

ALADDIN RADIO INDUSTRIES, INC.
466n West Superior Street, Chicago, Illinois
Licensee of Johnson Laboratories, Inc.

FREE 1937 RADIO CATALOG

FREE

to Servicemen and hustling agents, our NEW 1937 Radio catalog, listing over 500 Nationally advertised home and auto Radios. We carry R. C. A.—Philco—G. E.—Zenith — Delco — Bosch — Motorola — Emerson — Detrola — Fada — Grunow and many others. The discounts we allow you range up to 50% from manufacturers' prices.

Become Our Representative

in your locality. Write for catalog, descriptive literature and confidential discount sheet to

Modell's - Wholesale Division
Since 1889
58 Cortlandt St., Dept. G-2, New York City

THE NEW RCA ACT-20 AMATEUR TRANSMITTER

20 WATTS C-W, 16 WATTS PHONE
100% MODULATION

The flexibility of 5-band operation, a minimum of adjustments, and reliable performance make the ACT-20 an ideal low-powered transmitter.

Amateur Net Price **\$129.50** Less Tubes, Accessories

Write for new 1937 catalog

CAMERADIO

963 LIBERTY AVE. PITTSBURGH, PA. 30 TWELFTH ST. WHEELING, W. VA.
Established 1919

GET KINK-AIDS

More than 3000 filed and indexed service kinks to repair those hard-to-fix home and auto radios. Just pull out the card corresponding to the name and model of the set you are repairing, and there you have listed the service troubles found in that radio and how to fix them.

NEW REVISED KINK-AIDS

- Clearly printed on 250 wear-resisting cards
- Filed by set name and model number
- Enameled steel cabinet, FREE
- Supplements issued quarterly

\$1.95

Sent postpaid for only.....
FREE—Write for Bulletin RV-6 and sample cards. Jobbers write for attractive proposition.

AKRAD PRODUCTS COMPANY
362 Wooster Ave. Akron, Ohio

LEE Correspondence Courses in **RADIO and ELECTRICAL ENGINEERING**

ELECTRICAL ENGINEERING Get good grasp of wide electrical field. Prepare yourself, at Low Cost, for secure future. Modern course. So simplified anyone can understand quickly.

RADIO ENGINEERING Extra fine course in radio, public address, photo-electric work. Trains you to be super-service man, real vacuum tube technician. Experimental kits furnished. Diploma on completion. Tuition ONLY \$25, either course. Deferred payment plan available.

FREE! Send name quick for free copies of school catalogues, student magazines, complete details. **SEND NOW!**

LINCOLN ENGINEERING SCHOOL, Box 931-26, Lincoln, Nebr.

On broadcast as well as shortwave frequencies, in any location, you can eliminate "man-made" static with

CORWICO

NOISE-MASTER ALL-WAVE ANTENNA

Send for complete literature.

CORNISH WIRE CO., 30 CHURCH STREET, NEW YORK CITY.

TELEVISION FANS!

Make sure you read the valuable data on the fundamentals of television in "34 Lessons In Radio and Television." RADIO NEWS advertisements on Page 763 tells how you can get this handy instruction book absolutely FREE!

utes spent in listening on these bands, all districts were copied on 40 meters, all but the 6th and 7th districts on 80-meter c.w. and all but the 5th, 6th and 7th districts on 75-meter phone. The time the tests were made was early evening when QRM conditions were at their worst. It is expected all districts might have been copied on these latter two bands had the listening been done after midnight.

The receiver also performed exceptionally well on 160 meters. Here it has more than adequate bandspread, and its sensitivity is adequate.

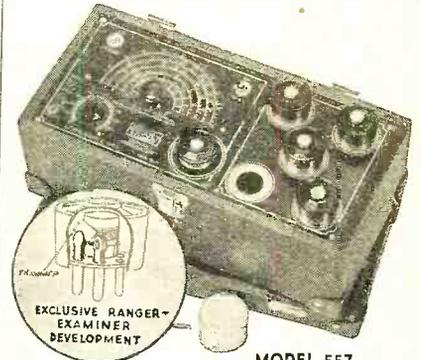
Brief excursions were made to the short-wave broadcasting bands. London and Berlin were tuned in with ease, their signal strengths being comparable to those obtained on other sets at the same location.

Remember May 9th
(Continued from page 731)

atmosphere at heights of only a few miles. It has been termed the "temperature-inversion" phenomena, but I think a better name for it would be the "mirage effect". I believe that it can only take place in that part of our denser atmosphere where the "weather" exists, or at a distance upward not higher than five or six miles. Under observed conditions, where cold air may lie in a blanket along the surface of the earth with warmer air above it, or under other conditions where fog exists in a lower atmosphere with warm or dry air above it as is often the case during the approach of a weather cyclone in the Eastern part of the United States, there may be a difference in refractive index between the two layers so that the waves may be refracted and reflected at the junction of the two layers, as shown in Figure 2. This condition seems to prevail mostly over or near large bodies of water and we have noted on the sea coast (here in New York) that we could transmit up and down the coast for a distance of 300 or 400 miles under these conditions. We have never noted such an effect producing transmission more than 75-100 miles inland. This is a low angle of radiation phenomena.

