STARTING BEGINNER'S SERIES

# RADIO NEWS AND SHORT WAVE RADIO

MAY

SHORT WAVE TIME TABLE

## Noise Eliminator Perfected by Young Engineers

### New Device Cuts Out the Man-Made Static in Radio Reception Which Mars so Many Distant Programs

### By Turning Knob on Unit Noise Disappears

### Unit Can be Attached to Any Superheterodyne Receiver; Built by Two New Jersey Experimenters

NEW YORK, N. Y., Apr. 1—Old King Static, the bane of radio, suffers a severe blow as a new device for attachment to radio sets is announced by two young technicians of Demarest, New Jersey. The device eliminates inductive noise, commonly known as "man-made static", from radio reception.

Technically, it acts as a "che... out those sharp noise impul... loudspeaker when list... grams.

The circuit is connect... quency amplifier of th... surges, such as those ... street cars, vacuum cl... bells, oil burners, etc., ... to a previous tube in th... inoperative for a tiny ... period is so short in du... detect the "silent" spot ... the speech or music cle...

25¢ U. S. AND CANADA

See Page 650

GENERAL ELECTRIC RADIO


# SERVICE NOTES

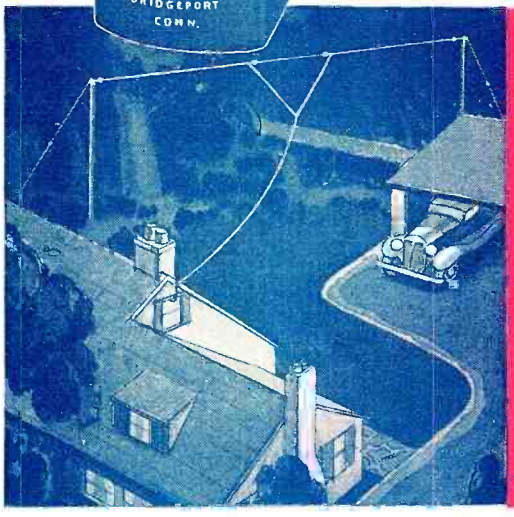
## 1930—1935

## *FREE . . . to Service Men*

### UPON THE RECEIPT OF 10 "V-DOUBLET" ANTENNA CARTON LABELS

● Here's an opportunity for radio service men to get a free copy of service notes on all radio receivers sold by General Electric during the past six years. This practical, 887-page volume, just released, is sold at the regular price of $2.00. Every radio service man, who sells 10 G-E "V-doublet" All-wave Antennas, may have a copy free. Just return CARTON LABELS FROM 10 G-E "V-DOUBLET" ANTENNA KITS, to your G-E Radio Distributor, and this valuable new book will be yours.

