SHORT-WAVE TUNING HINTS

RADIO NEWS and The SHORT-WAVE

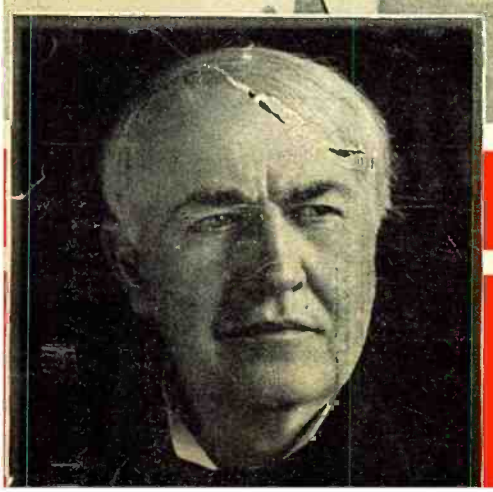
NRA CODE

DECEMBER, 25¢

MARCONI

A D for INVENTORS

EDISON



DO YOU KNOW HOW TO GET A PATENT?

LEARNING REPAIR WORK

A Publication Devoted to Progress in Radio

Service Work
Engineering
Experiments
Measurements

Set Building
Short Waves
DX Reception
Amateur Activity

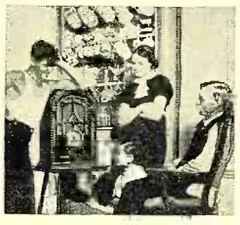
Television
Electronics
Broadcasting
Applications

Exiled . . . off Nova Scotia's lonely coast . . .

yet the world is his—at the turn of the dial

Like his father before him, William J. Faulkner keeps the lamps burning in desolate Devil's Island lighthouse.

Yet the isolation that his father knew is not his lot—thanks to a new General Electric All-wave Radio.



A General Electric All-wave Radio will take you on thrilling voyages of discovery. . . you'll hear scores of foreign stations.

And as to your favorite domestic programs . . . no other radio can bring them in with such fidelity and brilliance of tone.

and for the expert . . .

Amateurs and those who are expert in radio, will appreciate the technical superiorities found in General Electric All-wave Radio. Note these advances: Pre-selection. Dual tuning ratio of 10 to 1 and 50 to 1. Band-spread tuning, with extra needle and individual scale, making exact logging possible. High-gain, 6-watt audio system, feeding a large built-in dynamic speaker. Adapted for use with double doublet antenna, minimizing noise, and can be adapted for C. W. without chassis changes. (Write for complete information.) Visual band indicator shows frequency range in use.

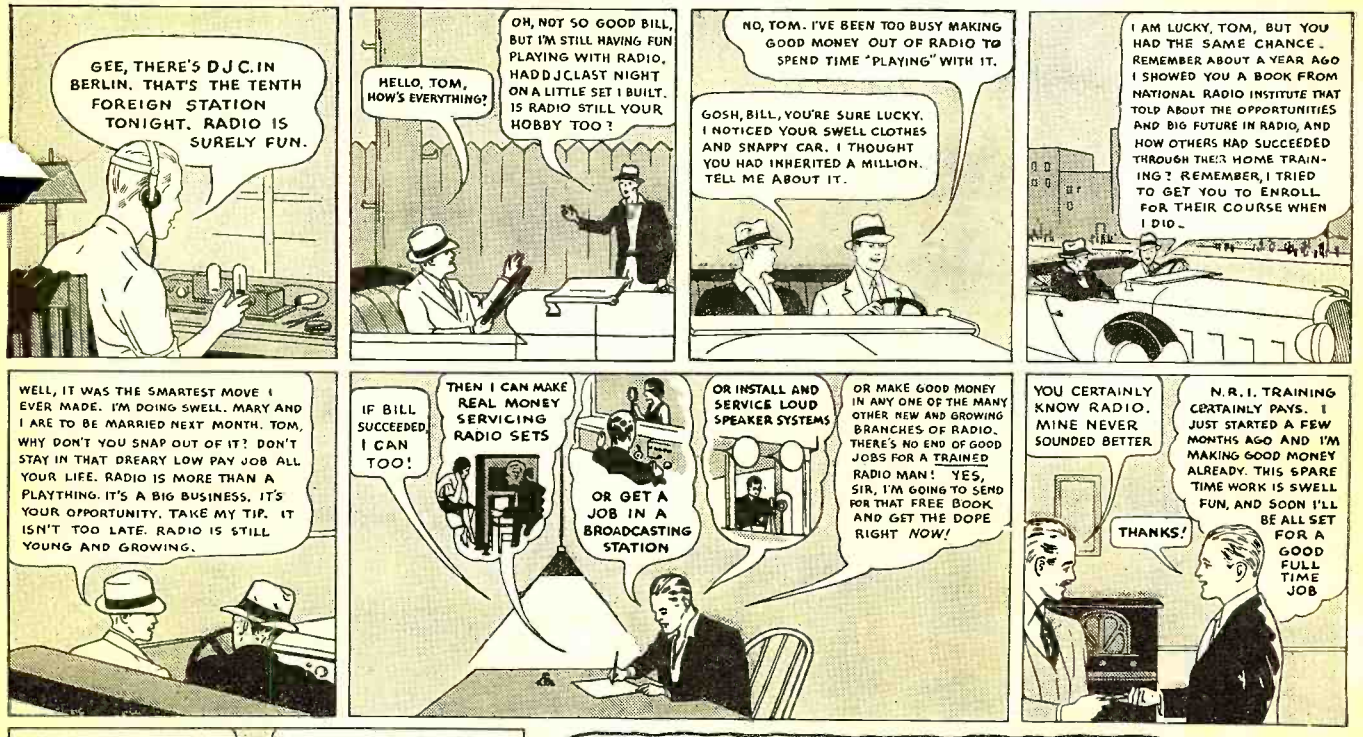
Many superb standard, short-wave, and all-wave models, ranging from $39.95 to $375. Prices slightly higher in the West, Mid-West and South. Subject to change without notice.

See your nearest G-E Radio Dealer, or write the General Electric Co., Merchandise Dept., Section R-8812, Bridgeport, Conn.

General Electric All-wave receiver Model M-81. Four frequency bands: 140—410 Kc., 540—1720 Kc., 1720—5400 Kc., 5400—18,000 Kc. Priced at $97.50 complete.

GENERAL ELECTRIC ALL-WAVE RADIO

How a "Tip" got Tom a Good Job



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

Many Radio Experts Make $40, $60, $75 a Week

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

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

The day you enroll I send you directions for doing 28 Radio jobs common in almost every neighborhood for spare time money. I give you plans and ideas that have made $200 to $1,000 a year for many N. R. I. men in spare time. My Course is famous as "The Training that pays for itself."

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

In just about 15 years Radio's growth has created over 300,000 jobs. Thousands more jobs will be opened by new Radio developments. Broadcasting stations use engineers, operators, station managers and pay up to $5,000 a year. Manufacturers employ testers, inspectors, foremen, engineers, servicemen, buyers, for jobs paying up to $7,500 a year. Dealers and jobbers employ servicemen, salesmen, buyers, managers, and pay up to $100 a week. My Free Book tells about these and other opportunities.

Television, Short Wave, Loud Speaker Systems Included

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

Find Out What Radio Offers You

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

J. E. SMITH, President
Nat'l Radio Institute, Dept. 4NR
Washington, D. C.

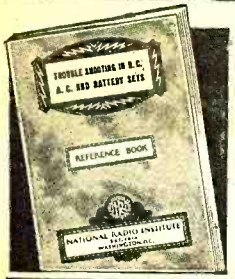
HERE'S PROOF THAT N.R.I. MEN MAKE GOOD MONEY

"Made $6,000 in 2 Years"

"Soon after the depression started, I found myself without a job, but I was well protected with N. R. I. training. I swung right to full time Radio servicing and I have made over $6,000 in a little over two years."—Wm. Spartivent, Sparty Radio Service, 93 Broadway, Newark, N. J.

"$500 a Year in Spare Time"

"Although doing spare time Radio work only, I have averaged about $500 a year extra in addition to my regular income. Full time Radio work would net me many times that amount."—Edw. H. Fawcett, Slough Rd., Ladner, B. C., Canada.



FREE: Radio Servicing Tips

Let me PROVE that my Course is clear, easy to understand, and fascinating to study. Send the coupon for a free lesson. "Trouble Shooting in D.C., A.C. and Battery Sets." This interesting lesson gives 132 ways to correct common Radio troubles. I am willing to send this book to prove that you, too, can master Radio—just as thousands of other fellows have done. Many of them, without even a grammar school education, and no Radio or technical experience, have become Radio experts and now earn two or three times their former pay. Mail the coupon now.

J. E. SMITH, President, Department 4NR
National Radio Institute, Washington, D. C.

Dear Mr. Smith: Without obligation, send me the Reference Book and your free book about spare time and full time Radio opportunities, and how I can train for them at home in spare time. (Please print plainly.)

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

ADDRESS.....

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

M

MAIL THIS for FREE 64 page book

Vol. XVI
No. 6

RADIO NEWS

December, 1934

Edited by LAURENCE M. COCKADAY

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THIS MONTH—

Inventions

Aircraft Radio

Amplifiers

Short Waves

Measurements

NEXT MONTH—

The January issue contains a wealth of new material, including Latest Developments and Future Trends in Radio.

For the DX fan: The DX Corners are growing and bringing you the finest Short-Wave and Broadcast-Band information you can get anywhere.

For the serviceman: Data on Service Work, including Technical Methods and Hints on Running Your Business!

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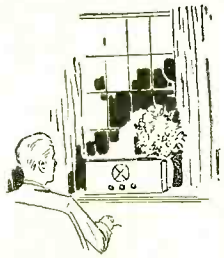
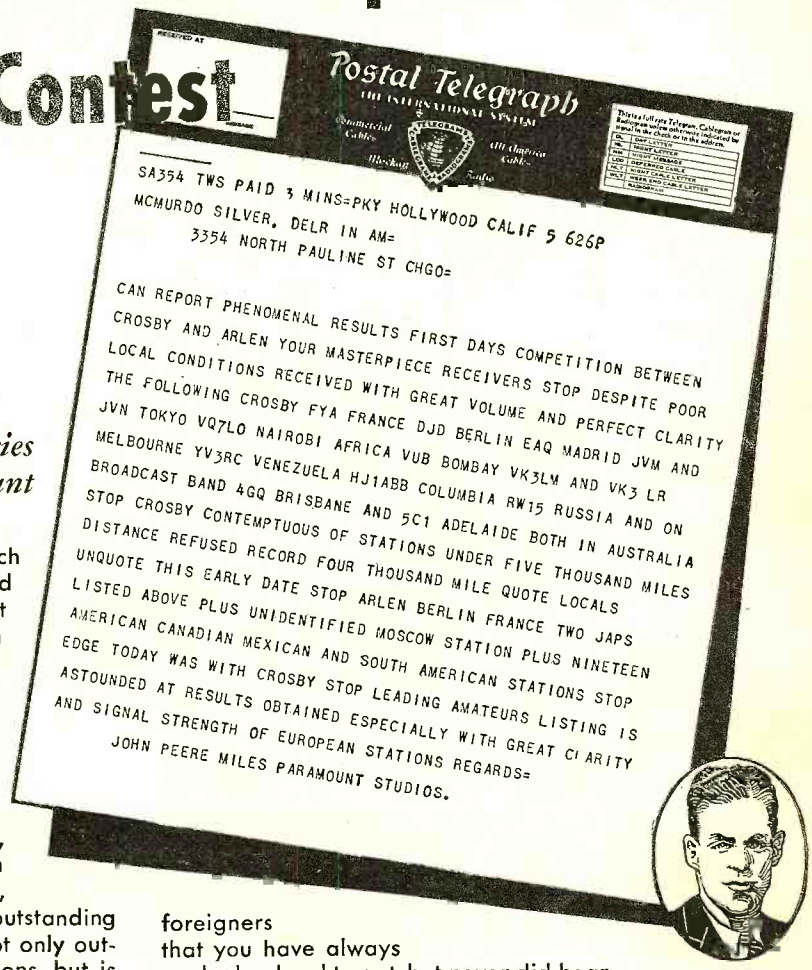
MASTERP ECE III

Smashes All Distance Reception Records in California Contest



122 Stations from 28 Foreign Countries in One Week . . . all 5000 Miles Distant



Postal Telegraph
THE INTERNATIONAL SYSTEM

SA354 TWS PAID 3 MINS=PKY HOLLYWOOD CALIF 5 626P
MCMURDO SILVER, DELR IN AM=
3354 NORTH PAULINE ST CHGO=

CAN REPORT PHENOMENAL RESULTS FIRST DAYS COMPETITION BETWEEN CROSBY AND ARLEN YOUR MASTERPIECE RECEIVERS STOP DESPITE POOR LOCAL CONDITIONS RECEIVED WITH GREAT VOLUME AND PERFECT CLARITY THE FOLLOWING CROSBY FYA FRANCE DJD BERLIN EAQ MADRID JVM AND JVN TOKYO VQ7LO NAIROBI AFRICA VUB BOMBAY VK3LM AND VK3 LR MELBOURNE YV3RC VENEZUELA HJ1ABB COLUMBIA RW15 RUSSIA AND ON BROADCAST BAND 4GQ BRISBANE AND 5C1 ADELAIDE BOTH IN AUSTRALIA STOP CROSBY CONTEMPTUOUS OF STATIONS UNDER FIVE THOUSAND MILES DISTANCE REFUSED RECORD FOUR THOUSAND MILE QUOTE LOCALS UNQUOTE THIS EARLY DATE STOP ARLEN BERLIN FRANCE TWO JAPS LISTED ABOVE PLUS UNIDENTIFIED MOSCOW STATION PLUS NINETEEN AMERICAN CANADIAN MEXICAN AND SOUTH AMERICAN STATIONS STOP EDGE TODAY WAS WITH CROSBY STOP LEADING AMATEURS LISTING IS ASTOUNDED AT RESULTS OBTAINED ESPECIALLY WITH GREAT CLARITY AND SIGNAL STRENGTH OF EUROPEAN STATIONS REGARDS=
JOHN PEERE MILES PARAMOUNT STUDIOS.

McMurdo Silver

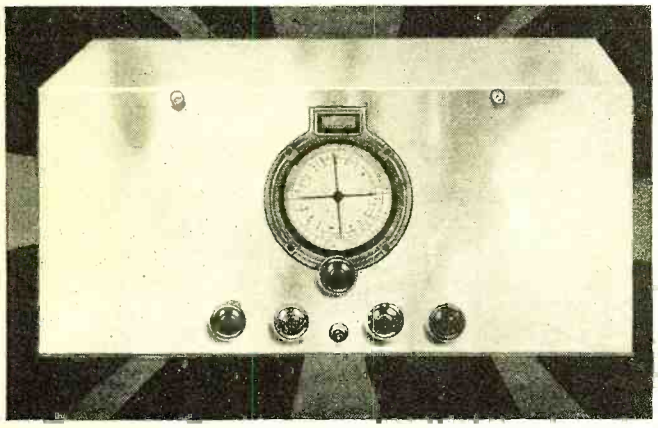
Bing Crosby and Richard Arlen, each using a Masterpiece III, have broken all established records for domestic broadcast and foreign short wave reception. 122 stations in a week! 28 foreign countries logged! Every station at least 5000 miles away! The Masterpiece III, that I will build to your order, will be fully as capable as the two receivers used by these two famous people in the Hollywood International DX Contest.

• • • •

Masterpiece III, by any standard of measurement, by any kind of competitive tests, and in the opinion of everyone who has seen it in action, we believe, is the most complete, the most capable, the most outstanding all-wave radio receiver ever engineered. It will not only outperform anything else in laboratory demonstrations, but is positively and unconditionally guaranteed to out-perform any other radio receiver in existence . . . right *in your own home!*

Greatest Foreign Reception Ever Heard

Masterpiece III yields a volume and a quality of tone on transoceanic reception under average conditions, unbelievable excepting to those who have heard it. It brings in with unmistakable identity those small, low-powered foreigners that you have always worked so hard to get, but never did hear.



Band Spread Tuning With New Watch Dial

MASTERPIECE III has more really new features than any receiver brought out to date. Among them is the new watch dial. Simply pull out the tuning knob and the second dial pointer spreads out the crowded short wave band over the full 180 degree scale! Masterpiece III provides actual band-spread tuning over all four wave bands, making short wave tuning just as easy as tuning on the broadcast band.

10 DAY TRIA

Everyone who has tuned and heard Masterpiece III wants to keep it. Columbia Broadcasting System heard it, tested it, then installed it as *official* studio receiver in Chicago. You can put Masterpiece III to the same tests, under your own reception conditions . . . without risking one cent of your money. You can try it 10 full days, then send it back if you want to. It's just as simple as that. Check the coupon and mail it at once, for particulars and full details of Masterpiece III's most amazing specifications.

McMURDO SILVER, INC.
3352 N. Paulina Street, Chicago, U. S. A.
Send me full particulars and specifications of Masterpiece III.

Name.....

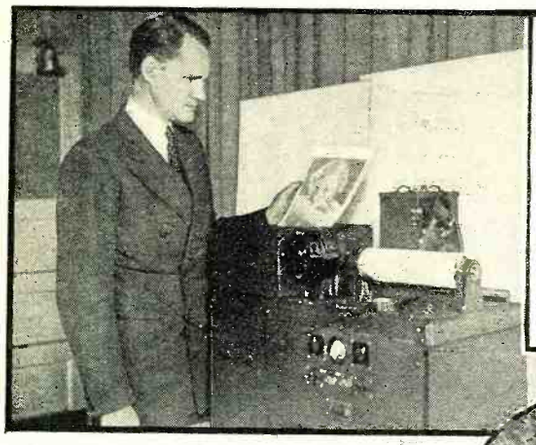
Street.....

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

McMURDO SILVER, INC.
3352 N. Paulina Street Chicago, U. S. A.

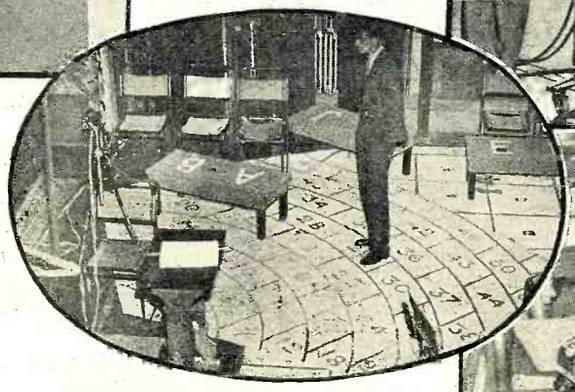
DOTS • • • • • and — — — DASHES

Short but Interesting Items from the Month's Radio News the World Over



NEW FACSIMILE SYSTEM

Charles J. Young, research engineer with RCA Victor, demonstrates newly invented facsimile transmitter and receiver. He is son of Owen D. Young



NUMBERED CARPETS FOR BROADCASTING

Scene in St. George's Broadcasting Hall, showing sectionalized and numbered carpets, that tell each artist just where to stand for perfect microphone technique

LATEST TELEVISION PICKUP

Top photo shows Philo T. Farnsworth, young television inventor, explaining to Frank Shields (left) and Lester Stoeffen (right), United States Davis Cup Team players, his newest devices for pick-up television scenes. Below: The Rev. Henry S. Rubel, also an old-time radio amateur, who writes funny songs and sayings for Joe Penner

Television Phones Planned in Reich

BERLIN, GERMANY—The German Post Office recently announced a spectacular plan for introducing television-telephone in the near future. Trials have been made between Berlin and Munich, with satisfactory results, it is reported. Postal authorities now plan the installation of television-telephone circuits linking the larger cities.

New Tube Makes Speedy Objects "Stand Still"

PITTSBURGH, PA.—The new Ignitron tube is a device, developed by Westinghouse engineers, that makes bullets, whizzing through space and revolving airplane propellers, spinning in high speed, appear to stand still as if at rest. The light from the device, pulsating at extremely high speeds, "freezes" the objects so that they only appear to be stationary.

Launching a Ship by Remote Control

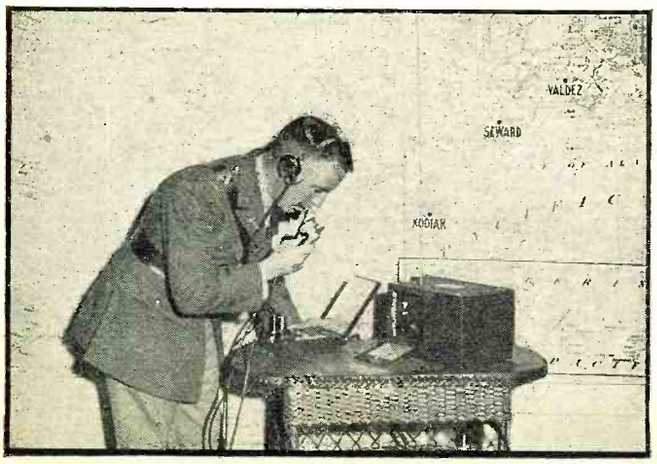
LONDON, ENGLAND—The new 20,000 ton steamship "Orion" launched at Barrow, England, started on its career by the throwing of a switch in Brisbane, Australia. The Duke of Gloucester pushed a button in Brisbane sending a signal by short-wave, to England causing the ship to be launched. This is the first time that a British ship has been launched from the other side of the world. However, ships of other nationalities have been controlled from a distance. During the month of June, the Prime Minister of the Union of South Africa launched a ship at Amsterdam, Holland, by pressing a button at Pretoria, South Africa.

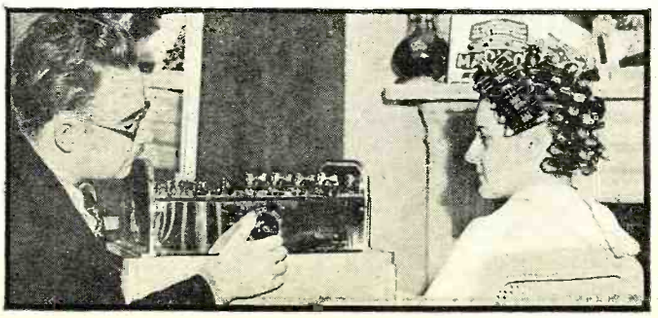
Two-way Radio for Boston Police Cars

BOSTON, MASS.—A mobile two-way radio system was demonstrated recently by engineers of the General Electric Company. Modified forms of short-wave radio transmitters and receivers have been used in the apparatus which is to be installed in the Boston district. Policemen in their cars may talk back to headquarters in this latest type of police radio apparatus.

A Versatile Clergyman

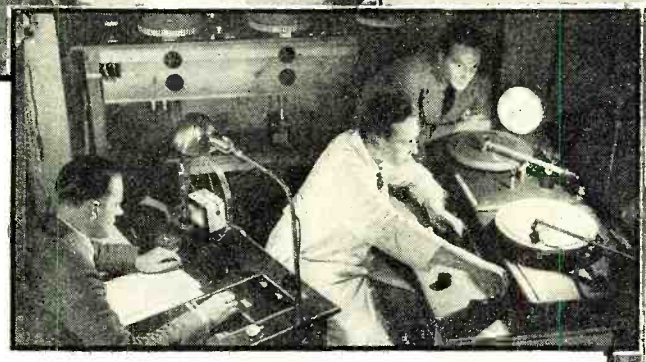
Believe it or not, but the man who creates most of the comedy situations and writes all the songs for Duck Salesman Joe Penner ("You Nasty Man!") is a dignified, soft-spoken clergyman who in years past has been a sailor on a mine sweeper, a pioneer radio amateur of prewar spark days, a commercial brass-pounder, a newspaper writer and an electrical engineer! A more unusual combination of talents is hard to imagine. That man is the Reverend Henry Scott Rubel, of Highlands, N. J., a tiny fishing village below Sandy Hook. As a boy in Cincinnati, Ohio, where he was born in 1898, he had a roaring spark station under the call letters 8EW and 8ZF. His study of electrical engineering at the University of Wis-





SHORT-WAVES vs. MARCEL-WAVES

At left: United States Army's latest six-meter ultra-high-frequency equipment operated by Lt. S. J. Keane at the Signal Corps Station at Ft. Monmouth, N. J. Below: Not a radio set, but simply the Beauty Doctor's latest mechanical contrivance for making permanent waves without wires



GERMANY'S MOBILE BROADCASTER

Above: Looking in a window at the recording apparatus in Germany's new radio-relay station. Top right: Illustration shows chauffeur and announcer rushing the microphone to a sport event. At right: Records being played in studio

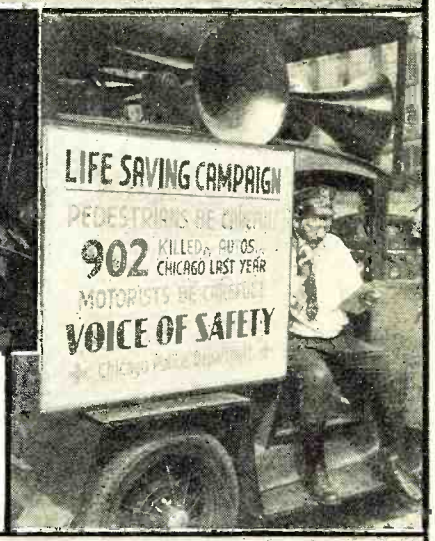
consin was interrupted by the World War, in which he served as a chief radio gunner. He returned to Wisconsin in 1920, graduated in 1923 and then turned to the ministry, graduating from the General Theological Seminary in New York in 1926.

British Royalty Heard on Radio Here

CHICAGO, ILL.—Ceremonies in which the Queen of Great Britain named and launched the liner, Queen Mary, at Clydebank, Scotland, were rebroadcast to American radio listeners, recently. The Queen's voice and the shattering of the bottle of wine against the ship and cheers of the crowd were plainly heard through the short-wave relay.

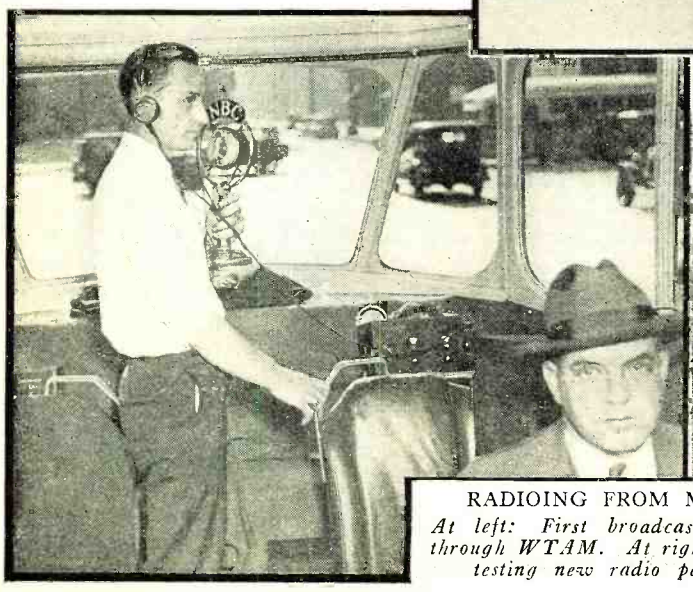
Short Waves from Vienna

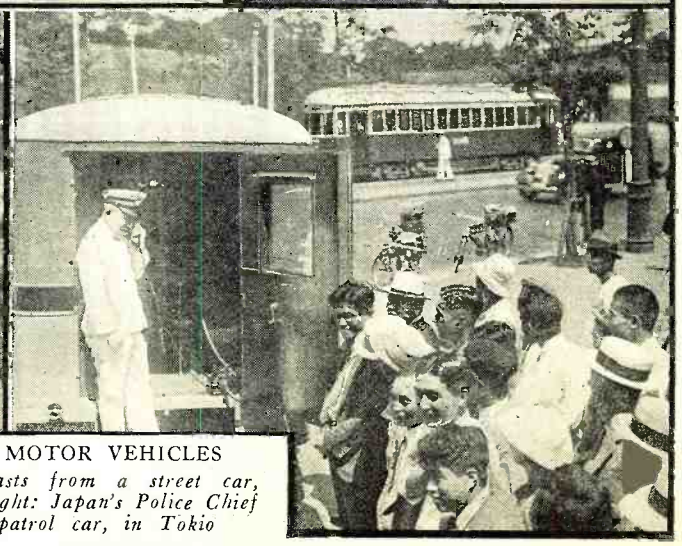
VIENNA, AUSTRIA—The short-wave transmitter OER2 now relays the official Viennese program on all week days from 14 to 22 G.M.T. The transmissions take place on a frequency of 6060 kilocycles with a power of 250 watts of output power.



VOICES OF SAFETY

At right: Police Radio car equipped with loudspeaker system for warning motorists and pedestrians of Chicago when they break traffic regulations. Below: The same type of installation in Washington, D. C.





RADIOING FROM MOTOR VEHICLES

At left: First broadcasts from a street car, through WTAM. At right: Japan's Police Chief testing new radio patrol car, in Tokio

You Need the Kit
You Need the Tool
You Need the Book

Here is the Most Complete Manual For Service Men Ever Published

Service men throughout America have heralded the appearance of a kit of six Yaxley Volume Controls that will service more than 2500 sets as *the greatest advance in volume controls* that the industry has ever seen. Service men in practically all States of the Union are saving time and making money with the beautifully finished Yaxley Wrench which is given FREE with every order for a Yaxley kit or in exchange for six tops from any Yaxley Control cartons.

You can't afford to be without the kit—you can't afford to be without the wrench. And you'll certainly want your free copy of the Yaxley Replacement Volume Control Manual—the most complete and authoritatively accurate service manual ever published, which tells all about the 30 new Yaxley Replacement Volume Controls that will service 98% of the 3200 set models now in existence. Mail the coupon now!

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- ☐ Please send free copy of Replacement Manual
- ☐ I enclose 6 carton tops for FREE Wrench
- ☐ I enclose $3.60 (which is 40% less than regular list price of Individual Controls) for Kit of 6 volume controls which entitles me to FREE Wrench.

Name.....

Address.....

My Jobber's Name is.....

Radio News

December, 1934

RADIO INVENTIONS

(The Editor—To You)

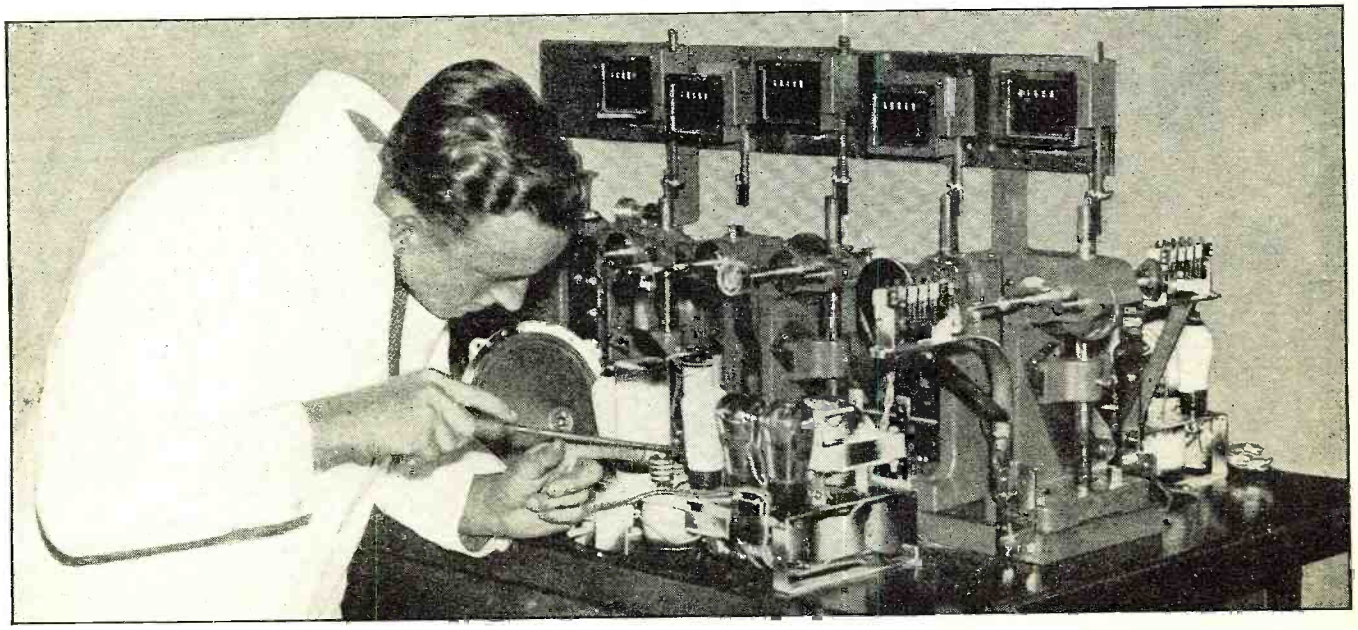
There is more misinformation than correct data circulated around, about inventions and patents, than for most other things that men have to deal with. To protect radiomen who are our readers from the folly to which some of this bad information may lead is a duty assumed by the Editors

NEW inventions are the cogs that keep the wheels of radio progress going. Hardly a new receiver is brought to production without one or more original ideas being incorporated in its make-up. The same holds true for transmitting apparatus, where improved efficiency, quality of transmission and power are items that the engineers are constantly bettering by new methods, many of which must be classed as inventions. And there is hardly a radio experimenter who, at some time, has not had at least a germ of an idea pass through his mind that might open out into an important new invention. But the lay mind has been filled with a lot of misinformation and bunk regarding inventions and patents. Inventions *are* important and patents *do* give the best kind of protection for *really good and new* ideas. But often the uninitiated is led to believe he can make a million dollars from an idea that may be absolutely worthless.

Your Editor believes that the "truth regarding inventions" should be told and should be told *convincingly, unhesitatingly* and *truthfully,* especially in this field where inventions are so important and where they can be made so easily. Such questions as: "Is my invention or idea worth money?" "Will it do the work for which it was intended better than the older ideas or apparatus?" "Will it find a worth-while commercial market?" "How may I protect it while I am working on it?" "Is it worth patenting?" "How may I get a patent?" "What protection will the patent give me?" "How may I proceed to market, sell or license my invention?" These are questions which are important for any radio man or any inventor to be able to answer—*correctly.* And the answers to these questions are what your Editor believes should be placed at the disposal of RADIO NEWS readers. And truthful, unequivocal facts are what our readers are getting from the pen of one of the world's authorities on these matters, himself an inventor and developer of many new and important ideas of his own and others. Start today and read and reread carefully this important series (*Continued on page* 375)

AN INGENIOUS INVENTION FOR LIFE TESTING RECEIVERS

This rather complicated piece of apparatus tests all the wearing parts of the receiver, shakes it, turns the dials back and forth and generally wears it out quickly, giving it a number of years' service in a few hours. An important invention for the radio production department



EVERYONE AN INVENTOR

Nearly every experimenter in radio at some time or other invents something, even though it might be such a simple thing as a new kind of a dial or an improvement on a dial

FIRST AID *to*

This is the second of the new series RADIO NEWS readers and explaining tions and patents. The present whereby the inventor can determine spending time and money on. facts about getting patent protection

Part Two

By E. E. Free, Ph.D.

IN the first article of this series, published last month, the effort was to explain what kinds of protection an inventor may expect for the children of his brain. One conclusion was that before a patent is applied for, or even considered, a first step should be to determine as surely as may be possible whether or not the supposed invention is useful and valuable enough to justify the expense of a patent or of anything else. The cost of patents may range from about one hundred dollars to many thousands of dollars, depending upon the care with which the patent case is prepared, the difficulty of preparing that case and prosecuting it before the Patent Office, and upon the experience and fee scale of the patent attorney employed. Even a hundred dollars is a lot of money nowadays. Before it is spent one should be sure that the expenditure is advisable.

WHETHER or not an invention is patentable is not the important point. As explained in our previous article, virtually anything is patentable. The first essential to be considered is whether the invention is *worth patenting?* To determine this the inventor must ask of himself and of his invention, it seems to me, four important queries. First is: "Has the invention an available market or other means of commercial utilization?" Second is: "Is it really new?" Third is: "Is the invention blocked or reduced to secondary position by some other patent owned elsewhere?" Finally, the fourth query is: "Will it really work?"

The matter of market (or other) value usually can be settled by a little honest and searching thought, or by a few inquiries in trade channels. The question of newness and that of possible interference from other existing patents usually can be determined by similar trade inquiries or by some search of printed literature.

The last and most important query, whether or not an invention really works, usually requires test or experimentation. It is foolish to begin any kind of patent application until this has been determined, not by guesswork but by unquestionable evidence.

The matter of a commercial market is usually the first thing to inquire about. If there is no visible or probable market, it is nonsensical to carry the matter further. Patents sometimes are taken out by large corporations for their problematical value in an unforeseen future. But for an individual this is like waiting to be famous after you are dead. It may happen, but the recipient of such postponed benefits is not likely to be much interested.

Because of the relatively short life of a patent, it seems to me merely common sense to insist that its commercial value shall be something already definitely in sight, not something to be hoped for in some imagined future. I do not recall ever having seen or heard of an invention patented for unseen future needs and which turned out to be really valuable.

Nine times out of ten, the decision whether or not an invention has a market can be made merely by common sense. The United States Patent Office once issued, I am informed, a patent on an automatic apparatus for tipping gentlemen's hats. A clockwork mechanism was placed inside stiff hats such as high silk hats or derbies and was operated by a pendulum. Whenever the owner's head bent forward in a bow the hat rose automatically and presently settled back into its place. Not much common sense should have been needed to see that such an invention was commercially foolish. Most men prefer to tip their own hats.

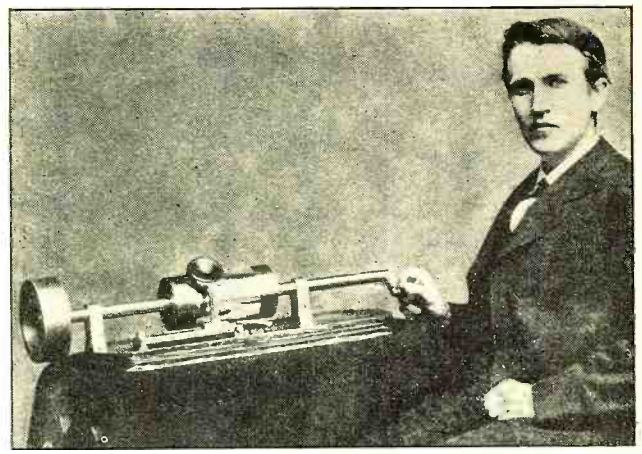
In the radio field, it would be simi-

AN INGENIOUS MACHINE FOR RECORDING ECHOES

S. S. Kirby, associate physicist in the Radio Department of the Bureau of Standards, operating a machine invented to record radio echoes. Number 1 is the receiver, number 2 is the converter and number 3 is the recording oscillograph

INVENTORS

of articles written exclusively for
many little-known facts about inven-
installment outlines a method
whether or not his idea is worth
Installments to come will give the
for your ideas and cashing them in



A FAMOUS INVENTOR

Thomas Alva Edison pictured in the days of his first success with his talking cylinder, the forerunner of the phonograph. He was sure his invention would be useful and that led him to carry through with the enormous amount of work necessary to perfect and protect it

larly foolish, nowadays, to patent a new way of adjusting the cat-whisker on the surface of a detector crystal. Radio has moved so far in advance of this once well-known technique that I suspect many of my readers may not even know what I am talking about.

Among inventions more in line with modern techniques or with habits of present-day people, decision as to commercial value may be more difficult. The chief rule is to be completely critical and "hard-boiled" about one's own ideas. Try to look at your own invention *not with the fond eye of a father who hopes to make much money if the child grows up, but with the cold and billious eye of the banker who is asked to lend money to send that child through school and who is promised nothing by way of security except the child's hope of success.*

I have found two devices of value to prevent fooling one's self. One is a formal rule. If an article or process already has some one waiting to buy it, with real money instead of hopes, it is worth while to try to develop the technical side of that article or process. Again, if an invention is completely ready for manufacture and marketing, it may be worth while to try to find or to develop the market for it. But if any idea still needs *both* technical development and market development, that is a good idea to let alone! There may be exceptions to this rule, but profitable business seldom is done on exceptions. It is done on averages.

The other insurance against self-deception is to make a superficial but actual market inquiry. If your invention is something which large corporations might use, ask one or two of them whether they would be interested. No corporation will offer to buy, or even to study, your invention "sight unseen," but a reasonably good judge of human nature usually can tell, from the kind of replies you get, whether anybody really is interested or whether your correspondents merely are being polite.

If your invention is something to be sold to the general public (or to some fraction of it such as the radio public), ask typical individuals whether or not they would buy the thing you hope to produce.

Don't get mad if they say "No." That is precisely the information you want! Don't nurse any idea of reforming the public or converting it to your point of view; of "creating" any demand which does not already exist. These things can be done, but they are tasks for persons or organizations with patience, skill and enormous capital. A cardinal rule, which should be tacked on every laboratory wall and slipped under the glass top of every business man's desk, is this: Unless you already have made at least a million dollars in some merchandising activity do not imagine yourself competent to make the public buy any article or service that it does not already want!

In the first article of this series I said that one common mistake of inventors is to imagine that people are trying to steal their inventions. Perhaps an equally common one is to disbelieve or explain-away discouraging advice. Someone who tells you that your invention is no good may be wrong about it, but this is unlikely. Most people like to please others. If you ask an acquaintance, or even a stranger, what he thinks of the value of your invention, the easiest reply to make is that it "looks valuable." Only the rare individual will go out of his way and run the risk of your displeasure or anger by telling you an unpleasant truth. You must learn, therefore, to judge your answerer's real opinions more by his manner and phraseology than by what he actually says. And you must give much more weight to *unfavorable advice* than to the *favorable kind.*

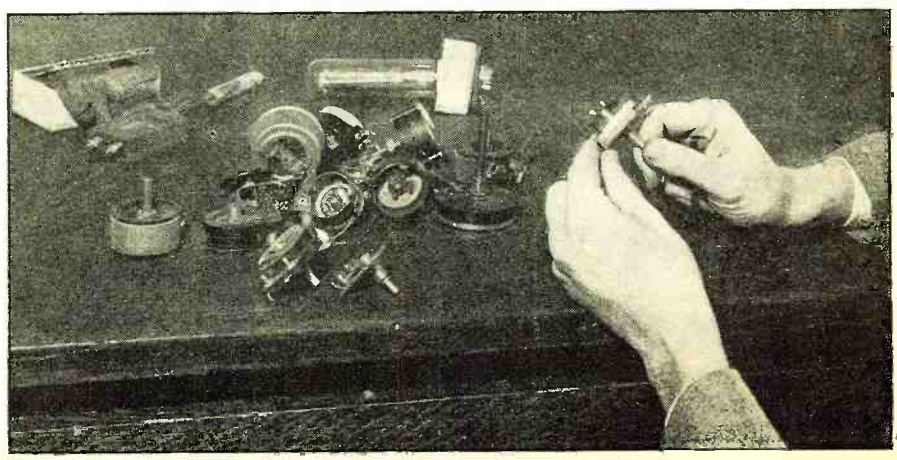
To decide the second point, of whether or not your invention is really "new," the best guide is acquaintance with the art or science in which the invention lies. People do frequently make valuable inventions in fields in which they are not themselves expert. Farmers may invent valuable machine tools. Mechanics may devise improved ways of farming. (*Continued on page* 380)

Follow This Series

DON'T be discouraged if Dr. Free tells you some startling facts uncovering the "bunk" generally prevalent regarding inventions. Follow his series and learn the real facts that may enable you to make real money out of good inventions and to save you from spending money on poor ideas.

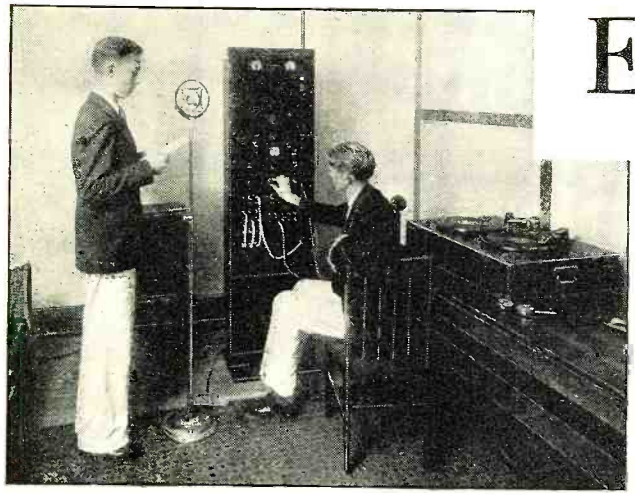
DO YOU REMEMBER WHEN IT WAS FIRST USED?

It is rumored that anyone who can prove the use of a volume control, or other variable resistance unit on which was combined an a.c. power snap switch controlled by the same knob, and in use before September, 1927, would have made a discovery worth considerable money. Can you prove it?



EDUCATION "MAKING

Part One



REAL BROADCAST EQUIPMENT

Students enjoying facilities offered by extensive laboratory and broadcast equipment at the Capitol Radio Engineering Institute

By Zeh Bouck

MAKING a living in radio involves the fundamental factor of training. As in every other line of endeavor, the one who knows his job best will, ambition and application being equal, forge ahead. In radio, it being essentially a technical field, specialized training is indicated in all its subdivisions. In the order of the number of students receiving instruction for definite radio jobs, the field can be more or less arbitrarily subdivided into —*Radio Servicing—radio operating—engineering* and *miscellaneous,* which last covers sales, factory work, writing and executive positions. That more radio students are going in for servicing than for the other related efforts, can be explained by the facts that the possibilities are relatively unrestricted, an independent and profitable business is practically assured to the intelligently ambitious, and there are practically no limitations imposed by age or previous education.

From the experience of the writer, which includes ten years of intimate contact with servicemen all over the world, the following tabulation of the manner in which special training for radio service work has been acquired, would seem justified:

Correspondence schools.....	50%
Resident service schools	20%
Residence training as part of regular schooling—manual training, etc.	5%
Total specially trained.....	75%
Self-trained	25%
	100%

Self-trained radio servicemen are recruited from the ranks of commercial operators, amateur operators, and radio fans and experimenters who have taken their hobby seriously enough to look into it and find out what makes the wheels go round. Of course, the average commercial operator is the product of a training school where the fundamentals of radio have been well inculcated —though many are graduated directly from the files of amateurdom.

