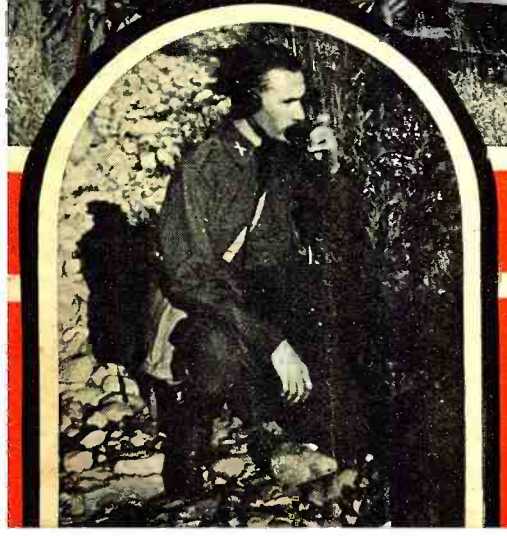
GREATEST CIRCULATION IN THE RADIO FIELD

RADIO NEWS AND SHORT WAVE RADIO

JANUARY
25¢
IN CANADA 30¢

DEATH DEALING RADIO WARFARE of the Future

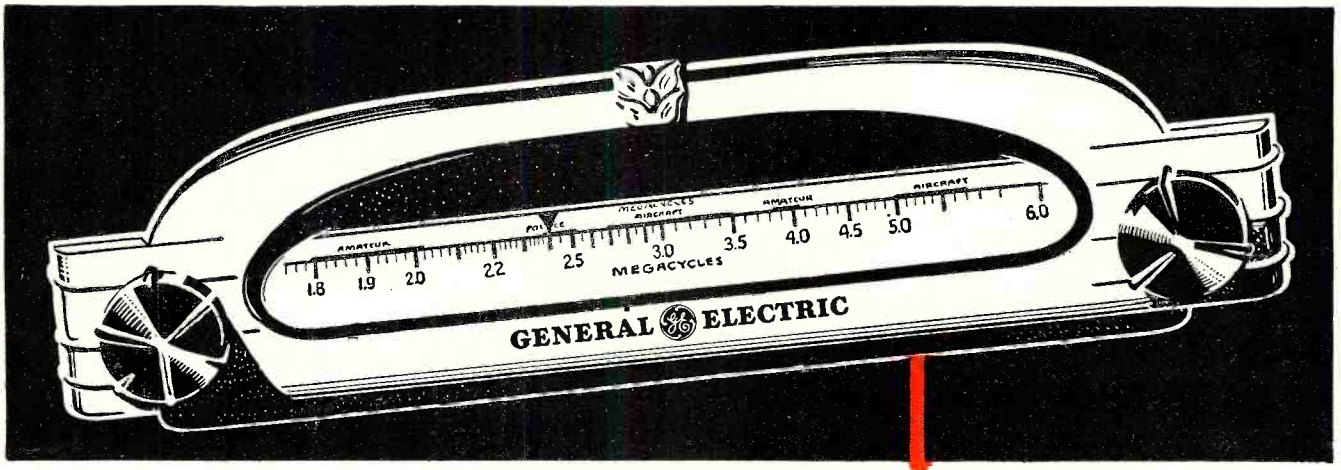


NEW "HAM" RECEIVERS

A Publication Devoted to Progress in Radio

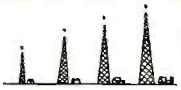
Service Work	Set Building	Television
Engineering	Experiments	DX Reception
Measurements	Short Waves	Broadcasting
Electronics	Amateur Activity	Applications

HERE'S THE "TOPS" IN TUNING

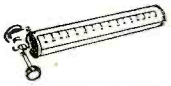


. . . the sliding-rule tuning scale

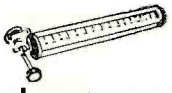
EASY TO READ. The scale is accurately calibrated in kilocycles on standard broadcasts, and in megacycles on short-wave. It's "as easy to read as a ruler."



LISTS ALL STATIONS IN A LINE. There's no confusion in locating the desired station on the dial. Each scale lists all stations in a straight line.



ONE BAND VISIBLE. No congestion of broadcasting bands on this scale. Only one band is visible at a time. Just a turn of the control knob and another band moves into view. The receiver is automatically aligned to the new reception band.



AUTOMATIC VERNIER TUNING. An ingenious mechanical arrangement regulates the dial pointer automatically to fast or slow motion with single knob. It eliminates the awkward "in or out" positions of the conventional single knob as well as the clumsy "double-deckers."

READ IT SEATED OR STANDING. The graduations are visible from either a sitting or standing position.

THIS IS BUT ONE OF FIVE OUTSTANDING FEATURES. Together, they give not only a new brilliance of performance, but a lasting brilliance that the years cannot dim.

SEE IT! HEAR IT! COMPARE!

MODEL A-82. This model has established new records in world-wide and amateur short-wave reception. Eight Metal Tubes. Four Reception Bands. Sentry Box. Permaliners. Stabilized Speaker. Sliding-rule Tuning Scale. Noise Control. Lo-note Compensation. CW Oscillator may be added.

$94.50
(Eastern List Price)

GENERAL ELECTRIC RADIO

WITH THE TUBE THAT'S "SEALED IN STEEL"

MERCHANDISE DEPARTMENT, GENERAL ELECTRIC COMPANY, BRIDGEPORT, CONN.

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*

JOSEPH F. ODENBACH, *Art Editor*

Vol. XVII January, 1936 No. 7

Reading Guide to this Issue—

AMATEURS—4, 6, 7, 8, 9, 10, 11, 12, 13, 18, 19, 20, 26, 27, 29

BROADCAST FANS—3, 4, 6, 12, 16, 17, 19, 20, 23, 27, 29

DEALERS—1, 5, 8, 10, 12, 13, 14, 15, 19, 22, 27, 29

DESIGNERS—2, 7, 8, 10, 13, 27

DX FANS—6, 12, 16, 17, 19, 20, 27, 29

ENGINEERS—2, 7, 8, 10, 13, 27

EXPERIMENTERS—1, 4, 5, 8, 9, 10 11, 12, 13, 17, 18, 19, 20, 21, 22, 26, 27, 29

MANUFACTURERS—2, 5, 27, 29

OPERATORS—4, 7, 9, 11, 27, 30

SERVICEMEN—1, 2, 4, 5, 6, 8, 10, 11, 12, 13, 14, 15, 18, 19, 20, 24, 25, 26, 27, 29

SET BUILDERS—7, 8, 10, 11, 13, 16, 17, 18, 19, 20, 26, 27, 29

SW FANS—3, 4, 6, 9, 12, 18, 19, 20, 21, 22, 27, 28, 29

STUDENTS—2, 4, 5, 9, 10, 12, 13, 14, 15, 17, 18, 19, 20, 24, 25, 26, 27, 29

TECHNICIANS—1, 2, 4, 5, 6, 7, 8, 10, 11, 12, 13, 14, 15, 18, 19, 20, 24, 25, 26, 27, 29

Coming—

The February issue will offer a wealth of information for the serviceman and the P.A. man. Much new equipment, including amplifiers, loudspeakers and microphones will be described and illustrated and should be of distinct interest to anyone dealing with sound equipment. In addition, work is being carried on in the RADIO NEWS Laboratory towards the development of a 20-watt amplifier incorporating a new circuit which provides several novel features.

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

Lee Ellmaker, *President and Treas.*
B. Holcepl, *Secretary*
H. D. Crippen W. P. Jeffery, *Advertising Management*
Virgil Malcher, 205 W. Wacker Dr., Chicago, *Western Representative*

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

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

MASTERPIECE IV

now uses Glass OR* Metal+ tubes

ENTHUSIASTIC OWNERS PRAISE MASTERPIECE PERFORMANCE

. . . from just a few of scores of such letters

England on 30-Foot Inside Antenna!

"Am getting very strong signal from England on 30 feet of inside wire . . . also French and German stations the same way".—J. Colin Lawton, Atlanta, Georgia.

Musician Likes Tone!

"I found it an easy and simple job to set up and operate. My wife, who is a musician, immediately complimented its tone".—F. H. Dodge, Colorado Springs, Colo.

Doubled Reception Range!

"The world shrinks again, as your engineering skill . . . has virtually doubled the range of reception heretofore available".—Robert Rossi, Philadelphia, Pa.

Selectivity on Crowded 49 Meter Band!

"The 'crowded 49 meter band' is another story with the MASTERPIECE IV and its superlative bandspread arrangement. In one evening tuned in following stations (lists 27 stations on 49 meter band from approximately 5700 kc to 6600 kc) . . . almost all came in clearly without interference . . . that's selectivity!"—C. A. Pickett, St. Louis, Mo.

Australia First Day!

"Simply amazed and delighted with the clarity and tonal range. Tuned in VK3ME—Melbourne . . . the volume was excellent with little static and no fading".—I. O. Thorley, Detroit, Michigan.

Wonderful Tone!

"Have never seen anything like it . . . the tone is wonderful".—H.L. Kleinbrodt, St. Joseph, Mo.

Used Phones as Antenna!

"Tuned in all of London's six transmissions one after another . . . Received London at 6:00 P.M. with one lead from a pair of phones hanging on wall for antenna".—B. E. Dickensheets, Milton, W. Va.

*Now built with the new OCTAL BASE sockets

We announce the following new features of the new MASTERPIECE IV for 1936:

Octal Sockets—All MASTERPIECE IVs are now equipped with the new eight-pin sockets which take either the new Octal-based glass tubes or (still inferior) metal tubes. This change does not mean, in any sense, that we recommend or accept present metal tubes. What it does mean is that if metal tubes later prove successful, your MASTERPIECE IV is ready for immediate change, simply by replacing tubes. Either way, you are assured that the MASTERPIECE IV which you buy now offers you the best in radio . . . today . . . tomorrow . . . next year.

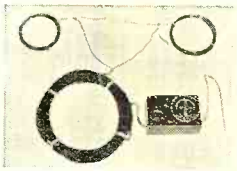
New Detector and Power Tubes—The new 6L7, a better, quieter, more efficient and more selective tube, is now used as first detector. The result is even greater sensitivity, selectivity and freedom from noise. In the power output stages are four 6B5s, increasing undistorted power output from 36 to 40 watts. This increase, in itself, means little . . . the real advantage is a tremendous improvement in already exceptional high-fidelity tone quality.

27 Tube Functions—The new tube equipment of 19 tubes gives a total of 27 separate tube functions . . . the equivalent of 27 separate and distinct tubes in circuit. The net result is finer, smoother, fuller and more brilliant tone . . . and an even finer receiver than that which has won the highest praise of critical users, engineers, musicians and champion DXers the world over.

+Metal tube merit on short wave is indicated by a measurement made at 10 megacycles, or 30 meters.

Three MASTERPIECE IV tuned circuits alone showed an excellence of 220. Glass tubes connected to them dropped merit to 215—2.3% less. A large number of brand-new and good metal tubes connected across the circuits cut Q or merit to 185—a net loss of 16%! Time, with dirt and moisture would give an even greater loss for metal, but not for glass. 16% loss seems a lot to pay only for metal envelopes on vacuum tubes on short waves!

DOUBLE YOUR SHORT WAVE RECEPTION *for only* **$8.85** *with the new*



R9+ TUNED ANTENNA

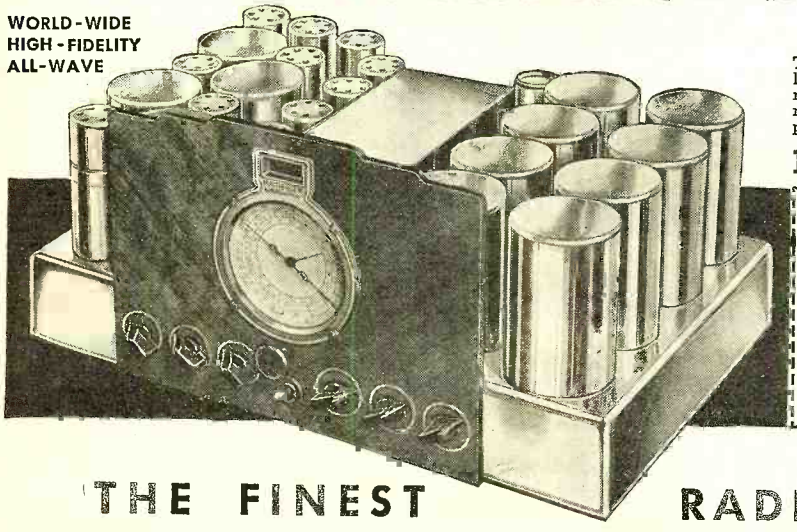
In practical tests the new R9+ Tuned Antenna has increased short wave signal volume on weak signals by from three to six times over present antenna equipment. It will give your reception a tonic equal to one to two stages of radio frequency amplification ahead of your receiver, tremendously reduce noise, and increase selectivity.

Representing, as it does, years of research on antenna problems—and beginning where all other antennae leave off—its cost of $8.85 net, fully assembled, soldered and ready to put up in half an hour, will prove to be the greatest and most beneficial value you have ever obtained.

Custom Built

SILVER MASTERPIECE IV

WORLD-WIDE HIGH-FIDELITY ALL-WAVE



TRY IT FOR 10 DAYS

Try the new MASTERPIECE IV for 10 days in your own home or laboratory, under your own reception conditions. It it fails to meet your every expectation, return it undamaged and your money will be promptly and cheerfully refunded, less only transportation charges.

MAIL COUPON FOR DETAILS

McMURDO SILVER CORPORATION, Div. G.H.P. Inc.
3352 N. Paulina Street, Chicago, U. S. A.

☐ Send Free "BLUE BOOK" giving complete specifications of MASTERPIECE IV, with details of 10-DAY TRIAL.

☐ Enclosed is $8.85 for One R9 + Tuned Antenna.

Check here ☐ if you want Free Circular on the new R9+ Antenna.

Name.....

Address.....

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

1-RN

THE FINEST RADIO OF ALL TIME!

Pages From A Serviceman's DIARY

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.

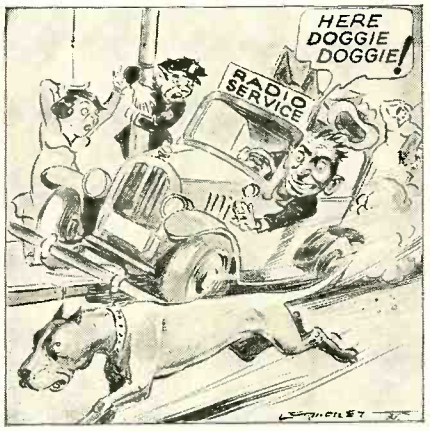
SATURDAY — Rush call from the country home of Madame Alla Nazimova. Found a Radiola 44 nesting in a book-shelf among an enormous collection of books extending from floor to ceiling around the room. A Clarence White photograph of the famous star stood on the grand piano and dozens of other photographs of celebrities surrounded the room. Wow!

Set had usual troubles, oscillation due to tarnishing of the edges of the copper shield cans and poor sensitivity and selectivity caused by shifting of the gang condenser stator plates. Sandpapered the shield contacts, adjusted and aligned the gang condenser. Went out to the gardener's cottage and corrected open circuit in an extension speaker operating from an old battery-type A.K.

The morning gone, off to lunch.

First one this afternoon, Colonial 32. Inoperative. Customer says it faded occasionally before it stopped altogether. Checked tubes. O.K. Probably too many things wrong to warrant a snap estimate. Removed to shop for thorough check. Left a midget on loan for customer to use over the week-end. (*Think he will probably buy it or a better one.*)

Next, Another celebrity. Toscha Seidel.



This famous violinist has an A.K. 55, a battery-operated short-wave set (and two of the biggest dogs I have ever seen, each one nearly as large as a Shetland pony). One of them rushed out as the maid opened the door to let me in (nearly knocking me for a goal) and disappeared around the corner. Started to work on the set but they asked me to find the dog and bring him back??x! Chased up and down several adjacent blocks, wondering how the deuce I could get the animal in the truck without a derrick. Luckily, I couldn't locate him. Returned to the job and found the antenna down. Made a temporary repair, returned to the shop and brought out an 11-tube Philco all-wave to demonstrate. Brought in London, Paris and Berlin, Mr. Seidel letting a pupil wait while he enthusiastically watched the set's performance. He wanted a Russian station but it wasn't on the air. Left the set on loan over the week-end. (Another sale?)

Next—Bosch 52. Complaint, noisy at 710 kc. Found corroded variometer contact. Cleaned the lug and realigned set.

Next—Majestic 70. Inoperative. Nuts loose on filament terminals of power pack. Broken drive cable. Replaced. Time—40 minutes. Some claim to be able to do this job in less than 15 minutes. Try and do it! My record is 25 minutes and often have to spend an hour or more if it isn't right the first time.

Returned to shop and found four emergency distress calls to ruin the evening. Loaded up with a few trade-in midgets for loan (*or preferably for sale*).

First one, Stromberg 846. Inoperative until one 45 is removed. Found short-circuited primary to secondary winding of input transformer. Left midget and removed chassis.

Last call—Philco 90, defective shadowgraph. Replaced.

The Need For Octal Tube Socket STANDARDIZATION

(An Editorial)

THE octal socket and base for the new metal and glass tubes were designed primarily to standardize socket design for all branches of the radio industry. The idea was to have one basic socket type for all tubes and the unused contacts were to be left unwired or not assembled into the socket, but all holes were to be drilled. A new trend, however, that has very serious handicaps for the service branch of the industry, seems to have been rather hastily adopted by a number of set manufacturers. What these people are doing is to employ sockets having the holes pierced *only for those actual pins employed* by the proper tube to be used in that socket. This has come, it is reported, from pressure of dealers and other sales outlets who have demanded it. They say that the new metal tubes have been of such great interest to purchasers of the sets that they have taken them out to look them over and then put them back in the wrong sockets, making the set inoperable or perhaps damaging it. The result of this seemingly hasty action has been that some manufacturers are "blanking out" unused socket holes.

But it is apparent that these manufacturers have not given much thought to the possibility of servicing these same receivers. If the true octal socket is retained (with its eight contacts and holes), the serviceman needs but one "adapter" for his analyzer. But if the blanking-out process is followed to its conclusion, the servicing of a radio set will mean an additional cost for the service equipment. It will also mean a much longer time spent on doing service work and it will also increase the cost to the set owner for the service work done; in other words, the final result will be threefold and the additional cost will come right back on the radio set user, the person the scheme was intended to protect.

If the scheme of "blanking out" is carried to a logical conclusion, with the unused socket pins left unpunched in the sockets, the serviceman will have to carry, it has been estimated, as many as fifty-nine different types of adapters. This, of course, would be when metal tube types are complete, as is the case with the glass tubes. The cost to servicemen in the United States for these extra adapters has been estimated as between one and two million dollars and the added cost in time alone spent by the serviceman (in finding and choosing the correct adapter), well over three million dollars per year. These costs would, of course, have to be borne by the set users.

The need for standardization on socket arrangements for the future, therefore, is an extremely critical one at this time. RADIO NEWS, in its position of observer and adviser to the radio industry, points out that *standardization should be accomplished immediately on the tube base situation* and that some authoritative body such as the Radio Manufacturers Association should immediately take steps to gather together not only the tube and socket designers and the radio manufacturers, but also the leading servicemen's organizations and the representatives of the measuring instrument and analyzer manufacturers, to thrash out this problem and to solve it once and for all in a way satisfactory to all branches of the radio field, including both the serviceman and the ultimate consumer. If the situation is thus carefully and speedily cleared up, the octal base socket will be a boon to the radio industry and the set owner, but if nothing is done about it, chaos will develop and the set owner will have to pay! We recommend, also, that servicemen and set owners write in giving their viewpoints to the Institute of Radio Servicemen, calling for action along these lines. If your letters are sent c/o RADIO NEWS, they will be forwarded direct to the Institute.

Volume Control Guide for Servicemen

A finely printed, 100-page book, listing replacement volume controls for practically every radio receiver made since the start of broadcasting is now being offered to servicemen by Electrad, Inc. As this is a real reference book, not a mere folder, its distribution is limited to the professional man in the servicing industry. A free copy will be sent to any serviceman or dealer who tears off the top flap of an Electrad volume control carton, and forwards it, along with his letterhead or business card to RADIO NEWS, 461 Eighth Avenue, New York City.

A New Socket

To hold r.f. losses to a minimum, Victron insulation is used in the construction of the Alden model 4955V Acorn type socket. Experimenters and amateurs who

RADIO NEWS INDEX

(Departments not included)

work with ultra high-frequency equipment will be glad to hear of this new socket for the Acorn type tube.

Latest Tube Checker

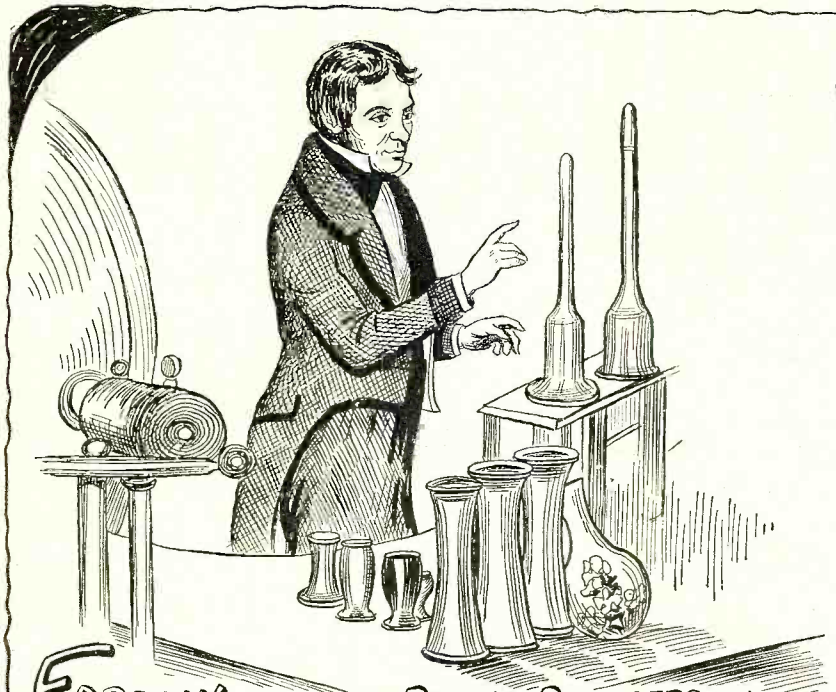
The Supreme model 89 counter-display tube-tester has eye appeal, is simple to operate and capable of testing both glass and metal type tubes. The large fan-shaped meter used for English reading "BAD" or "GOOD" tube classifications, is also used for power voltage adjustment from 98 to 125 volts.

General-Purpose 4-Stage Amplifier

A new 4-stage, 17-watt high-gain amplifier suitable for general public address work and party call systems was recently announced by the Webster Company. Known as the model HG417, it has field excitation for two dynamic type speakers and is equipped with a fader control system. The tube equipment comprises one 6C6, one 53, three 2A5's and one 5Z3. It has facilities for crystal microphone or phonograph connections.

RADIO FACTS and ODDITIES ....

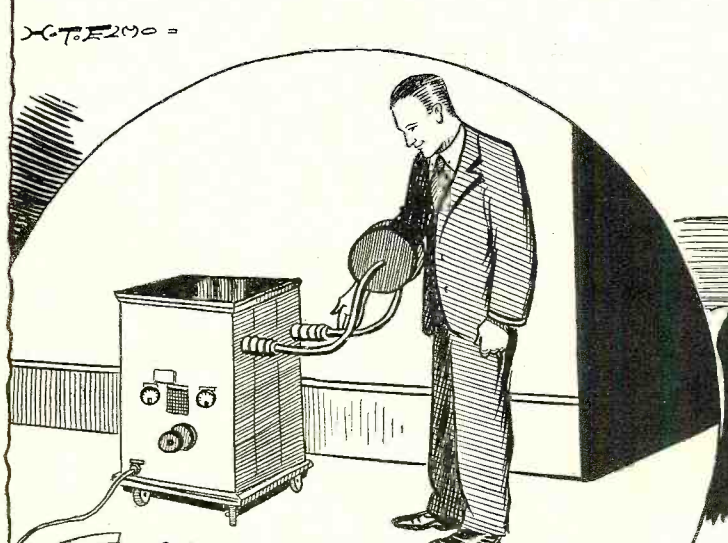
(Send in your Radio Oddities to "Elmo" and see them illustrated)



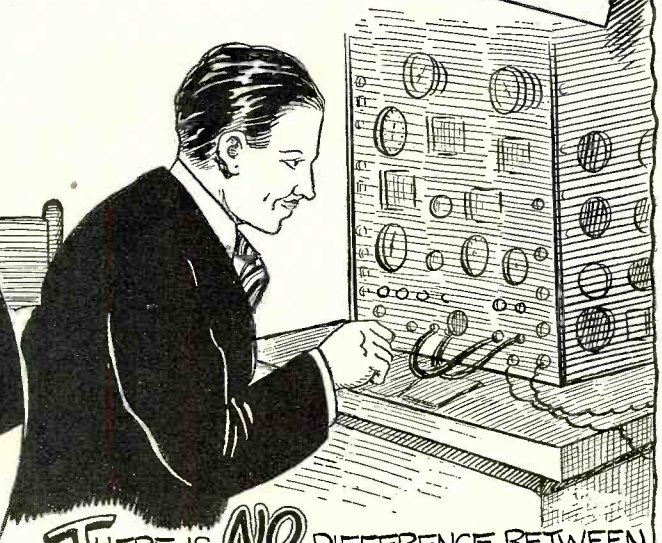
FARADAY, ONE OF RADIO'S PIONEERS, IN HIS YOUTH WAS A BOOK-BINDER!! THIS TRADE BROUGHT HIM INTO CONTACT WITH SCIENTIFIC BOOKS, RESULTING IN HIS SUCCESSFUL EXPERIMENTS AND INVENTIONS IN THE SCIENCES OF ELECTRICITY AND MAGNETISM!!

IN SIAM, IT IS CUSTOMARY FOR CITIZENS TO PRESENT THE KING WITH AN ELABORATE RADIO SET EVERY YEAR AS A SYMBOL OF THEIR AFFECTION! (SUBMITTED BY JOHN MOLNAR, BRONX, N.Y.)

THE MORSE ANAGRAM.. TELEGRAPH-GREAT HELP



THE MEDICAL PROFESSION FINDS MANY USES FOR RADIO PRINCIPLES!! FOR INSTANCE, THE FEVER MACHINE, DIATHERMY, THE ELECTRIC KNIFE, ETC.



THERE IS NO DIFFERENCE BETWEEN WIRELESS AND RADIO, NOR ANY DIFFERENCE BETWEEN THE TRANSMISSION OF CODE, SOUND OR TELEVISION.....

Radio News
January, 1936

Death-Dealing RADIO WARFARE *of the Future*

Radio can become a terrible engine of destruction in the future, although it has been a wonderfully humanizing force during the last 20 years. The author paints a picture of a "future battle" in which radio control and television play the leading rôle and also describes some present radio developments upon which his forecast is based

By **Lt. F. B. Fairchild**

WAR Time in the Future! At H. Q., ten miles back of the lines, a group of high ranking officers intensely scan a television screen in the center of a new standard ordinance table. An airplane high in the air, almost out of visibility, circles above the smoking front as an advancing column pushes its way into enemy territory. Down on the ground a signalling unit near the head of the column is in constant touch by short-wave radio with the guiding plane and with headquarters in the rear. Radio-equipped planes and radio-signalling units and even television are used in this future warfare so that all death-dealing activities are coordinated.

Back at headquarters, the television screen flashes up brightly. It reveals a living picture of the terrain below the plane which has advanced well ahead of the column.

"Seeing" the Enemy

A hand with a pointing pencil shows up in the frame; a voice is heard: "Strong force in ambush in broken terrain at this point." Instantly, orders are dictated, messengers are sent out with radiograms to the column, to the plane and to an emergency bombing field. A few minutes later twenty bombing planes rise in the air headed for the enemy force.

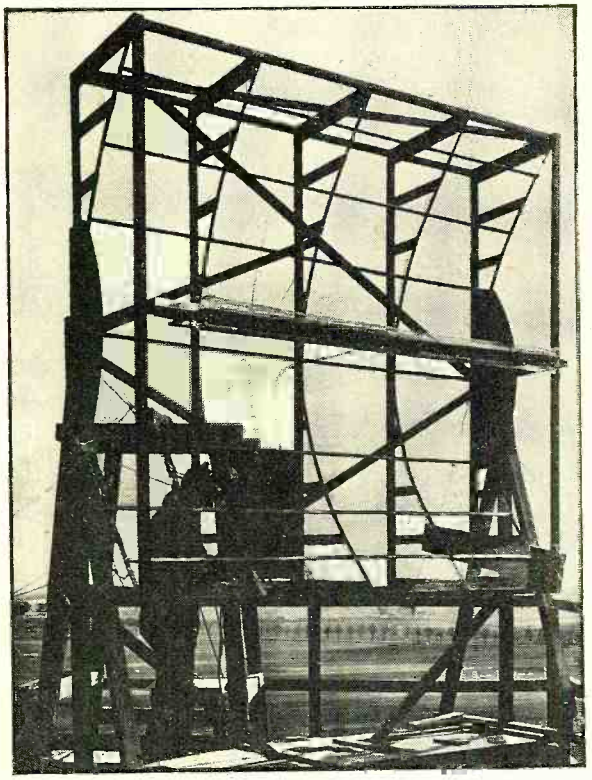
SHORT-WAVE RADIO DIRECTS AN ADVANCE

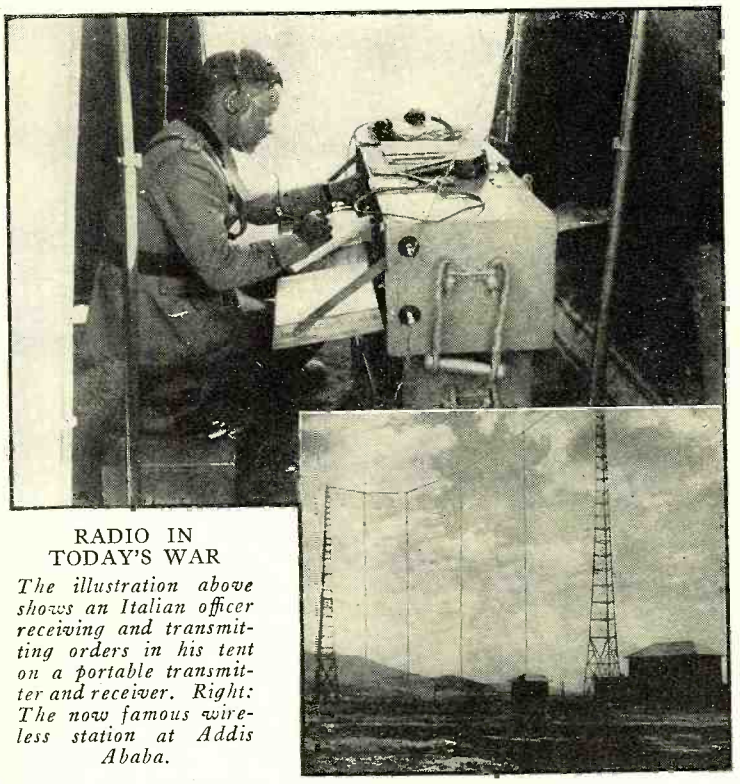
Infantry advancing under cover and receiving orders from a wireless operator with a portable short-wave radio installation strapped on a soldier's back in an Italian advance in which 200,000 took part.

Soon fifty high-speed flame-throwing tanks proceed from the advancing column in a flanking movement to take the enemy unawares. They circle and stop in position on the enemy's right flank. An emergency radio control station is quickly set up at this point. The crew of the flame-throwing tanks pile out and a signal switch is thrown that starts them roaring in the direction of the enemy force. Nothing can stop them until they reach their destination; they carry no man power. They are entirely guided by radio waves. The plane overhead issues curt orders to the radio control operators on the ground. The tanks swerve right and left and arrive within striking distance just after the aerial bombardment has been completed and all is confusion and death. The enemy ranks are scattering and trying to retreat with some remnant of order. From the tanks, in unison, shoot roaring streams of flame—thirty, forty, fifty feet ahead. Even the ground seems to burn as the enemy forces melt and disappear in the conflagration. No one could possibly live through that inferno!

Death-dealing Robots

This is just one of the possibilities of future warfare, using radio control for directing machines of





RADIO IN TODAY'S WAR

The illustration above shows an Italian officer receiving and transmitting orders in his tent on a portable transmitter and receiver. Right: The now famous wireless station at Addis Ababa.

STOPPING CARS AND PLANES WITH A "DECIMETER" BEAM

Will beam transmitters such as this be able to render gasoline motors inoperable? Experts claim that they will.

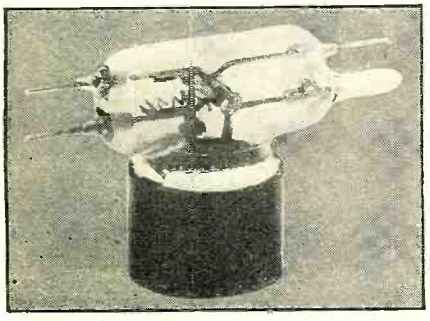
destruction. The war of the future will be more and more a war of machines, with radio as the controlling link, the directing eyes and ears and the trigger that will loose fearful death and destruction. Indeed, the future is a gloomy one unless people begin to understand the terrible havoc that radio can wield and control and unless all nations, for the protection of humanity itself, agree to cease once and for all these destructive activities.

The Famous Black Ray

What are some of the radio developments that have been evolved especially for war uses? We hear many statements and rumors regarding these machines, especially during the present time of unrest. This is a question, however, that almost any human being would be interested in having answered. We have heard much of certain European developments whereby the ignition of planes and motor vehicles of the internal combustion type could be stopped and made inoperable. Some of these developments have been credited to Marconi, although he has publicly denied their sponsorship. The scheme actually presupposes the transmission of considerable amounts of radio-frequency energy moving in a beam that could be focused along a highway or at a plane in the air and which would induce in the ignition wiring a continuous stream of electrical energy to either upset proper timing of the spark impulses to the various cylinders or to burn out the coils. Such a development *is* possible, although it would take extremely large amounts of power. It would use

NEW HIGH-FREQUENCY TUBE

Powerful new oscillator developed in Germany for ultra short-wave transmission.

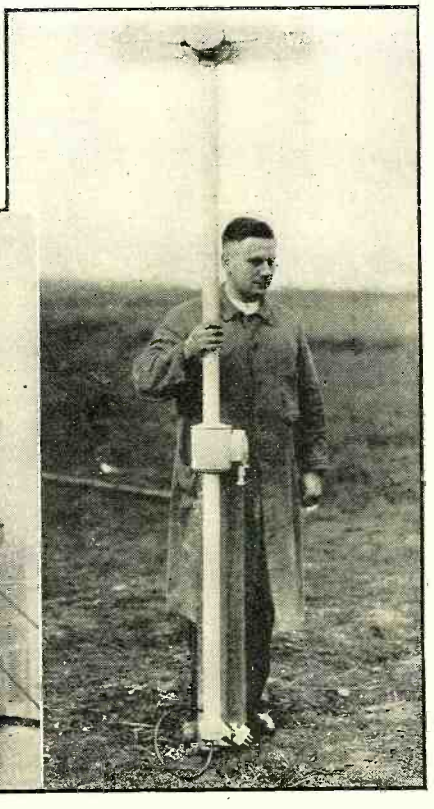


"SEEING" IN THE DARK OR FOG

This new device, the invention of a Frenchman, enables the operator to detect obstacles or moving vehicles at night and to determine their exact position.

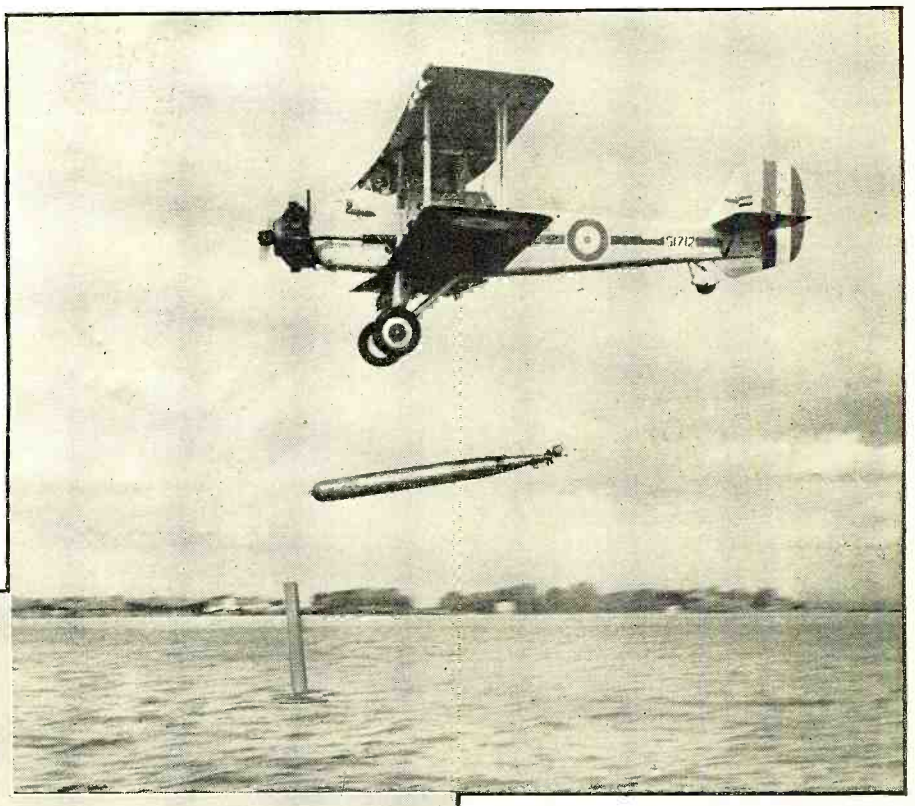
NEW SHORT-WAVE "EAR"

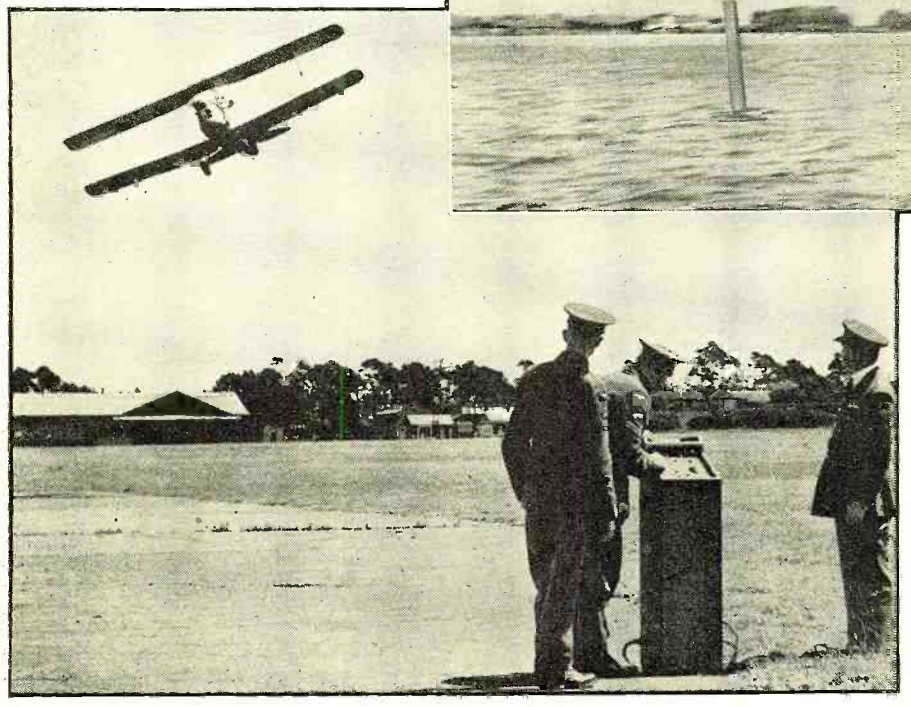
A receiving equipment that can detect the direction of transmitted signals, exactly. It uses a dipole-antenna and can steer a vehicle along an invisible radio beam.



ultra-short waves, with a beam antenna similar to that illustrated elsewhere in this article. The device is entirely within the range of possibility for operation over short distances.

Another device for war use is a direction-finding "detector" that would locate moving objects in the dark and automatically train (and fire) guns on the spot, although the objects were not visible to human eyes. Two systems have been experimented with, one using infra-red rays and the other "micro" waves. The first scheme would depend upon radiation of heat impulses from the moving object which could be detected at two points and, by triangulation, a fixed focal point arrived at. The second scheme would transmit "centimeter" waves which could be reflected back from the moving object and picked up at two separate receiving posts for triangulation purposes and by a series of relays control the elevation and swing of anti-aircraft guns as well as their firing.





REMOTE CONTROL BOMBING

Imagine a fleet of radio-controlled aerial bombers as pictured above dropping tons of TNT on even a powerful naval concentration. Illustration shows such a plane dropping a torpedo on marker. At left: a British radio-control airplane obeying commands without a pilot aboard and going through maneuvers directed by the officers by signals on the radio transmitter.

RADIO ARTILLERY CONTROL CAR

A wireless-control car for directing artillery. It can move quickly from place to place while making observations and directing and reporting line of fire.

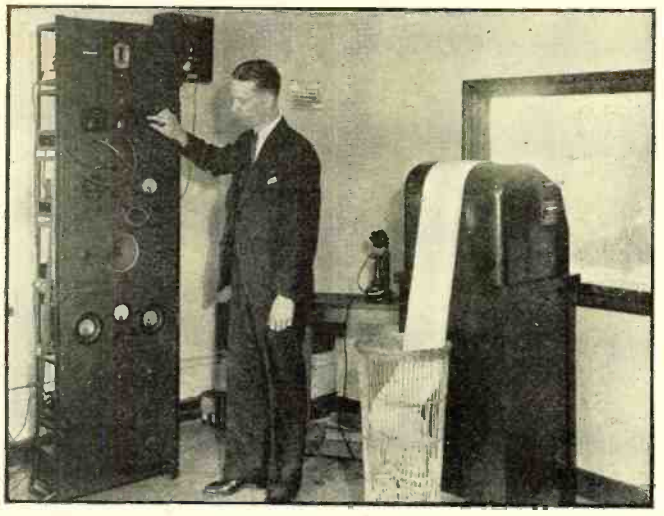
Portable radio sets for use in the field, packed by man power, have already been developed by the armies of all nations. They can be carried right into the scenes of conflict and would transmit and receive orders, immediately, where they are needed without loss of time. Portable sets for field headquarters, that can be set up in a few minutes, and packed in carrying cases will also come into wide use in future wars. Every army now has them and they are quickly changing the line-up of field warfare.

Fast, light vehicles equipped with short-wave radio have also been incorporated in the moving forces of many nations. They are usually narrow-gauge and carry an operator as well as a chauffeur. They are equipped with both transmitting and receiving apparatus for telephone and telegraphy.

High-powered short-wave transmitting stations are now operated by most governments to take care of propaganda campaigns covering the whole world as well as for emergency communications in case of war.

Remote Control by Radio

And there is also what may prove to be the most deadly of all radio war machines—radio remote control. Remote-controlled tanks, automobiles and aircraft, going their way without human pilots and controlled by radio from a distant vantage point or by another airplane high out of sight, have been experimented with and perfected by many inventors. Some of their peace-time demonstrations have been looked on as almost uncanny or at least marvelous pieces of engineering construction, but they also afford some idea of how they might be used in time of war. A group of such planes loaded with TNT bombs could be loosed to wipe out a whole city with no loss to the attackers outside of machinery. Radio-controlled torpedoes, ships, tanks and (*Turn to page* 435)



SPORTS AND NEWS EVENTS BROADCAST OVER THE LAND WIRES

News services for use by commercial clients only are now transmitted from a small studio over the telephone wires by means of the set-up shown above by a number of systems. The studio at the left is that of Ticker News which furnishes such programs to restaurants and hotels through the telephone wires, by means of the amplifying and switching panel shown on the right. Music is by electrical transcription

The Growing Use of WIRED RADIO *for Restaurants, Hotels and Night Clubs*

WIRED program services have been coming into the limelight during the past few months. But despite the apparent strides made by the wired audio or wired radio companies, the respective services are either highly specialized or still experimental so that no direct competition to established radio broadcasting and receiving has been noticed in those sections of the country where such methods of "directed" programs are offered.

By Merle Cummings

AT the time of this writing, New York City is witnessing the enlarged activities of three wired services. One of these—*Wired Music*—has been functioning since 1931, while the remaining two—*Ticker News Service* and *Teleflash*—are new in the field. It is interesting to note that all three of the New York services are offered solely to commercial subscribers, chiefly hotels and restaurants.

Utilize Telephone Lines

The three wired program services utilize leased lines of the New York Telephone Company to route the programs to subscribers. These, it was pointed out, are not ordinary voice wires, but are special cables with booster equipment to accommodate the wider ranges of musical renditions—instrumental and vocal.

Ticker News Service and *Teleflash* are, primarily, news services, offering speedy bulletins of sports results. Although the programs do not travel via the air waves, the radio influence is prominently applied to technique and to the pick-up and amplifiers employed.

The *Ticker News Service*, according to a representative, was originally designed to supply stock-market quotations via the familiar old telegraphic tape printers. Now, the tickers have been replaced with loudspeakers—small units with an "on-off" switch and volume control. An obvious advantage of loudspeakers to tickers for spots where large crowds assemble is that the messages can be heard by the entire group while just a few can crowd around reading distance of ticker tape. This firm, according to its spokesman, considers itself an "audible newspaper." It is on the air twelve consecutive hours each day, supplying such things as major league baseball scores, racing results from tracks, blow-by-blow accounts of important boxing matches, etc. General news items and stock quotations also have their place in the day's program schedule. The firm, (*Turn to page* 432)

"WIRED" SPORTS NEWS

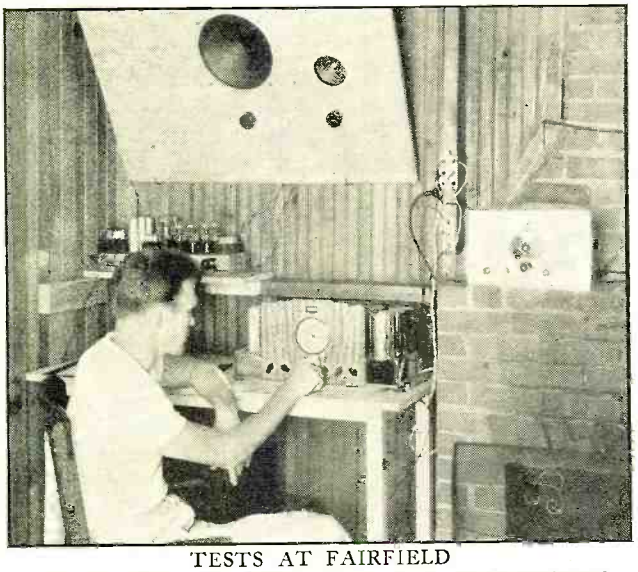
Scene on the opening night of the Teleflash sport news service in Jack Dempsey's Restaurant in New York City. That the service is proving popular is evidenced by the nightly crowds frequenting the bar which is equipped with loudspeakers

In Official Tests New 19 Tube Receiver

SPANS 5 Continents

(Silver "Masterpiece IV")

By L. M. Cockaday
and
S. Gordon Taylor



TESTS AT FAIRFIELD

The Broadcast DX Editor during tests at the Fairfield Listening Post. The broadcast-band DX season had not opened up yet, but Australian, Japanese and Russian stations were heard daily on the short waves.