This Offer Expires May 30, 1936



### THE GENERAL ELECTRIC "V-DOUBLET" ALL-WAVE ANTENNA Points the Way to Make Money

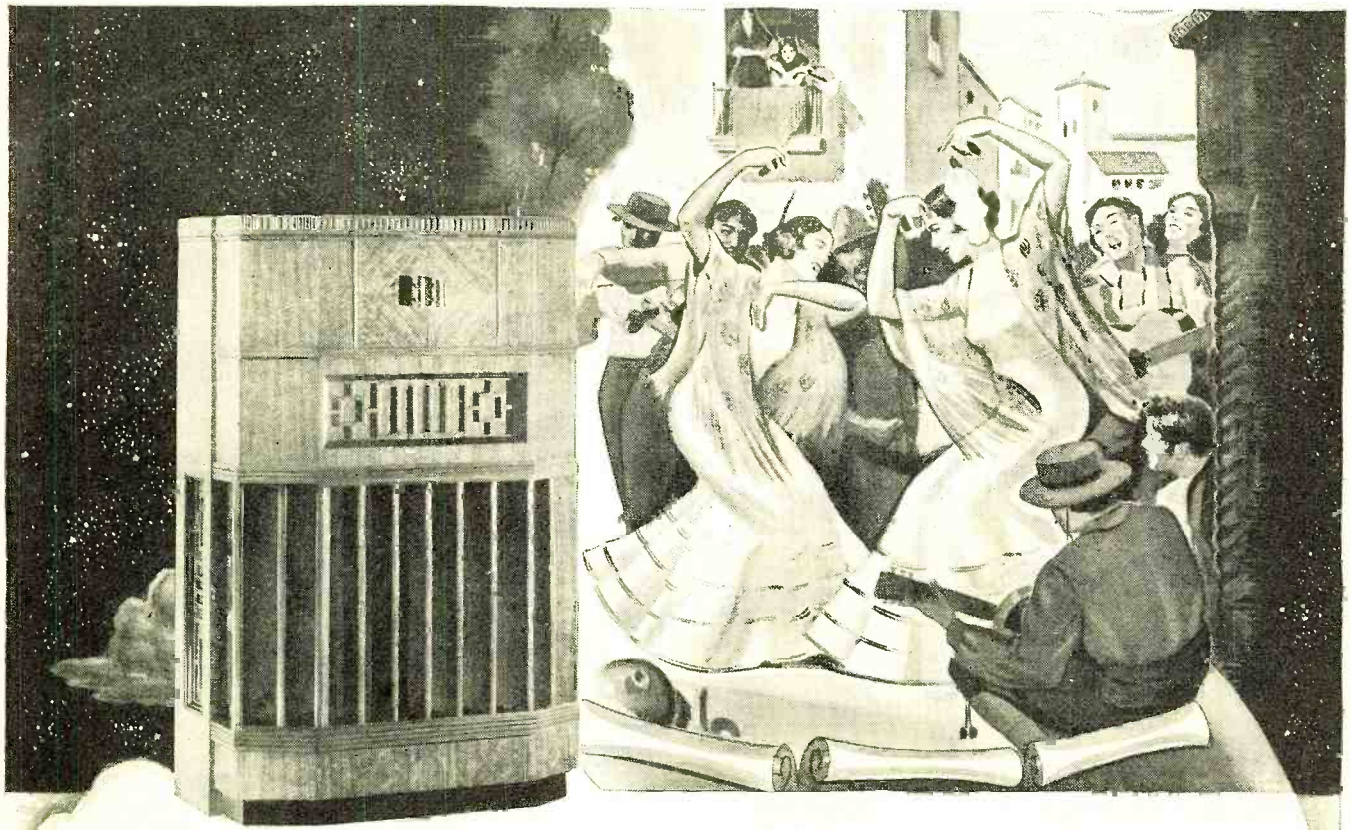
Do you want to cash in on radio's most neglected market? Then, sell and install the G-E "V-doublet" All-wave Antenna System. You'll find it pays big dividends in sales and profits. Canvass for prospective buyers every chance you get. Insist that a G-E "V-doublet" All-wave Antenna be included with every set. Get your share of this large and profitable market. Tune in on its profit possibilities.

*For complete information see your nearest General Electric Radio Distributor.*

# GENERAL ELECTRIC

**The Original Metal-tube Radio**

**APPLIANCE AND MERCHANDISE DEPARTMENT, GENERAL ELECTRIC COMPANY, BRIDGEPORT, CONN.**



# Sparkle of the Spanish Sevillana—Yours!—

## AS THE SCOTT BRINGS IT—AS ONLY THE SPANIARDS PLAY IT!

**IF** . . . . If there is any doubt in your mind that foreign reception can be as brilliant as the Broadway night—then hear the magnificent new 23 tube SCOTT! Radio has charged the starry night, the bright noon, the red dawn with a billion waves! Romantic Spain!—weaving its web of silver-stringed music over all the world—whirling Senoritas, flashing mantillas, the dashing Sevillana! From Hawaii to Holland—Germany to Japan—Italy to Indo-China—from dozens of other stations, continents away, the SCOTT brings you the world's most intriguing news and views and music—with astonishing volume and clarity of tone. Within a short six months SCOTT owners in U.S.A. alone sent in 19,257 detailed logs from 320 foreign stations in 46 countries!

**BULLET-DIRECT SEPARATION** . . . continuously variable selectivity 2 to 16 K.C. enabling you to pull in foreign and domestic stations having but 1/5000 the field strength of powerful locals!