Extreme DX on 5-meters, we believe to be due to reflection from the high upper atmosphere in a manner similar to those already noted for waves of lower frequencies. Conditions under which such transmissions are possible seem to recur monthly, either at or shortly before or after the period of full moon for this location on the earth. I believe there is a definitely reflecting layer formed, high in the atmosphere or above it. During these short monthly periods, starting last summer, I made measurements and calculated the height of these reflections on 35 distant signals from known distance points. For this purpose I used a receiving antenna that could be adjusted for any vertical angle of radiation and I kept records of these angles. Knowing the distance of the receiving station away from the transmitting station, it was a relatively simple matter to calculate by geometry the heights of these reflections. It is interesting to note that they range between 200 and 350 miles above sea level which is much higher than the various layers that reflect ordinary signals and longer wavelengths. These lower layers range from 65 miles above the earth for the E layer to a maximum height of over 190 miles for the F layer and seems to indicate that at times there is formed a still higher layer that we might call a G layer. We thought at first that this might be a deflected cloud of electrons bunched up above the atmosphere in some unknown way by some magnetic or gravitational

COMPARE THIS ACCURACY AGAINST THE FIELD



DIRECT READING SIGNAL GENERATOR

DEALER PRICE **\$1800**

*** Guaranteed Accuracy**

1%—110 to 3000 K. C.

2%—for higher frequencies

Range—110 to 20,000 K. C.

This amazing accuracy has been made possible by an exclusive Ranger-Examiner development. Each individual coil is separately calibrated by an exclusive method of peaking with trimmer condensers.

Model 557 All Wave Direct Reading Signal Generator uses plug-in type coils. Five frequency bands are covered from 110 to 20,000 K. C., all fundamentals. Completely shielded for static and magnetic fields. Attenuation and stability are outstanding features. Strong signals both modulated and unmodulated are furnished.

Supplied in attractive Black Leatherette Case. Silver and Black Panel.

Dealer Price\$18.00

Other Ranger-Examiner Models include Tube Testers, Volt - Ohm - Milliammeters, Free Point Testers, etc., both in single units and in Money Saving Combinations.

SEE YOUR JOBBER WRITE FOR CATALOGUE

FREE BOOKLET, "101 Radio Troubles and Their Cures." Lists 101 most frequent radio troubles, how to detect and how to cure. Nothing like it before. Greatly simplifies every day service work. Send coupon now.



Readrite Meter Works
615 College Dr., Bluffton, Ohio

...Without obligation please send me your free booklet—"101 Radio Troubles and Their Cures," with complete Ranger-Examiner Catalog

...I am particularly interested in Ranger-Examiner Model.....

Name.....

Address.....

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

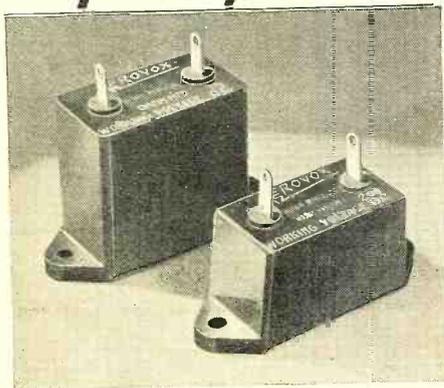


**A CLAIM
that needs no
amplification**

TAKE the word of experienced engineers—AmerTran Transformers result in superlatively clear, natural sound reproduction under the most trying circumstances. Only the highest quality of materials and the highest order of craftsmanship could produce transformers so dependable. Frequency characteristics are exceptionally uniform; filter types give full inductance with rated d.c. flowing; power units have better than 10% regulation. Consult our Bulletin 1002 for more details. Write:



AMERICAN TRANSFORMER CO.
178 Emmet Street Newark, N. J.



**Bakelite-Case
CAPACITORS**

- ★ Non-inductive long-life paper sections in attractive bakelite cases.
- ★ High insulation resistance. 200, 400, 600, and 1000 v. D.C. ratings. .05 to 1 mfd.
- ★ Popular for a.f. and r.f. by-passing. Also for resistance and impedance coupled amplifiers.

DATA Latest catalog covers largest variety of condensers yet offered. Ask local dealer or write us direct for copy.



effect of the moon but later have leaned towards the theory that it was an extension of the more or less fixed ionization in the upper atmosphere due to the gravitational effects of the moon and the sun.

An examination of the diagram in Figure 1 shows a greatly exaggerated and off-scale drawing of the sun, moon and earth during the full moon period. Of course everyone knows that the tides at this time produced in the earth's ocean waters are in the direction shown by the dotted lines A and A1. There must be, therefore, a much greater tide produced in the earth's more fluid atmosphere in the same directions as shown at B and B1. It is our theory, therefore, that a layer greatly extended in thickness in the upper atmosphere, and at much greater heights, may extend under these conditions so that even 5-meter waves will not be able to penetrate them and will be bounced down and back to earth if the radiation angle is kept fairly high. This is in agreement with our years series of tests.

Another interesting point in our series of tests with England is that we find that the best results are obtained somewhere between 10 p. m. and 2 a. m. E.S.T. the next morning. This may be due to reflection from the layer at B from the dark side of the earth. It would seem that it also might be possible to get similar results from the layer at B1 on the sunny side of the earth. Accordingly we made a series of tests for three months both for transmitting and receiving and did notice that long distance DX could be accomplished at this time or from about 10 a. m. to noon the morning after good long-distance DX periods the preceding evening.