It may be stated right here that one's training as an amateur provides the finest foundation for any sort of radio work—from servicing to engineering. The amateur is exceedingly well-informed on things radio, because learning is a pleasure. His heart, as well as his ambitions are wrapped up in radio. Many of today's foremost engineers were amateurs ten or twenty years ago. But the percentage of school-trained men over the self-trained is steadily increasing—a consideration of some significance, though it may be partly explained by the fact that relatively few radio-service courses were available a decade ago.

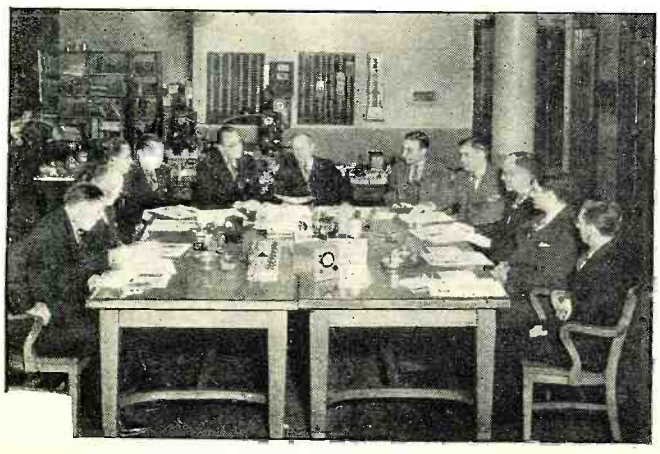
Resident training has some distinct advantages over that by correspondence. The intimate contact with the instructor, the association with students facing similar problems, the completeness of equipment and the discipline are all conducive to a rapid and thorough assimilation of knowledge. The average cost of a resident service course is $75.00, while that of comparable training by correspondence averages $112.00. There are some exceptions, naturally, but where the resident course is much higher than the correspondence training (as in the case of the Capitol Radio Engineering Institute) it is because the resident student receives an altogether different and more intensive instruction.

Unless the student is so fortunate as to live at home within walking distance of a residence school, the costs of commuting, or living expenses must be added to the price of tuition. This will necessarily vary (with the taste and habits of the individual) but the minimum costs will seldom be lower than those calculated by the Dodge's Telegraph and Radio Institute, Valparaiso, Indiana, of $4.75 per week, for furnished room and board. Also, the majority of prospective servicemen are forced to make a living during the period of study—usually on a day-time job, which eliminates them as possible students in most resident courses. However, some schools, such as the New York City Y. M. C. A., provide evening instruction for such cases.

Where residence attendance is physically inconvenient or impossible, recourse must be to home-study. This is a thoroughly tested and effective method of attaining a radio-service education.

EXPERT EDUCATIONAL AIDS

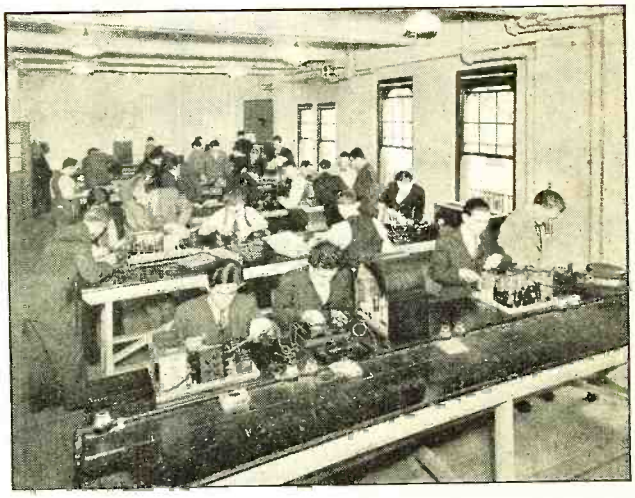
At left: The advisory board of the Radio and Television Institute in session. At right: View of the instruction department where lessons are graded and technical queries are answered at the National Radio Institute



for A LIVING IN RADIO"

The Serviceman

Making the most of one's ability and pocketbook in securing adequate training for specialized radio jobs. This month's installment covers the problems outlined in thousands of letters from servicemen readers to the Editor



INSTRUCTION IN SERVICING

Resident students at the New York Y. M. C. A. getting practical experience in service work

It is the opinion of the writer that, despite the great advantages of class and laboratory attendance, the *student who satisfactorily completes a modern correspondence course,* has every bit as much chance for success as the graduate from a resident school. This is because the home-study serviceman has made good *altogether on his own*—without the moral support of the class and the discipline of the instructor—and has demonstrated a conscientiousness and application which augur well for his future work.

The correspondence schools are making every effort to compensate the desiderata of home-study, as well as to provide features not found in residence courses. The lessons in the various courses inspected have been carefully and intelligently prepared. We have every reason to believe that the student exams. are thoroughly and conscientiously corrected by the distant instructor. The regular instructing staff is usually supplemented by a technical (or consultation board) composed of competent engineers whose vital function is *keeping the course up-to-date!*

Most of the correspondence schools endeavor to make up for lack of laboratory facilities, to a slight extent, by furnishing equipment sufficient for a course of experimental work. N. R. I. for instance, provides five kits of parts, from which oscillators, vacuum-tube voltmeters, ohmmeters, etc., can be made, and which, following completion of the course can be built-up into several pieces of permanent test equipment. Somewhat similar apparatus is included in the correspondence course of the Radio and Television Institute. An exception to the rule of furnishing equipment is the Capitol Radio Engineering Institute. As over ninety-five percent of the 1500 students enrolled with this school are already engaged in making a living in radio, it is justly assumed that equipment and facilities *are* available. As a matter of fact the outfits supplied by the other schools do not comprise a complete radio laboratory (nor are they intended as such), but should always be supplemented by additional equipment as the student progresses.

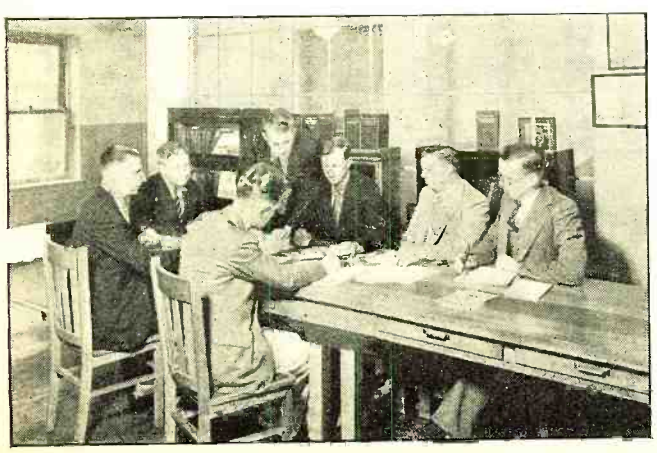
The majority of correspondence schools devote a part of their courses to the merchandizing end of servicing—sales promotion, publicity advertising, etc. Again C. R. E. I. is an exception; as President E. H. Rietzke writes: "When a serviceman enrolls with us, we assume that he has a mechanical knowledge of his profession, that he has access to service manuals and that he keeps up with current publications and trade papers. Our idea is to take him from that point and give him a practical technical education in his profession."

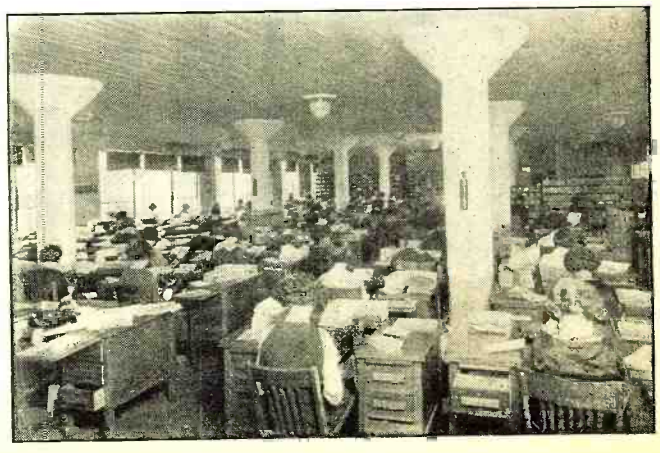
The correspondence schools, as a rule, go in for mathematics a bit more extensively than the resident courses. The regular course of the Capitol Radio Engineering Institute carries the student through algebra, trig and geometry. N. R. I. ordinarily includes only algebra (but further instruction is available); and the same holds for R. T. I.

The correspondence schools maintain a consultation service which becomes available immediately upon matriculation, and continues, *ad infinitum.* This is often of considerable benefit to the serviceman after the completion of his course and when he is confronted with unusual problems, technical and otherwise, out in the field. The National Radio Institute has oragnized an Alumni Association, (*Continued on page* 388)

SOLVING YOUR PROBLEMS

At left: An educational meeting of instructors and department heads at the National Radio Institute weekly meetings for solving new student problems. At right is the stenographic department at R. T. I.





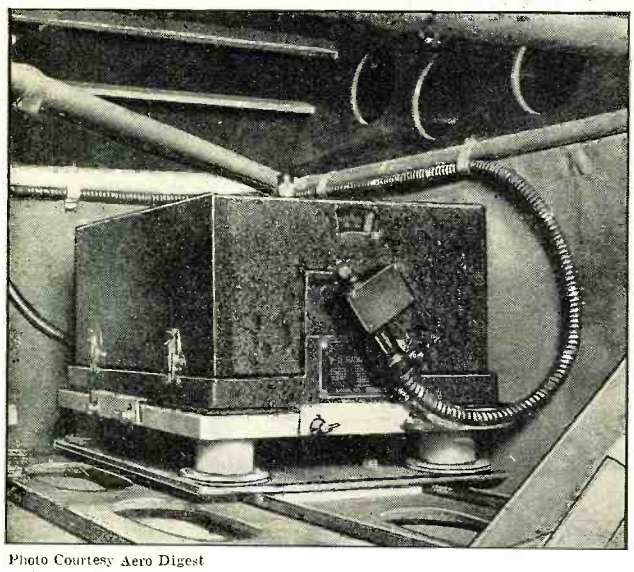


Photo Courtesy Aero Digest

MOUNTED IN THE FUSELAGE

Here is a clear illustration of modern methods of mounting a remote-control radio receiver in an airplane. Note the anti-vibration supports

RADIO *in*

INSTALLATION

(Receiver

Radiomen! Are you ambitious? something of a new field in radio series of articles on aircraft radio, who will tell RADIO NEWS tunities awaiting radiomen and tion they

Henry W.

Part

THERE is a new and important field opening in the radio industry — Aircraft - Radio. Further progress in flying, both commercial and private, is inseparable from greater use of radio aids, on the ground and in the air, from communication, navigation, and even in making a "blind" landing without seeing the ground.

Progress in American aviation, and especially in private flying, is inevitable. Most people like to fly, many own their own airplanes, and it can be confidently predicted that within five years a hundred thousand airplanes will wing their way back and forth over our country.

The airplane of today is reliable mechanically, comparatively inexpensive, and easy to fly—in fact, flying in clear weather is easier than driving a car—and the chief deterrent in the path of more popular adoption of this unsurpassed means of transportation by potential airplane owners has so far been the difficulty of *navigation under adverse weather conditions.*

Several radio aids to flying have been developed, mainly by the U. S. Department of Commerce, and are now available to all users of our sky lanes whose airplanes are equipped with radio. Fair weather or foul, radio makes it simple for a flyer to follow his course accurately, keeps him informed of weather conditions, and can even guide him to a safe landing on a fog-glutted airport. Today, every air-liner carries radio equipment, and private fliers are installing radio apparatus in their ships as fast as the low cost of the installation and its inestimable benefits are brought home to them. Our Government, as well as private companies, are investing literally millions of dollars in aircraft radio research and equipment; many more millions will be spent, because radio is vital to aviation.

The need for trained radio men familiar with aviation is already felt. A great opportunity beckons to the radio engineer, the radio operator, and the serviceman. The alert radio man will find that time and effort which he may now invest in becoming thoroughly familiar with aircraft radio installation and service will soon pay him handsome dividends. At your local airport, right now, there is enough work to make it worth your while.

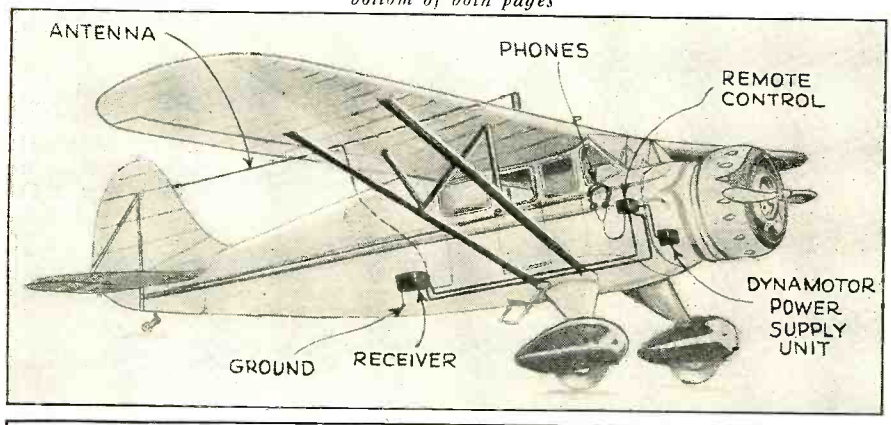
An aircraft radio installation must possess the following characteristics: (1) it must be compact and light in weight, yet rugged; (2) it must be sensitive, selective, and clear in speech reproduction; (3) it must be consistent in operation at all engine speeds and reasonably independent of weather conditions.

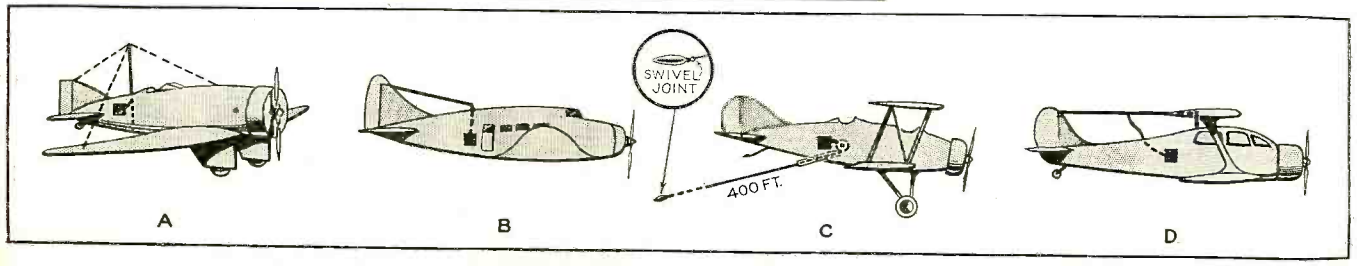
The first characteristic is already taken care of by the designer and the manufacturer. Modern aircraft receiving sets weigh 30 lbs. or less, including the receiver, the remote control, and the power supply unit, but excluding the antenna system and mountings. This compares with 50 lbs. and more but a few years ago. The only item here under the direct control of the serviceman is the antenna system and the mountings; their ruggedness must under no circumstances be sacrificed for a small saving in weight.

Aircraft receivers of today are extremely sensitive, capable of reproduc-

TYPICAL RADIO FOR PRIVATE PLANES

Figure 1. The installation of radio for a private airplane, including the antenna, the receiver, the control unit, the power supply and the wiring. Figure 2 across bottom of both pages





AIRCRAFT

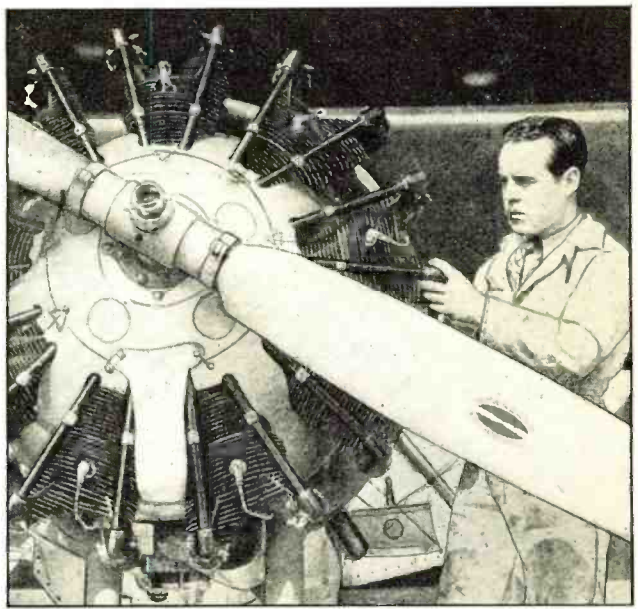
AND SERVICE

Installation)

Here is a chance for you to learn application. This is the first of a by an authority on the subject readers of the many new opporgive them the technical informawill need

Roberts

One



LEARN RADIO FOR AVIATION

Many opportunities await the radioman in the aviation field if he has the training to enable him to cope with the many irregularities of installation and repair

ing faithfully signal intensities as low as 2 microvolts; and possess a high degree of selectivity, usually in the order of 10 kilocycles. Higher selectivity would be impractical from the operating standpoint, even with a high gearing of the tuning condenser. These factors, once again, are in the hands of the designer and the manufacturer.

The most vital factor of all, however —the reliability of the complete installation, and clarity and consistency of reception—are almost entirely in the hands of the serviceman. The task of the serviceman is to select and make the best installation of a particular set in a particular airplane, to perform a specific service.

It is a bad policy to spare money on aircraft radio. Like a parachute, *it is relied upon in an emergency!* A poor radio installation is worse than none, because it may lull the pilot into a false sense of security and send him through weather which he would not attempt to tackle without a dependable set in which he could place complete confidence. There are many aircraft radio sets commercially available, carefully designed and well built. The selection is governed by the particular function which the set will be called upon to perform, and by the power supply most easily available in the airplane.

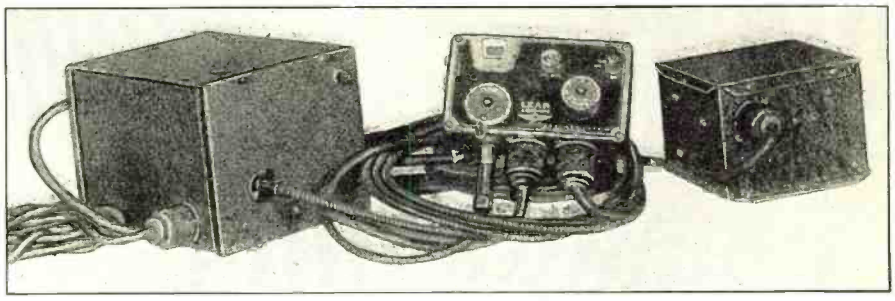
Radio in aviation is used for: (1) receiving weather reports and course indications from radio range beacons; (2) two-way communication with ground stations and ships in flight; (3) "blind" landing; and (4) broadcast reception for entertainment. The majority of private airplanes need only carry receiving equipment, transmitters being generally costly and heavy. A receiving set alone is amply sufficient for safety in all ordinary private flying.

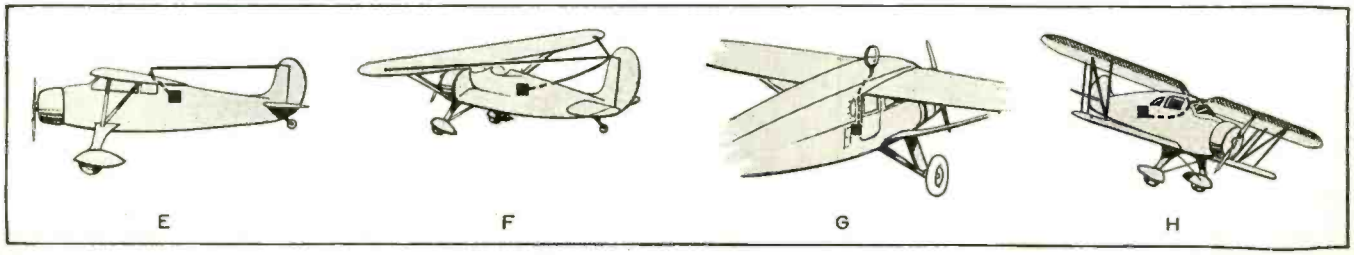
The power is usually supplied by the standard 12-volt aircraft battery, which is a part of the ignition system of most airplanes. Higher voltages are supplied by a "B" eliminator, or a dynamotor. Some receiving sets are designed to operate on 12-volt dry cell supply, and even on 6-volt supply. The "B" eliminator, if properly constructed and shielded, is generally quite satisfactory, and sufficiently reliable. Nevertheless, it is a good practice to install the "B" eliminator where it can be reached by the pilot, as the "B" eliminator will occasionally stop, and a sharp tap by hand is sometimes required to restart it. The dynamotor has usually been the preferred type of high-voltage supply, as its operation is rotary instead of vibratory, the construction is sturdier, and there is no possibility of electrical interference because of radiation leaks. However, in extremely cold regions, where flying is usually done in sub-zero temperatures, the "B" eliminator installation is to be preferred. The lubricant in the dynamotor, at very low temperatures, sometimes congeals to such an extent that the dynamotor shaft fails to turn over, rendering the radio useless.

Unless the set is designed to operate on a dry-cell battery supply, a suitable generator must be provided. Some airplane engines have engine-driven generators as standard equipment; if not, one should be installed. In general, engine-driven generator installations are to be preferred to the wind-driven type. The latter are more expensive, more difficult to (*Continued on page* 386)

STANDARD AIRCRAFT RADIO APPARATUS

This illustration gives an idea of what the receiver, at left, the remote control unit, center, and the power unit, right, look like. The text of the article describes such an installation



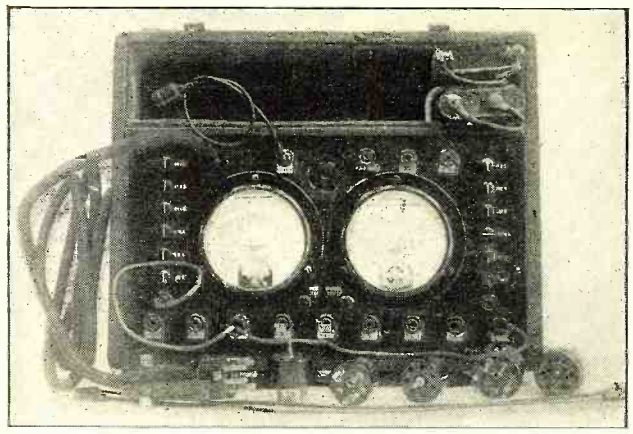


ANALYZER MODERNIZING

(The Jewell 199)

This simple, low-cost method of modernizing the popular Jewell 199 is also applicable to other testers

E. J. Sampson



THE ANALYZER BROUGHT UP TO DATE

THIS Jewell model, popular and commonplace as it was some five years ago, is now quite out of date, since the circuits of six- and seven-prong tubes cannot be analyzed, let alone the five-prong pentodes, Wunderlich, etc. About 18,000 of these set analyzers have been rendered obsolete by the invasion of new tubes and circuits. However, it is unnecessary to junk these set testers. In fact a very useful and up-to-date set analyzer can be easily made from the Jewell 199 with but little effort and *for less than* $7.00 *cost*.

After revamping, the analyzer will measure current in any tube circuit on any of the following three scales: 0-1.2, 0-12 and 0-120 milliamperes d.c. As for voltage measurements the new design permits the potential difference between any two possible combinations of tube elements to be measured on any of the following ranges: 0-6, 0-30, 0-60, 0-120, 0-300 and 0-600 volts d.c. as well as 0-4, 0-8 and 0-16 or 0-160 volts a.c. Also the resistance between any two circuits or any circuit to ground or chassis can be measured on the 0-100,000 ohm ohmmeter connection; and any tube having a control-grid cap can be given a transconductance or mutual conductance merit test by pressing the "grid test" button.

The revamping of this tester is made particularly easy and inviting by the use of the same panel as originally supplied.

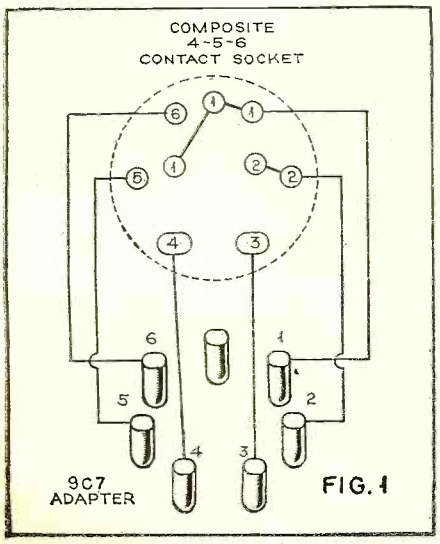


FIG. 1

However, this does not necessitate a flock of analyzer panel adapters to accommodate the various tubes even though the old panel has room for but one socket. In fact only one panel adapter is used, this being the newly developed Alden 9C7, (shown diagrammatically in Fig. 1) which is used to receive all four, five and six prong tubes. In this new adapter, the special silver plated contacts are shaped like tuning forks, and their design successfully banishes the problem of bent tube prongs. The contacts are laminated and nested in solid molded pockets to prevent any possibility of a short circuit which has until now been a weak point in composite sockets. However, with this perfected contact and its idealized insulation the composite socket or adapter is the logical unit for simplicity, compactness and low cost. The two seven-prong based tubes are accommodated directly in the panel socket. This socket is the Alden No. 477E which has the proper diameter and mounting hole spacing to exactly replace the UY five contact socket originally mounted in the Jewell 199. In case a panel is encountered which has the socket molded in as an integral part, it will be necessary to drill and file out this socket for replacement with the composite seven contact type.

To obtain the flexibility and completeness of circuit measurement facilities in the limited space available wherein only one jack in each tube circuit permits resistance, voltage and current tests, use was made of the new Alden series circuit-opening jack, No. 102J. This is a unique device since the insertion of a ⅛-inch banana plug simply makes contact whereas plugging in a ⅛-inch double circuit plug automatically opens the circuit, contacting the two circuit terminals so formed for current measurements or break-in tests.

Although this description applies specifically to the Jewell 199, owners of other popular set analyzers such as the Supreme Diagnometers, Weston, Jewell, Day-Rad, Sterling, Readrite, Mack, etc. set testers will be glad to know that the general method can be easily adapted to their particular instrument. First, replace the present panel socket or sockets with the 477E and 9C7 or the 477E and 456E composite sockets. Secondly, replace the old analyzer plug with a modern small seven-prong locking plug and eight-wire cable like the 907WLCA. Thirdly, mount the row of circuit jacks in some open space on the analyzer panel and wire the cable to the jacks. Finally, connect the output leads of the meter after they have passed through the range adjustment means whether it be by push button, rotary switch, plug and jack, or what not, to the two or more meter circuit jacks which are then connected to any of the circuit jacks desired by means of the jumper leads and current plug described later.

Now for the actual procedure with the Jewell 199. First, the two meters are taken out and then every piece of wiring is unsoldered and removed. Next, the bottom row of binding posts is taken down as well as the binding posts marked "4½ volts". The jack switches controlled through the "long lead" and "short lead" holes are dismounted as these are not required in the new tester. Then the two moulded plates covering the push button switches are taken off, so as to get access to the two spare push button holes which are molded nearly through from the back of the panel just below the bottom push button on each side of the tester. A quarter-inch drill is used to clear through these two holes. Likewise, the row of holes at the bottom of the tester previously occupied by binding posts are drilled out to a quarter-inch in diameter. Two more spare holes, molded nearly through, will be found on the back of the panel just to the left and right of this bottom row of holes. These two holes are also drilled out with the quarter-inch drill, as are the four holes at the top of the panel marked "long lead," "short lead," "+4.5 volts" and "—4.5 volts."

At this point the engraved markings on the front of the panel may be changed to suit the new analyzer. Black fender enamel is good for this blackening-out operation. As shown in the front view of the revamped tester, the circuit identifications just to the left of every push button are blacked out. The captions at all of the binding posts are also painted out. The words "LONG LEAD" are painted out and when the paint has dried "ADJ. OHMS" is lettered over it with white ink. In a similar way the 60 before M.A. is changed to 1.2. The wording "BOTH 300 M.A." is painted out as the new maximum cur-

rent range is 120 M.A. which is read by the fourth push button down from the top on the right hand side of the panel face. The "v" after "120" at this button is changed to "M.A." and this completes the panel changes.

The next step is to mount the jacks. All of the nine jacks in the lower row are molded in red but they are not all exactly alike. Three of these jacks are Alden type 100JR. These are the first, fifth and sixth from the front right and are identified with mats marked blank, "4" and "3" respectively. The remaining six jacks in this bottom row are Alden type 102JR and are marked "CAP," "1," "2," "5," "6" and "7" reading from the left. Each of the above jacks comes complete with a hexagon nut, insulating washer, lock washer and solder lug besides ten identification mats, "1," "2," "3," "4," "5," "6," "7," "CAP," "OHMS" and blank. The mat bearing the particular circuit number or name applying to the jack in question is used under the molded head of the jack, while the other mats are discarded. Next a 100J and a 100JR jack are used respectively above the "CAP" and "blank" jacks in the bottom row. After these jacks are fixed in place the molded push-button switch covers may be reassembled. Then the 101J phone-tip jack with the "CAP" mat in place is assembled to the left of the socket hole. The two remaining 100JR jacks, with the "OHMS" mat beneath each are mounted where the 4½ volt binding posts were on the old tester. This completes the assembly of the jacks.

The double seven-contact socket is now mounted in place of the old UY style found in the tester. A small 1000 ohm rheostat is mounted to the right of the panel socket. Any make volume control or rheostat having the necessary small size is suitable for this part as it dissipates but a thousandth of a watt. A piece of light gauge brass suitably drilled and clamped under one of the socket screws will conveniently mount this ohmmeter adjuster.

The various resistors salvaged from the old tester are now mounted in place as shown in Figure 2, the rear view of the panel. The fixed resistor in series with the ohmmeter adjuster can be a 4000 ohm extruded carbon style as accuracy is not important here. However, the resistor marked 2.10 ohm should be accurate as this is a current shunt. Although this value was not used in the old design, it can easily be made from the 4.24 ohm resistor which was used. It is only necessary to unwrap the tape covering from the spool and unsolder the resistance wire from the terminal lug. Then unwind the wire to its full length which will be only a couple of feet or so. Measure off 49.6 per cent of its total length and cut off the rest. Then wind back the 49.6 per cent length which will be the required 2.10 ohms. The 1.2 m.a. shunt should have a resistance of 1250 ohms. This can be made from one of the two 160 volt A.C. multiple resistors if the 16 volt range is chosen, or if the 160 volt range is to be used two standard 2500 ohm resistors can be connected in parallel to furnish the correct value of 1250 ohms for the shunt.

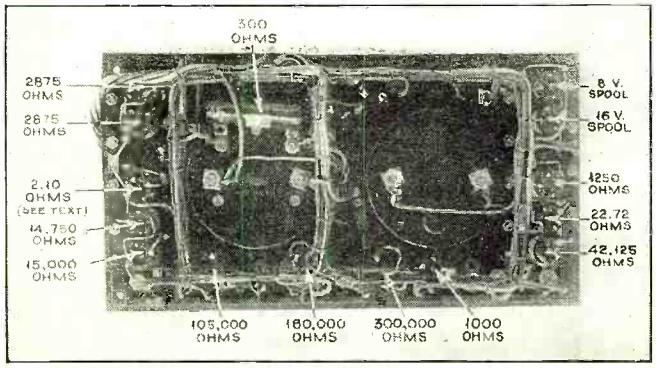
If the 907WLCA 8-wire analyzer plug kit is used the blank jack can be left dead. However, if the 907WLHA 9-wire analyzer plug kit is used the blank jack can be used as the ground circuit for point to point testing or as a reserve extra circuit for future use. The ninth wire at the plug end enters the analyzer plug through the braided cable and comes out singly for a length of six inches terminating in a pinch clip for chassis connection. The end of the cable is threaded through the cable hole and the skinned and tinned wire ends are clamped down in the 8 molded grooves by the cover plate. If the 9-wire cable is used the ninth wire may be connected to a solder lug held by one of the cover-plate screws.

Next comes the actual wiring of the analyzer. It will be better to use fresh wire. However, make sure that it is moisture proof since the tight lacing of the wiring may give ficticious readings due to leakage, especially on the high voltage circuits. Follow the diagram of Figure 3 in wiring up the parts, always routing the leads in the same rectangular paths, so that they may be neatly laced with fish line after the wiring is completed. The meters are remounted and connected after the jack switches between them have been wired. The battery leads may go through a quarter-inch hole made in the partition near where the two 4½-volt flashlight batteries are shown in the front view of the revamped tester. Two batteries are used for safety and to eliminate any extra switches from the front panel.

After carefully checking all wiring for possible errors, the tester is ready for use. To illustrate its operation the analysis of a 2A7 tube circuit will be described. All of the buttons are first checked to make certain that none are depressed. Then the tube is placed in the panel socket and the analyzer plug inserted in the set socket. For voltage and resistance measurements the red and black jumper leads, Alden No. 112SLR and No. 112SL respectively, are used and for current measurements the No. 111DL current plug lead is used.

The red and black voltage jumper leads are inserted in the correspondingly colored meter circuit jacks and in 3 and 4 for heater voltage, in 5 and 2 for plate voltage, in 5 and 1 for screen voltage, in 5 and "CAP" for control grid voltage, in 5 and 3 for oscillator plate voltage and in 5 and 6 for oscillator grid voltage.

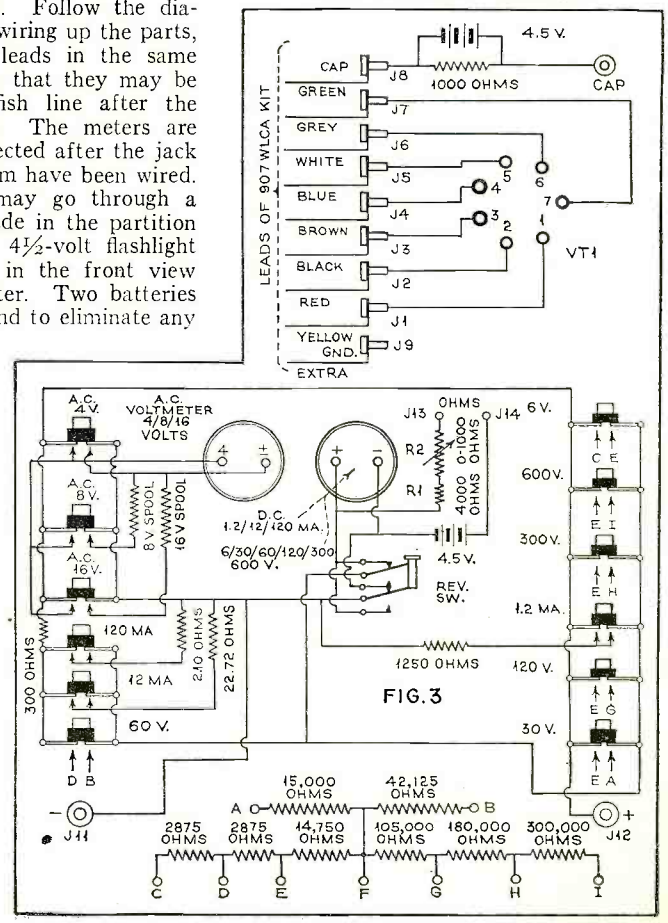
The particular meter range desired is chosen by simply pressing the button adjacent to the voltage marked on the panel. For current measurements the red and black leads of the No. 111D current plug are inserted in the meter circuit jacks and the current range button pressed. Then the double circuit plug is inserted in jack 2 for plate current, jack 1 for screen current, jack 3 for oscillator plate current, etc. For reference in identifying the circuits of different tubes, use any tube chart showing the standard RMA numbering. When analyzing tubes with caps the No. 91T lead is (*Continued on page* 391)



REAR VIEW OF FINISHED JOB

Figure 2. Below: The location of resistor spools is shown here

THE REVISED CIRCUIT



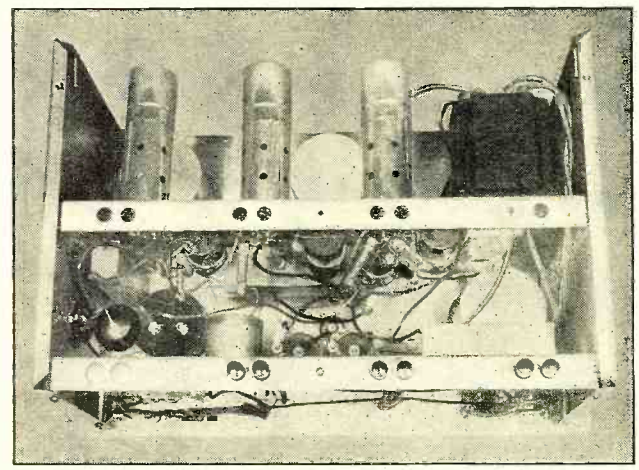
RADIO NEWS LABORATORY EQUIPMENT No. 1

A High-Fidelity LABORATORY AMPLIFIER

This article completes the description of the new amplifier installed in RADIO NEWS Lab.

S. Gordon Taylor

Part Three



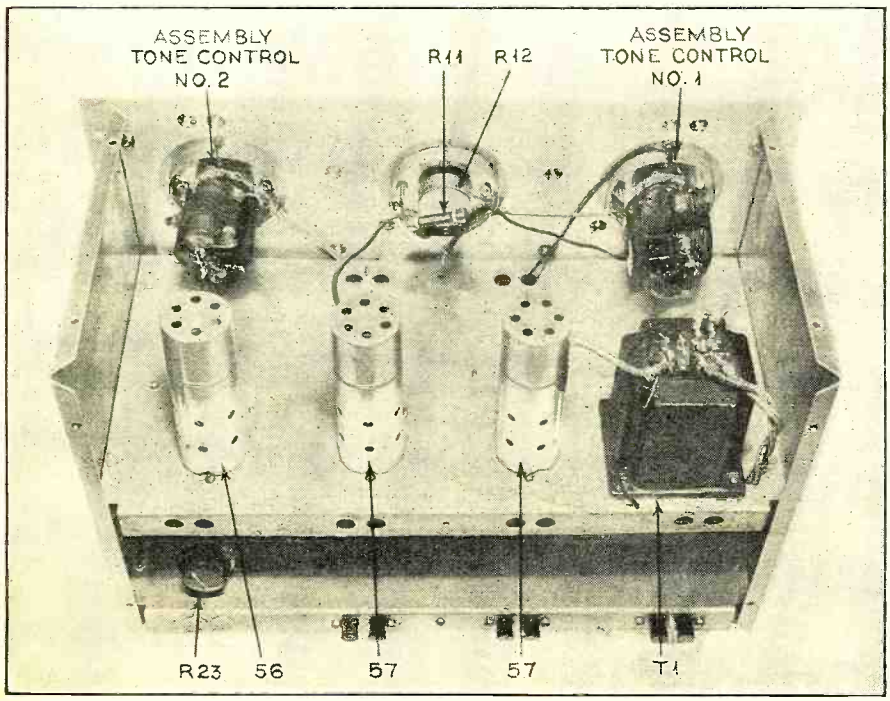
IN the October issue the characteristics of this high fidelity amplifier were discussed in some detail and in the November issue the circuit was taken up for consideration and the design was described rather fully. This month inside photographs of the three sections of the amplifier are included, showing some of the details of construction.

THIS amplifier was designed for use in the RADIO NEWS laboratory. For this type of work the requirements are somewhat different from those for P.A. work. Primarily the amplifier is used in connection with tests of microphones, phonograph pickups, loudspeakers, and high fidelity radio inputs. It may seem somewhat unusual to incorporate such high gain in an amplifier, and yet provide for such relatively low power output. There are very definite reasons for this. It was desired to have an amplifier which would function with any type of input without having to resort to the use of a preamplifier. This accounts for the requirement for high voltage gain. The output power has been limited for the simple reason that the acoustics of the laboratory are such that high sound output cannot be used to advantage. Actually it has been found undesirable to operate a speaker at higher than approximately three watts in this location. For this reason there did not seem to be any point in including a high power output stage in the amplifier. If at some later date this should seem desirable, the General Radio cabinet assemblies and rack and panel arrangement employed would facilitate the substitution of any desired type of output stage.

The 0-1 milliammeter was included on the panel of the voltage amplifier

VOLTAGE AMPLIFIER PANEL

This illustration and the one above show two views of the three-stage voltage amplifier, shown as the top panel on the rack. In one view the three-shield cans are removed from the tone controls and volume control to show these assemblies

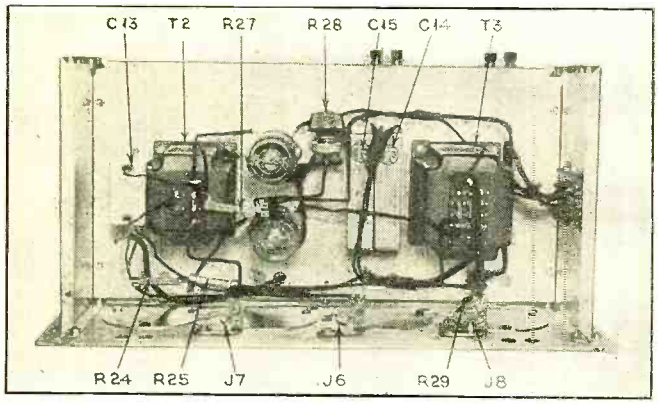


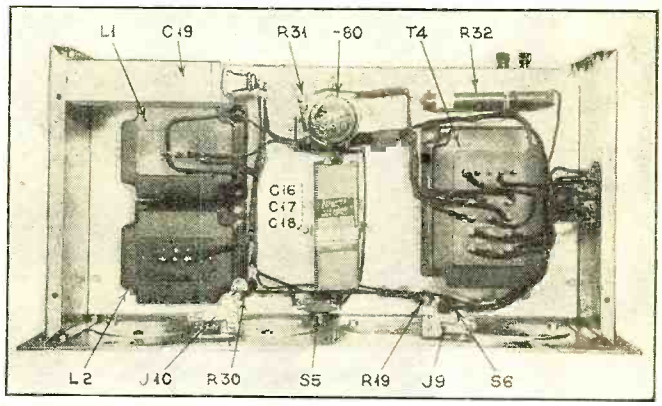
section to permit an instantaneous check on each tube and the power supply. This is accomplished in a simple manner by including a jack in the plate circuit of each tube, each microphone button circuit, and the power supply circuit. Across each current jack a shunt is permanently connected, automatically providing the current range required for each individual measurement. On the front panel, immediately under each jack, is marked the current range provided for by the corresponding shunt. Thus, when the meter cable is plugged into either one of the microphone button current jacks, the meter range automatically becames 25 ma. When plugged in the plate circuit of the 56 tube, the range becomes 10 ma., etc. When plugged into the power supply voltage jack, the meter becomes a voltmeter through the incorporation of a 500,000 ohm multiplier permanently connected in series with this jack, providing a range of 500 volts.

In the case of a completely shielded amplifier such as this one, where uninterrupted service is an important requirement, this simple method of checking tubes and circuits is decidedly advantageous. Otherwise, if something goes wrong, it would be necessary to remove the shields and perhaps devote a considerable amount of time to testing before the difficulty could be found.

Reference to the front view of the completed amplifier shows the various controls. At the upper left and upper right corners of the voltage amplifier panel, which is the top-most one on the rack, are found the two tone controls. These are each provided with six steps and an off position, and are moved in parallel. Inasmuch as they are always moved together it would have been more convenient to mount the two switches on a single shaft, but since they are connected in the circuits of two different tubes, leads would have been greatly lengthened and shielding complications would have arisen.

The upper center control varies the gain in an approximately linear manner. The curve for this control was shown in figure 3 of the October article. Immediately below this is the variable resistor, R1, to regulate the button current





THE POWER AMPLIFIER AND POWER SUPPLY UNITS

At the left is shown the push-pull output stage viewed from the top. At right a similar view of the power supply unit is shown

when using a carbon microphone input. To the left of the microphone current control is the input switch which permits a carbon microphone and any other type of input to be connected to the amplifier at the same time, and an instantaneous change-over to be made from one to the other. Along the lower edge of this panel are found the meter jacks used in checking the microphone button currents and the plate currents of the first and second voltage amplifier tubes.

The center panel carries no controls and has on its face only the current jacks for the 56 tube and the 45 tubes, and a phone jack which permits headphones to be plugged into the plate circuit of the 56 tube.

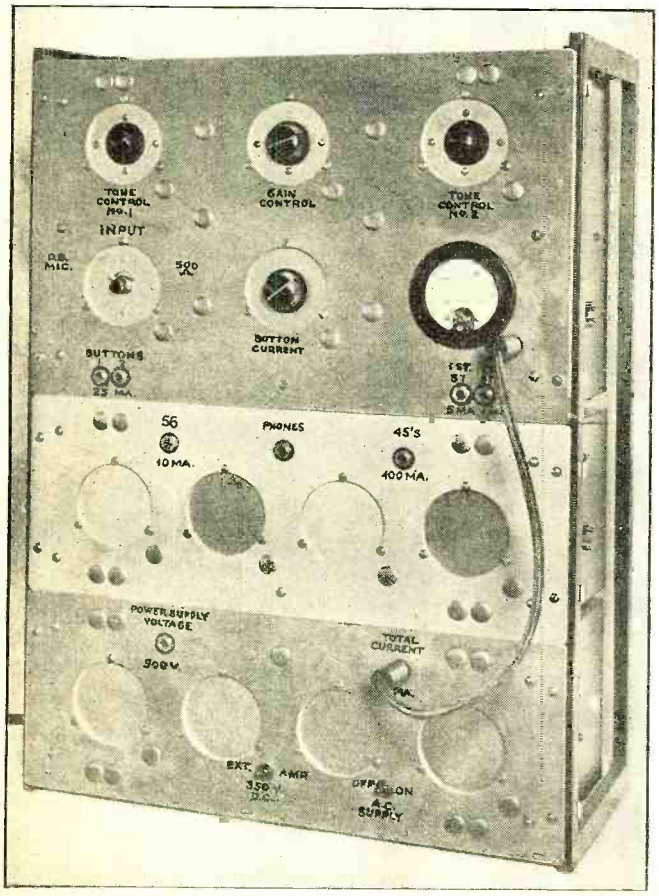
The lower panel, which is the power supply unit, carries meter jacks for measuring the power supply voltage and the total current for the entire amplifier. The a.c. supply switch is also located here and a double throw switch which, when thrown to one side, connects this power supply unit to the rest of the amplifier, but when thrown to the other side permits the d.c. output of the power supply to be taken off at terminals provided at the rear of the chassis for external use, as in making tests which involve the use of up to 350 volt d.c.

