BUILD YOUR TELEVISION SET

RADIO NEWS AND SHORT WAVE RADIO

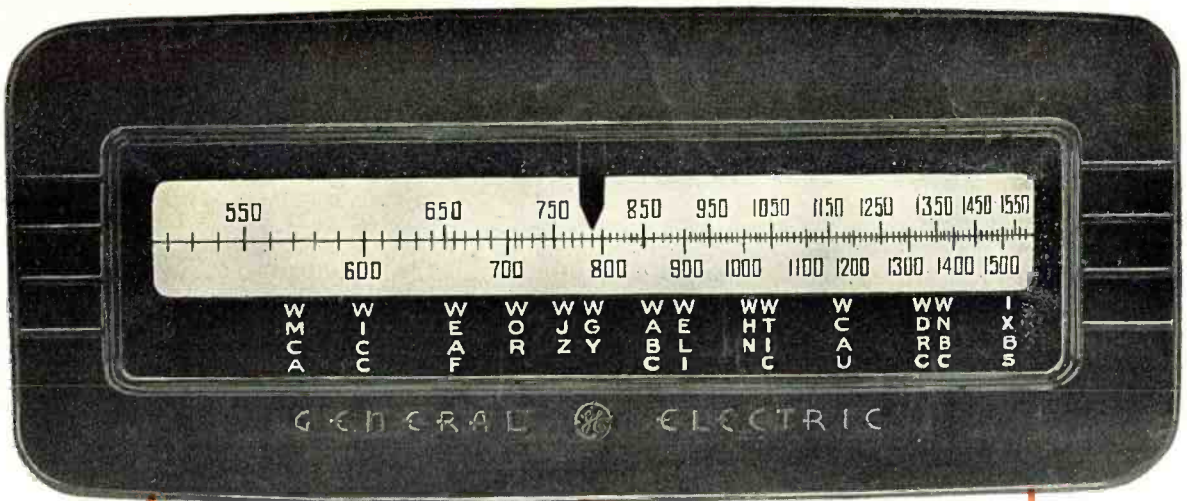
SHORT WAVE TIME TABLE

NOVEMBER

RADIO SPEAKER RIVALS VESUVIUS

SEE PAGE 269

25¢
U. S. AND CANADA



ONLY GENERAL ELECTRIC *Focused Tone Radio* DIAL has these 5 Sensational FEATURES

These new and amazing features are but a few of the sensational radio improvements incorporated in the new 1937 General Electric Focused Tone Radio models. See —and hear—the new G-E Radio. The G-E radio dealer nearest you will gladly give you a demonstration.

FOR METAL TUBE RENEWALS, SPECIFY G-E METAL TUBES.

G-E COLORAMA TUNING

The dial flashes *automatically* from red to green to guide you in the selection of stations. The red signal warns you reception is distorted or no station is tuned in. When the dial shows bright green, the signal is strong, and free from noise — every note is true and clear.

G-E LOCAL STATION PERSONALIZER

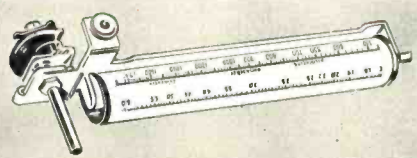
The call letters of local stations flash on when you tune in. On the higher-priced models they are illuminated in green, individually. A "custom-made" scale is provided for each locality, listing the most popular stations in that area.

G-E AUTOMATIC FREQUENCY CONTROL

As the dial pointer is moved into the approximate region of the station's resonance point on the dial scale, the receiver's tuned circuit *automatically* and *instantly* snaps into its perfect Focused Tone position. It's a dial you simply can't tune wrong.

G-E SILENT TUNING

Absolutely silences the speaker as you tune across the dial, passing over strong stations to the one you are interested in at the moment. When the station desired is reached, simply push in the control knob and the program is heard at its maximum clarity.



G-E SLIDING-RULE TUNING SCALE

It is as easy to read as a ruler. All kilocycle positions are shown on a straight line — like the markings of a "slide-rule." On the majority of models, only one scale is visible at a time; when changing to another band, a new scale is turned into position by the band-change switch. An automatic vernier reduction drive permits either rapid tuning or slow-speed tuning, without manual shifting of the tuning knob.

GENERAL ELECTRIC
Focused Tone Radio

APPLIANCE AND MERCHANDISE DEPT., GENERAL ELECTRIC CO., BRIDGEPORT, CONN.

Read what happened to these two men when I said:

will Train You at Home in Spare Time for a GOOD JOB IN RADIO

These two fellows had the same chance. Each clipped and sent me a coupon, like the one in this ad. They got my book on Radio's opportunities.

S. J. Ebert, 104-B Quadrangle, University of Iowa, Iowa City, Iowa, saw that Radio offered him a real chance. He enrolled. The other fellow, whom we will call John Doe, wrote that he wasn't interested. He was just one of those fellows who wants a better job, better pay, but never does anything about it. One of the many who spend their lives in a low-pay, no future job, because they haven't the ambition, the determination, the action it takes to succeed.

But read what S. J. Ebert wrote me and remember that John Doe had the same chance: "Upon graduation I accepted a job as serviceman, and within three weeks was made Service Manager. This job paid me $40 to $50 a week compared with $18 I earned in a shoe factory before. Eight months later I went with station KWCR as operator. From there I went to KTNT. Now I am Radio Engineer with WSUI. I certainly recommend the N. R. I. to all interested in the greatest field of all, Radio."

Get Ready for Jobs Like These. Many Radio Experts Make $30, $50, $75 a Week

Do you want to make more money? Broadcasting stations employ engineers, operators, station managers and pay up to $5,000 a year.

"I WANT TO HELP YOU. If you are earning less than $30 a week I believe I can raise your pay. However, I will let you decide that. Let me show you what I have done for others, what I am prepared to do for you. Get my book, read it over, and decide one way or another."

J. E. Smith.

Spare time Radio set servicing pays as much as $200 to $500 a year—full time Radio servicing jobs pay as much as $30, $50, $75 a week. Many Radio Experts own their own full time or part time Radio businesses. Radio manufacturers and jobbers employ testers, inspectors, foremen, engineers, servicemen, paying up to $6,000 a year. Radio operators on ships get good pay and see the world besides. Automobile, police, aviation, commercial Radio and loud speaker systems offer good opportunities now and for the future. Television promises many good jobs soon. Men who have taken N. R. I. Training are holding good jobs in all these branches of Radio.

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

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

Get My Free 64-Page Book Now

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

J. E. SMITH, President
National Radio Institute, Dept. 6MR
Washington, D. C.

Get My Lesson on Radio Servicing Tips FREE

I'll prove that my Training gives practical, money-making information; that it is easy to understand—that it is just what you need to master Radio. My sample lesson text "Radio 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., super-heterodyne, all-wave, and other types of sets and a cross reference system gives you the probable cause and a quick way to locate and remedy these set troubles. A special section is devoted to receiver check-up, alignment, balancing, neutralizing and testing. Get this lesson Free. No obligation. Just mail coupon.

FOR FREE BOOK OF FACTS ABOUT RADIO

J. E. SMITH, President, National Radio Institute
Dept. 6MR, Washington, D. C.

Without obligating me, send your service manual "Radio Receiver Troubles—Their Cause and Remedy" and free book about spare time and full time Radio opportunities and how I can train for them at home in my spare time. I am particularly interested in the branch of Radio checked below.

- ☐ Radio Service Business of My Own
- ☐ Spare Time Radio Service Work
- ☐ Retail Sales of Radio Sets and Equipment
- ☐ Service Expert for Retail Stores
- ☐ Broadcasting Station Operator
- ☐ Aviation Radio Operator
- ☐ Ship Radio Operator
- ☐ Auto Radio Installation and Service
- ☐ All-around Servicing Expert
- ☐ Loud Speaker Systems, Installation and Service
- ☐ Television Station Operator
- ☐ Designing and Constructing Testing Equipment
- ☐ Service Expert with Radio Factory
- ☐ Commercial Radio Station Operator

(If you have not decided which branch you prefer—mail coupon now, for information to help you decide.)

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

ADDRESS.....

14X-1

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*
WESLEY G. HILLS, *Art Editor*

Vol. XVIII November, 1936 No. 5

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Coming Next Month

RADIO SERVICE RACKETEERING! The Radio Servicing Business is infested with a small army of "Gyps" that are the bane of existence to the conscientious worker in the radio service field. Their dishonest activities are giving the entire industry a black eye.

A house-cleaning is in order if the status of radio servicing is to be raised to a professional plane which inspires the confidence of the radio public. As a first gun in this campaign, RADIO NEWS is conducting a first-hand investigation into the shady activities of these parasites. Associate Technical Editor John H. Potts, in an article in the December issue, will tell the story of how he was charged *from 75 cents to 7 dollars* for a simple, identical repair job submitted to several service organizations—most of which functioned under the "50-cent Service" banner.

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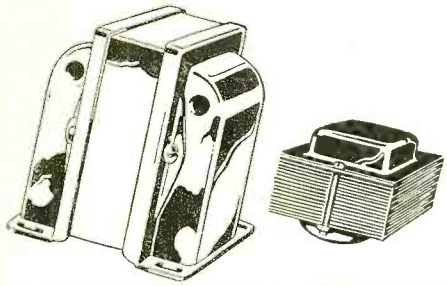
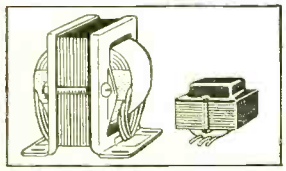
TELETONE IS HERE!

SEE and HEAR *New* SCOTT RADIO TRIUMPH



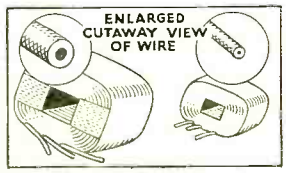
HERE IS WHY SCOTT "TELETONE" GUARANTEES BETTER PERFORMANCE-

COMPARE POWER TRANSFORMERS! See why SCOTT TELETONE is possible. Extreme left:—12 lb. Transformer on every SCOTT 23-tube Full Fidelity Radio. Near left:—4 lb. Transformer used on most mass production radios. People from New York to Los Angeles are buying SCOTTS on definite proof of superiority—proof like this:—



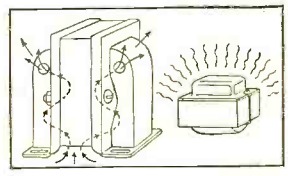
Left: Laminations and shield of power transformer used in SCOTT radio. Securely held together by special bolts. No vibration to cause buzzing in receiver.

Right: Laminations in power transformer of regular radio—held together merely by screws which bolt lamination to the chassis.



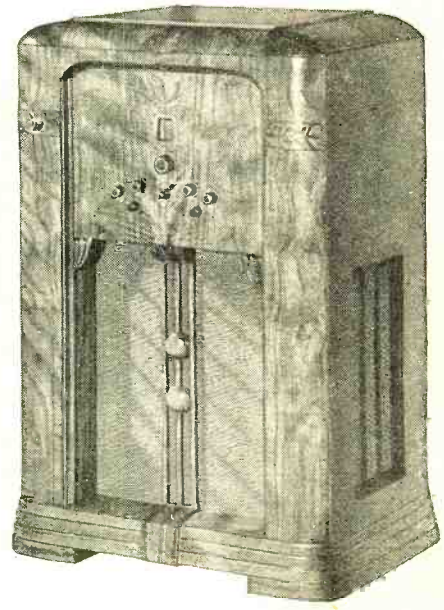
Left: SCOTT transformer coil. Heavier gauge wire and thicker insulation prevent breakdown of transformer under even abnormal conditions.

Right: Smaller wire and thinner insulation, not high enough safety factor for many operating conditions.



Left: Arrowed lines show constant draft of cool air through special vents in SCOTT transformer. Keeps it cool.

Right: Solid cap over ordinary power transformer allows it to overheat, causing insulation to break down, and stops reception.



23-Tube SCOTT
in Warrington Console

NOW—you can hear all the beauty of the music—with TELETONE! There are glorious tones and harmonies on the air which you never hear without the new SCOTT—with TELETONE, tone of such utterly new and breath-taking realism that the very musicians and singers in studios thousands of miles away seem ready to step from behind your SCOTT console. TELETONE has been made possible only by the following exclusive features:—

GET THE PROOF

See why only the exclusive 35-watt Class A power gives you the full grandeur of orchestra crescendos. No more distorted tone, no more howl, hum or "rain-barrel" boom.

See why only SCOTT Complete High Fidelity brings you all the gloriously thrilling high tones and overtones of clarinet, oboe, saxophone, trombone, violin and voice. There are thrilling harmonies of instruments you can never hear on any radio but the SCOTT!—a statement proven by national radio station in startling test with 150 other receivers!

See why ONLY the remarkable new SCOTT "Magic Maestro" restores to voice, to classical symphonies and swing symphonies all the inspiring expression played into the studio microphone but cut out by the broadcasting engineers.

See why SCOTT controls give you truly adjustable bass and treble tones.

See why the SCOTT is the overwhelming preference of such celebrities as Toscanini, Guy Lombardo, Ted Husing and hundreds of others.

VERIFIED WORLD LONG-DISTANCE RECEPTION RECORDS

World famous for its superiority on foreign short wave stations! Yet here is a *still more astonishing record!*—from Official Radio News Listening Post—39 foreign stations on the *Broadcast* Band, logged in detail in 7 hours! *See for yourself why ONLY* the SCOTT was capable of this remarkable achievement.

OWNERS ACCLAIM THE SCOTT

"England, Germany, Belgium, Italy, Spain are all in my back yard" writes J. A. Dunn of Canada. "I receive them every day without fail, with the volume control turned on about a sixteenth of an inch." "I regard this instrument as being without possible rival." "I find in no way exaggerated, your advertising." These quotations are from typical owner letters.

TEST ITS PERFORMANCE IN YOUR OWN HOME

Put the new 23-Tube SCOTT to a side by side comparison test for 30 days in your own home. If it does not bring in more domestic stations, and more weak remote foreign stations, with more thrilling volume, with more beautifully true tone and greater clarity and freedom from noise, you may return it any time within 30 days and the full purchase price will be promptly refunded. Moderately priced. Strictly custombuilt. Nationwide installation service. Come into one of the SCOTT Salons or send for the sensational story of SCOTT "TELETONE"—a story of unparalleled truth and beauty of tone, and of verified foreign reception—records backed with full proof! Send now! No obligation.

FREE-SEND TODAY FOR DETAILS

E. H. Scott Radio Laboratories, Inc.
4440 Ravenswood Ave., Dept. 5T6,
Chicago, Ill.

Send "PROOF" of unequalled tone and DX performance of 23-tube SCOTT.

Name.....

Address.....

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

E. H. SCOTT RADIO LABORATORIES, INC.

4440 Ravenswood Avenue, Dept. 5T6, Chicago, Illinois

630 Fifth Avenue, New York, N. Y. **115 N. Robertson Blvd., Los Angeles, Cal.**

BUILDERS OF THE WORLD'S FINEST CUSTOM-BUILT RADIOS SINCE 1924

Pages From A Serviceman's DIARY

THE ALERT SERVICEMAN PREPARES FOR TELEVISION

Careful study and preparation for the day when television will be used in the homes of American citizens, as sound broadcasting apparatus is today, will enable the wide-awake and progressive serviceman to take advantage of this great new industry from its inception. The Editors advise our readers to keep their eyes open for articles in the magazine, for book reviews in our Technical section, on new television books, so that they will be prepared. Read these carefully and if possible enroll in a course that will teach the fundamentals of television mechanics.

THURSDAY—The boss recently returned from a television demonstration and showed me a swell photo he had snapped of a television image of Jean Muir. He is very much interested and feels that television may break sooner than we expect. He let me read over a couple of new books on the subject. The service angle presents some weird problems. For instance, with one form of improper adjustment, the dark parts of the image will appear light and vice versa. I am curious to know how this is working out in Germany, where commercial television is now an accomplished fact. I don't know whether or not the Olympic games were broadcast by television but, if so, pity the poor serviceman who makes a temporary repair by jumping a defective "video" stage. The finals of the 100-meter dash would then show Jesse Owens as a white man conquering a field of dark-skinned contenders. This might go good with the Nazis but when the scene is switched to the grand stand and apparently presents 100,000 cheering Ethiopians, heaven help the serviceman!

Servicemen Must Learn Television!

There is a lot for all of us to learn about television and I'm starting right now to dig into every available source of information. The ones who know will be able to cash in in a big way, since this is definitely a proposition where *the tinkerer won't fit in!* It may seem a little early, but Weston is already out with a special television test instrument, a 20,000 ohms-per-volt meter. But—back to work.

The phone rang. "Can you please send a radioman over this morning? Two of my girl friends are broadcasting and I don't know where to find the station." Recognized the voice—a pretty (but very dumb) blonde who talks like Gracie Allen does on her program. Made a call there a few weeks ago and found the only thing wrong was that the a.c. plug had been pulled out. At that time I gave her a list of dial readings for all local stations (in addition to a complete check-up) to justify our high minimum charge. "What happened to the list I left there?" I said. "The station you want is on it." "Oh," she replied, "there were so many stations that I got all mixed up so I just jotted down the four big stations and threw the list away. I'm so sorry now. If you could drop in for just one minute and add this station to my list, I'd be ever so much obliged." (A typical bid for a free service call.) "But you will surely need more stations," I told her. "The school glee club gave a program from another small station a few months ago and we can't tell which one will be used next. I'll be right over." "All right," she said, "I'll be waiting."

Hopped into the truck and went right over. A big house on a prominent corner. Went up to the big glass-paneled doors of the vestibule, but they were locked. Pushed the outside bell button and waited. No answer. Pushed again, after a reasonable time. Still no answer. Knocked—no results. Pounded hard—only skinned my knuckles. Went down to the corner drug store and phoned. Told her I had called but no one came to the door. "Oh," she said, "I forgot to tell you. The bell is out of order. Why didn't you knock?" "Knock-knock," I squawked, pretty much peeved as I looked at my sore knuckles, "Why—" but she interrupted. "Do you play that funny game, too? Who's there?" "Big Bill," I said, grimly. "Big Bill who?" "Big bill for my time. Your vestibule doors were closed and I knocked until I hurt my knuckles." "I'm sorry," she said. "Come over now and I'll see that you get in." Went back and made a new station log—also repaired the bell (and collected).

What Kind of Static?

Made a short run over to the next stop. Complaint—static (which doesn't help much). Customers call nearly every type of noise static, whether it is hum, speaker rattle, microphone howl, or what not. Found a 5-tube midget of unknown make with a 24A detector, resistance-coupled to a 47. Hum developed after a short period of operation. Checked the tubes then the electrolytics and the audio coupling condenser—all O. K. Substituted another 47—trouble disappeared (apparently due to gas in the 47 which I can't test for with my tube checker). Cleaned up the installation and moved on to the next on the schedule.

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.

Just Shopping Around

Found an AK 55—Complaint—doesn't work, estimate on repairs. Had just started to look it over when the lady said, "How much does a speaker cone cost?" Told her I could look up the price but that speaker cones in this model seldom required replacement, though the voice-coil leads sometimes break. "I just had an estimate of $6.00 to replace the cone and I think it is too much—I had them return the set." Examined the cone and, sure enough the cone coil was ruined. All the wire had been torn loose. This could not have happened in normal operation. Decided that the previous serviceman had purposely ruined the speaker when his estimate had been turned down. Also, he had probably introduced other trouble so that it would be a "headache" for the next man. Decided that I didn't want any part of this mess. We've been stuck before. Too bad some organization doesn't rid the business of such crooked competition which certainly makes it hard for us. Just told the customer I was sorry but we really could not estimate on this job. Off for lunch.

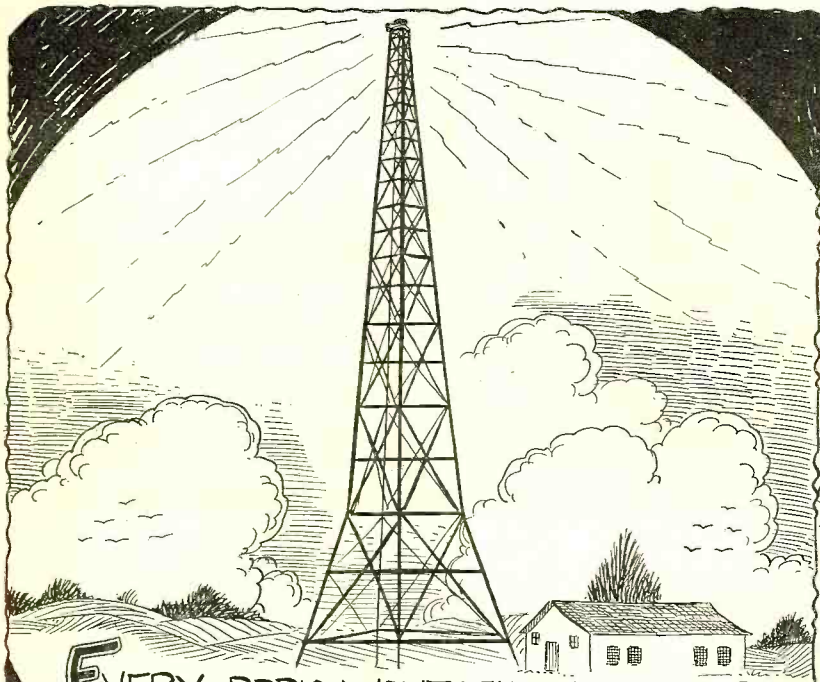
Spent the afternoon on work in the shop, putting a.v.c. in a Radiola 86. Not a difficult job with this model.

RADIO NEWS in CCC Camps

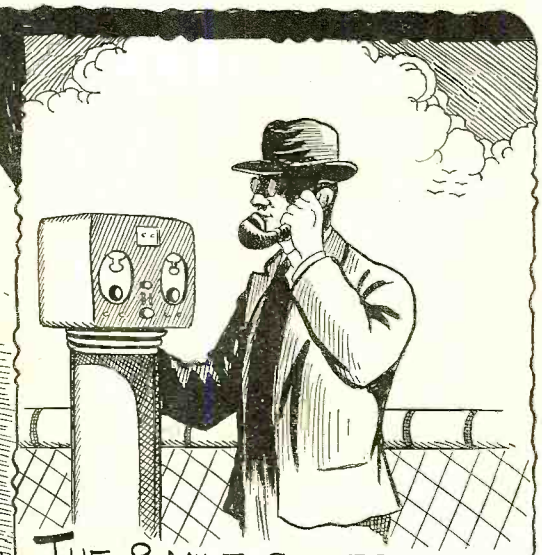
Washington, D. C.—The War Department is again supplying CCC companies with subscriptions to numerous magazines. The only radio magazine among them is RADIO NEWS, one subscription being placed for each company

RADIO FACTS and ODDITIES ....

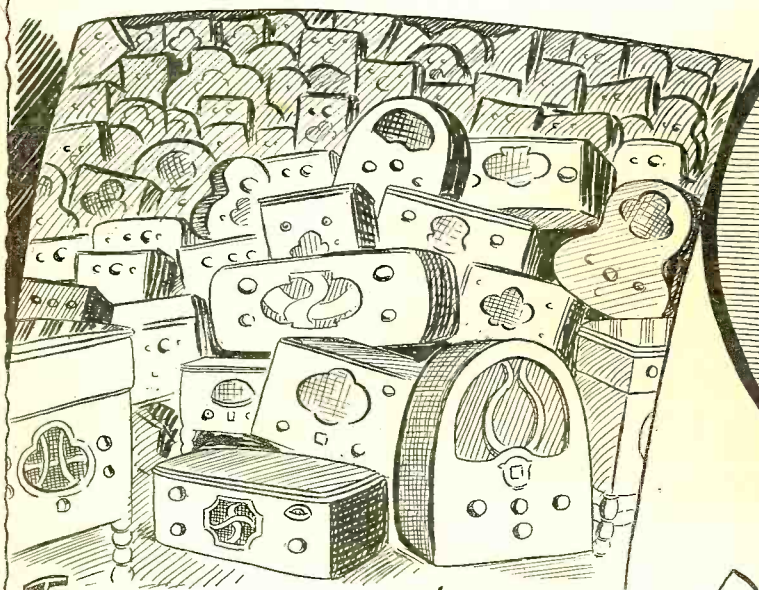
(Send in your Radio Oddities to "Elmo" and see them illustrated)



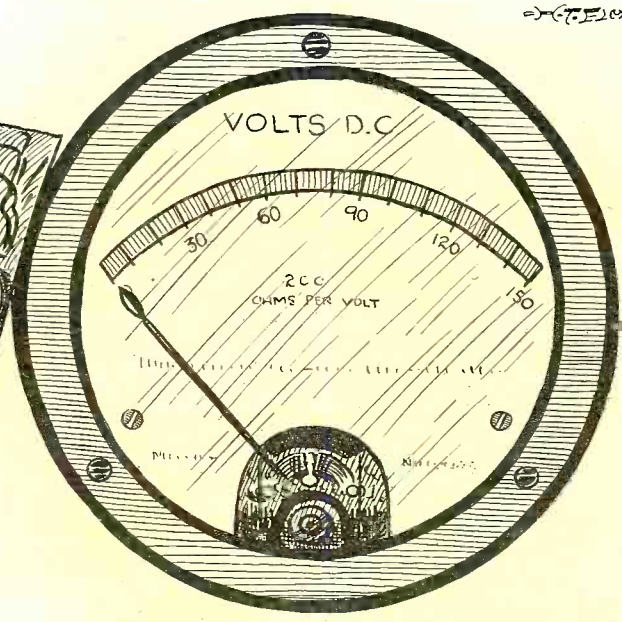
EVERY RADIO WAVE THAT LEAVES A TRANSMITTER STARTS ON AN ENDLESS JOURNEY THROUGH SPACE, THAT GOES ON FOREVER!!



THE 8 MILE SAN FRANCISCO BAY BRIDGE IS SO LARGE A CONSTRUCTION JOB THAT WORKMEN HAVE TO USE RADIO TRANSCEIVERS TO KEEP IN TOUCH WITH EACH OTHER !!!



THERE ARE MORE THAN 43,000,000 RADIO RECEIVERS IN THE WORLD!! OF THIS NUMBER, MORE THAN 18,500,000 SETS ARE IN THE UNITED STATES ALONE, WHICH EXCEEDS THE TOTAL NUMBER OF SETS IN ALL OF EUROPE !!!



A VOLTMETER DOES NOT MEASURE VOLTAGE!! WHAT IT REALLY MEASURES IS MAGNETIC PULL!!

SUBMITTED BY { EDMUND KRAMPERT, SECAUCUS, N.J.

OVER WITH A BANG

THE WESTON
MODEL 772
Super-Sensitive Analyzer
PRICE $46.50 NET TO DEALERS IN U.S.A.

THE NEW WESTON ANALYZER . . . WITH SENSITIVITY OF 20,000 OHMS PER VOLT, MEETS WITH OVERWHELMING RESPONSE— *servicemen won't take less!*

Announced but one month ago, the new WESTON Model 772 Super-Sensitive Analyzer is sweeping the service field. With sensitivity of 20,000 ohms per volt . . . with resistance ranges usable up to 30 megohms . . . with current measurements as low as ½ microampere . . . with a wide range of usefulness, including *all* radio receivers, old or new; television sets, amplifiers, sound movies, P.A. systems and photo-cell circuits . . . with a big, super-sensitive WESTON Meter . . . and, above all, being WESTON built throughout, it's no wonder that servicemen, everywhere, are equipping with this new device. For there is nothing that compares with Model 772, except in laboratory instruments, and at laboratory prices.

Be sure you get full particulars on Model 772 before you buy any set tester. Also, be sure to get complete information on the WESTON Model 771 Checkmaster, the portable tube checker equipped for quick and dependable trouble shooting. Return the coupon today . . . Weston Electrical Instrument Corporation, 615 Frelinghuysen Ave., Newark, N. J.

THE WESTON MODEL 771 CHECKMASTER

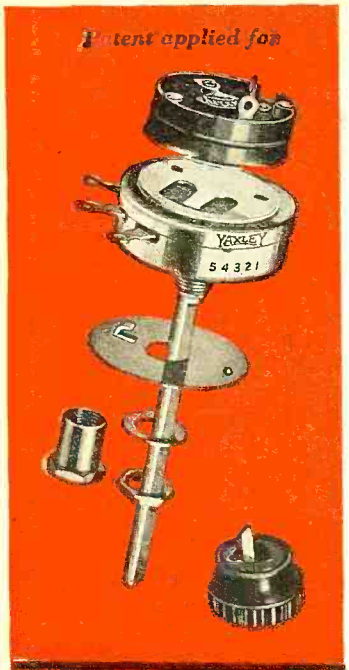
PRICE $45.00 NET TO DEALERS IN U.S.A.

Compact . . . attractive . . . tests all present tubes—neon short check—voltage ranges for point-to-point testing—resistance ranges for continuity testing, etc. For counter and portable use.

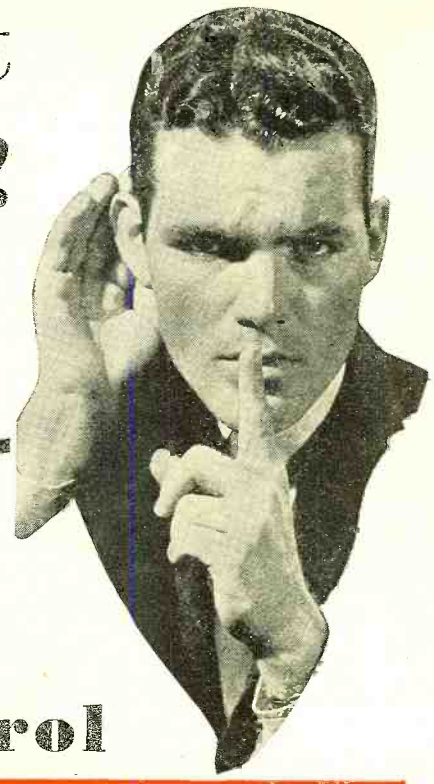
WESTON *Instruments*

Weston Electrical Instrument Corp.,
615 Frelinghuysen Ave.,
Newark, N. J.
Rush me bulletin on the new Super-Sensitive Analyzer, and the Checkmaster.

NAME .....
ADDRESS .....
CITY ..... STATE .....



You Can't Hear It!



The YAXLEY Replacement Volume Control is really SILENT

Believe it or not, the SILENT replacement volume control is here — perfected by Mallory-Yaxley engineers. Score another scoop for Mallory-Yaxley products — and for Yaxley Universal Replacement Volume Controls.

Velvety smooth in silent operation, the new Yaxley is Volume Control perfection. Mallory-Yaxley engineers have developed a "non-rolling" roller with a specially designed Mallory-Yaxley "Silent M" construction that eliminates the slightest noise. And here's what this construction does:

1. The roller rocks so its contact face always presents uniform contact pressure to all portions of the resistance element.
2. Sharp point contact between moving arm and roller insures a high unit pressure to penetrate any oxide film and insure a low resistance noiseless joint.
3. The non-rolling roller wipes any possible dust and dirt from the resistance element—keeps it clean and silent.
4. The moving arm has just the right pressure to insure perfect contact without damaging the microscopic carbon grains of the resistance element.

Use Yaxley Silent Replacement Volume Controls and help yourself to a slice of reputation as "the best radio man in town." Yaxley supplies the Silence — you will get the Praise. Get busy today. Get in touch with your distributor.

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YAXLEY

Radio News

November, 1936

TELEVISION *as GOOD as* HOME MOVIES

Being a report of a television demonstration staged in Philadelphia in which sight and sound programs were received in a home with a scale of picture detail, accompanied by high-fidelity sound reproduction, good enough to be accepted immediately on the basis of commercial broadcasting. Fundamental technical data on the system is also presented for the benefit of amateurs and experimenters thinking about building.

By The Television Reporter

WHAT was undoubtedly one of the finest demonstrations of television transmission by radio was viewed by your reporter, recently, when Philco Radio and Television Corporation transmitted sight and sound programs from their main laboratory in Philadelphia to the home of W. H. Grimditch, seven and one-half miles distant from the transmitter.

One thing that impressed us in the demonstration was the total absence of flicker and the smooth definition of the received pictures, which reminded us exactly of our own home moving-picture outfit in clarity of detail. This definition was great enough to allow the picture and writing on a package of Camel cigarettes to be read at the receiver when placed in front of the televisor (advertisers make note).

Defects Absent

This was the first time that we have viewed a demonstration of television in which the small but nevertheless bothersome inequalities of detail, small specks, wobble, did not interfere with the continuity of the picture being transmitted. In fact, they were absent and the feeling of actual vision, of the thing you are looking at, was experienced for the first time.

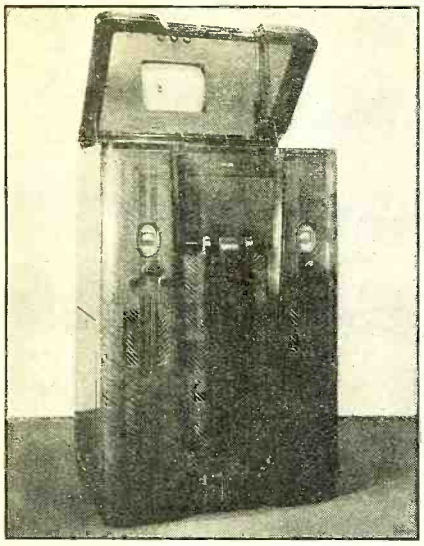
TELEVISION PICTURE "SNAPPED" BY RADIO EDITOR

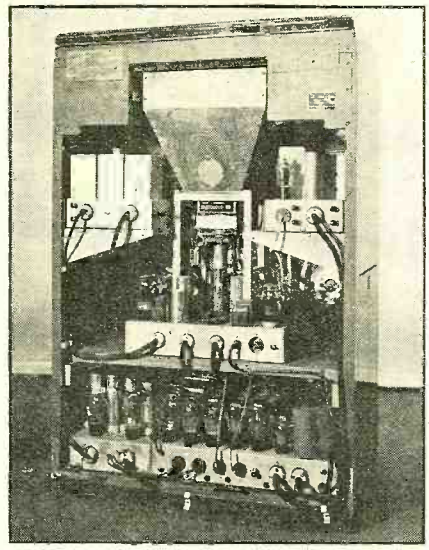
This picture was actually photographed, during the demonstration, with a small hand camera directly from the screen of the television receiver, after the image had been sent through the air, by ultra-short-wave radio, a distance of 7½ miles. Do you think it good enough for commercial broadcasting?

The picture on this page was taken with an ordinary camera focussed on the screen, by one of the editors as the program went on. It really suffers by being a photograph of a photograph and also in being made into a cut for reproduction on this page, but at least it does give an idea of the smooth and natural pictures that were seen.

What Was Seen

During the demonstration, artists selected from the Philco staff, including singers, dancers and a whole quartet were viewed and heard. The inimitable Boake Carter was interviewed from Mr. Grimditch's home by telephone to the television studio. Mr. Carter was seated at a small table with the telephone in front of him and his answers to questions and comments about television were very much to the point. It was interesting to note the changes in expression on





FRONT AND REAR VIEWS OF TELEVISION RECEIVER

At the left is the front view, showing the loudspeaker grills, the tuning knobs for the video and audio signals and in the slanting lid, the mirror which reflects the pictures to the looker and listener-in. At right: Rear view showing the various chasses for scanning, signal reception and the power units.

his face coming to us by television as he made a point or as he stressed an idea, with words which came to us from the loudspeaker. If all the broadcast listeners who hear his news comments daily could only have seen his face as we did, they would have had even a better insight into the quick perception of that very active brain.

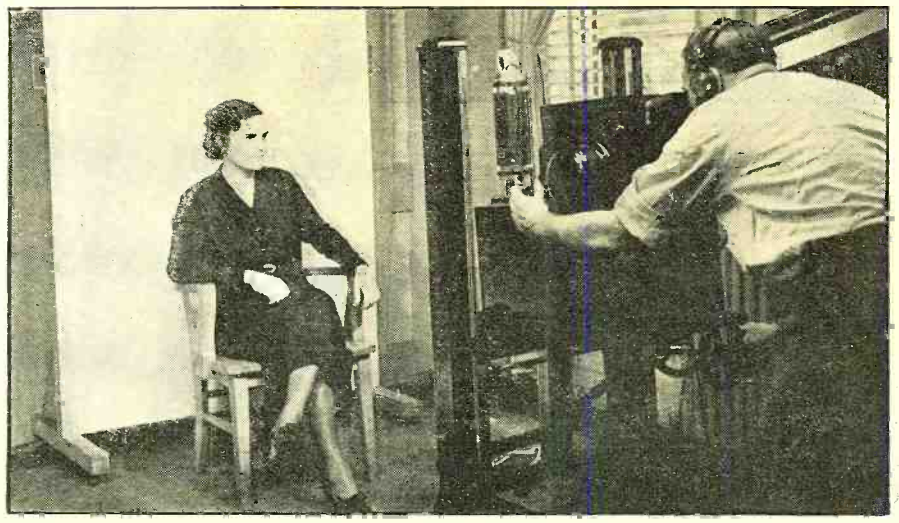
What a Fight!

Another scene, that had us "lookers-in" up on the edges of our seats, was a one-round contest in which the boxers (drawn from the factory force) put up a lively "scrap" in a ring built outdoors on the roof. This scrap was climaxed by one of the contestants knocking the other clear out of the make-shift ring. Actually he took the whole ring with him, railing, posts and everything; all the details of this were easily shown and were quite unexpected and humorous. Even the announcer could hardly stop laughing at the incident.

One of the most significant features of the whole demonstration was the running of a one-reel moving picture showing the exploits of a wild-life collector catching various animals by a novel, but it seemed to us quite hazardous, method; catching them with his hands. He dived from the banks of a jungle stream into the water after alligators, fish, huge turtles, otter, and actually outswam his victims. Some of these views were "under-water" shots and we were sorry to see the end of the picture arrive. When television comes (and it is on the way) moving pictures such as this can be viewed right in our own homes, and the moving picture industry had better watch its laurels! It seems to us that moving pictures and television will have to be very closely tied up in the future and it would be only logical to expect that the moving picture industry will associate themselves with, or control, the interests who will do our future television broadcasting.

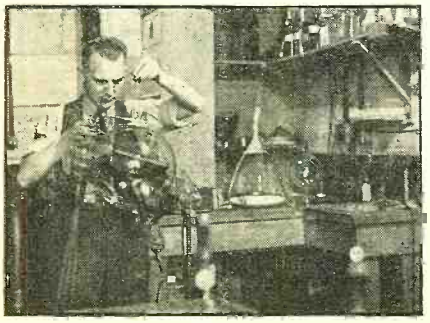
A SUBJECT BEING "SCANNED"

This young lady, who sang for the audience, is shown before the television camera with an operator focusing the device just as the test television program started.



MAKING AN ELECTRIC EYE

This laboratory worker is shown putting the final touches on the glass bulb of the photo-electric device which converts the visual scene into electric impulses for transmission.



But now for some of the details of the Philco television system. Some of this information will be important to those amateurs or experimenters who are thinking of building experimental types of television receivers and are trying to learn the fundamentals on which future broadcasts will be based. The electrical specifications for this system are as follows. The carrier frequency of the picture transmitter is 51 megacycles. The carrier frequency for the sound transmissions was 54.25 mc. This makes a spacing, between the two carrier centers, of 3.25 mc. approximately. The total space taken up in the ultra-short-wave spectrum is 6 mc. The number of scanning lines was 345, but this is being changed to conform to the R.M.A. recommendations of 440—450 lines. The number of pictures-per-second transmitted were 60, 30 of them being interlaced. By "interlacing" is meant that the lines of each consecutive frame show in between the lines of the preceding one. This reduces the rather striped appearance of earlier methods. The polarity of the transmission is negative. The aspect ratio is 4.3. The percentage of television signal devoted to the synchronizing signal was 20 percent. The wave-form of the

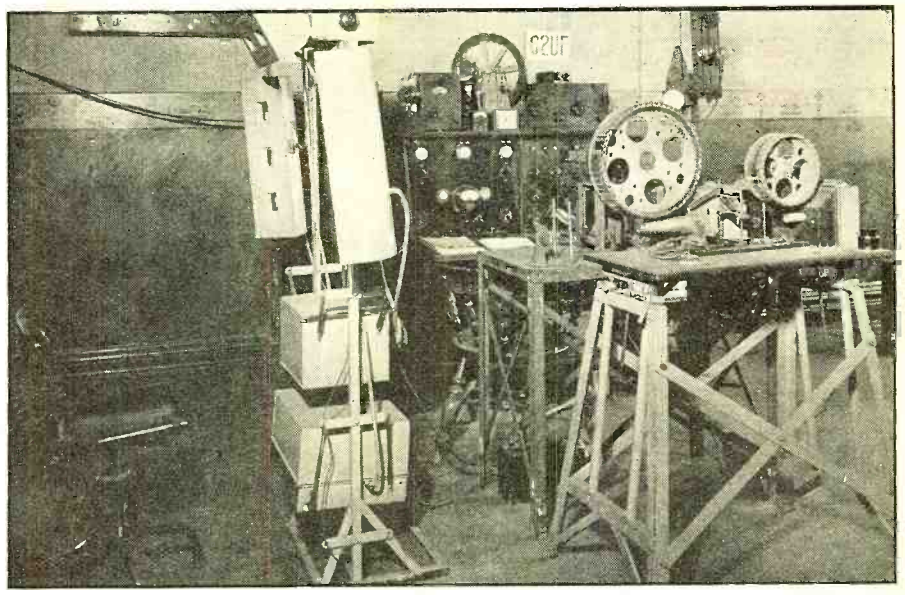
(*Turn to page* 308)

NEW JOBS FOR TECHNICIANS

There will be many calls for operators of television transmitters, men who understand both radio and television, when this art becomes established on a commercial basis.

NEEDED TECHNICAL INFORMATION BY MEANS OF WHICH SKILLED

AMATEURS *can Build* TELEVISION RECEIVERS



AMATEURS CAN EXPERIMENT WITH TELEVISION

This is the television station of a pioneer English amateur experimenter, Harold Bailey. The call letters are G2UF. At the left is the television studio with a chair for the announcer and at the right are the mirror scanning wheels and pick-up apparatus, with the control panels in the rear. Amateurs certainly have the required technical ability for television experimentation and research. Their untiring efforts would do much to make television a reality.

THE expert amateur and technician and those versed in radio engineering will find the essential data for building a set capable of receiving television in this article. In the near future we hope to have definite instructions which will permit the less-trained experimenter or layman to build a television receiver.