I would certainly like to hear from any or our readers who are interested as to any evidence they have found confirming these theories and would also appreciate any reports on W2JCY's test transmissions.

In conclusion I have a few recommendations for 5-meter amateurs who would like to engage in these researches throughout

the coming summer and I will outline them briefly below:

1. Keep a schedule log of all long-distance 5-meter signals heard, including time of day the date and the known weather conditions.
 2. Keep a careful log of your own test transmissions, with exactly what was said, for confirmation purposes.
 3. Obtain and use a good 5-meter super-heterodyne equipped with a noise silencer and with a beat oscillator.
 4. Try horizontal antennas or at least antennas with a high angle of radiation.
 5. Try beaming your transmission and reception with reflectors in back of or underneath your antennas.
 6. Use C. W., I. C. W., and phone on your DX tests. Any one of these may produce results where the others may not.
 7. Try prearranging 5-meter schedules with reports—back on 10 or 20-meters.
 8. Don't place too much importance on reported 5-meter transmissions of harmonics or stations transmitting on lower harmonic frequencies at the same time as on 5-meters. Five-meter reception has been noted over great distance where the actual signal has arrived on a lower frequency and has been "doubled" in the receiver.
 9. Watch the periods of time between three or four days before and three or four days after full moon for long distance DX on 5-meters this summer.
 10. Watch for short-distance DX (up to 200 or 300 miles) during quick changes of temperature or during sudden fog.
 11. Equip yourself with a stabilized-frequency transmitter such as a good M. O. P. A. or a crystal excited transmitter.
- W2JCY has made all of these experiments on 5-meters alone and has refrained from even setting up a lower-frequency transmitter during the period of the tests in order to eliminate any possibility of mistake being made due to Number 8.
- I sincerely hope that interested 5-meter amateurs will carry on this work and really learn something decisive about these

INDEX TO ADVERTISERS

Aerovox Corp.	766	Midwest Radio Corp.	746
Akrad Products Co.	765	Million Radio & Television Lab.	758
Aladdin Radio Industries, Inc.	764	Modells 765	
Allied Radio Corp.	759	Montgomery Ward 751	
American Transformer Co.	766		
Amperite Corp.	767	National Radio Institute 705	
		National Schools 760	
Bendix Products Corp.	Back Cover	National Union Radio Corp.	747
Bliss Electrical School 756		New York Y. M. C. A. Schools 746	
Bond Radio Co.	751		
Brush Development Co., The 760		Pioneer Gen-E-Motor Corp. 754	
Cameradio Company 765		RCA Institutes, Inc. 752	
Candler System Co., The 754		RCA Manufacturing Co. 743	
Capitol Radio Engineering Inst. 742		Radio City Products Co. 756	
Central Radio Laboratories 742		Radio Service Institute 744	
Chicago Wheel & Mfg. Co. 768		Radio & Technical Publishing Co. 762	
Classified Ads. 767		Radio & Television Institute 747	
Clough-Brengle Co. 745		Radio Training Ass'n of America 767	
Cornish Wire Co., Inc. 765		Radolek Co., The 757	
Cornell-Dubilier Corp. 744		Raytheon Production Corp. 765	
Coyne Electrical School 751, 758		Readrite Meter Works 750	
		Rider, John F. 750	
Dodges Institute 754			
First National Television, Inc. 767		Scott Radio Labs, Inc., E. H. 707	
		Silver Corp., McMurdo Inside Back Cover	
General Electric Co. Inside Front Cover		Solar Mfg. Corp. 746	
Goldentone Radio Co. 767		Sprayberry Academy of Radio 768	
		Standard Transformer Corp. 756	
Hallcrafters, Inc. 768			
Hammarlund Mfg. Co. 749		Teleplex Co. 752	
Hygrade-Sylvania Corp. 748		Triad Mfg. Co., Inc. 768	
		Trimmm Radio Mfg. Co. 760	
Instructograph Co. 742		Triplet Electrical Instrument Co. 755	
International Resistance Co. 758		Tri-State College 767	
		Try-Mo Radio Co., Inc. 752	
Kato Engineering Co. 767		Tung-Sol Lamp Works, Inc. 750	
Kenyon Transformer Co., Inc. 751			
		United Sound Engineering Co. 764	
Lincoln Engineering School 765		Utah Radio Products 760	
McElroy, T. R. 754			
Mallory & Co., Inc., P. R. 710		Webster Co., The 753	
		Weston Electrical Instruments Corp. 761	
		Wholesale Radio Service 763	
		Wright DeCoster Co., Inc. 762	

RADIO ENGINEERING DEGREE IN 2 YEARS

Complete Radio Engineering course in 96 weeks. Bachelor of Science Degree. Radio (television, talking pictures and the vast electron.c field) offers unusual opportunities for trained radio engineers. Courses also in Civil, Electrical, Mechanical, Chemical, Aeronautical Engineering; Business Administration and Accounting. Also short diploma courses in Surveying (36 weeks), Drafting (36 weeks). Low tuition, low living costs. World famous for technical two-year courses. Those who lack high school may make up work. Students from all parts of the world. 54th year. Enter June, September, January, March. Write for catalog.