**DOUBLE A V C** . . . . allowing all tubes to operate at their greatest efficiency—giving you the highest signal-to-noise ratio.

**LESS NOISE** . . . . less than 1 microvolt sensitivity—made practical by the SCOTT high signal-to-noise level.

**POWER GALORE** . . . all you want—when you want it! Listen to the full splendor of symphonic music without any distortion detectable to the human ear! 35 watts strictly class "A" undistorted power—five times the average!

**FULL HI-FIDELITY** . . . . the SCOTT captures the dazzling lacework of the overtones—which alone, distinguish voice from violin, trumpet from trombone, cornet from clarinet—overtones which vibrate up to 16,000 cycles per second! Average receivers catch less than 5,000 cycles. Without the SCOTT you miss the full beauty of programs.

**STILL SCOTT PIONEERS!** . . . now with the VOLUME RANGE EXPANDER! — truly the Eighth Wonder of the Radio World! Restores the petal-like delicacy of pianissimos—the full flory of fortissimos—all of which are "cut" by the monitoring engineer in the broadcasting control room. No more "canned" tones — now you may hear programs with even pre-microphonic truth—with more realism than they are actually transmitted! Send for full details at once on the sensational SCOTT Volume Range Expander—built exclusively for SCOTT receivers!

**SHORT WAVE STATION LOCATOR** . . . . True Bass Control. Separate Treble Control. Shadow Meter Tuning. 23 Completely Shielded High Efficiency Tubes. Three Distinct Loud Speakers. Strictly Custombuilt — Five year Guarantee — Nineteen Exclusively Designed Cabinets. Performance Features impossible to include in large-scale-production receivers.

These are the engineering triumphs which have maintained SCOTT performance leadership for more than nine years — which have won the SCOTT an envied place in 146 countries—which have made it the overwhelming preference of celebrities throughout the world, from Ted Husing to Baron de Rothschild!

**YOU ARE INVITED** to compare the SCOTT in a side-by-side performance test with any other radio at any price—in your own home—under any conditions. 30-day home trial anywhere in U.S.A., nation-wide installation service. The 20-page booklet "PROOF OF CONSISTENT FOREIGN RECEPTION" tells the story of the SCOTT—one of the most fascinating records of world-wide performance in all radio.

Send the coupon below—TODAY—and we will mail this remarkable story to you immediately!


**E. H. SCOTT RADIO LABORATORIES, INC.**
**4440 Ravenswood Ave., Dept. 5H6, Chicago, Illinois**
*Visit our new permanent salon at 630 Fifth Ave., New York City*

**FREE—SEND TODAY FOR DETAILS**

E. H. Scott Radio Laboratories, Inc.
4440 Ravenswood Ave., Dept. 5H6,
Chicago, Ill.

Send details of unsurpassed performance and life-true tone of new 23-tube SCOTT.

*Name*_____

*Address*_____

*City*_____ *State*_____

RADIO NEWS

*Edited by* LAURENCE MARSHAM COCKADAY

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WILLIAM C. DORF, *Associate Editor*
JOHN M. BORST, *Technical Editor*
JOHN H. POTTS, *Assoc. Tech. Editor*
JOSEPH F. ODENBACH, *Art Editor*

Vol. XVII May, 1936 No. 11

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## *Coming— Next Month*

The June issue will be the special annual short-wave number. Among numerous features will be tables, maps and other reference material of lasting value. There will also be a variety of articles of outstanding interest to servicemen, constructors and the "Ham," as well as some of a more general nature.



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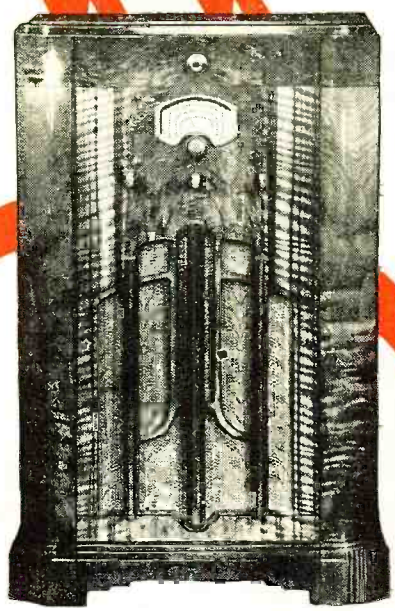
# Flashes from RCA