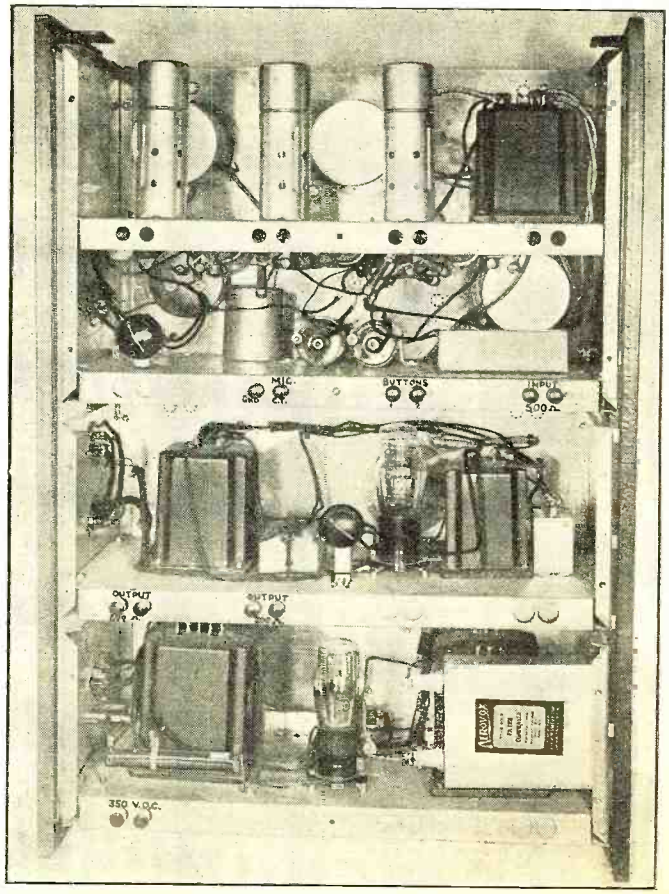
The input and output transformers employed in this amplifier are equipped with universal windings to match a wide variety of input and output impedance values. At the present time only output values of 200 ohms and 500 ohms are brought out to terminals, and 500 ohm and carbon microphone inputs. Eventually however, input and output switch panels will be arranged externally so that several different input and output impedance values will be available for use. In addition it will be possible to connect high impedance devices, such as the crystal microphone or crystal pick-up, directly to the grid of the first tube. The input panel will also include an input level attenuator. By means of these

(*Continued on page* 390)

THE COMPLETE AMPLIFIER ASSEMBLY

At the left is shown the amplifier ready for operation, and at the right a rear view with the dust covers removed to disclose the parts layout. The upper panel (A) contains the three-stage, high-gain voltage amplifier. The middle panel (B) is the push-pull, power-output stage, and the bottom panel (C) is the power supply





A Push-Pull HIGH-FIDELITY AMPLIFIER

(Resistance-coupled)

Hubert Shortt

RECENTLY, the public has been insisting more and more on better quality of reproduction. Naturally, while trying to meet this popular demand, the claims of faithful reproduction are going to be many and the term "high-fidelity" is likely to become used, abused and probably meaningless. Therefore it would be well to define just what is meant by "high-fidelity."

There have been various proposals for the definition of the requirements for high fidelity receivers, but a good standard definition was proposed by Mr. Stuart Ballantine in his article on high quality broadcasting in the Proceedings of the Institute of Radio Engineers for May, 1934. Mr. Ballantine would require of high fidelity broadcasting systems that they have "uniform response within 5 decibels from 50 to 8000 cycles or above." Mr. Ballantine means that the charactertics of input and loudspeaker should be included in the measurement. the amplifier is just one link in the chain.

The amplifier to be described presently, satisfies the above requirements and could be used in such a system so it is justifiable to use the term "high-fidelity."

To date amplifiers having unusually good quality have for the most part been strictly hand-made and in any event have been expensive. It has taken considerable research and experimenting to develop this Lafayette amplifier which can be produced in quantity at a reasonable price although it still requires some individual adjustments.

Let us now proceed with a description of the apparatus itself. It consists of three stages of amplification, two of which are push-pull; the output stage, employing two 2B6 "triple-twin" tubes is capable of delivering an average undistorted output of 15 watts and a peak output of 20 watts. The overall gain is 78 decibels, sufficient to obtain full output from a carbon microphone without the use of a pre-amplifier.

The Lafayette amplifier does not employ any interstage transformers. They are all resistance-capacity coupled and the coupling between the single first stage and the second stage (push-pull) is accomplished by a phase-inversion circuit employing a 53 type tube. The amplifier as illustrated, and diagrammed in Figure 1, does not contain any transformers—except the power transformer.

In the first stage, the inversion circuit works on the following principles. It is a well known fact that the output signal in the plate circuit of a tube is 180 degrees out of phase with the input signal; in other words, the amplifying tube reverses the phase of the signal. Referring now to Figure 1, the signal is applied to the grid of the first section of the 53, the output voltage appearing in the plate circuit across R6 and R7 in series. The portion across R7 is now transferred to the grid of the second section of the 53 and is inverted and amplified so that the signal in its plate circuit is equal and opposite to that across R6 and R7. R6 and R7 have been so chosen as to make the voltages equal in both halves of the tube. Thus the 53 is coupled to two 56 type tubes in push-pull without the use of a transformer, eliminating some of the causes of frequency discrimination.

This same function can be performed by two ordinary tubes but the 53 has the advantage of saving space and parts.

The second stage of push-pull feeds into the third stage where the triple twin tubes are used. Each of these tubes really comprises two stages directly coupled. The plate load of the first section is in the cathode side of the plate circuit. The voltage across this resistor is applied to the grid of the second section without any additional apparatus because the two are connected together. This is another distortionless transfer of energy. The input resistance is of the high-resistance type, 500,000 ohms—standard for Lafayette amplifiers. In cases where the source of the signal is a high impedance pickup or a crystal microphone, it can be connected directly to the input terminals without the use of an input transformer. A radio tuner can usually be connected by means of a coupling condenser. All low-impedance devices require a matching transformer.

The power supply utilizes 5Z3 type high-vacuum rectifier tube because of its low internal voltage drop resulting in better regulation. The chokes have been designed (*Continued on page* 379)

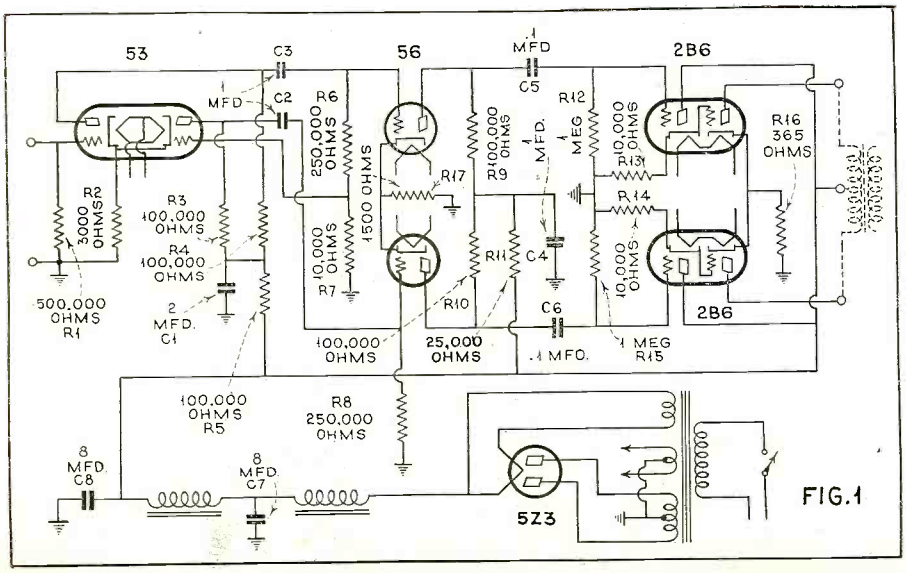


FIG. 1

UNUSUALLY GOOD FREQUENCY CHARACTERISTICS

Figure 2. The curves show the frequency response (A) with resistance input and no output transformer; (B) with highest quality commercial output transformer; and (C) with standard ($9.00) output transformer. Other features of the amplifier are: 15-watt output, gain 78 db., hum level 75.6 db. below maximum output, power consumption 120 watts

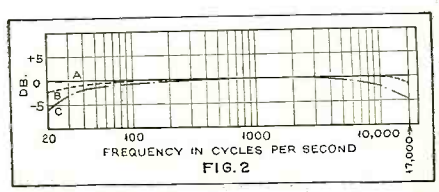


FIG. 2

A LEADING MIDWEST STATION

Here is the fine "shack" of W9DUD, Wells Chapin, of St. Louis, Missouri. The outfit is crystal-controlled with a capacity output of 600 watts. There are three operators and most work is done on 20 and 75 meter 'phone bands. They talk to all continents and have been heard or worked in 35 countries. They also operate portable station W9EWT

THE "HAM" SHACK

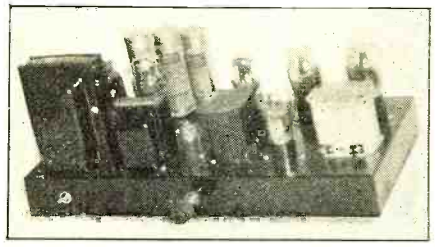
CQ CQ CQ

OFFICIAL figures issued by the Federal Communications Commission last September show that the total number of licensed amateur stations in the United States as of June 30 was 46,390. Since then probably several hundred additional stations have been licensed. Possibly some have dropped out, but the advance of amateur radio marches on. That astounding figure represents the fourth consecutive year of increase in number, and it is more significant when it is considered that the number of amateur stations have more than doubled—almost tripled since 1930—a period of adverse economic conditions that one might think would retard the advancement of any hobby. Not so with amateur radio, however. Its most fruitful period of development and advancement has taken place during a depression. When the "crash" came in 1929, there were about 17,000 licensed amateurs in the country. That figure represents an average for the years immediately following the World War. The rise and fall of operators did not vary much from one year to the next until 1929, but paradoxically the "crash" meant a boom for amateur radio. The Federal Communications Commission's official figures show that in June, 1930, the number of stations licensed was 18,994. In 1931 the total had grown to 22,739; in 1932 it reached 30,374, and again in 1933 the total zoomed to 41,555. And now the present total of 46,390 plus those who have acquired their "tickets" since the end of the government's fiscal year.

THE government's licensing authority handles more than 100 amateur licenses a day. Some of these are renewals, others are changes in addresses, etc., but a large percentage are *new licenses!* Economic factors have had very very little to do with the increase of amateur activity. It is not because it is an inexpensive hobby. But there are a number of factors to which the remarkable increase may be attributed. Perhaps the most important, and the one to which the most weight should be given, is the development of short-wave broadcasting. Through the increase in short-wave listening, the number of persons who have come in contact with amateur radio has been greatly expanded. Listeners to foreign short-wave programs (in the course of tuning their sets) must at some time pass over one of the four major amateur bands. When they hear amateur 'phone stations they pause to listen and become interested in these activities. As a result, their interest increases from that of *just listening* to a desire to *carry-on two-way communication!*

Another factor has been amateur activities in carrying on emergency communication in case of disaster, such as floods and hurricanes. These events have widely publicized the amateur and his work in establishing emergency communication.

Leading radio publications have also helped in no small way the advancement of the amateur. They have presented theory and construction material in a concise manner— in such a way that the most disinterested layman could glean something of what it was about. With the availability of reading matter and helpful ideas for construction it does not take long to learn sufficient technical knowledge, and with a little practice with a key and buzzer, it is only a matter of a few months before a *short-wave listener* is converted into a *licensed amateur.*



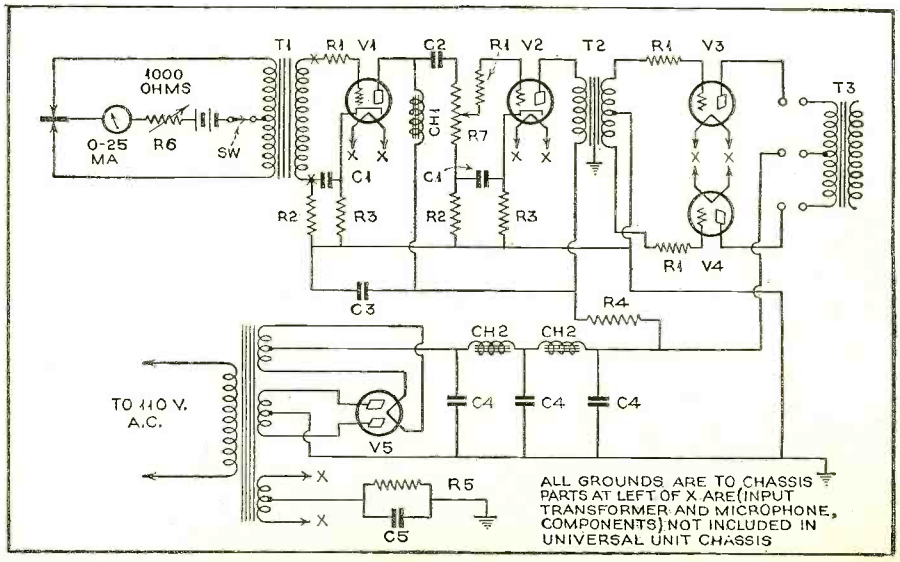
Class B modulation has become the most popular method of modulating for voice transmission — particularly among the newer 'phone addicts. The few disadvantages of Class B amplification as compared to Class A are more than out-weighed by the former's economic virtues. In Class B modulation it is "more-watts-per-dollar"—a factor which governs the construction of more than 90 percent of the amateur stations in the country. While it may not be possible to obtain the perfection of quality with this system of amplification that is possible with the older method, with careful design, construction and particular care in the matching of impedances, it is possible to obtain a quality of output that is better than the average heard on amateur 'phone bands. If in doubt, listen to station WLW at Cincinnati, the only American broadcasting station, as far as I know, using Class B modulation. The quality of WLW ranks with any other station on the broadcasting band.

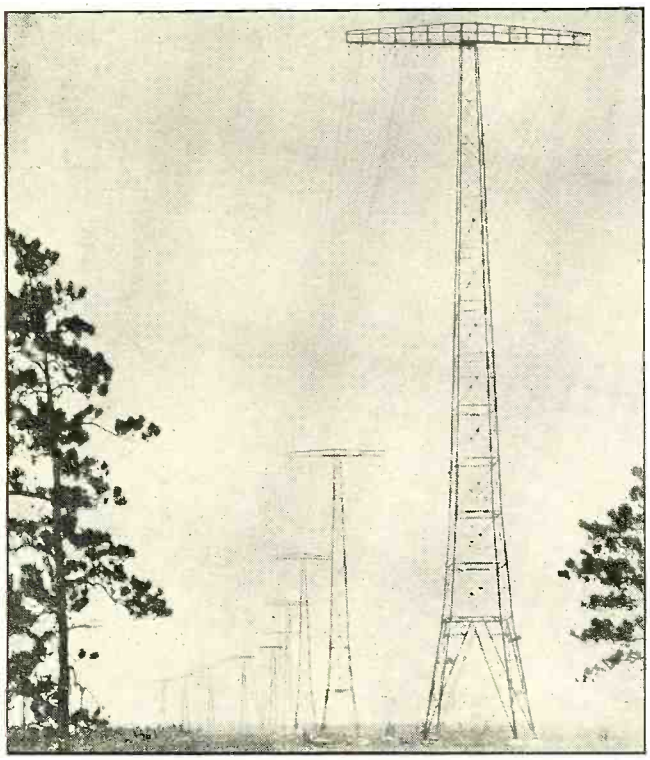
Quality can be no better than the speech equipment. A universal speech amplifier that may be used to drive Class B modulators up to 100 watts of audio output is described in the following paragraphs. Next month we will describe a typical Class B unit that may be driven by this amplifier.

The arrangement consists of a single 56 tube in the input stage followed by a stage of impedance coupling using another 56 and then a pair of –45 type tubes in push-pull. An output transformer is not provided for the push-pull stage, but instead, the plates of the final tubes are connected to terminals on the chassis. This is done in order that any type of coupling transformer may be used. It thereby becomes a universal unit. A transformer for matching the output of the push-pull stage of either a 200- or 500-ohm line or directly to the input of the Class B tubes may be used. Also a transformer for matching the output to the voice coil of a dynamic loud speaker may be substituted for testing or public address work.

The mechanical layout follows more or

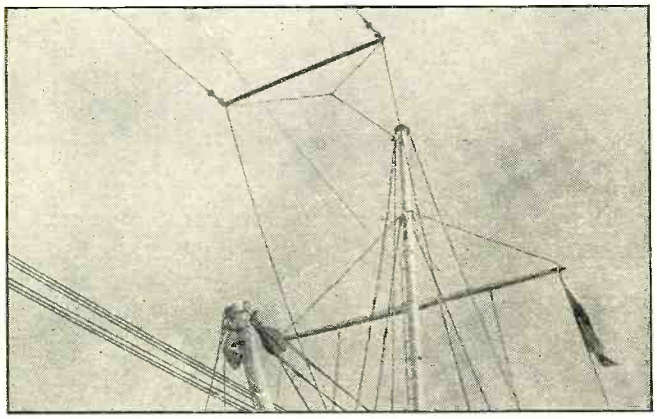
(*Continued on page* 384)





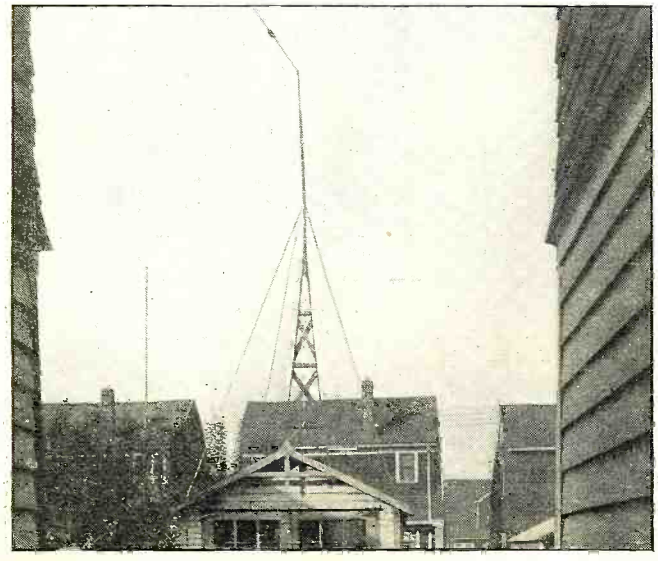
COMMERCIAL TYPE ANTENNA ARRAY

The mechanical features of these great antennas and towers are important considerations in service maintenance



ANTENNAS FOR SHIPS AND AMATEURS

The illustration, above, shows the spreader and rig for a ship's antenna, while that below illustrates an amateur mast and single-wire antenna, set up over a garage. The mechanics of construction for all three types are equally important if the aerial is to stay up



ANTENNA

Some time, in most of our lifetimes, in a while we have had an antenna that this was probably due to faults data on stresses, strains, loading, etc.,

***By* Ray**

WHILE the antenna is primarily an *electrical* part of the transmitter or receiver, having capacity and inductance, it should not be forgotten that it is also *mechanical,* from the point of view that it consists of a system of wires placed between supports, and exposed to the weather. It is subject to: expansion and contraction, due to temperature changes; stresses, due to ice and wind loads; and stretch.

Too often an antenna which has been carefully designed electrically, fails mechanically, and at the time least desired. In order to erect an antenna which will function in bad weather without danger of failure, and which will not continually stretch and have to be tightened up again, it is worth-while to plan it in accordance with certain rules of design, which allow for the physical properties of copper wire.

Safety Requirements

The antenna should be located so that the requirements of the National Electrical Safety Code are complied with, as shown in the Table 1.

Two types of copper wire are available for use as antenna wire, each having certain advantages and disadvantages. Either soft (annealed) wire or hard-drawn wire may be used. (Soft wire is easier to handle and has about 2 percent less resistance than hard, but only about half the strength. Hard wire, on the other hand, has a very high strength in comparison, but is a little more difficult to work with, due to its stiffness. Since the small difference in resistance is negligible in radio work, many use hard wire to gain the advantage of its strength. It may be strung up tighter and forms, in general, a more stable and rugged antenna system.

If either hard or soft wire is used for an antenna, without a preliminary treatment, it will gradually stretch and cause more and more sag. This in turn may cause "wobbulation," or frequency shift, and a generally unstable condition due to the wire swaying in the wind. It may be necessary to tighten the antenna several times before it stays tight. Therefore, where it is important that the wire have a certain definite length, this stretching must be allowed for. A good way to do this is to take all the stretch out of the wire before it is erected. If this is done properly, the wire will never stretch after it is put up in the air, and may be cut to length and tied in its insulators with the assurance that it will be permanent.

When tension is applied to a previously unstressed wire, two things happen. It elongates, due to the tension and it acquires a certain amount of "permanent stretch," or "set," and will not return to exactly the same length when the tension is removed. This property of copper is what causes all the trouble, unless it is corrected. The permanent stretch may be eliminated in a wire by stressing it to the proper tension before it is erected. Then, for all time afterwards, the wire will behave as a perfectly elastic material, or, in other words, will return to the same length when tension is removed from it. Thus the expansions and contractions due to changes in temperature and ice and wind loads will not cause the antenna to sag if the wire in it has had this preliminary treatment. In order to remove the permanent stretch from a copper wire, it is necessary to pull it to 60 percent of its breaking strength for a period of about 15 minutes. This does not harm the wire in any way.

If there is a building high enough to suspend the wire straight down, this operation may be performed easily by tying on a sack of sand of the proper weight and allowing it to hang for 15 minutes. (If no scales are handy, remember that sand weighs about 100 pounds-per-cubic-foot, or 13.4 pounds-per-gallon.) The weight to be used is determined by

MECHANICS

we have put up an antenna and once blow down. The author explains in mechanical design. He includes that should prove to be invaluable

Hawksley

taking 60 percent of the breaking strength shown in Table 2, for the particular size of wire. Hard wire is stretched in exactly the same way as soft, except that more weight is required.

If it is not convenient to stretch the wire by hanging a weight on it, it may be laid out on the ground with one end securely fastened, and stretched with a block and tackle, around a crank, or any other means available, as long as the wire is not jerked, but pulled slowly and steadily. In order not to overstress, the values given in Table 3 should not be exceeded.

To measure the permanent stretch, a mark should be made at the pulling end of the wire, and the wire pulled very slowly. The values in Table 3 are for stretch and with the *tension removed,* so that the mark will go past the given value when the tension is on, and return to it when it is removed. This requires some "cutting and trying." When the indicated number of inches of permanent stretch have occurred, the wire is ready for erection. (A steel tape should be used in preference to a cloth one, as the latter are usually unreliable.) It is generally much easier to measure the tension than to measure small amounts of stretch accurately.

It has been assumed in preparing Table 3 that the antenna is to be resonant to 10, 20, 40, 80, or 160 meters. If some other length is desired, the approximate permanent stretch may be obtained by multiplying the length by .00055, which is the permanent stretch in *feet.*

Factor of Safety

All sound engineering calculations allow a certain "factor of safety," which in the case of an antenna, will be reserve strength to take care of unusual weather conditions, such as heavy sleet storms or high winds. With the proper tension used at the time the antenna is erected, it will be able to withstand storms without failure or stretching. The geographical location of the antenna determines, to a large extent, what this tension is.

For convenience, the United States may be divided into three groups, the Heavy Loading States, Medium Loading States, and No Load States. In the Heavy Loading Group, the worst possible condition which is likely to occur is ½ inch of radial ice on the wire, combined with 8 pounds-per-square-foot crosswise wind, at a temperature of zero. In the Medium Loading Group, the maximum condition is assumed to be no ice on the wire, but a crosswise wind of 12 pounds-per-square-foot, at a temperature of 30 degrees. In the No Load Sections, it is assumed that weather conditions are so mild that neither ice formation on the wires nor high winds may be reasonably expected. This division of the states into three groups is more or less arbitrary, although based on average Weather Bureau figures over long periods of time. There will be districts in certain states where weather more severe than Heavy Loading, or less severe than Medium Loading, is the general rule. Before the wire is strung up, decide into which general classification the weather in your locality falls. In arriving at the values given later in Table 5, allowance is made for the severe ice and wind in Heavy Loading Districts, and the wire is strung looser to take care of it. Obviously if sleet storms are a possibility, the antenna should not be strung to Medium or No Load values, for the wire would then be tight, and would probably break when loaded with ice and wind.

The tension of the wire at the time it is strung and tied in to its insulators has everything to do with its behavior under severe weather conditions. If it is strung too tight, it will break. The Table 5 gives good average values for tension when the wire is put up, assuming (*Continued on page* 389)

TABLE I
MINIMUM ANTENNA CLEARANCES

LOCATION	RECEIVING AND LOW POWER	MEDIUM AND HIGH POWER
ABOVE STREET AND OTHER TRAVELLED ROADWAYS	18 FT. ABOVE GND.	28 FT. ABOVE GND.
ALONG ROADS IN RURAL DISTRICTS	15 FT. ABOVE GND.	28 FT ABOVE GND.
ALONG ROADWAYS TO RESIDENCE GARAGES	10 FT. ABOVE GND.	28 FT. ABOVE GND.
ABOVE SPACES ACCESSIBLE ONLY TO PEDESTRIANS.	10 FT. ABOVE GND.	28 FT. ABOVE GND
UNDER COMMUNICATION CONDUCTORS	2 FT. BELOW GND.	10 FT BELOW
UNDER SUPPLY CONDUCTORS 0-750 VOLTS	4 FT. BELOW	10 FT BELOW
UNDER SUPPLY CONDUCTORS ABOVE 750 VOLTS.	6 FT. BELOW	10 FT BELOW

TABLE II
WEIGHT AND STRENGTH OF COPPER WIRE

SIZE	WEIGHT PER FOOT, POUNDS	BREAKING STRENGTH SOFT, POUNDS	BREAKING STRENGTH HARD, POUNDS
NO.14 SOLID	.0124	97	214
NO.12 SOLID	.0198	154	339
7 NO. 24	.0087	60	133
7 NO. 23	.0110	76	168
7 NO. 22	.0139	95	212

TABLE III
INCHES PERMANENT STRETCH CORRESPONDING TO A TENSION OF 60 % OF BREAKING STRENGTH

FUNDAMENTAL WAVELENGTH METERS	ACTUAL LENGTH * FEET	PERMANENT STRETCH INCHES
10	15.62	0.1
20	31.25	0.2
40	62.50	0.41
80	125	0.81
160	250	1.3

*BASED ON CORRECTION FACTOR OF 2.1

TABLE IV
NOMINAL CLASSIFICATION OF STATES INTO LOADING GROUPS

MEDIUM LOADING STATES	HEAVY LOADING STATES	NO LOAD STATES
NO ICE - 12 LB. WIND - 30 DEGREES WASHINGTON, OREGON, CALIFORNIA, NEVADA, ARIZONA, TEXAS, NEW MEXICO, ALABAMA MISSISSIPPI, GEORGIA, SOUTH CAROLINA, FLORIDA, LOUISIANA	½" ICE - 8 LB WIND 0 DEGREE MAINE, VERMONT, NEW HAMPSHIRE, MASSACHUSETTS, RHODE ISLAND, CONNECTICUT, NEW YORK, NEW JERSEY, PENNSYLVANIA, DELAWARE, OHIO, WEST VIRGINIA, VIRGINIA, NORTH CAROLINA, IOWA, TENNESSEE, MICHIGAN, INDIANA, WISCONSIN, KANSAS, ARKANSAS, MINNESOTA ILLINOIS, OKLAHOMA, MONTANA, WYOMING, NORTH DAKOTA, UTAH, SOUTH DAKOTA, IDAHO COLORADO, NEBRASKA, MARYLAND, KENTUCKY.	NO ICE - NO WIND PARTS OF: NEVADA CALIFORNIA, NEW MEXICO, ARIZONA, UTAH, LOUISIANA, MISSISSIPPI, TEXAS, ALABAMA, GEORGIA, TENNESSEE, FLORIDA.

TABLE V
STRINGING TENSIONS

CONDUCTOR SIZE	TENSION MEDIUM LOADING	TENSION HEAVY LOADING	TENSION NO LOAD
NO.14 SOLID	85 LB.	65 LB.	110 LB.
NO.12 SOLID	135	100	170
7 NO. 24	55	40	70
7 NO. 23	70	50	85
7 NO. 22	85	65	110

S.W. PIONEERS
Official RADIO NEWS Listening Post Observers

LISTED below by States are the Official RADIO NEWS Short-Wave Listening Post Observers who are serving conscientiously in logging stations for the DX Corner:

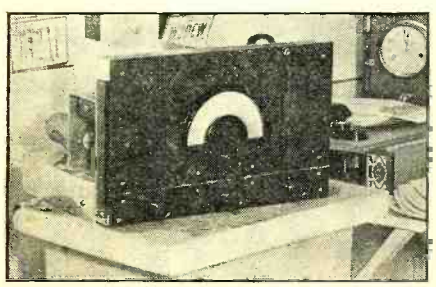
United States of America:

Alabama, J. E. Brooks; Arkansas, Don Pryor, Jas. G. Moore; California, E. G. DeHaven, C. H. Canning, E. S. Allen, A. E. Berger, Ralph Leavitt, Geo. C. Sholin, Wesley W. London; Colorado, Wm. J. Vette, F. Erich Bruhn; Connecticut, Geo. A. Smith, H. Kemp; District of Columbia, Douglas S. Catchim; Florida, E. M. Law, James F. Dechert; Georgia, James L. Davis, C. H. Armstrong, Guy R. Bigbee, John McCarley; Idaho, Bernard D. Starr, Lawrence Swenson; Illinois, Phillip Simmons, E. Bergeman, Robert L. Weber, Floyd Waters, Chas. A. Morrison; Indiana, Freeman C. Balph; J. R. Flannigan, Henry Spearing; Iowa, J. Harold Lindblom; Kansas, C. W. Bourne, Wm. Schumacher; Kentucky, Wm. A. McAlister, George Krebs; Louisiana, Roy W. Peyton; Maine, R. I. Keeler; Maryland, Howard Adams, Jr., James W. Smith, J. F. Fritsch; Massachusetts, Armand A. Boussy, J. Walter Bunnell, Harold K. Miller, Donald Smith, Elmer F. Orne, Arthur Hamilton, Roy Sanders; Michigan, Stewart R. Ruple; Minnesota, Dr. G. W. Twomey, M. Mickelson; Mississippi, Dr. J. P. Watson, Mrs. L. R. Ledbetter; Missouri, C. H. Long; Montana, Henry Dobrovalny; Nebraska, P. H. Clute, G. W. Renish, Jr., Harold Hansen; New Hampshire, P. C. Atwood, A. J. Mannix; New Jersey, William Dixon, R. H. Schiller, William F. Buhl; New Mexico, G. K. Harrison; New York, Capt. Horace L. Hall, S. G. Taylor, John M. Borst, Wm. C. Dorf, R. Wright, I. H. Kattell, Donald E. Bame, Albert J. Leonhardt, Wm. Kochnlein, Edmore Melanson, H. S. Bradley; Nevada, Don H. Townsend, Jr.; North Carolina, H. O. Murdoch, Jr., W. C. Couch, E. Payson Mallard; North Dakota, Dr. F. C. Naegeli; Ohio, Oker Radio & Electric Shop, R. W. Evans, C. H. Skatzes, Donald W. Shields, Albert E. Emerson, Samuel J. Emerson, Clarence D. Hall; Oklahoma, H. L. Pribble, Robert Woods; Oregon, Geo. R. Johnson; Pennsylvania, Edward C. Lips, K. A. Staats, C. T. Sheaks, George Lilley, John A. Leininger, F. L. Stitzinger, Hen F. Polm, Chas. Nick; South Carolina, Edw. F. Bahan; South Dakota, Paul J. Mraz; Tennessee, Charles D. Moss, Adrian Smith; Texas, Heinie Johnson, Bryan Scott, John Stewart; Utah, Harold D. Nordeen; Vermont, Joseph M. Kelley, Eddie H. Davenport; Virginia, Gordon L. Rich, G. Hampton Allison, D. W. Parsons; Washington, A. D. Golden, Glenn E. Dubbe, Chas. G. Payne; West Virginia, Kenneth Boord, R. E. Sumner; Wisconsin, Willard M. Hardell, Walter A. Jasiorkowski.

Applications for Official Observers in the remaining States should be sent in immediately to the DX Corner. Listeners outside of the United States who feel that they would like to serve in this capacity are also requested to file their applications as soon as possible before final appointments are made.

OFFICIAL L. P. O.—GERMANY

This is a new short-wave receiver designed and built by O. R. N. S. W. L. P. O. Herbert Lennartz



S. W. TIME SCHEDULE

LAURENCE M. COCKADAY

THE 21st installment of the DX Corner for Short Waves features the World Short-Wave Time-Table for 24-hour use all over the world. The list starts at 08 G. M. T., which is 3 a. m., E. S. T., and runs through 07 G. M. T., or 2 a.m., E. S. T., right around the clock. The Time-Table contains a list of short-wave stations, logged during the last month in the RADIO NEWS Westchester Listening Post (in our Editor's home), as well as at other Official RADIO NEWS Short-Wave Listening Posts throughout the world. It provides an hour-to-hour guide for short-wave fans, whether experienced or inexperienced. There is also included a List of Station Locations, giving the wavelength, call letters, frequency, town and country.

Affiliated DX Clubs

We are hereby placing a standing invitation to reliable DX Clubs to become affiliated with the DX Corner, as associate members acting as advisers on short-wave activities, in promoting short-wave popularity and reception efficiency. A list of associate organizations follows: International DX'ers Alliance, President, Charles A. Morrison; Newark News Radio Club, Irving R. Potts, President; A. W. Oppel, Executive Secretary; Society of Wireless Pioneers, M. Mickelson, Vice President; U. S. Radio DX Club, Geo. E. Deering, Jr., President. Any DX fan wishing to join any one of the clubs or associations may write for information to the S. W. DX Editor and his letter will be sent to the organization in question. Invitations have also been sent out to the Pacific States Short-Wave Club, the Radio Club Venezolano (of Venezuela) and the Quixote Radio Club. Other clubs who wish to become affiliated should make their applications to the Short-Wave DX Editor. Clubs associated with the DX Corner have the privilege of sending in Club news notes for publication in RADIO NEWS.

Reports for This Department

It is requested that all reports submitted for use in this department be addressed to the Short-wave DX Editor. Those who have occasion to submit reports on both short-wave and broadcast band reception should make these in the form of separate reports, as a great deal of confusion is caused where both types of material are included in a single report. Each report should be signed with the name and address of the reader submitting same, and the top should be clearly marked whether for broadcast band or short wave. It is further suggested that any correspondence not pertaining directly to these reports be on a separate sheet. It is our desire to make participation in this work as simple as possible for contributors, but experience during the past few months shows that the simple precautions suggested herein aid materially in avoiding confusion.

Another suggestion is that the Frequency, the Time when heard, and the Power (if known) be given for every station mentioned in the reports. This provides another means for maintaining a constant check on frequency and time changes which take place, particularly in the case of foreign stations.

Listening Post Observers and Other Fans, Please Note!

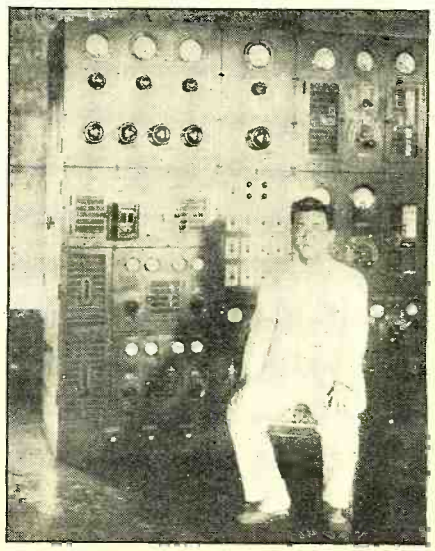
Listed below is this month's partial information regarding short-wave stations heard and reported by our World-Wide Listening Posts. Can you supply actual Time-Schedules, actual Wavelengths, correct Frequencies and any other information regarding them? There are some hard ones to pull in here, so, get busy and try your skill in logging these stations and getting correct information about them. When you are satisfied you are correct, send this information in to the Editor. The list follows:

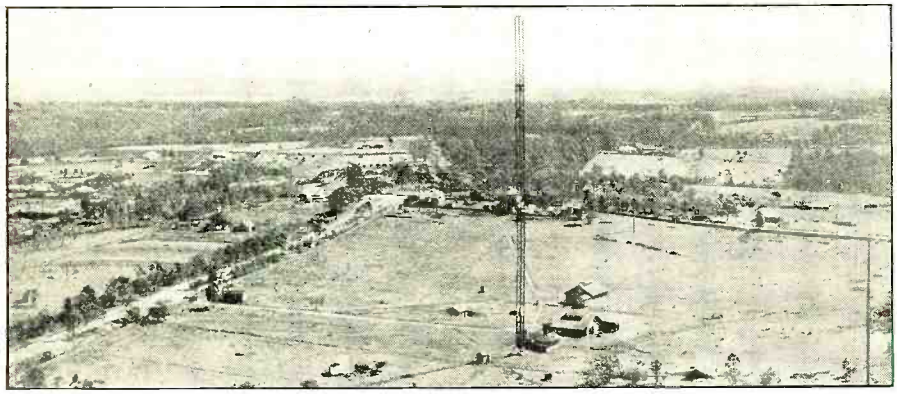
CE106, Santiago, Chile, America Del Sur, 1065 kc., 500 watts, reported in the evenings until 1 a.m., E.S.T.

HC2EP, Guayaquil, Ecuador, S. A., heard

FAMOUS JAPANESE ENGINEER

Presenting Mr. Tositada Matuyuki, chief engineer, of the equally famous Kemikawa-Cho transmitters





WORLD-FAMOUS AUSTRALIAN SHORT-WAVE TRANSMITTER

The A. W. A. radio sender, Penant Hills, Sydney, where the 20 kw. transmitter of VK2ME is located. The radio tower and the transmitter buildings can be seen in the foreground

Wednesday and Saturday nights, 9 to 11 p.m., E.S.T., 4650 kc., 64.5 meters.

YAD, Batavia, Java, reported on 49.02 meters.

F3ICD, Saigon, reported on 49.02 meters, 4 to 5:30, E.S.T.

CR6AA, 41.8 meters (500 watts), reported on the air Wednesdays and Saturdays, 2:30 to 4:30 p.m., E.S.T. Location given as Portuguese West Africa.

A new Russian station reported on 75 meters every evening after 3:30 p.m., E.S.T., repeating the words "Radiogram".

La Voz del Tropico, the "mystery" station on 44.7 meters heard from 9 to 10 p.m., E.S.T., has been variously reported as TIGP, PIEP, and TIEP. We believe the latter one, TIEP, is correct. We know this station is in San Jose, Costa Rica.

RNE, 21.5 meters, RKI, 19.97 meters, testing preliminary to relaying programs from America to Russia. Heard testing with Rocky Point. These same two stations may be heard Sunday mornings relaying Russian programs to America for rebroadcasting by the American chains. (See Time Schedule.)

Last month we asked, "What is the correct call of the station we published as PRBA, 9505 kc.?" This is the station of La Presse Nacional, at Rio de Janeiro. We got a flock of letters giving the following calls: PRBA, ERSI, EISI, PRBO, PSK, PRA3, PRA5, PRSI, PISI, PIFI, PRE5 and PRF5. (What's a poor editor to do?) We have personally heard the announcement of PRF5 made over this station and received as such by the Westchester Listening Post and other RADIO NEWS Official Observers. But we believe there is still some doubt as to whether this is the actual call of the station or the call letters of the long-wave station being rebroadcast.

Tripolis (Italian North African Service), 31.6 meters, 9459 kc., reported on the air, 4 to 6 p.m., G.M.T.

I2RO still off the air at the present writing. May start up again with an improved transmitter around November.

OA4AD the new call for OA4AC, which has changed its frequency to 51.9 meters.

KNRA heard at 7:45 p.m., on 8.84 megacycles.

VWY reported on 33.41 meters, 4 to 7:30 a.m., E.S.T.

RKI, Moscow, 19.9 plus, heard working RIM, 11:30 a.m. and 8 a.m.

HJ1ABB reported as occasionally working on 6040 kc.

LSQ, Buenos Aires, occasionally on 19500 kc., at 12 noon.

VPD reported on about 22 meters, 9 to 10 a.m., E.S.T.

W10XDA reported on 12825-12830 kc. Who has heard HJA3?

PK1WK, (where, in Java?) 6116 kc., reported from 6 to 10 a.m., E.S.T.

HSJ reported as Bangkok, Siam, on 37.6 meters, calling Berlin and playing records, 4:30 to 7 a.m., E.S.T.

PNI, Makassar, Celebes, reported on 37 meters calling Japan, 4 to 5 a.m., B.S.T.

XGW, Shanghai, China, reported on 28.7 meters, 6 a.m., E.S.T.

HI4 reported heard on 13200 kc., 8:30 p.m., E.S.T.

Here is a list (reported) of new German stations, 50 kw. for future services: DJR, 19.56 meters, 15340 kc.; DJQ, 19.63 meters, 15280 kc.; DJP, 25.31 meters, 11855 kc.; DJO, 25.43 meters, 11795 kc.; DJN, 31.45 meters, 9540 kc. Some of these are starting transmission with 8 kw. in the antenna reported soon to be raised to 50.

HC5ABD reported on 6380 kc., 9 to 10 p.m., E.S.T.

HI1A is now using 50 watts of power.

HC2RL is now on an extra day, Friday, weekly, from 9 to 11 p.m., E.S.T.

Three South American stations reported as follows: CP5, 6080 kc.; CP6, 9120 kc.; CP7, 15300 kc.

Frank Jones, our old friend, reports that CM6XJ "is no more" and that his new call is CM6XS on 14280 kc., with about 25 watts of power. This station is at Tuinucu, Cuba.

TIX, San Jose de Costa Rica, reported on 51 meters, 8:30 to 11:30 p.m., E.S.T.

CNR, Rabat, Morocco, has been hard to get (if not impossible) in the U. S. lately but one listener reports hearing him on 31 meters at 1:05 a.m., on Sundays.

Who knows who YVR might be?

XIR, Vera Cruz, Mexico, reported on 7100 kc., 8 to 10 p.m.

Who has heard the Air Ship "Macon" using the call letters XT2?

YVQ, who has heard this one on 22 meters?

Who has heard VK3CX (or VK3XX) on about 43 meters reported by two listeners at about 3 a.m., E.S.T.

DJM reported on 6079 kc., 8 kw., relaying German program irregularly to Africa simultaneously with DJC.

HJ5ABC, Cali, Colombia, reported on 6480 kc.

Have you heard FYB, Paris, France, sending time signals on 28.36 meters?

OK1MPT, Prague, Czechoslovakia, reported on 5145 kc.

EA8AB, Teneriffe, reported at 7211 kc. (We understood they were off the air.)

EA4AQ, Madrid, Spain, reported on 6976 kc., Tuesdays, Saturdays, 11-22 G.M.T.

FZR, Saigon, reported on 16200 kc.

HBO, Geneva, Switzerland, reported on 7444 kc. irregularly with 20 kw.

S.W. PIONEERS

Official RADIO NEWS Listening Post Observers

LISTED below by countries are the Official RADIO NEWS Short-Wave Listening Post Observers who are serving conscientiously in logging stations for the DX Corner:

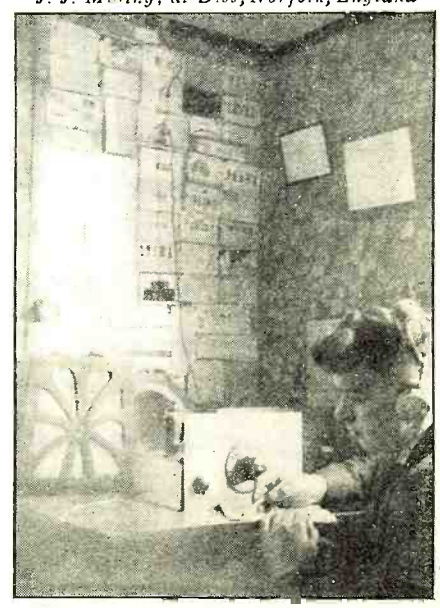
Argentina, J. F. Edbrooke.
Australia, C. N. R. Richardson, C. Arthur Matthews, A. H. Garth.
Batavia, A. den Breems.
Brazil, W. W. Enete, Louis Rogers Gray.
British Guiana, E. S. Christiani, Jr.
British West Indies, E. G. Derrick, Edela Rosa, N. Hood-Daniel.
Canada, Douglas Wood, Jack Bews, W. H. Fraser, Robert Edkins, Charles Eugene Roy, J. T. Atkinson.
Canary Islands, Manuel Davin.
Chile, Jorge Izquierdo.
China, Baron P. D. N. von Hoyningen-Huene.
Colombia, J. D. Lowe.
Cuba, Frank H. Kydd.
Curacao, R. J. Van Ommeren.
Denmark, Hans W. Priwin.
Dutch East Indies, A. den Breems.
England, Kenneth Judd, C. L. Wright, John J. Maling, Alan Barber, Donald Burns, L. H. Plunkett-Checkemian, L. H. Colburn, Norman C. Smith and John Parkinson, Norman Nuttall, L. C. Styles, Frederick W. Gunn, R. Lawton, R. Stevens, W. P. Kempster, R. S. Houghton.
France, J. C. Meillon, Jr.
Germany, Herbert Lennartz.
Honduras, R. Wilder Tatum.
Hawaii, O. F. Sternemann.
India, D. R. D. Wadia.
Italy, Dr. Guglielmo Tixy.
Japan, Masall Satow.
Mexico, Felipe L. Saldaña.
New Zealand, Dr. G. Campbell MacDiarmid, Kenneth H. Moffatt.
Philippine Islands, Victormo Lconen.
Scotland, Duncan T. Donaldson.
South Africa, C. McCormick, Mike Kruger.
Spain, José Ma. Maranges.
Switzerland, E. J. de Lopez, Dr. Max Hausdorff.
Venezuela, Francisco Fossa Anderson.

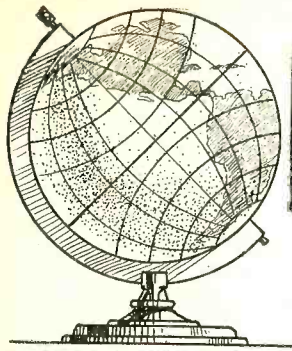
Applications for Official Observers in the remaining countries should be sent in immediately to the DX Corner. Listeners outside of the United States who feel that they would like to serve in this capacity are hereby requested to file their applications as soon as possible before final appointments are made.