1667 College Ave. Angola, Ind.

TRI-STATE COLLEGE

RADIOS... SAVE UP TO 50%

DEAL DIRECT... FACTORY PRICES: Many models to select from: AC-DC; All-Wave; Farm sets that operate like city radios! Your name and address on postcard brings you NEW Bargain Catalog in colors FREE! Get details of 30-DAY TRIAL plan and agent-user proposition! GOLDENTONE RADIO CO. Dept. A-6, DEARBORN, MICHIGAN

Free Catalog

30 DAY TRIAL \$6.98 UP

110 VOLTS A. C.
Anytime! Anywhere! With KATOLIGHT PLANTS

350 watt 110 v. 60 cycle A.C. \$89.60
300 watt 32 volt DC plant. 78.40
15 amp. 12 volt charger... 59.99
25 amp. 6 volt charger... 49.95
AC & DC Generators... Rotary Converters 32 Volt 800 Watt Wind Plant... \$141.00

Write For Details.
KATO ENGINEERING CO., Mankato, Minnesota, U. S. A.

Be a TELEVISION EXPERT

LEARN TELEVISION WITH RADIO NOW!
Here's opportunity! Get ready for the best paid jobs in Radio as Television sweeps the country. Train at big-time broadcasting station. Get actual experience over our Television Station W9XAL and commercial station W9XBY. Write today for free folder and literature showing actual photos of Television broadcasting, opportunities, etc.

FIRST NATIONAL TELEVISION, INC.
Dept. DD6 Power & Light Bldg., Kansas City, Mo.

Read Classified Advertising—It Pays

Advertisements in this section sixteen cents a word for each insertion. Name and address must be included at the above rate. Cash should accompany all classified advertisements unless placed by an accredited advertising agency. No advertisements for less than 10 words accepted. Objectionable or misleading advertisements not accepted. Advertisements for these columns should reach us not later than 3rd of 2d month preceding issue.

TECK PUBLICATIONS, INC.
461 Eighth Ave. New York, N. Y.

Correspondence Courses

USED Correspondence Courses and Educational Books sold or rented. Inexpensive. Money-back guarantee. Write for Free Catalog listing 4900 bargains. (Courses Bought.) Lee Mountain. Pisgah, Alabama.

BIG BARRAIN Catalogue Courses 10c. Hanfling, P-799 Broadway, New York.

Patent Attorneys

PATENTS. Instruction "How to Establish Your Rights" and form, "Evidence of Conception" sent Free! Laneaster, Zilvine & Rommel, 414 Bowen Building, Washington, D. C.

PATENTS—Advice and booklet free. Highest references. Best results. Promptness assured. Watson L. Coleman, Patent Lawyer, 724 9th Street, Washington, D. C.

Patents and Inventions Wanted

INVENTIONS COMMERCIALIZED. Patented or unpatented. Write Adam Fisher Company, 273 Enright, St. Louis, Missouri.

Radio Instruction

AMATEUR RADIO, Commercial Radiotelephone and Radiotelegraph licenses, complete training. Resident and correspondence courses. Every graduate a licensed operator. N. Y. Wireless School, 1123 Broadway, New York.

possibilities. I also hope that these few ideas may be helpful to others interested in ultra-high frequency phenomena.

The "Quartet"

(Continued from page 730)

transformer. Only the set screw on the side of the frame nearest the side of the can where the coupling adjustment nut is located need be loosened. It is a good plan to drill a hole in the chassis immediately below this set screw so that it can be loosened and tightened without the necessity of removing the transformer. It is not essential that it be tightened, however, and it is only necessary to loosen it about 1/4 turn.

When the set screw is loose, the coupling is adjusted by rotating the nut reached through a hole in the side of the transformer can. Turning this nut in a clockwise direction loosens the coupling, and the coupling is tightened by turning the nut in a counter clockwise direction. Two complete turns of the nut in either direction represents the complete range of coupling obtainable. When turning the nut in the counter clockwise direction, it should be pressed in so that the nut lies against the bakelite support.

A change which will show some benefit is the substitution of a 6K7 for the 6L7 in the second i.f. stage. The 6K7 is a remote cut-off tube and less subject to unamplified a.v.c. It does, however, provide somewhat greater gain. When used in this receiver, the overall a.v.c. action seems to remain just as good, presumably because the control effect is increased in the case of the 6L7 in the first i.f. stage which compensates for the reduced control in the second stage.

Through an oversight the r.f. chokes were all specified as National R-100's, whereas the one employed in the plate circuit of the 954 r.f. tube should have been specified as one of the 5-meter type. This choke resembles a tubular grid-leak in appearance and is clearly shown in the upper photograph on page 523 of the March issue, mounted horizontally just to the left of the detector coil socket.

In closing, it might be said that the model receiver has been in constant use in 5-meter communication work since it was built and has been giving consistently excellent results. It has been operated in side-by-side tests with a number of other ultra-high frequency receivers but as yet has not found its equal in useable sensitivity and all around excellence on the 5-meter band. It is equally good on 10 meters except that, of course, it does not provide as good selectivity as is obtained from 10-meter superheterodynes using a lower intermediate frequency. On the other hand, its sensitivity on 10 is excellent and its signal-to-noise ratio is particularly noteworthy—two factors which make it outstanding in this range.

