OPPORTUNITIES IN RADIO

RADIO NEWS AND SHORT WAVE RADIO

SHORT WAVE TIME TABLE

December

Special Features:

- **How Soon Television?**
- **High Fidelity D.C. Amplifier**
- **Data on U. H. F. Antennas**
- **Tuning by Push Buttons**
- **Dealer and Service Hints**
- **Home Built 2 Volt Receiver**
- **Theatre Acoustics**
- **10-160 Meter Transmitter**

25c
U. S. and Canada

Systematic Code Practice

NEW Standardized Test Bench Panels by TRIPLETT

THE IDEAL SERVICING LABORATORY

- Triplett is now offering for the test bench the same kind of standardization that has made Triplett Master models outstanding favorites; a standard size panel to accommodate standard Master and DeLuxe models. Testers may be added as required.
- Testers are held firmly in the panel compartments by flexible rubber retaining gaskets with compression fit. Instant installation or removal of instruments is possible. When in the panel, testers give appearance of being permanently installed.
- Laboratory panel cabinets can be bolted together if desired.
- Cabinets are of metal, black wrinkle finish. Size $22\frac{1}{2}$" x 16" x 5" top, $7\frac{7}{8}$" bottom.

Provision for lamp attachment.

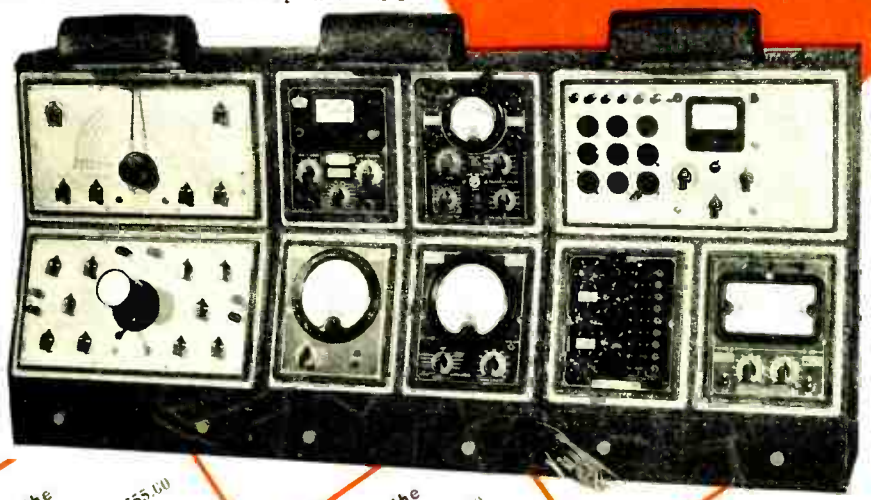
Price of Cabinets. Any Model Only $10.00, Dealer Net; Clamp-on Lamp, $4.34, Dealer Net.

Model 1402 Accommodates Any Two DeLuxe Models.

Model 1403 Accommodates Any One DeLuxe and Two Master Models.

Model 1404 Accommodates Any Four Master Models.

(Illustration shows three cabinets bolted together.)



Model 1402 As Shown Contains the Following Models:

1631 Oscillator . . . Single Unit Price . . . In Metal Case . . . $55.00
(with electronic frequency modulation)
1600 Oscilloscope . . . Single Unit Price . . . In Metal Case . . . $47.00

Model 1404 As Shown Contains the Following Models:

1210-A Tube Tester . . . Single Unit Price . . . $22.03
1200-D D.C. Volt-Ohm-Milliammeter . . . $20.00
Single Unit Price . . . $16.00
1200-A A.C. Voltmeter . . . Single Unit Price . . . $27.50
1241 Condenser Tester . . . Single Unit Price . . .

Model 1403 As Shown Contains the Following Models:

1250 Vacuum Tube Voltmeter . . . Single Unit Price . . . $36.67
1220-A Free Point Tester . . . Single Unit Price . . . $11.00
1670 Vibrator Tester . . . Single Unit Price . . . $21.00
In Metal Case . . .

Model 1601

New Triplett DeLuxe Set Tester

Contained in black leatherette case (as shown) with removable cover. Roomy compartment for accessories.

Dealer's Net Price $49.33

Also furnished in black wrinkle finish metal case (same as above less black leatherette carrying case and cover).

Dealer's Net Price $45.33

Any Combinations may be made up using standard Triplett 1200 Master Units and Triplett 1600 DeLuxe Testers.

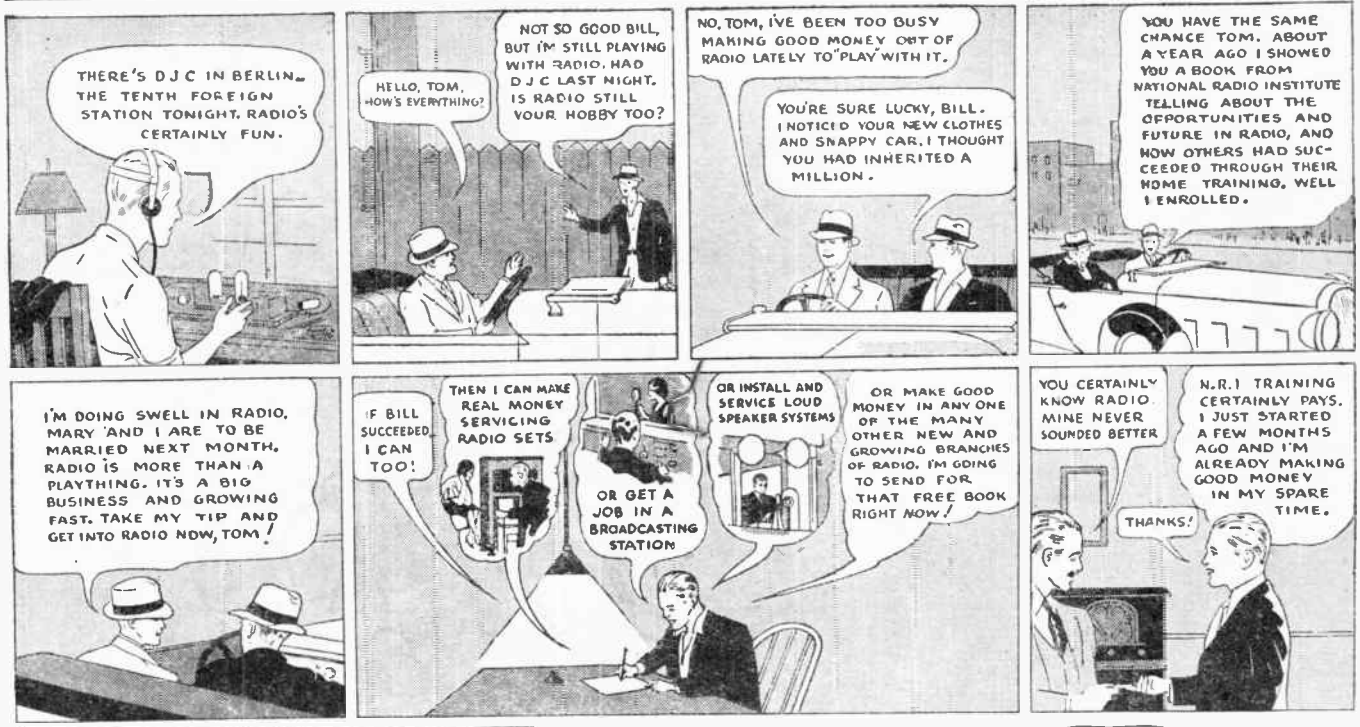
SEE YOUR JOBBER — WRITE FOR CATALOG

TRIPLETT *Precision* ELECTRICAL INSTRUMENTS

THE TRIPLETT ELECTRICAL INSTRUMENT CO.
1512 Harmon Avenue, Bluffton, Ohio

Please send me more information on . . . Model 1402; . . . Model 1403; . . . Model 1404; . . . Model 1601;
I am also interested in . . .
Name . . .
Address . . .
City . . . State . . .

How a "Tip" got Tom a Good Job



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

J. E. Smith, President
Naticnal Radio Institute
Established 1914

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

Do you want to make more money? The world-wide use of Radio sets has made many opportunities for you to have a spare time or full time Radio service business of your own. Three out of every four homes in the United States have Radio sets which regularly require repairs, servicing, new tubes, etc. Many sets are old and will soon be replaced by new models. I will train you to sell, install, service all types of Radio sets—to start your own Radio service business and build it up on money made in spare time while learning!

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

Broadcasting stations employ engineers, operators, station managers and pay to $5,000 a year. Spare time Radio set servicing pays as much as $200 to $500 a year—full time Radio servicing jobs as much as $30, $50, $75 a week. Many Radio Experts own and operate full time or part time Radio sales and service businesses. Radio manufacturers and jobbers employ testers, inspectors, foremen, engineers, servicemen, paying up to $6,000 a year. Radio operators on ships get good pay and see the world besides. Automobile, police, aviation, commercial Radio, and loud speaker systems offer good opportunities now and for the future. Television promises many good jobs soon. Men I trained at home have good jobs in all these branches of Radio. Read their letters in my 64-page book. Mail the coupon.

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

Practically every neighborhood needs a good spare time serviceman. The day you enroll I start sending you Extra Money Job Sheets. They show you how to do Radio repair jobs—how to cash in quickly. Throughout your training, I send you plans and ideas that have made good spare time money for hundreds of fellows. I give you special Radio equipment for conducting experiments and building circuits which illustrate important Radio principles. My Training gives you practical Radio experience while learning.

Find Out What Radio Offers You—Mail Coupon Now

Mail the coupon now for my Free Lesson and my book "Rich Rewards in Radio." Both are free to anyone over 16 years old. My book points out Radio's spare time and full time opportunities, and those coming in Television; shows my Training in Radio and Television; tells about my Money Back Agreement; shows you letters from men I trained, telling what they are doing and earning. Find out what Radio offers YOU! MAIL THE COUPON in an envelope, or paste it on a penny postcard—NOW!

J. E. SMITH, President, NATIONAL RADIO INSTITUTE, Dept. 7NR, Washington, D. C.

MAIL THIS. Get a Lesson and 64 page book FREE

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

Dear Mr. Smith: I want to take advantage of your offer. Without obligating me, send me your Free Lesson and your book "Rich Rewards in Radio." (Please write plainly.)

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

ADDRESS .....

CITY..... STATE 14N1

HERE'S PROOF THAT MY TRAINING PAYS

$3,500 a Year in Own Business

"After completing the N. R. I. Course I became Radio Editor of the Buffalo Courier. Later I started a Radio Service business of my own, and average over $3,500 a year."—T. J. TELAAK, 657 Broadway, Buffalo, N. Y.

I GIVE YOU A PROFESSIONAL SERVICING INSTRUMENT

Here is the instrument every Radio expert needs and want—an All-Wave, All-Purpose, Set Servicing Instrument. It contains everything necessary to measure A. C. and D. C. voltages and current; test tubes, resistance; adjust and align any set, old or new. It satisfies your needs for professional servicing after you graduate—can help you make extra money servicing sets while training

$10 to $25 a Week in Spare Time

"I am making from $10 to $25 a week in spare time while still holding my regular job as a machinist. I owe my success to N. R. I."—WM. F. RUPP, 203 Front Street, Conshohocken, Pa.

GET MY FREE LESSON On Radio Servicing Tips

I will prove that my training is practical, money-making information, that it is easy to understand—that it is just what you need to master Radio. My lesson text, "Radio Receiver Troubles—Their Cause and Remedy" covers a long list of Radio receiver troubles in A. C., D. C., battery universal auto, T. R. F., superheterodyne, all-wave and other types of sets. A cross reference system gives you the probable cause and a quick way to locate and remedy these set troubles. A special section is devoted to receiver check-up, alignment, balancing, neutralizing and testing. Get the lesson Free. No obligation Just mail coupon

RADIO NEWS

Edited by LAURENCE MARSHAM COCKADAY

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

Vol. XIX, December, 1937 No. 6

Reading Guide to this Issue—

Next Month

FULL constructional details will be presented on a new type d.c. voltmeter of a minimum resistance of 100,000 ohms-per-volt. The advantages of such a meter for determining d.c. voltages in resistance-coupled, a.v.c., a.f.c. circuits, etc., need not be emphasized. Developed through the collaboration of Gerard Kelley and the RADIO NEWS Laboratory, this meter is inexpensive to construct, requires no calibration, provides seven ranges between 0-5 and 0-500 volts. Servicemen, laboratory workers and experimenters will find that it eliminates guess-work and facilitates tracking down troubles almost impossible of analysis by ordinary means.

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

Lee Ellmaker, *President and Treas.*
B. Holcepl, *Secretary*
Walter C. Freeman, *Eastern Advertising Manager*
Virgil Malcher, *Western Advertising Manager*
605 N. Michigan Ave., Chicago
Tel. Superior 8938

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

Entered as second class matter at the Post Office at Dunellen, N. J., under the act of March 3, 1879.

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

Marconi's Estate

New York, N. Y.—At the request of the Marconi family, David Sarnoff, President of RCA made a statement on his arrival in New York. Contrary to widely published reports, the gross value of the estate left by Marconi will not exceed $150,000 and this sum will still be reduced by expenses and taxes. The sum also includes about $30,000. which the estate will receive from the sale of the yacht "Elettra;" it also includes the value of his old home in Bologna. The net proceeds are to be divided between the three children of his first marriage and his little daughter Elettra of the second marriage. The income of Elettra's share is to be paid to his wife, the Marchesa Marconi, during her lifetime for the benefit of herself and her daughter.

Some years ago, Marconi had established a trust fund of 40,000 pounds for the three children of this first marriage to former Lady Beatrice O'Brien.

Television School

Chicago, Ill.—Correspondence courses and resident courses in radio and television are offered to interested persons by the American Television Institute of Chicago which is under the leadership of U. A. Sanabria, pioneer in television. According to the literature sent out by the school, the student is taught to make photoelectric cells himself and do other practical work as well as being taught the theory. Graduate students receive a monthly magazine "The Collaborator" which is a cooperative laboratory magazine wherein the most worthy suggestions and advances are described.

World Radio Convention

Sydney, Australia—All radio engineers throughout the world are invited to the World Radio Convention to be held April 4-14, 1938 at Sydney. Engineers from all over the world are expected to be present and important papers will be presented dealing with all phases of radio. Those interested should write to Mr. O. F. Mingay, General Secretary of the Institution of Radio Engineers, Sydney, Australia.

Courses in Electronics

New York, N. Y. — The West-Side Y.M.C.A. has again made available resident courses in Electronics and its industrial applications, radio and television. These are courses extending over two terms, the first term started on Sept. 27, the second term will start on February 7, 1938. The teaching staff consists of the following instructors: J. L. Hornung, Chester L. Smith, P. von Kunits, R. R. Batcher, and L. Bohman.

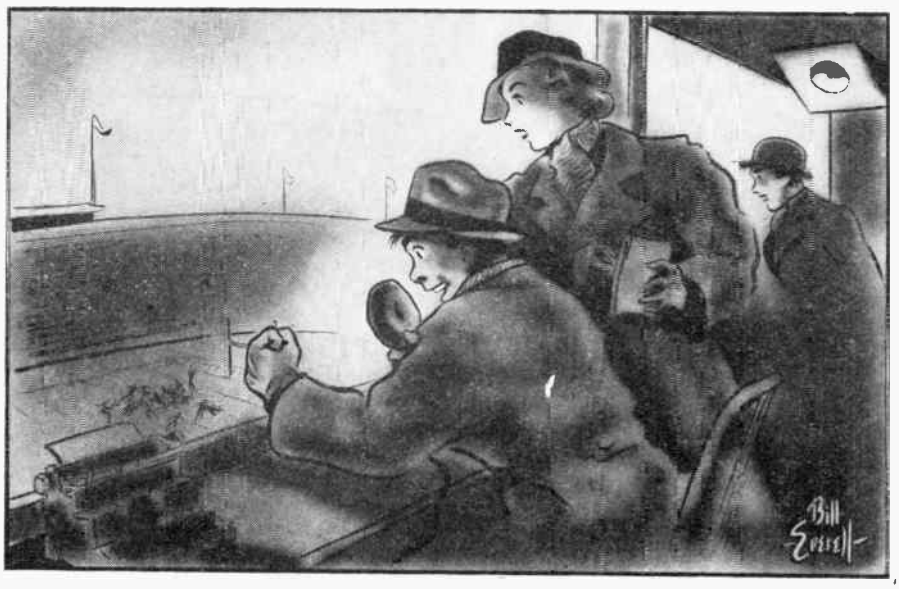
Army Radio Communications Lagging

Washington, D. C.—War Department experts declared that present army communication methods have become obsolete because of the speed of mobile fighting forces. This was the outcome of observations during the field manoeuvres held this summer. According to observers, radio, telephone, and messenger communication has not yet acquired the efficiency needed to supply the commanding officer with the necessary information and to transmit his orders.

Intermediate Frequencies

Washington, D. C.—The F.C.C. indicated in a letter to the RMA that the Commission will endeavor not to authorize any new frequency assignments in the band 450-460 kc., so as to establish 455 kc. as a protected intermediate frequency. No change in existing assignments will be made by the Commission. In case a change of the above policy is necessitated at a future date, the Commission will notify the RMA of any contemplated action.

Pages From A Serviceman's DIARY



SPORTS OFFER OPPORTUNITIES FOR PUBLIC ADDRESS WORK

Both in the installation and servicing of loud-speaking equipment for sports stadiums, outdoor athletic fields and gymnasiums, the local dealer or service organization is the logical one to take care of the work.

FRIDAY—Off to the stadium, after repairing the P. A. system used for announcing to the press play-by-play descriptions of the football games. The press box is located right above the top row of seats in the center of the grand stand. It is open in front, but sheltered by a wooden roof and back windows. It is about 30 feet wide and 8 feet deep and accommodates two dozen reporters and telegraph operators. This area is nicely covered by two 6-inch speakers, one at each end of the press box, driven by a portable a.c.-operated amplifier with but 5 watts output.

For Repairs

The P. A. system had been brought in for repairs and for work on the microphone. The system had gone bad, as I found, simply because the wire connecting to the microphone cable shielding had broken. Tape over the connection had concealed the break so the operators had not discovered the trouble.

The Astatic crystal mike had been suspended in the center of a wooden box about one foot square, the inside of which was padded with hair felt. A 2-inch speech channel was cleared from the center of the mike diaphragm to one end of the box. This arrangement provided an excellent acoustic shield, but it was rather bulky.

To make it less unwieldy, the mike was removed from the box and attached to a small portable stand. By completely surrounding the mounting ring with thick hair felt, leaving only a small opening to talk into, thoroughly satisfactory results were secured, with the added advantage of far greater convenience. This is a good stunt to try for any P. A. work where a directional mike is needed.

Free Seats

Tried out the job and found everything okay, managing to talk the supervisor into giving me a couple of good seats for the Thanksgiving Day game. Something might go wrong, you know, at a crucial moment and it would be nice to have me on hand. In which case, of course, I should abandon my girl friend, conjure up a new power transformer, speaker field, or what-not out of thin air and have the job operating again in a split second. (Here's hoping nothing happens.)

Returned to the shop and started work on a Radiola 80, which exhibited the characteristic sputter of a defective i.f. transformer. Nothing to do but put in a new one.

Ed dropped in and asked us to take a look at his new Chrysler. "How do you do it?" I asked him, a little enviously. "Servicing must be good in your territory."

Sales, Important Items

"Yes," he replied, "I sold six all-wave consoles, eight vacuum cleaners and a washing machine last month, in addition to a raft of midgets."

"What has all that got to do with servicing?" I wanted to know.

"If it weren't for the service calls," he told me, "I couldn't have made the sales. My shop is too small to attract customers. with all the big, showy competition I've got. Soliciting sales by house-to-house canvassing or even by phone doesn't pay out—in fact, it antagonizes the best people. But where they call for service, for the time being I am an invited guest. I can talk to them freely, and they know what I have to sell I can fix when things wear out."

"It has been my experience," I told him, "that people who call for service don't want to listen to a sales talk."

"Right," he answered. "But there is no harm in suggesting the old set be modernized. I simply mention a.v.c., magic eye tuning, high-fidelity, push-button tuning, etc., pointing out that it would improve the set to have one or two of the simple improvements installed, but if all were desired it would be better to get a new set, particularly if they have an old model which requires expensive repairs. If they don't ask for more info I drop the subject. I never try to force a sale under any conditions."

Expert Advice

Sounds good—but not everyone can work it. Modernizing seldom pays. It is true, though, that lots of people prefer to buy sets recommended by a well-established radio dealer or serviceman. If a serviceman sells a goodly number of receivers, he eventually becomes a radio dealer on his own and hires other servicemen. Naturally, he knows enough about the radio business to pick good sets and good servicemen. There are some servicemen, however, who will never become dealers. They take pride in being able to handle the most difficult radio jobs successfully, even though occasionally the customer might be better off buying a new set. These are fellows who are completely absorbed in their work. The radio industry needs more of

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

them, I think, and an automatic freak control to reduce the number of incompetents.

Last month we mentioned the fellow who had saved up fifteen thousand dollars while engaged in servicing. We wondered how he did it—and we got the story. Partly from servicing, partly because his wife works, too, but a goodly slice from service side-lines. We are getting more details on this for you and you will find same somewhere in this magazine in the very near future, if it pans out as we hope.

We don't know yet who has taken the job abroad which was mentioned some months back. But as soon as we get word, we'll give full details. If any more opportunities which look good are shoved over to us, you'll hear about them.

Spatari

New York, N. Y.—A new international language which is hoped to cure all linguistic difficulties in short-wave broadcasting has been introduced by Carlo Spatari. The originator of the language, an Italian musician, noticed that the notes of the scale; do, re, mi, etc., were pronounced the same all over the world. So he set about preparing a dictionary or code book, assigning meanings to combinations of notes in an orderly fashion. The present dictionary is especially prepared for the needs of announcers and short-wave fans. The idea is, that each shall have a dictionary for his own language. Announcers would speak the Spatari words, giving the name of the station, particulars about it, and news items. The listener, having the dictionary would then have no trouble identifying the station. There are also Spatari words to represent the most common phrases used in letters requesting verification.

At present, the English edition is finished and the Spanish one will soon appear, other languages are then to follow. In order to introduce the system, copies of the dictionary have been sent to many foreign short-wave stations. Tests have been conducted in New York by WBNX and WMCA. In one such test a sentence spoken in Spatari language was correctly understood by persons of different nationalities.

Nine-Channel Radio Link

Belfast, Northern Ireland—Nine telephone messages simultaneously on a single carrier is a new record in multiplex radiotelephony on the Belfast-Stanraer ultra-short-wave radio link between Ireland and Scotland which was opened on August 31. The system employs a carrier frequency of 76 mc. in one direction and 83 mc. in the other direction. The nine telephone channels employ individual carriers between 150 and 300 kc. and all these carriers together and with their sidebands are then used to modulate the transmitter. At the receiving end the signal is amplified and rectified; then the individual channels are selected by suitable selecting circuits.

New RMA Directors

New York, N. Y.—The Parts Division of the Radio Manufacturers Association elected as directors of that division: S. I. Cole, president of Aerovox; J. Kahn of Standard Transformer Corp.; H. E. Osmum of Centralab; and R. F. Sparrow of P. R. Mallory Co. These four directors have been elected for a term of one year. Mr. Cole was also appointed on the membership committee by President Muter.

THIS MAN FROM MISSOURI WAS SHOWN . . .

Read what he says about the MALLORY-YAXLEY Radio Service Encyclopedia

"YOUR radio service encyclopedia is the most practical and comprehensive assistance of its kind ever offered," writes G. M. Jenkins of Doniphan, Missouri. "I say '*It's a book!*' The *radio service fraternity* is indeed indebted to you for this grand volume."

And—thousands of Mr. Jenkins' "fraternity brothers" share his opinion.

Read this from Lynwood, California: "I am amazed at the necessary and valuable information! I can see in time to come a well thumbed book and *one of the most valuable tools* in the shop. Congratulations!"

William Irlam, secretary of the Radio Servicemen's Association of Pittsburgh, Pa., writes: "I have recently seen a copy of your Mallory Encyclopedia and can truthfully say it is an accomplishment of which you may be justly proud. *No service shop could possibly be considered complete* without one of these valuable helps!"

"Now I will not have to look through *this* book and *that* book," says Lloyd V. Stenberg of Willmar, Minnesota. "*I will grab Mallory's book and there it is.* I know it is going to save us a lot of time in servicing."

And so what?

So—see *your* Mallory-Yaxley distributor about *your* copy of the Mallory-Yaxley Radio Service Encyclopedia now! Don't let another day go by before you begin saving time and money by getting *all the answers—to all your problems—all in one book!*

The Mallory-Yaxley Radio Service Encyclopedia completely covers Schematics-Circuits, Volume Controls, I. F. Peak Frequencies, Transformer Circuits, Condensers, Tubes, Vibrators. It places at *your* finger tips information never before available for ready reference—information so usable that a librarian at one of America's greatest universities wrote: "We have received the Mallory-Yaxley Radio Service Encyclopedia. We very much appreciate your cooperation in making our library of the greatest possible value."

If you're "from Missouri" see your Mallory-Yaxley distributor right away about this greatest help a serviceman ever had! There are only a few copies left. Don't fail to get *yours!*

ONLY A FEW COPIES LEFT . . . SEE YOUR DISTRIBUTOR TODAY!

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

P. R. MALLORY & CO., Inc.
INDIANAPOLIS INDIANA
Cable Address—PELMALLO

Use YAXLEY REPLACEMENT VOLUME CONTROLS

Radio News

Volume XIX December, 1937 Number 6

How Soon TELEVISION?

By The Television Reporter

THE race is on! Who will be the first television broadcaster with regular and continuous programs? Who will be the first manufacturer of video-and-sound receivers for popular participation? Will it be Columbia? Will it be NBC? Or will a "dark horse" among the present contenders win the first television honors. Our reporter seems to find activities in the television field working up to a crisis that may soon answer these questions.

AGAIN the old question arises! "How soon television?" But this time there seems to be an answer. Spurred on by considerable technical progress at home and public-participating activities abroad, the leading contenders for American television supremacy are on the verge of announcing a definite date for dropping completely the veil of secrecy surrounding many of their current tests and permitting the public at large to look-in as well as listen-in.

One of the biggest strides towards television's early arrival was the CBS surprise announcement that it was already operating a 441-line sight-and-sound station in New York prior to the completion of its more elaborate video transmitter atop the Chrysler Building. This immediately put the Columbia chain on a virtual equal footing with NBC who have been conducting joint experimental high-definition transmissions from the Empire State Building for a considerable time. With these two great radio units vieing for video supremacy in the metropolitan area, New Yorkers stand to gain an early and advanced *public* service.

NBC and its parent firm—RCA—have always maintained that public television was a long, long way off. However, with the announcement of its exhibitions plans for the New York World's Fair in 1939, it was disclosed that public reception of the NBC video transmissions would be assured by that time. An RCA representative told the writer that sets would definitely be released to the public by that time—and probably before.

Not Yet But Soon!

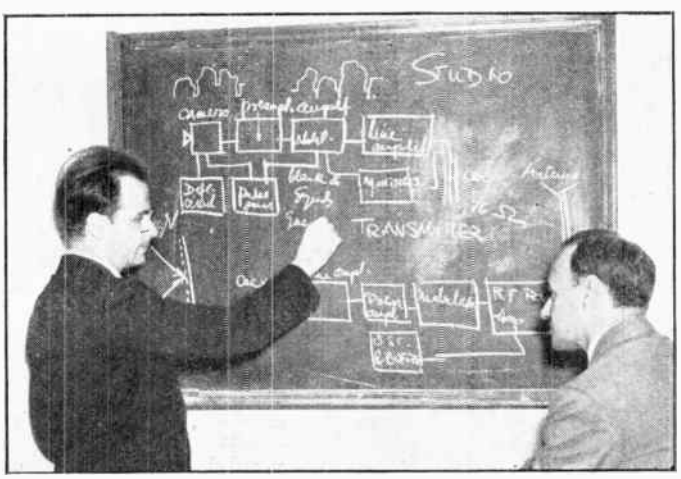
Just how much before 1939 the sets will be on sale cannot be determined. But the opening of the CBS Chrysler Building station next Spring may bring about the mass public release of receivers and kits as early as March, 1938. It is believed that the launching of the big CBS video station—which will naturally sharpen the rivalry between that chain and NBC—will be the wedge towards mass receiver sales. And once one of the big manufacturers enters the market—the whole roster of set makers will follow. Each manufacturer is watching the other closely on this point.

With New York assured of early television service, thoughts are now being turned to other cities. The Philadelphia area is already equipped with three up-to-the-minute television systems. The Philco station in that city, the Farnsworth plant in Wyndmoor and the RCA transmitter in Camden guarantee the Quaker City and its environs a superb television service. Don Lee experiments are continuing in Los Angeles and National Television has applied for a station in New York.

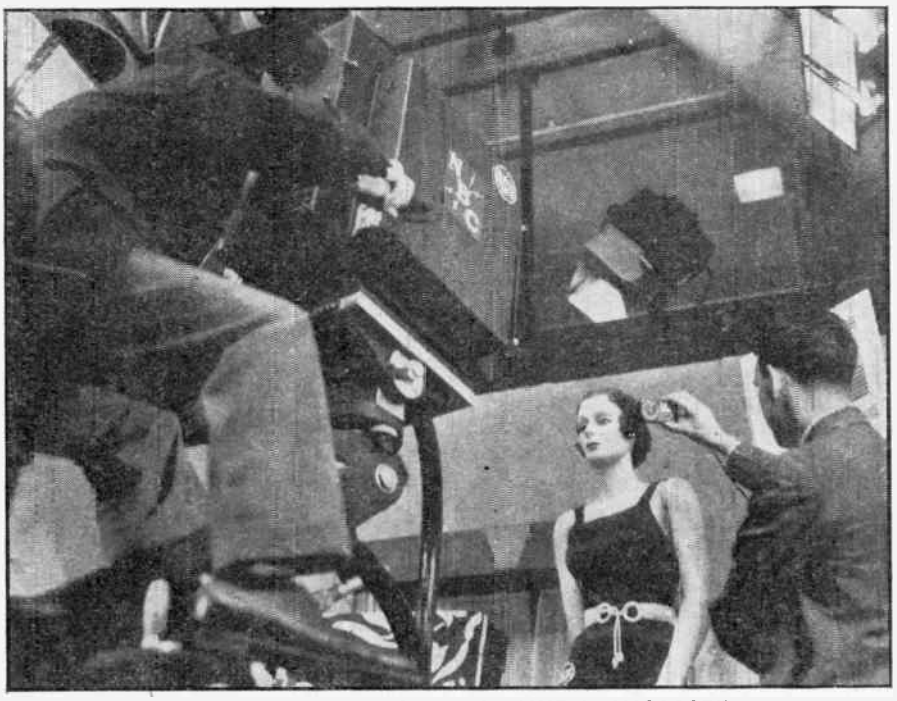
From coast to coast, key cities are watching the pioneer television municipalities with great interest. When the public cry of "Let's go!" is heard, the video art will be a national form of entertainment long before experts have predicted. With the demand for facilities heavy enough, it will be possible to reduce into a short period what now seems a development span of years and years.

PLANNING A NEW TELEVISION SYSTEM

Dr. Peter C. Goldmark, chief television engineer, and Gilbert Seldes, the new television program director of CBS, study the new layout for W2XAX.



The Columbia Broadcasting System's recent announcement of the construction of huge studios in Grand Central Terminal, New York, to supply program material for the powerful high-definition sight-and-sound station previously announced for the nearby Chrysler Building was accompanied by the disclosure that the network had already been operating a 441-line system from its headquarters building at 485 Madison Avenue in the same city. Thus, working quietly, the chain had been participating in



A TELEVISION STAR POSES FOR THE ICONOSCOPE

Here you see Miss Patience, "Pat" for short, posing in NBC's television studio. The man at the right is not holding a watch to the lady's ear; he is using a light meter to measure the amount of illumination on her imperturbable face. But she doesn't mind. She's a wooden model!

laboratory and field experiments simultaneously with other companies who accompanied their efforts with considerable ballyhoo.

Call Letters W2XAX

Call letters of the Madison Avenue transmitter are W2XAX. This same designation will be assigned the Chrysler Building station upon its completion in the spring. The present W2XAX is a home-built job entirely constructed by CBS engineers. The station occupies considerable space on the fifth floor—far below the studio levels—and even many CBS men didn't know of its existence for a time.

CBS, now recognized as a major contender for a leading television rating, is building its new "Look See" transmitter on the seventy-third and seventy-fourth floors of the Chrysler structure. This point will be linked by coaxial cable with the gigantic studio set-up in the Grand Central railroad station across the street. It is understood that RCA equipment will be largely used but that Farnsworth and other makes of apparatus will be represented in certain features and components.

Central Location

Space in the Grand Central structure was acquired both on account of its convenient location in one of the busiest spots of the metropolis and its ready-made adaptability to television usage. The studios are located on the Forty-second street side directly above the station's main waiting room. It is claimed that the main studio will be the largest television broadcasting chamber in the world, measuring 225 feet long, 55 feet wide and 40 feet high. Special rooms for rehearsals, dressing and observation will also be provided. There will be extensive facilities for visitors to view the operations of the video program plant.

The network recently acquired the services of Gilbert Seldes, newspaper and magazine writer, in the new post of experimental television program director. Seldes is a former movie critic and has given extensive attention to reviews of the drama and other arts. Seldes took up his task last September and is working from the old W2XAX until the new station is in readiness.

Old System Was a Mechanical One

Columbia has been in the television field experimentally on previous occasions. A mechanical scanning system was on the air for several seasons until about five years ago.

There were indications recently that the network contemplated entering the television set manufacturing or merchandising field but the rumors have now been denied. The reports were based on the fact that none of the receiving sets (with one RCA exception) in the CBS building were of established American manufacture and the premise that the network had to seek some concrete means of income from television to pay for the expensive equipment and upkeep until the video programs are sponsored and pay their own way—with a lot left over—as in sound broadcasting.

The writer had a chat with Mr. Seldes the day he took over his television program duties and was told that all branches of entertainment would be drawn from in the experimental sight-and-sound production efforts. Both live and filmed subjects will be employed, this situation being a carry-over from the earlier, but unballyhooed tests that had been going on in previous months.

Increasing Sensitivity

Dr. Peter C. Goldmark, chief television engineer of the network, recently returned from Europe where he made first-hand observations of the foreign television systems.

He declared that of greatest importance to the future of television programs is the progress of engineers in stepping up the light sensitivity of the television camera.

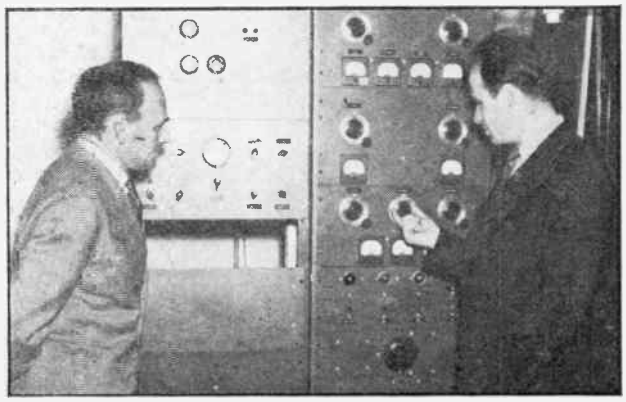
"Developments now under way in England and Germany as well as America," he said, "promise a television camera ten times more sensitive to light than any now in use, thus rendering it even more useful for reproduction than the ordinary photographic camera using modern emulsions."

An obvious advantage of this development, according to Dr. Goldmark, would be to reduce the intensity of studio illumination to a point where heat and glare would no longer handicap the performers. Also, it would make possible a greater depth of focus, enabling actors to freely move about the stage without becoming blurred on the receiving screen. This, in turn, would greatly extend the pick-up possibilities of the camera in conditions where special lighting would be impractical, he explained.

Color Television

He pointed out that scientists are striving to make the television camera reproduce all colors of the spectrum in their original intensities. He reported that, in England, the BBC has already put to practical use a television camera which has been rendered panchromatic to a "fair degree."

Dr. Goldmark complimented BBC on the fine quality of outdoor pickups. He said transmitters mounted on trucks enable the BBC to (*Turn to page* 361)



LEARNING

Columbia executives have built and studied television operation and technique through the use of a series of transmitters. This one is installed at 485 Madison Avenue. The new and larger equipment is being built atop the Chrysler Building.

Checking Up On

PUSH BUTTON Tuning

(The Midwest Model VT-20)

By Wm. C. Dorf

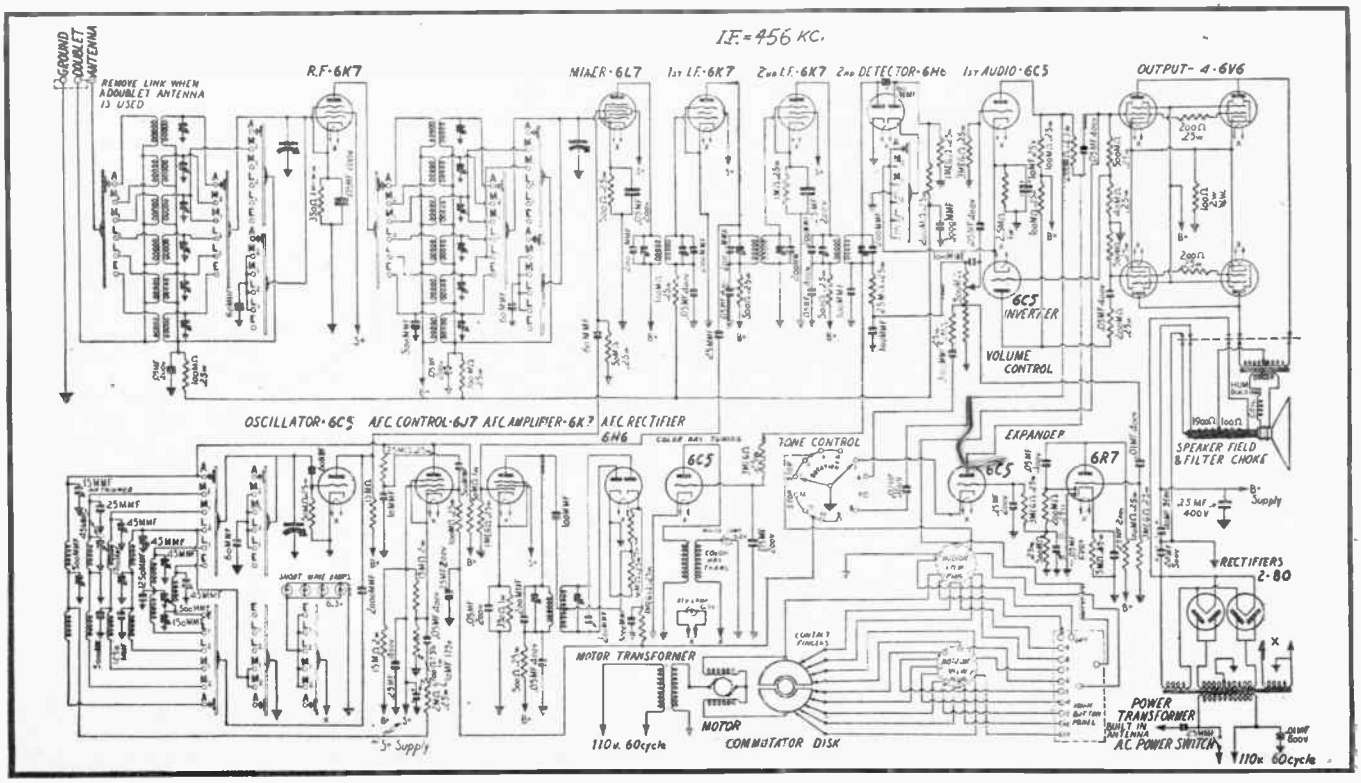
EXPERTS TEST A NEW DEVELOPMENT

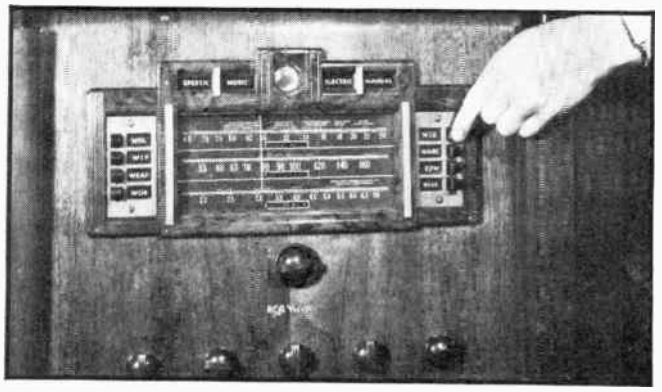
The author and John H. Potts shown above in one of the RADIO NEWS *Listening Posts putting this automatic-tuning, high-fidelity receiver through its paces so that they could tell you what you could expect in the way of operation. They have just finished a careful survey of all new methods by which automatic tuning can be obtained and their advices to our readers can be looked on as first-hand information from "headquarters."*

IN an article last month the author presented his report on the many out-of-the-ordinary advancements offered in the new Midwest Super Deluxe VT 20-tube receiver, such as the new large unique "Movie" dial with a traveling "Coloray Tuning Bull's Eye," volume expansion, automatic frequency control, and the outstanding 1938 refinement, electrical push-button tuning. The article pointed out the electrical and mechanical simplicity of the Midwest system of "Motorized Electrical Tuning."

THAT electrical tuning is here to stay and not just a one-season talking feature is already evident by its public reception. This second article describes the results obtained during intensive operating tests conducted on this new set over a period of about six weeks at the author's Bronx Listening Post, Fordham Heights, New York City. The results of the tests were far above standard in quality, DX reception and stable operation. The tests further showed high-gain with low-noise level and accurate calibration in kilocycles and megacycles. Conducting the operating tests provided a good deal of novelty because it was the first set of its type to be received here with electrical tuning. The tests emphasized the ease of automatic touch-button tuning and showed how simple it was to adjust the set to any desired list of 9 stations.

Fidelity of reproduction of the new Midwest set was impressive throughout the tests, not only on broadcast band reception but also on short-wave programs. A score of visitors to this post commented on the enjoyable reproduction provided by many short-wave broadcast stations; the German and English short-wave stations were particularly noteworthy in this respect. It is not difficult to find the main contributing factors for the fidelity of reception when one checks the circuit and notes volume expansion, the use of four 6V6 beam-power tubes in the push-pull parallel output stage and the three Trio-Sonic reproducers (two 6-inch, high-frequency speakers and one 12-inch, low-frequency reproducer). The audio-frequency range of this three-speaker combination is designed to go well above all frequencies which are broadcast or recorded. Realistic, full expression of a program, especially symphonic music, made possible (*Turn to page 359*)



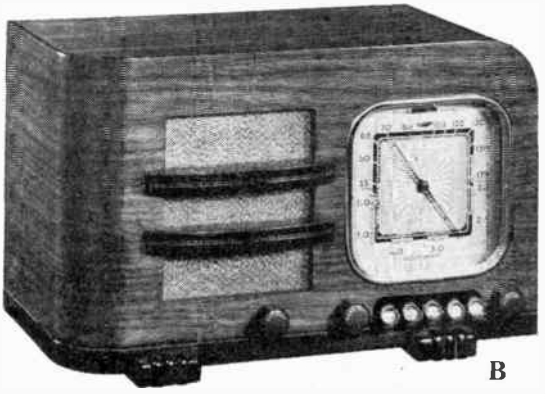


A Survey of the TOUCH by Push-Button

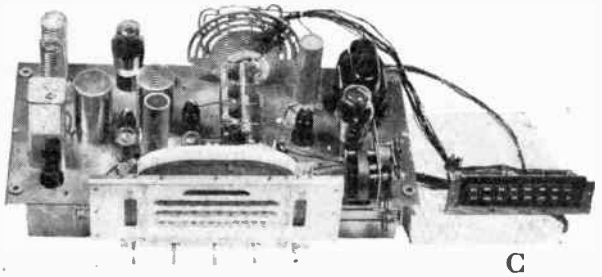
PUSH-BUTTON station selection gives the ultimate in convenience and simplicity of tuning to the owner of a 1938 model receiver. These advantages are so immediately evident that radio dealers and servicemen consider this feature the most forceful selling point offered in recent years.