ZL1AT, Christchurch, N. Z., reported on 14218 kc., irregularly 18:30 to 19:30, G.M.T. (*Continued on page* 356)

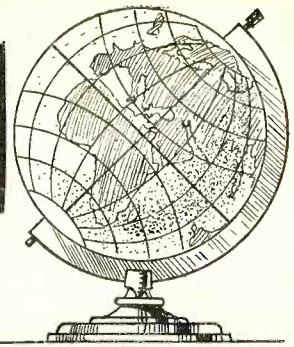
YOUR BRITISH OBSERVER

Part of the Listening Post of L. P. O. J. J. Maling, at Diss, Norfolk, England





WORLD SHORT WAVE TIME-TABLE



The schedule of short-wave broadcasting stations listed below includes only those that are received best in RADIO NEWS LISTENING POSTS. This new schedule is from 8 G. M. T. right around the clock. Both wavelength and frequency are noted for each station. Station locations are found on page 356.

International Short-Wave "Best Bets"

Wavelengths in Meters	*Call Letters*	*Frequency in k.c.*
08 G. M. T. 3 A. M. E. S. T.		
25.5	GSD	11750
27.9+	JVM	10740
28.1+ Irregular	JVN	10660
30.4 Irregular	JYS	9840
31.3 Except Sun. Irregular	VK3LR	9580
31.4+ Sun.	LKJ1	9540
31.5	GSB	9510
38.0+ Irregular	JVR	7880
44.5+ Irregular	JVT	6750
48.9+	ZTJ	6122
49.3+	OER2	6072
49.4+ Tues.	VQ7LO	6060
49.8 Mon., Fri.	CQN	6024
70.2	RV15	4273
09 G. M. T. 4 A. M. E. S. T.		
19.7 Sun.	DJB	15200
25.5	GSD	11750
27.9+	JVM	10740
28.1	CEC	10670
28.1 Irregular	JVN	10660
30.4+ Irregular	JYS	9840
31.2 Sun.	VK2ME	9590
31.3 Except Sun. Irregular	VK3LR	9580
31.3+ Sun.	DJA	9560
31.4+ Sun.	LKJ1	9540
31.5	GSB	9510
38.0+ Irregular	JVR	7880
44.5+ Irregular	JVT	6750
48.9+	ZTJ	6122
49.3+	OER2	6072
49.8 Mon., Fri.	CQN	6024
49.9+ Ex. Tu., Th., Sat.	RV59	6000
70.2	RV15	4273
10 G. M. T. 5 A. M. E. S. T.		
19.7 Sun	DJB	15200
19.8+ Except Sun.	HVJ	15123
27.9+	JVM	10740
28.1	CEC	10670
28.1 Irregular	JVN	10660
30.4+ Irregular	JYS	9840
31.2+ Sun.	VK2ME	9590
31.3 Except Sun.	VK3LR	9580
31.3+ Sun.	DJA	9560
31.4+	LKJ1	9540
31.5 Wed., Sat.	VK3ME	9510
38.0+ Irregular	JVR	7880
48.9+ Except Sun.	ZTJ	6122
49.3+	OER2	6072
49.4+ Mon., Wed., Fri.	VQ7LO	6060
49.8+ Mon., Wed., Thur.	ZHI	6012
50.2 Sun.	HVJ	5969
52.9+	XQAJ	5660
70.2	RV15	4273
11 G. M. T. 6 A. M. E. S. T.		
14.2+	LSN	21020
16.8+	GSG	17790
19.8	GSF	15140
25.1+ Sun.	RNE	11924
27.9+	JVM	10740
28.1+ Irregular	JVN	10660
30.4+ Irregular	JYS	9840
31.2+ Sun.	VK2ME	9590
31.3 Except Sun.	VK3LR	9580
31.3+	W1XAZ	9570
31.3+ Irregular	VUB	9565
31.4+ Irregular	LKJ1	9540
31.5 Wed., Sat.	VK3ME	9510
38.0+ Irregular	JVR	7880
48.9+ Tu., Fri., Sun.	ZGE	6130
48.9+ Except Sun.	ZTJ	6122
49.3+	OER2	6072
49.0+	PK1WK	6116
49.4+ Mon., Wed., Fri.	VQ7LO	6060
49.4+	W8XAL	6060
49.8+ Mon., Wed., Thu.	ZHI	6012
52.9+	XQAJ	5660
70.2	RV15	4273
12 G. M. T. 7 A. M. E. S. T.		
13.9+	W8XK	21540
14.2+	LSN	21020
16.8+	GSG	17790
16.8 Ex. Tues., Wed.	PHI summer only	17775
16.8+	DJE	17760
19.6+	FYA	15243
19.6+ Except Tu., Wed.	PHI	15220
19.8	GSF	15140
23.3+ Sun.	CNR	12830
24.8+ Sun.	CT1CT	12082
25.5+ Except Tues., Wed.	PHI	11730
26.0	XGR	11530
27.9+	JVM	10740
31.2+ Sun.	VK2ME	9590
31.3 Except Sun.	VK3LR	9580
31.3+	W1XAZ	9570
31.3+ Irregular	VUB	9565
31.4+ Irregular	LKJ1	9540
31.8	PLV	9415
38.0+ Irregular	JVR	7880
48.9+ Tu., Fri., Sun.	ZGE	6122
49.0+	PK1WK	6116
49.1+ Thurs., Fri., Sat.	VE9GW	6096
49.3+	OER2	6072
49.4+	W8XAL	6060
49.8+ Mon., Wed., Thu.	ZHI	6012
52.9+	XQAJ	5660
70.2	RV15	4273
13 G. M. T. 8 A. M. E. S. T.		
13.9+	W8XK	21540
14.2+	LSN	21020
16.8+	GSG	17790
16.8+ Ex. Tues., Wed.	PHI summer only	17775
16.8+	DJE	17760
19.6+	CP5	15308
19.6	FYA	15243
19.6+ Except Tues., Wed.	PHI	15220
19.7	DJB	15200
19.8	GSF	15140
23.3+ Sun.	CNR	12830
24.8+ Sun.	CT1CT	12082
25.1+ Sun.	RNE	11924
25.5+ Except Tues., Wed.	PHI	11730
26.0	XGR	11530
31.2+ Sun.	VK2ME	9590
31.3+	W1XAZ	9570
31.3+	DJA	9560
31.4+ Irregular	LKJ1	9540
31.8	PLV	9415
48.9+ Sun.	ZTJ	6122
49.0+	PK1WK	6116
49.1+ Thurs., Fri., Sat.	VE9GW	6096
49.3+	OER2	6072
49.4+ Thurs.	VQ7LO	6060
49.4+	W8XAL	6060
49.4+ Sun.	OXY summer only	6062
49.8+ Mon., Wed., Thur.	ZHI	6010
52.9+ Irregular	XQAJ	5663
70.2	RV15	4273
14 G. M. T. 9 A. M. E. S. T.		
13.9+	W8XK	21540
14.2+	LSN	21020
16.8+	W3XAL	17780
16.8+ Ex. Tues., Wed.	PHI summer only	17775
19.6+	CP5	15308
19.6+	FYA	15243
19.6+ Except Tues., Wed.	PHI	15220
19.7	DJB	15200
19.8	GSF	15140
19.9+ Irregular	RKI	15040
25.1 Sun.	RNE	11924
25.2+	GSE	11860
25.5+ Except Tues., Wed.	PHI	11730
26.0	XGR	11530
31.2+ Sun.	VK2ME	9590
31.3 Except Sun.	VK3LR	9580
31.3+	W1XAZ	9570
31.3+	DJA	9560
31.4+ Irregular	LKJ1	9540
31.8 Except Sat., Sun.	PLV	9415
48.9+	ZTJ	6122
49.0+	PK1WK	6116
49.0+	VV2RC	6112
49.0+	VE9HX	6110
49.0+ Irregular	VUC	6109
49.1+ Thurs., Fri., Sat.	VE9GW	6096
49.3+	OER2	6072
49.4+	W8XAL	6060
49.8+	COC	6010
70.2	RV15	4273
80.0 Sun.	CT1CT	3750
15 G. M. T. 10 A. M. E. S. T.		
13.9+	W8XK	21540
14.2+	LSN	21020
14.2+	IRW	19700
16.8+	W3XAL	17780
16.8+ Ex. Tues., Wed.	PHI summer only	17775
19.6+	W2XE	15270
19.6+	FYA	15243
19.6+ Except Tues., Wed.	PHI	15220
19.7	W8XK	15210
19.7	DJB	15200
19.8	GSF	15140
19.8	VE9DN	15130
19.8+ Irregular	IIVJ	15123
25.1+ Sun.	RNE	11924
25.2+	GSE	11860
25.4+ Sun.	W1XAL	11790
25.5+ Except Tues., Wed.	PHI	11730
30.0+	KAZ	9990
30.5+ Irregular	IRM	9820
31.2 Sun.	VK2ME	9590
31.3+	W1XAZ	9570
31.3+	DJA	9560
31.4+ Irregular	LKJ1	9540
31.5	GSB	9510
31.8 Irregular	PLV	9410
48.9+	ZTJ	6122
49.0+	VV2RC	6112
49.0+ Except Sat., Sun.	VE9HX	6110
49.0+ Irregular	VUC	6109
49.1+ Thu., Fri., Sat.	VE9GW	6096
49.3+	OER2	6072
49.4+ Sun., Wed.	VQ7LO	6060
49.4+	W8XAL	6060
49.8+ Sun.	ZHI	6012
49.8+	COC	6010
49.8+	XEBT	6010
16 G. M. T. 11 A. M. E. S. T.		
13.9+	W8XK	21540
14.2+	LSN	21020
16.8+	W3XAL	17780
17.3+ Fri.	W3XL	17300
19.6+	W2XE	15270

(*Continued on next page*)

THE WORLD SHORT

WAVE TIME TABLE

19.6+ Except Tues., Wed.	PHI	15220
19.7	W8XK	15210
19.7	DJB	15200
25.2	FYA	11900
25.1+ Sun.	RNE	11924
25.2+	GSE	11860
25.4+ Sun.	W1XAL	11790
25.5+ Except Tues., Wed.	PHI	11730
30.0+	KAZ	9990
31.3+	W1XAZ	9570
31.3+ Irregular	VUB	9565
31.3+	DJA	9560
31.4+ Irregular	LKJ1	9540
31.5	GSB	9510
46.5+	HJ1ABB	6447
47.8 Tues., Fri.	HI1A	6272
48.7+	YV3RC	6150
48.9+ Except Sun.	ZTJ	6122
49.0+ Sun.	YV2RC	6112
49.0+ Except Sat., Sun.	VE9HX	6110
49.1+ Thu., Fri., Sat.	VE9GW	6096
49.3+ Irregular	W9XAA	6080
49.3+	OER2	6072
49.4+ Except Fri.	VQ7LO	6060
49.4+	W8XAL	6060
49.4+ Sun.	OXY winter only	6060
49.8+ Sun.	ZHI	6012
49.8+	XEBT	6010
50.2	HJ2ABC	5973

17 G. M. T. 12 Noon E. S. T.

13.9+	W8XK	21540
14.2+	LSN	21020
16.8+	W3XAL	17780
17.3+ Fri.	W3XL	17300
19.7	W8XK	15210
25.2	FYA	11900
25.2+	GSE	11860
25.4	I2RO	11810
25.5	DJD	11760
25.6 Irregular	FYA	11720
26.0 Irregular	XAM	11530
30.6+ Irregular	GCW	9790
31.2+	W3XAU	9590
31.3+	W1XAZ	9570
31.3+ Irregular	VUB	9565
31.4+ Irregular	LKJ1	9540
31.5	GSB	9510
40.5 Except Sun.	HJ3ABD	7402
45.3+	RV72	6611
46.5+	HJ1ABB	6447
47.5 Sun.	HIZ	6315
47.8 Tues., Fri.	HI1A	6272
48.7+	VV3RC	6150
48.9+	ZTJ	6120
49.0+ Ex. Sat., Sun.	VE9HX	6110
49.0+ Sat.	VUC	6109
49.1+ Thu., Fri., Sat.	VE9GW	6096
49.3+ Irregular	W9XAA	6080
49.3+	OER2	6072
49.4+ Except Fri.	VQ7LO	6060
49.4+	W8XAL	6060
49.8	DJC	6020
49.8+ Sat., Sun.	ZHI	6012
49.8+	XEBT	6010

18 G. M. T. 1 P. M. E. S. T

13.9+	W8XK	21540
14.2+	LSN	21020
15.2 Irregular	IRW	19700
16.5+	LSY	18115
16.8+	W3XAL	17780
17.3+ Fri.	W3XL	17300
19.7	W8XK	15210
22.7+	ORP	13200
25.2	FYA	11900
25.4	I2RO	11810
25.5	DJD	11760
25.5	GSD	11750
29.0+	ORK	10330
30.4 Sat.	EAQ	9860
30.6+ Irregular	GCW	9790
31.2+	W3XAU	9590
31.3+	W1XAZ	9570
31.4+ Irregular	LKJ1	9540
31.5	GSB	9510
40.5	HJ3ABD	7402
47.5 Sun.	HIZ	6315
47.8	HI1A	6272
48.7+	YV3RC	6150
48.9+	ZTJ	6122
49.0+ Except Sat., Sun.	VE9HX	6110
49.0+ Sat.	VUC	6109
49.1+ Ex. M., T., Wed.	VE9GW	6096
49.3+ Irregular	W9XAA	6080
49.3+	OER2	6072
49.3+ Sun.	VE9CS	6070
49.4+ Except Fri.	VQ7LO	6060
49.4+	W8XAL	6060
49.4+	OXY	6060
49.8	DJC	6020
49.8+	XEBT	6010
73.0+ Except Mon.	HCJB	4107
84.6+ Mon., Thu., Sat.	CR7AA	3543

19 G. M. T. 2 P. M. E. S. T.

16.8+	W3XAL	17780
17.3+ Fri.	W3XL	17300
19.5	W2XAD	15330
19.7	W8XK	15210
22.7	ORP	13200
25.2	FYA	11900
25.3+	W2XE	11830
25.4	I2RO	11810
25.5	DJD	11760
25.5	GSD	11750
25.6	FYA	11720
28.3+ Time at 20 G.M.T.	FYB	10578
29.0+	ZFD	10335
29.0+	ORK	10330
30.4 Sat.	EAQ	9860
30.5+ Irregular	IRM	9820
30.6 Irregular	GCW	9790
31.2+	W3XAU	9590
31.3+	W1XAZ	9570
31.4+ Irregular	LKJ1	9540
31.5	GSB	9510
41.8	CR6AA	7177
42.0 Sun.	HJ4ABB	7138
43.8+ Irregular	HAS	6840
46.5+ Sun., very irreg.	HJ1ABB	6447
47.5 Sun.	HIZ	6315
47.8	HI1A	6272
48.9+	ZTJ	6122
49.0+ Sun.	YV2RC	6112
49.0+ Except Sat., Sun.	VE9HX	6110
49.0+ Sat.	VUC	6109
49.1+ Except M., T., W.	VE9GW	6096
49.3+ Irregular	W9XAA	6080
49.3+	OER2	6072
49.3+ Sun.	VE9CS	6070
49.4+ Sat.	VQ7LO	6060
49.4+	W8XAL	6060
49.4+	OXY	6060
49.8	DJC	6020
49.8+	XEBT	6010
49.9+	RV59	6000
50.2+	HVJ	5969
73.0+ Except Mon.	HCJB	4107
84.6+ Mon., Thur., Sat.	CR7AA	3543

20 G. M. T. 3 P. M. E. S. T.

16.8+	W3XAL	17780
17.3+ Fri.	W3XL	17300
19.4 Sun. summer only	PRADO	15440
19.5+	W2XAD	15330
19.7	W8XK	15210
22.7+	ORP	13200
25.1+ Sun.	RNE	11924
25.2	FYA	11900
25.3+	W2XE	11830
25.4	I2RO	11810
25.5	DJD	11760
25.5	GSD	11750
25.6	FYA	11720
28.9+	LSX	10350
29.0+	ZFD	10335
29.0+	ORK	10330
30.5+ Irregular	IRM	9820
30.6+ Irregular	GCW	9790
31.2+ Tues., Fri.	CT1AA	9600
31.2+	W3XAU	9590
31.3+	W1XAZ	9570
31.4+ Irregular	LKJ1	9540
31.5	GSB	9510
37.3 Sun.	CNR	8035
41.8	CR6AA	7177
42.0 Sun.	HJ4ABB	7138
43.8+ Sun.	HAS	6840
46.5+ Sun.	HJ1ABB	6447
48.9+ Except Sun.	ZTJ	6122
49.0+ Sun.	YV2RC	6112
49.0+ Except Sat., Sun.	VE9HX	6110
49.1 Ex. M., W., Sat.	W9XF	6100
49.1+	VE9GW	6096
49.3+ Irregular	W9XAA	6080
49.3+	OER2	6072
49.3+ Sun.	VE9CS	6070
49.4+	W8XAL	6060
49.4+	OXY	6060
49.8	DJC	6020
49.8+	XEBT	6010
49.9+ Irregular	RV59	6000
50.1	TGX	5984
84.6+ Mon., Thurs., Sat.	CR7AA	3543

21 G. M. T. 4 P. M. E. S. T.

15.9+	PLE	18860
16.8+	W3XAL	17780
17.3+ Fri.	W3XL	17300
19.4 Sun. summer only	PRADO	15440
19.7	W8XK	15210
24.8+ Except Sun.	CT1CT	12082
25.2	FYA	11900
25.2	W8XK	11870
25.4	I2RO	11810
25.5	DJD	11760
25.5	GSD	11750
25.6	FYA	11720
29.0+	ZFD	10335
30.5+ Irregular	IRM	9820
30.6+ Irregular	GCW	9790
31.2+ Tues., Fri.	CT1AA	9600
31.2+	W3XAU	9590
31.3+	W1XAZ	9570
31.4+ Irregular	LKJ1	9540
31.4+	DJN	9540
31.5	GSB	9510
31.8+	PLV	9415
37.3+ Sun.	CNR	8035
41.8	CR6AA	7177
42.0 Sun.	HJ4ABB	7138
43.8+ Irregular	HAS	6847
46.5+ Sun.	HJ1ABB	6447
47.5	HIZ	6315
47.8 Sun. Irregular	HI1A	6272
48.8+	W8XK	6140
48.9+ Sat.	ZTJ	6122
49.0+ Sun.	YV2RC	6112
49.0+	VE9HX	6110
49.1+ Mon., Wed., Sat.	W3XAL	6100
49.1 Ex. M., Wed., Sat.	W9XF	6100
49.1+	VE9GW	6096
49.3+ Irregular	W9XAA	6080
49.3+	OER2	6072
49.3+ Sun.	VE9CS	6070
49.4+	W8XAL	6060
49.4+	OXY	6060
49.8	DJC	6020
49.8+	COC	6010
49.8+	XEBT	6010
49.9+	HIX	6000
49.9+ Ex. Tues., Thu., Sat.	RV59	6000

22 G. M. T. 5 P. M. E. S. T.

15.9+ Irregular	PLE	18860
19.4 Sun. summer only	PRADO	15440
24.8+ Ex. Sun.	CT1CT	12082
25.2	FYA	11900
25.2	W8XK	11870
25.4	I2RO	11810
25.4+ Except Sat.	W1XAL	11790
25.5	DJD	11760
25.5	GSD	11750
25.6	FYA	11720
30.4	EAQ	9860
30.5+ Irregular	IRM	9820
31.2+ Tues., Fri.	CT1AA	9600
31.2+	W3XAU	9590
31.3	HBL	9580
31.3+	W1XAZ	9570
31.3+	DJA	9560
31.4+	DJN	9540
31.5	GSB	9510
31.5+	PRF5	9505
38.4+ Sat.	HBP	7790
43.8+ Irregular	HAS	6840
45.0+ Sun.	HC2RL	6668
46.1	HJ5ABD	6504
46.5+ Sun. Irregular	HJ1ABB	6447
46.6+ Fri.	W3XL	6425
47.5	HIZ	6315
48.7+	VV3RC	6150
48.8+	W8XK	6140
49.0	W2XE	6120
49.0+	YV2RC	6112
49.0+ Sat.	VE9HX	6110
49.1+ Mon., Wed., Sat.	W3XAL	6100
49.1+ Ex.Mon.,Wed.,Sat.	W9XF	6100
49.1+	VE9GW	6096
49.3+ Irregular	CP5	6080
49.3+	W9XAA	6080
49.3+	OER2	6072
49.3+ Sun.	VE9CS	6070
49.3+	VV5RMO	6070
49.4+	W8XAL	6060
49.4+	OXY	6060
49.8	DJC	6020
49.8+	COC	6010
49.8+	XEBT	6010
49.9+	HIX	6000
49.9+ Irregular	RV59	6000
50.1	YV4RC	5980
50.4	HJ2ABA	5880
50.6 Irregular	HJ4ABE	5860

23 G. M. T. 6 P. M. E. S. T.

15.9+ Except Sat., Sun.	PLE	18860
19.4 Sun. summer only	PRADO	15440
25.2	W8XK	11870
25.4+ Sun.	W1XAL	11790
25.5	DJD	11760
25.6	FYA	11720
30.4	EAQ	9860
30.5+ Irregular	IRM	9820
31.2+	W3XAU	9590
31.3	GSC	9585
31.3	HBL	9580
31.3+	W1XAZ	9570
31.3+	DJA	9560
31.4+	DJN	9540
31.5+	PRF5	9505
38.4+ Sat.	HBP	7790
42.0 Ex. Sat., Sun.	HJ4ABB	7138
40.5+	EA8AB	7403
45.0+ Sun.	HC2FL	6668
46.1	HJ5ABD	6504

(*Continued on next page*)

SHORT-WAVE TIME TABLE

46.5+ Sun., Irregular	HJ1ABB	6447
46.6+ Fri.	W3XL	6425
47.8 Sun., Irregular	HI1A	6272
48.7+	YV3RC	6150
48.8+	W8XK	6140
49.0	W2XE	6120
49.0+	YV2RC	6112
49.0+	VE9HX	6110
49.1+ Mon., Wed., Sat.	W3XAL	6100
49.1+ Ex.Mon.,Wed.,Sat.	W9XF	6100
49.1+	VE9GW	6096
49.3+ Irregular	CP5	6080
49.3+	W9XAA	6080
49.3+	OER2	6072
49.3+	VE9CS	6070
49.3+	YV5RMO	6070
49.4+	W8XAL	6060
49.4+	OXY	6060
49.5	GSA	6050
49.8	DJC	6020
49.8+ Sun., Irregular	COC	6010
49.8+	XEBT	6010
50.1	YV4RC	5984
50.6 Tues., Thurs., Sat.	HJ4ABE	5860
51.4+	HJ2ABC	5824
69.4 Irregular	G6RX	4320

00 G. M. T. 7 P. M. E. S. T.

15.9+ Except Sat., Sun.	PLE	18860
25.2	W8XK	11870
25.4+ Sun.	W1XAL	11790
25.5	DJD	11760
25.6	FYA	11720
28.9+	LSX	10350
30.4 Sat., Sun.	EAQ	9860
30.5+ Irregular	IRM	9820
31.2+	W3XAU	9590
31.3	GSC	9580
31.3	HBL	9580
31.3+	W1XAZ	9570
31.3+	DJA	9560
31.4+	DJN	9540
31.4+	W2XAF	9530
31.5+ Irregular	PRF5	9505
32.8+	CP5	9122
38.4+ Sat., Irregular	HBP	7790
40.5	HJ3ABD	7400
42.0 Tues., Fri.	HJ4ABB	7138
44.0+	YNLF	6800
45.0+ Sun.	HC2RL	6668
46.1	HJ5ABD	6504
46.5+	HJ1ABB	6447
46.6+ Fri.	W3XL	6425
47.8	HJ3ABF	6275
48.7+	YV3RC	6150
48.8+	W8XK	6140
48.9+	ZGE	6130
49.0	W2XE	6120
49.0+	YV2RC	6112
49.0+	VE9HX	6110
49.1+ Mon., Wed., Sat.	W3XAL	6100
49.1+	VE9GW	6096
49.3+ Irregular	CP5	6080
49.3+	W9XAA	6080
49.3+	VE9CS	6070
49.3+	YV5RMO	6070
49.4+	W3XAU	6060
49.5	GSA	6050
49.8	CQN	6024
49.8	DJC	6020
49.8+ Sun. Irregular	COC	6010
49.8+	XEBT	6010
49.9+	HIX	6000
50.1	TGX	5984
50.1	YV4RC	5984
50.4 Irregular	HJ2ABA	5880
50.6 Except Wed., Sun.	HJ4ABE	5860
51.4+	HJ2ABC	5824
69.4 Irregular	G6RX	4320

01 G. M. T. 8 P. M. E. S. T.

15.9 Except Sat., Sun.	PLE	18860
25.2	W8XK	11860
25.5	DJD	11760
25.6	FYA	11720
25.6	CJRX	11720
28.9	LSX	10350
31.3+	W1XAZ	9570
31.3+	DJA	9560
31.4+	DJN	9540
31.4+	W2XAF	9530
37.5	HC2JSB	8000
40.5+	HJ3ABD	7402
42.0 Tues., Fri.	HJ4ABB	7138
44.7	TIEP	6750
46.1	HJ5ABD	6504
46.5+	HJ1ABB	6447
46.6+ Fri.	W3XL	6425
47.8	HJ3ABF	6275
47.8	HI1A	6272
48.7+	CJRO	6150
48.7+	YV3RC	6150
48.8+	W8XK	6140
49.0	W2XE	6120
49.0+	YV2RC	6112
49.0+	VE9HX	6110
49.1+ Mon., Wed., Sat.	W3XAL	6100
49.1+ Ex.Mon.,Wed.,Sat.	W9XF	6100
49.1+	VE9GW	6096
49.3+	CP5	6080
49.3+	W9XAA	6080
49.3+ Sun.	VE9CS	6070
49.3+	YV5RMO	6070
49.4+	W3XAU	6060
49.8	DJC	6020
49.8+	COC	6010
49.8+	XEBT	6010
49.9+	HIX	6000
50.1 Irregular	YV4RC	5984
50.1	TGX	5984
50.4 Irregular	HJ2ABA	5880
50.6 Mon., Wed., Fri.	HJ4ABE	5860
51.4	HJ2ABC	5824
51.9+	TIX	5795
69.4 Irregular	G6RX	4320
73.0+ Except Mon.	HCJB	4107

02 G. M. T. 9 P. M. E. S. T.

25.2	W8XK	11870
25.5	DJD	11760
25.6	CJRX	11720
28.1	CEC	10670
28.9	LSX	10350
31.3+	W1XAZ	9570
31.3+	DJA	9560
31.4+	W2XAF	9530
37.5	HC2JSB	8000
38.3+ Irregular	OA4AC	7820
40.5+ Except Sun.	HJ3ABD	7402
42.0 Tues., Fri.	HJ4ABB	7138
44.7	TIEP	6750
45.0+ Tues., Fri.	HC2RL	6668
45.3 Thurs.	PRADO	6618
46.1	HJ5ABD	6504
46.5+	HJ1ABB	6447
46.6+ Fri.	W3XL	6425
47.5 Sat.	HIZ	6315
47.8	HJ3ABF	6275
47.8	HI1A	6272
48.7+	CJRO	6150
48.7+	YV3RC	6150
48.8+	W8XK	6140
49.0	W2XE	6120
49.0+	YV2RC	6112
49.0+	VE9HX	6110
49.1+ Mon., Wed., Sat.	W3XAL	6100
49.1+ Ex.Mon.,Wed.,Sat.	W9XF	6100
49.1+ Except Sun.	VE9GW	6096
49.3+ Irregular	CP5	6080
49.3+	W9XAA	6080
49.3+ Sun.	VE9CS	6070
49.3+	YV5RMO	6070
49.4+	W3XAU	6060
49.8	DJC	6020
49.8+ Sun. Irregular	COC	6010
49.8+	XEBT	6010
49.9+	HIX	6000
50.1 Irregular	YV4RC	5984
50.1	TGX	5984
50.4 Irregular	HJ2ABA	5880
50.6 Mon., Wed., Fri.	HJ4ABE	5860
51.4	HJ2ABC	5824
51.9	OA4AD	5820
51.9+	TIX	5795
64.5+ Wed., Sat.	HC2EP	4650
69.4+	G6RX	4320
73.0+ Except Mon.	HCJB	4107

03 G. M. T. 10 P. M. E. S. T.

25.1+	RNE	11924
25.5 Irregular	DJD	11760
25.6	FYA	11720
25.6	CJRX	11720
28.1	CEC	10670
31.3+	W1XAZ	9570
31.4+	W2XAF	9530
38.3+ Irregular	OA4AC	7820
40.5+ Except Sun.	HJ3ABD	7402
42.0	HJ4ABB	7138
44.7 Testing	TIEP	6750
44.8	YNLF	6692
45.0+ Tues., Fri.	HC2RL	6668
45.3 Thurs.	PRADO	6618
46.5+ Irregular	HJ1ABB	6447
46.6+ Fri.	W3XL	6425
47.5 Sat.	HIZ	6315
47.8	HJ3ABF	6275
47.8 Irregular	HI1A	6272
48.7+	CJRO	6150
48.7+	YV3RC	6150
48.8+	W8XK	6140
49.0+	YV2RC	6112
49.0+	VE9HX	6110
49.1+ Mon., Wed., Sat.	W3XAL	6100
49.1+ Ex.Mon.,Wed.,Sat.	W9XF	6100
49.1+ Except Sun.	VE9GW	6096
49.3+ Irregular	CP5	6080
49.3+	W9XAA	6080
49.3+ Sun.	VE9CS	6070
49.3+	YV5RMO	6070
49.4+	W3XAU	6060
49.4+	W8XAL	6060
49.8	DJC	6020
49.8+ Sun.	ZHI	6012
49.8+	XEBT	6010
49.9+ Sat.	HIX	6000
50.1 Irregular	YV4RC	5984
50.1	TGX	5984
50.6 Mon., Wed., Fri.	HJ4ABE	5860
51.9	OA4AD	5820
51.9+	TIX	5795
64.5+	HC2EP	4650
69.4+ Irregular	G6RX	4320
73.0+ Except Mon.	HCJB	4107

04 G. M. T. 11 P. M. E. S. T.

25.1+ Irregular	RNE	11924
25.2 Sun.	W8XK	11870
25.6	FYA	11720
25.6	CJRX	11720
31.3+	W1XAZ	9570
38.3+	OA4AC	7820
40.5 Irregular	HJ3ABD	7402
44.7 Testing	TIEP	6750
45.0 Fri.	TGW	6180
45.0+ Tues.	HC2RL	6668
45.3 Thurs.	PRADO	6618
46.6+ Fri.	W3XL	6425
47.5	HIZ	6315
47.8 Irregular	HI1A	6272
48.7+	CJRO	6150
48.8+	W8XK	6140
48.9+ Except Sun.	ZTJ	6122
49.0+	VE9HX	6110
49.1+ Mon., Wed., Sat.	W3XAL	6100
49.1+ Ex.Mon.,Wed.,Sat.	W9XF	6100
49.1+ Except Sun.	VE9GW	6096
49.3+ Tues., Sun.	VE9CS	6070
49.4+	W8XAL	6060
49.8+ Sun.	ZHI	6012
49.8+ Sat.	COC	6010
49.8+	XEBT	6010
49.9+ Sat.	VE9DN	6005
49.9+ Sat.	HIX	6000
50.1	TGX	5984
51.9	OA4AD	5820
51.9+	TIX	5795
73.0+ Except Mon.	HCJB	4107

05 G. M. T. 12 Midnight E. S. T.

19.7	DJB	15200
25.2 Sun.	W8XK	11870
27.9+	JVM	10740
28.1+ Irregular	JVN	10660
30.4+ Irregular	JYS	9840
31.3 Except Sun., Irregular	VK3LR	9580
31.3+	W1XAZ	9570
44.5+ Irregular	JVT	6750
45.0+ Tues.	HC2RL	6668
47.8 Irregular	HI1A	6272
48.8+	W8XK	6140
48.9+ Except Sun.	ZTJ	6122
49.0+	VE9HX	6110
49.1+ Exc.Mon.,Wed.,Sat.	W9XF	6100
49.3 Tues., Sun.	VE9CS	6070
49.4+	W8XAL	6060
49.8	DJC	6020
49.8+ Sat., Sun.	ZHI	6012
49.8+ Sat.	COC	6010
49.8+	XEBT	6010

06 G. M. T. 1 A. M. E. S. T.

19.0+ Irregular	JVT	15760
19.7	DJB	15200
27.9+	JVM	10740
28.1+ Irregular	JVN	10660
30.4+ Irregular	JYS	9840
31.2+ Sun.	VK2ME	9590
31.3 Except Sun. Irregular	VK3LR	9580
38.0+	JVR	7880
44.5+ Irregular	JVT	6750
47.8 Irregular	HI1A	6272
49.1+ Ex.Mon.,Wed.,Sat.	W9XF	6100
49.3 Tues.	VE9CS	6070
49.4+	W8XAL	6060
49.8+ Sat., Sun.	ZHI	6012

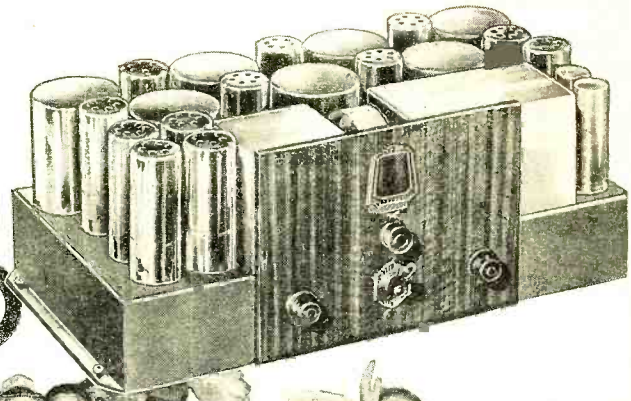
07 G. M. T. 2 A. M. E. S. T.

22.0 Irregular	JVK	13610
25.5	GSD	11750
27.9+	JVM	10740
28.1+ Irregular	JVN	10660
28.3 Time at 7:30 G.M.T.	FYB	10578
30.4+ Irregular	JYS	9840
31.2+ Irregular	XETE	9600
31.2+ Sun.	VK2ME	9590
31.3 Ex. Sun. Irregular	VK3LR	9580
31.5	GSB	9510
44.5+ Irregular	JVT	6750

STATION LOCATIONS

A complete List of all the stations shown in the foregoing Time Table, with their locations (city and country), will be found on page 356.

ABOVE THE CLAMOR OF THE CROWD

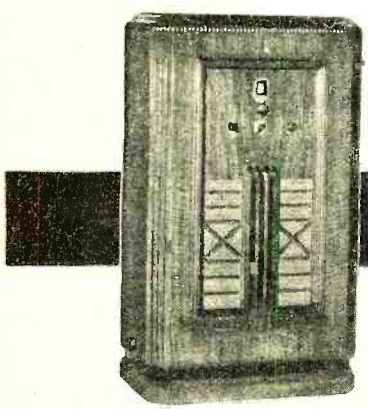


Custom-built SCOTT ALL-WAVE Fifteen

....backed by *More Years* of All-Wave Experience

SCOTT PIONEERS *STILL ANOTHER* AMAZING RADIO DEVELOPMENT "Tonetruth"

Now SCOTT adds to its sensational record of "firsts" in All-Wave radio the most startling perfection of tone reproduction ever known. By an unprecedented arrangement of its powerful, full 12-watt-output high-fidelity speaker and new Console design, SCOTT at last accomplishes that which has been sought in radio reproduction—the voice of a singer no longer sounds as though it were coming through a barrel, the orchestra no longer sounds as though it were playing in a box. Famous through the years for the the finest tone quality in radio, this new, exclusive SCOTT development—"TONETRUTH"—brings still finer reproduction—that is, in all truth—*actuality!*



The "Waverley"—one of several handsome new SCOTT Consoles featuring the newest SCOTT development—"TONETRUTH."

Every SCOTT Receiver built during the past five and a half years has been an *all-wave receiver* . . . which means that for some four and a half years SCOTT owners actually have enjoyed the all-wave reception just now being promised by other radios. Such leadership in accomplishment deserves your recognition, for it sounds loud and clear above the clamor of the crowd.

The SCOTT method of manufacture—laboratory-precise custom construction in limited quantities under the most exacting scientific standards known in radio—permits the frequent incorporation of improvements developed by the world's premier radio technologists. This obviously is impossible for mass production manufacturers who feature yearly model changes.

The outstanding ability of the SCOTT All-Wave Fifteen to give you complete enjoyment of long and short wave broadcasts from *everywhere in the world,* and on all wave lengths between 13 and 550 meters, is best demonstrated by the understanding under which you buy it! If, after a thirty-day trial period, in your own home, and test through side-by-side comparison or scientific laboratory measurement, you are not entirely satisfied that the SCOTT All-Wave Fifteen out-performs any other radio receiver, you may return it for full credit without quibbling. Also, this receiver is so made that its every part (except tubes) is warranted for five years.

Send today for complete information, technical description, and PROOF of superior performance in the use of owners in every state in the U.S.A., and 118 foreign countries.

E. H. SCOTT RADIO LABORATORIES, INC.

4440 Ravenswood Ave. Dept. 594 Chicago, Illinois

SEND COUPON FOR DETAILS

E. H. Scott Radio Laboratories, Inc.,
4440 Ravenswood Avenue, Dept. 594, Chicago, Ill.

Send me, without obligation, particulars regarding the SCOTT ALL-WAVE Fifteen, including PROOF of its superior performance.

*Name*_____

*Address*_____

*Town*_____ *State*_____

CANARY ISLAND POST

Here is the layout of our Official RADIO NEWS *Listening Post Observer, Manuel Davin, located at Teneriffe. The station includes a short-wave transmitter*

The DX Corner (Short Waves)

(*Continued from page* 351)

GSH, Daventry, England, 21470 kc., reported 11 to 15:45 G.M.T.

Who has heard HKE, Bogota, Colombia, 7.1 megacycles, giving lectures on Mondays and Thursdays at 6 p.m., E.S.T., and Tuesdays and Saturdays, 8 to 9 p.m., E.S.T.

HJ3ABF, Bogota, Colombia, reported on 6.2 megacycles, daily, from 12 to 1:30 p.m., E.S.T., and daily, except Sunday, from 7 to 11 p.m., E.S.T.

HJ5ABC, Cali, Colombia, 6100 kc., 30 watts, daily except Tuesday, Friday and Sunday, 11 a.m., to 12 midnight.

Recently we have heard PHI at 25.5 plus meters, 11730 kc., simultaneously with the same program on 19.6 (plus) meters. This started right after the 16.8 meter wave, used in the summer, was discontinued. We have used the call PHI for the 19.6 plus wavelength. Does anybody know the correct call and correct frequency? We have calculated it for this month's Time Table.

Who has heard PHI on 49 meters, 11 to 14 G.M.T.?

CT3AQ reported by number of listeners, again, on about 26.8 meters, transmitting Tuesdays and Thursdays 22:10 to 23:30 G.M.T. and Sundays 15:30 to 17 G.M.T.

XETE has been reported "off the air" by a number of listening posts.

GAQ, Rugby, England, reported on 18611 kc.

ORK on 29 meters reported daily with news items from 3 to 3:20 p.m., E.S.T.

DIQ is the call letters of the German station on 10290 kc., heard relaying the Gulf programs to America.

Who has definitely heard W1XAL, W4XB, W9XAA or XETE lately and can give their verified program time?

A number of Listening Posts complain that XEBT does not stay put on its correct frequency but breaks up DJC in the evenings.

HG1FG is the call reported in use by Prado when working amateurs on 20 meters.

LS4, 10350 kc., reported heard in the late afternoons.

CNR reported by another listener on 31 meters, 2:05 p.m., Sundays.

Prado, VY5RMO, HJ1ABB, TIEP reported as chatting together late at nights after their broadcasts.

Cali, Bogota, Managua and Manizales are reported as rebroadcasting each other in half-hour periods, late at night. First all stations will rebroadcast one, then they will all change to rebroadcast another, and so on.

CQN Transmissions

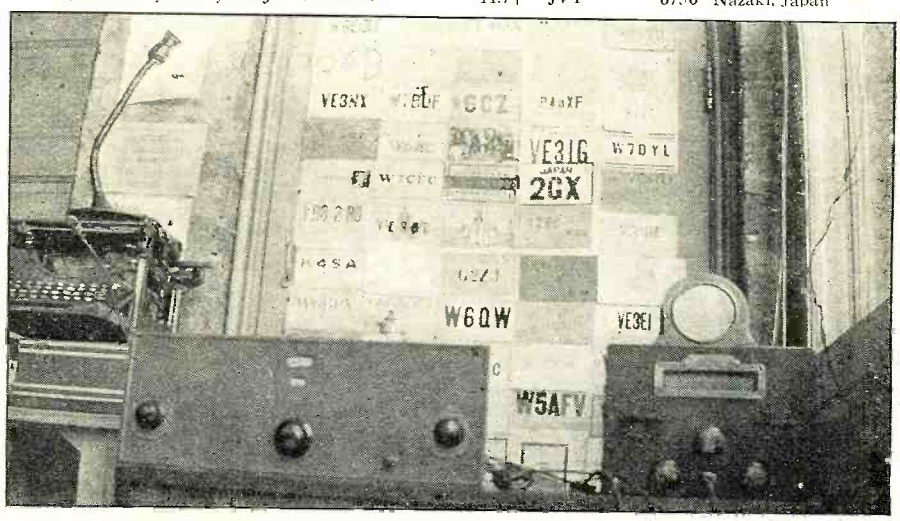
An official communication from the Post Master General of the General Post Office, Macao, Asia, states that station CQN is on the air on a frequency of 6024 kc., 49.8 meters from 8 to 10 G.M.T., Mondays and Fridays. The geographical position of this station is 113° 33′ 11.9″ East longitude; 22° 12′ 11.9″ North latitude. The station power is 500 watts.

Bolivian Transmissions

An official communication from the Manager of Compañia Radio Boliviana states that station CP5 is on the air on 6080 kc., from 8 to 9 p.m., E.S.T., daily. The communication also states that CP7 is their daytime broadcaster, on 15,300 kc., and is used also for experimental contacts with North and South America.

MEET OBSERVER SIMMONS

Or rather meet his Listening Post, as pictured below, showing receivers and a number of verification cards he has received from foreign countries



Station Locations

Wavelength Meters	Call Letters	Frequency Kc.	City Country
13.9+	W8XK	21540	Pittsburgh, Pa.
13.9+	GSH	21470	Daventry, England
14.2+	LSN	21020	Buenos Aires, Argen.
15.2+	IRW	19700	Rome, Italy
15.9+	PLE	18860	Bandoeng, Java
16.5	LSY	18115	Buenos Aires, Argen.
16.8+	GSG	17790	Daventry, England
16.8+	W3XAL	17780	Bound Brook, N. J.
16.8+	PHI	17775	Huizen, Holland
16.8+	DJE	17760	Zeesen, Germany
17.2+	J1AA?	17380	Kemikawa-Cho, Jap.
17.3+	W3XL	17300	Bound Brook, N. J.
19.4	PRADO	15440	Riobamba, Ecuador
19.5	W2XAD	15330	Schenectady, N. Y.
19.6+	CP5	15308	La Paz, Bolivia
19.6+	W2XE	15270	New York, N. Y.
19.6+	FYA	15243	Pontoise, France
19.6+	PHI	15220	Huizen, Holland
19.7	W8XK	15210	Pittsburgh, Pa.
19.7	DJB	15200	Zeesen, Germany
19.8	GSF	15140	Daventry, England
19.8	HVJ	15123	Vatican City
19.9+	RKI	15040	Moscow, U. S. S. R.
22.0	JYK	13610	Kemikawa-Cho, Jap.
22.7+	ORP	13200	Ruysselede, Belg.
23.3	CNR	12830	Rabat, Morocco
24.8+	CT1CT	12082	Lisbon, Portugal
25.1+	RNE	11924	Moscow, U. S. S. R.
25.2	FYA	11900	Pontoise, France
25.2	W8XK	11870	Pittsburgh, Pa.
25.2+	GSE	11860	Daventry, England
25.3+	W2XE	11830	New York, N. Y.
25.4	I2RO	11810	Rome, Italy
25.4	W1XAL	11790	Boston, Mass.
25.5	DJD	11760	Zeesen, Germany
25.5	GSD	11750	Daventry, England
25.5+	PHI	11730	Huizen, Holland
25.6	FYA	11720	Pontoise, France
25.6	CJRX	11720	Winnipeg, Canada
26.0	XGR	11530	Shanghai, China
26.8	CT3AQ	11180	Funchal, Madeira
27.9+	JVM	10740	Nazaki, Jap.
28.1	CEC	10670	Santiago, Chile
28.1+	JVN	10660	Nazaki, Japan
28.3+	FYB	10578	Paris, France
28.9+	LSX	10350	Buenos Aires, Argen.
29.0+	ZFD	10335	Hamilton, Bermuda
29.0+	ORK	10330	Ruysselede, Belgium
30.0	KAZ	9990	Manila, P. I.
30.4	EAQ	9860	Madrid, Spain
30.4+	JYS	9840	Kemikawa Cho, Jap.
30.5+	IRM	9820	Rome, Italy
30.6+	GCW	9790	Rugby, England
31.2+	XETE	9600	Mexico City, Mexico
31.2+	CT1AA	9600	Lisbon, Portugal
31.2+	W3XAU	9590	Philadelphia, Pa.
31.2+	VK2ME	9590	Sydney, Australia
31.3	HBL	9580	Geneva, Switzerland
31.3	VK3LR	9580	Lindhurst, Victoria, Australia
31.3	GSC	9575	Daventry, England
31.3+	W1XAZ	9570	Springfield, Mass.
31.3+	VUB	9565	Bombay, India
31.3+	DJA	9560	Zeesen, Germany
31.4+	DJN	9540	Nazaki, Japan
31.4+	LKJ1	9540	Jeloy, Norway
31.4+	W2XAF	9530	Schenectady, N. Y.
31.5	VK3ME	9510	Melbourne, Australia
31.5	GSB	9510	Daventry, England
31.5+	PRF5	9505	Rio de Janeiro, Br.
31.8	PLV	9415	Bandoeng, Java
36.6+	PSK	8185	Rio de Janeiro, Braz
37.3	CNR	8035	Rabat, Morocco
37.5	HC2JSB	8000	Guayaquil, Ecuador
38.0+	JYR	7880	Kemikawa-Cho, Jap.
38.3	OA4AC	7820	Lima, Peru
38.4+	HBP	7790	Geneva, Switzerland
40.5+	HJ3ABD	7402	Bogota, Colombia
40.5+	EA8AB	7403	Teneriffe, C. I.
41.8	CR6AA	7177	Lobito, Angola, Port West Africa
42.0	HJ4ABB	7138	Manizales, Col.
43.8+	HAS	6840	Budapest, Hungary
44.0+	YNLF	6800	Managua, Nicaragua
44.7+	JVT	6750	Nazaki, Japan

44.7	TIEP	6750	San Jose, Costa Rica
45.0+	HC2RL	6668	Guayaquil, Ecuador
45.3	PRADO	6618	Riobamba, Ecuador
45.3+	RV72	6611	Moscow, U. S. S. R.
46.1	HJ5ABD	6504	Cali, Colombia
46.5+	HJ1ABB	6447	Barranquilla, Col.
46.6	W3XL	6425	Bound Brook, N. J.
47.5	HIZ	6315	San Domingo, D. R.
47.8	HJ3ABF	6275	Bogota, Colombia
47.8	HI1A	6272	Santiago de Los Caballeros, D. R.
48.7+	CJRO	6150	Winnipeg, Manitoba
48.7	YV3RC	6150	Caracas, Venezuela
48.7	VE9CL	6150	Winnipeg, Man.
48.8+	W8XK	6140	Pittsburgh, Pa.
48.9+	ZGE	6130	Knala Lumpur, F. M. S.
48.9+	ZTJ	6122	Johannesburg, Africa
49.0+	W2XE	6120	New York. N. Y.
49.0+	PK1WK	6116	Java
49.0+	YV2RC	6112	Caracas, Ven.
49.0+	VE9HX	6110	Halifax, N. S.
49.0+	VUC	6109	Calcutta, India
49.1+	W3XAL	6100	Bound Brook, N. J.
49.1+	W9XF	6100	Chicago, Ill.
49.1+	VE9GW	6096	Bowmanville, Can.
49.3+	CP5	6080	La Paz, Bolivia
49.3+	W9XAA	6080	Chicago, Ill.
49.3+	OER2	6072	Vienna, Austria
49.3+	VE9CS	6070	Vancouver, B. C.
49.3+	YV5RMO	6070	Maracaibo, Venez.
49.4+	VQ7LO	6060	Nairobi, Kenya, Afr.
49.4+	W8XAL	6060	Cincinnati, Ohio
49.4+	W3XAU	6060	Philadelphia, Pa.
49.4+	OXY	6060	Skamlebaek, Den.
49.5+	GSA1	6050	Daventry, England
49.8	CQN	6024	Macao, Asia
49.8	DJC	6020	Zeesen, Germany
49.8+	ZHI	6012	Singapore, Malaya
49.8+	COC	6010	Havana, Cuba
49.8+	XEBT	6010	Mexico City, Mex.
49.9+	VE9DN	6005	Montreal, Quebec
49.9+	HIX	6000	San Domingo, D. R.
49.9+	RV59	6000	Moscow, U. S. S. R.
50.1	YV4RC	5984	Caracas, Venezuela
50.1	TGX	5984	El Liberal, Guatemala
50.2+	HVJ	5969	Vatican City
50.4	HJ2ABA	5880	Tunja, Colombia
50.6+	HJ4ABE	5860	Medellin, Colombia
51.4+	HJ2ABC	5824	Cucuta, Colombia
51.9	OA4AD	5820	Lima, Peru
51.9+	TIX	5795	San Jose. Costa Rica
52.9+	XQAJ	5660	Shanghai, China
64.5+	HC2EP	4650	Guayaquil, Ecuador
69.4	G6RX	4320	Rugby, England
70.2	RV15	4273	Khabarovsk, Siberia
73.0	HCJB	4107	Quito, Ecuador
80.0	CT1CT	3750	Lisbon, Portugal
84.6+	CR7AA	3543	Lourenzo Marques, Mozambique

VQ7LO Transmissions

An official communication from the Manager of Cable and Wireless, Limited, Nairobi, Kenya Colony, states that station VQ7LO will be on the air as shown in this month's Time Table.