## 1 RCA Check-Up Plan

At the head of the great profit parade stands the sensational RCA Radio Tube Check-Up Program. Advertisements in *The Saturday Evening Post, Collier's,* and 124 newspapers features the necessity of having sets checked up at least once a year if the wonderful radio programs are to be received clearly, enjoyably. This advertising, plus spot announcements over 30 radio stations, brings customers to your shop. Besides the profits from each set check-up, it gives you leads to the sale of tubes, new sets, refrigerators, washers, everything your shop handles. Ask your RCA Tube Distributor how you can participate.

## 2 RCA Oscillograph

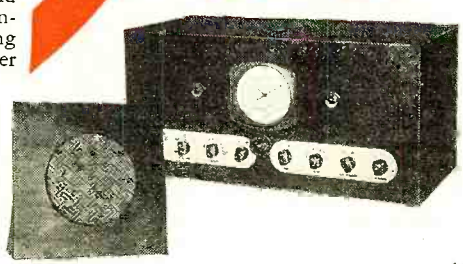
This is a scientific instrument that you can use with the greatest ease, swiftness, accuracy, not only in peaking I.F. transformers, checking distortion, etc., but to help you *sell sets.* People prefer to deal where skilled service is available. The Oscillograph ($84.50 net, complete) with the RCA Test Oscillator and RCA Frequency Modulator, enables you to duplicate factory practice. Brings you more service jobs, enables you to do the work with new perfection. Ask your RCA Parts Distributor about this and other RCA service specialties and parts.

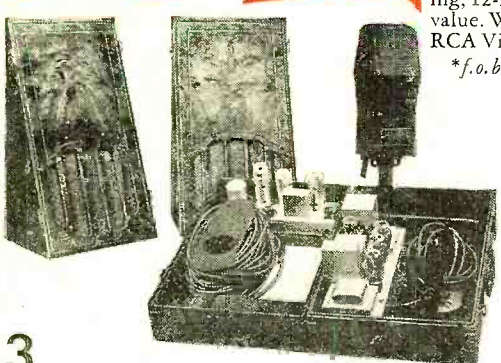


## 5 Stupendous Value! $89.95*

Here is a great RCA Victor leader for 1936, offering ALL THREE—"Magic Brain," the "Magic Eye," and RCA Metal Tubes, all in a beautiful console at an amazing low price. Has 8 tubes. Tunes 540 to 18,000 kilocycles, covering standard broadcasting and all the short wave services to 15 meters, including police, amateurs, aviation, international broadcasting. Features include adapted Colorband Dial, 3-point tone control, wave trap, 2-speed tuning, 12-inch dynamic speaker. Truly an astounding value. Write for information about this and other RCA Victor home receivers.

**f.o.b. Camden, subject to change without notice. Other sets from $19.95.*





## 3 Money in RCA P.A. System

New RCA Public Address System offers you *two* chances to make money—by renting it for special occasions, and by selling it outright to those who have frequent need for it. Model PG-62-D is RCA's latest. Features the famous Velocity Microphone used throughout NBC studios, sensitive high fidelity, permitting speaker to move freely. Two dynamic loudspeakers. Five-stage amplifier with output of 20 watts undistorted. System easily handles auditoriums of 2500 capacity. Completely portable in two units, or may be installed permanently. At $395 offers a profit-making opportunity.

## 4 New RCA Amateur Receiver

Here's the newest, most remarkable amateur receiver from the RCA laboratories. Designed by amateurs for amateurs. Has 32 amazing features. Tunes 5 to 600 meters continuous. Ultra-selective crystal filter. "Magic Eye" tuning and signal strength indicator. 11 tubes. Iron-core I.F. transformers for high gain, permanent alignment. RCA Metal Tubes. Astounding quiet, due to improved signal-to-noise ratio. Wave-change by switch. Separate dynamic speaker. Many other features. Ideal for short-wave listeners as well as amateurs. A real triumph at $119.50, amateur's net price f.o.b. Camden.