New Zealand DX

THE New Zealand radio authorities distributed 176,000 questionnaires to licensed listeners in an effort to determine their wishes and preferences in the matter of broadcast programs. Following is a summary of the vote on several specific points, as represented by an analysis of 80,000 questionnaires returned. These data are quoted from material submitted by L. W. Mathie, an Official Radio News Listening Post Observer at Hawkes Bay, N. Z.

"The first question on the form asked

SUCCESSFUL in PERFORMANCE..DESIGN.. CONSTRUCTION..SALES.. say leading P.A. men

AMPERITE VELOCITY



- ACHIEVES UNIQUE RECORD IN ACTUAL USE**
- Featuring..*
1. Output increased 6 DB.
 2. Triple shielded—against all RF or magnetic fields, entirely eliminating hum pickup.
 3. Eliminates feedback troubles.
 4. Excellent for close talking and distant pickup.
 5. Acoustically designed to eliminate any possibility of cavity resonance.
 6. Fitted with switch and cable clamp.

NEW! MODELS RBHn (High Impedance); RBMn (200 ohms) with Cable Connector and Switch ———— \$42.00 LIST

NEW! MODELS RBSn, RSHn, streamline; slightly lower output and frequency range than above, with switch only ———— \$32.00 LIST

Models RAL (200 ohms); RAH (2000 ohms). Built to Amperite standards: No peaks. Flat response. Triple shielded. Shock absorber. Swivel bracket! ———— \$22.00 LIST

Finishes: All microphones have the new standard Gunmetal Finish. Available in Chrome, extra, \$1.00 List.

FREE WINDOW DECAL advertising your SOUND SERVICE. Four-color design, 5 1/4 x 9 1/4. Write for it now.

AMPERITE Cable Address: Alkern, New York 561 BROADWAY NEW YORK

Velocity MICROPHONE

Send for your free copy-

1937 RADOLEK
Covers 1000 items

1000 New Radio Items

RADOLEK CO.
601 W. RANDOLPH ST. CHICAGO

The Spring and Summer edition of the 1937 Radolek Profit Guide is just off the press. The most up-to-date and complete Radio Supply Book. **1000 NEW ITEMS—** many presented exclusively—an Oscilloscope using a new 2" Cathode Ray Tube, automatic tuning auto radios, etc. 164 pages of valuable, detailed radio buying information... contains the most complete replacement parts listings of volume controls, condensers, transformers, and vibrators. Over 12,000 Repair Parts—the right replacement items for every radio that you will be called upon to service. A complete new selection of Radios and P. A. Sound Amplifiers. Every page of this catalog will bring extra profits to you. Radolek Quality is guaranteed—Radolek Prices are right—Radolek Service is fastest and most reliable. This is your Profit Guide—it's FREE. Send for your copy NOW!

RADOLEK

601 W. Randolph, Chicago, Dept. B-6
Send me the Radolek Radio Profit Guide FREE

Name.....
Address.....
Serviceman? Dealer?



"I'll show you how to get the jobs that other Radio men can't handle"

MAKE \$40-\$60 a WEEK with this New Kind of Radio Training

It Actually Sets You Up In Business!

Now there's a new kind of Radio training every man should know about if he wants to get on the money end of the Radio industry. Men taking my training right now are actually earning \$10, \$15, \$20 a week and more in spare time—while they learn. Men who have graduated are holding down jobs paying \$60 a week and up.

Make More Money Quick

My course is arranged so that you get practical lessons right at the start. Quickly, you are ready to begin servicing sets. Useful, simple job sheets show you every step to take. And you have the equipment to handle these jobs properly. Time and time again my students write to tell me they are handling jobs other Radio men couldn't handle. That's because my easy to understand lessons and professional equipment make you a real Radio expert.

No Experience Needed

Old-timers and new-comers are taking this new kind of training and making real money in Radio. If you are a Radio man now, you know now is the time to get extra training and bigger pay. If you are just about to enter Radio, now is the time to start taking this thorough, easily-learned course. Everything is clear. Everything practical. You learn business methods, gain self-confidence, get the satisfaction that nothing but quick cash in the pocket can give you.

Get the Facts

Your future in Radio can be rich and happy if you get started on the right track, get the kind of instruction that puts you ahead of others from the start. My new book, entitled "MORE MONEY IN RADIO" tells about Radio's spare-time and full-time opportunities, tells you about my unusual new type of practical Radio training. It shows you letters from men who have found success this way, shows how YOU can do the same. Send for this book today and get the facts. Act now! Fill in and mail this coupon below.

Big Professional Outfit Sent

Because I'm a practical Radio man, I have developed this practical training. While you learn at home, in your spare time, you train on real Radio parts, with real professional tools and implements. I send them to you as part of your course. This big professional outfit fits practically an entire Radio shop in itself—it sets you up in business. Mail coupon for complete information today.



Course Worth Many Times Price
"I took your Course while going to high school. Soon I built up a large Radio Service Business. Sold over 300 tubes between January and May. Your Course is worth many times the price." — Henry Foltz, Reynoldsville, Pa.



GET FREE BOOK

Mail Coupon Now

Sprayberry Academy of Radio,
F. L. Sprayberry, President,
Office No. 25-G,
University Place, N. W.,
Washington, D. C.