The vast improvement in the performance of present-day push-button tuning over the expensive, complicated systems in vogue years ago is due in considerable measure to other developments in receiver design which bear no direct relationship to push-button tuning. In particular, automatic frequency control and high-fidelity, broad-band i.f. transformers overcome the mechanical difficulties of hair-line tuning which caused designers of push-button systems so much distress in years gone by, while modern oscillator circuits have a degree of frequency stability not hitherto realized.

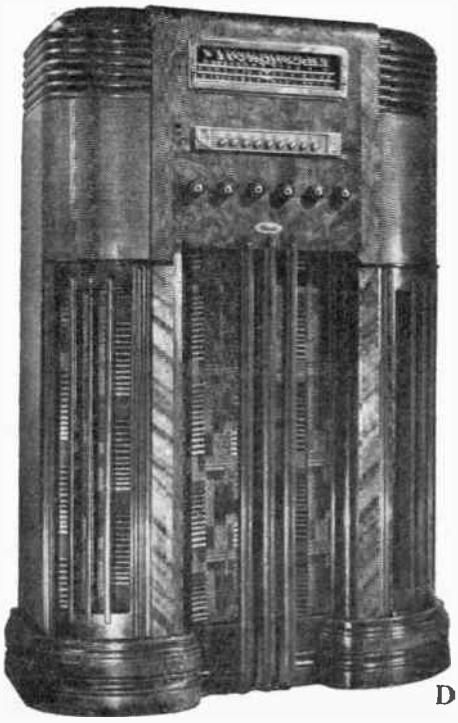
The new systems show a ruggedness in design and construction which promise long, trouble-free operation. Their freedom from delicate relays with light spring contacts eliminates a source of trouble found in earlier models.



B



C



D

The General Electric System

The General Electric Company touch-tuning system is operated by a special 6-volt reversing-type motor, using a split-phase winding with a 1000 mfd. capacitor. A schematic diagram of this system is shown at the top of the opposite page, and a chassis using this system appears at C.

The friction clutch motor pulley is bolted to a larger pulley on a horizontal shaft along the front apron of the chassis. This shaft is threaded and when it is rotated by the motor a pointer mounted on a split nut travels along the shaft. The tuning condenser is driven at the same time. A reversing switch on the tuning condenser shaft reverses the motor at each end of the run. For manual tuning, the tuning knob is pushed in slightly, disengaging the motor drive, and tuning adjustment is effected through an 86-to-1 vernier control.

There are 16 push-buttons in this design, which is employed in three console models incorporated in this line. One is for turning the receiver off, one for manual operation, one for scanning, while the remaining 13 are for stations.

Complete Finger-Tip Control

With the receiver turned off, depressing a station button turns it on and puts the motor in operation. When the roving contact strikes a contact pin connected to the depressed button, a relay opens the motor circuit, opens the silent tuning contact, puts the a.f.c. in operation and blocks the motor pulley. The tuning condenser is stopped instantly, the friction clutch removing any serious jar. Using the scanning button, the set is motor-tuned to any point desired.

Features of this system are the large number of stations which can be set up; complete freedom in assigning push-buttons to stations; quietness in operation, and motor scanning which eliminates the labor of manually tuning over the scale.

In the RCA push-button tuning system, the motor is mounted on top of the the variable condenser gang. The motor is of the shaded-pole type and the rotor is provided with longtitudinal motion to take care of switching operations. When the motor is energized, the rotor shifts forward, engaging the condenser drive mechanism and operating the a.f.c. and amplification suppression switches. When the motor is not operating, the rotor is automatically disengaged from the driving mechanism.

Features of the RCA method are simplicity of design and construction, making for trouble-free operation; automatic interlocking of the push-button controls so that it is unneces-

Latest Trends in TUNING

Control Systems

sary to hold down the push button until the station is tuned in by the motor, and fool-proof adjustment and operation of the system. A console model close-up view is shown in the heading on the opposite page.

The Knight 16-tube a.c. superhet console shown at D, put out by the Allied Radio Company likewise features electric tuning, a choice of any eight preselected stations being made available.

The photograph shown at F, discloses the chassis of a new Lafayette push-button model made available by the Wholesale Radio Service Company. This instrument also provides facilities for electrical tuning of any eight stations chosen by the owner. The push buttons do the trick quickly and effectively.

Others of the motorized variety operate in substantially the same way as the types described above.

Not all employ motors, however. Sparton has an arrangement whereby pushing a button shunts trimmer condensers across each of the three gang condenser sections. Six push buttons are provided so a choice of six stations is available. The unit is easily accessible for pre-tuning adjustments so that any desired selection of stations may be had. A photograph of a console is shown at G.

The greatest measure of convenience is of course obtained when remote control is incorporated. Many of the motorized types are easily adaptable to this form of operation and bid fair to attain wide acceptance.

Another method of remote control which requires no motor is illustrated in the photograph E which shows a novel system recently developed by Harry Fuchs, whose first push-button tuner appeared way back in 1918. It is designed to be adaptable to the modern midget receiver and can be installed at very low cost.

Midgets Have It Too!

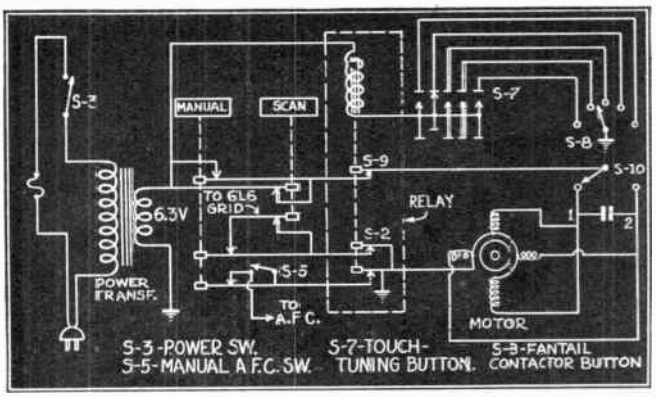
As shown, a belt encircles a pulley secured to the tuning condenser shaft. Each end of the belt is connected to an armature which is vibrated by an electro-magnet. There are only two control buttons. When one button is depressed, one electro-magnet is energized which causes its armature to vibrate and intermittently rotate the tuning condenser in one direction. Depressing the other button causes a similar action but the resulting rotation is in the opposite direction.

The two push buttons thus enable the user to scan the entire band, as with manual tuning, and pick out any desired station. In the small remote control box shown in the photograph, the volume control and on-off switch are included so that complete remote control operation is achieved.

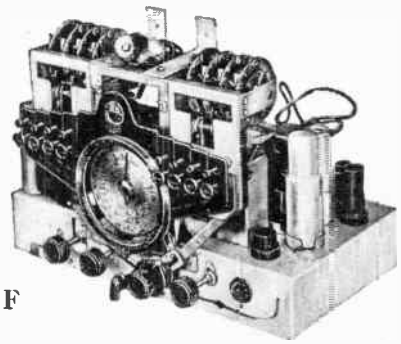
This apparatus is not on the market as a commercial unit but this experimental model may give some idea of what may be expected in the future.

There are still other systems beginning to appear on the market that incorporate further variations of the push-button idea. One of these is a commercial application of touch tuning to the midget receiver. The new Clarion model 70X shown at B is one of the latest examples.

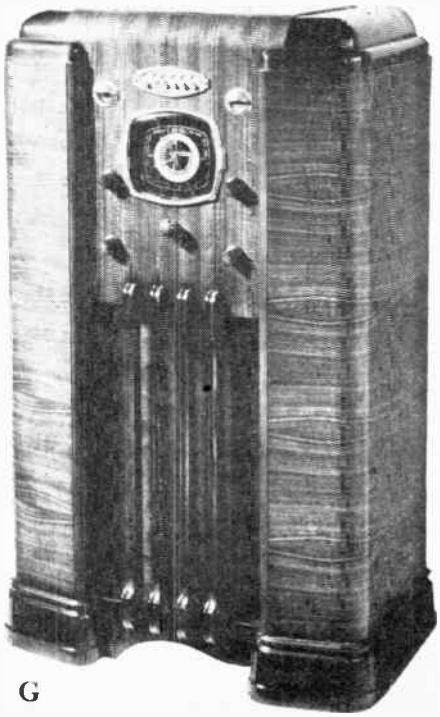
A revival of the miniature remote control cabinet incorporating the input tube and tuning circuits has also made its appearance. Detaining latches are set for the various stations selected so that arm-chair operation is obtained. The receiver power switch and volume control are also actuated by means of controls installed in the remote control box, which are connected to the main chassis and speaker through a flat, woven cable. Touch tuning is definitely here to stay and it appears that future models are likely to incorporate further refinements of the methods already outlined rather than new and untried systems.



E



F



G

CUSTOMERS MUST GET SERVICE

Mr. H. L. White, Jensen Traffic Manager, supervises a rush shipment to a Cleveland shop.

Service-

This Month:

Sales versus Service . . . Servicing in the South . . . Silvertone . . . Airline . . . Peter Pan . . . Philco . . . Atwater-Kent . . . Serenader . . . Trouble Lamp . . . Emergency Soldering . . . Service Shops . . . Service Notes.

Clarifying Terms

JUST what is a radio serviceman? And just what is a radio dealer? And when, if ever, is a dealer a serviceman or a serviceman a dealer? These are terms which need clarifying in the light of the trends in the field. In the instance of the radio dealers in the larger cities and especially in the case of larger dealers, the owner of the shop may not be a serviceman. But he either has in his organization a number of servicemen or an arrangement with a service organization to take care of his customers. But especially in the smaller towns and in the suburbs near large cities, the activity of the dealer may be more specifically service, although sales are also an important and fundamental part of his business.

The serviceman in suburban or rural districts gets his start in a small way and establishes himself by doing good work at reasonable prices and gains a reputation in the neighborhood as the local radio expert. He moves to larger quarters, takes on a number of lines of sets and increases the sales side of his business. Then he is also a dealer! Many thousands of shops of this origin sell a great bulk of the radio merchandise, both sets and parts, throughout the United States. Their owners are still servicemen who are sales conscious and they never forgot the necessity and advantage of doing a good service job. Incidentally no service business could exist without sales.

Read by Many Thousands

RADIO NEWS is read by these thousands of radio dealers or radio servicemen—call them what you like—because, as experts, they must know what is going on throughout the radio field and because in this way both the trends in the service end of the business and the sales end are reliably placed before them.

With the increasing complication of radio receivers and the higher degree of technical proficiency required in servicing them, the status of the radio serviceman-dealer has come up for considerable discussion. Pride, false and justifiable, has stimulated the argument. Personally, we consider the controversy as aside from the main issue. A rose by any other name would smell as sweet. If he is a good salesman and a good serviceman, he will do a good job, whether he considers his calling a profession or a trade.

The periodical introduction of new design features in receivers calls for continuous study of all available sources of information to keep him abreast of the times. He should be able not only to recognize the advantages and limitations of such developments but also to explain them in language his customers can understand. In addition, a large part of the labor involved in radio repairing requires mechanical ability and plain, ordinary hard work.

Radio servicing is a profession when the serviceman is applying his knowledge in diagnosing causes of trouble, instructing and advising customers in the proper use of apparatus, or in designing his test apparatus. It is a sales business during the time he spends selling his sets and accessories and his services. It is a trade in that much of the work is mechanical and a craft in the sense that manual skill is required. In short, radio sales and service is a combination of trade, craft and profession which must be judiciously joined with business acumen to expand into a fascinating and remunerative way of making a living.

But call it what you will, the essence of success is honest sales, a job well done, at a price fair to your customer and at the same time assuring you of a reasonable profit without unethical competition with fellow workers.

THE DAY'S WORK

HAROLD S. HUDSON of Newburg, N. Y., sends in the following data on trouble with a Sears Roebuck—

Silvertone

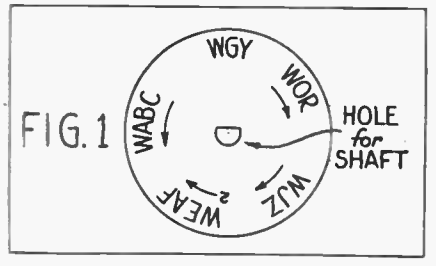
"This receiver was their model 101410, an 8-tube super-het (if you count the tuning eye) which comes in several table and console models. It was sold as a 1937 model. The receiver was absolutely dead without so much as a hum in the loudspeaker. No voltages (high) anywhere except across the first filter condenser—which was somewhat excessive. The trouble of course was an open field coil in the speaker. The 6-inch speaker was replaced with a universal replacement speaker—of which I keep several on hand. (I charge my customers only for the part required and the labor of repair—not for the new speaker unless an entire new speaker is really in order. I repair the broken speaker at my leisure, and always find use for it later. In this way nobody loses, and the client is not kept waiting for the special part.)

"This receiver had not been working well for some time, and the new speaker did little more than re-establish the correct potentials all around and bring in a couple of local stations. I was informed by the client that the set had not been satisfactory since a radiator valve had blown off the heating system in his home and the set had been subjected to hot water vapor for twelve hours! Needless to say complete realignment was necessary starting with the i.f. trimmers. Each band had to be taken in turn and before really satisfactory results were secured the rotor plates on all sections had to be bent slightly. It was also necessary to resolder several corroded connections and to clean the contacts on the wave band switch. And I forgot to mention one i.f. transformer could not be tuned to resonance and required a replace-

Figure 2. A neat, conservative card.

An attractive letterhead.

Figure 1. Emergency dial card. One station (WGY) is taken as the reference point. The arrows show which way to turn for the other station, and the number under WEAF indicates two turns.



Sales

By Zeh Bouck

Service Editor

A NOISE-MAKERS' CONVENTION?

Here are gathered together the various devices that cause most of the man-made interference in radio. All except an automobile! There are vacuum cleaners, fans, contactors, violet-ray machines, motors, heaters, irons and what-not. Radio dealers and servicemen would do well to study ways and means to quiet them.

ment! On the whole quite an overhaul job.

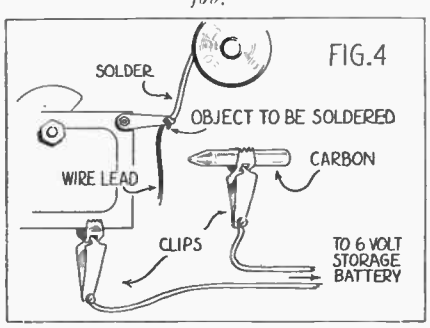
"But believe it or not—and herein lies the moral—that receiver would never have been brought in for servicing if the field coil hadn't opened! Just like some folks, they have to be dying before they'll see a doctor!"

Airline Projector Dial

"I thought I carried about everything in stock, particularly dial lights—but I found myself stumped the other day on a 1937 Montgomery Ward a.c. set with the 'movie dial.' This is a projection type dial, a powerful special dial light being used which projects the dial readings from a film, with a lens and mirror, on to the ground glass 'dial.' The life of the lamp is about nine months normal operation, and when it burns out the 'dial' is in total darkness and there is no way of even guessing where the receiver is tuned.

"I had to admit that I didn't have one of the lights in stock, and that it would take me a couple of days to secure one. The customer made a face at this—there were a couple of features he wanted to listen to on his pet stations. However, it was all okay again after I cut a small disk as shown in Figure 1. The disk is just large enough to permit the stations to be read—that is its diameter is about one inch greater than that of the tuning knob. The center hole is punched for a tight squeeze on the ¼ inch shaft and is shaped as shown to accommodate the flat side of the shaft. The knob is removed, the disk (which I cut from brown cardboard) is slipped on and the knob replaced. I located his favorite stations for him by checking frequencies against my test oscillator, and jotted them down as shown. The knob is merely turned until the desired station letters are on top and then tuned carefully by the magic eye—as per usual. Unless the stations are closely grouped it may be necessary to turn the knob several revolutions—but at that it's better than having no idea at all as to where the stations may be. This idea will doubtless help out on other radios having fancy dial arrangements requiring light for tuning. Incidentally, about the only place where you can buy these lamps is from Montgomery Ward and the catalog number is 62-5517." —Charles Lambert, Oneida, N. Y.

Figure 4. Emergency soldering—as well as instant heating for any small job.



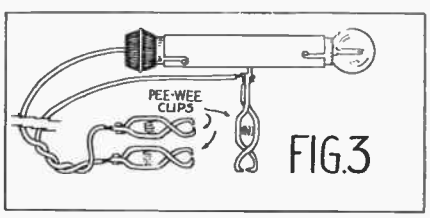
While there are probably not many—

Silver Marshall 34

—receivers still in circulation, those that are should be ripe for trouble, and the item mentioned below by James L. Hoard, Providence, R. I., may apply to other receivers as well: "Several of these receivers have ceased to function due to a bleeder resistor (R_{11}) which burns out as the result of a shorted screen grid bypass condenser. These bypass condensers are duo .1 mf. units. Two are found in C_8 and one in C_7 (on the S-M diagram). The resistor is rated at 2 watts. Occasionally resistor R_8—25,000 ohms, 1 watt—in the first audio plate circuit will be found open, with the usual symptoms." Mr. Hoard's conservatively neat business card is shown in Figure 2.

The following notes are from Eugene C. Drobeck, Los Angeles, Calif.: *Peter Pan 34:* Look out for a wire shorting the screen to suppressor at the 42 socket. *Philco II:* In this auto radio job a remedy was found to reduce the mechanical racket of a Mallory replacement vibrator. This was accomplished by placing an extra layer of rubber absorption material in the can around the vibrator unit, as well as some on the top. This effected a decided improvement, practically no noise now being heard. *Atwater-Kent 82:* Be careful in handling the leads to the volume control in this set—just in case you never worked on one before. These leads are made of very fine wound wire. *Serenader Chassis 47:* If one of these jobs comes in smoking, look for a shorted filter. Replace with a good make of condenser. *Philco 20:* If the tuning shaft is noisy, clean the bearings with gasoline.

Figure 3. A trouble light for shop and tool kit.



Trouble Lamp

"The drawing of Figure 3 shows a simple trouble lamp that I have found very handy in lighting dark corners while servicing receivers. The lamp consists of socket, plug and 6-volt auto lamp which can be secured at any store selling automobile accessories. A lamp of any desired candle power can be used. A 3-candlepower lamp is probably best for all around use—though you can go as high as a 32-candlepower headlight if you wish. I operate the trouble lamp from a 5-volt tap on my service bench."—Arthur Immicke, San Antonio, Texas.

Emergency Soldering Iron

While probably known to many old timers, this idea suggested by James W. Huffman, Belfair, Washington, is worth passing on for the benefit of the younger generation. After all, soldering irons do burn out, and, inevitably, when they are needed most. Figure 4 shows the idea. The object to be soldered is connected to one terminal of a six volt battery (or to 115 volts through an electric iron) and the other terminal is connected to a battery clip in the grip of which is the sharpened carbon from a flash-light cell. The solder is held in close contact with the object to be soldered, and an arc struck by touching the carbon to the solder. After sufficient solder has melted, it may be "run" by applying the arc directly. A slightly different soldering technique is required, but excellent soldering can be done this way. We know of several servicemen who prefer the arc to the regular iron for single connections and other minor jobs as heating is instantaneous. Use your favorite flux or paste.

Something New in Screw Drivers

The accompanying photograph tells the

(*Turn to page* 356)

Calibration of TEST Oscillators

By Kendall Clough

PROBABLY no feature of a test oscillator or signal generator is more important to the serviceman than the accuracy of the frequency calibration. Modern receiver service notes are exacting as to the frequencies which are to be used in alignment, and the customer attention to accurate dial calibration make it necessary that the modern service shop have an oscillator available which can be depended on to give an output accurately calibrated as to frequency from at least 100 kilocycles to 30 megacycles with excellent stability.

FORTUNATELY, accurate standards of frequency are now available to everyone. Substantially all broadcast stations have a deviation from assigned frequency of less than 50 cycles. In addition, the National Bureau of Standards maintains scheduled frequency transmissions over station WWV, accurate to considerably better than one part in a million. Both of these sources are available to the serviceman for checking the continued accuracy of his generator over a period of time.

All that is needed is a sensitive all-wave receiver, in order to use the frequency standards of both broadcasters and WWV. It is important that the oscillator under test be *loosely* coupled to the antenna lead of the receiver, in order that the signal from the generator shall not overload the receiver and prevent the heterodyning of the generator output with the signal. A simple method is to connect the output of the generator to a short piece of wire wrapped around the antenna lead to the receiver. The ground side of the generator should, of course, be connected to the same ground to which the receiver is connected. In the event that the signal from the generator is still too strong or cannot be attenuated sufficiently to avoid blocking, some of the twisted lead may be removed until proper heterodyne action between the two signals is obtained.

Getting "Zero Beat"

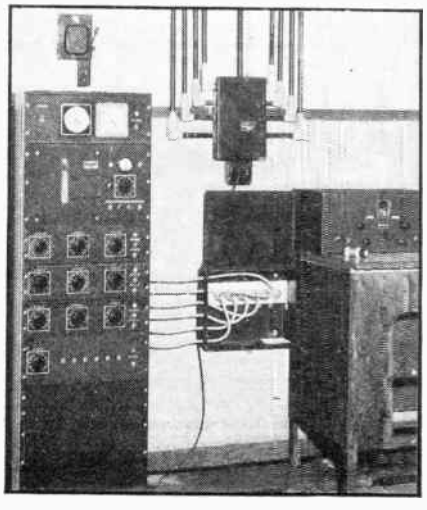
Let us say that WWV has been tuned in on 5 megacycles on the receiver. The signal generator is set at approximately the same frequency. With proper adjustment of the coupling a heterodyne note should be heard as the oscillator dial is turned slightly about this point, and the dial should be adjusted until the heterodyne note drops to a very low note and is finally inaudible. The setting of the generator dial should be noted at this point, and if the calibration is perfect, will show 5 megacycles. Let us suppose, for sake of illustration, that the generator calibration shows a setting of 5.15 megacycles at this point of zero heterodyne. The oscillator can then be said to be out of calibration by (5.15/50)—1 × 100%, or 3% at 5 megacycles.

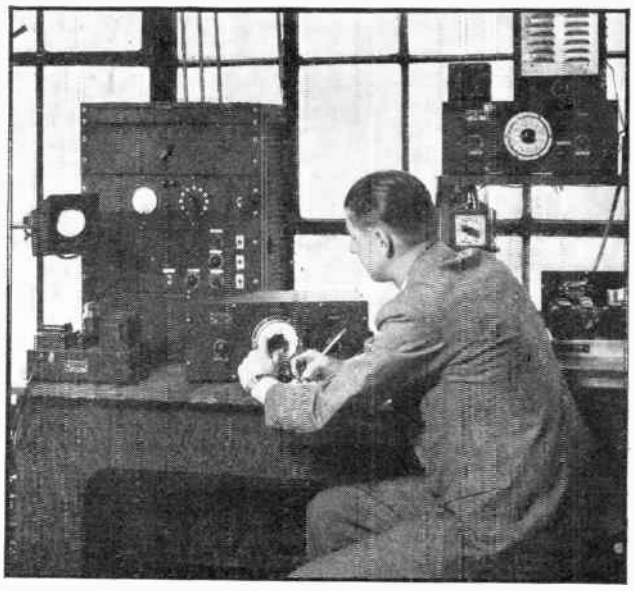
If the oscillator has a fairly strong harmonic output, it may be possible to tune it to 2500 kc. or 2.5 megacycles, and secure a heterodyne note, although it will probably be necessary to increase the coupling to the antenna. By using this harmonic method, it is sometimes possible to check the oscillator over a considerable range of frequencies, using only a few standard frequencies. The method is simple and obvious, although a few "dont's" are in order.

1. As previously mentioned, don't couple the signal generator too closely to the antenna lead of the receiver.

THE PRIMARY STANDARD

Figure 1. The rack at the left, using a temperature controlled 100 kc. crystal, includes a number of master vibrators all of which are "locked in" with the crystal and provide a number of frequency standards which are distributed by means of transmission lines to the various test benches.





CALIBRATING A. F. OSCILLATORS

Figure 2. One of the test positions where four standard frequencies are "piped in" from the primary standard. By utilizing harmonic and submultiple relationships, an almost unlimited number of audio calibration points are obtained.

2. In the case of curve calibrated or indirect calibrated oscillators, don't conclude that the calibration is badly off if there is a discrepancy between the actual and the indicated dial reading, because the calibration of the oscillator may be rather flat at the checking point; that is, there may be relatively few kc. per dial division on that portion of the dial. The safe way is actually to compute the percentage error, before going to the labor of completely recalibrating, or sending the oscillator to the factory.

Some Precautions

3. Don't confuse the order of the harmonic and conclude that the oscillator is off. In the illustration used above, you might calibrate at 5, 2.5, and 1.25 megacycles, provided your generator has sufficient harmonics. These frequencies correspond to first (fundamental), second, and fourth harmonics of the test oscillator. Don't forget the frequency whose *third* harmonic is equal to the standard signal. This will be 5 mc/3 or 1.666 MC on the oscillator dial. Because this is usually not a round number, it is frequently of the oscillator.

Generally speaking, the safe procedure for the serviceman is to use these check methods to determine that the oscillator is actually off calibration by more than the guarantee of the manufacturer as to accuracy, and then return the instrument to the factory for readjustment and recalibration.

Factory Methods

The writer feels that it might be interesting to many to learn of the methods used by the Clough-Brengle factory in checking oscillators from the manufacturing division or for repair. The equipment to be described is possibly more involved than used in the majority of equipment plants for this purpose, and (*Continued on page* 379)

See Them AT YOUR DEALER'S

(New Radio Products)

RK48—New Beam Power Tetrode Tube

The Raytheon RK-48 is a beam-type aligned-grid tetrode tube with a molybdenum plate and an isolantite base similar in appearance to the RK28. It is designed for amateur transmitting use. The aligned grids are employed to reduce the screen-to-plate-current ratio and to allow more efficient utilization of the total allowable space current. The deflector plates in the RK48 are connected to pin No. 4 of the base and should be connected to the mid-point of the filament. The RK48 may be operated at full voltage ratings up to 30 megacycles. The use of the tube is not recommended at frequencies higher than 60 megacycles.

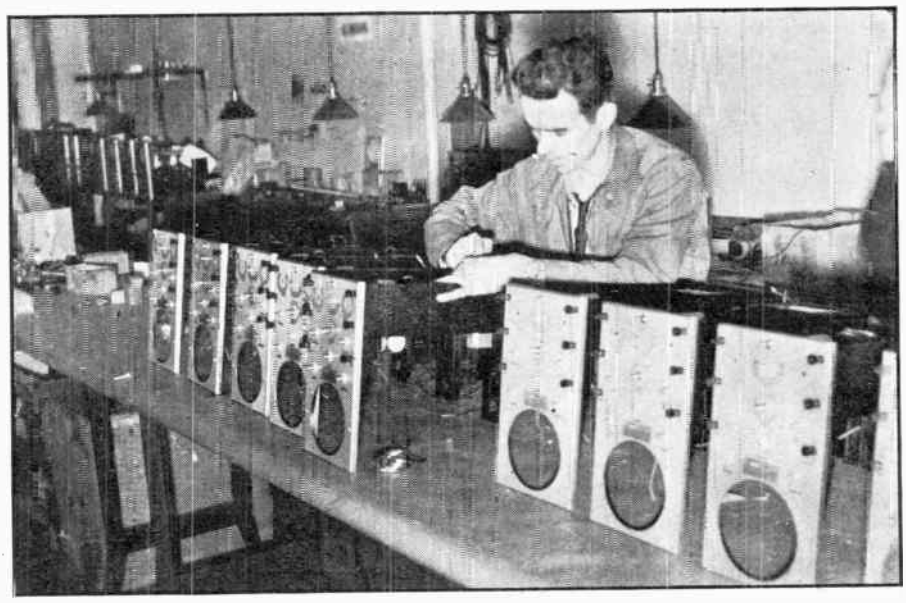
General characteristics: filament voltage 10 V.; filament current 5.00 amp. Average interelectrode capacities: 0:13 mmfd. grid to plate, input capacity 17 mmfd., output capacity 13 mmfd. Used as a class C oscillator or r.f. amplifier, maximum plate V. 2000 for telegraphy and 1500 V. for telephony; recommended screen voltage for both operations 400 V. Typical operation under telephony: grid bias—100; plate current 156 ma.: screen current 31 ma.: r.f. input power 1.20 W and carrier power output 175 watts. Audio power (plate and screen modulation with modulation factor of 1.0) 125 W.: peak power output (plate and screen modulation with modulation factor of 1.0) 700 W. Under c.w. operation grid bias—100 V.: plate current 180 ma.: screen current 27 ma.: r.f. power input 1.20 W.: carrier power output 250 watts.

This new tube can also be utilized as a class B. r.f. amplifier, and with maximum voltage of 2000 V.: the carrier power output is 50 W. with a peak r.f. power input of 0.22 W.

The physical characteristics of the new tube are: maximum length 9½ inches and maximum diameter 2⅝ inches.

Five-Band R.F. Signal Generator

The Clough-Brengle Company announces a new precision signal generator with an accuracy of ½ of 1 percent and a frequency range from 100 kc. to 31 megacycles. The dials are connected direct to the condenser rotor with insulated shaft and a ten-to-one vernier to prevent slippage, remove backlash and assure a smooth drive without errors. Permanence of calibration is assured by the use of air-trimmed iron core r.f. coils. The r.f. output is continuously variable through vernier control and a ladder attenuator from minimum to a rated 100,000 microvolts on all bands. A switch provides 400-cycle internally modulated r.f., unmodulated r.f., externally modulated r.f. and up to 1.2 volts of 400 cycles a.f. for amplifier tests. The tubes employed, comprise a 76 oscillator a 6X5 rectifier and a 6N7 modulator.



CATHODE-RAY OSCILLOSCOPES FOR RADIO NEWS READERS?

The uses of the cathode ray oscilloscope have found application in so many fields of radio, among servicemen, experimenters and amateurs, that the demand for the instruments has increased by leaps and bounds. Scene shows a production line in the Allen B. Dumont Laboratories where many instruments are turned out each day to keep up with the demand both here and abroad. Is your name on one of these?

Victor Opera Book Adapted For the Blind

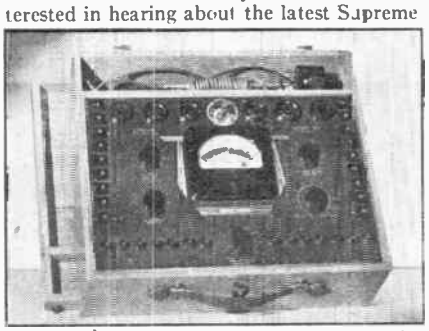
The RCA "Victor Book of the Opera" is to be translated into "Braille" so that its contents will also become available to the blind, according to a communication received from Martha Herman, supervisor of the WPA Braille project at Bismarck, North Dakota. This special edition for the blind, which will expand the 526 pages of the new ninth edition into several large volumes, will also be available in lending libraries.

Special for Servicemen

Philco has just introduced a volume control kit to take care of 95 per cent of all Philco models including the 1937 receivers. The assortment contains 24 different volume controls. They have also placed on the market a new electrolytic condenser kit containing an assortment of 10 midget type electrolytic condensers in those values which are most commonly employed. The condensers are rated at 450 volts d.c.

Combined Tube Checker and Analyzer

Both servicemen and dealers will be interested in hearing about the latest Supreme



model 502 tube and radio tester. The salient features of the electro-conductance tube checker are inter-element leakage test, open test in any element, short check between any two elements, and separate sectional quality tests. In addition to these features the instrument includes four a.c. and d.c. voltage measuring ranges from .2 to 1400 volts, three ohmmeter ranges to 20,000 ohms, two megohms ranges to 20 megohms, an electrostatic capacitor leakage test on a neon bulb and an electrolytic filter capacitor leakage check on an English-reading "Good-Bad" scale.

Announces New Condenser Line For Service Field

The National Union Radio Corp. a new entry into the field of condensers for radio service specialists will provide a complete line of electrolytic and paper condensers. The line will include standard and junior cardboard box types, standard and junior inverted can types and tubular paper and electrolytics types, automobile paper, uncased condensers, auto vibrator and oil filled transmitting condensers.

New Line of Receivers For Every Purse

Four new inexpensively priced radio receivers were recently placed on the market by the RCA Mfg. Co. Herewith illustrated an end table model 85-T2, a 5-tube super-

(*Turn to page* 376)

An Ultra-Modern Direct-Coupled AMPLIFIER For the Home

REVERSED feedback is employed and compensating circuits are added to boost both the low- and high-frequency response. In addition, the author employs a 6L6 as a highly effective triode and runs all amplifier filaments from the same transformer secondary.

By **Gerard J. Kelley**

IT is common to rate an amplifier by the amount of power available. If an amplifier has only a power output of 10 watts it is considered by many to be only half as good as one of 20 watts or ¼ as good as a 40 watt amplifier. Many times a good 10 watt amplifier will give far more satisfactory service than a medium quality 30 watt unit. The important consideration in the question of power output is the purpose for which the amplifier is to be used. While there are conditions and places which warrant amplifiers rated at 20 or more watts, such as in public address and theater work, the use of such equipment for the average small apartment is decidedly unnecessary.

What is Room Volume?

For use in the home an undistorted output of 3 watts is more than ample provided the fidelity curve is flat and an efficient speaker is used. This is true except for those whose sole use of a radio is a means of destroying silence and annoying their neighbors. Tests have proven that an average level of 0.8 watt with peaks reaching 2.6 watts is more than ample for satisfactory home radio service. Where a radio is used to furnish a background the level should not exceed 0.5 watts.

The best operating level for satisfactory radio service depends on a number of factors. These include the quality and type of program, the size and type of room, time of day and most important the attention given to the program. If it is dance music and the time late at night, a level of 10 to 20 milliwatts will give the same satisfactory service as 700 to 800 milliwatts earlier in the evening when traffic and other noises are heavier. This level is not satisfactory for dancing but is satisfactory for listening. A program of concert material which warrants the same careful attention as attendance at the concert, would require an average level of one watt provided the time is early evening. For entertainment of this type means should be taken to prevent distraction of interest from the program. The best way to do this is to darken the room, relax in the most comfortable chair and avoid conversation.

To meet these entertainment requirements a new direct coupled amplifier was designed which has many novel features. These include the use of the 6L6 as a triode, variable reversed feedback, low- high- or combination low-high frequency compensation in conjunction with reverse feedback, and operation of all amplifier tubes from a common heater winding. The circuit is shown in Figure 1.

The 6L6 is used as a triode (screen connected to plate) to reduce distortion encountered in its operation as a pentode. The average constants of several RCA and Sylvania tubes used as triodes follow: At 280 volts on the plate and 24 volts grid bias, the plate current is 42 ma.; the amplification factor, 7; mutual conductance, 4100 micromhos and plate resistance, 1700 ohms. The maximum power output at 5% total harmonic distortion is 3 watts in a 5000 ohm load. The tube has advantages over other triodes because of its greater power sensitivity (nearly twice that of the 6A3), its indirect heater which makes a single heater winding possible. The shielding metal shell also eliminates difficulties of instability. The difference in frequency characteristic between the pentode and triode 6L6 is illustrated in Figure 2.

Minimum Distortion

Reversed feedback is used in this amplifier to reduce phase distortion, prevent speaker hangover and to correct the frequency responses. If the 6L6 is used as a pentode the harmonic content is reduced approximately 50% while as a triode only 30% reduction is secured.

The feedback circuit used was designed after careful check of all circuits available. Reversed or negative feedback is no cure-all and strange to say this circuit which is used indirectly to reduce distortion may introduce severe phase distortion. It was for the latter reason that the screen of the 6J7 was used as the means of securing reversed feedback. Careful checks had shown that reversed feedback in the cathode of the 6J7 while giving greater gain reduction increased the phase distortion at the point of greatest gain reduction. A point could be secured which had minimum phase distortion but the total gain and harmonic reduction was not as high as in the screen circuit. When using the screen circuit of the 6J7 tube to secure reversed feedback the voltage required is higher than in the cathode circuit but this is easily secured from the 500-ohm secondary of the output transformer. This arrangement of reversed feedback allows correction of the frequency response curve. By means of the variable reversed feedback control in conjunction with the low and high frequency compensating networks the response curves may be varied within wide limits. In this case C7 and R4 comprise the low-frequency discriminating circuit and T3 with R3 the high-frequency corrector.

Adjusting Circuits

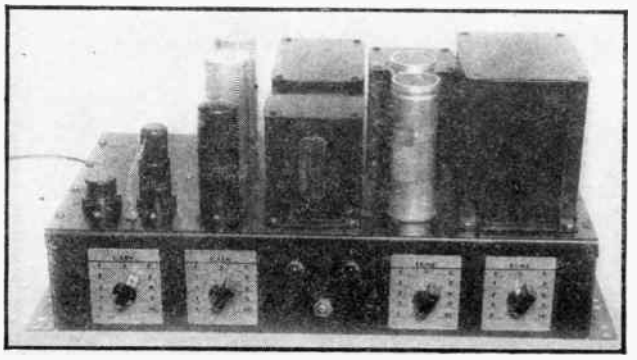
The response curve of the low frequency compensator circuit is not as good as could be desired. This is mainly due to the low Q of T3 which should have an inductance of 2 henries and a low d.c. resistance. The closest approach to this value found was a General Radio type 271 medium frequency transformer.

As pointed out by many authors, reversed feedback may cause oscillation at low or high frequency. In this amplifier the high frequency oscillation occurs at about 25 kc. and requires only a low value of feedback.

In order to prevent this oscillation and allow a higher value of feedback to be secured a trap circuit is placed in the feedback circuit. This trap consists of a Hammarlund 85 millihenry choke, Ch3, tuned by a variable 140 mmfd. mica padding condenser, C8. When adjusting this trap, which should be done with an oscillograph or output meter the feedback control is set at

CONSTRUCTION HAS PROFESSIONAL TOUCH

From left to right the controls are: volume control, inverse feedback, low-frequency compensator, high-frequency compensator. The rectifier tube is back of the power transformer.



maximum with the mica padder set at minimum capacity. The volume control should be set at maximum. The padder condenser should then be set to stop oscillation and when this is done the volume control should be moved to a minimum position, readjusting the mica padder condenser till it is possible to move the volume control from minimum to maximum position without high frequency oscillation taking place. R10 limits the high-frequency compensation, which might cause oscillation if it exceeds a critical value.

The low frequency oscillation is prevented by a 20,000 ohm resistor in series with the 5000 ohm feedback control. This resistor limits the maximum amount of feedback voltage applied to the screen circuit of the 6J7 tube.

Construction Details

In order to maintain good low frequency reproduction it is necessary that the power supply have good regulation. The chosen units have low resistance while the 83V rectifier was preferred because of its good regulation and its indirect heater which eliminates surges during the warming up period.

Due to the high voltage it is necessary to use paper condensers in place of electrolytic.

The mechanical assembly is simple, and the Kenyon UB103 base was a great help in this direction. This base has the advantage that the 4 sides are easily removed to allow easy assembly and wiring. All heater and plate power supply wiring is bunched as much as possible and kept away from all signal circuits in order to keep the stray capacities low and prevent stray pickup.

Provision is made for radio input to the diode detector by two pin jacks or to the 500,000 ohms volume control by means of a jack. When using this jack for audio frequency input a shielded low capacity lead should be used. The interstage coupling resistance is mounted well away from the chassis to reduce stray capacity.

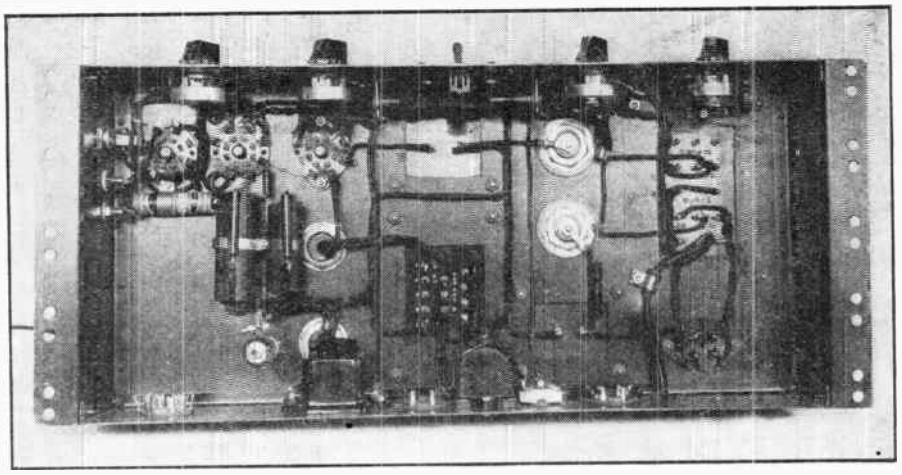
It is necessary to secure the correct phasing of the output transformer. In the model this was done in the primary and if the terminal marked ground on the Kenyon T301 transformer is grounded the Hi primary terminal next to it should go to the cathode of the 6L6 tube.

Frequency Response

A ½-volt flashlight cell in series with the cathode of the 6J7 tube is used for bias; and a flashlight lamp is used in series with the positive high voltage as a fuse and trouble indicator. The lamp is a 150 ma lamp and only glows dimly in normal operation. In case it is desired to use a switch to change the 6L6 from a pentode to a triode, which may be done with fair results without readjusting the wire-wound resistor in the cathode of the 6L6 tube, care must be taken to prevent extreme high-frequency oscillation due to length of screen grid lead of the 6L6.

Figure 3 shows several frequency response curves of the amplifier for different settings of the feedback controls.

The "no reverse feedback" curve shows the (*Turn to Page* 382)



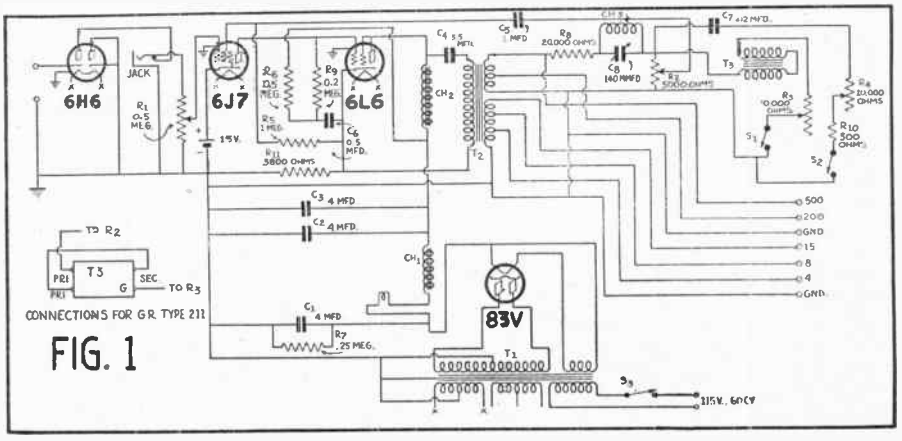


FIG. 1

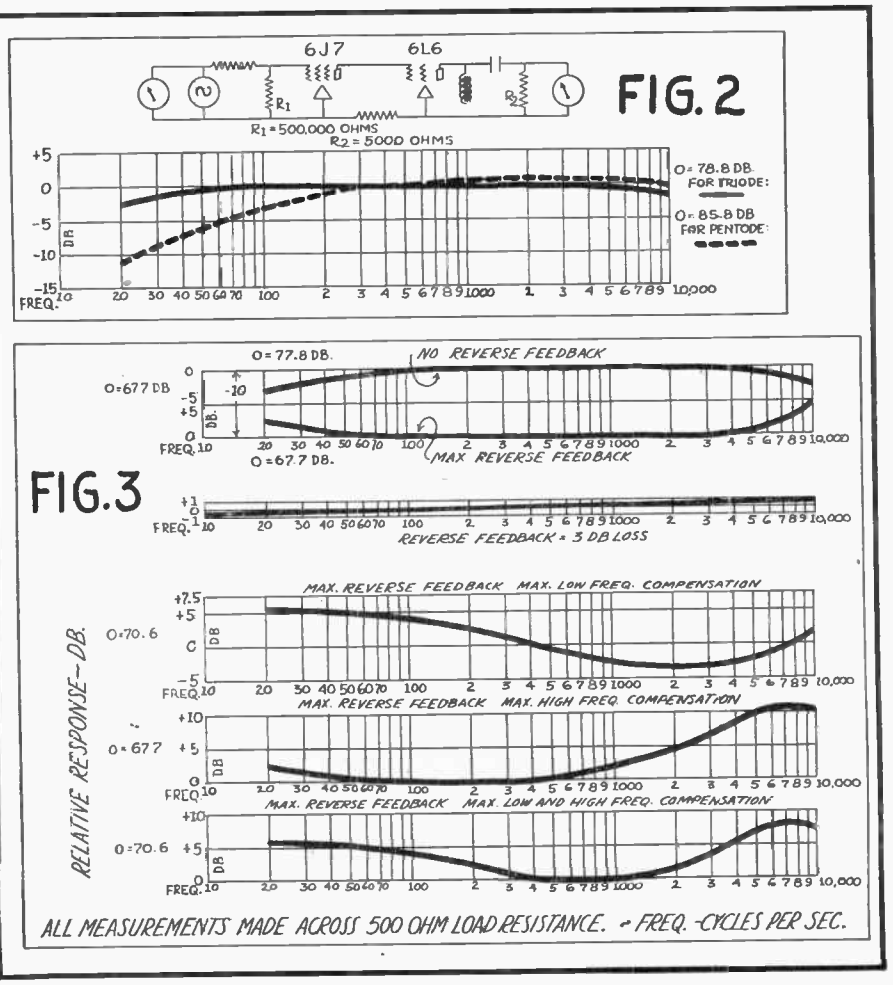


FIG. 2

FIG. 3

Practical Pointers for Servicemen on Servicing

MOVIE SOUND

(Theater Acoustics)

IN applying acoustical treatment to theaters or rooms, proper placement of the acoustical material is essential for best results. In this article, the author describes the accepted methods employed by sound experts. In addition, a table of the absorption coefficients of many well-known acoustical materials, as well as curves of absorption against frequency, are included and will provide valuable guides to those entering this profitable field.