RCA MFG. Co., Camden, N. J.
Gentlemen: I am interested in the subjects checked below.
Please send me complete information, without obligation.
1☐ 2☐ 3☐ 4☐ 5☐

Name.....
Street.....
City.....State.....

I am (check which)
Dealer☐ Service Man☐
S-W Listener☐
Amateur☐

RN

**RCA Manufacturing Co., Inc.**

**CAMDEN, NEW JERSEY**

A Service of the Radio Corporation of America

# *Pages From A Serviceman's DIARY*

THURSDAY—Put on non-skid shoes and old clothes, the standard costume for aerial jobs. Loaded up the truck, checked over the supply of split-knobs, springs, wire, etc., making certain the blow-torch and solder were on hand. (We solder our joints!) Mounted the extension ladders on the side of the truck. Took young Bill along, who can juggle ladders like a fireman, climb trees like a squirrel and is sure-footed on a slanting roof.

Number One—Installed a double-doublet from a roof-peak of a three-story house to a tree in the yard. Got good elevation without special supports. Ran the transmission line in through the cellar and up through the floor to the library, where the set was located. No trouble—operating O.K.

Number Two—Multiple installation. Customer wanted one antenna with three taps for receivers in bedroom, living room and basement. Put up an L-type job from the roof to a pole on the garage, ran the main lead-in down the side of the house past the bedroom window on the second floor, taking off a branch lead with a .00025 mfd. condenser in series with the receiver. Continued the main lead-in on to the living room, with a similar branch lead and condenser to the main set. Down to the basement window, the only one on this side of the house. Not so good! Found it opened into a well-filled coal bin, nicely boarded up to prevent the coal dust from seeping into the furnished part. Wanted to run the wire outside around to the front basement window, but nothing doing—customer wouldn't stand for it. Drilled a hole through the casement and fished the lead-in through a porcelain bushing to Bill, who crawled into the coal bin. Poor Bill gave a tug on the wire, skidded on a chunk of coal which started a black avalanche sweeping over him. Rushed down and pulled him out from under, finding he had acquired an African brunette complexion but otherwise no harm done. Cleaned up, finished the job and returned to the shop. Off for lunch.

Changed clothes, dolled up and started off for the afternoon calls. The first one, RCA-140; complaint—noise. Found intermittent buzz, blanketing reception. Asked customer if she had a service contract with the oil-burner representatives. She replied, "No, and we'd like to have you handle the job." Tried 1 mfd. condensers across line-supply at oil-burner switch. Slight improvement, but still bad. Temporarily hooked in a Tobe heavy-duty line filter, which incorporates chokes and condensers. O.K.! Made a permanent installation and moved on.