ORK Transmissions

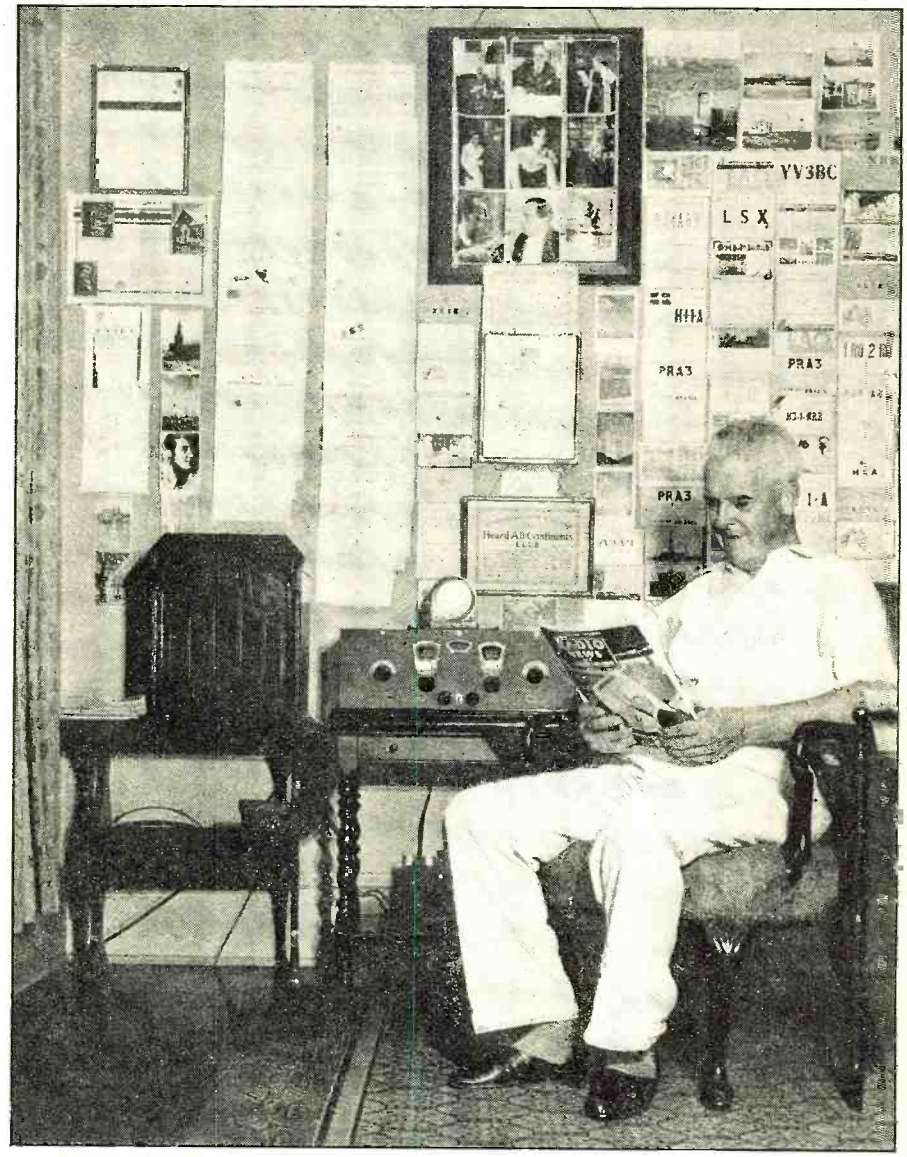
An official communication from Chief Engineer of Department of Telegraphs and Telephones at Brussels, Belgium, states that radio station ORK will be on the air, daily, from 18:45 to 20.15, G.M.T. Announcements are made in French and Flemish. This station works on a wavelength of 29.04 meters and the power is 9 kw.

I2RO Transmissions

An official communication from E. I. A. R. at Rome, Italy, states that the short-wave station I2RO is silent at the present time, owing to considerable improvements being made. It will begin its work again in about two months (that should be about the middle of November).

Other Official Communications from Stations Outside the United States

These were received from: the Chief Engineer of Radio Station VE9GW; the Director of radio station VK2ME; the British Broadcasting Corporation, operating the Empire short-wave stations; the Reichsrundfunkgesellschaft, operating the German short-wave stations; the Chief Engineer of station COC; the Press Secretary of the Danish State Broadcasting station OXY. The communications state that their programs are on the air at the times that we have shown in this month's Time Table.



FAMOUS GEORGIAN DX'ER

Introducing C. H. Armstrong, O. R. N. S. W. L. P. O. for Georgia, pictured, seated at his prize receiver, in his short-wave DX corner. Mr. Armstrong, as our readers aleady know, won third prize in the Denton Trophy Contest, and has been instrumental in reporting many new hard-to-get stations in our Time Schedule

American Stations' Programs

Official communications from: the Westinghouse Electric and Manufacturing Company, operating station W8XK; the General Electric Company, operating stations W2XAF and W2XAD; the WCAU Broadcasting Company, operating station W3XAU; and the Crosley Radio Corporation, operating station W8XAL. These communications state that these stations are on the air during the times that we have shown in this month's Time Table.

Best Bets from Italy

Dr. Guglielmo Tixy of Genoa, Italy, O.R.N.S.W.L.P.O. for that Country, sends in to us the following list of Best Bets for his location: RV59, DJC, W1XAL, W8XAL, W3XAL, W2XE, W8XK, RV72, CNR, PRBA, VK3ME, W2XAF, DJA, GSC, W3XAU, CT1AA, EAQ, FYA, GSD, DJD, RNE, CT1CT, GSF, DJB, W2XAD, DJE, PHI, GSG. He uses a Hammarlund "Pro" with a single wire "L" standard type antenna and a doublet type, with a transposed lead in.

Best Bets at Buenos Aires

J. F. Edbrooke, O.R.N.S.W.L.P.O. for Argentine, sends in the following list of Best Bets for his location: GSD, FYA, W8XK, LKJ1, W3XAU, HBL, DJA, GSB, W2XAF, PRBA, EAQ, VK3ME, RNE, JVS, LSX. He uses a doublet antenna, 35 feet from the ground with a five tube home-made regenerative set.

Best Bets from District of Columbia

Douglas S. Catchim, O.R.N.S.W.L.P.O. for the District of Columbia, calls our attention to the fact that COC is back on the air and that DJB, GSD, YV2RC, YV5RMO, DJC, VE9GW, HJ1ABB are excellent stations, there, on a Philco 16X, with an inverted "L" type antenna.

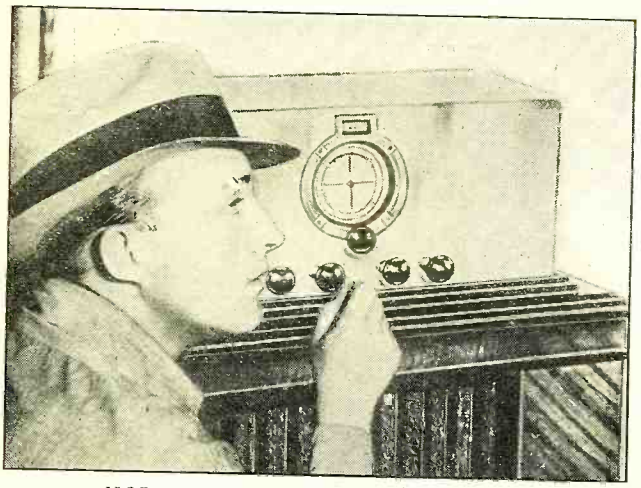
Best Bets from California

W. W. Loudon of Oakland, California, sends in the following Best Bets for his location: PK1WK, PRBA, KIO, the JV series at Nazaki, Japan, HSI, ZGE, PNI, XGW, ZHI, VE9CS, FYA, EAQ, CJRX. He is using a Sargent 9-33 all-wave receiver and is putting up an RCA Double-doublet.

Report from Jamaica

Mr. N. H. Daniel of Jamaica, B. W. I.,

(*Continued on page* 382)



HOLLYWOOD GOES SHORT WAVE

What the public does not know about Bing Crosby is that he is a real short-wave DX fan. Here he is practicing up for his contest with Richard Arlen for the Hollywood DX crown

Operating Tests on an ALL-WAVE "SUPER"

(McMurdo Silver Masterpiece III)

THE purpose of occasionally publishing reports such as this one on the results obtained with various all-wave receivers in actual operating tests is two-fold. First of all, there are always newcomers in the radio game who have never had experience with short-wave reception and do not appreciate its possibilities. For them these articles are a revelation and there seems to be considerable evidence that this type of article running over the past several years in RADIO NEWS has contributed a great deal to the present-day popularity of short-wave reception. Second, fans who are interested in short-wave (or all-wave) reception like to keep posted on improvements in design, and to know to what extent these developments actually improve reception results.

—The Editors.

ALL sorts of reports come out of Hollywood, but the latest one which seems to be definitely confirmed is that Hollywood has "gone short wave" in a big way. It has been quite a common practice in the past, among manufacturers who aim at attractive advertising, to show their receivers being operated by various well-known movie stars. This did not, however, necessarily mean that these stars were radio fans. Evidence that some of the movie stars are doing more than posing at radio sets is indicated by the fact that keen rivalry has sprung up among them to see who can log the greatest number of distant stations. Apparently among the most rabid are Bing Crosby and Richard Arlen, who are waging a contest between themselves with a $1000.00 side bet to determine which of the two can show evidence of the greater DX ability. Reports about who "brought home the bacon" have not been heard as yet. The interesting part of this contest is that both men selected the new McMurdo Silver Masterpiece III which was described in some detail in the last two issues of RADIO NEWS.

With the idea that many readers of these articles will be interested in a report of operating tests of this receiver, as completed by the RADIO NEWS Laboratory, a brief summary of observations and results is presented in this article.

The tests were not conducted with the idea of establishing a comprehensive log of stations tuned in but rather to obtain a definite idea concerning the general effectiveness of the receiver. It was given a try-out, first at the Westchester Listening Post, and then at two other RADIO NEWS Listening Posts in New York City. In all three locations, which were selected because they are typical of suburban, residential and city locations, the results obtained with the receiver were highly satisfactory.

A general idea of the appearance of the set can be obtained from the photographs which were included in the two preceeding articles. Actually, the receiver is quite striking in appearance. The entire cabinet is chronium plated but it does not have the gaudy effect which one might anticipate. Probably this is due to the severely rectangular lines of the cabinet.

Its good tone quality becomes evident immediately upon putting the receiver into operation. Also, it is found possible to advance the volume control until a tremendous output is obtained —far more than enough in any living home.

Getting down to actual operation of the receiver, it was found extremely simple. The four control knobs on the front panel are all essential to a receiver having the high sensitivity of this one. These include the usual volume and tone controls and the band-change switch. The other control regulates sensitivity and offers two distinct advantages. In the first place, if the receiver is being operated in a noisy location, this control can be retarded to limit the sensitivity so that only signals above the noise level will be heard. This avoids the terrific roar encountered when tuning between stations with a sensitive a.v.c. receiver, not having a manual sensitivity control. The second advantage of this control is that, in listening to powerful local stations, much better tone quality is obtained if the receiver sensitivity is reduced to a point which insures against any possibility of overloading any of the tubes.

The tone control is also useful in noise-reduction, because there are certain types of interference which can be minimized by retarding the tone control so that the higher audio frequencies are reduced.

Tuning is made relatively simple by the fact that the airplane-type dial employed is quite accurately calibrated for all ranges. This dial is immediately surmounted by the tuning meter, making it easy to tune and still keep an eye on the tuning meter at the same time.

Probably the outstanding feature of the tuning system, however, is the "second" hand which is, in effect, the band-spread indicator. Ordinarily, the tuning knob is manipulated in the usual way. However, where precise tuning is desired on the short-wave ranges, it is only necessary to pull out the tuning knob. This operation throws the dial into control of a separate group of ganged band-spread condensers and the adjustment of these small condensers is indicated by the second hand on the dial. Thus, when it is desired to tune in the 31-meter band, for instance, it is only necessary to tune into that band in the normal way. By shifting to the band-spread condensers, the stations are nicely spread out on the dial—actually making short-wave tuning as easy as tuning in the regular broadcast band.

An example of how the stations spread out is found in the following list. The left-hand column shows the readings on the (*Continued on page* 385)

RICHARD ARLEN PREPARES

Arlen and Crosby are both using Masterpiece III's in their "Battle of the Century," but maybe Arlen figures a new antenna will give him the jump on his rival

SHORT-WAVE STATION LIST

(Police, Fire and Television Stations)

Latest Lists of Municipal Police Radio Stations and State Police Radio Stations, two Marine Fire Radio Stations, and Experimental Television Stations in the United States. Call Letters, Location, Frequency, Power Output are given whenever possible and the company names sponsoring the television broadcasts, or private owners, are included

MUNICIPAL POLICE RADIO STATIONS

Call	*Location*	*kc.*	*Watts*
KGHG	Las Vegas, Nev.	2474	50
KGHK	Palo Alto, Calif.	1674	20
KGHM	Reno, Nev.	2474	50
KGHN	Hutchinson, Kan.	2450	50
KGHP	Lawton, Okla.	2466	50
KGHS	Spokane, Wash.	2414	100
KGHT	Brownsville, Tex. (C.P.)	2382	100
KGHU	Austin, Tex.	2382	100
KGHV	Corpus Christi, Tex.	2382	50
KGHW	Centralia, Wash. (C.P.)	2414	15
KGHX	Santa Ana, Calif.	2490	400
KGHY	Whittier, Calif.	1712	50
KGHZ	Little Rock, Ark.	2406	100
KGJX	Pasadena, Calif.	1712	400
KGOZ	Cedar Rapids, Iowa	2466	50
KGPA	Seattle, Wash.	2414	250
KGPB	Minneapolis, Minn.	2430	400
KGPC	St. Louis, Mo.	1706	500
KGPD	San Francisco, Calif.	2466	400
KGPE	Kansas City, Mo.	2422	400
KGPG	Vallejo, Calif.	2422	7.5
KGPH	Oklahoma City, Okla.	2450	250
KGPF	Santa Fe, N. M.	2414	25
KGPI	Omaha, Nebr.	2466	400
KGPJ	Beaumont, Tex.	1712	100
KGPK	Sioux City, Iowa	2466	100
KGPL	Los Angeles, Calif.	1712	500
KGPM	San Jose, Calif.	1674	50
KGPN	Davenport, Iowa	2466	50
KGPO	Tulsa, Okla.	2450	100
KGPP	Portland, Ore.	2442	500
KGPQ	Honolulu, T. H.	2450	100
	(Temporarily changed to	1712 kc.)	
KGPR	Minneapolis, Minn.	2430	400
KGPS	Bakersfield, Calif.	2414	50
KGPW	Salt Lake City, Utah	2406	100
KGPX	Denver, Colo.	2442	150
KGPZ	Wichita, Kan.	2450	250
KGZA	Fresno, Calif.	2414	100
	(C. P. for 500 watts)		
KGZB	Houston, Tex.	1712	200
KGZC	Topeka, Kan.	2422	50
KGZD	San Diego, Calif.	2490	100
	(C. P. for 500 watts)		
KGZF	Chanute, Kan.	2450	25
KGZG	Des Moines, Iowa	2466	100
KGZH	Klamath Falls, Ore.	2382	25
KGZI	Wichita Falls, Tex.	2458	50
KGZJ	Phoenix, Ariz.	2430	100
KGZM	El Paso, Tex.	2414	100
KGZN	Tacoma, Wash.	2414	100
KGZO	Santa Barbara, Calif.	2414	100
KGZP	Coffeyville, Kan.	2450	50
KGZQ	Waco, Tex.	1712	50
KGZR	Salem, Ore.	2442	50
KGZT	Santa Cruz, Calif.	1674	50
KGZU	Lincoln, Nebr.	2490	200
KGZV	Aberdeen, Wash.	2414	50
KGZW	Lubbock, Tex.	2458	50
KGZX	Albuquerque, N. M.	2414	50
KGZY	San Bernardino, Calif.	1712	50
KNEA	Clovis, N. M. (C. P.)	2414	50
KNEB	Idaho Falls, Idaho (C. P.)	2458	500
KNEF	Leavenworth, Kan. (C.P.)	2422	75
KNEE	Duluth, Minn.	2382	400
KNEH	Garden City, Kan. (C. P.)	2474	50
KNEJ	Pomona, Calif. (C. P.)	1712	50
KSW	Berkeley, Calif.	1658	400
KVP	Dallas, Tex.	1712	500
WCK	Belle Isle, Mich.	2414	500
WKDU	Cincinnati, Ohio	1706	500
WMDZ	Indianapolis, Ind.	2442	400
WMJ	Buffalo, N. Y.	2422	500
WMO	Highland Park, Mich.	2414	50
WNFP	Niagara Falls, N. Y.	2422	135
WPDA	Tulare, Calif.	2414	150
WPDB	Chicago, Ill.	1712	500
WPDC	Chicago, Ill.	1712	500
WPDD	Chicago, Ill.	1712	500
WPDE	Louisville, Ky.	2442	200
WPDF	Flint, Mich.	2466	100
WPDG	Youngstown, Ohio	2458	250
WPDH	Richmond, Ind.	2442	50
WPDI	Columbus, Ohio	2430	200
WPDK	Milwaukee, Wis.	2450	500
WPDL	Lansing, Mich.	2442	50
WPDM	Dayton, Ohio	2430	400
WPDN	Auburn, N. Y.	2382	50
WPDO	Akron, Ohio	2458	100
WPDP	Philadelphia, Pa.	2474	500
WPDR	Rochester, N. Y.	2422	200
WPDS	St. Paul, Minn.	2430	500
WPDT	Kokomo, Ind.	2490	50
WPDU	Pittsburgh, Pa.	1712	400
WPDV	Charlotte, N. C.	2458	50
WPDW	Washington, D. C.	2422	400
WPDX	Detroit, Mich.	2414	500
WPDY	Atlanta, Ga.	2414	150
WPEA	Syracuse, N. Y.	2382	400
WPEB	Grand Rapids, Mich.	2442	500
WPEC	Memphis, Tenn.	2466	400
WPED	Arlington, Mass.	1712	100
WPEE	Brooklyn, N. Y.	2450	400
WPEF	Bronx, N. Y.	2450	400
WPEG	New York, N. Y.	2450	500
WPEH	Somerville, Mass.	1712	100
WPEI	E. Providence, R. I.	1712	50
WPEK	New Orleans, La.	2430	250
WPEM	Woonsocket, R. I.	2466	100
WPEP	Kenosha, Wis. (C. P.)	2450	100
WPES	Saginaw, Mich.	2442	100
WPET	Lexington, Ky.	1706	500
WPEA	Newton, Mass.	1712	50
WPFC	Muskegon, Mich.	2442	50
WPFE	Reading, Pa.	2442	100
WPFG	Jacksonville, Fla.	2442	400
WPFH	Baltimore, Md.	2414	500
WPFI	Columbus, Ga.	2414	50
WPFK	Hackensack, N. J.	2430	200
WPFM	Birmingham, Ala.	2382	400
WPFN	Fairhaven, Mass.	1712	100
WPFO	Knoxville, Tenn.	2474	400
WPFP	Clarksburg, W. Va.	2490	30
WPFQ	Swarthmore, Pa.	2474	50
WPFR	Johnson City, Tenn.	2474	50
WPFS	Asheville, N. C.	2474	200
WPFT	Lakeland, Fla. (C. P.)	2442	50
WPFU	Portland, Me.	2422	100
WPFV	Pawtucket, R. I.	2466	50
WPFW	Bridgeport, Conn.	2466	50
WPFX	Palm Beach, Fla.	2442	50
WPFY	Yonkers, N. Y. (C. P.)	2442	400
WPFZ	Miami Beach, Fla.	2442	100
WPGA	Bay City, Mich.	2466	50
WPGB	Port Huron, Mich.	2466	50
WPGD	Rockford, Ill.	2458	50
WPGF	Providence, R. I.	1712	150
WPGH	Albany, N. Y.	2414	300
WPGI	Portsmouth, Ohio	2430	50
WPGJ	Utica, N. Y.	2414	50
WPGK	Cranston, R. I.	2466	50
WPGL	Binghamton, N. Y.	2442	200
WPGN	South Bend, Ind.	2490	100
WPGO	Huntington, N. Y.	2490	25
WPGP	Muncie, Ind.	2442	100
WPGS	Mineola, N. Y.	2490	400
WPGT	New Castle, Pa. (C. P.)	2482	50
WPGU	Cohasset, Mass.	1712	24
WPGV	Boston, Mass.	1712	500
WPGW	Mobile, Ala.	2382	400
WPGX	Worcester, Mass.	2466	100
WPHA	Fitchburg, Mass.	2466	50
WPHB	Nashua, N. H.	2422	50
WPHD	Steubenville, Ohio (C. P.)	2458	100
WPHF	Richmond, Va. (C. P.)	2450	150
WPHG	Medford, Mass. (C. P.)	1712	50
WPHI	Charleston, W. Va. (C. P.)	2490	50
WPHJ	Fairmont, W. Va. (C. P.)	2490	30
WRBH	Cleveland, Ohio	2458	500
WRDQ	Toledo, Ohio	2474	200
WRDR	Grosse Pointe Village, Mich	2414	50
WRDZ	Ft. Wayne, Ind.	2490	200
	Compton, Calif. (C. P.)	2490	25
	Mount Vernon, Wash. (C.P.	2414	50
	Santa Rosa, Calif. (C. P.)	2422	500

STATE POLICE RADIO STATIONS

Call	*Location*	*kc.*	*Watts*
KGHA	State of Washington, Portable-mobile	2490	10
KGHB	State of Washington Portable-mobile	2490	10
KGHC	State of Washington Portable-mobile	2490	10
KGHD	Seattle, Wash.	2490	50
KGHE	Snoqualmie, Wash.	2490	50
KGHO	Des Moines, Iowa	1682	400
KGHR	State of Washington, mobile	2490	10
KGHQ	Chinook Pass, Wash.	2490	10
KGZE	San Antonio, Tex.	2482	500
KNFC	State of Washington, S.S. Governor Isaac I. Stevens	2490	50
KNFD	State of Washington, S.S. Gov. John R. Rogers	2490	50
WBA	Harrisburg, Pa.	190	300
WBR	Butler, Pa.	190	300
WDX	Wyoming, Pa.	190	300
WJL	Greenburg, Pa.	190	500
WMB	W. Reading, Pa.	190	300
WMP	Framingham, Mass.	1666	1000
WPEL	W. Bridgewater, Mass.	1666	1000
WPEV	State of Ms., portable	1666	50
WPEW	Northampton, Mass.	1666	500
WPGC	S. Schenectady, N. Y. (5000 day—1000 w. nite)	1658	5000
WPGG	Findlay, Ohio	1596	500
WPGQ	Columbus, Ohio	1596	400
WPHC	Massilon, Ohio	1596	400
WPHE	Marion County, Ind. (C.P.)	1634	1000
WPSP	Harrisburg, Pa.	1674	1000
WRDS	E. Lansing, Mich. (5000 w. day—1000 w. nite)	1642	5000
	Wilmington, Ohio (C. P.)	1682	400
	Bellingham, Wash. (C. P.)	2490	50
	Shuksan, Wash. (C. P.)	2490	10

MARINE FIRE RADIO STATIONS

WEY	Boston, Mass.	1630	50
WKDT	Detroit, Mich.	1630	500

EXPERIMENTAL TELEVISION STATIONS

2000-2100 KILOCYCLES

Call Letters	*Power (watts)*	*Company*	*Location*
W2XDR	1000	Radio Pictures, Inc.	Long Island City, N. Y.
W8XAN	100	Sparks-Withington, Co.	Jackson, Mich.
W9XK	50	University of Iowa	Iowa City, Ia.
W9XAK	125	Kansas St. Col. Agr. & Apl. Sc.	Manhattan, Kansas
W9XAO	500	Western Television Research Co.	Chicago, Ill.
W6XAH	1000	Pioneer Mercantile Co.	Bakersfield, Calif.

2750-2850 KILOCYCLES

W3XAK	5000	National Broadcasting Co.	Portable
W9XAP	2500	National Broadcasting Co.	Chicago, Ill.
W2XBS	5000	National Broadcasting Co.	Bellmore, N. Y.
W6XS	1000	Don Lee Broadcasting System	Los Angeles, Calif.
W9XAL	500	First Natl. Telev. Corp.	Kansas City, Mo.
W9XG	1500	Purdue University	W. Lafayette, Ind.
W2XAB	500	Atlantic Broadcasting Corp.	New York, N. Y.

42000-56000, 60000-86000 KILOCYCLES

W2XAX	50	Atlantic Broadcasting Corp.	New York, N. Y.
W6XAO	150	Don Lee Broadcasting System	Los Angeles, Calif.
W9XD	500	The Journal Company	Milwaukee, Wis.
W2XBT	750	National Broadcasting Co.	Portable
W2XF	5000	National Broadcasting Co.	New York, N. Y.
W3XE	1500	Phila. Storage Battery Co.	Philadelphia, Pa.
W3XAD	2000	RCA Victor Co., Inc.	Camden, N. J.
W1OXX	50	RCA Victor Co., Inc.	Portable & Mobile
W2XDR	1000	Radio Pictures, Inc.	Long Island City, N. Y.
W8XAN	100	Sparks-Withington Co.	Jackson, Mich.
W9XE	1000	General Household Utilities Co.	Chicago, Ill.
W9XAT	500	Dr. Geo. W. Young	Portable
W2XD	500	R. D. Lemert	New York, N. Y.
W2XAG	100	R. D. Lemert	Portable (C. P.)
W1XG	500	General Television Corp.	Boston, Mass. (C.P.)

RADIO NEWS LABORATORY RECEIVERS—No. 2

Build This

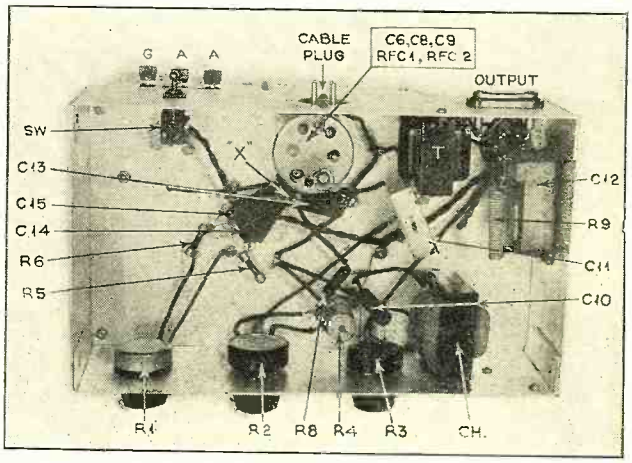
"SKYSCRAPER"

(3-Tube T.R.F. Receiver)

An effective short-wave receiver equally well adapted to broadcast or amateur service

Dale Pollack *and* S. G. Taylor

Part Two



BELOW DECK

The location and wiring of all parts beneath the chassis

LAST month the features which make this receiver outstanding were discussed in some detail. This month the authors continue with the description of the construction and wiring.

Circuit designs for tuned-radio-frequency, short-wave receivers have reached the stage where radical departures from standard design (if they are made) often result in impaired performance, rather than improvement. The designer, rather than attempting to develop "freak" circuits, does better to devote his attention to the *details* of efficiency, for the sum of these details spells a successful or a mediocre high-frequency set. In planning this new receiver every attention has been paid to this principle.

The circuit, Figure 1, reveals nothing startlingly new and nothing that is not well-known to the art. Close inspection, however, shows that care has been taken to omit nothing that would improve the performance of the receiver and to include nothing that would impair performance.

The antenna circuit is suitable for use with either a single or double lead-in. It is inductively coupled to the tuned radio-frequency stage, which employs a 6D6 type tube. This tube in turn is inductively coupled to the regenerative detector, a 6C6 pentode. Inductive coupling was decided upon in preference to direct or condenser coupling since it avoids placing the high plate voltage on the tuned coil circuit and on the coil side of the grid condenser, which conditions offer the possibility of a loss of sensitivity and erratic regeneration due to leakage through the grid condenser, and introduce complications involved in insulating the tuning condenser, etc.

It will be seen that ordinary plate regeneration is employed in the detector circuit. Before adopting this method six different detector circuits were experimented with, including modified Hartley, screen-grid tickler and cathode regeneration methods. A return was made to the old plate tickler arrangement, as offering the smoothest regeneration over the entire wavelength range.

The radio-frequency and detector circuits are isolated from each other by means of shielding cans. If coupling is to be avoided between these two circuits, the shields must be complete for each stage with no common wall between. This dictum is an important one, if interlocking between the detector and radio-frequency controls is to be avoided. Holes cut in the tops of the two shield cans permit of access to the compartments for coil changing. The holes are covered by small aluminum friction caps (not shown in the photos).

In laying out the shielding care should be taken that the coils are separated from the metallic parts by a distance at least equal to the radius of the coils. In addition, the coil sockets are mounted on legs one inch high instead of the half inch legs furnished with the sockets.

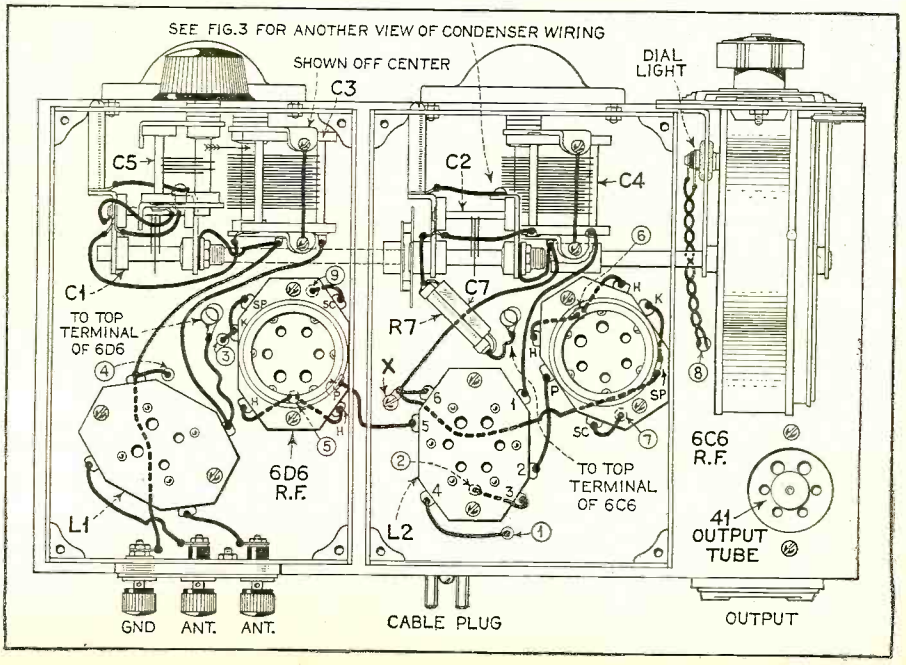
The plate circuit of the detector contains a more elaborate r.f. filter (consisting of 2 chokes, RFC1 and RFC2, and condensers C6, C6 and C9) than is commonly found in short-wave receivers. One trouble from which nearly all regenerative receivers suffer, particularly at the higher frequencies, is the presence of r.f. in the audio system, resulting in hand capacity and unstable regeneration. Thorough filtering in the detector plate circuit provides the only means for eliminating troubles of this kind.

A high inductance audio choke, Ch, by-passed with a resistor, R8, couples the detector output to the audio tube. The characteristic of the 6C6 tube is such that the audio choke may be dispensed with without much loss in sensitivity. If this is done, the resistor R8 should be reduced in value to 250,000 ohms.

To eliminate a possible source of hum when a.c. operated, a heater type

THE PICTURE WIRING DIAGRAM

Figure 2 (Top View Below and Underside View at Right). This diagram will be helpful to those who, as a safety measure, prefer to follow an actual wiring layout



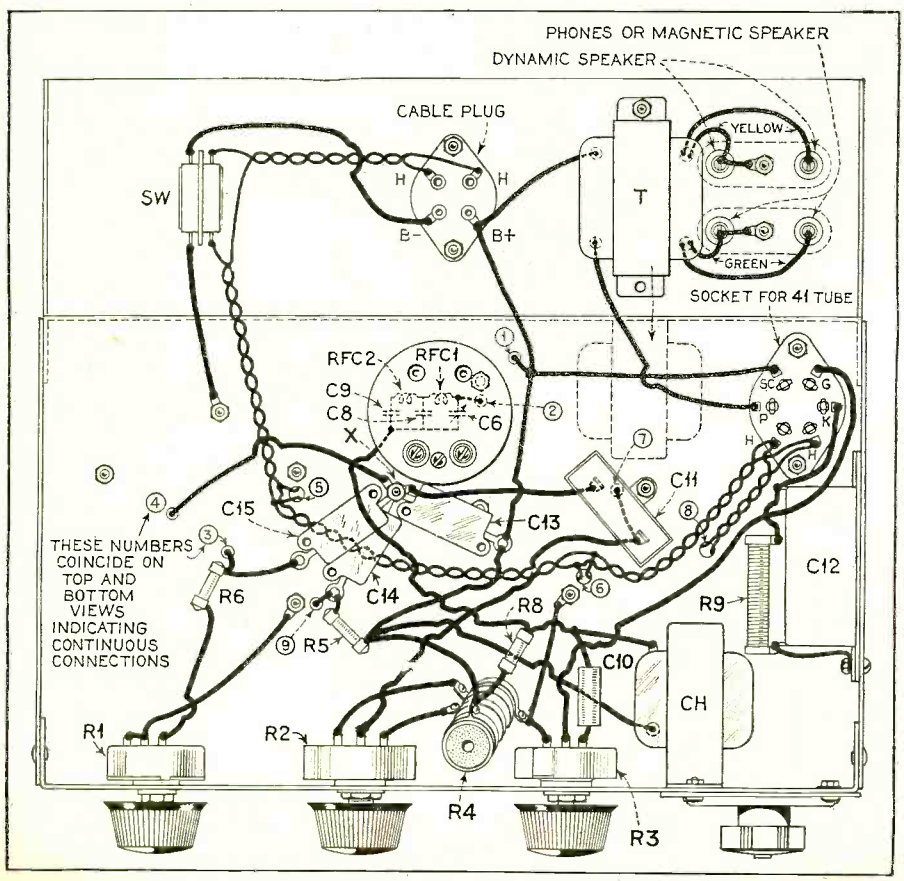
output tube was decided upon. The 41 pentode is used. The tube is connected to an output transformer (T) with two secondary windings, one of 10 ohms and the other of high impedance. Thus the receiver may be worked directly into either a magnetic or a dynamic loudspeaker, or headphones. If both outputs are desired another pair of tip jacks or a phone jack may be added as shown in the picture wiring diagram. In the model receiver only the high impedance terminals were brought out. The transformer output for headphones has a decided advantage over the condenser choke arrangement more commonly found in short-wave receivers, because the headphones are completely isolated from the plate voltage, and thus shocks which are more than annoying at 250 volts, are avoided.

The type of volume control to be employed in a tuned r.f. short-wave receiver presents a problem. Three positions for the volume control are possible; in the antenna circuit, in the grid or cathode circuits of the r.f. tube, or at the grid of the audio tube. The first of these has the disadvantage of affecting the tuning and selectivity of the r.f. stage. The second method was attempted with this receiver but the sensitivity of the receiver is such that except on weak signals it was not found possible to reduce the signal strength to comfortable headphone volume. Its advantage, in common with that of the first method, is that the detector can be prevented from overloading on strong phone stations and from blocking on strong c.w. signals. The third method, audio frequency control, does not suffer the disadvantages of the antenna or r.f. bias control, but it cannot prevent detector overloading. After considerable testing of all these methods, it was decided to employ both the r.f. gain control (R1) and the a.f. voltage control (R3).

The Hammerlund coils are tuned by a band-spreading condenser arrangement. The tuning condensers C1 and C2 are of 20 mmfd. capacity and are ganged together to the drum dial. The band setting condensers, C3 and C4 are of 140 mmfd. each and are controlled by individual dials. The trimmer C5 in the r.f. stage is not essential and is employed solely to make the two tank condensers read alike and need rarely be adjusted.

Constructor Blueprints

DUE to limited space it is not deemed practical to include complete working drawings of the chassis and shields in this article. However, a set of "Skyscraper" blueprints is available which includes full-size drawings of the chassis and shields; showing size and locations of all drill holes, etc. In addition a full-size picture-wiring diagram is included in this set. The complete set of prints (RADIO NEWS Blueprints—No. 3) may be obtained by forwarding 25 cents in U. S. stamps to Blueprint Department, RADIO NEWS, 461 Eighth Avenue, New York City.



The small panel on which the drum dial is mounted is 9⅝ inches high by 3 inches wide. This panel is mounted directly on the front of the chassis.

In the construction of the receiver, the coil and tube sockets are mounted first and the entire chassis is wired without the metal shield cans in position. Sub-chassis mounting is employed only for the audio tube. All the leads are made as short as possible, but it is important that all the r.f. grounds be made at the same point on the chassis. All the grounds are brought to the centrally located machine screw (marked "x" in the bottom view). Most of the small by-pass condensers are mounted directly on this screw.

The detector plate filter, consisting of a mica compression condenser C6, two fixed condensers C8-C9 and two r.f. chokes, RFC1-RFC2, is mounted in a small shield can placed under the chassis directly beneath the detector coil socket. The screw type condenser C6 is actually an auxiliary regeneration adjustment but once set may be forgotten. In the particular unit employed in this model receiver C8 is also a compression type condenser but a fixed condenser will serve as well.

After the chassis has been wired, the shield boxes should be placed in position and the drum dial and tuning condenser mounted. Note that the two short lengths of shaft, one between the condensers and one between C2 and the drum dial are of bakelite. In addition to avoiding one possible source of coupling between the r.f. and detector stages, the bakelite shaft will not introduce noise, as would a metal shaft should it rub against the shields at the holes through which it passes. The condensers and the shafts are connected by means of two (*Continued on page 390*)

The special "Skyscraper" chassis is 12⅛ inches long, 7 inches wide, and 3½ inches deep, over all. This chassis is formed by bending down the four sides to make a complete enclosure with an open bottom. The two box shields are each 4½ inches wide, 6¾ inches long, and 6 inches high. These boxes are built up on special corner posts, manufactured by Blan, The Radio Man. These are of triangle cross-section and are drilled and tapped on two sides and on both ends. The walls and tops of the shields are of plain aluminum and are drilled to correspond with the holes in the corner posts. The friction caps employed to close the holes of the plug-in coils are also a product of this same concern. These caps are, however, not absolutely essential as the receiver is still stable with these holes left open.

Space did not permit including complete construction and drilling layouts for the chassis and shields in this article. However, such drawings have been prepared and are available, from the RADIO NEWS blueprint department, in full size blue print form, at a price of 25c. These drawings include detailed specifications for the location and sizes of all drill holes, etc.; also a full-size enlargement of the picture wiring diagram shown in Figure 2.

SHORT-WAVE PAGE

NAVIGATION and short wave reception have very much in common. When a ship leaves Southampton the skipper never knows what he will be up against. The weather may be clear and the sea smooth, or there may be a run of "dirty" weather. Short-wave signals, too, have to cross the oceans, plowing their way through atmospheric disturbances, good and bad. Any short-wave listener this past month should have been able to tell that there were severe disturbances between here and the English Channel. Signals were sometimes weak and shaky.

There have been times when even our own American stations were not able to "sail" through the high background noise. Of course there were a few high lights, but nothing to rave over.

At present the best morning hours for tuning are from 4 a.m. on to 7 a.m. when one is likely to hear most anything from GCW, 30.6 meters, Rugby, England, calling New York, to JVM, Mazaki, Japan, 27.93 meters, sending a musical program. LSX, 29.98 meters, Buenos Aires, has been fairly active of late.

Forty to fifty meters can be called the new "Spanish Section." South Americans have recently swooped down on poor defenseless listeners and almost defy identification. We all appreciate the clear, distinct announcements coming from HJ1ABB, Baranquilla, Colombia. But I feel like "giving up" on some of the others, not even hoping that I can make them out. One station on 52 meters has rattled off his call so often in rapid-fire Spanish that my thinning hair stood on end. Still he goes blissfully on. One word is understood; that was "Colombia," but that is a BIG country. Coming in contact with a large number of short wave fans, I feel that I can make this rather strong statement. If the foreign stations not having English announcements would supply identifying sounds or symbols, everything would be fine. When all the short-wave broadcasting stations get together on a plan of "clear identification" everybody will be happy.

Would any listener have any difficulty identifying Daventry when he heard Big Ben even if the station did not use our own language? Or CTIAA, Lisbon, Portugal, when the three coo-coo calls are heard. XEBT, 49.9 meters, Mexico City, cleverly adopted the automobile horn to tell us who they are. South Americans are on at all hours of the night and early morning. Some of them perform as broadcasting stations in the evening and then call "CQ" until the wee hours of the morning. HJ4ABB, Manizales, Colombia, which transmits on 41.6 meters was heard recently at 4.40 a.m., E.S.T.

Henry Guerrero of XEBT, Mexico City, sent us some very interesting news about radio stations in his part of the country. Mr. Guerrero says "A very small station is on the air in the state of GUANAJUATO, Mexican Republic. Its call letters are XEAZ, and it operates on a frequency of 1420 kc. with a power of 60 watts. If it turns out to be a success they will raise their power. I am confirming you that XETE is no more. It operated with 250 watts power and relayed the programs of XEAL, but there is not any XEAL any more. It went into bankruptcy after a hunger strike was declared because everybody who was working under the call letters hadn't received any fees from the month of May to September. After the hunger strike lasted for four days they were paid in full." Then Mr. Guerrero adds, "Aren't those news?"

TI4NRH is back on the air on their old wavelength of 31 meters. This is the world-famous station owned and operated by Cespedes Marin of Heredia, Costa Rica. We are hearing them between 7:00 and 8:00 p.m., E.S.T. The modulation is poor, but the signal fairly strong.

We tuned in a station at 3:15 p.m. just as the announcer said, "This is ———, 19,860 kc., using 30 kilowatts power, signing off with London. It is now 9:15 p.m. Good night, London." Upon consulting our time charts we found that, according to the hour mentioned, our catch was Klipkeuval, South Africa. PRF5, 31.4 meters. Rio de Janeiro, is one of the best heard of the South Americans. They come on early in the evening, thereby avoiding a certain amount of "evening static" and now with announcements in four languages, it is not difficult to "get" their call letters.