WHEN a couple of hard-boiled, gray-bearded DX editors spend hours playing with a radio receiver after the official tests have been completed—it must be *some* receiver! That is exactly what happened when the authors completed the tests of the "Masterpiece IV" 19-tube, all-wave, high-fidelity superheterodyne.

SPACE does not permit a detailed description of all the factors that contribute to the pleasure found in operating this receiver. In general, it is the combination of high sensitivity and selectivity, with smooth and stable operation and a dial which is accurately calibrated in frequencies throughout all ranges.

An odd thing about the receiver is that its sensitivity is quite deceiving at first because when tuning between stations the noise usually encountered in a highly sensitive receiver is noticeable by its relative absence. It is only after trying for weak distant signals that the operator realizes that it is the unusually good signal-to-noise ratio of this receiver that results in the low noise level between stations—and which permits stations to be brought in which, with receivers having less favorable signal-to-noise ratios, are heard poorly if at all.

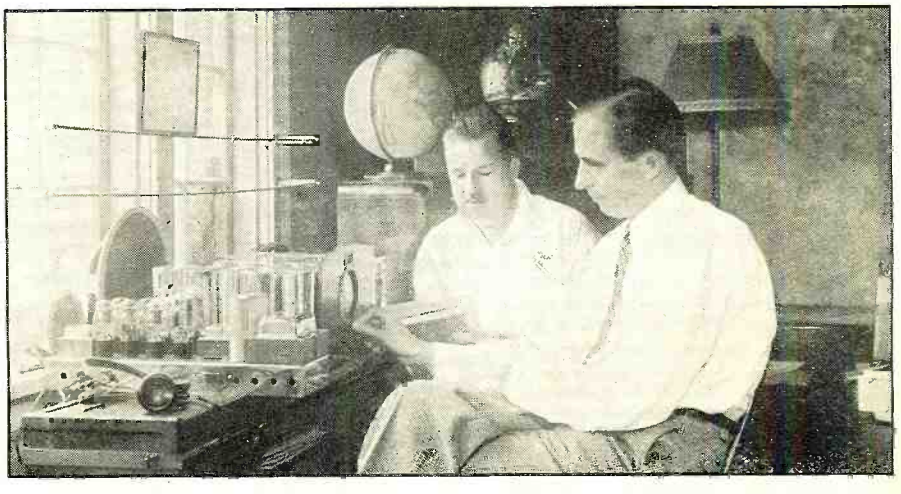
High Order of Selectivity

The receiver's selectivity is apparent right from the start, both on the short-waves and in the broadcast band. The broadcast band, because of its 10-kc. channel separations, provides an opportunity for a definite check. It was found possible to bring in stations on every 10-kc. channel—even distant stations on the channels adjacent to powerful local stations. Only in one or two cases was adjacent channel interference caused by the locals and then it was only occasionally apparent and took the form of "monkey chatter" rather than actual overlapping. This type of interference is one which is not the fault of the receiver and which can not be avoided in the locations where these tests were made. In some instances it was found possible to bring in foreign stations midway between two adjacent American channels, without interference. It is important to add here that the selectivity tests were made with an antenna slightly over 100 feet in length—long enough to completely upset the selectivity of many receivers.

The tone quality is unusually good in spite of this high degree of selectivity because a true band-pass effect is obtained. This is easily demonstrated by watching the tuning meter as the receiver is tuned through a station. As the frequency of that station is slowly approached the tuning meter retards rapidly to a certain point and there it will hang as the dial is tuned through resonance. After resonance has been passed the meter reading will again rapidly change. This rapid change of the tuning meter definitely indicates the highly desirable "steep sides" of the resonance curve and the stationary position of the tuning meter as the receiver is tuned through resonance indicates the "flat top" which spells good quality.

AT THE WESTCHESTER LISTENING POST

The Short-Wave DX Editor keeping log as Henry B. Lockwood, well-known amateur (W2HFS), puts the receiver through its paces on the amateur bands.

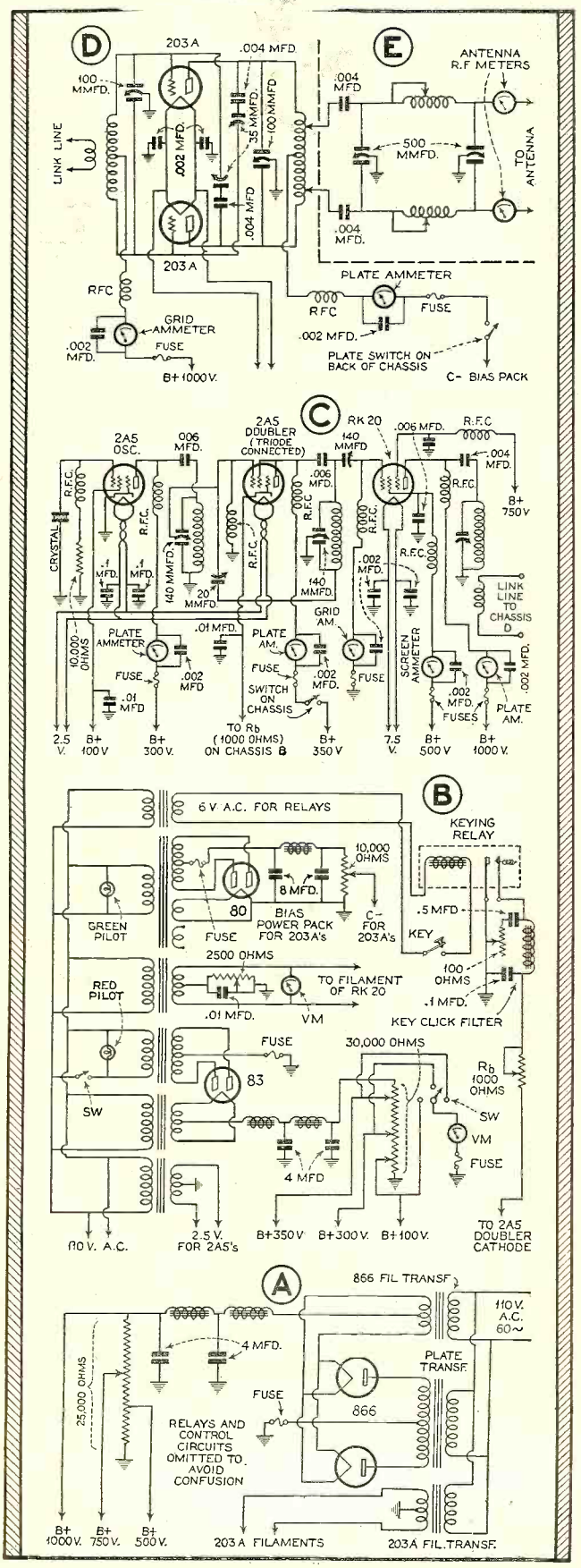


Tone Fidelity

It is quite obvious that with such good quality obtained with the selectivity—fidelity switch in the "selective" position, "high fidelity" is readily obtainable when the switch is set for it. Actual measurements made during the tests substantiate the manufacturer's claim of passing side bands (audio frequencies) up to approximately 9000 cycles. (See descriptive articles by McMurdo Silver in the September and October issues.) When using the receiver for high fidelity reproduction the audio characteristic can be shaded to individual taste by (*Turn to page* 432)

Goodbye to Breadboard Rigs!

A "HAM" DE—



No more "raggedy" layouts and "haywire" newest transmitter for phone communication! by the other, is a real sensation of efficiency ably a number of features anyone planning

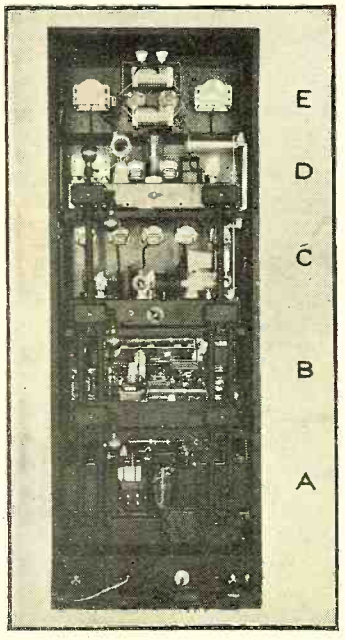
By **Robert**

A BEAUTIFUL and unusual example of careful technical design and meticulous hand craftsmanship, as applied to an amateur radio transmitter, is found in the apparatus built by Frank Frimerman, W2FZ, a pioneer "ham" of the Bronx, New York, and construction engineer for the Eastern Radio Specialty Co., for Nathaniel Pfeffer, W2AIM, a lifelong friend and fellow member of the famous Bronx Radio Club. This transmitter was the sensation of a recent amateur convention held in New York, visitors expressing loud admiration and many longing sighs.

New Ideas in Design and Construction

An old time amateur whose experience dates back to the days of spark, Mr. Pfeffer, like many other hams, has always dreamed of an efficient, well-constructed station to replace the endless successions of breadboard rigs that usually work pretty well but look pretty awful. After an absence of several years from the amateur bands, spent in building up a law practice, he decided to put some of his ideas in execution. He disposed of the receiver problem very quickly by obtaining a crystal-model Hammerlund "Pro," fitted with a Peak Pre-selector.

For a transmitter he wanted a fully enclosed unit that could be installed in a city apartment without making it look like an experimental laboratory. On paper he first worked out every detail of the circuit and the layout, and discussed them far into many nights with Frimerman, whose own station has been a show place for fifteen years. Living in an apartment, Pfeffer had no adequate construction facilities, so he commissioned W2FZ to make the plans materialize in steel, bakelite, isolantite and glass. Frimerman labored for six months, performing every cutting, drilling, forming, finishing and assembly operation with ordinary hand tools; he even crackle finished all the panels.



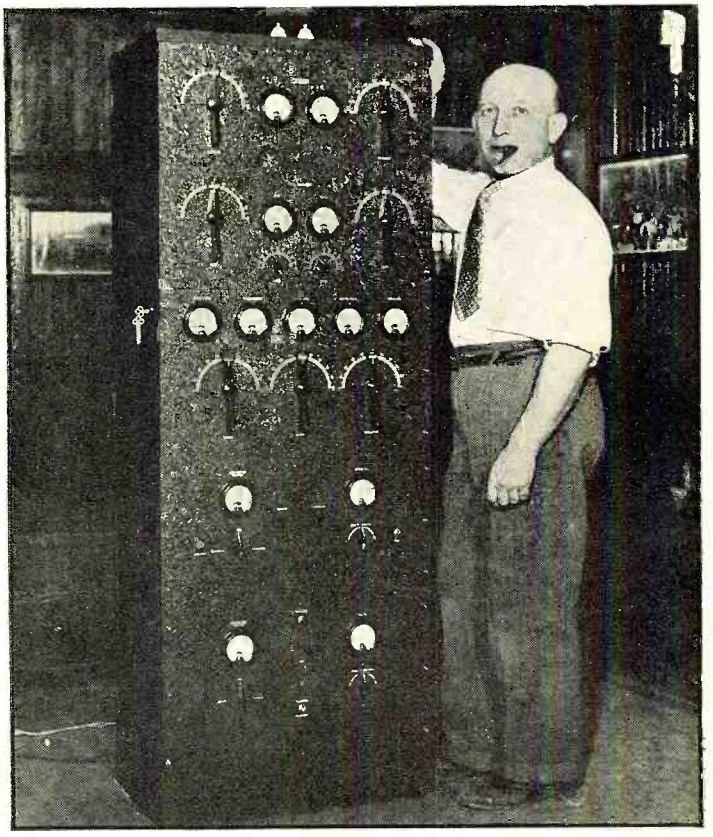
REAR VIEW

Notice the business-like arrangement of the various stages, all mounted on tracks and wheels so that they can be slipped in and connection made, with plugs and jacks, in one operation. The circuits of these units are shown at left.

goes LUXE

wiring for these two amateurs in their
The unit, built by one and owned
and mechanical skill. There are prob-
to build a transmitter can utilize

Hertzberg



HERE IT IS, BOYS, AND IT'S A "HUMDINGER"!
The beautiful panel layout of the completely "free wheeling" transmitter shown with its builder, Frank Frimerman, W2FZ, a pioneer amateur, experimenter and builder.

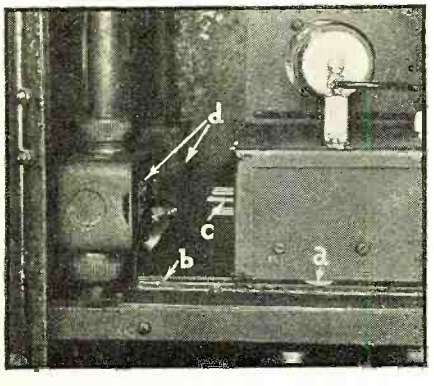
The unique feature of this rig is the trolley-track arrangement of the four sectional units, as shown in a close-up herewith. Each chassis is fitted with four wheels, riding on miniature railroad track. The back of each chassis is fitted with two six-prong plugs, one at each end, these plugs engaging corresponding receptacles mounted on conduits along the back of the main cabinet supports. All connections to a chassis are made through these plugs, not a single loose wire except the antenna clips being in sight.

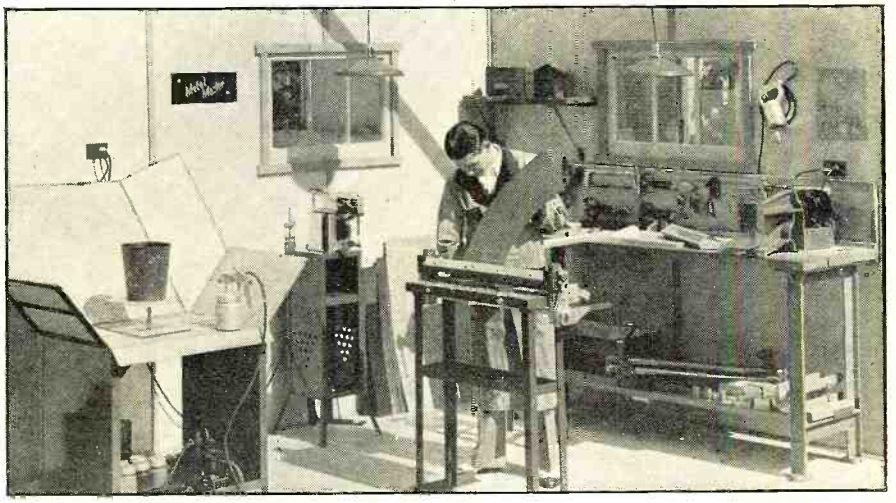
This method of construction makes the transmitter remarkably flexible. To get at any unit, Pfeffer merely removes the side screws on the front and pulls the whole section out, drawerlike. He can make all sorts of circuit changes or try new ideas without having to tear down the whole frame, as is the case with many rack-and-panel outfits. He is forever demonstrating his "free wheeling" transmitter to visitors, who get a big kick out of it!

To facilitate inspection and display, Frimerman included a 10-watt miniature lamp, in a reflector, at each chassis level. With these lamps and all the tubes lighted, and the rectifiers flashing a weird purple, the whole apparatus looks highly intriguing. The rig stands 6 feet high, 2 feet wide and 20 inches deep and weighs about 400 pounds.

Fundamentally, the circuit comprises a 2A5 crystal oscillator, 2A5 buffer-doubler and RK-20 buffer-amplifier, all this being on the center panel (C), the one with the five meters in a line. On the next shelf (*Turn to page* 447)

"FREE WHEELING"
The view below shows, (a) the wheels which run on a track (b), and the plugs (c) which make contact in the receptacles (d) when the unit is pushed in flush.





Doing Your Own METAL WORK

Compact Metal Workshop for the Home

Experimenters, servicemen, radio dealers and small manufacturers will be interested in hearing that complete metal working equipment is now made available by the Glascock Bros. Mfg. Company. Several combination groups can be had; the standard combination equipment comprises an electric spot welder, a universal metal former, a jig shear and accessories for forming posts, etc. It is often very difficult to find a metal working concern that will bother to make up individual metal radio chassis or cabinets to specifications and without a doubt there should be a real service for equipment of this type in the radio field. The photograph shows a group of equipment adequate for making all types of chassis, cabinets, fittings, shields, etc., of metal.

AN EFFICIENT BRITISH AMATEUR STATION

The Ham Shack of T. Arnold Whitely, G6QA, located at Rochdale, Lancashire, England. At the left is the transmitter equipment, with the operator's desk at the right, showing the various receivers, control panels and converter equipment.

The "HAM" Shack

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

Conducted by

Everett M. Walker

Editor for Amateur Activities

THE most important instrument in the ham shack is the receiver! Unfortunately, it frequently is the most neglected. It may seem a surprising statement to make, but the majority of amateurs use receivers that are far less efficient than their transmitters. Yet, it must be remembered that a transmitter is no better than the receiver. It is impossible to work out well unless stations can be heard. Believe it or not, the writer knows of one station operating on a 20-meter 'phone where, until recently, the legal limit of one kilowatt was used along side of a 4-tube radio-frequency, regenerative detector receiver. Needless to say, the station was heard in all parts of the world, but seldom had a successful contact.

AMATEUR radio has progressed to a stage where the requirements of a receiver are extremely stringent. With the crowded bands in which he must operate, the first requirement (even above sensitivity) is selectivity; then in order of importance, sensitivity, adequate band-spreading, fidelity (particularly for 'phone work) and finally ease of control.

There are still a large number of amateurs who still "roll-their-own" receivers, but the practice seems to be giving away to the use of commercial sets. So many new receivers have made an appearance within the last year that it is difficult for the amateur to keep up with the trend of development. Many of them have been described in periodicals, but, to the writer's knowledge, there never has appeared in print a complete digest of the technical specifications of these many receivers under one heading. Therefore, it has been suggested this department be devoted this month to a symposium of commercial and kit receivers for the amateur. Several of these have been described already on the pages of RADIO NEWS. However, in such instances, the specifications will be included with cross-reference to issues of the magazine wherein further details and the schematic wiring diagrams appeared.

National HRO Receiver

The National HRO receiver is manufactured by the National Company, Inc., of Malden, Mass. It is designed primarily for amateur and communication purposes and has many features that the amateur will readily recognize as extremely valuable to communication on crowded channels. Much space already has been devoted to a description of this receiver in the columns of RADIO NEWS. Articles describing its features and performance under practical conditions appeared in the September and October issues of 1935. In review however, the receiver employs nine tubes in all but not including rectifier. It requires the use of a separate power supply which, of course should use a 5Z3 type tube or its equivalent to supply sufficient plate current power. One of the most interesting features of the HRO receiver is the tuning control. This unit consists of four ganged condensers mounted on a sturdy frame and controlled by means of precision gears in which every precaution has been taken to eliminate back lash. This in turn is controlled by a unique band spreading dial that is a pleasure to operate.

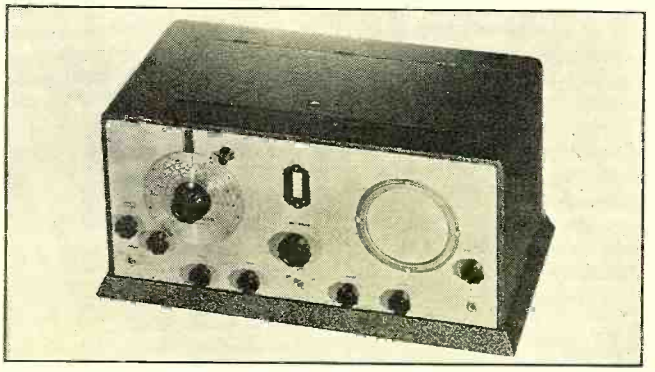
Plug in type coils are employed. Four are provided with the receiver providing general coverage from 1,700 to 30,000 kilocycles. These coils are in the form of a "drawer" that fits into an opening on the front of the set and each drawer has four coils: one for each of the R. F. stages, one for the detector stage and a fourth for the high frequency oscillator. Each set of coils is arranged so that band spreading may be had on each of the amateur bands. With this arrangement the effect of many feet of dial scale is available. For instance on the 20-meter band, some stations will cover more than an inch on the dial, which means less than a kilocycle for degree of dial scale.

A tabulation of the features of the HRO follow: Tubes, radio-frequency or pre-selector stages, 6D6, if 6-volt filament supply is available, or 58s if 2.5 volt supply is used. First detector: 6C6 or 57; high-frequency oscillator, 6C6 or 57; two i.f. stages, 6D6 or 58; diode detector, AVC and first audio stage, 6B7 or 2B7; beat-frequency oscillator, 6C6 or 57 and audio output stage, 42 or 2A5. A crystal filter is employed which provides single signal reception. Selectivity may be as high as 50 cycles. Series and parallel adjustment is provided which make it applicable for use on telephone signals. The i.f. frequency is 456 kc.

Both audio volume and sensitivity controls are provided on the front panel. The audio control is used when AVC is employed, thereby making available adequate grid swing on intermediate frequency stages wherein the AVC functions. A toggle switch turns the AVC on and off.

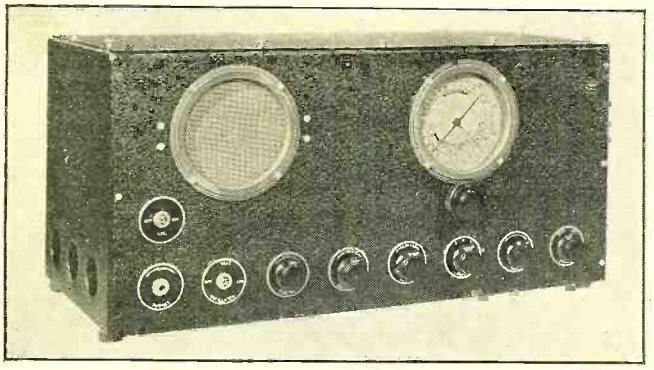
RECEIVERS FOR HAM USE

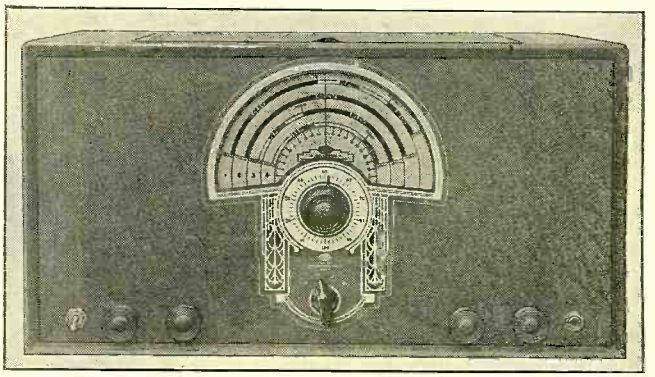
These sets are all suitable for amateur communications purposes. Description of the sets is given in the text.



SKYRIDER, ABOVE, BROWNING, BELOW

THE MONTGOMERY-WARD "SUPER 7"





Beat frequency oscillator switch and control is provided on the front panel providing for adjustment of beat frequency from the front panel. Standby switch which cuts off plate current from all tubes, but leaves the filaments lighted, facilitating quick change from "send" to "receive" position. Measurement of carrier strength is made possible by the incorporation of a meter calibrated directly in S units. External apparatus necessary: power supply and loud speaker. A 'phone jack is provided for the use of headphones.

The New Super Skyrider

The Super Skyrider is manufactured by the Hallicrafters, of Chicago. While essentially an all-wave receiver, it has been designed to meet all of the requirements of amateur practice. Among other features, it enjoys the distinction of being one of the first short-wave receivers to employ metal tubes. It is completely contained in one cabinet, which includes loudspeaker and power supply. It covers all frequencies from 545 to 48,000 kilocycles with continuous band spread in five band adjustments that are controlled by a band changing switch on the front panel.

Tubes employed in the Super Skyrider are as follows: 6K7, as a r.f. pre-amplifier; 6L7, first detector and mixer; 6C5, signal-frequency oscillator; 6K7, first i.f. amplifier; 6H6, second detector and AVC; 6F5, first audio amplifier; 6F6, second audio-output stage; 6K7, electron-coupled beat-frequency oscillator for c.w. reception and 5Z4, rectifier.

The band-control switch provides ranges as follows: Band 1, 1,530 kc. to 545 kc.; Band 2, 4,200 to 1,495 kc.; Band 3, 11.500 to 3,950 kc.; Band 4, 22,750 to 8,000 and Band 5, 48,000 to 16,000 kc. The band changing is accomplished by means of five sets of r.f. and antenna coils and four oscillator coils. The harmonic of the fourth oscillator coil is used to cover the fifth band. Two tuning controls are provided, one designated as a main tuning control and the other a band spread control. The main tuning control is set for frequency coverage with the band spread control set at minimum position. The main control has a micrometer scale set under the dial light enabling the operator to reset the dial accurately to within one-tenth of a division. Band-spread tuning then is accomplished by means of the band spread dial. This dial in addition to being graduated in divisions is arranged so stations may be logged.

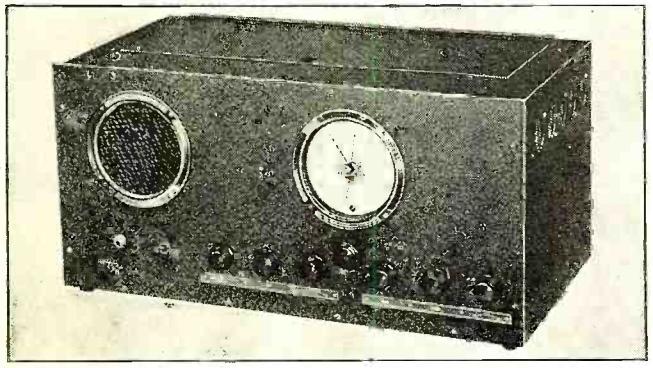
Automatic volume control is provided through the use of diode detection. A switch for its control is provided. When it is in use, the r.f. sensitivity control should be set at maximum in order to gain full advantages of the AVC action. Beat frequency oscillator also is provided for CW reception. This is controlled by means of an on and off switch, and also has a pitch control on the front panel for best adjustment on a given signal. A crystal for signal-signal reception also is provided with phasing control and cut-out switch on the front panel. A transmit and receive switch which breaks the plate circuit also is provided for stand-by during transmissions. Transformers used in the intermediate frequency stages are iron core construction providing greater selectivity and gain due to the better Q of the coils which is achievable than by the use of air core coils. In addition, a tone control is provided and a jack on the front panel for 'phones.

ACR-136 Communications Receiver

The ACR-136 receiver is manufactured by the RCA Manufacturing Company, Inc., and is designed for all-wave coverage with particular attention to the requirements for inter-station communication. It is a 7-tube super-heterodyne contained entirely within one cabinet. A tabulation of its specifications follows: Cabinet: Metal, black ripple finish, cabinet size 22 inches long by 10½ inches high by 11½ inches deep. Circuit: 7-tube superheterodyne, 460 kc. intermediate frequency. Tubes: 6D6, as r.f. amplifier; 6A7 oscillator and mixer; 6B6 i.f. amplifier; 6B7 second detector, automatic volume control and a.f. amplifier; 6D6 beat-frequency amplifier; 41 a.f. output; 80 rectifier.

Dial: Calibrated in kilocycles and megacycles with vernier pointer for logging received stations. Vernier pointer which makes nine complete revolutions while main pointer covers one band. Band changing: By switch from the front panel. Each band employs separate set of antenna, radio-frequency and oscillator coils.

Frequency range: 540 to 18,000 kc. continuous in three bands. Power supply: built in. Power consumption: 85 watts. Speaker: five-inch electro-dynamic built-in. Controls: 1, stand-by switch; 2, combined power switch and sensitivity control; 3, high-frequency tone control; 4, beat-frequency oscillator "on-off" switch; 5, dual-ratio vernier tuning control; 6, band switch; 7, audio volume control; 8, automatic volume control "on-off" switch. The beat-frequency oscillator adjustment is available by lifting the top of the cabinet.



NEW!
ACR-136
AMATEUR
RECEIVER

New METAL TUBE

By R. Purinton

A NEW combination type metal tube which has been designated type 6Q7, has just been announced by Raytheon. Type 6Q7 is a dual diode-triode, with circuit applications corresponding to those used with the type 75 glass tube. Reference to the characteristics of the new Raytheon 6Q7 shows noteworthy changes in the triode section. The amplification factor is 70 and the plate resistance 59,000 ohms—both lower than in the 75. The mutual conductance of the 6Q7 is slightly higher.

The result of these changes is a definite improvement in the signal-handling capability of the 6Q7:

Characteristics of the Raytheon 6Q7, Duplex-Diode Triode (Heater Coated Uni-potential Cathode)

Heater Rating

Voltage	6.3 volts
Current	0.3 ampere

Triode Unit—Class A Amplifier

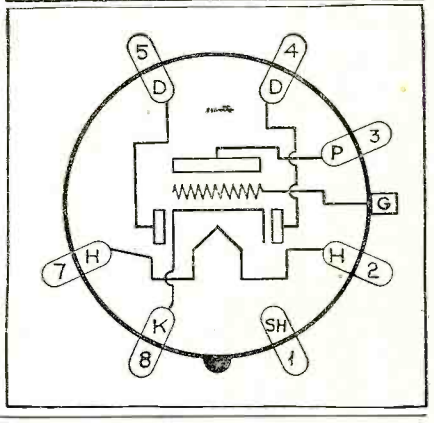
Operating Conditions and Characteristics

Plate	250 volts	100 volts
Grid	−3 volts	−1.5 volts
Plate Current	1.2 M.A.	0.4 M.A.
Ampl. Factor	70	67
Plate Res.	59000 ohms	8400 ohms
Mutual Cond.	1200 micromhos	800 micromhos

The triode section is a high-mu tube designed for resistance coupling. The coupling resistance may be any value up to approximately one-quarter megohm.

Diode Units

The two diode units are independent of each other and the triode unit, except for the common cathode sleeve. The diode units may be used either as a half-wave or full-wave rectifier, or a half-wave rectifier with the other unit used for delayed a.v.c.



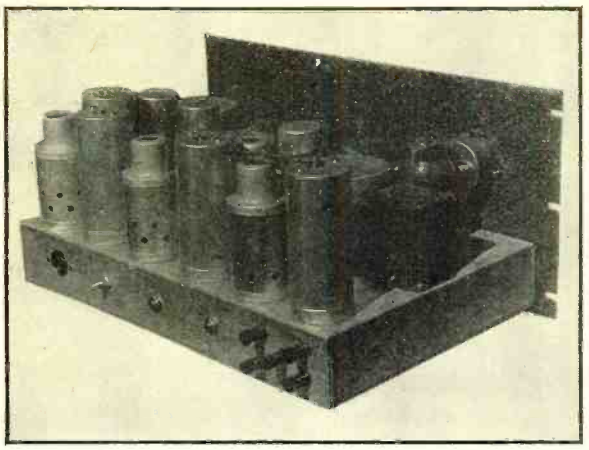
Patterson R-16

The Patterson R-16 is manufactured by the Patterson Radio Company, of Los Angeles, Calif., and has just been announced. It is designed primarily for the amateur, and, as its name implies, has 16 tubes. It is equipped with many features not to be found on many of the older types of receivers. Tuning is accomplished from 8 to 550 meters in five bands. The specifications of the R-16 follow: Cabinet: Black crackle finish with polished panel containing all controls. Circuit: Sixteen tube super-heterodyne with 458 intermediate frequency, using three

(*Turn to page* 442)

WORLD CHAMPION OPERATOR

T. R. McElroy of Boston, champion code operator of the world receives silver cup at the Brockton fair from the hands of Mark H. MacAdam.



Design and Construction

High-Frequency Superheterodyne

For Discriminating Amateurs

By Chester Watzel

THE authors have always held a reputation of being quite critical of the design, construction and performance of both high-frequency receivers and transmitters—in fact are quite hard-boiled on the subject. They, as designers, make a practice of trying every idea that comes along the pike—but give them a hard, critical test, under the difficult conditions prevailing in working 20 meter fone and c.w. DX, before either rejecting them or using them.

THIS particular receiver is the result of many different models of high-frequency supers built and tested ever since the first single-signal receiver made its appearance. Although it has only eight tubes and is simple in design and construction, this receiver is proving its worth daily in leading amateur stations, such as for instance, W2HFS who was the leading station in the recent RADIO NEWS test. It would be well to note first our own personal receiver standards, which are of course those of other serious workers in the high-frequency field. These standards set stability, consistency of operation and a high signal-to-noise ratio as foremost—and it is in these respects that some receivers fall down on the job. The first named requirement is obtained by using *only* air-spaced tuning and trimming condensers throughout, single purpose tubes, low-gain high-bias audio stages, elimination of all unnecessary frills, good shielding, and a system of wiring which makes possible the greatest isolation of individual stages. What is probably one of the greatest contributions to easy tuning and precise logging is the new National PW type of gang-condenser and dial. The 500-degree precision dial and isolated rotor condensers of this unit form the basis of a high-gain, stable high-frequency section with band-spread tuning for all frequencies. A very high signal-to-noise ratio is obtained by realization of some of the fundamental super-heterodyne design principles—and their proper utilization. One of these principles is that of dividing the total receiver gain properly between the three frequencies used in a superhet—namely signal (high) frequency, intermediate-frequency (465 kc.) and the audio-frequency band. Excessive gain on any one of the latter two frequencies gives an unnecessarily large amount of noise. These three frequencies are represented respectively by the pre-rf., detector and high-frequency oscillator—the 1st and 2nd i.f. stages, diode section of the 55 second detector and beat oscillator—and the triode section of the 55 tube and the 59 output tube. We will analyze also the three sections in this order for their effect on the high signal-to-noise ratio we have obtained.

High Signal Ratio

In order to obtain a good signal-to-noise ratio in any one stage we must have the strongest possible signal on the grid of the tube in that stage, in order to keep the signal in the plate output circuit sufficiently high above the inherent noise generated by the tube. This means efficient low C circuits throughout, good shielding and stage isolation, and particularly a good signal to the input grid of the first pre-r.f. tube. This can best be obtained with a tuned antenna, placed out of the local noise field and connected through a low impedance, cancelled pickup feeder line. Half the battle against noise is won or lost in the first tube and its associated antenna circuit. This pre-r.f. stage is doubly important in that the mixer combination of 1st detector and high-frequency oscillator is the most profligate source of noise in the entire superhet receiver—as there are three i.f. stages (including the 2nd detector) and two audio stages following this mixer to greatly amplify this noise. The solution of the problem lies in keeping this i.f. and audio gain as low as possible. This can only be done when the signal on the 1st detector grid is sufficiently high to permit of a good speaker output to be obtained while the i.f. and audio gain are kept low—which again puts the burden on the pre-r.f. section. This "high pre-r.f.—low i.f." gain ratio is the only way of keeping the inherent set noise low and should be kept in mind at all times, whether designing or operating a superhet receiver. Just try it on your own present superhet. First tune in a station with the pre-r.f. gain control set low and the i.f. gain control wide open. Then open the pre-r.f. gain wide and cut the i.f. gain back so that the speaker or tuning meter output is the same as before. The lowering of the noise level will be at once perceptible.

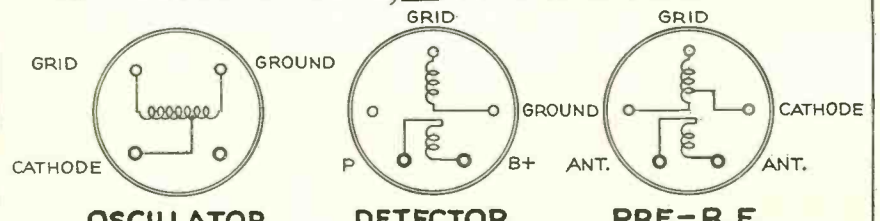
Study the Diagram

It would be well at this point to study the diagram and photos carefully to more fully grasp all the features of this set. Regeneration is used in the pre-r.f. stage, with the cathode-coupled

COIL DATA TABLE

BAND		10-20 METERS TURNS	10-20 METERS RIBS	20-40 METERS TURNS	20-40 METERS RIBS	40-80 METERS TURNS	40-80 METERS RIBS	80-160 METERS TURNS	80-160 METERS RIBS
R.F.	PRIMARY	3	1	6	1	6	1	12	1
R.F.	SEC. TAP	1	5	2	5	3	5	6	5
	SEC. GRID	2	8	7	3	16	3	40	3
DET.	PRIMARY	3	1	4	1	13	1	15	1
	SEC.	2	7	7	8	17	8	42	8
OSC.	TAP	USE 20m OSC.		2	5	3	5	6	5
	GRID			7	7	16	7	40	7
		GRID WINDINGS SPACED ± TO DIAMETER OF WIRE.							

COIL TURNS ABOVE ARE FROM ONE TAP TO THE NEXT.
FOR INSTANCE, THE SECONDARY OF THE 20-40 METER R.F. COIL HAS A TOTAL OF 9 TURNS AND 8 RIBS, NOT 7 TURNS AND 3 RIBS.



OSCILLATOR DETECTOR PRE-R.F.

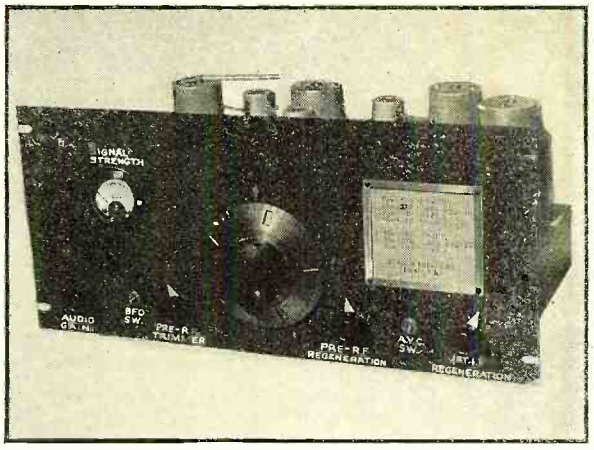
ABOVE ARE BOTTOM VIEWS FOR BOTH COILS AND COIL SOCKETS.

Data on a New Type of

The BRL-8

and Short-Wave Listeners

and **Willard Bohlen**

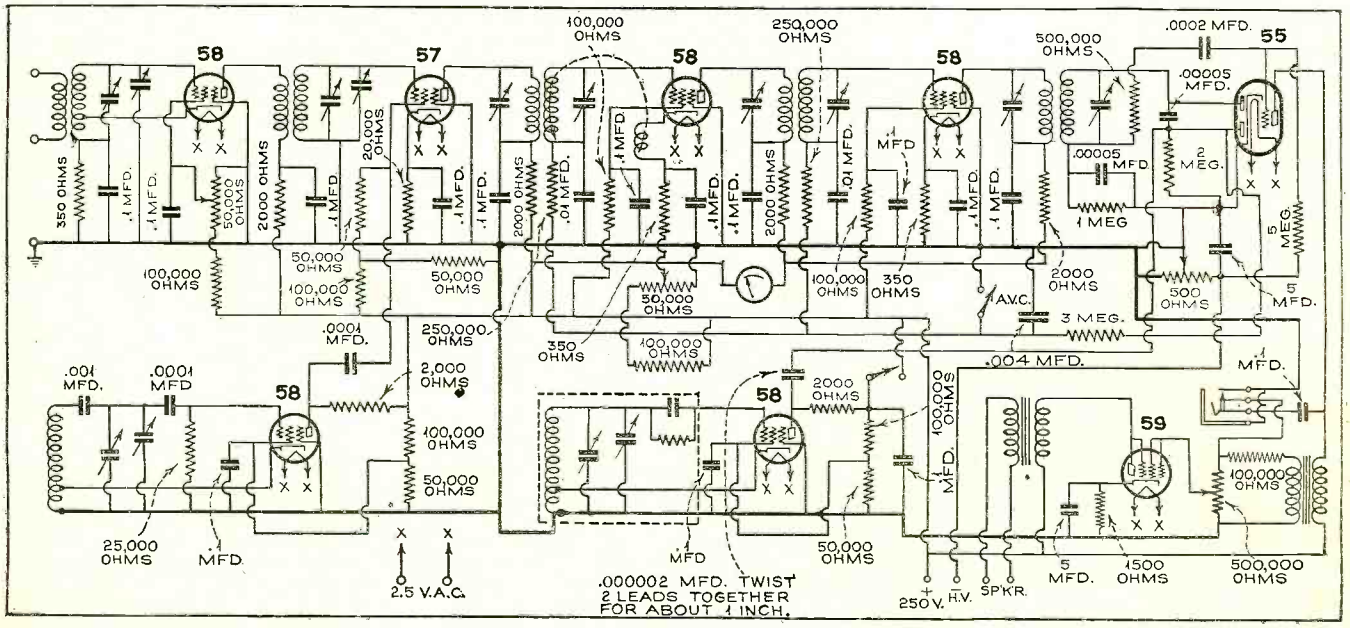


circuit for greatest stability and smoothness of control. This regenerative pre-r.f. stage is the equivalent of two ordinary stages and solves quite adequately the problem of getting high pre-r.f. gain, which in turn is the all-important link in obtaining our much desired high signal-to-noise ratio. This regenerative pre-r.f. stage also solves another problem encountered in superhet receivers—that of image-frequency interference. The selectivity obtained in this stage through the use of regeneration is enough to completely eliminate all image-frequency signals. In order to keep the pre-r.f. gain high at all times no a.v.c. is used on either the pre-r.f. or 1st detector, being confined alone to the two i.f. stages. The high-frequency oscillator is of the standard electron-coupled type. The coupling to the screen-grid of the 1st detector from the oscillator has been found the best of the many methods tried. An important factor in the design of this high-frequency section is the proper isolation of each of the three stages. The isolated rotors of the gang condensers used eliminate common coupling through the condenser unit, and the independent coil shielding and single-point grounding method used in wiring complete a good job of stage isolation.

The design of the i.f. amplifier is more or less usual except for the method used for obtaining selectivity sufficient for .single-signal c.w. reception. Instead of the more complicated crystal filter usually used for this purpose we use merely a regenerative 1st i.f. stage. This regeneration is also obtained by the cathode-coupled method. A simple 3-turn cathode coil, wound next to the grid coil in the 1st i.f. transformer and a variable cathode voltage control do the trick. The degree of selectivity obtained through this regeneration approaches closely that obtained by use of a crystal. A c.w. signal that is R9 on the loud side of "beat" can be reduced to R2 or R3 on the other side—and an R7 signal on the correct side of beat is inaudible on the other side. The degree of selectivity obtained is easily varied by use of the i.f. cathode regeneration control. When the a.v.c. is turned "on" the regeneration is automatically reduced so as to eliminate extreme cutting of the audio side-bands. The audio band-width obtained can be sufficiently widened by use of this control to permit of very satisfactory broadcast reception. The strictly class A audio system used is the final step in securing really enjoyable musical results on the foreign broadcasters. The most important feature in the construction of this i.f. amplifier section is the use of the Hammarlund air-tuned i.f. transformers. Using regeneration to obtain high selectivity in the i.f. section means that the tuned circuits must be kept exactly on the peak of resonance at all times, and only good air-tuned intermediates will do this.

Simplicity of Control

There is one point of design that should be brought up before going any further—that of control of the receiver outside of actual tuning adjustments. We have to control pre-r.f. gain, i.f. gain, audio gain, pre-r.f. regeneration (image-frequency rejection), and 1st i.f. regeneration (selectivity). After a number of tests under all receiving conditions the combination of controls shown has been found best. The knob just to the right of the tuning dial is a screen voltage control on the pre-r.f. tube and controls both the pre-r.f. gain and regeneration. The knob furthest to the right on the panel is a grid bias (or cathode) voltage control on the 1st i.f. stage. This quite satisfactorily takes care of both the i.f. gain and 1st tube regeneration (selectivity). The separate audio gain control on the extreme left of the panel permits (*Turn to page* 444)



DURING AN ALL-NIGHT SESSION

Your editors comb the ether lanes, during an early morning "trick" at the dials, and snare a number of hard-to-get distant stations.

Tests on This Receiver Show

STRONG SIGNALS

Little Noise

on

D X

(Crosley "Constitution" Receiver)

By William C. Dorf

STRONG signals on distant stations with little background noise are the two main features brought out in operating tests on this latest receiver of the Crosley line. This 10 metal tube, 5-band all-wave superheterodyne was put through complete operating tests for over a period of three weeks at both the Westchester Listening Post and at a New York City Listening Post. During this time, the receiver was used with both long and short single-wire antennas and with a doublet-type aerial. The set was tested during a period of time under good and bad weather conditions, and all the set's features were carefully checked to see if they performed strictly according to "Hoyle."

To say that the set came through these tests "on top" is attested and proven by the unusually fine log of stations received and by a review of the test operator's notes on its selectivity, sensitivity, signal-to-noise ratio, etc.

Uses New Metal Tubes

Before listing the actual operating results, a word about the circuit would be appropriate. The tuned r.f. pre-selector stage (used on all bands) utilizes a type 6K7 triple-grid super-control tube, followed by a type 6A8 pentagrid as first detector. A type 6C5 triode functions as the oscillator, another 6K7 is used in the i.f. amplifier and the type 6H6 twin-diode is used as second detector and a.v.c. tube which feeds a 6C5 in the first a.f. stage followed by a 6F6 used as a triode driver. This tube in turn feeds a pair of 6F6's in the class AB pentode power stage. The type 5Z4 full-wave high-vacuum tube is used for rectification.