IN line with RADIO NEWS' policy of keeping interested readers and experimenters informed on the latest developments in television as they happen, the article on this page gives the salient technical features of the system of cathode-ray television now in use at the Don Lee experimental television station W6XAO, Los Angeles. This is a system perfected by Harry R. Lubcke, Director of the Television Division of the Don Lee System. The first demonstrations of the transmitter and the cathode-ray tube receiver were witnessed Thursday, June 4th, by radio editors and other technicians and by many thousands of interested citizens since that time. That the system is a successful one and produces pictures of sufficient detail and clarity for home reception has been attested by many persons who have seen it work and who have been interviewed. Public demonstrations where experimenters can see and ask questions about the receiver, which is of the self-synchronized cathode-ray tube type are being held daily, except Sundays and holidays, in the afternoons and evenings. Mr. Lubcke, who is interested in having experimenters build home-made television receivers for the reception of these television broadcasts, has furnished the following details to encourage the skilled amateur and to give him the essential information that will enable him to build such a receiver.

"The advantages of the television enthusiast today are far greater than were those of the amateur constructor of broadcasting's earlier days. Sufficient technical information to allow a moderately well-skilled person to construct a television receiver to receive the programs of W6XAO are given in the following paragraphs," said Mr. Lubcke as he handed them to our technical staff on a recent visit to the Editorial Offices.

"The Don Lee television transmitter W6XAO operates on the ultra high-frequency of 45,000 kilocycles (6 2/3 meters) daily, except Sundays and holidays, from 3:00 to 5:00 p.m., and from 6:30 to 8:30 p.m. Voice announcements concerning the broadcast are made at the beginning and end of each transmission.

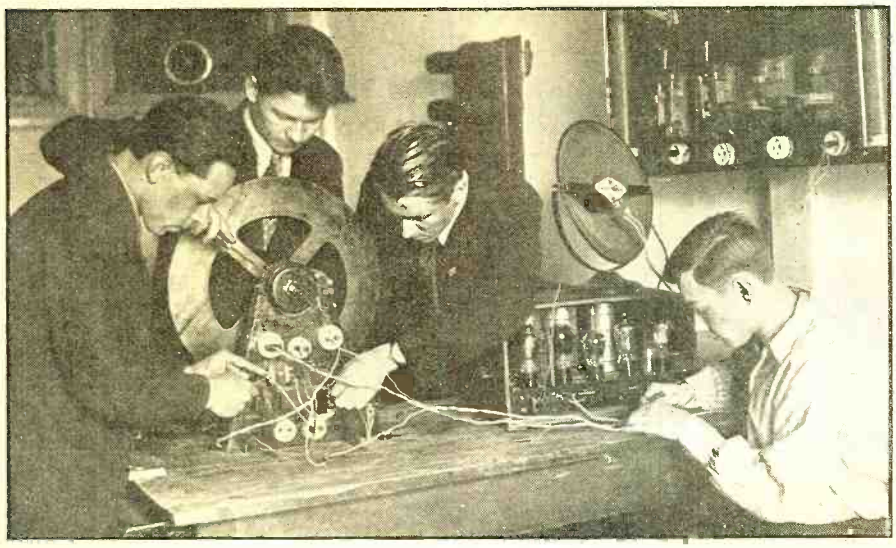
"For receiving the voice announcements of W6XAO and for preliminary experiments, any type of ultra short-wave receiver which will tune to 6 2/3 meters may be used. Receivers designed for 5-meter amateur work are suitable when provided with larger coils. Install coils with 50 percent more turns and remove one turn at a time while tuning for W6XAO. A simple line-image of constant intensity is broadcast for a short period of each schedule, and an appreciable change in its strength after a change in the circuit or operation of a receiver is a direct measure of the effect of the change.

Receiver Requirements

"The image broadcast is a 300-line, sequentially-scanned picture, with a frame frequency of 24 per second. For receiving these images the receiver must tune very broadly and should be of the super-heterodyne type, with band-pass intermediate-frequency transformers arranged to operate (*Turn to page* 313)

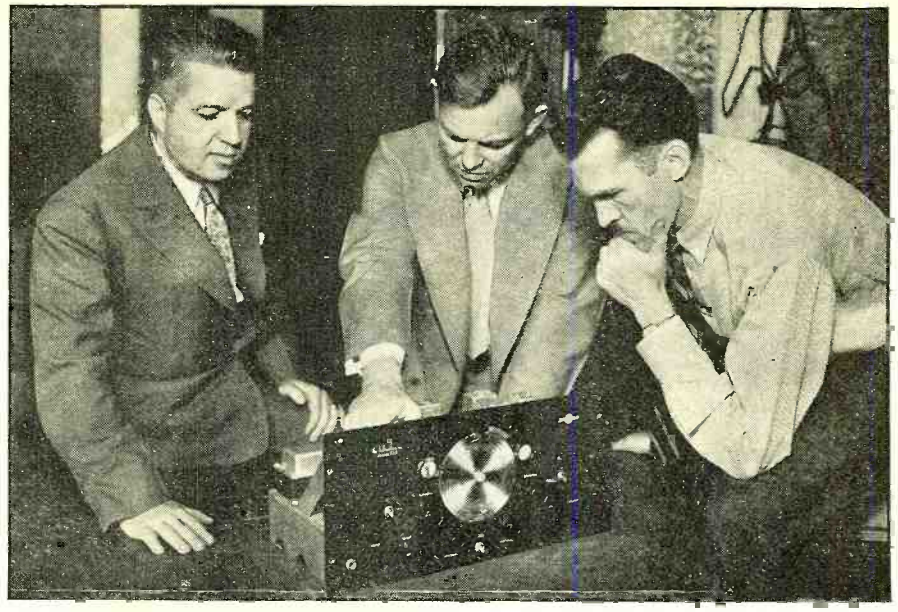
TELEVISION BOOM COMING

Most of us remember the old days of set-building and experimentation in sound broadcasting. Television will reopen interest in this scientific field among young people whose brains are alert and ever looking for new fields to conquer.



Efficient DOWN TO 4 METERS

By L. M. Cockaday
and S. G. Taylor



AN ADVANCE SHOWING FOR THE EDITORS

Karl Miles (center), Chief Engineer of Hallicrafters, points out the numerous features of his latest "brain-child." The model shown is the first completed receiver of this new type and unquestionably the most advanced ultra high-frequency superheterodyne yet offered to the public.

ANOTHER cycle of radio development has been completed and as a result the wavelengths down to below 5 meters have demonstrated their possibilities for practical utility. It is the old story over again! The radio amateur several years ago started to investigate these ultra high-frequency ranges which at that time were considered commercially impractical. As a result of his experiments they are not only recognized as being practical, but within a short time will take their place as among the most useful portions of the radio spectrum.

IN the metropolitan New York City area there are approximately 1200 amateur stations regularly operating on the 56-60 mc. band with many, many thousands of others distributed throughout the United States. The balance of the band between 30 mc. and 80 mc. is being assigned, with a number of broadcast stations already operating therein and numerous other broadcast and television stations clamoring for licenses.

During the several years which the amateurs have spent in investigating and developing these ultra high-frequency ranges they have necessarily been constructing most of the equipment employed, but already the need for more effective equipment is being felt—equipment which many amateurs do not have the ability, time or facilities to construct themselves. A demand is therefore developing for good manufactured receivers capable of effective broadcast and amateur operation in these ranges. Recognizing this growing demand, Hallicrafters have produced the "Ultra Skyrider," a 4-50-meter superheterodyne in which are incorporated the refinements encountered in high-grade communication and broadcast receivers for the lower frequencies, plus some additional features demanded in ultra high-frequency operation.

It is the purpose of this article to present a description of this new receiver; but first a word about the equipment now in common use. The most popular type of receiver for the ultra high-frequencies is the superregenerative type but superheterodynes are growing in popularity because of their greater sensitivity, greater selectivity and freedom from the characteristic superregenerative "hiss". Their one operating drawback is that they are susceptible to ignition noise and certain other types of noise interference. The superheterodyne as employed on the lower ranges also suffers another limitation in this service, imposed by the fact that the vast majority of present-day ultra high-frequency signals are unstable in frequency. Therefore full advantage cannot be taken of the inherent selectivity of the superheterodyne circuit. It is necessary to employ broadly tuned intermediate-frequency amplifiers which are exemplified by the resistance-coupled i.f. stages found in most receivers of this type today.

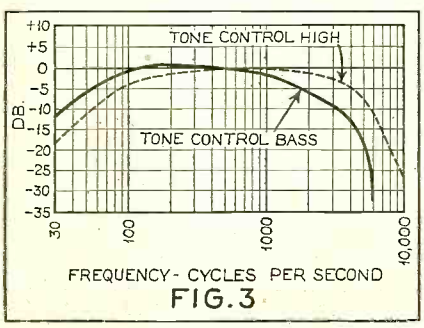


FIG. 3

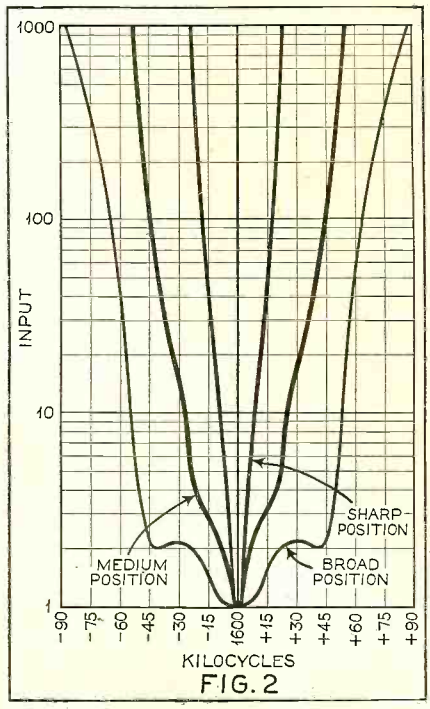
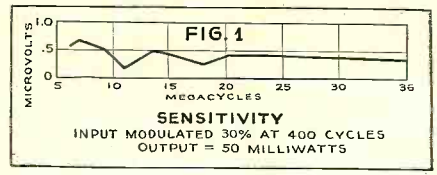
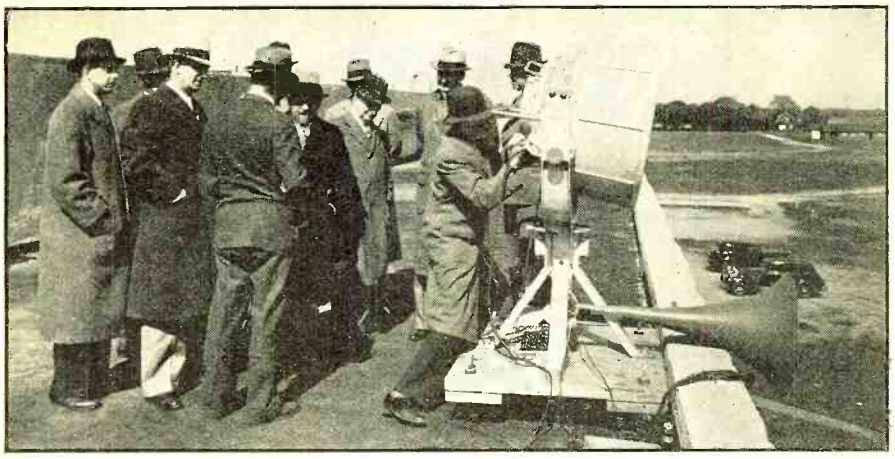


FIG. 2

Variable Selectivity

The new receiver illustrated here employs a tuned i.f. amplifier of the conventional type except for two very important features. The first of these is the use of 1600 kc. as the intermediate frequency. This broadens the i.f. selectivity to a certain extent but at the same time provides an excellent degree of image-frequency rejectivity. The second of these features is the provision for varying the i.f. selectivity characteristic. The overall result of this is that a good degree of selectivity is provided for use in the reception of good, clean signals, but for the reception of "wobbulating" signals the i.f. acceptance band can be increased (by means of a front panel control) to provide a band width in excess of 120 kc. (at 100 times down). Furthermore, (*Turn to page* 304)





TESTS ON THE FIELD

One of the super-power sound projectors being demonstrated atop a hangar at Roosevelt Field, Long Island. Among the group witnessing the tests are executives and engineer representatives from municipal, county and state departments. Nineteen of these units are used on the tower.

NEWEST P. A. SYSTEM FOR RACE-TRACKS

RIVALS VESUVIUS *in Sound-Producing Power*

by **Laurence M. Cockaday**

THE loudest sound-reproducing installation of any kind ever built by man was installed at the new Roosevelt automobile raceway at Mineola, Long Island, as the greatest racing drivers of Europe and America matched their speed and skill in the October inaugural 400-mile race and as 150,000 people, each demanding to hear as well as to see, crowded the grandstands. Based on the amount of electric power used to work this new super-powered P.A. system, it has been calculated that the only natural phenomenon that can produce sounds as great in volume is the explosion of a volcano.

Volume Equals Krakatoa

Even Vesuvius in eruption does not exceed in volume the sound of the new system. The loudest volcanic explosion ever measured was that of Krakatoa in 1883 which has been computed as being about as loud as the complete installation, or approximately 150 of the decibel units now used to measure sounds.

Surpasses All Others

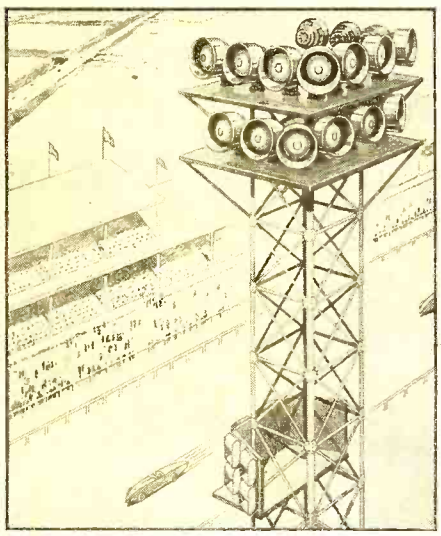
According to Dr. E. E. Free, well-known sound authority, the loudest human shout ever measured is 86 decibels. Because of the logarithmic character of the decibel scale this is less than one 100,000th of the sound delivered from the new P.A. tower, which is shown in the illustrations on this page and on the front cover of this magazine. The noisiest pneumatic riveter runs about 109 decibels which is only one 1,000th as loud as the combined nineteen horns used. The noisiest human contrivance previously recorded is a multi-engined airplane which measured a maximum of 123 decibels with all motors roaring, which again is only 1 percent of the sound value of the new system. The loudest thunder ever measured is only 106 decibels.

Speech Heard Mile Away

The new Western Electric super-power system is a development of the Bell Telephone Laboratories and will cover the entire one-half square mile expanse, above the intensity of competing sounds, from a single source. A tower, 100 feet high, contains a cluster of nineteen mammoth sound projectors pointed so as to cover the entire field. Twelve smaller loudspeakers on the same tower serve the nearby grandstand. Actually sounds of the announcers' voices could be heard clearly and understood above the roar of the motors over a mile away. Heretofore, most outdoor public-address systems to serve large areas have been unsatisfactory either because they lacked power to project intelligible sound so that it would cover the required area or because the loudspeakers were installed at widely-separated points with the result that sound from one set of loudspeakers reached the listeners sooner or later than that from other loudspeakers further away and speech and music were garbled. A battery of amplifiers of a total power of 20,000 watts, as well as power and input equipment were installed in a 25-foot square room near the base of the tower.

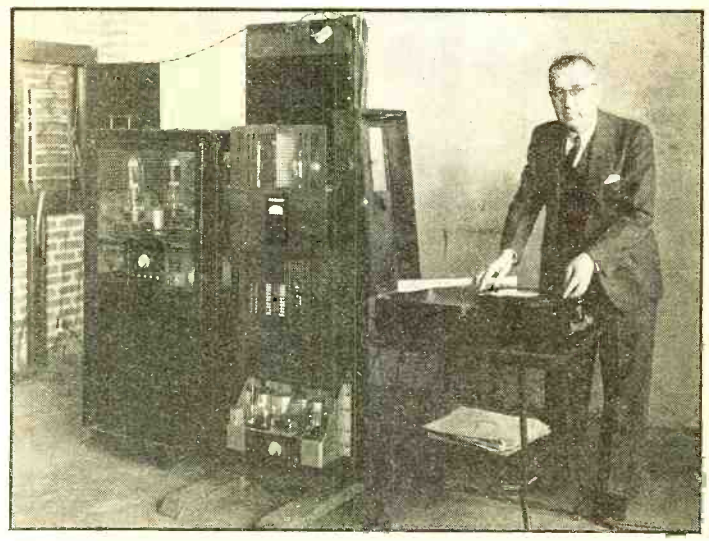
600-Pound Speakers

Separate volume control devices provide for individual regulation of each loudspeaker on the tower so that distribution may be adjusted to compensate for changes in the wind and in accordance with what parts of the field are crowded by spectators. Automatic volume regulation to provide maximum intelligibility of the (*Turn to page* 281)



TOWER DETAILS

The drawing at left, shows the nineteen super-sound projectors on the tower. The loudspeaker group below "feeds" the grandstands.



POWER UNIT

E. W. Thurston, Engineer of the Western Electric Company demonstrates one of the 1,000-watt units for energizing each speaker.

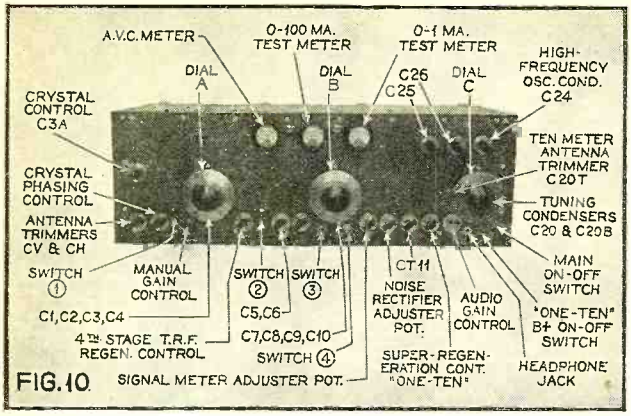


FIG. 10

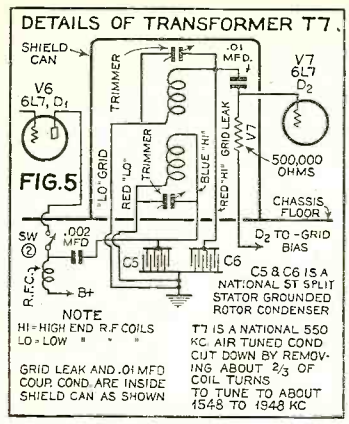


FIG. 5

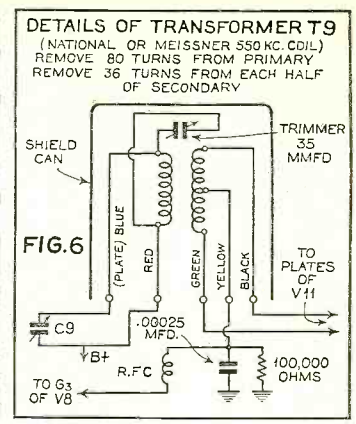


FIG. 6

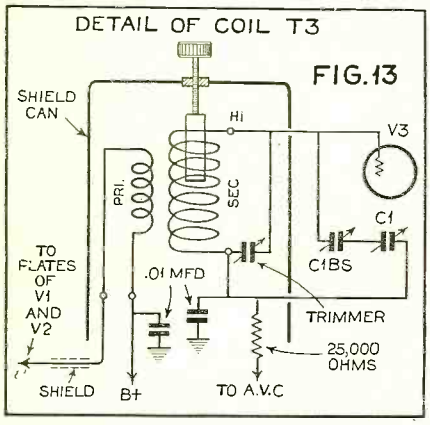


FIG. 13

LIST OF RAYTHEON METAL TUBES, ALSO ACORN TUBES	
	TUBE NUMBER
V1, V2, V3, V4, V5, V12, V14	6K7
V6, V7, V8, V9, V25	6L7
V10, V24	6J7
V11, V13	6H6
V15, V16, V17, V18, V19, V23	6F6
V20	954
V21	955
V22	6C5

FIG. 9

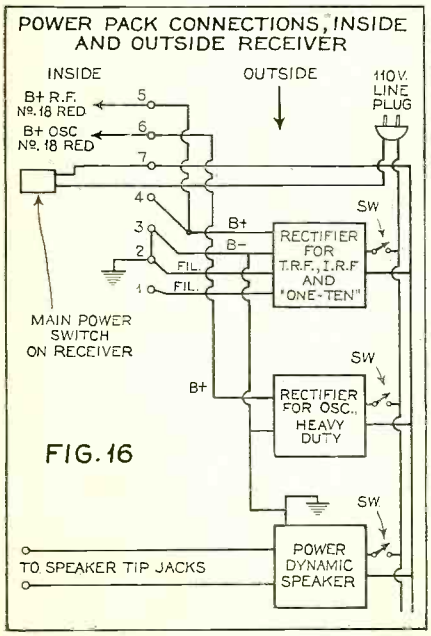


FIG. 16

IN this installment constructional data is given together with many detailed drawings. A third installment will discuss the procedure of lining up the set.

LOUD speaker reception on this experimental receiver naturally is normal on even the weakest signals, but headphone reception may be used by plugging the phones into phone jack, which also cuts out the speaker. Headphone reception may be had from the tuned-radio-frequency section only, and on signals of reasonable strength, on the speaker also using only the t.r.f. section of the receiver. Under conditions of minimum QRM this is perfectly satisfactory.

The ultra-high frequency section of the receiver is made from National "1-10" chassis. This unit uses super-regeneration with a stage of tuned r.f. ahead of the super-regenerative detector, the r.f. and detector stages using the efficient acorn-type tubes. The complete receiver is equipped with Raytheon metal tubes throughout. Certain changes were made in the connections of the National chassis for interconnecting with the rest of the complete receiver. Note that in this arrangement each change in *any* connection must be made *one wire* or *one connection* at a time, or you may upset the nice smooth operation in some range in the one- to 10-meter gamut. Better get the whole unit and make the indicated changes one wire and one connection at a time, checking operation after each change.

National P.W. condensers and dials were the solution of smooth tuning, good band-spread and absolute freedom from back-lash. With these condensers

The Radio News 5 - 10 - 20 SUPERHET

By Frank

in the gangs, you can come right back to any exact previous setting. National air-tuned trimmers and spreaders are used throughout, as well as their isolantite sockets, shield cans and intermediate coil transformers (with slight wiring changes shown in the Figs. 5, 6 and 7 of detailed parts in the circuit).

Fig. 8 shows a general plan sketch with certain principal dimensions. The individual set builder will be helped by these overall dimensions, and he may also wish to make minor changes in placements of some of the parts. Note that all oscillator and oscillator amplifier coils are numbered O_1 to O_6 etc. O_3 is below chassis. The main chassis is 34 inches long by 12 inches wide by 3 inches in depth. The front panel is 35 inches long. All the metal and acorn tubes are numbered from V_1 and up. See tube list, Fig. 9. Condenser gangs C 1, 2, 3 and 4 and C 7, 8, 9, 10 are the P.W. type. The rest of the material such as coil forms, shield cans are labeled the same as in the main circuit in Fig. 1.

Figure 10 shows a front photograph

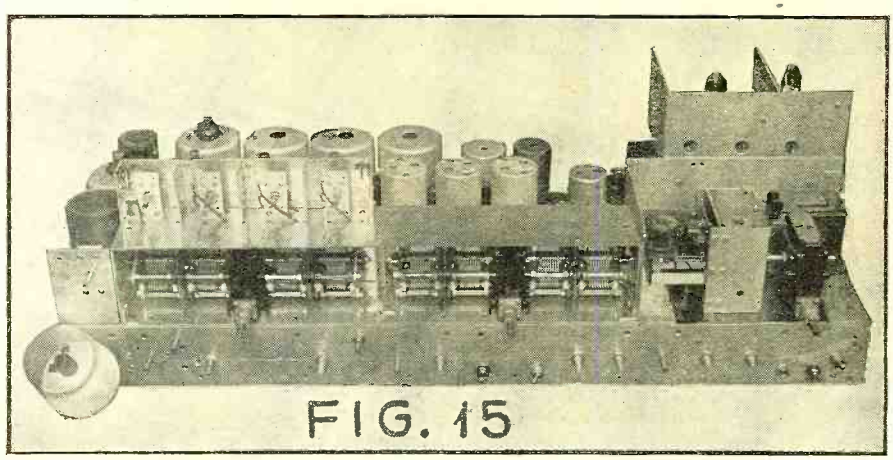
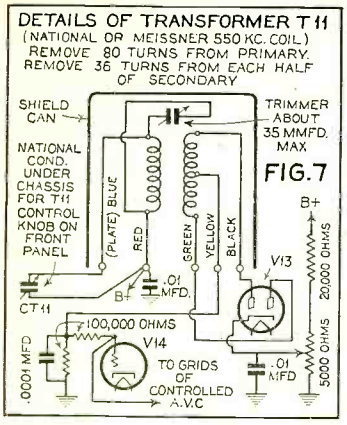
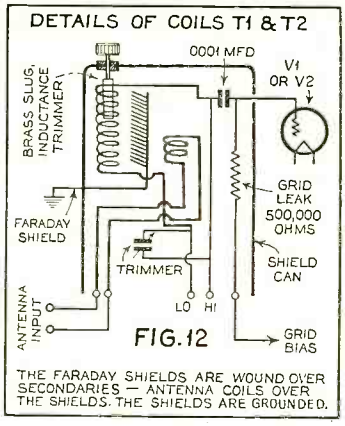
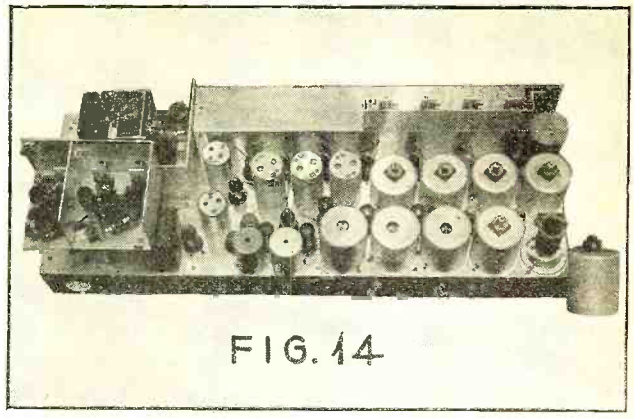


FIG. 15







Laboratory Model METER ERODYNE

H. Jones

IN last month's article Frank Jones (CO60M) described the receiver as a whole, its principles of design and gave the complete schematic circuit diagram.

of panel controls. The arrows accompanying the figure tell what each control is for.

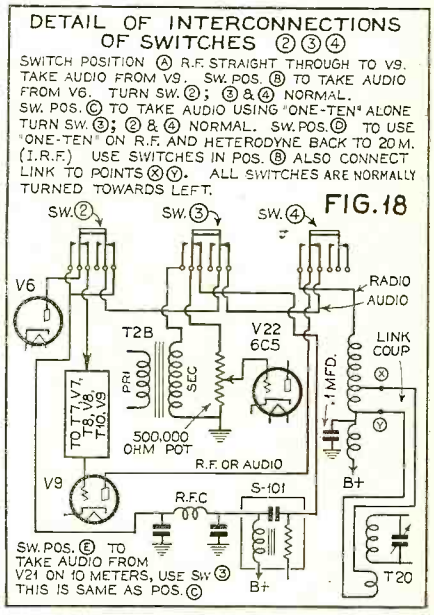
Figure 11 is a bottom view of receiver showing the wiring, and associated resistors, by-pass condensers, switches, certain peaking condensers, shields, etc. All r.f. "hot" leads are run in shielded wire with the shielding grounded. This shielding of certain leads is very important. The chassis is hinged to a bottom plate. The bottom metal plate is screwed to a 5/8 inch wood (polished at edges to look like black bakelite) sub-base.

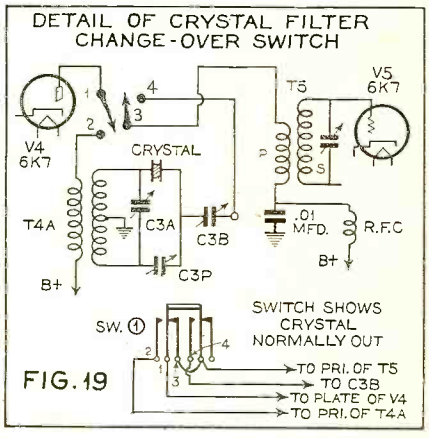
For inspection, the entire receiver can be swung up and back, thus exposing every sub-panel connection and making it easy of access for any change or repair. However, only the very best of parts have entered into the construction, and every energy-carrying part is working away under load. The entire chassis as well as the cabinet are all constructed of 1/8-inch aluminum, which is easy to work, and has sufficient rigidity. The front panel is 3/16-inch aluminum with black crackle finish on the front or operating side of the panel.

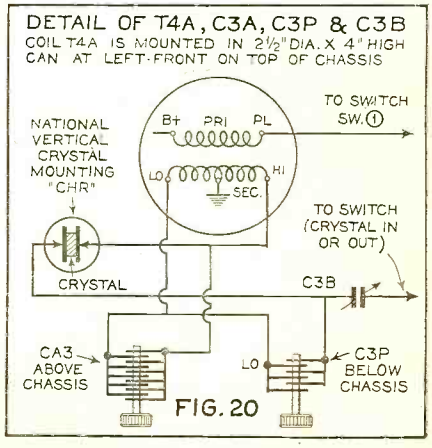
The chassis should be constructed first after careful layout and all socket holes cut, then the bases of the shield cans bolted down, and the sockets for the r.f. coils mounted and the appropriate number of holes drilled in the base for the connections below the chassis floor. Use R-39 coil forms and isolantite coil-form sockets for maximum low-loss construction. Then consult coil data at end of this article, and go ahead and make up the coils. See Figures 12 and 13 for details of coil shield cans for coils T-1 to T-6. These cans have an inductance matching, adjustable metal slug (see Figure 15) that can be moved up and down inside the coil forms, thus varying the inductance, which is highly valuable in tracking the first four circuits.

These metal slugs are made of brass in a lathe and turned to 5/8 inch diameter and 1 inch long. They are fastened to a long screw that passes up through a bakelite threaded bushing fastened to the top of the shield can. The 1-inch diameter circular lock nut on the outside allows locking the adjustment after once determined. Very minute trimmer condensers are also fastened to the coil sockets near the bottom (see photo in Figure 14). These are accessible from small holes in the sides of the shield cans for the preliminary line-up.

The directions mentioned in the various detail figures, (*Turn to page* 316)

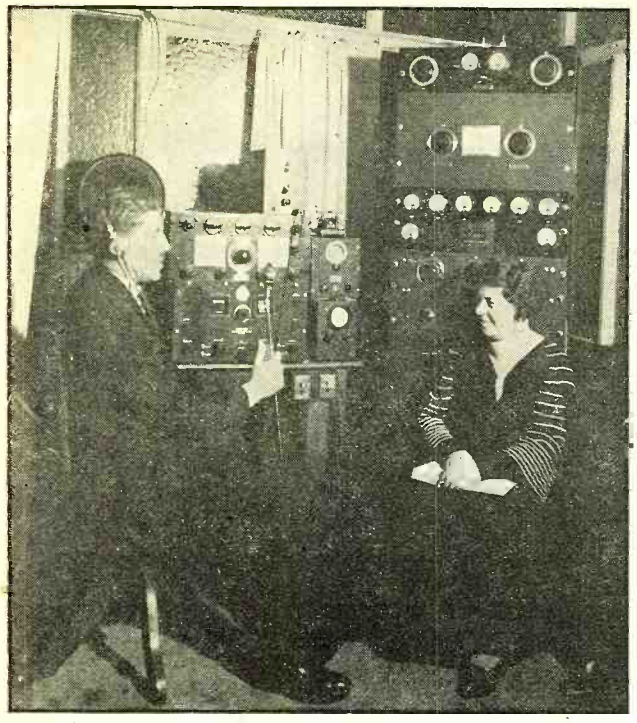






The "HAM" Shack

Conducted by
Everett M. Walker
Editor for Amateur Activities



FAMOUS LINGUIST

Meet "Ole Barnacle Bill," otherwise known as Will Nightingale, and Lottie, who often are heard anywhere in the world over their 20-meter station G5NI. Yes, Bill likes American apparatus.

Fall Activity On 5 and 10 METERS

THIS fall and winter promises to bring forth a tremendous increase in amateur activity on both the five- and ten-meter bands. The former, particularly, is coming in for greatly increased activity due to the fact for the first time in the history of the band, it opened up on numerous occasions this spring and summer, and promises to repeat this phenomenon again this fall and winter.

With this decided amateur trend toward ultra-high-frequency operation it is quite possible that much data of value to radio research will be obtained. Hithertofore, ultra-high frequencies of the order of forty megacycles or higher have been regarded as quasi-optical in characteristics and therefore practical only for local communication. However, many new factors have entered the picture that materially change these formerly accepted but now obsolete theories.

Improving the Band

Principally among these is a decided change in the type of equipment being used on the five-meter band. Up until a year ago the accepted thing was a simple push-pull oscillator as the ideal transmitter and the broad tuning super-regenerative receiver because of the necessary wide tuning band in order to permit reception of frequency modulated signals with some degree of intelligibility.

Now this order of things has been vastly changed. The frequency-modulated self-excited oscillator and the super-regenerative receiver are beginning to fade from use on this band. The former is being replaced by master-oscillator-amplifier transmitters and even crystal-controlled units and the latter by more selective superheterodyne receivers.

Much pioneering work has been done by amateurs to make the use of this more stable equipment both possible and practicable. With the help of tube engineers who have made available new types that are more practicable for operation on these high frequencies, the amateur has found it *is* possible to construct a master-oscillator power-amplifier transmitter that will perform efficiently and effectively. A year ago this was practically impossible. With old types of tubes it required more power to drive an amplifier at five meters than necessary to put out a good local signal with a self-excited oscillator.

Enter, the 6L6 Tube

One of the tubes that has helped no end is the 6L6—a tube designed primarily for audio use, but which has turned out to be the answer to the five-meter amateur's prayer. It has proved to be an excellent crystal oscillator or electron-coupled oscillator and radio-frequency doubler and amplifier. It is possible to construct a transmitter around these tubes alone in the r.f. circuit. Several transmitters of this type are already on the air.

This is one of the principal factors in opening up the possibilities of the five-meter band. Those who have used m.o.p.a. units have found their signals far more effective with less power than any type of self-excited oscillator, including the comparatively stable "long lines" type which hithertofore was the most stable type of transmitter available for ultra-high frequency work.

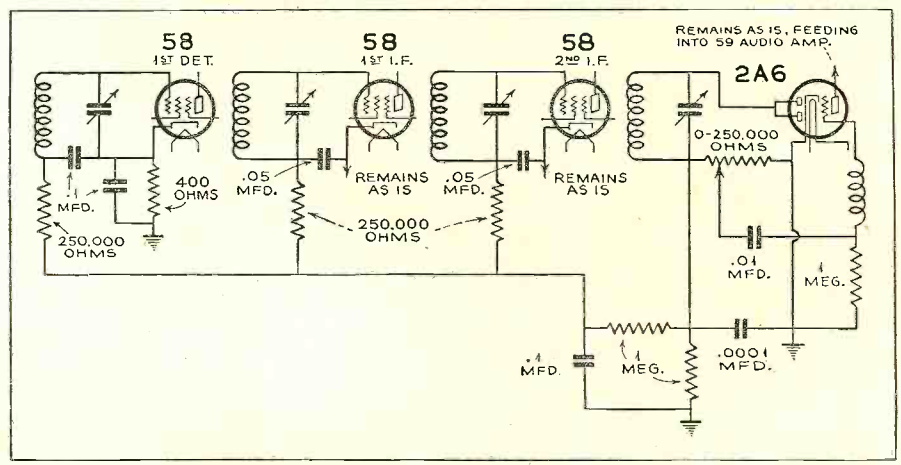
Crystal control offers even greater possibilities for stability. A few already have been constructed and are on the air. With the new tubes available and 20-meter crystals that now are being cut with a high degree of efficiency the task of building a five-meter crystal-controlled transmitter is not extremely difficult. It is no longer necessary to use a long string of frequency-multipliers and amplifiers in order to get a few watts into an antenna.

What this means in addition to the distant communication possibilities is becoming increasingly important to the five-meter band. The band is 4,000 kilocycles wide. Frequency-modulated self-excited oscillators cover band widths from 20 kilocycles at a minimum to as much as 60 kilocycles. The conclusion is obvious. The big hole put in the band by the older type of transmitter limits the number of stations that can effectively operate on the band. On the other hand the carrier of the stable transmitter is definitely fixed and the broadness of the signal is kept within the side band limits of the audio modulation. This need not exceed more than 3,000 to 5,000 cycles if the transmitter is operated properly for voice transmission.

The ultra-high-frequency bands and most particularly the five-meter band are extremely important amateur bands for local work, and rapidly are becoming more so. With television "just around the corner" there is a constant threat to the amateur's priority on these bands. The Federal Communications Commission already has been told by radio interests that "the most valuable part of the spectrum for television starts at 42 megacycles." The television committee of the Radio Manufacturers Association already has requested the commission to allocate "a television band extending from 42 to 90 megacycles."

Battling Unfairness

Details of these requests and comments on their unfairness previously have been reported in these columns. The point is it



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

will be necessary for the amateur to put up a fight and prove to the commission that their operation on these channels is in "public interest, convenience and necessity" which is the way the Radio Act of 1927 (a compromise measure sometimes referred to as the Dill-White Bill), says radio channels should be allocated.

Retain the 5-Meter Band

It obviously is to "public interest, convenience and necessity" that the amateur retain the 5-meter band because it is just being discovered that they are more than just "local bands." It is now reasonably feasible to assume that these channels hold potential possibilities for communication over medium and long distances. If these channels once are allocated to television they will forever be lost to other services that might find them of value. Witness the broadcast band! There is practically no possibility for this being changed. If this band suddenly were shifted say to lower frequencies of the order of several hundred kilocycles, all of the sound broadcasting receiving sets in the home today would be rendered obsolete. This would deprive listeners of "property rights"—something they would not surrender without a fight unless it were a case of national emergency

Recommendations to F.C.C.

So it is recommended the F.C.C. does not underestimate the importance of the five-meter band to the amateur. There still is much research to be done to determine its phenomenal characteristics. It might be pointed out here that it was the amateur who demonstrated that short wavelengths (below 200 meters) were not useless, but decidedly valuable for long distance communication. There was a time when the amateur was assigned all wavelengths below 200 meters. It was due almost entirely to his work that the skip distance phenomenon was discovered and proved. Also, the amateur has made a great investment in 5-meter equipment that would have to be confiscated if this band is taken away.

Now we have five meters—a virgin territory where both the amateur and the laboratory research worker are just beginning to discover what it is all about. There are many thousands of amateurs operating on this band—more than any research organization could possibly put to work on its problems. It seems only logical that the amateur should have a chance to finish his attack on the problem now that he is off to a fair start, and then if it is in "public interest, convenience and necessity" he should be allowed to share his portion of this frequency allocation with other services permanently. Certain it is that the art of radio has been forwarded greatly by amateur experimentation so that in peace or war America has been the leader. Cut down on the amateur's right or ability to experiment and you cut down on the progress the industry will make in the future.

AUTOMATIC volume control is a valuable accessory in the receiver of the telephone station operator. It facilitates tuning across the band without having loud signals nearly tearing the loudspeaker apart and at the same time automatically steps up the gain so the weaker stations "in-between" are not missed, as is invariably the case when attempting to control the sensitivity manually. However, there still are a number of old receivers not equipped with this feature that are giving good service in many "Ham" shacks. Some of these old receivers, with a slight amount of "revamping" can be made to perform well, too, by installing such units as iron-core, intermediate-frequency transformers, etc.

Installing automatic volume control in sets such as the FB-7 (National) and the Comet Pro (Hammarlund) is not as difficult as it at first might seem. As a matter of fact very few changes have to be made. A simple system was devised for an FB-7. The same system may be adapted to the Comet Pro or any other receiver of similar type.

The first requirement is to isolate the i.f. and first detector grids from ground and then to install a diode rectifier as second detector that will provide the a.v.c. volt-

(*Turn to page* 281)

A New and "Boomless"

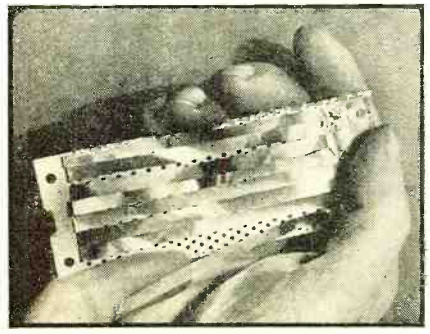
RIBBON MIKE

By John H. Potts

UP to the present time velocity microphones have employed a magnetic field for their operation. Research work by William A. Bruno of the Bruno Laboratories has culminated in the introduction of the Velotron, a new velocity microphone utilizing a static field.

This instrument has decided advantages over many previous velocity microphones. Its output is so much greater (minus 50 db., zero level .006 watts) that one stage less amplification will give equivalent volume. It is a high-impedance type, therefore no transformer is required and one source of trouble due to hum pickup is eliminated. It is highly directional. In tests conducted at the RADIO NEWS Laboratories, negligible acoustic feedback occurred even with the microphone but a few inches from the loudspeaker. It can be used for close talking without the usual "boomy" effects present in other velocity microphones with good frequency response.

The design is very simple. As shown in the photograph, eight thin aluminum foil ribbons are placed loosely across a heavily insulated and perforated metallic plate. This metallic plate and the ribbons thus form a condenser which has a normal static capacity of about 500 mmfd. These



ribbons are anchored at each end and the unit is mounted in a protective case.

In operation, a polarizing voltage is applied to the ribbons through a resistance network as shown in Figure 1. Sound vibrations vary the capacity between the ribbons and the fixed plate, causing variations in the minute charging current flowing through R1 and R2. The resulting variations in the voltage drop across R1 provide an electrical replica of the sound frequencies actuating the ribbons. Since the aluminum ribbons are only 2/1000 of an inch thick, they have negligible inertia at sound frequencies.

Increasing the polarizing voltage causes an increase in sensitivity. This occurs because the ribbons are then drawn closer to the fixed metallic plate, and minute sound vibrations cause a greater change in capacity. However, strong low frequency vibrations require a large movement of the ribbons, while high frequency notes require but little. Therefore, increasing the polarizing voltage effectively changes the response curve so as to increase the high-frequency output though the low frequency response is but little affected. This characteristic may be used to advantage in p.a. work.

The polarizing voltage may be taken from any amplifier. There is substantially no current drain and the resistor R2, and condenser C2, provide adequate hum filtration from any rectified power source.

The microphone performed very well in its tests at the RADIO NEWS Laoratories. Its relatively low price should prove an additional attraction to workers in the p.a. field.