How many short-wave listeners would expect to hear Eskimos on the air? One evening, the schooner "Effie Morrissey," bound back from the Arctic, was in contact with the amateur W2NV. The program consisted of some "contact" talk, but then the announcer said that the ship was in Laborador and as they did not know just when they would be in that place again, they had decided to bring Eskimo talent to the microphone. The performers chosen were two Eskimo girls, with fine voices, who sang some weird songs, a la Japanese. Any listener who tuned in while these girls were singing would certainly have thought that they had one of the elusive Japs. The "Morrissey's call letters are WI0XDA, and they operate on 20 meters. Reports of reception should be sent to Mrs. Clara E. Moe, 562—79th Street, Brooklyn, New York. Mrs. Moe is the mother of the radio operator on board the schooner, and is very interested in reports and promises to see that such reports reach WI0XDA.

Now about those Japs, who by the way have not been so reliable of late. I think the most important information from or about the "J" stations comes from fans on the west coast. Dr. J. R. Crowdery, Creede, Colorado, is located in a spot which short-wave fans might call a DX paradise. Dr. Crowdery says, "I am located fifteen miles southwest of Creede in a camp which sets in the pocket of the Continental Divide at an altitude of 9,450 feet. My aerial is 49 feet high and 25 feet long. JVN, 10,660 kc., comes on the air at 8:30 p.m. Mountain Standard Time. At 9:35 it begins relaying JOAK. I also find them any morning at 3, 4 or 5 o'clock. They sign off sometimes at 5:45 a.m., M.S.T. The Jap on 9780 kc. gave his call letters as JVH. JVN uses 10,660 kc., and JVM uses 10,740 kc."

Joseph Witmark, Brooklyn, New York, says, "The Jap on 27.93 meters sure puts in a swell signal, but too much talk for me. I would like to write for a veri, but gosh! what could I say?"

Russell Bills, Elkhart, Indiana, has sent us some very interesting information on reception in that part of the United States. Here are a few of the stations Mr. Bills has logged in the last few weeks. "Last night I heard KFZ on about 9,400 kc., from 9:35 to 10:10 p.m. Had G5OC and K7AJD (Alaskan amateur) on the 75 meter ham band. How many fans heard the special program from an Italian amateur for listeners in the U.S.A. on September 16th at 22:30 G.M.T., operating on the 21 meter band. HCIFG; XIG; HI8X; HI7G; K4SA is the sum total of my hams outside the U. S. I've had the "G," "D," HBL; FYA; HIX; YV3RC; HJIABB; HJ55ABD and YV5RMO. Sundays I can get PHI, GSG, VK2ME, DJB and JVM. Have never heard RKI, CNR or RVI5."

R. C. Messer, Portland, Maine, sent us a letter that caused us to chuckle. This fan says, "Just reading your article and thinking of what you said about the young "pride and joy" going "bugs" over short waves. Well, my youngsters go bugs over jazz and the "old man" over short waves. I have logged most all the stations except the Japs and now I am hearing a station on 10,660 kc. from 5 a.m. to 5:55 a.m. Any idea who it is?" (See above).

The tuning editor of the "Miami Post," Mr. Bob Purvis, tells us that Jesse Jay, owner and operator of W4XB, 49.6 meters, has been requested to show cause why he has not been on the air in the last six months. If he does not return to the ether waves in a very very short time, his license will automatically be revoked.

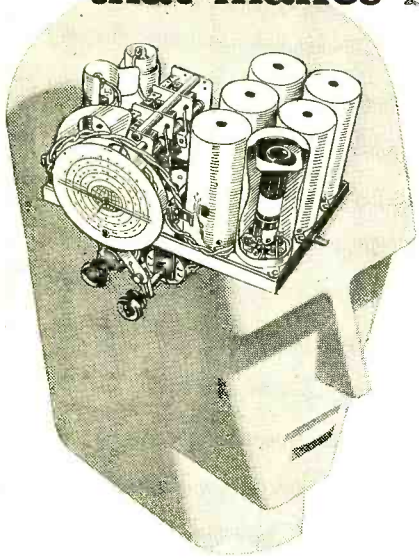
Capt. Horace L. Hall

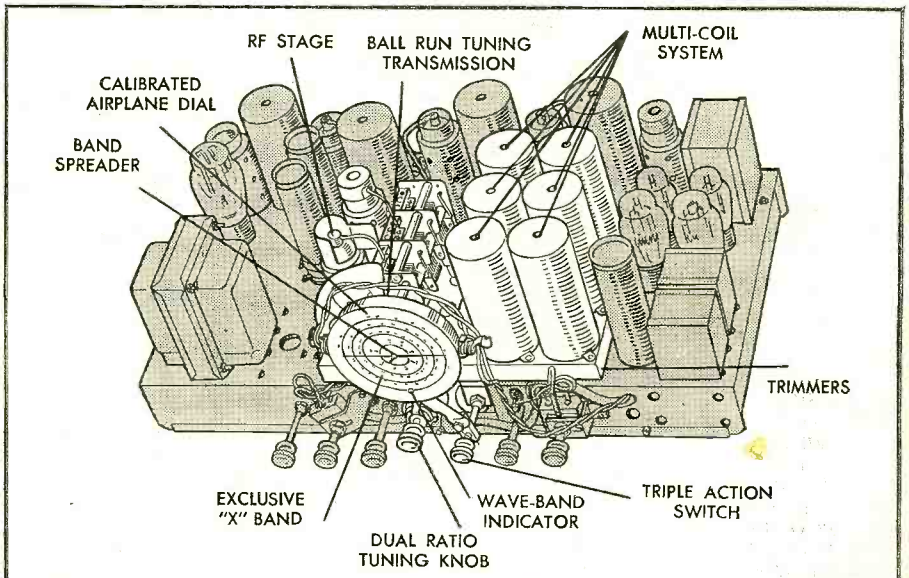
Best Bets from West Virginia

Mr. Kenneth Boord, O.R.N.S.W.L.P.O. for West Virginia sends in the following list of Best Bets heard in his location with an Alan Inter-nationale 4-tube set: VK3LR, GSC, KNRA, W1XAZ, GSB, EAQ, GSD, DJD, FYA, W8XK, W2XE, GSE, VK3ME, HBP, HBL, DJC, XEBT, CJRO, COC, VK2ME, W9XF, W2XAF, LSI, CGA, HJ1ABB, LSX.

Science develops a "Magic Brain"

that makes All-Wave Radio actually think!





Here you see the relation of the "Magic Brain" to the rest of a typical 12-tube RCA Victor all-wave chassis. Indicated by the pointers are those parts of this unit which, acting in unison, produce the finest all-wave reception you've ever heard!

RCA Victor engineers produce uncanny governing unit in all-wave chassis that is directing force for superior long- and short-wave performance

Deep in the center of RCA Victor's new all-wave radios is placed the "Magic Brain".

It is a new and exclusive RCA Victor development that permits far greater latitude in all-wave performance. Human in its power of selection and direction of discovering signals, it can be compared to the human brain.

There are two principal engineering features which give the "Magic Brain" its outstanding performance characteristics. First, the radio frequency stage *ahead of the first detector*. RCA Victor engineers have succeeded in designing this stage so that it functions with equal efficiency on all bands. It amplifies the signal you tune, *four times*, without acting on noise, cross-talk, image frequencies or other interfering factors. Thus, the wanted signal is *supercharged*, resulting in a four-to-one signal-to-noise ratio and a practical elimination of background noise and cross-talk from the speaker output. Reproduction is clear, with a higher-fidelity tone, and freer from interference than ever before.

The second great "Magic Brain" advantage is the RCA Victor multi-coil system. A separate and distinct set of three coils act for each band—so no coil performs more than one function. Furthermore, each coil is trimmed or adjusted individually for maximum performance. In effect, then, these RCA Victor "Magic Brain" all-wave sets are really three, four or five sets in one, depending on the number of wave bands covered.

You get an enormously increased range in these new receivers—as much as 140 kc to 36,000 kc! Everything, practically, in the world of radio is yours, including the new ultra short-wave police signals. Also, in "Magic Brain" chassis of 8 tubes or better, an exclusive "X" band is provided—for hourly U. S. Government weather aviation reports.

An interesting pamphlet is offered you, free. It tells, in detail, the fascinating story of the "Magic Brain". Write today for it. Use the convenient coupon.

GET THE INTERESTING ANSWERS to these "Magic Brain" Questions!

What is the "Magic Brain"?
Why you get higher fidelity tone?
What are the 3 reasons for the RF stage?
How does the multi-coil system work?
Why is it so necessary?
Why is high "Signal-to-noise" ratio good?
What extra mechanical features has it?
How wide is the KC range?

—the answers to these and many other questions are given for you in a free pamphlet. You are invited to get your copy. Use this coupon now.

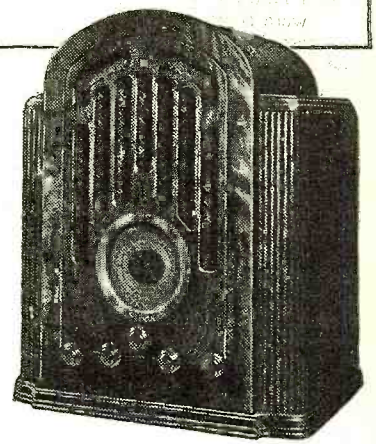


TABLE MODEL 128. "Magic Brain" Superheterodyne, domestic, foreign, police, amateur wave bands $69.95

"X" Band is in all sets of 8 tubes or more

•

A RADIO AND A PRICE FOR EVERYONE! RCA Victor Instruments priced from $18.75 to $375, including Standard Receivers, Auto Radios, Air-Cell Battery Radios and Radio-Phonographs. All RCA Victor Instruments equipped with RCA Micro-Sensitive Radio Tubes. All prices subject to change without notice. Any short-wave radio performs better with an RCA World-Wide Antenna.

RCA Victor Co., Inc., Camden, N. J.
Dept. N

I'm interested in getting more details on the "Magic Brain". Kindly send me the pamphlet you mention.

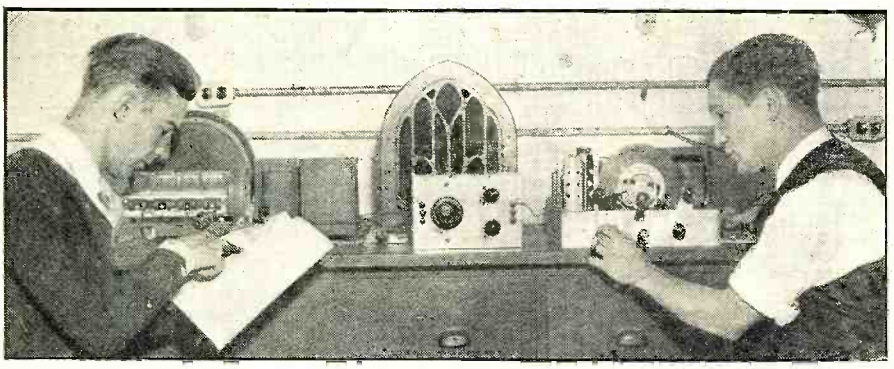
*Name*_____

*Address*_____

*City*_____ *State*_____

RCA VICTOR

RCA VICTOR CO., INC., ONE UNIT OF RADIO CORPORATION OF AMERICA . . . THE WORLD'S LARGEST RADIO ORGANIZATION. OTHER UNITS: NATIONAL BROADCASTING CO., INC. . . . R. C. A. COMMUNICATIONS, INC. . . . RCA RADIOTRON CO., INC. . . . RADIOMARINE CORPORATION OF AMERICA



THE DX CORNER

FOR BROADCAST WAVES

HERETOFORE, the DX Corner for the Broadcast Band has been in a formative stage, but this month marks the inauguration of the department in its final form. More space has been provided, with the result that three full pages are devoted to it this month, and, judging from the increasing volume of correspondence coming in from readers, it will be necessary to further increase the size of the department in future issues. It is an earnest hope that this department will become one of the important features of RADIO NEWS, and all those who are interested in Broadcast Band DX are urged to submit, for publication, any information they believe would be of use to other DX listeners.

As promised last month, a number of Official Listening Post Observers have been appointed. The complete list of all appointments to date is given elsewhere on this page. All these Observers have qualified for appointment on the basis of their fine DX records. There are numerous other readers who have submitted applications for appointment. These applications are now under consideration, and next month additional appointments will be listed in this department.

Any others who have established worthwhile DX records and desire appointment are invited to submit their applications, together with an outline of their qualifications. All such applicants will receive careful consideration.

Listening Post Applications

It is suspected that when RADIO NEWS offices were moved recently, some applications which had been received for Listening Post appointments were mislaid. If you have applied for appointment, but have not received an acknowledgement of the application, you are requested to apply again. All applications received to date have been acknowledged, and we therefore take this method of correcting the unfortunate loss of some of the correspondence addressed to this department during the months of August and September.

Reports for This Department

It is requested that all reports submitted for use in this department be addressed to the Broadcast Band DX Editor. Those who have occasion to submit reports on both broadcast-band and short-wave reception should make these in the form of separate reports, as a great deal of confusion is caused where both types of material are included in a single report. Each report should be signed with the name and address of the reader submitting same, and the top should be clearly marked whether for broadcast band or short wave. It is further suggested that any correspondence not pertaining directly to these reports be on a separate sheet. It is the desire to make participation in this work as simple as possible for contributors, but experience during the past few months shows that the simple precautions suggested herein aid materially in avoiding confusion.

Another suggestion is that the frequency, the time when heard, and the power (if known) be given for every station mentioned in the broadcast-band reports. This provides one means for maintaining a more or less constant check on frequency and time changes which take place from time to time, particularly in the case of foreign stations.

Reports from New York

R. H. Tomlinson, Official L. P. O. of Port Chester, New York, writes as follows:

"I think I shall start off by giving a report for this section on the broadcast band. Static is still quite high, nevertheless the trans-pacific stations are being received. The Australians and New Zealand stations have made their appearance much earlier than last year. I believe we are due for one of the best DX seasons yet.

"For actual results: The two best stations in Australia so far are 4QG on 760 and 5CK on 635 kc. Last Wednesday, September 19th, these two were heard as early as 3:30 a.m. 2CO on 560 kc, 7ZL on 580 kc, 2YA on 570 kc, and 2BL on 855 kc. were also heard this week. These last four faded badly until after daylight, then they left for good. So far the only European heard is Poste Parisien on 959 kc. and this only for two minutes. West coast stations, even the 100 and 250 watters, are coming in quite well for this time of year. To the south of us LS2 on 1190 kc. can be heard just about every night. They are best between 7 and 8:30 p.m., E.S.T. Other South Americans heard have been LR4 on 990 kc. when WBZ fades; LR5 on 830 kc., when KOA is fading; LR3 on 950 kc.; at times LR3 over-rides WRC. LR2 on 910 kc. has been heard twice, but CRCM gives him a good battle. YV1RC on 960 is heard quite well at times when the Canadian on this frequency fades.

"I have been assigned to the Foreign Affairs Dept. of the IDA and have promises for some wonderful DX transmissions this fall and winter. First, HIX in Santo Domingo, Republica Dominicana will come on November 11th between 3:00 and 4:00 a.m. (E.S.T.) on a frequency of 1270 kc. Please note this change in frequency from 598 to 1270 kc. Second on December 11th, CP4 in La Paz, Bolivia will come on for us from 3:00 to 4:00 a.m. on 1040 kc. In addition to the International DX'ers Alliance this transmission will be dedicated to the New Zealand DX Radio Club. Some fine music and a well balanced program is promised, so none of the DX'ers should miss this. By far the most important is CPX also in La Paz. This one will come on for us on December 12th from

Official RADIO NEWS Broadcast Band Listening Post Observers

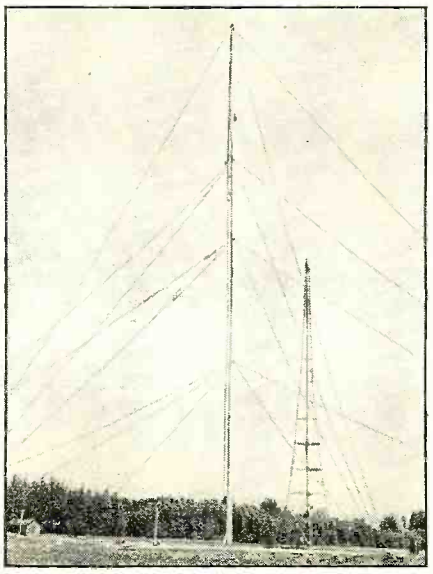
Ansell, William H., Regina, Saskatchewan, Canada
Biss, F. L., Brittmount, Minnesota
Blodgett, Lee F., Port Arthur, Texas
Burleigh, Fred, Meriden, Connecticut
Ellis, George, N. Stockport, England
Everly, Ray E., Newton, Illinois
Goss, Edward F., Brooklyn, New York
Halpern, Karl I., Brooklyn, New York
Hough, Robert, New Rochelle, New York
Hunt, Randolph, Leucadia, California
Ingle, George F., New South Wales, Australia
Kalmbach, John C., Jr., Buffalo, New York
Kimmons, E. L., Austin, Texas
Long, C. H., Winston, Missouri
Roberts, Evan B., Danvers, Massachusetts
Robinson, Philip H., Shelburne, Nova Scotia, Canada
Schneider, Jack B., Garwood, New Jersey
Schofield, R. W., Missoula, Montana
Shields, Donald W., Roseville, Ohio
Stokes, Joseph, Swissvale, Pennsylvania
Tomlinson, R. H., Port Chester, New York
Wilkinson, Henry, Jr., Baltimore, Maryland
Winkley, Warren E., Hughson, California
Woodhead, J. R., Monarch, Wyoming

From Wyoming

J. H. Woodhead, Official L.P.O., of Mon-

NEW KEX VERTICAL ANTENNA

This new antenna marks one of the latest developments. Some idea of its tremendous height can be obtained by comparison with the man hanging suspended from it. It is well over 300 ft. high and supports a 302-ft. copper tube, which is the antenna



arch, Wyoming, has been away from home and has not as yet had an opportunity to set up his receiver in his new location. However, in order not to fall down on his report for the month, he passes along information obtained from Irving VanZandt, Bozeman, Montana, State Manager of the I.D.A., to the effect that TGW, Gautemala, 565 kc., is coming in very well from 2:30 to 3:30 a.m. M.S.T. It is reported, however, that this station suffers some interference from Australian 2YA, 570 kc.

The fact that foreign DX has started so early this year leads Observer Woodhead to opine that this is going to be an excellent winter for DX. He is about to install a new McMurdo Silver receiver, and believes he will do better this year than ever before.

Report from Minnesota

Apparently DX reception in Minnesota is forging along. Floyd Biss, Official L.P.O., Brittmount, Minnesota, reports that as early as September 5th he tuned in seven Australian stations, 2BL, 2YA, 2GB, 3LO, 3YA, 4BC, and 4QG. He further states that the American stations KPAC, WKEU, WJBC and KWYO—stations which are seldom heard in Minnesota—have been picked up by him during the early morning hours of September. KWYO operates with 100 watts on 1370 kc., unlimited time. Their slogan is "Broadcasting from the heart of the Big Horn Mountains in wonderful Wyoming."

U. S. Reception in South America

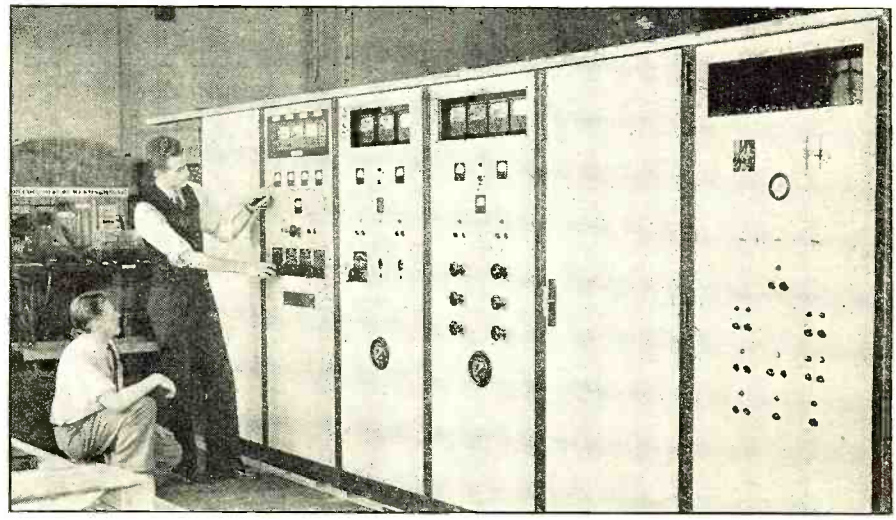
In the August issue a report was published from Louis Rogers Gray of Rio de Janeiro pertaining to DX reception in Brazil and listing the stations logged by him between January and April 1934. Now B. Cooke, of Camarones-Chubut, Argentine Republic, does not agree with some of the frequencies listed by Mr. Gray for some of the Argentine stations. He states that the following are the correct frequencies for the four Buenos Aires stations in question:

L.R.2—Radio Prieto	910 kc.
L.R.3—Radio Nacional	950 kc.
L.S.3—Radio Mayo	630 kc.
L.S.9—La Vox del Aire	1270 kc.

L. E. Adels writes from Buenos Aires that the results obtained by him during June, July and August do not check at all with those reported by Mr. Gray in the August issue. He states that during the months mentioned the United States broadcasting stations have been received at Buenos Aires, in many cases, well enough to be classed as A-1 entertainment. WLW is received practically any evening after the locals sign off. WBAP has produced the greatest volume, while KFI, WENR, and WEAF have also been clearly received along with others which were of less entertainment value.

Report from Nova Scotia

Philip H. Robinson, Official L.P.O., Shelburne, Nova Scotia, in a letter of September 23rd, provides the following information on reception during the previous week: "Nothing much first part of the week. *FRIDAY:* Toulouse, 913 kc., very good, about R7-QSA4-5, from 6:30 to sign-off 7:18 p.m., A.S.T., real program value—several orchestral selections and announcements recognized. EAJ7, Madrid, 1095 kc., heard well enough to recognize type of program at 7:00 p.m., A.S.T., interference from WPG or WLWL. Hamburg on 904 kc., fair. Recognized German announcements and music. LS2, 1190 kc., heard; not as loud as usual. *SATURDAY:* Milan, 814 kc., opera at 6:30 p.m., A.S.T. Toulouse as good as usual, (R7, QSA4-5). Rome, 713 kc., fair, R7 at 6:40 p.m., A.S.T. YV1RC early evening before XEAW appeared. *SUNDAY:* Toulouse R7. Usually on until 7:00 or 7:15 p.m., A.S.T. or at least audible until then. YV1RC good until 8:00 p.m. LS2, very good program value until 7:30 p.m., A.S.T. (WOA1 after 7:30). Frankfurt and VONF, 1195 kc., about equal volume at 8:00 p.m. Dates are September 21st, 22nd, and 23rd. OD4K, a new station in Lima, Peru, 1350 kc., and short waves, is supposed to be the most powerful in South America. CHGS, Summerside, P.E.I., now on 1450 kc., LR2, 910 kc., on until 1:35 a.m., A.S.T., every Sunday morning. Good volume about R8, QSA5, except for fades. Municipal Auditorium programs.



KGW TRANSMITTER NEARS COMPLETION

The new 10 kw. broadcast transmitter to be installed in Philadelphia will contain panels finished in aluminum. The illustration shows work nearing completion

T. P. Lists

With the TransPacific DX season upon us, the following lists of Chinese, New Zealand and Australian stations should be of considerable service to international DX'ers. A list of the Japanese stations was published in this department of the September, 1934, issue. The lists as given here include corrections and additions sent in by George F. Ingle, Official L. P. O. of Narrabri, New South Wales, Australia; Joseph Stokes, Official L. P. O. of Swissvale, Pa., and L. W. Mathie of Hawke's Bay New Zealand, who also provided the corrected New Zealand list down below. The Chinese list as given herewith was sent in by John C. Kalmbach Jr., Official L.P.O. and Albert L. Stanton of Buffalo, New York.

CHINA

XLHB	Shanghai	560	25
XQHA	Shanghai	580	250
XMHA	Shanghai	600	200
XTOY	Tsangtsi	625	500
XGOA	Nanking	660	75000
LUHO	Hong-yu	668	20
XGOY	Wing Nang	698	500
XMHC	Shanghai	700	500
XLHC	Shanghai	720	15
XLHO	Shanghai	720	30
XHHB	Shanghai	740	50
XGOK	Canton	750	1000
XLHI	Shanghai	760	7
XLHJ	Shanghai	760	22
XHHC	Shanghai	780	50
XLHK	Shanghai	800	7
XLHL	Shanghai	800	30
XQHB	Shanghai	820	30
XGF	Tsi-nan	833	7
XGTM	Shanghai	840	15
ZBW	Hong Kong	845	2060
XOST	Tsi-nan	857	500
XHHO	Shanghai	860	50
XHHV	Shanghai	880	100
XHHI	Shanghai	900	100
XHHX	Shanghai	920	1000
XHHE	Shanghai	940	100
XOPP	Peiping	952	100
XHHF	Shanghai	960	100
XGOD	Hangchow	978	1600
XMHD	Shanghai	980	500
XGCK	Che-tsang	990	7
XHHG	Shanghai	1020	100
XHHH	Shanghai	1040	100
XKRI	Canton	1070	7
XHHJ	Shanghai	1080	80
XGOB	Lo Yang	1090	250
XHHS	Shanghai	1100	100
XLHM	Shanghai	1120	50
XLHN	Shanghai	1120	50
XGOC	Nan-chang	1132	500
XGKA	Cha-nang	1140	15
XHHO	Shanghai	1160	100
XHHM	Shanghai	1180	100
XHHN	Shanghai	1200	100
XLTC	Wusih	1210	15
XHHY	Shanghai	1240	100
XHTG	Tienstsin	1240	7
XHHP	Shanghai	1260	100
XDYF	Wu-hu	1270	15
XQHC	Shanghai	1300	400
XLIA	Ning-po	1310	15
XGWT	Chang-chow	1330	15
XGSA	Kwong-yum	1335	5
XHHR	Shanghai	1340	50
XHHA	Hangchow	1360	50
XQHD	Shanghai	1360	200
XLHE	Shanghai	1380	75
XLHO	Shanghai	1400	15
XHHK	Shanghai	1420	100
XLHQ	Shanghai	1440	30
XGKL	Su-Chow	1440	10
XQHE	Shanghai	1460	250
XGDZ	Chang-chow	1470	10
XOCL	Tsin-nan	1500	10

AUSTRALIA

2CO	Corowa, N. S. W.	560	7.5
7ZL	Hobart, Tasm.	580	1.0
3AR	Melbourne, Vict.	610	4.5
5CK	Crystal Brook, S. Austr.	635	7.5
2FC	Sydney, N. S. W.	665	3.5
6WF	Perth, W. Austr.	690	3.5
5CL	Adelaide, S. Austr.	730	2.0
4QG	Brisbane, Qnsld.	760	2.5
3LO	Melbourne, Vict.	800	5.0
2BL	Sydney, N. S. W.	855	3.0
6PR	Perth, W. Austr.	880	0.5
7HO	Hobart, Tasm.	890	0.05
3MA	Mildura, Vict.	900	0.05
4RK	Rockhampton, Qnsld.	910	2.0
3UZ	Melbourne, Vict.	930	0.4
2GB	Sydney, N. S. W.	950	1.0
5DN	Adelaide, S. Austr.	960	0.3
3BO	Kangaroo Flat (near Bendigo, Vict.)	970	0.2
6BY	Bunbury, W. A.	980	0.05
4AY	Ayr, Qnslnd	980	
4GR	Toowoomba, Qnsld.	1000	0.05
3HA	Hamilton, Vict.	1010	0.3
2UE	Sydney, N. S. W.	1025	1.0
5PI	Crystal Brook, S. Austr.	1040	2.0
2CA	Kingston, Canberra	1050	0.05
4MB	Maryborough, Qnsld.	1060	0.05
3YB	Melbourne, Vict.	1060	0.025
2KY	Sydney, N. S. W.	1070	1.0
3SH	Swan Hill, Vict.	1080	0.05
6AM	Northam, N. Aust.	1090	0.95
7LA	Launceston, Tasm.	1100	0.3
2HD	Newcastle, N. S. W.	1110	0.5
2UW	Sydney, N. S. W.	1125	1.0
6ML	Perth, W. Austr.	1135	0.3
4BC	Brisbane, Qnsld.	1145	0.75
2WG	Wagga, N. S. W.	1155	0.05
4TO	Townsville, Qnsld.	1170	0.2
3DB	Melbourne, Vict.	1180	0.4
4MK	Mackay, Qnsld.	1190	0.1
5KA	Adelaide, S. Austr.	1200	0.3
2CH	Sydney, N. S. W.	1210	1.0
6KG	Kalgoorlie, W. Austr.	1220	0.01

2GF	Sydney	1220	0.5
2NC	New Castle, N. S. W.	1245	2.0
3WR	Wangaratta, Vict.	1260	0.05
2SM	Sydney, N. S. W.	1270	1.0
3TR	Sale, Vict.	1280	0.05
4BK	Brisbane, Qnsld.	1290	0.2
3BA	Ballarat, Vict.	1300	0.05
5AD	Adelaide, S. Austr.	1310	0.05
2MO	Gunnedah, N. S. W.	1320	0.05
4RO	Rockhampton, Qnslad	1330	0.05
2XN	Lismore, N. S. W.	1340	0.05
3KZ	Melbourne	1350	0.4
3HS	Horsham, Vict.	1370	0.05
4BH	Brisbane, Qnsld.	1380	0.6
2GN	Goulburn, N. S. W.	1390	0.1
3GL	Geelong, Vict.	1400	0.05
2KO	Newcastle, N. S. W.	1415	0.5
3AW	Melbourne, Vict.	1425	0.4
2WL	Wollongong, N. S. W.	1435	0.05
7UV	Ulverstone, Tasm.	1460	0.25
5MU	Murray Bridge	1460	0.1
6IX	Perth	1470	0.3
2AY	Albury, N. S. W.	1480	0.05
3AK	Melbourne, Vict.	1500	0.05

NEW ZEALAND

2YA	Wellington	570	5kw.
4ZP	Inercargill	620	500
1YA	Auckland	650	500
3YA	Christchurch	720	2.5kw.
2YB	New Plymouth	750	100
12H	Hamilton	770	40
4YA	Dunedin	790	500
2ZH	Napier	820	65
2YC	Wellington	840	200
1YX	Auckland	880	150
2ZP	Wairoa	900	105
3ZR	Greymouth	940	400
2ZF	Palmerston North	960	250
2ZJ	Gisborne	980	250
4ZO	Dunedin	1050	25
1ZB	Auckland	1090	200
4YO	Dunedin	1140	125
2ZM	Gisborne	1150	17
2ZD	Masterton	1170	7.5
3YL	Christchurch	1200	500
4ZF	Dunedin	1220	7
4ZL	Dunedin	1220	100
2ZL	Hastings	1240	65
1ZM	Manurewa	1260	50
4ZC	Cromwell	1280	7
3ZE	Greymouth	1300	35
1ZJ	Auckland	1310	50
4ZR	Balclutha	1340	4
2ZR	Nelsen	1360	50
2ZO	Palmerston North	1400	100
3ZM	Christchurch	1450	100
4ZW	Dunedin	1470	50

Report from Pennsylvania

Joseph Stokes, Official Listening Post Observer of Swissvale, Pa., and Master of Ceremonies at the regular weekly KDKA DX Club Tips Broadcasts, sends in some pithy information. Among other things he passes the following information along: Beromunster, Switzerland, is increasing its power and at the present time (September) is off the air . . . New stations are planned for the following Spanish cities—Madrid, 50 kw., 1022 kc.; Barcelona, 50 kw., 1213 kc.; also other new stations for Madrid, Seville, Corunna, Vizcaya, Bilbao, Valencia, Murcia, Oveido and the Island of Tenerife . . . A new Czech station will be in operation this winter at Banska Bystrica with a power of 30 kw. . . . It is understood that a new 250 kw. station at Saltillo, Mexico, will be operating next winter on 540 kc. . . . Breslau, Germany has increased power of 100 kw.

KDKA DX Club

Observer Stokes also provides the following information on the weekly tips broadcast from KDKA. Mr. Stokes is the founder of the KDKA DX Club and dispenses the broadcast news and tips over this station. Edward Lips is the announcer of short-wave news and schedules, while the club is under the supervision of Lynden Morrow, publicity director of KDKA. Mr. Stokes has to say: "In order to facilitate world reception, three frequencies are utilized by KDKA for the transmission of club news, for the broadcast band we use 980 kc. and for short waves (W8XK) 6,140 and 11,870 are used.

"The bulk of the material used on these broadcasts is supplied to us by other organized clubs, whose hearty cooperation we sincerely appreciate.

"The listening audience of the KDKA DX Club is probably the most widely distributed of any regular scheduled program, fans in New Zealand, Australia, England, Wales, Jamaica, Hawaii, Scotland, Newfoundland, Canada and 40 States have reported reception of our club and stating that they tune us in regularly, even ships at sea having reported our program. (Indian, Jamaica, P. R., I. of Wight, U. of S. Af., Transvaal, Alaska, Ireland, Mexico, Venezuela and Cuba.)

"The KDKA DX Club takes the air every Friday night at 12:30 a.m. (E. S. T. during the Winter and E. D. S. T. during the Summer.)"

J. C. Kalmbach, Jr., Official L. P. O. of Buffalo, New York, submits some notes covering the reception in the vicinity of Buffalo: WMEX Chelsea, Massachusetts, 1500 kc., 100 watts (250 watts daytime) is a new station on the air and was heard testing several times during the month of September. This is a full-time station . . . With the extra 20 kw. used by WJZ this station now comes in as well as WLW in the vicinity of Buffalo . . . WLW, WABC, WEAF, WJZ, WTAM, WJAY, WJSV and WJR are all well received in Buffalo during the daytime in spite of the fact that they are all more than 300 miles distant . . . KDYL, Salt Lake City, Utah, 1290 kc., 1 kw., broadcasts DX programs during

A VOICE OF RIGA

When DX'ers tune in on the Riga station of Latvia, 583 kc., the young lady shown here, Miss Austra Plucis, is the one whose voice is heard making announcements in English. Visioning Miss Plucis should add an extra thrill to DX'ers tuning in on this station

the early morning hours, one of which was heard at 2 a.m., E.S.T., one Monday morning (September 10). This club sponsors the "Dx'ers Nite Owl" Club, membership in which is open without charge to anyone addressing an application to the club care of Station KDYL, Salt Lake City, Utah.

European List

George Ellis one of the Official Listening Post Observers for England has forwarded the following list of European stations corrected to August 15th and published in World-Radio, official organ of the British Broadcasting Corporation. This list is here republished with permission from this organ.

Freq.	*KW.*	*Location*
536	1	Bolzano, Italy
536	16	Wilno, Poland
546	120	Budapest, Hungary
556	60	Beromunster, Switzerland
565	60	Athlone, Irish Free State
565	4	Palermo, Italy
574	100	Stuttgart, Germany
583	15	Riga, Latvia
592	120	Vienna, Austria
601	6.5	Rabat, Morocco
601	10	Sundsvall, Sweden
609	20	Florence, Italy
620	15	Brussels, 1, Belgium
620	20	Cairo, Egypt
629	20	Trondelag, Norway
629	15	Barcarena (Lisbon), Portugal
638	120	Prague, 1, Czechoslovakia
648	15	Lyons (La Doua), France
648	10	Petrozavodsk, U. S. S. R.
658	17	Cologne, Germany
668	50	North Regional, Gt. Britain
677	25	Sottens, Switzerland
686	2.5	Belgrade, Yugoslavia
695	7	Paris (Ecole Superieure), Fr.
704	55	Stockholm, Sweden
713	50	Rome, Italy
722	36	Kiev, U. S. S. R.
731	3	Madrid (Radio-Espana), Spain
731	1.5	Seville, Spain
731	20	Tallinn, Estonia
740	100	Munich, Germany
749	5	Marseille (PTT), France
749	0.5	Pori, Finland
758	12	Katowice, Poland
767	25	Midland Regional, Gt. Britain
776	10	Stalino, U. S. S. R.
776	2	Toulouse (PTT), France
776	0.7	Fredrikstad, Norway
785	120	Leipzig, Germany
795	5	Barcelona (EAJ1), Spain
795	16	Lwow, Poland
804	50	Scottish Regional, Gt. Britain
814	50	Milan, 1, Italy
823	12	Bucharest, Roumania
832	100	Moscow, 1V, U. S. S. R.
841	100	Berlin, Germany
850	1	Bergen, Norway
850	0.35	Aalesund, Norway
850	0.7	Porsgrund, Norway
850	1	Sofia, Bulgaria
850	1.5	Valencia, Spain
859	10	Simferopol, U. S. S. R.
859	15	Strasbourg, France
868	16	Poznan, Poland
877	50	London Regional, Gt. Britian
886	7	Graz, Austria
895	10	Helsinki, Finland
895	0.5	Limoges (PTT), France
904	100	Hamburg, Germany
913	10	Dniepropetrovsk, U. S. S. R.
913	60	Toulouse (Radio-Toulouse), F
922	32	Brno, Czechoslovakia
932	15	Brussels, 11, Belgium
941	12	Algiers, North Africa
941	10	Goteborg, Sweden
950	17	Breslau, Germany
959	100	Poste Parisien, France
968	20	Grenoble, France
968	10	Odessa, U. S. S. R.
968	2	Ukhta, U. S. S. R.
977	50	W. Regional, Gt. Britain
986	10	Genoa, Italy
986	2	Cracow, Poland
995	20	Hilversum, Holland
1004	13.5	Bratislava, Czechoslovakia
1013	50	North National, Gt. Britain
1013	5	Tchernigov, U. S. S. R.
1022	3	Barcelona (EAJ15), Spain
1022	0.7	Oviedo, Spain
1031	60	Konigsberg Germany
1040	10	Leningrad, 11, U. S. S. R.
1040	2.5	Rennes (PTT), France
1050	50	Scottish National, Gt. Britain
1059	20	Bari, Italy
1068	4	Tiraspol, U. S. S. R.
1077	12	Bordeaux Lafayette, France
1086	2	Falun, Sweden
1086	0.7	Zagreb, Yugoslavia
1095	7	Madrid (EAJ7), Spain
1095	10	Vinnitsa, U. S. S. R.
1104	1.5	Naples, Italy
1104	50	Madona, Latvia
1113	11.2	Moravska Ostravia, Czechoslovakia
1122	1	Belfast, N. Ireland
1122	6.2	Nyiregyhaza, Hungary
1122	0.25	Alexandria, Egypt (Exper.)
1131	10	Horby, Sweden
1140	7	Turin, Italy
1149	50	London National, Gt. Britain
1149	50	West National, Gt. Britain
1158	2.6	Kosice, Czechoslovakia
1167	15	Monte Cerneri, Switzerland
1176	10	Copenhagen, Denmark
1185	10	Kharkov, 11, U. S. S. R.
1195	1.5	Cassel, Germany
1195	17	Frankfurt, Germany
1195	5	Freiburg-im-Breisgau, Ger.
1195	1.5	Kaiserslautern, Germany
1195	2	Trier, Germany
1204	5	Prague 11, Czechoslovakia
1204	0.1	Tromso, Norway
1213	5	Lille (PTT), France
1222	10	Trieste, Italy
1231	5	Gleiwitz, Germany
1241	1	Cork, Irish Free State
1240		Swedish Relay Stations
1249	2	Juan-les-Pins (Radio Cote d'Azur), France
1258	1	Rome, 11, Italy
1258	3	San Sebastian, Spain
1267	2	Augsburg, Germany
1267	2	Nurnberg, Germany
12.6	0.5	Bodo, Norway
1276	0.5	Christiansand, Norway
1276	0.5	Stavanger, Norway
1285	1	Aberdeen, Gt. Britain
1285	1.5	Dresden, Germany
1294	0.5	Linz, Austria
1294	0.5	Dornbirn, Austria

(*Continued on page 384*)

How good is YOUR TUBE TESTER?

Make this test and judge for yourself

Remember, how we have emphasized the fact that more tubes require replacement because of noisy reception resulting from internal leakages than for any other reason! And how Supreme Neonized Tube Tester Model 85, has proved this, when other tube testers gave the tubes an O.K.?

Now make this test and judge for yourself. Take a power tube, a type 45, 2A5, 71A, etc. Be sure that the tube is a good tube. Then—close to the base—solder a 100,000 Ohm resistor between the plate and control grid. Substitute this tube for a tube in a radio known to be operating at its peak of efficiency. NOTICE THE DISTORTION—THE NOISY AND UNSATISFACTORY RECEPTION—AND OFTEN, THE COMPLETE SILENCING OF THE RADIO.

Now that you know you have a tube unfit for use or entirely unsatisfactory and in fact, now that you know you have a tube in the same condition as a great many other tubes in the possession of many of your customers, place this same tube in YOUR tube tester, and observe the result. 95 times out of 100, the tube will test "GOOD". Convincing evidence that you are losing more than 50% of the tube business you should have . . . simply because of inadequate and out of date methods.

Now test this tube on a SUPREME NEONIZED TUBE TESTER 85. Your jobber will gladly make it available to you. Notice how the Neon signal immediately flashes the elements between which the leakage or short is occurring, and proves to anyone that satisfactory reception is impossible with such a faulty tube. This super tube tester will pay for itself and the out-of-date tube tester it replaces, in short order.

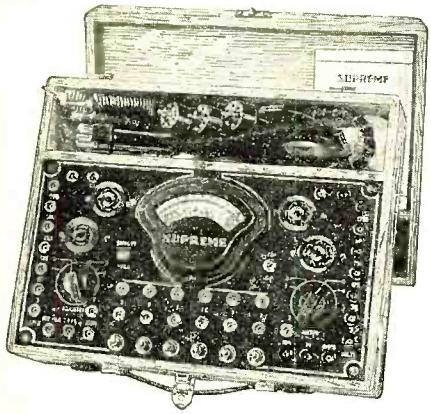
SUPREME NEONIZED TUBE TESTER 85-P

Dealers Net Cash Wholesale Price

Available also in modernistic Walnut Upright Counter Model

$39.95

6,000 REASONS why you should have a Supreme 333 DeLuxe Radio Analyzer



SUPREME 333 DELUXE RADIO ANALYZER $39.95

Dealer Net Cash Wholesale Price

6,000 progressive radio men attest to the superiority of the Supreme 333 DeLuxe Radio Analyzer. They are the reasons why you can be sure it will pay you to modernize your service with this superbly engineered portable testing radio analyzer. Other reasons are the new and exclusive features in design that in every way stamp this instrument in the $60 class. Its low price, $39.95, further exemplifies Supreme's ability to give fine, outstanding values in every type of testing instrument. Ask your jobber to let you sell yourself on the Supreme DeLuxe Analyzer.

Supreme 35 Tube Tester **$29.95**

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RIGHT:
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LAWRENCE
TIBBETT

LEFT:
H. C. ADAMSON

TONY
WONS

BACKSTAGE *in* BROADCASTING

Samuel Kaufman

Chatty Bits on Radio Personalities

LAWRENCE TIBBETT, noted operatic and radio baritone, has returned to the air under new sponsorship. He is starred on the NBC Tuesday nights in a triple role—singing, speaking and dramatic. The series is sponsored by the Packard Motor Car Company. He participates in dramatizations based on his life and adaptations of roles he created on the opera stage and the talking screen. He also discusses general topics with John B. Kennedy, the master-of-ceremonies of the program.

FIVE of radio's best known orchestra leaders have formed a committee to ban suggestive song titles and lyrics from the air. The Committee of Five for the Betterment of Radio, as the group is known, includes Richard Himber, Guy Lombardo, Rudy Vallee, Paul Whiteman and Abe Lyman. The committee planned to meet weekly to judge new songs. If a music publisher refuses to alter an "objectionable" song, the selection will be placed on a list to be mailed to orchestra leaders throughout the nation, many of whom are reported to have agreed not to play such selections. The networks have constantly been on the alert to ban offensive song lyrics, but many of the smaller, independent stations have refrained from any such censorship.

THERE are strong indications that many prominent radio manufacturers will sponsor stellar broadcasts this season. One of the new industry-sponsored features is the American Bosch Radio Explorers Club presented over NBC each Sunday. The program brings to the microphone many of the noted explorers of the American Museum of Natural History in thrilling narrations of their experiences. The list of guest speakers on the series includes F. Trubee Davison, Roy Chapman Andrews, Margaret Mead, Vilhjalmur Stefansson, Theodore Roosevelt, Jr., and others of equal prominence. Permanent members of the program's cast are Captain James P. Barker, veteran skipper, and Hans Christian Adamson, author.

LOIS BENNETT, soprano, and Conrad Thibault, baritone have been assigned the leading roles in "The Gibson Family" series, an original radio musical comedy heard over NBC Saturdays under the sponsorship of the Procter & Gamble Company. The story is an original work by Courtney Ryley Cooper, noted author. Howard Deitz and Arthur Schwartz, collaborators on many Broadway stage hits, have prepared the lyrics and music. The program is a full hour affair and is one of the most important additions of the new season. Jack and Loretta Clemens have prominent parts on the programs. Don Voorhees is general director of the music. Prominent dramatic parts have been assigned to Adele Ronson—the "Wilma" of the CBS Buck Rogers feature—Bill Adams, Anne Elstner, Sandor Vaga and Emmett Whitman.

WHEN a radio star manages to secure a sponsor he is considered lucky. But, when the performer manages to line up *two* sponsors, the achievement must definitely be attributed to outstanding talent as well as luck. And that's the trick that Jack Benny has accomplished. He was under a long-term contract with the General Tire & Rubber Company for an NBC series which expired in October and again signed for a new weekly program for the same sponsor beginning in February, 1935. In the intervening period, Benny will appear on a Sunday NBC series sponsored by General Foods in behalf of its Jell-O product. General Foods holds options on the comedian's micro-

PAUL WHITEMAN
AND
LEE WILEY

"THE GIBSON FAMILY"

JACK BENNY
AND
MARY LIVINGSTONE

LORETTA POYNTON

phone services during 1935 and 1936, but arrangements were made whereby Benny will be permitted to appear for both sponsors at alternate periods. His wife, Mary Livingstone, will remain in the leading feminine role under the two sponsorships.

TONY WONS, of CBS "Scrapbook" fame, has launched a new series on NBC under the sponsorship of S. C. Johnson & Son. Wons is heard in a dramatic role on the Sunday series entitled "The House by the Side of the Road." The programs feature incidental music. Supporting Wons are Gina Vanna, soprano; Emery Darcy, baritone; Ronnie and Van, song and comedy duo; Loretta Poynton and Hazel Dopheide, actresses, and an orchestra and vocal ensemble directed by Ulderico Marcelli. "The House by the Side of the Road" was inspired by Sam Walter Foss's well-known poem of the same name.