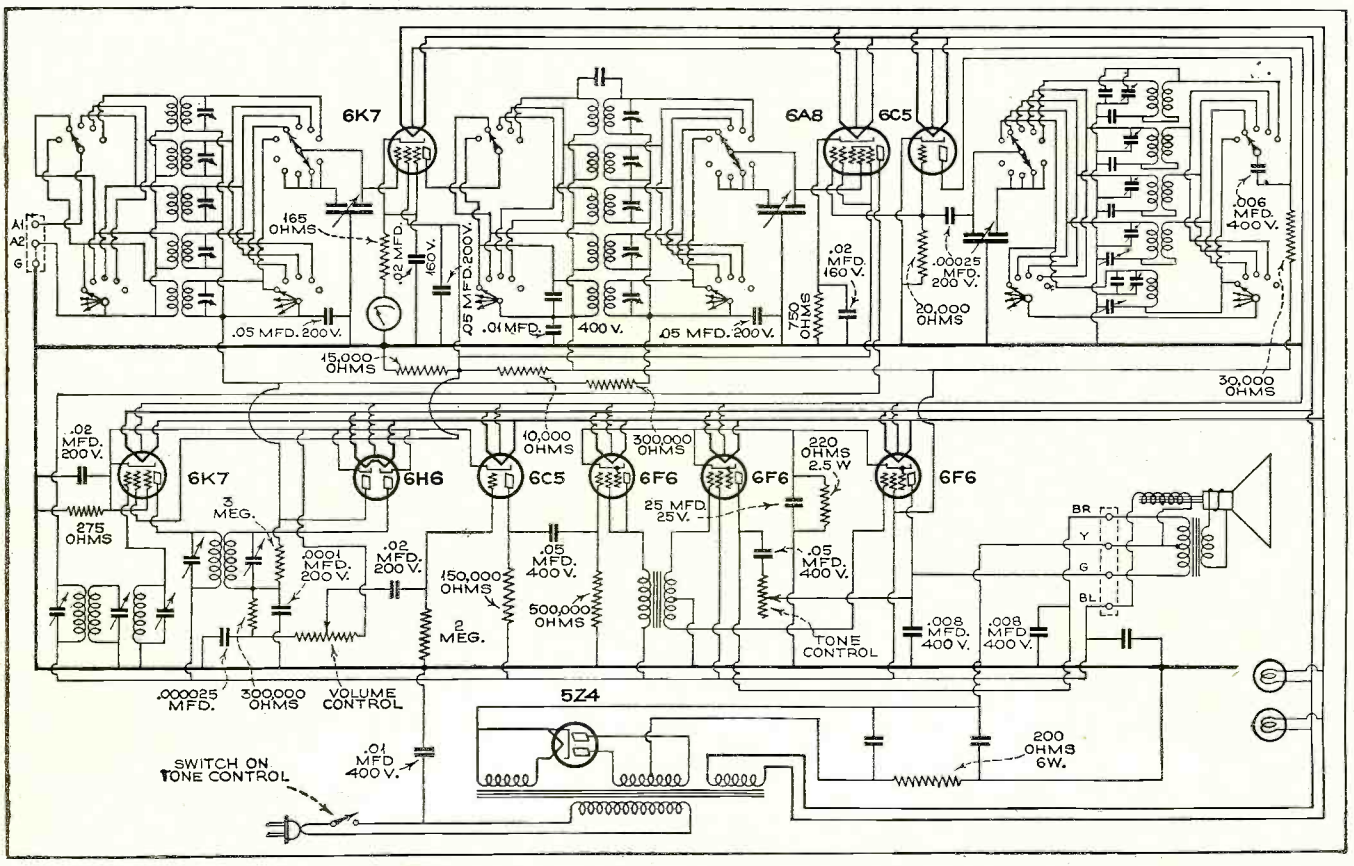
Listed below are some of the outstanding refinements incorporated in the receiver:

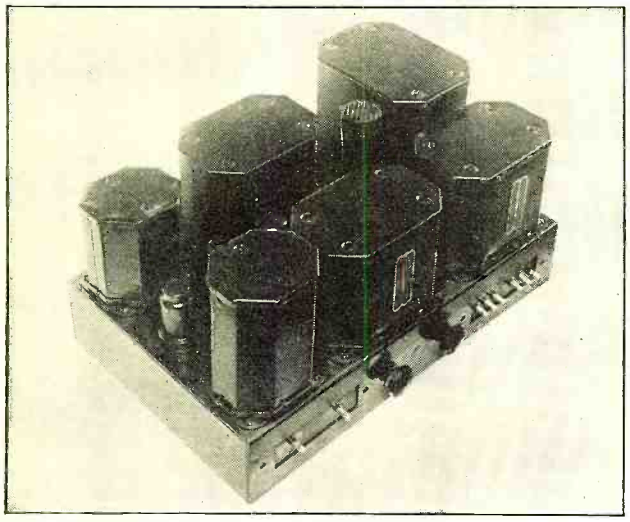
(1) New metal type tubes used throughout.

(2) Shadow tuning indicator, a real convenience for accurately tuning the set.

(3) Full floating dynamic type speaker and rubber mounted chassis.

(4) Automatic (*Turn to page* 446)





SERVICEMEN-AMATEURS

A New High-Fidelity METAL-TUBE Amplifier

By I. A. Mitchell

NOT only is the engineering fraternity talking in terms of high fidelity, but high fidelity is actually being sold to the public. The user of broadcast facilities is beginning to realize that fine studios and artists are not enough, but that program reproduction must have a low distortion level. In keeping with this, broadcast stations are continuously improving fidelity; lines are being equalized and better audio equipment is being developed.

Practical High-Fidelity

Unfortunately, high fidelity as it has been applied to radio receivers during the past year has in many instances been too theoretical. It is easy to picture a high fidelity mike placed in an ideal studio working through a high fidelity transmitter at the broadcast end. It is also easy to picture a flat top tuner, a straight line amplifier and a high fidelity speaker combination at the receiving end. There is but one flaw in this entire picture, namely, acoustic operating conditions. While a microphone or speaker may have a perfect frequency characteristic thirty feet off the ground in an ideal open air test, how will these units operate respectively in the studio or your home?

The importance of acoustics in the broadcast station studio is generally recognized. Acoustics in the home and in locations where P.A. systems are operated should be studied just as carefully. When installed, a radio receiver should be placed at least a few inches from the wall or the low frequency response will be affected. It is also desirable to try the set in a number of different positions in the room and so determine where best acoustic conditions exist. Standing waves and objectionable reflections can often be eliminated in this way.

In many cases, particularly with modern small apartments, it is difficult to obtain a large baffle area. For true low frequency reproduction, a speaker baffle should be at least six to eight feet square. This is an impossibility in the average home, but equalization of the electrical low frequency end will help compensate for the loss of lows.

Most of us are acquainted by now with the numerous advantages of the metal tubes. The amplifier made by the United Transformer Co., and described below was designed to take full advantage of such features as rugged mechanical construction, freedom from tube noise and microphonics, self-shielding, and compactness, all of which are offered by these tubes. The amplifier is ideal in a number of important respects. First, it is completely self-contained, consisting of a power supply and an audio amplifier, both on the same chassis. Due to effective shielding and the judicious placement of parts, this arrangement offers no hum difficulties whatever.

ACOUSTIC COMPENSATION!

HIGH Fidelity reproduction is not obtained through the use of "flat characteristic" components alone because it is rare indeed that room acoustics are ideal. Some means for controllable compensation for the acoustic irregularities of the room in which the loudspeaker operates is of the utmost importance.

Parts Moderately Priced

For ideal audio amplifier fidelity, it is essential that high fidelity transformers be used. Unfortunately, while these are excellent for the broadcast station, laboratory, or high quality sound system, many are too expensive for the average home. Fig. 1 illustrates an amplifier circuit using medium priced components which has excellent fidelity.

It will be seen that the amplifier is equipped with a Varitone transformer, which couples the first and second stages and simultaneously introduces a large degree of controllable tone compensation, thus providing for irregularities in the frequency characteristics of any apparatus that may be used with the amplifier. This feature contributes appreciably to the fidelity of the entire system. The primary of this transformer consists of two windings. One is a high impedance winding designed to operate from the (*Turn to page* 445)

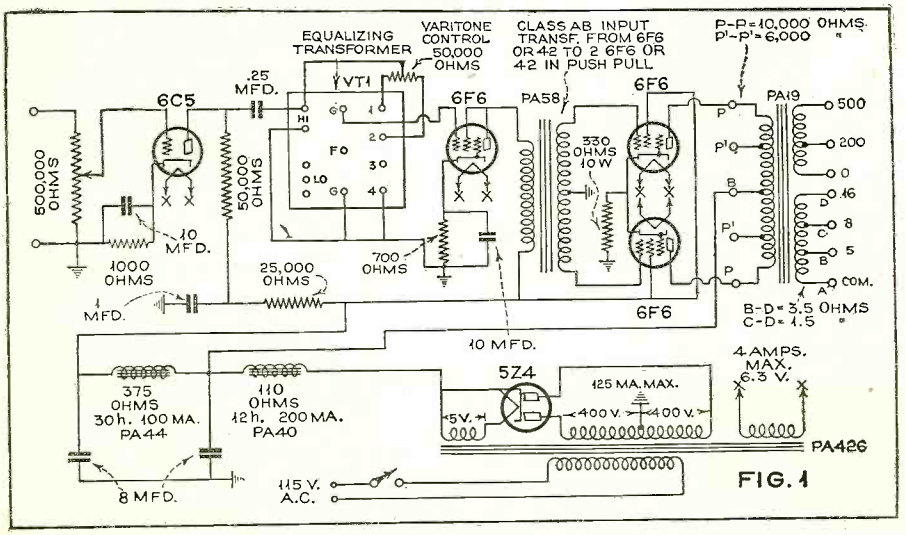
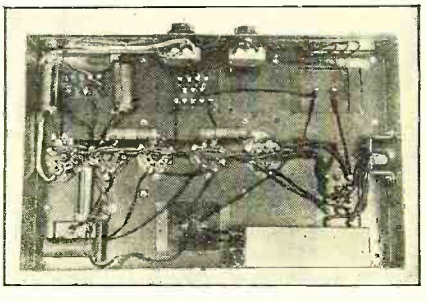


FIG. 1



BUSINESS LET for the

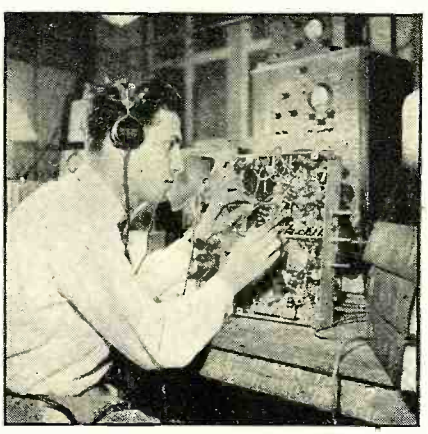
An attractive letterhead to any form or sales letter. help you—as well as many turers who cooperate with ing handsome letterheads

By Zeh

SALES letters play an important role in the promotion of any business. Radio servicing is no exception. Indeed, in radio service work the possible variety of letters is multiplied by the many factors which stimulate their writing, such as seasonal features, automotive radio, service follow-ups, dunning letters, modernization, public-address, etc. However, in most of such letters there exists a degree of duplication. Inspection of literally thousands of them that have come over the writer's desk in the course of ten years contact with active servicemen, indicates that these letters can be dissected into a dozen or two "units," which can be recombined in various ways to provide effective sales letters covering practically all phases of service work and attendant problems. Also, the flexibility of the unit system makes it pos-

TECHNICAL ABILITY NOT ENOUGH NOWADAYS

Servicemen, today, need more than just the ability to check and repair a receiver. They have to combine with this necessary knowledge an understanding of business and sales promotion methods. Illustration shows M. Pavri, a Bombay serviceman, associated with D. R. D. Wadia.

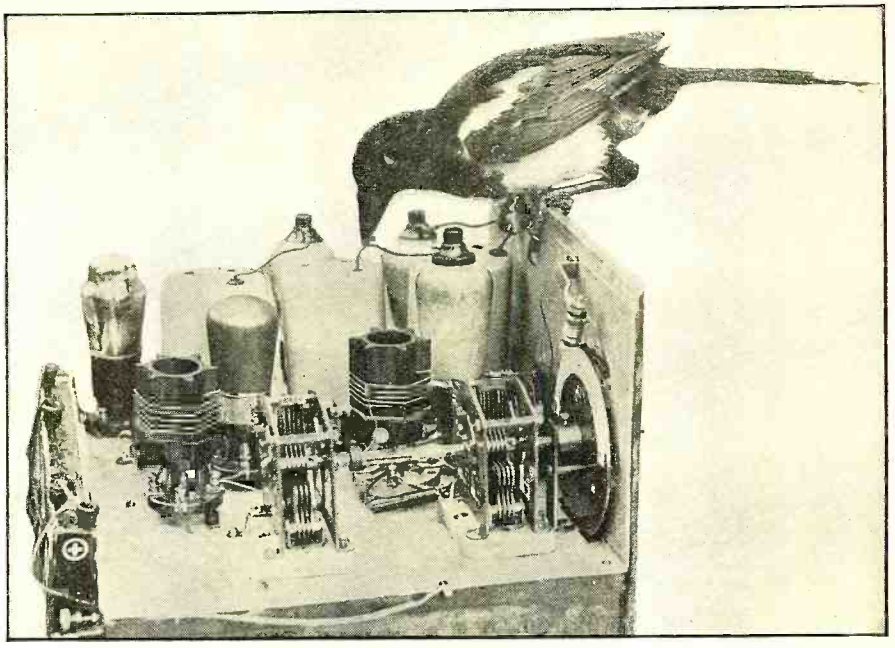


GETTING TERS

Serviceman

contributes pulling power
Your local printer can
tube and parts manufac-
the serviceman by supply-
and cards at cost prices.

Bouck



THE BUGABOO OF THE WELL-KNOWN "DODO" BIRD

"There ain't no such animile." Servicemen should have learned long ago that there are no little birdies to fly about in the neighborhood examining radio sets to see if they need servicing and to whisper this information in the serviceman's ear. Convincing sales letters or cards distributed in the neighborhood will call this matter to the attention of radio set owners and tell them where to go for repairs.

sible to prepare good letters of any desired length. There are, of course, some letters of so definitely a specific nature as to exceed the practicability of the unit system—such as dunning letters and sales literature on modernization. Exceptions of this nature will be considered in the second of these articles.

Even the unit system cannot be made universal. The individual serviceman must make such changes himself as to conform with his own policies for charging (or not) for inspection, parts, service, etc.—variations from the stereotyped unit system which will be self-evident.

Good Sales Letters

Sales and similar letters should be typewritten on a good grade of water-marked bond paper with an attractive letter-head. It is seldom possible to purchase a satisfactory paper for less than $1.50 a ream. Your local printer can set up an inexpensive but effective heading. Several samples accompany this article. (Quite a number of tube and parts manufacturers supply servicemen with letterheads, with attractive art work on excellent paper, at cost. Check-up on the lines you are handling, and investigate to what extent those back of them assist the serviceman in sales promotion.) In every business, one's stationery often has *as much effect as what is written on it!* Not altogether fair, perhaps, but a fact.

If not rendered impractical by obvious considerations, every letter should be individually typed, and sent by first-class mail (in a sealed envelope). Many servicemen are exceedingly careless in letter-writing, exhibiting crass ignorance of the most common get-up of a letter. Almost any business letter—of which every serviceman must receive many in the course of a year—will show the observant the conventions of dating, name and address, salutation, punctuation, etc. There is no excuse for writing a sloppy letter, with poor spacing, worse paragraphing and a flagrant disregard of the elementary forms taught in public school. Remember, your most profitable clients are folks of attainment, who will not be negatively impressed, at least, by a correctly-typed letter. A typewritten letter has more pulling power than a multigraphed or mimeographed job. However, form letters by the last two processes may be necessitated by length or number. But don't forget that a short, personally typed note may be more effective, for psychological reasons, than a long-winded multigraphed sales argument.

In any event, *sign* the letter in ink. Do not leave the letter unsigned, as many servicemen do, believing their letterhead to be all that is required. *Do not stamp with a facsimile signature.* Similarly, your name typed at the end of the letter is not sufficient. Sign above the typewritten line. A person too lazy to sign his name may be too lazy to do a good servicing job.

Unless there is some very strong reason for formality, commence each letter, "My dear Mr. ——:" (or "Dear Radio Listener:" if no name is known) rather than "Dear Sir:". On the same grounds, sign yourself, "Yours sincerely," "Cordially," etc., rather than "Yours truly." (*Turn to page* 430)

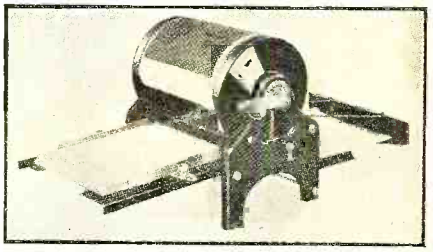
"ROTOSPEED"

A New Business Help for the Serviceman

A new duplicating printer has recently been placed on the market that should solve many problems for the wide-awake serviceman. The "Rotospeed" duplicator, as it is called, reproduces cards, letters and circulars quickly and economically.

There are a great many ways in which a duplicating machine can be used to increase the sales and service of the average radio serviceman; for instance, for printing advertising post cards which can be left with a customer after completing a repair job, for printing invoices, statements and receipts. It can be used to illustrate items for sale, tracing pictures of manufacturers' equipment onto the stencils, or for offering radio specials on handbills. Servicemen can develop sales manuals that will explain their training and why they are particularly fitted to service radios, they can print their own guarantee certificates like the sample shown, they can also print station record cards which can be used as a mailing piece or distributed to different businesses and professional men's offices.

Servicemen or dealers can obtain further information on this new printer and also additional data on how to increase their sales through the use of a duplicating machine by writing to RADIO NEWS, 461 Eighth Ave., New York City.



THE DX CORNER

S. GORDON TAYLOR

(For Broadcast Waves)

THE list of Observers has been omitted this month pending appointments for 1936. It is hoped that appointments for 1936 will be made in time to include a new list in the February issue. 1935 Observers who desire re-appointment but who have not made application are invited to do so immediately. Other DX'ers who desire appointment should send their applications to the editor of this department, including a brief summary of DX accomplishments to date and a brief description of the equipment employed.

AN extension of time has been arranged with the result that hereafter Observers' reports should be in the editor's hands by the end of each month instead of the 20th as heretofore. Thus ten days will be gained in the timeliness of information presented in the DX Corner.

KCMC Tips Broadcasts

Official RNLPO Halsey has been given a weekly spot over KCMC and will broadcast tips from this station each Saturday from 7:45 to 8 p.m., CST. He will be assisted in this by Caleb A. Wilkinson who will specialize in the short-wave end.

These tips broadcasts are all being dedicated to RADIO NEWS Listening Post Observers and in return it is hoped that Observers will pass plenty of tips along to Observer Halsey. In writing to him the address is: James F. Halsey, DX Tips Editor, c/o KCMC, Texarkana National Bank Building, Texarkana, Ark.

RHODE ISLAND LISTENING POST

L.P.O. Lawton, Westerly, shown in his Listening Post with the RCA Super on which he has heard 38 countries.

DX CALENDAR

Below are given lists of special and periodic DX broadcasts which are scheduled up to January 15th. The initials following an item indicate the organization to which the program is dedicated and where a RADIO NEWS special has been arranged for by an Observer, his name is given in the schedule.

Don't fail to tune in the RADIO NEWS specials on this list and as many others as possible—and above all, don't fail to report to each station tuned in, giving them as much information as you can concerning their signal strength, fading, quality, etc. Practically all of these stations verify reports and where verifications are desired it is always desirable to enclose return postage. If a large number of RADIO NEWS readers send reports to the stations who dedicate programs to us, these stations will feel well repaid for the time and effort required to put on these early morning programs.

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

SPECIALS

Day	Hour	Kc.	Call	State	Kw.	Club
			December			
1	1-2	1310	CJLS	Nova Scotia	.1	
	1-4	1150	XEWZ	Mex. City	.1	CDXR
	2-3	1040	CP4	Bolivia	10.	IDA NNRC
	2-4	890	WMMN	W. Va.	.5	CDXR
	3-4	1010	CKWX	B. C.	.1	NRC
	3-4	1200	CHAB	Sask.	.1	CDXR
	3-4	1220	KWSC	Wash.	1	CDXR
	3-4:10	1400	KTUL	Okla.	.5	CDXR
	5-?	880	CFJC	B. C.	.1	NRC
2	1-2	832	RW39	U.S.S.R.	100	IDA
	3-4	1440	XEFI	Chih.Mex..	.25	CDXR
3	2-3	1420	KGIW	Colo.	.1	CDXR
	3-4	1370	KRE	Calif.	.1	NRC
4	**3-3:20**	**1370**	**WDAS**	**Pa.**	**.1**	**R. NEWS Cleaver**
	3-5:10	1400	WIRE	Ind.	.5	NNRC
5	**2:40-3**	**1420**	**WJBO**	**La.**	**.1**	**R. NEWS Golson**
	5:10-5:30	**1420**	**KCMC**	**Ark.**	**.1**	**R. NEWS Halsey**
6	2-3	1530	W1XBS	Conn.	1	NRC
	4:20-4:40	**1450**	**WGAR**	**Ohio**	**.1**	**R. NEWS Elcheshen**
7	12:30-3	1390	KLRA	Ark.	1	NNRC
	4-30-5:30	1200	CKNX	Ont.	.05	CDXR
	7-8	1210	WSBC	Ill.	.1	NNRC
8	1-4	1150	XEWZ	Mex. City	.1	CDXR
	2-3	1250	CMKC	Cuba	.15	IDA
	2-4	1420	WJBO	La.	.1	NRC
	2:30-4:30	1320	KID	Ida.	.25	NNRC
	3-4	1370	KFRO	Tex.	.1	NNRC
	3:30-4	890	KUSD	S. C.	.5	CDXR
	4-4:30	630	CKOV	B. C.	.1	
	4-5	1410	CKFC	B. C.	.05	NRC
9	3-4	1440	XEFI	Chih.Mex.	.25	CDXR
10	2-3	1420	KGIW	Colo.	.1	CDXR
	3-4	1370	KRE	Calif.	.1	NNRC
	4-30-5:30	1200	CKNX	Ont.	.05	CDXR
	7-8	1210	WSBC	Ill.	.1	CDXR
11	2-?	1210	KIUL	Kans.	.1	
	2:30-3	1370	WHBQ	Tenn.	.1	NNRC
12	2-3	1530	W1XBS	Conn.	1	CDXR
13	2-5	1320	CMOX	Cuba	.25	
14	12:30-3	1390	KLRA	Ark.	1	NNRC
	2-3	740	WHEB	N. H.	.25	UDXC
	3-4	1200	WCLO	Wisc.	.1	CDXR
	3-5	1450	CFCT	B. C.	.075	MCDXE
	4-5	620	WHJB	Pa.	.25	CDXR
	6-7	1200	KGFJ	Calif.	.1	CDXR
	7-8	1210	WSBC	Ill.	.1	NNRC
15	12-3	960	CMCD	Cuba	.25	CDXR
	1-3:30	600	WICC	Conn.	.5	CDXR
	1-2	920	KVOD	Colo.	.5	CDXR
	1-3:30	590	WOW	Nebr.	1	CDXR
	1-4	1150	XEWZ	Mex. City	.1	CDXR
	3-3:30	630	CKOV	B. C.	.1	CDXR
	3-4	860	WABC	N. Y.	50	NNRC
	3-4	1260	WTOC	Ga.	1	CDXR
	3-4	1220	KYA	Calif.	1	CDXR
	3-4	1500	KDB	Calif.	.1	CDXR
	3-5	830	WEEU	Pa.	1	ICCP NRC
	3:30-4:30	1200	CHAB	Sask.	.1	CDXR
	3:30-4:30	1370	KFRO	Tex.	.1	CDXR
	4-5	630	WGBF	Ind.	.5	CDXR
	4-5	**1260**	**WTOC**	**Ga.**	**1**	**R. NEWS Halsey**
	4-5	1310	KVOL	La.	.1	CDXR
	5-6	1010	CHML	Ont.	.05	CDXR
	5-7	1310	WTRC	Ind.	.1	
	9:30-10	1040	WTIC	Conn.	50	CDXR
16	1-2	1360	WGES	Ill.	.5	NNRC
	2-3	830	KOA	Colo.	50	CDXR
	3-4	1440	XEFI	Chih. Mex.	.25	CDXR
17	1-2	1210	WKOK	Pa.	.1	NNRC
	1-4	940	WDAY	N. D.	1	CDXR
	1:30-2:30	601	RABAT	Morocco		IDA
	2-3	1210	WFAS	N. Y.	.1	NNRC
	2-3	1420	KGIW	Colo.	.1	CDXR
	3-4	1210	KFXM	Calif.	.1	NNRC
	3-4	1370	KRE	Calif.	.1	CDXR
	4-5	1210	KPPC	Calif.	.05	NNRC
	5-6	1210	WHBU	Ind.	.1	NNRC
	7-8	1210	WSBC	Ill.	.1	NNRC
18	2-?	1210	KIUL	Kans.	.1	
	3-6	1500	WOPI	Tenn.	.1	CDXR
20	1-2	904	HAM-BURG	Germ.	100	IDA
	1:30-2:30	895	OFA	Finland	10	IDA
21	12:30-3	1390	KLRA	Ark.	1	NNRC
	4-5	1330	KMO	Wash.	.25	NNRC
	5-5:30	1310	WCMI	Ky.	.1	NRC
	5-6	1370	WMFO	Ala.	.1	NNRC
	5:30-6	1310	WMFF	N. Y.	.1	NRC
	6:30-7	1310	KGFW	Nebr.	.1	NRC
	7-8	1210	WSBC	Ill.	.1	NNRC
22	1-4	1150	XEWZ	Mex. City	.1	CDXR
	1:30-2:30	859	STRAS-BOURG	France	60	IDA
	2-4	1420	WJBO	La.	.1	MCDXE
	3-4	760	KXA	Wash.	.25	UDXC
	3-4	1310	KIUJ	N. Mex.	.1	NRC
	4-4:30	630	CKOV	B. C.	.1	
	4-5	1040	KWJJ	Ore.	.5	UDXC
23	1:10-2	1031	KONIGS-BURG	Germ.	100	IDA
	3-4	1440	XEFI	Chih. Mex.	.25	CDXR
24	12-1	1310	XEFW	Tamp.Mex.	.25	CDXR
	1:15-1:45	1140	I1TO	Italy	7	IDA
	2-3	1420	KGIW	Colo.	.1	CDXR
25	2-3	1370	WOC	Iowa	.1	NNRC
	2-?	1210	KIUL	Kans.	.1	
	2:30-4	1200	KADA	Okla.	.1	
26	5:30-6	1310	WRAW	Pa.	.1	MCDXE
28	12:30-3	1390	KLRA	Ark.	1	NNRC
	5-6	1370	WMFO	Ala.	.1	NNRC
	7-8	1210	WSBC	Ill.	.1	NNRC
29	12-1	1310	XEFW	Tamp.Mex.	.25	CDXR
	12-3	1420	WPAR	W. Va.	.1	CDXR
	12-3	1390	CJRC	Man.	.1	NNRC
	1-4	1150	XEWZ	Mex.City.	.1	CDXR
	3-3:30	630	CKOV	B. C.	.1	CDXR
	3-4	1220	KWSC	Wash.	1	CDXR
	3-5	1450	CFCT	B. C.	.07	NRC
	4-4:30	**560**	**KSFO**	**Calif.**	**1**	**R. NEWS Covert**
	4-4:30	630	CKOV	B. C.	.1	
	4-5	1420	KGFF	Okla.	.1	CDXR
31	2-3	1420	KGIW	Colo.	.1	CDXR
			January			
1	**2-:220**	**1310**	**WEBR**	**N. Y.**	**.1**	**R. NEWS**
	2-9	590	XEPN	Coah.Mex.	50	CDXR NRC
	3-4	1200	CHAB	Sask.	.1	CDXR
	3-5:10	1400	WIRE	Ind.	.5	CDXR
	5:40-6	**1370**	**KFRO**	**Tex.**	**.1**	**R. NEWS**
2	**2:40-3**	**1420**	**WJBO**	**La.**	**.1**	**R. NEWS**
	4-4:20	**580**	**WDBO**	**Fla.**	**1**	**R. NEWS**
	4:50-5:10	**1310**	**KVOL**	**La.**	**.1**	**R. NEWS**
	5:10-5:30	**1370**	**WPAY**	**Ohio**	**.1**	**R. NEWS**
	5:10-5:30	**1420**	**KCMC**	**Ark.**	**.1**	**R. NEWS Halsey**
4	12:30-3	1390	KLRA	Ark.	1	NNRC
	4:30-5:30	1200	CKNX	Ont.	.05	CDXR
	5-6	1370	WMFO	Ala.	.1	NNRC
	5:40-6	**880**	**WSUI**	**Ia.**	**.5**	**R. NEWS**
	7-8	1210	WSBC	Ill.	.1	NNRC
5	1-2	1310	CJLS	N. Scotia	.1	
	1-4	1150	XEWZ	Mex.City	.1	CDXR
	2-3	1270	CMKC	Cuba	.15	NNRC

WJBO, BATON ROUGE, LOUISIANA

Cooperating with DX'ers by putting on special DX programs the second and fourth Sundays of each month, 2:00-4:00 a.m., E.S.T. These specials in December, as well as all WJBO frequency checks, are dedicated to RADIO NEWS.

	4-4:20	1260	KPAC	Tex.	.5	R. NEWS
	4-4:30	630	CKOV	B. C.	.1	
	6-7	950	KMBC	Mo.	1	CDXR
6	3-4	1440	XEFI	Chih. Mex.	.25	CDXR
	4:40-5	1310	WRAW	Pa.	.1	R. NEWS
7	2-2:20	1210	WPAX	Ga.	.1	R. NEWS Wood
	2:40-3	1500	WOPI	Tenn.	.1	R. NEWS
	4:10-4:30	1310	WTJS	Tenn.	.1	R. NEWS
	4:50-5:10	1310	WROL	Tenn.	.1	R. NEWS
8	12-1	1310	XEFW	Tamp.Mex.	.25	CDXR
	2-?	1210	KIUL	Kans.	.1	
9	2-3	830	WRUF	Fla.	5	GCDXC
11	12:30-3	1390	KLRA	Ark.	1	NNRC
	5-6	1370	WMFO	Ala.	.1	NNRC
	7-8	1210	WSBC	Ill.	.1	NNRC
12	1-4	1150	XEWZ	Mex. City	.1	CDXR
	2-4	1420	WJBO	La.	.1	R. NEWS
	2:30-4:30	1320	KID	Idaho	.25	NNRC
	3-3:30	630	CKOV	B. C.	.1	CDXR
	3-4	1370	KFRO	Tex.	.1	NNRC
	3-5	830	WEEU	Pa.	1	ICCP CDXR, GCDXC
	4-4:30	630	CKOV	B. C.	.1	
13	1-2	1360	WGES	Ill.	.5	NNRC
	2-5	1320	CMOX	Cuba	.25	
15	2-?	1210	KIUL	Kans.	.1	
	2:30-3	1370	WHBQ	Tenn.	.1	NNRC

PERIODIC

Daily—
7:30 a.m. 1050 kc., KFBI, Abilene, Kansas, 5 kw. (tips)

Tuesdays—
2:30-3 a.m. 900 kc., KSEI, Pocatello, Idaho, .25 kw.

Thursdays—
8 p.m. 1320 kc., WORK, York, Pa., 1 kw., (NRC) (tips)
11-11:15 p.m. 1010 kc., Regina, Sask., .5 kw, (tips)

Fridays—
8:45-9 p.m. 1530 kc., W9XBY, Kansas City, Mo. 1 kw. (tips)

Saturdays—
12:30-1 a.m. 980 kc., KDKA, Pittsburgh, Pa., 50 kw. (tips)
3 p.m. 1360 kc., WQBC, Vicksburg, Miss., 1 kw. (tips)
3:30-3:45 p.m. 830 kc., WEEU, Reading, Pa., 1 kw (tips)
8:45-9 p.m. 1420 kc., KCMC, Texarkana, Ark., 1 kw., (Radio News) (tips)

Sundays—
12:45-1 a.m. 1250 kc., WTCN, Minneapolis, Minn., 1 kw. (tips)
1 a.m. 640 kc., KFI, Los Angeles, Calif., 50 kw. (tips)
2 a.m. 730 kc., CJCA, Edmonton, Alberta, 1 kw.
2-5 a.m. 1380 kc., CMBX, Havana, Cuba, .25 kw.

Consolidated Foreign "Best Bets"

Following is a list of the foreign stations being heard by Official Observers in different sections of the U. S. and Canada. Wherever either an asterisk (*) or a number appears in a column it indicates that the station has been heard in the section represented by that column but the time not given. The numbers represent the approximate *local* time when the station is heard. Heavy numbers represent p.m. and light numbers a.m.

This list is made up from observers' reports as follows: Column 2 (New York)—Observers Kalmbach, Tomlinson, Lonis, Schmarder, Kentzel; Column 3 (Ohio, Virginia, Maryland, New Jersey, Pennsylvania)—Observers Shields, Beitman, Parfitt, McVey, Base, Bauer, Wilson, Gaiser, McCray, Botzum, Routzahn, Brus, Kocsan; Column 4 (Illinois, Missouri, Kansas, Minnesota, Nebraska) — Observers Truax, Meade, Rimer, Johnson, Crawford; Column 5 (Texas)—Housenfluck, Kimmons; Column 6 (California)—Sholin, Hunt.

The location and power of the European stations listed will be found in the European Call List in the December issue; of the TP's, in the Asiatic Call List, November issue.

(Note: Official Observers and other readers are invited to send in a listing of foreign stations heard each month. In doing so it will facilitate matters if stations are reported in the form of a list giving the frequency, call, location and hour (your own local time) when best heard.)

Kc.	*Call*	*2*	*3*	*4*	*5*	*6*
540	CJRM	–	–	*	–	–
550	CFNB	2	–	–	–	–
560	MTCY	–	–	–	–	*
570	2YA	*	–	*	–	*
590	7ZL	–	*	–	–	–
590	JOAK-2	–	–	–	–	*
600	CFCF	–	–	–	11	–
600	4QN	–	*	–	–	–
600	CRCW	–	*	–	–	–
610	JODK-2	–	–	–	–	*
610	2FC	–	*	–	–	–
620	4ZP	*	–	–	–	–
630	3AR	*	*	*	–	–
635	JODG	–	–	–	–	*
638	Prague	*	–	–	–	–
640	5CK	6	6	*	–	*
650	1YA	5	6	*	*	*
660	XGOA	–	*	–	–	–
670	JFAK	–	–	–	–	*
670	2CP	6	5	–	–	*
681	HJN	*	–	–	–	–
685	VAS	11	–	–	–	–
690	6WF	*	–	–	–	–
710	JOJK	–	–	–	–	*
710	XEN	–	*	*	–	–
720	3YA	*	*	*	–	*
730	5CL	*	–	*	–	–
730	CFPL	–	*	–	–	–
740	2BL	6	6	*	–	*
740	Munich	*	–	–	–	–
750	JOBK-1	–	–	–	4	*
750	7NT	6	5	*	–	*
750	KGU	–	5	1	–	–
770	JOHK	–	–	–	4	*
770	3LO	6	*	–	–	–
770	CMBS	–	11	–	–	–
776	Toulouse	6	3	–	–	–
780	JOPK	–	–	–	–	*
790	4YA	*	–	*	–	–
790	JOGK	–	–	–	4	–
800	4QG	6	5	*	–	*
800	HIX	*	–	–	–	–
804	West Regional	6	–	–	–	–
810	JOCK-1	–	–	–	4	*
814	Milan	6	–	–	–	–
815	CMCF	–	*	–	–	–
830	JOIK	–	–	–	4	*
830	3GI	–	6	–	–	–
830	LR5	8	–	–	–	–
840	CMQ	6	11	*	7	–
841	Berlin	1	–	–	–	–
850	JOFK	–	–	–	4	*
860	XEMO	2	2	–	–	–
870	LR6	8	–	*	–	–
870	JOAK-1	–	–	–	–	*
870	2GB	6	–	–	–	–
880	CMBN	–	*	–	–	–
900	JODK-1	–	–	–	–	*
904	Hamburg	6	1	–	–	–
910	4RK	–	–	*	–	–
920	JOQK	–	–	–	–	*
920	CMX	–	6	–	–	–
923	PRF4	*	–	–	–	–
930	3UZ	*	–	–	–	–
930	JOAG	–	–	–	–	*
940	JONK	–	–	–	–	*
950	LR3J	8	8	–	–	–
950	2UE	*	–	–	–	–
959	Poste Parisien	–	2	–	–	–
960	VV1RC	*	6	–	–	–
960	CMCD	–	6	–	–	–
970	JOBG	–	–	–	–	*
980	6AM	*	–	–	–	–
980	JOXK	–	–	–	–	*
990	LR4	8	–	–	–	–
1010	XEU	–	1	–	–	–
1013	Daventry	6	–	–	–	–
1017	PRB9	–	4	–	–	–
1020	XEJ	–	1	–	–	–
1030	CFCN	1	–	–	11	–
1030	CMCY	–	7	*	–	–
1040	5PI	*	–	–	–	–
1040	Rennes	6	1	–	–	–
1050	CX26	*	–	–	–	–
1077	Bordeaux	–	2	–	–	–
1085	JOBK-2	–	–	–	–	*
1095	EAJ7	6	–	–	–	–
1110	2UW	*	–	*	–	*
1113	Radio-Normandie	6	–	–	–	–
1120	4BC	*	–	*	–	*
1120	CKOC	–	*	–	–	–
1130	6ML	*	–	–	–	–
1140	I1TO	6	–	–	–	–
1150	XEH	–	–	–	7	–
1150	XEWZ	–	1	2	–	–
1150	LR8	–	–	*	–	–
1170	CMBD	–	9	–	–	–
1175	JOCK-2	–	–	–	–	*
1190	LS2	8	8	*	–	–
1190	2CH	*	–	–	–	–
1195	Frankfurt	6	–	–	–	–
1200	CKNX	5	*	–	–	–
1210	TGW	–	*	–	–	–
1230	LS8	–	8	–	–	–
1240	WKAQ	–	6	–	2	–
1250	CMKC	–	*	*	–	–
1255	CMCG	–	*	*	–	–
1310	CKCV	–	*	–	–	–
1310	CJLS	–	*	–	–	–
1380	CMBX	4	1	*	2	–
1450	CHGS	–	–	*	–	–
1510	CKCR	–	*	–	–	–

HEAR HIM AT THE MIKE

Official L.P.O. Wilbur T. Golson is chief engineer and DX announcer for station WJBO shown opposite.

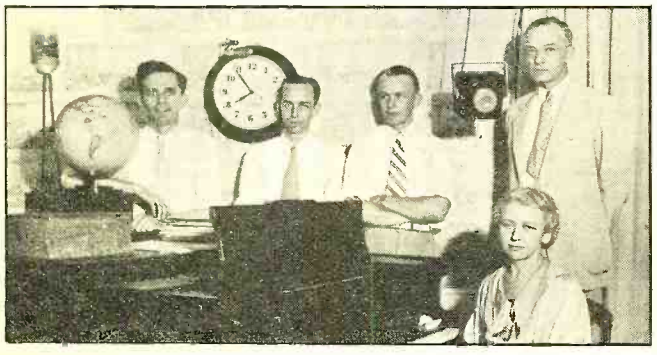
DX Club Register

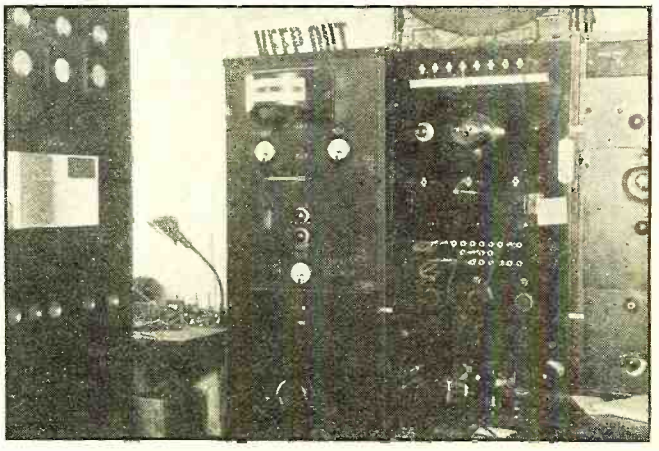
The Mid-Co DX Exchange is a thriving DX club which has headquarters at 247 South Hillside, Wichita, Kansas. Members receive a 6-page bulletin each week throughout the DX season. Membership for the balance of the 1935-36 season may be obtained for 80c, beginning December 1st; 70c beginning January 1st, etc. The president is T. R. Grosvenor. The MCDXE is a member of the Inter Club Cooperative Plan, scheduling its special DX programs through the "clearing house". Further information on the club may be obtained by writing to the editor of this department.

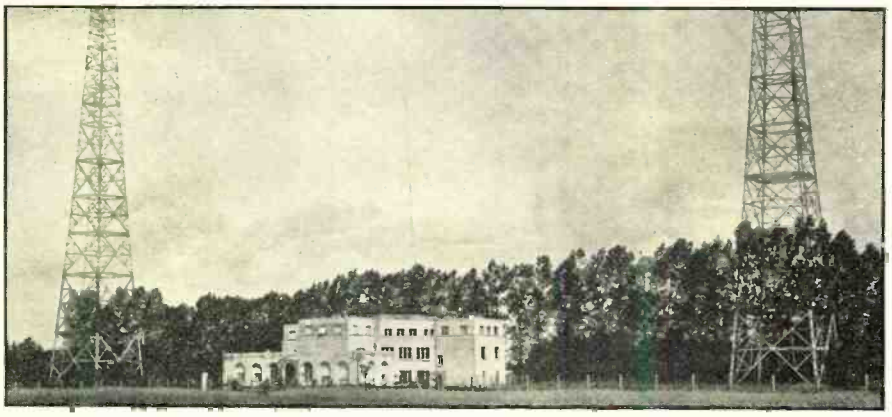
The New Zealand DX Radio Association has

WTRC AND STAFF

Numerous "specials" are put on by this station for the benefit of DX'ers.







RADIO STRASBOURG

This French station will be on the air December 22, 1:30-2:30, E.S.T., with a "special" for I.D.A. which was arranged by Observer Tomlinson.

a world-wide membership close to the 900 mark. Life membership including an enamel badge and a certificate of membership costs 2/6, or roughly 65c in U. S. money. Its bulletin takes the form of the 26-page printed magazine "Tune In" which is issued monthly and costs approximately $2 per year. The Association also publishes a 72-page quarterly call book which contains the calls of broadcast stations throughout the world as well as short-wave stations and Australian amateurs and sells for approximately 25c per copy. Any one desiring information on the club can address an inquiry to the editor of this department who will forward it to the proper club official. The foregoing information was supplied in a letter from Official LPO Watson of New Zealand, one of the very active executives of the Association.

Randolph-IDA DX Trophy Contest

Winners of the Randolph-IDA Contest for 1934-1935 have recently been announced by the International DX'ers Alliance as follows:

1st	J. L. Sullivan	Cambridge	New Zealand
2nd	Charles Hesterman	Saskatoon Sask	Canada
3rd	W. K. Walton	Carn Towan Cornwall	England
4th	Warren Reichardt*	Reading Mass.	U. S. A.
5th	Leo A. J. De Roo	Lanikai Oahu	Hawaii
6th	Irwin Beitman*	Elyria Ohio	U. S. A.
7th	R. T. Coales*	Southsea	England
8th	R. Stansfield	Ripley Woking	England
9th	A. C. Lyell*	Johannesburg	S. Africa
10th	Howard Eck*	E. Lansing Mich.	U. S. A.
11th	Randolph Hunt*	Encinitas Calif.	U. S. A.
12th	Ray Swenson	Rockford Illinois	U S A.
13th	R. H. Tomlinson*	Portchester N. Y.	U. S. A.
14th	Fred Crowder*	Hull	England

An unusual group of prizes were awarded through the courtesy of Randolph Hunt who is well known in DX circles as an I.D.A. executive, an Official Radio News Listening Post Observer and as a member of a number of other DX Clubs. Outstanding among the prizes contributed by Mr. Hunt are the trophies awarded for first, second and third and special awards. The first prize is a trophy of 24 karat gold and sterling silver standing 40 inches high. The second, third and special awards are trophies in two-tone bronze. The other winners listed above are given a choice of prizes all of which are provided by Observer Hunt. Several of these are subscriptions to RADIO NEWS. Among the additional prizes is a subscription to RADIO NEWS contributed by the Broadcast Band DX Corner. This goes to John Shanks, of Russellville, Tennessee, one of the runners-up.

The editor would like to take this occasion to extend his hearty congratulations to the prize winners listed above. Every one of these DX'ers has established an enviable record. Especially would we like to extend congratulations to the 8 Official RADIO NEWS Observers whose names appear among winners, as indicated by the asterisks.

In this contest only distant foreign broadcast-band stations were counted. Counts were made on a point basis, the number of points allowed for each station logged depending upon the distance and several other factors which made competition somewhat more fair than is usually encountered in DX contests where the number of stations heard forms the basis of judgment.

Our Readers Report

Frank Wheeler (Pennsylvania) sends in some news about the United States Radio DX Club: "We have been preparing to establish listening posts and are following the RADIO NEWS example of calling them "OLPO's. The Courtesy Programs Committee of our club is working on our third Anniversary Frolic on January 1st and we expect to have a large number of stations participating with special DX programs".

Observer Wood (Alabama) would like to correspond with foreign DX fans. His address is Route 3, Box 212, Wetumpka, Alabama.

Observer Covert (California): "XEAQ, Rosario Beach, Baja California is a new Mexican station on 1090 kc. XGOA, 660 kc., Nanking, China broadcasts news in English on Tuesday, Thursday and Saturday at 5 a.m., PST.

Observer Tyndall (Vermont) complains that in his locality DX signals had been very poor this fall. He has experienced few mornings when anything but the large west coast stations put in an appearance. He reports that WTMV, 1500 kc., puts on regular Saturday night frolics from 11 p.m. to 3 a.m., Sunday, EST.

Observer Kalmbach (New York): "Station WBNY, Buffalo, N. Y., 1370 kc., goes on the air in November on practically a full-time basis, according to Roy L. Albertson, owner and operator. The power will be 250 watts day, 100 watts night".

Observer Tomlinson (New York) reports a large number of South American, European and TP stations heard (see Column 2, this month's "Best Bets"). He suggests Toulouse, 913 kc., as the strongest of the TA's. It is heard best from 6-7:30 p.m., EST. He finds 2CO and 1YA the best TP's.

Observer Lonis (New York) lists 5CK, 640 kc.; 1YA, 650 kc.; 2CO, 670 kc.; 2BL, 740 kc.; 7NT, 750 kc.; 3LO, 770 kc. and 4QG, 800 kc. as heard by him, each on several different occasions in the past few weeks. 2GB, 870 kc. was heard once. Best hour for these stations is 5:30-6:10 a.m., EST.

Observer Kentzel (New York): "Short-wave verification received from HIX, Santo Domingo, D. R. states that this station is also on 800 kc. with 750 watts".

Observer Shields (Ohio): "TP's are coming in and so far have identified 2BL, 740 kc.; 1YA, 650 kc. and 3GI, 830 kc. Have heard others on 640, 670, 790, 870 and 1020 but unable to log them due to static. All heard best between 5:45 and 6:15 a.m., EST".

Observer Beitman (Ohio): "1YA, 2CO, 3AR, 2BL and 3LO are the only TP's breaking through well enough to be of any use. LR3, LS2, and LS8 are frequently heard between 7 and 9 p.m., EST". He wants to know what Spanish speaking station is heard behind WJR on 750 kc. Can anyone help him on this?

Observer McVey (Maryland) with his Philco 116B reports 1YA, 2CO, and 4QG, 2BL, 7NT, 3GI as the best TP's. These are heard 4:30-6 a.m., EST. Also reports YV1RC, 960 kc. and WKAQ, 1240 kc. as being strongly heard between 5 and 6 p.m. "LS2 has been heard tolling the hour at 8 p.m. behind WOAI. PP heard at 2:10 a.m. and Toulouse at 3 a.m. TGW heard at 5 a.m. on 1220 kc. instead of 565".

Observer Base (Maryland): "It may interest you to know that the RADIO NEWS Tenatuner used with my Scott Imperial receiver has been bringing up the signals of the Transpacific stations to a considerable extent. During the past week I have logged 1YA, 4QG, 2CO, 2BL, 3YA, 7NT and 3GI".