By **W. W. Waltz**

(Part Five)

ASSUMING that the quantity of acoustical material necessary has been determined, the next question is, where shall it be placed. An almost invariable rule is to start with the rear wall of the theater and work forward (toward the screen). The rear wall is covered starting at a point slightly above the head level of the audience. It should be noted that the balcony, if any, in most motion picture theaters is so low that there is little use in treating the rear wall under the balcony. And, where there is a balcony the acoustic treatment on the rear wall starts at a point slightly above the head level of the audience in the balcony.

The next points of treatment are the side walls starting at the rear walls and extending forward at approximately the same height, that is, slightly above the head level of the audience. Except in the case of an irregularly shaped auditorium, the acoustic material should extend forward the same distance on either side.

Safety Precautions

Regardless of how and where the material is placed it should be borne in mind that just because some acoustic materials look more or less like burlap sacking is no excuse for a job to look sloppy. Except in those cities where the Fire Department inspectors go around with gasoline blow torches looking for—and usually finding!—trouble, the acoustic composition can be covered with materials variously known as "theatrical gauze" or "scrim." The acoustic materials are generally fire proof or fire-retardant; any light coverings put on for decorative purposes can probably be treated to make them slow-burning.

It was pointed out above that the generally accepted practice is to use the absorption coefficient of a material at 512 cycles, and the absorption at this frequency was used in our illustrative example. Examination of curves of absorption vs. frequency for various kinds of acoustic material shows that the absorption increases with frequency and in general reaches a peak at about 1024 cycles. Above this frequency some of the curves drop while others become more nearly flat. The curves (Figure 1) reproduced herewith show, for instance. that the material which was used in the theoretical problem has twice the absorption at 1024 cycles that it has at 512 cycles. Figure 2 is a table of the absorption coefficients of typical high-grade acoustical materials.

In communication work mean speech frequency—theoretically the frequency most often appearing in any given number of speech sounds—is taken as 796 cycles per second; this is somewhat closer to 1024 cycles than it is to 512 cycles, and this might seem to indicate the advisability of using the higher frequency, 1024 cycles, rather than the lower.

Experience Needed

The whole subject of acoustic conditions is greatly involved and it must be appreciated that experiment, in the form of actually making acoustic surveys and applying acoustic material on the basis of the results of the surveys, is worth more than dozens of text books. However, even from a theoretical standpoint the subject has its fascinations, and for those who wish to investigate further is recommended Watson's "Architectural

(*Turn to paage* 378)

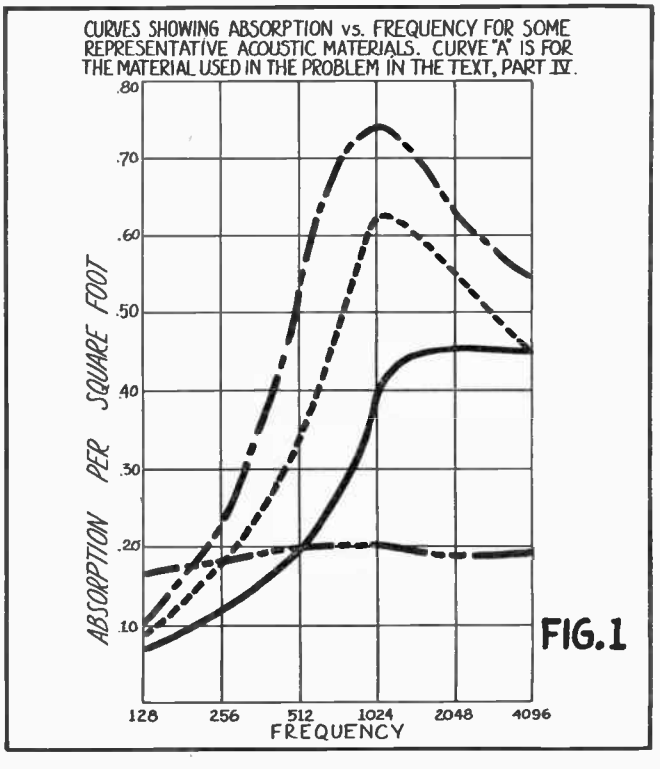


FIG. 1

SOUND ABSORPTION COEFFICIENTS

MATERIAL	FREQUENCY			
	128	512	1024	2048
ABSORBEX A, 1" THICK, BACKED WITH 1" GIMCO MINERAL WOOL, NAILED TO 1"x2" WOOD FURRING 12" O.C. SPRAY PAINTED.	.58	.98	.92	.79
ACOUSTEX, 2" THICK, TYPE 100 W, CEMENTED TO PLASTER BOARD. PAINTED BY MANUFACTURER.	.33	.83	.88	.87
ACOUSTI-CELOTEX TYPE BBB, 1¾" THICK, CEMENTED TO PLASTER BOARD.	.19	.91	.92	.92
ACOUSTONE D, 1.05" THICK, CEMENTED TO PLASTER BOARD, PAINTED.	.43	.83	.77	.69
AKOUSTOLITH D, 2" THICK.	.15	.59	.74	.52
CERAMACOUSTIC, 1.5" THICK, CEMENTED TO PLASTER BOARD.	.40	.70	.70	.61
MASONITE ACUTILE, 1.5" THICK. CEMENTED TO PLASTER BOARD	.38	.88	.96	.88
SANACOUSTIC HOLORIB, 1⅛" THICK	.50	.87	.79	.77
MASONITE, STANDARD BOARD ½" THICK, NAILED TO 1"x2" FURRING 24" O.C.	.20	.33	.37	.37
MASONITE TILE, TYPE CQS, 1.8" THICK, CEMENTED TO PLASTER BOARD.	.19	.92	.89	.74

A Systematic Program for

LEARNING THE CODE

Correct Methods and Persistent Practice

By John M. Borst

IT is possible for you to become an efficient sending and receiving radio operator if a definite plan of instruction and learning is followed and persistently carried out. One requirement is to devote a definite period to the code-work each day. The length of the period depends on your endurance; in the beginning 15 minutes twice a day is recommended. Later these periods can be lengthened or shortened. By all means it is desirable, especially in the beginning, to work together with a partner who may also be a beginner so that you can send to each other. Later this becomes less essential because after the student learns to receive a minimum of 8 to 10 words-per-minute, he will be able to pick plenty of material from the air for practicing copying.

Material Required

The material required consists of a telegraph key and some sort of code-practice oscillator (such as that shown in the diagram of this article) and a pair of phones. The oscillator is easy to make; it takes a battery-operated tube, type 30, which can be made to oscillate at audio frequencies by means of an audio transformer. Very little plate voltage is required; in this case it is about 2½ volts. If necessary, those who do not wish to construct an oscillator may employ a buzzer and a battery, but an effort should be made to obtain a buzzer with a pleasing note.

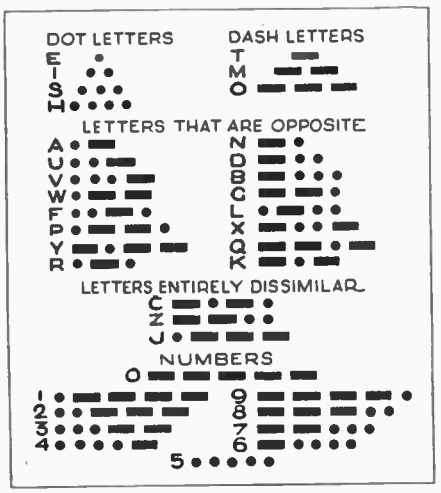
The original "American Morse Code" consisted of letters made up out of dots and dashes and spaces of different length. The fact that it had "spaced letters" makes this the fastest code but it is harder to learn and may more easily lead to errors. It is only used now for wire telegraphy. The "Continental" or "International" code; is now exclusively used for radio communication. The letters of the Continental code are composed of dots and dashes only and no "spaced" letters exist except the period.

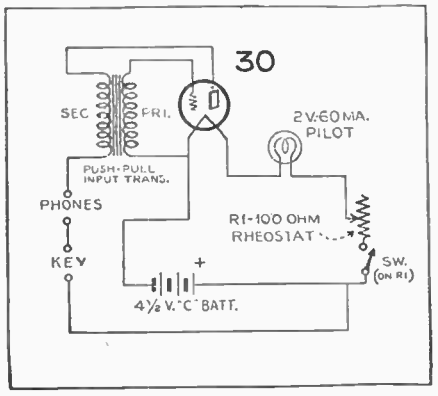
Correct Spacing

The respective lengths of dots, dashes and their separating spaces in the International Morse code are as follows: A dot has a definite length, which depends on the speed of transmission, a dash equals three dots; the space between dots or dashes belonging to the same letter is equal to the length of a dot. The space between two letters is equal to three dots, the space between words is equal to five dots. These relations should be maintained as accurately as possible by the operator, being sure that the several dashes of a letter are equal in length and that spaces between letters remain regular, regardless of the length of the letters.

BESIDES those who intend to become commercial or amateur radio operators, there are others who will find it profitable and interesting to learn the code. In the first place, many positions in radio which are engineering positions still call for a knowledge of the code. Then, there is a wealth of interesting material picked up by your all-wave receiver if you will only take the trouble to learn its language. Those who can read the code with facility will often have a front-seat at the "news reel of the ether" and can obtain some of the information at first hand.

When the student begins learning the code there are several things he should *not* do. First and foremost he should not try to memorize the code visually. He should learn to recognize the letters *by their sound* and think of the letter *a* as "dit-dah" (spoken) and not as a dot and dash. Perhaps the best way to begin is to practice a few letters at first and add new ones later. For this reason the letters of the code are shown in the chart in a systematic order rather than in alphabetic order.





On the first day all attention might be confined to all letters formed by dots alone; these are the *e, i, s, h,* numeral 5, and the period. Learn to make your dots regular without any hesitation between them. The key should be mounted 18 inches back from the edge of the table. Grasp the knob firmly but not tightly between the first two fingers and the thumb of the right hand, somewhat like you might hold a pencil. The elbow should rest on the table but the wrist is up in the air. All dot and dash movements *should be made with the forearm and the wrist* (including the dots) and *not with the fingers!* Do not release the grip after every word or sentence, as some persons do; it causes fatigue and holds down the speed.

Practice Makes Perfect

When the student is able to make dots evenly spaced, he should repeat sending and receiving the dot letters until he can recognize them without any difficulty. Then he can add the letters consisting of nothing but dashes and practice them until they are memorized. Finally, the other letters can be added in pairs as shown on this page. It will take perhaps three days to a week until all the letters of the alphabet have been assimilated as definite sounds. When sending the more difficult letters like the *c* and the *y* it is important to watch the regularity of spaces as well as the length of the dashes. Many people have the habit of making the first dash of a letter the longest, the next one shorter and then still shorter. To guard against this there are some schools which make the student do his first sending by the beat of a metronome until he has the right rhythm. One beat would then equal one dot or a space between parts of a letter. For a dash the key has to be held down for three beats, etc.

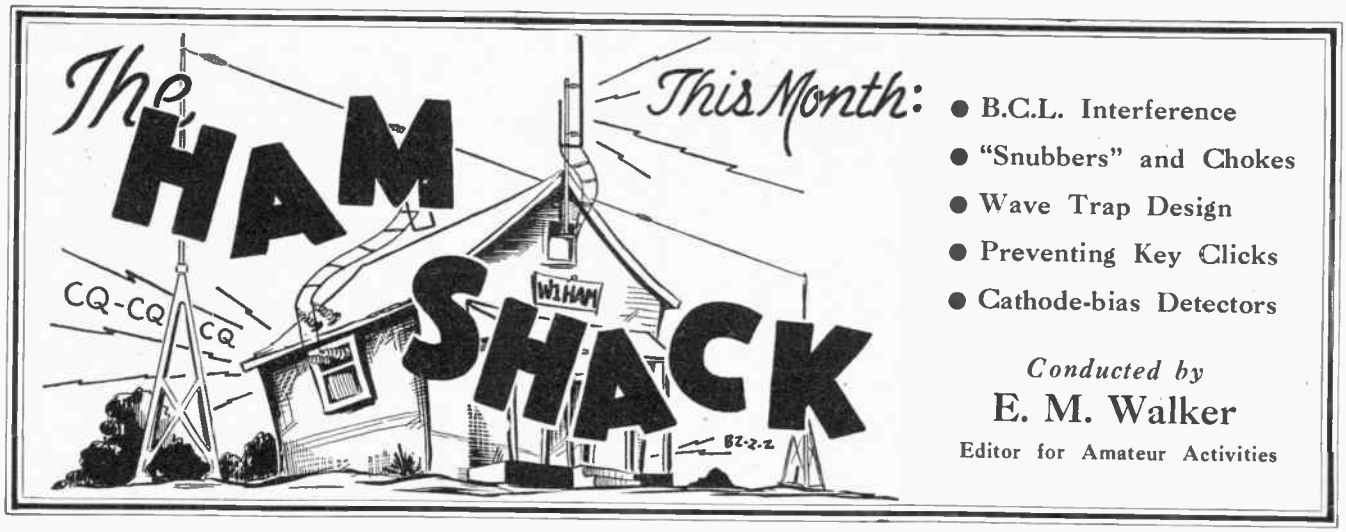
Keep Going!

During copying it is important not to think too long, if one letter is missed, but immediately concentrate on the next. Otherwise one will probably miss several words.

When the student has progressed so that he can send and receive some 5 to 8 words a minute (5 characters to the word) he might take a course, such as the Candler course, which will help him overcome many difficulties.

For copying practice, most of the material can be picked from the air, with

(*Continued on page* 383)



Curing BCL Interference

WHILE the Federal Communications Commission's records show a decided decrease in the number of amateur broadcasting interference complaints recently, this problem still should have the consideration of every amateur. Interference with the neighbors' favorite broadcast programs causes hard feelings. And, such hard feelings tend to destroy amateur good will—good will that is built up by the excellent work amateurs do in times of emergency, such as floods and hurricanes.

AMATEURS during times of emergency win flattering publicity in the newspapers calling to the attention of the public at large and the broadcast listeners in general that John Jones down the street who sometimes is heard on his neighbors' radio sets is a member of a fraternity that not only "fools and experiments" with radio, but actually contributes something worthwhile when the occasion arises. At the same time this good will can be offset when the Communications Commission receives a large number of complaints of BCL interference. A number of cases on record show some amateurs, particularly younger ones, are inclined to assume that because they are licensed by the government they have a prior right to the airways and their neighbor who only "listens," and therefore, refuse to help solve his problem. Indeed, there are few cases on record where this unreasonable attitude has been assumed, but one case in a thousand like this will have its harmful effect.

Worth the effort

There are few cases on record where with a little effort expended on the part of the amateur, interference in his neighbor's radio has not been eliminated. True, there are certain types of sets in which interference is more difficult to eliminate than in others, but these are few and far between. In this category are antiquated receivers that use grid-leak detection and the very cheap 3, 4 and 5-tube A.C.-D.C. midget sets, but even in these it is possible to overcome the problem, even if it is necessary in the case of the former to change the detector from grid-leak bias to cathode bias.

Official records show phone stations cause more interference than those that use c.w. exclusively. This is understandable in view of the fact in the case of the c.w. station the interference cause usually is key clicks or transients which may be eliminated simply with a key-click filter in the transmitter. But in phone station there is modulation with all of its interference-causing maladjustments to contend with. Further, the average phone station employs a larger amount of power than the average c.w. station, simply because the man who can afford the expensive modulating equipment also can afford the higher power, whereas the majority of the c.w. men are content with an average of about 100 watts input.

Concerning ourselves first with phone interference and its elimination, it is interesting to note it is more prevalent from stations on certain bands than on others. An overwhelming majority of the cases brought to official attention are from stations operating on the 160-meter band. Complaints from stations operating on 20 and 75-meter bands are about tied for second place; while those on 5 meters are next and 10 meter complaints at the bottom of the list.

Top of the List

Interference from 160-meter stations is at the top of the list for several reasons: First, because operation on this band requires such a large antenna that the majority of its users are forced to Marconi type radiators; second, while there are a number of "old timers" on this band, it is the landing place of many phone newcomers who lack experience in adjusting the more complicated modulated equipment.

The use of the Marconi type antenna (that is, a quarter-wavelength aerial and ground) results in the emission of a strong ground wave that has a tendency to "blanket" a large area. The records show that stations using half-wave radiators without ground connection have very little trouble with BCL interference. This bears out the theory that the Marconi type antenna is a poor one to use in congested areas.

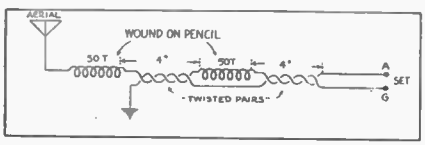
Phone Interference

Some of the interference from phone stations is due to faulty adjustment in the transmitter. Therefore, if a complaint is received, the thing to do is take a look at the source first. The two most common causes are improper modulation and improper neutralization. The latter is easy to check and should be done first. To check the former it is desirable to use an oscilloscope or some other means of modulation indication. If the modulation is within 100 percent and all indications are that the transmitter is operating normally, then it will be necessary to eliminate the interference in the receiver itself. But if the oscilloscope shows unsymmetrical modulation or the presence of spurious frequencies, clearing up this trouble probably will solve the interference.

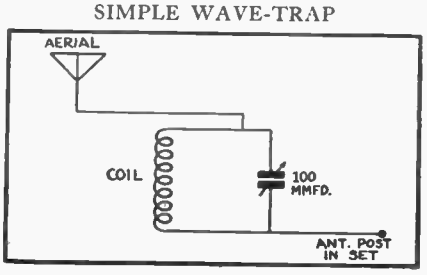
Analyzing Causes

Another way of checking on whether the cause is in the transmitter or receiver is to determine whether the BCL interference is general or just in one or two sets. If it is general, it probably is in the transmitter, particularly if the interference is present on modern middle priced super-heterodyne

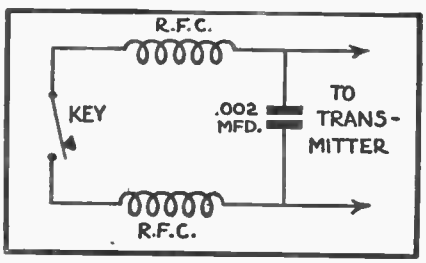
THE "SNUBBER"



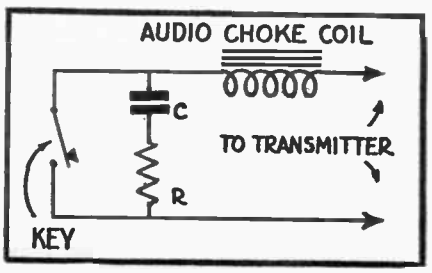
SIMPLE WAVE-TRAP



KEYING FILTER



ANOTHER TYPE

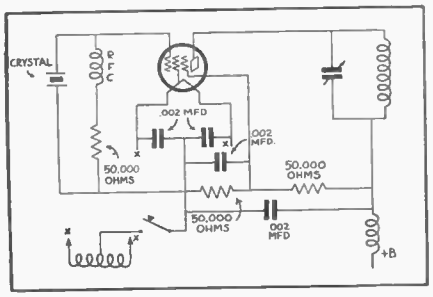


¶ A Department for the amateur operator to help him keep up-to-date

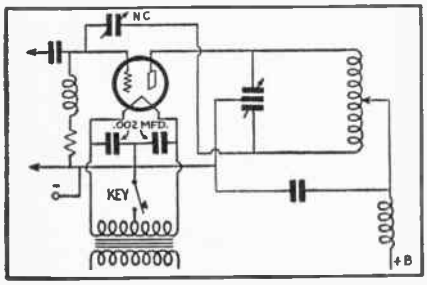
receivers. On the other hand, if the interference is present in one or two sets, and they are a type susceptable to interference, the problem must be attacked at the offended receiver.

Common Types

The most common form of BCL interference from phone stations is "blanketing." This type causes the broadcast program to completely disappear or fade down considerably when the transmitter carrier is turned on. In such cases when the transmitter is modulated, the operator's voice usually is heard as loudly as the broadcasting station. Such interference is most common in listeners' receivers whose antennas are close to the transmitter's radiator. It results when considerable power is picked



KEYING OSCILLATOR



KEYING CENTER-TAP

up by the receiving aerial, thus overloading one or more of the tubes in the receiver to a point where amplification is greatly reduced.

Such interference cases often may be cured by relocating either the transmitting or receiver antenna. The farther apart they are, the better. If possible they should be at right angles to each other. However, in severe cases, rearrangement of the antennas will not eliminate the trouble completely. In such cases it will be necessary to "trap" out the transmitter signal in the antenna circuit.

Methods of Cure

There are a number of methods of eliminating this form of interference. Incidentally, it might be pointed out here that in more than 95 percent of the cases observed the receiving antenna used was a simple wire antenna, and, that it is very seldom the BCL listener using one of the modern doublet-types of antenna that has trouble from nearby amateur signals. The doublet designed for broadcast reception (both short and long wave) will not pick up as much of the transmitter's energy as a straight wire, and therefore, offers a possible cure to the interference problem in itself. This

(*Turn to page* 380)

Voltage Supply for the

VELOCITY Electrostatic MIKE

By Robert Ames

THE Velotron mike, which combines the features of the velocity and electrostatic types, and avoids the main drawbacks of both, has gained wide popularity for P. A. work and is likewise gaining wide favor among hams. It is less expensive than most "good" mikes, provides higher output and is the one microphone which permits variation of the frequency response to meet individual taste or requirements.

Polarizing Voltage

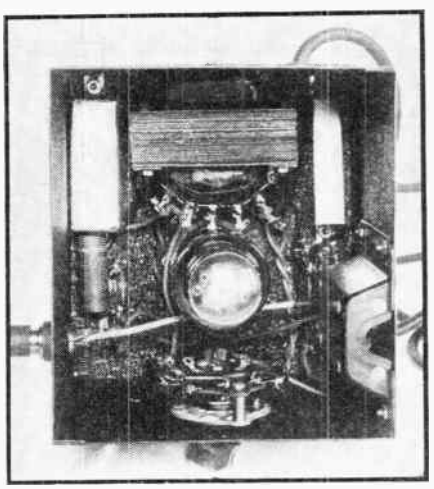
Like all electrostatic microphones it requires a polarizing voltage. It is by varying this voltage that the desired frequency response is obtained. Once this value has been determined, the polarizing voltage may be taken from the amplifier power supply. But many users prefer to use a separate variable voltage supply unit for this purpose. Since the current required is nil, such a unit may be extremely simple.

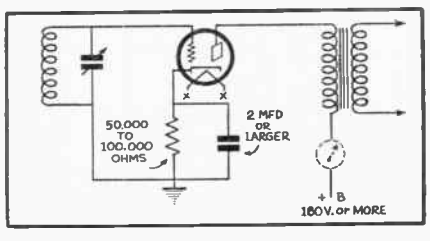
Designed by W2IDV

The small unit shown in the photographs is one developed and constructed by Glenn Pickett, (W2IDV), and has worked out very nicely at W2JCY.

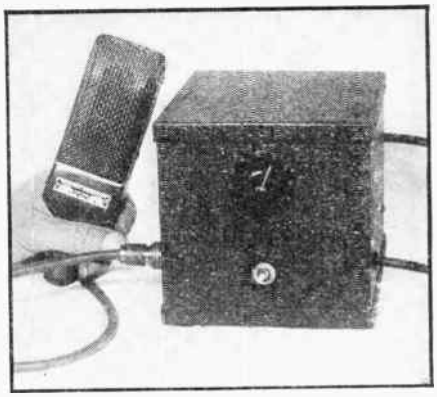
As shown in Figure 1, it is a simple

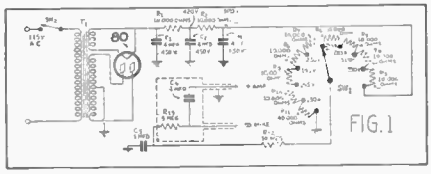
INTERIOR VIEW





CATHODE BIAS
For old-style receivers





straightforward power supply employing resistance-capacity filtering. The tap switch affords a choice of 9 voltages. Lower voltages tend to accentuate low-frequency response while the higher voltage taps increase the "highs." By selecting the proper voltage, one may compensate in some degree for amplifier deficiencies.

In Shielded Case

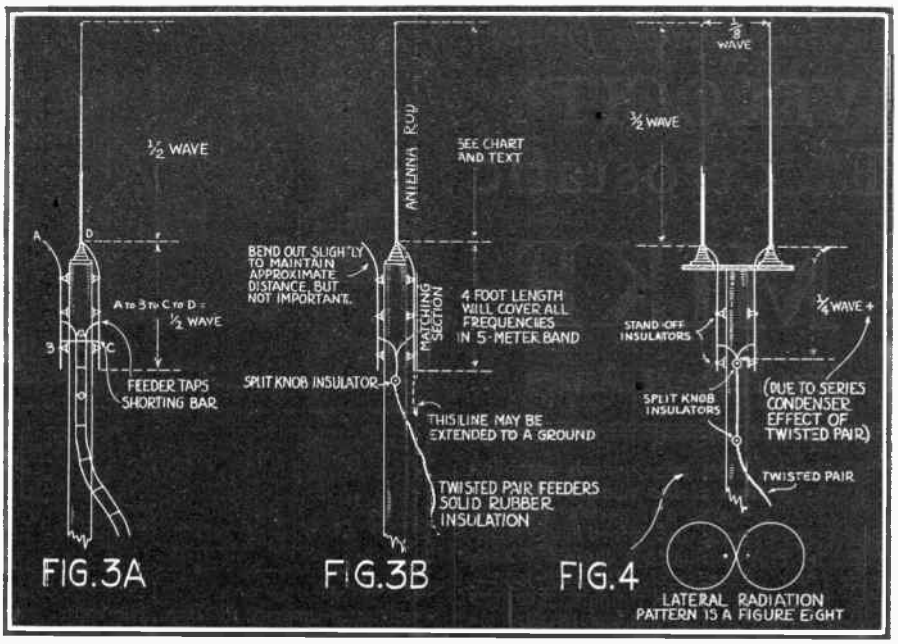
The entire unit is assembled in a steel box measuring approximately 6 by 6 by 6 inches. A screw-type connector plug for the microphone cable is installed at one side of the box while a shielded cable is brought out to a shielded plug for connection to the amplifier input. The metal shield over the 5 megohm resistor and the .1 mfd. coupling condenser, was taken from an old loudspeaker terminal block.

The shielded cable employed should be of high quality since the slightest leakage will cause severe drop in voltage. Preferably the insulation should be of rubber, both inside and outside, since cotton which is not impregnated will develop leakage.

The voltages indicated on the diagram were measured with a new electronic d.c. voltmeter to be described next month, which has an input resistance of 50 megohms—equivalent to 100,000 ohms-per-volt on the 500-volt range. Readings taken with ordinary types of voltmeters will of course be undependable because of the load they apply to the high-resistance circuit of this voltage-supply unit. If one desires to measure the voltages available, however, and has only a standard 1000 ohm-per-volt meter to do it with, fairly good accuracy may be obtained by measuring the voltages across each of the resistors (511 to R3) which are in the circuit, and adding them together.

List of Parts

C1—Cornell-Dubilier midget electrolytic condenser, type JR504, 4mfd., 450 v.
C2, C3—Cornell-Dubilier midget electrolytic condenser, type JR544, 4 4-mfd., 450 v., (both condensers in one unit)
C4, C5—Cornell-Dubilier tubular paper condensers, type DT-4P1, .1 mfd., 400 v.
R1, R2, R3, D4, R5, R6, R7, R8, R9, R10—I. R. C. fixed carbon resistors, 10,000 ohms, ½ watt
R11—I.R.C. fixed carbon resistor, 40,000 ohms, ½ watt
R12—I.R.C. fixed carbon resistor, 10 megohms, ½ watt
R13—I.R.C. fixed carbon resistor, 5 megohms, ½ watt
T1—United power transformer, type UH-1, pri. 115 v.,—60 cy., sec. 600 v., at 50 ma., c.t., 6.3v. 2a., 5v. 2a.
SW1—Yaxley 11-point switch, shorting type, No. 1211 L, with etched plate
SW2—Single-circuit toggle switch
1 Bruno shielded cable connector
1 Eby 4-prong, moulded socket
1 small shield (see text)
1 Bud steel box (see text)
Shielded wire, push-back wire, etc.



CONSTRUCTION DATA FOR USING THE "J" ANTENNAS

Figure 3A gives the dimensions and methods of mounting for the single "J", with spaced feeders. Figure 3B shows the method for using twisted pair feeders. Figure 4 gives the arrangement of the double "J" beam end-fire antenna.

Data on Single "J"

By

A. J. Haynes
(Radio W2JHV)

IN spite of the fact that the "J" type antenna is frequently mentioned in amateur magazines and handbooks and is becoming increasingly popular on the 5-meter band, little practical constructional data has been given on it except for some specific application or other.

LET us first consider the simple "J" in the two ways in which it is used most frequently; with twisted pair feeders and with spaced feeders. See 3B. These are both matched-impedance, untuned transmission lines; the former is of low impedance (usually less than 100 ohms) while the latter is of higher impedance (usually falls somewhere between 300 and 600 ohms, depending mainly on the size and spacing of the wire used). Rather than try to calculate the exact surge impedance of our transmission line let's ignore it and do the whole job by cut-and-try methods, or rather just "try" methods as we can fortunately build our "J" so that no cutting will be required. Figures 3A and 3B shows the simple construction used. It consists of an eight foot (plus or minus) fishpole telescoping type of rod with which the radio market is at present glutted. Just make sure that the sections are equipped with good locking devices or else you will have to do the job over again in a few days.

Obtain a 2 by 3-inch wooden pole about 8 feet long and mount the antenna on top of it with any suitable insulator. Mount two No. 12 copper wires on opposite sides of the pole extending from the top down. One of these wires should be extended to the bottom of the "fish-pole" and connected to it while the other is ended in the air at the level of this connection. These two wires form the matching section and they should be separated by a distance of 6 or 8 inches. This spacing is not critical enough to warrant much concern.

FIG.2 - TABLE OF ANTENNA LENGTHS

FREQUENCY IN MEGACYCLES	LENGTH OF ½ λ ANTENNA IN INCHES
56.	99 1
56.5	98.2
57	97 4
57.5	96.5
58.	95.7
58.5	94.9
59.	94.1
59.5	93.3
60	92.5

THE LENGTH FOR ANY DESIRED FREQUENCY WILL BE $L = \frac{492.5}{f}$ WHERE L = LENGTH IN FEET; f = FREQUENCY IN MEGACYCLES.

The "Shorting-bar"

Make the matching section 50 inches long. We won't use all of it but the rest will not do any harm but can be cut off later if you insist. If you are going to use spaced feeders a "shorting-bar" will be necessary—a temporary one can be made from No. 12 wire, by soldering an alligator clip on each end of a short length so that it will just reach across the matching section. This shorting-bar is *not* necessary if twisted pair is used for the transmission line; just put the two alligator clips on the end of the twisted pair and you are all set to start the tuning operations.

Field Strength Meter

The lower part of the wooden pole should be fastened in place; or if its final position is in a dangerous or inaccessible spot, lash it to a standpipe, or something, on the roof as near as possible to its final position and well in the clear.

Before we attempt to do any tuning, some form of field strength indicating device will be necessary. Now don't let this discourage you. Even if you have no available junk box to resort to, you can start from scratch and buy the parts for such a device for three or four dollars and you will have a very worthwhile addition to your collection of radio equipment for which you will continually find new uses. The only expensive item needed is an 0 to 1 milliammeter and this does not need to be a high-priced one as accuracy is not important, a relative indication being all that we are interested in.

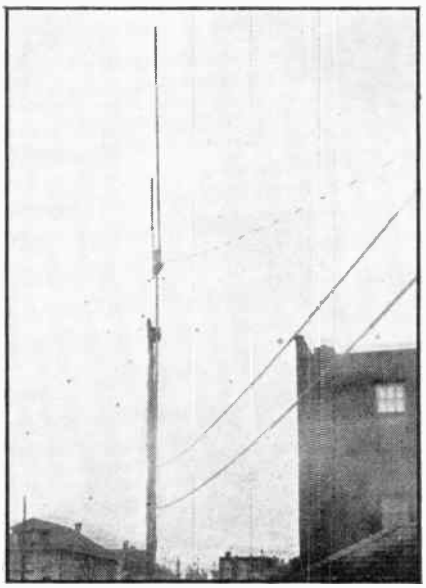
Instructions for building more elaborate field-strength meters may be found in the hand books, the simplest forms being entirely suitable for our purpose. The one illustrated in Figure 1 is about as simple as can be built and serves the purpose.

Spaced Feeders

The general consensus of opinion seems to be that twisted pair feeders are not so good and where it is possible and convenient to use a spaced-pair transmission line it should be done. Much of the prejudice against twisted pair, however, is undeserved. Good work can be done with it providing the right kind is used and *properly* used. It will *not* work well as a tuned or semi-tuned transmission line which it immediately becomes the moment the transmitter is

A STEEL PIPE "J"

Here is a novel installation, consisting of a steel-pipe "J", atop a clothes-line pole, as in use at W2MQ at Maspeth, Long Island. The metal pipe is grounded.

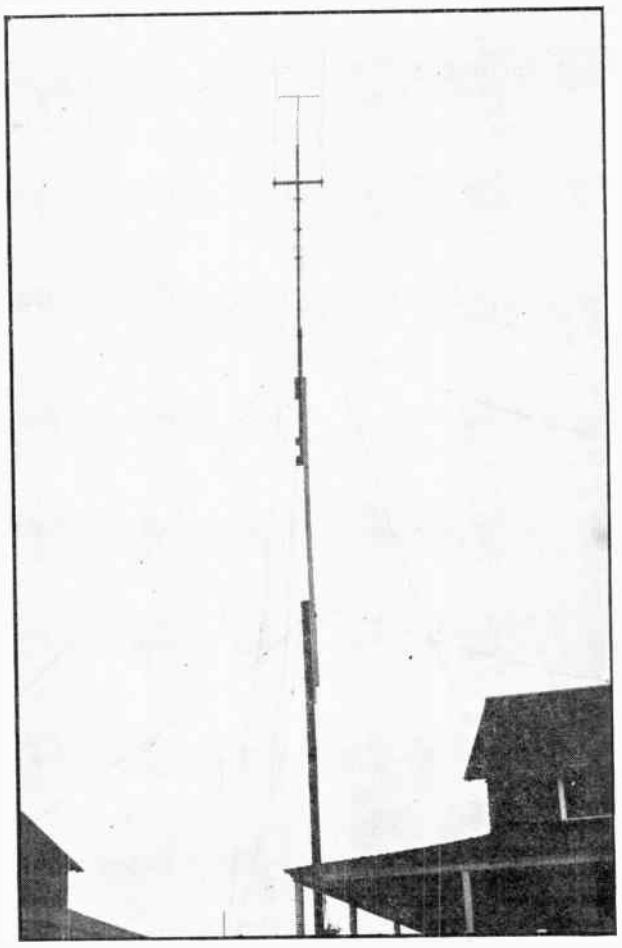


and New Double-Type

ANTENNAS

(Construction Details)

This article considers the practical construction of the standard "J" antenna and the very efficient double "J" beam, giving tuning and matching instructions for both types



THE DOUBLE "J" INSTALLED AT FAIRFIELD

This highly efficient beam antenna, atop a 60-foot collapsible mast, has been doing fine work at W2JCR's portable location in Connecticut.

shifted from its proper frequency or if a mismatch exists at the antenna end. The efficiency under such conditions decreases to a much greater extent with twisted pair than with spaced feeders. Do *not* use fabric-covered twisted pair, even if it is weather-proofed. It won't stay that way more than a few days. It must be entirely rubber covered. Even moulded rubber lamp cord (the five and ten cent store variety) is better than fabric covered wire. The latter type of line can be obtained with solid rubber covering and is well worth the added cost.

Adjusting Antenna

When used with a "J", twisted pair has the advantage of simplifying the tuning at the matching section as it eliminates one operation—the adjustment of the shorting-bar. The procedure, when tuning with twisted pair, can be as follows:

Determine the frequency on which you wish to operate and adjust the transmitter, *without* the feeders attached, to this frequency.

Set the field strength indicator near the transmitter and tune it to resonance carefully. Now do *NOT* change the adjustment on the field strength meter during the remainder of the tuning operation.

Figure the proper theoretical length of the antenna proper and matching section from the chart in Fig. 2.

Adjust the antenna rod to about an inch short of this length and clip the twisted pair feeders onto the matching section about four inches short of half the antenna length. The distance from the bottom of the antenna rod down to one clip, across to the other clip and up again to the open end of the matching section will be about the length of the antenna rod.

Now turn on the transmitter and start exploring with the field strength meter around the roof (here's hoping you have a flat one). Set it down in some position where it shows a reasonable reading and where it can be seen from the vicinity of the antenna, unless you don't mind running back and forth. All that remains to be done is to adjust the height of the rod and the feeder clips on the matching section until you have obtained a maximum reading. You will find that the matching-section adjustment is the most critical. When you get it right make sure that the telescoping sections of the antenna are securely locked. Then solder, to their proper spot on the matching section, the ends of the twisted-pair feeders.

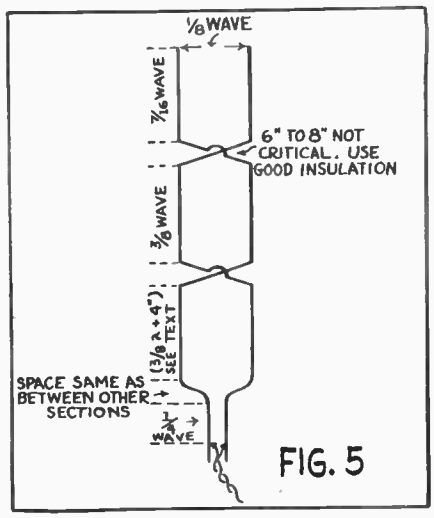


FIG. 5

Matching-in Feeders

The procedure to follow in tuning the "J" when using spaced pair feeders is the same, except for one additional adjustment. In this case the shorting-bar is placed at about the point where we clipped on the feeders, when using the twisted pair, and the spaced feeders are clipped on some distance up from the shorting-bar; depending upon the surge impedance of the feed line, the size and spacing of the wire in the matching section, etc. But again, who cares? Let the field strength meter do the calculating while we make the adjustments.

A Double "J" Beam

A simple but unusually effective type of directive beam antenna which is very easy to erect may be made in the form of a double "J" as illustrated in Fig. 4. This beam is directional in two directions in the plane of the antenna wires, giving a figure eight pattern. The two half-waves are working against each other *out*-of-phase, each acting as both director and reflector for the other. The result is a gain of several DB in *two* directions. By stacking two or three half sections, vertically, See Figure 5, the radiation is confined to a flatter beam along the earth's surface which may show a still greater gain for general coverage. The tuning up methods for the double J beam are the same as for the single J except that the matching section is slightly longer.

"Increasing" Power

When we can show a gain of several DB by such a simple expedient it does seem foolish to resort to higher and higher power on our ultra-high-frequency bands before making the most of what power we are already using by giving our antennas a little more consideration. (*Continued on page* 384)

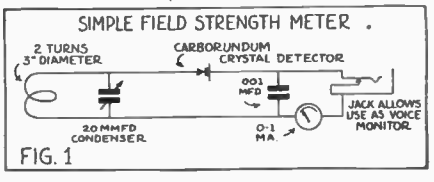


FIG. 1

Air Testing the Communication "14"

(Meissner "14-5" Kit)

By John H. Potts

(Part Two)

CONTAINS ALL THE NEW DEVELOPMENTS

The home set builder making this set can gain first-hand knowledge of the actual principles and working of many new ideas built into this receiver. And at the same time he will own a superior type communication receiver, covering all bands including the ultra-high frequencies.

LAST month the design and construction of the Meissner 14-5 Communications receiver were discussed in an article by Clifford E. Denton. Before considering its performance in "on the air" tests at one of the RADIO NEWS Listening Posts, let us review briefly some of its salient features.

THIS new Meissner receiver was designed particularly for the advanced set builder and for the more experienced operators of high-grade amateur transmitting stations. It is a unique, dual-purpose receiver, since features essential in a high-grade, high-fidelity broadcast receiver have been included, as well as those required for code and phone reception under adverse conditions. It meets the need economically for those who wish to use a single receiver for all types of reception, yet who require outstanding performance in each application. The pre-wired tuner, factory-aligned, greatly simplifies the electrical problems, while the machine-punched chassis relieves the constructor of the arduous labor of punching and drilling holes in heavy steel. There is still plenty of room for the exercise of one's skill in wiring and in the final careful realigning touches which contribute so much to receiver efficiency.

Everything Under Control

At first glance the number of controls on the front apron of the chassis may seem rather bewildering. However, each serves a definite and useful purpose. The first control at the left regulates the noise-suppression action. Following in line are the crystal condenser phasing, i.f. band width, range switch, tuning, audio volume, tone control, phones-stand-by speaker switch, and the a.v.c. level controls. The power switch is on the tone control.

Fidelity Tests

The location chosen for "on the air" tests was the author's Listening Post, on the fifth floor of an elevator apartment house, sixty feet above sea level and one block from interurban and trolley lines. Obviously this constitutes something less than a radioman's conception of a Utopia for DX listening. Yet it is typical of conditions prevalent in the average city-dweller's home, so the results secured should represent what others may expect under similar unfavorable conditions. No special antenna system was erected for the tests; a simple inverted L type, 30 feet long and 10 feet above the roof, with a 30-foot lead-in was used.

Overall fidelity tests under actual home operating conditions were greatly facilitated by taking advantage of the special monthly test broadcasts from station WQXR. This station has been allotted a special double-channel at 1550 kc. which enables the utilization of modulation side-bands of higher frequency than can be presented by other stations in the standard broadcast band without causing interference. Those within its effective range enjoy a truer presentation of orchestral music than is generally offered by the more powerful New York stations.

The station test program was tuned in with the i.f. band width switch set for "high fidelity." The a.v.c. switch was adjusted to the "off" position. The volume control was turned up to give normal room volume for the 400-cycle tone which was first broadcast by WQXR. Four listeners were present, including the writer. Two were children, as they have greater aural sensitivity for high frequencies than adults. During the test program, tones were broadcast at frequencies ranging step by step from 20 to 16,000 cycles. The receiver responded to all frequencies from 20 to 8000 cycles with sufficient volume for all to hear. Above 8000 cycles, none of us could hear the tone, which had dropped off noticeably above 6000 cycles. At the low frequency end, the output volume was excellent clear down to 40 cycles and substantial even at 20 cycles, though the tone character suffered slightly. The speaker was installed in a large cabinet during the tests.