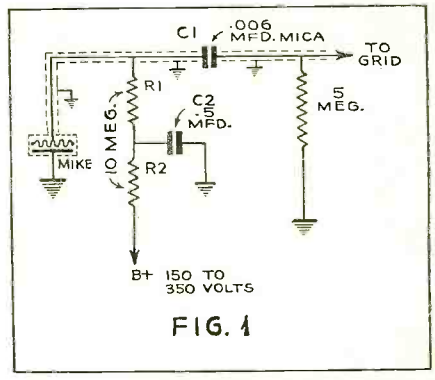
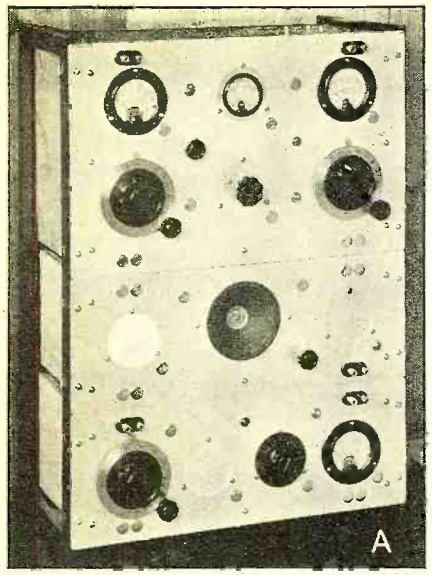
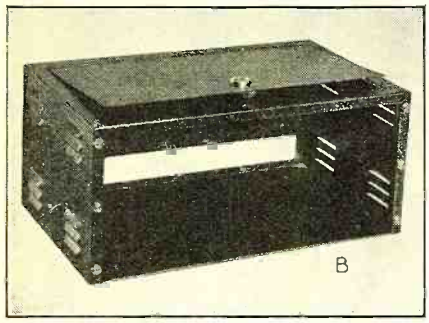


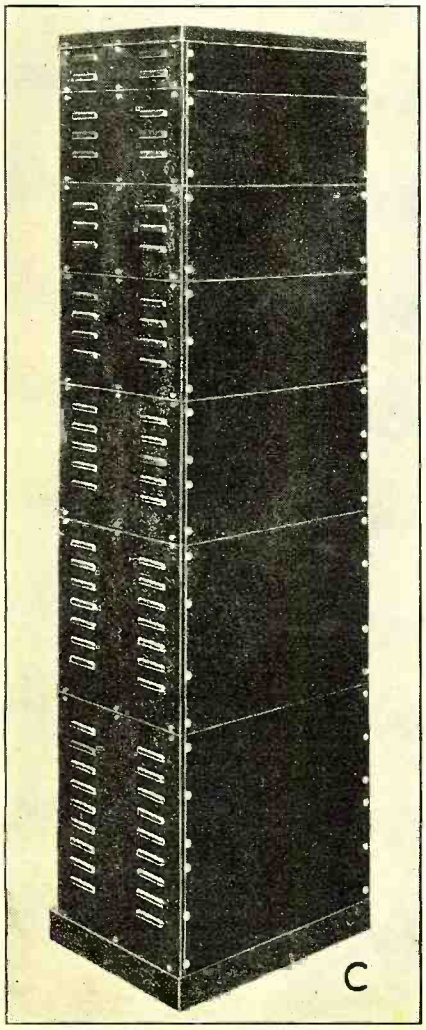
FIG. 1

A RADICALLY NEW PRINCIPLE

Combining the good features of the velocity and electrostatic principles, this microphone provides excellent "quality" with high output, light weight, ruggedness and long life.







What CABINETS

What They Are And

IF put to a vote, it is practically certain that the experimenter, radio constructor, laboratory technician and radio amateur would agree that one of his biggest problems in experimental work and home construction is the difficulty of knowing where to obtain cabinets, panels, chassis and racks in a variety of suitable sizes for mounting his equipment.

The need for metal enclosures, racks, etc., is no mere "drop in the bucket" requirement. There is constant demand for multi-unit cabinets and racks for the large army of "hams" who are forever building and changing their rigs and for chassis and cabinets for new receivers, measuring apparatus and innumerable other devices.

The old style of breadboard layout is rapidly passing. Modern multi-tube circuits do not lend themselves to breadboard construction due to the need for complete shielding, rugged construction and neatness, all afforded by the use of metal cabinets, chassis, etc.

Unit Panel Equipment for That New Transmitter

THE General Radio Company has developed a series of unit-panels designed to facilitate the fabrication of experimental and semi-permanent installations. A big feature of these new unit-panels is the fact that they are cut and drilled in such a manner as to be interchangeable and universal in application. Layout changes can be made at any time without disfiguring the panel and a unit is easily disassembled for conversion into an entirely different instrument.

The equipment comprises three different types of front panels and two types of base plate and dust cover assembly units. The photograph A, shows all types of panels. All principal parts are made of Eraydo, a non-magnetic, non-corrosive alloy of copper, silver and zinc. Each panel is provided with a variety of large and small holes to take care of practically any type of equipment mounting. Unused holes are simply plugged with snap buttons or plates provided for the purpose. These plates are suitable for mounting shielded plug-in coils, etc.

Special panel clamps are provided to clamp a unit panel to the rack in any desired position. The panels come in standard 19-inch widths and in two different heights, 7 and 12 inches.

The rack consists of two rectangular steel frames which mount parallel to each other. These frames can be screwed to the bench or they may be fastened to the wall by the 4 clamps supplied with each rack. The overall height of the rack is 26½ inches.

Specialists in Racks, Panels and Cabinets

THE model H relay rack illustrated at D is one made by the Par-Metal Products Corp. This enclosed type of rack is constructed of heavy sheet steel, is substantially reinforced and has louvres at top and bottom of the sides, and screen sections in the back, providing ample ventilation. The hinged door at the back is easily removable Panel mounting holes tapped for 10-32 screws are drilled every 1¾ inches. It is finished in durable black crystalline enamel.

The overall measurements of the rack are 21 inches wide by 15¼ inches deep, and either 42 or 66½ inches high. It takes the standard 19-inch panel. The shelves are constructed so as to be mounted inside the rack with side bolt mounting.

This company also makes channel relay racks, sectional P.A. racks, double and triple-unit panel cabinets, meter and speaker panels, all sizes of aluminum rack panels, blank chassis bases, loudspeaker cabinets, foundation cabinets and general utility steel cabinets. The photo B illustrates their all-purpose metal cabinet drilled and tapped to fit a standard 19-inch panel 8¾ inches high. The cabinet is 13 inches deep and may be used with any chassis up to 11 by 17 inches in size. It is ideal for housing short-wave or all-wave receivers.

Full Line of Constructional Equipment

THE Insuline Corp. of America manufactures complete line of building material which includes standard relay racks and brackets, metal panels in 14 different standard sizes, crystallized finish cabinets in several different sizes with metal chassis to fit and utility metal boxes and cabinets. This is also a headquarters for electralloy and aluminum cans supplied in 10 different sizes in knock-down form with drilled and tapped corner posts for quick assembly. They are in a position to supply aluminum corner and angle posts in plain or drilled and tapped units.

The photos at C and E show the new Insuline sectional standard construction rack. This new rack is designed in such a way that as many sections as desired can be stacked to provide all the advantages of a standard rack and panel

Always a Problem To The Amateur

TO USE?

Where To Get Them

With the knowledge that the home constructor and experimenter would consider it a real service to him in his work to know the available sources of supply for all types of enclosures and mountings, a general call was sent out to manufacturers for information. The products herein shown or mentioned are such as to meet a wide variety of requirements and all offer the advantages of practical utility and real professional appearance. Some of these manufacturers specialize in chassis and panels, the latter available in bakelite, hard rubber and metal. Constructional accessories also include aluminum shield boxes which so many experimenters have found applicable to innumerable shielding and radio constructional problems. A number of companies listed are in a position to make special cabinets and rack and panel equipment and have facilities for punching and stamping chassis, sub-chassis and metal shelves, singly or in quantities, to any desired specifications that may be required by the amateur set builder.

assembly. Additional sections may be added at any time. A screwdriver is the only tool required in assembly. Panels are 19 inches long and are available in 11 different heights from 3½ inches to 21 inches.

One of their latest items includes a foundation chassis with cane type perforated metal shield covers which give a real professional appearance to sound amplifiers. They are made of high grade auto-body steel. The shield covers are made of a sturdy, heavy duty sheet metal, crackle finished. Chassis and covers are spot welded with ½ inch flanges. They are supplied undrilled and can be had in 5 different sizes ranging from 5 by 8¼ by 9½ inches to 8¼ by 10 by 17 inches.

Full Line of Racks and Cabinets

THE Wholesale Radio Service Co. announce a very complete line of racks, panels and cabinets in many different styles and sizes suitable for meeting a wide variety of purposes. Representative of their line is the steel cabinet for multi-panel mounting illustrated at F. This is a popular model with the amateurs, as it is available in double and triple panel types and can be used very nicely to house transmitters. They are equally advantageous for housing P.A. equipment, testing apparatus, etc.

They are made of 16 inch steel, black crystallized lacquer finished and are equipped with a rear panel door and snap cover. Sides and back have louvres for ventilation and all joints are spot welded. The unit shown, measures 17½ inches high by 19 inches wide by 13 inches deep.

Other products in this line include relay racks for amateur and broadcast stations, sectional P. A. racks, general utility steel cabinets spot-welded constructed, and all kinds of panels. A desirable feature of the utility cabinets is that the top and bottom covers are removable, fit snugly and are held in place by self-tapping screws. The line also includes small steel cabinets for portable use.

Standard Cabinets

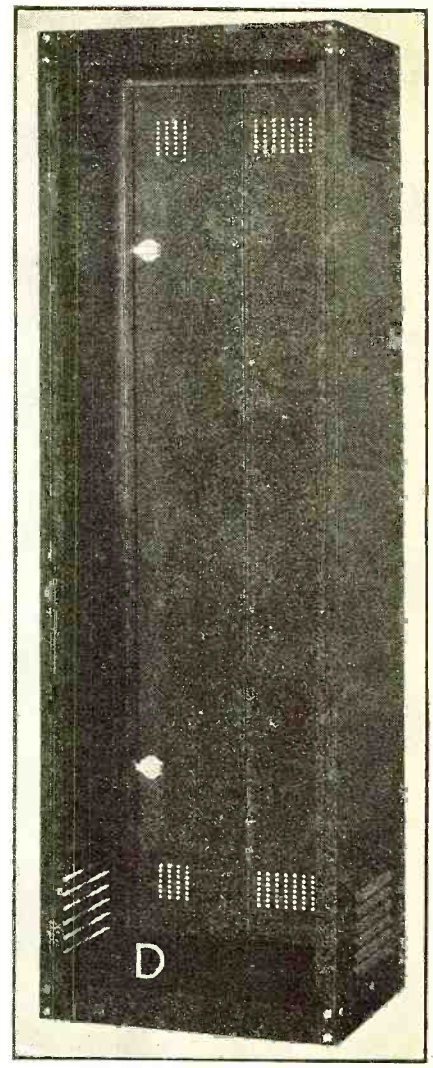
THE National Company is in a position to furnish heavy gauge steel cabinets in different sizes, moire lacquer finished and with panels either drilled for housing the National line of popular short-wave receivers or with blank panels to meet individual constructional requirements. The illustration shows the cabinets with holes punched for the different National sets, left to right—type C-SRR, 7 by 7¾ by 7¾ inches, type C-FB7, 8¼ by 11¾ by 12¼ inches, type C-PSK, preselector cabinet, 6¼ by 8¼ by 12¼ inches and type C-SW3, 7⅜ by 9⅛ by 9⅝ inches. Subpanels are furnished with all units. This company can also supply the cabinets used for the type HRO and NC-100 receivers. The first one measures 8¾ by 11½ by 18 inches and the dimensions of the latter are 8¾ by 11 1/16 by 19⅜ inches.

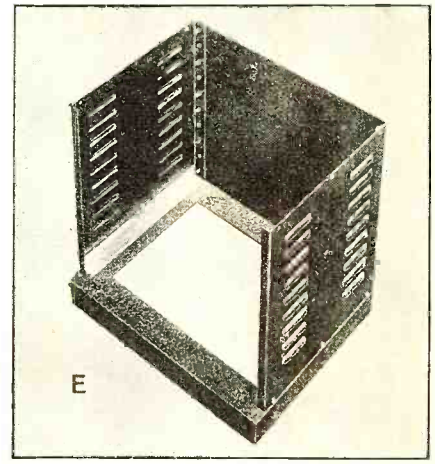
Complete Line of Set Building Material

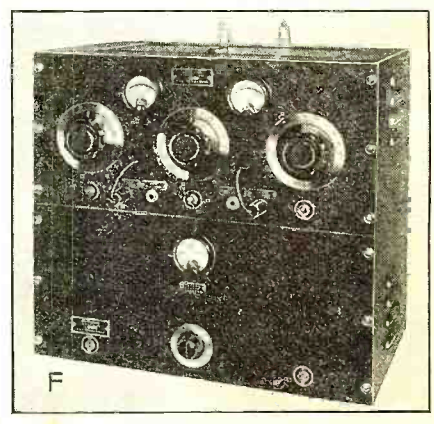
THE Allied Radio Corp. offers a complete line of metal chassis, crystallized finished cabinets and shield cans, as well as electralloy, aluminum, hard rubber and bakelite panels. In addition to stocking a wide variety of sizes in the above material, the company is equipped with the latest types of bending, stamping and punching machines for forming chassis bases to any size desired. Radio builders are invited to submit their specifications for special requirements.

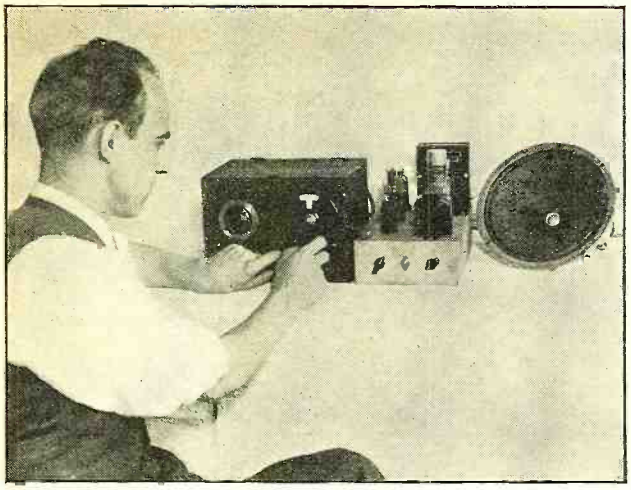
The illustration shows their metal chassis base which can be had in template or electralloy. The first metal is a heavy coated steel which solders easily. Electralloy is a rust-proof nonmagnetic metal which is easy to drill. The chassis bases are available in 6 different sizes from 7 by 9 by 2 inches to 10 by 23 by 3 inches.

(*Turn to page* 319)









ALL SET TO GO

The completed 2-tube tuner is shown in its cabinet. The power supply and speaker are those covered in Parts 4 and 5 of this series (August and September issues).

Practical Construction The Radio

This series of articles is presented
sire to obtain a working knowledge
have some theoretical knowledge
tical experience which is so essential

Part Seven—Two-Tube

by John

ACCORDING to last month's promise the present article will provide constructional information on changing the untuned r.f. stage of the all-wave tuner described last month to a tuned r.f. stage. First, however, the operation of pentode tubes will be discussed in some detail.

In order to explain the pentode, it is best to follow the development of the vacuum tube. The first tube made was a diode (two-element) which contained a filament and a plate only. This could be used only as a rectifier (as a detector or a power rectifier). The device was invented in 1904 by J. A. Fleming, an English physicist.

The next improvement was due to Lee de Forest. He interposed a grid between plate and filament which made possible amplification and oscillation. The action of this tube, the triode, has already been described.

Further Improvements

After amplification had been obtained, the next demand was, of course, more amplification. The triode has definite limits along this line. Last month, it was explained that undesired oscillations may occur due to some coupling between plate and grid circuits of a tube. The plate and grid together form a small condenser which causes some coupling or "feedback". This coupling happens to be in the right phase to cause oscillations. Whether or not such oscillations will take place depends on the magnitude of the voltage fed back. This in turn, depends on the amplification in the tube, the frequency and the size of the elements. The higher the amplification and the higher the frequency, the more feedback. Therefore, the obtainable amplification is limited. Power tubes too are limited; when the electrons are on their way to the plate, they are so numerous that they form a cloud. This cloud of electrons is negatively charged (called the "space-charge") and therefore repels the electrons following them. The whole action reduces the maximum plate current.

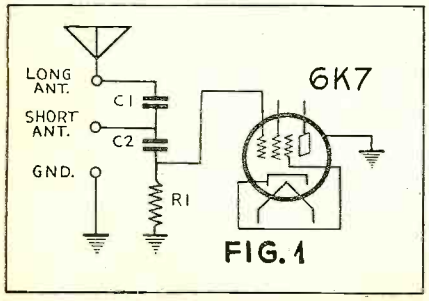


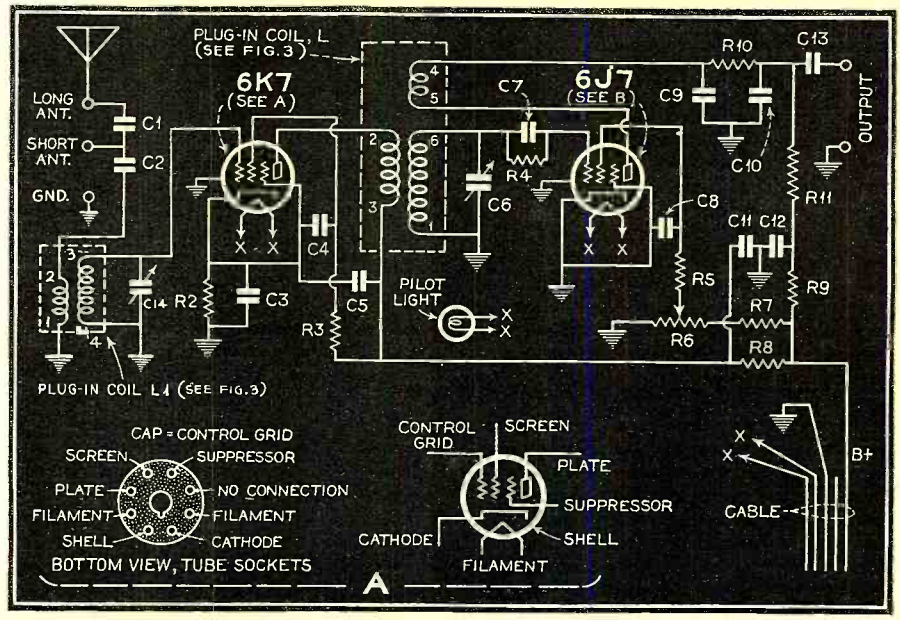
FIG. 1

Both of these limitations are overcome in the screen grid tube (tetrode, four-element tube). Such a tube, as its name implies, has an extra grid which *screens* or *shields* the plate from the grid. In actual construction the extra or screen grid consists of two grids (helical wires or mesh) one inside and one outside the plate. These two parts are connected together and form a shield practically surrounding the plate. Yet, the electrons can reach the plate by going through the openings in the screen. In order that the screen be effective, it must have a d.c. voltage applied, yet it must be grounded, or rather it must have a low resistance path to ground for the frequency to be amplified. This is accomplished by connecting a condenser across the voltage supply, as C4 and C8 in Figure 2.

The positive voltage on the screen neutralizes the space charge with the result that higher power is available. When used as a voltage amplifier, the plate to grid capacity is reduced several hundred times and the result is a greatly reduced tendency toward oscillation. Such a tube can be made so as to have a large amplification factor but the a.c. resistance is high, which makes it hard to realize the greater part of the high amplification.

These screen-grid tubes again had a limitation. When the electrons hit the plate they may knock one or more electrons out of the plate. This is called "secondary emission." These electrons will be attracted back to the plate if the plate voltage is higher than the screen voltage; otherwise they may travel to the screen. A large signal will cause the plate voltage to swing up and down and when it becomes lower than the screen voltage, the "secondary" electrons travel to the screen. The

FIGURE 2



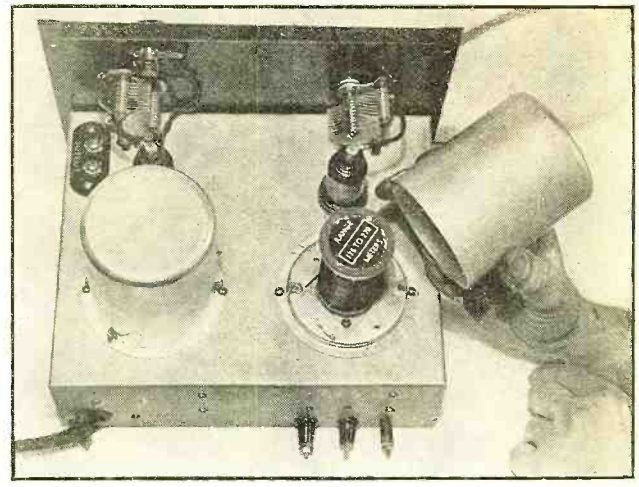
and Instruction for

Beginner

for the benefit of beginners who de- of radio, and also for those who of the subject but lack the prac- to thoroughly understanding radio

T.R.F. Regenerative Set

M. Borst



A DX GETTER—AND EASY TO BUILD

The ability of this tuner to drag in signals from all over the world is little short of amazing, yet even the novice will find no difficulty in building it.

plate loses some of its current and this causes distortion. Consequently, in screen grid tubes the screen voltage is the practical lower limit of the plate voltage swing.

In the pentode (five-element tube) an additional grid has been placed between the screen and the plate. This grid, which is called the "suppressor", serves to prevent the passage of the secondary electrons from the plate to the screen. The suppressor is connected to the cathode, so when the electrons are knocked out of the plate, the negative potential of the suppressor repels them, while the plate attracts them and they have to return to the plate. It might be thought that the suppressor would also prevent the passage of electrons the other way but this is not so. An electron, when leaving the cathode, is attracted by the plate and the screen while the control grid has a retarding action. By the time the electron has passed through the meshes of the screen, it has attained such speed that the suppressor does not stop it.

The advantage of the pentode as a power tube is that the screen voltage can be higher and the plate-voltage can swing below the screen voltage, in other words more power can be delivered by a smaller tube. As a radio-frequency amplifier, the coupling between plate and grid is still further reduced and still more amplification can be obtained. In some pentodes the connection between suppressor and cathode is made inside the tube, while in others the suppressor has a separate prong. This was done to give constructors an opportunity to use the tube in special circuits where the third grid might be employed for another purpose.

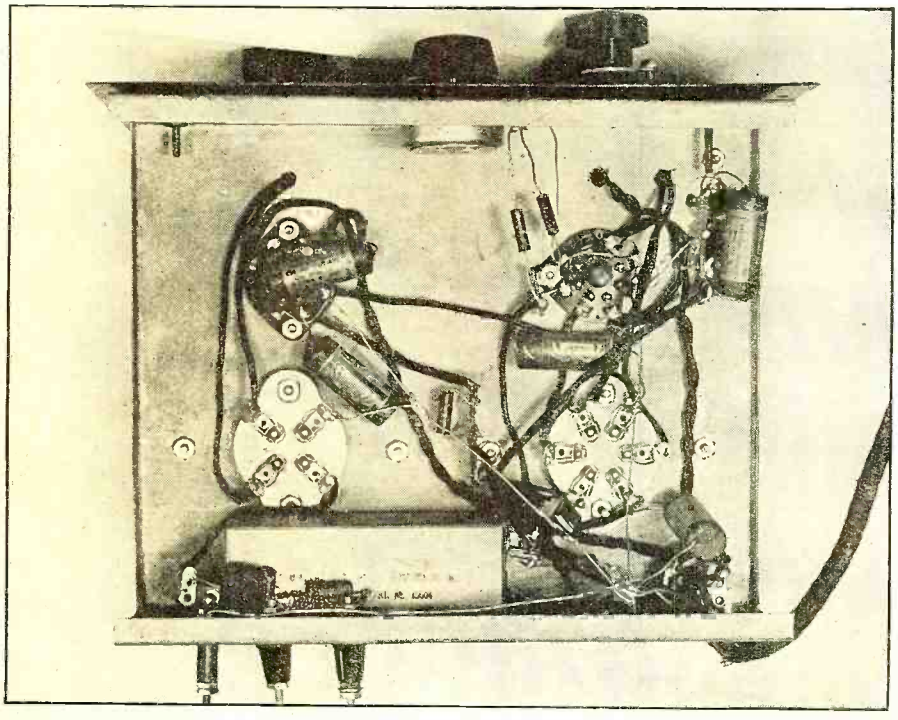
Among the voltage amplifier pentodes, one finds the "variable-mu" pentode and the ordinary pentode. The variable-mu pentode, also called "super-control pentode" and "remote cut-off pentode" has a control grid which is wound helically with the pitch of the winding gradually increasing. The pitch of the winding is one of the factors controlling the amplification factor or "mu". It is possible to control the amplification of the tube by changing bias on this same grid. The more negative the bias, the less the amplification. Moreover, this happens without rectification because the bend in the characteristic is so slow and gradual that both halves of the cycle are amplified equally.

Tube Constants

The variable-mu pentode is used wherever it is desired to vary the amplification of the stage, as is the case in most radio-frequency amplifiers. The standard pentode is employed as a detector, or whenever the amplification is held constantly at maximum. In last month's receiver, the first tube, the 6K7 is a variable-mu pentode, while the detector is of the standard type. The amplification of the r.f. stage can be varied by changing the value of the bias resistor R2. The value recommended is 500 ohms. More amplification is obtained with a lower value and less amplification with higher values of resistance. The reader might experiment to convince himself of these facts. However, do not make the bias resistor less than 200 ohms, for then the plate current will rise beyond the maximum limits recommended by the tube manufacturers.

When speaking about the performance of tubes, the following terms are commonly employed.

The *"amplification factor"*, also called "mu" or "μ", is the ratio between small increases of plate (*Turn to page* 306)



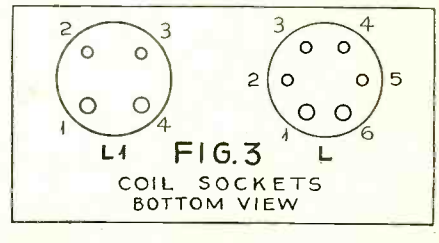
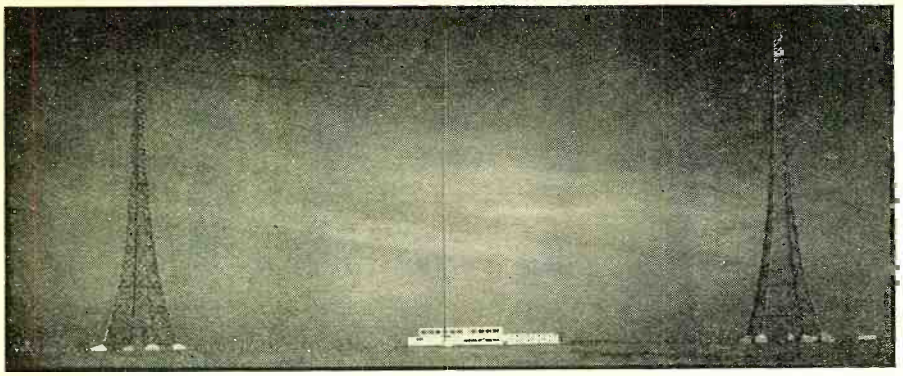


FIG. 3

COIL SOCKETS
BOTTOM VIEW



RADIO MUNICH (GERMANY)

An unusual view of one of Germany's highest powered stations which employs 100 kw. on 740 kc. This station will be heard frequently this winter by U. S. DX'ers.

Courtesy—Observer Watson. New Zealand

THE DX CORNER

S. GORDON TAYLOR

(*For Broadcast Waves*)

HERE we are entering the 1936-37 DX season. It is believed that it will be better than the last one and it is fervently hoped that such will be the case.

In order to provide plenty of ammunition for the DX'er a timely list of European stations is included immediately after the DX Corner this month. Last month a complete list of trans-Pacific stations was given. A feature of this month's DX Corner is a list of the F.C.C. monitor schedules in its latest revised form.

Go to it DX'ers—and the best of luck. Don't forget that the latch string is out to those desiring appointment as Official Radio News Listening Post Observers. If you desire an appointment simply write a letter to the editor of this department outlining your DX experience and accomplishments and briefly describing the equipment you are using.

Australian Station Changes

The following information on additions and changes in the Australia station list were submitted by L.P.O. Jurd of Queensland, Australia. Figures in parenthesis are old power or frequency:

New Stations

Call	*Location*	*Kc.*	*Watts*
2 AD	Armidale N. S. W.	1080	100
2 DU	Dubbo N. S. W.	1060	100
2 LV	Inverell N. S. W.	820	100
2 QN	Deniliquin N. S. W.	1440	50
4 CA	Cairns Queensland	1390	100
4 LG	Longreach Queensland	1100	300
4 VL	Charleville Queensland	1430	50
7 BU	Burnie Tasmania	660	50

Alterations

Call	*Location*	*Kc.*	*Watts*
2 GN	Goulburn N. S. W.	1390	200(100)
2 WL	Wollongong N. S. W.	1430	300(50)
3 BA	Ballarat Vic.	1320	500(50)
3 GL	Geelong Vic.	1350	100(50)
3 MB	Birchip Vic.	1490(1470)	100
4 AY	Ayr Queensland	1450(980)	300(100)
4 BU	Bundaberg Queensland	1480	100(50)
4 GR	Toowoomba Queensland	1000	500(50)
5 MU	Murray Bridge Sth Aust.	1340(1450)	100
6 AM	Northam W. A.	980	2000(1000)
6 KG	Kalgoorlie W. A.	1210	500(100)
7 HO	Hobart Tas.	860(820)	100

Correspondents Wanted

Official Observer George C. Sholin, 55 Lapidge Street, San Francisco, California would like to correspond with DX'ers outside of the U. S. A.

Official Observer William W. Beal invites correspondents from other official observers and guarantees to answer all letters promptly. His address is 254 Broadway, Lawrence, Mass.

F. C. C. Monitor Schedule

The following is the monitor schedule of the Federal Communications Commission. The stations are on the air twenty minutes each, beginning with the time shown. During these transmissions the stations operate on cleared channels and each station announces its call letters at three-minute intervals. This list enables DX'ers to log these low-power stations, most of which cannot normally be heard at a distance because of numerous other stations operating on the same frequencies.

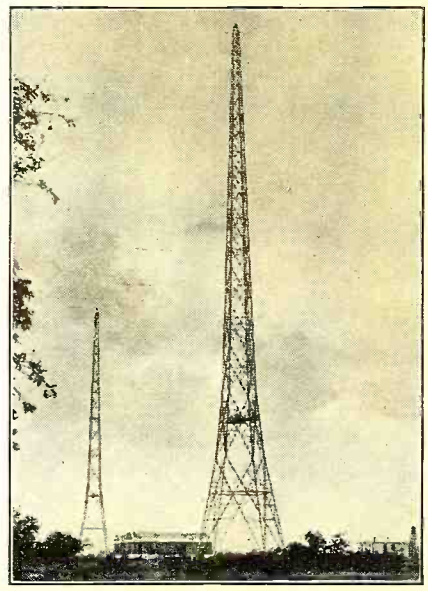
Second Monday of Each Month

E.S.T. a.m.	*Freq.*	*Call*	*Location*	*Watts*
2:00	1310	WLNH	Laconia, N. H.	100
	1420	WJBO	Baton Rouge, La.	100
2:10	1210	WBRB	Red Bank, N. J.	100
	1500	WHBB	Selma, Ala.	100
2:20	1420	WMAS	Springfield, Mass.	100
	1300	WIOD	Miami, Fla.	1000
2:30	1500	WWRL	Woodside, N. Y.	100
	1200	WJBW	New Orleans, La.	100
2:40	1430	WOKO	Albany, N. Y.	500
	1370	WMBR	Jacksonville, Fla.	100
2:50	1200	WCAX	Burlington, Vt.	100
	1500	WOPI	Bristol, Tenn.	100
3:00	1290	KTRH	Houston, Tex.	1000

XGOA, NANKING, CHINA

A 75-kw. station frequently heard in the U. S. on 660 kc.

Courtesy—Observer Chalmers. New Zealand



	1310	WMBO	Auburn, N. Y.	100
	1420	WMSD	Muscle Shoals, Ala.	100
3:10	1370	WOC	Davenport, Iowa	100
	1220	WCAD	Canton, N. Y.	500
	1210	WMFN	Clarksdale, Miss.	100
3:20	1270	KWLC	Decorah, Iowa	100
	1500	WMBQ	Brooklyn, N. Y.	100
	1430	WNBR	Memphis, Tenn.	500
3:30	1210	KFPW	Fort Smith, Ark.	100
	1310	WMFF	Plattsburg, N. Y.	250
	580	WDBO	Orlando, Fla.	1000
3:40	1420	KABC	San Antonio, Tex.	100
	1370	WQDM	St. Albans, Vt.	100
	1320	WSMB	New Orleans, La.	500
3:50	1200	KADA	Ada, Okla.	100
	1210	WFAS	White Plains, N. Y.	100
	1500	WHEF	Kosciusko, Miss.	100
4:00	560	KFDM	Beaumont, Tex.	500
	1280	WCAP	Asbury Park, N. J.	500
	1440	KLS	Oakland, California	250
	1370	WAGF	Dothan, Ala.	250
4:10	1420	WHDL	Olean, N. Y.	100
	1310	KCRJ	Jerome, Ariz.	100
	1200	KMLB	Monroe, La.	100
4:20	1370	KLUF	Galveston, Tex.	100
	550	WDEV	Waterbury, Vt.	500
	1100	KGDM	Stockton, Calif.	1000
	1500	WDNC	Durham, N. Car.	100
4:30	1310	KROC	Rochester, Minn.	100
	1370	KGAR	Tucson, Ariz.	100
	1420	KALB	Alexandria, La.	100
4:40	1200	WBNO	New Orleans, La.	100
4:50	1370	KRE	Berkeley, Calif.	100
	1310	WLAK	Lakeland, Fla.	100
5:00	1450	KIEM	Eureka, Calif.	500
	1120	WGCM	Miss. City, Miss.	100
5:10	1210	KDON	Del Monte, Calif.	100
	1310	WTAL	Tallahassee, Fla.	100
5:20	1420	KUMA	Yuma, Ariz.	100
5:30	1200	KWG	Stockton, Calif.	100
5:40	1320	KGMB	Honolulu, Hawaii	1000

Second Tuesday of Each Month

2:00	1210	WBAX	Wilkes-Barre, Pa.	100
2:10	1370	WDAS	Philadelphia, Pa.	100
2:20	1210	WBBL	Richmond, Va.	100
2:30	1310	WFBG	Altoona, Pa.	100
2:40	1210	WMBG	Richmond, Va.	100
2:50	1310	WEBR	Buffalo, N. Y.	100
3:00	1500	KDAL	Moorehead, Minn.	
	1420	KFIZ	Fond du Lac, Wis.	100
	1200	WLVA	Lynchburg, Va.	100
3:10	1260	KPAC	Port Arthur, Tex.	500
	1210	WOMT	Manitowoc, Wis.	100
	1370	WBTM	Danville, Va.	100
3:20	1500	KBIX	Muskogee, Okla.	100
	550	WKRC	Cincinnati, Ohio	1000
	1430	WHEC	Rochester, N. Y.	500
3:30	1010	WNAD	Norman, Okla.	100
	1420	WMBC	Detroit, Mich.	1000
	1370	WRAK	Williamsport, Pa.	100
3:40	1210	KFVS	Cape Girardeau, Mo.	100
	900	WTAD	Quincy, Ill.	500
	1310	WJAC	Johnstown, Pa.	100
3:50	1120	WTAW	College Sta., Tex.	500
	1430	WBNS	Columbus, Ohio	500
	1370	WBNY	Buffalo, N. Y.	100
4:00	1210	WCOL	Columbus, Ohio	100
	1390	KOOS	Marshfield, Ore.	250
	1310	WBRE	Wilkes-Barre, Pa.	100
4:10	1240	KLPM	Minot, N. Dak.	250
	1370	WPAY	Portsmouth, Ohio	100
	1500	KPQ	Wenatchee, Wash.	100
	1420	WPAR	Parkersburg, W. Va.	100
4:20	1310	KRMD	Shreveport, La.	100
	1200	WCLO	Janesville, Wis.	100
	1120	KFIO	Spokane, Wash.	100
	570	WSYR	Syracuse, N. Y.	250
4:30	1270	KGCA	Decorah, Iowa	100
	610	WJAY	Cleveland, Ohio	500
	1420	KORE	Eugene, Ore.	100
	1500	WNBF	Binghamton, N. Y.	100
4:40	1370	KFJM	Grand Forks, N. D.	100
	1200	WHBC	Canton, Ohio	100
	900	KGBU	Ketchikan, Alaska	500
	1310	WGH	Newport News, Va.	100
4:50	1420	KRLH	Midland, Tex.	100
	1390	WHK	Cleveland, Ohio	1000
	1260	KGVO	Missoula, Mont.	1000
	1500	WWSW	Pittsburgh, Pa.	100
5:00	1340	WSPD	Toledo, Ohio	1000
	1210	WSAY	Rochester, N. Y.	100
5:10	1420	KNET	Palestine, Tex.	100
	940	WAVE	Louisville, Ky.	1000
	1370	KAST	Astoria, Ore.	100
5:20	1370	KCMO	Kansas City, Mo.	100
	1240	WXYZ	Detroit, Mich.	1000
	1210	KFJI	Klamath Falls, Ore.	100
5:30	1420	KIDW	Lamar, Colo.	100
	1450	WGAR	Cleveland, Ohio	500
	1310	KGCX	Wolf Point, Mont.	100
5:40	1200	WCAT	Rapid City, S. Dak.	100
	1380	KQV	Pittsburgh, Pa.	500

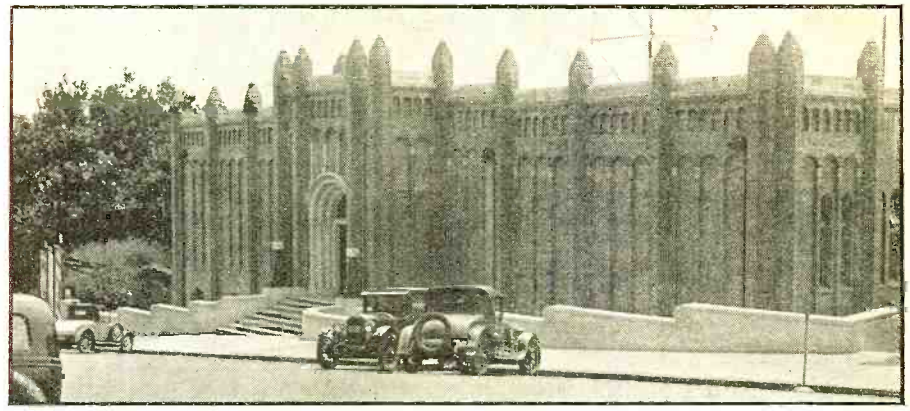
Second Wednesday of Each Month

2:00	1420	WMFJ	Daytona Beach, Fla.	100
2:10	1200	WAIM	Anderson, S. Car.	100
2:20	1310	KVOL	Lafayette, La.	100
2:30	1370	WHBQ	Memphis, Tenn.	100

STUDIOS OF 1YA, AUCKLAND, N. Z.

Among the world's most modern studios are those of 1YA (10 kw., 650 kc.). Soundproofing, air-conditioning and scientific lighting are among the up-to-date features.