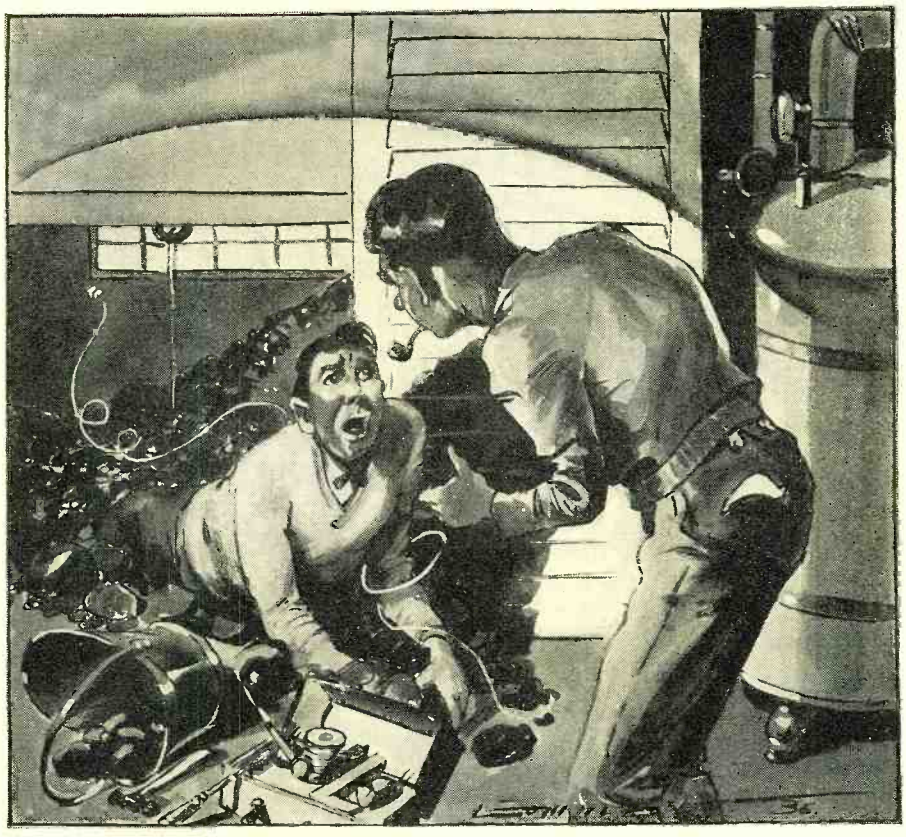
Next—Handsome, gray-stone house set back from street. Notation on service slip, "Old Stromberg-Carlson battery model—wants service—not sales talk." Followed the butler upstairs to a large, beautifully-furnished room. A famous $15,000 Ispahan rug on the floor. Stromberg was placed on a typical old-style radio cabinet, with the storage-battery charger and B eliminator in the rear compartment. Checked the tubes and battery, which had a badly corroded clip. The inside of the cabinet was badly affected by the acid, the usual white crystalline powder appearing throughout the compartment. Started to examine the rug underneath the radio as a tall, slim lady entered. "How much will it cost to fix this radio?" she asked. Told her all it needed was a new battery clip, which cost a quarter, plus the usual service charge. "I suppose I can stand that," she replied, "though I wouldn't spend that much for another radio. I never listen to it—it's only for the children. Why were you examining the rug?" Pointed out the effects of the acid on the cabinet and explained that I was somewhat worried whether it had affected the rug. Told her so far it seemed no acid had touched the rug and with continued care it might be possible to avoid damage. Added that all rags used for cleaning the cabinet should be promptly destroyed. "How much will a small radio set cost which does not require such a battery?" Did not quote, but made an appointment to demonstrate a few. Carted the old battery outfit down to the shop.

(P. S.—Another sale. She bought a new set.)

Ran over to the other side of the town into a small apartment where a young colored couple lived. Very little furniture but everything orderly and spotlessly clean. Had just had the set serviced elsewhere and now it was "worse than ever." One of the last of the old Fada models, with the chassis finished in bronze paint. Miserably difficult to get the tubes in and out of the sockets. Found the previous serviceman had sold a new set of tubes, one of which, unfortunately, was noisy. Told them they should have called back the original serviceman who would have been glad to replace the tube without any charge whatsoever. Decided to replace the tube myself as a matter of good-will to the trade. Made a service charge to cover the time and replaced a badly-worn window lead-in strip. Everybody happy.

Next—Stromberg 642, still a fine set after all these years. Complaint—fades on one station at 7:00 p.m. Said her husband had been in to our shop and had been told that the station she mentioned often faded on all sets in this locality and nothing could be done about it (which is true). However, she had called up the broadcasting station and was there told that the trouble must be in her set, that their station never faded, etc., and why didn't she call a competent serviceman? Now, could we correct her trouble—or else? Sure had me on the spot this time! No use to tell her about ground and sky waves and more modern antenna systems for broadcasting stations. The broadcaster has to sell time and if sponsors are not sufficiently interested to find out what sort of service is being rendered in the nation's wealthiest county, the station officials certainly won't spend any money to improve their service. Of course they know the trouble exists, but it is so easy merely to "pass the buck" over to the ultimate dumping ground for all

(*Turn to page* 687)



SERVICING IS NOT ALWAYS A BED OF ROSES

*Down in the cellar, tumbling over coal piles, squeezing through an attic, climbing trees and over slippery roofs, clinging perilously to loose chimney pots—these are some of the "pastimes" that are necessary evils the serviceman has to bear along with the more pleasant phases of radio servicing. Keeping a stiff upper lip is just a part of the game*