Please send me, without obligation, "More Money in Radio" and complete facts about your new type of training.

Name.....
Address.....
City..... State.....
Paste this coupon on a penny postcard and mail TODAY.



which of the eight national stations listeners could receive satisfactorily. The replies indicate that:

- 65,202 receive 1YA satisfactorily
- 64,114 receive 2YA satisfactorily
- 64,794 receive 3YA satisfactorily
- 61,828 receive 4YA satisfactorily

"The second question sought information as to the number of licensees who are members of radio or listeners' clubs. The replies show that 8 per cent of voters are members of such clubs.

"Licensees in the third question were asked to indicate the order of the nights of the week on which they listened most frequently. The following figures show the first preference voting: Monday, 30,788; Tuesday, 26,310; Saturday, 25,908; Sunday, 22,348; Wednesday, 17,808; Thursday, 17,792; Friday, 15,062.

Order of Preference

"In response to the question as to the order of the preference of licensees for overseas artists, local artists and recordings, the following votes were recorded:

	First	Second	Third
Overseas artists	27,354	34,666	17,806
Local artists	11,270	22,692	45,864
Recordings	22,302	29,720	27,804

"The invitation to licensees to express their opinions as to whether the proportion of entertainment by overseas artists, local artists and recordings should be increased, decreased or remain unaltered, resulted as follows:

	More	Less	Satisfied
Overseas artists	31,678	8,288	39,860
Local artists	20,734	30,116	28,976
Recordings	28,490	11,682	39,634

"Information was sought in another question regarding the stations which were listened to most frequently, and the replies indicate that 79 per cent of voters listen most frequently to the eight national stations.

Types of Entertainment

"The following figures show the voting in reply to the invitation to express opinions as to whether the types of entertainment specified should be increased, decreased or remain unaltered:

	More	Less	Satisfied
Plays	28,272	19,282	32,272
Classical and symphonic music	7,734	49,000	23,092
Breakfast session	29,108	2,668	48,050
Talks	12,506	28,656	38,664
Light opera and musical comedy	32,440	8,418	38,968
Dance sessions	22,100	24,292	33,434
Vocal solos (serious)	12,232	30,198	37,396
Grand opera	16,364	31,478	31,984
Band music	21,812	21,380	36,634
Chamber music	7,902	40,586	31,338
Music, mirth and melody	47,818	5,312	26,696
Sunday morning programs	21,150	15,994	42,682
Sunday afternoon programs	21,150	15,994	42,682
Instrumental solos	20,910	12,106	36,810
Vocal jazz items	17,838	38,846	23,142

Thirty-eight per cent of affirmative answers were received to the last question: "Do you dance to broadcast dance music?"

There Is "No Repair" of Tubes

New York, N. Y.—During the past year the Hygrade Sylvania Corporation has maintained a strict "no repair" policy. This means that tubes which do not pass inspection standards are destroyed instead of salvaged by a repair department. This has resulted in operators being more alert so as to cut down the number of rejected tubes. Production standards have been raised and the tube quality increased without increase of costs.

Here's a Complete line of

Hallicrafters COMMUNICATIONS RECEIVERS

A MODEL FOR EVERY NEED —FOR EVERY PURSE

THE SUPER SKY RIDER
An 11-Tube 5 Band Superheterodyne, tuning from 40 M.C. to 535 K.C. in 5 bands. America's most outstanding communications receiver.

THE ULTRA SKY RIDER
A 10-Tube 4 Band Superheterodyne designed especially for Ultra High Frequency reception. Tunes from 3.7 to 33 meters.

THE SKY RIDER COMMERCIAL
An 11-Tube Super tuning from 20 to 3000 meters. With the "Ultra" the "professional" type receiver provides complete coverage.

THE SKY CHALLENGER
Amateur Radio's Greatest Value! A 9-tube superhet tuning from 85 M.C. to 535 K.C. (No gaps). Electrical Bank Spread—5 Band Tuning.

THE SKY CHIEF
A new 7-Tube Super with all the latest features, tuning from 17.6 M.C. to 540 K.C. in 3 bands.

THE SKY BUDDY
Hallicrafters' 5-Tube Junior Communications Receiver—amazing sensitivity and selectivity. Tunes from 18 M.C. to 544 K.C.

See them at your dealers or write for complete information.

the hallicrafters inc.

2603 Indiana Ave. Chicago, U. S. A.
Cable Address: Hallicraft, Chicago.

TRIAD

THE CHOICE OF SERVICEMEN BECAUSE THEY ARE USED BY LEADING SET MANUFACTURERS

TRIAD MANUFACTURING CO., Inc.
PAWTUCKET RHODE ISLAND

THE QUALITY NAME IN RADIO TUBES

HANDY

Tool of 100 Uses

A whole shop full of tools in one. Does away with slow hand work. Plug in any light socket AC or DC, 110 v 13,000 r.p.m. Uses 200 different accessories—grinds, polishes, routs, drills, cuts, carves, sands, saws, sharpens, engraves.