Observer Bauer (Maryland): "That was a nice picture of Observer McVey and his wife in the November issue. I sure hope he gets plenty of DX on his new Philco. At present am having both my sets overhauled in preparation for a real DX effort".

Observer Wilson (Virginia): "The days here have been nice and clear but at night static has been high. One morning the static was reasonably low and 1YA, 2BL and KGU, as well as some west coast 100 watters, were heard".

Robert F. Gaiser (New Jersey) offers the following information on WKAQ—operates noon to 1 p.m. and 6-10 p.m., PRT or 11 a.m.-noon and 5-9 p.m., EST. The address is Radio Corporation of Porto Rico, Telephone Building, San Juan, Porto Rico.

Observer Chalmers (New Zealand) is one of the operators of the most southern broadcast station in the world, 4ZP, Invercargill, New Zealand, and sends in the following information on the station: "It is on the air weekdays from 12-2 p.m. and 5-10 p.m. local time. Saturdays it operates from 7-10 p.m.; Sundays from 11 a.m.-1 p.m. and 6:30-10 p.m. Power is 500 watts on 620 kc. The transmitter is crystal controlled, 100 per cent modulated and the station with equipment is valued at $30,000. A T-type antenna is employed, 115 feet high, 400 feet long. It is owned by Mr. R. T. Parsons and the mailing address is 155 Layard Street, Invercargill, New Zealand. Several reports have been received from U. S. DX'ers including an especially excellent one from Art Collins of Buffalo, N. Y."

Observer Mathie (New Zealand): "The site for the erection of the 60 kw. station and mast for 2YA is at Titahi Bay which is on the seacoast several miles out of Wellington. The single antenna mast will be 700 feet high and the construction will be done by Amalgamated Wireless Ltd."

Observer Watson (New Zealand): "The latest commencement dates for the new Australian National Stations are as follows: 4QN, 600 kc., 7 kw., and 2NR, 700 kc., 7 kw. will start operations the latter part of December 1935; 6WA, 560 kc., 10 kw. during March 1936; 2CR, 550 kc., 10 kw. and 3WV, 580 kc., 10 kw. in June 1936.

"A strennous effort is being made to protect independently owned New Zealand stations from the high royalty payments on the broadcasting of recorded music. At present privately-owned stations are not permitted to sell time on the air, but the agitation at this time is to introduce laws permitting them to do so, to enable them to cover their operating and carrying costs. The alternate plan is to pay the copyright royalty on recordings out of the government license fees which are regularly received from every owner of a radio receiver. Unless one or the other of these steps is taken it is felt that many of the non-government owned broadcast stations will be forced out of existence."

Incidentally, at the end of June 1935 there were nearly 165,000 licensed receivers in New Zealand, an increase of 34,000 over June 1934. The introduction of all-wave receivers is largely responsible for this increase.

Observer Yamamoto (Japan): "The Japanese list in the November issue of RADIO NEWS contained some misprints and errors which may be corrected as follows:

JOVK Hakodate (not Hajodate).
JOHG Kagoshima (not Kagashima) 1050 kc. (not 760 kc.). This station will begin transmission shortly.
JOCK-1 Nagoya (not Nagaya).
JOBG Maebashi (not Maehashi).
JBAK Fuzan 1030 kc. (not 1020 kc.) 0.15 kw.
JOIG is the call of the Toyama station.

Next spring JOAK-1, and JOAK-2, Tokio, will change power and frequency. JOAK-1 will operate on 590 kc. with 150 kw., while JOAK-2 will be on 880 kc. with 150 kw.

Observer Botzum (Pennsylvania): "CMBD, 1170 kc. heard every evening behind WCAU, 8:30-10 p.m., EST".

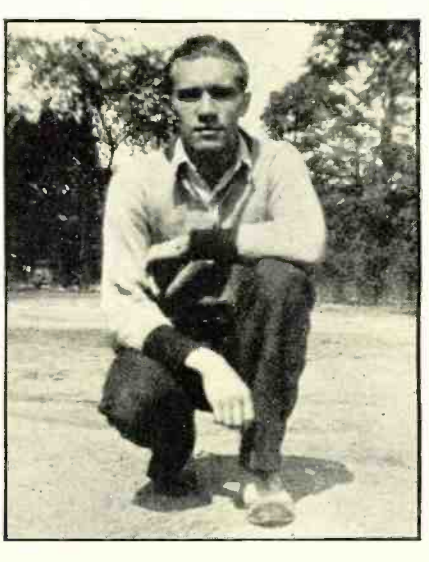
Observer Routzahn (Pennsylvania): "Since last reporting I have raised my log to a total of 857. 7NT, 4QN and 7ZL are new TP's recently added. 1YA, 2CO, and 5CK are very strong and are heard best from 5-5:45 a.m., EST. Have heard nothing of the TA's as yet but really haven't tried very hard for them".

Stanley Brus (Pennsylvania): "KVOD, 920 kc., Denver, broadcasts a dance program every morning, 2-3 a.m., EST. KADA, 1200 kc., Ada,

(*Turn to page* 448)

OFFICIAL L.P.O. FOR OHIO

Stan Elcheshen, whose listening post is located at 801 Literary Road, Cleveland, needs no introduction to DX'ers. Here he is—in person.



BROADCASTING STATIONS IN THE U. S.

Alphabetically by Call Letters, Location, Frequency and Power

Compiled by John M. Borst

Call	Location	kc.	kw.
KABC	**San Antonio, Texas (.1–.25 kw.)	1420	.1
KABR	Aberdeen, S. Dak	1420	.1
KADA	Ada, Okla.	1200	.1
KALB	Alexandria, La.	1420	.1
KALE	Portland, Ore.	1300	.5
KARK	Little Rock, Ark.	890	.25–.5
KASA	Elk City, Okla.	1210	.1
KAST	Astoria, Ore.	1370	.1
KBPS	Portland, Ore.	1420	.1
KBTM	Paragould, Ark.	1200	.1
KCMC	Texarkana, Ark.	1420	.1
KCRC	Enid, Okla.	1370	.1–.25
KCRJ	Jerome, Ariz.	1310	.1
KDB	Santa Barbara, Calif.	1500	.1
KDFN	Casper, Wyo.	1440	.5
KDKA	Pittsburgh, Pa.	980	50
KDLR	Devils Lake, N. Dak.	1210	.1
KDON	Del Monte, Calif. (C.P.)	1210	.1
KDYL	Salt Lake City, Utah	1290	1
KECA	**Los Angeles, Calif. (1-5)	1430	1
KEHE	Los Angeles, Calif.	780	.5–1
KELD	Eldorado, Ark.	1370	.1
KELW	Burbank, Calif.	780	.5
KERN	Bakersfield, Calif.	1370	.1
KEX	Portland, Ore.	1180	5
KFAB	Lincoln, Nebr.	770	10
KFAC	Los Angeles, Calif.	1300	1
KFBB	Great Falls, Mont.	1280	1–2.5
KFBI	Abilene, Kans.	1050	5
KFBK	**Sacramento, Calif. (1490 5)	1310	.1
KFDM	Beaumont, Tex.	560	.5–1
KFDY	Brookings, S. Dak.	780	1
KFEL	Denver, Colo.	920	.5
KFEQ	St. Joseph, Mo.	680	2.5
KFGQ	Boone, Iowa	1370	.1
KFH	Wichita, Kans.	1300	1
KFI	Los Angeles, Calif.	640	50
KFIO	Spokane, Wash.	1120	.1
KFIZ	Fond du Lac, Wis.	1420	.1
KFJB	Marshalltown, Iowa	1200	.1–.25
KFJI	Klamath Falls, Ore.	1210	.1
KFJM	*Grand Forks, N. Dak. (.1–.25)	1370	.1
KFJR	Portland, Ore.	1300	.5
KFJZ	Fort Worth, Tex.	1370	.1
KFKA	Greeley, Colo.	880	.5–1
KFKU	Lawrence, Kans.	1220	1–5
KFNF	Shenandoah, Iowa	890	.5–1
KFOR	Lincoln, Nebr.	1210	.1–.25
KFOX	Long Beach, Calif.	1250	1
KFPL	**Dublin, Tex. (.1–.25 kw.)	1310	.1
KFPM	Greenville, Tex.	1310	.015
KFPW	Ft. Smith, Ark.	1210	.1
KFPY	Spokane, Wash.	1340	1
KFQD	Anchorage, Alaska	780	.25
KFRC	**San Francisco, Calif. (1–5 kw.)	610	1
KFRO	Longview, Tex.	1370	.1
KFRU	Columbia, Mo.	630	.5–1
KFSD	San Diego, Calif.	600	1
KFSG	Los Angeles, Calif.	1120	.5–1
KFUO	Clayton, Mo.	550	.5–1
KFVD	Los Angeles, Calif.	1000	.25
KFVS	Cape Girardeau, Mo.	1210	.1–.25
KFWB	Hollywood, Calif.	950	1–2.5
KFXD	Nampa, Ida.	1200	.1–.25
KFXJ	Grand Junction, Colo.	1200	.1–.25
KFXM	San Bernardino, Calif.	1210	.1
KFXR	Oklahoma City, Okla.	1310	.1–.25
KFYO	Lubbock, Tex.	1310	.1–.25
KFYR	Bismarck, N. Dak.	550	1–5
KGA	Spokane, Wash.	900	1–2.5
KGAR	Tucson, Ariz.	1370	.1–.25
KGB	**San Diego, Calif. (1–2.5 kw.)	1330	1
KGBU	Ketchikan, Alaska	900	.5
KGBX	*Springfield, Mo. (1230 .5)	1310	.1
KGBZ	York, Nebr.	930	1–2.5
KGCA	Decorah, Iowa	1270	.1
KGCU	Mandan, N. Dak.	1240	.25
KGCX	Wolf Point, Mont.	1310	.1–.25
KGDE	Fergus Falls, Minn.	1200	.1–.25
KGDM	**Stockton, Calif. (1 kw.)	1100	.25
KGDY	Huron, S. Dak.	1340	.25
KGEK	Sterling, Colo.	1200	.1
KGER	Long Beach, Calif.	1360	1
KGEZ	Kalispell, Mont.	1310	.1
KGFF	Shawnee, Okla.	1420	.1
KGFG	Oklahoma City, Okla.	1370	.1
KGFI	Corpus Christi, Tex.	1500	.1–.25
KGFJ	Los Angeles, Calif.	1200	.1
KGFK	Moorhead, Minn.	1500	.1
KGFL	Roswell, N. Mex.	1370	.1
KGFW	Kearney, Nebr.	1310	.1
KGFX	Pierre, S. Dak.	630	.2
KGGC	San Francisco, Calif.	1420	.1
KGGF	Coffeyville, Kans.	1010	1
KGGM	Albuquerque, N. Mex.	1230	.25–.5
KGHF	Pueblo, Colo.	1320	.5
KGHI	Little Rock, Ark.	1200	.1–.25
KGHL	*Billings, Mont. 780	950	1–2.5
KGIR	Butte, Mont.	1340	1–2.5
KGIW	Alamosa, Colo.	1420	.1
KGKB	Tyler, Tex.	1500	.1
KGKL	San Angelo, Tex.	1370	.1–.25
KGKO	Wichita Falls, Tex.	570	.25–1
KGKY	Scottsbluff, Nebr.	1500	.1–.25
KGMB	**Honolulu, T.H. (1 kw.)	1320	.25
KGNC	Amarillo, Tex.	1410	1–2.5
KGNF	North Platte, Nebr.	1430	1
KGNO	Dodge City, Kans.	1340	.25
KGO	San Francisco, Calif.	790	7.5
KGU	Honolulu, T. H.	750	2.5
KGVO	Missoula, Mont.	1260	1
KGW	Portland, Ore.	620	1–5
KGY	Olympia, Wash.	1210	.1
KHBC	Hilo, T. H. (C.P.)	1420	.1
KHJ	Los Angeles, Calif. (C.P. for 5 kw.—daytime)	900	1
KHQ	Spokane, Wash.	590	1–2
KHSL	Chico, Calif.	950	.25
KICA	Clovis, N. Mex.	1370	.1
KID	Idaho Falls, Ida.	1320	.25–.5
KIDO	Boise, Ida.	1350	1–2.5
KIDW	Lamar, Colo.	1420	.1
KIEM	Eureka, Calif.	1210	.1
KIEV	Glendale, Calif. (C.P. for .25 kw.)	850	.1
KINY	Juneau, Alaska	1310	.1
KIRO	*Seattle, Wash. (710 kc., .5 kw.)	650	.25
KIT	Yakima, Wash.	1310	.1–.25
KIUJ	Santa Fe, N. Mex.	1310	.1
KIUL	Garden City, Kans.	1210	.1
KIUN	Pecos, Texas	1420	.1
KIUP	Durango, Colo.	1370	.1
KJBS	San Francisco, Calif.	1070	.1–.5
KJR	Seattle, Wash.	970	5
KLCN	Blytheville, Ark.	1290	.1
KLO	Ogden, Utah	1400	.5
KLPM	Minot, N. Dak.	1240	.25
KLRA	Little Rock, Ark.	1390	–2.5
KLS	Oakland, Calif.	1440	.25
KLUF	*Galveston, Tex. (.1–.25 kw.)	1370	.1
KLX	Oakland, Calif.	880	1
KLZ	**Denver, Colo. (1-5kw.)	560	1
KMA	Shenandoah, Iowa	930	1–2.5
KMAC	San Antonio, Texas	1370	.1
KMBC	**Kansas City, Mo. (1-5 kw.)	950	1–2.5
KMED	Medford, Ore.	1310	.1–.25
KMJ	Fresno, Calif.	580	.5–1
KMLB	Monroe, La.	1200	.1
KMMJ	Clay Center, Nebr.	740	1
KMO	Tacoma, Wash.	1330	.25
KMOX	St. Louis, Mo.	1090	50
KMPC	Beverly Hills, Calif.	710	.5
KMTR	Los Angeles, Calif.	570	1
KNOW	Austin, Tex.	1500	.1
KNEL	Brady, Tex.	1500	.1
KNX	Los Angeles, Calif	1050	50
KOA	Denver, Colo.	830	50
KOAC	Corvallis, Ore.	550	1
KNET	Palestine, Tex. (C. P.)	1420	.1
KOB	Albuquerque, N. Mex.	1180	10
KOH	Reno, Nev.	1380	.5
KOIL	Council Bluffs, Iowa	1260	1–2.5
KOIN	Portland, Ore.	940	1–5
KOL	Seattle, Wash.	1270	1–2.5
KOMA	Oklahoma City, Okla.	1480	5
KOMO	**Seattle, Wash. (1-5)	920	1
KONO	San Antonio, Tex.	1370	.1
KOOS	Marshfield, Ore.	1200	.25
KORE	Eugene, Ore.	1420	.1
KOTN	Pine Bluff, Ark.	1500	.1
KOY	Phoenix, Ariz.	1390	.5–1
KPAC	Port Arthur, Tex.	1260	.5
KPJM	Prescott, Ariz.	1500	.1
KPLC	Lake Charles, La.	1500	.1
KPO	San Francisco, Calif.	680	50
KPOF	Denver, Colo.	880	.5
KPPC	Pasadena, Calif.	1210	.05
KPQ	Wenatchee, Wash.	1500	.1–.25
KPRC	Houston, Tex.	920	1–5
KQV	Pittsburgh, Pa.	1380	.5
KQW	San Jose, Calif.	1010	.5–1
KRE	Berkeley, Calif.	1370	.1–.25
KREG	Santa Ana, Calif.	1500	.1
KRGV	Weslaco, Tex.	1260	.5
KRKD	Los Angeles, Calif.	1120	.5–1
KRKO	Everett, Wash.	1370	.05
KRLC	Lewiston, Ida.	1420	.1
KRLD	Dallas, Tex.	1040	10
KRLH	Midland, Tex. (C. P.)	1420	.1
KRMD	Shreveport, La.	1310	.1
KRNR	Roseburg, Ore. (C. P.)	1500	.1
KRNT	Des Moines, Iowa	1320	.5–1
KROC	Rochester, Minn.	1310	.1
KROW	Oakland, Calif.	930	1
KRSC	Seattle, Wash.	1120	.1
KSAC	Manhattan, Kans.	580	.5–1
KSCJ	Sioux City, Iowa	1330	1–2.5
KSD	**St. Louis, Mo. (1-5 kw.) (*1 kw.)	550	.5–1
KSEI	Pocatello, Ida.	900	.25–.5
KSFO	San Francisco, Calif.	560	1
KSL	Salt Lake City, Utah	1130	50
KSLM	Salem, Ore.	1370	.1
KSO	**Des Moines, Iowa (.5- 1 kw.)	1430	.25–.5
KSOO	Sioux Falls, S. Dak.	1110	2.5
KSTP	St. Paul, Minn.	1460	10–25
KSUN	Lowell, Ariz.	1200	.1
KTAR	Phoenix, Ariz.	620	1
KTAT	Fort Worth, Tex.	1240	1
KTBS	Shreveport, La.	1450	1
KTFI	*TwinFalls.Ida. (1 kw.)	1240	.5–1
KTHS	Hot Springs National Park, Ark.	1040	10
KTRB	Modesto, Calif.	740	.25
KTRH	**Houston, Tex. (1-5kw) (*1290 kc.)	1380	1–2.5
KTSA	San Antonio, Tex.	550	1–5
KTSM	El Paso, Tex.	1310	.1
KTUL	Tulsa, Okla.	1400	.5–1
KTW	Seattle, Wash.	1220	1
KUJ	Walla Walla, Wash.	1370	.1
KUMA	Yuma, Ariz.	1420	.1
KUOA	Fayetteville, Ark.	1260	1
KUSD	Vermillion, S. Dak.	890	.5
KVI	Tacoma, Wash.	570	1
KVL	Seattle, Wash.	1370	.1
KVOA	Tucson, Ariz.	1260	.5
KVOD	Denver, Colo.	920	.5
KVOL	Lafayette, La.	1310	.1
KVOO	Tulsa, Okla.	1140	25
KVOR	Colorado Springs, Colo.	1370	1
KVOS	Bellingham, Wash.	1200	.1
KVSO	Ardmore, Okla.	1210	.1
KWEA	Shreveport, La.	1210	.1
KWBG	Hutchinson, Kans.	1420	.1
KWG	Stockton, Calif.	1200	.1
KWJJ	*Portland, Ore. (1040 kc.)	1060	.5
KWK	St. Louis, Mo.	1350	.1
KWKC	Kansas City, Mo.	1370	.1
KWKH	*Shreveport, La. (1100 kc.)	850	10
KWLC	Decorah, Iowa	1370	.1
KWSC	**Pullman, Wash. (1–5 kw.)	1220	1–2
KWTN	Watertown, S. Dak.	1210	.1
KWTO	**Springfield, Mo. (5kw)	560	1
KWYO	Sheridan, Wyo.	1370	.1
KXA	Seattle, Wash.	760	.25–.5
KXL	Portland, Ore.	1420	.1–.25
KXO	El Centro, Calif.	1500	.1
KXRO	Aberdeen, Wash.	1310	.1
KXYZ	Houston, Tex.	1440	.5–1
KYA	San Francisco, Calif.	1230	1
KYW	Philadelphia, Pa.	1020	10
WAAB	Boston, Mass.	1410	.5
WAAF	Chicago, Ill.	920	.5
WAAT	Jersey City, N. J.	940	.5
WAAW	Omaha, Nebr.	660	.5
WABC	New York, N. Y.	860	50
WABI	Bangor, Me.	1200	.1
WABY	Albany, N. Y.	1370	.1
WACO	Waco, Tex.	1420	.1
WADC	Tallmadge, Ohio	1320	1–2.5
WAGF	**Dothan, Ala. (.1-.25kw)	1370	.1
WAGM	Presque Isle, Me.	1420	.1
WAIM	Anderson, S. C.	1200	.1
WAIU	Columbus, Ohio	640	.5
WALA	Mobile, Ala.	1380	.5–1
WALR	Zanesville, Ohio	1370	.1
WAML	Laurel, Miss.	1310	.1
WAPI	Birmingham, Ala.	1140	5
WARD	Brooklyn, N. Y	1400	.5
WASH	Grand Rapids, Mich.	1270	.5
WATR	Waterbury, Conn.	1190	.1
WAVE	Louisville, Ky.	940	1
WAWZ	Zarephath, N. J.	1350	.5–1
WAZL	Hazleton, Pa.	1420	.1
WBAA	West Lafayette, Ind.	890	.5–1
WBAL	*Baltimore, Md. (760 kc., 2.5 kw.)	1060	10
WBAP	Fort Worth, Tex.	800	50
WBAX	Wilkes-Barre, Pa.	1210	.1
WBBC	Brooklyn, N. Y.	1400	.5
WBBL	Richmond, Va.	1210	.1
WBBM	Chicago, Ill.	770	50
WBBR	Brooklyn, N. Y.	1300	1
WBBZ	Ponca City, Okla.	1200	.1
WBCM	Bay City, Mich.	1410	.5
WBEN	Buffalo, N. Y.	900	1
WBEO	Marquette, Mich.	1310	.1
WBHS	Huntsville, Ala.	1300	.1
WBIG	Greensboro, N. C.	1440	.5–1
WBNO	New Orleans, La.	1200	.1
WBNS	Columbus, Ohio	1430	.5–1
WBNX	New York, N. Y.	1350	.25
WBNY	Buffalo, N. Y. (C. P.)	1370	.1–.25
WBOQ	See WABC		
WBOW	**Terre Haute, Ind. (.1–.25 kw.)	1310	.1
WBRB	Red Bank, N. J.	1210	.1
WBRC	Birmingham, Ala.	930	1
WBRE	Wilkes-Barre, Pa.	1310	.1
WBSO	Needham, Mass.	920	.5
WBT	Charlotte, N. C.	1080	50
WBTM	Danville, Va.	1370	.1–.25
WBZ	Boston, Mass.	990	50

Call	Location	kc.	kw.
WBZA	Boston, Mass.	990	1
WCAC	Storrs, Conn.	600	.5
WCAD	Canton, N. Y.	1220	.5
WCAE	**Pittsburgh, Pa. (1–5 kw.)	1220	1
WCAL	Northfield, Minn.	1250	1–2.5
WCAM	Camden, N. J.	1280	.5
WCAO	Baltimore, Md.	600	.5–1
WCAP	Asbury Park, N. J.	1280	.5
WCAT	Rapid City, S. Dak.	1200	.1
WCAU	Philadelphia, Pa.	1170	50
WCAX	Burlington, Vt.	1200	.1
WCAZ	Carthage, Ill.	1070	.1
WCBA	Allentown, Pa.	1440	.5
WCBD	Waukegan, Ill.	1080	5
WCBM	Baltimore, Md.	1370	.1–.25
WCBS	Springfield, Ill.	1420	.1
WCCO	Minneapolis, Minn.	810	50
WCFL	Chicago, Ill.	970	5
WCHS	Charleston, W. Va.	580	.5–1
WCKY	Covington, Ky.	1490	5
WCLO	Janesville, Wis.	1200	.1
WCLS	Joliet, Ill.	1310	.1
WCMI	Ashland, Ky.	1310	.1
WCNW	Brooklyn, N. Y.	1500	.1–.25
WCOA	Pensacola, Fla.	1340	.5
WCOC	Meridian, Miss.	880	.5–1
WCOL	Columbus, Ohio	1210	.1
WCOP	Boston, Mass.	1120	.5
WCPO	Cincinnati, Ohio	1200	.1–.25
WCRW	Chicago, Ill.	1210	.1
WCSC	Charleston, S. C.	1360	.5–1
WCSH	Portland, Me.	940	1–2.5
WDAE	*Tampa, Fla.(1-2.5kw.)	1220	1
WDAF	Kansas City, Mo.	610	1–5
WDAH	El Paso, Tex.	1310	.1
WDAS	Philadelphia, Pa.	1370	.1–.25
WDAY	Fargo, N. Dak.	940	1–5
WDBJ	Roanoke, Va.	930	1
WDBO	*Orlando, Fla. (1 kw.)	580	.25
WDEL	Wilmington, Del.	1120	.25–.5
WDEV	Waterbury, Vt.	550	.5
WDGY	Minneapolis, Minn.	1180	1–5
WDNC	Durham, N. C.	1500	.1
WDOD	Chattanooga, Tenn.	1280	1–5
WDRC	Hartford, Conn.	1330	1–2.5
WDSU	New Orleans, La.	1250	1
WDZ	**Tuscola, Ill. (1020 .25)	1070	.1
WEAF	New York, N. Y.	660	50
WEAN	Providence, R. I.	780	.5
WEBC	Superior, Wis.	1290	1–5
WEBQ	Harrisburg, Ill.	1210	.1–.25
WEBR	Buffalo, N. Y.	1310	.1–.25
WEDC	Chicago, Ill.	1210	.1
WEED	Rocky Mount, N. C.	1420	.1
WEEI	Boston, Mass.	590	1
WEEU	Reading, Pa.	830	1
WEHC	Charlottesville, Va.	1420	.1–.25
WEHS	Cicero, Ill.	1420	.1
WELI	New Haven, Conn	900	.5
WELL	Battle Creek, Mich.	1420	.1
WEMP	Milwaukee, Wis.(C.P.)	1310	.1
WENR	Chicago, Ill.	870	50
WESG	Elmira, N. Y.	1040	1
WEVD	New York, N. Y.	1300	1
WEW	St. Louis, Mo.	760	1
WEXL	Royal Oak, Mich.	1310	.05
WFAA	Dallas, Texas	800	50
WFAB	New York, N. Y.	1300	1
WFAM	South Bend, Ind.	1200	.1
WFAS	White Plains, N. Y.	1210	.1
WFBC	**Greenville S. C. (1–5 kw.)	1300	1
WFBG	Altoona, Pa.	1310	.1
WFBL	Syracuse, N. Y.	1360	1–5
WFBM	Indianapolis, Ind.	1230	1
WFBR	Baltimore, Md.	1270	.5
WFDF	Flint, Mich.	1310	.1
WFEA	Manchester, N. H.	1340	.5–1
WFIL	Philadelphia, Pa.	560	.5–1
WFLA-WSUN	Clearwater, Fla.	620	1–5
WFMD	Frederick, Md. (C. P.)	900	.5
WGAL	Lancaster, Pa.	1500	.1–.25
WGAR	Cleveland, Ohio	1450	.5–1
WGBB	Freeport, N. Y.	1210	.1
WGBF	Evansville, Ind.	630	.5
WGBI	*Scranton, Pa. (5 kw.)	880	.25
WGCM	**Gulfport, Miss. (1120 .5)	1210	.1–.25
WGES	Chicago, Ill.	1360	.5–1
WGH	Newport News, Va.	1310	.1–.25
WGL	Ft. Wayne, Ind.	1370	.1
WGN	Chicago, Ill.	720	50
WGNY	Chester Town'p., N. Y	1210	.1
WGPC	Albany, Ga.	1420	.1
WGR	Buffalo, N. Y.	550	1
WGST	Atlanta, Ga.	890	.5–1
WGY	Schenectady, N. Y.	790	50
WHA	Madison, Wis.	940	2.5
WHAM	Rochester, N. Y.	1150	50
WHAS	Louisville, Ky.	820	50
WHAT	Philadelphia, Pa.	1310	.1
WHAZ	Troy, N. Y.	1300	.5
WHB	Kansas City, Mo.	860	1
WHBB	Selma, Ala. (C.P.)	1500	.1
WHBC	**Canton, Ohio (.1–.25)	1200	.1
WHBF	Rock Island, Ill.	1210	.1–.25
WHBI	Newark, N. J.	1250	1–2.5
WHBL	Sheboygan, Wis.	1410	.5
WHBQ	Memphis, Tenn.	1370	.1
WHBU	Anderson, Ind.	1210	.1
WHBY	Green Bay, Wis.	1200	.1–.25
WHDF	Calumet, Mich	1370	.1–.25
WHDH	Boston, Mass.	830	1
WHDL	Olean, N. Y.	1420	.1
WHEB	Portsmouth, N. H.	740	.25
WHEC	Rochester, N. Y.	1430	.5–1
WHEF	Kosciusko, Miss.	1500	.1–.25
WHFC	Cicero, Ill.	1420	.1
WHIO	Dayton, Ohio	1260	1
WHIS	Bluefield, W. Va.	1410	.25–.5
WHJB	Greensburg, Pa.	620	.25
WHK	Cleveland, Ohio	1390	1–2.5
WHN	**New York, N. Y. (1–5 kw.)	1010	1
WHO	Des Moines, Iowa	1000	50
WHOM	Jersey City, N. J.	1450	.25
WHP	Harrisburg, Pa.	1430	.5–1
WIBA	**Madison, Wis. (1-5kw.)	1280	1
WIBG	Glenside, Pa.	970	.1
WIBM	Jackson, Mich.	1370	.1–.25
WIBU	Poynette, Wis.	1210	.1–.25
WIBW	Topeka, Kans.	580	1–5
WIBX	Utica, N. Y.	1200	.1–.3
WICC	Bridgeport, Conn.	600	.5–1
WIL	St. Louis, Mo.	1200	.1–.25
WILL	Urbana, Ill.	890	.25–1
WILM	Wilmington, Del.	1420	.1
WIND	Gary, Ind.	560	1–2.5
WINS	New York, N. Y.	1180	1
WIOD-WMBF	Miami, Fla.	1300	1
WIP	*Philadelphia, Pa.(1kw.)	610	.5
WIRE	Indianapolis, Ind.	1400	.5–1
WIS	**Columbia, S. C. (560 1–5)	1010	.5–1
WISN	Milwaukee, Wis	1120	.25–1
WJAC	Johnstown, Pa.	1310	.1
WJAG	Norfolk, Nebr.	1060	1
WJAR	*Providence, R.I.(.5kw.)	890	.25–.5
WJAS	Pittsburgh, Pa.	1290	1–2.5
WJAX	**Jacksonville, Fla. (1–5 kw.)	900	1
WJAY	Cleveland, Ohio	610	.5
WJBC	Bloomington, Ill.	1200	.1
WJBK	Detroit, Mich.	1500	.1–.25
WJBL	Decatur, Ill.	1200	.1
WJBO	Baton Rouge, La.	1420	.1
WJBR	Gastonia, N. C. (C. P.)	1420	.1
WJBW	New Orleans, La.	1200	.1
WJBY	Gadsden, Ala.	1210	.1
WJDX	Jackson, Miss.	1270	1–2.5
WJEJ	Hagerstown, Md.	1210	.1
WJIM	Lansing, Mich.	1210	.1–.25
WJJD	Chicago, Ill.	1130	20
WJMS	Ironwood, Mich.	1420	.1
WJR	Detroit, Mich.	750	50
WJSV	Alexandria, Va.	1460	10
WJTL	Oglethorpe Univ., Ga.	1370	.1
WJW	Akron, Ohio	1210	.1–.25
WJZ	New York, N. Y.	760	50
WKAQ	San Juan, Puerto Rico	1240	1
WKAR	East Lansing, Mich.	1040	1
WKBB	East Dubuque, Ill.	1500	.1–.25
WKBF	Indianapolis, Ind.	1400	.5–1
WKBH	La Crosse, Wis.	1380	1
WKBI	Cicero, Ill.	1420	.1
WKBN	Youngstown, Ohio	570	.5
WKBO	Harrisburg, Pa.	1200	.1–.25
WKBV	Richmond, Ind.	1500	.1
WKBW	Buffalo, N. Y.	1480	5
WKBZ	Muskegon, Mich.	1500	.1–.25
WKEU	Griffin, Ga.	1500	.1
WKJC	Lancaster, Pa.	1200	.1–.25
WKOK	Sunbury, Pa.	1210	.1
WKRC	**Cincinnati, Ohio (1-2.5 kw) (*1 kw.)	550	.5
WKY	Oklahoma City, Okla.	900	1
WKZO	Kalamazoo, Mich.	590	1
WLAC	Nashville, Tenn.	1470	5
WLAP	Lexington, Ky.	1420	.1–.25
WLB	Minneapolis, Minn.	1250	1
WLBC	Muncie, Ind.	1310	.05–.1
WLBF	Kansas City, Kans.	1420	.1
WLBL	Stevens Point, Wis.	900	2.5
WLBZ	Bangor, Me.	620	.5–1
WLEU	Erie, Pa.	1420	.1–.25
WLLH	Lowell, Mass.	1370	.1–.25
WLNH	Laconia, N. H.	1310	.1
WLS	Chicago, Ill.	870	50
WLTH	Brooklyn, N. Y.	1400	.5
WLVA	Lynchburg, Va.	1200	.1–.25
WLW	*Cincinnati, Ohio (500 kw.)	700	50
WLWL	New York, N. Y.	1100	5
WMAL	Washington, D. C.	630	.25–.5
WMAQ	Chicago, Ill.	670	50
WMAS	Springfield, Mass.	1420	.1–.25
WMAZ	Macon, Ga.	1180	1
WMBC	Detroit, Mich.	1420	.1–.25
WMBD	Peoria, Ill.	1440	.5–1
WMBF-WIOD	See WIOD-WMBF		
WMBG	Richmond, Va.	1210	.1–.25
WMBH	Joplin, Mo.	1420	.1–.25
WMBI	Chicago, Ill.	1080	5
WMBO	Auburn, N. Y.	1310	.1
WMBQ	Brooklyn, N. Y.	1500	.1
WMBR	**Jacksonville, Fla. (.1–.25 kw.)	1370	.1
WMC	Memphis, Tenn.	780	1–2.5
WMCA	New York, N. Y.	570	.5
WMEX	Chelsea, Mass.	1500	.1–.25
WMFD	Wilmington, N. C.	1370	.1
WMFF	**Plattsburg, N. Y. (.1–.25 kw.)	1310	.1
WMFG	Hibbing, Minn.	1210	.1
WMFJ	Daytona Beach, Fla.	1420	.1
WMFN	Clarksdale, Miss.	1210	.1
WMFO	Decatur, Ala.	1370	.1
WMFR	High Point, N. C.	1200	.1
WMMN	Fairmont, W. Va.	890	.25–.5
WMPC	Lapeer, Mich.	1200	.1–.25
WMT	*Cedar Rapids, Iowa (1–2.5 kw.)	600	.5–1
WNAC	Boston, Mass.	1230	1–2.5
WNAD	Norman, Okla.	1010	1
WNAX	Yankton, S. Dak.	570	1–5
WNBC	New Britain, Conn.	1380	.25
WNBF	Binghamton, N. Y.	1500	.1
WNBH	New Bedford, Mass.	1310	.1–.25
WNBR	Memphis, Tenn.	1430	.5–1
WNBX	Springfield, Vt.	1260	1
WNBZ	Saranac Lake, N. Y.	1290	.1
WNEL	San Juan, Puerto Rico	1290	.5
WNEW	Newark, N. J.	1250	1–2.5
WNOX	*Knoxville, Tenn. (560 kc.)	1010	1–2
WNRA	Sheffield, Ala.	1420	.1
WNRI	Newport, R. I. (C.P.)	1200	.1–.25
WNYC	New York, N. Y.	810	1
WOAI	San Antonio, Tex.	1190	50
WOC	Davenport, Iowa	1370	.1–.25
WOCL	Jamestown, N. Y.	1210	.05
WOI	Ames, Iowa	640	5
WOKO	Albany, N. Y.	1430	.5–1
WOL	Washington, D. C.	1310	.1
WOMT	Manitowoc, Wis.	1210	.1
WOOD	Grand Rapids, Mich.	1270	.5
WOPI	Bristol, Tenn.	1500	.1
WOR	Newark, N. J.	710	50
WORC	Worcester, Mass.	1280	.5
WORK	York, Pa.	1320	1
WOS	Jefferson City, Mo.	630	.5
WOSU	Columbus, Ohio	570	.75–1
WOV	New York, N. Y.	1130	1
WOW	**Omaha, Nebr. (1–5 kw.)	590	1
WOWO	Ft. Wayne, Ind.	1160	10
WPAD	Paducah, Ky.	1420	.1–.25
WPAR	Parkersburg, W. Va.	1420	.1
WPAX	**Thomasville, Ga. (.1–.25 kw.)	1210	.1
WPAY	Portsmouth, Ohio	1370	.1
WPEN	Philadelphia, Pa.	920	.25–.5
WPFB	Hattiesburg, Miss.	1370	.1
WPG	Atlantic City, N. J.	1100	5
WPHR	Petersburg, Va.	880	.5
WPRO	Providence, R. I.	630	.25
WPRP	Ponce, Puerto Rico (C.P.)	1420	.1–.25
WPTF	Raleigh, N. C.	680	1–5
WQAM	Miami, Fla.	560	1
WQAN	Scranton, Pa.	880	.25
WQBC	Vicksburg, Miss.	1360	1
WQDM	St. Albans, Vt.	1370	.1
WRAK	Williamsport, Pa.	1370	.1–.25
WRAW	Reading, Pa.	1310	.1
WRAX	Philadelphia, Pa.	920	.25–.5
WRBL	Columbus, Ga.	1200	.1
WRBX	Roanoke, Va.	1410	.25–.5
WRC	Washington, D. C.	950	.5–1
WRDO	Augusta, Me.	1370	.1
WRDW	Augusta, Ga.	1500	.1
WREC	Memphis, Tenn.	600	1–2.5
WREN	Lawrence, Kans.	1220	1–5
WRGA	Rome, Ga.	1500	.1–.25
WRJN	Racine, Wis.	1370	.1
WROK	Rockford, Ill.	1410	.5
WROL	Knoxville, Tenn.	1310	.1–.25
WRR	Dallas, Tex.	1280	.5
WRUF	Gainesville, Fla.	830	5
WRVA	Richmond, Va.	1110	5
WSAI	Cincinnati, Ohio	1330	1–2.5
WSAJ	Grove City, Pa.	1310	.1
WSAN	Allentown, Pa.	1440	.25–.5
WSAR	Fall River, Mass.	1450	.25
WSAZ	Huntington, W. Va.	1190	1
WSAY	Rochester, N. Y.(C.P.)	1210	.1
WSB	Atlanta, Ga.	740	50
WSBC	Chicago, Ill.	1210	.1
WSBT	South Bend, Ind.	1360	.5
WSFA	Montgomery, Ala.	1410	.5–1
WSGN	Birmingham, Ala.	1310	.1–.25
WSIX	Springfield, Tenn.	1210	.1
WSJS	Winston-Salem, N. C.	1310	.1
WSM	Nashville, Tenn.	650	50
WSMB	New Orleans, La.	1320	1
WSMK	Dayton, Ohio	1380	.2
WSOC	Charlotte, N. C.	1210	.1–.25
WSPA	Spartanburg, S. C.	920	1
WSPD	Toledo, Ohio	1340	1–2.5
WSUI	Iowa City, Iowa	880	.5–1
WSVA	Harrisonburg, Va.	550	.5
WSVS	Buffalo, N. Y.	1370	.05
WSYB	Rutland, Vt.	1500	.1
WSYR-WSYU	Syracuse, N. Y.	570	.25
WTAD	Quincy, Ill.	900	.5
WTAG	Worcester, Mass.	580	.5
WTAL	Tallahassee, Fla.	1310	.1
WTAM	Cleveland, Ohio	1070	50
WTAQ	Eau Claire, Wis.	1330	1
WTAR	Norfolk, Va.	780	.5–1
WTAW	College Station, Tex.	1120	.5
WTAX	Springfield, Ill.	1210	.1
WTBO	Cumberland, Md.	800	.25
WTCN	Minneapolis, Minn.	1250	1–5
WTEL	Philadelphia, Pa.	1310	.1
WTFI	Athens, Ga.	1450	.5
WTIC	*Hartford, Conn. (1040 kc.)	1060	50
WTJS	Jackson, Tenn.	1310	.1–.25
WTMJ	Milwaukee, Wis.	620	1–5
WTMV	East St. Louis, Ill.	1500	.1
WTNJ	Trenton, N. J.	1280	.5
WTOC	Savannah, Ga.	1260	1
WTRC	Elkhart, Ind.	1310	.05–.1
WVFW	Brooklyn, N. Y.	1400	.5
WWAE	Hammond, Ind.	1200	.1
WWJ	Detroit, Mich.	920	1
WWL	New Orleans, La.	850	10
WWNC	Asheville, N. C.	570	1
WWRL	Woodside, N. Y.	1500	.1–.25
WWSW	Pittsburgh, Pa.	1500	.1–.25
WWVA	Wheeling, W. Va.	1160	5
WXYZ	Detroit, Mich.	1240	1

Note: Where two powers are given, the first one is used at night.

*Station has special authorization covering use of alternate frequency or power shown in parenthesis.

**Construction Permit for power or frequency.

Added Features for the Taylor-Cockaday *"Ocean Hopper"*

By John H. Potts

Part Three

SOME refinements in the "Ocean Hopper," promised last month, have been made and are described here for the benefit of constructors. Included are the addition of a beat-frequency oscillator and a headphone jack, also the substitution of an improved speaker.

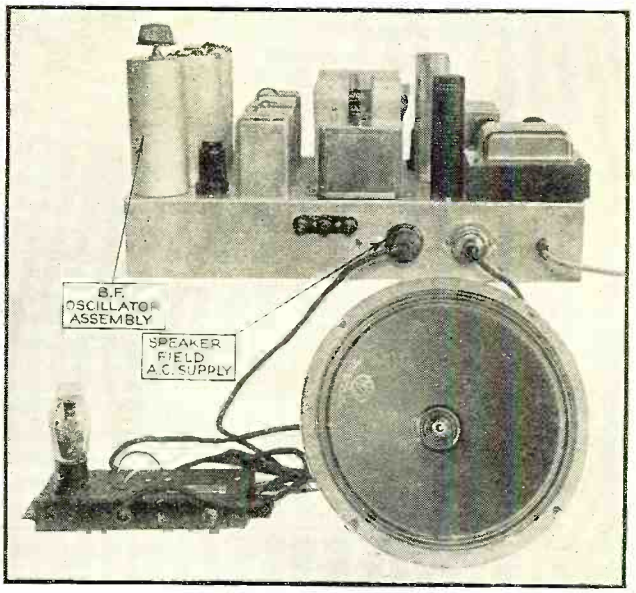
IN using the "Ocean Hopper" receiver during the past couple of months the conclusion has been reached that it deserves a considerably better speaker than the one suggested in the original construction article. After investigating various inexpensive speakers on the market a 10-inch Wright-DeCoster type 790 dynamic speaker was selected. This provided better quality and much higher sensitivity and volume than the original speaker.

The field excitation requirement for this speaker is considerably higher and it was therefore found desirable to provide external excitation, for which purpose the Wright-DeCoster type 470 field supply unit was found highly effective and pleasingly inexpensive.

Constructors of the "Ocean Hopper" may desire to make this substitution or to use some other speaker in place of the one originally specified. If so it should include a transformer suitable to work out of 6F6 pentodes and the following suggestion will be of interest.

External Field Supply

If a separate field supply is used a 1000 ohm, 20-watt resistor may be substituted for the 1000 ohm field which served as a choke in the power-supply filter of the original circuit. When this substitution is made, additional filtering will be required to reduce hum. A resistance-capacity filter in the first a.f. transformer voltage supply circuit serves this purpose very effectively. It consists simply of an additional 75,000 ohm series resistor in the plate supply voltage for the 6C5 audio tube, bypassed with a .25 mfd. condenser, as shown in Figure 1. When this is done, the present 1000 ohm resistor, R14, from the 6C5 cathode to ground, should be increased to 4000 ohms.



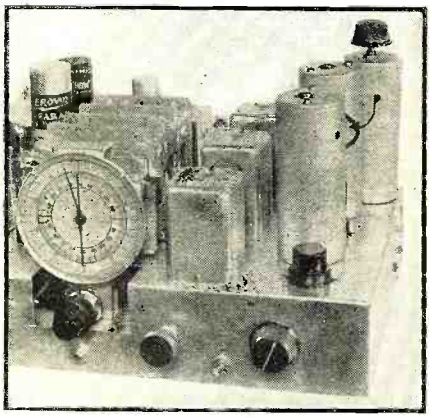
IMPROVED SPEAKER OPERATION

In the foreground are the new speaker and its simple field supply unit which is controlled simultaneously by the receiver "on-off" switch.

In order that the external field supply unit may be turned off and on from the receiver power switch, the present speaker socket may be rewired and a separate receptable installed for the field supply power plug. When connected as shown in the diagram, not only are both operated from the same switch but also removal of the speaker plug will open the line supply circuit, preventing condenser damage due to voltage surges which might otherwise occur.

ADDED REFINEMENTS

The new B.F. oscillator circuit is enclosed in the shield can at the rear right and its "off-on" toggle switch is located on the front panel. The added phone jack is seen just below the tuning control.



Field Supply Unit

If it is preferred to construct, rather than buy, the field supply unit, a suitable hookup is shown in Figure 2. The power transformer high voltage secondary voltage should not exceed 375 volts either side of the center tap. Its current rating will of course depend on the wattage dissipation desired, which will vary widely with different speakers. Taking 10 watts as an average for a medium sized speaker, a 1000 ohm field will require 100 m.a. If the voltage at this load is 300 from the junction of the speaker field and the choke to ground, R will have to be 2000 ohms. The voltage drop across the speaker field will then be 100. For a 2500 speaker field, the voltage drop should be approximately 160 and the current in the circuit 64 m.a. R should be adjusted to 2188 ohms. The values are not critical for any speaker, the simple formula

$$\frac{E^2}{R} = W$$

may be applied to find the proper constants. R is an 0-300-ohm adjustable resistor. The (*Turn to page* 431)

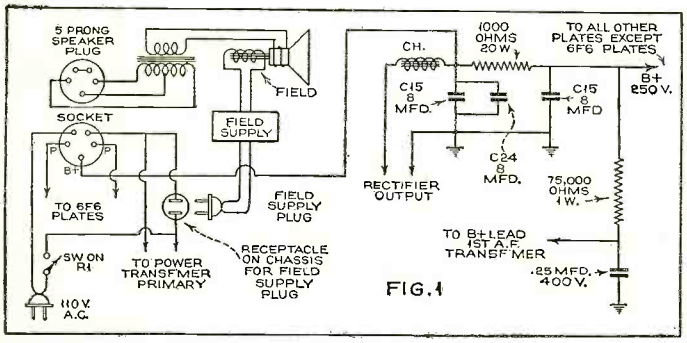


FIG. 1

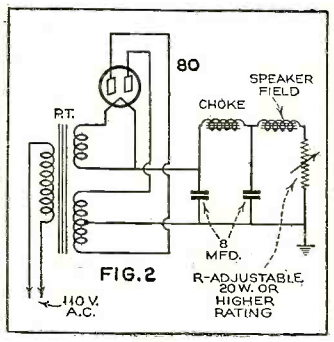


FIG. 2

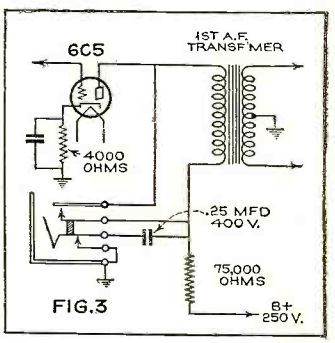
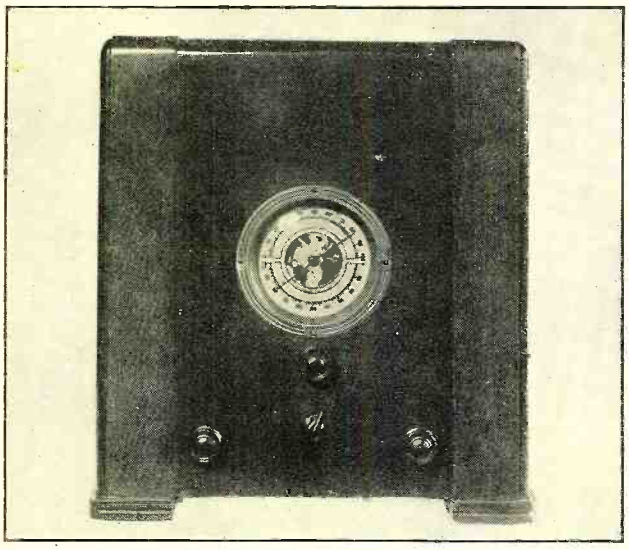


FIG. 3



THE COMPLETED UNIT

The P.C.A. "Observer" which can be installed on your desk or table, with the old receiver placed in a closet or on a shelf.