**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.**

# That "CORNER" in TELEVISION

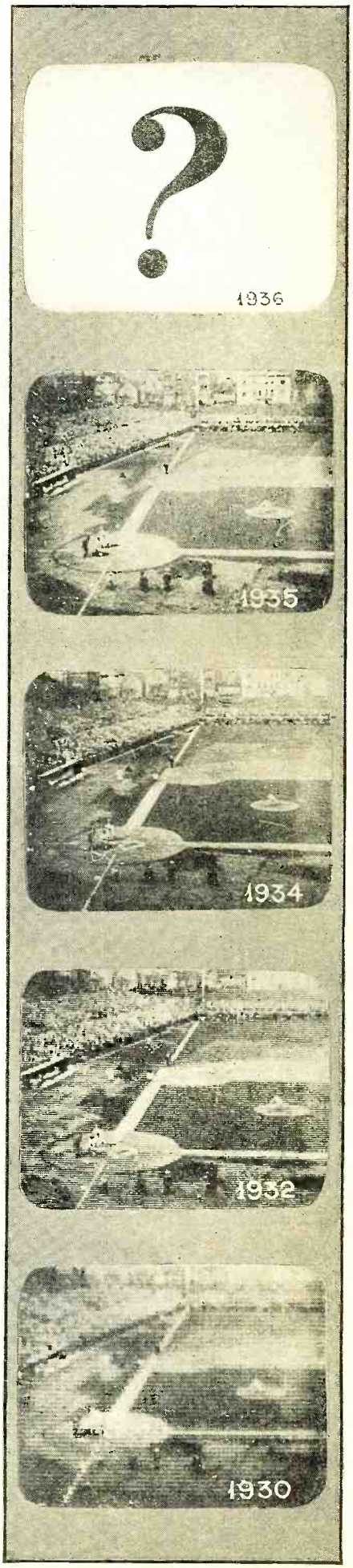
The odds are that by the time you read these lines initial television "field activities" will be in full swing in the metropolitan New York area! At the most these television transmissions will be just a few weeks away, or possibly during the time of the Democratic Convention in Philadelphia. If we are wrong in these assertions it will be obvious that some sudden new decision of their own making has caused radical changes in the plans of the engineers and executives of the companies concerned

## *By* The Television Reporter

TELEVISION is breaking forth high, wide and handsome in all parts of the world. Great strides in introducing visual transmissions to the public have been made in England and Germany. The American radio and television interests have no intention of letting Europe steal a march on them. But fearing that any sort of television announcement would hamper the sales of standard broadcast receivers, the RCA has unwisely adopted a close-mouthed policy on the subject, leaving much of their actual limited television activities to unofficial gossip —some of it greatly magnified in the process of being passed from one person to another.

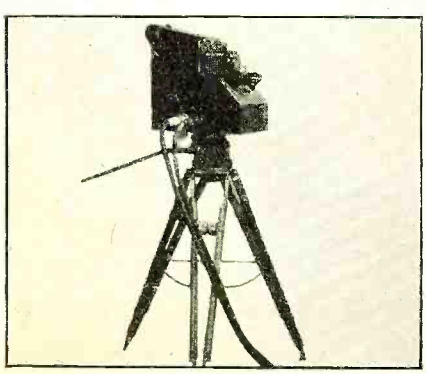
Television development is by no means limited to the RCA in the United States. Farnsworth, Philco, Peck, National, Sanabria and others will undoubtedly share in its application. But the fact that the RCA owns NBC and Photophone—and various other interlocking facilities that would be invaluable in the general launching of the art —gives that company the position of being the one to break the thick television ice. And conceding the fact that talkie patents will play a considerable part in television presentations, it can be expected that the American Telephone & Telegraph Company, through its allied Bell Telephone Laboratories and Western Electric Company, will be shoulder-to-shoulder with RCA in the commercial side of the new industry.