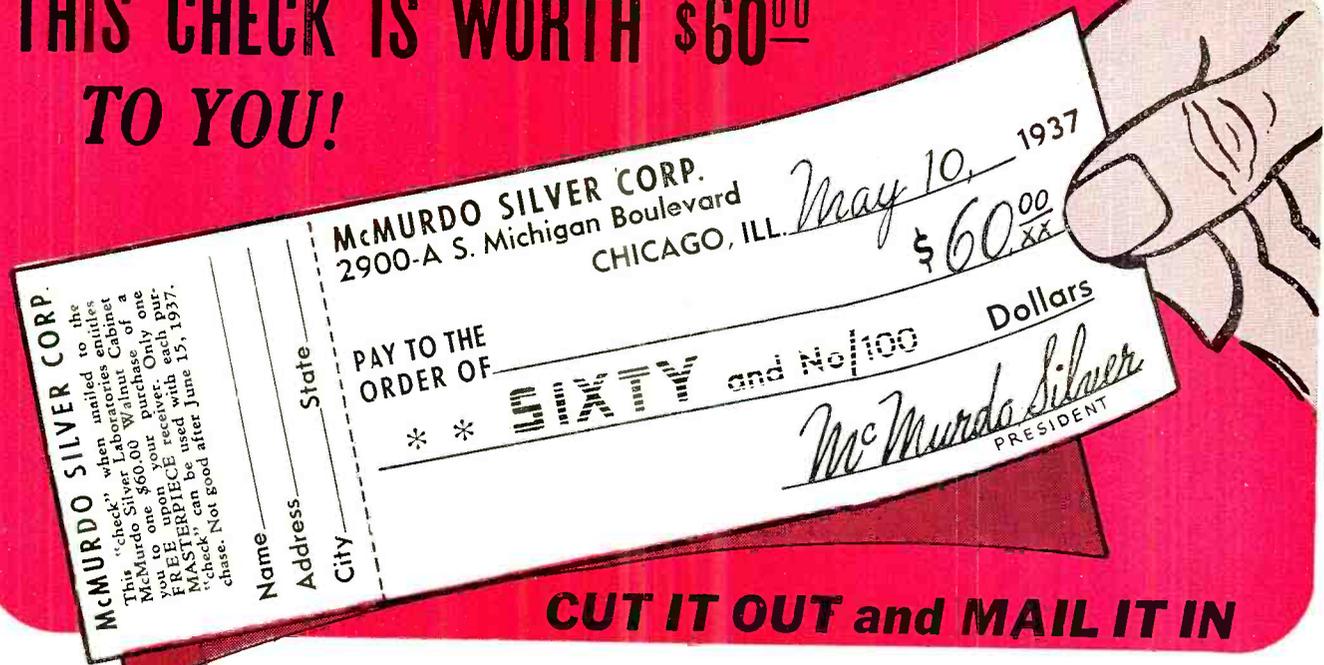
Get A Demonstration at Hardware, Dept. Stores, Tool Dealers or order on 10 Day Money-Back Trial. \$10.75 and up postpaid, 3 Accessories Free. De Luxe Model \$18.50, with 6 Accessories. Catalog Free.

CHICAGO WHEEL & MFG. CO., 1101 W. Monroe, Dept. AB, Chicago

For Faster Better Jobs

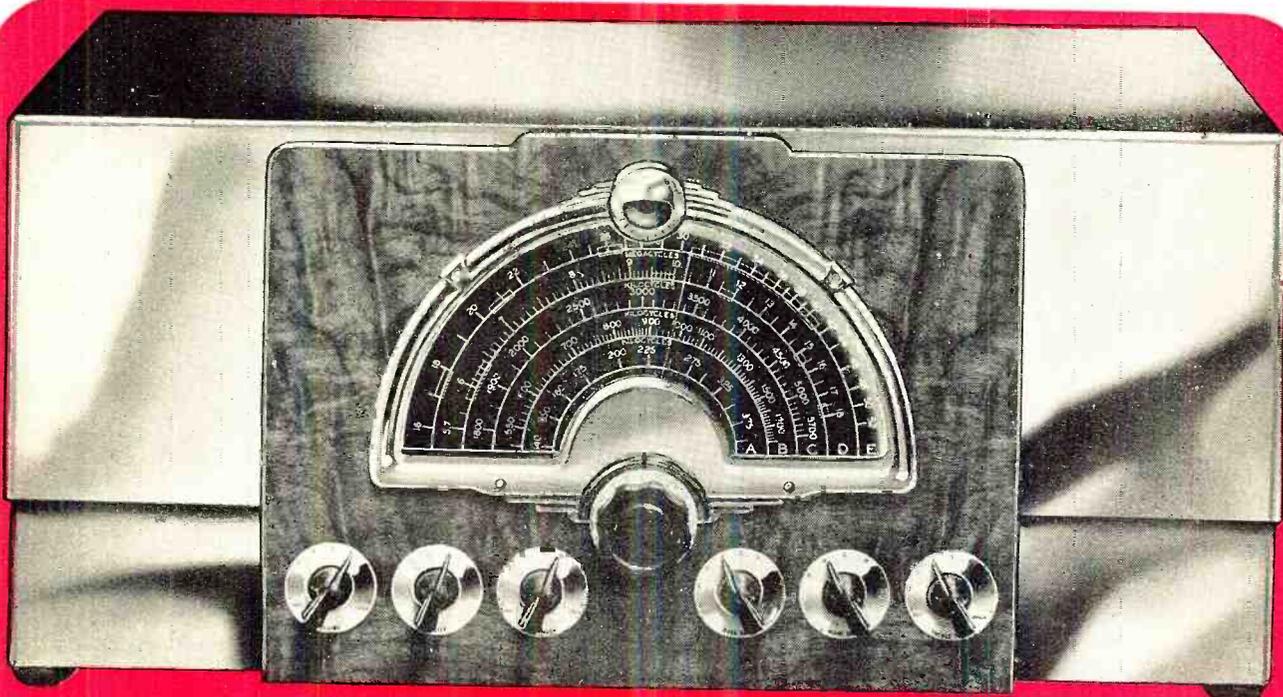
New CRAFTSMAN Project Book
...Pressure and Heat with a Handy "Easy working" plan for making many interesting and unusual projects 25c, stamps or coin.