The P.C.A

GIVES YOU ALL-WAVE

A revolutionary type of tuner that hour that will bring even a mediocre ards of reception, with extra gain broadcast bands. Build it from the

Part

By

Laurence M. Cockaday
H. J. Benner
Glenn H. Browning

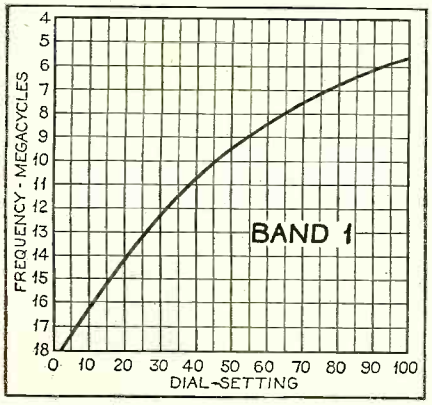
THE first description of this latest development in receiving equipment appeared in last month's RADIO NEWS where it was dedicated by the authors to the fraternity of Official Listening Post Observers from whence it took its name—the "P.C.A. Observer." The reason for this choice of name lies in just *one* of its several valuable features, namely—the decided gain it shows in signal-to-noise ratio.

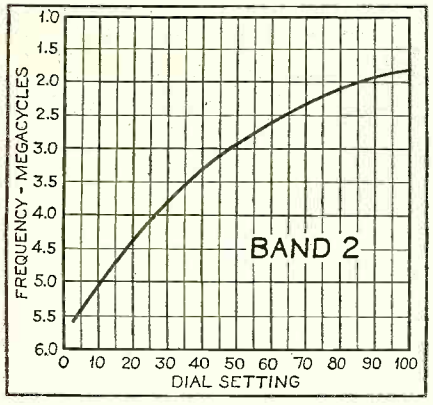
Complete Remote Control

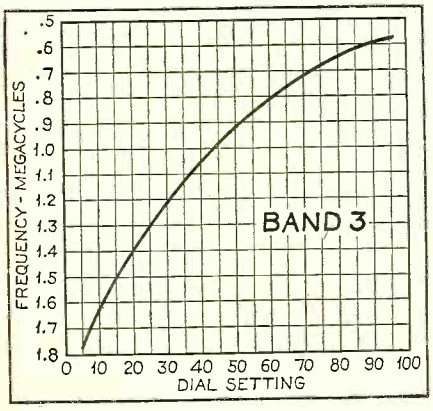
We do not mean to belittle its other features. Its increased selectivity is of special value on the crowded 6 M.C. band and is useful anywhere on the dial to the D.X. hunter as it helps to suppress static and man-made interference. Also the unity remote-control feature is a decided advance in preselector development. Instead of adding another control, as in the case of the ordinary t.r.f. preselector, the P.C.A. Observer allows the main receiver to be adjusted at its best point of reception (below the inherent noise level of the set itself) and then left strictly alone, while all tuning and volume control is done by the Observer, which also contains the "on" and "off" switch for both units.

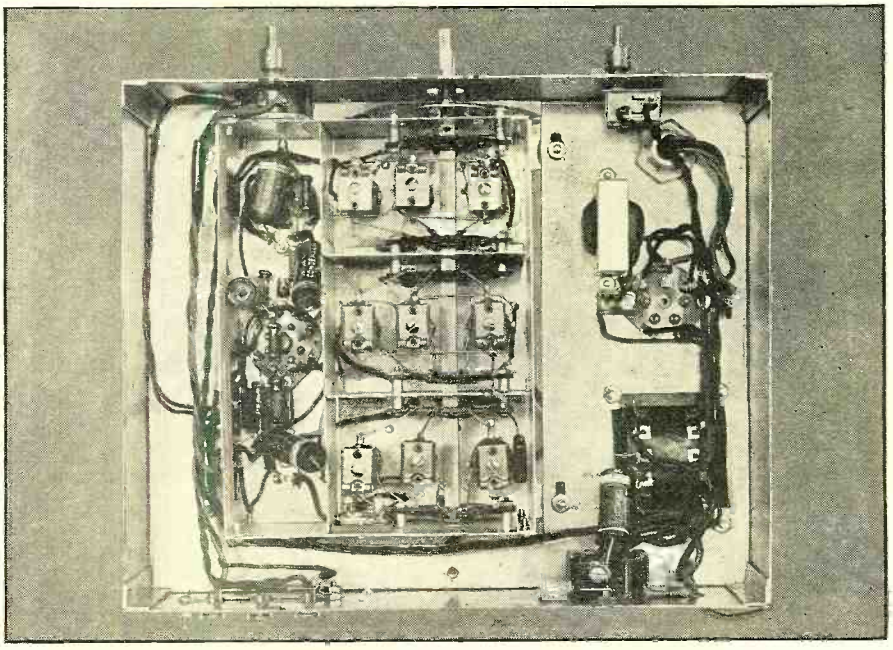
Low Noise Level

Nevertheless the experienced radio man knows that the one predominant limiting factor in long-distance reception is *noise*. No matter how excellent his receiving location may be, when the gain control of his receiver has been advanced to the point where he begins to hear the inherent tube noises of the set, he knows that more amplification will only increase the rush and crackle in his phones or speaker and will *not* bring out intelligible speech from that weak carrier he has picked up. Hence, the noise-to-signal ratio is really the most important factor of all to the Listening Post Observer and an improvement in









"Observer"

DOUBLE-SUPER RESULTS!

anyone can build in less than an hour a receiver up to the most modern standards of sensitivity and selectivity on the short-wave and broadcast bands. The following description and blueprints

Two

this one point inevitably results in logging D.X. catches which have been hopelessly submerged in the "mush" of the tube noises heretofore.

Broadcast and S-W Bands

The unit, besides providing preamplification, combines the functions of a preselector and all-wave converter. Then it goes one step further and also allows remote control if desired. It will be noted from the schematic diagram (shown last month) that it is a complete unit in itself containing its own power supply and hence may be placed at some distance from the receiver with which it is used. Unlike the common converter, it covers the *long-wave broadcast band as well as the short-waves!* Thus, the receiver proper is tuned to 550 K.C. and then left entirely alone.

While the Observer is so designed that it may be used with any receiver, from the lowly one-tube regenerator up to the most elaborate "super" with preamplification, it is of particular interest when used in combination with a superheterodyne—and it doesn't necessarily have to be a very good one either—to provide *double superheterodyne reception.* This results in double frequency-conversion and extremely fine selectivity.

The Observer itself gives such great preamplification that it is not necessary to use much gain in the intermediate amplifier of the original superheterodyne, and it can thus be adjusted and left at a point well below its own noise level.

Metal Tubes

Two of the new metal tubes are used in the Observer, a 6K7 as a radio-frequency preamplifier and a 6A8 as a mixer oscillator. These two tubes are particularly outstanding in the new metal line and show a distinct improvement over their glass prototypes. Full advantage is taken of their higher efficiency and quieter operation by throwing on them the maximum burden of r.f. amplification while the main receiver is held down to the point where it is always quiet and minor tube inefficiencies are not of great importance.

Last month, the design features of the P.C.A. were taken up in some detail as well as the performance curves. Consequently, it remains to give the constructional details of the apparatus itself. It has already been stated that the Tobe P.C.A. tuner, which is the heart of the apparatus, consists of a tuning catacomb; in which the nine coils, waveband switch, and trimming and padding condensers are mounted. The tank tuning condenser is located on the top of the tuning catacomb and the sockets for the two metal tubes are incorporated as an integral part of the tuner. The P.C.A. tuner is completely wired, aligned, and tracked and as all the wiring to the r.f. and mixer oscillator tubes has been (*Turn to page* 444)

Fine Blueprints to Help YOU Make It

BLUEPRINTS, including a full-size picture wiring diagram showing exact placement of each wire in assembling the "P.C.A. Observer," have been prepared by our Technical Staff especially for the benefit of our readers who have never built or assembled a set before. These may be obtained by sending 25 cents in cash or U. S. postage to RADIO NEWS, Blueprint Department, 461 Eighth Avenue, New York City.

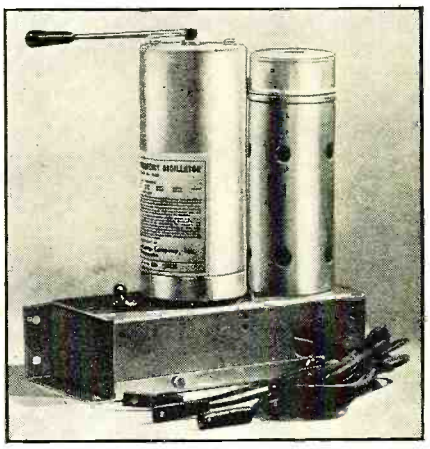
1. *Double-Super Results*
2. *Maximum Signals, Minimum Noise*
3. *Covers Short-Wave and Broadcast Band*

First Aid in

LOCATING WEAK SIGNALS

By John Strong

EVEN experienced users of modern all-wave receivers often have difficulty in tuning in weak, far-distant broadcasting stations. Most professional-type receivers are equipped with a beat oscillator which greatly simplifies this problem. When so equipped, a faint carrier-wave causes a distinct "tweet" in the speaker, when tuning closely to its frequency, and enables the operator to adjust his receiver to zero-beat with the carrier, even though no program is being broadcast at the moment.



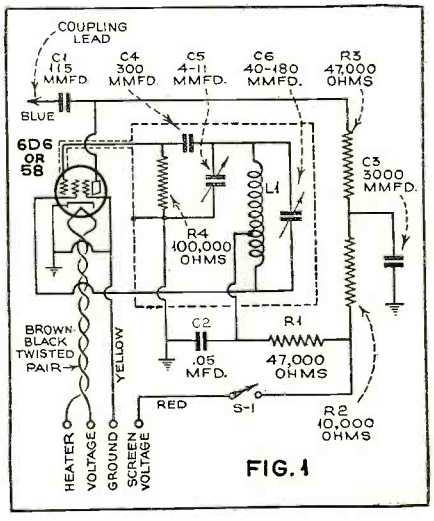


FIG. 1

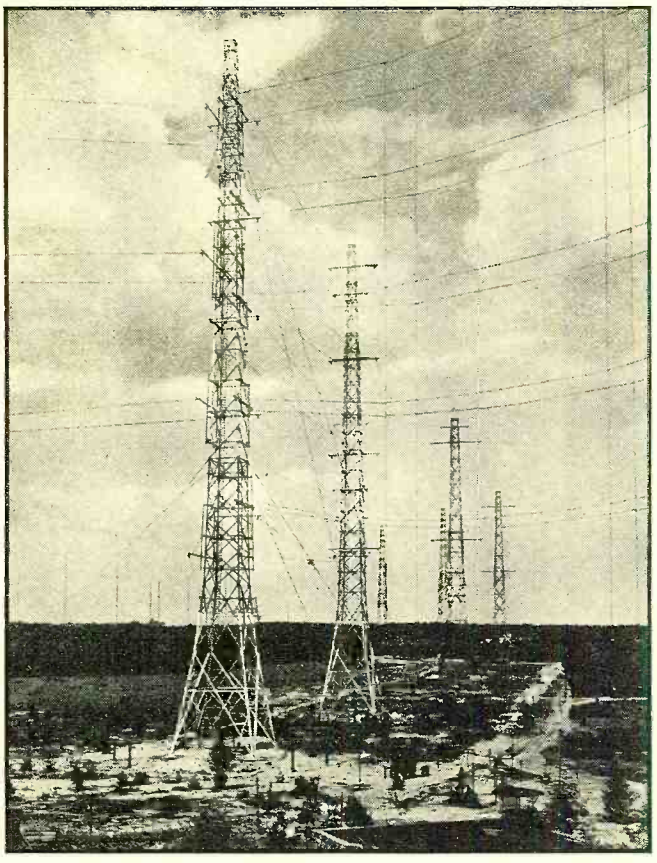
The new RCA Beat Oscillator, which has just been announced, may be connected to any a.c. operated superheterodyne receiver, providing its i.f. amplifier operates between 415 and 700 k.c.. With this beat oscillator the user may enjoy this valuable feature with his present receiver.

A schematic diagram of the circuit is shown in Figure 1. High stability is secured by means of electron-coupling and air-condenser tuning. The device is adaptable to sets having either 2.5 or 6.3 volt tubes as either a 58 or 6D6 may be used. A long control lever allows easy adjustment of this unit to the exact intermediate frequency of the radio

(*Turn to page* 445)

The DX for the

Conducted by Laurence



BERLIN
The intricate systems used by the German short-wave stations, at Zeesen (near Berlin) for world short-wave transmission, are seen here.

THE thirty-fourth installment of the DX Corner for Short Waves contains the World Short-Wave Time-Table for 24-hour use all over the world.

Affiliated DX Clubs

We are hereby placing a standing invitation to reliable DX Clubs to become affiliated with the DX Corner as Associate Members, acting as advisers on short-wave activities, in promoting short-wave popularity and reception efficiency. A list of associate organizations follows: **International DX'ers Alliance,** President, Charles A. Morrison; **Newark News Radio Club,** A. W. Oppel, Executive Secretary; **Society of Wireless Pioneers,** M. Mickelson, VicePresident; **U. S. Radio DX Club,** Geo. E. Deering, Jr., President; the **Radio Club Venezolano,** Venezuela, President, R. V. Ortega; **The World-wide Dial Club,** President, Howard A. Olson; **International 6000- to 12,500-Mile Short-Wave Club,** Oliver Amlie, President, Joseph H. Miller, Vice-President; **Globe Circlers DX Club,** W. H. Wheatley, President; **Radio Fellowship,** M. H. Ryder, Chairman; **Short Wave Club of New York,** H. C. Lange, President.

Any DX fan wishing to join any one of these Clubs or Associations may write for information to the Short-Wave DX Editor, and his letter will be sent to the organization in question. Other Clubs who wish to become affiliated should make their application to the Short-Wave DX Editor. Clubs associated with the DX Corner have the privilege of sending in Club Notes for publication in RADIO NEWS.

Your DX Logs Welcome

Please keep on sending in your information on any S.W. stations that you hear during the coming month, getting them in to the short-wave DX Editor by the 20th of the month. In this way you share your "Best Catches" with other readers and they, in turn, share with you, making for improved knowledge on short-wave reception. Also send in any corrections or additions that you can make to the short-wave identification charts, including station addresses, station slogans, station announcements, and any identifying signals the stations may have.

To save a lot of wasted effort for our editors it would be best if our Observers use a standard form for their reports of new stations or station changes. We have found a system of paragraphs, in exactly the following procedure, most convenient:

"JVH, Nazaki, Japan, 20.5 meters, 14,600 kc., daily 12 m. to 1 a.m., EST, irregularly testing 3 p.m. EST."

In other words, use one paragraph to an item and also indicate whether data was from a veri, an announcement or other source.

Send in Your New Applications or Renewals

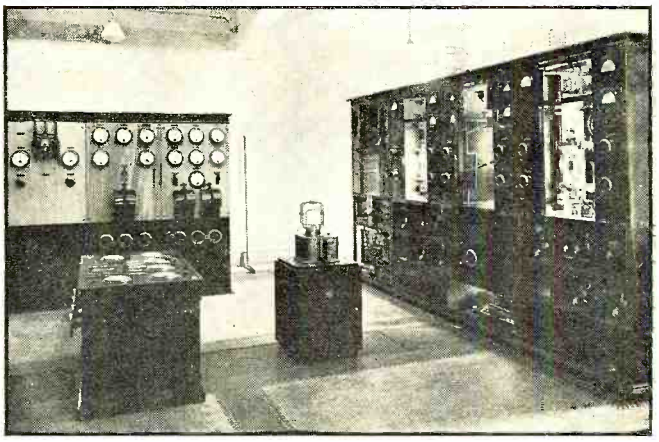
The list of Observers has been omitted this month pending appointments for 1936. It is hoped that appointments for 1936 will be made in time to include a new list

NEW L.P.O. FOR EGYPT
Aram Iskanian is pictured, below, with his nephew who is visiting him in Cairo. Mr. Iskanian is also operator of the Abu Zabal station and he is shown sitting at the control desk in the corner illustration.

AN ARDENT LISTENER
Meet Bob Gaiser, a short-wave DX fan of Butler, New Jersey. Radio News is his "Bible".

Corner SHORT WAVES

M. Cockaday



STATION CNR AT RABAT, MOROCCO
Latest information received states that this station is still "on the air." The illustration shows the transmitters and control desk.

in the February issue . . . 1935 Observers who desire re-appointment but who have not made application are invited to do so immediately. Other DX'ers who desire appointment should send their applications to the editor of this department, including a brief summary of DX accomplishments to date and a brief description of the equipment employed.

"Esperanto" Again

Mr. George Sholin, Official Listening Post Observer for Radio News and also Observer No. 10-SW for the KDKA DX Club suggests that Esperanto be adopted by all DX'ers as the DX'ers' language. Says Mr. Sholin, "Esperanto is based on the principal modern languages. A declaration signed by 27 members of the French Academy of Sciences described Esperanto as a masterpiece of logic and simplicity. It is a neutral language and does not offend national sentiment and is thus an ideal bridge between all peoples. The grammar can be learned in an hour. Exceptions and irregularities do not exist. I have arranged to supply all DX'ers with a pamphlet containing the whole grammar and a vocabulary sufficiently large for daily use. I will send this to anyone addressing Mr. George C. Sholin, 55 Lapidge Street, San Francisco, California, U. S. A. if they will send me 5c in stamps or coin (U. S. A. only). (Dx'ers from other countries may obtain one by sending an International Reply Coupon.) Please type or print your name and address plainly."

CANADA HEARD FROM
This is the set-up of L.P.O. A. Belanger of Hull, Quebec. He swears by (not at) the Stromberg Carlson converter.

Listening Post Observers and Other Fans Please Notice

Listed in next column is this month's partial information regarding short-wave stations heard and reported by our World Wide Listening Posts. Each item in the listing is credited with the Observer's surname. This will allow our readers to note who obtained the information given. If any of our readers can supply actual Time Schedules, actual Wavelengths, correct Frequencies, or any other Important Information regarding these items, the DX Corner Editor and its readers will be glad to get the information. There are some hard stations to pull in in these listings, but we urge our Listening Posts and other readers to try their skill in logging the stations and getting correct information about them.

FROM FRANCE TO BRAZIL
F. C. Mascarenhas, formerly stationed in France, has been appointed L.P.O. for Brazil where he now resides. He uses a Skyrider for short-wave work.

When you are satisfied that you have this information correct, send it in to the editor; or if you have received a "veri" from any of the hard-to-get stations, send in a copy of the "veri" so that the whole short-wave fraternity may benefit. The list containing this information follows:

SPW, Warsaw, in Poland, is a new station on 13635 kc., 22 meters reported heard Sundays, 11:30 a.m.-12:30 p.m. E. S. T. (Baadsgaard, Mascarenhas, Scott, W8ER, Westchester.)

DFB, Nauen, Germany, 17520 kc. Thursdays 6-7 p.m. E.S.T. (Schumacher.)

DIP, Berlin, Germany, 14410 kc. heard with same program as DJD, early evenings. (Libby.)

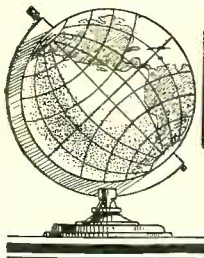
PCV, Holland, 17780 kc. on the air, except Sundays, 9-12 a.m. E.S.T. (McCormick.)

FTN, France, 12260 kc. reported heard calling Saigon, Indo-China, Sundays, 10-11 a.m. E.S.T. (Howald.)

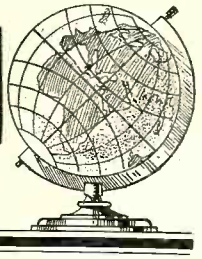
HVJ, Vatican City, correct fre-

(*Turn to page* 418)

AN INTERESTING LAYOUT
This is the DX Corner (all in one cabinet) of Short-Wave Listener T. Enochty of New York City. Can you recognize any of the equipment?



WORLD SHORT WAVE TIME-TABLE



Compiled by LAURENCE M. COCKADAY

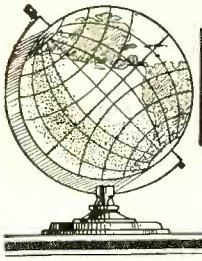
Hours of transmission for the World's Short Wave Broadcast Stations

												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

Wave-length Meters	Call Letters	Frequency Kc.	City Country
13.9+	W8XK	21540	Pittsburgh, Pa.
15.9+	PLE	18830	Bandoeng, Java
16.8+	GSG	17790	Daventry, England
16.8+	W3XAL	17780	Bound Brook, N. J.
16.8+	DJE	17780	Zeesen, Germany
19.5	HAS3	15370	Budapest, Hungary
19.5+	W2XAD	15330	Schenectady, N. Y.
19.6+	DJQ	15280	Zeesen, Germany
19.6+	W2XE	15270	New York, N. Y.
19.6+	GSI	15260	Daventry, England
19.6+	FYA	15245	Pontoise, France
19.7	PCJ	15220	Huizen, Holland
19.7	W8XK	15210	Pittsburgh, Pa.
19.7	DJB	15200	Zeesen, Germany
19.8	GSF	15140	Daventry, England
19.8	HVJ	15121	Vatican City
19.9+	RKI	15040	Moscow, U.S.S.R.
20.5+	JVH	14600	Nazaki, Japan
21.2+	HJ5ABE	14120	Cali, Colombia
21.9+	SPW	13635	Warsaw, Poland
22.7+	ORP	13200	Ruysselede, Belg.
22.9+	VPD	13075	Suva, Fiji Islands
23.3+	CNR	12830	Rabat, Morocco
24.5+	TFJ	12235	Reykjavik, Iceland
24.8+	CT1CT	12082	Lisbon, Portugal
24.9+	RV59(RNE)	12000	Moscow, U.S.S.R.
25.2	CT1GO	11900	Parede, Portugal
25.2+	FYA	11890	Pontoise, France
25.2+	W8XK	11870	Pittsburgh, Pa.
25.2+	GSE	11860	Daventry, England
25.3+	W2XE	11830	New York, N. Y.
25.3+	I2RO	11810	Rome, Italy
25.4+	DJD	11770	Zeesen, Germany
25.5+	GSD	11750	Daventry, England
25.5+	PHI	11730	Huizen, Holland
25.5+	CJRX	11720	Winnipeg, Canada
25.5+	FYA	11720	Pontoise, France
25.6+	HJ4ABA	11710	Medellin, Col.
27.2+	PLP	11000	Bandoeng, Java
27.2+	YBJO	11000	Mexico City, Mex.
27.9+	JVM	10740	Nazaki, Japan
28.1	CEC	10670	Santiago, Chile
28.1+	JVN	10660	Nazaki, Japan
29.0+	ORK	10330	Ruysselede, Belgium
29.2+	PMN	10260	Bandoeng, Java
29.5+	OPM	10135	Leopoldville, Africa
30.4+	EAQ	9860	Madrid, Spain
31.1+	I2RO	9635	Rome, Italy
31.2+	CT1AA	9600	Lisbon, Portugal
31.2+	HBL	9595	Geneva, Switzerland
31.2+	W3XAU	9590	Philadelphia, Pa.
31.2+	VK2ME	9590	Sydney, Australia
31.2+	HP5J	9590	Panama City, Pana.
31.3	VK3LR	9580	Lyndhurst, Australia
31.3	GSC	9580	Daventry, England
31.3+	WIXK	9570	Millis, Mass.
31.3+	VUY (VUB)	9565	Bombay, India
31.3+	DJA	9560	Zeesen, Germany
31.4+	DJN	9540	Zeesen, Germany
31.4+	LKJ1	9530	Jeloy, Norway
31.4+	W2XAF	9530	Schenectady, N. Y.
31.5+	VK3ME	9510	Melbourne, Australia
31.5+	GSB	9510	Daventry, England
31.5+	PRF5	9501	Rio de Janeiro, Braz
31.8	COCH	9428	Havana, Cuba
31.8+	PLV	9415	Bandoeng, Java
32.8+	HAT4	9125	Budapest, Hungary
32.8+	CP6	9120	La Paz, Bolivia
34.2+	ZCK (ZBW)	8750	Hong Kong, China
35.9+	HCJB	8333	Quito, Ecuador
36.4+	ZP10	8220	Asuncion, Paraguay
36.7	CO9JQ	8170	Camaguey, Cuba
37.3+	CNR	8035	Rabat, Morocco
38.1+	HC2JSB	7854	Guayaquil, Ecuador
38.4+	HBP	7797	Geneva, Switzerland
40.4+	HJ3ABD	7406	Bogota, Colombia
40.6+	XECR	7380	Mexico City, Mex.
41.1+	HJ1ABD	7281	Cartagena, Col.
41.7+	CR6AA	7177	Lobito, Angola, Afr.
42.1+	HB9B	7118	Basle, Switzerland
42.3+	PI1J	7082	Dordrecht, Holland
43.4+	HI3C	6900	La Romana, D. R.
44.0	HIH	6818	San Pedro, D. R.
44.4+	JVT	6750	Nazaki, Japan
44.6+	TIEP	6710	San Jose, Costa Rica
44.9+	YVQ	6672	Maracay, Ven.
45.9+	HC2RL	6668	Guayaquil, Ecuador
45.3	PRADO	6616	Riobamba, Ecuador
45.3+	RV72	6611	Moscow, U. S. S. R.
45.7+	TIRCC	6550	San Jose, Costa Rica
45.9+	YV6RV	6520	Valencia, Ven.
46.2	HJ5ABD	6490	Cali, Colombia
46.2+	HI4D	6482	San Domingo, D. R.
46.4+	YN1GG	6450	Managua, Nicaragua

HOURS OF TRANSMISSION



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

HOURS OF TRANSMISSION												Wave-length Meters	Call Letters	Frequency Kc.	City Country	HOURS OF TRANSMISSION											
D	D	L										46.5	HJ1ABB	6447	Barranquilla, Col.				D	D	D			S	D	D	D
		D		I								46.7+	TIPG	6410	San Jose de Costa Rica												
D	D	D										47.0	YV4RC	6375	Caracas, Venez.										D	D	D
		Sa	Sa	Sa								47.4+	HIZ	6315	San Domingo, D. R					S	S	S		I	I	I	I
							I	I	I			47.5+	VUC	6300	Calcutta, India	I	I	D	D	Sa							
L	L	L										48.1+	OAX4G	6230	Lima, Peru												L
AM												48.1+	HJ1ABH	6225	Cienaga, Colombia												AM
D	D	I	I	I								48.4+	HI1A	6188	Santiago de Los Caballeros, D. R.				Z	Z	D	D					D
XS	XS	D										48.5+	HJ3ABF	6180	Bogota, Colombia				D								XS
S	S	S	S	S	S							48.6+	VPB	6160	Colombo, Ceylon	D	D	D	D	D							
D	D	XS	XS									48.7+	CJRO	6150	Winnipeg, Manitoba								S	S	S	S	D
D	D											48.7+	HJ2ABA	6150	Tunja, Colombia						D						D
D	D	D										48.7+	YV3RC	6150	Caracas, Venezuela				D	D	D			D	D	D	D
XR	XR											48.7+	HJ5ABC	6150	Cali, Colombia				D	S	S						XR
D	D	D		F	M	M						48.7+	COSGC	6150	Santiago, Cuba					D			D	D	D	D	D
	D	D	D	D								48.8+	W8XK	6140	Fittsburgh, Pa.												
												48.8+	CR7AA	6135	Lourenzo Marques, Mozambique						AC	AC	AC				
										AE	AE	48.9	ZGE	6132	Kuala Lumpur, F. M. S.	AE											
D	D	D	D									48.9+	COCD	6130	Havana, Cuba										D	D	D
XY												48.9+	CT1GO	6130	Parede, Portugal				S	S	S						XY
D	D											49.0+	W2XE	6120	New York, N. Y.												D
D	D	D									D	49.0+	HRP1	6115	San Pedro Sula, Honduras					D	D						
XA	XA	M	M									49.0+	HJ1ABE	6115	Cartagena, Col.				XA	XA					S	XS	
D	D	D	D	D								49.0+	VE9HX	6110	Halifax, N. S.		D	XA	XA	XA	XA	XA	XA	D	Sa	D	D
		D										49.0+	GSL	6110	Daventry, England					D	D	D	D	H		D	D
			Sa									49.1+	W3XAL	6100	Bound Brook, N. J.									AH			
XSa				D	S							49.1+	W9XF	6100	Chicago, Ill.												
D	Z	I	S									49.1+	HJ4ABB	6100	Manizales, Col.					XA							
D			XS	XS				AL	D	D	D	49.1+	ZTJ (JB)	6098	Johannesburg, Africa	XS	XS				XS	XS	D	D	D	D	Sa
D	D	D	D									49.1+	CRCX	6090	Toronto, Can.					S	S	S	S	D	D	D	D
									XA	XA		49.2+	VQ7LO	6083	Nairobi, Kenya, Afr.	E	E		D	D	D	XS	Sa				
												49.3+	CP5	6080	La Paz, Bolivia										I	I	I
											XS	49.3+	W9XAA	6080	Chicago, Ill.	XS	XS	D	D	D	D	D	D	D	S	S	S
							K	K				49.3+	ZHJ	6080	Penang, S. S.	XS											
							D	I	I	I	I	49.3+	CQN	6073	Macao, Asia												
XS												49.3+	OER2	6072	Vienna, Austria	I	D	D	D	D	D	D	D	D	D	I	
S	S	S	AG	AG	T							49.3+	HH2S	6070	Port au Prince, Haiti												
D	D	Sa	Sa	Sa								49.3+	VE9CS	6070	Vancouver, B. C.						S	S	S	S	D	D	
			D	D	D	Sa				XS	XS	49.4+	HJ4ABL	6065	Manizales, Col.				D						D	D	
D	D											49.4+	W8XAL	6060	Cincinnati, Ohio	D	D	D	D	D	D	D	D	D	D	D	D
												49.4+	W3XAU	6060	Philadelphia, Pa.												D
												49.4+	OXY	6060	Skamlebaek, Den.												
												49.5+	GSA	6050	Daventry, England				S	S	D	D	D	D	D	D	
	D											49.6	HJ3ABI	6045	Bogota, Colombia								T	D	D	D	D
XS	XS	XS		Sa								49.6+	HJ1ABG	6042	Barranquilla, Col.					XS	S	S	S	S	S		XS
E												49.6+	WIXAL	6040	Boston, Mass.									S	S	S	E
D	D	D	D									49.6+	W4XB	6040	Miami, Fla.					D	D				D	D	D
D											D	49.6+	PRA8	6040	Pernambuco, Brazil	D	D	D			D	D	XS	D	D	D	D
D	D	D										49.7+	HP5B	6030	Panama City, Pan.					D				I			
D	D	D	D	D	Th	Th						49.7+	VE9CA	6030	Calgary, Alberta, Can.		XS	XS	XS	D	D	D	XS		S	S	D
D	D	D										49.8	DJC	6020	Zeesen, Germany					D	D	D	D	D	D	D	D
				S	S							49.8	XEUW	6020	Veracruz, Mexico											D	D
D										N	N	49.8+	ZHI	6018	Singapore, Malaya	N											
			Sa	Sa								49.8+	HJ3ABH	6012	Bogota, Col.				XS	D	D			S	S	D	D
D	D	D	D									49.8+	COCO	6010	Havana, Cuba		D	D	D	D				D	D	D	
				Sa								49.9+	HJ1ABJ	6006	Santa Marta, Col.					D							D
D	D	D	D	D								49.9+	VE9DN	6005	Montreal, Canada							D					
D	D	I										49.9+	XEBT	6000	Mexico City, Mex.			D	D	D	D	D	D	D	D	D	D
Z	Z	Sa	Sa									50.1+	HJ2ABC	5985	Cucuta, Col.											D	D
		D	D									50.1+	HIX	5980	San Domingo, D. R.					D							I
									S			50.1+	XECW	5975	Xantocam, Mexico												
D	D	D										50.2+	HVJ	5969	Vatican City							D					
XS												50.5+	HJ4ABE	5930	Medellin, Colombia				D	D	D					D	D
D	D	S	S	S								50.9+	YV8RV	5880	Barquisimeto, Ven.											XS	XS
XS	XS								S			51.0+	HRN	5875	Tegucigalpa, Hond's												D
D	D											51.2+	YV5RMO	5850	Maracaibo, Ven.				D	D	S	S			XS	XS	XS
D	D	S										51.6	YV7RMO	5810	Maracay, Ven.				D	D					D	D	D
	AH	AH	AN									51.6+	YV2RC	5800	Caracas, Ven.	S	S	S	D	D	D	S	S	D	D	D	D
		D	D	D								51.8+	OAX4D	5780	Lima, Peru		AN	AN	AN								
						I	D	D	D	D	D	52.4+	YV10RSC	5720	San Cristobal, Ven.												
												70.2	RV15	4273	Khabarovsk, Siberia	D	D	I	I								
												79.5+	HB9B	3770	Basle, Switzerland									AD	AD		
												79.9+	CT1CT	3750	Lisbon, Portugal		S										

List of Symbols

A—Thursday, Sunday
C—Monday, Wednesday, Friday
D—Daily
E—Tuesday, Thursday
F—Friday
G—Tuesday, Thursday, Saturday
H—Wednesday, Thursday, Friday, Saturday
I—Irregularly
K—Monday, Friday
L—Wednesday, Saturday
M—Monday
N—Monday, Wednesday, Thursday
O—Monday, Tuesday, Wednesday, Friday
P—Except Tuesday, Wednesday

R—Thursday, Friday, Saturday
S—Sunday
T—Tuesday
U—Wednesday, Thursday, Sunday
Th—Thursday
V—Sunday, Wednesday
W—Wednesday
XTh—Except Thursday
Z—Tuesday, Friday
AB—Tuesday, Wednesday, Friday, Saturday
AC—Monday, Thursday, Saturday
AD—Monday, Thursday, Friday
AE—Tuesday, Friday, Sunday

AF—Saturday, Sunday
AG—Tuesday, Sunday
AH—Monday, Wednesday, Saturday
AL—Except Monday, Sunday
AM—Monday, Thursday
AN—Tuesday, Saturday
Sa—Saturday
XA—Except Saturday, Sunday
XM—Except Monday
XR—Except Thursday, Saturday
XS—Except Sunday
XSa—Except Saturday
XX—Tuesday, Thursday, Friday
XY—Except Tuesday, Sunday

The DX Corner

(Short Waves)

(*Continued from page* 415)

quency is 15121 kc. (Libby.)

CT1GO, Portugal, 48.40 meters heard on Mondays, Wednesdays, Thursdays, Fridays, and Saturdays 7:20-8:30 p.m. E.S.T. and on Sundays from 11:30 p.m.-1:30 a.m. (Dalal.)

IQA, Rome, Italy, 14700 kc., on 20 meters, heard 9-10:30 a.m. E.S.T. (Wilkinson, Kemp.)

CTV (or **CTV2**), Monte Santo, Lisbon, Portugal heard testing on 20.0 meters and also on 17.5 meters, signing off at 6 a.m. E.S.T. (Mascarenhas.)

CT1HO (or **CT1HL**), Radio Invicta, Oporto, Portugal, 5790 kc. reported heard. Who knows operating schedule? (Styles.)

A new station in Villebon, France, of 50-100 kw. power is soon to be on the air on a frequency higher than 10000 kc. It is reported that the station will have four transmitters with six directional antennas on the same site as Paris PTT of the broadcast band. (Sholin.)

RADIO, BILLIARDS, 'N' EVERYTHING

These seem to keep R. Allen, a short-wave listener of Sussex, England, happy if this photograph does not lie.

HONEYHOONERS MEAN NOTHING TO HIM

Meet L.P.O. Thaddeus Grabek of Niagara Falls, New York, whose hobby, short-wave reporting, may be an escape from well-known honeymooners in that city.

FTM, France, 19355 kc. reported heard talking to Buenos Aires 1:25-1:40 p.m. E.S.T. (Reilly.)

ROU, Omsk, Siberia, U.S.S.R., 14790 kc. heard testing with Khabarovsk, 6-10 p.m. E.S.T. (Sholin.)

RIM, Tashkent, U.S.S.R., 15.25 megacycles,, reported heard at 10 a.m. E.S.T. (Olson, World-Wide Dial Club.)

ZEK (previously reported as ZCK rebroadcasting ZBW) Hongkong, China, transmits simultaneously on 34.25 meters, 55.46 meters, 12:30-2:15 p.m. and 5-11 p.m. Hongkong time which is 8 hours ahead of G.M.T. (Dalal, Baadsgaard) Observer Adams reports them at 5:30-10 a.m. E.S.T.

FZS, a station in Indo-China on 18.3 megacycles, reported heard 10 a.m. E.S.T. (Olson, World-Wide Dial Club.)

JVH, Nazaki, Japan, has been reported on 15620 kc. talking with KWU on 15355 kc. (Bews) JVH on 14600 kc. is now used for relaying programs to Manchukuo at 5:10 p.m. E.S.T. Program includes music, talks, exercises, etc. (Craft.)

JVN, Nazaki, Japan, 10660 kc. now has taken the place of JVH, for the American hour between midnight and 1 a.m. E.S.T. They also transmit news in English at 5:55 a.m. E.S.T. (DeMarco, Craft, Brundle, Gallagher, Lower, World-Wide Dial Club, Olson, Dickson, Adams, Gibson Chambers, Sholin, Loudon, Baadegaard, Matthews, Jackobs, Catchim, Wilkinson, J. E. Moore, Howald.)

ZGR, is reported as a new Malayan station heard testing on 49 meters (Dalal.)

HSP, Bangkok, Siam, 17.75 magacycles, reported heard, 5-6:30 a.m. E.S.T. (Adams.)

VUC, Calcutta, India, 6300 kc. reported now on the air 2:30-3:30 a.m. E.S.T. (Adams.) Observer Dalal says they are on the air from 4-5 a.m. and from 10 a.m.-4 p.m. E.S.T.

VPB, Colombo, Ceylon, 6050 kc. 48 meters, 300 watts, reported heard daily 8 a.m.-12:30 p.m. E.S.T. and on Sundays 8 p.m.-1:40 a.m. (Brundle and Dalal.)

VUY (VUB), Bombay, India, reported heard 11:45 a.m.-12:30 p.m. (Baadsgaard.) Also reported heard 11 a.m.-1 p.m. E.S.T. on Sundays, Saturdays and holidays. (Dalal, Adams, Scheierman.)

ETA, Addis Ababa, Ethiopia, uses three frequencies 7620 kc., 16180 kc. and 18270 kc. They have been reported heard on 7620 kc. and 13193 kc.,

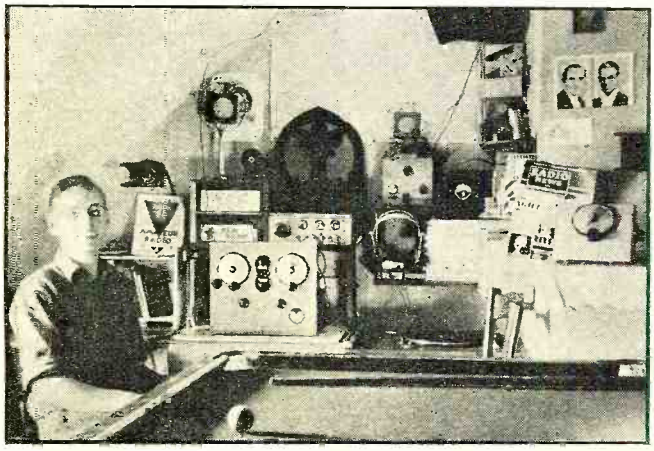
(*Turn to page* 420)

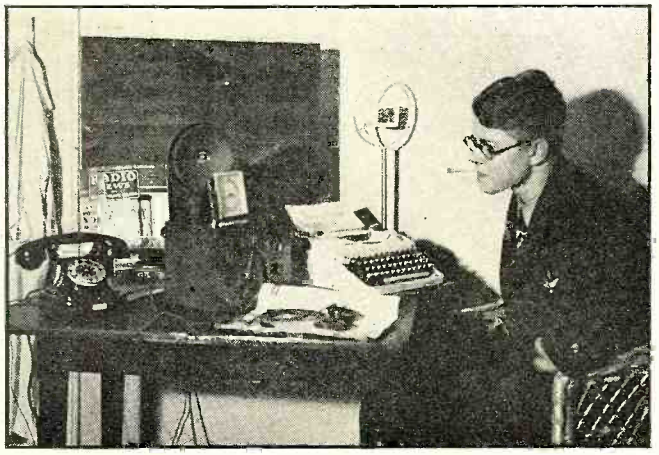
TIRELESS L.P.O.

Norman C. Smith, Official Observer for England, is shown in his DX Corner. He has his certificate plainly displayed.

OFFICIAL OBSERVER, BERLIN

Greetings from Herbert Lennartz, from his listening post to all other short-wave fans.





Only the SCOTT
Full Range Hi-Fidelity ALL-WAVE
BRINGS *You* ROME'S SISTINE CHAPEL CHOIR WITH ALL ITS *Magnificent* POWER AND BEAUTY

Rome! . . . it sends its torch of immortal glory to you!—from ten thousand miles across the star-spangled sky. No longer confined within the massive holy nave of St. Peter's is the living, enthralling union of deathless music and inspired voices of the Sistine Chapel Choir!

Now it is *yours!*—at a touch of the dial of your new SCOTT!—with a clarity, a tonal splendor, a volume which the SCOTT Laboratories guarantee no other radio in the world can approach!

TWO YEARS AHEAD OF ANY OTHER RECEIVER!

The new SCOTT Bullet-Direct Station Separation brings you more new, exciting foreign stations than any other radio on earth. Be it Java, Hawaii, Morocco, France, Australia, Spain, England or Germany — it is only a fragment of the brilliant-hued world-parade which is *nightly* yours with a SCOTT!

Only the new SCOTT captures the full range of glorious silver overtones of voice and violin, of trumpet and trombone, of saxophone, oboe, clarinet, flute. You miss half the program without a SCOTT.

WHAT TOSCANINI SAYS

The great Toscanini himself (a SCOTT owner) exclaims: "Never would I have believed it possible to attain such marvelous reproduction!" This is the famous receiver owned by such international celebrities as Guy Lombardo, Al Jolson, Eddie Cantor, Rudy Vallée, Walter Winchell, Ted Husing and hundreds more.

HEAR THE CUSTOM-BUILT SCOTT!

Yet you can own the SCOTT for no more than you would pay for an ordinary radio. Place the SCOTT in your home for 30 days' trial. If long before that time it has not reached into more remote corners of the world than any other receiver, with greater volume, with more beautifully clear, true tone than any other receiver, then send it back. There will be no obligation whatsoever.

Custom-built throughout. Five year guarantee. Sold direct from the laboratories. Nationwide installation service. Read the coupon offer below—and decide RIGHT NOW to send for the most thrilling story of world-covering performance in the history of radio!

Visit our new permanent Salon at 630 Fifth Avenue, Rockefeller Center, New York City

SCOTT — THE YARDSTICK BY WHICH ALL WORLD DISTANCE RECORDS ARE MEASURED

Highest Strictly Class "A" Power — 35 watts. 50 watts Class "AB" for undistorted programs at concert volume. Six times average power.

Highest Signal-to-Noise Ratio — 50% clearer foreign reception than any other radio,—provable in any comparative test.

Bullet-Direct Selectivity—Continuously variable —for more foreign stations than you have ever heard before. Most revolutionary feature of importance today.

Perfected Automatic Volume Control — keeps world programs at even volume.

Foreign Station Locator — instantly locates foreign stations.

Diffusion Panels—the only radio that directs all musical frequencies equally throughout the room.

Three Loudspeakers—massive low frequency unit for full base, and two special high frequency units for the living overtones, tones you have never heard before.

Tonetruth Sound Chamber—eliminates all boom.

Full Range Hi-Fidelity — provably twice the tonal range of any other high fidelity receiver, 25 to 16,000 cycles.

More Important Features than any other receiver, including True Bass Control, Precision Dial Calibration, Allwave Reception, Shadow Tuning, 23 Tubes, new Highest Efficiency Type.

SEND THIS COUPON *TODAY*-DETAILS FREE

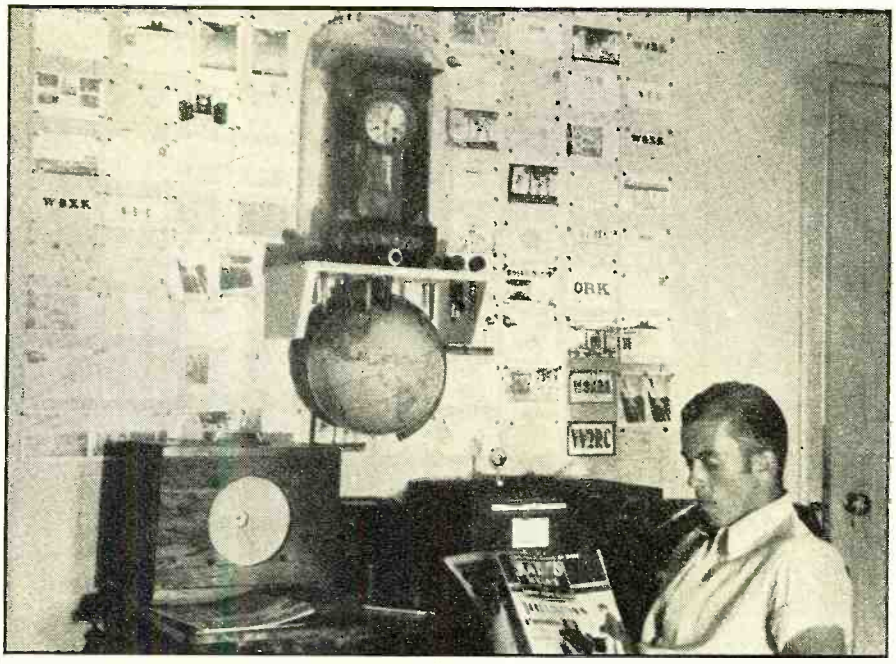
E. H. Scott Radio Laboratories, Inc., 4440 Ravenswood, Dept. 5A6, Chicago

Send "94 PROOFS" of the SCOTT'S superior tone and DX performance and particulars of 30-day home trial anywhere in U. S. A.

NAME.....

STREET.....