Courtesy—Observer Watson, New Zealand



E.S.T. a.m.	Freq.	Call	Location	Watts
2:40	1240	WKAQ	San Juan, P. R.	1000
2:50	1310	WSJS	Winston-Salem, N. Car.	100
3:00	1420	KABR	Aberdeen, S. Dak	100
	1200	WFAM	South Bend, Ind.	100
	1370	WMFD	Wilmington, N. Car.	100
3:10	1290	KLCN	Blytheville, Ark.	100
	1210	WPAX	Thomasville, Ga.	250
3:20	1310	KFPL	Dublin, Tex.	100
	570	WKBN	Youngstown, Ohio	500
	1500	WRDW	Augusta, Ga.	100
3:30	1230	KGBX	Springfield, Mo.	500
	1420	WELL	Battle Creek, Mich.	100
	1360	WQBC	Vicksburg, Miss.	1000
3:40	1200	KFXJ	Grand Jct., Colo.	100
	1320	WADC	Tallmadge, Ohio	1000
	1500	KPLC	Lake Charles, La.	100
3:50	890	KARK	Little Rock, Ark.	250
	570	WOSU	Columbus, Ohio	750
	1420	WGPC	Albany, Ga.	100
4:00	1370	KFJZ	Fort Worth, Texas	100
	1210	WHBU	Anderson, Ind.	100
	1200	WJNO	Jacksonville, Fla.	100
4:10	1250	WLB	Minneapolis, Minn.	1000
	1310	WBEO	Marquette, Mich.	100
	880	WCOC	Meridian, Miss.	500
4:20	1430	KSO	Des Moines, Iowa	500
	1200	WMPC	Lapeer, Mich.	100
4:30	1370	WHLB	Virginia, Minn.	100
	1310	WEXL	Royal Oak, Mich.	50
4:40	1420	WJMS	Ironwood, Mich.	100
4:50	1310	KFXR	Oklahoma City, Okla.	100
	1210	WTAX	Springfield, Ill.	100
5:00	1200	KFJB	Marshalltown, Iowa	100
	1370	WEOA	Evansville, Ind.	100
5:10	1020	WDZ	Tuscola, Ill.	250
5:20	1370	KELD	Eldorado, Ark.	100
5:30	1210	KDLR	Devils Lake, N. Dak.	100

Second Thursday of Each Month

2:00	1370	WSVS	Buffalo, N. Y.	50
2:10	1210	WKOK	Sunbury, Pa.	100
2:20	1310	WRAW	Reading, Pa.	100
2:30	1210	WOCL	Jamestown, N. Y.	50
2:40	1310	WTEL	Philadelphia, Pa.	100
2:50	1410	WHIS	Bluefield, W. Va.	250
3:00	570	KGKO	Wichita Falls, Tex.	250
	1200	WCPO	Cincinnati, Ohio	100
	880	WQAN	Scranton, Pa.	250
3:10	1310	KFYO	Lubbock, Tex.	100
	1370	WGL	Ft. Wayne, Ind.	100
	1420	WLEU	Erie, Pa.	100
3:20	1500	KGFI	Corpus Christi, Tex.	100
	1210	WIBU	Paynette, Wis.	100
3:30	1370	KGFL	Roswell, N. Mex.	100
	1410	WBCM	Bay City, Mich.	500
	1310	WSAJ	Grove City, Pa.	100
3:40	1230	KGGM	Albuquerque, N. Mex.	250
	1200	WJBC	Bloomington, Ill.	100
3:50	1320	KGHF	Pueblo, Colo.	500
	1420	WLAP	Lexington, Ky.	100
	1310	WHAT	Philadelphia, Pa.	100
4:00	1200	KGHI	Little Rock, Ark.	100
	1380	WSMK	Dayton, Ohio	200
	1500	KXO	El Centro, Calif.	100
4:10	1420	KGIW	Alamosa, Colo.	100
	1210	WJIM	Lansing, Mich.	100
	1070	KJBS	San Francisco, Cal.	500
4:20	1500	KGKB	Tyler, Tex.	100
	1310	WBOW	Terre Haute, Ind.	100
	750	KGU	Honolulu, Hawaii	2500
4:30	1370	KGKL	San Angelo, Tex.	100
	1420	WCBS	Springfield, Ill.	100
	1200	KSUN	Lowell, Ariz.	100
4:40	1310	WDAH	El Paso, Tex.	100
	1500	WTMV	E. St. Louis, Ill.	100
	950	KHSL	Chico, Calif.	250
4:50	1210	WHBF	Rock Island, Ill.	100
	1370	KERN	Bakersfield, Cal.	100
5:00	1310	WTRC	Elkhart, Ind.	100
	1420	KHBC	Hilo, Hawaii	100
5:10	1200	WWAE	Hammond, Ind.	100
	740	KTRB	Modesto, Calif.	250
5:20	1370	WIBM	Jackson, Mich.	100
5:30	1210	WALR	Zanesville, Ohio	100

Second Friday of Each Month

2:00	1210	WGNY	Chester Twp., N. Y.	100
2:10	1500	WCNW	Brooklyn, N. Y.	100
2:20	1210	WGBB	Freeport, N. Y.	100
2:30	1370	WABY	Albany, N. Y.	100
2:40	1200	WNRI	Newport, R. I.	100
2:30	1500	WSYB	Rutland, Vt.	100
3:00	1370	KICA	Clovis, N. Mex.	100
	1210	WEBQ	Harrisburg, Ill.	100
3:10	1420	WACO	Waco, Texas	100
	1310	WLBC	Muncie, Ind.	100
3:20	760	WEW	St. Louis, Mo.	1000
	1500	WKBB	E. Dubuque, Ill.	100
	1200	WIBX	Utica, N. Y.	100
3:30	1260	KUOA	Fayetteville, Ark.	1000
	1370	WHDF	Calumet, Mich.	100
	1420	WAGM	Presque Isle, Me.	100
3:40	1310	KIUJ	Santa Fe, N. Mex.	100
	1210	WJW	Akron, Ohio	100
	1290	WNBZ	Saranac Lake, N. Y.	1000
3:50	1420	WMBH	Joplin, Mo.	100
	1500	WJBK	Detroit, Mich.	100
	1370	WRDO	Augusta, Me.	100
4:00	1210	KIUL	Garden City, Kans.	100
	1310	WCMI	Ashland, Ky.	100
4:10	1420	WLBF	Kansas City, Kans.	100
	1070	WCAZ	Carthage, Ill.	100
4:20	1210	WMFG	Hibbing, Minn.	100
	1330	WTAQ	Green Bay, Wis.	1000
4:30	1370	KIUP	Durango, Colo.	100
	1420	WPAD	Paducah, Ky.	100
4:40	1500	KNOW	Austin, Tex.	100
	1310	WEMP	Milwaukee, Wis.	100
4:50	1200	KGDE	Fergus Falls, Minn	100
5:00	1420	KIUN	Pecos, Texas	100
5:10	1200	KGEK	Sterling, Colo.	100
5:20	1370	KMAC	San Antonio, Texas	100
5:30	1200	WIL	St. Louis, Mo.	100
5:40	1370	KGFG	Oklahoma City, Okla.	100

Second Saturday of Each Month

2:00	1200	WMFR	High Point, N. Car.	100
2:10	1370	WMFO	Decatur, Ala.	100
2:20	1210	WSOC	Charlotte, N. Car.	100
2:30	1310	WTJS	Jackson, Tenn.	100
2:40	1210	WSIX	Nashville, Tenn.	100
2:50	1310	WROL	Knoxville, Tenn.	100
3:00	1500	KOTN	Pine Bluff, Ark.	100
	560	WQAM	Miami, Fla.	1000
3:10	1370	KWYO	Sheridan, Wyo.	100
	1310	WCLS	Joliet, Ill.	100
	1420	WPRP	Ponce, Porto Rico	100
3:20	1240	KGCU	Mandan, N. Dak.	250
	1200	WHBY	Green Bay, Wis.	100
	1290	WNEL	San Juan, P. R.	1000
3:30	1440	KXYZ	Houston, Texas	1000
	1500	WKBV	Richmond, Ind.	100
	1310	WAML	Laurel, Miss.	100
3:40	1260	KRGV	Weslaco, Tex.	500
	1200	WJBL	Decatur, Ill.	100
	1370	WPFB	Hattiesburg, Miss.	100
3:50	1500	KNEL	Brady, Texas	100
	630	WGBF	Evansville, Ind.	500
	1420	WEED	Rocky Mount, N. Car.	100
4:00	1210	KVSO	Ardmore, Okla.	100
	1310	WFDF	Flint, Mich.	100
	780	KFQD	Anchorage, Alaska	250
4:10	1370	KONO	San Antonio, Tex.	100
	1500	WKBZ	Muskegon, Mich.	100
	1200	KVOS	Bellingham, Wash.	100
4:20	1310	KTSM	El Paso, Tex.	100
	1420	KRLC	Lewiston, Idaho	100
4:30	1210	KWEA	Shreveport, La.	
	1370	KUJ	Walla Walla, Wash.	100
4:40	1420	KCMC	Texarkana, Ark.	100
	1500	KRNR	Roseburg, Ore.	100
4:50	1210	KWTN	Watertown, S. Dak.	100
	1370	KVL	Seattle, Wash.	100
5:00	1420	KGFF	Shawnee, Okla.	100
	1310	KIT	Yakima, Wash.	100
5:10	1200	KBTM	Paragould, Ark.	100
	1370	KRKO	Everett, Wash.	50
5:20	1370	KFRO	Longview, Tex.	100
	1310	KGEZ	Kalispell, Mont.	100
5:30	1200	KFXD	Nampa, Idaho	100
5:40	1310	KXRO	Aberdeen, Wash.	100
5:50	1210	KGY	Olympia, Wash.	100
6:00	1310	KINY	Juneau, Alaska	100
6:10	1410	KMED	Medford, Ore.	100

A BRITISH LISTENING POST

Observer Phillips does most of his DX'ing while at Selwyn College, Cambridge, England, and here is his set-up.

Notes from Readers

Observer Geller (Roxbury, Mass.) WAAB, Boston, is the key station of a new chain known as the Colonial Network. Other stations in this chain are WSAR, WNBH, WLLH, WATR, WEAN and WICC.

Observer Clancy (Alberta, Canada) TIGPH, San Jose, Costa Rica has a new transmitter on 650 kc. CJAT has a new 1 kw. transmitter on 910 kc.

Observer Phillips (Woking, England) A new station, "Radio Marconi" at Bologna, Italy, replaces Trieste, Italy, on 245.4 meters, Trieste moving to 263.2 meters which it shares with Radio Turin. The new "Radio Marconi" uses 50 kw. Agen (France) is again operating on 360.6 meters.

Observer Meade (Kansas City, Mo.) Have been busy getting ready for fall DXing. Broke into the circuit of my Kolster K-20 just ahead of the detector tube so that the r.f. portion could be connecting between my Philco and the antenna. Wow! More power than I can use, and 10 kc. selectivity.

Observer Smith (Greenville, Ill.) Have erected six antennas and have four different grounds. These are all arranged so that I may use any one or any combination. Its surprising how much better some aerials and grounds work than others on a certain station.

A DX fan (Charleston, S. C.) WCSC, Charleston, S. C., 1360 kc. offers a DX program the last Saturday of each month, 2-2:30 a.m. This station employs 1 kw. in the daytime, .5 kw. at night.

Observer Crowley (Rochester, N. Y.) XERA is testing with their new 500 kw. transmitter. Boy! What a wallop they pack. TGW, Guatemala City is going to move from 1210 kc. to 1190 kc.

Observer Mathie (Hawkes Bay, N. Z.) There may be some change in N. Z.'s stations shortly and I will keep you posted. Australian stations 2NR, Lawrence, 700 kc., and 4DU, Dubbo, 1060 kc., are now on the air. I would suggest that U. S. A. DX'ers try for 2NR after WLW closes down as this station has plenty of punch.

EUROPEAN STATION LIST

ALBANIA

Call	Location	kc.	kw.
....	Tirana (under construction	1384	.....

AUSTRIA

....	Innsbrueck	519	1.0
....	Vienna	592	100.0
....	Graz	886	7.5
....	Linz	886	15.0
....	Klagenfurt	1294	5.0
....	Vorarlberg	1294	5.0
....	Salzburg	1348	2.0

BELGIUM

....	Brussels I	620	15.0
....	Brussels II	932	15.0
....	Brussels	1122	0.1
....	Schaerbeek	1122	0.1
....	Antwerp	1465	0.1
....	Binche	1491	0.2
....	Chatelineau	1491	0.2
....	Courtrai	1491	0.1
....	Andrimont	1500	0.1
....	Liege	1500	0.1
....	Liege	1500	0.1
....	Liege	1500	0.1
....	Seraing	1500	0.1
....	Vellereille-le-Brayeau	1500	0.1
....	Verviers	1500	0.1

BULGARIA

....	Sofia (to be increased to 2 kw.)	850	1.0
....	Varna	1276	2.0
....	Stara Zagora	1402	2.0

CZECHOSLOVAKIA

....	Banska Bystrica (under construction)	392	.....
....	Prague (Liblice)	638	120.0
....	Brno	922	32.0
....	Bratislava	1004	13.5
....	Moravska Ostrava	1113	11.2
....	Kosice	1158	2.6
....	Prague (Strasnice)	1204	5.0

DANZIG

....	Danzig	1303	0.5

DENMARK

OXP	Kalundborg	240	60.0
OXQ	Copenhagen	1176	10.0

ESTONIA

....	Tartu	517.2	0.5
....	Tallinn (Reval)	731	15.0

FINLAND

....	Lahti (to be increased to 220 kw.)	166	166.0
....	Oulu (to be increased to 10 kw.)	431	1.2
....	Viipuri (Viborg)	527	10.0
....	Pori (Bjorneborg)	749	1.0
....	Sortavala	749	0.25
....	Helsinski (Helsingfors)	895	10.0
....	Tampere (Tammerfors)	1347	0.7
....	Vaasa (Vasa) (under construction)	1420	0.5
....	Turku (Abo)	1429	0.5
....	Pietarsaari (Jakobstad)	1500	0.25

FRANCE

Radio Paris	Paris	182	80.0
Alpes-Grenoble	Grenoble	583	15.0
Lyon PTT	Lyons	648	100.0
Paris PTT	Paris	695	120.0
Marseille PTT	Marseilles	749	100.0
Toulouse PTT	Toulouse	776	120.0
Radio Agen	Agen	841	0.6
Radio Strasbourg	Strasbourg	859	100.0
Limoges PTT	Limoges (to be increased to 120 kw.)	913	0.5
Radio Toulouse	Toulouse	913	60.0
Poste Parisien	Paris	959	60.0
Rennes (Bretagne)	Rennes	1040	120.0
Radio Cité	Paris	1068	0.2
Bordeaux-Lafayette	Bordeaux (to be increased to 120 kw.)	1077	12.0
Radio Normandie	Fecamp	1113	0.2
Nice PTT	Nice	1185	60.0
Lille PTT	Lille	1213	60.0
Cote d'Azur	Juan-les-Pins	1276	0.8
Montpellier-Languedoc	Montpellier	1339	5.0
Bordeaux-Sud-Ouest	Bordeaux	1348	3.0
L'Ile de France	Paris	1366	2.0
Radio Lyon	Lyons	1393	30.0
Radio Beziers	Beziers	1411	0.3
Tour Eiffel	Paris	1456	7.0
Radio Nimes	Nimes	1492	0.8
Radio Montpellier	Montpellier	1500	0.6

GERMANY

....	Koenigswusterhausen	191	60.0
....	Muehlacker	574	100.0
....	Langenberg	658	100.0
....	Munich	740	100.0
....	Leipzig	785	120.0
....	Berlin-Tegel	841	100.0
....	Hamburg	904	100.0
....	Breslau	950	100.0
....	Heilsberg	1031	100.0
....	Frankfurt on Main	1195	25.0
....	Freiburg	1195	5.0
....	Kassel	1195	0.5
....	Koblenz	1195	2.0
....	Trier	1195	2.0
....	Gleiwitz	1231	5.0
....	Saarbruecken	1249	17.0
....	Nurnberg	1267	2.0
....	Dresden	1285	0.25
....	Bremen	1330	2.0
....	Flensburg	1330	2.0
....	Hannover	1330	2.0
....	Magdeburg	1330	0.5
....	Stettin	1330	2.0
....	Konigsberg	1348	1.5

GREECE

....	Athens (under construction)	601	100.0
....	Salonika	804	10.0
....	Corfu (under construction)	1285	5.0

HUNGARY

HAL2	Budapest II	360	20.0
HAL	Budapest I	546	120.0
HAE	Nyiregyhaza	1122	6.25
HAE2	Magyarovar	1321	1.25
HAE3	Miskolc	1438	1.25
HAE4	Pecs	1465	1.25

ICELAND

TFU	Reykjavik	208	16.0

IRISH FREE STATE

....	Athlone (will be increased to 100 kw.)	565	60.0
6CK	Cork	1240	1.0
2RN	Dublin	1348	1.0

ITALY

I1BZ	Bolzano	536	10.0
I1PA	Palermo	565	3.0
I1FI	Florence	610	20.0
I1RO	Rome I	713	50.0
I1MI	Milan I	814	50.0
I1GE	Genoa	986	10.0
I1BA	Bari I	1059	20.0
I1NA	Naples	1104	1.5
I1TS	Trieste	1140	10.0
I1TO	Turin	1140	7.0
I1BO	Bologna	1222	50.0
I1RO3	Rome III	1258	1.0
I1BA2	Bari II	1357	1.0
I1MI2	Milan II	1357	4.0
I1TO2	Turin II	1357	0.2

LATVIA

YLZ	Riga	583	15.0
....	Madona	1104	50.0
....	Kuldiga	1258	10.0
....	Liepaja	1734	0.1

LITHUANIA

LVK	Kaunas	155	7.0
LVJ	Klaipeda	565	10.0

LUXEMBURG

....	Luxemburg	232	200.0

MALTA

....	Malta (under construction)	1176	.....

NETHERLANDS

....	Kootwijk	160	10.0 150.0
PX-1	Hilversum	995	15.0 60.0

NORWAY

LKO	Oslo	260	60.0
LKJ	Finnmark	349	10.0
LKH	Hamar	519	0.7
LKT	Trondelag	629	20.0
LKD	Bodo	686	0.5
LKF	Frederikstad	776	1.0
LKA	Aalesund	850	0.35
LKB	Bergen	850	1.0
LKP	Porsgrunn	850	1.0
LKM	Tromso	1186	0.1
LKG	Narvik	1222	0.3
LKK	Christiansand	1276	0.5
LKS	Stavanger	1276	0.5
LKR	Rjukan	1348	0.15
LKN	Notodden	1357	0.15

POLAND

....	Warsaw (Raszyn)	224	120.0
....	Wilno	536	1.0
....	Katowice	758	12.0
....	Lwow	795	16.0
....	Poznan	868	16.0
....	Torun	986	24.0
....	Krakow	1022	2.0
....	Lodz	1339	2.0

PORTUGAL

CT1AA	Lisbon	629	20.0
CT1GL	Parede	1031	5.0

RUMANIA

....	Bod (near Brasov)	160	150.0
....	Bucarest	823	12.0

SPAIN

Due to the political situation, it is impossible to obtain complete, up-to-date data. The following list is compiled from the last information received from reliable sources.

Call	Location	kc.	kw.
EAJ2	Madrid	731	3.0
EAJ5	Seville	731	3.0
EAJ1	Barcelona	795	7.5
EAJ3	Valencia	850	1.5
EAJ15	Barcelona	1022	1.0
EAJ19	Oviedo	1022	1.0
EAJ7	Madrid	1095	12.0
EAJ8	San Sebastian	1258	3.0
EAJ4	Santiago de Compostela	1492	0.2
EAJ6	Pamplona	1492	0.2
EAJ9	Malaga	1492	0.2
EAJ10	Zaragoza	1492	0.2
EAJ12	Alcoy	1492	0.1
EAJ13	Palma de Mallorca	1492	0.1
EAJ16	Granada	1492	0.2
EAJ17	Murcia	1492	0.2
EAJ20	Sabadell	1492	0.2
EAJ21	Melilla	1492	0.2
EAJ23	Gandia	1492	0.2
EAJ24	Cordoba	1492	0.1
EAJ27	Burgos	1492	0.2
EAJ28	Bilbao	1492	0.2
EAJ31	Alicante	1492	0.2
EAJ33	Tarragona	1492	0.2
EAJ34	Gijon	1492	0.2
EAJ39	Badalona	1492	0.2
EAJ41	La Coruna	1492	0.2
EAJ42	Larida	1492	0.2
EAJ43	S. C. Tenerife	1492	0.2
EAJ44	Albaceta	1492	0.2
EAJ46	Ceuta	1492	0.2
EAJ47	Valladolid	1492	0.2
EAJ48	Vigo	1492	0.2
EAJ51	Manresa	1492	0.2
EAJ52	Badajoz	1492	0.2
EAJ54	Alcira	1492	0.11
EAJ57	Orense	1492	0.2
EAJ58	Jerez Fra (Cadiz)	1492	0.2
EAJ60	Almeria	1492	0.2
EAJ61	Jaen	1492	0.2
EAJ65	Ciudad Real	1492	0.2
EAJ11	Reus	1500	0.2
EAJ14	Castellon	1500	0.2
EAJ18	Logron	1500	0.2
EAJ22	Huesca	1500	0.2
EAJ25	Tarassa	1500	0.1
EAJ26	Antequera	1500	0.2
EAJ29	Alcala de Henares (Madrid)	1500	0.2
EAJ30	Onteniente (Valencia)	1500	0.1
EAJ32	Santander	1500	0.2
EAJ35	Villanueva Geltru (Barcelona)	1500	0.2
EAJ36	Jativa	1500	0.2
EAJ37	Linares	1500	0.2
EAJ38	Gerona	1500	0.2
EAJ40	Pontevedra	1500	0.2
EAJ45	Denia	1500	0.04
EAJ49	Toledo	1500	0.2
EAJ50	Las Palmas	1500	0.2
EAJ52	Elche	1500	0.2
EAJ55	Algeciras	1500	0.2
EAJ56	Salamanca	1500	0.2
EAJ62	Vitoria	1500	0.2
EAJ63	Leon	1500	0.2
EAJ64	Segovia	1500	0.2
EAJ68	Lugo	1500	0.2

SWEDEN

SBG	Motala	216	150.0
SBE	Boden	392	0.6
SBF	Ostersund	413.5	0.6
SBD	Sundsvall	601	10.0
SBA	Stockholm	704	55.0
SCN	Malmberget	704	0.2
SBB	Goteborg	941	10.0
SCC	Falun	1086	2.0
SBH	Horby	1131	10.0
SCB	Eskilstuna	1240	0.2
SCP	Saffle	1240	0.4
SCU	Varberg	1240	0.2

SCV	Orebro	1240	0.2
SCL	Kiruna	1258	0.2
SBC	Malmo	1312	2.5
SCK	Karlstad	1312	0.25
SCO	Norrkoping	1312	0.25
SCQ	Trollhattan	1312	0.25
SCG	Halsingborg	1384	0.2
SCF	Hudiksvall	1402	1.0
SCS	Umea	1402	1.0
SCW	Ornskoldsvik	1402	0.5
SCE	Halmstad	1411	0.2
SCR	Uddevalla	1411	0.05
SCA	Boras	1447	0.2
SCI	Kalmar	1447	0.2
SCD	Gavle	1483	0.2
SCT	Uppsala	1492	0.2
SCM	Kristinehamm	1500	0.2
SCH	Jonkoping	1515	0.2
SCJ	Karlskrona	1530	0.2

SWITZERLAND

....	Geneva	401	1.3
....	Beromunster	556	100.0
....	Sottens	677	100.0
....	Monte Ceneri	1167	15.0
....	Basel	1375	0.5
....	Bern	1375	0.5

TURKEY

TAJ	Istanbul	186	3.0

UNITED KINGDOM

Droitwich National	Droitwich	200	150.0
North Regional	Moorside Edge	668	70.0
Scottish Regional	Westerglen	767	50.0
West Regional	Washford	804	70.0
London Regional	Brookmans Park	877	50.0
Northern Ireland Regional	Lisnagarvey	977	100.0
Midland Regional	Droitwich	1013	70.0
Scottish National	Westerglen	1050	50.0
Newcastle	Newcastle	1122	1.0
London National	Brookmans Park	1149	20.0
North National	Moorside Edge	1149	20.0
West National	Washford	1149	20.0
Aberdeen	Aberdeen	1285	1.0
Bournemouth	Bournemouth	1474	1.0
Plymouth	Plymouth	1474	0.3

U. S. S. R.

RV1	Moscow	174	500.0
RV10	Minsk-Kolodishchi	208	35.0
RV4	Kharkov	232	10.0
RV8	Baku	238	10.0
RV53	Leningrad	245	100.0
RV43	Moscow	271	100.0
RV7	Tiflis	283	35.0
RV3	Saratov	340	20.0
RV12	Rostov-on-Don	355	20.0
RV24	Smolensk	364	10.0
RV5	Sverdlovsk	375	40.0
RV21	Erivan	380	10.0
RV27	Makhach-Kala	390	4.0
RV49	Moscow	401	100.0
RV25	Voronezh	413.5	10.0
RV37	Ufa	436	10.0
RV45	Orenburg	461.5	1.0
RV41	Syktyvkar	472	1.0
RV34	Stalingrad	522	10.0
RV42	Gorki	565	10.0
RV36	Arkhangelsk	586	10.0
RV35	Astrakhan	598	10.0
RV6	Frunze	608	2.5
RV18	Pyatigorsk	610	1.0
RV79	Murmansk	610	10.0
RV31	Ivanovo	625	10.0
RV29	Petrozavodsk	648	10.0
RV23	Grozny	676	1.0
RV17	Kazan	686	10.0
RV48	Elista	704	2.5
RV16	Kuibishev	713	10.0
RV9	Kiev	722	35.0
RV65	Saransk	734	1.0
RV74	Cheboksary	740	5.0
RV64	Ordzhonikidze	749	10.0
RV78	Izhevsk	767	4.0
RV26	Stalino	776	10.0
RV51	Nalchik	794	1.0
RV39	Moscow	832	100.0
RV73	Simferopol	859	10.0
RV61	Ioshkar-Ola	888	1.0
RV30	Dnepropetrovsk	913	10.0
RV55	Engelsk	937	1.0
RV71	Kalinin	959	2.5
RV13	Odessa	968	10.0
RV67	Ukhta	968	2.0
RV86	Chernigov	1013	4.0
RV70	Leningrad	1040	10.0
RV33	Krasnodar	1050	1.0
RV57	Tiraspol	1068	4.0
RV75	Vinnitsa	1095	10.0
RV20	Kharkov	1185	10.0

YUGOSLAVIA

....	Ljubljana	527	5.0
....	Belgrade	686	2.5
....	Zagreb	1086	0.7

The "Ham" Shack

(*Continued from page 273*)

age. The schematic diagram of a simple arrangement is shown on this page and is almost self-explanatory. Only a few parts are necessary, mostly resistors of the 1-watt variety, a 5- to 6-prong tube adapter and a few small by-pass condensers.

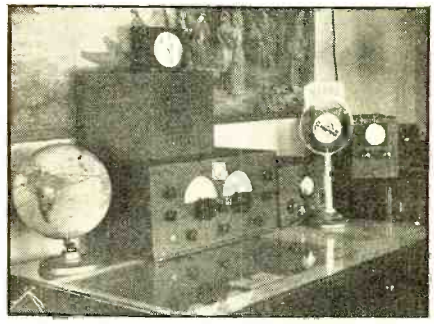
The FB-7 lends itself well to the installation of a.v.c. In the place of the "on-off" switch for cutting the plate power during stand-by periods a combination switch and audio volume control is easily mounted, thus eliminating the necessity of drilling holes. This unit is an 0 to 250,000 variable resistor and in addition has a switch mounted on it which may be used as a stand-by or plate cut-off switch. The switch is connected in the same manner as the minus B cut-off installed in the original receiver.

Isolating Grids

Next the grids of the tubes must be isolated. This is done by connecting 250,000-ohm resistors in the grid return circuits of the first detector and each of the i.f. stages, and at the same time a by-pass to the cathode must be provided. In the case of the first detector this is a .1 mfd. paper condenser and in each of the i.f. stages a .05 mfd. condenser. The FB-7 employs a type 57 tube as the first detector, and for the a.v.c. arrangement it is necessary to change this to a 58 tube. Due to this type tube's different bias requirement, it is necessary to replace the 2,000-ohm bias unit to one of 400 ohms.

Furthermore, it is necessary to replace the second detector, a 56 type tube, with a diode-triode type tube. For this purpose a 2A6 was used. The change-over is simply accomplished by using a 5-prong to 6-prong tube adapter to accommodate the tube. This may be done because both of the diode plates are connected together. The arrangement provides an additional audio stage. It is necessary to eliminate the radio-frequency choke coil and by-pass condenser that feeds into the 59 audio amplifier. The r.f. choke may be used in the grid-circuit of the triode section of the 2A6.

Operation of the arrangement is extremely simple. A switch to cut out the a.v.c. is not provided simply because by turning up the audio volume control to maximum and using the radio-frequency volume control (the one already in the receiver) the automatic action is eliminated. Then for a.v.c. it is merely necessary to advance the r.f. gain control to maximum and use the audio control for setting the volume. The arrangement has been used on a receiver of the FB-7 type and has proved to be both efficient and effective.



AMATEUR STATION W2HNA

Well-Known Amateur Station

THE receiving position at the station of Edward Clegg, of Greylock Parkway, Belleville, N. J., who is well known on all bands as W2HNA, is shown in this month's heading. The receiver is an RME-69, and this with the auxiliary apparatus including an oscilloscope, microphone and necessary controls are in the sun-parlor of W2HNA's home while all of the transmitting equipment is remotely controlled and installed in the attic. The main transmitter operates on 20 and 75 meter phone bands and occasionally on 40 meter C.W. bands. It consists of a 53 type tube as oscillator and doubler, an 802 first buffer, a pair of RK-20s as second buffers and a pair of Eimac 150Ts in the final amplifier. The modulators for phone operation are a pair of 805 type tubes in Class B. Inputs up to 900 watts are used. The antenna is a half wavelength, 65 feet high and fed by a twisted-pair feeder line. On 20 meters a three-half wavelengths antenna is used. Separate 5-meter transmitters and receivers also comprise part of W2HNA's equipment. One 5-meter transmitter employs a pair of 801s and another uses an RK34.

Calls Heard

By Matthew Bills, of 1151 Thirty-ninth Street, Brooklyn, N. Y., on 20 meter C.W.: OY2CD, CK2HX, XE2N, CM2RM, CM2DO, K5AC, U1AP, OZ5M, OZ7ON, PAOYQ, G2ZY, G5BJ. On 20 meter 'phone: G5BJ, G5NI, G5JO, G6NR, G6LK, G6GF, G6CW, SU1CH, F8MG, K6KKP, K6JLV, EA2BH, EA3VQ, EA7DA, EA7AI, CE1AR, HP1A, YV5AA, LU4BH, LU5CZ, LU8AB, HK3JB, VP4TH, VP9R, ON4VK, SM5SX, HH2B, NY2AE, VO1I, VO1J, XE2DC, XE1KQ, XE1G, XE1HH, XE2AH, VE1AU, VE1AG, VE3ADP, VE5HI, PY2CK, HI4F, HI7G, HI5X, HI6O, TI2RC, TI2AV, T15JJ, WIOOXDA, CO2SV, CO2WK, CO2WZ, CO2KY, CO2HY, CO2AU, CO2JM, CO2LL, CO6OM, CO7HF, CO8YB.

By H. Kemp, 250 Walnut Street, Waterbury, Conn., on 20 meter 'phone: VK2ABD, NY2AE, VK3JR, HI6O, VP6XB, PY2CK, G5NI, YN1HS, HI5X, VP4TH, EA1CK, VP3BG, HI1C, W7CEO, VK2AP, CT1CV, VK2EG, VE5BU, XE2LU and HP1A.

By Robert Muguet, 58 Rue de Verdun à Meudon, France, on 20 meters during June: CE3AE, CO2HY, FU1PH, LY4BH, LU5TX, LU8AB, OA2LL, PY2BA, PY2EG, SU1CH, VE1EH, VE1FE, VE3NF, VE3GV, VP4TH, W1BDS, W1CR, W1ESU, W1FLH, W1JPA, W1VA, W1ZB, W2BSD, W2CFU, W2EKK, W2EOO, W2FF, W2HFS, W2IKY, W2MG, W2AKK, W3EXC, W4CVJ, W9AR, W9SYD. During July: CO2KY, CO7HF, LU6AP, LU8AB, PY2CK, PY2EG, SU1CH, VE1CR, VE1AP, VE1JO, VE2BJ, VE2FJ, VE2HY, VE2YE, VE3BC, VE3BJ, VE3BK, VE3EO, VE3HE, VE3NF, WO1G, VO11, W1ACQ, W1BIC, W1COG, W1MX, W1ZD, W2BMJ, W2GA, W2GOA, W2HFS, W2MG, W2ZB, W3AVR, W3BBB, W3CKM, W3GBP, W3JY, W4BOB, W8IRK, W9MCD and W1OXPA.

P.A. System Rivals Vesuvius

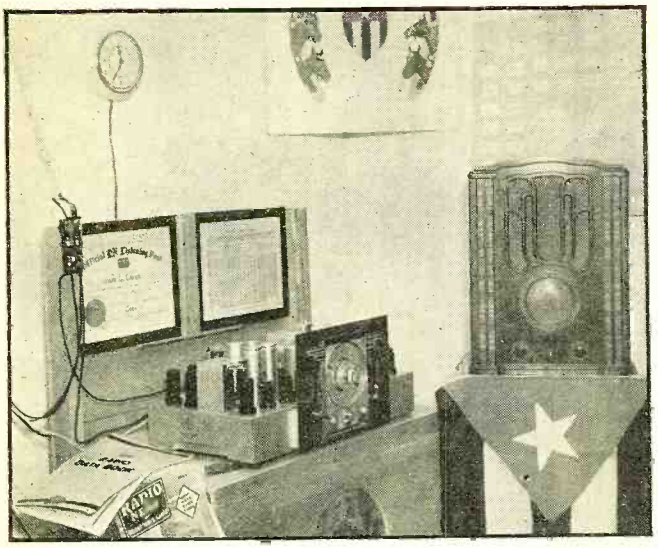
(*Continued from page 269*)

speech above the noise of the racing cars is also included. The announcer's studio is a sound-proof, glass-enclosed structure on top of the judges' observation tower at the center of the main grandstand and about 120 feet above the ground. Each of the high-powered loudspeakers employed weighs 600 pounds and takes the entire output of a separate 1000-watt amplifier.

Special tests were made with these separate units at the field to determine the amount of power necessary to cover the whole field. These tests were conducted before the installation was planned and one of the illustrations shows a group of engineers and race track officials witnessing such a test. The new installation certainly sets a new mode for outdoor, public-address work of high power, combining as it does the entire output of sound in a "point" source rather than distributing small units over the field to be covered.

The DX for the

Conducted by Laurence



A DX CORNER IN CUBA

This is the shipshape Listening Post of Official Observer Jose L. Lopez of Havana, Cuba, who uses a Midwest receiver for all-wave reception. Notice the Observer's certificate in the place of honor.

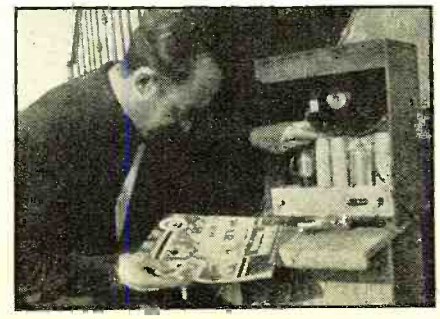
THE forty-fourth installment of the DX Corner for Short Waves contains the World Short-Wave Time Table for 24-hour use all over the world and Official Observers' reports of stations heard this month. Consult these two items regularly and make your all-wave set pay big dividends!

Next Year's Line-up of Listening Post Observers

As the months of October and November roll along a survey of our Listening Post Observers shows a big increase numerically as well as in quality. We now have more observers throughout the world scanning the short waves and reporting reception results and these observers are now doing a very fine job of making careful neat reports (on post cards). When this time of the year comes around we look forward to such things as reappointments and new appointments for the next year, 1937.

If you wish to do this work and help bring short waves to an even greater peak of popularity and efficiency during the next year, kindly drop us a line along with your next report stating that you would like to continue as an Official Observer for 1937. Send this in on a separate sheet, not as a part of your report. This year we will *not carry over appointments unless this request is made!* So if you wish to be reappointed next year be sure to notify us and you will receive a fine new Certificate for the year 1937. If you have never been an Observer but feel you would like to engage in these worthwhile activities, write us a letter asking for qualifications and stating your experience, your name and address in full, your location and the type of equipment you are using for short-wave reception.

We hope to make next year even a bigger and better year for short waves than the present one and you can be of service to short-wave listeners the whole world around by joining this organization. It costs you nothing and the DX Corner brings you the combined reports of all the other observers, containing the latest



LISTENS IN ARGENTINA

Ventura Martinez of Buenos Aires is an ardent listener and discovers in RADIO NEWS *many useful facts and hints to better reception.*

THE WORLD'S ORIGINAL ORGANIZATION OF S.W. PIONEERS

Official RADIO NEWS Listening Post Observers

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

United States of America

Alabama, J. E. Brooks, L. T. Lee, Jr., William D. Owens; Arizona, Harry Wolf; Arkansas, James G. Moore, Caleb A. Wilkinson, Claude H. Dalrymple, Charles Holt, John Hartshorn, Chester A. Joerger, C. W. Bourne; California, Eugene S. Allen, A. E. Berger, C. H. Canning, Earl G. DeHaven, G. C. Gallagher, Werner Howald, Robert J. McMahon, Oriente I. Noda, George C. Sholin, James E. Moore, Jr., Phil E. Lockwood, Hank G. Wedel, H. H. Parker, Fred A. Pilgrim, Frank Andrews, Fred M. Craft, Radio Fellowship Andrews C. Atkins, Gabriel M. Costes, Bernard L. Wood; Colorado, Wm. J. Vette, T. B. Mechling; Connecticut, H. Kemp, George A. Smith, Harold R. Smith, Philip Swanson, Herbert I. Hyde; District of Columbia, Phillip R. Belt; Florida, James F. Dechart, George H. Fletcher, E. M. Law; Georgia, C. H. Armstrong, Guy R. Bigbee, James L. Davis, John McCarley, R. W. Winiree, Owen Reeve, Ed McKay; Idaho, Bernard Starr, Lawrence Swenson, Melton and Gilpin Amos; Illinois, E. Bergemen, Larry Eisler, Robert Irving, R. O. Lamb, Charles A. Morrison, Phillip Simmons, Ray A. Walters, Floyd Waters, Robert L. Weber, J. Ira Young, Evert Anderson, Eddie Zarn, Louis Horwath Jr., Heinie Johnson, Gus Bartsch, Arthur Evans, Leo Herz, Bruce Holmgren; Indiana, Freeman C. Balph, Arthur B. Coover, Earl R. Roberts, Henry Spearing, Ted Stark, Karl W. Miles; Iowa, Clarence Morman, E. P. Webb; Kansas, William Schumacher; Kentucky, W. W. Gaunt, Jr., George Krebs, Charles Miller, William A. McAlister, James T. Spalding, J. E. Wilson; Louisiana, Roy W. Peyton, Irving G. Couvillion; Maine, Danford L. Adams, M. Keith Libby, Vincent M. Wood, R. C. Messer, Clayton D. Sands, H. Francis Shea; Maryland, Howard Adams, Jr., J. F. Fritsch, Forrest W. Dodge, Lyman F. Barry, Oliver Hersowitz, Wm. J. Thomas III, August J. Walker; Massachusetts, Armand A. Boussey, Walter L. Chambers, Arthur Hamilton, Sydney G. Millen, Harold K. Miller, Roy Sanders, Donald Smith, Robert Loring Young, James B. Robbins, George James Ellsworth, Albert Pickering, Jr., W. C. Reichardt, Francis T. Reilly, G. L. Harris, Edward J. Dailey, Jr., James A. McGregor, Jr., Dixon C. Greenwood; Michigan, Ralph B. Baldwin, Stewart R. Rupple, Jerry M. Hynek, Lewis W. Jones; Minnesota, M. Michaelson, E. M. Norris, Dr. G. W. Twomey, Walter F. Johnson, Preston C. Richardson; Mississippi, Mrs. L. R. Ledbetter; Missouri, C. H. Long, Walter A. Greiner, R. C. Ludewig, Merton T. Meade, Lewis F. Miller, Raymond W. Sahlbach, Robert S. Nash; Montana, Henry Dobrovolny, Charlie E. Hansen; Nebraska, Hans Andersen, P. H. Clute, Harold Hansen Louis T. Haws, John Havranek; Nevada, Don H. Townsend, Jr., New Hampshire, Paul C. Atwood, Alfred J. Mannix; New Jersey, William Dixon, Morgan Foshay, George Munz, R. H. Schiller, Paul B. Silver, Earle R. Wickham, George W. Osbahr, A. Kosynsky, Robert F. Gaiser, Morton Dennis Meehan, Fletcher W. Hartman, Peter J. Tortoriello; New Mexico, G. K. Harrison; New York, Donald E. Bame, John M. Borst, H. S. Bradley, William C. Dorf, Capt. Horace L. Hall, Robert F. Kaiser, I. H. Kattell, W. B. Kinzel, William Koehnlein, T. J. Knapp, A. J. Leonhardt, Joseph M. Malast, S. Gordon Taylor, Edmore Melanson, Joseph H. Miller, R. Wright, Harry E. Kentzel, Howard T. Neupert, A. C. Doty, Jr., Thaddeus Grabek, Kenneth L. Sargent, Robert J. Flynn, George Pasquale, Frank J. Flora, James E. Lynch, Pierre A. Portmann, A. J. Umlauf, Alvin H. Behr, E. Scala, Jr., Daniel H. Carey, Kenneth Dressler, Gerald Liccione, Harry J. Potthoff, Russell M. Ballard, H. F. Fey; North Carolina, W. C. Couch, E. Payson Mallard, H. O. Murdock, Jr., E. H. Goodman, Shirley Brown; North Dakota, Billie Bundlie, Ray N. Putnam; Ohio, Paul Byrns, Charles Dooley, Virgil Scott, Stan Elcheshen, Albert E. Emerson, Samuel J. Emerson, R. W. Evans, Clarence D. Hall, Donald W. Shields, C. H. Skatzes, Orval Dickes, Edward DeLaet, M. L. Gavin, Arthur Leutenberg, Oklahoma, H. L. Pribble, Robert Woods, W. H. Boatman, Wade Chambers; Oregon, Harold H. Flick, George R. Johnson, James Haley, Ernest R. Remster, Ned Smith, Virgil C. Tramp, Jack Frost; Pennsylvania, Harold W. Bower, Roy L. Christoph, John Leininger, George Lilley, Edward C. Lips, Charles Nick, Hen F. Polm, C. T. Sheaks, K. A. Staats, F. L. Stitzinger, Walter W. Winand, J. B. Ganfield, Charles B. Marshall, Jr., S. G. DeMarco, R. H. Graham, Thomas R. Jordan, John G. McConomy, Steve Scibal, Jr., Leon Stabler, Joseph Stokes, R. B. Oxrieder; Puerto Rico, Manuel E. Betances, A. N. Lightbourn, Jose D. Caro Costas, Jr.; Rhode Island, Carl Schradieck, Joseph V. Trzuskowski, Spencer E. Lawton; South Carolina, Edward

Corner SHORT WAVES

M. Cockaday

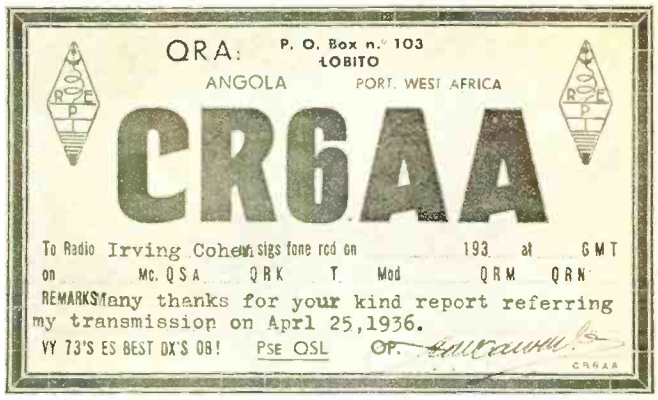
dope on short-wave reception. Join now! Let us hear from you. We hope to have more than 1000 members in 1937.

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 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:

A BRITISH DX'ER

Meet Observer Lawton of Manchester, England, shown seated at his DX Corner. He sends greetings to American listeners.



SOMETHING TO TRY FOR

This is a QSL card from Lohito, in Portuguese West Africa, received by Mr. Cohen verifying his reception of CR6AA on April 25, 1936. It represents a fine catch for short-wave DX'ers in New York City.

Europe

HBO, Geneva, Switzerland, 11420 kc., heard at 8:18 p.m., E.S.T.; address: 12 Quai de la Poste, Geneva. (O'Connell, Kerman, Hamilton, Hartman).

HBL, Geneva, Switzerland, 9595 kc., and HBP, Geneva, Switzerland, 7797 kc., heard Saturdays from 5:20 to 6:10 p.m., E.S.T. (Kerman, O'Connell, Shalbach, Herz).

GSI, Daventry, England, 15260 kc., heard 5:30 p.m., E.S.T. daily. (Diez).

GSG, Daventry, England, 17857 kc., 5:30 p.m., E.S.T. daily. (Diez).

GSD, Daventry, England, 11750 kc., reported heard 6 to 8 p.m., E.S.T. daily. (Diez, Gurr, Partner, Jensen).

GSC, Daventry, England, 9580 kc., heard daily at 6:30 p.m., E.S.T. (Diez, Kernan, Coover).

GSF, Daventry, England, 15140 kc., heard daily from 9 to 11 p.m., E.S.T. (Silvius, Coover, Kernan, Williams); heard 9 a.m., E.S.T. (Diez).

GSB, Daventry, England, 9501 kc. (Gurr, Coover).

GSP, Daventry, England, 15310 kc. (Gurr, Coover).

I2RO, Rome, Italy, 11810 kc., heard from 6:30 to 7:30 p.m., E.S.T., The American Hour on Mondays, Wednesdays and Fridays. (De Marco.