ROWENE WILLIAMS, soprano, won the coveted assignment of the leading feminine role on the CBS Friday Hollywood Hotel feature which stars Dick Powell. Miss Williams, who hails from Minneapolis was selected as the outstanding entrant out of 20,000 young women competing in the national auditions. A total of 86 CBS stations in the U.S.A. and Canada participated in the auditions. After local and sectional eliminations, the winner in each of twelve zones was brought to New York for the finals. Miss Williams, although a Minneapolis girl, was the Chicago zone entrant.

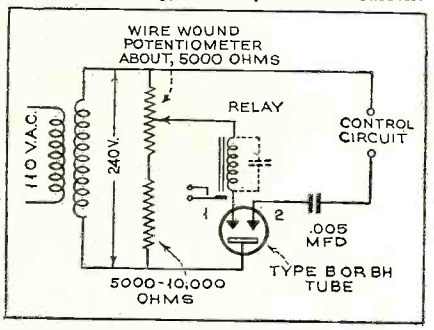
ROWENE WILLIAMS

WITH THE EXPERIMENTERS

WILLIAM C. DORF

Novel Use for an Old Rectifier Tube

Believe it or not, one of the old gaseous rectifiers of the (Raytheon B or BH) type can be used as a grid-glow tube. This tube permits the control of a relatively heavy current by an almost unbelievably tiny amount of power. The improvised grid-glow tube, while by no means as sensitive as the real thing, will respond to a current



as low as ten microamperes and will control a current over 2500 times as large.

In using the accompanying circuit, note that the prong connections of the tube are not standard, the two plates connecting with the usual filament pins, and the cathode with the usual plate pin. With one plate disconnected, adjust the voltage on the other plate until the tube just fails to pass current. This will be about 200 volts, depending on the tube. Now, when the control element (plate No. 2) is connected to a point about 10 volts higher in potential, the resistance of the tube is broken down and the main current of about 25 milliamperes flows. This is sufficient to operate a relay so as to control a still larger amount of power, such as a motor. Generally, one plate will be found to pass current at a lower voltage than the other. Use this one for the control element.

The current required in the control or "trigger" circuit is extremely minute, and it will operate through a resistance of several megohms, through a grid condenser, or even a match flame. As in the standard grid glow tube circuit this small current serves to ionize the helium gas in the bulb. As might be expected, the tubes vary in sensitivity and the older types seem to give the best results. All tubes, tested so far by the writer, however, have worked in this circuit.

C. D. SAVAGE,
Portland, Ore.

Salvaging Old Panels

Almost every radio shop has a stock of old discarded panels which have been drilled and redrilled and are just about ready for the refuse heap.

We salvage a great many of these panels by the use of impregnating compound. With the panel face down on a piece of waxed paper, the hot impregnating compound is poured into the holes until the holes are flush with the panel. Upon cooling, a smooth, shiny surface is left which is not distinguishable from the rest of the panel, except on close inspection. We also use this method successfully on new panels which have been incorrectly drilled.

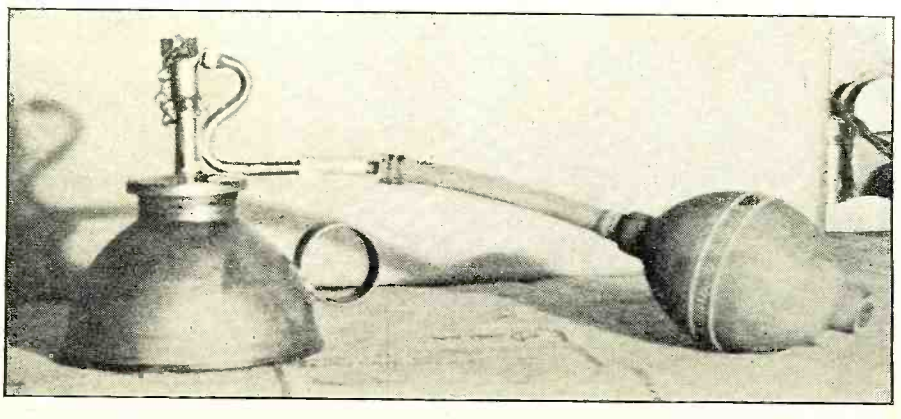
PRECISION RADIO LABS.,
Chicago, Illinois.

A Home-Made Blow Torch

This is an interesting and practical suggestion for a home-made blow torch of the alcohol burner type, made from an old oil can, two pieces of copper tubing and an atomizer bulb.

Many experimenters will find this inexpensive blow torch extremely handy for outdoor work, as for instance in soldering the lead-in to an antenna, etc., or for soldering jobs too heavy for the ordinary small soldering iron.

Construction of the torch is quite apparent in the photograph. The spout of the oil can is cut down to the required length



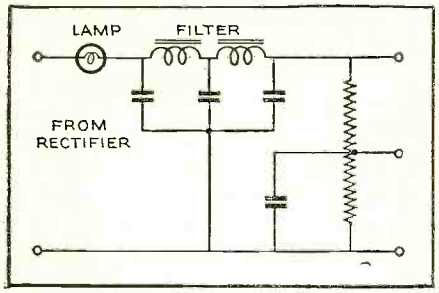
and the improvised nozzle is made from a light piece of copper tubing easily bent for the purpose and soldered to the spout or burner. The nozzle is flattened at one end so that the air will be confined to a thin stream. A bulb taken from an old atomizer is attached to the nozzle and provides the necessary air pressure. The cap for the burner (the "snuffer") is made from a piece of copper tubing and is flattened at one end and a chain attaches it to the spout as shown. For the wick, cotton packing is used.

In most cases the torch and bulb can be held in one hand leaving the other hand free for tools.

KENNETH H. COLVIN,
Worcester, Mass.

Protecting the Rectifier Tube

Rectifier type tubes can be ruined or seriously injured if subjected for any length of time to an accidental short-circuit or an excessive overload. To indicate and warn me that such a condition is occurring in



my power supply, I connect a small pilot lamp of the flashlight type in series with the output of the rectifier as shown in the drawing. The lamp will show unusual brilliancy for the excessive current and will indicate that the power supply should be immediately turned off before permanent damage results.

WILMOT COOGAN,
St. Louis, Mo.

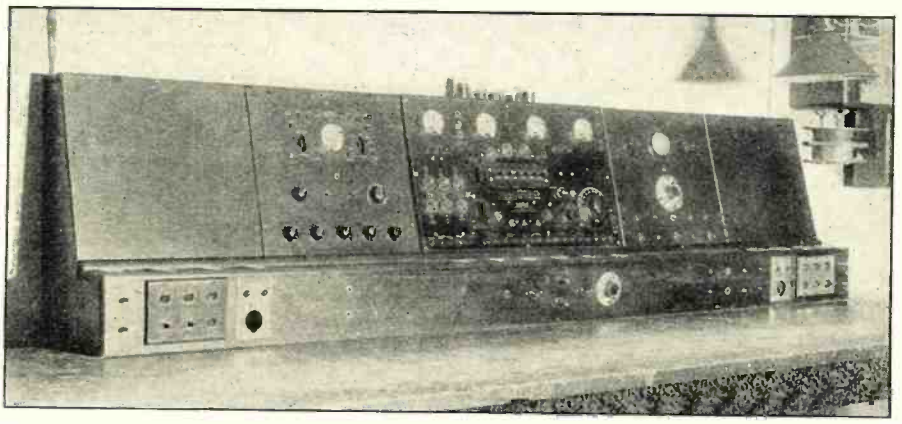
THE comedy team of Jesse Block and Eve Sully scored so favorably on last season's NBC Eddie Cantor programs that they are back on the air as stars in their own right. They are co-featured with Gertrude Neisen, the songster, and Lud Gluskin's Continental Orchestra on the CBS Ex-Lax program, Monday nights. All of the headliners of this series are performers who leaped to microphone fame in short periods.

THE American Broadcasting System—the Eastern network "keyed" by Station WMCA—recently broadcast a gala celebration program in observance of the tenth microphone anniversary of The Three Little Sachs. The ABS claims that the trio holds the record for long term continuous broadcasting in New York. The trio includes Bill Hanson, Vincent Howard and Jim Brennan. In their decade of commercial broadcasting, the boys have never been off the air and have always been sponsored by the same firm.

Report from England

P. J. Burwell sends in the following list of Best Bets for his location at Cleethorps, England: EAQ, F8KR, OER2, RV59, RV72, PCB, FYA, HBL, HAT, PHI, LKJ1, GSA to GSH, DJA to DJE, OXY, ORK, RNE, HVJ, RV15, SUV, W1XAL, W3XAL, W2XAF, W3XAU, W8XK, W2XE, VE9GW, COC, PRADO, PRBA, KFZ, VK3LR, VK3ME. The set used is a battery-fed O-V-1 Pen.

Other reports were received from O.R. N.S.W.L.P.O.'s N. C. Smith and J. Parkinson whose notes have been incorporated in the Time Table.



THE SERVICE BENCH

ZEH BOUCK

MAKING THE MOST OUT OF P. A. POSSIBILITIES

THE sale and rental of public-address systems is rapidly becoming the most profitable sideline intimately associated with radio servicing. It is a "natural" for the serviceman, and every advantage should be taken of modern and improved equipment which may substantially improve the service rendered and attract new customers.

Probably no component in the P. A. layout has been improved upon recently to the extent of the microphone, and the progressive serviceman will not be satisfied with more or less antiquated designs, the operation of which is characterized by excessive background noise, feedback tendencies, etc.

The ribbon, or velocity microphone is particularly well adapted to P. A. work. It is rugged, can be operated successfully with little attention to shielding, is highly directional, possesses a minimum of background noise and outputs practically perfect quality. It may be maintained by some that a fidelity curve of the high excellence attained with the ribbon mike is not essential in P. A. work due to the limitations imposed by the rest of the equipment, location, and the fact that it is used mostly for announcing.

However, it is exactly these arguments that recommend a high fidelity mike in P. A. systems. Having a perfect output to start with, attenuation of either highs or lows can be readily achieved to compensate other distorting factors.

The directional effect of the ribbon microphone is highly desirable. It results in the further lowering of the background noise, and makes it possible to use the mike in proximity with the speakers with no tendency to feedback. Heretofore, at races, fairs, etc., where it is almost essential to mount the microphone and at least two speakers on the judges' stand, consideration of feedback presented somewhat of a problem.

The photograph of Figure 1 shows an Amperite ribbon mike at a county fair—installed and employed to advantage by a rural New York serviceman.

It is well to bear in mind that the P. A. system itself is its own best salesman. Naturally enough, it is used only when

FIGURE 1 ABOVE. FIGURE 2 BELOW

large crowds are to be addressed—crowds which it is logical to assume must contain prospective customers for your service. They will be impressed by the clarity and reliability of your system—one way or the other.

The man with a reputation for highly effective public address systems will often be given preference over a lower bid for possibly inferior performance.

The sound car also makes an effective advertisement for P. A. work—the owner and operator being publicized simultaneously with the product he is advertising. An attractive sound car, operated by the Manning Radio and Sound Service, Youngstown, Ohio, and which can be quickly reconverted into a sedan, is shown in Figure 2.

THIS MONTH'S SERVICE SHOP

The service bench illustrated in our heading was designed for the Groce Electric Company, Columbus, Ohio, by A. V. Ditty (Figure 3). The two end panels

FIGURE 3

have been left blank with an eye for future expansion. Mr. Ditty writes of this very clean layout:

"The center panel is a Dayrad instrument rebuilt for modern circuit analysis. The panel to the right of center contains a condenser leakage, flash and capacity tester. On the panel to left of center are mounted a Supreme four range calibrated ohmmeter, a condenser substitute from .0005 mf. to 8 mf. in fifteen steps, and a resistance substitute ranging in one hundred steps from 100 ohms to 1 megohm.

"Particular conveniences are the fourteen metal cups on the horizontal shelf just below the main panels (for screws, nuts, bolts, etc.), and the lights which may be slid along the rod to any desired position."

A Crutch Tip

Our photographic serviceman, Frank V Bentley, Jr., from Missouri Valley, Iow

(*Continued on page* 391)

FIGURE 4

THE TECHNICAL REVIEW

JOSEPH CALCATERRA

"How to Write for Business Publications," by F. A. Orth, published by the Mercury Press. Here is a small book dedicated to writers who wonder why they do not receive more acceptances from editors. The book is devoted to opportunities for industrial and technical writers and outlines the editor's attitude in reviewing articles. It also gives many enlightening facts on: how to find ideas; choosing publications in which an article would be most suitable; how to write the article; how to submit it and much other information that an author should have to become successful in this field. Although it does not deal strictly with radio writing there is much knowledge that the radio author or prospective author will have to acquire if he is to become a successful radio contributor.

Review of Articles in the September, 1934 Issue of the Proceedings of the Institute of Radio Engineers

Nonlinear Theory of Electrical Oscillations, by Balth. Van der Pol. A detailed mathematical treatment of the nonlinear theory of electric oscillations and lists an extensive bibliography of books and articles which have appeared on the subject.

Synchronization of WJZ and WBAL, by K. A. Norton. The results of a series of field-intensity recordings of stations WJZ and WBAL to determine the effects of synchronized operation on reception, especially with regard to fading.

"Short-Cut" Method for Calculation of Harmonic Distortion in Wave Modulation, by I. E. Mouromtseff and H. N. Kozanowski. A time-saving graphical method for the precalculation of harmonic distortion produced by vacuum tubes used in all stages of a class B amplifier, for a great variety of operating conditions.

Ionosphere Investigations at the Huancayo Magnetic Observatory (Peru) During 1933, by L. V. Berkner and H. W. Wells. The equipment and methods used in ionosphere investigations at the Huancayo Magnetic Observatory of the Carnegie Institution of Washington.

Measurement of the Electrical State of the Upper Stratosphere in Polar Regions, by M. A. Bontch-Bruewitch. Results of wireless observations made in connection with the International Polar Year 1932-1933 at Moormansk (Lat. 68° 56′ N; Long. 33° 05′ E) in the U. S. S. R.

Review of Contemporary Literature

Speech Input Equipment for Radio Broadcasting, by W. L. Black. Bell Laboratories Record, September, 1934. Description of the requirements which must be met by speech-input equipment for radio broadcasting, together with detailed information on the equipment and setups used for the purpose.

Iron-Cobalt Alloys, by G. A. Kelsall. Bell Laboratories Record, September, 1934. Important advantages, from the standpoints of small size, higher permeability and higher flux densities, obtainable by the use of cobalt-iron alloys for magnet cores, and the use of vanadium to permit the rolling of iron-cobalt alloys into thin sheets.

A Portable Oscilloscope, by R. F. Mallina. Bell Laboratories Record, September, 1934. A compact and efficient oscilloscope which can be used for instruction in schools and is also suitable for lectures and demonstrations as well as for actual acoustical studies.

Output Wave-shape of Controlled Rectifiers, by F. O. Stebbins and C. W. Frick. Electrical Engineering, September, 1934. An article giving a method for estimating the harmonics in the output voltage of controlled mercury-arc rectifiers. Formulas and curves are presented which enable the reader to calculate the harmonics for inductive and non-inductive loads.

A 100-KW Vacuum Tube; Electrical Engineering, September, 1934. A description of the 100-kw type 265A tube. This tube was made possible by improvements in water cooling and a satisfactory copper-glass seal.

Fundamental Laws of Photoelectricity, by A. L. Hughes. Electrical Engineering, August, 1934. This article gives an account of the fundamental laws of photo-electric phenomena, including the theory of photo-conductive, photo-emissive and photo-voltaic cells. A brief bibliography is added.

Radio Fog Navigation, Science News, August 10, 1934. A short account of Marconi's new invention of directing ships in fog by means of ultra-short-wave radio-beacons. Scientific men in America see little difference between Marconi's system and the present beacons used for guiding airplanes to a "blind" landing.

An Improved Bend Tester. Bell Laboratories Record, September 1934. New type of bend tester used to determine the bending characteristics of materials used in telephone and radio apparatus.

The Photronic Cell and Photronic Control, by R. T. Pierce. Proceedings of the Radio Club of America, June 1934.

Characteristics and advantages of the Weston Photronic Cell for photo-electric applications. Its use in illumination meters, photographic exposure meters and industrial control applications is discussed.

Impedance Matching, by A. E. Thiessen. General Radio Experimenter, July-August 1934. The fact that while matching of impedances is desirable to prevent power and reflection losses, the most important reasons for matching is to maintain proper frequency characteristics.

Electrical Interference with Radio Reception, Letter Circular LC415. National Bureau of Standards. A circular, obtainable from the National Bureau of Standards, Washington, D. C., replaces the previous editions on the subject, issued by the Bureau.

The Grid-Anode Capacity of Valves, by M. O'Connor Horgan. The Wireless Engineer and Experimental Wireless, September 1934. The effect of the grid-anode capacity on the associated tuned circuits. Includes expressions for the variation of the damping and capacity reflected onto the grid circuit from the anode circuit for all positions of the anode tuning.

New Lapel Velocity Microphone, by J. P. Taylor. Broadcast News, August 1934. The features and advantages of the new Type 30-A lapel microphone for many types of broadcasts where an inconspicuous, light-weight microphone which does not limit the freedom of a speaker or other broadcast artist is required.

December, 1934
RADIO NEWS Free Technical Booklet Service
222 West 39th Street
New York, N. Y.

Gentlemen: Please send me, without charge, the booklets or folders I have filled in below:

Numbers.....
.....
.....

My occupation or connection in radio is checked off below.

- ☐ Serviceman Operating Own Business
- Serviceman Employed By:
  - ☐ Manufacturer
  - ☐ Jobber
  - ☐ Dealer
  - ☐ Servicing Organization
- ☐ Dealer
- ☐ Jobber
- ☐ Radio Engineer
- ☐ Experimenter
- ☐ Laboratory Technician
- ☐ Professional or Amateur Set Builder
- ☐ Licensed Amateur
- ☐ Station Operator
- ☐ Public Address Work
- ☐ .....

I am a ☐ subscriber ☐ newsstand reader.

I buy approximately $..... of radio material a month. (Please answer this question without exaggeration or not at all.)

Name.....

Address.....

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

PLEASE USE PENCIL AND PRINT IN FILLING IN COUPON

Technical Booklets Available

2. 1935 R.F. Parts Catalog. Specifications on the line of Hammarlund variable and adjustable condensers, r.f. transformers, sockets, shields, and miscellaneous parts for broadcast and short-wave receivers.

(*Continued on page 378*)

WHAT'S NEW IN RADIO?

WILLIAM C. DORF

New All-Wave Receiver

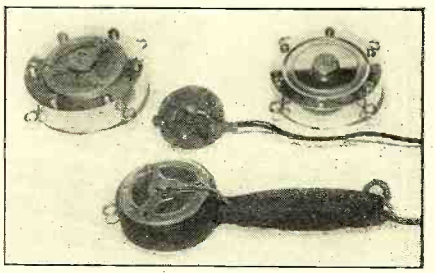
The latest fashion in radio set design by Federated Acratone includes the new International set which has a wavelength coverage from 18 to 2500 meters. Its tube equipment comprises two 6B6's, one

6A7, one 75, one 76, one 41 and one 80 type rectifier. Among the features incorporated in the set are: tone control, automatic volume control and a new airplane

type tuning dial with dual ratio drive. The second illustration shows the Acratone "Roamer" portable radio and phonograph combination designed to operate from 110 volts a.c. or d.c. supply. The receiver circuit is a five tube superheterodyne and the shipping weight of the set is 30 pounds. The new line of sets by this company is complete with midget and console sets in broadcast and short-wave design and also in motor car receivers.

Microphones

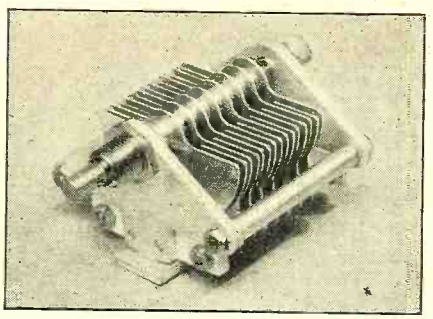
The illustration below shows the new line of Lifetime microphones. The model at the top left-hand corner of the illustration is the type MM double-button studio microphone measuring 3¼ inches in diameter by 2 inches in thickness and weighs 2 pounds. It employs a specially heat-treated, cathode sprayed gold spot duraluminum diaphragm .001 inch thick. The general purpose model 88 D.B. microphone shown at the right also utilizes a gold spotted duraluminum diaphragm with a special stretch ring arrangement. The lapel microphone model 44 is especially developed for speakers and lecturers as it allows full freedom of movement and gesture. It is a double-button unit measuring 1¼ inches diameter by ¼ inch in thickness. It weighs only 2 ounces. The model 55 two-button hand microphone is 6½



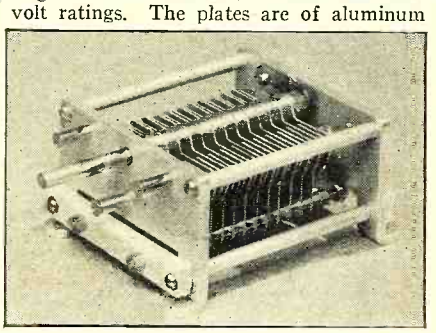
inches overall and the diameter of the head is 2¼ inches. It is attractively finished in black crystal and comes completely equipped with 10 feet of three conductor rayon covered cord.

New Equipment

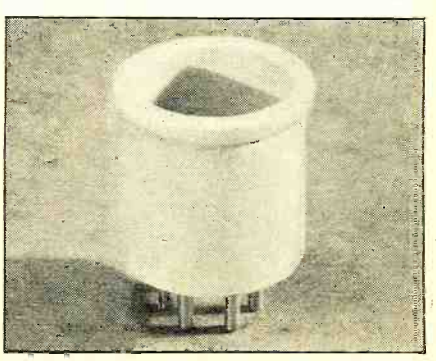
An interesting announcement was recently made by the National Company, Inc., of several new developments which



include the type TMS compact transmitting condenser available in 1000 and 2000 volt ratings. The plates are of aluminum



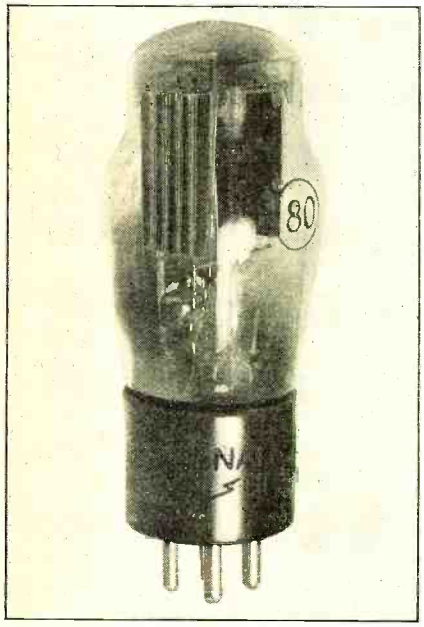
and are mounted on Steatite-Isolantite insulation. They are available in capacities from 35 mmfd. to 250 mmfd. The second



photograph shows the type TMC intermediate size transmitting condenser made with Steatite insulation, polished aluminum rotor and stator plates and in 3000 volt rating. This type condenser is available in capacities from 50 to 150 mmfd. The third item is the new Steatite plug-in coil form, made in five or six prong models to fit the National Steatite sockets.

A New Rectifier Tube

The National Union Radio Corporation introduces a new and improved type 80 rectifier. It differs from the standard type 80 in design by employing a corrugated plate which provides a greater surface area, therefore greater radiating surface and a lower operating temperature. The new tube permits a higher current drain with



longer life, as an example, it is made to provide as long life at 150 milliamperes drain as the old style 80 at 125 milliamperes. The new tube can replace the standard 80 rectifier in any radio receiver.

Hook-Up Wire

The unusually high insulation resistance of the new Lenz push-back, hook-up wire, under extreme humid conditions is made possible by the special cellulose acetate treated textile covering plus the cotton braids thoroughly saturated in moisture resisting compounds. The new Lenzite wire as it is called is especially adaptable to auto radio receiver manufacture and for use in all-wave radio sets because of its non-moisture absorbent feature which prevents alignment shifting.

PRESIDENT FRANKLIN D. ROOSEVELT is generally acknowledged as one of the world's most forceful and impressive radio orators. Since his inauguration he has spoken to the nation frequently on subjects of timely importance. Miss Vida Sutton, noted speech authority whose "Magic of Speech" programs are featured over the NBC, terms the President a master of the art of correct speech. "The President," she says, "possesses almost perfect speech technique. That is, he keeps the vocal passages well open, the tongue well forward, and the lips neither too open nor too closed, so that sounds are effectively made. His voice is well modulated and is used at the proper pitch, and he has an easy speaking rhythm. Mr. Roosevelt also has the nearest to perfect cosmopolitan speech of any of our public figures."

RADIO PHYSICS COURSE

ALFRED A. GHIRARDI

Lesson 35

Capacitor Properties

THEORETICALLY, any insulator is suitable for use as the dielectric in a condenser. However, only a few materials are used extensively for this purpose, simply because they are the only ones which possess certain properties which make them particularly suited for the types of condensers in which they are employed.

Since the electrons must flow through the connecting wires and through the metal of the plates themselves, any resistance which these parts have will impede the flow of the electrons, and heat will be produced proportional to I^2R. Therefore, it is important that the resistance of both sets of plates, all contacts and the condenser leads be kept as low as possible to prevent this loss. This is not difficult, for the large cross-section area of the condenser plates results in very low plate resistance in practically all cases.

If the dielectric used in the condenser does not have a very high insulating value or insulation resistance, a flow of electrons (current) will take place right through the dielectric from the negative plate (excess of electrons) to the positive plate (scarcity of electrons) depending on the value of the voltage applied to the plates. This is called *leakage*. It not only tends to discharge the condenser by reducing the quantity of free electrons stored in the negatively charged plate, but also produces some detrimental heating effect in the dielectric itself. Leakage may also take place between the terminals of a condenser, either through the insulating material, or over its surface in damp weather.

The other losses in the dielectric itself are known as *dielectric hysteresis*, and *absorption loss*. These are important when the condenser used in alternating current circuits of high frequency, as in radio work.

When a steady voltage is applied to a condenser having paper for a dielectric, careful measurement will show that the charge will sort of "soak" into the condenser for a considerable length of time. Similarly it will gradually soak out on discharge. If a charged paper-insulated condenser is discharged, and then left for a short interval, a further small voltage will appear at its terminals, and it may be discharged again. It appears that it requires some time for the electron orbits in the dielectric to re-adjust themselves to their normal shapes and positions and it is for this reason that all of the excess electrons in the negative plate are not immediately repelled back around through the circuit to the positive plate when a complete circuit is provided. At the high frequencies used in radio work, the condenser does not have much time between alternations to give back all of the absorbed or residual charge left from one voltage peak, before the next one comes along. Therefore most of the absorbed charge is lost and never recovered from the condenser. This loss is called the *dielectric absorption loss*. It depends on the material used for the dielectric. Air, mica, and oil have very low dielectric absorption loss. Cheap grades of wood-pulp paper, etc., may have very high loss.

When an alternating e.m.f is applied to a condenser, the electron orbits in the dielectric between it become alternately strained from their normal positions and there is a lag in the dying away of the electrostatic field in the dielectric. This action is similar to the lag in the magnetic field of a magnet, (magnetic hysteresis), and is called *dielectric hysteresis*. Condensers used in radio frequency circuits where the current may reverse as many as a million times every second, should preferably have low hysteresis loss.

All of the losses in a condenser are sometimes considered to be combined to form a total single loss which may be represented by a resistance, called the *equivalent series resistance*. The equivalent series resistance of a condenser, is the amount of resistance which if placed in series with a perfect condenser of the same capacity would allow the same current to flow that actually flows in the condenser being considered. The losses in the air-dielectric tuning condensers used in radio equipment are usually so low as to be neglected. The losses in paper dielectric or electrolytic condensers may be quite high if poor grades of material are employed, or the design is faulty.

When condensers are connected in actual circuits, a potential difference, or difference of electrical pressure exists between one plate (or set of plates) and the other. If the impressed voltage is great enough, it may cause a considerable force to act upon the electrons in the dielectric. In some cases, this may produce a spark discharge to take place through the dielectric, in which case free electrons are caused to pass physically through the dielectric whether it be air, glass, paper, mica or what not. This actually punctures the insulating medium. In insulators like paper, mica, etc., a tiny hole is actually burned through by the spark. The voltage required to cause this effect, is called the *breakdown voltage* of the condenser or the dielectric. As the actual breakdown voltage depends upon various factors, such as composition of the sample tested, temperature, length of time of application of the test voltage, whether the voltage is applied between two needle points or between two large surfaces, etc., these values should be considered merely as average values for the materials listed. Notice that very thin pieces of mica and paraffined paper can stand quite high voltages. This is one of the reasons for the extensive use of these two materials for the dielectric of fixed condensers.

When the dielectric of a condenser of the mica or waxed-paper type becomes punctured by the application of excessive voltage, a permanent short-circuit occurs between the plates through the dielectric, and the condenser is worthless and is discarded. If the dielectric in an "electrolytic" or "air" type condenser becomes punctured by excessive voltage, a short-circuit also occurs between the plates, but as soon as either the voltage is removed or the condenser is disconnected from the circuit, the insulating value of the dielectric is automatically restored and the condenser is ready for normal use again. Dielectrics of this type are said to be "self-healing."

*Radio Technical Pub. Co. Publishers, Radio Physics Course.

The Technical Review

(*Continued from page* 375)

4. *A 15- to 200-Meter Superheterodyne.* Outstanding features of the Hammarlund-Roberts high-frequency superheterodyne de-

signed especially for commercial operators for laboratory, newspaper, police, airport and steamship use.

5. *A 1935 Volume Control, and Resistor Catalog.* Data on standard and replacement volume controls, Truvolt adjustable resistors, vitreous wire-wound fixed resistors, voltage dividers, precision wire-wound non-inductive resistors, high-quality attenuators, center-tapped filament resistors, power (50-watt) rheostats and other Electrad resistor specialties.

6. *Line Voltage Control.* Characteristics and uses of a voltage regulator and chart showing the correct Amperite recommended by set manufacturers for their receivers.

7. *Rich Rewards in Radio.* Interesting information on the growth of radio and the opportunities existing in the field of radio manufacturing, radio servicing, broadcasting, talking pictures, television, public-address systems and commercial station operation on land and sea, for men who are trained to fill the many jobs created by the radio and allied industries. The book also contains detailed information on the complete home-study courses in radio and allied subjects offered by the National Radio Institute.

25. *Noise-Reducing Antenna Systems.* Two types of noise-reducing systems perfected by the Lynch Mfg. Co. for both broadcast and short-wave reception.

26. *Auto Radio Antennas, Filters and Noise Suppressors.* The line of Lynch antennas, filters and ignition noise suppressors especially designed for motor radio installations. Data on how to eliminate motor radio noise is included.

34. *Serviceman's 1935 Replacement Volume-Control Guide.* Revised list, in alphabetical order, of all old and new receivers showing model number, value of control in ohms and a recommended Electrad control for replacement purposes.

57. *How to Build a High-Quality Condenser or Ribbon Microphone.* The Amperite Microphone Kit, with which it is possible to build, easily and quickly, a high-quality condenser or ribbon microphone.

60. *Transformers and Choke Coils for Use in Public-Address Amplifiers and Radio Receivers.* Information on the characteristics of a wide variety of Amer-Tran De-Luxe and standard audio and power transformers and chokes.

63. *Moderate Priced Transformers and Chokes.* Descriptions and prices on the new Amer-Tran line of moderate priced audio and power transformers and chokes designed for original and replacement use in radio receivers, amplifiers, public-address systems and amateur transmitters.

65. *New 1935 Line of Testing Instruments.* Information on the new 1935 line of Supreme testing instruments including the new 5″ fan-shape meter, the new Model 333 deluxe analyzer, the low-priced Model 333 standard analyzer and an improved Model 85 tube tester.

66. *An A.C.-D.C. Tester Which Can be Built at Home at Low Cost.* Information about the Supreme 5″ fan-shape meter, rectifier and resistor kit for the home construction of an inexpensive A.C.-D.C. tester.

Radio Inventions

(*Continued from page 335*)

of articles entitled "First Aid to Inventors." It is true it may not fill you full of flowery ideas of how many millions of dollars you are going to make, but it *does tell you of the many pitfalls and mistakes that lie in wait for the inventor and rob so many of their chances of success.* If you have an original idea on a new piece of apparatus or a new method of doing something, this series will quickly tell you how to determine whether it is worth-while and whether you can make money out of it. It may be the means of starting you out on the path to success. If you have any friends or experimenters whom you think should be interested and who want to know the truth about inventions (and inventors) be sure to tell them of their series.

Push-Pull Amplifier

(*Continued from page 346*)

with low d.c. resistance which is another requirement for good regulation. The best of parts have been used in the filter circuit in order to make the power supply free from hum.

Now comes the proof of the pudding. This amplifier, with a resistance coupled input and a non-inductive resistor as output load, was measured in the laboratory for frequency response and the result is shown in Figure 2, curve (A)—absolutely flat. However, it is impossible to use it in this way since at least an output transformer is required. Employing the best obtainable commercial output transformer the amplifier was measured again for frequency response and the characteristic is shown in curve (B). A third set of measurements was obtained with a more reasonably priced output transformer, giving curve (C). A careful inspection of these curves shows that the first transformer limits the maximum variation of response to 2 db. and this is with a frequency range from 20 to 17000 cycles. The second transformer causes a maximum variation of somewhat less than 5 db.

It is recommended that the best possible speakers be employed with this amplifier in order to realize the full benefit of the quality provided. Even the best of high-quality dynamic speakers lack sensitivity on the high notes. The latter can be increased with a special high-frequency speaker, to be used in conjunction with the regular speaker.

A special model has been developed for operation from the d.c. line. This d.c. powered amplifier employs six tubes, has a gain of 80 db. and can deliver an undistorted output of 15 watts, with a peak output of 20 watts. There are three stages of amplification; the first stage, employing a 77 tube is resistance coupled to the second stage, a 37 tube. The latter is transformer coupled to the output stage, consisting of four 48 tubes in parallel-push-pull. The amplifier unit does not incorporate an input or output transformer.

The frequency response curve is flat to within 2½ db. from 30 to 17000 cycles; that is, without an output transformer. Employing the best commercial transformer available this becomes flat to within 4 db. from 30 to 15000 cycles. A more economical type of transformer causes the response to be 7 db. down at 30 cycles and 6 db. down at 15000 cycles, 3 db. down at 50 cycles and 10000 cycles.

QRD? QRD? QRD?

CONDUCTED BY G.Y.

IT is with a great deal of pleasure and satisfaction to Ye Ed to note the great change that has taken place for the better in the organization of the ARTA. Not having been to the main offices here in New York for some time it was worth the effort in climbing four flights of steps because we could not find the elevator. A full suite of offices greeted us, with a large sitting room for the gang and private offices for the President and his clerical force. Although Mr. Haddock was out attending a conference with an executive of the Grace Lines, we enjoyed ourselves in the company of most of the gang who are now making this place their headquarters instead of the Buzzer Room of the RMCA. Activity is in the air—new men being added to the already large-sized roster and reports coming in from all parts of the country with information as to conditions. Because of the press of business and the necessity for having a secretary to accompany the President to conferences and meetings, Mr. Willard L. Bliss was elected to that position. He advised us of the progress which has been made up to the present time and stated that with the exception of the midwest, every port on the edges of the United States was being covered by duly accredited ARTA delegates and that plans were being formulated to send proper men into this great untouched area, the center of the country, to stimulate and contact radio ops for the organization, making it a truly national association. Men in this area who have not become members of the ARTA will do well to get in touch with the organization either through this column or direct with them for any information desired.

The SS *Belle Isle* sailed out of Los Angeles harbor June 9, 1934, for tuna fishing along the banks, off Southern California, with just a few dots and dashes from the fist of radio op Bill A. England tuning his set up. Until twelve bodies were picked up off the coast of San Diego no word had been received from her. It is believed that she was lost in a hurricane. We deeply mourn the passing of our old sidekick and leave him in the care of Davey Jones. . . .

Great advances have been made in securing better wages and working conditions for radio ops on ships and land stations. KFS has increased the monthly wages of three men from $135 to $148.50. . . . The Grace Lines have agreed to place three men on all ships with appropriate wage increases. . . . An 8-hour day and $110 minimum wage has been obtained for those ops on the Great Lakes. . . . A $2000 back-pay was OK'd by the board of the NRA through ARTA intervention to technicians at KTAB, Oakland, California . . . And so it goes on with victory after victory reflecting the militant fashion in which the ARTA has overridden obstacles in their attempt to organize and build up the morale of radio operators.

L. L. Dawkins of WPTF, Raleigh, N. C., states that due to the boom in Police Radio xmiting, all licensed First Class ops who are now out of work could be used for this purpose, instead of the policy now in vogue in many cities of issuing a Third Class ticket to men who *have only a small knowledge* of radio. He has written in to the FCC suggesting this action and has advised other stations to do likewise, with this letter: "We respectfully submit for your consideration the fact that whereas there are a large number of unemployed radio operators holding First Class licenses and in need of work, that Third Class licenses are being issued to men with extremely limited knowledge of radio, granting them permission to operate certain types of transmitters, particularly police radio xmtrs, which positions doubtless could more efficiently be filled by First Class men. We request that some action be taken limiting the scope of the Third Class license. In fact, considering the large number of unemployed First Class men, we recommend the deletion of the third class license." Due to the FCC pending revision of many of the existing regulations, this action coming up at the present time may receive consideration if enough ops write to its Secretary.

Our West Coast correspondent advises us that out of 7 ops on a certain airline operating out of Los Angeles *only 3 have been put back to work since the award of the mail back to private commercial companies!* Perhaps their former large subsidy has not been returned to them with the mail but then it would seem as though the mail was not being flown as rapidly or as efficiently as formerly. This is a matter of the NRA and Postmaster Gen. Farley . . . Also, that maybe the IATSE didn't hear Mr. Green of the AFL when he stated that the IBEW has jurisdiction over radio technicians as they still are trying to collect dues from some of the boys in the Northwest . . . That out of 130 freighters owned by twelve companies for Intercoastal work, 75 have been tied up since May but are expected to be put back into service again, shortly, and with the addition of the Amer-Hawaiian and Luckenback Lines having 34 ships ready for sailing there should be quite a few jobs opening up for the gang.

Kenny Isbell of KECA and Joe McLean of Kern are being kept busy nowadays with a revival of the old I Tappa Key fraternity, which is an organization of ops with no dues to pay but plenty of work to better themselves as key men. We hear that Mervyne Rathborne, the former editor of CQ and original organizer of the ARTA under the regime of Delaney, is now at KFS. Operator XM at Pto Castilla would like to know who is the op who sends press from New Orleans WFL/WFB who always spells the word "subscribers" as "suscribers" in the preamble of the morning press bulletin to KUFC. (*With what is happening around New Orleans, we wouldn't blame a guy for not being able to spell his own name out right.—Ed.*)

There cannot be any doubts in the minds of operators that certain influences are being brought to bear upon organized business to the extent that better wages and working conditions are being gradually attained. Therefore when a united front of radiomen and technicians, organized 100%, can be brought together there is no doubt but that effective and happy results will be the order for a profession. So with the best of good holiday spirits and the season's greetings to ye all, and with a cheerio, 73 . . . ge . . . Gy

Aid to Inventors

(*Continued from page* 337)

But no farmer will be a good judge of the new tool he has invented and no mechanic will appraise correctly an innovation on the farm. Again, honest advice, honestly

listened to and evaluated, is what the inventor needs.

The conventional way to decide whether or not an invention is "new" is the so-called "search" made in the records of the Patent Office. That is not what I mean! Such a search often is a desirable preliminary to formal application for a patent, after you decide to make an application. This we shall discuss in a later article of this series. What I mean just now by newness is whether or not the invention already is known or used or has been tried out and discarded by the trade, or whether something nearly like it has been known, used or discarded.

There are different degrees of newness. It is not enough that a valuable invention be slightly new in some minor particular. It must be new enough so that it substantially betters any equivalent already on the market.

Many years ago I helped to invent a new adjustable frame for hacksaw blades. It was a new idea and it worked. It would take and hold firmly a hacksaw blade of any length at all, not merely the standard series of lengths in whole inches or half inches. Metric blades could be used, or broken blades, or other blades which happened for some reason to be of unexpected lengths. The idea was patentable and a patent was obtained. It proved to be commercially worthless. There were two reasons for this. One was that hacksaw blades of any off-standard length are exceedingly rare articles. The vast majority of blades came then, and come now, in a small number of definite lengths. Accordingly, there was no great, insistent demand for the article which we had invented. The second reason was that several types of adjustable frames for hacksaw blades already existed and formed parts of the standard lines of tool manufacturers. These were not quite so flexible or perfect as the one which we had invented but the improvement was *too small to be significant*. Several of my good friends (among mechanics) and several more acquaintances (among tool salesmen and manufacturers) were kind enough to tell me this. Looking back, I thank them sincerely. At the time, I merely thought they were trying, for some undiscoverable reason, to keep us inventors *out of well-deserved success!*

The third inquiry which should precede any consideration of a patent is one still more often forgotten by would-be inventors. This is to make sure that the invention is "unblocked."

One of my clients once invented an attachment for Eastman Kodaks. It seems to him, and to us, a useful attachment. We believed that the public might like it and buy it. Yet the invention was commercially handicapped, because it was, at best, a mere improvement on an article which someone else controlled. My client could not manufacture complete Kodaks or similar devices. If he did he would be infringing many patents held by present manufacturers. He could not apply his invention to anything else. Accordingly, his only market was to sell his idea to manufacturers of the articles to which his invention had to be attached. If that failed he had nothing.

It does not follow that an invention, so blocked by previous patents or inventions, always is useless. Sometimes a sale can be negotiated or some other community of interest arranged. The point is that this phase of a project should be considered before money is spent on patents or on anything else. An invention which hinges on the use of a previous invention, already patented, has no commercial value except to, or through, the owner of the other patents which block it. Sometimes a condition of this kind exists because of purely commercial considerations. Metallic aluminum is manufactured under basic patents which have expired. Legally, there is no reason why a new manufacturer should not enter this field and make all the aluminum he wants. One obstacle is, however, that this requires great skill and experience, which no one but the present manufacturers possess. Another is that the capital investment required would be at least several million dollars. A third is the requirement of large supplies of cheap electrical power, whereas most places where cheap power can be developed already are owned. Accordingly, there is little use inventing improvements in the manufacture of raw aluminum unless you contemplate some community of interest with present organizations in that field.

Finally, there is the inquiry into whether or not your invention will work. I do not mean whether it will work on a laboratory scale or in your own hands. Even the least experienced of inventors would be unlikely to apply for patents until they themselves had tested their inventions. This, however, is only the first step in the test of workability. Recently one of my associates invented, what seems to all of us, a new and useful improvement in laboratory apparatus. The inventor makes this work perfectly. I can make it work. Whether or not everybody can make it work is still to be determined. This is what we are doing. A number of these pieces of apparatus have been made. These have been put into actual service in several kinds of laboratory work. Some have been supplied to laboratory workers who know nothing about them and do not care whether they work or not. We are seeing what happens under such impartial tests. If the apparatus works all right we shall proceed with further development and protection. If faults develop we must try to find ways of overcoming them.

I am convinced that this kind of trial in practical use, in the hands of persons indifferent to the invention (or even hostile to it) would save many expensive but useless patent applications and enormous sums of money. There may be instances in which such advance practical trials are unnecessary, impracticable or undesirable, but such instances are few. Such tests must be conducted, of course, in ways which *will not prevent later application for patent*, should the invention prove useful and the patent seem desirable. How to do this is one of the things we hope to discuss in future articles.

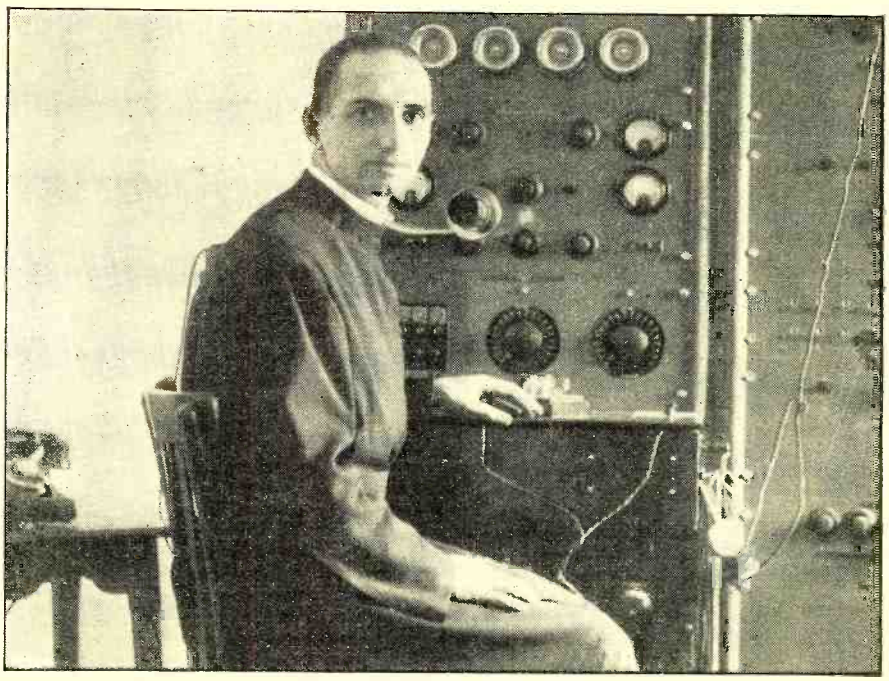
Summing up, there are, then, four things to ask about an invention before one considers patenting it. Has it a market? Is it new and sufficiently different from things already available? Is it unblocked by other patents, methods or processes otherwise controlled? Will it really work under practical conditions? Unless the answers to all four of these questions are unmistakably affirmative, any further expense on the invention should stop right there!

Appointed RCA Advertising Head

CAMDEN, N. J.—T. F. Joyce has recently been appointed Manager of Advertising and Sales Promotion succeeding Pierre Boucheron, resigned. In addition to his new duties, Mr. Joyce will continue to direct the advertising and sales promotion activities of the RCA Radiotron Company.

Sales Manager Appointed

NEW YORK, N. Y.—Mr. George E. Palmer has recently been appointed General Sales Manager of Electrad, Inc.