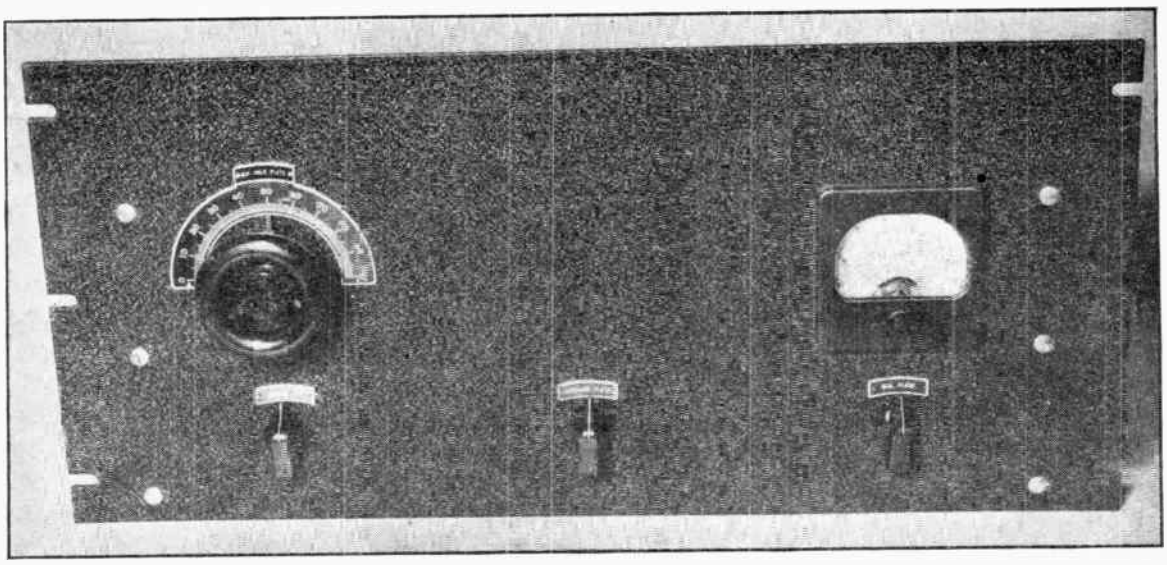
Considering that this was an overall acoustic test, and not merely an electrical fidelity measurement, this performance is excellent. There are few commercial receivers not specifically designed for high-fidelity reception which do as well.

Short-Wave Results

The receiver was then tried out on short-wave reception. A number of German, French and English stations were tuned in without the slightest difficulty. It was immediately found that good room volume could be secured using only a fraction of the available sensitivity of the set. Static conditions blanketed the weaker signals. Moving down to the 10-meter band, static is far less troublesome. Electrical noise from autos, elevators, street-cars, etc., predominates, but may be considerably reduced by judicious use of the noise suppressor. The 10-meter band, also, is where many all-wave receivers fail to perform. On this job, under the prevailing conditions, phone transmissions from every district except the 3rd were picked up without difficulty. The 3rd district is not too far away; it is too near. Skip distance enters the picture and, as a result, we find an amateur station such as W7AEM in far-off Oregon pounding in, while others, more powerful, 50 miles away, are inaudible.

Band Spread

On the 5-meter band, the designer has wisely eliminated the r.f. stage. Ordinary tubes give little or no gain at such frequencies. While the overall sensitivity on this (*Turn to page* 381)



UNIT A—A 25-WATT C.W. TRANSMITTER, LATER BECOMES THE EXCITER

The Radio News

"PROGRESSIVE" *Transmitter*

THIS is the first of a series of four articles on a real transmitter which any ham would be proud to own. It can be built on the installment plan as the pocketbook permits and can go on the air with completion of the first two simple units described herewith.

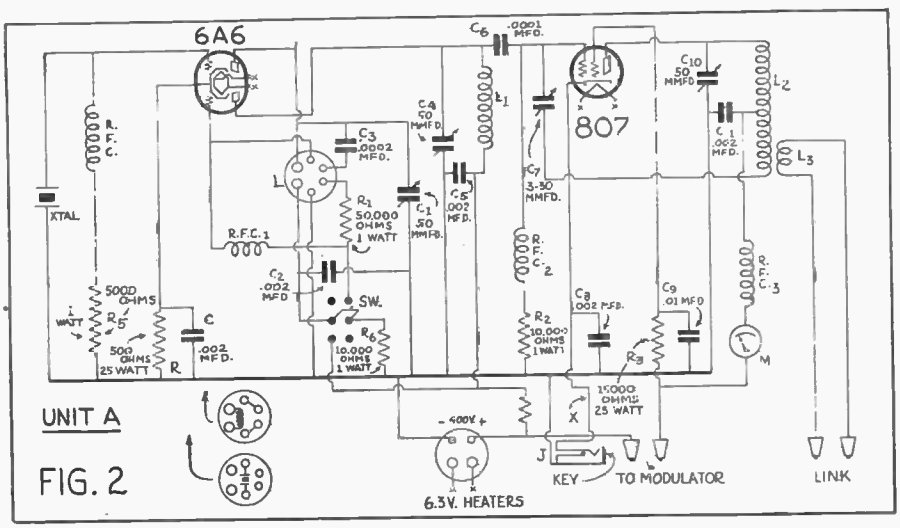
By Chester Watzel *and* Willard Bohlen

THE average amateur is a progressive sort of chap who, starting with low-power transmission equipment, builds and rebuilds until he arrives at his ultimate transmitter. During this process both money and time are often wasted because he does not start out with a definite plan for expansion. As a result his construction program is likely to be one of constant tearing down and rebuilding. The final job is a makeshift—and the pile of discarded parts staggering.

The transmitter to be described in this series of articles will appeal to many "Hams" — particularly to newcomers in the amateur fraternity, and to oldtimers who are once more getting back into the game—because it provides a means for starting in a small way and expanding in a carefully planned and orderly manner. The series will describe a "progressive" transmitter to operate crystal controlled on 10, 20, 40 and 80 meters. This present article describes and illustrates a 25-watt, 2-tube, c.w. transmitter and its power supply. Later articles will describe a suitable modulator for this low-power rig, the addition of a higher power final r.f. amplifier and in addition to the earlier modulator to provide for phone operation of this "high-power" rig. Figure 1 shows the development in a series of four steps as it will be described in this and three articles to follow.

The rig as it will be described will provide highly efficient operation on the four bands from 10 to 80 meters. The 160-meter band has not been included because tuning capacities suitable to provide efficient 10-meter operation will not provide efficient operation at 160 meters. The constructor can, however, adapt the transmitter for 160-meter operation if he so desires by winding suitable coils and by adding additional capacity at the same time.

In building a rig of this kind, it is sometimes necessary to use the low-power portion of it for some weeks or perhaps months before finances permit the addition of the high-power equipment. Such being the case, it is desirable that the low-power portion be of sufficient power to provide practical results on the air when used by itself. Yet in the final rig, its power should not be such as to be wasteful. In the transmitter being described, the output power of this first portion has been set at approximately 25 watts. This is more than ample to drive the pair of T20's to be added later but not so much higher as to represent an



extravagance.

An outline of the evolution of this transmitter will be given before starting on the details of the first unit. Figure 1 shows the progress chart of the construction details involved in each "step" to be covered in a corresponding number of articles.

Four Steps

Step 1 includes the low-power c.w. unit and its power supply. These are built up on 2 standard panels and chassis. The former utilizes a 6A6 dual triode as crystal oscillator and doubler (or quadrupler), driving an 807 beam power tube. The power supply, using a 5Z3, supplies 400 volts at 250 ma.

Step 2 involves the construction of the modulator, and the assembly of this and the two previous units on a rack, making a complete 25-watt phone rig. This modulator will be designed to include 4 type 6L6 tubes, push-pull-parallel, and provide 60 to 70 watts of audio. At first, however only two of these tubes will be used to modulate the low-power r.f. unit.

Step 3 will include construction of the T20 "high" power final. Its power supply is constructed on the unused portion of the chassis employed for the earlier power supply. This step provides a complete 112-watt c.w. rig.

Step 4 provides for the construction of another low-power supply, in order to take care of the modulator when 4—6L6's are used to modulate the high-power final. This supply unit and the modulator are then assembled on a second rack, both being of the table-mounting type.

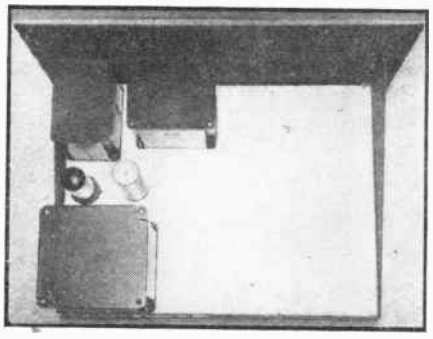
A Real Economy

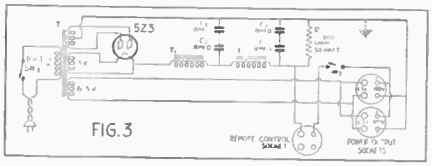
This winds up the job—a complete phone and c.w. transmitter which is capable of excellent results on any and all of these four popular bands. It will be noted that in the evolution nothing is wasted, nothing discarded. Moreover, no time is wasted in tearing down and rebuilding. Every step is a progressive one.

With these preliminaries out of the way we can now get down to a detailed consideration of Step 1.

TOP VIEW OF CHASSIS

Here is clearly shown the layout of parts on the chassis of Unit A which, when completed, constitutes a highly effective c.w. rig. Next month a suitable modulator will be described.

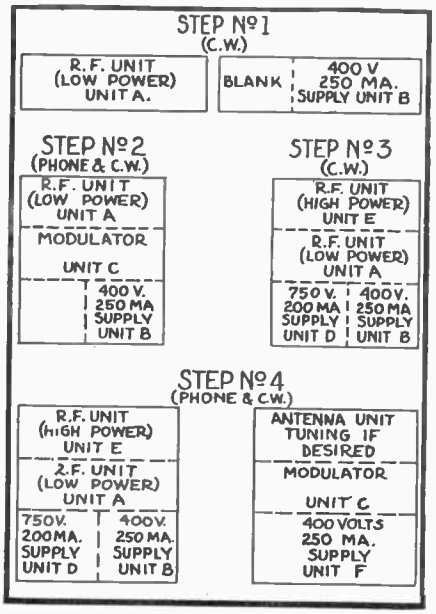




UNIT B—THE POWER SUPPLY

This power supply is for the r.f. unit shown opposite. Later, another power supply will be assembled in the space provided at the right of this chassis to take care of the high-power final r.f. stage.

In the diagram of the r. f. unit, Figure 2, the 6A6 is shown as two separate tubes for convenience. The 807 stage is of standard design using grid-leak bias.



The key plugs into the jack (J) which is one of the circuit-closing type. It might be well to use a little cathode bias on this stage to reduce the off-resonance plate current when tuning or when the excitation is removed. This could be a 10-watt, wire wound resistor of a few hundred ohms inserted in the cathode lead at the point marked "X".

Neutralization

As the 807 is to be later plate-and-screen modulated both the screen and plate voltage leads run to the "modulator" insulator. For c.w. operation the "modulator" posts are shorted. For checking neutralization of the 807 they may be opened.

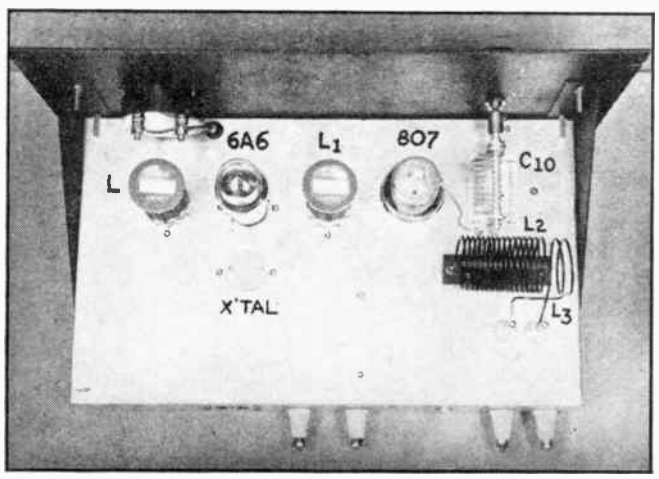
The 807 stage was first constructed with no provision for neutralization. It is shown this way in the present photos. It was found, however, that neutralization was necessary. Several minor changes were then made that are not shown in the photos but will be described.

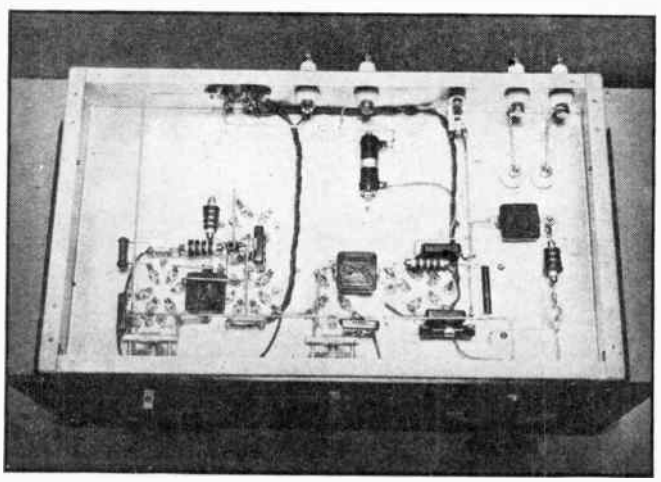
Insuring Short Leads

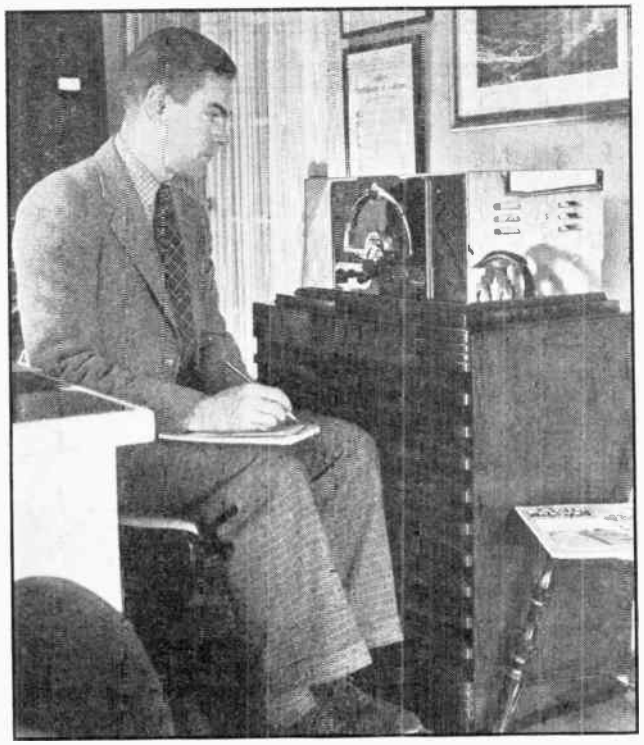
The connections to the plate coil L2 were reversed so that the plate end of the coil was away from the tube. This provided the shortest neutralizing lead. The 431J standoff jack-type insulator was moved to this end of the coil. It is desirable that the plate r. f. does not run down thru this insulator. An extra 478J feedthru jack-type insulator was mounted between the other two insulators. This connected to the tap on the coil L2 which goes to C11 and RFC3. The end feedthru insulator then went direct to neutralizing condenser C7. This condenser is a Hammarlund isolantite mounted mica trimmer type with the adjusting screw removed and the top plate bent at right angles to the fixed plate. This provided a small air-gap between the two plates. Due to the very small grid-to-plate capacity of the 807 neutralizing is not at all critical, the tube being almost neutralized with the condenser C7 in. With the tap on L2 taken a few turns from the lower end (on the diagram) it will be (*Turn to page* 372)

UNDERNEATH THE UNIT A CHASSIS

Everything here is wide open and accessible, and so planned that no alterations will be required in this unit when the high-power final stage is added.







KEEPING THE LOG AT PELHAM

One of our Official Observers at the Westchester Listening Post checking reception of foreign stations on the new receiver.

Ether Fishing with the "Masterpiece" 21-TUBE Receiver

(Silver Masterpiece VI)

By S. Gordon Taylor
and L. M. Cockaday

(Part Three)

ONCE a year McMurdo Silver designs and produces a new Masterpiece receiver, incorporating in it as many of the year's developments as he considers practical and applicable. And once a year the editors of RADIO NEWS are called upon to test, criticize and comment. Two months ago the job turned up again with this new receiver, although far from being an unpleasant task. The receiver has been put through its paces in the laboratory and also has been thoroughly tried in our Listening Posts on actual air tests. The general results and our comments have been so favorable that we are now publishing the highlights, for we feel that others might like to know just what this receiver will do. And we are not alone in our opinions, as during the tests there were present a number of outstanding persons who have heard the receiver, have seen our report and called it conservative. Among these were a U. S. Navy Lt. Commander, himself a communications officer, a Major in the Army, a well-known physician, an attorney, a broadcasting commentator and a number of engineers, including the chief engineer of one of the country's powerful broadcasting stations.

THE receiver was set up for its main air tests at the Westchester Listening Post and was installed completely, counting the time taken from the first breaking of the cartons, in less than a half hour. Naturally, our first test was to deny or to verify the manufacturer's claim that the receiver would satisfactorily pull in broadcasting stations with only a short piece of wire for an antenna. We can state emphatically that it will do so on a wire as short as the average screw driver. Actually, European s.w. stations were received using a soup spoon tied on the antenna terminal! So much for this incident.

And now for the more serious side of the tests. Broadcast reception was tested using four different classes of standard broadcast antennas; first, a vertical lead-in wire about 30 feet long; second, an "L" antenna the top portion of which was 40 feet long with a 33-foot lead-in; third, with a common type of indoor antenna around the picture molding and last, with a long wire antenna 125 feet long. Both local and DX broadcasting stations from all sections of the United States were easily received, both on the high-fidelity and more selective settings of the selectivity switch. Even with the indoor antenna, broadcasting stations in Denver and Los Angeles were picked up with ease. As the receiver has a number of selectivity adjustments, interferences from local broadcasters was easily eliminated. A visiting engineer (of a broadcasting station at some distance from New York) listened in on the set to check the operation of the station and was astonished at both the powerful signal received and the fidelity with which it was received. We quote one of his remarks: "I did not really know our station sounded as well as it does here in New York." The long wire antenna brought the most distant broadcasting stations in with tremendous volume and our only criticism was that in the case of some local stations, the long wire antenna overloaded certain of the r.f. tubes as might be expected.

Volume Expansion

Now as regards to quality of reception on broadcasting. The tests showed that with the 32 kc. band-width using the receiver's expander system, a totally different kind of radio reception is accomplished. This system puts real life into the programs and gave our visiting listeners a thrill that almost left them breathless. Soft passages were really soft and almost whispering just as they were meant to be and the swell of volume when symphony orchestras worked up to a climax was astonishing. When the expander was cut out and the program was received in the ordinary manner, it became, although still excellent tone quality, just another radio set, but with the expander operating, one could feel the personality of speakers and singers and catch the full meaning of the rhythm and harmony that famous musicians have written into their masterpieces. It is our feeling that "expansion" and "high-fidelity" must go hand-in-hand in any receiver in the future that would produce a really life-like program.

Short Waves

And now for the results on short-wave broadcasting. Except for a few days during the last two months when atmospheric conditions were exceptionally unfavorable it was easy to tune in the powerful European short-wave stations with volume and quality comparable to local reception. In this group were the Daventry stations, the German "D" stations, Italy, France, Holland, Spain, Russia, Czechoslovakia, Portugal, Switzerland, and Belgium. Other Europeans were heard quite satisfactorily at times including HVJ, LZA, SPW, SBG, CSW, OXY. Receiving from the West we heard the morning programs quite regularly of JZJ, JZK, as well as programs from ZBW4, CQN, XGOX. From the North we picked up station TFJ and all the Canadian broadcasters. From the South the multitudes of Central Americans, Cubans, and South Americans could be heard at any time without any other difficulty than the matter of trying to understand rapid-fire Spanish. All of the Australian broadcasters came through fine during the morning hours with four of the African stations logged during the afternoons. The receiver, for both regular good quality short-wave broadcast reception and for DX fishing, should satisfy all requirements.

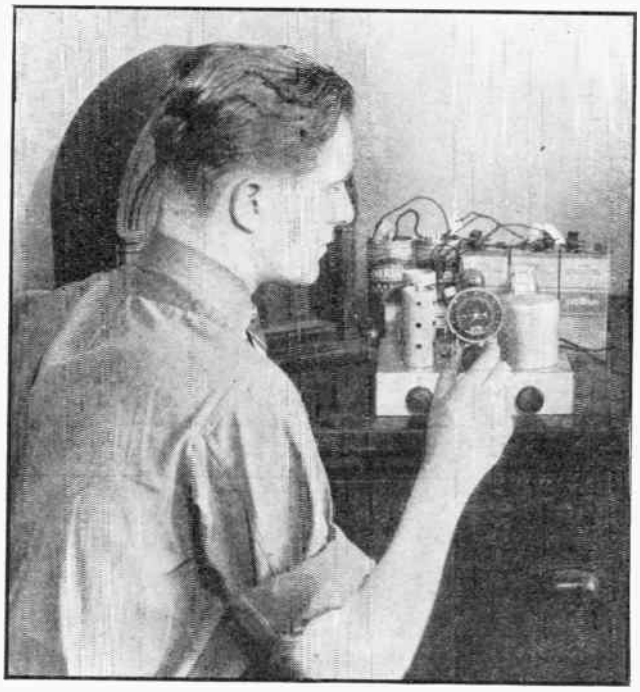
Considerable time was spent on the amateur bands from 160 meters down, including the 10-meter range, and the re-

(*Turn to page* 373)

Build this 2-Volt *The* R. N.

A simple but highly effective plug- primarily for 17-270 meter coverage well. The author's model, shown R. N. Lab. and

By Harry D.



A RIGHT-UP-TO-THE-MINUTE DESIGN

No frills, but modern and practical. This little receiver uses modern tubes and parts which result in superior efficiency as compared with older designs employing a similar circuit.

SINCE the early days of broadcast radio, the three or four tube circuit using a tuned-radio-frequency stage, a regenerative detector and one or two stages of audio has been a popular and highly efficient receiver. After the advent of the screen-grid and pentode tubes, the circuit was still further improved until today it is undoubtedly the best for the beginner or the short wave fan or ham who does not wish to go into the intricacies of building and adjusting a good superhet, yet this little receiver is capable of extraordinary performance.

THE "t.r.f." is not only easy to "get going" but in the hands of an experienced operator will do about everything that might be expected of a super of similar cost. In fact, weak signals that may be lost in the high noise level of some superheterodynes are perfectly readable on the t.r.f. receiver.

The 4-tube, battery-operated t.r.f. receiver to be described has been designed especially for the experimenter with little or no practical experience in radio construction. It employs plug-in coils. A detachable shield covers the r.f. coil. As the photographs show, it has been kept as simple as possible and only standard easy-to-get parts are used throughout. The schematic diagram, Figure 1, shows the circuit, which consists of a 1A4 as tuned r.f., a 30 as regenerative detector, another 30 as first a.f. amplifier and 1F4 for output. With the exception of the 30's, the above tubes are of rather recent release, the 1A4 being similar to the older type 34 except for a lower cut-off bias and a smaller physical size. The 1F4 is a new pentode power amplifier tube which is designed especially for economical battery operation. The rated maximum undistorted output is 0.34 watts. The recommended load resistance is 16,000 ohms which means that best results will be obtained when a high-impedance speaker or head-phones are used.

Making the Chassis

The set is built up on a 7 by 9 by 2-inch electralloy chassis. The data for cutting, drilling and bending the chassis are given in Figure 2. The layout of the parts is the result of much study to obtain short and direct r.f. wiring. Unless the constructor has had considerable experience in building short-wave receivers, it is best to follow the arrangement as given. The short-wave receiver with the most beautiful layout is not always the most efficient one.

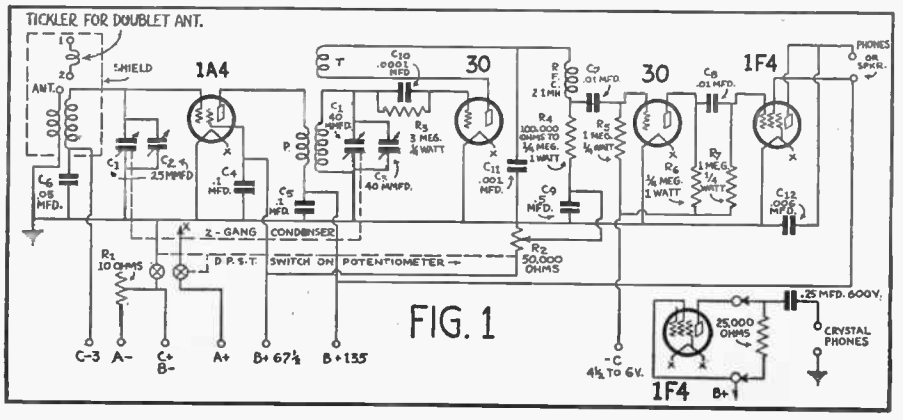


FIG. 1

The actual construction of the set is not at all difficult but the work should be done slowly and carefully. Lay out the various lines on the metal chassis as shown in Figure 2, using a scriber or other sharp-pointed instrument. Drill a small hole at the intersection of the lines and draw out the socket-hole dimensions as given. If no punch of the proper size is on hand, the holes may be reamed out and then dressed down with a half-round file. When making accurate measurements, such as socket or tube-shield mounting holes, use a pair of dividers and transfer the settings to the chassis. Drill and cut *all* of the holes before any of the parts are mounted; small metal filings or dust, once imbedded in the isolantite insulation of the sockets or tuning condenser, are extremely difficult to remove and are almost certain to cause trouble. Cut the holes for the coil sockets large enough so that the prongs of the coils cannot touch the chassis when these are being changed. It is a good practice to remove any small burrs or sharp points of metal from the edges of the holes with 00 sandpaper before mounting the sockets.

Keep Leads Short

Keep the leads, especially the "hot" grid and plate wiring from the tubes to the coil sockets and the tuning condenser, as short and direct as possible. Use a hot, clean, well-timed iron and just enough rosin core solder to make a good connection and "sweat" it into the joints thoroughly; a poorly-soldered, high-resistance connection may make the receiver insensitive or extremely noisy in operation. It is not necessary to keep the audio leads as short as those of the r.f. portion, but these leads should not be excessively long. The various paper and mica fixed condensers and carbon resistors are mounted directly on the parts terminals, their tinned leads being of sufficient stiffness to hold them in place. Make certain that the pin jacks are insulated from the chassis or short-circuits will result.

The Final Tests

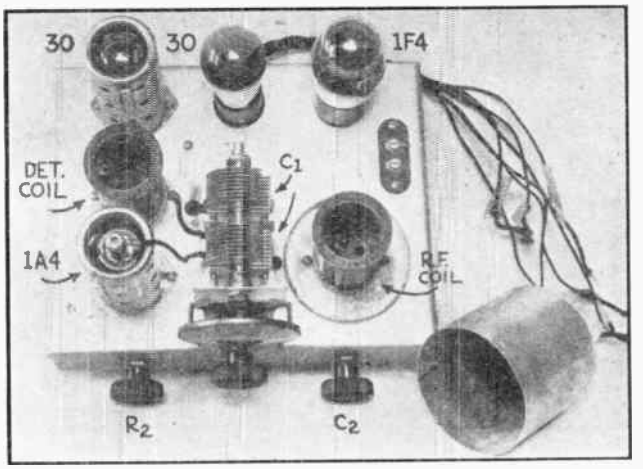
When the wiring has been completed place the coils in their respective sockets, place the 1A4 in its socket and connect the shield and grid-clip. Check the wiring against the schematic diagram, Figure 1, and with a pair of head-phones and a

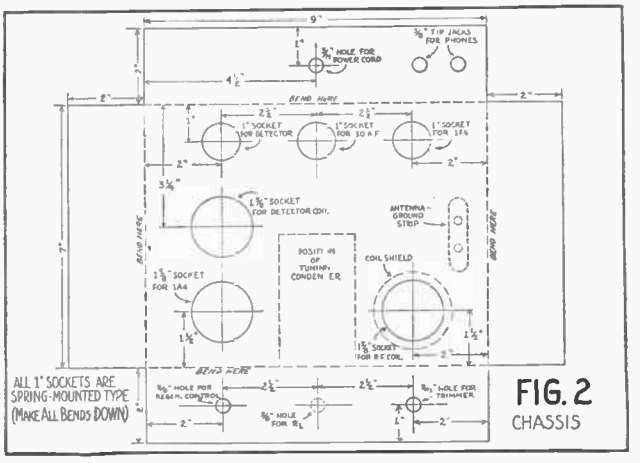
T. R. F. Receiver

"SKIPPER"

in coil receiver which is designed but will cover the broadcast band as here, was tested thoroughly in the is fully approved.

Hooton (W8KPX)





A NEAT AND EFFICIENT LAYOUT

Above: Top view of the chassis and the chassis drilling plan. There is nothing complicated about this design and any home set builder will find it an excellent set to build and use.

4½ volt "C" battery, test as follows for a possible short-circuit *before* connecting the "B" and "C" batteries. Connect one of the head-phone terminals to the chassis and the other to the "C" negative 4½-volts terminal on the test battery. Now touch each B and C battery lead to the plus terminal of the C battery, making and breaking the connection. If the circuit has been correctly wired, a loud click should be heard in the head-phones the first time the contact with the B leads is made, and very weak ones or none at all on successive contacts. This is due to the charging of the by-pass condensers. If a loud click is heard each and every time the contact is made and another when it is broken, this indicates a short-circuit in some part of the B circuit or a leaky paper condenser. Paper dielectric condensers that have been removed from old broadcast sets or picked up from bargain counters are always of doubtful quality. New by-pass units of well-known and reliable manufacturers cost only a few cents more than the "bargains," and assure trouble-free operation.

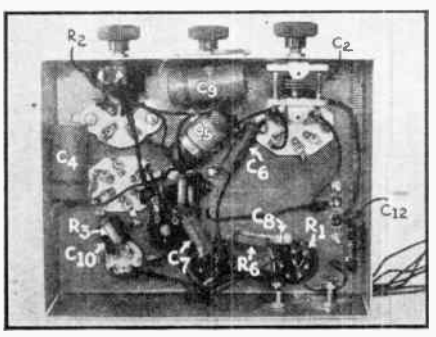
Starting Operation

If everything appears correct, connect the A, B and C batteries. Then place the other tubes in their sockets. Using a voltmeter of about 0-5 volts range, turn on the battery switch and adjust R1 until the meter reads exactly two volts when it is connected across the filament terminals of one of the tube sockets. If no voltmeter is available, the rheostat may be adjusted to the point where the filaments of the four tubes begin to show a barely noticeable but real glow at a dull cherry-red color in a dim light. Do not turn the rheostat above this point; the filaments of all 2-volt tubes are rather delicate and operation at too high temperatures will either burn them out or shorten their useful life. R1 is not shown in the photograph and may be omitted if a 2 volt shortage battery or an "Air Cell" battery is employed. A 1 ohm fixed resistor may then be substituted.

The operation of the set is extremely simple and easy. An antenna, from 30 to 75 feet in length, well-insulated and erected in the clear, is connected to one of the binding-posts on the terminal strip near the r.f. coil shield and the ground lead to the other. Turn R2 to the right until a rushing sound is heard in the phones or speaker and rotate the dial for a signal. Adjust R2 for best reception and turn (*Turn to page* 365)

THE BOTTOM VIEW

Even below deck the construction and wiring is simplicity itself.

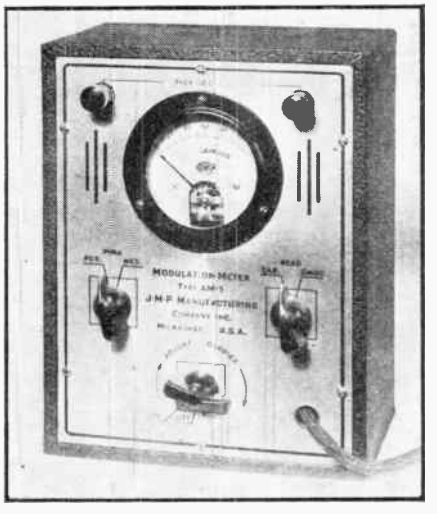


Direct-Reading Modulation Meter

By John Strong

OVER-MODULATION is conspicuous in the operation of all too many amateur transmitters and as a result overcrowding in the popular bands is greatly accentuated. In some cases it is evident that such over-modulation is intentional, in other cases it is due to carelessness but in the great majority of cases it is due to inability on the part of the operator to determine when his modulation is being held to within 100%.

A new unit has been placed on the market which not only provides direct reading of modulation percentage but permits the amateur to check his positive and negative peaks, hum level and carrier shift. This is the type AM-1 modulation meter put out by the JMP Manufacturing Company and is shown in the accompanying photograph. (*Turn to page* 379)



The DX for SHORT

Conducted by

"EVERGREEN" LISTENING POST

Observer O. Westman of Maitland, Cape, South Africa, sends best wishes, health and prosperity to all RADIO NEWS *readers from his Listening Post. He has verifications from every part of the globe except New Zealand.*

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

Credit Where It Is Due

Extra special mention is made of the following observers for their excellent reports for the past month: Alfred, Diez, Fleming, Gallagher, Myers and Randle. Our congratulations to these members for their fine attention, persistent observation and well-prepared reports.

News Notes

The following observers ask for "pen pals" and state they will answer any letters from other short-wave listeners: Thaddeus Grabek of Niagara Falls, N. Y.; Harold Murray of Malba, L. I.; Enrico Scala, Jr., of the Bronx, N. Y. and Burnell Unger of Hanover, Pa. These may be addressed in care of RADIO NEWS, 461 Eighth Avenue, New York City. The letters will be forwarded to them. Observer Grabek asks what has become of Terry A. Adams of Bombay, India. Where are you Terry? Let us hear from you.

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

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

Our DX editors announce three short-wave broadcasts to different parts of the world for complete coverage. These will be made over the General Electric stations at Schenectady, W2XAD and W2XAF. The subject of the main talk will be "Ultra-High Frequencies, 10 Meters and Below." The first broadcast will be from station W2XAD, 15.33 mc. and station W2XAF, 9.53 mc. on December 17 from 4-4:30 p.m., E.S.T. The second broadcast will be from W2XAF the same evening 11:30-midnight, E.S.T. The third broadcast will be from station W2XAF the next morning from 7-7:30 a.m., E.S.T.

Europe

DJA, Zeesen, Germany, 9,570 kc., Wittig, Wollenschlager, Shamleffer Eder, 9,560 kc.; heard 12:05 a.m. Oglesby, Lander; heard 12:05-5:15 a.m. Henry; daily 4:50-10:45 a.m. Gallagher.

DJB, Zeesen, Germany, 15,220 kc.; heard 10 p.m. Wittig, Wollenschlager, Kemp; 15,200 kc., daily 8-4 p.m. White, Shamleffer; daily 4:50-10:45 p.m. Alfred, Eder, Myers, Lander, Sculley; daily 1-3 a.m. Gallagher, Pena, Pierce, Nigh, Unger.

DJD, Zeesen, Germany 11,770 kc. Coover, Wollenschlager, Kemp, Shamleffer; daily 4:50-10:45 p.m. Alfred, Eder, Myers, Gallagher; heard daily 3:05 p.m. Diez, Pierce, Coover, Unger.

DJL, Zeesen, Germany, 15,110 kc. Wollenschlager, Kemp; heard Thurs. 5-9 p.m. Shamleffer, Alfred, Eder, Sculley; daily 3 p.m. Gallagher; daily 11:35 a.m.-4:30 p.m. Dressler, Unger.

DJN, Zeesen, Germany, 9,540 kc. Wollenschlager, Kemp; heard 9:30 p.m. Nigh, Shamleffer, Oglesby, Hendry; daily 4:50-10:45 p.m. Gallagher; heard daily 1:15 p.m. Diez.

DJE, Zeesen, Germany, 15,220 kc. Kemp; testing 10:45-11 p.m. Lopez, 17,760 kc.; heard 9 p.m. Gallagher.

DJP, Zeesen, Germany, 11,855 kc.; irregularly 7-9 p.m. Fleming; heard Tues. 6:35-8 p.m. Shamleffer.

DJQ, Zeesen, Germany, 15,260 kc.; heard 10 p.m. Wittig, Kemp, Wollenschlager, Shamleffer; 15,280 kc. heard 7 p.m. Alfred, Eder; daily 4:50-10:45 a.m. Gallagher, Pena.

DJR, Zeesen, Germany, 15,340 kc. heard 10 p.m. Wittig, Wollenschlager, Kemp, Shamleffer; heard 7 p.m. Alfred, Eder, Myers, Lander; heard 5-8 p.m. Gallagher, Jordan.

DZH, Berlin, Germany, 14,460 kc. heard Thursday 6 p.m. Shamleffer, Eder, 5:15-6:30 p.m. Dressler, Jordan.

DZC, Zeesen, Germany, 10,290 kc. heard 7-9 p.m. Fleming, Alfred, heard 4 p.m. Augustine, heard Saturday 3 p.m. Shamleffer.

DJO, Zeesen, Germany, 11,795 kc. daily 4:50-10:45 p.m. Alfred, Shamleffer, Lander.

DIP, Zeesen, Germany, 14,410 kc. heard 4:50-10:45 Alfred.

DZG, Zeesen, Germany, 15,360 kc. heard Monday 5:15-6:30 p.m. Dressler.

EAQ, Madrid, Spain, 9,860 kc. heard irregular Shamleffer, Alfred, Lander, Hernday, daily 7-9 p.m. Fleming, daily 5-7:30 p.m. & Sunday 7-8 p.m. reports requested, Gallagher, Weiss, Unger.

EAR, Madrid, Spain, 9,480 kc. heard irregular, Shamleffer, 9,584 kc. heard 8 p.m. Alfred, Fleming, Sculley, Cindel, Diez, daily 6-9 p.m. Dressler. Address: P. O. Box No. 931.

"Radio Requete," Madrid, Spain, 14,007 kc. & 13,950 kc. daily 9:45-10 p.m. Gallagher.

RV59, Moscow, U. S. S. R., 12,000 kc. daily 3-5 p.m. Westman, White, Shamleffer, heard 10:30-11 p.m. Alfred, Sibbers, heard 8:15 a.m. Smith, Tuesday & Wednesday 3-4 p.m. Scala, Lindner, Sunday & Wednesday 6-7 p.m., Monday 10-11 p.m. & 4-5 p.m. Unger.

RAN, Moscow, U. S. S. R., 15,800 kc. heard 9:30-10 p.m. Wittig, 15,080 kc. Kemp, daily 7-9:15 p.m. Alfred, Ralat, Shamleffer, Unger, Dressler, Pickering, 6,014 kc. Gallagher, Wollenschlager, Mott, Hendry, Fleming, Pena, Tuesday & Wednesday 3-4 p.m. Scala, 7,530 kc. 7-9:15 p.m. Magunson.

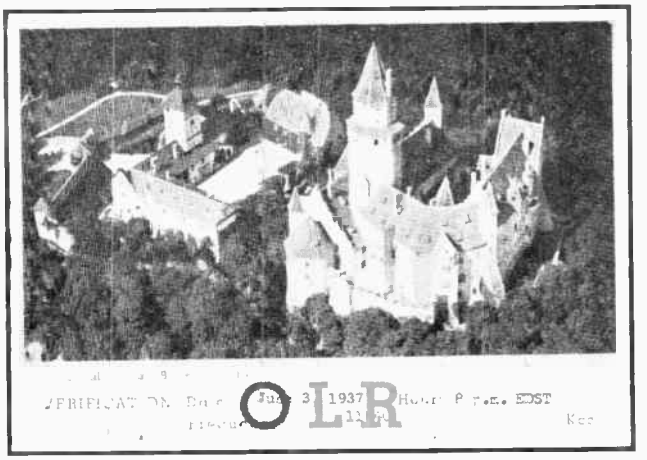
RKI, Moscow, U. S. S. R., 15,800 kc. heard 9:30-10 p.m. Wittig, 15,080 kc. Kemp, 15,040 kc. heard Tuesday 6:45 p.m. Shamleffer, heard 7-9:15 p.m. Alfred, daily 7:30-9:15 p.m. & Sunday 7-9:15 p.m. Eder, Sculley, Atherton, Mott, Jordan, Cateheim, Tuesday & Wednesday 3-4 p.m. Scala. Address: Salianka, 12, Radio Center, Blanchard, Dressler, Unger.

OLR3A, Prague, Czechoslovakia, 9,550 kc., heard 7-9 p.m. on Monday & Thursday, Alfred, 9,645 kc., signed at 5:30 p.m. Ralat.

OLR5B, Prague, Czechoslovakia, 15,320 kc. heard 9:30-11 p.m. Wittig.

OLR4A, Prague, Cechoslovakia, 11,840 kc. Coover, Kemp, Shamleffer, Monday & Thursday 7-9 p.m. Alfred, Eder, signs daily at 4:30 p.m. Fleming, Ralat, Unger, daily 2-4:30 p.m. Dress-

Corner *the* WAVES



VERIFICATION CARD FROM ORL, CZECHOSLOVAKIA
Received by Observer Herman Ruppert for his reports.

L. M. Cockaday

ler, Sculley, Gallagher, and Stevenson.

OLR5A, Prague, Czechoslovakia, 15,230 kc., Kemp, Shamleffer, signed at 10 p.m. Atherton, Monday & Thursday, 7-9 p.m. Alfred, Eder, Myers, daily 2-2:15 p.m. Catchim, Fleming, Sculley, Gallagher, Skinner.

HBF, Geneva, Switzerland, 18,450 kc., heard Saturday 8:20-8:55 p.m. Shamleffer.

HBJ, Geneva, Switzerland, 14,535 kc. Shamleffer, Saturday 7:30-8:45 p.m., Alfred, Eder, Sporn, Fleming. Slogan: "Radio Nations."

HBO, Geneva, Switzerland, 11,402 kc., Saturday 7:30-8:45 p.m. Shamleffer, Alfred, Eder, Sporn, Augustine, Fleming, Blanchard, Unger. Slogan: "Radio Nations."

HBL, Geneva, Switzerland, 9,345 kc. Saturday 5:30-6:15 p.m. Alfred Blanchard, 9,595 kc. Myers, 7:30 & 8 p.m. daily (except Saturday) on 9,340 kc. Shamleffer, Margrie, Sporn, Weiss. New schedule, 2 p.m. and on Burton, Cindel, Margrie.

HBP, Geneva, Switzerland, 7,797 kc. Saturday 5:30-6:15 p.m. Alfred, Shamleffer, Augustine. New schedule, 2 p.m. and on Burton, Blanchard, heard 7-8:30 p.m. Unger.

GSI, Daventry, England, 15,260 kc. Wollenschlager, Shamleffer, Eder, daily 9-11 p.m. Fleming, Gallagher, Diez, Pierce, Nigh, Unger.

GSJ, Daventry, England, 21,530 kc. daily 4:45-7:55 a.m. & 8:15-11 a.m. Dressler, Duncan.

GSO, Daventry, England, 13,180 kc. Noyes, Wollenschlager, Kemp, daily 4-5:45 a.m. Alfred, Gallagher, Dressler, Catchim, Unger.

GSP, Daventry, England, 15,310 kc. Noyes, Wollenschlager, Kemp, Shamleffer, daily 4-5:45 p.m. heard 6:17-8:30 p.m. Alfred, heard 11 p.m. Wittig, Myers, daily 5:30-8:30 p.m. Fleming, Gallagher, Jordan, Dressler, Catchim, Unger.

GBU, Rugby, England, 18,640 kc. (from veri) heard Monday 8:45 a.m. Shamleffer, 12,290 kc. Nigh.

GST, Daventry, England, 21,550 kc., heard irregular 9:15-12:00 a.m. Dressler.

GSB, Daventry, England, 9,510 kc. Wollenschlager, Kemp, heard Thursday 6 p.m. Shamleffer, daily 4-5:45 p.m. Alfred, Oglesby, Nigh, Hendry, Lindner, daily 6-8:30 p.m. & 9-11 p.m. Fleming, Gallagher, Coover, Unger.

GSD, Daventry, England, 11,750 kc. Noyes, Coover, Wollenschlager, Kemp, Shamleffer, heard 6-8 p.m. Nigh, Alfred, Eder, heard 9-11 p.m. Myers, Hendry, daily 5:20-8:30 p.m. & 12-2 a.m. Fleming, Gallagher, Catchim, Diez, Pierce, Redmond, Lindner, Unger.

GSF, Daventry, England, 15,140 kc. Noyes, Kemp, Shamleffer, daily 4-5:45 p.m. and 6:17-8:30 p.m. Alfred, Eder, daily 5:30-8:30 p.m. Fleming, Gallagher, Dressler, Coover, Unger.