(*Turn to page* 286)

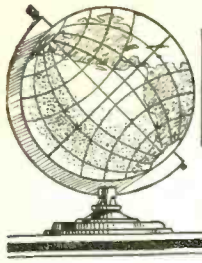
SHORT-WAVE LISTENING POST OBSERVERS

Bahan, Ben F. Goodlett; South Dakota, Paul J. Mraz; Tennessee, Charles D. Moss, Eugene T. Musser, Darrell Barnes; Territory of Hawaii, O. F. Sternemann; Texas, James Brown, Carl Scherz, Bryan Scott, James W. Sheppard, John Stewart, Overton Wilson, Isaac T. Davis, Arthur Immicke, Earl P. Hill, Roy E. DeMent; Utah, Earl Larson, A. D. Ross; Vermont, Eddie H. Davenport, Dr. Alan E. Smith, John Eagan, Fred Atherton; Virginia, G. Hampton Allison, L. P. Morgan, D. W. Parsons, Gordon L. Rich, Gaines Hughes, Jr., E. L. Myers, A. T. Hull, Jr., Wheeler T. Thompson, E. W. Turner, Douglas S. Catchim, Morris Harwood; Washington, Glenn E. Dubbe, A. D. Golden, J. Wendell Partner, Jack Perry, Wesley W. Loudon, Jack Staley; West Virginia, Kenneth R. Roord, R. E. Sumner, Fred C. Lowe, Jr.; Wisconsin, Willard M. Hardell, Walter A. Jasiorkowski, E. L. Frost, Howard E. Sauberlich; Wyoming, L. M. Jensen, Dr. F. C. Naegeli, Eric Butcher.

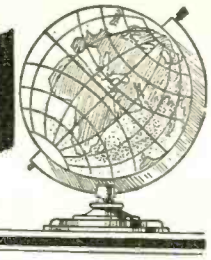
Official RADIO NEWS Listening Post Observers in Other Countries

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

Argentina, J. F. Edbrooke, Santiago E. Roulier.
Australia, Albert E. Faull, A. H. Garth, H. Arthur Matthews, C. N. H. Richardson, R. H. Tucker, Harold F. Lower, E. O. Stafford, Ron Gurr.
Belgium, Rene Arickx.
Bermuda, Ralph Clarke.
Brazil, W. W. Enete, Louis Rogers Gray, Flavio Mascarenhas.
British Guiana, E. S. Christiani, Jr.
British West Indies, D. G. Derrick, Edela Rosa, N. Hood-Daniel, Aubrey H. Forbes.
Canada, J. T. Atkinson, A. B. Baadsgaard, Jack Bews, Robert Edkins, W. H. Fraser, Fred C. Hickson, C. Holmes, John E. Moore, Charles E. Roy, Douglas Wood, Claude A. Dulmage, A. Belanger, Robert B. Hammersley, Cyril G. Clark, Fred Cox, Arthur Church, Arthur E. MacLean, George L. Loke, Fred W. Alfred.
Canal Zone, Bertram Baker.
Canary Islands, Manuel Davin.
Chile, Jorge Izquierdo.
China, Baron Von Huene.
Colombia, J. D. Lowe, Italo Amore.
Cuba, Frank H. Kydd, Dr. Evelio Villar, Augusto Anca, Juan Manuel Salazar, Jose L. Lopez, Rafael Penalver y Ballina.
Czechoslovakia, Ferry Friedl, Joe Klar.
Denmark, Hilbert Jensen.
Dominican Republic, Jose Perez.
Dutch East Indies, E. M. O. Godee, A. den Breems, J. H. A. Hardeman.
Dutch West Indies, Rein J. G. van Ommeren.
Egypt, Aram Iskanian.
El Salvador, Jose Rodriguez R.
England, N. C. Smith, H. O. Graham, Alan Barber, Donald Burns, Leslie H. Colburn, C. L. Davies, Frederick W. Gunn, R. S. Houghton, W. P. Kempster, R. Lawton, John J. Maling, Norman Nattall, L. H. Plunkett-Checkemian, Harold J. Self, R. Stevens, L. C. Styles, C. L. Wright, John Gordon Hampshire, J. Douglas Buckley, C. K. McConnan, Douglas Thwaites, J. Rowson, A. J. Webb, F. Crowder, J. E. Puyenbrock, J. N. Street.
France, J. C. Meillon, Jr., Alfred Quaglino, S. F. Carville.
Germany, Herbert Lennartz, Theodor B. Stark.
Greece, S. E. Stefanou.
Guatemala, Luis Diez.
Holland, L. Hintzbergen, R. Groeneveld.
Iceland, Arni Sigurdsson.
India, D. R. Wadia, A. H. Dalal, Terry A. Adams, Harry J. Dent, H. W. Kamen.
Iraq, Hagop Kouyoumdjian.
Irish Free State, Harry Dumpleton, W. J. Humphries.
Italy, A. Passini, Dr. Guglielmo Tixy.
Japan, Masall Satow, Tomonobu Masuda, Shokichi Yoshimura.
Malaya, D. A. Seneviratne, S. P. Shotam.
Malta, Edgar J. Vassallo.
Manchukuo, Anatol Kabatoff.
Mexico, Felipe L. Saldana, Manuel Ortiz G.
New Zealand, Kenneth H. Moffatt, B. A. Peachey, Eric W. Watson.
Newfoundland, Frank Nosworthy.
Norway, Per Torp.
Palestine, W. E. Frost.
Panama, Alberto Palacio.
Peru, Ramon Masias.
Philippine Islands, Victorino Leonen, Johnny Torres.
Poland, P. Piorko.
Portugal, Jose Fernandes Patrae, Jr.
Scotland, Duncan T. Donaldson, Jack Holden.
South Africa, Mike Kruger, A. C. Lyell, C. McCormick, H. Westman, L. E. Williams, Edward R. Greaves.
South West Africa, H. Mallet-Veale.
Spain, Jose Maria Maranges.
Straits Settlements, C. R. Devaraj.
Sweden, B. Scheierman.
Switzerland, Dr. Max Hausdorff.
Turkey, Hermann Freiss, M. Seyfeddin, A. K. Onder.
Venezuela, Francisco Fossa Anderson.



WORLD SHORT WAVE TIME-TABLE



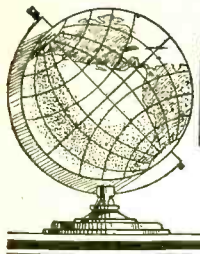
Compiled by LAURENCE M. COCKADAY

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

HOURS OF TRANSMISSION

Wavelength Meters	Call Letters	Frequency Kc.	City Country	HOURS OF TRANSMISSION
13.93	W8XK	21540	Pittsburgh, Pa.	D
13.94	W2XE	21520	New York, N. Y.	D D D D D D
13.97	GSH	21470	Daventry, England	D D D D
16.86	GSG	17790	Daventry, England	D D D D D D D D D D
16.87	W3XAL	17780	Bound Brook, N. J.	D D D D D D D D
16.88	PHI	17775	Huizen, Holland	P P
16.89	DJE	17760	Zeesen, Germany	D D D
19.43	PRADO	15440	Riobamba, Ecuador	S S S S
19.52	HAS3	15370	Budapest, Hungary	S S
19.56	DJR	15340	Zeesen, Germany	D D
19.57	W2XAD	15330	Schenectady, N. Y.	D D D D D D D
19.60	GSP	15310	Daventry, England	D D
19.62	LRU	15290	Buenos Aires, Arg.	D D D D D D D
19.63	DJQ	15280	Zeesen, Germany	D D D D D D D D
19.65	W2XE	15270	New York, N. Y.	D D D D D
19.68	TPA2	15244	Pontoise, France	D D
19.71	PCJ	15220	Eindhoven, Holland	W W W
19.72	W8XK	15210	Pittsburgh, Pa.	D D D D D D D D D D D
19.74	DJB	15200	Zeesen, Germany	D D D S S D D D D
19.76	RV96	15180	Moscow, U.S.S.R.	
19.76	GSO	15180	Daventry, England	D D D D D D D
19.81	RKI	15140	Moscow, U.S.S.R.	D D S
19.82	GSF	15140	Daventry, England	D D D D D D D D D D
19.84	HVJ	15121	Vatican City	I
19.85	DJL	15110	Zeesen, Germany	D D D D D D D D
20.00	SV1KI	15000	Athens, Greece	X S X S X S X S X S X S
20.04	LZA	14970	Sofia, Bulgaria	S S S U U S S
20.55	JVH	14600	Nazaki, Japan	E
22.16	SPW	13653	Warsaw, Poland	C C S S S
22.95	VPD	13075	Suva, Fiji Islands	
24.52	TFJ	12235	Reykjavik, Iceland	S S
25.00	RV59(RNE)	12000	Moscow, U. S. S. R.	S S S S D H H
25.24	TPA3	11885	Pontoise, France	D D D D D D
25.27	W8XK	11870	Pittsburgh, Pa.	D
25.36	W2XE	11830	New York, N. Y.	D D
25.36	W9XAA	11830	Chicago, Ill.	D D D D I I D D I
25.40	I2RO	11810	Rome, Italy	D D D D D D D D D D X S X S
25.49	DJD	11770	Zeesen, Germany	D D D D D D D D D
25.53	GSD	11750	Daventry, England	D D D D D D D D
25.58	CJRX	11730	Winnipeg, Canada	D D
25.60	TPA4	11720	Pontoise, France	D D D D
25.62	HJ4ABA	11710	Medellin, Col.	D D I D D
27.35	HS8PJ	10955	Bangkok, Siam	M M D I
27.93	JVM	10740	Nazaki, Japan	E
28.14	JVN	10660	Nazaki, Japan	I E
29.04	ORK	10330	Ruysselede, Belgium	D D I I
30.43	EAQ	9860	Madrid, Spain	S S D D
30.75	COCQ	9750	Havana, Cuba	D D D D D D D D D D D D D
31.00	CQN	9677	Macao, Asia	K
31.07	YNLF	9655	Managua, Nicaragua	D D D D D
31.09	CT1AA	9650	Lisbon, Portugal	G G G I
31.25	HJ1ABP	9600	Cartagena, Col.	D D D D D D
31.27	HH3W	9595	Port-au-Prince, Haiti	D D
31.27	HBL	9595	Geneva, Switzerland	S a S a
31.28	W3XAU	9590	Philadelphia, Pa.	D D D D D D D D
31.28	VK2ME	9590	Sydney, Australia	S S S S
31.28	PCJ	9590	Eindhoven, Holland	T T V
31.28	HP5J	9590	Panama City, Pana.	S S D S D
31.32	VK3LR	9580	Lyndhurst, Australia	X S
31.32	GSC	9580	Daventry, England	D D
31.35	HJ2ABC	9570	Cucuta, Col.	D D D D
31.35	W1XK	9570	Millis, Mass.	D D D D D D D D D D D D D D
31.38	DJA	9560	Zeesen, Germany	D D D D
31.40	TIPG	9559	San Jose, C. R.	D D D D D D
31.45	DJN	9540	Zeesen, Germany	D D D D D D
31.48	W2XAF	9530	Schenectady, N. Y.	D D D D D D
31.48	LKJ1	9530	Jeloy, Norway	D D D D D D D
31.51	RAN	9520	Moscow, U. S. S. R.	D
31.55	GSB	9510	Daventry, England	D D D D D D D D
31.55	HJU	9510	Buenaventura, Colom.	C C
31.55	VK3ME	9510	Melbourne, Australia	
31.56	XEFT	9505	Veracruz, Mex.	D D D D D D D
31.58	HJ1ABE	9500	Cartagena, Col.	D X A X A S S S D X S X S
31.75	TGWA	9450	Guatemala City	I I
31.82	COCH	9428	Havana, Cuba	D D D D D D D D D D D
31.35	HS8PJ	9350	Bangkok, Siam	
32.88	HAT4	9125	Budapest, Hungary	S
34.19	HCJB	8775	Quito, Ecuador	S S S X M
34.29	ZBW	8750	Hong Kong, China	D D S a
34.62	CO9JQ	8665	Camaguey, Cuba	
38.48	HBP	7797	Geneva, Switzerland	S a S a
39.95	JVP	7510	Nazaki, Japan	D D A M
41.20	SM5SD	7281	Stockholm, Sweden	
41.80	CR6AA	7177	Lobito, Angola, Afr.	W W L L L
42.37	VP3MR	7080	Georgetown, B. G.	S S S I I I I
42.80	EA8AB	7010	Tenerife, C. I.	C C
43.48	HI3C	6900	La Romana, D. R.	D D D
43.99	XGOX	6820	Nanking, China	D
44.14	H1H	6796	San Pedro, D. R.	A C A C S A C
44.44	JVT	6750	Nazaki, Japan	Z
44.71	TIEP	6710	San Jose, Costa Rica	I D D
45.00	HC2RL	6667	Guayaquil, Ecuador	S S S
45.25	HIT	6630	Trujillo, D. R.	X S X S D D
45.38	RV72	6611	Moscow, U. S. S. R.	I



WORLD SHORT WAVE TIME-TABLE

(Continued from the Previous Page)

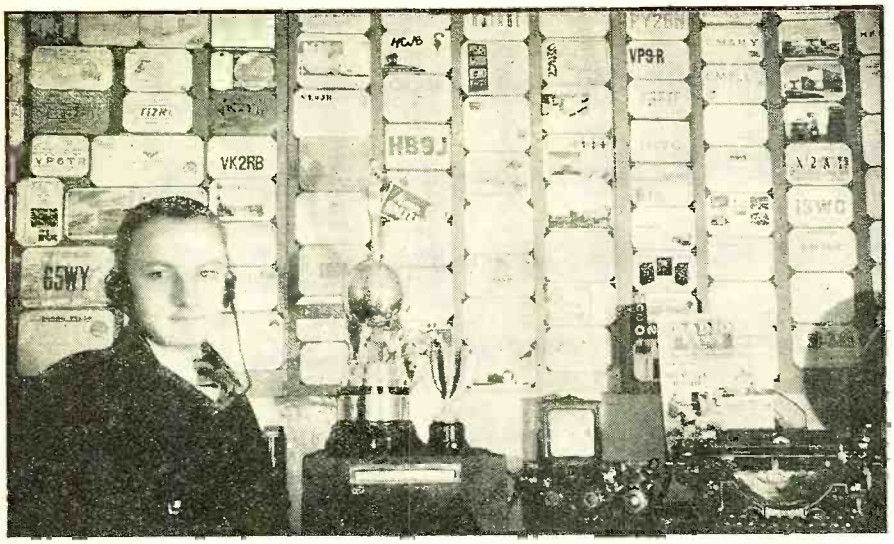
Hours of transmission for the World's Short Wave Broadcast Stations

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

Wave-length Meters	Call Letters	Frequency Kc.	City Country	HOURS OF TRANSMISSION
45.80	HI4D	6550	Trujillo, D. R.	XS XS XS XS XS XS
46.01	YV6RV	6520	Valencia, Venezuela	D D D D D D D D D D D D
46.08	HIL	6510	Trujillo, D. R.	D D D D
46.66	HI1S	6430	Puerto Plata, D. R.	D D D D D D D D D D D D
47.06	YV4RC	6375	Caracas, Venezuela	D D D D D D D D D D D D
47.24	HRP1	6350	SanPedroSula,Honduras	D D D D D D D D D D D D
47.54	HIZ	6310	Trujillo, D. R.	S S S S I I I I I I I I
47.62	YV12RM	6300	Maracay, Venezuela	
47.77	HIG	6280	Trujillo, D. R.	XS XS XS XS XS XS
47.77	CO9WR	6280	Sancti Spiritus, Cuba	D D D D D D D D D D D D
48.08	HI8O	6240	Trujillo, D. R.	D D D D D D D D D D D D
48.11	HRD	6235	La Ceiba, Hond.	S S L L L L L L L L L L
48.15	OAX4G	6230	Lima, Peru	AM AM AM AM AM AM AM AM AM AM AM AM
48.19	HJ1ABH	6225	Cienaga, Colombia	D D I I I D D D D D D D
48.50	HI1A	6185	Santiago, D. R.	D D D D D D D D D D D D
48.70	VPB	6160	Colombo, Ceylon	D D D D D D D D D D D D
48.70	CJRO	6160	Winnipeg, Canada	Sa Sa D D D D D D D D D D
48.78	VE9CL	6150	Winnipeg, Can.	D D D D D D D D D D D D
48.78	HJ2ABA	6150	Tunja, Colombia	D D D D D D D D D D D D
48.78	YV3RC	6150	Caracas, Venezuela	D D D D D D D D D D D D
48.78	HJ5ABC	6150	Cali, Colombia	D D D D D D D D D D D D
48.78	COKG	6150	Santiago, Cuba	D D D D D D D D D D D D
48.86	W8XK	6140	Pittsburgh, Pa.	D D D D D D D D D D D D
48.89	CR7AA	6136	Lourenzo Marques, A.	S S S XS XS XS XS XS XS XS XS XS XS
48.94	XEXA	6130	Mexico. D. F.,	D D D D D D D D D D D D
48.94	COCD	6130	Havana, Cuba	D D D D D D D D D D D D
48.96	HJ3ABX	6128	Bogota, Col.	D D D D D D D D D D D D
49.02	HJ1ABB	6120	Barranquilla, Col.	D D D D D D D D D D D D
49.02	W2XE	6120	New York, N. Y.	D D D D D D D D D D D D
49.10	CHNX	6110	Halifax, N. S.	D XA XA XA XA XA XA XA D Sa D D
49.18	W3XAL	6100	Bound Brook, N. J.	AH AH AH AH AH AH AH AH AH AH AH AH
49.18	W9XF	6100	Chicago, Ill.	D D D D D D D D D D D D
49.20	ZTJ (JB)	6098	Johannesburg, Africa	S D D XS D D D D D D D D
49.22	HJ4ABE	6095	Medellin Col.	D D D D D D D D D D D D
49.26	CRCX	6090	Toronto, Canada	S S D D D D D D D D D D
49.30	HJ5ABD	6085	Cali, Col.	D D D D D D D D D D D D
49.31	HJ3ABF	6084	Bogota, Col.	D D D D D D D D D D D D
49.32	VQ7LO	6083	Nairobi, Kenya, Afr.	E E U U U XC XS XS XS XS XS XS
49.34	HP5F	6080	Colon, Panama	S D XS S S D D D D D D D
49.34	W9XAA	6080	Chicago, Ill.	D D D D D D D D D D D D
49.34	ZHJ	6080	Penang, S. S.	XS XS XS XS XS XS XS XS XS XS XS XS
49.41	OER2	6072	Vienna, Austria	I D D D D D D D D Sa Sa D D D D
49.42	YV7RMO	6070	Maracaibo, Ven.	D D D D D D D D D D D D
49.50	W8XAL	6060	Cincinnati, Ohio	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
49.50	OXY	6060	Skamlebaek, Denmark	S S D D D D D D D D D D
49.59	HJ3ABD	6050	Bogota, Col.	D D D D D D D D D D D D
49.59	HI9B	6050	Trujillo, D. R.	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
49.65	HJ1ABG	6042	Barranquilla, Col.	XS XS S XS XS XS XS XS XS XS XS XS
49.67	VDA	6040	Tandjong Priok, Java	E E E E E E E E E E E E
49.67	W1XAL	6040	Boston, Mass.	D D D D D D D D D D D D
49.75	HP5B	6030	Panama City, Pana.	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
49.83	XEUW	6020	Veracruz, Mex.	D D D D D D D D D D D D
49.85	ZHI	6018	Singapore, Malaya	N N N N N N N N N N N N
49.90	HJ3ABH	6012	Bogota, Colombia	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
49.95	HI1ABI	6006	Santa Marta, Col.	D D D D D D D D D D D D
49.96	CFCX	6005	Montreal, Can.	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
49.96	VE9DN	6005	Montreal, Canada	D D D D D D D D D D D D
50.00	XEBT	6000	Mexico City, Mex.	D D D D D D D D D D D D
50.00	RV59	6000	Moscow, U. S. S. R.	I I 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
50.21	XECW	5975	Xantocam, Mexico	D D D D D D D D D D D D
50.25	HJN	5970	Bogota, Col.	D D D D D D D D D D D D
50.25	XEWI	5970	Mex. D. F.,	S C 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
50.50	TG2X	5940	Guatemala City	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
50.76	HRN	5910	Tegucigalpa, Hond.	D S S S D D D D D D D D
50.85	YV8RB	5900	Barquisimeto, Ven.	D D D D D D D D D D D D
51.15	HI1J	5865	San Pedro, D. R.	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
51.72	YV2RC	5800	Caracas, Venezuela	S S D D D S S S D D D D
51.90	OAX4D	5780	Lima, Peru	AH AH AH AN AN AN AN AN AN AN AN AN
55.45	ZBW	5410	Hong Kong, China	D D D D D D D D D D D D
70.21	RV15	4273	Khabarovsk, Siberia	D D D D D D D D D D D D

List of Symbols

A—Thursday, Sunday
C—Monday, Wednesday, Friday
D—Daily
E—Tuesday, Thursday
F—Friday
H—Sunday, Monday, Wednesday, Friday
G—Tuesday, Thursday, Saturday
I—Irregularly
J—Tuesday, Thursday, Friday, Sunday
K—Monday, Friday
L—Wednesday, Saturday
M—Monday
N—Monday, Wednesday, Thursday
O—Monday, Tuesday, Wednesday, Friday
P—Except Tuesday, Wednesday
S—Sunday
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
AL—Except Monday, Sunday
AM—Monday, Thursday
AN—Tuesday, Saturday
Sa—Saturday
XA—Except Saturday, Sunday
XB—Except Tuesday, Thursday
XC—Except Tuesday, Thursday, Sunday
XM—Except Monday
XS—Except Sunday
XY—Except Tuesday, Sunday
XSa—Except Saturday



The DX Corner
(Short Waves)

(*Continued from page* 283)

Coover, Silvius, Herz, Lopez, Anca, Dressler, Munz). I2RO4, reported daily 1:15 to 3:30 p.m., 4:30 to 5:15 p.m., G.M.T. (Piorko).

SM5SX, Stockholm, Sweden, 11705 kc., heard nights, testing. (O'Connell, Millen, Riley).

I2RO3, Rome, Italy, 9635 kc., American Hour, 6 to 7:30 p.m., E.S.T. Mondays, Wednesdays, Fridays; daily from 1 to 5 p.m., E.S.T. (Kerman).

Radio Podebrady, Czechoslovakia, heard testing on 1530 kc. about noon, E.S.T. Also reported on 6115 kc. and 11760 kc. Heard again August 12 on 15230 kc. at 1 a.m., E.S.T. for an hour and on August 14 from 8 p.m. to 2 a.m., E.S.T. (Kosynsky, Shamleffer, Beck, Gallagher, O'Connell, Coover, Herz, Salazer, Beyer); heard irregularly 4:45 to 12 p.m., E.S.T. (Gleason, Atkinson, Parsons, Fallon, Schradieck).

HAT4, Budapest, Hungary, 9230 kc., reported Sundays 6:15 p.m., E.S.T. (Partner, Diez.)

DJR, Zeesen, Germany, 15340 kc., reported daily at 5:30 p.m., E.S.T. Programs to Mexico beginning 9:15 p.m., E.S.T. (Partner, Piorko, Diez Silvius, Dressler).

DCZ, Nauen, Germany, 10274 kc., reported at midnight. (Diez).

DJB, Berlin, Germany, 15200 kc., heard daily 8 to 10 a.m., E.S.T. (Piorko, Hormel) 11 a.m. to 12:20 p.m., EST. (Herz, Dressler, Howald, Coover, Kemp, Wilkinson, De Laet).

DJL, Berlin, Germany, 15110 kc., heard 11:35 a.m. to 4:30 p.m.; 4:50 p.m. to 10:45 p.m., E.S.T. (Piorko, Jensen, Coover, Hartman, Mac Lean, Munz, Partner, Dressler).

DJD, Berlin, Germany, 11770 kc., heard 6 to 8 p.m., E.S.T. daily. (Jensen, Diez, De Laet, Shamleffer, Piorko).

DJE, Berlin, Germany, 17760 kc., heard midnight at 1 a.m., E.S.T. (Howald, De Laet, Piorko).

DZA, Germany, 9675 kc., heard from 12:30 a.m. to 12:30 p.m., E.S.T. (Partner, Kemp).

DZB, Germany, 10042 kc., heard from 12:30 a.m., E.S.T. on (Shamleffer, Partner, Kemp).

DZC, German, 10290 kc., heard until 10:30 p.m., E.S.T. (Wilkinson, Salazar, Stabler, Dressler, Partner, Howald, Williams, Andrews, Kemp).

PCJ, Huizen, Holland, 9674 kc., heard daily at 8 p.m., E.S.T. (O'Connell, Riley, Diez). Wednesdays from 8 to 12 p.m., E.S.T. (Beck, Kerman, Coover). Station transmits on 19 meters from 4:30 to 6 a.m., E.S.T. Tuesdays and from 8 to 11 a.m. Thursdays. Transmissions on 31 meters take place from 1:30 to 3 p.m. E.S.T. Tuesdays, 7 to 10 p.m., E.S.T. Wednesdays. (O'Connell).

PHI, Holland, 17751 kc., heard at 8:30 p.m., E.S.T. (Diez).

FYB, Pontoise, France, 10811 kc., heard daily at 11 p.m., E.S.T. (Diez).

TPA3, Pontoise, France, 11880 kc., heard daily at 5:45 p.m., E.S.T. (Diez, Gurr).

TPA4, Pontoise, France, 11720 kc., heard at 9:30 p.m., E.S.T. (Coover, Diez).

TPA2, Pontoise, France, 9030 kc., heard from 12 noon E.S.T. on, relaying a program. (Williams). Heard on 12220 kc. relaying and phoning irregularly. (Stephens).

CT1AA, Lisbon, Portugal, 5650 kc., heard Tuesdays, Thursdays and Saturdays 4 to 7 p.m., E.S.T. Address: 144 Av. Antonio Augusto d' Aguiar, 144 (Letters to the old address come back!). Reported by Chandler, Oxrieder, Andrews, Gurr, Piorko).

EAQ, Madrid, Spain, 9850 kc., reported daily 6 to 12 midnight, E.S.T. (Diez); reported on 6860 kc. (Lopez, Hamilton, Partner, O'Connell, Gurr, Stabler, Andrews).

LKJ1, Jeloy, Norway, 9584 kc., heard daily at 7 a.m., E.S.T. (Diez).

SV1KI, Athens, Greece, 15000 kc., heard 2:30 to 7 p.m., E.S.T., daily except Saturday. (De Marco).

HE HEARS 'EM "PLENTY"

Ed. G. Schmeichel of Chicago, Illinois, poses for a picture for RADIO NEWS. *Notice his prize-winning DX trophies, his fine exhibition of long-distance QSL cards, his typewriter for making out reports and last but far from least, a copy of faithful* RADIO NEWS.

LZA, Sofia, Bulgaria, 14970 kc., reported from 5 to 7 a.m., E.S.T. daily. (Mascarenhas). Reported on Sundays from 12:30 a.m. to 4:30 p.m., E.S.T. (Partner, De Marco).

Radio Beograd, Belgrad, Yugoslavia, 6100 kc., heard 2 a.m. to 5:45 a.m., E.S.T. (Piorko). Reported daily 6 to 8 p.m., 11:30 to 12:15 p.m., G.M.T.; 12:45 to 1:15 p.m., 7:20 to 11:15, G.M.T.; power one kw. (Gurr, Stephens).

Compania Necropolitana, Madrid, Spain, heard calling Ovedo on 40 meters 2:30 a.m., British Summer Time. This is believed to be a temporary station. (N. C. Smith).

RV59, (RNE), Moscow, U.S.S.R., 12000 kc., reported on Sundays 5:30 p.m., E.S.T. (Diez).

Asia

HS8PJ, Bangkok, Siam, 10165 kc., reported heard 8 to 11 a.m., E.S.T., Mondays only. (Houghton). Reported heard 10950 kc., 10 a.m., E.S.T., daily.

JVH, Nasaki, Japan, 14600 kc., reported heard Saturday 11 p.m. on, E.S.T., daily midnight at 1 a.m., E.S.T. (Jensen, Diez, Silvius, Gallagher, Howald).

JVN, Nazaki, Japan, 10,660 kc., heard irregularly. (Gallagher) Daily 4 to 10 a.m., E.S.T. (Partner). Heard up to 6 a.m., P.S.T. (Howald). Heard 4:30 to 8 a.m., E.S.T. Wednesdays. (Shamleffer, Parsons).

PLP, Bandoeng, Java, 10989 kc., heard between 5 to 10 a.m., E.S.T.; carrier often the only thing heard. (Diez, Parsons, Silvius).

PMN, Bandoeng, Java, 10250 kc., heard from 7 to approximately 11 a.m., E.S.T. (Silvius).

XGOX, Nanking, China, 8620 kc., (Woo, Cox).

ZBW, Hong Kong, China, 8750 kc., heard signing off Saturday at 11 a.m., E.S.T.; often relays Daventry. (Williams).

XGOA, China, approximately 6800 kc., heard until 9 a.m., E.S.T. (Howald).

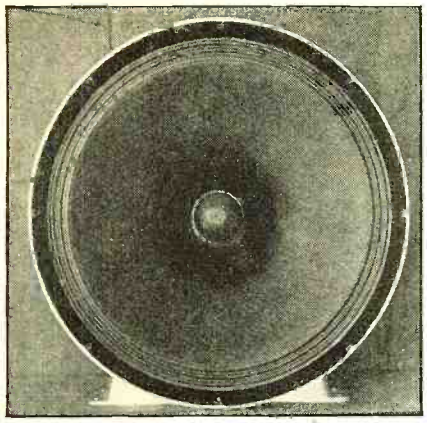
Colombo, Ceylon, 49.60 meters, heard until 10 a.m., E.S.T.; address: Broadcasting Office, Torrington Square, Colombo, Ceylon. (Stephens).

VWY2, Poona, India, 10150 kc., heard from 3 to 5 a.m. Sunday, E.S.T. (De Marco).

(*Turn to page* 302)

A NUMBER 1 RADIO DX'ER

Introducing Andreita Cloquell of Santurce, Puerto Rico, a DX ace, member of the International 6000-125,000-Mile All-Wave Club. She is also a trophy winner noted for her exceptional ability in receiving short-wave DX.



THE HIGH-FIDELITY SPEAKER

Surprising life and brilliance is lent to music by this 18-inch speaker.

Measurements Show Merit of "LAB-BUILT" SUPER

By McMurdo Silver

IN the October issue of RADIO NEWS, appeared a brief description of the new Masterpiece V, 20-tube all-wave receiver. This month the circuit diagram and actual performance measurements made upon one of these receivers are presented. But first it is necessary to remind the reader that as each individual receiver is built to the buyer's particular specifications, needs and location requirements, these curves are typical only of the fundamental and basic design, which may be varied to suit the tastes and needs of each owner.

Figure 1 shows the sensitivity, in microvolts absolute antenna input, plotted against dial readings for wave bands A, B, C and D. No accurate equipment for such measurements being developed today, E band sensitivity is not shown. Besides showing the fractional microvolt antenna signal needed to produce test standard 50 milliwatt power output above inherent circuit noise (which must include not inconsiderable noise of the signal generator itself at such tremendous sensitivities), the dotted lines of Figure 1 show the total circuit noise, output when a 1.0 microvolt signal, unmodulated, is fed to the receiver. The instant this signal is modulated, audio output becomes 450 milliwatts, with total noise not over 30 milliwatts. This is the extraordinary signal-to-noise ratio of 15 to 1—at 1.0 microvolt input!

Total noise output is zero for all signals of 5.0 microvolts or stronger—99% of all stations listened to.

Figure 2 shows only four of an infinite variety of tone fidelity choices at one's finger tips. Curve 1 shows the theoretically perfect response, flat to 5 db. (less variation than can ordinarily be heard in music) from about 20 to 8000 cycles, had with bass and treble tone knobs set at 5 (half way) and fidelity knob at "HI.FI." Curve 3 shows the automatic aural compensation obtained when volume is set at half way on, or less, as it will be used 95% of the time. Curve 2 shows the cut-off just above 6000 cycles provided by the filter switch on the speaker, which is also shown in curve 3. Curve 2A shows the "boost" of 12 db. bass and 4 db. treble (to which is added 10 db. in the Super-Giant speaker), as when bass and treble tone knobs are set fully right.

Curve 4 shows graphically the bass and treble attenuation possible by turning both tone knobs to zero. This is an absurd extreme, (*Turn to page* 309)

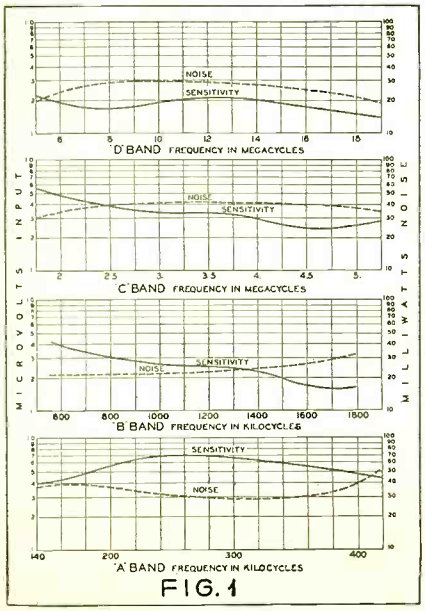


FIG. 1

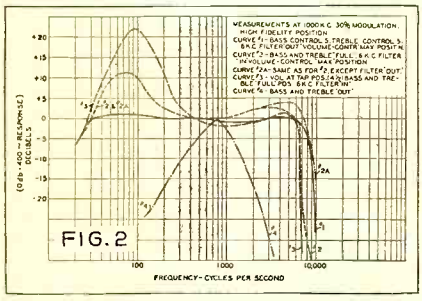


FIG. 2

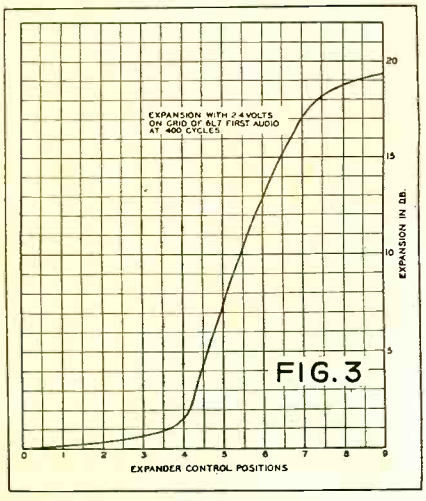
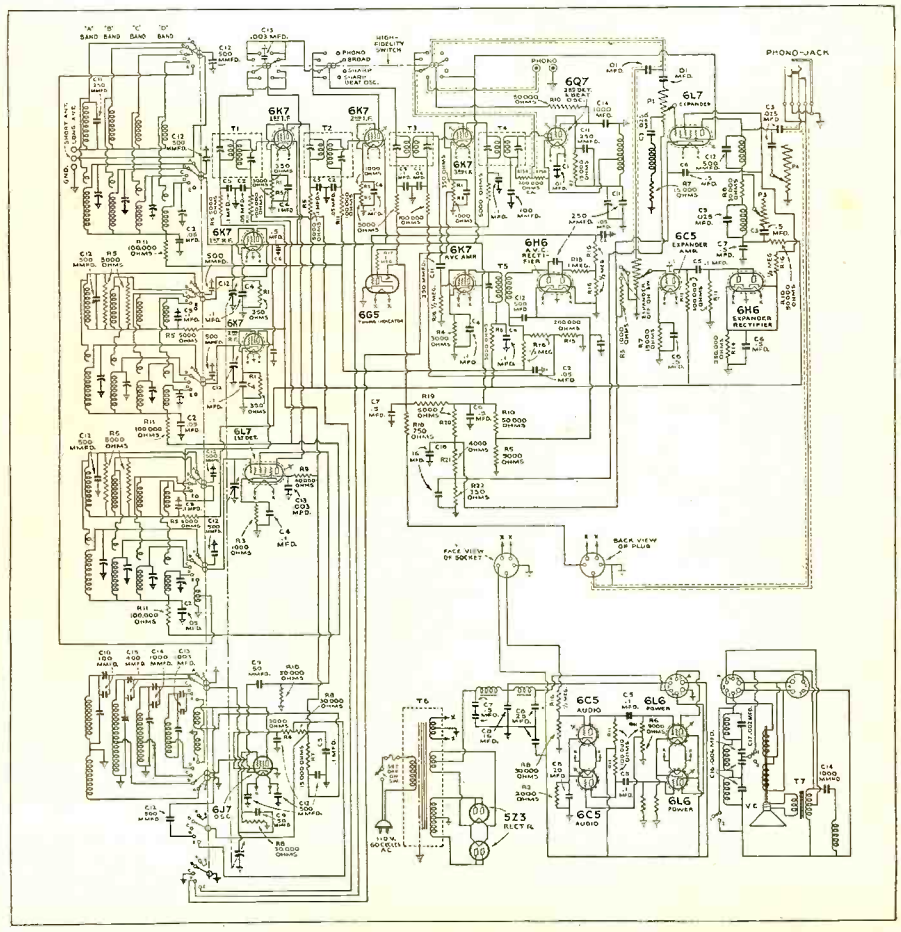


FIG. 3



SERVICEMAN'S PRIZE CONTEST

Announcement of Awards

CASHING IN ON POLITICAL CAMPAIGNS

Figure 3. Maybe you also would like to add a few more hundreds of dollars in service profits by using this proven window display this month in your service shop. It sure dragged in customers for the originator.

THE following service organizations and prize-winning ideas have considerable to offer when it comes to cashing in on radio service opportunities. Any serviceman will do well to study these paying methods of making service work more efficient and honestly profitable.

FIRST PRIZE

Equipment and Arrangement

FROM inspection of Figure 1, the reader will not be surprised to learn that this Service Bench, designed by Hubert C. Martin, was constructed by a cabinet maker. It is 9 feet long, 36 inches high, 32 inches wide and built entirely of hard wood. The shelf-mounting arrangement of the equipment makes it possible to utilize the full width of the bench. Writes Mr. Martin: "The left-hand drawer contains a built-in electric turn-table and pick-up with the necessary controls for switching the output through an external audio system for test purposes, or for modulation of an r.f. oscillator. The remaining two drawers hold tools, small parts, etc.

"Outlets for 110 volts are mounted in both the front and rear of the bench, and are controlled with three-way toggle switches at either end. A panel-mounted neon lamp and a 150-volt a.c. meter are connected across the line.

"The two test panels, mounted at each end of the bench, were designed and constructed by the writer. Four 7 by 18-inch bakelite panels were used in each rack, resulting in a very flexible construction. Individual panels can be removed for servicing, replacement or redesign without disturbing the remaining units. You will note that the right-hand rack contains three blank panels for future expansion. (*Turn to page* 311)

FIGURE 2. (*Right*) *D. H. Thompson*

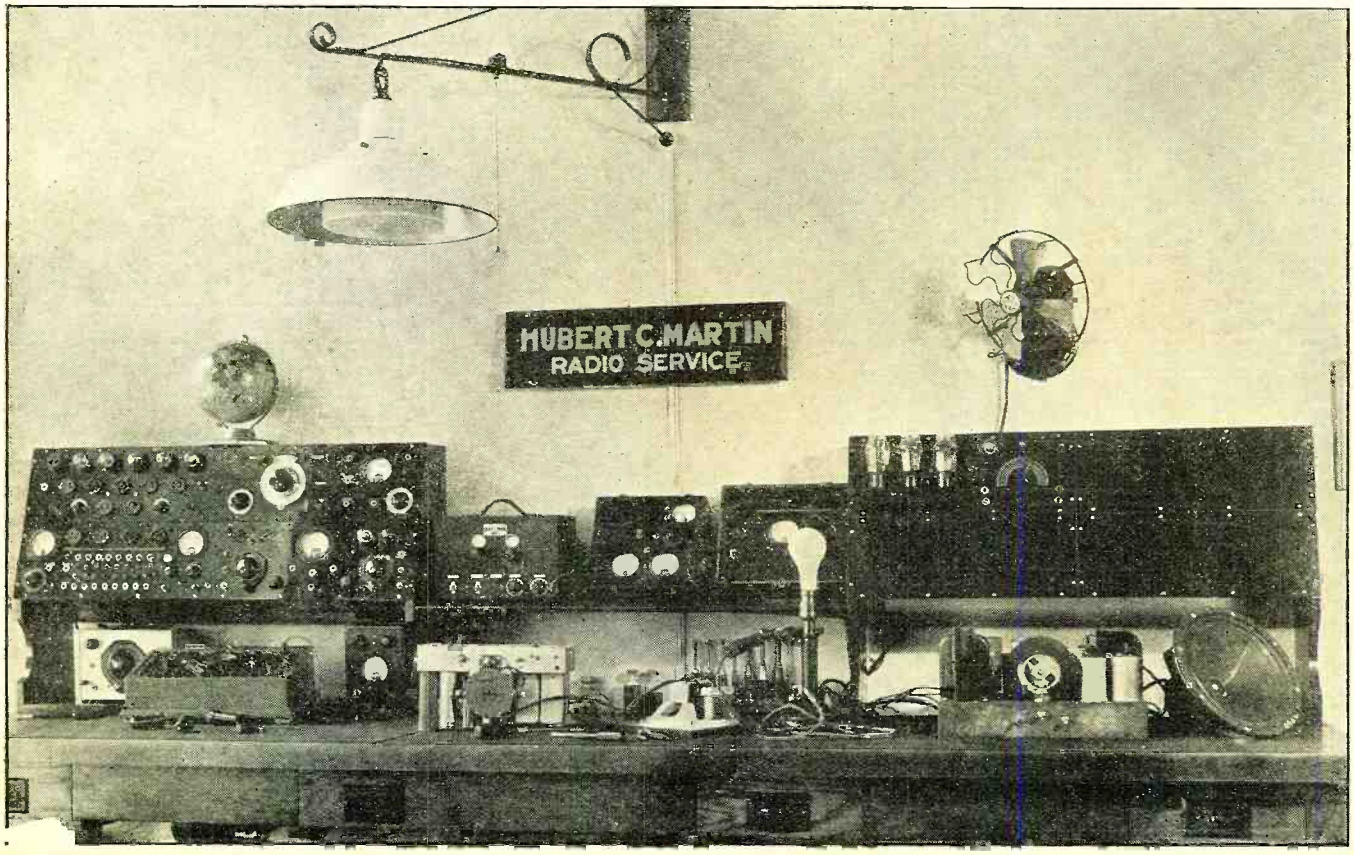
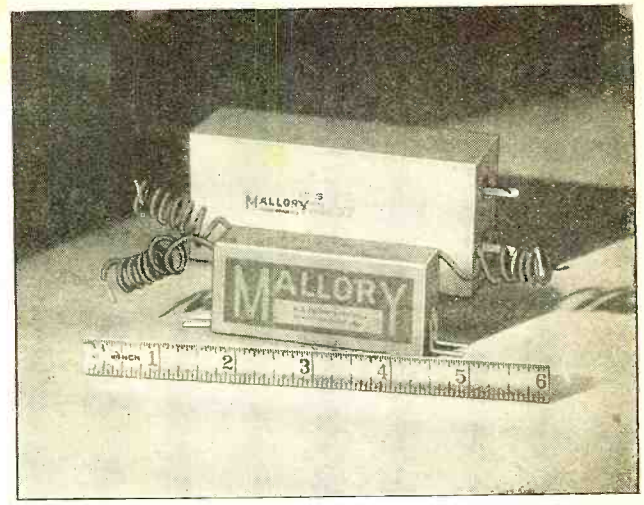


FIGURE 1. (*Below*) *First Prize*

What You Should Know About Electrolytic CONDENSERS

By R. M. Ellis



THE LATEST IN ELECTROLYTICS
Illustrating the reduction in size of electrolytic condensers during the past few years. The larger condenser has a capacity of 8 mfd. but the small one consists of two separate 8 mfd. units!