CITY.....*STATE*.....



L.P.O. FOR PENNSYLVANIA

W. C. Boyce, of Ambler, Pa., peruses RADIO NEWS *while sitting comfortably before the radio apparatus in his DX corner.*

The DX Corner (Short Waves)

(*Continued from page* 418)

the latter frequency being heard from 2:15-2:10 p.m.. They have also been reported heard on 11955 kc., on 18240 kc., on 12270 kc. and on 25 meters (Scheireman, Cummins, Putnam, Sholin, Reilly, Wood, Payer.) (We wonder whether some of these frequencies are from the new American short-wave transmitter set up by the United States Government in Addis Ababa. Some of these reports include hearing them testing with America.—Editor.)

IRG, Massaua, Eritrea, 14710 kc. heard transmitting and going off the air at 1:25 p.m. E.S.T. (Putnam.)

SUV, Cairo, Egypt 13810 kc. reported heard, 12:35-1:05 p.m. E.S.T. (Berlanger.)

SUZ, Abuzabal, Cairo, Egypt, reported sending programs on 13830 kc., 12:45-1 p.m. on Sundays. (Libby, Olson, World Wide Dial Club, Sholin.)

CNR, Rabat, Maroc, Africa, 17 meters reported heard Sundays, 8-11 a.m. (McCormick, Silver.)

VQ7LO, Nairobi, Kenya, Africa, reported moved in frequency to 6083 kc., 49.31 meters (Westchester.)

A new station in Jerusalem, Palestine of 20 kw. power has now started on the air, testing. What is its schedule and frequency? (deLaet.)

CR6AA, Lobito, West Africa, 7177 kc. 500 watts, may be heard Wednesdays, Saturdays 2:45-4:45 p.m. E.S.T. (Scala.)

CR7AA, Lourenço Marques, Mozambique, 6135 kc. heard testing Sundays (McCormick.) They are also on the air on 3540 kc. regularly Mondays, Wednesdays and Fridays from 4-8 p.m. E.S.T.

ZTJ, Johannesburg, South Africa, 6122 kc. reported heard. (McCormick.)

ZE1JR, Salisbury, Southern Rhodesia, Africa, 50 watts, heard 10:30-11:30 a.m. also 1-2 a.m. E.S.T., also can be heard talking to American amateurs. (Westchester.)

KKH, Kahuku, Hawaii, 7.52 megacycles, reported heard 11:30 p.m.-2 a.m. testing with music. (Reilly. Cacthim, Johnson.)

KIO, Hawaii, 11680 kc. testing with music, 5-5:30 p.m. E.S.T. (Twomey.)

VIZ3, 11500 kc. reported heard, 7-9 a.m. E.S.T., testing with CGA4. (Reilly, Wilson, Gates.)

W1XAL, Boston, Mass., is soon to have two transmitters, one as at pres-

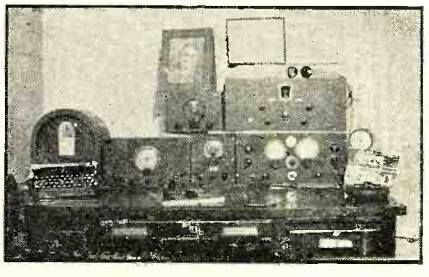
(*Turn to page* 422)

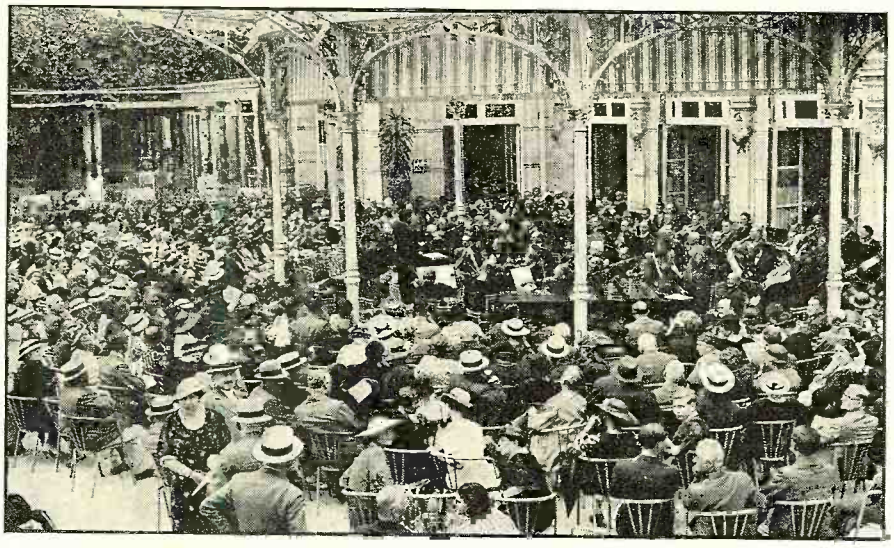
IN NORTH DAKOTA

A bedside DX corner. Here's lots of luck to R. N. Putnam, of Fargo, N.D. He is shown indulging in his short-wave hobby.

A TRIO'S DX CORNER

Robert Irwin, of Chicago, Illinois, shares this DX Corner with F. Anzalone, and Louis Miller. The RME9D receiver is Irwin's, the Hammarlund belongs to Anzalone, and Miller owns the National SW-3.





THOSE SYMPHONIES FROM FRANCE

The terrace of the Grand Casino, in Vichy, is the scene of many a symphony concert with Louis Fourestier, leader of the Paris Opera Comique, conducting. This music is often broadcast from FYA.

The DX Corner (Short Waves)

(*Continued from page* 420)

ent on 6040 kc. and the other on 17790 kc., for simultaneous broadcasting. (Chambers, Gaunt.)

KKQ, 11970 kc. and KEJ, 9010 kc. can be heard rebroadcasting NBC programs to Honolulu, 8-9 p.m. and 11 p.m.-12 midnight. (Gallagher, Reilly, Kentzel.)

W8XKA, Pittsburgh, Pa., 55.5 megacycles is the ultra-short-wave outlet of W8XK heard on the air, daily, 3-11 p.m. and Sundays 12:15-1 a.m. (Fletcher, Partner.)

WQP, New York, 13900 kc., 21.3 meters reported heard Sundays at 11 a.m. (Angel.)

W1OXFN, the stratosphere bowl at at Rapid City, South Dakota, 6350 kc. heard testing with W1OXFH, the stratosphere gondola, 13056 kc. and also with WUFF 6270 kc. (Partner, Johnson, Putnam.)

W1OXL, Rapid City, South Dakota, 6350 kc. is reported heard testing for the next stratosphere flight 6-9 p.m. E.S.T. (Pulver, Gallagher.)

KXA now has a short-wave program on 7600 kc. known as the R.C.A. Victor Short-Wave Observer Hour, for Short-Wave DX'ers in Washington state, 10:30-10:45 p.m. E.S.T. daily. Observer Loudon conducts this hour.

W9XBY, Kansas City, 1530 kc. conducts short-wave tips, daily except Sundays, at 7:45 p.m.; the program is named "Touring the World with Radio" (Schumacher.)

K6XJI, Howland Island in the Pacific, a survey expedition can be heard on 14300 kc. This station is operated by the well-known amateur K6BAZ. (Robins.)

HI1J, San Pedro de Macoris, D. R., is now on 5865 kc. except Sundays, 6-10 p.m. E.S.T. (Johnson.)

TIXGP3, San Jose de Costa Rica, 5830 kc. reported heard until 11:30 p.m. E.S.T. Saturdays. (Foshay, Gavin.)

TI5HH, San Ramon, Costa Rica, heard testing on 5500 kc., 54.55 meters irregularly 9:45-11 p.m. E.S.T. (Hynek.)

TIPG, San Jose, Costa Rica, 6410 kc. reported heard, daily, 9-10 or 11 p.m. E.S.T. (Libby, Evans, Betances, Kenzel, Chambers, Millen, Prats, Wilkinson, Foshay, Miller, Pulver.)

HI4D, Quizqueya, D. R., 10.10 megacycles, reported heard testing. (Prats.)

HIX, San Domingo, D. R., 5980 kc., 50.16 meters, 200 watts, reported on the air Sundays, 7:40-11:10 a.m. E.S.T. 4:40 p.m. and 8:10 p.m. and daily at 11:10 a.m. and 4:40 p.m. (Kentzel.)

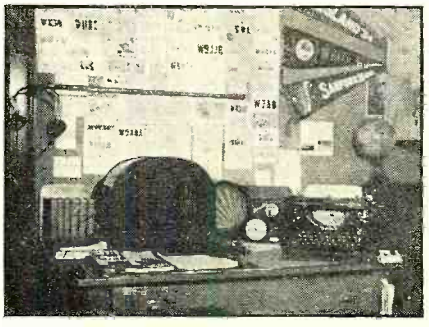
HI1J, reported now on the air, regularly (Twomey.)

HRN, Tegucigalpa, Honduras, 5875 kc., 700 watts, reported on the air

(*Turn to page* 437)

MASSACHUSETTS HEARD FROM

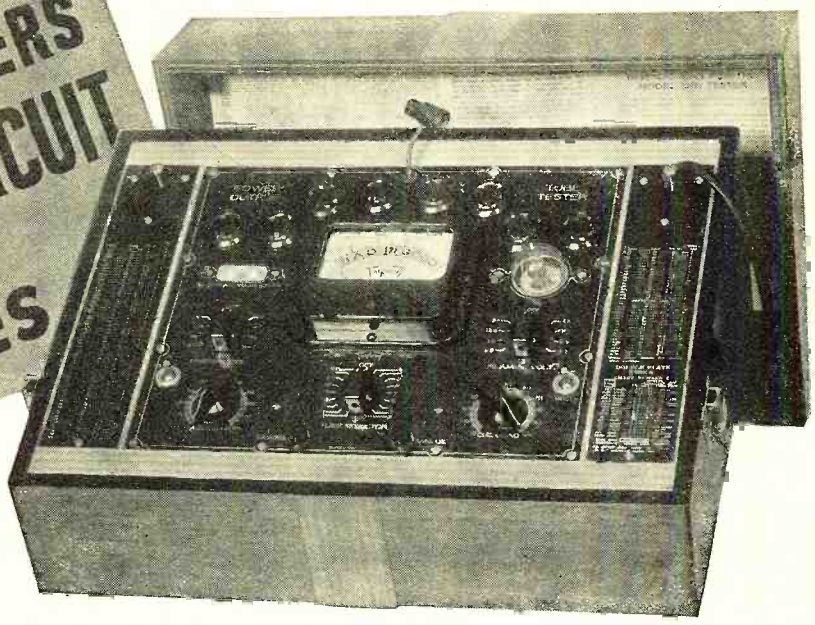
Here is the shipshape DX corner of A. S. Harris Jr., Winchester, Mass. He types his reports.



NEW L.P.O. FOR KENTUCKY

Meet J. E. Wilson, newly appointed short-wave Observer for Kentucky. He resides at Frankfort.

Triplett ENGINEERS PERFECT NEW CIRCUIT TO TEST RADIO TUBES



New POWER OUTPUT TUBE TESTER MODEL 1500

DEALER NET PRICE Only $36.67

All radio service engineers have learned that the final test on a radio tube is—does it work in a radio set; therefore, they have wished for a tube tester that would approximate radio set conditions.

Try out some of your trick tubes in Triplett's New Power Output Tube Tester—tubes you had difficulty before in checking.

Then you will understand why this new method of tube testing will help you to—

1. Sell more tubes by finding more weak and defective ones.
2. Speed up your service work by locating tube troubles quickly.

The new Triplett Multi-Purpose Tube Tester Model 1501 combines in one unit 10 instruments that are needed by radio service engineers in their daily work.

Here are the 10 instruments and what they do—

1. Test all type tubes (New Power Output Test)
2. Neon short test
3. Separate Diode Tests
4. Neon Paper Condenser Tests
5. Electrolytic Condenser Leakage Tests
6. D.C. Voltmeter and Milliammeter
7. Ohmmeter
8. A.C. Voltmeter with shadow line adjustment
9. Decibel Meter
10. Impedance Meter

Model 1501 is installed in attractive modernistic wooden case with detachable cover—sloping panel—good and bad scale.

Dealer Net Price.....$46.67

Model 1500 tube tester only, same power output tester circuit, has neon short test and shadow line voltage indicator—uses same case as 1501.

Dealer Net Price.....$36.67

ALL WAVE DIRECT READING SIGNAL GENERATOR.....

Six Bands . . . Vernier . . . Precision Built, yet fully stabilized . . . easy to operate. This new All-Wave Signal Generator by Triplett marks a great improvement in signal generator design. Scale is direct easy reading with vernier for accurate setting to any one of six frequency bands covering all ranges from 100 to 30,000 Kc. Write for complete details.

$26.67

Model 1231 D.C.....Dealer Net Price $26.67
Model 1232 A.C.....Dealer Net Price $26.67
Carrying Case .....Dealer Net Price $4.00

MAIL COUPON FOR DETAILS

TRIPLETT ELECTRICAL INSTRUMENT CO.,
Dept. 151 Harmon Drive, Bluffton, Ohio, U.S.A.

Please send me information on the following:

Name.....

Street.....

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

TRIPLETT *Precision* ELECTRICAL INSTRUMENTS

Backstage in Broadcasting

LESLIE HOWARD

HARRIET HILLIARD

ELIZABETH LOVE

JAMES MELTON

By
Samuel Kaufman

WE don't think we have any prejudices. But when it comes to serialized dramatizations on the air, we feel that they must be handled very, very carefully to hold our interest. We hold that the "to be continued" sign-off is okay in a magazine because we can resume the story at our leisure. But, on the air, if you're not at the loudspeaker at a precise moment, you may lose forever the continued action you waited for through a long week of suspense. And now we find the talented Britisher, Leslie Howard, carrying on for Lehn & Fink, Sunday nights over CBS, in just that type of a program. However, he's just the type of an actor to overcome the handicap of serialized continuity. He was most enthusiastic over his radio endeavors when we chatted with him in New York just before the series began. Elizabeth Love won the choice spot as his radio leading lady. The program is entitled "The Amateur Gentleman," based on an old novel of that name. But it is unfortunate that Howard's half-hour should clash with the latter portion of NBC's broadcast of that other amateur gentleman—Major Edward Bowes. This is but one of many instances this season of competition in simultaneous headlining programs.

ROBERT L. RIPLEY, the "Believe It Or Not" man, is the featured personality of the Fall and Winter series of Fleischmann Bakers' Broadcasts (NBC) Sundays, holding down the spot previously filled by Joe Penner. The cartoonist relates some of his strange facts which are then dramatized by a studio cast. Ozzie Nelson, the bandleader, and Harriet Hilliard, songster, (Mr. and Mrs. Now) are back on the show. The "Voice of the People" street interview series which previously appeared on the Fleischmann Bakers' schedule has moved to an earlier Sunday NBC spot under the new sponsorship of the Molle Company.

MAYBE it is so, and maybe is isn't! However, it is our opinion that the growing popularity of short-wave programs has caused American broadcasters to reach out for some outstanding foreign talent to be featured on our domestic network shows. Jack Hylton, prominent British orchestra is one of the latest imported radio personalities. Hylton has relayed programs to the U.S.A. in the past. We were in London four years ago when he broadcast to the U.S.A. and the B.B.C. executives were thrilled over the event despite the fact that it was for a cigarette sponsor and, ordinarily, the British radio men frown at commercialism. The Standard Oil Company of Indiana is paying the bills for the Hylton orchestra's efforts over CBS Sunday nights. Ray Noble, Hylton's countryman who helped blaze the trail from the Portland Place microphones to the American studios, recently shifted from NBC to CBS under the new sponsorship of Coca-Cola on Wednesday nights. Al Bowlly remains Noble's featured vocalist.

THE Palmolive Beauty Box Theatre, a consistently good air show, enters the new season with a new set-up among its headliners. Josephine Antoine, young lyric soprano whose radio efforts won her a Metropolitan Opera placement. Rose Bampton, also of the Metropolitan roster, and James Melton, radio tenor just back from a Hollywood sojourn, are now heading the Beauty Box troupe heard over NBC Friday nights. John Barclay continues as director of the productions while Al Goodman's orchestra supplies the accompaniment. The Goodman orchestra is also featured on the new Luden's series presented over NBC Sundays.

TCH! TCH! Things aren't the same as they used to be. The radio picture is changing. Yes, we're awakened to the fact when we note that, after all these seasons, "Rubinoff and His Violin" is the billing on a non-Eddie Cantor program. With the parting of the famous pair, Dave Rubinoff returns to the NBC fold as star of the Saturday Chevrolet series. And we think the new arrangement is a

RAY NOBLE

ROBERT L. RIPLEY

RUBINOFF WALLACE BEERY

WILLIE MORRIS

big break for Rubinoff. It is true that Cantor's constant jesting about him helped the violinist's radio ascent. But it was being overdone. Dave had real talent of his own, but with Cantor he was paradoxically obliged to play second-fiddle even though he was the only featured violinist on the show. Rubinoff's supporting cast includes Virginia Rea, soprano, Jan Peerce, tenor, and Graham McNamee, the veteran announcer. Peerce is climbing the radio ladder by leaps and bounds, consistently popping up on choice programs.

HIS contract terminated, Al Jolson had bid adieu to NBC's Saturday night Shell Chateau program. As master-of-ceremonies of this full-hour variety show, Al did a far better radio job than on his other broadcast series in recent seasons and it probably won't be long before he'll be doing his stuff for some sponsor or other. After a week's fill-in by Walter Winchell, the Shell master-of-ceremonies assignment went to Wallace Beery for an extended run. And we must note here that Wally's "Viva Villa!" dramatization on his initial program of the series was one of the high spots of the radio year.

WILLIE MORRIS, recently heard on the air with John Charles Thomas, has earned a starring series of her own on CBS Friday nights. The program entitled "Flying Red Horse Tavern," sponsored by Socony, also features Freddie Rich's Orchestra, Jim Harkins as master-of-ceremonies, and guest personalities of prominence.

ERNO RAPEE

THE SERVICE BENCH

tells YOU something about

Service Kinks
• • •
P. A. Work
• • •
Loss of Volume
• • •
Auto Radio
• • •
Service Notes

FIGURE 2

Conducted by Zeh Bouck, *Service Editor*

EMERSON immortalized the "kink"—those labor and time saving devices on infinite variety—when he said that the world would beat a path to the door of anyone, even though he lived in the middle of the woods, if he made a better mousetrap. A mouse-trap is only an elaborate kink. We won't follow you into the woods—we'll do better than that, and send you a check for every good kink you send us.

THE best service idea for this month comes from Frank W. Bentley, Jr., Missouri Valley, Iowa, a serviceman who kodaks as he goes. Every serviceman has occasion to use shellac, varnish, paint and soldering paste—sticky or greasy substances that come in small cans or jars, slop over the sides for transfer via the fingers to clothes, cabinets and tools. Mr. Bentley's photograph of his kink (Figure 1) is practically self-explanatory. Two small sticks of woods are nailed together as indicated—or the serviceman with a yen for whittling can carve himself the handle from a single piece. It is strapped

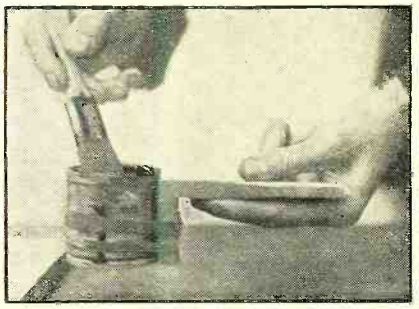


FIGURE 1

to the can with a couple of rubber bands —in Mr. Bentley's case, cut from an old inner tube. As is obvious, the handle may be instantly removed, if desired, when the can is stored or for transfer to another can.

P.A. WORK IN ENGLAND

P. J. Stonor, with the Aigburth Sound Company, Liverpool, England, sends us the photos of Figures 2 and 3 along with a few words that will be of interest and value to servicemen throughout the world. "We have been in operation only nine months, in the course of which we have covered over fifty public-address events—from whist drives to garden fêtes. The pictures enclosed were taken during the British Legion fête. I am announcing with one of the beauty queens beside me.

"Our main amplifier is the Wholesale Radio Service Company's Lafayette 15-watt, 6-volt portable amplifier. This amplifier has been in constant use since we started business, and has not given us a bit of trouble—not even so much as a tube replacement. For gain and quality, it certainly has many British amplifiers.

FIGURE 3

costing five times as much, beaten. The microphone is British, as are the speakers and gramophone pick-up. We are forced to employ the 6-volt job as there are so many different kinds of current in use in England. English public-address equip-

ment costs very much more than American. A 10-watt amplifier will cost as much as $75.00, while an adequate horn cannot be had under $60.00. The crystal microphone has just been introduced and costs about $35.00.

"In soliciting assignments, we find it is best actually to see the person in authority, rather than write or 'phone. Failing an interview, the telephone call is the next best bet. Letters are so easily lost or destroyed before they reach the right person."

THE DAY'S WORK

Harry Schmidt, of Richmond Hill, L. I., and whose letterhead features "Radio Service, Public-Address Installations, Special Installations, Electrical Hearing Aids," sends us several pages from his service notebook: "Low volume and oscillation in a Lang B. A. 5 was caused by a short-circuited condenser from cathode to ground. Replace with a .5 mfd. 400-volt capacitor. In a similar model, oscillation was caused by open and leaky condensers between r.f. plate and ground and r.f. cathode and ground. Use .1 mfd. for replacement.

"On a DeWald 640 auto radio, the switch had to be turned "on and off" several times before the receiver would operate. The trouble was a defective vibrator. If the vibrator contacts are in good condition, adjustment will remedy the difficulty —otherwise replace the vibrator.

"Trouble with a Bosch 20-L was characterized with low volume, distortion and speaker rattle. A break under the insulation of the antenna lead was responsible for the poor volume. Replacing the 27 second detector with a 56 also pepped up performance. The rattle was caused by loose fastening bolts in the speakers. When tightening it is desirable to use extra lock washers.

"Sparton 110: Dead when brought to the shop. The voice coil was corroded open. This was repaired by unwinding ¼ of a turn and soldering. The set then worked, but was noisy, oscillations, and the plate voltage was low in the detector and push-pull 26 stages. I cured the oscillations by replacing three leaky 1 mfd. by-pass condensers in the r.f. amplifier. In the power supply there are two 20,000-ohm, 2-watt carbon resistors which had changed in value. Replacements cured the low voltage on the 26's. The noise and low detector plate voltage was caused by a defective winding in the primary of the first a.f. push-pull transformer.

"A Macy superhet (no model name or number—speaker facing the floor) was noisy and howled badly when the volume was turned more than one-quarter the way up. The noise was similar to that caused by an arcing condenser, but in this instance was due to an open winding and a high-resistance contact in the primary of the r.f. coil. The microphonic howl was cured with the aid of a five-and-ten kneeling pad. Place a layer of rubber between the speaker rim and the baffle. Small pieces of rubber were also distributed as follows: Between the chassis and the shelf, between the shelf and shelf supports, and under the heads of all holding screws and bolts. Make sure that the control shafts and knobs do not touch the panel. A metallic rattle was caused by a loose escutcheon plate, which was eliminated by fastening the plate with speaker cement."

Where? Oh, Where?

There is a check awaiting the "Roanoke Radio Service Shop" for a contribution to the *Service Bench* in the July, 1935, issue of RADIO NEWS. This check has been returned, unclaimed, from their former address at 813½ West 39th Street, Kansas City, Mo.

RADIO NEWS is offering this month five new cash prizes of $10.00, $5.00, $4.00, $3.00 and $2.00 each for photographs and descriptions of Service Shops. We and our readers are as much interested in seeing *where* you work as in knowing how you work. Elaborateness will *not* be the deciding factor. Ingenuity and neatness will count higher. Send in *your* Service Bench photo. Describe your equipment and anything unusual you have done with it in one hundred words or less. All material used will be paid for, whether prize-winning or not. Address contributions to, yours for better servicing—

The Service Contest Editor.

An Inexpensive Output Meter

C. M. Delano, of Lincoln, Nebraska, sends us the diagram of Figure 4, showing a circuit which employs a ½-watt neon lamp as an output indicator. The diagram is self-explanatory. The transformer is a Jefferson "Tri-Volt" bell-ringing type with the secondary tapped for 6, 12 and 18 volts. The taps are selected by means of the pin-jacks for the best flashing indication. Mr. Delano writes: "The neon tube will flash in a manner indicating the strength of the signal, the illumination being brightest when the output is maximum. Connect the input transformer to the voice coil. In using the indicator, the variable resistor should be adjusted so that tests start at the weakest discernible glow. If the receiver being realigned is considerably out of resonance, it may be necessary to cut down the resistance as the proper adjustment is approached so that variations may be more readily apparent."

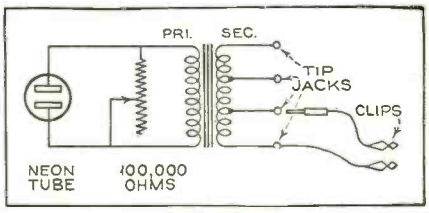


FIGURE 4

SERVICE NOTES

To dramatize the importance of noise elimination, the Tobe Deutschmann Corporation is supplying a "Radio Interference Inspector" badge without charge to their official Filterette stations. This organization has also prepared a sales promotion kit, consisting of a window display card, envelope stuffers, advertising mats and stationery stickers for use in conjunction with a receiver modernization campaign built around the Browning 35 and 36.

Servicemen and sound engineers will find

(*Turn to page* 429)

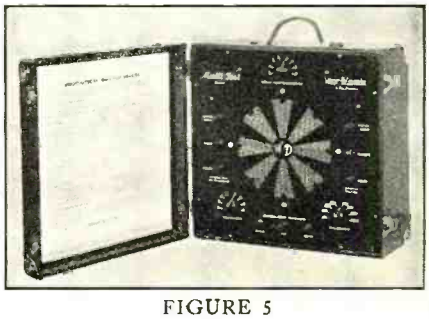


FIGURE 5

Servicemen's PRIZE CONTEST

Announcement of Awards

Zeh Bouck
Service Editor

FIRST PRIZE

A Tube Life Guessing Contest

"I placed a brand new tube, in a wired socket, in the midst of a tube window display. A neat display card informed passers-by that—ENDURANCE CONTEST. How Long Will This High-Efficiency Tube Continue to Burn? This High-Efficiency Tube Started to Burn Thursday, August 1st. It Has Been Burning to Date ——— HOURS. (A small card with the number of hours was slipped in place each morning.)

"Under the display card was the announcement—Guess the Time Free. To the Winner, We Will Equip Your Radio with a Complete Set of Tubes Free! Come in and Make Your Guess. No Obligation!

"The coupon shown in Figure 1 had to be filled out by each guesser and they had to come in the store to get the coupon. This contest attracted a lot of attention, and hundreds of contestants entered every week, which thus gave us their names and addresses, make of radio, number of tubes —all of which not only made up an excellent mailing list of people who had been in the store and knew us, but also provided a live list to work on for selling more radios and tubes. It proved a wonderful idea for selling tubes. It made the public tube-buying conscious. We sold a gross of tubes per week during the contest. Those who had already filled in guessing blanks would stop by every day or so to see the number of hours the tube had burned. We figured at first that if we got 2,000 hours, or about 100 days, out of it, it would be something. But it went way beyond our expectations. And all that time it was a good business stimulant!"—*Benjamin Swayne.*

I GUESS THE HIGH EFFICIENCY PHILCO TUBE WILL BURN CONTINUALLY ..... Hours | Minutes | Seconds

I OWN A _____ (YEAR & MAKE) RADIO

HAS _____ (NUMBER OF) TUBES

NAME _____

ADDRESS _____

POSITIVELY NO GUESSES WILL BE ACCEPTED UNLESS DEPOSITED BY CONTESTANT AT THE HUB PIANO COMPANY 304 N. Howard St. Baltimore, Md.

DO NOT MAIL

FIGURE 1

SECOND PRIZE

A Double Utility Calendar

"While this idea was originated with Canadian customers in mind, there is no reason why it cannot be adapted to the use of servicemen in the States. I had a wall calendar printed with the usual advertising, but instead of a picture the space was left for the pasting in of the listener's radio receiving license. The law requires that the license be displayed for inspection at all times. The customer usually hangs the calendar close to the radio where it is a constant reminder of whom to call in case of trouble.

"I would suggest for adapting the idea to the States, that a list of the more prominent broadcasting and foreign stations, with frequency allocations, be printed in the space I leave blank for the license."—*George W. Davison.*

THIRD PRIZE

A Business Card That's Kept

G. D. White applies a similar idea to his business card, the reverse side of which is shown in Figure 2. He writes: "I have found that customers will keep a card of this sort longer than the average business card because it is more useful to them. In fact, customers whose radios I have serviced a year ago have called me, and I find that they still have the original cards."

Stations on the Air.

	Kilocycles
KYW	1020
WABC	860
WCAM	1280
WCAU	1170
WDAS	1370
WEAF	660
WFIL	560
WIBG	970
WIP	610
WJZ	760
WLWL	1100
WOR	710
WPEN	920
WPG	1100
WRAX	920
WTEL	1310

Keep me Near your Radio

FIGURE 2

FOURTH PRIZE

Penny Wise and Pound Wise

"In May, 1934, I had occasion to send out the penny postcard shown in Figure 3. This brought such a great response from old customers that I sent out the card in Figure 4 during September, 1935, with equally gratifying results. A small charge was made to stimulate and invite the customer (which, psychologically, is often better than offering him something for nothing), and the list of the service it covered was signed by me to add a per-

THIS MONTH'S WINNERS

FIRST PRIZE—To Benjamin Swayne, Manager of the Hub Piano Company, 304 N. Howard Street, Baltimore, Maryland—$10.00 for originality—an endurance contest that sold tubes and built up a live-wire list of prospects!

SECOND PRIZE—To George W. Davidson, Box 698, Springhill, N. S., Canada—$5.00 for bringing the calendar idea up-to-date!

THIRD PRIZE—To G. D. White, 5620 Montrose Street, Philadelphia, Pa.—$4.00 for a business card that cheats the wastebasket!

FOURTH PRIZE—To K. W. Brown, Universal Radio Service, 610 Dewey Avenue, St. Joseph, Mo.—$3.00 for two penny postcards that brought in the dollars!

FIFTH PRIZE—To Harry D. Hooton, Radio Service Co., Beech Hill, West Va.—$2.00 for radio service by mail-order!

Congratulations and thanks—from *Radio News* and its thousands of servicemen readers!

sonal touch."—*Kenneth W. Brown.*

UNIVERSAL ELECTRIC SERVICE
610 Dewey Ave.
St. Joseph, Mo.
Phone 6-5576W

May 25,1934.

Dear Customer:

We have moved to larger quarters so we may render better and quicker service.

Thank you for your past patronage

Yours very truly,
Universal Elec.Service.
By Kenneth W. Brown

FIGURE 3

FIFTH PRIZE
Mail Order Radio Servicing

"The serviceman who lives in a small town or rural district can augment his income by advertising for business in the farm journals. Farmers are always anxious to save money and, since the advertising

(*Turn to page* 431)

The Service Bench

(*Continued from page* 427)

the Wright-DeCoster model 3,000 "Multi-Test" speaker (Figure 5) of considerable utility. It is readily portable, and its flexibility is such that it matches all tubes, all output transformers and all field coils, including those in which the C bias is secured by means of a drop across part of the circuit.

The progressive serviceman will be interested in the Cinemaphone 16—a 16-millimeter sound-on-film (or silent) projector—manufactured by the Sales On Sound Corporation. While the complete outfit, consisting of projector, sound-on film mechanism, amplifier, speaker, cable and carrying cases can hardly be described as inexpensive, they are priced as low as possible consistent with a quality product, and the cost should be readily liquidated by rentals within a year to church and school events, business meetings, fraternal organizations, etc.

RADIO PHYSICS COURSE

ALFRED A. GHIRARDI

Lesson 48. Ohm's Law for A.C.

THE total opposition to current flow in alternating-current circuits is called the *impedance* (Z). We found, when dealing with direct-current circuits, that the relation existing between current strength, applied e.m.f., and resistance was fully explained by Ohm's law and the relation $I = E \div R$. This law also applies to alternating-current circuits, but instead of dividing by the resistance R of the circuit we must divide by the total opposition or *impedance*, Z, of the circuit. Thus for alternating-current circuits we have:

$$I = \frac{E}{Z}; \quad E = IZ \text{ or } Z = \frac{E}{I}$$

Substituting the value of Z as given in equation (18), in the above, we obtain:

$$I = \frac{E}{\sqrt{R^2 + \left(2\pi f L - \frac{1}{2\pi f C}\right)^2}}$$

This general modification of Ohm's law applies to alternating currents flowing in any circuit. From this equation any one of the values may be found if all of the others are known. If the circuit contains inductance only, the expressions for resistance and capacitive reactance in the denominator drop out, etc.

EXAMPLE: The primary coil of a certain power transformer has a resistance of 5 ohms and an inductance of 10 henries. What current will flow through this coil if it is connected to a 110-volt, 60-cycle circuit?

SOLUTION:

$$I = \frac{E}{Z} = \frac{E}{\sqrt{R^2 + (2\pi f L)^2}} = \frac{110}{\sqrt{5^2 + (2 \times 3.1416 \times 60 \times 10)^2}} =$$

.03 amps. Ans.

EXAMPLE: What current will flow through an a.c. circuit having an e.m.f. of 110 volts, a resistance of 4 ohms, an inductive reactance of 100 ohms, and a capacitive reactance of 120 ohms? Will the current lead or lag the applied e.m.f.?

SOLUTION:

$$I = \frac{E}{\sqrt{R^2 + (X_c - X_L)^2}} = \frac{110}{\sqrt{4^2 + (120 - 100)^2}} = \frac{110}{20.4} =$$

5.4 amperes. Ans.

The current will lead the voltage since the capacitive reactance is largest and therefore the circuit acts as a capacitive circuit.

When several inductive or capacitive devices are connected in series in an alternating current circuit, the total impedance of the group cannot be determined by simply adding the individual impedances *arithmetically*, since this does not take into account the various phase displacements produced. Instead, the impedance of each device must be resolved into its component resistance and reactance, and these are then added separately, remembering that the net reactance is equal to the total capacitive reactance subtracted from the total inductive reactance or vice versa. This may be expressed by the following:

$$Z = \sqrt{(R_1 + R_2 + \text{etc.})^2 + (X_{L1} + X_{L2} + \text{etc.} - X_{C1} - X_{C2} - \text{etc.})^2}$$

In a parallel circuit, the current in each branch is found from the applied voltage and the impedance of the branch. The currents in the various branches are combined vectorially with regard to their phase relations to give the resultant current.

Service Letters

(*Continued from page* 405)

The Unit System

An effort, more or less successful, has been made to codify the parts of this system. The units are paragraphs which can be grouped in a variety of combinations to form complete letters. Units designated by the letter A are most appropriately used for opening paragraphs, and the Z units for closing paragraphs. Units with the numeral 1 after the letter are paragraphs to be used only in writing to potential new customers. The number 2 indicates old customers. Paragraphs without numerals can be incorporated in letters addressed either to old or potential clients.

Unit A1

"As a radio set user, you are naturally interested in keeping your receiver in first class condition—from the point of view of entertainment, and for the protection of your investment."

Unit A2

"It has been a long time since we have been called upon to service your radio. We take it that this means our last efforts were pleasingly permanent. We are naturally gratified at this!"

Unit B

"A radio, like an automobile, should be periodically inspected if it is to give the best service engineered into it by the manufacturer. In the absence of sudden failures, there is a slow but steady let-down in performance, which, being gradual, is rarely perceived by those who listen to the set day after day. Or perhaps you have *noticed it, in contrast with a friend's radio, or maybe subconsciously and are using your receiver less and less."*

Unit C

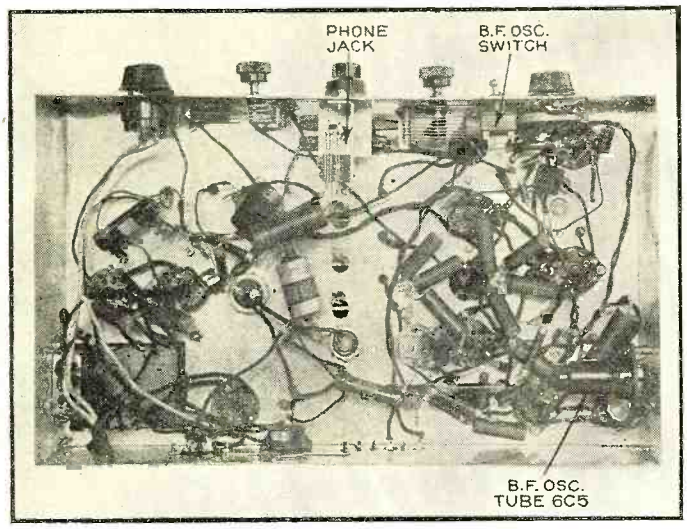
"May we suggest that you listen critically to your radio tonight? Do you really enjoy it as much as you did immediately after we last serviced it? Is the quality all that it should be—or is there a slight raspiness, particularly on loud tones? Do distant stations come in with the old-time "wallop"? Or are they weak and accompanied with considerable noise? Do the stations line up on the dial as they used to? Do you have to turn your volume control farther up than you did when the set was new?"

Unit Z

"A card or 'phone call from you will bring one of our service experts to your door at any time convenient to you. There will be no charge for inspection, and he will tell you honestly just how well your set is performing. If reception can be improved upon by us, he will estimate charges—and the job will cost you exactly that—or less! Similarly, the work will be completed on time—or before—with our usual guarantee of satisfaction."

There is no good reason why unit Z could not be used on a post-card for circularization, rather than as the termination of a letter for which it was originally intended. Units B and Z form a short—not too long for typing—sales letter to old and prospective clients. Units A2 and Z provide a personally-typed length letter *to old customers*—for a new mailing list, take unit A1 and unit Z. For a complete sales argument to established clients, units A2, B, C and Z, in the order given, comprise an effective form letter. To new customers, substitute A1 for A2.

The five units already presented are such as to admit combination with many of the units to be suggested in the next and concluding article on this subject, in the formation of a variety of letters covering almost every service exigency.



CIRCUIT CHANGES

Below the chassis changes are shown in this illustration from the actual model that was built up in the laboratory. The whole job can be completed in two or three hours. The changes adapt the receiver for amateur use, including headphones and beat frequency oscillator for c.w. reception.

The Ocean Hopper

(*Continued from page* 411)

power rating should be at least 20 watts to avoid excessive heating.

A jack for headphones may be added as shown in Figure 3. When the phone plug is inserted, the primary of the 1st a.f. transformer is shorted to silence the speaker. Since the filter circuit (shown in Figure 1) is not required for headphone operation, the 75,000 ohm resistor is used to form a plate load and the .25 mfd. bypass is used as a coupling condenser, returning to its normal function when the speaker plug is removed. A Pacent type 66-S filament control jack was used, which has one extra leaf not required. If not readily obtainable, any similar type will do.

A beat oscillator is invaluable for locating weak broadcasting stations and is necessary for c.w. work. A commercial unit, such as the RCA beat oscillator, may be used or one may be constructed as shown in Figure 4. The primary and secondary coils are scramble-wound. The coils are carefully adjusted by varying the number of turns until the tube oscillates at 540 kc. with the small variable condenser well meshed. The coil form may be mounted directly on the fixed .00025 shunt condenser and the entire assembly supported by heavy bus bar wires soldered to the terminals of the 100 mmfd. variable condenser. Any type of shield can of suitable physical dimensions will suffice to shield the device. A Hammarlund i.f. transformer can was used to house this unit and the 100 mmfd. tuning condenser mounted on top. The oscillator tube may be mounted beneath the chassis, as illustrated.

The beat oscillator should be very loosely coupled to the i.f. amplifier tube. This may be done by wrapping the insulated lead from the oscillator grid one or more turns around the grid lead to the 6K7 i.f. amplifier tube. The minute capacity thus provided is ample. If the coupling is too close, the sensitivity of the set will be reduced when the oscillator is switched "on" due to the effect on the a.v.c. circuit. When the proper degree of coupling has been secured (by varying the number or tightness of the wrapped turns), the i.f. circuit should be carefully realigned. The oscillator should be adjusted for zero beat with the incoming signal. This point may be located by tuning in a station, then varying the 100 mmfd. variable condenser until a faint squeal is heard. As the condenser is turned in the same direction the pitch should decrease, then increase. The point at which it becomes inaudible is zero beat. In tuning for weak distant stations, the carrier wave may be located even when no modulation is used.

For either broadcast or i.c.w. reception, the beat oscillator should be switched off once the carrier wave has been located. A toggle switch to cut off the B supply to the 6C5 beat oscillator is conveniently located at the front of the chassis, as illustrated in the photograph.

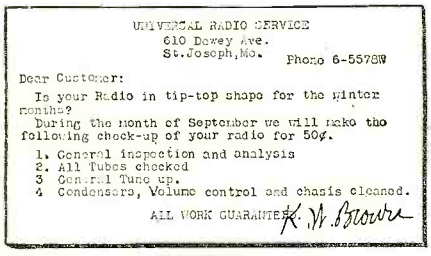
Where wires pass through holes in the chassis, rubber grommets should be used to prevent chafing. It is also desirable to place same under transformer and choke mountings so that any slight vibration may not be transferred to the chassis. Since we have not found the metal tubes microphonic, it is unnecessary to follow the usual practice of suspending the tuning condenser on rubber.

Prize Contest

(*Continued from page* 429)

rates are low, a special mail-order price can be made. We tried out this idea during the summer months, and at the present time over 25% of our work is being done in this manner.

"Here is our plan: The customer sends the set, usually the chassis only, by express or parcel post. An estimate of the repair charge is sent out before work is started. After the repairs are completed, the radio is shipped C.O.D. for the bill and shipping


UNIVERSAL RADIO SERVICE
610 Dewey Ave.
St. Joseph, Mo.
Phone 6-5578W

Dear Customer:

Is your Radio in tip-top shape for the Winter months?

During the month of September we will make the following check-up of your radio for 50¢.

1. General inspection and analysis
2. All Tubes checked
3. General Tune up.
4. Condensers, Volume control and chasis cleaned.

ALL WORK GUARANTEED K. W. Brown

FIGURE 4

charges. After paying for the transportation, the customer usually saves 20% or more over local service charges. We give mail-order customers a 20% commission on the profits of all work they send in to us from their vicinity. Results have been surprisingly good."—*Harry D. Hooton.*

BLUEPRINTS

RADIO NEWS "Ocean Hopper" blueprints are available for 50 cents per set and include full-size chassis layout drawings, full-size picture wiring diagram, etc. Order direct from: RADIO NEWS, Blueprint Dept., 461 Eighth Avenue, New York City.

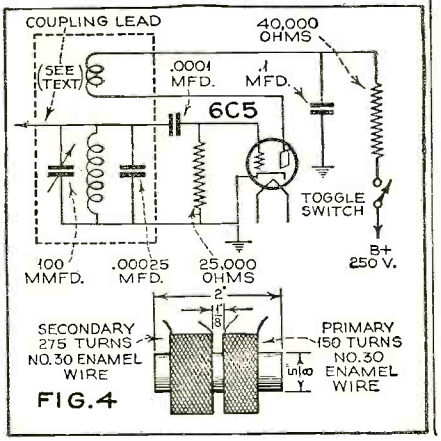


FIG.4

Wired Radio

(*Continued from page* 394)

the writer was informed, receives complete international and Universal press dispatches and, in addition, uses its own reporters at some events.

Studios of *Ticker News* are located atop a New York office building. A monk's cloth draped room serves as the main studio. Its chief furnishings are a crystal microphone, a desk to accommodate an announcer and telegrapher, and some chairs. There's no piano because all the music used at intervals comes from electrical transcriptions played on turntables in the adjoining control room.

The control room, visible from the studio through the broadcasting type of double-plate glass window, includes a panel for volume adjustment, as well as switching equipment linking the studio with the various subscribers, via the telephone company's facilities.

Teleflash, an associated company of the New York *Morning Telegraph,* functions in quite a similar manner. The *Teleflash* headquarters are on Fifth Avenue, while studios are on West Twenty-sixth Street. Sport news is the chief program subject and music is used as fill-in material. While the system is available chiefly to commercial spots such as hotels, restaurants, etc., we were told that no definite limiting of its scope was decided on. *Teleflash* has a 14-hour program day, starting operations at 10 a.m., continuing until midnight. An executive stated that the program content averages 80 percent of sports material, and he termed his service a "talking newspaper."

As mentioned in a prior paragraph, *Ticker News Service* used the term "audible newspaper." These two designations indicate that the two firms intend adhering to the news field—rather than a general entertainment sphere.

Wired services are already branching out to other cities. *Ticker News* has established similar set-ups in the Boston and Philadelphia areas while *Teleflash* is branching out in the Baltimore and Chicago areas, the writer was informed. *Teleflash* expects about eight or nine more cities to be included in its wired program area. In both firms' instances, it is believed that, while some single circuits linking the cities may be employed, local cut-ins will have to be provided for sport news of strictly locality importance.

Teleflash, according to an executive, uses Western Electric equipment "generally" in transmission and reception. *Ticker News* informed the writer that its own equipment is used in the New York area, Bell apparatus in Boston, and Philco in Philadelphia.

Wired Music is usually accredited with being the pioneer New York wired program service. It has its studios and transmission equipment in a West Forty-second Street hotel. As its name implies, its service is strictly musical, no vocal announcements of any kind being given. The firm was organized to provide sound entertainment over loudspeakers as a substitute for individual talent at each subscriber's establishment. Live talent, we were told, is used while transcriptions are added as occasional filler.

The latter firm, according to a representative, endeavors to supply "all the properties of an orchestra, except physical ones" to subscribers. Inasmuch as hotels and restaurants form the bulk of trade, the music is timed for dining hours. The day starts with luncheon music, resumes with cocktail hour selections and continues through the evening with dinner and dance music, all compositions being selected according to the clock. After ten o'clock, the programs are solidly dance music.

A novel part of the *Wired Music* service is that the timing of selections is almost identical to that of average metropolitan restaurant entertainment. For example, after a few selections, there is a period of silence. This program gap simulates the intervals in the dining spots when the players leave the bandstand for a smoke and rest. Such gaps are controlled at the *Wired Music* studios, the loudspeaker units being left turned on continuously at subscribers' outlets.

A representative of the firm said that the equipment used in transmission and reception was entirely of its own design.

Out in Cleveland, the *Wired Radio—"Muzak"*—subsidiary of the North American Company, has been functioning experimentally over a long period. It was understood that, after a long test in the Lakewood area, sets—supposedly of Philco manufacture—were being commercially installed and regular program service begun. However, at the New York office of the North American Company, its representative asserted that everything was still in the experimental stage and that the firm, not desirous of publicity at the time of the writer's query could neither confirm nor deny anything.

It is understood, though, that a choice of three simultaneous programs is offered in the Cleveland set-up. The *Wired Radio* service differs from the other "directed" program methods mentioned in this article in the fact that the entertainment is conveyed by radio frequency over power lines. Transcriptions are reported to be used virtually exclusive to live talent. Also, it is said that the special transcriptions made by this firm are now being offered to some standard broadcast stations. The absence of commercial announcements on the Muzak programs in Cleveland is apparently the only chief change from radio program formula.