GSG, Daventry, England, 17,790 kc. Wollenschlager, Kemp, daily 8-9 a.m. White, heard Thursday 9:05 p.m. Shamleffer, Duncan, daily 4-5:45 p.m. and heard 3:45 p.m. and 11:57 p.m. Alfred, Sculley, Gallagher, Dressler, Diez. Signed 6 p.m. Pierce, Unger.

GSH, Daventry, England, 21,470 kc. Kemp, daily 8:15-11 a.m. and 4:45-7:55 a.m. Dressler, Duncan, Pierce.

I2RO3, Rome, Italy, 9,635 kc., heard 6-7:30 p.m. and 11,810 kc., 7 p.m. Myers, Sporn, Gallagher, Fleming.

IQA, Rome, Italy, 14,750 kc., heard Sunday 4-4:20 p.m. Shamleffer, heard 8:40-9:35 p.m. Sporn.

I2RO4, Rome, Italy, 11,810 kc., daily 8-12 a.m. White, heard 7:20 p.m., 11,800 kc. (from veri) Shamleffer, heard 5 p.m., Ralat, Monday, Wednesday and Friday, 6-7:30 p.m. Fleming, Gallagher, Monday, Wednesday and Friday, 4-5:30 p.m. (from veri) Fleming, daily 7:00-8:20 a.m., 9-10 a.m., 12:30 a.m.-3 p.m. (except Sunday). Bird used is a canary (from veri) Magnuson, Coover, Nigh, Kemp, daily 6-7:45 p.m. Alfred, Shamleffer, 9,630 kc., heard 3:15-4 p.m. Sporn, Sculley, Hernday, Weiss, daily 6:45-10:30 a.m., 11:20 a.m.-12:30 p.m., 12:30-1:00 p.m. and 1:40-7:30 p.m. Address 5 Via Montello (from veri).

CT1AA, Lisbon, Portugal, 9,665 kc., Tuesday, Thursday and Saturday, 3-6 p.m., Westman, Kemp, Alfred, 9,650 kc. Shamleffer, 9,680 kc. Augustine, Sporn, Fleming. Slogan "Radio Colonial." Address: Ralio Colonial, Lisbon.

CSW, Lisbon, Portugal, 9,930 kc., signed at 8 p.m. Lindner, heard Sunday, 4:20-7:30 p.m. Shamleffer, 9,940 kc., daily 6-8 p.m. Alfred, Randle, Eder, Ralat, Harris, 10,040 kc., daily 12-6 p.m. (from veri), Sporn (11,040 kc.), 12-4 p.m. (9,940 kc.), 4-8 p.m. Hartzell, Dressler, Fleming, Sculley, Gallagher, Sahlback, Diez, Unger. Slogan: "Emisora Nacional."

CT1CT, Lisbon, Portugal, 9,680 kc., heard Thursday 3-5 p.m. and Sunday 6-8 a.m., Randle.

TPA3, Pontoise, France. 11,880 kc., heard 10:30 p.m. Wittig, heard Sunday 2:30-3 p.m. Shamleffer, Eder, Hendry, daily 3:30-6 p.m. Fleming, Unger, Gallagher, Pena. Slogan: "Radio Coloniale."

TPA4, Pontoise, France, 12,000 kc., heard 1 a.m. Gallagher, 11,720 kc. heard 10 p.m. Shamleffer, Catchim, Hernday, Fleming, heard 6 a.m., Gallagher, Weiss, Diez, signed 9:30 a.m. Pierce, Weiss. Slogan: "Radio Colonial."

TPA2, Pontoise, France, 15,243 kc. Jordan, 15,210 kc. Diez, daily 7-11 a.m. Dressler.

SM5SX, Stockholm, Sweden, 15,155 kc., Birnie, Beard, daily 11 a.m.-5 p.m. Magnuson.

SBG, Motala, Sweden, 11,705 kc. heard 1:15-1:30 p.m. Sporn, Gallagher. Slogan: "Radio Samola." Reports are requested.

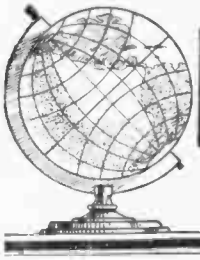
PCJ, Huizen, Holland, 9,590 kc. heard 8:30-9:30 p.m., Wittig, Coover, Shamleffer, Duncan, heard 7-10 p.m. Alfred, Eder, Ralat, Hartzell, 15,220 kc. heard 4:30-6 a.m. Sporn, Fleming, Gallagher, Wollenschlager, Weiss, Tuesday 4:30-6 a.m. and 1:30-3 p.m. Wednesday 8-11 a.m. and Thursday 7-10 (from veri) Atherton, Hendry, Diez, Unger.

PHI, Huizen, Holland, 11,730 kc.

(*Turn to page* 366)

10 YEARS OF S. W. ANNOUNCING

This is Edward Startz, announcer from the Holland stations, who speaks eight languages fluently. Everyone knows his cheery voice.



WORLD SHORT WAVE TIME-TABLE

Compiled by LAURENCE M. COCKADAY

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

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

HOURS OF TRANSMISSION

Wavelength Meters	Call Letters	Frequency Kc.	City Country
13.93	W8XK	21540	Pittsburgh, Pa.
13.93	GSJ	21530	Daventry, England
13.94	W2XE	21520	New York, N. Y.
13.97	GSH	21470	Daventry, England
15.77	HS8PJ	19020	Bangkok, Siam
16.86	GSG	17790	Daventry, England
16.87	W3XAL	17780	Bound Brook, N. J.
16.88	PHI	17770	Huizen, Holland
16.89	DJE	17760	Zeesen, Germany
19.56	DJR	15340	Zeesen, Germany
19.57	W2XAD	15330	Schenectady, N. Y.
19.60	GSP	15310	Daventry, England
19.62	LRU	15290	Buenos Aires, Arg.
19.63	DJQ	15280	Zeesen, Germany
19.65	W2XE	15270	New York, N. Y.
19.66	GSI	15260	Daventry, England
19.68	TPA2	15243	Pontoise, France
19.71	PCJ	15220	Huizen, Holland
19.72	W8XK	15210	Pittsburgh, Pa.
19.74	DJB	15200	Zeesen, Germany
19.75	ZBW4	15190	Hong Kong, China
19.76	GSO	15180	Daventry, England
19.79	JZK	15160	Nazaki, Japan
19.82	GSF	15140	Daventry, England
19.84	HVJ	15121	Vatican City
19.85	DJL	15110	Zeesen, Germany
19.88	RKI	15090	Moscow, U.S.S.R.
20.04	LZA	14970	Sofia, Bulgaria
22.16	SPW	13653	Warsaw, Poland
24.52	TFJ	12235	Reykjavik, Iceland
25.00	RV59(RNE)	12000	Moscow, U.S.S.R.
25.24	TPA3	11885	Pontoise, France
25.27	W8XK	11870	Pittsburgh, Pa.
25.34	OLR4A	11840	Podebrady, Czech.
25.36	W2XE	11830	New York, N. Y.
25.36	W9XAA	11830	Chicago, Ill.
25.40	I2RO4	11810	Rome, Italy
25.42	OER2	11800	Vienna, Austria
25.42	JZJ	11800	Nazaki, Japan
25.45	W1XAL	11790	Boston, Mass.
25.49	DJD	11770	Zeesen, Germany
25.53	GSD	11750	Daventry, England
25.57	PHI	11730	Huizen, Holland
25.58	CJRX	11730	Winnipeg, Canada
25.60	TPA4	11720	Pontoise, France
25.62	HJ4ABA	11710	Medellin, Colombia
25.63	SBG	11705	Motala, Sweden
25.64	HP5A	11700	Panama, Pana.
26.24	COCX	11435	Havana, Cuba
26.60	HIN	11280	Trujillo, D. R.
27.17	CSW	11040	Lisbon, Portugal
28.93	EAJ43	10370	Tenerife, C. I.
29.04	ORK	10330	Ruysscledc, Belgium
30.18	CSW	9940	Lisbon, Portugal
30.43	EAQ	9860	Madrid, Spain
31.00	CQN	9677	Macao, Asia
31.06	LRX	9660	Buenos Aires, Argentina
31.09	YNLF	9650	Managua, Nicaragua
31.09	CT1AA	9650	Lisbon, Portugal
31.10	HH3W	9645	Port-au-Prince, Haiti
31.25	RAN	9600	Moscow, U.S.S.R.
31.25	HJ1ABP	9600	Cartagena, Colombia
31.27	HBL	9595	Geneva, Switzerland
31.28	VK6ME	9590	Perth, Australia
31.28	W3XAU	9590	Philadelphia, Pa.
31.28	VK2ME	9590	Sydney, Australia
31.28	PCJ	9590	Huizen, Holland
31.28	HP5J	9590	Panama City, Pana.
31.32	VK3LR	9580	Lyndhurst, Australia
31.33	HJ2ABC	9575	Cucuta, Colombia
31.35	W1XK	9570	Millis, Mass.
31.38	DJA	9560	Zeesen, Germany
31.40	TIPG	9559	San Jose, C. R.
31.42	OLR3A	9550	Podebrady, Czech.
31.42	XEFT	9550	Veracruz, Mexico
31.45	DJN	9540	Zeesen, Germany
31.48	W2XAF	9530	Schenectady, N. Y
31.48	LKJ1	9530	Jeloy, Norway
31.49	ZBW3	9525	Hong Kong, China
31.51	OAX4J	9520	Lima, Peru
31.55	GSB	9510	Daventry, England
31.55	HJU	9510	Buenaventura, Colom.
31.55	VK3ME	9510	Melbourne, Australia
31.58	PRF5	9500	Rio de Janeiro, Brazil
31.58	HJ1ABE	9500	Cartagena, Colombia
31.82	COCH	9428	Havana, Cuba
32.09	HS8PJ	9350	Bangkok, Siam
32.88	HAT4	9125	Budapest, Hungary
33.53	HCJB	8948	Quito, Ecuador
34.62	CO9JQ	8665	Camaguey, Cuba
38.48	HBP	7797	Geneva, Switzerland
43.48	HI3C	6900	La Romana, D. R
43.59	XGOX	6820	Nanking, China
44.14	HIH	6796	San Pedro, D. R.

GREENWICH MEAN TIME											
13	14	15	16	17	18	19	20	21	22	23	00

HOURS OF TRANSMISSION

WORLD SHORT WAVE TIME-TABLE

(Continued from the Previous Page)

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

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

FILL IN LOCAL TIME
EASTERN STANDARD TIME
GREENWICH MEAN TIME

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

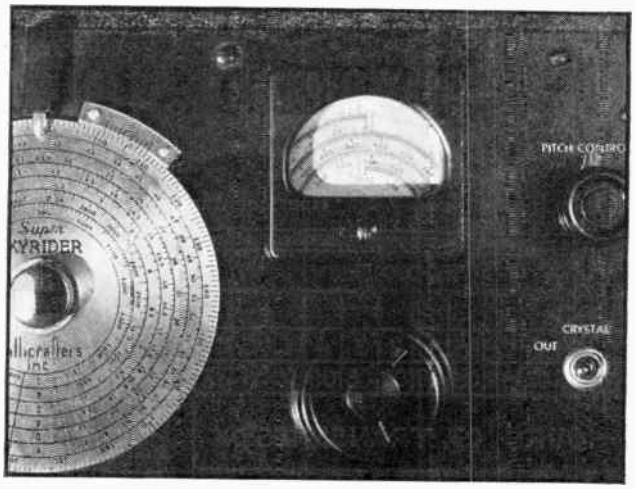
Wave-length Meters	Call Letters	Frequency Kc.	City Country	HOURS OF TRANSMISSION
44.71	T1EP	6710	San Jose, Costa Rica	I D D
45.22	HC2RL	6635	Guayaquil, Ecuador	S S S
45.25	H1T	6630	Trujillo, D. R.	XS XS D D
45.34	PRADO	6618	Riobamba, Ecuador	T T XS XS XS XS XS XS XS
45.80	H14D	6550	Trujillo, D. R.	D D D D D D D
46.01	YV4RA	6520	Valencia, Venezuela	D D D D D
46.08	H1L	6510	Trujillo, D. R.	D D D D
46.66	H11S	6430	Puerto Plata, D. R.	D D D D
46.85	YV5RH	6400	Caracas, Venezuela	D D D D D
46.91	H18Q	6395	Trujillo, D. R.	D D D D D D D
47.10	YV5RF	6375	Caracas, Venezuela	D D D D D
47.12	YV1RH	6360	Maracaibo, Venezuela	D D D
47.24	HRP1	6350	San Pedro Sula, Honduras	D D D D
47.54	H1Z	6310	Trujillo, D. R.	S S S I I I I
47.62	YV4RD	6300	Maracay, Venezuela	XS
47.77	H1G	6280	Trujillo, D. R.	D D D D D D D
47.77	COHB	6280	Sancti, Spiritus, Cuba	D D D
48.05	H1N	6243	Trujillo, D. R.	S S
48.11	HRD	6235	La Ceiba, Honduras	L
48.15	OAX4G	6230	Lima, Peru	AM
48.19	HJ1ABH	6225	Cienaga, Colombia	D
48.39	COKG	6200	Santiago, Cuba	D D D D
48.50	H11A	6185	Santiago, D. R.	D
48.62	OAX1A	6170	Chiclayo, Peru	D
48.70	XEXA	6160	Mexico, D. F. Mexico	XS XC V V Sa D D
48.70	VPB	6160	Colombo, Ceylon	D D D D D D D
48.70	CJRO	6160	Winnipeg, Canada	D D D D
48.72	YV5RD	6158	Caracas, Venezuela	D
48.78	VE9CL	6150	Winnipeg, Canada	D S S
48.78	HJ2ABA	6150	Tunja, Colombia	D D D D D D
48.78	HJ5ABC	6150	Cali, Colombia	D D D D D D D D
48.86	W8XK	6140	Pittsburgh, Pa.	X X X X X F F SF D D D D
48.88	CR7AA	6137	Lourenzo Marques, A.	D D D D D D D
48.94	LKJ1	6130	Jelov, Norway	X D D XS D D D D
48.94	VE9HX	6130	Halifax, N. S.	D D D D D D D D
48.94	COCD	6130	Havana, Cuba	XS XS D D XS D D
48.96	HJ3ABX	6122	Bogota, Colombia	D D D D
49.00	HJ1ABB	6120	Barranquilla, Colom.	XS D D D D D D
49.18	YTC	6100	Belgrade, Yugoslavia	D D D D D D D D D D D D D D D D
49.18	W3XAL	6100	Bound Brook, N. J.	XS
49.18	W9XF	6100	Chicago, Ill.	
49.20	ZTJ (JB)	6098	Johannesburg, Africa	S D D XS D D D D
49.20	HJ4ABE	6097	Medellin, Colombia	D D D D D D D D D D D D D D D D
49.26	CRCX	6090	Toronto, Canada	S D D D D D D D D D D D D D D D
49.30	HJ5ABD	6085	Cali, Colombia	N
49.31	HJ3ABF	6084	Bogota, Colombia	D XS
49.32	VQ7LO	6083	Nairobi, Kenya, Afr	E E U U U XC XS XS D
49.34	HP5F	6080	Colon, Panama	S D XS S S D
49.34	W9XAA	6080	Chicago, Ill.	D D D D E D D D D D D D D D D D
49.34	ZHJ	6080	Penang, S. S.	XS D D D D D D D D D D D D D D D D
49.42	YV1RE	6070	Maracaibo, Venez	D D D D
49.46	SBG	6065	Motala, Sweden	D D D D E D D D D D D D D D D D
49.50	W8XAL	6060	Cincinnati, Ohio	S S D D D D D D D D D D D D D D
49.50	W3XAU	6060	Philadelphia, Pa.	D D D D D D D D D D D D D D D D
49.50	OXY	6060	Skamlebaek, Denmark	D D D D D D D D D D D D D D D D
49.59	HJ3ABD	6050	Bogota, Colombia	D D D D D D D D D D D D D D D D
49.59	H19B	6050	Trujillo, D. R.	D D D D D D D D D D D D D D D D
49.63	HJ3ABI	6045	Bogota, Colombia	D D D D D D D D D D D D D D D D
49.65	HJ1ABG	6042	Barranquilla, Colom.	XS XS S XS XS D D D D D D D D D D
49.67	WIXAL	6040	Boston, Mass.	D D D D D D D D D D D D D D D D
49.67	YDA	6040	Tandjong Priok, Java	D D D D D D D D D D D D D D D D
49.75	HP5B	6030	Panama City, Panama	D D D D D D D D D D D D D D D D
49.79	HJ1ABJ	6025	Santa Marta, Colombia	D D D D D D D D D D D D D D D D
49.83	DJC	6020	Zeesen, Germany	D D D D D D D D D D D D D D D D
49.83	XEUW	6020	Veracruz, Mexico	D D D D D D D D D D D D D D D D
49.88	XEWI	6015	Mexico, D. F., Mexico	D D D D D D D D D D D D D D D D
49.90	HJ3ABH	6012	Bogota, Colombia	D D D D D D D D D D D D D D D D
49.92	COCO	6010	Havana, Cuba	D D D D D D D D D D D D D D D D
49.96	CFCX	6005	Montreal, Canada	D D D D D D D D D D D D D D D D
49.96	HP5K	6005	Colon, Panama	D D D D D D D D D D D D D D D D
49.96	VE9DN	6005	Montreal, Canada	D D D D D D D D D D D D D D D D
50.00	XEBT	6000	Mexico, D. F., Mexico	D D D D D D D D D D D D D D D D
50.17	HIX	5980	Trujillo, D. R.	S S S D D D D D D D D D D D D D
50.25	HJN	5970	Bogota, Colombia	D D D D D D D D D D D D D D D D
50.26	HVJ	5969	Vatican City	D D D D D D D D D D D D D D D D
50.50	TG2X	5940	Guatemala City	D D D D D D D D D D D D D D D D
50.72	HH2S	5915	Port-au-Prince, Haiti	D D D D D D D D D D D D D D D D
50.76	HRN	5910	Tegucigalpa, Hond.	D D D D D D D D D D D D D D D D
50.85	YV3RA	5900	Barquisimeto, Venez.	D D D D D D D D D D D D D D D D
51.15	H11J	5865	San Pedro, D. R.	D D D D D D D D D D D D D D D D
51.46	TIGPH	5830	Alma Tica, Costa Rica	D D D D D D D D D D D D D D D D
51.72	YV5RC	5800	Caracas, Venezuela	S D D D D S S S D D D D D D D D
51.90	OAX4D	5780	Lima, Peru	AN AN AN

List of Symbols

A—Tuesday, Wednesday, Thursday
B—Saturday, Sunday
C—Monday, Wednesday, Friday
D—Daily
E—Tuesday, Thursday
F—Friday
H—Sunday, Monday, Wednesday, Friday
G—Tuesday, Thursday, Saturday
I—Irregularly
J—Sunday, Tuesday, Wednesday
K—Monday, Friday
L—Wednesday, Saturday
M—Monday
N—Tuesday, Wednesday
P—Except Tuesday, Wednesday
Q—Sunday, Monday, Tuesday
R—Sunday, Wednesday, Saturday
S—Sunday
SF—Sunday, Friday
T—Tuesday
Th—Thursday
U—Sunday, Monday, Thursday
V—Sunday, Wednesday
W—Wednesday
Z—Tuesday, Friday
AC—Monday, Thursday, Saturday
AG—Tuesday, Sunday
AH—Monday, Wednesday, Saturday
AM—Monday, Thursday
AN—Tuesday, Saturday
AO—Wednesday, Thursday
Sa—Saturday
X—Except Saturday, Sunday
XC—Except Tuesday, Thursday, Sunday
XS—Except Sunday
XSa—Except Saturday

Spinning the Dials of the "SKYRIDER"

By Laurence M. Cockaday
and S. Gordon Taylor



HERE'S A UNIQUE BAND-SPREAD SCALE!

The scale set behind the small window surmounting the bandspread tuning control takes a spiral shape. Behind it is a spot of light which travels as the control rotates, indicating the point on the scale to which the bandspread system is tuned. Three full revolutions of this dial are required to tune the bandspread range. At the left is the main dial on which all six tuning ranges are completeely calibrated.

WHAT we might call the "operating mechanics" of the Super-Skyrider proved highly satisfactory in recent air tests made in our Listening Post. The controls all acted smoothly and accurately, the range for which the band switch is set is clearly indicated, the dial calibration for all ranges is considerably more accurate than the great majority of present-day receivers, etc.

To determine the effectiveness of the band-spreading system, a check was made on the 10-meter amateur band. It was found that this 28-30 megacycle range covered from 925 to 225 on the band-spread dial, which is calibrated from zero to 1000 but actually divided off into 500 divisions. Thus even in this very high-frequency range where tuning on most receivers is badly crowded, this receiver averages only about 11 kc. per division.

Another feature which provides for comfortable tuning is found in the type and action of the knobs provided for both main tuning and band-spread tuning. These take the form of sizable wheels and are provided with free-wheeling action. When given a twist with the fingers, they continue rotating for an appreciable time and big jumps in tuning are accomplished speedily and with a minimum of effort.

"Broad or Sharp"

Rather unusual for a communications type receiver is the fact that the quality of reproduction provided on the broadcast band is really fine. This is with the "selectivity" switch in the broad position. Thrown to the sharp position, a radical change in quality is very apparent as a result of very definite sideband cutting. This latter reduction of high-frequency response likewise results in a very low noise level and a correspondingly good signal-to-noise ratio. This is further improved by judicious use of the tone control.

Crystal Filter

The crystal filter provides still greater selectivity and is of inestimable value in the reception of c.w. signals. Unlike many crystal circuits, it is definitely usable on speech signals. Although sideband cutting is severe in such reception, the speech is nevertheless intelligible. The crystal, combined with the beat-frequency oscillator, provide excellent "single signal" tuning for c. w. reception. The "pitch control" on the front panel is a distinct aid in such operation and the "beat-frequency oscillator injection" control permits the output of the beat-frequency oscillator to be regulated in accordance with the strength of the desired signal.

It would be possible to go on at great length, detailing the functioning of the various refinements provided in this Super-Skyrider model. However, as space is limited, it is necessary to proceed with the discussion of the actual results accomplished during the Listening Post tests. These were carried on at the "ham" stations, W2JCY, a few miles out of New York City, W2JCR, in New York City and W2JCR-portable, at Fairfield Beach, Conn.

Antennas Tried

In general, it was found, as would be expected, that the best results on any band were obtained when using an antenna resonating in the particular band. However, standard all-wave doublet antennas were tried and the performance obtained with them was laudable. Even an ordinary "L" type BCL antenna was used to advantage. The only variation from the foregoing statements is that for 5-meter reception it was found almost essential to use a regular 5-meter antenna. Strange as it may seem, however, results on 10 meters, using an ordinary "L" type antenna, were as good if not a little better than when using a 10-meter doublet.

The Test Results

It is out of the question to present here a log of all the stations tuned in during these extensive "on the air" tests. Reference to the sensitivity curves published last month indicate that the sensitivity of the receiver is lower in the range which includes the 10-meter band than in the lower-frequency ranges which include the other amateur bands. Therefore this range was selected for the presentation of a log of stations heard. This portion of the test was conducted at W2JCY, at North Pelham, N. Y., and covered a two-week period of operation. Some 300 10-meter stations were logged during this time and close to 80% of them were not only logged but were worked. While nothing but DX stations were included among these 300 stations, many of them are being omitted from the following list, including all United States stations. The list therefore represents only the foreign stations and even many of these have been omitted where a great many were heard in any one country. Immediately after each call there is given the "R" strength at which each station was logged: British Amateurs; G6DH-9, G6GS-9, G6WU-8, G6VX-9, G5VM-9, G6BJ-9, G2PL-9, G2KH-8, G2IT-9, G2DC-9. German; D4ORT-9, D4QET-9, D4YLI-9, D4GDF-9, D4AOR-8, D3PBN-7. French; F8BS-7, F8LX-9, F8HS-7, F3CX-7, F3GR-8. Dutch; PAOAZ-9, PAOGN-9, PAOFB-9, PAOXR-9. Some other Europeans were EI9J-9 in Ireland; GM6RG-9, in Scotland: GW8HI-9 and GW2UL-9, in Wales; SM5O1-9 and SM5YH-7, in Sweden; OK2RM-7, OK20P-8, OK2WV-9, in Czechoslovakia; ON4JB-7, ON4AU-8, in Belgium. Other stations worked or heard in all parts of the world included the following list; LU9BV-9, LU5AN-6, OA4J-8, K4EIL-8, K4EJG-8, ZT2G-8, ZS1AH-7, ZS6AJ-7 ZU6P-8, XE1JB-4, ZL2CI-7, SV1WM-4, VU2CQ-8, K6MVV-9, K6MHY-7, K6OQE-9, K6LCV-8, K6OGS-6, K6KNV-8, K5AT-9, K5AC-9, VO2MV-8, VK2GU-8, VK2UD-4. J8CF-4, J3JF-7, J5CC7, XE1GE-9, XE1AM-7, XE1AG-7 PY3AB-4, PY2AC-8, TI2RC-5. TI2FG-9, (*Turn to page* 383)

Technical vs. "Air" Tests

IN the descriptive article last month the features of this receiver, based on laboratory measurements of sensitivity, selectivity and fidelity, were presented, together with a general description of the circuit. This month we take the receiver out of the laboratory and into the Listening Post for a check on its performance in actual "on the air" operation dealing with real signals.

ALLIED LEADS AGAIN IN VALUE!

1938 KNIGHT RADIOS OFFER EVERY New FEATURE

ELECTRIC PUSH-BUTTON TUNING • FULL-VISION DIALS
STUDIO TONE QUALITY • WORLD-WIDE RANGE
AND MANY OTHER "MONTHS-AHEAD" FEATURES

AT PRICES THAT CHALLENGE THE INDUSTRY!

KNIGHT 11-TUBE ALL-WAVE with Electric Tuning, Select-o-Matic Dial, 12" speaker only $58.95

KNIGHT 7-TUBE CHAIR-SIDE with Select-o-Dial Tuning, World-Wide Range only $41.75

KNIGHT 5-TUBE SUPERHET with Quick-Touch Dial Tuning only $13.95

57 other great KNIGHT Models shown in ALLIED'S Catalog

KNIGHT 7-TUBE DUAL-WAVE with Electric Eye, Tone Control, full A. V. C. only $18.95

ALLIED has done it again! Now in the 1938 Knights, ALLIED presents radio's newest thrilling features at sensational, typically-ALLIED prices: *Select-O-Matic Electric Tuning*—a station a second, just press a button! New simplified Horizontal Dials—new Full-voiced Speakers—Broadcast Studio Tone Quality—Advanced R. C. A. and Hazeltine licensed circuits—Newest Tube types—World-Wide Range—the Electric Eye—Automatic Frequency Control—all these features and more, at the season's lowest prices!

Only ALLIED's tremendous volume, low distribution costs, and low-price policy makes these values possible. KNIGHT Radios offer you greater values and bigger profits than any other line. Choose from 61 great models—for every purpose—from 5 to 16 Tubes, for AC, AC-DC, 6 volt, 32 volt. battery and auto operation. See them all in ALLIED's great 1938 Catalog—if you haven't one, just send coupon.

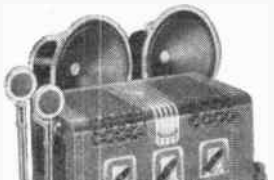
Everything in Radio at Lowest Prices!

Whether you're a Dealer, Service man, Sound - Specialist, or Amateur - Experimenter, you need ALLIED's 1938 Catalog. It brings you everything you need in one book, at lowest prices. Over 12,000 Parts, for building or repairing any circuit. Complete *Amateur* Section—all nationally-known lines of receivers, transceivers, transmitters—factory-built or kit form. *Test-Equipment* for every service requirement, including new instrument-kits. *Sound* and *Inter-Com* Systems—*Builders' Kits* of every type—*Books, Tools, Tool-Kits*—every radio requirement.

ALLIED's high standards and rigorous testing assure you of highest quality. Fast dependable shipment (stocks all under one roof) saves your time. And ALLIED's prices (possible through tremendous volume) save you money. That's why thousands buy from ALLIED! For free catalog, just send coupon.

KITS

Radio's largest selection, from Beginners' One-Tuber to 14-tube Superhet. Write for Free Parts Lists for any kit described in any radio publication.



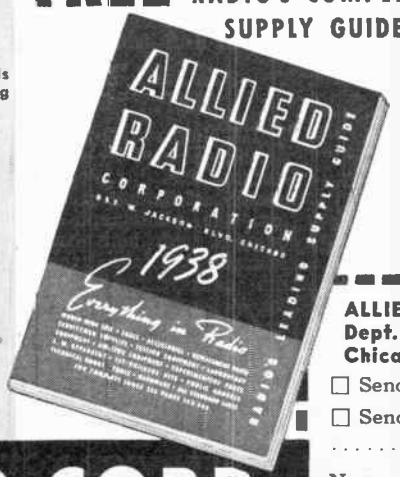
SOUND

Knight Integrated Sound Systems for every PA need—8 to 60 watts—and Inter-Com Systems, 2-way, Selective and Super-Selective.

TESTERS

Every type—analyzers, tube-checkers, set-testers, meters, signal generators — all nationally-known brands, at lowest prices.

FREE SEND COUPON FOR RADIO'S COMPLETE SUPPLY GUIDE

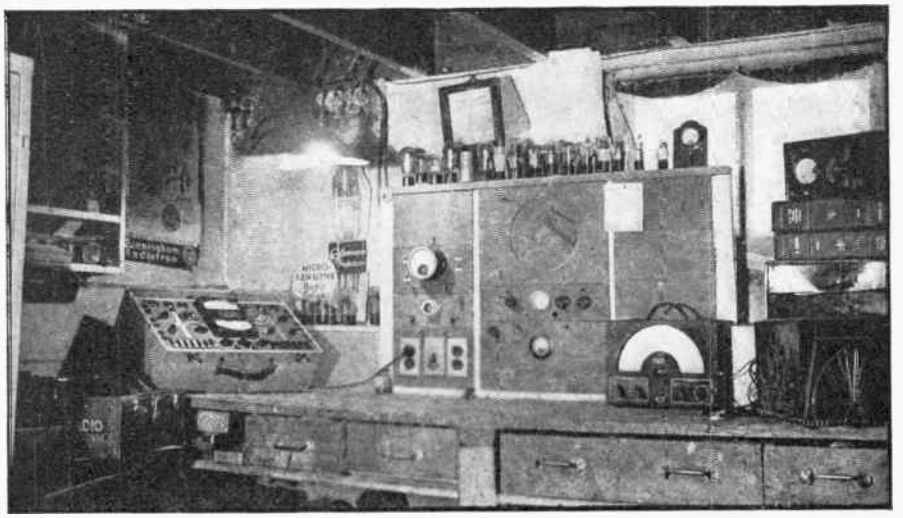


ALLIED RADIO CORP.
833 WEST JACKSON BLVD. CHICAGO, ILLINOIS

ALLIED RADIO CORPORATION
Dept. 1-M8, 833 W. Jackson Blvd., Chicago, Ill.

☐ Send your Free 1938 Catalog
☐ Send Free Parts Lists for .....
.....

Name .....
Address .....
City ..... State .....



"SERVICEABLE AND HANDY"—WORDS SERVICEMAN UNDERSTANDS
Figure 5. A husky Bench that looks as if it had seen plenty of profitable service!

SERVICE — SALES

(*Continued from page 333*)

complete story of the excellent application feature of this new tool. All of us have at some time or another had the annoying experience of trying to work a screw-driver in a dark corner of a radio receiver chassis, testing instrument, or some other piece of radio apparatus. The Stanley Tool Company introduces this special flash-light screw driver especially to take the headaches out of such work. The overall length of the tool is 11 inches. The width of the blade is $\frac{3}{16}$ of an inch. The tool is made of tempered

steel and is magnetized for picking up small objects. The composition handle holds two standard flash-light cells.

THIS MONTH'S SERVICE SHOP

THE shop shown in Figure 5 is owned and operated by George A. Popdavid, Canton, Ohio. Mr. Popdavid fails to send us any details but it is obvious enough from the photograph that he is well equipped with both bench and portable apparatus. We take it this is a cellar shop, with correspondingly reduced overhead. The owner has not lost his sense of display as will be observed from the RCA-Cunningham posters. Mr. Popdavid has a neat enough letterhead to justify publication, and we show it in Figure 6. The printing is in black with the horizontal lines in red.

SERVICE NOTES

THE next time you visit your distributor, look around for one of the displays shown in Figure 7—playing up the Ghirardi trouble-shooting gadgets. Look 'em over and act accordingly. We don't know why it hasn't occurred to someone, but these gadgets are of unusual value to the service student, and a lot can be learned for keeps by checking the various items against corresponding sections or lessons in his service course.

Transitone—Philco—announces a new service manual on all Philco Auto Radios. Free copies to authorized service stations and a nominal cost to the trade in general. According to the release—"The book contains schematic diagrams, base views, parts lists, major changes, adjustments and general information on every Philco auto radio ever produced. Needs of the servicemen were uppermost in the minds of the editors. . . . Required months for its preparation." Remember the days when the dealer serviceman couldn't wangle so much as a minor specification from a manufacturer for love or money—by hook or by crook?

SOUTHWARD HO!

IN the spring the young serviceman's fancy may turn to other things, but in the fall—about the time this issue of RADIO NEWS appears—those of them who are able to do so consider the possibilities of migrating south. Your service editor spent a goodly portion of last winter visiting servicemen in various parts of Florida, investigating conditions and determining as far as possible just what the chances were of the northern serviceman making a living there during the winter. Representatives of several trades and professions do transfer their activities to the south for the winter season—for reasons of comfort, or because the state of health of themselves or members of their families make it inadvisable to attempt withstanding the rigors of the northern cold. The question is—can the radio serviceman do likewise? The answer is YES to the A-1 serviceman with enough capital to help him over his first season. The problems involved are both economic and technical.

Cost of Living

A family of three can drive from the northern part of New York state to the southern section of Florida for under forty dollars—including meals, first class accommodations at overnight camps, gas, oil, tips, etc. It will cost about ten dollars to freight essential household goods and equipment. Thus round-trip transportation will amount to approximately one hundred dollars, which just about equals the differential

Servicemen! Dealers!

HAVE you a well-equipped shop, neatly and efficiently laid out? Or an attractive and effective Window Display, Sales Counter, Demonstration Room, or Service Bench? If so, send in a photo, with a short description, for publication. After using it, you can have the cut, free of charge.

Here is a chance to obtain an expensive cut, gratis, suitable for any literature or newspaper advertising you have in mind.

Send photos and captions to the Service Editor, RADIO NEWS, 461 Eighth Avenue, New York City.

between the cost of heating during a northern winter and a southern winter. The actual cost of living in Florida is definitely cheaper than up north—excepting of course for the tourist and vacationist splurging at the swank resorts. In general, the cost of living is higher on the east coast. It is lower in the central portions and on the west coast, excepting in the vicinity of Clearwater and St. Petersburg, where it is very high indeed. Probably nowhere is the cost of living cheaper than in the City of Tampa and its suburbs. A city such as this, with a large year-round population, offers the greatest opportunities for radio servicing. Resort cities, catering largely to hotel trade should be avoided, as the cost of living is usually high, and the transient population has few radios to service.

Locate close to a large municipal trailer camp if possible. The thousands of trailers that pass through each season offer many chances for automobile and trailer radio servicing. Make the acquaintance of the director of the trailer camp, and arrange to display a small card advertising your services in the recreation room, office, etc.

Rentals are reasonable—and in many instances ridiculously cheap. If you are satisfied with a modest bungalow—unpre-

(*Turn to page 372*)

Figure 7. Ghirardi's gadgets on display.

RADIO PHYSICS COURSE

ALERED A. GHIRARDI

Lesson 68. Meters

ABOUT 1885 Dr. Weston set about to improve the D'Arsonval galvanometer and reduce it to a form which would meet all conditions of accuracy, ruggedness, portability, compact size, etc., required for electrical measuring instruments which were needed at the time in connection with the development of electric lighting systems and electroplating. The so-called "Weston movement" so widely used today in d.c. measuring instruments is the result of his work. He retained the basic idea of the stationary permanent magnet and moving coil, but introduced several refinements of construction which eliminated most of the objections to the old D'Arsonval galvanometer.

The moving element consisting of the coil frame, coil winding, pivots, springs and pointer was made very light to reduce friction in the bearings. An idea of the remarkable lightness achieved in these units may be gained from the fact that in one type of portable Weston combined voltmeter and ammeter, the entire movable system weighs less than .007 ounces although consisting of 16 separate little parts. Since the wire wound on such a moving element must be fine and light, it is evident that the movable coil cannot carry very much current without undue heating. The movable element in this form of meter is rarely allowed to carry more than about 0.05 ampere. Thus for ammeters or milliammeters designed to measure currents up to about this value the moving coil is connected directly in the circuit, and carries the full circuit current as shown at (A) of Figure 1. The reading of the meter is of course directly proportional to the current or (number of electrons per second) flowing through the circuit and the moving coil.

If the meter is to be connected into circuits carrying more current than this, it is evident that we must either increase the size of the wire on the movable coil proportionally to take care of the larger current without undue heating, or else we must allow only a definite fraction of the total current of the circuit to go through the meter coil, as shown at (B). The former method is impractical for it would result in a clumsy, heavy, movable coil and greatly increased inertia and bearing friction. The latter method is the one used in ammeters. The current is divided, a certain definite part of it flowing through the movable coil and the rest "shunted" around the coil by means of a low resistance "shunt" connected across it. The action of the meter with the shunt may be explained as follows:

At (A) of Figure 1, the only path for the current is through the moving coil of the instrument. If the current to be measured is greater than the wire on the moving coil can safely carry, part of the current can be "shunted" or allowed to flow through the parallel *shunt* resistor R_s as shown at (B). Suppose the resistance R_s of this shunt is just equal to the resistance R_m of the moving coil of the meter; then, of course, just half of the total current will go through this shunt and half will go through the meter coil, and all we have to do is multiply any reading of the instrument by 2 to determine the total current. If we carried this further and added another similar shunt as at (C) the instrument reading would represent ⅓ of the total current. We might continue this indefinitely, adding any number of equal shunt resistors in parallel and thereby making the current actually flowing through the coil less and less.

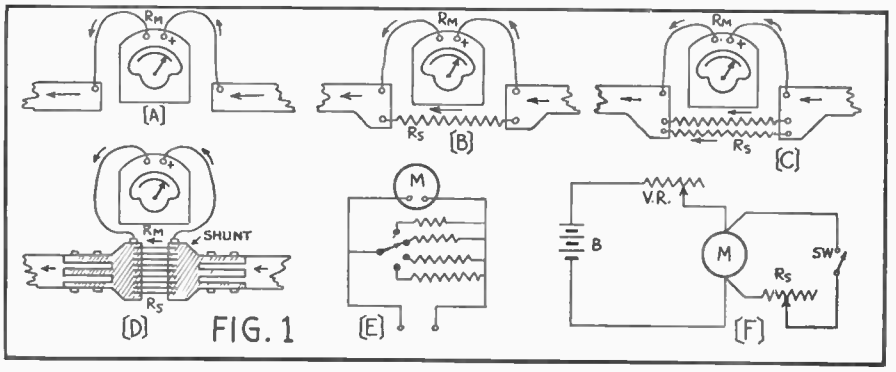


FIG. 1

Figure 1. How shunts are connected to carry a definite fraction of the total current in a circuit, permitting the use of an ordinary galvanometer movement as an ammeter to measure large currents.

In practice, a single shunt resistor of the proper resistance value and current carrying capacity is connected across the moving coil for each particular current range of the ammeter. The shunts are usually made of Manganin alloy since this has a very low temperature coefficient of resistance and therefore the heat developed by the flow of current through the shunt will not change its resistance appreciably. Where the instrument is to be used to measure large currents, the shunt is constructed in multiple blade form with several strips firmly soldered into a block at each end, and having air spaces in between them for cooling, as shown at (D) of Figure 1. The current which a shunt is to carry chiefly determines its physical size, because enough metal and surface area must be provided to prevent overheating, and at the same time the resistance must be high enough to allow a suitable portion of the current to flow through the movable coil of the instrument. When the current is greater than about 30 amperes, it is not practical to construct an instrument with a self-contained shunt, because the instrument itself would become so large as to be unwieldy, the heat developed in the shunt is not readily dissipated, and besides, the path of the current conductors would have to be more or less indirect in order to reach the instrument. It is much more convenient, therefore, to construct the shunt separately, pro-

vide it with suitable terminals and connections, and insert it by cutting the main circuit conductors (or bus bars as they are called) at any convenient point. The indicating instrument is then connected across the shunt by means of a set of flexible leads whose resistances are measured and adjusted exactly so as to form part of the instrument. These should never be cut or lengthened, as their resistance would then be changed.

For ammeters of medium range up to about 30 amperes, the manufacturer puts the shunt inside of the instrument and calibrates the scale so that it correctly indicates the *total current* without any need for further calculations. Most ammeters used in radio work have the shunts enclosed within the instrument case.

Push Button Tuning

(*Continued from page 329*)

by the volume expander circuit, has a new meaning in radio reproduction for the music critic.

An examination of the log showed that short-wave reception was obtained from many different countries and from all continents. That well over 60 short-wave station calls were heard and identified. There were numerous stations received but not logged because they were special transmissions or because there was no English announcement and no identifying clue as to the country. In addition to the many "G" stations of England and the "D" calls of Germany; France, Holland, Russia, Australia, Czechoslovakia, Rome, Canary Islands, Japan and a flock of South and Central American stations were tuned in. A number of these stations were received with volume to classify them as "locals."

A record was made of the many calls heard on all the amateur bands with special attention given to the 20 meter phones. Calls were heard from all the nine districts and a number of foreign amateurs in Great Britain, South America, Haiti, Canada, Cuba, and others.

The mechanical band spread made possible by the use of the large dial is a decided advantage in short-wave tuning. It is particularly effective on the 10 to 20 megacycles (15-30 meter) range and 5.2 to 10.4 megacycles (29-57 meter) range. An idea of the size of the scale for the 10 to 20 mc. range can be realized from the fact that it measures approximately 7 inches in diameter and has an overall scale length of over 17 inches. The scale length for just the 9 to 10 kc. (31 meters) band is about 3 inches, an excellent and very much desired spread for this band.

On the broadcast band it was possible to pull in DX stations adjacent to powerful local stations. A number of western broadcast calls, KFI, KGO, WFAA and others were brought in as well as Mexican and Canadian stations.

The circuit diagram for this new receiver is shown in Figure 1. A reference to the circuit shows that the tuning range, covering from 125 kc. to 20 mc. (15 to 2400 meters) is divided into six bands. All tubes employed are of the octal glass type excepting the 80 rectifiers and the functions of all the tubes are outlined on the drawing. The automatic-frequency-control circuit is indicated, also the Coloray Tuning Eye, volume-expander circuit, the tone control circuit with switching arrangements for Motorized and manual tuning and the complete electrical tuning system.

From the foregoing discussion a good idea can be obtained of the many engineering advancements offered by the receiver and its excellent all around reception ability.

QRD? QRD? QRD?

CONDUCTED BY GY

OVER the mahogany has been flowing quite a number of this type of requests, and by answering this one, the others will be included: Dear GY: I obtained my second class radio telegraph license a short time ago but as I live in a small town, I am at a loss as to where to apply for a position as operator on board ship. I would appreciate it very much if you could give me the names and addresses of the various hiring agencies. . . . Answer: Dear Brother. . . . The Radiomarine Corporation at 75 Varick Street, Mackay Radio at 20 Broad Street, Tropical Radio Telegraph, Pier 7, North River and the Morgan Line, Pier 49, North River. These companies, all in New York, have agencies for Radiops. Then there are the two radio unions who are placing a number of men directly from their Buzzer Rooms. Their addresses are CTU-Marine Division, 265 West Fourteenth Street and ARTA, 10 Bridge St., both in New York. Of course, with the new law in effect as regards radiops who first must have had six months experience on board ship under the tutelage of another radiop, billets are not so easy to get. There are still a number of ships only using one radiop. But if there is any hiring being done these agencies should be able to place you for this coast.

All in the life of a radiop: CS was the one and only op on the yacht whose owner had the market cornered on the chemical industry. One bright afternoon, the air being quiet, he went below for a cup of java. Upon his return to the shack he could hear Chatham calling him frantically. The phones were bouncing up and down on the table. "Bk, Bk, K," CS broke in and Chatham fired back, "Where you been? A couple of your Boss's factories are burning up." CS almost fell over himself getting aft to where the big Acid and Chlorine man was sunning himself. He hesitated disturbing him. Gathering courage, he pushed the msg at the A&C man expecting a terrific outburst. The Boss's steak-broiled face glanced up at the fidgety radiop. He reread the msg and then quietly said, "Tell them to put it out."