NEW DIRECTOR OF HVJ

The Rev. Filippo Soccorsi, S.J., who has recently been named director of the Vatican City broadcasting station, succeeding the Late Rev. Guiseppe Gianfranceschi

The DX Corner (Short Waves)

(*Continued from page* 357)

sends in the following list of Best Bets for his location: GSD, GSC, W3XAL, W8XK, W2XAF, DJC, DJD, DJA, FYA. He uses a Lafayette 8-tube all-wave set with a Hertz antenna.

Reports by the "Thousands"

The reports coming in from our Official Listening Posts from all over the world and from the United States itself as well as from our other readers have increased so greatly that we can no longer hope to run each one but this should not discourage any S.W. fan from working with us, as every single note and every single item is incorporated in the checking material for the Time Schedule. The Editor has computed that it would take at least 50 pages more (of this size magazine page) to include all the material sent in, monthly, at the present rate.

So do not feel slighted if you do not see your own item actually credited with a note in these pages. The information *is* used and *every bit of it is used* to help make this department the best in the world.

Yes, We Hear from Vicksburg

Many welcome letters from (Mrs.) L. R. Ledbetter have brought us fine short-wave material that is included in the Time Table. (Thanks, a whole lot! Editor.)

Report from Honduras

Mr. R. W. Tatum, O.R.N.S.W.L.P.O. for Honduras, sends in the following Best Bets: PRDA, GSG, W3XAL, FYA, W2XE, W8XK, GSD, PRADO, EAQ, W1XAZ, W2XAF, HJ1ABB, YV5RMO, on an RCA Victor model 141 all-wave receiver

Report from Canada

Mr. J. F. Atkinson, Minnedosa, reports the following Best Bets: FYA, GSD, EAQ, HJ1ABB, DJB, DJD, LSX, ORK, GSC, GSB, GSE, PRBA, VY3RC, HC2RL, PRADO.

Listening Post Observers Wanted!

We are especially desirous of locating reliable listening post observers in the following remaining states in the United States of America. Any one feeling that they would like to undertake this work and that they have the necessary qualifications and interest in Short Waves to be able to log stations for us accurately, should make their application for appointment immediately, sending in at the same time a sample log, made at their receiving apparatus: **Arizona, Rhode Island, Wyoming.**

We also want to locate reliable listening posts in the following countries outside of the United States: **Alaska, Algeria, Austria, Belgium, Bolivia, Central America, Czechoslovakia, East Indies, Ecuador, Egypt, Finland, Greece, Holland, Hungary, Irish Free State, Java, Malay State, Manchuria, Norway, Paraguay, Portugal, Poland, Siberia, Sweden, U. S. S. R.**

All applications should be accompanied with a statement as to qualifications, the kind of receiving set used, antenna, etc., and a sample log. Appointments will be made as the individual cases are considered and passed upon by the Editor.

Readers Who Helped Log Stations for This Month's Report

We are indebted to the following readers of RADIO NEWS who furnished important information on their reports of short-wave reception this month: F. H. Jones, Tuinucu, Cuba; A. E. Stewart, Charlotte, N. C.; O. A. Weiss, Brooklyn, N. Y.; E. L. Kimmons, Austin, Tex.; J. McCarley, Decatur, Ga.; J. Tudor, Esquimalt, Victoria, Can.; R. Kure, Cincinnati, O.; M. Horlick, Youngstown, O.; J. E. Moore, Jr.; San Francisco, Calif.; C. E. Denton, New York City, N. Y.; F. Baillie, Trinidad, B. W. I.; G. E. Deering, Jr., Shrewsbury, Mass.; A. W. Oppel, Newark, N. J.; A. W. Shane, Bowmanville, Can.; D. A. Myer, Pittsburgh, Pa.; P. M. Farmer, Sydney,

Australia; E. L. Robinson, Schenectady, N. Y.; J. A. Chambers, Cincinnati, O.; J. G. Leitch, Philadelphia, Pa.; I. Rhodes, Cape Town, South Africa; Luis Casas, Jr., Havana, Cuba; C. E. Roy, Montreal, Canada; C. Lopez Videla, La Paz, Bolivia; L. B. Martins, Macao, Asia; Baron von Huene, Tientsin, China; Dr. M. Hausdorff, Switzerland; J. D. Lowe, Barranca Bermeja, Colombia; N. Smith, Nehalem, Ore.; Dr. G. Tixy, Genoa, Italy; H. Spearing, Indianapolis, Ind.; N. Hood-Dante, Jamaica, B. W. I.; R. S. Vatelia, Bombay, India; W. W. Loudon, Oakland, Calif.; J. F. Edbrooke, Buenos Aires, Argentine; D. S. Catchim, Washington, D. C.; R. Bartley, Toledo, O.; J. C. Kalmbach, Jr., Buffalo, N. Y.; E. Rosa, Trinidad, B. W. I.; M. H. Clary, Geneseo, Kans.; N. C. Smith and J. Parkinson, Kent, England; P. J. Burwell, Lancashire, England; J. T. Spalding, Louisville, Ky.; F. L. Saldana, Huamantla, Tlax, Mexico; R. H. Tomlinson, Port Chester, N. Y.; J. Bews, Vancouver, Can.; D. T. Donaldson, Kelty, Fife, Scotland; E. A. Conklin, Norwich, N. Y.; A. E. Emerson, Cleveland, O.; G. C. Sholin, San Francisco, Calif.; L. Brandenburg, Dayton, O.; E. Mantu, Far Rockaway, N. Y.; D. E. Bame, Copiague, N. Y.; Mrs. L. D. Ledbetter, Vicksburg, Miss.; M. J. Kramar, Tabor, S. D.; S. J. Emerson, Cincinnati, O; M. Mickelson, Minneapolis, Minn.; D. Pryor, Texarkana, Tex.; R. W. Tatum, Trujillo, Honduras; R. Woods, Sand Springs, Okla.; T. Jiordano, New Castle, Pa.; D. D. Bassett, Brooklyn, N. Y.; D. M. Blankenship, Bluefield, W. Va.; R. J. Gilchrist, Summit, N. J.; C. M Hansman, Bethel, Me; D. Funk, Dayton, O.; J. Kallaher, Memphis, Tenn.; H. Kemp, Waterbury, Conn.; J. F. Fritsch, Baltimore, Md.; M. E. Teska, Sioux City, Ia.; H. W. Priwin, Copenhagen, Denmark; A. B. Baadsgaard, Ponoka, Can.; H. Adams, Jr., Baltimore, Md.; S. L. Ernst, Chardon, O.; K. A. Staats, Aliquippa, Pa.; J. E. Brooks, Montgomery, Ala.; C. Miller, Covington, Ky.; C. A. Steele, Port Arthur, Tex.; H. E. Seivert, Chicago, Ill.; C. W. Wykoff, Jerome, Ariz.; F. C. Balph, Indianapolis, Ind.; R. Peters, Roslyn Heights, N. Y.; P. Swanson, New London, Conn.; L. Swenson, Eden, Idaho; J. M. Malast, Buffalo, N. Y.; G. W. Acker, Wadsworth, O.; L. C. Styles, Ingatestone, Essex, Eng.; R. Edkins, Transcona, Can.; J. Mason, Melrose, Mass.; G. W. Twomey, Minneapolis, Minn.; C. D. Hall, Chillicothe, O.; W. Schumacher, Ellis, Kans.; A. Hamilton, Somerville, Mass.; K. Boord, Smithfield, W. Va.; S. Eaton, Lincoln, Nebr.; B. Scott, Corpus Christi, Tex.; J. T. Atkinson, Minnedosa, Can.; F. H. Kydd, Ceballos, Cuba; O. F. Sternemann, Honolulu, T. H.; W. A. McAlister, Hopkinsville, Ky.; W. J. Wood, Oak Park, Ill.; C. P. Peters, Troy, O.; H. Holmes, Philadelphia, Pa; J. Stewart, Houston, Tex.; G. Krebs, Louisville, Ky.; W. W. Beal, Jr., Lawrence, Mass.; A. G. Rogers, San Francisco, Calif.; G. H. Fletcher, Gainesville, Fla.; R. Stevens, Romford, Essex, Eng.; D. W. Shields, Roseville, O.

The Editors acknowledge with thanks the assistance of public-spirited readers who have thus co-operated to make these columns so successful and helpful. Let us urge our readers, one and all, to continue, in even a larger way, to send in these reports. We would be grateful if every reader who hears even a single station would send it in to us with just the data as to its wavelength, the time which it was heard, etc. Of course, we would prefer to get more information, including the Best Bets in each listener's locality, as well as definite logs of stations, their wavelengths and times of transmission. Readers will also help by stating what type of receiver they use in logging these stations.

The DX Corner
(Broadcast Band)

(*Continued from page* 366)

1294	0.5	Klagenfurt, Austria
1303	0.5	Danzig (Danzig Free City)
1312	0.25	Karlstad, Sweden
1312	1.25	Malmo, Sweden
1312	0.25	Norrkoping, Sweden
1312	0.25	Trollhattan, Sweden
1321	0.8	Budapest, 11, Hungary
1330	1.5	Bremen, Germany
1330	1.5	Flensburg, Germany
1330	1.5	Hanover, Germany
1330	1.5	Magdeburg, Germany
1330	1.5	Stettin, Germany
1339	5	Montpellier (PTT), France
1339	1.7	Lodz, Poland
1348	1	Bordeaux-Sud-Ouest, France
1348	1	Dublin, Irish Free State
1348	0.15	Rjukan, Norway
1348	0.5	Salzburg, Austria
1348	2	Radio-Vitus, France
1357	0.08	Notodden, Norway
1357	4	Milan, 11, Italy
1366	0.1	Turin, 11, Italy
1375	0.5	Basle, Switzerland
1375	0.5	Berne, Switzerland
1384	2	Warsaw, 11, Poland
1393	5	Radio-Lyons, France
1402		Swedish Common Wave
1411	2	Portuguese Common Wave
1420	1.2	Tampere, Finland
1429	2	Beziers, France
1429	2	Radio LL—Paris, France
1429	1	Newcastle, Gt. Britain
1438	1.25	Magyarovar, Hungary
1438	1.25	Miskolc, Hungary
1447		Spanish Common Wave
1456	10	Radio-Normandie, France (Sign Off 8 p.m. E.S.T.)
1465	1.25	Pecs, Hungary
1474	1	Bournemouth, Gt. Britain
1474	0.3	Plymouth, Gt. Britain
1492	0.1	Binche, Belgium
1492	0.1	Chatelineau, Belgium
1492	0.1	Antwerp, Belgium
1492	0.1	Courtrai, Belgium
1492	0.1	Wallonia, Belgium
1492	0.2	Nimes, France
1492	0.6	Turku, Finland
1500	0.1	Liege, Belgium (Experimental)
1500	0.1	Radio-Cointe, Belgium
1500	0.1	Wallonia, Belgium
1500	0.1	Seraing, Belgium
1500	0.1	Verviers, 1, Belgium
1500	0.1	Verviers, 11, Belgium
1500	0.25	Pietarsaary (Jacobstad), Fin.
1530	0.2	Karlskrona, Sweden
1737	0.1	Liepzja, Latvia

Report from Montana

R. W. Schofield, Official L. P. O. of Missoula, Montana sends in the following report on stations heard by him during the month of September. All these stations were heard with good volume and intelligibility:

All 36 Jap stations including Korea and Formosa;

Manchurian—J2AK, Dairen and MYCY, Harbin;

New Zealanders, 2YA (Wellington), 3YA (Christchurch.),

Australian—2BL, 2CO, 3AR, 3LO, 4QG, 4RK, 2UE, 6WF, 7ZL, 5CL and 5CK;

KZRM, Manila, P. I.;

XGOA, Nanking, China;

KGU, Honolulu;

Alaskans—KFQD (Anchorage) and KGBU (Ketchikan);

Cuban—CMK, CMQ and CMCW.

Observer Schofield also reports the Mexican, Canadian and United States stations as coming in quite well.

Reports from California

Warren E. Winkley, Official L. P. O., Hughson, California, says that he just started a new DX season on September 1st of this year and up to September 11th had logged 222 stations in 28 states, Japan, China, Australia, New Zealand, Korea, Hawaii, Alaska, Cuba, Canada, Mexico, and Argentina. Among the United States stations tuned in was WOCL, a 50 watter, operating on 1210 kc. and located in Jamestown, New York.

Observer Winkley continues: "This DX season promises to be very good for I have heard 19 Japs, 8 Aussies, 4 New Zedders, and other stations in the countries mentioned above. I listened to 2BL, Sydney, Australia for three hours September 8th, and they were R8-QSA5 all the time with barely any fading. When I quit at 5:50 a.m,. P.S.T., they were still going strong.

"I received a verification from XOST, China, 857 kc., 500 watts, in which they state that I am the only person in the United States to report them thus far. That makes me feel real proud of my Atwater-Kent. I have had this station three times so far this year."

New Zealand Best Bets

L. W. Mathie, New Zealand, district secretary of the Hawkes Bay branch of the New Zealand DX club, sends in the following list of best bets for New Zealand listeners:

KFI, 640 kc.
WLW, 700 kc.
KSL, 1130 kc.
KNX, 1050 kc.
XEW, 890 kc.
KGU, 750 kc.
KPO, 680 kc.
KHJ, 900 kc.
WOAI, 1190 kc.
KGER, 1360 kc.
XEFO, 940 kc.
WBBM, 770 kc.
KFOX, 1250 kc.
KMOX, 1090 kc.
KVOO, 1140 kc.
WFAA, 800 kc.
WENR-WLS, 870 kc.
WHO-WOC, 1000 kc.
KDKA, 980 kc.
XEPN, 590 kc.
KGMB, 1320 kc.

The "Ham" Shack

(*Continued from page* 347)

less the schematic wiring diagram. This facilitated short leads and thereby reduces the possibility of feedback. The metal chassis is 8 by 17 inches and conveniently accommodates all the component parts without waste of space. The power supply is isolated at the left end of the chassis, and requires only seven inches of the width of the metal base. This leaves ten inches in which to mount all of the audio components.

The first tube is at the back and to the left of the center of the chassis. The output of this tube feeds directly into the impedance of the second stage. In the unit described, the impedance for this circuit is the primary of an audio transformer. Although it might have been better to employ a regular audio impedance unit here, it will be found that the primary of a good grade transformer will serve the purpose. Because of the nature of the circuit the transformer primary will provide even better frequency response than it would when used in a transformer-coupled stage.

A gain control is connected across the impedance controlling the input to the grid of the second tube. Also it will be noted that suppressor resistances are connected in each grid circuit. This further isolates the audio component, and is an added precaution against possible feedback. These resistors may be eliminated, but they are highly desirable. The second audio tube is at the right of the impedance (transformer primary). To the right of that is the push-pull input transformer, which in turn feeds directly into the grids of the –45 type tubes again through resistors. It will be noted that the audio path follows a "U" about the right-hand sector of the chassis. This method of mounting and wiring facilitates extremely short leads and at the same time makes it possible to segregate the components of each stage. If parts other than those used in the amplifier described, it may be necessary to change the layout slightly, but if good quality materials are used, the results obtained should not be impaired. One important point is to have the grid and plate voltages on the tubes the same as those specified by the manufacturers' of the

tubes. Two per cent deviation is allowable, but with the unit shown, a check-up on the values with the resistors specified resulted in finding them within one half of one per cent of the desired value.

A point that might be mentioned: If electrolytic condensers are used for by-passing the cathode resistor, the negative terminal should be connected to the cathode, which, of course is at negative potential, despite the fact the bias on the grids of the tubes is negative. The grid is always positive with respect to the cathode.

There are some operating points that may be of value. If the amplifier is to be used exclusively for voice transmission (which undoubtedly it will for amateur station use) it is possible to experiment with the size of the audio by-pass condenser in the impedance-coupled stage. While the capacity recommended will provide for a wide frequency response, by reducing its value, it is possible to obtain the effect of a "high peaked" amplifier. An amplifier having this characteristic is ideal for making a voice carry through QRM and static conditions. Different values ranging down from the .01 microfarad condenser recommended, to a value of .004 may be substituted. It is desirable to experiment with the value of this condenser, but when doing so, listen to the output through a loudspeaker. On the other hand, the audio-frequency response may be improved by using a larger condenser in this circuit. However, there is no need for this unless the amplifier is to be used for musical reproduction.

The chassis, of course, should be grounded. In wiring, it is a good plan to bring all ground wires to a common point. A description of a Class B modulator using the new 20-watt plate dissipation tubes and capable of delivering 57.5 watts of audio power will be described next month.

List of Parts

C1—Aerovox 2 mfd. electrolytic condenser
C2—Aerovox .01 mfd., mica condenser, 400 volts
C3—Aerovox 1 mfd. electrolytic condenser
C4—Aerovox 8 mfd. electrolytic condenser
C5—Aerovox 4 mfd. electrolytic condenser
Ch1—Amertran primary of audio transformer or audio choke at least 30 henrys
Ch2—Thordarson smoothing choke, type R-196
R1—Lynch 75,000 ohms resistor, 1 watt
R2—Lynch 250,000 ohms resistor, 1 watt
R3—Lynch 2,000 ohms resistor, 2 watt
R4—Electrad 5,000 ohms resistor, 10 watts
R5—Electrad 750 ohms resistor, 25 watts
R6—Clarostat 1,000 ohm rheostat
R7—Clarostat 0-500,000 potentiometer
T1—Microphone input transformer (not wired in unit)
T2—Amertran push-pull input
T3—Push-pull output (not wired in unit, see text)
T4—Thordarson power transformer, type T-5604
V1—Type -56 tube
V2—Type -56 tube
V3—Type -45 tube
V4—Type -45 tube
V5—Type -80 tube

Calls Heard—

By N. C. Smith, Forge House, High Street. Foots Gray, Sidcup, Kent, England. Foreign phones on 40 meters: LU8DR, TI2EP. 40 meter C. W.: EA6AM, LU1EP, HB9AQ, ZL2GN, OE1CM, ZL3DJ, W4UP, EA2JJ, ZL1HV, ZL2FV, VK2BV, VK2ZC, W4AXA, ON4VDB, VJ3JQ, and XD4BOZ.

By Duncan Donaldson, Main Street, Kelty, Fife, Scotland. 20 meter phone: W1GBE (consistently), K4SU, W9USA, CM2WZ, W2DC, W3ZX, W3NK, W9BHM, VE2BG and W9BJ.

Mr. Donaldson reports hearing a number of 75-meter amateur phone stations, but static during the fall made identification difficult.

By F. W. Gunn, Ox Yard, Gosfield, Essex, England. 20 meter phones: W2FWK, W2HFS (This might be an error, as this is a new call, and United States regulations require a station cannot operate on the amateur experimental bands until the owner and operator has held a license for more than one year. It is possible, however, the operator is an "old timer" that has recently returned and obtained a new set of call letters), W9BDW, W5YW and CM2WC.

All-Wave Super

(*Continued from page* 358)

hundred degree portion of the dial over which the second hand travels. During the logging of the stations shown no change was made in the adjustment of the large condenser gang.

Band-Spreading on the 49-Meter Band

12	CJRO	6150 kc.
14	YV3RC	6150
25	W9XF	6100
26	VE9GW	6095
28	W9XAA	6080
31	YV5RMO	6070
34	W8XAL	6060
37	"SPANISH"	
43	DJC	6020
45	COC	6010
50	"SPANISH"	
77	"SPANISH"	
80	"SPANISH"	

The beat-frequency oscillator and the tuning meter are both helpful accessories in DX work. It is simpler to locate weak stations with the beat-frequency oscillator in operation. This is especially true if the stations are so weak as to be close to the noise level. This oscillator also permits reception of c.w. signals by those who are interested in code reception. It is cut "in-and-out," at will, by means of the toggle switch immediately under the main tuning-control knob on the front panel.

In the operating tests this receiver proved its ability to go down to the noise level—even at the Westchester Listening Post, where there is substantially complete freedom from any type of noise, other than natural static.

While, as stated before, no attempt was made to see how many stations could be logged, the test notes show calls of nearly 50 short-wave broadcast stations which were actually identified and a large number of others which were marked "Spanish," etc., and on which no attempt was made to wait for an announcement. Among other stations shown in the notes are VK3ME (9510 kc.), Australia, and JVM (10740 kc.), Nagasaki, Japan. During another test a station was heard which is believed to have been VUB of Bombay, India, but due to excessive fading, this station was not definitely identified.

The only test on the regular broadcast-band was made during the early part of an evening which was a very poor one for any sort of long-wave DX work. In spite of this fact stations were tuned in on every broadcast channel, except two, and the stations heard included KFI and a multitude of other western, mid-western and eastern stations with some from Cuba and Mexico.

Aircraft Radio

(*Continued from page* 341)

service, offer considerable drag, and are frequently inoperable under sleet or snow conditions.

Next is the location of the set in the airplane. The installation must be readily accessible for inspection and maintenance, yet the set should be removed as far from the engine as possible, to reduce electrical interference from the ignition system. The ideal location for the set is in the fuselage, just back of the luggage compartment (Fig. 1), with the remote control located within easy reach and view of the pilot. In general, remote control operation is always preferable, as it allows the set to be installed out of the way. In very small ships, however, it may be preferable to locate the set as close to the center of gravity as possible (which generally is the pilot's cockpit); in small side-by-side, two-seaters the set can be conveniently located just back of the pilot, above the luggage compartment.

Considerable latitude is possible in the selection of the antenna system. The selection is governed principally by the structural limitations of the airplane under consideration, and the purpose for which the radio equipment is intended.

An aircraft radio antenna must be structurally simple, installed so that it does not interfere with the operation of the airplane, or ingress and egress of the pilot and passengers, and easy to inspect and maintain. Receiving antennas (Fig. 2), since they are used principally for reception of course beacon signals, should possess good directivity, i.e., they should be sensitive to signals from all directions without giving false course indications, and a clear definition of the "cone of silence" and marker beacons. Since most of the beacon flying is done directly towards or away from a radio beacon, maximum antenna sensitivity in the fore-and-aft direction (as in all longitudinal antennas) is permissible, and even desirable; transverse antennas invariably give very poor course indications.

Fig. 3 shows schematically polar diagrams of two typical radio beacon stations, and a marker beacon indicating the course change. 92 such beacons form a coast-to-coast network, enabling pilots to find their destinations in any weather. The aural type of airway beacons sends out code signals: letter A (dot-dash) is directed east and west, or north-east and south-west, while letter N (dash-dot) is directed to north and south, or north-west and south-east. The zone where the two signals blend into one audio-frequency note is the "beam." The visual type of airway beacons employ instead of code letters two different frequencies: 65 cycles taking the place of letter A, and 86 2/3 cycles taking the place of letter N; the intensity of the signals is recorded visually by means of a vibrating reed instrument. Where indeed, low-power marker beacons send forth their call letters, apprising pilots of their progress along the beam; and immediately above beacon station there is a narrow conical zone, called the "zone of silence," where all signals cease, telling the pilot that the beacon station is immediately beneath.

We will now describe several types of aircraft antennas.

The Mast Antenna, (Fig. 2), is one of the most popular and the most efficient types. It possesses very accurate directivity (important in beacon reception), especially with the addition of a longitudinal element running back to the vertical fin of the tail unit. This type of antenna is not suited for transmission, and if a transmitter is carried, the mast may be guyed with a horizontal or inclined antenna, to be used for transmission, the antenna wires running from the top of the mast to each wing tip, as shown in the diagram by dotted lines. Because of its excellent directive properties, this type of antenna should be recommended where the installation of blind landing radio equipment is contemplated.

The mast antenna is usually constructed of streamlined duralumin tubing, and is securely anchored at both the top and bottom of the fuselage, from which it is well insulated with rubber or bakelite, the insulation extending at least 1½ inches beyond the fuselage. The height of such antennas above the fuselage should be from 4½ to 6 feet.

Unfortunately, such an antenna has a rather low pickup, and also presents construction and maintenance difficulties. The mast is prone to vibrate at certain engine speeds, and the metal may, in time, fail through fatigue. It collects rain, sleet and ice, which reduces the signal strength, and in bad weather, a short-circuit across the insulator at the fuselage may occur, interfering with the reception. A streamlined wood mast with metal center, or with a wire taped to the front, is a satisfactory variant, and in some respects superior to the all-metal type of mast.

The Inclined Antenna, Fig. 2B, possesses almost all the advantages of the mast type, with none of the disadvantages. It is used extensively in large air liners, but in private installations its use would be rather limited, because of the relatively small height of the vertical tail surfaces in the smaller airplanes used for private flying.

The Trailing Antenna, Fig. 2C, is in effect an inclined antenna, the lead "fish" attached to the free end keeping the wire at an angle to the line of flight. Trailing antennas are excellent for both transmission and reception, but unfortunately cannot be used at very low altitudes, or when approaching an airport, because of the danger of fouling the antenna. It cannot be used on the ground except when stretched to a pole or a tree.

In construction, an antenna reel is installed conveniently to the pilot, the reel being mounted on a bakelite panel to insulate it from the fuselage, and the wire is led out near the tail through a bakelite tube sufficiently wide to permit drawing the lead "fish" completely through it. There must be an air space of at least 2" between the tube and any metal part of the airplane. The usual length of the trailing antenna is 400 to 500 feet, and a spare antenna must be carried on board, complete with the lead "fish," in the event that one antenna becomes lost. The lead fish weighs from 2 to 6 lbs., depending on the wire used, and will give an inclination to the antenna of from 10 to 30 degrees, depending on the weight of the "fish" and the speed of the airplane. When trailing antenna is used, it is recommended that an emergency fixed antenna also be carried.

The Longitudinal T Antenna, Fig. 2D, is generally the preferred type. It possesses practically the same degree of directivity as the mast or the inclined type, is easy and inexpensive to construct and maintain, and adds very little drag. The lead-in should be located exactly at the center of the horizontal element, to eliminate course errors.

The antenna usually extends from the top of the vertical fin to a short streamlined support (10 to 18 inches high) on top of the fuselage between the wings (in cabin airplanes), or on top of the wing in open ships. This type of antenna, in spite of its most desirable characteristics, may not always be suited for an open airplane where it would interfere with the pilot getting in

and out of the cockpit, in which event a mast or some other type of antenna would be preferable.

In cases where the set is located forward, it may be more convenient to employ a Longitudinal L Antenna, Fig. 2E, consisting of a horizontal element running from the vertical fin to a short support forward, as in the preceding case, but with the lead-in located at the support. Such an antenna is slightly uni-directional, and signals received when flying away from a beacon would be stronger than when flying toward a beacon. Its directivity is quite good, but it tends to distort the „cone of silence."

The Horizontal V or Inclined V Antenna, Fig. 2F, is suited for both transmission and reception. Its receptive qualities, however, while good in volume, have poor directivity, and the "cone of silence" is so distorted, that accurate reception of course signals is almost impossible. This type of antenna should not be employed for course signal reception.

The Loop Antenna, Fig. 2G, is only intended for use with a radio compass, or a radio direction finder. The antenna is rigidly mounted at right angles to the fuselage, and its unbalanced field patterns are switched electrically, the difference in potential of the two fields, indicating the direction of the radio station, registering on a zero-type course indicator on the instrument board. The construction and electrical adjustment of such an antenna are too complicated to be attempted by the average service man. Like the blind landing equipment, it is highly specialized in purpose, and not yet completely standardized, and is best left to the factory manufacturing radio direction finders, or the expert specializing in such installations.

In some airplanes with wooden wings, it is possible to use Sheet Metal Antenna, Fig. 2H, a non-rusting metal sheet about 12 inches wide and extending 6 to 10 feet along the leading edge of each wing. The sheet antenna is secured to the wing, then covered with fabric, and the fabric doped and painted in the usual manner. Such an antenna is efficient, simple and neat, but does not possess directive qualities. It is sensitive to horizontally polarized waves, such as used in ultra-short wave blind landing beams, although not sufficiently accurate for the purpose.

In most receiver installations, your selection of antenna will be narrowed to a choice between the mast type and the longitudinal T type; careful consideration, however, should be given to every possible means of getting the best performance.

High-frequency oscillations are set up by the engine ignition system, creating an electro-magnetic effect perceptible at some distance from the circuit. Highly-damped oscillations, such as ignition sparks produce, cover a wide range of frequencies, and are picked up and amplified by the radio set. For this reason, the entire electric system of the airplane must be suitably shielded to eliminate interference.

The electrical resistance of various parts of the airplane will vary, resulting in an uneven distribution of static electrical charges, and unless connected into one electrical whole, the charges may flow off in an erratic manner, and may even cause interference with radio reception, sometimes even making it impossible. The operation of connecting electrically the metal component parts of the airplane together to eliminate this interference from this source (and to provide a good counterpoise for the set is known as "bonding."

The importance of properly shielding and bonding an airplane cannot be overemphasized, and these two operations will be discussed in detail in our next article, giving the serviceman much valuable practical data.

Education

(*Continued from page 339*)

with chapters that are rapidly spreading across the country. These chapters meet at various times to discuss current problems besetting the serviceman. This is supplemented by a bi-monthly publication, which is an effective medium in maintaining a thoroughly modern point-of-view. C. R. E. I. keeps in touch with its students and graduates through news bulletins.

As we indicated before, there is practically no age limit or previous educational requirements predicated for radio-service courses. The Dodge Institute does specify two years of high-school, but it is implied that this stipulation is elastic and instruction will be given to anyone who can convince the director that he is capable of following the course. As a matter of statistics, the average pre-education of students enrolling for service course, both resident and correspondence, is two years of high-school.

The National Radio Institute accepts students from sixteen to fifty years of age —the only school, to our knowledge, indicating any definite limitations. The average of correspondence students is twenty-six years.

The time required to complete residence courses is definitely established, ranging from three to six months. With the exception of engineering courses, classes can usually be entered the first of any week throughout the year. Correspondence courses can be commenced at any time at all, and the rapidity with which they are completed depends upon the student, and somewhat upon the nature of the course. The average length of time is fourteen months. The Radio and Television Institute places no limit to the time taken. The Capitol Radio Engineering Institute gives the student three years for their regular course and the National Radio Institute two and a half years.

Deciding on the "best" radio course will be a matter of individual requirements, finances and convenience. In the foregoing, various features have been outlined which should assist the prospective student in making the choice best adapted to his particular needs.

The choice of residence or correspondence study is an easy one. Obtain catalogs from five or six schools, and go over these carefully with an eye for scope, facilities, geographical location and price. It is highly desirable that some attention be given to electronic fundamentals. A knowledge of photo-cell theory and practice opens the way to many profitable service sidelines. Public-address systems should also receive extended delineation, as they are becoming as increasingly important adjunct to an expanding service enterprise.

Both resident and correspondence courses can be purchased for cash, or on the installment plan. A discount, generally about ten percent, is allowed when the full price of tuition is paid with registration. Some courses by mail are sold with a money-back guarantee, of which advantage may be taken, even after the course is completed, if the student is dissatisfied. In all courses, both resident and correspondence, some rebate may be had, if demanded within a reasonable time.

No school definitely can guarantee a job following completion of the course. The amount of employment assistance may or may not come up to the promises implied in the school literature. However, the diploma or certificate of graduation will never be a drawback in obtaining a job,

and some degree of direct help from the employment services of the various schools may be expected.

Regardless of how you obtain your radio service knowledge—by residence course, correspondence or self-training—it is vital that you continue to study even after the initial period of training is over. Your magazine files should grow month-by-month and your library increase consistently as good radio books and new service manuals are published. Your mental equipment should be kept as up-to-date as your test-sets and analyzers!

Antenna Mechanics

(*Continued from page* 349)

that this is done in mild weather when the temperature is around 60 or 70.

These are the tensions which should exist in the wire at the time it is tied-in to its insulators. To get the right tension, a bag of sand of the proper weight may again be used, rigged up to pull over a pulley. If this is not convenient, the tension may be measured quite closely by pulling the wire up to a certain *sag*, since sag is a function of tension. The sag to correspond to any given tension may be calculated very easily by means of the formula

$$S = \frac{3\ WL^2}{2T},$$

where S is sag in inches, W is weight-per-foot, in pounds (Table 2), L^2 is length-of-wire in feet, squared, and T is tension-in-pounds.

The sag is the "belly" in the wire, and is measured by sighting on the level from one support to the other. Mark off on each support the number of inches required and adjust the wire until a straight line between them is just tangent to the belly of the wire.

It is preferable to use the weight-over-a-pulley method rather than the sag method, as on short antennas it is rather difficult to get the sag exactly right.

Illustrative Example

Suppose it is desired to erect a medium power antenna somewhere in Vermont. The antenna is to be resonant to 80 meters, be made of No. 14 hard-drawn, copper wire. It passes over a street. First, by Table 1, the height above the street must be at least 28 ft., to comply with safety code regulations. (If wires are running along the street, the antenna cannot cross it at all).

To stretch the No. 14 hard-drawn wire, a tension of 60% of the breaking strength is required. By Table 2, $214 \times .60 = 128$ lbs. If this is not convenient, 125 feet of it must be stretched 0.81 inches (Table 3).

After the wire has been stretched, and is ready to pull up, the stringing tension must be determined. In Vermont, Heavy Loading conditions may be expected, so a tension of 65 lb. should be used (Table 5). To calculate the sag which corresponds to this tension,

$$S = \frac{3WL^2}{2T} = \frac{3 \times .0124 \times 125 \times 125}{2 \times 65} =$$

4½ inches

Antenna failures are due to faulty supports, or stringing the wire too tight. Breakage from the latter cause may be eliminated by taking into consideration two things, the maximum weather conditions to be expected, and the correct value for tension at the time the wire is strung. Stretching in antenna wires may be eliminated by removing the "permanent stretch" from them before erection.

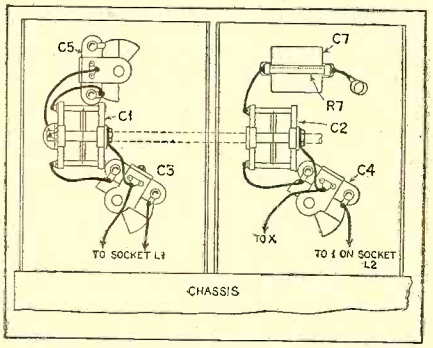
The "Skyscraper"

(*Continued from page* 361)

solid couplings and one flexible coupling, as the photograph shows. Note should be made that the two bearings of each of the variable condensers have been connected together, and that wire connections are made to each of the condensers. No dependence whatever should be placed on returning the condensers to the coils through the metallic shielding. Good contacts to aluminum are always difficult to make, and should never be depended upon in t.f. circuits. The photograph shows that the small tuning condensers are mounted on posts fastened to the front of the shield cans instead of by means of the front bushing.

Since the preparation of the article which appeared last month, there has been further opportunity for operating tests. The Skyscraper has been tried out in several locations and every test has confirmed its extreme effectiveness. It has given an excellent account of itself on all the amateur bands, both c.w. and phone, and on the various short-wave broadcast bands has produced in a big way. An early morning test at the Westchester Listening Post s.w. broadcasters in Japan and Australia were brought in—and this was a morning which proved to be below average, as indicated by the fact that foreign signals were much weaker than usual on the standard receivers employed at this post.

The band spreading was found highly advantageous. A typical example of the band-spread effect is found in the way the short-wave broadcast bands spread out over the dial. For instance, the 49-meter band between 6,000 and 6,500 kc. is spread out over 95 degrees on the main tuning dial instead of being crowded into 4 or 5 degrees as is the case with most receivers which do employ band spreading. Dial settings in the 31-meter band show that the hundred kc. range between 9500 and 9600 kc. is spread over 23 degrees on the dial. In the case of the 25-meter band the frequency range from 11720 to 11900 kc. is spread over 26 degrees.



DETAIL OF CONDENSER WIRING

Figure 3. This view is provided to more clearly show the wiring of the tuning condensers

Next month a descriptive article covering a simple power pack will be published.

High-Fidelity Lab. Amplifier

(*Continued from page* 345)

switching panels the utmost flexibility will be attained.

In normal use in the laboratory, this amplifier is worked into a Wright-DeCoster model 306, auditorium type speaker. This is accomplished through a 500 ohm line. However, upon completion of the output switching panel the transformer at the speaker will be eliminated and the voice coil connected directly to a low impedance connection of the output transformer in the amplifier. This speaker, incidentally, has shown excellent performance. It is when using a high quality speaker such as this, that the excellent frequency characteristics of the amplifier become quite apparent to the listener.

INDEX TO ADVERTISERS

Analyzer Modernizing

(*Continued from page* 343)

inserted and the "CAP" jack and attached to the tube cap. To check these tubes, the plate current is read the "GRID TEST" button pressed, the difference in plate current being a measure of the worth of transconductance of the tube. In making point-to-point resistance tests the set should of course be disconnected from the power outlet. The jumper leads are then used in the "OHMS" jacks. Touching the other ends together should give full-scale deflection on the d.c. meter. If this is not so, the ohms adjuster knob is turned to correct this reading. The leads are then plugged into the various circuit numbers between which the resistance is to be measured. For resistance to ground the chassis pinch clip is attached to some convenient point on the set chassis.

The ohmmeter circuit calls for a standard 0-100,000 ohmmeter scale with a 4500 ohm center.

Parts List

J1, J2, J5, J6, J7, J8—Alden insulated double jacks, red, type 102JR
J3, J4, J9, J12, J13, J14—Alden insulated jacks, red, type 100JR
J11—Alden insulated jack, black, type 101J
J10—Alden insulated jack, black, type 100J
R1—Small I.R.C. carbon resistor, 4000 ohms, ¼ watt
R2—Small (Kobi) rheostat or volume control, 1000 ohms
VT1—Alden double seven socket, type 477E
1—Alden panel adapter, type 9C7
1—Alden insulated grid lead, type 91T
1—Alden current plug lead, type 111DL
1—Alden jumper lead, black, type 112SL
1—Alden jumper lead, red, type 112SLR
1—Alden analyzer plug kit, type 907WLCA
2—Small (Burgess) batteries, 4½ volt

The Service Bench

(*Continued from page* 373)

sends along two new uses for crutch, chair or cane tips of the familiar soft rubber variety. He observes from his own, but by no means exclusive experience, that fuse plugs have the habit of being misplaced, getting mixed up with burned-out fuses and being generally illusive when the lights are

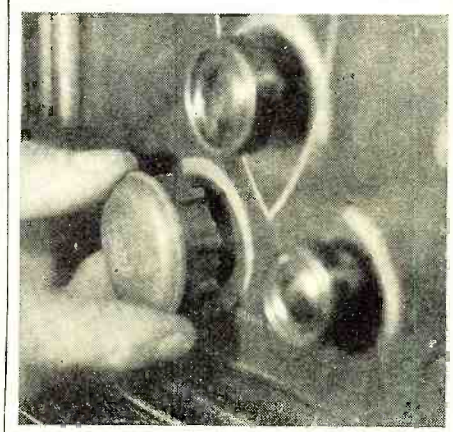


FIGURE 5

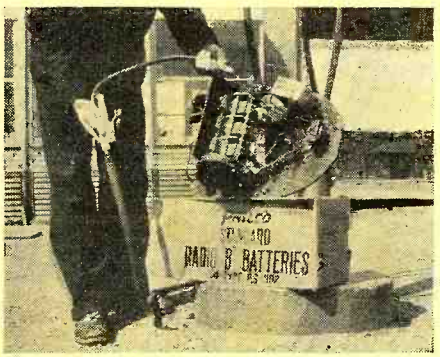
out. Figure 4 shows Mr. Bentley's solution, which is nothing more than a crutch tip tacked to the wall close to the fuse box.

A trick like this, pointed out to the next customer serviced for a blown fuse, will elicit an appreciative response.

A similar *tour de force* is Mr. Bentley's answer to the small, hard-moving knobs found on so many midget sets. Crutch and cane tips may be obtained in sizes from one-half inch up. Cut across with a razor blade to the desired height and slip over the recalcitrant knob. The larger diameter will provide more leverage and the soft rubber a non-skid surface. The idea is shown in Figure 5, and while devoid of esthetic appeal, it will satisfy many customers who do not care to spend money for the freeing up of a badly frozen control.

Compressed Air Dusting

Pipe cleaners and chicken feathers are antiquated for the purpose of dusting between condenser plates—at least as far as Russell Wooley, Seattle, Washington, is concerned. A visit to the air hose (Figure



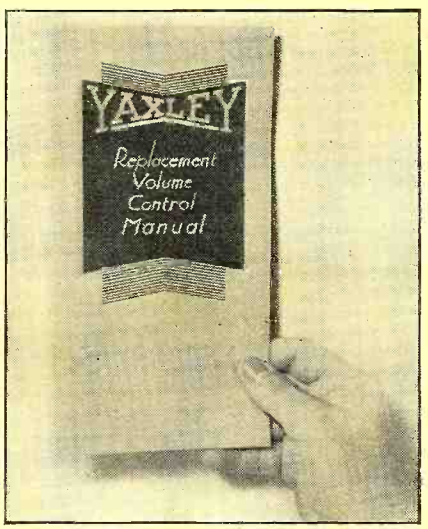
"BLOWING OUT CONDENSERS"

Figure 6. The air hose at the automobile service station affords an excellent means for blowing out dust and dirt from between the plates of tuning condensers

6) at the nearest auto service station does the trick a lot more quickly and effectively.

Replacement Volume Control Manual

Radio dealers and servicemen will want to obtain the new Yaxley replacement volume control manual of over 100 pages. It will be full of important information for service workers. Through a special ar-



rangement, these manuals are made available, free, to radio servicemen and dealer readers. The only requirement is that all requests be written on letterheads indicating that the reader is a bonafide radio serviceman or dealer. Address requests to Department Y. RADIO NEWS, 222 W. 39th St., New York City.

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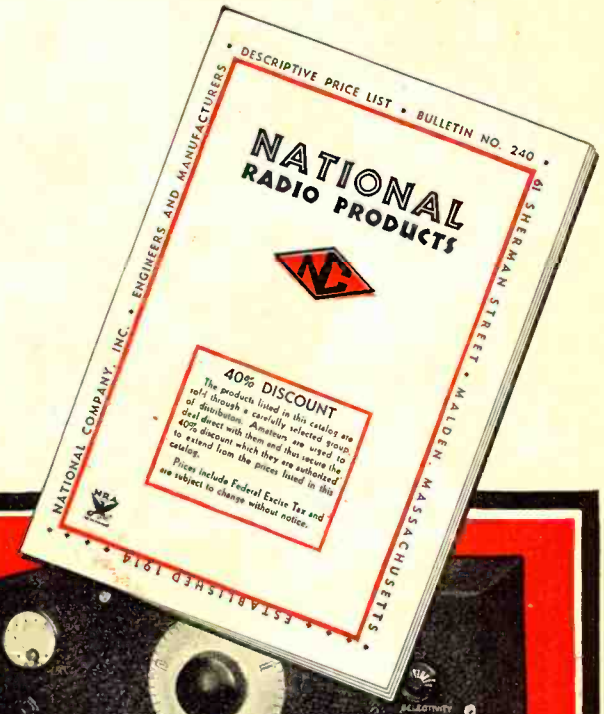

NEW TR 56 MC TRANSCEIVER
A portable combinat on 5 meter receiver and transmitter (special booklet available). Uses two tubes.

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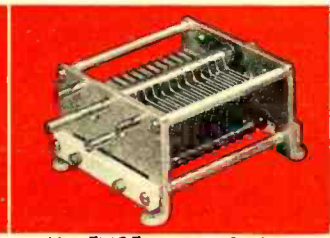
Provides instantaneous graphic picture of actual operating conditions in transmitter circuits. (Booklet available).

NEW TYPE HRO AMATEUR RECEIVER
Two stages of pre-selection, two air-tuned IF stages, calibrated band spread, automatic volume control, 4-gang condenser, micrometer dial, single signal filter, new ganged plug-in coils, vacuum tube voltmeter, and many other new features.

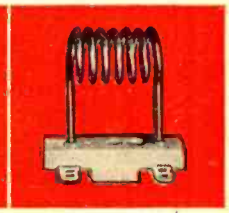
New TMS Transmitting Condenser
For low power use. Steatite-Isolantite insulation. Compact, inexpensive.



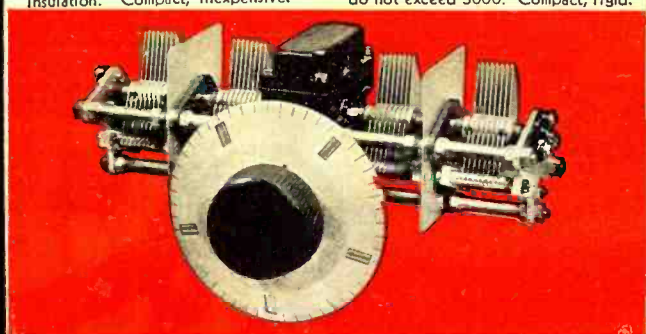
New TMC Transmitting Condenser
For power stages where peak voltages do not exceed 3000. Compact, rigid.

New NC 800 Neutralizing Condenser
For high voltage use, especially with RCA-800.

New M30 Mica Padding Condenser
Steatite mounting. Max. capacity 30 mmf.



New Type XR-9 Five-Meter Coil
Copper coil, air-spaced winding on Steatite base.



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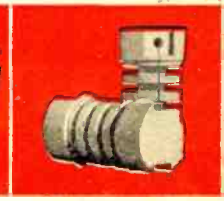
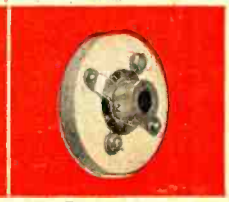


New XT-8 Choke Coil Form
Steatite form for small choke coils and resistances



New TX-9 Shaft Coupling
Steatite insulation, for isolating circuits.

Illustrated above are just a few of the many new items shown in the new National Catalogue No. 240. National Radio Products include these and many other new items, and of course the well-known National Velvet Vernier Dials, Transmitting Condensers, Receiving Condensers, IF Transformers, RF Chokes, Sockets, Coil Forms, Coil Shields, Transformers, and HF Dielectrics.

Included also are the famous NATIONAL AGS and AGSX Receivers, the FB-7A and FB-XA Amateur Receivers, the SW-3 High Frequency Receiver, the PSK Preselector, the SRR 5 Meter Super-Regenerator Receiver, the HFC 5 Meter Converter—as well as the power units for operating these receivers. Call at your National Dealer's today for a free copy of this new catalogue, or send coupon below, enclosing 6c to cover mailing costs.

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Admires Wonderful Tone

Conneaut, O.—There is not a better radio than the Midwest. Everyone says they never heard such a wonderful tone. We have gotten many foreign stations very clearly. Our Midwest is worth more than we paid for it. Mrs. M. C. Mondy, 179 Marshall St.

Gets Byrd at Pole Direct

Hammond, La.—The greatest distance I have received so far is Byrd at the Pole direct, not a relay through LSX. EAQ and VK2ME come clearly as locals. DJB GSC, GSB, come in extremely well. R. T. Pursley.

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