The "directed" program services, while opening up new fields for experienced radio talent and technicians, has not yet directly duplicated the offerings of the broadcasting world. It is probable that the "directed" sound transmissions will continue as an entirely distinct group, related to radio only in matters of talent and equipment.

The Masterpiece IV

(*Continued from page* 395)

means of the treble and bass tone controls, both of which are highly effective.

Tuning the receiver is extremely simple on all ranges. As an example a check-up showed that tuning through the 25 meter broadcast band caused the "second" hand to move over 42 divisions on the dial. This band is only 290 kilocycles wide which means that the "second" hand moved approximately 1½ dial divisions for each 10 kilocycles. This "second" hand can be accurately logged and any short-wave station will come in again at the same setting. On the 31 meter band the spreading effect is almost identical and on the 49 meter band it increases to approximately 2 divisions per 10 kilocycles. For the 16 and 19 meter bands the spread is exactly 10 kilocycles per division. In the 20 meter ham band the spread is a little better and in the 75 meter ham phone band it is almost 4 divisions for each 10 kilocycles.

To add to the ease of control the "main hand" moves over accurately calibrated frequency scales —so accurate that the receiver can be visually tuned to any of the short-wave or amateur bands —simply depending upon the dial calibration.

The tuning meter is an extremely useful tuning and DX accessory. It is provided with a 20 division scale and deflection noted for a few stations at various distances from New York are as follows: KFI, 2; KOA, 7; WWL, 7; WBAP, 8; WCCO, 9; WHAS, 10; KDKA, 12; WBBM, 13; WLW, 15; WEAF, 15, and WABC, 18. Because of the excellent operation of this meter it serves not only the usual purpose of indicating resonance, but also as a dependable signal-strength meter which can be used to check the relative strength of distant stations.

The 8 control knobs shown on the front panel may give the casual observer the impression that the receiver is complicated to handle but such is really not the case. For ordinary use in the home the single tuning control knob, the volume control knob, and the band switch are the only ones that need be employed.

So much for the general operating observations. Actual operating tests were carried out at the Fairfield, Westchester and Bronx Listening Posts. No special attempt was made to log stations on the broadcast band. However, on one occasion, at ten o'clock in the evening a run through the dial brought in 99 separate stations. These were in the range from 550 to 1500 kc. and included the 96 American channels as well as 3 foreign stations on odd frequencies in-between.

As a further interesting test the receiver was loaned to Broadcast Band Listening Post Observers Buitekant and Mendler to be used by each for an early morning search for foreign stations. As luck would have it, reception conditions were extremely poor these mornings. In fact during Observer Buitekant's test, conditions were so poor as to make even the west coast real DX. As a result he had nothing spectacular to report. The test made by Observer Mendler found conditions somewhat better although still definitely poor (as proven by field strength measurement checks made at the Bronx Listening Post at 1 a.m. that morning). In spite of this condition Observer Mendler was able to tune in and definitely identify 2YA, about 10,000 miles away. In addition he heard signals from 1YA and 5CL. What makes this broadcast-band reception of Australian and New Zealand stations noteworthy is that this is the only receiver with which Observer Mendler has ever been able to tune in Transpacific stations in his location in Brooklyn Borough of New York City.

As for the short-wave tests, a typical log of daytime broadcast reception is given herewith. It was found that such distant stations as those in Russia, Japan, Australia and Africa were consistent visitors. Numerous European and South American stations provided real entertainment value at all hours of the day.

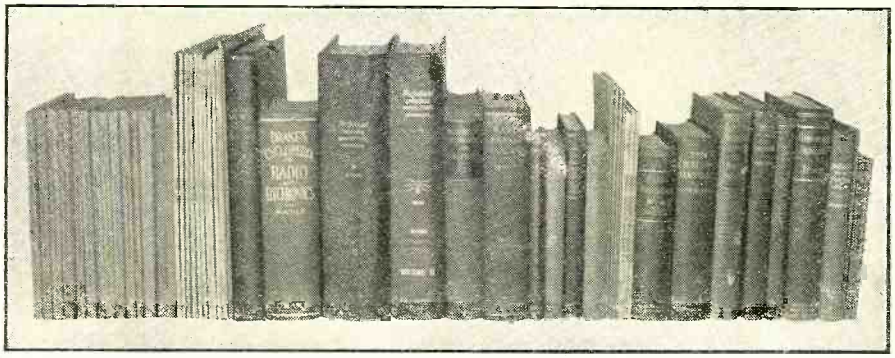
A Typical S.W. Log

17790	GSG	Daventry, England
17780	W3XAL	Bound Brook, N. J.
17775	PHI	Huizen, Holland
17760	GJE	Zeesen, Germany
15280	DJQ	Zeesen, Germany
15270	W2XE	New York, N. Y.
15245	FYA	Pontoise, France
15220	PCJ	Huizen, Holland
15210	W8XK	Pittsburgh, Pa.
15200	DJB	Zeesen, Germany
15140	GSF	Daventry, England
15123	HVJ	Vatican City
12000	RW59	Moscow, U.S.S.R.
11890	FYA	Pontoise, France
11870	W8XK	Pittsburgh, Pa.
11830	W2XE	New York, N. Y.
11810	12RO	Rome, Italy
11770	DJD	Zeesen, Germany
11750	GSD	Daventry, England
11720	FYA	Pontoise, France
11720	CJRX	Winnipeg, Canada
11710	HJ4ABA	Medellin, Col.
10740	JVM	Nazaki, Japan
10660	JVN	Nazaki, Japan
10330	ORK	Ruysselede, Belgium
10135	OPM	Leopoldville, Africa
9860	EAQ	Madrid, Spain
9635	12RO	Rome, Italy
9600	CT1AA	Lisbon, Portugal
9590	W3XAU	Philadelphia, Pa.
9590	VK2ME	Sydney, Australia
9590	HP5J	Panama City, Pana.
9580	VK3LR	Lyndhurst, Victoria
9580	GSC	Daventry, England
9570	W1XK	Springfield, Mass.
9560	DJA	Zeesen, Germany
9540	DJN	Zeesen, Germany
9530	LKJI	Jeloy, Norway
9530	W2XAF	Schenectady, N. Y.
9510	VK3ME	Melbourne, Australia
9510	GSB	Daventry, England
9428	COH	Havana, Cuba
6160	CJRO	Winnipeg, Manitoba
6120	W2XE	New York, N. Y.
6110	VE9HX	Halifax, N. S.
6100	W3XAL	Bound Brook, N. J.
6060	W8XAL	Cincinnati, Ohio
6060	W3XAU	Philadelphia, Pa.
6010	COC	Havana, Cuba

On the amateur phone bands the "Masterpiece IV" proved surprisingly good—in fact far better than most receivers especially designed for this service. This is demonstrated by the following list of 20-meter foreign amateur phones taken from the test log:

FOREIGN (Amateur 20-Meter Phones)

Chile—CE1DK; Cuba—CO2AY, CO2HY, CO2KC, CO2LL, CO2LN, CO2RA, CO2WW, CO2WY, CO2WZ, CO2XA, CO8RQ, CO8YB; France—F8DR; Great Britain—G2CJ, G5DL, G5ML, G5NI, G5YL, G5VM, G5YY, G6DH, G6FS, G6XR; Switzerland—HB9AJ, HB9J; Haiti—HH2W; Dominican Republic—HI7G; Panama—HP1A; Norway—LA1G; Argentina—LU6AP; Belgium—ON4AC, ON4FE; Costa Rica—TI2AV, TI2AZ, TI2FG, TI2RC, TI3AV; Newfoundland—VO1I; Jamaica, W. I.—VP51, VP9O; Mexico—X2AH.



THE TECHNICAL REVIEW

CONDUCTED BY ROBERT HERTZBERG

Making a Living in Radio, by Zeh Bouck, McGraw-Hill Book Co., 1935. What opportunities exist today in the radio field? What is the best way of training and how much will it cost? What are the prospects of finding employment, and how do you go about it? These and similar questions are ably and entertainingly discussed by the author. The book gives an unbiased, honest view of the present conditions in the radio industry, the chances of advancement and the salary to be expected.

The book covers the technical fields—servicing, operating, engineering—as well as the non-technical fields such as writing for broadcasting, broadcasting, salesmanship, etc. Since the beginning of radio, a similar volume has never appeared. Such articles as did appear have usually been written in an over-enthusiastic vein which has caused countless misconceptions and disappointments. Those who contemplate studying for a career in radio as well as those who have already started will find much useful information and advice within the covers of this book.

Review of Articles Appearing in the October, 1935, Issue of the Proceedings of the Institute of Radio Engineers

A Note on the Source of Interstellar Interference, by Karl G. Jansky. Consideration of the data obtained during observation of interstellar interference has shown that these radiations are received any time the antenna system is directed toward some part of the milky way system, the greatest response being obtained when the antenna points toward the center of the system. This leads to the conclusion that the source of these radiations is located in the stars themselves or in the interstellar matter distributed throughout the milky way.

Interfering Responses in Superheterodynes, by Howard K. Morgan. Superheterodyne receivers respond to frequencies other than the one for which the receiver is tuned. Various types of these undesired responses are treated and the methods of reducing them are described in this paper.

The Present State of the Art of Blind Landing of Airplanes Using Ultra-Short Waves in Europe, by E. Kramar. The title of this paper is self-explanatory.

An Analysis of Continuous Record of Field Intensities at Broadcast Frequencies, by K. A. Norton, S. S. Kirby, and G. H. Lester. During the past three years, graphical records of the field intensity of 300 broadcast stations in the United States have been made at the National Bureau of Standards receiving station at Meadows, Md., near Washington, D. C. This paper describes the information and some of the conclusions reached from an analysis of these records.

Negative Resistance and Devices for Obtaining it, by E. W. Herold. Negative resistance is shown to be a phenomenon controlled by either current or voltage, but not by both together. Various methods of producing the effect are described.

Comparative Analysis of Water Cooled Tubes as Class B Audio.

Amplifiers, by I. E. Mourontseff and H. N. Kozanowski. Performance of vacuum tubes used as Class B audio amplifiers are studied in this paper, with particular stress on the influence of the amplification factor on the behaviour of tubes. The methods used for this particular study are also applicable to a variety of similar problems.

An Electro-chemical Representation of a Piezo-electric Crystal Used as a Transducer, by W. P. Mason. The author describes an electro-mechanical representation of a piezo-electric crystal which can represent the crystal when it is used to drive an external mechanical system.

Review of Contemporary Literature

The Status of Television in Europe, Electrical Engineering, Sept., 1935. The result of a survey of the present status of television in England, France and Germany by Andrew W. Cruse of the U. S. Dept. of Commerce. The article tells what progress has been made in these countries and what the plans are for the near future.

Analysis of Rectifier Filter Circuits, by M. B. Stout, Electrical Engineering, Sept., 1935. A mathematical analysis of the wave form to be expected in circuits containing rectifiers of different kinds. Wave forms are found by computation for several typical circuits and verified by oscillograms.

Shielded Transformers for Impedance Bridges. "General Radio Experimenter," October, 1935. The importance and application of shielded transformers in the direct measurement of impedance is expounded in this article, which treats the entire subject in a technical but understandable manner.

A New Receiving System for the Ultra High Frequencies, by Ross A. Hull. QST, November, 1935. Selectivity of any desired order, combined with extreme sensitivity, wide range automatic volume control and noise suppression,—are the features of a new and highly novel ultra high frequency receiver, originated by the headquarters staff of the A.R.R.L. The principles of the superheterodyne, the infradyne and the super-regenerator are all combined.

An Undirectional Microphone, by R. N. Marshall. Bell Laboratories Records, October, 1935. Complete technical description of the new undirectional microphone, which, because of its shape, has become known as the "billiard ball" type. A cross section drawing shows the internal construction of the microphone in great detail.

What Frequency?, by Charles Roof. Radio Engineering, October, 1935. A description of a new and original method of locating the frequency of any receiver below 200 meters.

The Aircraft Radio Compass, Electronics, October, 1935. To the familiar "follow the beam," the air pilot has added "fly the waves," that is, following a radio direction finder trained on any radio broadcast station or beacon signal. Principles, circuits, operating technic, possibilities and limitations and details of commercial instruments are given in this excellent paper.

Technical Booklets Available

1936 Catalog

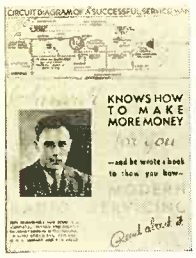
A large 114-page catalog, listing a complete line of radio receivers, service supplies, P.A. equipment, and amateur parts has just been brought out by the Allied Radio Corp. It is well indexed and clearly printed and is a valuable book to every purchaser of radio equipment. To obtain a free copy, write to RADIO NEWS, 461 Eighth Avenue, New York City.

Radio Parts Catalog

Through the courtesy of the Insuline Corp. of America the new 1936 ICA Catalog is available to our readers for the asking. It is a 40-page illustrated book listing their complete assortment of radio parts, amateur equipment, short-wave kits and bakelite stock of tubing, panels, etc. Send requests to RADIO NEWS, 461 Eighth Avenue, New York City.

Circular on Two New Books

A 6-page circular, printed in two colors, describing the contents of a new 1300-page book, "Modern Radio Servicing," and a 240-page supplement book entitled, "Radio Field Service Data," is available to servicemen free of charge, simply by sending in their request to RADIO NEWS, 461 Eighth Avenue, New York City. The books are written by Alfred A. Ghirardi and Bertram M. Freed, both of whom are well-known to readers of this magazine.



196-Page Catalog

The new 1936 catalog of Wholesale Radio Service Co., Inc., contains 196 pages. It is printed in several colors and lists everything in radio from binding posts to a 24-tube all-wave receiver. To obtain a copy free, write to RADIO NEWS, 461 Eighth Ave., New York City.

RADIO NEWS Booklet Offers Repeated

For the benefit of our new readers, we are repeating below a list of valuable technical booklets and manufacturers' catalog offers, which were described in detail in the June, July, August, September, October, November and December, 1935, 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:

J1—Information on the Cornish Wire Company "Noise-Master" Antenna Kit. Free.

J2—Booklet describing the technical features of the Hallicrafters' "Super-Skyrider" short-wave superheterodyne. Free.

J3—New 1935 catalog of the Hammarlund Manufacturing Co. Free.

J5—Booklet on tube testing prepared by Supreme Instruments Corp. Free.

J6—"Practical Mechanics of Radio Service," issued by F. L. Sprayberry. Free.

J7—New 1935 parts catalog of Alden Products Co. Free.

J8—Practical ham antenna design folder and leaflet on a new auto-radio under car antenna system, published by Arthur H. Lynch, Inc. Free.

J9—Information on new radio courses given by the Capitol Radio Engineering Institute. Free.

J10—"Radio Noises and Their Cure." A 75-page book. Price 50 cents.

Jy2—New parts catalog of Birnbach Radio Company. Free.

Jy4—"Increasing the Serviceman's Income," folder issued by Philco Radio & Television Corp. Free.

Jy5—Transformer Bulletin of American Transformer Corp. Free.

A1—Information on new Browning "35" receiver, issued by Tobe Deutschmann Corp. Free.

A3—Data on a multi-testing instrument, published by Supreme Instruments Corp. Free.

A4—Condenser catalog prepared by Cornell-Dubilier Corp. Free.

A5—Instructive and interesting information on condensers published by the Sprague Products Company. Free.

S1—Analyzer booklet, published by Supreme Instruments Corp. Free.

S2—Transformer bulletins, issued by Kenyon Transformer Co. Free.

S3—Bulletin of sound equipment, issued by Sound Systems, Inc. Free.

S4—Amateur equipment catalog of Wholesale Radio Service Co., Inc. Free.

O1—Dial Bulletins, issued by Crowe Name Plate & Mfg. Co. Free.

O2—Carbon Resistor folder, published by Ohio Carbon Co. Free.

O3—Muter Catalog of "Candohm" wire-wound resistors. Free.

O4—Cardwell condenser catalog. Free.

N1—Resistors folders, issued by Erie Resistor Corporation. Free.

N2—Latest resistor catalog of Electrad, Inc. Free.

N3—Folder on resistance bridge, issued by the Muter Company. Free.

N4—Free code charts, offered by Dodge's Institute. Free.

D1—Yaxley Replacement Manual. Free to servicemen and dealers, only.

D2—Latest Sound Equipment Bulletin of Webster Co. Free.

D3—Catalog of Resistors and Condensers, of the Aerovox Co. Free.

D4—Free booklet on servicing instruments, Radio Products Co.

Simplified World-Time Chart

Radio listeners will be interested to hear that Lieut. Charles M. Thomas of the U. S. Coast and Geodetic Survey, recently developed and patented a very fine, compact time-chart of the world, measuring 9 by 12 inches in size.

No figuring or computation is required to use this chart. It does not, like many other systems, give only the time difference between definite points in the world, but actually gives the time for any hour, day or night.

Through a special arrangement with Lieut. Thomas, RADIO NEWS can supply these charts to readers. If you are interested in having a copy, address a request to RADIO NEWS, Department TC, enclosing 25 cents.

Radio Warfare

(*Continued from page* 393)

airplanes may play a large part in the next war. Tests have been made in both Europe and America on this type of equipment and some of the machines are illustrated on these pages.

It is true, however, that these machines and methods for future warfare do have an inherent weakness in operation. They all rely on the use of radio waves and all radio waves are subject to interference so it is entirely possible that methods may be developed which will render many of these schemes inoperable under war conditions. Unless someone develops a non-interferable system it would be possible to erect a radio defense against the radio-controlled machines themselves. This would be something like the barrage of interfering signals that was set up some time ago in central Europe against certain powerful propaganda broadcasting stations that were laying down a barrage of propaganda. But along the lines of some recent work where frequency modulation is used in place of amplitude, a non-interferable system *may* be developed. At any rate, experimenters are still continuing, at a feverish pace, their efforts for perfection of radio remote control and these machines would certainly be tried out under extreme war conditions. The sooner the citizens of the various nations on earth become initiated into the possibilities of radio in warfare, the better they will be able to understand the dangers that lurk in these seemingly harmless and interesting scientific developments.

Radio has been a wonderful force for humanity during the last 20 years, but it could also develop into a terrible engine of destruction in the future unless its path is steered along peaceful and humanitarian channels.

SHORT-WAVE PAGE

WHEN a man leaves the land of his birth and travels to a distant land, there are always some memories that he carries with him. Generally the thing that makes the deepest impression on all of us is the songs our mother sang to us. In every corner of the world there is someone singing a song to some babe and although one may not grasp the meaning of the words, the musical rhythm will have a deep impression on him in after years. Suppose this dearly loved one, when grown to manhood, leaves his home and comes to the United States. Later he tunes in a program on his all-wave receiver originating in the country of his birth and hears the songs he knew so well!

WITH the knowledge that many of their sons and daughters have drifted to other lands, where long or medium waves will not reach, short-wave transmitters have been installed by a number of foreign governments to radiate native programs to these people. England has spent many thousands of pounds and endless research, with the object in view of radiating (through the Daventry short-wave outlets) programs that can be heard by Englishmen living in Canada or darkest Africa. Germany, France, Italy and Spain followed suit, and a native of any of these countries can, providing he has a short-wave receiver, listen to these countries broadcast just as though he were back home.

For a long while, several years in fact, other countries ignored their "wandering children" and they were left "in the cold." But within the last few months, short-wave transmissions are being broadcast from nearly every European country. Realizing that many sons of Japan and China have felt the "call of the wild," both of these countries now have short-wave transmitters. The Chinese short-wave station is really in the infant class and is only heard by the short-wave listener who goes in for DX. ZBW, Hong-Kong, is still on the list of those stations that are difficult to receive and will continued to be so called until they increase their power.

With the Japanese stations it is just the opposite and we will agree that any listener can now go to the dials of his short-wave receiver and tune in JVN, 10.68 mc., or JVM, 10.74 mc., Tokyo, between the hours of 5 to 7 a.m., E.S.T. Special programs intended for overseas listeners were also inaugurated by the Broadcasting Corporation of Nippon. Occasionally specials radiated over JVF do seep across the United States and are heard spasmodically.

Continuing our little discussion of the Asiatic stations, our thoughts recall that this year, better than ever before, the Javanese stations *are* being heard. The commercial telephone stations in the Netherlands East Indies have been very active, not only when heard calling European countries, but transmit on regular schedules musical programs of the highest grade. Regularly at 9 a.m., E.S.T., short-wave listeners tune in PLE, 15.93 mc., and hear the operator calling Holland. Between "shouts" for Kootwijk, which is the name of the city in the Netherlands where the European commercial phone traffic originates, the PLE station would broadcast musical selections.

A regular Sunday visitor that travels 12,000 miles to reach us is PLP, 11 mc. This Bandoeng station only utilizes 3 kilowatts power, but the signals reach the American listener with fine volume from about 5 to 7 a.m., E.S.T., and are remarkably clear of atmospheric disturbances. PLP and PMN, 10.26 mc., are now relaying the NIROM programs.

PMA, 19.34 mc., and PLV, 9.41 mc., are broadcasting a program of native music every Tuesday, Thursday and Saturday from 10 to 10.30 a.m., E.S.T. Other active government-owned stations in Java are: PLK, 14.48 mc.; PMC, 18.13 mc.; PLE, 18.83 mc. They are telephone stations broadcasting occasionally, using directional aerials towards Europe, America, Australia or the Far East.

A station that was always put away in the proverbial "moth balls" and taken out for an airing during the latter part of September was RV15, 4.27 mc., Khabarovsk. This Siberian station was considered a winter catch, but this year they were heard with varying degrees of volume during some of our warmest weather. RV15 is really an Asiatic station. Programs such as are usually broadcast from the stations in the Orient are never heard on the Khabarovsk station. Their programs consist of classical or operatic selections rendered by excellent artists. A lady is in charge of announcements. Tune for RV15 between 4:45 and 6:30 a.m., and often it will bring you success. For several years this station refused to verify reports on their transmissions, but within the last few months any short-wave listener who sent a correct report of RV15's transmis-

The DX Corner (Short Waves)

(*Continued from page* 422)

7:45-10 p.m. (Gallagher, Chambers, Sholin, Evans, Kentzel, Miller, Millen, Betances, Twomey, Dickes, Wilkinson.)

Observer Kemp says they have a special DX program 10 p.m.-1 a.m. E.S.T. Sundays.

TGIX, Guatemala, Guat., 9450 kc., heard Sundays at noon (Schumacher.)

TG2X, Guatemala, Guat., 5940 kc. on the air, Mondays, 9:30-10:30 and Saturday nights, 8-11 p.m. (Gallagher, Wilkinson, Chambers.)

The police department of Guatemala City, Guat., has been reported heard on the air 6030 kc. Mondays 5-9 p.m. with a fine musical program. (Ortiz.)

X2AH, Tijuana, Mexico, 14000 kc., 21.42 meters, 500 watts, reported heard relaying XEMO, 5-8 p.m. E.S.T. (Styles.)

XEAW, Reynosa, Mexico, 10350 kc. reported heard. Is this an harmonic? (Gallagher.)

XICB, Mexico City, Mexico, heard on 7150 kc. daily. (Ortiz.)

XBJQ, Mexico City, Mexico, 11000 kc. deported on the air 5:30-12 p.m. E.S.T. Other listeners have heard them as late as 1:30 a.m. (Chambers, Hynek, Betances, Lone Star, Putnam, Reilly, DeMarco, Elchester Pulver, Twomey, Gavin, Kemp, Fletcher, White, Christoph, Coover, Wedel, Ortiz, Gaiser, Dickes, Olson, World-Wide Dial Club, Staley, deLaet, Partner Evans, Sholin, Butcher, Gallagher.) This station rebroadcasts XEW and announces in English.

XEIO, Mexico City, Mexico, 5970 kc. reported heard. (Johnson.)

XEFT, Vera Cruz, Mexico, 6120 kc. and 9600 kc. heard daily. (Johnson, Rodriguez, Jasiorkowski.)

XEUW, Vera Cruz, Mexico, reported heard on 49.83 meters, 6-8 p.m. daily (Ortiz.)

CO9JQ, Camaguey, Cuba, has changed its frequencies a number of times, from 8470 kc. to 8665 kc. to 8200 kc. and finally to 8170 kc. (Gallagher, Chambers, Johnson, Betances.)

VP5MK, Kingston, Jamaica, 42.74 meters, gives talks on Jamaica, Saturdays at 5 p.m., E.S.T. (N. C. Smith.)

HJ3ABI, Bogota, Colombia, reported heard on 6460 kc. (Libby.)

HJ2ABC, Cucuta, Colombia, is reported now transmitting on 5985 kc.

HJ1ABC, Quidbo, Colombia, 6010 kc., reported transmitting Wednesdays and Sundays, 8-10 p.m. (Johnson.)

HJ4ABJ, Ibaque, Colombia, 6460 kc., reported transmitting daily, 7-10 p.m., E.S.T. (Chambers.)

HJ3ABH, Bogota, Colombia, has two frequencies, 5970 kc. and 6112 kc., 1200 watts, according to L.P.O. Betances. Which one is used and what is the correct schedule?

HJ4ABD, Medellin, Colombia, has moved from 6057 kc. to about 5785 kc., according to L.P.O. Betances. Gallagher also reports this station.

HJ1ABB, Barranquilla, Colombia, is soon to build a new transmitter and will work on the 48-49 meter band. (Gavin.)

LSN3, Buenos Aires, Argentina, 9890 kc., reported on experimental broadcasts Sundays 9-11 p.m., E.S.T. (V. D. S.)

LSN2, Hurlington, Argentina, is reported as transmitting evenings irregularly. (Zarn.)

CEC, Santiago, Chile, 10670 kc., is now operating daily, 7-8 p.m., and on Sundays, Thursdays 8:30-9 p.m., E.S.T. (Alvarez, Dickson.)

ZP10, Asuncion, Paraguay, reported heard on 7.9 megacycles, 8-10 p.m., E.S.T. (deLaet.)

Listen for the "Earbenders," an association of amateurs meeting weekly on the air on the 20-meter band (all stations on approximately 14200 kc. or thereabouts). If you can pick them up you will hear their round-table, and as they are usually up to a number of pranks, our listeners will have a lot of fun tuning in as eavesdroppers or "earmuffs," as the "earbenders," call them. Here is one transmission that is open to all and anyone can get in on the fun. The "Earbenders" are located mostly in Westchester County and are on the air Sunday nights 9:30-11 p.m., E.S.T. Reports and comments are invited by the participating amateur transmitters.

W9X7 reported seen and heard at Ainsworth, Nebraska, with R9 signal, Nov. 11, 1935, by C. W. Bourne.

Capt. Hall's Page

(*Continued from previous page*)

sions to the Moscow Radio Centre was rewarded with a verification.

We are expecting fine reception reports this coming season, mainly due to the fact that the short-wave and all-wave radios, with few exceptions, have reached a point where experimentation seems almost unnecessary. In our opinion, twelve tubes, or valves as our British cousins call them, are sufficient for the average radio listener. Some receivers that give perfect satisfaction use only eight or ten tubes and seemingly the modern purchaser of a new radio is "sold" on the idea that they (the tubes—not the buyer) must be metal tubes.

We know that when we even mention metal tubes there is certain to be an argument started—pro and con! Just let us look at this revolutionary step forward in short waves *not* from the manufacturer's standpoint, but from the buyer's. The former always wants to attract the eye of the customer, but the latter only wants assurance that what he purchases will perform! And without doubt the metal tubes certainly do do that!

Having tried out several of the new receivers that are equipped with metal tubes throughout, we feel that we can honestly say that these radios were the quietest and most sensitive of any receivers that have been placed before the listening public.

Reports for the Columbus Day Party

Quite a number of reports have been received about the transmissions on the 20-meter band for last Columbus Day. This was the Exploration Party sponsored by RADIO NEWS. These reports will be verified by cards just as soon as they have been sent for identification to all of the stations taking part in the transmission. We are still waiting to hear from our farthest L.P.O.'s in Australia and Asia and a consolidated report of the transmission will be published as soon as returns are complete. If you have heard this transmission and have failed to report, kindly do

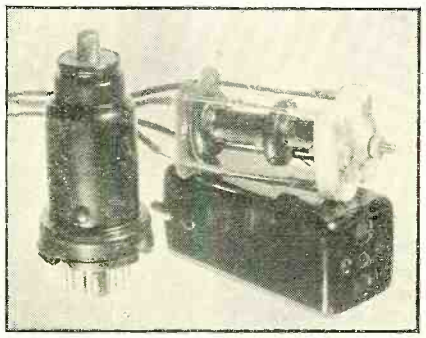
(*Turn to page* 441)

WHAT'S NEW IN RADIO?

By WM. C. DORF

Iron Core I.F. Transformer

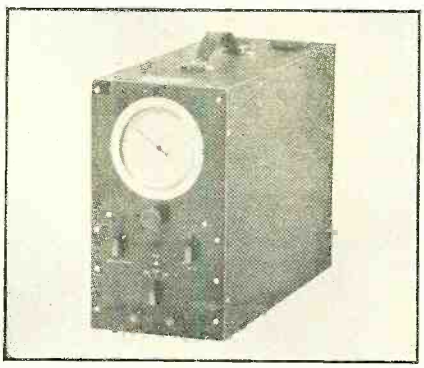
The Aladdin Radio Industries are now producing i.f. transformers wound on Polyiron cores. The principal advantages are concentration of the magnetic field,



permitting smaller size transformers, and increased ratio of inductance to resistance by virtue of less copper being required for a given inductance.

A. C. Operated B. F. Audio-Oscillator

A portable beat-frequency audio-oscillator produced by the United Sound Engineering Company to combine the features of laboratory quality and low cost. The unit has a calibrated frequency range from



10 to 20,000 cycles. The dial is 4½ inches in diameter and the total scale length of the frequency control is 9 inches at 270 degree pointer rotation. The tubes are three 76's, one 42, one 6C6 and one type 84.

Special Condensers

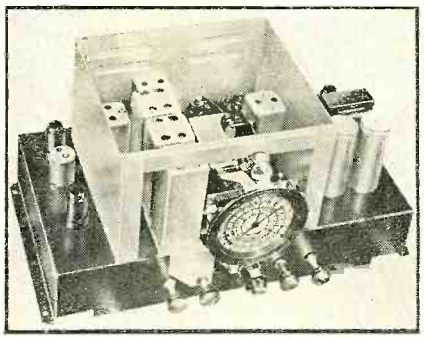
The Electronic Laboratories, oil impregnated, moisture proof buffer condensers are specially designed for use in auto-radio power supplies. They are sturdily constructed to withstand the hard use they are subjected to in radio equipment of this type. They are available in capacities of .01 and .02 mfd. The a.c. voltage rating is 800 and their flash test 3,600 volts.

Counter Tube Checker

The Dayrad model 25 tube tester is so designed that a novice can operate it easily and quickly. It tests all tubes including the new metal and octal glass types. The instrument uses a special handy index system and a feature of the device is the full-vision 4-inch square type meter with English reading scale.

A 24-Tube Superhet

The Lafayette 24-tube, 5-band superheterodyne receiver covers a wave-length range from 8 to 2,050 meters. The outstanding features of the set include: cathode-ray tuning, variable band-width selectivity and a dual high-fidelity speaker system. It comprises two units; an r.f. chassis shown in the photograph which employs 13 metal type tubes, and a separate audio amplifier-speaker unit using 11



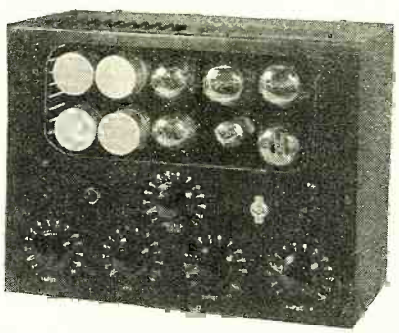
glass type tubes. The output stage, which uses 8 type 45 tubes in Class AB, is designed to deliver audio power up to 50 watts.

New Antenna Kit

The Corwico "Noise-Master" all-wave antenna kit made by the Cornish Wire Company and introduced to our readers in these columns several months ago, now has an electrical automatic switching arrangement from short to long waves and after the new antenna is installed no manual operation is necessary.

Attention! Sound Engineers

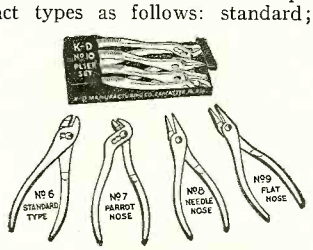
Illustrated directly below is the new Webster 4-position 15-watt amplifier, designed to handle 4 crystal velocity type microphones or 3 crystal mikes or 1



phonograph input connection. It is a high-gain job and no preamplifier is required.

Pliers to Meet All Jobs

This set of four-4½ inch pliers should be helpful in radio servicing and radio experimental work. The set comprises 4 distinct types as follows: standard; par-



rot nose; needle nose and flat nose pliers. They are produced by the K-D Manufacturing Company.

Affiliated Short-Wave Club News

National Radio Club

The National Radio Club in their DX news state there will be a DX program November 17th, 4:30-6:30 a.m., E.S.T., dedicated to all the clubs in the Interclub Cooperative Plan (of which RADIO NEWS is a member). The broadcast will take place over WGAR.

Newark News Radio Club

The official bulletin of the Newark News Radio Club contains the following announcement credited to Walter F. Fohnson of Chisholm, Minnesota: XEFT, the short-wave station on 6120 kc., transmits a 1-hour program beginning at 11:30 p.m., E.S.T., November 20th. This program is dedicated to RADIO NEWS. We are sorry that it did not arrive in time for publication in the previous issue. It is requested that all reports be sent to the station.

New Zealand DX Radio Association

The New Zealand DX Radio Association (through Eric W. Watson as publicity organizer in Christchurch, New Zealand) applies for association with our register of DX Clubs in the DX Corner. (The Association will be registered next month.—*Editor.*) The Association is an active and progressive body of amateur all-wave DX'ers banded together for the furtherance of this king of hobbies. The organization is run by DX'ers for DX'ers. The dues are nominal, including membership, enamel badge and a certificate of membership. Its official organ is "Tune In," published monthly. Applications for membership should be sent to the Secretary, 88 McFaddens Road, Christchurch, N. I., N. Z., or in care of RADIO NEWS and they will be forwarded.

U. S. Radio DX Club

The United States Radio DX Club extends greetings to the following new members: Eric Butcher, Wyoming; Albert Pickering, Massachusetts; George Wetmore, Connecticut; A. D. Ellis, Massachusetts. The whole membership joins in welcoming these new members into the fold. Other DX'ers who would like to join the club are invited to send in their applications to us, care of RADIO NEWS.

World Wide Dial Club

The general program committee of the World Wide Dial Club announce they will hold their meetings at 8 p.m. sharp, with discussions of reception and a short technical class conducted by a government engineer. "We have special set demonstrations and interesting speakers as well as talking motion pictures. We would like to have all the fans living in Chicago to know about us. Our dues are nominal and we issue a membership card and certificate. We have stationery for members' use and the meetings are held on the first and third Tuesday every month at the Hotel Morrison." Prospective members should apply to RADIO NEWS and their applications will be forwarded.

New Zealand DX Radio Association

DX'ers in New Zealand who would like to join the Association and can do so by writing to the Association in care of RADIO NEWS and the applications will be forwarded. The organization publishes a monthly organ "Tune In." The following new members are welcomed to our membership: D. A. Rosie, Wellington; D. C. Dopson, Edetahuna; J. Moore, Christchurch; S. G. White, Christchurch; G. V. Auger, Auckland; A. F. Roswell, Rangiora; L. G. Mills, Auckland; Miss E. Lumsden, Hastings; E. Lumsden, Hastings; E. A. K. Lee, Hawera; W. F. Cooke, Dunedin; J. S. Bohm, Sweden; R. Thomas, Invercargill; J. H. Parkinson, Opotiki; R. G. Bell, Christchurch; G. P. Hawkins, New Plymouth; D. A. Cameron, South Australia; E. J. Petchell, Raglan; G. Smith, Helensville.

Society of Wireless Pioneers (International)

Alice R. Bourke, W9DXX, our only YL member to date, has recently placed an exceedingly FB radiophone rig in operation with fine results on 20 meters. Here's a chance for members outside of the United States to establish regular schedules with the States by arranging permanent contacts on 20 meters. Her QRA is Mrs. Alice R. Bourke, 2560 East 72nd Place, Chicago, Illinois. Surely there are other members of the fair sex (and otherwise) who are anxious and eligible to become members of the orianization. If the bug bit you before 1924 and your experiments are below 200 meters you are eligible. Address inquiries to the Vice-President, 1907 10th Avenue, South, Minneapolis, Minnesota, U. S. A. or write to us care of RADIO NEWS. Oliver Amlie of Philadelphia, rabid DX'er and designer of the Amlie DXer 3-tube receiver tells us that his brainchild will be available to the public through a New York distributor shortly. British and European members please send their news items to Henry B. Shields, 35 Bluestone Road, Noston, Manchester 10, England.

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

J. Rodriguez L., Boris Scheierman, S. G. DeMarco, F. T. Reilly, Morgan Foshay, Jerry M. Hynek, Fred M. Craft, Louis Horwath Jr., Edward DeLaet, J. W. Partner, Manuel Ortiz G., Orval Dickes, Arthur Evans, George Sholin, G. C. Gallagher, Walter L. Chambers, C. McCormick, L. C. Styles, J. E. Gibson, Frank Grey, Edward Schmiechel, Charles Tresize, Robert Irwin, Earl Zerfass, Frank Ansalone, Russell Bean, Howard Olson, A. E. MacLean, Chas. O. Francis, Sydney G. Millen, Manuel E. Betances, Walter F. Johnson, Robert Gaiser, Angel de Angel Jr., George H. Fletcher, Arthur B. Coover, H. Arthur Matthews, Stan Elcheshen, Roy L. Christoph, J. R. Scott, Harold C. Nolan, Enrico Scala Jr., Hank G. Wedel, Robert H. Pulver, G. W. Twomey, D. R. Wallis, M. L. Gavin, Lewis F. Miller, Vincent M. Wood, H. Kemp, Caleb Wilkinson, A. B. Baadsgaard, Arthur Meinhardt, Sam J. Emerson, Edgar J. Vassallo, C. E. Cheatum, F. S. Carville, James B. Robbins, Theodor B. Stark, Bill Bundlie, M. Keith Libby, R. C. White, Arthur Campbell, Paul B. Silver, Harry E. Kentzel, W. W. Gaunt Jr., Jack Bews, Darrell Barnes, Frank Nosworthy, Joseph Trzuskowski, Lone Star DX'er, Oliver Amlie, U. L. Jacobs, A. Belanger, Ralph Justo Prats, G. L. Harris, Eddie C. Aarn, Herman M. Valentine, J. P. Scott, Howard Adams Jr., Gerald W. Peyer, Werner Howald, Douglas S. Catchim, James E. Moore, Jr., Thomas P. Jordan, V.D.S., Wm. Schumacher, Jack Staley, Leo Herz, Bob Brundle, Floyd Nicholson Jr., B. L. Cummins, Clyde A. Ritter, Alex N. Chalmers, John R. Scott, Roy Bretz, Wesley W. Loudon, N. C. Smith, Charles Miller, J. H. A. Hardeman, J. Nemeth, Francis L. Guertin, Hagop Kouyoumdjian, Alfred Quaglino, Eric Butcher, Thaddeus Grabek, Herbert Lennartz, J. Edwin Wilson, Steve F. Litwin, Goodwin G. Peterson, Ben Lewis, Aram Iskanian, Flavio Mascarenhas, Ray N. Putnam, W. C. Boyce, R. Allen, J. C. Meillon, Docteur L. Bailleul, W. C. Neil, A. H. Dalal, Harold F. Lower, S. L. Hudson, Joseph F. Simon, Don Campbell, Francisco Fossa Anderson, John McClindon, Aluizio Rocha, M. Mickelson, Howard A. Allson, Edgar J. Anzola.

QRD? QRD? QRD?

CONDUCTED BY GY

WELL, the boys have been getting quite a bit of publicity in the various large city dailies ever since they started in with a vengeance to cut down the giant Goliath to the point where he would listen to reason and grant the sundry requests of the lowly radio op., viz.; better wage scales, eight-hour day aboard ships, union recognition and elimination of the stretchout system. Although it has been tough going due to the practice of placing substitute ops aboard striking vessels, a few of the smaller shipping companies did sign on the dotted line. The ARTA is arranging with the Mackay Radio Corporation to discuss the policy of that concern in supplying substitute radio ops to replace strikers. The strikers have an agreement with the RMCA whereby the latter has promised not to assign ops to ships on which strikes have been called. They will seek a similar agreement with Mackay.

The photo in our heading this month shows the radio operator in his "quarters" on the new China Clipper-ship planes. Some close quarters, what?

ARTA has announced that about 300 company ops of the Mackay System walked out and claimed that this action tied up the Oriental circuits, which was denied by official of that company. This official also charged that strikers tampered with instruments before walking out, but said the trouble was remedied quickly. Reminds us of the broadcast station strike where it was reported one of the engineers put a piece of cut flat glass in place of the piezo crystal. But boys will be boys and you can't take away pranks from the best of us, what?

Looks like shipping might pick up shortly. What with the war actually proceeding and cotton shipping! And then there is the possibilities of a good job with the Ethiopians, acting as instructors, aviation ops, or just plain water boys to the thirsty actors in this great drama. Coming down to earth, we find that inexperienced men will have to wait at least until the ink gets dry on their licenses. The author of this blurb listened to the 600-meter band when the air was supposed to be silent after an SOS—seems like the boys on those one-man ships rise and shine at 7:20, eat breakfast at 7:30, and about 8:00 a.m. make a rush for the radio shack, throw in the juice, press the key and call the nearest coastal station, and then don the headphone and listen. They should *listen first!* In fact, we suggest a law making an operator listen for at least 15 minutes before transmitting when first opening the station or when coming on watch after being off for several hours. Now there is a law for you, what?

In every SOS there is always a self-appointed ship that tells the boys "QRT distress!" When the Dixie was on the Florida coral reef the Mexican station at Merida still worked and kinda jammed things for awhile. No one knows who put her wise to herself. And here is another law that could be put down in the books: Letting the coast stations clear paid traffic on 700 meters from stations at least 2500 or 300 miles from the ship. It seems unfair to keep the air clear for 12 or 15 hours when there is no immediate danger to the distressed vessel.

Some of you intercoastal boys can write the U. S. Weather Bureau (or have your skipper do so) and ask them to have the navy station at NPG send out weather forecasts for the west coast of Mexico and the Gulf of Tehuantepec. If Uncle Sammy can send out weather reports for Japan, or Europe, he ought to take care of the west coast ships. As it is the boys QST their own weather every noontime, which is good for a couple of hundred miles but not so hot. As for the local weather forecasts which are put out by the Mexican stations, they are worse than guesses (we hope this doesn't start international complications). A government man said that if the S.S. companies would give an operator more consideration and make his life on board ship a happy one, more ops would stay on one ship a longer period of time and would also take better care of the apparatus. A visit to one ship shows the equipment in perfect condition and on another ship the same outfit is rusting away. Inquiry proved that the op on the first ship has remained on for two years and the op on the second vessel has been on only a few months and there had been a big turnover of men. So there!

There has been a lot of talk that if planes carry an operator it will take away that much pay load. Here is the dope sent in by one of the B. H. (bloodhounds to you). One big line found that it could junk modulating and power equipment which was heavy and substitute 2-tube receivers and c.w. transmitters. The weight saved was almost equal to the weight of an op, so that at the most only 10 to 20

pounds pay load was lost. And on the 12- or 14-passengers ships it would be easy to find space for an operator. They found space for a stewardess, which is considered a luxury, but not always for radio ops. . . . Apropos of nothing, we find that the stewardesses often make more money than ops. . . .

Recently the FCC issued its report on the crash of the TWA liner which caused the death of Senator Cutting and others. The report blamed the ops at Los Angeles and Albuquerque for the radio equipment failure. Let's take a look at it. The ops at Albuquerque were busy "gassing" the plane. (The TWA makes an operator do this plus mechanical work and the general cleaning up.) The op usually has to drop his radio watch and service the plane with gas, etc. Where is the time to repair the equipment? The FCC has done its duty in placing the blame, and now it is the duty of someone or other to find the actual underlying reason for this crack-up and similar ones which may gradually undermine the general public's confidence in aviation travel. Whether business is good or bad, companies cannot underestimate the value of a full crew and *no doubling-up jobs!*

Tut, tut! Can you imagine that? RCA again pulls a fast one and this is a wow! With photograph agencies in London and New York demanding all possible speed, the operating room in N. Y. C. decided to try splitting the radio signals from Frisco carrying news photos. This was accomplished by routing the signals to two separate amplifiers, one operating a recorder here and the other actuating a radio transmitter at Rocky Point, in service with London. The results were entirely satisfactory, London receiving the photo at the same instant that it was also produced in N. Y. C. by the same set of signals. Engineers pointed out that, aside from the saving of time, a better picture was received at London because of the elimination of double screening.

Musing. . . . Who knows where VY, formerly TRT running out of N. O. in '27, is now? HV, of KLH in same year, wants to know. Just a radio friendship. After a few years try going back to sea. Things sure do change. There is less desire to QST now than formerly. There is now a greater respect shown the operator aboard ship and S.S. owners regard the ARTA as worthy of respect and confidence. Wonder why advances in commercial receivers haven't kept pace with the advance in XMTRS. The government has had a lot of 4-tube sets, with one stage of tuned r.f. that cover a range from 200 to 6000 meters, made up at a fair price and the extra one step r.f. helps quite a bit. The bone yards at Baton Rouge, Norfolk, New Orleans and on the west coast are showing signs of men chipping rust and splashing paint. Financial circles show an increased interest in shipping. Kind of reminds us of the period just before the "Big Scrap" of '17. Well, a job's a job, eh? So with that for a nightcap and a 73 . . . ge . . . GY.

The DX Corner (Short Waves)

(*Continued from page* 437)

Club Programs from Station YV2RC

The following club programs dedicated to Radio Clubs and RADIO NEWS readers will be broadcast from station YV2RC, 5800 kc., 51.7 meters at these dates:

December 3, 1935 to the Trindad Radio

(*Turn to page* 447)

The "Ham" Shack

(*Continued from page* 399)

stages of i.f. with 16 tuned circuits of the band-pass type; automatic volume control; two pre-selector stages; crystal filter; low-C tuning condenser with six sections. Tubes: 6D6, first detector; two 6D6s used in parallel in r.f. amplifier stage; 6C6 high-frequency oscillator; 6D6, first, second and third i.f. stages; 6C6 oscillator; 76, i.f. vacuum-tube voltmeter; 6F7 second detector and beat oscillator; 6C6 in AVC stage; 6A6 first audio push-pull phase inverter and two 76's as drivers for a pair of 6A3s in final audio stage and 5Z3 rectifier. Dial: 360 degree band spread dial. Band changing: Accomplished by means of switch on front panel, each having a separate coil for antenna, r.f. oscillator and detector stages. Power supply: built-in with a total capacity of 56 mfds. Speaker: External 12-inch dynamic speaker supplied with receiver as standard equipment. Controls: 'phone jack, manual volume control; "communication" switch, volume control and A.C. switch; tone control; station selector with two speed, wave band switch; beat oscillator switch, crystal phasing control, "quiet-between-station" switch, crystal series-parallel switch. Carrier strength meter: Illuminated unit calibrated in Rs.