WHILE the internal construction of dry electrolytic condensers has been somewhat of a mystery to the service man, the realization of a number of important developments as evidenced by greatly decreased size, improved power factor, increased life, and reliability, has created considerable interest among the fraternity to learn just how these improvements have been accomplished. The accompanying picture showing the comparative size of old and modern condenser units is indicative of the progress that has been made in the art of manufacturing dry electrolytic condensers. It is therefore our purpose to give a brief review of the operation of dry electrolytic condensers and to explain these development changes.

Electrolytic condensers are made possible by the fact that aluminum and some other metals form an oxide coating which possesses a most unique property known as unilateral conductivity—that is, the property of passing a current of electricity only in one direction when the oxidized plate is placed in a solution containing a suitable electrolyte. The first commercial use of this effect was as a rectifier of alternating current in "A" and "B" eliminators that were on the market in the early days of the industry.

This effect of unilateral conductivity also explains why all electrolytic condensers are polarized and must be connected in the circuit with the polarity as marked or the condenser will short-circuit the line. (In 110 volt d.c. sets protection against this shorting effect can be obtained by using a two-section [common negative] dry electrolytic unit with the two positive leads connected in the circuit and the common negative lead clipped short and left unused.)

The actual cathode or negative plate is not the plain strip of foil which forms the second element of the condensers—it is the electrolyte. The sole purpose of the plain foil is to form a low resistance connection with the electrolyte of the condenser.

Film as Dielectric

The dielectric of an electrolytic condenser—which corresponds to the waxed paper of a paper type condenser, is the sub-microscopic film of oxide on the anode or positive plate. Now it is a well known fact that the capacity of any condenser depends on three things—the area of the plates, the dielectric constant of the separating medium, and the distance by which the plates are separated. Since the dielectric medium of the electrolytic condenser consists of a film of oxide of sub-microscopic thickness, it is easy to account for the vastly improved space factor of this type of construction.

Engineers believed that certain features of the wet type of construction, such as the requirement of mounting in one position and the tendency of electrolyte to escape through the vent, could be overcome. After extended research Mallory engineers developed and pioneered the so-called "dry" form of construction wherein the liquid was replaced with a gauze soaked in a special wet paste solution. This paste is peculiar in that under conditions of high temperature and low humidity it will dry out, while under conditions of low temperature and high humidity the paste will absorb water from the air and creep.

Need for Sealing

Note this carefully—for herein lies one of the chief differences between cheap dry-electrolytic condensers of short life and doubtful performance, and high grade electrolytic condensers of long dependable life and performance as exemplified by the improved construction. Condensers of the better type are *hermetically* sealed. Around each condenser roll is a wrapping of aluminum foil into the ends of which is poured a quantity of high grade sealing compound.

It was discovered early in manufacturing condensers that the plates were extremely sensitive to contamination—the mere touching of the foil with a finger was sufficient to introduce impurities which in time would cause corrosion and destroy the condensers. This led to methods of cleanliness that even a surgical hospital might envy. After the forming of the plates no part of the condenser is ever touched by a human hand. All work is done with rubber or cotton gloves which are washed with distilled water. Over 16,000 pairs of gloves were used during the first six months of 1936 in the Mallory plant.

The larger size electrolytic condensers employ a special high-grade surgical gauze as the plate separator. Standard surgical gauze was found to be unsatisfactory because of the presence of too much chloride, so the gauze used is specially washed for the purpose and is chemically much purer than the gauze used in hospitals.

Gauze as a separator is open to two objections—excessive bulk and non-uniform support of the plate. The first of these objections is obvious—the second is due to the fact that, under normal operation, gas pressures are generated which tend to force the aluminum foil through the pores of the cloth. To prevent this the aluminum foil must be heavier than otherwise would be required.

In the course of further development paper was considered as a possible separator medium. Unfortunately, not only were all available papers unsatisfactory from the standpoint of chemical purity, but also they lacked strength when wet, and had inadequate absorbent power for the electrolyte. Extended research ultimately developed a paper which had all of the desired qualities. Because of the flat smooth surface of the paper a lesser thickness was required.

Etched Foils

And now we come to the most startling of the new developments. Until recently dry-electrolytic condenser plates were formed on smooth polished metal. The area of the metal was exactly equal to the product of the linear dimensions of the plate. Since the capacity of a condenser is controlled by the effective area of the plate a method was sought by Mallory engineers to increase the *effective* area of the plate without increasing the size. The answer was the etched plate construction, wherein rolls of polished aluminum are run through an acid bath to (*Turn to page* 312)

"Extra Service" Brings MORE DOLLARS

"Good Will" isn't just a trick term. It's one of the most valuable assets of a service business that aims to be successful

By R. M. Purinton

THE two words "extra service" carry a great deal of weight in any field of endeavor. If that field is one which is little understood by the customer or consumer, "extra service" is most appreciated. The sale and service of radio receivers falls directly into such a classification. To a lesser extent, the sale and servicing of automobiles take place in an atmosphere which is a "fog" to the average driver. Ordinary service may be taken for granted but the unusual will seldom go unnoticed and unrewarded. A good example can be drawn from the writer's own experience.

A certain automobile provided braking action loaded with front wheel chatter and resultant loss of braking power. At the time of purchase the brake trouble was passed off with a smile and a promise that the difficulty would correct itself in a thousand miles. Instead, the chatter grew worse and could be limited only by frequent adjustment of the brakes.

Service with a Capital S

Finally, with a last hope, the car was given to a previously untried service organization for new brake linings. The result—more chatter than ever. But here the writer met the first service man whose vision was not blockaded by good reasons for failure. This man, forgetting that the car and its brakes were "incurable", drove the car back to the garage. After a few minutes thought he dismantled the front wheel brakes and beveled the front and rear edge of each of the front wheel brake shoes. The brakes haven't chattered since and they never were as smooth or as positive as they are today. That was "extra service" of the kind that could not be overlooked. Continued boosting to friends in the community may compensate in part for his doing the impossible.

Radio offers opportunities in every service job. The opportunity may vary with the customer's appreciation of tone, selectivity and the distance-getting ability of the receiver. It may be obvious that a slight realignment of an i.f. transformer trimmer condenser to compensate for the slight capacity change introduced by a replacement tube will noticeably improve the selectivity and sensitivity of the receiver. The time required for one little extra touch is small. Its effect on customer good will can be relatively enormous.

Every owner of an all-wave receiver is in line for an extra service covering the accurate calibration or "spotting" of the receiver for the principal short-wave broadcasting frequencies. The result is certain to be pleasing to the set owner if he has the slightest interest in short-wave foreign broadcasts. The only instrument needed, a test oscillator, is among the essential service tools of every service man. The fact that the oscillator itself need not be accurately calibrated is explained later. The entire calibration of the receiver can be carried out with the oscillator adjusted to only two frequencies—100 kc. and 1000 kc.

The first step is adjustment of the oscillator to approximately 100 kc. with the oscillator output coupled to the receiver antenna post (with antenna connected). If the oscillator calibration is fairly good, the modulated oscillator note or tone will be heard at every 100 kc. point on the broadcast band scale. In any event the oscillator harmonics will fall near 600 kc., 700 kc., and on up in frequency through 1300 kc., 1400 kc. and 1500 kc. Following are a few of the broadcast stations operating on these integral hundred kilocycle frequencies.

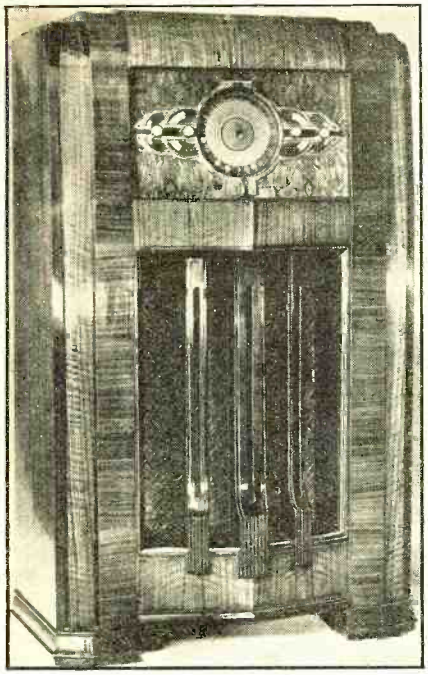
FIGURE 1

Broadcast Band

ACTUAL FREQUENCY	RECEIVER DIAL READING
600	603
700	695
800	800
900	900
1000	1002
1100	1104
1200	1207
1300	1312
1400	1414
1500	1518
Band 2	
2.0 MC	630
3.0 MC	920
4.0 MC	1240
5.0 MC	1520
Band 3	
6.0 MC	580
7.0 MC	675
8.0 MC	760
9.0 MC	850
10.0 MC	940
11.0 MC	1038
12.0 MC	1135
13.0 MC	1238
14.0 MC	1335
15.0 MC	1430
16.0 MC	1540

600 Kc.	1200 Kc.
KFSD	KBTM
WICC	KFJB
WMT	WBNO
WREC	WIBX
	WKBO
700 Kc.	WWAE
WLW	1300 Kc.
	KALE
800 Kc.	KFAC
WBAP	KFH
WFAA	WBBR
WTBO	WEVD
	WFAB
900 Kc.	WIOD
KHJ	1400 Kc.
WBEN	KLO
WJAX	KTUL
WTAD	WARD
	WBBC
1000 Kc.	WIRE
KFVD	1500 Kc.
WHO	KDB
	KGFI
1100 Kc.	WCNW
KGDM	WMEX
WLWL	WWRL
WPG	WJBK

(*Turn to page* 318)



INCLUDES NEW FIDELITY CONTROL

The Midwest Model Y-18 shown here is an 18-tube, 4½ to 2400 meter superhet which includes the dual-channel audio system described in this article.

Separate Treble and Bass AMPLIFIERS Provide *TRUE TONE*

By Paul P. Smith

IT has been well-known that in radio broadcasting, at every point where audio tones are handled, the low frequencies are continually being sacrificed and attenuated. Attempts have been made in reproduction to correct these deficiencies by resonance, time constant, cabinet design, etc., but they have all suffered the common fault of improper response and hangover contributing "barrel tone".

By means of the tone control the attempt is made to bring the music back to its original quality by attenuating the high frequencies. But this is not a solution because while it reduces the high notes it leaves the middle register unchanged. This is illustrated in Figure 1 by curve "A" which shows the normal receiver characteristics and curve "B" which shows the effect of the tone control. The impression is an increase of bass tones but it is merely an illusion because there has been no change in the low frequencies.

A practical solution of the problem of returning the music to its original beauty is to amplify the low notes separately at a higher rate of amplification and then combine them again with the remaining notes. This has been done in "The Dual-Channel-Audio, Fidel-A-Stat Program Expander" which was developed by Midwest laboratories. This circuit takes advantage of the new dual grid tubes (such as the 6L7) which are now available. In these tubes one grid has a relatively low amplification factor and the other one a much higher amplification factor. In this new circuit, the middle and high register signals are fed into the low-gain grid. The low-frequency portion is separately fed into a high gain grid. The two signals are amplified and then mixed in their modified proportions by the same tube. The amount of modification can be controlled by the listener by the Fidel-A-Stat mounted on the panel.

How this is (*Turn to page* 317)

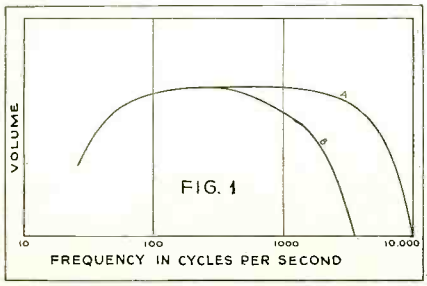


FIG. 1

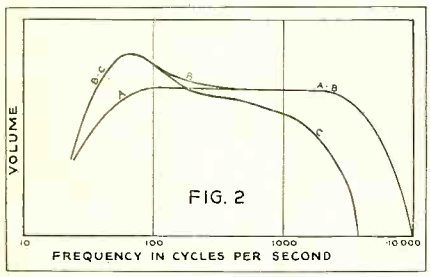


FIG. 2

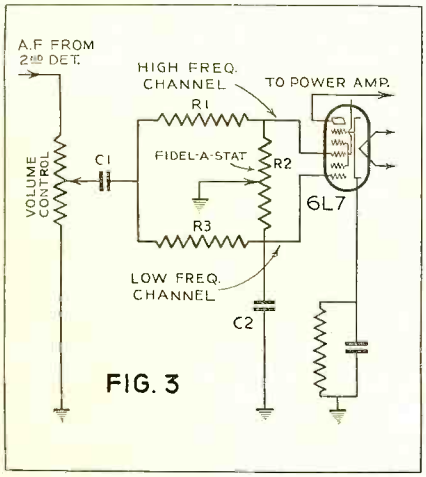


FIG. 3

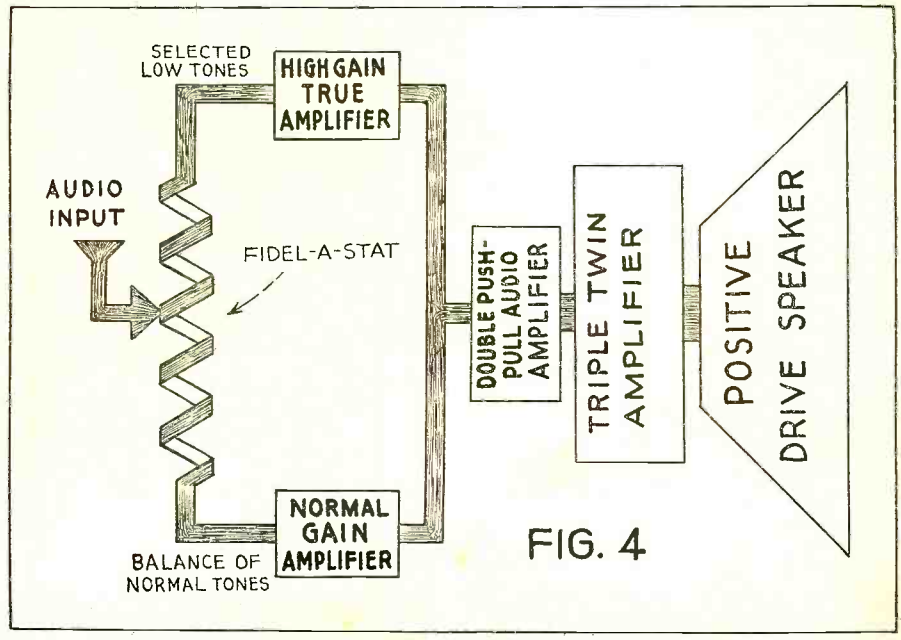
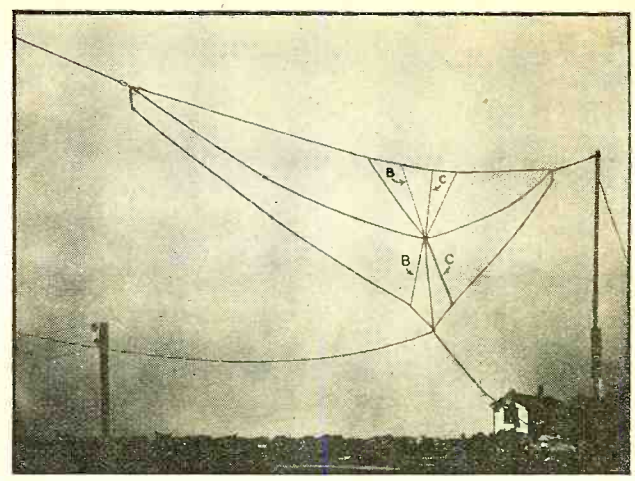


FIG. 4

The "SPIDERWEB" Snags All Waves

By S. Gordon Taylor



THE accompanying photograph shows the RCA "Spider-Web" all-wave antenna installed for test at the Fairfield, Connecticut, Listening Post where it has been giving an excellent account of itself.

The fundamental antenna, known as the type No. 9685, is designed to cover the wide range of 140 to 23000 kc. For use with receivers capable of tuning higher in frequency than this the RCA type 9689 auxiliary kit may be added to the main antenna extending the coverage to 70 mc. For fans who are purchasing the newest all-wave receivers which cover all frequency ranges down to 5 meters the fact that such an antenna is available is indeed fortunate because in almost every case it is found that the ordinary "L" antenna provides very poor pickup at ultra-high frequencies.

The fundamental antenna consists of a group of three doublets. Each of these doublets is most effective over a certain frequency range but the three of them combine to reenforce each other in effectiveness at frequencies other than these three normal frequencies. In theory one might be a little skeptical concerning the ability of three doublets to cover such a wide range as from 140 kc. to 23 mc. but it is an interesting fact, disclosed during the Fairfield tests, that this system actually performs as claimed.

Comparative Tests

For the purposes of the Fairfield tests two standard "L" type antennas were used for comparison, with a switching arrangement which would permit the "Spider-Web" or either of the "L" antennas to be interchanged at the receiver input. Tests were then made with signals tuned in on the broadcast bands and each of the short-wave ranges. The result was that the "Spider-Web" antenna produced stronger signals than either of the "L" antennas except in one instance and in that case the superiority of one of the "L" antennas was in all likelihood due to the fact that it just happened to resonate at that particular frequency. It might be added that a signal-strength meter was employed in conjunction with the all-wave superheterodyne receiver used in these tests and the relative signal strengths were therefore actually measured, leaving nothing to guesswork.

The ultra-high frequency auxiliary kit consists of two additional doublets which are attached directly to the larger group. These are shown in the illustration and are indicated at B and C. The doublet C covers the highest frequency range while B covers the next lowest range, having a lower fundamental resonance frequency by virtue of two small u.h.f. coils which constitute a part of the B doublet.

The fundamental kit comes ready assembled with insulators attached, etc. It is only necessary to fasten the outer ends of the wires to the two spreader brackets which are shown at the extreme ends of the antenna. To add the ultra-high frequency kit the insulators at the extreme ends of each of the two small doublets are simply fastened on to the top and bottom wires of the main antenna and the necessary interconnections made at the terminal block in the center.

The antenna is small enough to be mounted on a house top or in almost any other convenient location. It is 37 feet long over all and approximately 10 feet from top to bottom. At the extreme bottom tip of the antenna is an automatic matching transformer to match all the doublets to the low-impedance twisted-pair transmission line which connects to the receiver. This transmission line is shown in the photograph running off to the lower left. What appears to be a similar line running off to the lower right is actually a (*Turn to page* 308)

New TUBES Save Current

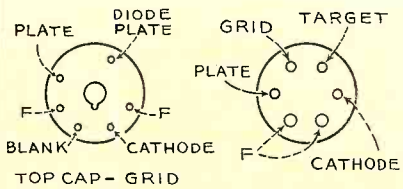
By J. Montyn

A NEW series of tubes with low filament drain has been announced by National Union and Raytheon. These tubes require 6.3 volts and .150 ampere for their filaments and will be welcomed by designers and users of battery-operated sets such as those in automobiles or in rural districts. The reduced filament drain seems to have little effect on the efficiency of the tube itself. Their characteristics are nearly the same as those of the regular tubes 6K7, 6A8, 6C5, the triode of the 6Q7 and 6G5.

The new line of tubes was designed for 135 volts plate supply but they may also be used with a 250 volt supply.

The following are the first five tubes of the new line: The 6S7G, a variable-mu pentode resembling the 6K7 in characteristics; the 6D8G, a pentagrid converter, somewhat similar to the 6A7; the 6L5G, a triode with a mu of 17 otherwise the same as the 6C5; the 6Q6G, containing a single diode and a high-mu triode (mu = 65); the 6N5, similar to the 6G5.

All these tubes have glass bulbs and octal bases, except the 6N5 which has a (*Turn to page* 318)



6Q6G 6N5

BOTTOM VIEW OF BASES

FIG. 1

6N5 TUBE	
PLATE SUPPLY V	135 MAX.
TARGET VOLTAGE	135 MAX.
SERIES TRIODE PLATE RESISTOR	0.25 MEG.
TRIODE PLATE CURRENT FOR GRID VOLTAGE=0	0.5 MA.
TRIODE GRID-VOLTAGE FOR 0° SHADOW	-12 APPROX.
TRIODE GRID-VOLTAGE FOR 90° SHADOW	0 APPROX.

6Q6G TUBE		
TRIODE SECTION		
PLATE V	135	250
GRID V	-1.5	-3
PLATE Current	0.9ma.	1.2ma.
Mu	65	65
G_m	1000	1050

THE SERVICE BENCH

tells YOU Something about

Window Publicity

. . .

Sound Trucks

. . .

Service Notes

. . .

Radio Noise

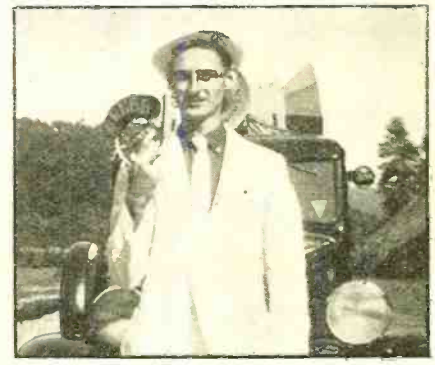


FIGURE 1

Conducted by Zeh Bouck, *Service Editor*

MAKING MONEY WITH P. A. EQUIPMENT

THERE is no slump, seasonal or otherwise, in the P. A. business. As this issue of RADIO NEWS appears upon the stands, there will be another month of political campaigning before election day rolls its riotous way around. Immediately thereafter the football season comes into full swing, followed with basketball, hockey and winter carnivals—not to mention profitable indoor activities such as Christmas plays at the schools and commencement exercises. Routine advertising fills up the springtime gap until the baseball season starts, with the year rounding out with the usual quota of state and county fairs.

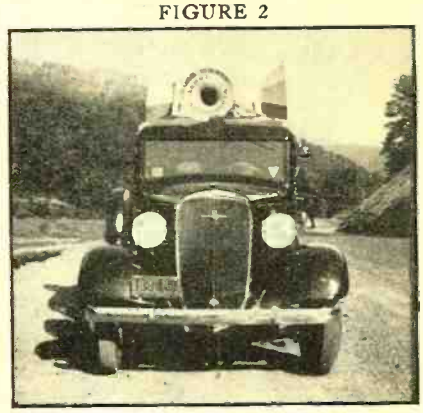
CLAYMAN FOSTER, of the Grubb Radio and Sound Service, Appalachia, Va., sends in some live-wire tips on how to make P.A. P-A-Y. "Here is a successful stunt that we use every summer. We approach one of our leading merchants and get permission to use one of his display windows every Saturday night. On these occasions we stage a two-hour show in the window, which we advertise as the 'Saturday Night Shin-Dig and Barnyard Frolic.' We use local talent of the barn dance type, and put on the show exactly as is done in a broadcasting station. Mikes in the window pick up the music and jokes, and the audience listens to the loudspeakers outside. We sell advertising time for five dollars, each merchant receiving a 75-word announcement five times during the show. This actually nets us from $40.00 to $60.00 every Saturday night.

"Another profitable P. A. idea which we employ quite consistently is to proposition our local ball club, offering them free public-address services if they will permit us to announce ads for local merchants over the system. We charge from $2.50 to $4.00 for such a plug. Needless to say this idea can be applied to sporting events other than baseball.

"In our sound truck advertising, we have used the following stunt with considerable success. We put on a shoppers' guide program, cruising up and down the main thoroughfares Saturday morning, announcing specials for the various stores. We always manage to get at least ten of these ads, at $4.00 per advertisement. We, of course, also rent our sound-truck equipment for advertising purposes on an exclusive basis. Our charge for one day is $25.00, which includes truck, engineer and announcer."

Figure 1 shows Mr. Foster in front of his sound truck, while Figure 2 is a view of the truck itself.

FIGURE 2



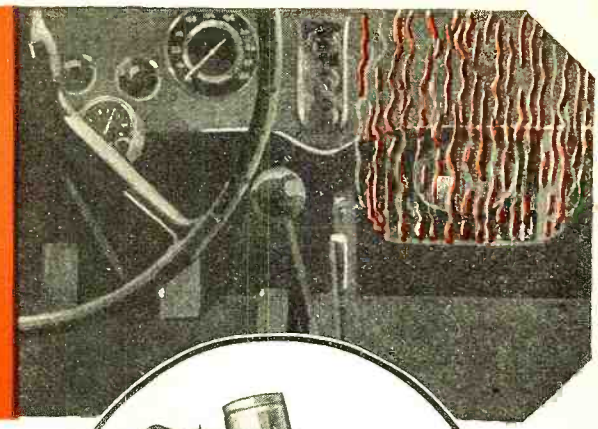
Just to show that the public address business is universally profitable, we present Figures 3 and 4, showing respectively the mobile sound equipment of the Paramount Public Address Company, London, England, and of H. F. Moroney, Melbourne, Australia. The first named installation is particularly ideal when some distance must be traveled to the scene of operations. The van is equipped with two bunks, facilities for washing and general comfort while en route. Power is derived from two rotary convertors driven from 48 volts of storage battery, the latter being charged from a dynamo coupled to the engine. The speakers driven by three ten-watt amplifiers are 70-inch spun aluminum horns, and have been heard at a distance of four miles. A Marconi-Reisz mike is used.

Though well around on the other side of the globe, Mr. Moroney uses identical equipment in so far as the mikes and speakers are concerned. The latter are

(*Turn to page* 314)

Forget Temperature Troubles

P. R. MALLORY & CO. Inc.
MALLORY



Replacement Condensers are Temperature Proof

High temperatures cause no small part of condenser troubles in the field. Yet hot climates and hotter temperatures under the hoods of motor cars, never bother condenser performance when the Replacement Condenser is Mallory.

Here's where quality construction à la Mallory really shows its stuff. Mallory Replacement Condensers are built to resist condenser troubles caused by high temperatures—such as increased leakage, lowered series resistance and lower sparking voltage of the electrolyte. Life tests at room temperatures mean nothing to Mallory. Every Mallory Replacement Condenser is oven-tested at 140° Fahrenheit before leaving the plant—as severe a life test as anyone could devise.

Ability to resist high temperatures is just one of Mallory's outstanding features. Surge-proof, Humidity-proof—with greater efficiency and smaller sizes—with the famous Mallory Universal Mountings—Mallory Replacement Condensers offer condenser quality that you just cannot get elsewhere.

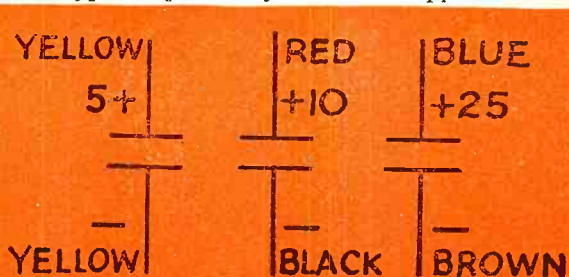
Invest 20 Minutes in Reading and Save Hours in Servicing

Twelve pages of The Mallory Replacement Condenser Manual (reading time; 20 minutes) tell you how to do those tough jobs with simple, easy effectiveness—Show you how to use the Mallory Universal Application method to gain profits and save time. If you haven't received a copy, write us today and we'll send you one by return mail. You cannot afford to be without it.

Service men everywhere are enthusiastic over Mallory's help for service men—"gives me the best service"..."your Condenser hit the spot"..."Your Manuals are splendid helps"..."Highly satisfactory performance"... Comments like these pour in every day. Service men everywhere agree that Mallory-Yaxley parts and Mallory-Yaxley service give the finest help to service men that ever has been offered.

Mallory Universal Replacement Type UR 182—is typical of Mallory Universal Application

UR 182



P. R. MALLORY & CO. Inc.
MALLORY

P. R. MALLORY & CO., Inc.
Indianapolis Indiana
Cable Address—PELMALLO

YAXLEY

RADIO PHYSICS COURSE

ALFRED A. GHIRARDI

Lesson 56. By-passing

THE shunting action of a condenser connected across a source of e.m.f. is usually very puzzling to the novice, especially since many confusing and misleading statements concerning it are to be found in popular radio literature. As this important action occurs in many parts of radio transmitters and receivers, as for instance in by-passing radio or audio-frequency currents around a C-bias resistor, or the B-voltage supply device; in by-passing radio-frequency currents in the plate circuit of the detector tube in radio receivers, etc., it will be well for us to obtain a good mental picture of it at this point.

By-passing by means of a condenser is always associated with either alternating, or pulsating direct current. The action is practically the same in each case. Consider the circuit shown at (B) of Figure 1 which represents the filter circuit shown last month with an a.c. generator or other source of e.m.f. supply connected at the left and a device at the right into which the current from the source is to flow. This load may be simply a resistance as shown. The end of the filter which is connected to the source of e.m.f. is called the *source* end. That connected to the load is called the *load* end. The e.m.f. of the generator is rapidly alternating, so the current through the circuit is doing likewise as shown by the arrows.

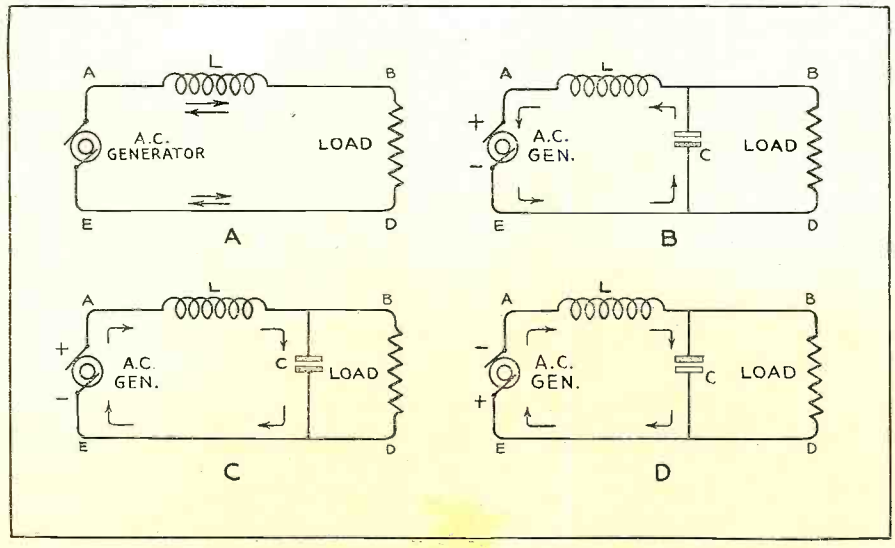


Figure 1. Illustrating the by-passing action of a condenser across a line.

Let us consider the action taking place when the e.m.f. supplied by the generator is at a frequency which is suppressed by the filter. If the condenser were not connected in the circuit, as at (A), the inductor would present a definite impedance or opposition to the flow of current around the circuit, both when it flows in the direction A-B-D-E and also when in the reverse direction E-D-B-A. At high frequencies this impedance would be high, but some current would always get through the inductor. Therefore the inductor alone would act as a sort of low-pass filter, but imperfectly.

Now if the condenser is connected as shown, during the part of the cycle when terminal A of the generator is positive (as at B) the electrons flow through the circuit in the direction shown by the arrows, (opposite to the direction of current flow). The lower plate of the condenser collects a large portion of the electrons which are being transferred around through the circuit consisting of the upper condenser plate, inductor, and a.c. generator (provided the reactance of the load is appreciably larger than that of the condenser so it does not also furnish an appreciable quantity of electrons). If the condenser were not there, as in (A), all of the electrons transferred around the circuit by the e.m.f. of the generator would have to go through the load.

Hence it can be seen that the condenser really assists the action of the inductor L, in *reducing* the current flowing through to the load, simply by taking into its plates a large number of the electrons thus *by-passing* them from the load. The larger the capacitance the more electrons it will take in at the high frequencies considered, and hence the greater will be the filtering action. Now when the e.m.f. of the generator has reached its peak value and begins to decrease, the current through the coil tends to decrease, and the collapsing magnetic field induces a self-induced e.m.f. in the coil which tends to keep the electrons flowing into the condenser still in the same direction.

When they both die down, the lower plate of the condenser begins to discharge electrons back around through the circuit to the upper plate of the condenser as shown at (C). When the generator e.m.f. reverses, it tends to drive more electrons around to the upper plate as shown at (D) and thus the plate now becomes negatively charged.

When the e.m.f. passes its peak value in this direction the electrons surge around the circuit again in the direction shown at (B). This is repeated over and over again. The inductor of course reduces the number of electrons or current transferred around the circuit in each case, but since the condenser stores some of them each time, less reach the load than would if the condenser were not there. Notice that no electrons or current can actually flow through the condenser, since the dielectric insulates one plate from the other. This is contrary to

(*Turn to page* 307)

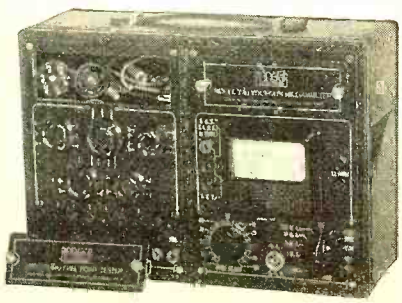
TWO PRECISION TESTERS FOR THE PRICE OF ONE

Each Ranger-Examiner Combination puts together in one case (2) units of test equipment every serviceman needs in his everyday work. The savings effected in design and in using this exclusive Ranger-Examiner grouping permits offering these combinations of two Precision Testers at prices you would normally expect to pay for one.

Each item is precision built throughout by the oldest company in the service equipment field. Their past contacts with the trade as well as with every advancement in the field of radio make them fully acquainted with the needs of the service profession. From the standpoint of sheer merit Ranger-Examiner testers are becoming popular favorites with radio servicemen.

RANGER EXAMINER

COMBINATION FREE POINT TESTER AND VOLT-OHM-MILLIAMMETER. MODEL 640-740



Model 640 Free Point Tester has five (5) sockets. Panel includes automatic switch type and single action jacks. Model 740 VOLT OHM MILLIAMMETER Unit has a Triplett Precision Instrument Scale reading 10-50-250-500-1000 A.C. and D.C. volts at 1000 ohms per volt. 1-10-50-250 M.A.; low ohms 0-300; high ohms to 250,000 at 1.5 volts. Rheostat adjustment. Model 640-740 is contained in the standard size metal carrying case above described.

Dealer Price $27.00

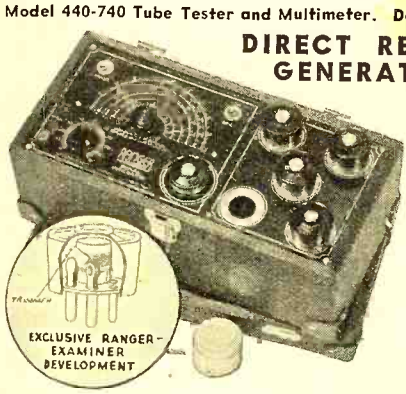
ADDITIONAL COMBINATIONS

Using the same standard size metal carrying case the following additional combinations may be had; the testers in all cases being identical with foregoing descriptions and complete with necessary accessories.

Model 540-740 Signal Generator and Multimeter. Dealer Price...$36.00

Model 440-740 Tube Tester and Multimeter. Dealer Price.....$37.50

DIRECT READING SIGNAL GENERATOR. MODEL 557



Model 557 has the same features as described for Signal Generator Model 540 except that it is installed in a black leatherette carrying case and is an integral part of the case. The five individually calibrated coils are nested on the side as shown, handy for instant use. The attractive panel is silver and black.

Dealer Price $18.00

Model 554-A is the same as Model 557 but not direct reading. Calibrated graphs included for accuracies under 1% on any band.

Dealer Price $14.40

COMBINATION TUBE TESTER AND SIGNAL GENERATOR 440-540

Model 440-540 has the two separate testers installed in a sturdy metal carrying case for shop or field use.

COMPLETE DEALER PRICE $33.60

Model 440 Tube Tester checks all type tubes. Condition of tubes is read directly on GOOD-BAD instrument scale while load values are applied. Circuit designed to indicate inter element shorts and leakages. Illuminated dial A. C. instrument for line volts adjustment, also shows when tester is connected to power supply.

Model 540 Signal Generator uses plug-in type coils. Five frequency bands cover 110 to 20,000 Kc. All readings are direct and fundamentals. Each coil is individually calibrated by peaking with trimmer condensers. Accuracy, within one percent (1%) from 110-3000 Kc—2% for higher readings. Completely shielded. Attenuation and stability are outstanding features. Complete with coils, two type 30 tubes, batteries and necessary accessories.

Model 440-540 consists of these two instruments installed in a sturdy metal case with built-in compartment having snap on cover for accessories, finished in electro black baked enamel, panels in silver and black. Every essential feature is incorporated in these outstanding instruments. No extravagance. No added unnecessary cost. To see one—to use one—means you will be glad to own this outstanding tester. Combination Tube Tester and Signal Generator.

D.C. Pocket Volt-Ohm-Milliammeter. Model 735

Contained in sturdy black molded case with silver and black panel, rounded corners. Ranges are 15-150-750 volts; 1.5-15-150 M.A.; ½-1,000 low ohms; 0-100,000 high ohms at 1.5 volts. Provision for external batteries to be used for higher resistance measurements. Has Triplett D'Arsonval precision instrument accurate to 2%. Selector switch for all ranges. Provides for all D.C. measurement requirements of the serviceman.

Size is 3 1/16"x5⅞"x2⅛" deep—is easily carried in the pocket, and handy for the laboratory, complete with battery, test leads and alligator clips.

Dealer Price $10.80

SEE THEM AT YOUR JOBBER—WRITE

RANGER EXAMINER

Readrite Meter Works,
1115 College St., Bluffton, Ohio

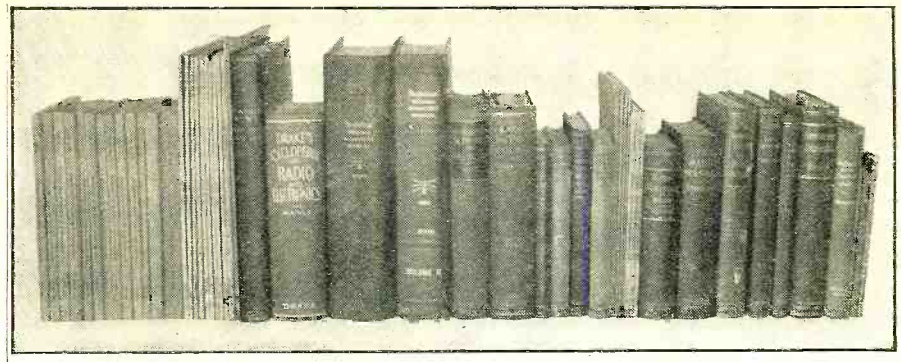
Without obligation please send me more information on .....

Ranger-Examiner Combination .....

Name.....

Address.....

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



THE TECHNICAL REVIEW

CONDUCTED BY THE TECHNICAL EDITOR

Electronic Television, by George H. Eckhardt, published by The Goodheart-Willcox Co.; 1936. By "electronic television" the author means, evidently, systems which do not employ any mechanical scanning systems. The growth of television has resulted in several new electronic devices such as Farnsworth's Image dissector, and oscillight and Zworykin's Iconoscope and Kinescope. The greater part of the book is devoted to an explanation of how these instruments work and what part they play in the complete television receiver or transmitter. The book is, evidently, aimed at the general reader who is already familiar with radio.

Part I of the book describes the different devices used at the transmitting end. There are chapters on the Farnsworth system, giving an explanation of the image dissector, the telecine and the multipactor tube. Another chapter deals with the iconoscope. The rest of Part I is devoted to the subject of scanning, interlaced scanning, the radio frequencies involved, aerials and the coaxial cable.

The second part describes the receiving systems. It gives a block diagram of the receiver and devotes most of the space to the different cathode-ray tubes.

Part III calls attention to the by-products of television. It contains chapters on the electron multiplier, the infra-red camera, electron microscope and the RCA three-meter circuit.

Radio Service Business Methods, by John F. Rider and J. van Newenhizen, published by RCA Manufacturing Co.; 1936. The reason why so many servicemen do not show a profit, says Mr. Rider, is that they are not "business-minded." The amount of the service charge should be determined from an accurate knowledge of the cost of doing business. In other words, Mr. Rider advocates that each serviceman keep records and do cost accounting in order to determine what to charge so as to make a fair profit.

The second part is written by Mr. Newenhizen who describes a system of records especially designed for the radio service business. These blanks can be obtained from RCA. The author goes into considerable detail on the way of arriving at the proper figure for overhead and how to fill out the records.

Foundations of Wireless, by A. L. M. Sowerby, published by Iliffe and Sons, London; 1936. An elementary textbook on radio which covers the subject from "electrical notions" to the working of a complete superheterodyne. The text is non-mathematical, although it does use some elementary algebra. It will be found useful to prospective set-builders, experimenters and others who wish to gain an insight into the working of a radio set. The ground covered seems a little ambitious for a book of only 258 pages but nevertheless, it contains much useful information.

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

Ultra-high-frequency Transmission for Television Between the RCA Building and the Empire State Building in New York City by P. S. Carter and G. S. Wickizer. A study of the propagation between the two buildings at a frequency of 177 mc. with the object of providing flat response over 3 mc. Effects of reflections were observed.

Electron-optical System of Two Cylinders as Applied to Cathode-ray Tubes, by D. W. Epstein. A discussion of the properties of electron lenses and their analogy to ordinary lenses. The results are applied to the cathode-ray tube.

Magnetron Oscillators for the Generation of Frequencies Between 300 *and* 600 *Megacycles,* by G. R. Kilgore. Describing the properties of negative-resistance magnetron oscillators. It has become possible to build a radiation cooled tube delivering fifty watts at 550 mc. and a water cooled tube yielding 100 watts at 60 mc.

Review of Contemporary Literature

Copies of the articles mentioned below are available from the publishers of the publications mentioned in each case. They are not included in the "free booklets". The editors will be pleased to give addresses of publishers on request.

RCA Television Field Tests, by L. M. Clement and E. W. Engstrom, RCA Review for July, 1936. An account of the television tests being conducted at the Empire State Building and at the Camden station from 1931 to 1936. First, 120 lines at 24 frames was used, employing mechanical scanning at the transmitter. Separate transmitters were used for sight and sound. The 1936 tests wound up with the same transmitter for both, 343 lines interlaced scanning, from frequency 30 per second. All scanning is now done electrically. In addition there is a remote pickup system which works between 150 and 200 mc.