**THIS CHECK IS WORTH \$60⁰⁰
TO YOU!**



The "check" above entitles you to a \$60.00 walnut cabinet absolutely FREE upon your purchase of a MASTERPIECE receiver. Only it is not good after June 15. So sign

it, cut it out and mail it in. We will send you all the technical data, illustrations, and descriptive literature on the finest radio receiver ever built! And we will hold a beautiful cabinet for you without obligation.



Every part in a MASTERPIECE receiver, except tubes, is guaranteed—not for 90 days—but for FIVE YEARS!

McMURDO SILVER
MASTERPIECE

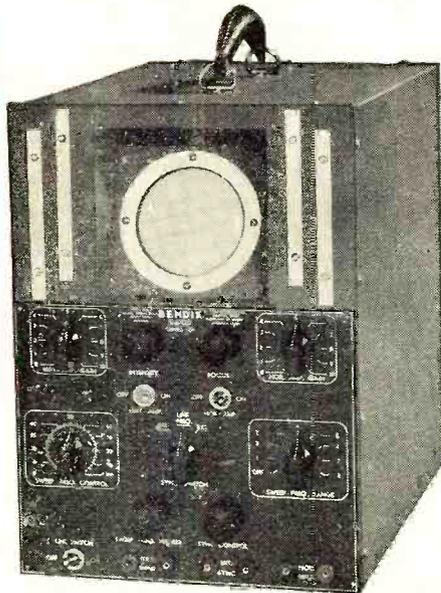
MASTERPIECE receivers are built to your order and sold on a small down payment and even smaller monthly terms.

"WORLD'S FIRST TRULY

CUSTOM-BUILT RADIO"

**DON'T TRY TO
GUESS A
RADIO SET
INTO BALANCE!**

**BE SURE with
the Series 64**



**USES and
FEATURES**

- The alignment of radio receivers.
- Built-in sweep circuit.
- Built-in amplifiers to adjust for the sensitivity of the receiver.
- The measuring for peak voltage A.C. with or without amplifiers.
- The measuring of audio quality in audio amplifiers, therefore locating causes of distortion.
- The measuring of modulation, percentage of transmitters, or oscillators.
- Frequency measurements by using of Lissejou figures.
- Checking phase shifts in various devices.
- Study of Transient and Recurrent wave forms.
- Testing of auto radio vibrators.
- The adjustment of transmitters.
- Check for power line modulation in transmitters and receivers.
- Check for distortion in intermediate frequency amplifiers.

BENDIX-DAYRAD

CATHODE RAY OSCILLOGRAPH

The quickest and most accurate means of checking the alignment and balance of any radio circuit! With the Bendix-DayRad Cathode Ray Oscillograph you can at once isolate the factors of unbalance. You can establish their values. You can check the effects of your corrective measures.

That is the kind of service attention today's set deserves—and the kind today's radio owner demands. It will build you friends, prestige and profit.

Send coupon below for new Bendix-DayRad catalog.

Series 64
\$85
Net to Dealer
F. O. B. South Bend

**SOLD ON LIBERAL
TIME PAYMENT PLAN**

**SEE THIS EQUIPMENT AT THE
I R S M
RADIO SHOW**
June 10-11-12-13
Stevens Hotel—Chicago
Booths 46 and 47

**TESTING, ALIGNING, BALANCING MODERN
RADIO SETS PROFITABLY IS IMPOSSIBLE
WITHOUT SUCH INSTRUMENTS AS THESE!**

SEND THIS COUPON NOW!

BENDIX PRODUCTS CORPORATION
Bendix-DayRad Dept.
(Subsidiary of Bendix Aviation Corporation)
452 Bendix Drive, South Bend, Indiana

Please send full details of the Bendix-DayRad System of Radio Service, including data on Time Payment arrangements, for above, and other Bendix-DayRad units.

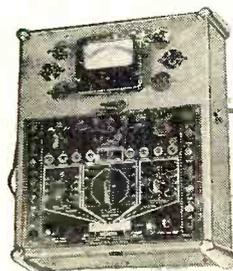
Name

Address

City State

My Distributor's Name

**COMBINATION UNIT
(SERIES 200) WITH STAND**



Tests more than two hundred types of tubes, including the new metal Octal "G" and "MG" types. Operates on 110-Volt 60-cycle A.C. Analyzes circuits for voltage, amperage, resistance. Read A.C. or D.C. voltages 0 to 1250; milliamperes 0 to 1250; ohms 0 to 3,000,000; amperes 0 to 25.

**PRICE COMPLETE
WITH STAND \$10450**