Hallicrafter Amateur Communication Receiver

The Amateur Communication receiver is a 7-tube superheterodyne manufactured by the Hallicrafters, of Chicago. While it is designed for all-wave coverage, it is essentially a communication receiver, as its name implies. This model receiver is completely contained in the one cabinet which includes loudspeaker and power supply. It has a frequency range of from 540 kilocycles to 18,000 kilocycles which is covered in three bands by means of band switching. Separate coils are used for each band.

Frequency ranges covered are: 1700 to 540 kilocycles which is covered by setting the selector switch to band 3; 4,300 to 1,650 kilocycles on band 2 and 18,000 to 5,500 kilocycles on band 1. Tubes employed include a 78 as a radio frequency preselector stage; a 6A7 as a first detector and mixer; 78 as an i.f. amplifier; a 75 as a second detector, AVC and audio amplifier; a 42 as power output tube; a 78 as an electron-coupled beat-oscillator and an 80 as rectifier in the power supply. Band spreading is accomplished by means of a vernier dial the face of which is calibrated in megacycles. All controls are mounted conveniently on the front panel and identified by their individual markers. A description of these controls is in reality a description of the features contained in the set. The controls are in addition to the band-changing switch and tuning control: a stand-by switch which makes the set inoperative when transmitting by cutting out the plate voltage on the plates of the r.f. and i.f. amplifier tubes; power switch and tone control (combined) which may be used to reduce atmospheric interference by reducing the audio range of the receiver (it consists of a tapered variable resistor connected from the grid of the power tube to ground with a fixed condenser connected from the variable arm); volume control which is connected in the audio output circuit; sensitivity control which is connected in the r.f. and i.f. stages; beat frequency oscillator switch for turning on and off the oscillator; pitch control for adjusting the frequency of the beat oscillator; headphone jack and automatic volume control switch.

Tobe Amateur Communication Kit

The Tobe Amateur Communication receiver is, of course, a kit built around a foundation unit manufactured by the Tobe Deutschmann Corporation and designed by Glenn H. Browning, of Browning-Drake fame. The receiver is an amateur unit with a large degree of band spread for covering the four principal amateur bands. The kit is available, with all necessary equipment, which may be purchased at one time. The task of wiring is simplified by the fact the tuner, which contains all coils, condensers and band adjustments is completely assembled and wired and requires only the connection of seven wires. This also saves work in adjusting and aligning.

Circuit: Seven tube super-heterodyne with 456 kc. intermediate. One feature of the circuit is a triple tuned i.f. transformer which adds to the selectivity of the receiver. Tubes: 6D6 radio frequency amplifier; 6A7 pentagrid converter; 6D6 i.f. amplifier; 75 diode detector, AVC and audio amplifier, 42 output audio stage; 76 beat frequency amplifier and 80 rectifier. Frequency range: Complete band spread on 20, 40, 80 and 160 meter bands. Dial: Illuminated dial with 'phone and C.W. bands indicated and controlled by a vernier control marked in degrees which tunes at a rate of between 2 and 3.5 kilocycles per degree according to band. Band changing: By switch on front of receiver which changes coils in all circuits. Power supply: Built in as part of the receiver. Speaker: External. Either dynamic or magnetic types may be employed. Controls: I. F. gain control; AVC "on-off" switch; beat frequency oscillator switch; stand-by switch, 'phone jack; audio volume control. A special model of this receiver is now available using air trimmers and padders on all critical circuits.

It is impossible to include in this issue all of the receivers designed specifically for the amateur and communication purposes. However, space permitting, descriptions of the Hammarlund communication receiver, the Breting, RME-9D, Sargent Model 10, Ross, and Wholesale radio kit receiver will be included in the "Ham Shack" next month.

RADIO NEWS Sponsors New Opportunity for Code Practice at Home

RADIO NEWS takes pleasure in publishing the following schedule of code transmissions in the United States especially for those who wish to learn the code over the air. All one has to do is to tune in to the proper frequency as specified at the proper time and day and start copying the special code transmissions for practice. A daily schedule is given for the present month (beginning December 1st and ending January 1st. In the first column is the time (a.m. or p.m.; in the second column are the symbols, E, C, M and P (where E is used for E.S.T., C for C.S.T., M for M.S.T. and P for P.S.T.). In the third column are the call letters of the transmitters of amateur members of the Guild and the fourth column contains the frequencies of transmission in all cases, except where otherwise noted. Each CSCG transmitting station will begin his program at stated time by sending "CSG" 6 times, followed by his station call repeated 3 times, slowly. At intervals of 5 minutes, he will repeat "CSG" 6 times and his call letters 3 times. All who listen to CSCG programs are requested to write a card to the transmitting station telling him how his signals come in and, if possible, sending him copies of transmissions.

MONDAY

8:30	A.	E.	W1AMH 56,100-3536½
9:00	A.	ED.	W2HZJ 3577
10:00	A.	E.	W3AEJ 3785
4:00	P.	E.	N1FNM 3510
5:00	P.	P.	W7WE 3637-7274
6:00	P.	E.	W8MHE 3830
6:00	P.	E.	W8EEZ 3598
6:30	P.	C.	W9LKK 3757
6:30	P.	E.	N1DUZ 3638
6:30	P.	E.	W2HCP 3785
7:00	P.	C.	W9SFT 3585
7:00	P.	E.	W8NUO 7250
8:00	P.	E.	W8MCP 3580

TUESDAY

8:15	A.	E.	VE3UU 3865
9:00	A.	ED.	W2HZJ 3577
4:00	P.	E.	N1FNM 3510
6:00	P.	E.	W8MHE 3830
6:00	P.	E.	W8EEZ 3598
6:30	P.	C.	W9LKK 3757
6:30	P.	C.	W9RPD 3514.5
7:00	P.	M.	W9HHW 7276
7:00	P.	M.	W6IQY 14380
7:00	P.	E.	W8NUO 7250
7:30	P.	C.	W8HKT 3750
8:00	P.	C.	W5CPV 7149
8:00	P.	E.	W8MCP 3580
8:00	P.	M.	W7DBP 3607
8:15	P.	M.	W7DWI 3620

WEDNESDAY

6:00	A.	C.	W5DDC 7200
9:00	A.	E.	W2HZJ 3577
10:00	A.	E.	W3AEJ 3785
4:00	P.	E.	N1FNM 3510
5:00	P.	P.	W7WE 3637-7274
6:00	P.	E.	W6MHE 3830
6:00	P.	E.	W8EEZ 3598
6:30	P.	C.	W9LKK 3757
6:30	P.	C.	W9RPD 3514.5
6:30	P.	E.	W2HCP 3785
7:00	P.	E.	W3AEJ 3785
7:00	P.	C.	W9SFT 3585
7:00	P.	M.	W9HHW 7276
7:00	P.	E.	W8NUO 7250
8:00	P.	M.	W7DBP 3722

THURSDAY

8:15	A.	E.	VE3UU 3865
9:00	A.	E.	W2HZJ 3577
6:00	P.	E.	W8MHE 3830
6:00	P.	E.	W8EEZ 3598
6:30	P.	C.	W9LKK 3757
6:30	P.	C.	W9RPD 3514.5
7:00	P.	M.	W6IQY 14380
8:00	P.	M.	W7DBP 3607
8:15	P.	M.	W7DW1 3620

FRIDAY

10:00	A.	E.	W3AEJ 3785
9:00	A.	ED.	W2HZJ 3577
5:00	P.	P.	W7WE 3637-7274
6:00	P.	E.	W8MHE 3830
6:00	P.	E.	W8EEZ 3598
6:30	P.	E.	N1DUZ 3638
6:30	P.	C.	W9LKK 3757
6:30	P.	E.	W2HCP 3785
7:00	P.	E.	W8NUO 7250
9:30	P.	E.	W4BHR 3867

SATURDAY

6:30	P.	C.	W5BXA 3610
8:15	A.	E.	VE3UU 3865
8:30	A.	E.	W1AMH 56,100-3536½
9:00	A.	ED.	W2HZJ 3577
6:00	P.	E.	W8MHE 3830
7:00	P.	E.	W8NUO 7250
11:50	P.	P.	W7WE 3637-7274

SUNDAY

6:30	P.	C.	W5BXA 3610
8:15	A.	E.	VE3UU 3865
9:00	A.	ED.	W2HZJ 3577
10:30	A.	E.	W3EEY 3628
10:30	A.	C.	W5DDC 7200
11:00	A.	E.	W8KGM 3807
1:00	P.	P.	W7WE 3637-7274
6:00	P.	E.	W8MHE 3830
6:30	P.	C.	W9RPD 3514.5
7:00	P.	C.	W9LUS 3631
7:00	P.	E.	W8NUO 7250
8:00	P.	M.	W7DBP 3722

Active Members Candler System Code Guild

W1AMH—Harold J. Morse, 48 Hebron St., Hartford, Conn.
N1DUZ—J. E. Vermeiren, 137 Middlesex St., Springfield, Mass.
N1FNM—G. W. Wabrek, New Hartford, Conn.
W2HCP—A. P. Boser, 82 Dove St., Albany, New York.
W2HZJ—Walter G. Germann, 905 E. 169th St., New York, N. Y.
W3EEY—Dr. H. A. D. Baer, BAER HOSPITAL, Allentown, Penna.
W3AEJ—Geo. W. Knowles, 82 Elgin Avenue, Westmont, N. J.
VE3UU—Gordon Murray, 53 Elm Grove Ave., Toronto, Ont., Canada.
W4BHR—James D. Randolph, Warren Plains, N. C.
W5BXA—H. Trosper, Box 225, Whittenburg, Texas.
W5DDC—Herbert Leo, 1420 Hawthorne St., Houston, Texas.
W5CPV—Grady L. Hardin, 132 Oak St., Hot Springs, Ark.
W6IQY—E. L. Troutman, Box 85, Flagstaff, Ariz.
W7WE—Loren C. Maybee, 3516 Hudson St., Seattle, Washington.
W7DBP—F. W. Stuart, R. F. D. 2—Boise, Idaho.
W7DWI—R. J. Gunning, Wendell, Idaho.
W8HKT—F. T. McAllister, 807 Michigan Ave., St. Joseph, Mich.
W8MCP—Chas. Hedrich, 30 DeKalb St., Tonawanda, N. Y.
W8MHE—Charles L. Gibson, 9 Sycamore St., Natrona, Pa.
W8EEZ—Tauno M. Alanen, 512 New Street, Fairport Harbor, Ohio.
W8KGM—E. J. Goodison, 300 E. Edward St., Endicott, N. Y.
W8NUO—J. A. Ditmyer, 2541 Kress St., Toledo, Ohio.
W9HHW—Denzel Begley, Box 46, Ft. Meade, S. Dak.
W9RPD—R. J. Lawrence, Fort Lincoln, N. Dak.
W9SFT—Gerald Broughton, CCC Co. 735, Scammon, Kansas.
W9LKK—Sidney Schulz, 3132—4th St. S. E. Minneapolis, Minn.
W9LUS—Clarence Read, 3401 Parnell Ave., Chicago.

Calls Heard

By Theodor B. Stark, Berlin, Germany on 75 meter 'phone: W3MD, W1AF, VE2HK, HI7G, W5AOP, W3EOZ.

By Sam J. Emerson, 1097 Galewood Drive, N.E., Cleveland, Ohio, on 75 meter 'phone: VE9CNE.

On 20 meter 'phone: CE1BC, CO2HY, CO2JM, CO2LL, CO2RA, CO2SE, CO2SV, CO2WW, CO2WZ, CO2XS, CO5RY, CO7HF, CO8RQ, CO8YB, CO8YD, EA4AO, F8DR, G5NI, G5ML, G5VL, G6XR, HC1FG, HH2W, HH5PA, HI7G, HP1A, K4SA, K6CMC, K6DDN, LU6AP, LU8AB, LU9PA, ON4AC, PY1CK, PY2BA, TG1O, TI2AV, TI2RC, TI3AV, TI3FG, VE1CR, VE2CA, VE2FI, VE2HK, VE3GS, VE4BF, VE4FI, VE4HW, VE4LA, VE4NI, VE5AA, VE5AM, VE5AN, VE5CR, VE5DK, VE5EH, VE5IK, VO1I, VP2KM, VP5AC, VP5AK, VP6CS, VP6YB, VP9R, W6AVU, W6BWE, W6CAH, W6CNE, W6CQG, W6DDA, W6EBJ, W6EFC, W6ERT, W6FDM, W6FJ, W6FQY, W6GRI, W6HXP, W6IRX, W6IVB, W6LAT, W7AOF, W7ARK, W7BCE, W7BJS, W7CGR, W7FP, W7IF,

W7MD, X1AI, X1CZ, X1G, X1Q, X2AH.

By Edward Pohlig, 40 Columbia Street, Farmingdale, N. Y., on 20 meter 'phone: EA4AO, CT1BY, G5ML, VP6TR, VP5PA, VP5IS, CO1I, CO2WZ, CO2WW, CO2HY, CO2SB, CO2RA, CO2SE, CO6OM, CO7HF, HI7G, K4SA, HC1FG, LU6AP, LU8BR, HP1A, X2AH, X1W, X1G, VE1CR, VE2DX, VE3OX, VE4NI, VE4GQ, VE5HN, VO1I, G5NI, G6XR, VE1EA, CO2LL, VE1GH, VE1CI, TI3AD, VE4GC, VE2CQ, X1AI, VE3WN, TI3AV, YN1OP, HH5PA, PAO1DW, G5YY, TI2RC, PY2AK, CO8YB, TI2AV, ON4AC, PY2BN, PY2BA, VP6YB.

By Lionel E. Gleason, Private, U. S. Army, Plattsburg Barracks, N. Y., on 20 meter 'phone: CO(M)8YB, CO2KY, CO2LL, CO2SV, CO2XF, CO6OM, G5NI. HH2W, HH5PA, HI7G, HP1A, K4DDH, K4SA, TI2AV, TI2EA, TI2RC, LU6AP, LU6PA, VO1I, VP9R and X1G.

The BRL-8

(*Continued from page* 401)

of adjustment of speaker output without disturbing either the signal-to-noise ratio, image rejection or degree of selectivity previously obtained by proper adjustment of the other two gain controls. A switch mounted on the audio gain control cuts "off" the B voltage.

The beat-frequency oscillator stage is quite ordinary in design and is coupled capacitatively to the diodes of the 2nd detector. The degree of coupling used affects considerably the ratio obtained between the loud and weak sides of beat during the single-signal reception of c.w. signals. The particular combination of by-pass condensers and resistors used in this stage should be carefully followed if the b.f.o. harmonics in the high-frequency bands are to be completely eliminated.

The layout of the 2nd detector circuit, both diode and audio triode sections, and the a.v.c. system should be very carefully followed. It has had careful and painstaking design and testing. For instance the .0002 mfd. audio feed condenser to the triode grid may look wrong in size, but is part of this design. It will pass the low audio frequencies as it is being used in a high-impedance grid circuit. The low value has been chosen so as to have the least loading effect upon the diode section. The fone-jack circuit accomplishes three purposes. When the fones are plugged in this circuit keeps the DC out of them, grounds the 59 grid to kill completely any speaker signal, and through the 100,000 ohm resistor prevents a dead short-circuit of the audio-transformer secondary.

The audio system has been designed to prevent blocking on strong signals. This has been accomplished by using tubes which require a high grid bias, which in turn permits of large grid swings. The diodes, of course, will handle the highest swing of any type of detector. The triode section of the 55, with its 20-volt bias, and the 59 (triode connected) with its 28 volts of bias are in strong contrast with the usual 2B7-2A5 combination, handling only a 3-volt and a 16½-volt grid swing, respectively. Furthermore the low 55 triode plate impedance of only 7500 ohms permits of a good impedance match to a pair of ear-fones. The 2B7 output impedance of 650,000 to 800,000 ohms cannot be at all matched to the low impedance of fones. Also a 20-volt grid swing, which can be nicely handled by the 55, will completely cut off the plate current of the 2B7 (see RCA tube manual) and, of course, block the entire receiver output. To obtain the best audio-frequency response it is necessary to use a good dynamic speaker and a large baffle.

The mechanical design and construction are next of interest. The band-spread system used is properly a point of mechanical interest. As said before, the 500-degree, 12-foot equivalent-scale-length dial permits of good band-spread over the entire range of all sets of coils. There are four coil sets used. They cover the ranges shown in the coil-data table. As will be noticed there is an amateur band at both ends of every range. Although the number of dial degrees for each amateur band appear to be small, the spread on the dial is actually much greater. This is because each dial division is a full quarter-inch wide, so that, for instance, the 25-degree spread of the 20-meter amateur band is a full half-dial wide, and equal to a 100 degree spread on any ordinary dial.

The air-trimmer condensers mounted in the coils eliminate the necessity for auxiliary trimmers on the panel and provide the means for precise relogging of any station when shifting sets of coils. The only auxiliary tuning control on the panel is the small pre-r.f. trimmer on the left of the main tuning dial. The combination of varying antenna load and extreme sharpness of tuning, due to regeneration, makes it impossible to track the pre-r.f. stage exactly over an entire coil range. The degree of change necessary with this trimmer is actually quite small, so that it can be set and left for any particular amateur of broadcast-band being received. With it, changes in the antenna can be taken care of right on the front panel.

There is one more point of design to be brought up in this first installment. That is the controversial matter of plug-in coils versus coil switching. Coil switching using efficient large coils and air-trimmer condensers can and has been used, but create the necessity for a receiver of much larger size. And this does not take into account the many difficulties to be encountered in designing, constructing and lining-up (for home construction) this high efficiency coil switching system. So we stick to the much simpler plug-in coil system and avoid a lot of trouble. Even so the arrangement used in this receiver minimizes the necessity for coil shifting. For instance plugging in the 20-40 meter coils allows us to receive several different bands by merely turning the main tuning dial. We can receive, on this particular range, the 20-meter amateur band, 25-meter foreign broadcast, 31-meter foreign broadcast and the 40-meter amateur band, in addition to several important commercial bands. The other coil ranges will do the same sort of thing.

The next installment next month, will give the full constructional data, coil winding sizes, and full instructions for lining up and operating this receiver.

The P.C.A. "Observer"

(*Continued from page* 413)

done it will be unnecessary, in practically all cases, to realign or track this unit. In fact, it is only necessary for the constructor to mount the apparatus and wire the power supply.

The first step in the construction of the complete unit is to mount the socket for the 84-type rectifier tube, the power transformer, choke, filter condenser, 110 volt outlet plug, switch and volume control on the main chassis. When this is done the power supply should be completely wired before the P.C.A. tuner is placed in position. This tuner is mounted on soft rubber grommets which not only insulate it from the chassis but also give it a cushioning effect. The tuner then should be grounded to the main chassis at one point only. There are only six connections other than a ground that need to be made to this tuner. Two of these are for the filament supply; two for the doublet, or plain antenna and ground; one for the plus B; and one for the output volume control. The picture wiring diagram shown gives the location of all connections.

The Observer is then completed and ready to attach to any radio set. This is done simply by connecting the output of the Observer to the antenna post of the receiver. Generally, it is not necessary to shield this lead, though in some localities it may be advisable if there is a powerful local station working on a frequency of approximately 550 K.C., as in this case a signal from this station might otherwise cause interference. Usually a ground connection between the Observer and the broadcast receiver is not necessary, but it may be well to determine this point in each individual case. The 110-volt plug from the original receiver is then plugged into the receptacle provided for this connection on the Observer, whereupon the "off" and "on" switch of the latter will control both units. A doublet antenna may be used or, if an ordinary antenna is used, the doublet connection should be grounded to the chassis. The main receiver should be set for a frequency of 550 K.C. with some degree of accuracy, for if the intermediate frequency is a considerable amount off, the P.C.A. tuning unit will not track accurately over the band.

Tuned Output Impedance

A tuned impedance-matching output transformer is used between the plate of the 6A8 mixer oscillator tube and the output of the Observer, which is connected to the radio receiver. This transformer has been tuned for a frequency of 550 K.C. but the frequency to which it is tuned may change slightly when its secondary is connected to the broadcast receiver. Consequently, it will be necessary to slightly adjust the tuned circuit. This may be done conveniently by setting the volume control on the Observer at the point of maximum response (turn clockwise). Set the band selector switch on band 2. Disconnect the antenna from the Observer. Turn the volume control on the broadcast receiver so that a slight hiss is heard in the loudspeaker. Adjust the condenser in the output transformer of the Observer for maximum hiss (this condenser is adjusted by means of a screw-driver through a hole in the top of the output-transformer can). The Observer then is in operating condition. It will be found that for average reception the broadcast receiver should be set for a sensitivity of about 50 to 100 microvolts. The lower the volume control is set on the main receiver the better the signal-to-noise ratio on the whole combination. Of course sufficient sensitivity must be retained for the desired volume.

As stated before, the tuner itself is carefully aligned and tracked at the factory, consequently none of the trimming or padding condensers should be adjusted except in rare cases. It is not within the scope of this article to give the necessary detailed steps for tracking and align-

ing. These are identical with the process followed in tracking and aligning the Tobe Super-Tuner in the Browning 35 All-Wave Receiver. and are completely covered in literature on that set and were also given in detail in the May 1935 issue of RADIO NEWS.

List of Parts

1 Tobe three band P.C.A. tuner (the dial, escutcheon, and knobs are included with this tuner).
1 power transformer 250 volts at 20 M A with 6 3/10 volts filament winding to carry 1 Amp. United Transformer Co.
1 10 to 12 henry 400 ohm choke. United Transformer Co.
1 5 prong socket.
1 100 volt receptacle
1 line cord
1 single pole rotary 110 volt switch
1 10,000 ohm volume control—Centralab
1 chassis and antenna strip (Tobe)
1 .05 mfd. 300 volt condenser. Tobe M S O
1 double 8 mfd. 500 volt Electrolic condenser knobs for volume control and switch. Tobe 628A

Weak Signals

(*Continued from page* 413)

amplifier. Insulated leads and connectors permit quick installation without removing the chassis or soldering operations. A toggle switch is supplied to cut the oscillator out of the circuit when not needed. The instrument also adapts the radio to c.w. reception, which otherwise cannot be heard on a receiver designed for broadcast reception. This feature will be greatly appreciated by all listeners familiar with the code, and to those who wish to learn the code.

As shown in the photograph, the oscillator coils and tube are shielded and the metal base is drilled for convenience in making a permanent installation.

M. T. Amplifier

(*Continued from page* 403)

plate of an amplifier or detector tube. It is also suitable for use with a high impedance magnetic pickup. The other winding is a center tapped low impedance winding suitable for use with a single or double button microphone, a 200 or 500 ohm line, or a low impedance pickup. The center tapped secondary is designed to operate into push-pull grids or a single grid equally well. In addition to this, a newly developed equalizing structure has been incorporated into this unit. As mentioned above, many radio stations and also many phonograph recordings are not as yet up to true high fidelity standards. Through the use of the tone corrector network these can be fully equalized to obtain quality reproduction. The Varitone transformer can also be used to compensate for poor acoustic conditions. *This network is not a tone control.* With B+ strapped to terminal 4 and the potentiometer arm at one end the lows are equalized. With the potentiometer arm at the other end the highs are equalized. If the B+ is strapped to terminal 3 equalization at both ends is obtainable.

The importance of a wide range equalizing transformer for high fidelity radio receiver or PA work cannot be overemphasized. Through the use of such a unit veritable "new life" can be given to radio and phonograph music. In addition, this unit affords an inexpensive method of improving the quality of performance of the average receiver.

The amplifier may be operated directly from a radio tuner, a high impedance pickup or a medium level, high impedance microphone. In addition low impedance devices may be used with the aid of an external input matching transformer. The first tube is a 6C5, the input to which is controlled by a 500,000 ohm potentiometer. The 6C5 feeds a 6F6, triode connected, through the Varitone coupling transformer. The 6F6 driver works into two 6F6 pentodes in push pull. This arrangement provides a larger output with less distortion than would be obtained by using the tubes as triodes. The output transformer is provided with a universal secondary to accommodate either a 200 or 500 ohm line or voice coils ranging from 1½ to 16 ohms. The maximum undistorted power output of the amplifier is approximately 19 watts.

Testing the Crosley

(*Continued from page* 402)

volume control as well as a completely adjustable tone control.

(5) An efficient 5-band coverage from 22,000 to 150 kc. (wavelength 14 to 2,000 meters).

(6) An especially interesting and practical feature is the new airplane type dial with different colored calibrated scales for each wave-band. The dial is equipped with a really fine reduction-gear smooth-acting control and with this tuning aid and the mechanical band-spread arrangement, DX stations can be brought in and logged which might otherwise be passed over in tuning.

In addition to the above features, phonograph connections are provided; the input circuit is arranged for an all-wave duplex antenna and the band-selector control has corresponding colored dots for the various colored wave-bands shown on the tuning dial.

Checking back over the operating results showed that on one of the evenings during the tests, an actual operating selectivity check was made on the broadcast band. The results showed that stations WGN, 720 kc. and WLW, 700 kc. were both received clearly and without interference from WOR, 710 kilocycles. Also stations WSM, 650 kc.; KFI, 640 kc., and WMAQ, 670 kc., were received through WEAF. As an additional selectivity check, WENR, 870 kc., was received without interference from WABC, on 860 kc. Reviewing the broadcast log at random, it was noted that many western, mid-western and eastern stations were listed, i.e., KDKA, WBZ, KOA, WGY and WTAM. The log also included three Mexican stations XEB, XEAW and XENT. T. A. and T. P. stations were not tried for on account of adverse weather conditions.

On the short-wave bands, a total of 70 short-wave broadcast stations were brought in and logged betwen 13.9 and 52.4 meters. The list includes 7 British stations, 6 German stations and other European stations such as PHI and PCJ, Holland; FYA, France; ORK, Belgium; EAQ, Spain; 12RO, Italy; HVJ, Vatican City; RV59, Moscow, U.S.S.R.; HBP, Geneva, Switzerland and HB9B, Basle, Switzerland. A good catch was made when the new Polish station SPW, Warsaw, was picked up and held for an hour during initial tests on 13,635 kc. Eighteen South and Central American stations were received. The log is further enhanced by the calls of JVM, Nazaki, Japan, and ZCK, Hongkong, China, and the Australian stations VK2ME, VK3ME and VK3LR. These stations came through with much less than the usual noise and signal strength was excellent.

Amateurs will be interested to know that the set gave a good account of itself on the 20, 80 and 160 meter "Ham" phone bands. In checking over the results on the 75-meter band, calls were brought in on the 1st, 2nd, 3rd, 4th, 8th and 9th Districts, and the record shows numerous airplane and police calls received.

INDEX OF ADVERTISERS

Read Classified Advertising—It Pays

Advertisements in this section twenty cents a word for each insertion. Name and address must be included at the above rate. Cash should accompany all classified advertisements unless placed by an accredited advertising agency. No advertisements for less than 10 words accepted. Objectionable or misleading advertisements not accepted. Advertisements for these columns should reach us not later than 3rd of 2nd month preceding issue.

TECK PUBLICATIONS, INC.
461 Eighth Ave. New York, N. Y.

A.C. Generators

TWENTY practical and low cost changes converting old generators into new generators and motors 100-500 watt capacity, d.c. or a.c. current, with 6 to 400 volts, for radio operation, power, light, or welding. Also instructions for rewinding armatures. 350 definitions of electrical terms, etc. All in new, revised book with simplified instructions. Endorsed by thousands. Only $1.00 postpaid. Autopower, 414-A S. Hoyne Ave., Chicago.

Agents Wanted

AGENTS: Stick-on-Window Sign Letters. 500% profit. Write today. Metallic Letter Co., 422 N. Clark, Chicago.

Correspondence Courses

USED Correspondence Courses and Educational Books sold or rented. Inexpensive. Money-back guarantee. Write for Free Catalog listing 4000 bargains. (Courses Bought.) Lee Mountain, Pisgah, Alabama.

Patent Attorneys

PATENTS—Advice and booklet free. Highest references. Best results. Promptness assured. Watson E. Coleman, Patent Lawyer, 724 9th Street, Washington, D. C.

PATENTS. Instruction "How to Establish Your Rights" and form, "Evidence of Conception"—sent Free! Lancaster, Allwine & Rommel, 414 Bowen Building, Washington, D. C.

Patents and Inventions

INVENTIONS COMMERCIALIZED. Patented or unpatented. Write Adam Fisher Company, 278 Enright, St. Louis, Missouri.

Personal

WIN $150.00 working crossword puzzles. Send 3c for our illustrated crossword folder. Puzzle Co., Midland, Mich.

Printing

2000 BUSINESS cards neatly printed $1.50. Free samples. Atlas Distributing Co., 1814 Bedford Ave., Pittsburgh, Pa.

Wind Driven Lights

ELECTRIC LIGHTS—WIND DRIVEN—You build them. Write, Wind Motor Electric, Ridgway, Montana.

De-Luxe X'mitter

(*Continued from page* 397)

above (D) is the final amplifier stage, comprising two 203A's in push-pull. With something like 70 watts of driving power available from the RK-20, this final stage really is excited to the maximum. Pfeffer figures he gets as much as 350 watts output, which is a lot of juice.

The topmost panel (E) is antenna tuning, the circuit comprising two variable condensers and two tapped inductors in the popular Collins type filter.

The bottommost chassis (A) contains the power supply for the RK-20 and 203A stages. Two 866's are used in a conventional full-wave circuit. Positive protection of all tubes is provided by two time relays, not shown in circuit, in conjunction with overload and underload circuit breakers. Any circuit condition other than normal will cause one of these four devices to open the high-voltage supply and thus prevent serious damage.

The second chassis (B) from the bottom contains two more power supplies: one, using an 83 rectifier, for the 2A5's, and the other, using an 80, for grid bias for final stage. The parts for all three power packs are 100% oversize as a matter of safety and long life.

Once the master switches on the power panels of the transmitter have been turned on, all further control is had from the operating table by means of a small control box. The tube filaments are kept running, plate voltage being removed during reception periods by a relay.

Any reader who has gotten the impression that this transmitter was built primarily for show is mistaken. It works as well as it looks. Using a rather mediocre antenna in the midst of a forest of steel frame houses, Pfeffer has no trouble working almost every station he calls on the 7000 kc. c.w. band. The usual remark from the other end is, "Boy what are you using there, anyway? Sure has some sock." Pfeffer has to get some sleep, but W2AIM is likely to be heard most anytime after office hours.

With this c.w. transmitter successfully completed, Pfeffer and Frimerman are working on the plans for a modulator unit of companion size and appearance. This will contain a cathode ray oscilloscope and every known precaution for preserving speech quality. They'll probably have to call out the whole Bronx Radio Club to help them lift the modulation transformer!

Oh, yes. How much did this rig cost? It looks like the proverbial million dollars, but the parts actually came to about $800. Time and labor were something else, of course, but this was something of a labor of love and therefore the time can't be calculated in terms of money. Needless to say, both Pfeffer and Frimerman are mighty proud of their handiwork, and rightfully so.

The DX Corner (Short Waves)

(*Continued from page* 441)

Club, Port of Spain, Trindad.

1:30—2 a.m., GMT of the following day. December 10, 1935 to the Western World Wave Club, Berkeley, California.

1:30—2 a.m., GMT of the following day. December 17, 1935 to the International DX'ers Alliance, "Radio Guide" and short wave fans; 1:30—2 a.m., GMT of the following day.

All our readers are invited to listen for these programs and to send in reports to the station for verification. Mention that you are a RADIO NEWS reader.

International 6000-12500 Mile DX Club

Some interesting news for all members of the Club is a special subscription offer to members of this club. Send in to the president of the club regarding this offer. Your president has just finished one-year's test on VK2ME, VK3ME, and VK3LR for the Australian Government. Listen in December 29th to VK2ME to the farewell program to your president and to readers of RADIO NEWS. It will take place from 6:45-7:15 a.m., EST. The same will take place from VK3ME on December 26th from 6:45 to 7 a.m., EST. On December 30th VK3LR will repeat same program from 6:45 to 7:15 a.m., EST. Let's have a big turn-out and send in all your reports to each station. New members who wish

to join the club in 1936 should write to the Club, in care of RADIO NEWS, with their applications. A. J. Rabbidge, Southland; A. E. Sims, Hastings; D. W. Shields, Ohio, U. S. A.; R. Baldson, Rotorua.

The Radio Club Venezolano is open for membership to readers of RADIO NEWS. They publish a monthly periodical RCV and will be happy to sent out circulars regarding the membership.

The DX Corner (Broadcast Band)

(*Continued from page* 408)

Oklahoma, has a special DX program 2:30-4 a.m., EST, the 25th of each month. Both promptly verify correct reports. My log now stands at 395 with 117 verified and 22 reports out".

Observer Kocsan (Pennsylvania): "Usually reception is poor during a full moon but during this period in October was surprisingly good. While on the subject, did any Observers notice the peculiar and extraordinary fading of signals on the night of September 11th? A great number of normally strong stations were fading deeply and at a rapid rate, much like the fading often experienced on short-waves. This was experienced on nearly all frequencies and was especially noticeable on such powerful stations as KDKA, WJZ, WABC, WLW and WEAF. KDKA was absolutely unreadable".

(*This condition was noticed several evenings during September at the New York Listening Post and seemed to be especially bad on the high power stations from 200 to 500 miles distant. It would be interesting to know whether this was a general condition throughout the country*—THE EDITOR.)

"Guess my Crosley will have to do another season. I have it tuned up, the RN Tenatuner hooked up, my pencils sharpened and some extra sleep under my belt, waiting for conditions to improve so I can resume DX'ing in earnest".

Observer Truax (Illinois) reports that his log now stands at 361 heard, 83 verified. The 50 watter, CHGS, Summerside P.E.I., 1450 kc., is one of his recent additions.

Observer Meade (Missouri): "Succeeded in logging 163 stations so far this season, not including the powerful ones. The following stations send positive verifications and appreciate reports: KOOS, KIUL, KUOA, WACO, KLZ, KRGV, KOTN, KLUF and WDAY. The 'tenatuner' is proving its worth in this Listening Post and I expect to materially increase my log this winter with its aid. Am contacting several local stations in an effort to have them dedicate DX programs to RADIO NEWS".

Observer Rimer (Kansas): "The TP's put in an occasional signal here and I have heard 1YA, 2UW and 4BC. The October issue of RADIO NEWS with the article on the RADIO NEWS DX 'Hopper Upper' was just what I needed. As soon as I read the article I built this booster using whatever parts I had on hand. While this is a makeshift substitute it works well enough to cause very high hopes for the circuit using the parts that are called for and I plan to build it as soon as the football season is over".

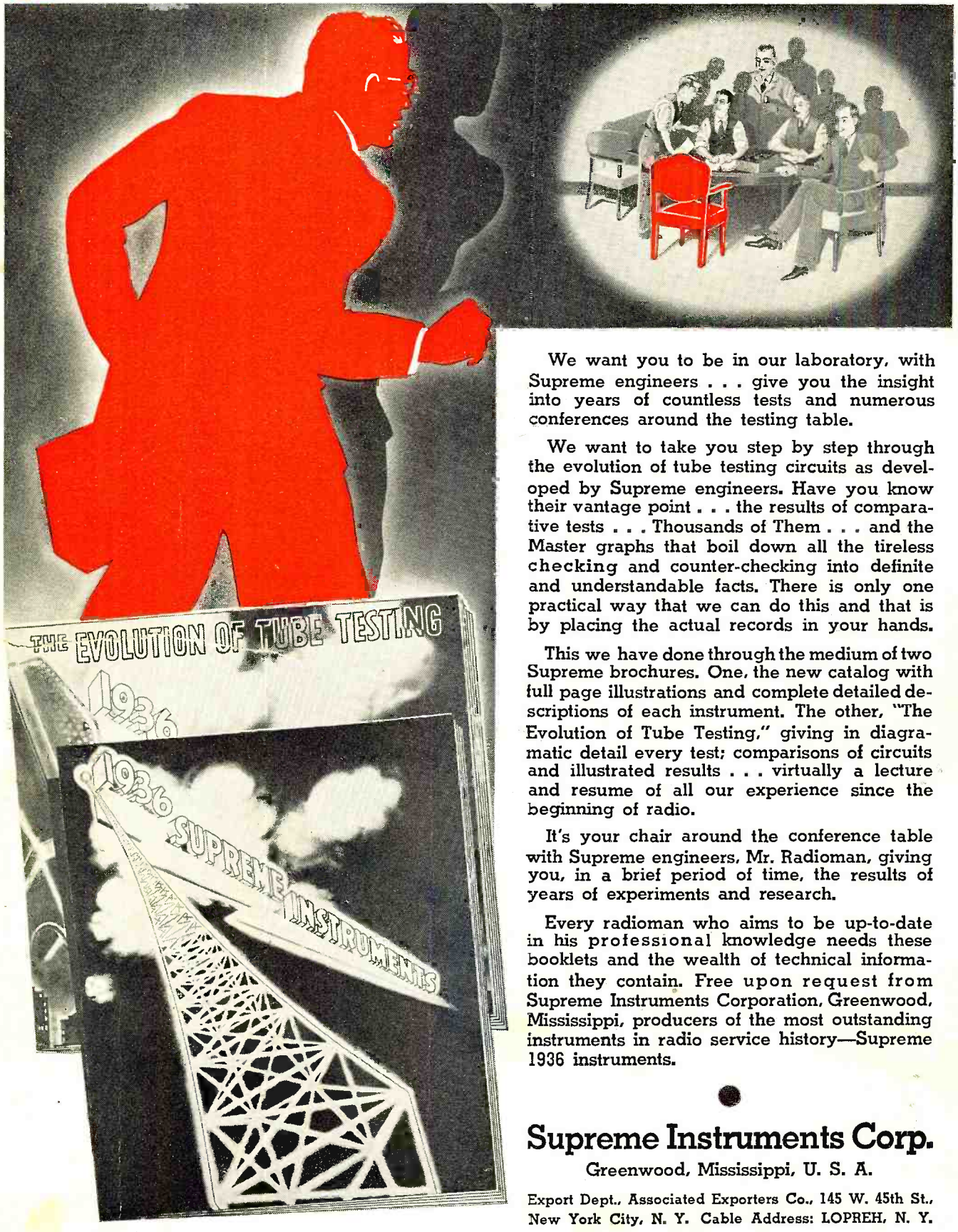
Observer Johnson (Minnesota) reports his log now shows 716 stations. He also comments on the effect of the full moon on DX reception. In his location it makes reception poor from the east but allows western and southern stations to come through well, particularly the South Americans. At such times he says that foreign stations are heard on more than half of the broadcast band frequencies.

Observer Kimmons (Texas) sounds an optimistic note in reporting that reception during October was better than during October last year. He has logged more stations and has found the signals stronger this season.

Observer Sholin (California) sends some interesting information on Japanese and Manchukuo stations as follows: "The evening programs of all Japanese and Manchukuo stations start at 1 a.m., PST. JO- and JB- stations sign off at 5 a.m., PST, the JF- stations at 6 a.m. and the JQ- and MT- stations at 6 or 6:30 a.m., PST. JOAK-2, JOBK-2 and JOCK-2 constitute one chain. All other stations are on a second chain except JODK-2 which is a station for the Korean language only. Call letters are not given frequently but are always given when starting and when signing off. JOAK-1 and JOAK-2, Tokyo, will be using 150 kw. by next spring. At that time JOAK-1 will be shifted to 590 kc. and JOAK-2 to 880 kc. Each will have a special cantilever antenna, 1000 feet high".

Observer Hunt (California): "DX is best between 1 and 5:30 a.m., PST. 1YA, 650 kc. and JOIK, 830 kc. are usually the first stations to put in an appearance. The greatest number are heard between 3-4 a.m., although interference from the eastern U. S. stations is quite bad at this hour".

Your Chair, Mr. Serviceman



We want you to be in our laboratory, with Supreme engineers . . . give you the insight into years of countless tests and numerous conferences around the testing table.

We want to take you step by step through the evolution of tube testing circuits as developed by Supreme engineers. Have you know their vantage point . . . the results of comparative tests . . . Thousands of Them . . . and the Master graphs that boil down all the tireless checking and counter-checking into definite and understandable facts. There is only one practical way that we can do this and that is by placing the actual records in your hands.

This we have done through the medium of two Supreme brochures. One, the new catalog with full page illustrations and complete detailed descriptions of each instrument. The other, "The Evolution of Tube Testing," giving in diagramatic detail every test; comparisons of circuits and illustrated results . . . virtually a lecture and resume of all our experience since the beginning of radio.

It's your chair around the conference table with Supreme engineers, Mr. Radioman, giving you, in a brief period of time, the results of years of experiments and research.

Every radioman who aims to be up-to-date in his professional knowledge needs these booklets and the wealth of technical information they contain. Free upon request from Supreme Instruments Corporation, Greenwood, Mississippi, producers of the most outstanding instruments in radio service history—Supreme 1936 instruments.

●

Supreme Instruments Corp.

Greenwood, Mississippi, U. S. A.

Export Dept., Associated Exporters Co., 145 W. 45th St., New York City, N. Y. Cable Address: LOPREH, N. Y.

only MIDWEST Gives You an 18-TUBE Radio

(Metal or Glass)

- SIX TUNING RANGES
- 4½ to 2400 METERS
- FULL SCOPE HIGH FIDELITY
- PUSH BUTTON TUNING
- ROBOT EAR

and Scores of Other Features for

$59.50 (LESS TUBES) with New GIANT THEATRE-SONIC SPEAKER

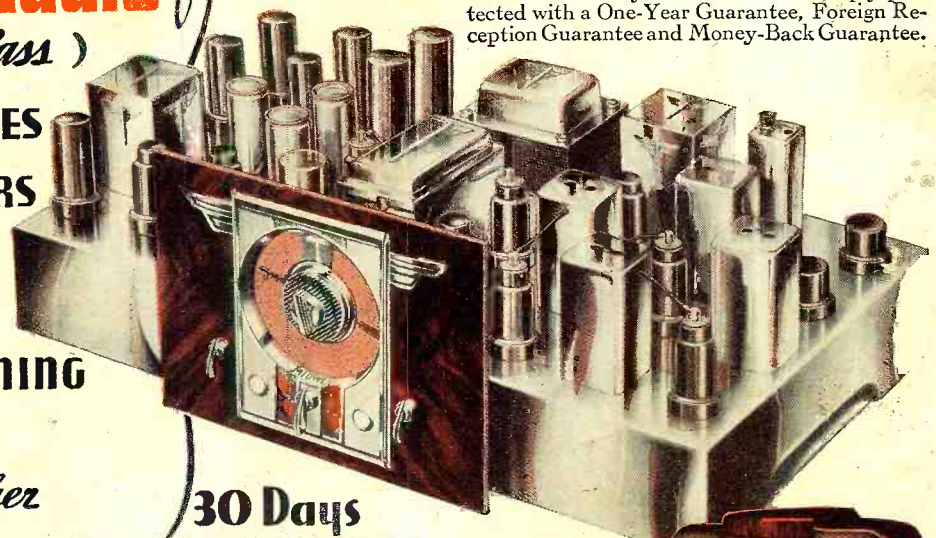
TERMS AS LOW AS $5.00 DOWN

ONCE again Midwest demonstrates its leadership by offering the world's most powerful Super De Luxe 18-METAL Tube 6-Tuning Range radio. It is a master achievement . . . today's most highly perfected, precisely built, laboratory adjusted set. It is a radio-musical instrument that will thrill you with its marvelous super performance . . . glorious new acousti-tone . . . crystal-clear "concert" realism . . . and magnificent foreign reception. Before you buy any radio, write for FREE 40-page 1936 catalog. Learn about the successful Midwest Laboratory-To-You policy that saves you 30% to 50% . . . that gives you 30 days FREE trial.

SAVE UP TO 50% Direct FROM MIDWEST LABORATORIES

No middlemen's profits to pay. You buy at wholesale price, direct from Laboratories . . . saving 30% to 50%. You can order your 1936 Midwest radio from the new 40-page catalog with as much certainty of satisfaction as if you were to come yourself to our great laboratories.

You save 30% to 50% . . . you get 30 days FREE trial . . . as little as $5.00 down puts a Midwest radio in your home. You are triply protected with a One-Year Guarantee, Foreign Reception Guarantee and Money-Back Guarantee.



30 Days FREE Trial!

GUARANTEED FOREIGN RECEPTION

This super radio will out-perform $200 and $300 sets on a side by side test. It is so powerful, so amazingly selective, so delicately sensitive that it brings in distant foreign stations with full loud speaker volume, on channels adjacent to powerful locals. The 18 tubes permit of advanced circuits, make it possible to use the tremendous reserve power, and to exert the sustained maximum output of the powerful new tubes.

80 SENSATIONAL ADVANCEMENTS

Scores of marvelous Midwest features, many of them exclusive, explain Midwest glorious tone realism, super performance and thrilling world wide 6-band reception. They prove why nationally known orchestra leaders [illegible] Fred Waring, George Olsen, Jack Denny, etc., use Midwest in preference to more [illegible]ly makes. Pages 12 to 21 in FREE catalog [illegible] the new Midwest features. Study [illegible] you make up your mind.

PUSH BUTTON TUNING

Simply pushing Silencer Button silences set between stations. Beautiful tuning lights automatically indicate when station is properly tuned. Release button . . . and station comes in perfectly. Pressing Station Finder Button (Midwest's exclusive ROBOT EAR) automatically determines proper dial position for bringing in extremely weak stations

GINGER ROGERS AMAZED AT MIDWEST PERFORMANCE

Hollywood, California—"Your Midwest is a wonderful instrument. The tone quality is delightful and it surpasses any set I have ever owned. I have heard stations from all over the world. I got a thrill the first time I tuned in on the booming of 'Big Ben.'"

GINGER ROGERS

Send for FREE 40-page four-color catalog. It pictures the complete line of beautiful 1936 Midwest Acousti-Tone V-Spread consoles...and chassis...in four colors.

SIX TUNING RANGES

This exclusive engineering triumph puts Midwest radio [illegible] ahead of ordinary sets and makes them the "World's Greatest Radio Va[illegible]". Now, it is easy to make the nations of the world parade before you. You can switch instantly from American programs to Canadian, police, amateur, commercial, "secret," experimental, airplane and ship broadcasts . . . to the finest and most fascinating programs from Europe, Africa, Asia, Australia, South America . . . 12,000 miles away.

ACOUSTI-TONE V-SPREAD DESIGN

(U. S. Patent No. 96750)

The V-Front Dispersing Vanes established a new radio style overnight. They spread the beautiful lace-work of the "highs" throughout the room in a scientific manner . . . directing the High Fidelity waves uniformly to the ear. Now, get complete range of audible frequ[illegible]es from 30 to 16,000 cycles . . . achieving glorious new acousti-tone . . . assuring life-like crystal-clear "concert" realism.

MIDWEST RADIO CORP.
DEPT. 11-P CINCINNATI, OHIO U.S.A.
E[illegible]1920 Cable Address MIRACO All Codes

MAIL COUPON TODAY FOR FREE 30-DAY TRIAL OFFER and 40-PAGE FOUR-COLOR FREE CATALOG

MIDWEST RADIO CORP.,
Dept. 11-P, Cincinnati, Ohio

User-Agents Make Easy [illegible]

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

Check here for details ☐

Name_____

Address_____

Town_____ State_____

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