Iconoscopes and Kinescopes in Television, by V. K. Zworykin, RCA Review for July, 1936. Description of the development, theory of operation and application of the transmitting and receiving device in television. The text is clarified by diagrams and pictures.

New Developments in Audio Power Tubes, by R. S. Burnap, RCA Review for July, 1936. A study of the construction,

(*Turn to page* 306)

WHAT'S NEW IN RADIO

WILLIAM C. DORF

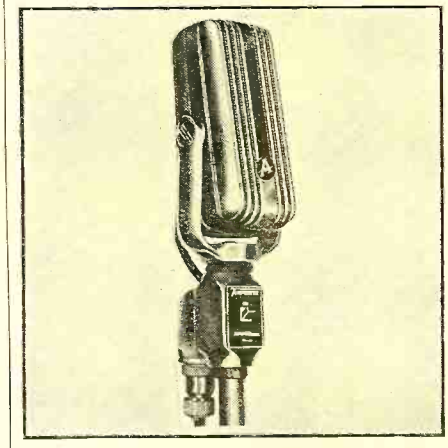
Many New Developments in 1937 Receiver Line

The outstanding feature of the Philco model 116X DeLuxe 5-band receiver is automatic tuning. It is operated exactly like a dial telephone except it is only necessary to twirl the dial once to bring in your favorite station on its exact frequency set-

ting. This is made possible by a development known as "Magnetic Tuning," a circuit arrangement that automatically pulls the powerful foreign or domestic stations into perfect tuning. An automatic silencer cuts out inter-station noise as the listener twirls the dial from one station to another. Additional features include a colored spread-band dial, a glowing beam tuning range indicator, a high-fidelity audio system with inclined sounding board, and others.

Velocity Microphone

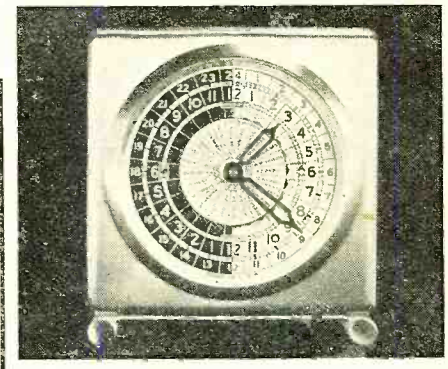
The latest Amperite velocity microphone model RBH is designed to provide studio type reproduction and unusually high output. Acoustically, it is made to eliminate any possibility of cavity resonance. Triple



shielding is employed to prevent the pick-up of any stray fields and shock absorption is used at two different points to overcome mechanical vibration. The microphone uses nickel aluminum magnets. It is obtainable with either a low or high impedance output in gun-metal or chrome finish.

World Time Clock

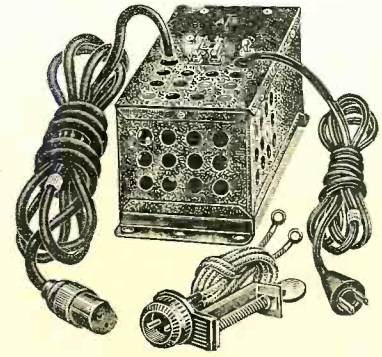
Listening Post observers and all short-wave and broadcast DX fans will be interested in the new "Sky Pilot" world time clock designed by H. L. Van Wyck. It is a regular time piece except that it has a 24-hour dial. It can be set at any time zone and will then show the corresponding time for all other time zones throughout the world. The clock is spring wound and



is enclosed in an attractive modernistic case of brushed brass measuring 5½ inches square.

New Battery Chargers

The American Television & Radio Co. announce a new line of automatic tapering battery chargers. The series includes three models: the Standard with a maximum charging rate of 4½ amperes; the DeLuxe, 6 amperes; and the Master, 10



amperes. They are equipped with a polarized dash receptacle and plug and long connecting cords. Utilizing a full-wave dry disc type rectifier, they are designed to operate from the 110 volt 50-60 cycle a.c. line supply. With the increased drain imposed on auto batteries by radio sets, heaters and other motor-car accessories, this new charger with its convenient connecting arrangement is ideal for keeping the car battery fully charged without the necessity of removing the battery.

Recording Disc

Universal Microphone Co. announces a new professional instantaneous recording and playback disc in 6 different sizes from 8 to 17 inches. It is said that the cellulose mass of the new disc is totally free of foreign particles and substance. The disc has been developed so that continuous recording can be done without dulling or chipping of the stylus edge or point.

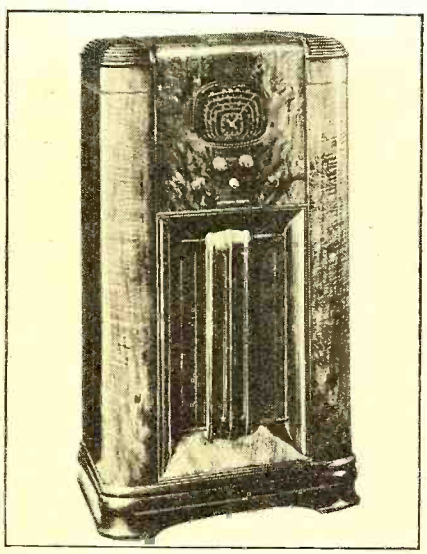
CRL Bridge Employs 6E5 Tube

This new bridge designed around the 6E5 cathode ray type tube offers visual null indication in the measurement of capacity, inductance and resistance. Manufactured by the Tobe Deutschmann Corp., it is completely self-contained, comprising the usual standards and ratio arms, 60

and 1200 cycle oscillator, power supply, amplifier and indicator tube. A 6J7 type tube is used for the dual frequency oscillator, while an 84 rectifier is used in the power unit. The sensitivity of the electric eye is adjustable. The range of the bridge is from 2 micromicrofarads to 100 microfarads in capacity, from a fraction of one ohm to one megohm in resistance and from 10 microhenries to 100 henries in inductance.

1937 Line of Receivers

The outstanding new development in the 1937 line of American-Bosch receivers is called the "Automatic Maestro", which centralizes the radio components on the separate "CentrOmatic" unit, isolated and insulated from the audio section. One of its purpose is to suppress discordant interference. It eliminates many soldered connections and 90 percent of the wiring. An important acoustical contribution in the new sets is their "Band-Stand" baffle to eliminate boom and echo. An additional new development is the "Semaphore" tuning system, automatically tuning in the signal with electrical precision also the wave-band is indicated by a colored beam.



The model 680, shown in the illustration, employs a 15-inch speaker.

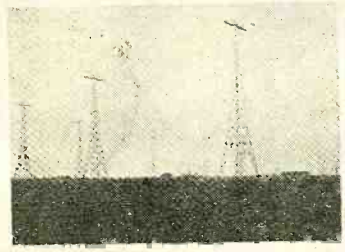
New Headphones

The Acme Specialty Co. introduces a new low-priced, bi-polar headset designed for

good sensitivity and quality of reproduction. This new headset should find wide application among short-wave and broad-

(*Turn to page* 304)

Nazaki Station Longitude 138°51'00" E
Latitude 36°10'44" N

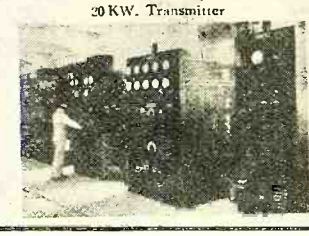


I Overseas broadcast for North America, Hawaii, etc.
Transmitter:
JVN 10660 K.C. 20 KW. Beam Antenna
JVH 14600 K.C. 20 KW. "
Program:
0500—0600 GMT. News in English and Japanese, Music. Entertainment, Lecture, etc.

II Relaying broadcast for Manchukuo and Formosa
Transmitter:
JVT 6750 KC. 20 KW. Vertical doublet Antenna
JVP 7510 " 20 " "
JVN 10660 " 20 " "
JVM 10740 " 20 " "
Program:
0000—0010 GMT. Weather forecast, Market quotations
0240—0245 Market quotations
0340—0410 News, Market quotations
0650—0720 Market quotations, News
0800—1230 Children's Hour, News, Lecture, Entertainment, Music, Drama, etc.
1230—1300 Time Signal, News, Weather forecast, etc.
2220—2240 Physical Exercise

III. Overseas Broadcasting Test
Transmitter:
JVP 7510 K.C. 20 K.W. Beam antenna
JVN 10660 " " "
JVM 10740 " " "
JVH 14600 " " "
Program:
1. For the East Coast of North America & South America
2100—2200 G.M.T. Announcement, Gramophone music, Etc.
For Europe
00—2000 G.M.T. Announcement, Gramophone music Etc.

20 KW. Transmitter



The DX Corner (Short Waves)

(*Continued from page 286*)

North America

W3XL, Bound Brook, N. J., 17300 kc., heard testing afternoons irregularly. (Kosynsky, Silvius).

W10XDA, Schooner "Effie Morrissey," 14265 kc. and 12862 kc., heard 1 p.m., E.S.T., August 22, 1936. (Potthoff). Also heard on 14246 kc., August 21 at 8:15 p.m., E.S.T. (Jordan, Gleason, Tortoriello).

W9XPD, St. Louis, Mo., 31.6 meters, heard daily at 8 a.m. to 9:30 a.m., 9:45 a.m. to 12:15 p.m., 12:45 p.m. to midnight, E.S.T. (Goodman).

W8XAI, Rochester, N. Y., 31600 kc., heard 7:30 to 12 midnight, E.S.T. Relays WHAM. (Field).

W2XAD, Schenectady, N. Y., 9615 kc., heard daily 7 p.m., E.S.T. Also on 15385 kc. (Diez).

W3XAL, New York, N. Y., 17880 kc., heard daily 2 p.m., 9 a.m., E.S.T. (Diez).

W3XAD, Schenectady, N. Y., 15400 kc., heard daily 2 p.m., E.S.T. (Diez).

W1XK, Millis, Mass., 9615 kc., heard daily 6 a.m., 9:30 p.m., E.S.T. (Diez).

W1XAL, Boston, Mass., 15250 kc. (11790 kc.?) heard regularly Sunday 10 to 11 a.m., daily 5 to 5:40 p.m., E.S.T., except Saturday and Sunday. (O'Connell, Partner).

W4XH, Spartansburg, S. C., 31.02 meters, heard 7:30 to 7:50 p.m., E.S.T. (Smith).

W9XHW, Minneapolis, Minn., 5850 kc., heard 9 a.m. to 12 p.m., E.S.T., daily except Saturday and Sunday which is 1 to 11 p.m., E.S.T. (Dustin).

W2XNY, Saint George, Staten Island, New York City, 2590 kc., heard regularly around 10:15 p.m., E.S.T. (Dustin).

XE3W, Mexico, reported heard on 20 meters. (Tortoriello).

XERC, Mexico, 7380 kc., heard Sundays 7 to 8 p.m., E.S.T. (Silvius).

TFJ, Reykjavik, Iceland, 12235 kc., heard 10:30 a.m. Sunday, Pacific Standard Time, 1:40 to 2 p.m. Sundays, E.S.T. (Partner, Howald).

Central America

TIPG, Costa Rica, 6410 kc. from verification, 9550 kc. according to Anca, 9590 kc., Hunter; 6410 kc., Diez, schedule from veri. 6:30 to 8:30 a.m., 11 a.m. to 1 p.m., 5 to 10:30 p.m., E.S.T. (Davis, Salazar, Diez, Hunter).

TI2PG, Costa Rica, reported heard on 9565 kc. (Houghton).

TIRCC, San Jose, Costa Rica, 6575 kc. and 13150 kc., heard daily 1:30 p.m., E.S.T. (Diez).

TIGPH, San Jose, Costa Rica, 5859 kc., heard daily 11 p.m. and 8 p.m., E.S.T. Station slogan: "Alma Tica" y Estacion "X" la Reina del Aire (Diez).

TIEP, San Jose, Costa Rica, 6775 kc., heard daily 11 p.m., also 7:30 p.m., E.S.T. (Diez, Oxrieder).

TI4RNH, Costa Rica, 9500 kc. approximately, reported heard 2 to 12 p.m., E.S.T. (Wright).

COCQ, Havana, Cuba, 9730 kc., heard 7 a.m. to 1 a.m., E.S.T. 18 hours, relays CMQ (Diez, N. C. Smith, Houghton, Chandler, Oxrieder, Cox, Pickering, Reilly, Ballina, Silvius, Turner, Adams, Betances, Kemp, Jensen, Sauberlich, Wilkinson, Lopez, Stabler, Harris, De Ment, Kosynsky). Station slogan: "La Voz de la Victor." Station address: RCA Victor 25, 225 Vedado, Havana, Cuba.

COCD, Cuba, 6112 kc., heard 7 p.m. to 2 a.m., E.S.T. (Houghton, Diez). Station address: P. O. Box 2194, Havana, Cuba.

COCX, Havana, Cuba, 11650 kc. approximately, heard 5 to 10 p.m., E.S.T., train sounds as identification (McKay, Kemp, Alfred, Ballina, Reilly, Shamleffer, Atherton, Cox). Station address: Casa Lavin, Officios y Obrapia, Edificio Calles.

COCE, Cuba, 12250 kc. approximately, heard between midnight and 1 a.m., E.S.T., on August 15 (Gallagher).

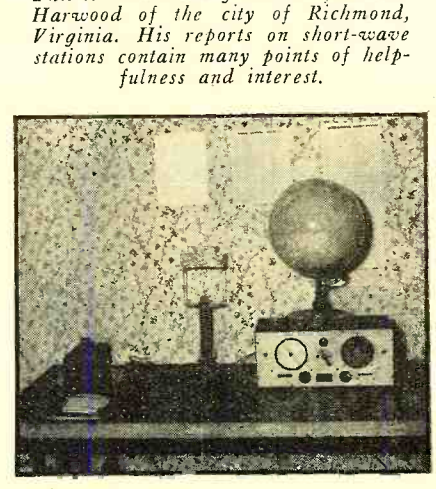
ZFB, Hamilton, Bermuda, 10060 kc., traffic

WHO HAS HEARD JAPAN?

If you have been lucky and successful enough to pull in programs from the "JV" Japanese stations and sent for a verification card this is what you will eventually receive. It gives a wealth of information about the station programs, etc.

NEAT AND SIMPLE

This is the receiving station of Morris Harwood of the city of Richmond, Virginia. His reports on short-wave stations contain many points of helpfulness and interest.



to London and New York (Andrews).

ZFD, St. George, Bermuda, 10370, heard Sunday till 9:30 p.m., E.S.T. (N. C. Smith).

HI8Q, Trujillo, D. R., 6230 kc, heard 10:40 p.m. to 1:40 a.m., E.S.T., 4:40 to 7:40 p.m., E.S.T. (Oxrieder, Stephens, Houghton). Station slogan: "La Voz de los Muchachos." Station address: Aveneda Espara 12, Trujillo, D. R.

HIFM ?, Trujillo, D. R., 6150 kc., heard from 6 a.m. to 7 a.m., E.S.T., 12 noon to 1 p.m., E.S.T. (Street).

HIN, Trujillo, D. R., 11283 kc., heard daily 5 to 6 p.m., E.S.T. (Salazar). Heard on 6180 kc., 12 noon to 2:30 p.m., 7:30 to 9:30 p.m., E.S.T. (Samson). Heard on 6243 kc. (Atherton, O'Connell, Hartman, Kemp, Potthoff, Stabler, Diez, Lopez). Station slogan: "Voice of the Dominican Party." Station address: Radio City, Dominican Republic.

HI8A, Santiago, D. R., moved from 6450 to 6380 kc., heard 2:40 to 3:40 p.m.; 8:40 to 10:40 p.m., E.S.T. (Betances).

YNGU, Managua, Nicaragua, 9300 kc., heard daily 12 noon to 1:45 p.m.; 5 to 6 p.m.; Sundays 11 to 12 midnight, E.S.T., operated by a YL. Station slogan: "Alma Nica." Station address: P. O. Box 295 (Diez, Salazar).

YNLF, Managua, Nicaragua, 9670 kc. and 5950 kc. (Diez, Andrews). Heard at 12:30 p.m., E.S.T., good music irregularly (Oxrieder).

YNVA, Managua, Nicaragua, 8675 kc., heard 8 p.m. daily, E.S.T. (Diez).

HH3NW, Port-au-Prince, Haiti, 6350 kc. (Oxrieder).

HH3W, Port-au-Prince, Haiti, 9640 kc., heard 8 to 10 p.m., E.S.T. (Diez, Oxrieder). Heard on 6325 kc. approximately by Obs. Betances.

HRN, Tegucigalpa, Honduras, 5875 kc., heard at 8 p.m., E.S.T. (Oxrieder, Diez).

HRP1, San Pedra Sula, Honduras, 6350 kc., heard 7:30 p.m., E.S.T. (Diez).

HP5K, Colon, Panama, 6050 kc., heard 7:15 to 9 a.m., E.S.T. (Diez).

VP6YD, Barbados, B. W. I., approximately 14500 kc., heard talking with "Ham" in second district at 8:45 p.m., E.S.T. (Jordan).

South America

PPQ, Rio de Janeiro, Brazil, 11660 kc., reported heard 7:30 to 8:45 p.m., E.S.T. (Kernan). Heard on 11673 kc., Sundays after 7 p.m., E.S.T. (Diez).

PSH, Rio de Janeiro, Brazil, 10220 kc., relays traffic (Andrews).

PSA, Marapicu, Brazil, 21080 kc., heard at 12 noon, E.S.T. (Mascarenhas). Mascarenhas reports German stations are received with the strength of locals in Rio.

CE1BC and CE1AR, Chilean amateurs, were heard around 10 p.m., E.S.T. (Cox).

HJ1ABP, Cartagena, Colombia, 9590 kc. (from verification), (Shamleffer). Heard 7:30 to 11 p.m., E.S.T. (Oxrieder, Lopez, Coover, Diez). Heard on 9733 kc. (Diez).

HJ1ABE, Cartagena, Colombia, 9500 kc., regular schedule 11 a.m. to 1 p.m.; 5 to 10 p.m.; Sundays from 10 a.m. to 1 p.m., 2 to 6 p.m., E.S.T. Announcements in English approximately 12:45 a.m., E.S.T. Power 1 kw. (Silvius, Shamleffer, Hartman, O'Connell, Meehan, Dressler, Salazar, Betances). Station slogan: "The Voice of Fuentes Laboratories." Station address: Radiodifusora, Cartagena, P. O. Box 37, Cartagena, Colombia, S. A.

HJ4ABU is the new call of "La Voz de Pereira," 6145 kc., 1 kw. (Oxrieder, Millen, Betances).

HJ1ABD and HJ1ABH, Cartagena, Colombia, 9400 kc., heard testing and calling CQ, 9 p.m., E.S.T., July 16 (Gallagher).

HJU, Buenaventura, Colombia, 9510 kc., heard 12 to 2 p.m., 8 to 11 p.m., E.S.T., Monday, Wednesday, Friday, 1 kw. (Lopez, Diez).

HJN, Bogota, Colombia, 6100 kc., heard at 9:30 p.m., E.S.T. (Diez).

HJ1ABG, Barranquilla, Colombia, 6037 kc. (Oxrieder). Heard Sundays 1 to 2:30 a.m., E.S.T. (Pilgrim). Station slogan: "Emisora Atlantica."

HJ4ABP, Medellin, Colombia, reported heard on 6027 kc. (Oxrieder).

HJ3ABF, Bogota, Colombia, 9590 kc. (Oxrieder). Heard on 6211 kc. at 10 p.m., E.S.T. (Diez).

HJ3ABD, Bogota, Colombia, 6100 kc., heard at 10 p.m., E.S.T. (Diez). Heard on 12150 kc., 9:15 to 12 p.m., E.S.T. (Sahlbach).

HJ4ABD, Bogota, Colombia, 5800 kc., reported heard at 9 p.m., E.S.T. (Diez).

HJ4ABC, Ibague, Colombia, 6451 kc., heard at 9 p.m., E.S.T. (Diez).

OAX4G, Lima, Peru, 6230 kc., heard daily from 7 to 11 p.m., E.S.T. (Ballina).

YV9RC, Caracas, Venezuela, 6400 kc. (Ballina). Station slogan: "Ondas Populares." Station address: P. O. Box 1931, Caracas, Venezuela.

YV7RMO, Maracaibo, Venezuela, 6070 kc., heard irregularly in the evenings (Oxrieder, Betances). Station slogan: "Radiofusora Maracaibo."

LSN, Hurlingham, Argentina, 14480 kc., heard from 5:45 to 6:30 p.m., E.S.T. (Sahlbach).

LU4BH, Argentina, 14400 kc., amateur,

heard regularly from 6 to 7 p.m., E.S.T. (Dressler).

PRF5, Rio de Janeiro, Brazil, 9510 kc., heard daily from 4:45 to 5:45 p.m., E.S.T. (Mascarenhas).

LRX, Argentina, 9660 kc., reported heard daily from 10 to 11 p.m., E.S.T. (O'Connell). Heard daily from 7 to 11 a.m., 3:45 to 6 p.m., 8 to 9 p.m., E.S.T. (Silvius, Oxrieder). Heard from 10 to 11 p.m., E.S.T. (Andrews). Also heard on 15290 kc. (Dressler). Station slogan: "Radio El Mundo."

PZ1AA, Paramaribo, Dutch Guiana, 20 meters, is a government experimental station (Millen).

HC2CW, Ecuador, 8404 kc., heard 12:30 to 1 a.m., E.S.T. (McKay).

PRADO, Riobamba, Ecuador, approximately 6650 kc., heard on Thursdays 9 to 10 p.m., E.S.T. (Stabler).

HC2JSB, Ecuador, 9510 kc., heard daily until 1 a.m., E.S.T. (Pilgrim).

VP3BG, Georgetown, British Guiana, reported heard working on 20 meters (Bird).

VP3MR, British Guiana, 7080 kc (Bird). Station slogan: "The Voice of Guiana." Station address: British Guiana Broadcasting Co., Georgetown, British Guiana.

Africa

SU1CH, Cairo, Egypt, 14300 kc., is a 20-meter amateur working the W's evenings (Beck, Dressler).

SUZ, Egypt, 13830 kc., reported heard talking to GBB 6 to 6:30 p.m., E.S.T. (Kemp).

ZSS, Capetown, S. Africa, 18890 kc., heard as late as 10:45 a.m., begins about 6 a.m., E.S.T. (Partner).

EA8AB, Tenerife, Canary Islands. 10415 kc., 20 kw., heard 2 to 3:15 p.m. and 6 to 7:15 p.m., E.S.T. (Salazar, Masearenhas). Station address: Radio Club, Tenerife, Canary Islands.

DEKKA, Dirigible Hindenburg, heard on its flight to Rio (Masearenhas).

Oceania

KIO, Kahuku, Hawaii, 11680 kc., and KQH, Kahuku, Hawaii, 15985 kc., take place of KKH on 7522 kc. Tuesday morning programs and lasts from 12:45 a.m., E.S.T., on (Dressler).

KKP, Kahuku, Hawaii. 16030 kc., reported heard Saturday 11 p.m., E.S.T. Replaced KKH for Monday broadcast to CBS 11:30 to 12 p.m. Monday night, E.S.T. (Howald, Partner).

KKH, Kahuku, Hawaii, 7520 kc., reported heard 11:15 p.m. to 12:15 a.m., E.S.T., relaying program (Silvius).

ZLT, Wellington, New Zealand, 27.24 meters, reported heard almost daily 8 to 11 p.m., E.S.T. (Pilgrim).

VK3LR, Lyndhurst, Australia, 9580 kc., heard daily 6 to 9 a.m., E.S.T. (Howald, Pickering, Partner, Coover).

VK3ME, Melbourne, Australia, 9495 kc., reported heard daily 6 a.m., E.S.T. (Kemp, Tortoriello, Oxrieder, Pickering).

VK2ME, Australia, heard well on 31 meters (Tortoriello).

VK2ABD, Bellvue Hills, Sidney, Australia, 14135 kc., 30 watts, tests with W4BAZ early mornings (McKay). Station address: C. C. Galbraith, 77 Drumbalyn Road, Bellvue Hills, Sidney, Australia.

VK9MI, on board S. S. Kanimbla, 49.8 meters, also on 25.61 meters (N. C. Smith).

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

Curtis Purdy, R. F. Shamleffer, E. Williams, Arthur Boroughf, James L. Davis, Floyd M. Murphy, Jack Holden, Shirley Brown, Oliver Amlie, Byron Silvius, F. T. Reilly, Paul C. Bird, Howard Kemp, Lawrence Wright, A. Kosynsky, A. E. MacLean, Edward DeLaet, Winfred Pratt, Jr., R. S. Houghton, Werner Howald, Juan Manuel Salazar, H. J. Potthoff, J. N. Street, Kenneth Dressler, Ellsworth G. Dumas, Fletcher W. Hartman, E. H. Goodman, Fred Atherton, Clifford O. Field, Elmer Samson, Morton Dennis Meehan, Dr. G. W. Twomey, Sydney G. Millen, Melville Edwards, R. B. Oxrieder, Morris Harwood, Ron Gurr, Dr. S. G. DeMarco, Robert Rogers, R. Stevens, John J. Kernan, L. E. Williams, Howard Sauberlich, Frank Andrews, William H. Meyer, Jr., Grace M. Beck, Paul B. Silver, Clarence Thompson, Luis Diez, Fred Cox, Fred W. Alfred, Harry Dumpleton, Rafael Penalver Ballina, Albert Pickering, Jr., Jack Staley, Dixon C. Greenwood, G. C. Gallagher, C. V. Hunter, Ernest J. Hormel, L. M. Jensen, Arthur B. Coover, Peter J. Tortoriello, S. F. Carville, H. F. Fey, A. Rasmussen, Fred Webb, Harold P. Leary, Joe L. Stewart, Carrol G. Utermahlen, Jacob Reichler, Ed McKay, J. Wendell Partner, Fred A. Pilgrim, Joseph O'Connell, Thomas P. Jordan, R. W. Sahlbach, Manuel Betances Schradieck, George Munz, Leon Stabler, Caleb A. Wilkinson, Chas. A. Spielman, James Chandler, Leo Herz, Matthew Bills, R. B. Staton, Flavio Mascarenhas, Walter J. Dustin, G. T. Beyer, Thomas Fallon, Edgar J. Vassallo, J. T. Atkinson, Jose Lopez, N. C. Smith, Arthur Hamilton, Augusto Anca, D. W. Parsons, Gilbert L. Harris, Fletcher W. Hartman, Lionel E. Gleason, Roy E. DeMent, James L. Davis, E. W. Turner, Frank W. Edlin, Howard Adams, Jr.

What's New in Radio

(*Continued from page* 301)

cast listeners, also for hospital group systems and other large institutional sound distributing installations.

Down to 4 Meters

(*Continued from page* 268)

the i.f. amplifier is equipped with a crystal filter which provides extreme selectivity when needed. By these means the superheterodyne circuit is excellently adapted for ultra high-frequency service.

A superheterodyne receiver having the i.f. features described would still be susceptible to ignition noise and its use would therefore be largely limited to suburban and rural sections. But this problem has been overcome in this new receiver by incorporating a built-in Lamb noise silencer—the addition of which is particularly effective in the reduction of automobile ignition and similar noises. Thus, it would appear that those interested in ultra high-frequency reception can now obtain full advantages of the superheterodyne circuit but without the disadvantages which have accompanied the utilization of this type of receiver in the past.

The Ultra Skyrider was not designed exclusively for ultra high-frequency reception but rather to cover the entire short wave broadcast spectrum and the higher amateur bands. Its range extends from 5.65 to 80 mc. It was designed to provide excellent coverage of ultra high-frequencies and then the range was continued to as low a frequency as could be effectively incorporated without sacrificing the ultra high-frequency efficiency.

This range is divided into four bands as follows: 5.65 to 11:45 mc., 10.5 to 21.35 mc., 19.6 to 38.3 mc., and 36.4 to 79.5 mc. The ranges are selected at will by means of a band switch on the front panel. Coil switching was, of course, a difficult thing to accomplish, the complications multiplying rapidly with increasing frequency. At 79.5 mc. one cannot afford even what are known today as "short" leads. The problem was worked out, however, by mounting the coils directly on the band switch, thus reducing leads to an absolute minimum and concentrating the inductance in the coils where it belongs.

Ten tubes are employed. A 6K7 is used in the tuned preselector stage which functions in all bands. The r.f. oscillator is a 6C5 with a 6L7 used as the first detector. There are two i.f. stages; the first using a 6K7 and the second a 6L7. A 6R7 serves as the second detector and beat oscillator. The noise silencer amplifier is a 6J7, with a 6Q7 as the noise silencer rectifier and first a.f. stage. A 6F6 is used in the power output stage and a 5Z4 rectifier for the power supply.

Figures 1, 2 and 3 show measured sensitivity, selectivity and fidelity of the new receiver. Unfortunately laboratory technique has not developed to a point where accurate measurement of sensitivity is possible in the ultra high-frequency range, therefore no attempt is made here to show the sensitivity of band number 4. For bands 1, 2 and 3 the average sensitivity is better than ½ microvolt, as shown in Figure 1. This is clear evidence that these ranges have not been neglected in the process of design.

The selectivity of an u.h.f. receiver is almost entirely limited to that of i.f. amplifier, the r.f. circuits contributing substantially nothing, although they are help-

ful in image suppression. For this reason the curves of Figure 2 may be taken as representing the overall selectivity of the receiver. If anything, the actual selectivity in the lower frequency ranges will be somewhat better than shown because the r.f. circuits in these ranges do contribute to some small degree.

Figure 2 is of particular interest as it shows the i.f. selectivity for the three different settings of the variable selectivity knob on the front panel. In the "sharp" position selectivity is adequate for most purposes but when extreme selectivity is required the crystal filter may be switched in. This crystal filter incidentally may be used on voice as well as on c.w. and while appreciable side-band cutting will occur on voice reception, signals are nevertheless entirely understandable. The degree of selectivity obtained in the "sharp" position is too great for satisfactory reception of most transmitters employed in the 5-meter amateur band. For such transmitters the control is set in either the "medium" or "broad" position. The "broad" position provides an adequately wide acceptance range for even the most unstable signals. Incidentally, this arrangement for "expanding" the i.f. makes it possible to avoid side-band cutting in the reception of high fidelity broadcasting, the type which will be most common in the ultra high-frequency ranges.

The audio-frequency fidelity as shown in Figure 3 represents a considerably better tone range than is found in any but high quality broadcast receivers. With the tone control knob set in the extreme high position the over-all characteristic is flat within 10 db. from 60 cycles to 6000 cycles. On the other hand where inter-station interference or a high noise level are encountered the higher frequencies can be considerably attenuated, by setting the tone control to the extreme bass position, as indicated by the heavy line of Figure 3.

One of the outstanding features of the Ultra-Skyrider is the complete simplicity of tuning and excellent degree of band spreading provided. The main tuning control is calibrated directly in frequencies, making it possible to tune the receiver to the desired frequency range in the usual manner. Even this is simplified by a "free wheeling" arrangement by means of which a quick turn of the knob keeps the dial spinning until the desired frequency is reached. The band-spread knob is then brought into play. This operates a 200-division scale which moves behind the small circular window at the right of the main dial. Tuning of the 5-meter band, for instance, is actually spread over the entire 200 divisions (180 degrees) of the band-spread dial. The 10-meter amateur band likewise spreads over this entire dial while the 20- and 40-meter bands are each spread approximately over 170 divisions.

The front panel controls include the following: tone control and a. c. switch, audio gain control, r.f. gain control, noise silencer control, band switch, crystal switch, crystal phasing condenser, variable selectivity control, beat-frequency oscillator switch and injector control, beat frequency pitch control, a.v.c. switch, send-receive switch, main tuning control, band-spread tuning control. From this list of controls it will be readily recognized that the receiver offers an unusual degree of flexibility and adaptability for all types of services. Amateurs will be particularly interested in the beat-frequency oscillator system. Not only does it permit the beat note to be adjusted over a wide range either side of zero beat, but it allows the beat-oscillator voltage to be varied in accordance with the strength of the signals being received, thus providing the maximum response regardless of whether the received signals are weak or strong.

The Radio Beginner

(*Continued from page 277*)

voltage and grid voltage, which will have the same influence on the plate current. For instance, if the grid-voltage is made .1 volt more negative—reducing the plate current—and it takes 10 additional plate volts to return the plate current to its previous value, the amplification factor is $\frac{10}{.1} = 100$. The oldest tubes had an amplification factor of only 6 or 8, but the 6J7 has a mu of 1500.

The *"a.c. plate resistance"* of a tube is simply the resistance of the plate circuit for alternating currents.

The *"mutual conductance"* of a tube is the ratio between a small increase in plate current and the increase in grid voltage producing it. For instance, increasing the grid voltage by 1 volt may result in an increase of 2 ma. in plate current. The mutual conductance is then $\frac{.002}{1} = .002$ mho. or 2000 micromhos.

The three quantities are related as follows: Mutual conductance in micromhos × plate resistance = amplification factor × 1,000,000.

When a tube has an amplification factor of 100 it does not necessarily mean that it will amplify 100 times. It does mean that one might think of the tube as a generator with 100 times the applied grid-voltage with an internal resistance equal to the a.c. plate resistance. This increased voltage divides across the generator and the plate load in proportion to their resistance. In order to realize a great part of the amplification, the plate load resistance must be very much higher than the a.c. resistance and that is not always practical. Tubes with the highest amplification factor generally have the highest a.c. resistance. So, the 6J7 with a mu of 1500, generally cannot give a gain greater than 200 at radio frequencies and not more than 100 at audio frequencies.

Figure 1 shows the untuned input section of the receiver as it was shown last month, before the transformation. Figure 2 shows the complete circuit after converting the r.f. stage to the tuned type. All the necessary holes for mounting the added parts were shown last month in the chassis layout. The coil socket with its shield as well as the tuning condenser are to be mounted as shown in the photographs. The resistor R1 is removed and the primary winding of the plug-in coil connected in its place. The grid circuit of

(*Turn to page 316*)

The Technical Review

(*Continued from page 298*)

operation and applications of the 6L6 tube.

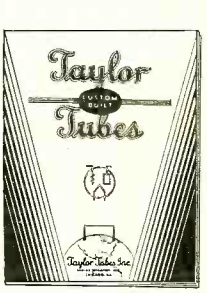
A Volume-Compressing Method for 'Phone Transmission, by Wilbert B. Smith, QST for September, 1936. A scheme for keeping the audio level nearly constant automatically. The method employs a bridge circuit with tungsten lamps in two of the arms.

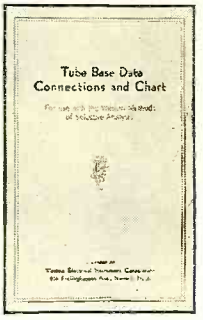
Signal Generators: High or Low Power?, by Malcolm Ferris, Radio Engineering for August 1936. The writer discusses the respective merits and limitations of "high power" and "low power" signal generators. There is some worth-while information on attenuators.

Free Bulletins

Handbook on Transmitting Tubes

RADIO NEWS offers through the courtesy of the Taylor Tube Company a large 30-page catalog and handbook listing the complete line of Taylor transmitting tubes with operating characteristics and application data. It also contains transmitter construction information, LC charts for all types of transmitting tubes and typical rectifier circuits applicable to amateur use. This is a very helpful book for the radio amateur and station engineer and they can obtain free copies by including on the request their amateur call letters, station or organization with which they are affiliated. Send requests to RADIO NEWS, 461 Eighth Avenue, New York City.





Tube Base Chart

RADIO NEWS offers through the courtesy of the Weston Electrical Instrument Corp. a very helpful tube base chart showing the base connections for all metal and glass type tubes. A convenient table in the folder classifies more than 300 makes and types. To obtain this folder, simply send in your request to RADIO NEWS, 461 Eighth Avenue, New York City.

RADIO NEWS Booklet Offers Repeated

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

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

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

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

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

Je1—Sound Equipment Catalog of the Webster Co. Free.

Je2—Radio Parts Catalog of Allied Radio Corp. Free.

Je4—Radio Supply Catalog of Wholesale Radio Service Co., Inc. Free.

Je5—Spring Radio Catalog of Radolek Co. Free.

Jy1—Tube Engineering Bulletin on Harmonic Analysis of Modulation. Ken-Rad Corp. Free.

Jy2—Free Tube Chart of the Raytheon Production Corp.

Jy3—Public Address Catalog of Operadio Mfg. Co. Free.

Jy4—Latest Radio Parts Bulletins Utah Radio Products Co. Free.

Jy5—Commercial Refrigeration Booklet of the Frigidaire Corp. Free.

Jy6—Short-Wave Catalog of Harrison Radio Co. Free.

At2—Modulation Booklet. United Transformer Corp. Free.

At3—Precision Instrument Catalog. Clough-Brengle Co. Free.

At4—P. A. Equipment Catalog. Wholesale Radio Service Co., Inc. Free.

At5—Amateur Radio Booklet. New York Wireless School. Free.

S1—Catalog on Permanent Magnet Speakers. Cinaudagraph Corp. Free.

S2—Recording Equipment Catalogs. Presto Recording Corp. Free.

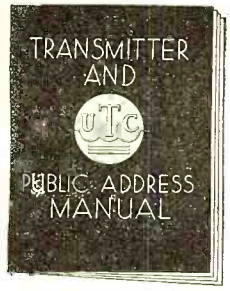
S3—Cornell-Dubilier Corp. Folder on New Service Condensers. Free.

S4—Webster Company Catalog on Sound Systems and Accessories. Free.

S5—Transformer Replacement Catalog. United Transformer Corp. Free.

O1—1937 Catalog of Insuline Corp. Free.

O2—Transformer Guide, Johnson Transformer Co. Free.



Latest Transmitter and P. A. Manual

THIS new large 42-page technical book published by the United Transformer Corp. is devoted especially to the interests of the radio amateur and sound engineer. It contains technical information with circuit diagrams and parts data on the latest sound and transmitter equipment. The transmitting circuits range in power from 10 watts to a 1 kilowatt unit. There is an instructive chapter on controlled carrier modulation, one on audio circuits, a chapter on plate power design and several charts to facilitate calculations of capacitance, inductance, reactance and decibel values. The price of the book is 25c and any reader desiring a copy can obtain same by forwarding his remittance in U. S. stamps, check or money order, to RADIO NEWS, 461 Eighth Avenue, New York City.

Radio Physics Course

(*Continued from page 296*)

the misleading statements often made when speaking of this action. Also notice that the condenser will act exactly as described above only when its reactance is very small compared to the reactance of the load it is shunting.

If the reactance of the load were equal to that of the condenser at the particular frequency being considered, the latter would only exert half as much filtering action since now half of the transferred electrons would go into the condenser and half would go directly through the load. It is for this reason that the load impedance should preferably bear a definite relation to the impedance of the filter. The condenser and inductor really form a series circuit across the source of e.m.f.

Television Like Home Movies

(*Continued from page* 266)

synchronizing signal is narrow and vertical.

The focussing device for picking up the television signal actually looks somewhat like a camera on wheels. It contains a large tube, operating on photo-electric and cathode-ray principles combined. This tube generates, by an electrical scanning method, voltages corresponding to the light and shade of the television picture which is focussed by the lens onto the signal plate of the tube. A special amplifier in the control room strengthens these varying voltages about 10,000 times, to modulate the ultra-high-frequency transmitter. Also mixed with this television signal, as it is transmitted, are the synchronizing and blanking impulses. These impulses when received by the receiving set control the movement of the electron beam in the receiving cathode tube which rebuilds the picture.

In the studio there were, of course, accompanying the picture transmitting apparatus, microphones and audio-frequency amplifiers and another radio transmitter for sending the sounds to our receiving location.

A separate pick-up device consisting of a specially built projector, was used for transmitting the motion picture part of the program. This apparatus energizes the same radio transmitters that were used for televising the actual scenes.

The receiver used at Mr. Grimditch's home, over which we saw and heard the program, comprised a combination sound and television receiver, an experimental Philco model which tuned over the frequency range of 42—86 mc. These receivers tune the sound and sight channels, separately, and tuning in the dual program was accomplished very much as one would tune the usual sound receiver. They are not at all difficult to operate. Front and rear views of this receiver are shown on these pages. The rear view shows (at top) the metal container for the cathode-ray tube and surrounding this are the units for synchronizing and controlling the beam. The power units are distributed along the bottom of the cabinet.

The total number of tubes used in the set is 36. Looking at the front of the cabinet one can see (at the top) the hinged mirror which reflects the picture to the listeners' eyes and lower down on the front of the cabinet (at right and left) the sound and television tuning knobs and dials.

Philco officials stated that they have been working steadily but quietly on television for a number of years, first using 60-line scanning disks in 1928. In 1932 they started transmissions over their experimental station W3XE transmitting 240-line pictures by an electronic method. The next work carried them through the necessary research work in the vacuum tube laboratory, on special tubes to be used in the system. We understand that Farnsworth collaborated in this work. The next experiments were made with 345 lines and in due course the necessary wide-band amplifiers were developed and improved. Other special new tubes were designed to meet the requirements and once again defects and distortions had to be eliminated one by one. The first experiments with 345 lines were made by wire; then later the experimental television transmitter W3XE was rebuilt and the power increased to 1½ kw.

Next in line came transmitting experiments, over the city of Philadelphia and its suburbs, to find what power was necessary to flash television signals to distances in a circle at least 7 miles from the transmitter. Various types of antennas and transmission lines were tested. A special mobile truck was employed, fully equipped with television apparatus, for plotting field strength for satisfactory service throughout the city.

Along with this work were researches in combination television-and-sound receivers, to develop the apparatus necessary to receive the programs.

With all these units of a complete system developed and operating satisfactorily, field tests were started on the system in December, 1935. Many changes have been made since then and starting in June, 1936, another series of experimental programs were broadcast nightly by the station on 51 and 53.25 mc. As a result of these tests the present apparatus used by Philco was developed so that this very excellent demonstration could be made. Philco engineers tell us that work is now progressing on still another stage of progress. Mr. Larry E. Gubb, President of the company, when asked how soon we would have television commercially, stated "Commercial television will not come during 1936", but he added "Television is going to be a tremendous industry when it does come." Mr. James M. Skinner, Chairman of the Board, stated that he "believed television sets could be sold as soon as a reliable service started." Sayre M. Ramsdell, Executive Vice President of the company told us that "Philco's main objective in television, at present, was to produce and receive a good picture." He also said he "would hate to see a patent monopoly set up in television," although he thought a patent pool like that in the automobile industry, so that *everybody could use these patents to build a big industry* would be advisable. He also stressed the point that *a single set of television standards must be arrived at* and that this standard should be set high enough to give definition as good as home moving pictures.

The "Spiderweb" Snags All Waves

(*Continued from page* 292)

guy rope which was used in this particular installation to counteract the pull of the transmission line which would otherwise pull the antenna out of shape.