One of the gang just returned on the Scantic tells this one. The vessel was twenty hours out of Copenhagen when the usual msg from the line's officials was received asking expected time of arrival. The skipper gave the radiop the information and told him to send the msg. After having some difficulty raising the shore station he broadcasted the msg and heard the same CW note say, "R nr2." And that was the number of his msg. The next day they docked right on time and were greeted by an aggravated bunch of ship's officials. "Where the dickens was the time of arrival msg?" they howled at the skipper. He called the radiop up and down but the latter showed his log and swore he had heard the receipt for the msg. Nothing was done about it but the op still gets nightmares whenever he transmits a msg and gets a receipt.

Here's one for the books: Of the three ops on the cruiseship, only the third knew how to dance. Coming up to the ballroom, the Cruise Director noticed an old lady chaperoning a sweet YL watching the dancers wistfully. The CD gallops over to them and solicitously enquired why the YL wasn't twirling. Interrupts the Old Lady, "She'd dance if some sober gentleman would ask her." The CD glances around the dance floor, quickly sees the Purser and the First Officer occupied. He excuses himself and makes a beeline for the radioshack. "Any of you fellows dance?" and as they pointed to the third class he snapped, "Come with me to the ballroom. You're dancing tonight, without overtime pay." Well, me hearties, you guessed it! The Old Lady owned enough stock in that shipping outfit to sink a battlewagon and that Third op is now bearing down a swivelchair getting bearings on inkwells, the cuspidor and the pay check.

Brother Curtis (PC) sends this across the board; "ref to radiop who wants a berth in South America or Rumania. Sorta leads me to believe he speaks some Romance language, which is the first requirement necessary to getting a Latin American berth. Tropical Radio Telegraph, 321 St. Charles Avenue, New Orleans, for Central America or Colombian work. Southern Radio Corporation, subsidiary of Standard Oil of N. J., 31 Rockefeller Plaza, NYC, uses a few American ops in Bolivia and a few in Venezuela. Pan American Airways uses the most and they should be addressed at Dinner Key Base, Miami, Fla. The Rumanian consulate should know the chances for a man in their country; I believe only a B.C. installation job would be possible there. From 1930 to 1936 I worked in Mexico, Cuba, B.W.I., Brazil, Uruguay, Argentina and Bolivia. Notice Radiops down there may earn as low as $30 a month and most ops hold down two jobs (for two different companies each day). I hope this guy gets his job but he'll come back to the states darn quick. 73. . . ."

Well, the days of poor pay, non recognition and bad working conditions in the U. S. seem to be but a bad dream for radiops. The CTU—Marine Division and the ARTA have both made some great gains in every division. The CTU-Marine union has not only raised wages, bettered working conditions and other incidentals but has put into the record that a hot meal must be served for the evening dinner. We wonder whether the law can be invoked when that hot meal has to be eaten whilst entwined around a stanchion to keep from sliding across the deck? The next thing one knows they'll be getting air-conditioned radio shacks, hot water bottles and a few other things. It's rather a far cry from corned bill and hardtack! But those were the days of wooden ships and iron men—now it seems to be iron ships, etc.

And so, brethren of the French telephone, another chapter in radiop history comes to an end. Sit-down strikes continue to harass shipping owners. Radiop wages are being increased in a few cases. But trouble between various unions on the waterfronts of the nation has caused Mr. Kennedy of the Maritime Commission to refuse the billions of dollars offered to him for the purpose of building up an American Merchant Marine second to none. His contention was that with present unsettled conditions it would be impossible to do anything until the marine industry became more stabilized. This money would have been used to build approximately 300 new vessels, scrap obsolete ships and recondition those vessels now considered hazardous. But in spite of this dour picture, shipping is stepping out. Business recovery has brought

prosperity to exporting and cruise business and that has meant more radiops being taken off the beach, more ships put back into commission and more and better happy days. So with a cheerio and 73 . . . ge . . . GY

How Soon Television?

(*Continued from page 328*)

televise events taking place within a 20-mile radius of Alexandra Palace where the transmitter is located. The interesting point of his observations is that such outdoor pickups can be made in any daylight illumination ranging from bright sunshine to a dim foggy day.

The engineer observed that the "high cost" of television receivers was handicapping the new art's status as a popular entertainment medium. During his visit prices ranged from $300 to $800. However, within a couple of weeks of his return, British televisors introduced at the London radio show, were selling for $200 and even lower, with, of course, deluxe models in the higher brackets.

French Television

France, too, was showing television progress, he observed, with transmissions on the old 180-line standard abandoned and Government preparations under way for a 441-line unit atop the Eiffel Tower.

New activities in television have also been reported by NBC and RCA. The most important of the new announcements emanating from Radio City was the statement of Lenox R. Lohr, NBC president, to the effect that outdoor pick-ups would be made experimentally from a mobile television unit—claimed to be the first built in the United States. England and Germany had been using television "vans" for remote sight-and-sound broadcasts for a considerable time.

Outdoor experimentation, according to Lohr, will be another forward step in the television field test program of his company. The mobile station was to be placed in operation during October and should be in frequent use at the time you read this.

O. B. Hanson, NBC chief engineer, cited presidential inauguration ceremonies, political conventions, football and baseball games and boxing matches as some of the remote events that might be desirable video program fare.

Mobile Pick-ups

The mobile television station consists of two specially constructed motor cars each about the size of a large bus. Picture and sound pick-up equipment will be installed in one, and a video transmitter, operating on a frequency of 177,000 kilocycles, in the other. Ten engineers will be required to operate the two television units. The earlier-designed NBC mobile sound transmitter will be part of the portable television arrangement.

Plans call for sight and sound to be relayed by microwaves to the Empire State Building transmitter of the network for rebroadcasting. The layout of equipment in the trucks will be a veritable counterpart of the Radio City-Empire State television station, although much more compact.

A new use for the pretty-faced dummies seen in fashionable women's shops has been discovered by NBC television engineers. A comely manikin is now used to test lighting and pick-up effects, the job being a bit too tedious for a live subject. They've named her Miss Patience—or "Pat" for short.

THE TECHNICAL REVIEW

CONDUCTED BY THE TECHNICAL EDITOR

Listen and Learn, by F. E. Hill, American Association for Adult Education, 1937. In this volume the author has set down the important facts about adult education by radio, past and present. He begins by estimating the size of the present radio audience. The next chapter is devoted to the question "What Is Education?" Next comes some historical material, which tells the reader how broadcasting grew until the band was crowded and legislative troubles appeared. Then we have the conflict betwen broadcasters and educators. The educators say that broadcasters are not willing to give them time on the air, sponsored programs being their main interest. The broadcasters say that they will be pleased to give time for educational programs as soon as the educators know how to present acceptable programs; they insist that it shall not be dull. There are a considerable number of stations which transmit educational program exclusively and there are many educational features on commercial stations. The author presents further observations of present-day programs and suggested improvements.

Television Cyclopaedia, by A. T. Witts, D. Van Nostrand Co., 1937. This is a cyclopedia giving definitions of terms used in television. There are approximately 150 pages of definitions and short explanations. The terms are arranged alphabetically and contain many which are used in optics, physics, and radio. The work has been written in England and some of the terms may be strange to the American; however, most American terms have been included. Here is a sample definition: Electrostatic Image: An image formed by minute condenser elements each containing a charge proportional to the light intensity corresponding to its position in the picture. An example of an electrostatic image is that formed on a mosaic screen, as in the Iconoscope (q.v.).

Cornstalk Acoustical Board, by L. K. Arnold, H. J. Plagge and D. E. Anderson. Published by Iowa State College of Agriculture and Mechanic Arts. A study of the acoustical properties of cornstalk acoustical board and results of tests when the board is used in various ways.

Review of the Proceedings of the Institute of Radio Engineers For September 1937

Notes On Some Practical Comparison Tests Made Between Several Acoustic Measurement Methods by E. T. Dickey. A discussion of different acoustical measurement methods and typical curves obtained of the same receiver by several different laboratories.

The Physical Reality of Space and Surface Waves in the Radiation Field of Radio Antennas, by K. A. Norton. Evidence is presented that in spite of a change in sign made by Sommerfeld in his 1926 paper on radio wave propagation, the radiation field of a vertical dipole may be separated into space and surface wave components.

The Origin and Development of Radiotelephony, by L. Espenschied. A brief review of the history of telephony and its place in electric communication.

Review of Contemporary Literature

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

The Design of Inductances for Frequencies between 4 and 25 mc., by Dale Pollak, Electrical Engineering, September 1937. A study of the most efficient form and wire size, for short-wave coils, giving design equations. Investigations show that special form materials do not appear to have great advantage.

The Surface Wave in Radio Propogation, by C. R. Burrows, Proceedings of the Radio Club of America, August 1937. A report of experiments which determined that the Weyl formula rather than the Sommerfeld formula agrees with observed facts. This would mean that the "ground wave" has no physical existence.

Television Abroad, by M. P. Wilder, Electronics, September 1937. A report of the progress of television in Germany and England.

Condenser Dio-charge Chart, by J. B. Hoag, Electronics, September 1937. A nomographic chart for computing the charge or discharge of a condenser through a series resistor in terms of time and RC product.

Methods of Analyzing Acoustic-Feedback Howl, by C. O. Caulton, Communications, September 1937. There are four types of howls; this article describes the methods of locating the cause of each.

Resistance-Tuned Oscillators, by W. G. Gordon and R. E. B. Makinson, The Wireless Engineer, September 1937. Circuits involving a negative resistance which

is a function of frequency can be tuned by means of a variable resistance.

Amplifiers, the Aerovox Research Worker, June and July 1937. A summary of design formulas for a.f. and r.f. amplifiers.

Concentrated Directional Antennas for Transmission and Reception, QST, October 1937. Describing two efficient antennas, one originated by John L. Reinartz, the other by B. T. Simpson.

Brittany Patrol, by H. Wickliffe Rose, Ex-Lieut. (j.g.) U.S.N.R.F., W. W. Norton and Co., 1937. A saga of high adventure aboard converted yachts of the "Suicide Fleet" in the Bay of Biscay during the World War. A first-hand narrative of experiences on anti-submarine patrol and convoy operations that should appeal to students of naval phases of World War History. Written by an amateur radio operator who "joined up" at the beginning of hostilities as a naval radioman and who subsequently won commissioned rank. This book should prove to be of particular interest to readers who are in the Navy or Naval Reserve.

FREE BULLETINS

Free Instrument Catalog

Supreme's latest catalog on their new line of 1938 testing equipment is very descriptive and is a helpful folder for servicemen and dealers. It describes set testers, analyzers, signal generators, multimeters, frequency modulators and cathode ray oscilloscopes. Requests should be sent to RADIO NEWS, 461 Eighth Avenue, New York City.

(*Turn to page* 371)

THE AMATEUR OBSERVER

Conducted by W2JCR

THIS department has "gone to town" in a big way, with the result that even after weeding out many stations which could not be considered as real DX it has been found impossible to publish all of the lists received. In view of this condition it is urgently requested that Observers in their future reports include only *real DX reception.*

AGAIN a special invitation is extended to foreign listeners to apply for appointment as Official Amateur Band Observers. It is the purpose of this department not only to keep listeners informed as to what is being heard by others but also to keep the Amateurs themselves informed as to where their transmitters are being heard. For this latter purpose reports of stations heard by foreign listeners are naturally of outstanding interest to American Amateurs.

It should be pointed out that appointments as Official Observers are open to both "Hams" and SWL's. The majority of Observers appointed thus far have been SWL's, but amateurs are especially invited to apply, especially those operating in the 5, 40, 80, and 160-meter bands.

'Round-the-World Broadcast

THOSE who are interested in the DX possibilities of the range extending from 10 meters downward may be interested in a talk which W2JCR is scheduled to deliver over station W2XAD and W2XAF from 4-4:30 p.m., E.S.T., on December 17. This talk will be repeated over W2XAF from 11:30-12 midnight of the same date and from 7-7:30 a.m. on December 17; W2XAD operates on 15.33 megacycles and W2XAF on 9.53 megacycles. Each of these three talks will be directed toward a different part of the world so that world-wide coverage will be obtained.

Calls Heard

By Ray Service, 30 Harding Road, Glen Rock, N. J.

20-meter phone: W6AM-9, W6FGU-8, CT1AY-5, EI2L-3, GM6RG-2, G2PU-4, G5BJ-3, G5ML-8, G6DT-3, HK4AG-7, LU5Z-6, TI2RC-8, VE4KF-8, VE4UM-3, VP3BG-8, VP4TH-5, VP5AF-5, XE1Y-9.

By John Fitzpatrick, 18 First Street, Port Reading, N. J.

20-meter phone: W6HLY, W6KAN, W6ATH, W6ISH, W6ASZ, W6LR, W6AEW, W6BXL, W6IDG, W6LYT, W6IJU, W1OXDA, 62HQ, G2MF, G2PU, G5LU, G5BQ, G5TZ, G5JO, G5BJ, G5ML, G5XI, G5IS, G6OL, G6BW, G8GW, ON4UC, ON4UK, ON4PA, XE2N, XE3AF, XE3AH, YV5AA, YV5AE, YV5ABE, YV5AK, YV5AG, PK1GL, LU1QA, LU7AC, LU9PA, HI5X, HI7G, HK4AG, VP5BZ, VP6YB, PY1SJ, PY1EW, PY2CW, PY2ET, EI2L, K6MZQ, F8MX, F8XT, SU1CH.

75-meter phone: W1JDN, W1GAN, W1DO, W2AMB, W2JLC, W2IIS, W2CEP, W2ABX, W2BRO.

By George L. Krausse, 47-20 188th Street, Flushing, N. Y.

20-meter phone: W6LCL-5, W6LAJ-5, W6BGH-5, W6FQY-5, W6AGI-7, VP3GB-4, VE4LH-5, VE5EF-7, VE5GF-7, HH5PH 7, G2HQ-3, G5SP-6, G5BJ-7, G6LC-6, GM6R-7, PY2ET-6, LU7BK-7, OA4N-8.

75-meter phone: W3EOZ-9, W3BSZ-9.

160-meter phone: W1AA-8 (portable), W2KIV-8, W2ILQ-6, W2IKS-8, W2KAX-8, W2ILC-7, W2IBC-7, W2IXX-8, W2HSP-9, W2FAR-9, W2IUQ-7, W2HJV-7, W2IZD-8, W2JDN-5, W2KBN-8, W2DXB-7, W3FVK-4, W8QLT-7, W8QLK-7, W8BCO-7.

By Paul Wunsch, Jr., 387 Clifton Avenue, Clifton, N. J.

20 meters: HK1AG-9, HK3MA-8, I5KY-5, SM7YE-5, VP2CD-7, VP6YB-9, XE2FC-8, F8IX-8.

160 meters: W1JTO-8, W2DTD-6, W2DVV-9, W2GHO-7, W2JED-8, W2JHG-7, W3BJU-9, W3GRO-8.

By W. Hallgren, P. O. Box 31, Santa Rosa, Calif.

20-meter phone: W1ACF-7, W2JJ-7, W2DLD-8, W3FOJ-8, W3ENH-7, W3AEX-8, W3CHE-8, W3BBB-7, W4DKK-7, W4TJ-8, W4DAC-8, W4BAZ-9, VE2EQ-6, VE1AO-5, VE4WF-8, VE4PK-7, VE4GI-7, VE5NY-9, XE1Y-9, CO2WW-8, CO8OG-6, K6KMB-7, K6OQE-9, K7FST-9, VK2HS-4, VK3AL-5.

By Harry Honda, 429 No. Fremont Avenue, Los Angeles, Calif.

20 meters: W7VA (Portable), VK2FU, VK2UC, VK2IQ, VK2CI, VK2OQ, VK2ABG, VK2XU, VK2CE, VK2VV, VK3MR, VK3XD, VK3CQ, VK3WX, VK3KI, VK3PE, VK3KR, VK3WA, VK3GQ, VK3IL, VK4VJ, VK4OO, VK4IU, VK4VD, VK4WU, VK4JX, VK5JC, KA1ME-8, KA1HS-8-9, KA1DT-6, VS1AM-6, VS1AI-6, VS2AK-7, CO7CX-7, HI5X-8, VP6YB-8, K6BNR-9, K6OQE-8, K6KNB-8, ZT5P-8, ZS6AJ-7, PY2ET-6, VE2XI, VE3AA, VE4BD, VE4CW, VE4IF, VE4PK, VE4WJ, VE5AM, VE5UW, VE5PE, VE5BF, VE5EF, VE5JB.

By E. H. Davenport, Pittsford, Vt.

20-meter phone: OQ5AA, HI5X, HI7G, HI1ABM, VE5ZO, VE5KV, VK2JU, VK2AP, VK3XJ, VK3KR, VK2XU, VP3BG, VP6YB, LU5CZ, LU6KE, G2NQ, G2NH, G5ML, G5BY, G6WU, K6KMB, XE2AH.

By D. J. White, Palmetto, Ga.

20 meters: W6IRX, W6NTX, W6DAW, W6HOW, W6CTG, W6FDM, W6NVQ, W6OJZ, W6OQE, W6KTQ, W6NZQ, W6IKR, W6MYO, W6FPF, W6DEP, W6COQ, W6BDA, W6HLY, W6NKX, W6BKG, W6ABF, W6LY, W6AL, W6LAJ, W6KPQ, W6MWD, W6KSQ, W6MOV, W7ADX, XE1CT, XE2HD, XE3AR, VE4TDK, VE4OK, K6NVQ, K6OQE, K6ZNQ, K8IHS, S3JB, LU9BV, TI2RC, HC1FT, OA4AB, CO2HY.

By Ernest Pavlidis, 303 E. Hector Street, Conshohocken, Pa.

20 meters: VE4BG-8, G2PU-7, G2AK-6, G2XY-6, G5BJ-7, G5NI-8, G5ML-9, G5JO-8, G5LU-7, G5SP-7, G5BM-6, G6IF-7, G6VX-6, G6PW-5, G6TZ-5, G6XR-9, G6DC-7, G8LP-7, G8OG-8, GM6RG-8, CT1EI-7, F8DR-8, F8GW-6, CN8AM-7, EA9AH-9, YV5ABT-8, VP3BG-6, VP4TH-6, PA0AE-6, PA0UN-7, SM7YA-7, EA8AB-7, K6NZQ-7, I2MI-5, VK3IL-6, VK4JC-5.

By Don Smith, 725 North 16, Salem, Ore.

20-meter phone: G2PU, G5MI, VK2HF, VK2HS, VK2AZ, VK2QR, VK3AL, VK4JX, VK5AW, VK6MW, K4SA, K6QGE, K6FAB, K6JBD, K6NZQ, K6CMC, K6NTV, K7FST, K7FBI, LU4BH, LU5CZ, HC1JW, OA4AB, OA4N, OA4C, OA4AL, VS2AK, XE2FY, XE2FC, XE2HD, XE2AS, CE1AO, KA1YL, KA1MM, KA1ME, CO2BY, CO2LY, CO8OA, VP5PZ, HI5X, HI7A, ZE1JR, HH2B.

By Michael Kelly, 435 East 74th Street, New York, N. Y.

20 meters: W6CNA-8, W6CFJ-9, W6BPM-5-7, W6HOI-9, VK2AP-6-7, VK4JO-7, G2LK-8, GM6RG-5.

75 meters: W5BEK-7, W8LPK-9, W9LTY-9.

160 meters: W2KAX 6-8, W2JYK-9, W2JRE-9, W3FTU-7-8, W8PFJ 8.

By R. Robert Hatcher, 3221 Fifth Avenue, Richmond, Va.

20 meters: VE4CW-4, VE5DK-5, VE9AL-7, XE1BT-7, XE2N-8, XE3AH 7, CO2EG-9, CO7VP-4-5, CO8OG-6-8, NY2AE-7, HR2A-8, HC1JB-7, HI2X-3, HI5X-7-8, HI7G-8-9, YV1AP-7, YV5ABT-7-8, PY2ET-8, PY5AK-7, PY8AH-4, PY9AE-3-4, LU1QA-8, LU4AB-6-7, LU7AG-7, LU8AD-3, K4SA-7 8, K5AG-5-6, K6OQE-6, VP3AG-6-7, VP5PZ-8, VP6YB-7, G2XV-6, G5JO-4-5, G6XR-6-7, G8ZY-5, CT1AY-8, CT2OZ-5, HH2B-8, ON4VK-8, TI2RC-8, VK2ZX-4, VK5JB-4, GM6RG-7-8, OQ5AA-5, PA0XK-5, CE1AO-6, CE3DW-7, CX1CC-4, F3AK-5, EI2J-5, HK3JA-8, HK4AG-8, PK3GD-3, SM5SV-4, HB9IJ-5.

By Earl S. Marshall, 936 Mahoning Road, North East Canton, Ohio

75-meter phone: W3BFZ, W3DRC, W3FQ, W3VRK, W4BYA, W4BGD, W8BUM, W8BK, W8BWH, W8HLM, W8KSA, W8MOL, W8HFC, W8MBW, W8GFC, W8BUL, W8 CBJ, W8CGU, W8MZR, W8MDU, W8LR, W9CDK, W9SXM, W9TTA, W9BFZ, W9JFD.

By Raymond W. Sahlbach, 4707a South Compton Avenue, St. Louis, Mo.

20 meters: G5BS-4, G5XI-8, G6GF-5, G6JF-4, G6OS-6, HI5X-9, HI7G-8, HK4AG-4, HK5OBC-4, K4SA-9, K6BNR-7, K6CMC-6, K6MBT-5, K6NBQ-6, K6OQE-6, LU4KA-7, LU6EK-6, OA4AL-6, OA4CE-9, OA4AC-6, OA4N-5, T12KP-7, TI3AV-5, VE4JJ-9, VE4MO-6, VE4OF-6, VE5BF-7, VE5HA-5, VE5EF-7, VE5OT-9, VE5UK-5, XE1AK-6, XE2AR-6, XE2CI-9, XE2DC-8, XE2FX-6, XE2HB-9, XE2SC-8, XE3AH-5, XE3AR-6, VK2IR-4, VK2JG-5, VK2UA-3, VK2UC-4, VK2UX-3, VK3AR-5, VK3AL-4, VK3LY-3, VK3IL-6, VK3RA-5, VK4VD-6, VP3BG-8, VP4TH-5, VP5AF-7, VP7NA-6, YV2AB-3, YV5ABE-6.

By Raymond Hernday, 109 "C" Street, Jefferson, Wisc.

20 meters: CO2LY, CO2WZ, CO2KC, CO2EG, CO7VT, CO8OG, VUB, HI5X, HI7G, HK5AZ, PI2KP, PI2RC, K4SA, XE2XE, VE4KO, LU7AC, OA4AD.

Dan T. Wollenschlager, 448 Bannock Street, Denver, Colo.

20 meters: K4SA-4, K6NTV-4, K6NVV-5, K7FST-1, VK2AC-3, VK2AZ-2, OA4N-5, TI2RC-5

By Bill Sloan, 2719 Grand Avenue, Dallas, Texas

20-meter phone: VE1LR-9, VE1GP-8, VE2BG-9, VE2JJ-8, VE2CR-7, VE2FJ-7, VE3YQ-7, VE3AFD-7, VE3JV-8, VE3VT9, VE3XQ-8, VE3GU-8, VE4VM-7, VE4KF-9, VE4BB-6, VE5BF-8, XE1AK-9, XE1BT-6, XE2HD-6, XE2FC-9, XE2AH-9, XE3AH-7, TI2LR-7, TI2RC-8, TI2KP-9, TI3AV-8, YV5AK-7, HH5PA-9, LU5CZ-8, PY2AC-6, OA4N-8, OA4AB-7, OA4AL-6, CE1AO-8, VP7NA-9, K6OQE-8, K6QMB-7, K7FBE-6.

By H. Francis Shea, Box 4, East Machias, Maine

20-meter phone: CE1AH, CE1AR, CE3DW, CN8AM, CN8AJ, CO2BY, CO2MT, CO2LL, CO2KY, CO2HY, CO2WZ, CO2KL, CO2RA, CO6OM, CO7VP, CO7AS, CO7HS, CO8RQ, CO8YB, CT1AY, CT1BY, CT1CV, EA8AE, EA9AH, EI2J, EI2L, EI3J, EI3L, G2PU, G2NM, G2ML, G5NI, G5BM, G6CL, G5GS, G6XR, G6LW, G8LX, G8LP, GM8CN, GW2UL, HB9J, HC1FG, HC2CG, HI1C, HI5X, HI6O, HI6P, HI7G, HH2B, HH3V, HP1A, HK1DG, HK3RC, I1IT, K6JLV, OQ5AA, OA4R, OA4C, OA4AC, OA4AK, ON4VK, ON4VZ, ON4SS, PA0FB, PA0IDW, PA0FP, PY1FR, PY2BAB, PY5AQ, SV1KE, SM5SV, SU1CH, SU1SG, PK2VD, TI2KP, TI2RC, TI3AV, TG1GS, VO1I, VO2N, VO4C, VO4J, VE5TV, VP2CD, VP3BG, VP4TH, VP6YB, VP7NA, VE9G, VP9R, CK2XS, VK2HF, VK2MA, VK2ABD, VK2NO, VK3AL, VK3ZL, VK6MW, XE2FC, XE3AH, XE3W, ZE1JR, LU4AJ, LU4DH, LU6AP, LU7AB, CP1AA, YV5AI, YV5AK, YV5AV, YV5AE, F3MF, F3JF, F3JD, F8DW, F8KW, KA1AN.

By L. F. Gallagher, 307 East 17th Street, New York, N. Y.

20 meters: W6AC-6, W6YU-9, W6KBD-8, Y6HMS-6, W6AZO-9, W6CEL-8, W6UC-8, W6QD-7, W6ELC-8, W6NHC-7, W6MYJ-9, W6JJ-9, W6KOP-8, W6LRC-9, W6LX-7, W6LR-6, W6ETK-9, W6ID-6, W7AOA-9, W7AXX-9, W7BBY-9, W7BPA-8, W7DXA-9, W7CPJ-7, W7DOX-7, W7DUD-6, W7EFO-7, W7EYD-7, W7GU-8, W7QI-4, W7VQ-4, W7DRJ-6, W7GGG-9, OE1CCM-4, OE3AH-4, OE5PZ-5, FK8AA-5, FA8JO-5, FA8LC-3, FM8AD-6, FB8AD-7, LU1EP-6, LU2AL-5, LU4HK-4, LU5AH-6, LU6AU-5, LU7EJ-3, LU9MB-7, LU9DD-3, VP1AA-6, VP2CD-4, VP2AT-4, VP3BG-3, VP4TH-5, VP4WA-2, VP5SI-3, VP5HG-6, VP6YR-4, VS2AJ-3, VS6AO-2, VS6AK-4, VS7RR-2, KA1CS-4, KA1NR-5, KA9JO-5, FR8TM-5, FE8FO-4, K4SA-8, K4UG-8, K4AGH-7, K5AA-9, K5AF-9, K5AG-9, K5AC-8, K6NJI-6, K6MV-7, K6NLD-6, K6FAZ-7, K6CQA-5, K6KVX-4, K6OLX-4, K7FRU-8, K7PQ-6, K7FRV-8, VK2LP-5, VK2UP-6, VK3AL-4, VK4WA-5, VK5WG-4, VK6KA-5, VK7KV-3, VQ1VU-5, VQ9BK-5, VQ8AB-5, VU2DL-6, VU2CQ-5, VU7FY-6, CP1AA-3, CE1AN-2, CE3AR-3, CE3EQ-3, CX1BU-2, CX2AJ-3, CX3AX-2, CX3BL-3, CT1AY-4, CT1LZ-4, CN8AA-6, CN8AH-6, CR5CF-5, CR7KA-7, YI4Q-7, YT7CI-7, YU7DX-8, YN1AA-4, YV5AC-4, YV5OM-6, YRTCP-5, YR5AA-5, YR5CF-4, YL2BB-7, HB9AT-9, HA5PA-9, HP5V-7, HK3JA-6, HS1RJ-5, HH5IA-6, HC1FG-7, ES5C-7, EI4J-8, EI7L-8, EI8B-8, EI9G-9, ON4AU-7, ON5UF-6, OZ8D-7, OZ9U-7, OH1NL-7, OH5G-6, J2MH-4, J2LU-6, J5LX-5, GM6NX-7, GM6KS-7, SV1SM-4, LA1G-6, ZE1JR-7, PZ1AA-8, PK4LO-6, PK4MY-6, SU1NK-8, SU1CH-8, SU1AZ-6, ZT6AM-7, ZU6E-6, ZS6TK-7, XE1AM-9, EX1G-9, XE2N-9, XE2J-5, XE3W-7, D3BMP-7, D3DEN-7, D4YLI-8, D4WLL-6, D4SNP-6, F3KH-7, F3BJ-6, F6AK-7, F8AE-6, F8EO-9, F8PZ-8, G2PL-8, G5BJ-7, G5BO-6, G6DL-7, G6NJ-4, G6YL-7, CO2HY-9, CO2AU-8, CO6OM-9, CO6OE-9, CO8YT-7, CM4AK-6, CM6AN-6, CM7AG-7, CM8AP-5, PY2DS-2, PY3CM-4, PY5QG-3, PY8AE-5, U9AW-4, U9MI-6, SM7YA-7, OA4V-8, OA4N-7, OK2LO 8, OK2HX-3, OK6OU-6.

By Albert Augustine, 7229 Eastwick Avenue, Philadelphia, Pa.

20 meter c.w.: K5AM-9, K6BNR-9, I1MH-7, D3FZI-8, D3CDK-8, D4SZK-8, D4JED-8, OH5NF-8, PA0SD-9, PA0SS-8, PA0CE-9, PA0AZ-9, PA0EA-9, G2DH-8, VK2BR-7, VK5PS-8, ON4NW-8, ON4VU-9, ON4KM-9, CT1DB-8.

20 meter phone: YV4AK-7, YV5AN-9, EI2L-9, HA8N-8, K6OQE-8, K6NTV-9, K7FBE-8, TI2RC-9, HC1JB-7, CN8AJ-8,

---

The "Skipper"

(*Continued from page 349*)

C3 until maximum volume is obtained when C2, the r.f. trimmer, is about one-half meshed. It is not necessary to re-adjust C2 for each station; a single setting will usually hold for about 30 or 40 degrees on the dial. C3 requires no further adjustment.

To use a doublet antenna, connect the twisted-pair or transposed lead-in wires to the tickler winding on the r.f. coil as indicated in Figure 1. The usual ground should be used no matter which type of antenna is connected to the input of the set. If desired, two binding-posts may be used for two different length antennas or degrees of antenna-coupling. Better selectivity will be obtained when the antenna is coupled through the tickler winding; greater signal strength is obtained with the regular interwound primary as the coupling medium.

The author used the Brush crystal type of head-phones which have very high impedance, the necessary coupling circuit being indicated in Figure 1. Due to the extremely wide frequency range of the crystal phones, it may be desirable to increase the capacity of the mica fixed condenser from the 1F4 plate to negative filament, from .004 mfd. to .01 mfd. in order to reduce the high frequencies. If the capacity of this condenser is too low, the background noise may become excessive when operating the detector near the point of oscillation.

The author is interested in hearing from those who build this little receiver. If a reply is desired, a self-addressed and stamped return envelope must be enclosed. Letters may be sent in care of RADIO NEWS.

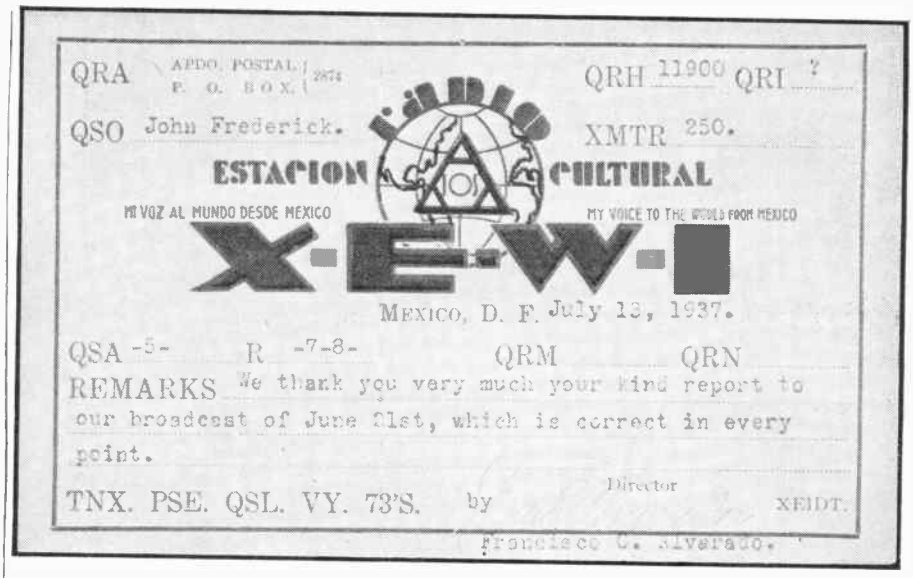
List of Parts

C1—Hammarlund 2-gang variable condenser, 140 mmfd. per section
C2—Hammarlund midget variable condenser, 35 mmfd.
C3—Hammarlund mica equalizer condenser, 35 mmfd. max, type EC-35
C4, C5—Aerovox tubular condenser, type 484, 0.1 mfd., 400 v.
C6—Aerovox tubular condenser, type 484, 0.05 mfd., 400 v.
C7, C8—Tubular condensers, 0.01 mfd., 400 v.
C9—Aerovox tubular condenser, 0.5 mfd., 400 v.
C10—Aerovox mica condenser, type 1467, 0.0001 mfd.
C11—Aerovox mica condenser, type 1467, 0.001 mfd.
R1—Yaxley 10-ohm rheostat, Type C
R2—Yaxley 50,000-ohm potentiometer, type Y50 MP, with d.p.s.t. switch
R3—Carbon resistor, 3 meg., ¼ watt
R4, R6—Carbon resistor ¼ meg., 1 watt
R5, R7—Carbon resistor, 1 meg, ¼ watt
2 Hammarlund 6-prong plug-in coil kits, type SWK-6 (4 per kit—17 to 270 meters)
2 Hammarlund 6-prong plug-in coils, type BCC-6 (250 to 560 meters)
1 Hammarlund midget r.f. choke, 2.1 mh. type CH-X
2 Hammarlund tube shields, type TS50
2 Hammarlund isolantite 6-prong sockets, type S-6
2 Hammarlund isolantite 4-prong sockets, type S-4
1 bakelite 4-prong socket
1 bakelite 5-prong socket
1 removable type coil shield
1 airplane dial
1 chassis, steel or electralloy, 7 by 9 by 2 inches
1 pair tip jacks
Necessary solder, hookup wire, machine screws, etc.

COIL DATA

Range In meters	Space*	Grid Coil	Tickler	Primary
17-41	1¼ inch	9 No. 16	5 No. 30	6 No. 30
33-75	1½ inch	18 No. 24	6 No. 30	12 No. 30
66-150	1⅝ inch	38 No. 26	11 No. 30	25 No. 30
135-270	1⅞ inch	82 No. 28	16 No. 30	47 No. 30

*Spacing refers to length of winding on the coil form. All forms 6-prongs, 1½ inch diameter. Ticklers on filament end, ¼-inch from grid coil. Primaries wound between the turns at filament ends of the grid coils.



QRA APDO. POSTAL 2874 P. O. BOX. QRH 11900 QRI ?

QSO John Frederick. XMTR 250.

ESTACION CULTURAL

MI VOZ AL MUNDO DESDE MEXICO — MY VOICE TO THE WORLD FROM MEXICO

X-E-W-I

MEXICO, D. F. July 13, 1937.

QSA -5- R -7-8- QRM QRN

REMARKS We thank you very much your kind report to our broadcast of June 21st, which is correct in every point.

TNX. PSE. QSL. VY. 73'S. by Director XEIDT.

Francisco C. Alvarado.

MEXICO HEARD FROM

John Frederick received this card from XEWI for correct reports on the station's transmissions. Have you one of these cards?

The DX Corner (Short Waves)

(*Continued from page 351*)

Kemp, signed at 10:50 a.m. Blanchard, Sporn, 17,870 kc. Heard 1:08 p.m. Diez, Pena.

SPW, Warsaw, Poland, 13,635 kc., Kemp, heard Sunday 1:15 p.m. Shamleffer, heard Sunday 11:30 a.m.-1:30 p.m. Hartzell, Gertenbach, Monday and Wednesday 12:30 p.m. (from veri) Sporn, Gallagher. Address: 5 Mazowiecka Street.

HAT4, Budapest, Hungary, 9,125 kc. Kemp, Wednesday & Sunday 7-8 p.m. Alfred, Saturday 6-7 p.m. (from veri) Frederick, Monday 7-8 p.m., Thursday same, & Saturday 6-7 a.m. Randle, Eder, Shamleffer, 10-11 a.m. Sporn, Dressler, Sahlback, Unger. Address: Radio Labor.

HAS3, Budapest, Hungary, 15,370 kc. heard Sunday 9-10 a.m. Alfred, Randle, Sporn. Slogan: "Justice for Hungary." Same address as HAT4.

OXY, Skamlebaek, Denmark, 11,805 kc., Sunday 8-8:30 p.m. & irregular 9-10 p.m. Alfred, Westman, Unger, Sahlback, Birnie.

TFJ, Reykjavik, Iceland, 12,235 kc. heard Sunday 1:40-2:30 p.m. Alfred.

Central America

YSD, San Salvador, El Salvador, 9520 kc. and 7844 kc., 9:30 p.m. (Skinner); 7894 kc. (from announcement), 9-12 p.m. (Kentzel); 7900 kc. (Lindner).

YN1PR, YNPR, Managua, Nicaragua, 8600 kc., daily 7-9 p.m. (Alfred, Ralat); 8580 kc. (Birnie).

YNGU, Managua, Nicaragua, 9300 kc., weekdays 12-2 p.m. and 5-6 p.m., Sunday 11 a.m.-12 noon (Sahlbach).

YNSG, Managua, Nicaragua, 6325 kc. (from announcement), 9:50-12:30 p.m. (Shamleffer).

HRD, Tegucigalpa, Honduras, 6235 kc., Monday and Friday 7 p.m. (Weiss); Monday 10-1:40 p.m. (Shamleffer); daily 8-11 p.m. except Sunday (Dressler). Slogan: "La Voz Atlantida."

TIEP, San Jose, Costa Rica, 6710 kc., Saturday 10:30 p.m. and Sunday 7:30 p.m. (Shamleffer, Coover, Hendry); daily 7-10 p.m. (Lindner). Address: P. O. Box 257.

TIPG, San Jose, Costa Rica, 6410 kc., Saturday 9 and 10:30 p.m. (Shamleffer); 8 p.m. (Ralat, Harris, Fleming, Coover); daily 6-11:30 p.m. (Dressler).

TIOW, Port Limon, Costa Rica, 6850 kc., 8:30-9:30 p.m., daily 10-11:30 p.m. (Dressler).

TG2X, Guatemala, Guatemala, 5940 kc. (Lindner); 4-6 p.m. (Nigh, Frederick); 10-11 p.m. (Alfred, Ralat, Shamleffer).

HP5A, Panama, Panama, 11,700 kc., 9 p.m. (Coover, Kemp, Shamleffer); daily 7-10:30 p.m. (Atherton, Alfred, Schrock, Ralat, Harris); Thursday 9:30-10 p.m. (Blanchard); daily 12-10 p.m. (Fleming, Lindner, Pickering, Diez, Dressler, Birnie); daily 8-10 p.m. (Unger, Lindner). Slogan: "La Voz del Isthmo" and "Radio Theatre." Address: P. O. Box 954.

HP5K, Colon, Panama, 6005 kc., 6-9 p.m. (Nigh, Weiss).

Oceania

KZRM, Manila, Philippine Islands, 9570 kc. and 9650 kc., irregularly 8-10 a.m. (Westman, Rances, Lander, Gertenbach, Yoshimura); 11,840 kc. (Birnie); 5:30 a.m. (Honda).

VPD2, Suva, Fiji Islands, 9540 kc., Saturday and Tuesday 5:30-7 a.m. (Noyes, Eder); daily 6-7 a.m. (Alfred); irregularly (Westman, Pickering, Pierce).

KKP, Honolulu, Hawaii, 16,030 kc., Friday 9:30-9:50 p.m. (Shamleffer).

VK6ME, Perth, Australia, 9590 kc., 6:57 a.m. (Eder, Lander); 6:07-6:40 a.m. (Alfred, Oglesby); daily except Sunday 6-8 a.m. (Unger, Markuson).

VK9MI, M. V. Kanimbla, Australian Coast, 7 a.m., opens transmissions with a ship's bell striking the hour and three blasts of a whistle (Sibbin).

VK2ME, Sydney, Australia, 9680 kc. (Kemp); Sunday 2 a.m. and 4:30-8:30 a.m., Monday 10:30 a.m.-12:30 p.m. (Unger, Smith, Diez); Sunday 5-9 a.m. (Unger).

VK3ME, Melbourne, Australia, 9500 kc. (Kemp); daily except Sunday signed 7 a.m. (Myers, Eder); daily 6-7 a.m. (Alfred, Fleming, Oglesby); daily 4-7 a.m. (Unger); daily except Sunday 6-9 a.m. (Hendry, Pickering, Dressler, Pierce, Honda, Unger).

VK3LR, Lyndhurst, Australia, 9580 kc. (Kemp); 7 a.m. (Myers, Eder,

Lander); 1:30-2 a.m. (Randle); daily 6-7:30 a.m. (Alfred, Lopez); daily except Sunday 6-8:30 a.m. (Fleming, Gallagher, Hendry, Shamleffer, Weiss, Blanchard, Pierce, Honda). Address: P. O. Box 1686.

Africa

EAJ43, Tenerife, Canary Islands, 10,380 kc., Tuesday 6:45-7:30 p.m. Shamleffer, daily 1-3 p.m., 5:45-7 p.m. & 8:20-10:30 a.m. Alfred, daily 6-8 p.m. Fleming, Gallagher, Augustine, Diez.

EA9AH, Tetuan, Spanish Morocco, 14,200 kc., 10:15 p.m. Wicks; 14,070 kc., Gallagher, 14,030 kc., 7:20-9 p.m., Alfred, Smith, Diez, 5 p.m. & 7-8 p.m., Magunson Kentzel 14,040 kc. (from veri) Eder.

ZNB, Mafeking, Union of South Africa, 5900 kc., daily 1-2:30 p.m., except Saturday (veri) Westman; reports requested, Gertenbach. Address: P. O. Box No. 106, Mafeking, Bechunaland Protectorate, Union of South Africa.

CR7BH, Lourenco Marques, Portuguese Africa, 11,710 kc., 10 a.m., Gallagher, 11,718 kc. Pierce.

"Radio Marino," Magadiscio, Port Somaliland; alternate weeks on different frequencies 12-4 p.m., Westman.

SUV, Cairo, Egypt, 10,055 kc., heard 5:30-6:20 p.m., Sporn.

Asia

JVH, Nazaki, Japan, 14,600 kc., heard Sunday 4:30-4:40 p.m. (Shamleffer), 14,640 kc. (from ann.), (Alfred, Diez). Slogan: "The Voice of Japan."

JZI, Nazaki, Japan, 9535 kc., daily 8-9 a.m. (Westman, Sporn, Honda).

JYT, Kemikawacho, Japan, 15,760 kc., heard 7-10 a.m. (Craston).

ZBW, Hong Kong, China, 9520 kc. (Kemp), heard 7:07 a.m. (Eder), daily 5:30-8 a.m. (Fleming), 9530 kc., daily 5-9:30 a.m. (Pierce, Honda).

CQN, Macao, Portuguese China, 9750 kc., heard Monday and Friday 7 a.m. (Fleming), 9710 kc. (Diez).

RV15, Khabarovsk, Siberia, 4273 kc., heard 2-9 a.m. (Ravelle), schedule: every other day 3-3:30 a.m. (from veri) (Shamleffer).

HS8PJ, Bangkok, Siam, 19,020 kc., heard 8-10 a.m. (Randle), 4350 kc., Thursday only 8-10 a.m., test irreg., Monday at same time (from veri), (Scala, Weiss), heard Monday 8:30 p.m. (Unger). Address: Post and Telegraph Dept., St. Col. Phra Oram, supt. Radio Section, Bangkok.

VUB, Bombay, India, 6160 kc., heard 8:20-9 a.m. (Sporn).

YAO, Afghanistan, 4150 kc., heard 2:20-3:15 a.m. (Sporn).

PLP, Bandoeng, Java, 11,040 kc. (Kemp), 11,000 kc. (Lindner), daily 6-7:30 a.m. (Alfred, Pickering, Shamleffer, Sporn), daily 5-10 a.m. (Fleming, Sahlback, Pierce, Honda).

PMN, Bandoeng, Java, 10,260 kc., heard 6-7:30 a.m. (Alfred, Pickering).

YDA, Batavia, Java, 3040 kc. heard 5:30-10:30 a.m. (Randle, Weiss).

JZK, Nazaki, Japan, 15,160 kc., daily 8-9 a.m. (Noyes, Wollenschlager), daily 4:30-5:30 p.m. and 12:30-1:30 a.m. (Kemp, Shamleffer, Alfred, Westman, Eder, Pierce, Pickering, Hartzell), daily 3-4 p.m. (Fleming, Beard, Honda, Atherton, Unger). Slogan: "The Voice of Tokyo."

JZJ, Nazaki, Japan, 11,800 kc., daily 8-9 a.m. (Noyes), daily 4:30-5:30 p.m. and 12:30-1:30 a.m. (Kemp) (from ann.) (Alfred, Westman, Eder, Myers, Shamleffer, Sporn), daily 3-4 p.m. (Hartzell, Fleming, Weiss, Sahlback, Honda). Slogan: "The Voice of Japan."

JVN, Nazaki, Japan, 10,660 kc. (Gallagher, Kemp), heard 6-7:45 a.m. (from

ann.) (Alfred, Eder), heard 4-7:45 a.m. (Sporn, Fleming, Diez, Dressler, Pierce, Honda, Unger). Slogan: "The Voice of Japan."

JDY, Dairen, Manchukuo, 9620 kc. (Gallagher), heard 10-11 a.m. (Honda).

JFAK, Taihoku, Japan, 9600 kc., heard 10 a.m. (Gallagher).

West Indies

HIN, Trujillo, Dominican Republic, 6240 kc. (Coover), heard 8:30 p.m. (Wittig, Eder), heard 12,480 kc., at 9 p.m. (Myers, Shamleffer), 12,500 kc. (Atherton, Fleming, Sculley), 11,280 kc. (Gallagher) daily 6-7 p.m. (Smith, Nigh), 12,550 kc. (Mott, Hendry, Lindner).

HIT, Trujillo, Dominican Republic, 6630 kc. (from ann.), heard 8:15 p.m. (Shamleffer, Sculley), heard 11 p.m. (Coover). Slogan: "Voice of RCA Victor."

HI1X, Trujillo, Dominican Republic, 6340 kc., Tuesday and Frilay 8:10-10:10 p.m. (Lindner, Weiss).

HIV4, San Francisco de Macoris, Dominican Republic, 6477 kc., heard 5:10-9:40 p.m. (Nigh).

PCJ-1, Willemstad, Curacao, 5930 kc. (usual frequency is 9470 kc.), special program 7:35-8:35 p.m. (Bower).

"Radio France," Martinique (Fort-de-France), 9685 kc., heard Tuesday 6:40-7:30 p.m., signed with "Marseillaise" (Shamleffer, Hartzell, Eder). Address: P. O. Box 56.

HH3W, Port-au-Prince, Haiti, 9645 kc., daily 7-8:45 p.m. (Hartzell), daily 1-2 p.m. (Augustine, Lindner, Piorko, Sporn). Address: P. O. Box A-117.

FZF6, Fort-de-France, Martinique, 7710 kc., heard Tuesday 8:30 p.m. (Hernday).

COCW, Havana, Cuba, 6330 kc., relays CMW (Anca), Sunday 7-10 p.m. (Shamleffer, Alfred, Markuson, Sahlback). Slogan: "La Voz de las Antillas." Address: P. O. Box 130.

CO9BC, COBC, Havana, Cuba, 9380 kc., relays CMBC (Anca, Shamleffer), 9360 kc. (Lindner), 9300 kc., heard 8-12 p.m. (Wicks, Alfred, Wittig, Eder), daily 6-10 p.m. (Fleming, Pickering, Dressler, Hendry, Markuson), 9400 kc. (Sahlback, Birnie). Slogan: "El Progreso Cubano"; "La Voz de la RCA Victor." Address: 139 Monte St.; P. O. Box 866.

COJK, Camaguey, Cuba, 8665 kc. (Shamleffer), heard 7-10:30 p.m., relays CMJK (from veri.) (Alfred, Eder, Lopez, Schrock, Fleming, Sculley, Hendry, Massey, Atherton). Slogans: "Radio Zenith" and "La Voz de El Camagueyano." Address: Finlay 3, Altos.

COCD, Havana, Cuba, 6130 kc., heard Monday 10:30 p.m. (Shamleffer), relays CMCD (Alfred), daily 9-11 p.m. (Gallagher, Weiss, Hendry), daily 7-12 p.m. (Unger, Coover). Slogan: "La Voz Del Aire."

COBF, Havana, Cuba, 9000 kc., daily 7 a.m.-12 midnight (Fleming). Slogan: "RCA Victor."

CODX, Havana, Cuba, 9125 kc., heard 6-9 p.m. or later (Magnuson).

COHB, Sancti Spiritus, Cuba, 6280 kc., daily except Sunday 9-11 p.m. (Hartzell, Diez).

CO9JQ, Camaguey, Cuba, 8665 kc., heard sign at 10 p.m. (Westman), heard 9-11 p.m. (Gallagher, Weiss, Diez).

COCQ, Havana, Cuba, 9750 kc. (Wollenschlager, Kemp), heard 9:30 p.m. (Wittig, Coover, Redmond, Shamleffer), heard 8 a.m.-1 a.m. (next day), relays CMQ (Alfred, Craston, Eder, Myers, Nigh), daily 7 a.m.-8 p.m. (Fleming, Hendry, Diez, Weiss, Unger, Lindner).

COCH, Havana, Cuba, 9820 kc. (Wollenschlager, Kemp), heard 9:30-10 p.m. (Wittig), 9428 kc., heard 6 p.m. (Nigh, Eder), 9420 kc., daily 6-11 a.m. and 3-10 p.m. (Fleming, Sculley, Gallagher, Dressler, Hendry, Unger), daily 7 p.m.-1 a.m. (Lindner).

COCF, Matanzas, Cuba, 11,810 kc., daily 1-4 p.m. and 6-10 p.m. (Kemp, Coover, Shamleffer). Sunday 9-10 p.m. (Atherton, Alfred, Frederick, Lander, Eder, Myers, Lopez, Ralat), daily 10 a.m.-11 p.m. (Fleming, Smith, Hendry, Diez, Dressler, Lindner, Duncan). Address: General Bertancourt 51. Slogan: "Radio Philco."

CO9BZ, COBB, COBZ, Havana, Cuba, 9030 kc. (Kemp), relays CMBZ (Anca, Magnuson, Shamleffer, Alfred), 9190 kc., daily 4-10 p.m., Saturday 4-10:30 p.m. (Frederick, Randle, Eder, Hartzell, Fleming, Schrock, Pickering, Dressler, Markuson, Hendry, Sahlback, Diez) daily 7:45 a.m.-12 midnight (Lindner, Kentzel). Slogan: "Radio Salas." Address: P. O. Box 866.

COCO, Havana, Cuba, 6000 kc. (Diez), heard 8-10 p.m. (Unger, Weiss).

COCX, Havana, Cuba, 11,640 kc. (Kemp, Wittig), 11,500 kc. (Shamleffer), 11,435 kc., heard 5-11 p.m., relays CMX (Alfred), daily 8 p.m.-1 a.m. (from veri.) (Frederick, Eder), five chimes at announcement (Myers), 11,435 kc., daily 8 a.m.-midnight (Fleming, Sculley, Gallagher, Wollenschlager, Weiss, Hendry, Diez, Unger), 11,500 kc. (Dressler). Slogan: "La Casa Loyin." Address: P. O. Box 32.

COCM (COCN?), Havana, Cuba, 9820 kc., relays CMCM, daily 8-12 p.m. (Gallagher, Lindner), 9875 kc. (Shamleffer), 9775 kc., relays CMCN (Anca), 9840 kc. (Magnuson, Alfred, Wittig, Eder, Hartzell, Lopez, Ralat, Pickering, Hendry, Markuson, Skinner, Dressler), daily 5-11 p.m. (Sahlback, Diez). Address: P. O. Box 36; P. O. Box 33.

North America

W1XAL, Boston, Mass., 15,250 kc., reports requested (Patrick), 11,790 kc. (Shamleffer, Fleming, Gallagher), heard Sunday 9:30 a.m. (Hendry, Beard, Unger).

STARTING IN YOUNG!

Dr. Harry R. Williamson's YL, Althea Nancy Williamson, is a radio fan at the tender age of seven months. Dr. Williamson's amateur station is W8OFL of Lansford, Pa.

W6XKG, Los Angeles, Calif., 25,950 kc., relays KGFJ 24 hours a day (Schrock, Honda). Address: 1417 S. Figueroa St.

KEJ, Bolinas, Calif., 9010 kc., heard Sunday 12-12:45 a.m. (Craston).

W4XB, Miami, Fla., 6040 kc., heard 12-2 a.m. (Craston).

W3XAU, Philadelphia, Pa., 9600 kc., heard 4-12 p.m. (Westman), daily 12-6 p.m. (Gallagher, Weiss).

W3XES, Baltimore, Md., 35,600 kc., daily 9 a.m.-5 p.m., reports requested (from veri.) (Randle). Address: 811 W. Lanvale St.

W2XAD, Schenectady, N. Y., 15,330 kc. (Kemp), daily 11 a.m.-9 p.m. (Duncan, Shamleffer, Diez, Beard, Unger).

W2XAF, Schenectady, N. Y., 9020 kc (Kemp), heard 11 p.m. (Lindner), 9530 kc. (Redmond), heard 4 p.m. (Nigh, Oglesby), 9530 kc., daily 8-10 a.m. (Gallagher, Weiss, Diez), daily 4-12 p.m. (Unger).

W9XF, Chicago, Ill., 6100 kc. (Kelly, Wollenschlager, Redmond), heard 6:30 p.m. (Wittig, Gallagher), Tuesday, Thursday and Friday 8-12 p.m., Monday, Wednesday and Saturday 12-1 a.m. (Unger).

W3XAL, Bound Brook, N. J., 6100 kc. (Kemp), heard 8:13 p.m. (Oglesby), 17,780 kc., signs Sunday 6:30 p.m. (Wittig), 17,780 kc., 9 a.m.-9:30 p.m., 6120 kc., 9:30-11 p.m. (from veri.) (Randle, Gallagher, Shamleffer, Lindner, Weiss, Yoshimura, Diez, Beard, Honda), daily 8-10 p.m. (Unger).

W8XAL, Cincinnati, Ohio, 6060 kc. (Kemp, Redmond), heard 10:15-11 p.m. (Shamleffer), heard 5:30 a.m.-7 p.m. (Nigh), heard 10 p.m.1- a.m., relays WLW (Lindner, Weiss).

W8XK, Pittsburgh, Pa., 11,870 kc. (Kemp, Redmond), heard Saturday 9 p.m., 6140 kc., Saturday 9-12 p.m. (Shamleffer), 15,210 kc., daily 11 a.m.-6 p.m. (Fleming, Sculley), 6140 kc. (Gallagher, Weiss, Pera, Diez, Murray), 11,350 kc. (Lindner).

W2XE, New York, N. Y., 11,930 kc. (Kemp, Wittig), 15,270 kc., heard Sunday 4:30 p.m. (Ralat), heard 11 p.m. (Wittig, Lander), 11,830 kc., 11,900 kc., 6120 kc., 17,760 kc., and 21,520 kc. (Blanchard), daily 2-5 p.m. (Fleming, Gallagher, Weiss, Lindner, Diez, Pierce, Unger).

XEGW, Mexico, D. F., Mexico, 6110 kc. (heard on 6130 kc.), relays XEJW (Velasco, Diez). Slogan: "El Heraldo de Mexico." Address: P. O. Box 8403.

XEWW, Mexico, D. F., Mexico, 15,160 kc., daily 9 a.m.-6 p.m., 9500 kc., daily 7 p.m.-1 a.m. (Kemp, Wicks, Shamleffer, Ralat, Atherton) (from veri) (Schrock, Alfred, Eder, Wollenschlager, Hendry, Dressler, Fleming, Birnie, Sahlback, Diez, Honda). Slogan: "La Voz de la America Latin." Address: P. O. Box 2516 Aguntemiente 54.

XEWI, Mexico, D. F., Mexico, 6015-11,900 kc. (Coover), Monday, Wednesday and Friday 3-12 p.m., Tuesday and Thursday 7:30-12 p.m., Saturday 9-12 p.m. and Sunday 12:30-2 p.m. (from veri.) (Frederick, Augustine, Nigh, Magnuson, Weiss, Unger). Slogan: "My Voice to the World from Mexico." Address: P. O. Box 2874.

XEWU, Mexico, D. F., Mexico, 9500 kc., signed at 12:50 a.m. (Lindner), uses four note chimes (Fleming), daily 9 a.m.-10 p.m. (Fleming), 15,160 kc., heard 10-11 p.m. (Kentzel). Slogan: "The Voice of Latin America from Mexico City."

XEXN, Mexico, D. F., Mexico, 9550 kc., heard 11:15-11:30 p.m. (Shamleffer).

XEXA, Mexico, D. F., Mexico, 6180

kc., heard Sunday 11:15-11:30 p.m. (Shamleffer, Weiss).

XEBT, Mexico, D. F., Mexico, 6000 kc., heard 11-12 p.m. (Alfred), heard 8 p.m.-1 a.m. (Randle), siren and cuckoo used between announcements (Hendry, Sporn, Diez, Weiss).

XEBR, Hermosillo, Mexico, 11,820 kc., 1-4 p.m. and 9-12 p.m. (from veri.), relays XEBH (Frederick, Diez, Honda, Redmond). Slogan: "Radio Difusora de Sonora." Address: P. O. Box 68.

CFA5, CGA5, Drummondville, Canada, 9630 kc., heard 6:40 a.m. (Oglesby), testing 8:30 p.m. (Alfred, Fleming), heard Saturday 10:40 a.m. (Gallagher, Wollenschlager, Augustine, Shamleffer). Address: Canadian Marconi Co.

VE9HX, Halifax, Nova Scotia, 6110 kc., heard 9 p.m. (Fleming), 6130 kc. (Sculley, Gallagher), daily 6-12 p.m., daily except Saturday and Sunday 10:30 a.m.-2:30 p.m., Friday 2-9 p.m., Saturday and Sunday 3-12 p.m. (Unger).

CJRX, Winnipeg, Canada, 11,720 kc., also 11,800 kc. (from 8 p.m. on) (Gallagher, Wollenschlager, Redmond), heard 4-10 p.m. (Nigh), 11,730 (Shamleffer, Lander), daily 6-11 p.m. (Fleming, Sculley, L. F. Gallagher, Weiss, Hartzell, Hendry, Unger, Duncan).

CFRX, Toronto, Canada, 6070 kc., heard 7-12 a.m. (Nigh, Wittig), 6050 kc.

South America

YV1RH, Maracaibo, Venezuela, 6360 kc., daily 7-10 p.m. and irregularly on Sunday (Fleming); daily 5-10:45 p.m. (Unger); 11 a.m.-2 p.m. (Lindner). Slogan: "Ondas del Lago."

YV1RB, Maracaibo, Venezuela, 5850 kc., 7-11 p.m. (Randle, Ralat). Slogan: "La Voz del Zulia."

YV1RI, Coro, Venezuela, 6210 kc., 7:30 p.m. (Ralat); 8:30-9 p.m. (Shamleffer). Slogan: "Radio Coro."

YV1RG, Valera, Venezuela, 6230 kc., schedule: daily 5:30-10 p.m. (Dressler).

YV4RB, Valencia, Venezuela, 6520 kc., daily 12-1 p.m. and 6-12 p.m. (Schrock). Slogan: "Radiofusora la Voz de Carabobo" (from verification).

YV4RH, Valencia, 5917 kc., daily except Sunday 5-9:30 p.m. (Hartzell).

YV5RD, Caracas, Venezuela, 6158 kc., daily 10 p.m. (Gallagher, Birnie); signs Sunday 11 p.m. (Shamleffer).

YV5RF, Caracas, Venezuela, 6380 kc., 6-10:30 p.m. (Lindner). Address: P. O. Box 983.

YV5RP, Caracas, Venezuela, 6270 kc (from announcement); 7:30 p.m. on Sunday (Shamleffer, Diez). Slogan: "Voice of the Philco."

YV5RC, Caracas, Venezuela, 5800 kc., Saturday 10:30 p.m. (Shamleffer, Lindner); daily 6-10:30 p.m. (Fleming, Alfred, Wittig, Hendry, Coover, Unger). Slogan: "Radio Caracas."

YV6RC, Bolivar, Venezuela, 6440 kc., 9 p.m. (Wittig, Atherton).

LRX, Buenos Aires, Argentina, 9660 kc., daily 5-10:30 p.m. (Alfred, Wittig, Eder); Sunday 7-8 p.m. (Shamleffer); 9600 kc., daily 5-12 p.m. (Fleming, Sculley, Gallagher, Westman, Nigh, Diez, Hendry, Blanchard, Lindner). Slogan: "Radio El Mundo." Address: Calle Maipú 555.

LSX, Buenos Aires, 10.350 kc., testing 7:32 p.m. (Alfred); Monday 10:20 p.m. (Shamleffer, Sculley); 6:55-7:30 p.m. (Dressler); signed Monday 7 p.m. (Fleming, Unger).

LRU, Buenos Aires, Argentina, 15,290 kc., 7 a.m.-7 p.m. (Randle, Gallagher, Diez, Blanchard). Address: Calle Maipú 555.

CPF, La Paz, Bolivia, 33.10 meters, daily 8-10 p.m. and irregularly (Pena).

PPQ, Rio de Janeiro, Brazil, 11,670 kc., Sunday 7:45-8:15 p.m. (Shamleffer).

HC2CW, Guayaquil, Ecuador, 8400 kc., daily 8-11 p.m. (Nigh).

HC0DA, Guayaquil, Ecuador, 9440 kc., daily except Sunday 8-11 p.m. (Sahlbach).

PRADO, Riobamba, Ecuador, 6620 kc., 7 p.m. (Coover); Thursday 9-11:45 p.m. (Myers, Unger, Shamleffer).

HC2RL, Guayaquil, Ecuador, 6668 kc. (Westman); Tuesday 9:15-11:15 p.m. and Sunday 5:45-7:45 p.m. (Fleming, Dressler).

HC2JSB, Guayaquil, Ecuador, 7854 kc., daily 9 a.m.-2 p.m. and 4-11 p.m. (Augustine, Diez); irregularly (Lindner).

OAX5A, Ica, Peru, 11,796 kc., schedule: 12-4 p.m. and 7-11:30 p.m. (Kemp); relays OAX5B (from verification (Alfred, Frederick, Birnie) Slogan: "Radio Universal." Address: Avenida San Luis.

OAX4J, Lima, Peru, 9320 kc., Friday and Saturday 10:30 p.m. (Shamleffer); 9520 kc., daily 12-3 p.m., 5 p.m.-1 a.m. and Saturday 10 p.m. 1 a.m. (Frederick). Slogan: "Radio Internacional." Address: P. O. Box 1166 (from verification).

OAX1A, Chiclayo, Peru, 6150 kc., 8-11 p.m. (Craston).

CEC, Santiago, Chile, 10,670 kc., 8:30-9:15 p.m. (Gallagher).

CB1170, Santiago, Chile, 11,760 kc., daily 11 a.m.-12 midnight (Geneve). Slogan: "Otto Becker." Address: P. O. Box 706.

CB615, Santiago, Chile, 12,300 kc., 8-9 p.m. (Wicks); 12,245 kc. (Diez).

CEB, Santiago, Chile, daily 5-7:30 p.m. (Smith). Slogan: "Radio Servicc."

Santiago, Chile, 12,020 kc., daily 8-12 p.m. (Gallagher).

HJ1ABP, Cartagena, Colombia, 9610 kc., 10 p.m. (Wittig, Coover, Shamleffer, Lindner); 9600 kc. (Blanchard, Eder, Oglesby); daily 7-10 p.m. (Fleming, Lindner, Diez, Hendry, Unger. Slogan: "Radio Cartagena." Address: P. O. Box 37 (from verificatiou).

HJ1ABE, Cartagena, Colombia, 9505 kc., 5-10:30 p.m. (Nigh, Myers); 9550 kc., irregularly (Gallagher); daily 6-10 p.m. (Unger, Lindner).

HJ1ABB, Barranquilla, Colombia. 4770 kc. (Eder); 9555 kc., 4:30-6 p.m. (Nigh).

HJ1ABG, Barranquilla, Colombia, 6040 kc., 9-10:30 p.m. (Shamleffer).

HJ1ABC, Cartagena, Colombia, 9670 kc., daily 8 a.m.-11 p.m. (Pena). Address: P. O. Box 37.

HJ3ABD, Bogota, Colombia, 4860 kc. (Gallagher); 6050 kc., 9 p.m. (Nigh); 4700 kc., 12:30 a.m. (Pickering, Weiss).

HJ4ABH, Armenia, Colombia, 9520 kc., 9 p.m. (Wittig); Saturday 10:30 p.m. (Shamleffer); daily 6-11 p.m. (Fleming, Lindner); daily 8-11 a.m. (Augustine, Diez); chimes used between announcements (Hendry). Slogan: "La Voz de Armenia."

HJ4ABU, Pereira, Colombia, 6140 kc., 6:30-10:30 p.m. (Lindner).

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

Peter J. Massey, Harold E. Lindner, O. Westman, Bertram Boss, Jr., Robert McCue, Harry Honda, James Doyle, D. S. Catchim, M. J. Markuson, W. W. Enete, Shokichi Yoshimura, Kenneth Dressler, R. F. Shamleffer, George M. Fleming, C.

Roman, Irving Sporn, Alfonso Velasco, Wayne C. Wicks, Thomas P. Jordan, Norman Hendry, Erroll R. Birnie, R. W. Sahlbach, J. Burton, Anton J. Cindel, A. Tracey-Bower, Leslie Mott, P. Piorko, A. Sainz de la Pena, E. A. Margrie, W. Beard, Luis Diez, Gustave A. Magnuson, J. S. Dunn, Edward O. Sculley, Dan T. Wollenschlager, William Skinner, Albert Pickering, N. C. Smith, Albert Augustine, James Nigh, Jr., Clarence Hartzell, L. F. Gallagher, Robert L. Blanchard, A. E. Redmond. J. Weiss, Arthur B. Coover, Charles Pierce, E. W. Strack, H. E. Kentzel, Burnell Unger, E. Geneve, Elmer Duncan, Carl & Ann Eder, Fred Atherton, P. L. Patrick.

The Technical Review

(*Continued from page 363*)

Free Color Code Chart

A convenient vest pocket size R.M.A. condenser color code chart has just been made available by the Cornell-Dubilier Corp. Servicemen, amateurs, and experimenters will want one of these charts for their work. They are free and all you need to do is to send your name to RADIO NEWS, 461 Eighth Avenue, New York City.

Large 32-Page Catalog

The "Fifteenth Anniversary Edition" of the Aerovox catalog is now ready for distribution. This book lists a diversified line of condensers and resistors. The manual has been prepared for easy reading and

quick reference. Condensers are grouped first under their general type classification, then subdivided under working voltage, and finally by capacity and in addition there is a handy index on every page. Replacement condensers are also included. To obtain a copy free, write to RADIO NEWS, 461 Eighth Avenue, New York City.

Free Technical Pamphlets

Through the courtesy of Wright-DeCoster Inc., this department is able to offer free copies of their "Talk-Bak" pamphlet and bulletin No. A16. The first folder contains information on all the well known inter-communication systems and data for connecting the various "Talk-Bak" units. The folder A16 outlines methods for calculating load impedance and power division for multi-speaker installations. Address requests to RADIO NEWS, 461 Eighth Avenue, New York City.

Free Book for "Hams"

Amateurs will be pleased to hear that the Standard Transformer Corp. has very kindly offered to supply free copies of their latest No. 110 "Hamanual." It lists 16 complete transmitter circuits accompanied by helpful information on their products. Address your request with call letters to RADIO NEWS, 461 Eighth Avenue, New York City.

Skyrider Booklet

Hallicrafters Inc. recently published an attractive, descriptive booklet on their complete line of communications receivers. Particular attention is given to the Super Skyrider model S16. A free copy of the book can be had by writing to RADIO NEWS, 461 Eighth Avenue, New York City.

Ballast Tube Replacement Catalog

The Muter Company announces a new catalog listing their complete line of metal ballast resistors. It is conveniently arranged in two sections; the first according to names of receivers showing the Muter stock No. resistor required, and the second section for cross-reference with sets and model numbers. Servicemen and dealers write to RADIO NEWS for a free copy, address requests to 461 Eighth Avenue, New York City.

Large 12-Page Catalog

Centralab has just brought out a new catalog covering their complete line of volume controls, fixed resistors, switches, and other products. The new items include "Midget Radiohms," special switches for inter-office call systems, and other new articles. For your free copy write to RADIO NEWS, 461 Eighth Avenue, New York City.

RADIO NEWS Booklet Offers Repeated

FOR the benefit of our readers, we are repeating a list of valuable, FREE technical booklets and manufacturers' catalog offers, which were described in detail in the July, August, September, October and November, 1937, issues. The majority of these booklets are still available to all readers. Simply ask for them by their code designations and send your request to RADIO NEWS, 461 Eighth Avenue, New York, N. Y. The literature marked with an asterisk is available only to bona fide servicemen, dealers and engineers. In applying for these folders it is necessary to send in your request on your card or letterhead. If you are an amateur give call letters. The list follows:

Jy1—Instrument Topics. A new folder published periodically by Clough-Brengle Co.*
Jy2—Instrument Catalog. Triplett Electrical Instrument Co.
Jy5—Parts Catalog. Radolek Co.*
Jy6—Latest Catalog on Accessories. Radio Corp. of America.*
At1—Broadside on Super-Pro. Hammarlund Mfg. Co.
At2—Catalog on Transmitting Equipment. Wholesale Radio Service Co., Inc.
At3—Folder on Western Electric 633, a dynamic microphone.
At4—Tube Folder. Weston Electrical Instrument Corp.*
At5—P. A. Catalog. Webster Co.
S1—Accessory Folder. American Phenolic Corp.
S2—Transformer Catalog. Kenyon Transformer Co.
S3—P. A. Equipment and Parts Catalog. Inter-World Trade Corp.
O1—Vibration Study with Neobeam Oscilloscope. The Sundt Engineering Co.*
O2—Sound Equipment Catalog. The Radolek Co.
O3—Instructive data for eliminating interference. The Sprague Products Co.*
O4—Catalog on "Nokoil" Speakers. Wright-DeCoster, Inc.
O5—Circular describing gas-engine a.c. electric plants. Kato Engineering Co.
O6—Replacement Condenser Catalog. Solar Mfg. Co.
O7—Guide Book on Peri-Dynamic Speakers. Jensen Radio Mfg. Co.
N1—Parts Catalog. Wholesale Radio Service Co.
N2—Radio Receiver Catalog. Modell's.*
N3—Catalog on Radio Accessories, Cabinets, etc. Bud Radio, Inc.*
N4—Allied Radio Corp. Parts Catalog.

W1XAL

Boston, Mass.—That educational, non commercial programs are possible is amply proven by station W1XAL of the World Wide Broadcasting Foundation. It is now entering its third year of educational programs with new equipment and improved directional antennas. The station now broadcasts daily from 7-9 P.M. E.S.T. on 6040 kc., from 4:45 to 6:30 P.M. E.S.T. on 11790 kc. while some additional programs are transmitted on 15250 kc.

SERVICE–SALES

(*Continued from page* 357)

tentious but pleasantly located on the outskirts of, say, Tampa—such can be secured furnished for twenty dollars a month.

Thus writing off transportation against coal, and considering the lowered cost of living, the serviceman should return home having done better than break even. Of course it will be a bit more difficult the first season, but once you know the ropes, and more or less establish yourself, trailer transients plus a regular resident clientele, will contribute an excellent net income in addition to the by no means negligible feature of spending the winter months under pleasurable conditions.

The season in Florida begins the first of November and ends the first of May. However, things rarely get under way until the New Year, and most of the migratory population wends its way to cooler climes around the middle of April. This corresponds roughly to the radio season. During the summer months static is such as to render enjoyable reception impossible even on the short-wave bands. Very little radio receiving is done during the summer months. Hence it is possible to build up a clientele of permanent residents who will not miss you during the summer and take their business elsewhere. The majority of such customers will require radio service only in the winter, will remember you, and call on you then. Of course it will be desirable to check up on them—drop them a reminder—upon your return south each winter. One serviceman we know, who spends each summer in the Adirondacks and winters in Sarasota, sends his Florida clients a card during the summer, drops them another line early in December announcing that he is returning south shortly, and then sends them a third card immediately upon re-establishing himself at winter headquarters.

Incidentally, this serviceman operates from a trailer both summer and winter, thus cutting his overhead to about ten dollars a month plus depreciation.

Technical Considerations

While southern static is of course at its worst during the summer time it is prevalent at all times of the year in Florida. Also, few programs are available on the regular broadcast channel that are good from all points of view. Where the tonal quality is satisfactory, in the case of a local pick-up, the programs themselves have little appeal And where the NBC and Columbia chain features are carried, the quality is usually marred in the land-line transmission. Thus the Florida radio audience is gradually becoming educated to short wave listening—particularly to such stations as W8XK, W2XAD, W2XAF and W2XE. If the serviceman expects to retail receivers, he should choose a line that is highly effective and easily tuned on the short waves. All receivers serviced should be peaked for highest efficiency on these bands.

If the serviceman does go in for selling radios, he should certainly include one or two automobile and trailer radios.

At the beginning of the winter almost every set in Florida could stand realignment. The high humidity of the summer. with alternate rain and sunshine once or twice, or more times, every day, throws everything out of kilter. These conditions are also responsible for the high percentage of a-f transformer failures and the relatively rapid deterioration of speaker cones A generous supply of replacements should therefore be on hand. Antenna installations also suffer from the elements, and a few aerial kits on the shelf are a profitable investment.

Regardless of to what section of the south you transfer your activities, check with the local chamber of commerce, other authorities or a local serviceman to determine whether or not a license is required for radio servicing

Progressive X-mitter

(*Continued from page* 346)

found that the 807 is satisfactorily neutralized with no adjustment of the "neutralizing" condenser. The r. f. across C7 is very low as it merely connects from the grid to a point of low r. f. voltage on L2. The neutralizing tap should be tried on adjacent turns to those indicated in the coil chart (Figure 4) for check of best neutralization

The 6A6 exciter section employs a somewhat novel switching system. When the second section of the 6A6 either doubles or quadruples to the output frequency of the 807 stage both sections of the 6A6 are used This makes a total of two stages in one tube. When operating in this fashion the crystal is plugged into the grid circuit of the first tube and a coil of the same band as the crystal frequency plugged into the 6-prong socket marked L.

When the 807 output is at the crystal frequency, in other words working "straight through", the first section of the 6A6 is eliminated, reducing the total number of stages in the unit to two. In this case the coil is taken out of the L socket and a crystal plugged into the socket holes indicated on the lower section of figure 1.

The second section of the 6A6 operates under different conditions as a crystal oscillator than when it is doubling or quadrupling. For the latter type of operation a large value of grid leak must be used so that the tube will multiply efficiently On the other hand, for crystal operation of the second section this high bias would increase the crystal current to a harmful degree.

COIL CHART

COIL	TURNS	LENGTH	FORM	DIAM.	NEUT TAP FROM GRID END	WIRE SIZE
A	27	CLOSE-WOUND	SWF-6			#20 D.S.C
B	14	3/4"	SWF 6			#20 D.S.C
C	28	CLOSE-WOUND	SWF-4			#20 D.S.C
D	15	1"	SWF-4			#20 D.S.C
E	8	3/4"	SWF-4			#20 D.S.C
F	4	5/8"	SWF-4			#20 D.S.C.
G	30	2 3/4"	TCF		6 TURNS	#20 D.S.C
H	18	2 3/4"	AIR-WOUND	2"	5 TURNS	#12 ENAMEL
J	12	2 3/4"	AIR-WOUND	1 3/4	4 TURNS	#12 ENAMEL
K	6	2 3/4"	AIR-WOUND	1 3/4	1 TURN	#12 ENAMEL

OUTPUT	CRYSTAL POSITION	COIL AT L	COIL AT L_1	COIL AT L_2	CRYSTAL
80 M	IN →		C	G	80 M
40 M	1st SECTION GRID	A	D	H	80 M
	IN →		D	H	40 M
20 M	1st SECTION GRID	A	E	J	80 M
	1st SECTION GRID	B	E	J	40 M
10 M	1st SECTION GRID	B	F	K	40 M

NOTE: -AIR-WOUND COILS ARE SUPPORTED ON STRIPS OF VICTRON COIL G WOUND ON TCF FORM WITH BASE SAWED OFF FORM IS SUPPORTED HORIZONTALLY ON VICTRON STRIP.

Switch SW takes care of the situation. In its upper position this shorts out the grid leak R1 when the second section runs as a crystal oscillator and cuts off the plate voltage of the first section. When both sections of the 6A6 are employed the switch is thrown down, placing the 6A6 stages in the proper connections for this method of operation.

The switch SW and socket L are so arranged that it is impossible to operate the 6A6 stages improperly. If the switch is thrown to the wrong position the unit will simply not work at all.

If the unit is constructed according to the data given, the values of the components followed as indicated in the parts list, and the approximate layout followed, no trouble should be had in securing proper operation. It is important that the tank leads from the coils to their tuning condensers be kept as short as possible. It should be remembered that blocking condensers C2, C5 and C11 are part of their respective tank circuits and the leads to them from their tuning condensers and coil sockets be kept as short as possible. The mechanical layout used on this unit makes very short leads possible.

Figure 3 is the diagram of the 400 volt supply. It will be noted in the parts list that the plate switch, SW2, is listed as being of the double pole type. The extra section is used, later, to switch the plate power of the 750 volt job. A remote control socket is also shown. The unused prongs of this socket will later connect to the other section of the plate switch for simultaneous remote control of both power supplies.

All four sockets necessary in the power supply are of the 4-prong wafer type. All except that of the 5Z3 rectifier tube are on the back edge of the chassis.

Parts Lists

Low Power R.F. Unit

Aerovox

C —type 1650, .002 mica condenser
C2 —type 1650, .002 mica condenser
C3 —type 1650, .0001 mica condenser
C5 —type 1650, .002 mica condenser
C6 —type 1650, .0001 mica condenser
C8 —type 1650, .002 mica condenser
C9 —type 1650, .01 mica condenser
C11—type 1650, .002 mica condenser

Birnbach

4 type 478 white feedthru insulators, for link and modulator connections
1 type 478J white jacktype feedthru insulator, to mount link (L3) and L2
1 type 431J white standoff insulator to mount plate end of L2
2-foot length of 6 wire cable type 176 (filament wires doubled)
12 type 401 coil plugs
25-foot coil rubber-covered wire type 225 for filament leads, etc.
Roll No. 12 tinned wire type 1498
½ lb. spool No. 20 DSC wire for winding L and L1
Roll No. 12 solid enameled wire type 492

Bliley

2 type LD-2 crystals, one 80-meter and one 40-meter, to desired frequencies

Coto Co.

RFC —type CI-11 125 ma. RF choke
RFC1—type CI-12 250 ma. RF choke
RFC2—type CI-11 125 ma. RF choke
RFC3—type CI-12 250 ma. RF choke
1 type CI-45 control wheel assembly with No. 7 indicator plate
3 type CI-47 indicator plates, Nos. 2, 6, 1

Hammarlund

C1—type MC-50-S 50 mmfd. tuning condenser
C4—type MC-50-S 50 mmfd. tuning condenser
C7—type MEX 3-30 mica trimmer condenser (see text for alterations)
C10—type MC-50-SX 50 mmfd. double-spaced tuning condenser
1 type S-5 5-prong isolantite socket for crystal
1 type S-6 6-prong isolantite socket for L
1 type S-4 4-prong isolantite socket for L1
2 type SWF-6 6-prong coil forms for L
4 type SWF-4 4-prong coil forms for L1
1 type TCF coil form

Irc

R1—50,000-ohm 1-watt carbon resistor
R2—10,000-ohm 1-watt carbon resistor
R5— 5,000-ohm 1-watt carbon resistor
R6—10,000-ohm 1-watt carbon resistor

Ohmite

R —type 0202 500-ohm 25-watt wirewound resistor
R3—type 0217 15,000-ohm 25-watt wirewound resistor
R-4—type 0407 2,000-ohm 50-watt wirewound resistor

Parmetal Products

1 type 3679 8¾ x 19 aluminum black crackle finished panel
1 type C-4526 17 x 3 x 10 cadmium-plated chassis
1 pair type SB-78 brackets

RCA

1 type 6A6 tube
1 type 807 tube

Weston Instrument Corp.

1 model 301 ma. 150 milli-amps. flush bakelite rectangular case meter with square type scale

Yaxley

J—type A-2 jack
SW—type 3242J switch

Miscellaneous

3 bar-type knobs
1 4-prong wafer socket (power connection)
2 4-prong cable plugs (for power cable)

400 Volt 250 Ma. Power Supply

Coto Co.

2 type CI-47 indicator plates Nos. 18 and 19

Kenyon

T —type T-216 power transformer
T1—type T-501 swinging choke
T2—type T-151 smoothing choke

Ohmite

1 type 0416 15,000-ohm 50-watt bleeder resistor

Parmetal Products

1 19 x 10½ type 3605 black crackle finished panel
1 type 15312 17 x 3 x 13 heavy-duty cadmium chassis
1 pair type SB-713 brackets

RCA

1 type 5Z3 rectifier tube

Miscellaneous

SW1—single-pole single-throw toggle switch
SW2—double-pole single-throw toggle switch (see text)
1 AC flush receptacle for 115-volt line input
4 4-prong wafer sockets

Aerovox

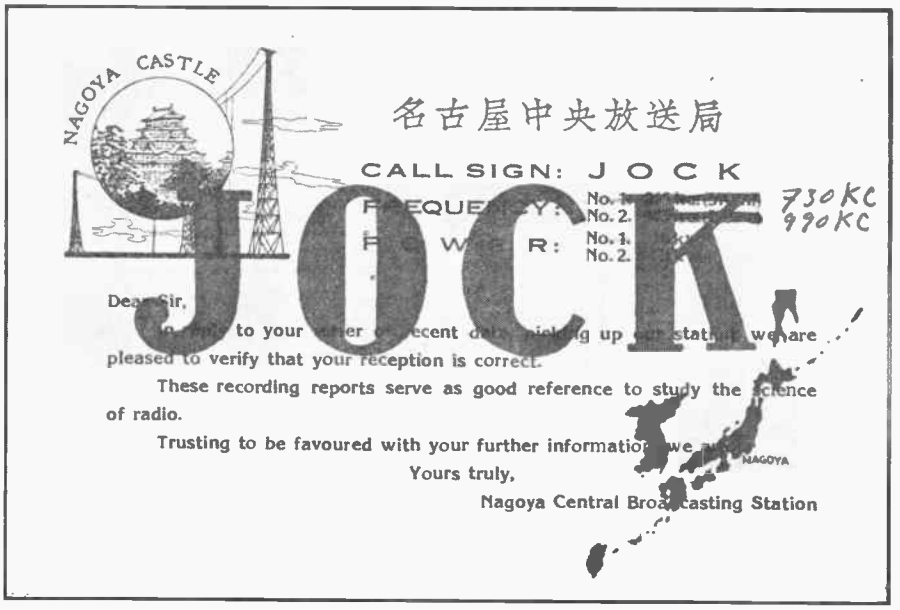
C1—type GL5 dual 8-8 mfd. electrolytic (with 2 sections in series)
C2—type GL5 dual 8-8 mfd. electrolytic (with 2 sections in series)

21-Tube Receiver

(*Continued from page 347*)

ceiver's sensitivity was great enough to use it for even extreme DX. Its sensitivity on these bands in the sharpest position was equal to that of some standard communications receivers. We made a number of tests which further indicate its selectivity by rebroadcasting amateur transmissions on frequencies very close to that of the 1 kilowatt transmitter used. The reports on fidelity of these rebroadcasts were reported as excellent by other amateurs. Using this set as a receiver, amateur stations in India, Japan, South America, and Australia, as well as Africa, were logged on phone. The receiver also incorporates a 5-meter standby band on which only local signals were received. This band was rather insensitive.

And now a few words about operation. The set is equipped with microphone connections so that it may be used as a P. A. high-fidelity system. It also has a very satisfactory method for connecting a phonograph. Tuning in with a single main dial is easy and the rocker action for the dual speed control on this dial is an excellent idea. You simply turn the dial slightly past the band on which you want to receive and then on turning it back the tuning action becomes very, very slow for accurate dial settings. Expansion can be increased to the desired amount by a separate pointer. Any variety of sound reproduction can be obtained (according to listeners' tastes) by the two tone-control pointers, one of which regulates and highs and the other taking control of the amount of bass response. The incorporation of the 18-inch speaker in its new "infinite-baffle" cabinet produces a tonal effect for the complete frequency range of sounds. The appearance of the chromium cabinet with its artistic colored dial is unique and modernistic. Any one should be proud, and we think lucky, to have such a receiver in their home.



THE DX CORNER

(For Broadcast Waves)

S. GORDON TAYLOR

AFTER reviewing the activities of the broadcast band DX corner the tentative conclusion has been reached that possibly the most important service that it can render DX'ers is to publish each month as complete a list as possible of special DX broadcasts and periodic DX broadcasts.

Arrangements are being made with the various DX clubs to obtain advance notice of their specials and in addition observers are invited to include in their reports notice on all specials which they may hear announced over the air. With this sort of cooperation we can make the DX calendar all comprehensive.

It is the plan in publishing the DX calendar to indicate the club or organization to which each program is dedicated. This will provide helpful publicity to the individual clubs.

WJBO Ultra Special

The new WJBO, with a power of 500 watts on 1120 kc., is putting on a special RADIO NEWS program on Sunday morning, December 5 from 2-4 a.m., E.S.T., as was announced in the DX corner last month. This should be a distinctly attractive and entertaining program. This present issue will not reach readers until after the December 5 date but it is urged that those who heard the program be sure and write to observer Wilbur T. Golson, Chief Engineer of this station, if you like the program.

Other similar programs by WJBO will be dedicated to RADIO NEWS on the first and fourth Sunday of each month throughout the season. These are all at the same hour and all are crammed full of swell entertainment with plenty of DX tips.

DX Calendar

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

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

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

Day	Hour	Kc.	Call	State	Kw.	Club
			November			
7	2-4	1120	WJBO	La	.5	R. News, Golson
8	4-5	1170	2NZ	Australia	2	UDXC
11	1:30-7:30	1060	WJAG	Nebr	1	URDXC
28	2-4	1120	WJBO	La.	.5	R. News, Golson
			December			
5	2-4	1120	WJBO	La.	.5	R. News, Golson
8	2:40-3	1240	WKAQ	P. R.	1	R. News, Sahlbach
11	5:40-6	1310	KXRO	Wash.	.1	R. News, Sahlbach
26	2-4	1120	WJBO	La.	.5	R. News, Golson

Periodic

Mondays—
9:15-9:30 p.m., 690 kc., CJCJ, Calgary, Alta., Canada, .1 kw (R. News) (tips).
Wednesdays—
12:30 a.m., 1390 kc., KOY, Phoenix, Ariz., 1 kw. (tips).
Saturdays—
1-1:10 a.m., 1390 kc., KLRA, Little Rock, Ark., 1 kw.
Sundays—
12:45-1 a.m., 1280 kc., KLS, Oakland, Calif., .25 kw. (URDXC) (tips).
2:45-3 a.m., 1010 kc., CKWX, Vancouver, B. C., Canada, .1 kw
3-3:30 a.m., 1410 kc., CKMO, Vancouver, B. C, Canada, .1 kw.
3:30-3:45 a.m., 570 kc., KMTR, Los Angeles, Calif., 1 kw. (tips).
Monthly—
1st day of month, 3-4 a.m., 1200 kc., WTOC, Savannah, Ga., 1 kw.
1st Sunday of month, 4-4:30 a.m., 1340 kc., KGDY, Huron, S. Dak., .25 kw.
2nd Tuesday of month, 5-5:30 a.m., 1370 kc., KRMC, Jamestown, N. Dak., .1 kw.