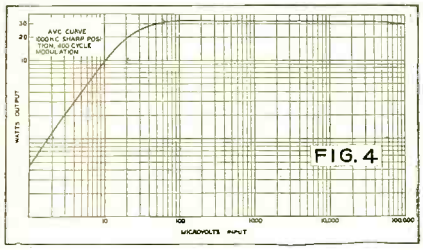
At the receiver end of the transmission line is another matching transformer which automatically selects the proper antenna for the frequency to which the receiver is tuned. This selection is accomplished electrically and therefore does not involve any mechanical operation on the part of the listener. The transmission line is simply connected to the two terminals provided for it on this transformer and the other transformer terminals are connected to the antenna and ground terminals of the receiver.

At first glance this antenna may appear to be a rather complicated arrangement but after all it is only by means of complicated arrangements that good all-wave reception is possible. Actually, all of the complications in this case have been taken care of by the manufacturer with the result that all the fan has to do is to erect the antenna according to instruction which come with it.

"Lab-Built" Super

(*Continued from page 287*)

making tone almost unintelligible. Comparing the extremes of this and the other curves of Figure 4 shows unlimited control of the tone of the Masterpiece V; its knobs



can be easily set to give any tone desired on any program.

All these curves were taken with the fidelity knob is set to "HI-FI." When it is set "sharp", the result is to bend every curve sharply down at 4000 cycles.

Figure 3 shows volume expansion, plotted against the calibration of the "expander" knob whereby volume expansion can be adjusted to make up for broadcast station compression of all different types of programs. This 20 db. expansion range, possible only to a completely co-ordinated expander circuit, is what enables restoration of full emotional life and vigor to music.

Figure 4 depicts a.v.c. action as measured at 1000 kc. in accord with I. R. E. standard measurement practice. It shows constant output (to the ear, which can barely tell the 3 db. difference between 15 and 30 watts close by) to be attained, and held constant, for all signals of 15 microvolts or stronger. This is theoretical perfection itself, preventing overloading or blasting on strong signals, and releasing full amplification for weak signals. Figure 4 shows how total power output is held to not over 32 watts, or the "undistorted" maximum.

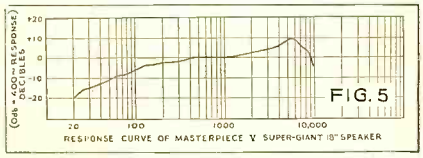
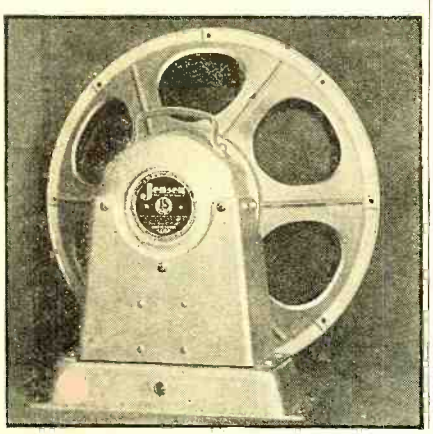
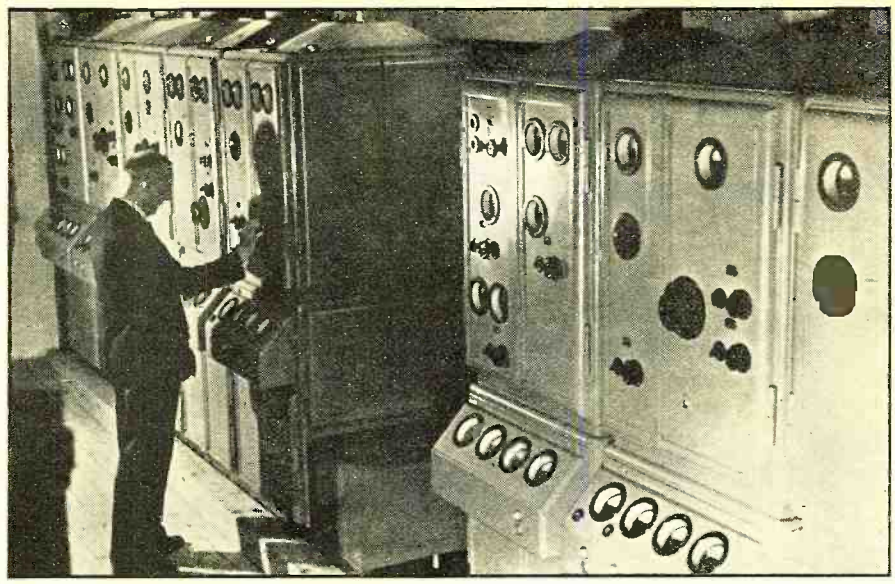


Figure 5 shows the unusual flatness of the 18-inch, 70-pound Super-Giant speaker's (shown in photographs) response curve, a feature that can be had only in large and heavy loud speakers. This curve does not show the 700% greater efficiency of this speaker when compared with the average dynamic speaker, which provides 700% greater effective power.





QRD? QRD? QRD?

CONDUCTED BY GY

FOR some time past we have intermittently advised the new, embryonic future radio ops to go to the nearest buzzer room and get their name on the list until they receive the coveted call to go somewhere and report for duty. There is no other easier manner on going down to the sea in ships. Of course, there is the airways and that is very simple. You must be able to pass their exams, and if this is done I am sure they will be able to find a berth for you. But personal recommendations, etc. and etc., won't get you anywhere with the buzzer room gang or the airways, although proper schooling certainly makes an examination easier.

IN a recent communication from the head of the ARTA a few paragraphs were devoted to the quoting of certain remarks which were made by various members at the National Convention of the ARTA recently held in San Pedro. From some of the cracks passed, it would seem that a few of the boys must have thought that his cracks might be able to get by the official secretary of the meeting or that the San Pedro local was an entity or the whole shooting-match by herself. Was it because the boys were in their own back yard that remarks were made without fear of reprisal or just because it looks good to a bunch of delegates to spout off with anything that might come into the mouth? Y'know kids do that to show off!

With television getting "hot" in America it would be advisable to have some of our own forward-looking operators start to get a basic training in the art, for when commercial operation begins, those who have this training will find ready employment. Photo in our heading this month shows an operator holding down this important post in the Berlin television station.

Some hot and heavy action is now being pushed forward by the ARTA in regards to the organizing of the airways operators because of one big reason . . . some one else is trying to beat them to it. Some one by the name of Welsh wrote a letter to all the Airlines ops and, designating himself a committee of one, he named himself president and is proceeding to enroll members and, unless the ARTA steps, he will not find much competition. We have spoken about this situation for some time past, but the only organization which could do something concrete has been having so much trouble looking after other people's troubles, that it couldn't take care of its own boys. I suppose this chap Welsh will act like a hot needle so maybe we'll get some action, and it's an ill wind that doesn't blow somebody some good.

Four years ago a brother op was stricken with a rare ailment and has been residing since then in the U. S. Marine Hospital at Staten Island, N. Y. He has never left the hospital during all this time and has tried to help his active brothers on the outside by passing the word along to other ops who came to the hospital, delegating, recruiting, and in other ways making himself invaluable. It is not expected that he will be coming out next week, but he may be out within the next few months. In the meantime, anything you may desire to send to him to make his stay more pleasant will surely be appreciated by him. Send your contribution either to this column or else to the Hospital Fund of the ARTA.

Well, our Westcoaster is strutting his stuff with the announcements that the lay-up of some ships in the coastal service and the sale of another line which will be operated on the East Coast takes a lot of jobs from those ports. But the West's loss is the East's gain and more jobs out of the Static rooms on the East Coast. Shippers are pooling resources and trying to figure out ways and means of moving merchandise even if there is another marine strike in these parts. Are they expecting another????? Here a Haddock quotation . . . "Every member in ARTA is a person definitely assigned to one local. He is not a member of all locals." From this we see that a member of any local, say, Chicago, or New Orleans, will not necessarily be accepted as eligible to ship out of New York or San Pedro. Operators travel extensively, sail this year out of Pedro, next out of Mobile and perhaps five years from now the same op will be a static room occupant in Boston. The dictatorial powers and demagogic rule of ARTA delegates and officials prevent travel at the option of the op. San Pedro officials demand information as to vacations, whyfore and wherefore, etc. Jim Hartness of ARTA

San Pedro assignment committee lets Jordan handle the assignment work, and a letter addressed to him is answered by Jordan. A ship was sold in San Pedro in July, 1935, sailed to the East Coast, and in June, 1936, Hartness wanted to know about the assignment of an operator of that boat. Some one should bet him on the Schmeling-Louis fight, or last year's football game. . . . Many ops found jobs in the Los Angeles-Honolulu annual yacht race. This is an annual race of sailing vessels, 40 to 80 feet long, having from 4 to 12 in the crew. Sails July 4th and the first ship into Honolulu wins. Operators get good pay and all expenses in the islands, plus first-class fare home. Which just goes to show that there are more ways than one of bringing home the bacon, so with a ge . . . 73 . . . GY.

Prize Contest

(*Continued from page 288*)

"The equipment is as follows: Supplementing the usual oscillators, analyzers and portable apparatus, are a grid-dip oscillator, an a.f. oscillator and a special 12-watt, radio-frequency generator which is used to locate and break-down intermittent condensers. Special leakage tests are provided for paper and electrolytic condensers. All useful a.c. and d.c. voltages are available directly from the racks. Two antenna and ground leads are installed at the bench, a weight and pulley arrangement keeping them out of the way except when in use."

Note the soldering-iron holder constructed from a telephone desk-stand. This is so arranged that when the iron is placed on the holder—built around the stubs of the receiver hook—the 100-watt lamp is placed in series with the iron, keeping it hot enough for instant service, but not hot enough to burn off the tin. Adequate lighting is no secondary feature in Mr. Martin's trim establishment, and we imagine the electric fan contributes to comfortable and efficient servicing these summer days. The bench illustrated is only one of the two in Mr. Martin's shop, the second, similar in appearance, being designed exclusively for battery-operated and auto-radio receivers. We trust a photo of this bench, with full details, will be coming through in the near future.

THIS MONTH'S WINNERS

First Prize—To Hubert C. Martin, Marion, North Carolina. $10 for equipment and arrangement!

Second Prize—To D. H. Thompson, D. H. Thompson's Radio Service, "The Radio Man," Pecatonica, Ill. $5 for a window display that is particularly pertinent right now!

Third Prize—To L. A. Mayberry, Barron-Mayberry Radio Service, "Specialists in Radio and Sound Equipment," 128 North Beard, Shawnee, Oklahoma. $4 for a neat layout, from within and without the shop!

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

SECOND PRIZE

Animated Election-Time Window Display

D. H. Thompson, who appears genially

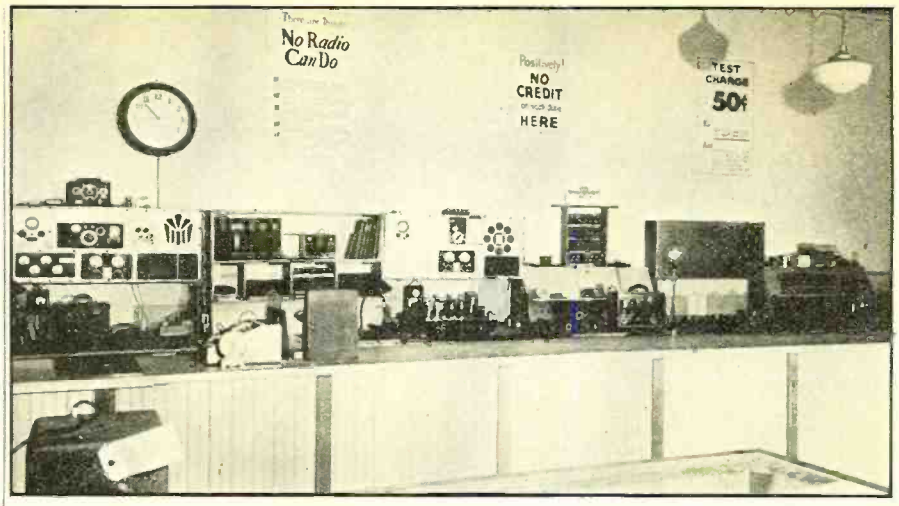


FIGURE 5

behind one of his own microphones in Figure 2, sends us the photograph of a window display (Figure 3) which he designed for the Roosevelt-Hoover campaign of 1932. It merely needs the obvious substitution of Landon for Hoover to bring it up-to-date, rendering it applicable to the present fracas. Mr. Thompson explains: "The background and the cut-outs of the donkey, elephants, microphones, etc., were made of corrugated strawboard and painted with show-card ink. The background was light blue with yellow drapes painted at the sides and top. The lettering is in bright red. The elephant, painted black and white, nodding its head, opened and closed its mouth and waved its right fore-leg in front of the mike. The donkey, in the same colors, wagged its ears, waved its left fore-leg in front of the microphone, and switched its tail up over its back. Meanwhile the bewildered voter scratched his head in perplexity. This figure was made of stiff cardboard, with a dark-blue coat and white trousers. "The Voting Public" was lettered on the background just under the figure.

"The animation was accomplished by a system of small crankshafts and draw-bars belted together with pulleys and driven by a small fan motor through a speed-reducing gear. The donkey's tail was made of a short length of coiled spring with a piece of stout fishing cord running through it and attachd to the outer end. Tightening the cord raised the spring in a most realistic manner. The spring was covered with a piece of black shoe-string tubing, with the end frayed out to form a tassel on the tail. Yes! It certainly paid for itself in bringing in new repair work. Try it yourself.

THIRD PRIZE
Sales Appeal— Inside and Out!

Figures 4 and 5 are an excellent exemplification of a neat layout from either side of the show window. The bench itself is covered with masonite, and has the usual complement of drawers, sockets, outlets and shelves. Rider's manuals will be seen conveniently shelved—as are the shop tubes, painted silver for identification. The test equipment is mostly Hickok and Weston, and consists of the usual oscillators, checkers, analyzers in both portable and shop designs. A Solar direct-reading condenser tester is employed for checking capacitors.

Noisy tubes are located by means of a special noise tester, consisting of a combination of sockets with a filament-voltage selector switch and speaker mounted in an attractive countertype case. The noise output of the tube is fed through a 5-stage amplifier mounted under the counter, and then back up to the speaker in the noise-checker proper. A gain control is used with this amplifier. Short-circuited tube elements are located by a modern neon lamp short-circuit tester.

Each of the three panels has a built-in test speaker with a rotary 11-point switch for matching various plate and coil impedances. Individual field substitutes of a choke in series with a 5000-ohm 50-watt resistor are also provided. Each speaker has its own and independent field supply.

Mr. Mayberry, joint proprietor of the shop, has been in the game since 1923, which year just about marks the beginning of commercial radio servicing.

FIGURE 4

Midget Condensers

(*Continued from page 289*)

produce a roughened surface. The polished finish of the aluminum is converted into a fine sandpaper-like surface, which when viewed under a microscope reveals millions of hills and valleys. As a result an etched plate condenser having the same rating as to life and capacity, can be built with only one-fourth the bulk.

At present the final step in dry-electrolytic condenser construction is the introduction of Regenerated Cellulose, a special cellophane of high absorption, absolute chemical purity and uniform texture as a separator medium. Many other improvements have been made and are constantly being made in the chemical composition of the electrolyte, the method of forming plates, etc., with the result that the reliability of the modern dry electrolytic condenser makes it one of the most dependable units of modern radio receiver construction; and secondly, the tremendous reduction of physical size has been accomplished with an actual improvement in condenser performance.

Build Television

(*Continued from page 267*)

on an intermediate frequency of approximately 8,000 kilocycles. The RCA 954 or 955 "acorn" tubes are recommended for use in circuits carrying ultra high-frequency radio energy, except for the first detector of a superheterodyne receiver, where the metal tube 6L7 is recommended.

"The receiver 'audio' channel must be resistance-coupled and capable of substantially uniform response over a range of from 24 cycles to 800 kilocycles, in order to reproduce faithfully the high-definition picture that is broadcast. A cathode-ray tube must be used as the image reproduction device, since it is practically impossible to construct a scanning disc of sufficient accuracy. Data on cathode-ray tubes, and a gas triode for producing saw-tooth scanning waves are given in the booklet, "Cathode Ray Tubes and Allied Types," Technical Series TS-2, obtainable from the RCA Radiotron Company, 415 South Fifth Street, Harrison, New Jersey, and at large radio stores.

"The high-frequency receiver scanning source should produce a saw-tooth wave-shape of a frequency of 7200 cycles. This is applied to the pair of deflection plates, in the cathode-ray tube, which produce a horizontal deflection. The low-frequency scanning source should also produce a saw-tooth wave-shape, and of a frequency of 24 cycles. This is applied to the pair of deflection plates which produce a vertical deflection. If the image appears upside-down, reverse the connections to the low-frequency deflection plates; if printing reads backwards, to the high-frequency deflection plates.

"A negative image is radiated from the transmitter. In the particular receiver constructed, if the image shown on the cathode-ray tube is a 'negative' (white objects reproduced black, and vice-versa) one more or less, stage of 'audio' frequency amplification (following the second detector) will give the proper 'positive'.

"Synchronizing pulses are transmitted at the end of each line and at the end of each complete image for keeping the receiver scanning sources in step at the 7200- and 24-cycle frequencies, respectively. A small amount of the image signal should be supplied to the grids of the gas triode tubes to synchronize the sources.

"Extensive data on television reception is given in the December 1933, November 1934 and March 1936, issues of 'The Proceedings of the Institute of Radio Engineers'. This publication can be consulted at public libraries or obtained from the Institute of Radio Engineers, 33 West 39th Street, New York City.

"Reports on reception results are requested. Please give the date, time, signal clarity and strength, amount and nature of interference, your address, location of nearby hills and large buildings, type of receiving antenna and its height above ground, type of receiver, and your signature. Standardized reception report forms may be had from the Television Division of the Don Lee Broadcasting System, Seventh and Bixel Streets, Los Angeles, upon the receipt of a stamped self-addressed envelope." Harry R. Lubcke, Director of Television, Don Lee Broadcasting System.

B Batteries for Longer Life

Radio "B" batteries of new design with metal tops and plug-in connections have recently been brought out by the Ray-O-Vac Co. The manufacturer points out that these new batteries offer increased capacity.

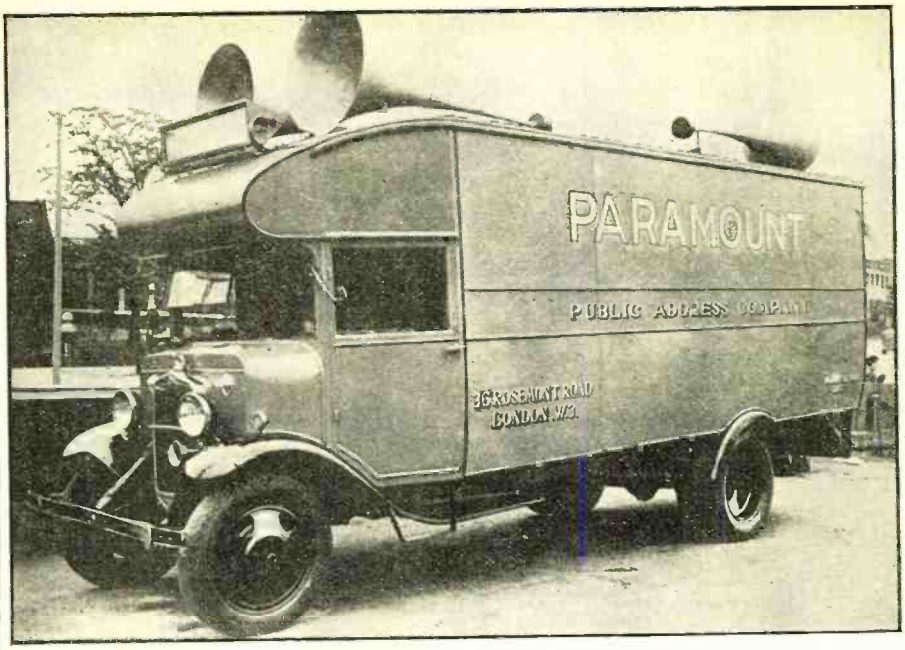


FIGURE 3

The Service Bench

(*Continued from page 294*)

facing a crowd of 6000 attending the weeking Victorian Amateur Athletic Championships at Melbourne. The particular feature of Mr. Moroney's equipment is the fact that the speakers can be readily demounted, and the truck employed in routine service work. All test apparatus is carried in the truck—it is a veritable mobile laboratory—and well over 90 percent of his service work is done in the home of the set owner, thereby eliminating the overhead associated with an elaborate service shop. Mr. Moroney operates under contract with several dealers who possess no service facilities of their own and on a flat-rate yearly basis with individual customers. For a charge approximating five dollars in American money, payable in two semi-annual installments, he guarantees to keep his clients' radios in perfect condition regardless of service and replacement requirements. There are no other expenses involved with the exception of new tubes for which the customer pays fifty percent off list price.

THE DAY'S WORK

S. Solway, a familiar contributor to this department and proprietor of the Ansol Radio Service, Monticello, N. Y., sends us the following notes from his service record book: "Zenith 430-440: The complaint was low volume. Look for a partial short in the .5 mfd. condenser connected in the second detector plate circuit—left side of the chassis, alongside of the volume control.

"Stromberg Carlson—68: The set plays normally, except for sparking sounds inside the chassis. Test condenser number 65 in the S-C. diagram. This capacitor is connected as an input filter condenser, and is located in the small container in the right center of the chassis. Intermittent break-down will be discovered in the majority of cases.

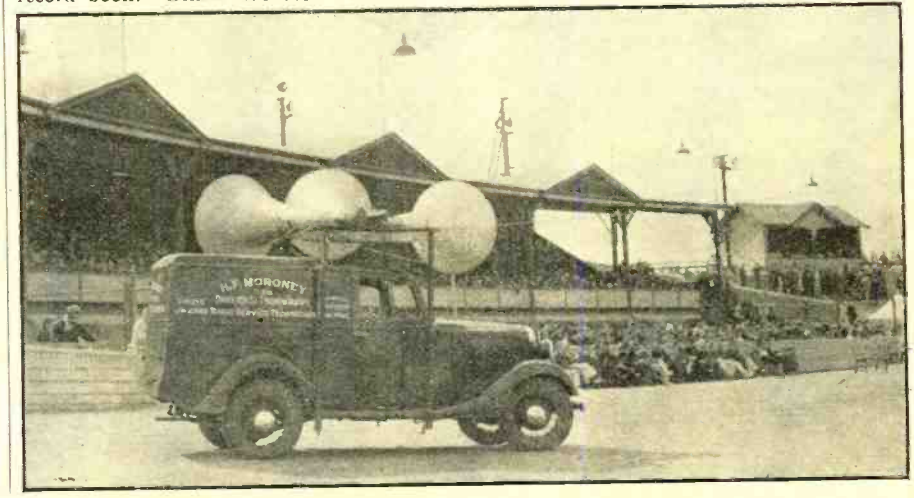
"Silvertone 8 Tube: Instances of motorboating. Make the usual tests, and if everything checks okay, change the oscillator grid resistor; 100,000 ohms is the correct value.

"Emerson 102-104: This set went dead, and checked no plate voltage at any sockets. The obvious, of course—a shorted condenser in the by-pass block—in this case the one connected to the red and white lead. In the case of intermittent reception with the same receivers, test the .25 mfd. condenser bypassing the 75 tube plate circuit—connected with a red wire on the high side.

"Stewart-Warner R-100: Oscillation accompanied with abnormally high voltages. Replace the orange resistor in the center of the resistor mounting board. The correct value is 20,000 ohms.

"Crosley 42S: A fairly common com-

FIGURE 4



plaint with these receivers is distortion. Check the double .5 mfd. condenser used for by-passing the detector and first audio stage bias resistor for leakage between the sections.

"Crosley 124: In puzzling cases of fading, replace all condensers in the four-unit can marked W22412 with .1 microfarad capacitors."

Thank you Mr. Solway!

Grunow 8A

"The complaint was low volume, and check showed a heavy plate current in the output tube. The trouble was discovered in the filter condensers which are enclosed in a fiber box in turn fitted inside a metal case. New filter section cured the trouble. (This doesn't quite check—unless the plate current was measured on the power side of the filter condensers. This would then be the total plate current to the receiver, not merely to the output tube. Ed.)

"Servicing a Philco battery set: First low volume, then cutting out and finally no reception. Could get next to no oscillator signal through the set. It took some time to discover that the very fine wire running from the last tuning condenser section to the grid clip was broken inside the cloth covering. We replaced all grid wires and vowed thereafter to test all grid circuits as a matter of general principle.—J. O. Roberts, Roberts Radio Service, St. Louis, Mo.

Sparton 89-A

James L. Hoard, Providence, Rhode Island, sends through the familiar plaint that justifies voltage measurements as almost a preliminary service procedure: "These receivers occasionally become inoperative due to a punctured filter section in the power unit. Disconnect the red lead to the choke coil and connect a new 2 mfd. 1000-volt condenser between the choke and ground. If a compact condenser is available, it can be mounted atop the power pack and under the shield."

SERVICE NOTES

The "Philco Serviceman" (Philco, R. M. S. house organ) publishes the following interesting data on radio noise. This should be of aid to servicemen in trouble-shooting on noise complaints. The table is self-explanatory.

Responsibility for Noise	Complaints	Percentage
Power Company	2,207	20.6
Other Utilities	595	6.4
Consumers' Equiment	2,735	29.3
Radio Sets	1,214	13.0
Transient and Unfounded	2,583	27.0
Total	9,334	100.0

Consumers' equipment being responsible for the largest percentage of noise, the analysis is continued as follows:

Consumers' Equipment	Complaints	%	% of Total Complaints
Motor Devices	984	36.0	10.5
Interrupter Devices	532	10.4	5.7
Diathermy, X-Ray			
Neon Signs	258	9.5	2.8
Ignition Equipment	119	4.3	1.3
Building Wiring Defects	563	20.6	6.0
Miscellaneous	279	10.2	3.0
Total	2,735	100.0	29.3

All in all, this sums up to a good argument for adequate filters—with additional profits to the radio serviceman!

Service Contest!

Watch next month's issue of RADIO NEWS *for announcement of a new Service Contest.*

The Radio Beginner

(*Continued from page* 306)

the 6K7 is hooked up as shown in the diagram. The dial of the original diode receiver, described in the May issue, can be used here. Of course, those who so desire may use any other kind of dial.

The reader may think that now he needs three hands to tune the set, but actually operation is very simple. The best procedure is to set the left-hand dial somewhere near the point where one wishes to tune and then concentrate on the right-hand dial and regeneration control. After the station has been found, readjust the left-hand dial for best results. It should be remembered that only the detector is ever supposed to oscillate and then only when receiving c.w. signals, or in searching for weak 'phone signals. If the first tube oscillates, no results can be obtained. One can detect the condition with the finger test, as described last month. If this happens, an increase in the resistance values of R2 and R3 should help. The model receiver was stable with the recommended values.

The antenna can be the usual inverted L type with a total length of 75 to 100 feet. A good ground is essential to stable operation.

Parts List

(In addition to those listed last month)

C14 Hammarlund "Star" midget variable condenser, 140 mmfd.
One set of Hammarlund plug-in coils, type SWK-4 (covering from 16-270 meters) (L1).
One Hammarlund broadcast band coil, type BCB4 (L1).
One Bud 2¾-inch dial.

Radio News Super

(*Continued from page* 271)

should be carefully followed with respect to the number of turns to be removed from some of the National 500 kc. coupling transformers to adapt them to the intermediates as used in this Laboratory Communications Receiver.

All the power is brought in through one cable and 7-prong plug the construction and connections of which are described in Figure 16.

It will be noticed that the external connections may be arranged for convenience in actual quick break-in operation.

Figure 3 shows a sort of a picture circuit elevation diagram of the entire crystal master oscillator and harmonic amplifier layout. Every "hot" r.f. lead under the chassis of this part of the circuit is run in shielded cable with the shield grounded.

Figure 17 is a block diagram showing the principal ranges of the frequency changes.

The audio circuit which can be used in several combinations is the audio circuit of the 1-10 receiver. Detail Figure 18 shows the switch Sw3 for connecting Sw2 (see main circuit) through 1-10 detector audio coupling high impedance. This allows the audio gain control of the 1-10 receiver to be used in any of the circuit combinations of this Laboratory Receiver.

Now, let's go back for a minute and look at the fourth stage of the t.r.f. input part of the circuit. This is made regenerative with a time tested method with very smooth and non-critical control. This stage, properly adjusted, gives the required selectivity right after the crystal (if you are using the crystal). Otherwise, it is an additional sensitivity and selectivity control.

One 0-1 scale meter in the signal-meter circuit can be used for accurate tuning and also shows relative signal strength.

The 0-100 scale meter and the 0-1 scale meter are for testing purposes. Closed-circuit jacks on the back of the chassis can be plugged into a show plate-current dip in lining-up or testing the oscillator circuits.

Small HRK 1⅝-inch dials are used on all the front panel knob controls.

The top cover of the aluminum cabinet is hinged at the back for easy access to change tubes, or make trimmer adjustments, etc.

The power cable is shielded and each power pack has an electrostatic shield between the primaries and secondaries of the power transformers. No signal can get into the receiver except through the antenna jacks. Grounded electrostatic or Faraday shields are located between the antenna pick-up coils and the V-1 and V-2 grid input circuits for use with balanced transmission lines to the antennas.

Type 6K7 metal tubes are used in the t.r.f. section, and the 6L7 type is used in the mixer or detector sockets. The diode rectifiers are the 6H6 type. The oscillators and the audio power amplifier use the pentode 6F6 type. For greater amplification and shorter cut-off in the noise amplifier of the "Lamb" noise silencer a 6J7 is used. All by-pass condensers subject to over 100 volts are Sangamo 500-volt mica type.

Now, take a look at Figure 12, showing details of T-1 and T-2. Note that inside the shield and associated with the coil are .0001 mfd. mica condensers as well as small 500,000-ohm grid-leak resistors. The grid leak to the tube comes out the side of the can.

Figure 13 is a detail of coil T-3. Note that this primary goes through shielded leads to both of the plates of tubes V-1 and V-2.

The antenna trimmer condensers are ganged and below the chassis floor.

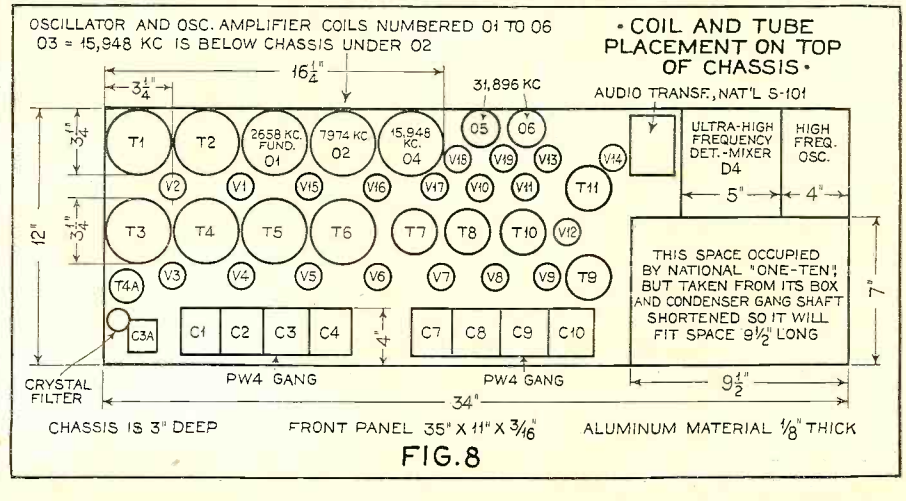


FIG. 8

The inductance of the r.f. coils can be adjusted by means of a small brass slug soldered to a machine screw—see Figures 12 and 13—this is very helpful in aligning.

Coil T-4 is conventional and coil T4A is associated with the crystal filter and shown in Figures 19 and 20. This filter combination is at the front left corner of the chassis, and coil T4A is in the 2½ inch diameter by 4 inches high shield can. The crystal holder, a National CHR is just in front of the coil.

Figure 19 shows detail of switching arrangement for crystal-filter circuit, making use of a double-pole, double-throw knob switch Sw.1. All these switches are Yaxley.

Look now at Figure 5 showing detail of T-7. This is made from a National air condenser tuned i.f. transformer of the 500 kc. type with about ⅔ of the turns removed to tune from 1548 to 1948 kc. Normally T-7 is only partially tuned as there is sufficient gain ahead of this circuit to let a signal through when T-7 has its external condenser gang set at minimum frequency. This external condenser is a National split-stator ST type labeled in the circuit as C-5 and C-6.

Figure 6 shows detail of the T-9 transformer. The coil can should be opened and about 80 turns removed from the primary. Then remove about 36 turns from *each* of the closely coupled secondaries. The primary is tuned by C-9 which is the third condenser in the second PW gang.

Figure 7 shows details on transformer T-11. Do the same operation on this coil as you did on T-9. That is, remove 80 turns from the primary and 36 turns from each half of the secondary. Note that this transformer primary is tuned by CT-11 which is a ST condenser with front panel small dial control.

Further details of construction and operation of this receiver will be given by Mr. Jones in the December issue of RADIO NEWS.

True Tone

(*Continued from page* 291)

accomplished is shown in Figures 3 and 4. Figure 4 gives a block diagram of the amplifier showing that the input is divided into low notes and the balance of normal notes in a proportion which can be controlled by the listener. The two portions of the signal are separately amplified, united again and continue their way through the rest of the amplifier. Figure 3 shows the schematic diagram of the 6L7 tube and its associated circuits. It is seen that the signal divides, one part passing through R1 and the upper part of R2 while the other part passes through R3 and the lower half of R2. This latter part is by-passed by the condenser C2 which removes the higher frequencies from this path. The position of the potentiometer R2 determines the proportion of the two signals to be fed into the 6L7. Note that either channel may be wholly or partially grounded by means of the Fidel-A-Stat control so that normal tone is obtained by grounding the high-mu grid. As the control is rotated away from this grid, the lower tones are fed to the high-mu grid and appear in the output in increasingly higher proportion. When the tone is shaded to soften high notes, the volume is automatically increased to compensate for the apparent decrease in volume. With the use of the single control, it is possible to gain a variety of tone variations that will satisfy anyone's particular taste. The result is illustrated in Figure 2. Curve "A" shows the normal characteristics of a receiver, curve "B" shows the response when

the Fidel-A-Stat is at center position with accentuated lows and normal highs while curve "C" shows the extreme left-hand position with the highs attenuated and the lows accentuated.

Current-Saving Tubes

(*Continued from page 292*)

regular 6-prong base. The base connections of the 6S7G, 6D8G, and 6L5G are the same as those of the 6K7, 6A8 and 6C5 with the exception that pin number one has no connection. Base diagrams of the 6Q6G and the 6N5 are shown in Figure 1.

The characteristics of the 6Q6G and the 6N5 are shown in the Tables.

An Extra Service

(*Continued from page 290*)

With the oscillator adjusted to approximately 100 kc., the receiver should be tuned to any one of the stations operating on an integral 100 kc. frequency. As the next step the oscillator should be carefully adjusted so that its harmonic, if not already interfering with the broadcast station signal, falls directly in the middle of the broadcast carrier, or zero beats with it. Tuning of the receiver to any other broadcast station on an integral 100 kc. frequency will show zero beat between that station's signal and the corresponding harmonic from the oscillator. Each 100 kc. position on the dial not carrying a broadcast signal will be occupied by the clear audio tone of the oscillator.

At this point, if desired, a card can be filled out showing any inaccuracies observed in the marking of the broadcast band dial. Figure 1 illustrates a form suitable for this purpose.

The next step calls for accurate adjust-

INDEX TO ADVERTISERS

ment of the oscillator to 1000 kc. With the oscillator remaining at the 100 kc. position, tune in the oscillator harmonic which falls at 1000 kc. Leave the receiver dial set at this position and retune the oscillator to 1000 kc., tuning it carefully so that the oscillator signal (now the fundamental) is loudest in the receiver speaker.

Now if the receiver is switched to the short wave bands, harmonics will be noted 1000 kc. (one megacycle) apart. The frequencies most important to the short-wave broadcast listener are those from 6.0 megacycles upward. A harmonic will be found at or near the 6.0 mc. dial marking (sixth harmonic of the 1000 kc. oscillator). Likewise the 7.0, 8.0, 9.0, 10.0, 11.0, 12.0, 13.0, 14.0, 15.0 and 16.0 megacycle points will be identified by harmonics.

If the dial has division points between the lines printed at the integral megacycle positions, the broadcast listener will have little trouble figuring out where 6.2 mc. stations may be found. However, most all-wave receiver dials leave much to the imagination in their calibration for short-wave bands. Fortunately these dials usually carry a division for at least every 20 kc. through the broadcast band. Since the dial pointer extends entirely across the face of the dial in most cases, short-wave band positions can be recorded in terms of the broadcast band divisions as indicated under "Band 2" and "Band 3" of Figure 1.

The calibration of an all-wave receiver, even though it cover relatively few points, will prove a real benefit to the set owner.

The accuracy of calibration using this method is excellent. The original 100 kc. oscillator setting is obtained by beating the oscillator against a broadcast signal. Broadcast station frequencies are required by law to be held within plus or minus 50 cycles of the assigned value.

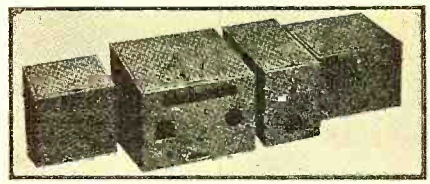
Prior to the calibration the receiver and oscillator should be permitted to operate until the parts in each unit reach a normal operating temperature.

Dial calibration or "spotting" is only one of the services which can be provided in radio with tools already on hand and without expenditure for materials. The service man who capitalizes on these opportunities for "extra service" will be well repaid in new business and prestige in his community.

Make Special Cabinets

(*Continued from page 275*)

THE Korrol Manufacturing Co. specializes in cabinets and chassis made and drilled to specifications and finished in cadmium plate, crackle enamel or as required.



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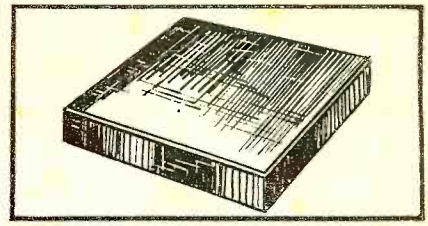

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Model 1200-B. Similar to Model 1200-A but with copper oxide A.C. Includes low (2) volt A.C. range. Dealer Price, $26.67.

VACUUM TUBE VOLTMETER
Model 1250. The ultimate in Supersensitivity. No current drain and self calibrating. Accuracy independent of changing tube values. Readings are all direct on a Triplett linear scale twin instrument. Dealer Price, $33.34.

AUDIO OSCILLATOR
Model 1260. Generates pure sine wave without distortion or harmonics. Laboratory accuracy. Wide frequency range. Signal strong and impedance matching is variable, permitting matching with low, medium or high impedance input of amplifier or P.A. systems. A. C. operated. Dealer Price, $28.33.

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Model 1210-A. Tests all types of tubes, under R.M.A. standards for load conditions. Direct reading colored GOOD-BAD scale. Large instrument. Dealer Price, $20.00.

A.C. SIGNAL GENERATOR
Model 1232. Large 12" direct reading dial, 6 bands from 100 to 30,000 kc., fundamentals. Perfect attenuation. 400 Cycle Audio note Now with peaked calibrated coils. Broadcast and intermediate bands less than 1%; short wave bands 3% accuracy. Dealer Price, $25.00.
Model 1231 D.C. Similar to Model 1232 but self-contained battery operation. Dealer Price $23.33.

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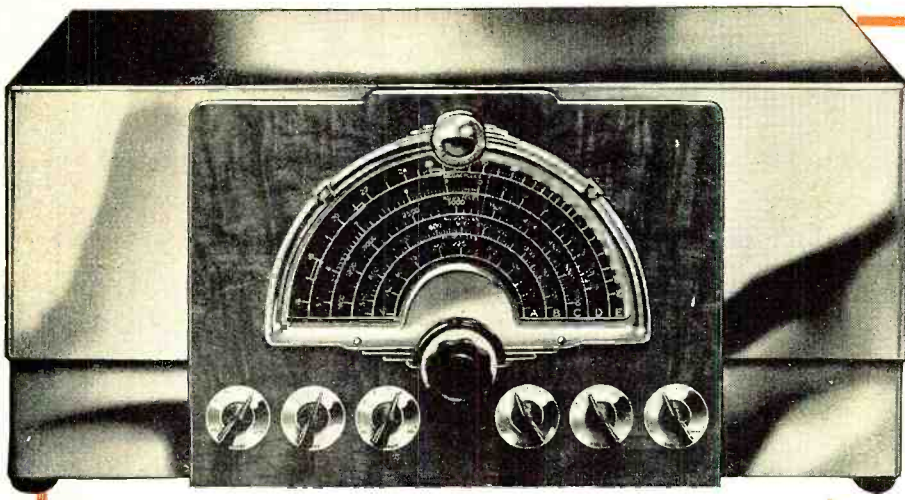

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AUGUST 16
1 9 3 6

MEMBER'S CORRESPONDENCE

McMurdo Silver Corp.,
3354 No. Paulina St.,
Chicago, Illinois.

Robert Rossi,
2815 So. 11th St.,
Philadelphia, Pa.

Dear Mr. Silver:

CONGRATULATIONS! We pass the palm to you - Mr. Silver - and to your entire laboratory staff for the engineering accomplishment concoted in the Masterpiece V, which has been in operation only a few days. Right now, I must frankly admit it is electrically and mechanically - a perfect instrument.

Many thanks also, Mr. Silver, for the astonishing and consistent microvolts per meter. More power on the European short-wave stations than is necessary or possible to absorbed here on the Atlantic Seaboard. Yet, we are enthused over the reserve power available with the twiddle of the index finger - essentially required occasionally on short-wave owing to adverse atmospherical conditions. Then, too, it is a source of satisfaction to raise the volume level of the innumerable and more unfortunate weaker stations as never heretofore. And that, as you already know, is my fascinating and interesting hobby, not to mention the educational knowledge I derive therefrom.

A strange coincidence occurred this morning between 7:10 to 7:25 A.M. (Sunday August 16th) I should think it would be an acid test for sensitivity on any type of receiver. Believe it or not, while tuning over the 20-meter phone band (in the vicinity of approximately 14.12 meg.) I ran smack into the carrier-wave of an Australian amateur phone. It was VK2ABD, Bellvue Hills, (Sydney) who happened to be conducting a rare test, employing a rotary beam antenna directed to U.S., and consuming only one-watt of electrical current. ASTOUNDING! Isn't it? This extra-ordinary feat was accomplished on my loudspeaker with sufficient room volume - 100 per cent intelligible--mind you. That's what I term, "pratical sensitivity". Fortunately enough, for both of us, it happened within the 30 day trial period. May your efforts and that of the laboratory staff be rewarded with ever-increasing success. I am,

A critical and fussy customer:
Robert Rossi

P.S. Due to the sensitivity of the "Magic Eye" it is now possible to decipher telegraphic code by "sight" rather than by the rythmical sounds.

McMURDO SILVER

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