(Continued on next page)

A PRIZED POSSESSION

Verifications from trans-Pacific stations are not too numerous among DX'ers in the Eastern U. S.—but here is one earned by Observer Thomas Black who does his DX'ing at Pittston, Pennsylvania.

Another Monitor Schedule

The Commercial Radio Equipment Company makes precision frequency measurements on 275 stations each month and the following list is the schedule of special transmission made each month for this purpose. These transmissions are in addition to the regular F.C.C. monitor schedule transmissions. All hours are A. M., E.S.T., and this schedule is provided through the courtesy of the above named concern:

Call	Location	Kc.	Monthly Schedule (A.M., E.S.T
KTSA	San Antonio, Tex.	550 kc	1st Monday, 1:00 to 1:15
WRR	Dallas, Texas	1280 kc	1st and 3rd Tuesdays, 1:00 to 1:30
KLAH	Carlsbad, N Mex.	1210 kc.	1st Tuesday, 5:00 to 5:30
KBIX	Muskogee, Okla.	1500 kc	1st, 3rd, 4th Tuesdays, 5:30 to 6:00
KWOS	Jefferson City, Mo.	1310 kc	1st Wednesday, 2:00 to 2:30
KWBG	Hutchinson, Kans	1420 kc.	1st and 3rd Wednesdays, 6:30 to 7:00
KNOW	Austin, Texas	1500 kc.	1st Friday morning, 1:45 to 2:15
WACO	Waco, Texas	1420 kc.	1st Friday, 1:45 to 2:15
WPAY	Portsmouth, Ohio	1370 kc	1st of every month, 4:00 to 4:30
KSAL	Salina, Kansas	1500 kc.	1st Saturday, 2:30 to 3:00
WGRC	New Albany, Ind.	1370 kc	6th of every month, 3:30 to 4:00
KVGB	Great Bend, Kans.	1370 kc	7th of every month, 3:00 to 3:30
WPAD	Paducah, Ky	1420 kc	7th of every month, 3:00 to 3:30
WJAG	Norfolk, Neb.	1060 kc.	2nd Friday, 1:30 to 2:00
KPOF	Denver, Colo.	880 kc	2nd Friday, 2:15 to 2:45
KGFW	Kearney, Neb.	1310 kc.	15th and 29th of every month, 6:00 to 6:30
KADA	Ada, Oklahoma	1200 kc.	25th of every month, 2:45 to 3:15
WBBZ	Ponca City, Okla.	1200 kc.	29th of every month, 6:00 to 6:30
WSUI	Iowa City, Iowa	880 kc.	Wednesday preceding 1st Saturday, 1:30 to 2:30

AT YOUR DEALER'S

NEW RADIO PRODUCTS

(*Continued from page* 335)

het. with a tuning range from 530 to 1720 kilocycles. The refinements include a large easy-to-read dial, the new "Magnetite" core i.f. transformers, and a cabinet of pleasing design that lends itself to the decorative mode. The tubes include a 6A7, a 6D6, a 75, a 41, and an 80.

Aerial Kits

A new line of antenna systems for every purpose and purse put up in a handy kit form has been announced by Technical Appliance Corp. The model 400, a low price

kit shown in the illustration is a self-selecting noise-reducing system for both broadcast and short-wave reception. There are other higher priced kits for maximum signal pickup with minimum background noise. The Taco master antenna system is produced for special radio outlet requirements of apartment houses, hotels and other large buildings.

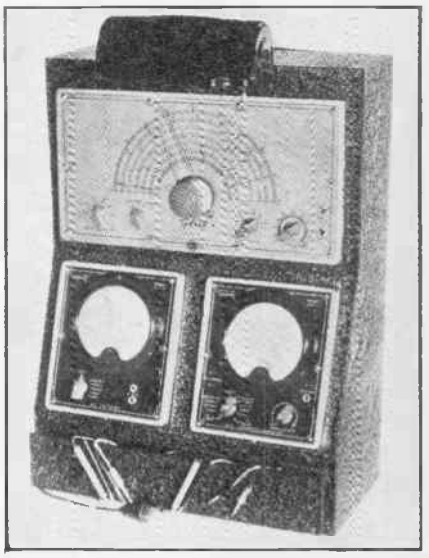
Announces Two New Radio Batteries

The Electric Storage Battery Co. has just brought out two new radio storage batteries for the owners of 2-volt battery re-

ceivers. The type 2R-160 has nineteen plates per cell and is rated at 160 ampere hours; type 2R-105, with thirteen plates per cell, is rated at 105 ampere hours.

Attention Servicemen

The Triplett laboratory test-bench panel offers facilities for a complete service laboratory. They are adaptable to any Triplett master or de luxe line tester. The model 1403 panel shown here accommodates one de luxe and two master units. The instruments can be easily removed for field use. Three cabinet styles are offered and two



or more cabinets can be bolted together to form a continuous panel. There is a large drawer at the bottom for accessories. The measurements are: 22½ inches high by 16 inches wide by 7⅞ inches deep.

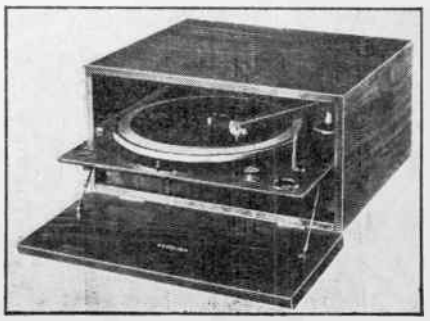
Tiny New Velocity Mike

The Amperite Hand-I-Mike, said to be the smallest velocity type microphone ever

made, is available with either a high or low impedance type output transformer. It can be used as a hand or desk microphone or installed on a regular floor stand. As its name implies it is designed to be a handy microphone for many purposes. Its response is rated flat from 60 to 7500 cycles per second and an output 3 db below the standard size velocity transmitter.

A Good Idea

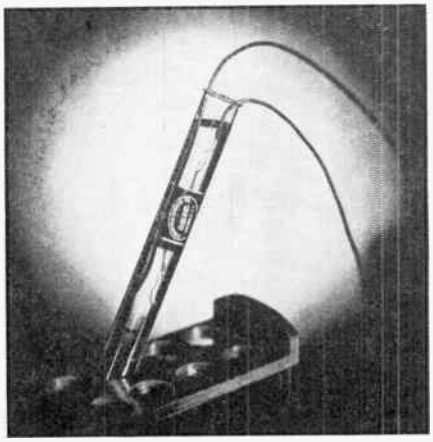
Illustrated below is the Recton, a compact record player complete with a self-starting motor and a high-fidelity crystal pickup. The entire mechanism is attached to a panel which automatically slides out



to permit adjustment of the record and the pickup. It is equipped with a volume and a speed control and there is a special lever attachment on the pickup to facilitate placement of the record. It employs a 12-inch turn-table. The attractive walnut cabinet measuring 9 by 15 by 17 inches is ideally suited both for size and style for placement below a midget radio or on top of a console. It is available for a.c. or a.c.-d.c. operation.

Operates Under Water

Before the Condenser Products Co. introduced their new "Glassmike" condenser it was subjected to very rigid tests. A number of condensers were actually operated under water as shown in the illustration with no apparent electrical or mechanical changes. It is generally agreed that the



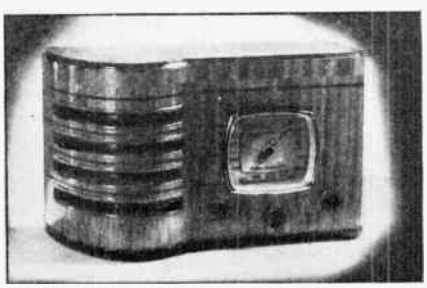
principal cause for failure of fixed condensers lies in the effect of humidity. In the "Glassmike" the condenser cartridge is contained in a glass tube, which is sealed with a special compound bearing the name of "Hillite." This compound adheres permanently to the walls of the tube preventing moisture seepage between it and the glass. The plates are tinfoil, not aluminum, and are contacted by flat helical pigtails which actually become part of the plates.

Saves Time and Labor

Centralab has a new universal control to effect speedy replacement in 95 percent of auto radio volume control jobs. These controls are available with or without switch in resistance values of ¼, ½, 1, and 2 megohms. All are tapped for tone compensation—the tap can be omitted if desired. They are made with ¼ inch diameter shaft 3 inches long, slotted for entire length. Hinged shaft insert makes duplication of either slotted or tongue type shafts easy. The controls without switch are assembled with a slip clutch shaft, an important feature for those cases where the on-off switch is in the remote control head. Switch type units are furnished with double pole single throw switch. The case diameter is slightly over one inch.

5-Tube Superhet

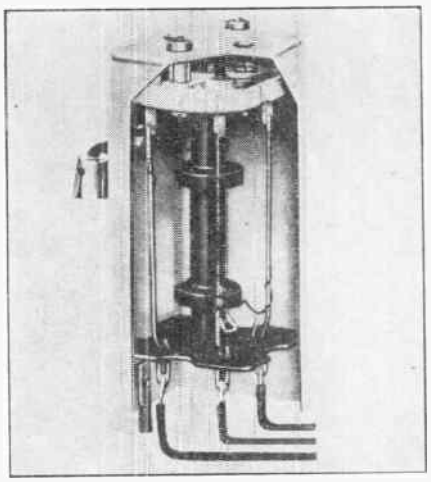
This is the latest Emerson model R167 table-type receiver which covers both the



standard broadcast band and police and amateur ranges. Its rated power output is 3 watts. It has automatic volume control, and uses a 6½-inch dynamic type speaker.

Iron Core Transformers

A new group of iron-core i. f. transformers designed to provide extremely high



gain per stage with a high degree of selectivity, were recently introduced by the Hammarlund Mfg. Co. The core is made from a finely powdered high permeability magnesium alloy. This specially developed core is said to afford a great increase in inductance thus permitting a reduction in the number of winding turns and consequently reducing eddy current losses. The transformers are tuned to 465 kc. and can be used with all tubes normally employed in i.f. amplifiers. Their overall size is 4⅛ inches high by 1½ inches square.

Easy Tuning—Keynote of 1938 Receiver Line

This attractive Philco model 38-3XX nine-tube, triple-range superhet features an

inclined control panel to permit easy tuning, whether the operator is in a standing or sitting position. Other advances include automatic tuning, band spread dial with stations named and located in color, concert grand electro-dynamic speaker, and noise-excluding signal amplifier.

Coaxial Cable

To meet a long felt want in the radio industry for an efficient and reasonably priced coaxial cable the Transducer Corporation has just brought out their new "Co-X" cable. A few of the many uses for coaxial cable include transmission lines, antenna lead-ins, connecting lines between photo-electric cells and amplifiers, for connecting measuring instruments where high-frequency losses or conductivity losses must be reduced to a minimum, aircraft installations, etc. In short, any case in which

(*Turn to page* 384)

Vehicle Speaker Requirements

By RAYMOND P. ADAMS

IT would seem quite in keeping with present radio interests to point out and review the general requirements which a speaker must meet for service on cars and boats.

First and last, the mobile installation depends, for tube filament and power pack driving voltage, upon a storage battery delivering 6 or 12 volts. Whatever the total drain of filaments and power pack, logic suggests a practical extreme in economy of current drain. Even minor reductions in drain are desirable, particularly when they may be effected without decreasing receiver efficiency.

The field-coil energized dynamic, generally designed for 6-volt operation with approximately a 6-ohm field, draws a full, unnecessary ampere. We cannot afford this extra pull—not even on a car battery which, however much it remains under conditions of constant charge, must handle lights, horn, starter, electrical odds and ends—plus the modern 6 or 7-tube superhet.

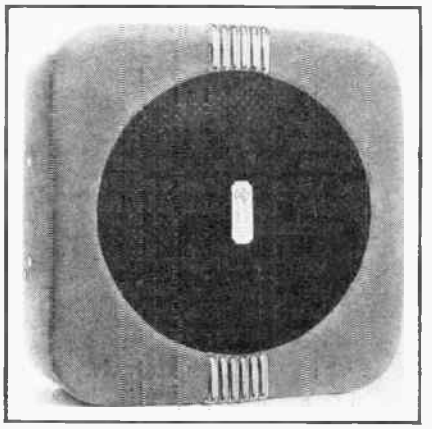
The modern permanent-magnet reproducer, provided with a self-energizing field unit of light weight, small physical structure, high magnetic density and tremendous coercive force, suggests itself as the ideal vehicular unit not only because it relieves the battery of unnecessary drain, but also because its field generates no heat. The magnetic speaker may be satisfactory in certain cases and electro-dynamics are acceptable where battery current limitations are not important but the permanent-magnet dynamic as available today has become the most practical of all reproducers for automotive and similar operation.

Appearance and physical dimension are important these days, of course. A speaker for car radio service must be so built that it will fit into the available spaces suitable to reproducer installation and operation, and the case must be so designed and constructed that it will harmonize with existing interior treatments. An example of those which are now available and which will match up well with upholstery and fittings in cars is the Wright-DeCoster "Nokoil" permanent-magnet speaker shown in the illustrations. Finish here is soft taupe suede, with black grill, and chrome relief. What holds for the average car-radio job holds as much, these days, for certain low-power P.A. installations—particularly those set up in passenger-type cars and small panel trucks.

The reproducing unit in a good vehicle speaker should have protected parts. A non-magnetic shell is desirable. The magnet, whether it be self or field-coil energized, naturally draws to it small bits of magnetic metal. These collect on magnet and transformer and do their greatest damage near the voice coil, where they cause misalignment, scraping and loosening. Dust and oil splatter likewise do their additional share in causing speaker trouble.

Protection of metal parts is of importance, and it is wise policy to make sure that your vehicle speaker frame and similar assembly pieces are adequately rust proofed as constant out-of-door service implies the use of the speaker under severe atmospheres and extreme weather conditions.

Where the atmosphere is salt or humid, such as that encountered in seashore and



tropical service, particular efforts must be made to protect the transformer, cone and voice coil from moisture absorption and saturation with consequent electrolysis or corrosion, lowered insulation resistance and warpage.

The average watercraft job is very similar to the typical car-radio assembly, derives its operating power from the usual storage battery, and in various circuit and constructional details follows general auto set design principles. Economy of operation is especially necessary because the battery is not generally subject to constant charge during set operation. Good appearance, small size, high power handling ability and good tone quality all remain requirements of no mean dimension.

However, and it's a "however" which carries a whale of a lot of meaning—the seafaring reproducer must be especially prepared for marine service. A metal case, of itself, will afford little protection against the effects of humid atmosphere! The thing we must do is to see to it that the speaker is built for adequate protection of *individual* parts. All metal parts must be cadium plated, to prevent corrosion and these plated parts may well, for additional security, be further protected by a couple of coats of high-grade marine lacquer.

The output transformer must use thoroughly impregnated coils and must be sealed with a heavy wax coating. Otherwise, moisture will penetrate, endangering insulation and, once inside the transformer, may go into chemical combination with impurities dissolved from the insulating bodies, causing rapid corrosion of coil windings and connections.

And if extremely humid atmospheres alone will ruin a transformer, what about atmospheres which are not only characterized by high moisture but may have a high salt content? It is altogether possible that moist sea air may bring salt with it. We cannot consider the fact that there might be times when dry hot atmospheres will remove this moisture. The salt can't dry out with the water. It's left as a conductive, ruinous deposit to carry on its destruction.

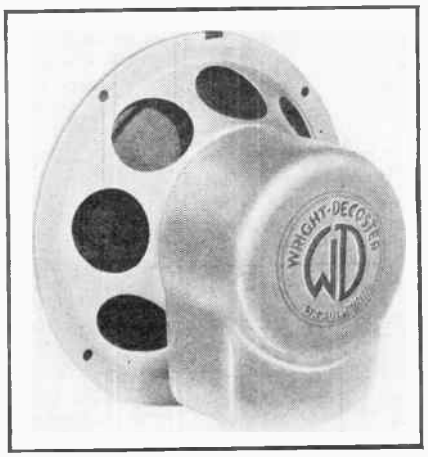
If a field coil is present it must be similarly impregnated and wax coated. Inasmuch as the "Nokoil" type of speaker

(*Continued on next page*)

Movie Sound

(*Continued from page* 338)

Acoustics" and the publications of the Professors Sabine, father and son. In addition to the circular previously mentioned, the Bureau of Standards has several others of considerable interest.



has no field coil it offers this additional and definite advantage for marine service.

The voice coil will give trouble unless certain precautions are taken. Moisture may cause shorted turns. Moisture and salt may eventually ruin it. Salt alone left as a deposit will disturb the centering, upset the impedance and wreck tone quality and power handling ability. Therefore, a voice coil protecting shell is necessary, with the shell itself suitably weatherproofed.

The cone which is of soft, fibrous construction and is blotterlike in its natural tendency to absorb moisture *must* be weatherproofed on both sides. A cone used in a marine speaker and unprotected against humid atmospheres will soften. Drying will simply warp it, so that accurate centering of the voice coil will be made impossible.

Test Oscillators

(*Continued from page* 334)

was built two years ago with a view to satisfying future requirements as to accuracy, as well as present day standards.

It is essentially a primary standard, and is installed and maintained by the laboratory, the frequencies being "piped out" to the various departments of inspection and calibration by means of shielded transmission lines.

The master unit is shown in Fig 1. The second panel from the top contains a temperature controlled crystal, oscillating at 100,000 cycles (100 kc.). This unit is the heart of the whole instrument, but means are yet necessary to be certain that the crystal circuit operates on frequency at all times.

This is done by a series of master vibrators and a clock circuit. Three of these units are shown in the photograph, although a fourth one has been added for greater stability, since the taking of this picture. These vibrators operate at 10,000 cycles, 1,000 cycles, 250 cycles, and 50 cycles respectively.

The output of the 50 cycle multivibrator is filtered in the lowest panel, and the output is amplified to sufficient power to run a clock designed to keep correct time on a 50 cycle power line. This clock is mounted in the center of the uppermost panel. Beside it is a standard 60 cycle clock which operates from the same power line which supplies the complete assembly.

Two methods are used to determine the frequency of the crystal to the desired accuracy; checks of the clock time against observatory time signals from Arlington, and checks of harmonics of the crystal oscillator against the standard frequency transmission of WWV. Periodic checks of frequency against WWV never show a discrepancy greater than two parts in a million. This is a very satisfactory degree of accuracy for factory calibration, but further equipment is necessary to make this fundamental frequency available for the numerous purposes for which it is used by the calibration department.

It was previously mentioned that the multivibrators operate at 10,000, 1,000, 250, and 50 cycles. Since these frequencies are already available in the primary standard, they are individually filtered and carried to the inspection department through transmission lines for the calibration of audio frequency oscillators of various types. In the case of the 10,000 cycle factory signal, six separate amplifiers are used in order that the various factory test positions may cause no interference with one another.

The audio frequency calibrating position is shown in Fig. 2. The four transmission lines can be seen coming into the unit. An oscillograph tube is mounted at the side of the cabinet and is arranged with suitable controls, so that the output of audio frequency oscillators can be compared with any of the test frequencies by means of Lissajous' figures or gear patterns on the cathode-ray tube. By the use of harmonic and submultiple relationships, practically any frequency in the audio spectrum can be determined with the same accuracy as that of the primary standards.

Modulation Meter

(*Continued from page* 349)

Two terminals are provided for connecting a pick-up coil which is coupled to the final tank circuit of the transmitter. This may be an untuned coil of a few turns or may be a coil and condenser tuned to the frequency of the transmitter. Coupling to the tank may be obtained by placing the pick-up of the coil close to the tank or by use of a link. The type of pick-up coil and the method of coupling depend largely upon the amount of power used in the transmitter. In the case of the low-power transmitter, more effective coupling is required and may be rather critical whereas with high power, loose coupling will be adequate.

To check the percentage of modulation, the "read" switch is set in the "carrier" position and the "adjust carrier knob" is adjusted until the pointer on the meter rests on the position marked "carrier" on the meter scale. The 'read" switch is then thrown to the "% mod." position. Thereafter, as the transmitter is modulated, the meter will show the modulation percentage directly. A third control on the panel permits analysis of the modulation by providing separate checks on the positive and negative peaks. The meter scale calibration extends from zero to 120%.

If hum is present its level is determined by reading the meter directly with no sound entering the mike. R.f. harmonics and their amplitude in respect to that of the fundamental carrier of the output can be measured by tuning the pick-up coil to the desired harmonic with the "read" switch in the "carrier" position. The meter reading, divided by 100 gives the value of this particular harmonic in terms of percentage.

By using a device of this type, and keeping an eye on it during transmission periods, it is possible to maintain modulation at or below 100%, even avoiding the variations which so frequently result when the operator leans toward or away.

The "Ham" Shack

(*Continued from page 341*)

is true of any antenna using a low-impedance line feeder system (twisted pairs, etc.)

One of the most effective means of eliminating interference of this kind is to use either a wave-trap or a low-pass filter that will offer a barrier for the transmitter's signal. One of the most effective and least expensive devices of this kind, a "Snubber," has been devised by Laurence M. Cockaday, the editor of this magazine. It has been used by Mr. Cockaday in conjunction with his home station, W2JCY, by other members of this staff and a number of amateurs in the New York area to whom Mr. Cockaday has given the specifications. Its most desirable feature is that it costs practically nothing to make and may be wound up on a moment's notice. All that is necessary is a spool of No. 22 double-cotton-covered wire and a round pencil.

To make it wind fifty turns, evenly, around the pencil leaving a long lead. Then run the wire from the end of the coil down the pencil four inches and wind another fifty turn coil around the pencil. Leave another long lead. When this is done you will have two 50-turn coils connected together. Next these are slid off the pencil. Now take the spool of wire and wind another lead around the 4-inch length between the coils as if making a twisted pair; then jump the second coil and make another "twisted pair" 4-inches long on the lead off the second fifty-turn coil.

To connect to the receiver the free end of the first coil is connected to the aerial and the free end of the second coil just at the end of the "twisted pair" is connected to the aerial post on the receiver. The first lead off the first "twisted pair" (the 4-inch length between the coils) is connected to the ground and the remaining wire to the ground terminal on the receiver. It is a good plan to use wire with different colored insulation for the coils and "twisted pair" to avoid misconnection. After the filter has been installed the wire may be "wadded" together without fear of destroying the effectiveness of the unit.

Tests made with this unit show that it cured interference in more than 90 percent of the cases where it has been tried. Once installed it may be completely forgotten. Unlike a wave-trap which requires tuning to eliminate an interfering signal, it cannot get out of adjustment. Furthermore, it will have practically no effect on the operation of the broadcasting receiver.

Another simple method of eliminating blanketing interference is to install a small radio-frequency choke coil in series with the aerial lead to the broadcast receiver. It has been found that those that are wound in pies are the most effective and while the ordinary receiving type will work satisfactorily in many cases, more difficult interference cases may be cured by using a standard transmitting choke (four millihenries at 600 milliamperes).

If either or both of these devices do not cure the trouble, it may be necessary to install a tuned wave-trap. The writer has not yet encountered a case where a wave trap did not clear up the trouble. The disadvantage of the wave-trap is that it is effective only on one band (the one on which it is resonant) whereas the two previously described devices are effective on all bands. Therefore, if the offending amateur operates on several bands, it will be necessary for him to install a trap for each band on which he operates.

Wave-traps are relatively simple to construct. The writer has found they may be constructed cheaply by using 1½ inch bakelite tubing and compression type condensers. In some cases 100 micromicrofarad midget condensers (of the cheapest type) have been used. The condenser is connected across the coil and the coil in series with the aerial lead to the set, as closely as possible to the aerial terminal of the receiver. The coil-condenser unit should, of course, tune to resonance with the transmitter's output frequency. Coils of the following dimensions will work effectively on the five most used amateur brands: 160 meters, 55 turns of No. 22 d.c.c.; 80 meters, 25 turns of No. 22 d.c.c.; 40 meters, 14 turns of No. 22 d.c.c.; 20 meters, 8 turns of No. 22 d.c.c. and 10 meters 5 turns of No. 22 d.c.c. All coils are slightly spaced between turns excepting those for 160 and 80 meters

The wave-trap before it is installed in the receiver should be tested for ability to resonate at the transmitting frequency. This may be done easily by turning on the transmitter, holding the wave-trap 8 or 10 inches from the final tank circuit and tuning for resonance which will be indicated by a deflection of the plate current meter. If held too closely to the tank circuit, a spark will jump across the condenser and in the case of the compression type might damage it. Another means of determining resonance is to attach one terminal of a neon bulb to one end of the trap. At resonance the bulb will glow, thus indicating the approximate setting when put in the receiver.

All of these devices are effective for eliminating "blanketing" interference of any kind, whether it be from a phone or C.W. transmitter. However, none are particularly effective in eliminating transients or key clicks from a c.w. transmitter. These transients occur at each end of a dot and dash when the key is opened and closed. The problem in keying a transmitter is to cause the power to be completely turned off when the key is up, and completely turned on when it is down. If the key has any tendency to spark these disagreeable clicks will result. Therefore it is desirable to use a method of keying that will completely shut the transmitter on and off rapidly by making and breaking a point in the transmitter at a low current and voltage point. The most serious key click interference results from transmitters in which the keying is done in the final amplifier. Therefore, it is desirable to avoid this practice, although if the transmitter is keyed in a preceding stage it will be necessary to use cut off battery bias on the final amplifier so the plate current in this stage will not run to an extremely high point when excitation is taken off the grid.

The most popular method of keying an amateur transmitter is in the center tap of the filament transformer. This method has both good and bad features. While effective in cutting off the power and convenient it sometimes will be the cause of very bad transients. If the trouble is caused by sparking between the key points connecting two radio-frequency chokes in series with each key lead will eliminate the trouble Also a small capacity condenser (.001 to .005) connected across the key leads on the transmitter side of the r.f. choke coils will help.

If such a unit does not eliminate the trouble, the installation of a lag circuit to eliminate the transients may be necessary. Such a unit may be built around a small iron-core choke coil, condenser and resistor. The constants are not very critical although they sometimes will have to be varied somewhat to meet the conditions encountered in the individual transmitter. A choke coil of about 1½ henries will do in most cases. The primary of a cheap bell-ringing transformer has been used effectively in many cases. This is connected in series with one

key lead. The condenser and resistor are connected in series across the key contacts. Anything up to about 1 microfarad may be used for the condenser and a resistor between 50 and 500 ohms will work effectively. The proper constants for the individual transmitter best may be determined by experiment. Most amateurs have a supply of condensers and resistors around the shack so the experiment will not be very costly.

Another method of keying to eliminate "thumps" is to key the oscillator circuit. This may be keyed in the center tap of the filament transformer or, if cathode-bias is used, in series with the bias resistor. One important thing to remember is: if the oscillator tube is a pentode (that is 47, 2A5 6L6, etc.) it is essential to obtain the screen voltage through a voltage divider rather than a series resistor. The reason is obvious. With a series resistor and no plate current the screen voltage will jump to a high point and damage the tube or crystal. As most pentode oscillators require a screen voltage of about 100 volts a simple voltage divider may be constructed with two 50,000-ohm, 10-watt resistors, connected in series across the plate voltage in the oscillator circuit. The voltage for the screen is obtained from the midpoint of the two resistors. The resistors, of course, should be by-passed with .002 mfd. condensers.

If the oscillator is of the triode type (such as the 6A6 or 53) cathode keying is very effective in eliminating thumps. It must be remembered in any case if oscillator keying is employed, battery or some form of fixed bias supply must be used in each of the following stages to provide complete cut-off when the excitation is removed.

Another advantage of oscillator keying is that it facilitates break-in operation. A large percentage of c.w. stations have adopted this practice.

Returning to the subject of old style receivers that have grid-leak bias detectors and are subject to amateur signal interference, such sets may be converted to cathode bias with little trouble. If the owner has no objection to making the change, all that is necessary is to take out the grid-leak circuit or jump it with a short-circuiting wire; connect a 50,000 to 100,000-ohm, one-watt resistor in series with the cathode of the tube; by-pass this with a 2 (or larger) mfd. condenser and raise the detector plate voltage to 180 volts or more. This change may affect the sensitivity of the receiver somewhat, but in hopeless cases will eliminate amateur interference.

Co-operation between the amateur and the broadcast listener is essential to elimination of trouble. It is true that only a comparatively small percentage of stations have an interference problem, but this small percentage, if allowed to complain loud enough, puts the amateur in bad standing and otherwise hazard his position. Yet, if the two groups work together, there is no reason why all cases of interference cannot be remedied.

Communication "14"

(*Continued from page* 344)

hand is naturally not comparable with the gain on other bands, a number of local 5-meter stations were picked up.

The mechanical band-spread afforded by the large vernier dial contributes to tuning ease over the congested short-wave bands. No difficulty was experienced in tuning in any of the stations.

The character of reception on the standard broadcast band was of outstanding quality as would be expected from the fidelity tests! The receiver fills well a long-felt need for the exacting constructor.

D. C. Amplifier

(*Continued from page 337*)

frequency response curve of the amplifier and output transformer from the 500,000 ohm input volume control to a 500 ohm resistive load. Comparing this curve to the curve taken with a 5000 ohm load (Figure 2), it is seen that this transformer has an excellent curve for a low priced unit.

What may be done in the line of frequency is shown in the 3 db. loss curve. Here the reverse feedback control was set at 6 on the dial, with both high and low frequency compensation controls turned off, and the result is a response curve within plus or minus 1 db. from input to load.

Even with the high and low frequency compensating controls at minimum position there is a slight compensation effect and single pole switches are therefore used to open the circuits.

The other curves in Figure 3 show the compensation possible for low frequencies, high frequencies, or both in combination. In case it is desired to have the high frequency compensation rise at a lower frequency it is only necessary to increase the condenser C3 from .02 mfd. to a larger value.

Parts List for 6L6 Direct-Coupled Amplifier

C1, C2, C3—Cornell Dubilier Dykanol TL6040, 4 mfd., 600 v.
C4—Cornell Dubilier PE-B6808, 3.5 mfd., 600 v.
C5—Cornell Dubilier DT 4W1, 1.0 mfd., 400 v.
C6—Cornell Dubilier DT 4P5, 0.5 mfd., 400 v.
C7—Cornell Dubilier DT 4S2 0.02 mfd., 400 v.
C8—Hammarlund type IBT 140 mica padder condenser, 70-140 mmfd.
Ch1—Kenyon T154 filter choke, 15 henries, 165 ma., 210 ohms d.c.
Ch2—Kenyon T153 output choke, 30 henries, 90 ma., 350 ohms d.c.
Ch3—Hammarlund type R.F.C. 85 choke, 85

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACTS OF CONGRESS OF AUGUST 24, 1912, AND MARCH 3, 1933

Of RADIO NEWS & SHORT WAVE RADIO, published monthly at Dunellen, N. J., for October 1, 1937.

State of New York } ss.:
County of New York }

Before me, a Notary Public in and for the State and county aforesaid, personally appeared Lee Ellmaker, who, having been duly sworn according to law, deposes and says that he is the Business Manager of the RADIO NEWS & SHORT WAVE RADIO, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, Teck Publications, Inc., 461 Eighth Ave., N. Y. C.; Editor, L. M. Cockaday, 461 Eighth Ave., N. Y. C.; Managing Editor, None; Business Manager, Lee Ellmaker, 461 Eighth Ave., N. Y. C.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.) Lee Ellmaker, 461 Eighth Ave., N. Y. C.; Teck Publications, Inc., 461 Eighth Ave., N. Y. C.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state) None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company, but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the twelve months preceding the date shown above is: (This information is required from daily publications only.)

LEE ELLMAKER, Business Manager.

Sworn to and subscribed before me this 24th day of September, 1937.

(SEAL) EDYTHE E. TOMPKINS,
Notary Public,
Bronx County Clerk's No. 41,
Register's No. 25T38,
New York County Clerk's No. 234,
Register's No. 8T133,
Commission expires March 30, 1938.

INDEX TO ADVERTISERS

mh, 230 ohms, d.c.
R1—IRC. type B-133, .5 megohm
R2—I.R.C. type B-114, 5000 ohms
R3, R4—I.R.C. type B-116, 10,000 ohms
R5—I.R.C., 1 watt, 1.0 megohm
R6—I.R.C., 1 watt, 0.5 megohm
R7—I.R.C., 1 watt, 0.25 megohm
R8—I.R.C., 1 watt, 20,000 ohms
R9—I.R.C., ½ watt, 0.2 megohm
R10—I.R.C., ½ watt, 300 ohms
R11—I.R.C. type DHA., 25 watt wire wound. 5000 ohms, set at 3800 ohms
S1, S2—I.R.C. No. 21 switch
S3—Toggle switch, s.p.s.t.
T1—Kenyon T212 Power transformer, 840 volts center tapped, 125 ma; 5 volts, 3 amp; 6.3 volts, 3 amp. CT; 2.5 volts, 4 amp. CT, not used.
T2—Kenyon T-301 output transformer, 3000-5000 ohms primary; secondary, 200-500 ohms and 4—8—15 ohms
T3—1 General Radio type 271 m.f. transformer
1 Yaxley single circuit closing jack type A2
2 Yaxley pin jacks No. 407
1 Yaxley 310R, pilot light
1 Yaxley 310G, pilot light
4 Yaxley No. 366 knobs
2 Crowe No. 438 gain dials
2 Crowe No. 439 tone dials
3 8-prong sockets
3 4-prong sockets
1 Kenyon UB 103 chassis

The "Skyrider"

(*Continued from page* 354)

HP1A-8, HI2T-9, VE4AW-9, VE4GD-9, VE5FY-8, VP5GM-9, HR4AF-9, CO2EG-9, CO2RY-8.

While conditions were not suitable for outstanding DX in the broadcast-band range, enough was accomplished to represent enviable performance both from the standpoints of sensitivity and selectivity. Everything not too far below the static level was brought in readily and in every case it was found possible to separate, on adjacent channels, even distant stations separated only 10 kc. from powerful local stations. These same observations hold on the other ranges between the broadcast band and the 10-meter band.

On the highest frequency range, the receiver was found adequate for local reception on the 5-meter band as well as the high-fidelity broadcast range around 7 meters. It is a very handy thing for any amateur who works a number of bands and needs a local stand-by, 5 meter receiver that allows him to contact his friends in the neighborhood at distances up to 25 or 30 miles. That is the main reason why the manufacturer put in the 5-meter band on this communication receiver.

This, then, is a summary of the Listening Post tests including the findings and observations of the authors. In conclusion, it is felt that this is a receiver which is destined to enjoy wide popularity not only among the "Ham" Fraternity, but among Broadcast Listeners and those to whom Broadcast and Short-Wave DX is a hobby.

Learning the Code

(*Continued from page* 339)

all-wave receivers. There are many stations which send relatively slowly for certain periods; this is sometimes the case with weather reports sent out by coastal stations. When the student progresses further he will find more and more material on the air which will serve him as copying practice. In the beginning it is better to copy from commercial stations than from amateur stations, as an average they are better senders. Later you will be able to pick the better amateur keying.

Here is another "don't". Whatever you

do, don't develop a Ham "swing". It is a distortion of correct sending and may place quite a strain on the receiving operator.

Finally, remember that regular practice of proper methods makes the most progress. Fifteen minutes a day, more if necessary, should enable most beginners to copy well enough to pass the amateur code tests in one month's time. Don't give up when you have almost won the battle—remember you are learning a new language and if learned at all it should be learned right!

"J" Antennas

(*Continued from page* 343)

Tuning Tips

Tune the antenna to the transmitter; *not* vice versa.

Do not alter the tuning of the field strength meter. Set it on the frequency of the transmitter *before* the feeders are connected to the tank coil and then *leave it alone* to the bitter end.

Use loose coupling between your transmission line and a self excited oscillator. Less output concentrated at one frequency will give better DX than higher power smeared over 100 or more KC.

Do not pay too much attention to individual R reports. Receivers, with their antenna systems, will show great variation in sensitivity over the band.

Stop worrying about power limitations and give more thought to making the most of what you have available.

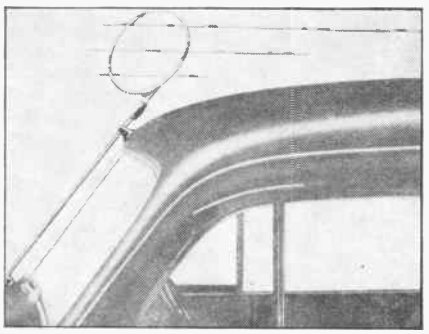
At Your Dealer's

(*Continued from page* 377)

freedom from disturbances, or from pick-up, good shielding, low capacity and low resistance loss are paramount. This new cable is reduced to its simplest components, that is,—the inner conductor, a set of spacers, and the outer conductor which acts as a shield. This simplicity has been made possible by the design of the spacers and by the material used in their construction.

Motor Car Antenna

The Galvin Mfg. Corp. recently introduced their new "Clipper" roof aerial. It is styled in the modern manner to match the



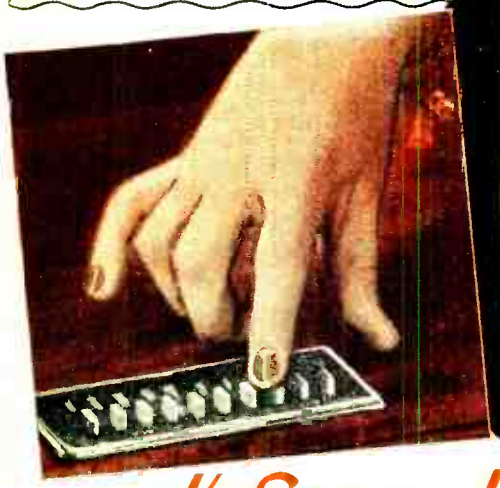
stream-lined automobiles. Constructed and designed especially for cars with steel or turret tops, so as to permit maximum signal pick-up.

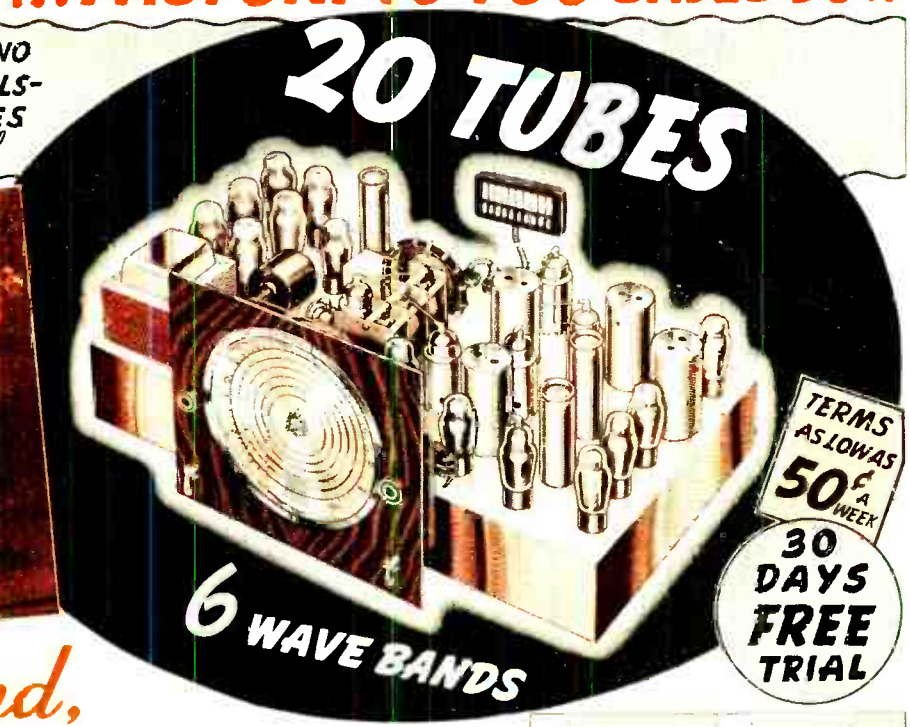
Edward F. Glavin

Hollywood, Calif.—Edward F. Glavin, radio engineer and pioneer, recently died while visiting California. Glavin was an early worker in the development of radio-controlled vehicles. A radio-controlled automobile equipped by him was shown at the 1921 Radio Show. During later years Mr. Glavin did research work for the Pacent Electric Company.

MIDWEST... THE ONLY RADIO OF ITS KIND IN THE WORLD... FACTORY-TO-YOU SAVES 50%

JUST TOUCH ONE BUTTON... NO NEED TO TURN ANY CONTROLS— AN ELECTRIC MOTOR DOES EVERYTHING FOR YOU!



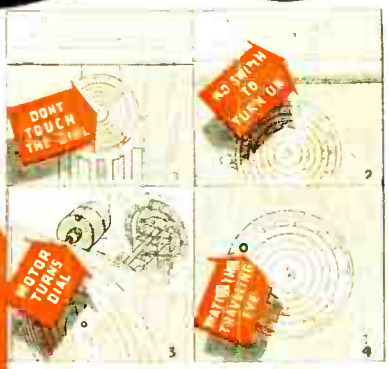


TERMS AS LOW AS 50¢ A WEEK

30 DAYS FREE TRIAL

...in 1/3 Second,

YOU CAN BRING IN YOUR STATION—2 to 5 TIMES FASTER THAN ORDINARY SO-CALLED "ELECTRIC TOUCH-BUTTON" RADIOS!



PHANTOM HAND

This remarkable device supervises the electric motor until the station you desire comes in perfectly tuned.

THREE SPEAKERS

Full-scope high fidelity is now made possible by Midwest's Giant Trio-Sonic speaker combination (one 12" bass reproducer, one 6" tenor speaker and one 6" high fidelity reproducer).

Only $49.95 LESS TUBES NEW LOW BASE PRICE CHASSIS

TRAVELING COLORAY EYE

When you touch a button, Eye zips around the dial and stops at exact point where station comes in best.

Top tuning is easier tuning!

SINCE 1920, Midwest has been first with features that other manufacturers adopted later. Over a year ago, Midwest engineers were first with Push-Button Tuning and Dial-A-Matic Tuning. Today, the most talked about of Midwest's 101 features is *1/3-second Motorized Tuning!* Just touch a button on top of the radio . . . that's all . . . and FLASH! . . . your station comes in perfectly tuned in just 1/3 (one-third) second . . . just like magic . . . at the exact center of resonance. (You can also tune by hand whenever you desire.)

Big FREE catalog shows you how to buy handsome, newly styled, richly finished consoles at wholesale prices . . . to save up to 50% . . . to make your radio dollar go twice as far . . . to pay as little as 50 cents a week on the Midwest Easy Pay Plan . . . and secure 30 days FREE trial in your own home! You are triply protected with One-Year Warranty, Money-Back and Foreign Reception Guarantees.

[SERVICE MEN: Join the nation-wide Midwest service organization. Write for free details.]

PASTE COUPON ON 1¢ POSTCARD... OR Write Today!

MIDWEST RADIO CORPORATION
Dept. HH-11 Cincinnati, O.

Send me your new FREE catalog and complete details of your liberal 30-day FREE trial offer. (Special offer and prices prevail only when dealing direct with factory by mail.)

Name .....

Address .....

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

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

☐ Check Here for 1938 BATTERY catalog

MIDWEST *factory-to-you* RADIOS

DEPT. HH-11 MIDWEST RADIO CORPORATION . CINCINNATI, OHIO, U.S.A.

Manufacturers of Quality Radios Since 1920

W9ARA, winner of the A.R.R.L. DX contest for phone, says he is delighted with the performance of his New Super Skyrider.

W9WVZ of Marshall Pass, Colorado, with his 6 Volt Battery operated Sky Challenger "It's a privilege to own it" says he.

Thousands OF AMATEURS THE WORLD OVER USE HALLICRAFTERS RECEIVERS

If we had a telephoto camera, we could catch pictures of thousands of radio amateurs enjoying the marvelous performance, the razor-sharp selectivity and fine sensitivity of their Hallicrafters Receivers. Here are a few caught in Ninth District. We may show more in the future so why not send us a snapshot of your rig with your Hallicrafters receiver?

World's Largest Manufacturer of Amateur Communications Equipment

the hallicrafters inc.

2603 Indiana Avenue, Chicago, U. S. A.
Cable Address "Hallicraft" Chicago

W9LLX traveled nearly 10,000 miles across country, working DX all the way, with a Sky Challenger installed in his car.

W9ZBU enjoys the reception of his new 1938 Super Skyrider in Platte, So. Dakota.