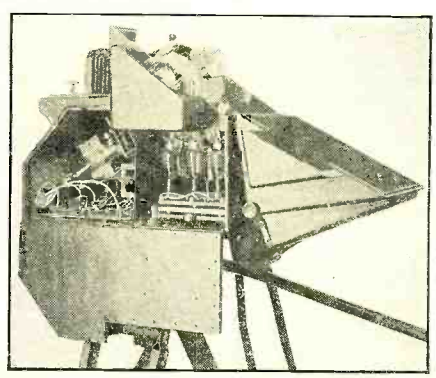
When the powers that be at the RCA, in the recent annual report of the company, openly asserted that the television transmitter is located atop the Empire State Building, they merely formally stated what was already known in the industry a long time back. And you can bet your old (*Turn to page* 700)




THE INSIDE AND OUT OF TELEVISION PICK-UPS

*Two views of the Zworykin Television Camera. At the left is the complete camera which furnishes the electrical images to be broadcast over wire or radio. At the right, the inside view, showing the Iconoscope cathode-ray tube which does the scanning and the battery of tubes that are associated with it*





# Precision is a quality you can bank on in all MALLORY-YAXLEY Replacement Parts



Only Mallory precision engineering could make possible the small sizes of Mallory Replacement Condensers without loss of quality — sizes exact and without bulge. Only precision engineering could make practical universal mountings for both carton type and round can condensers.

In volume controls — only precision engineering could make possible the development and construction of accurate tapers to service thousands of receivers through Yaxley Replacement Volume Controls.

In vibrators — only precision engineering in producing contacts that meet the exacting requirements of the manufacturers of millions of auto radio sets could develop the highly satisfactory service given by Mallory Replacement Vibrators.

Mallory-Yaxley Precision Engineering is no accident. It is the outgrowth of many years' experience in meeting precision requirements of manufacturers. And it benefits jobber, dealer and service man by providing universal application of parts essential to prompt and efficient servicing.

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

MALLORY YAXLEY

Radio News

May, 1936

## *"One, Two, Three, Four, Five"*

# "HELLO SHREEVE"

## *(First Words Spoken Across Atlantic)*

Out of the countless industrial tasks radio has been called upon to fulfill none is as dramatic a story as the transoceanic radio telephone. The public gasps with astonishment when great discoveries are made. Yet when these are applied to work-a-day needs they become accepted in a matter-of-fact way without comment. This is the highest tribute that can be paid to scientific advancement; quick public utility of a new development is a gauge of the homage due it

*By* **Stanley Kent**

TODAY, you can lift the receiver off your home or office telephone and engage in two-way conversation with any telephone subscriber in sixty foreign lands. The human voice, projected into the ether, knows no limitations of distance. But there was plenty of labor—years of it—behind the successful introduction of the radio-telephone.

It was in the early days of the World War—June, 1915—when the Bell Telephone System sent two young engineers, H. E. Shreeve and A. M. Curtis, to Paris with loads of experimental paraphernalia. Their mission was to carry on tests in the transoceanic reception of radio-telephone transmissions from the U. S. A.

### Wartime Tests

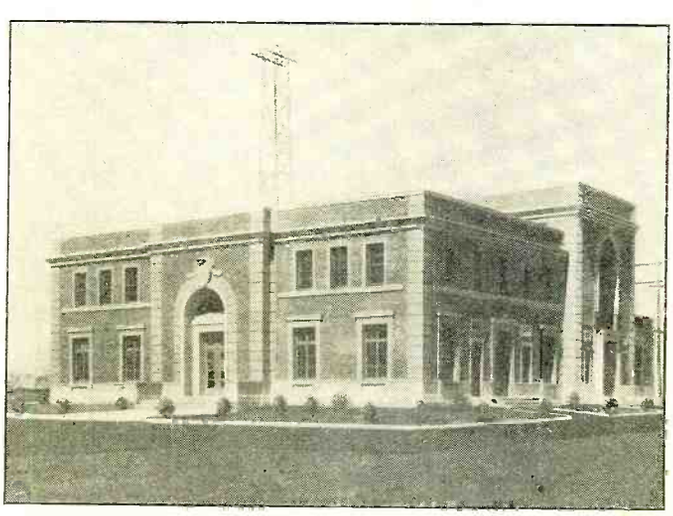
America was still a neutral nation and the French military authorities had very generously permitted Messrs. Shreeve and Curtis to set up their receiving equipment in the Eiffel Tower, which was the nerve center of French military communications.

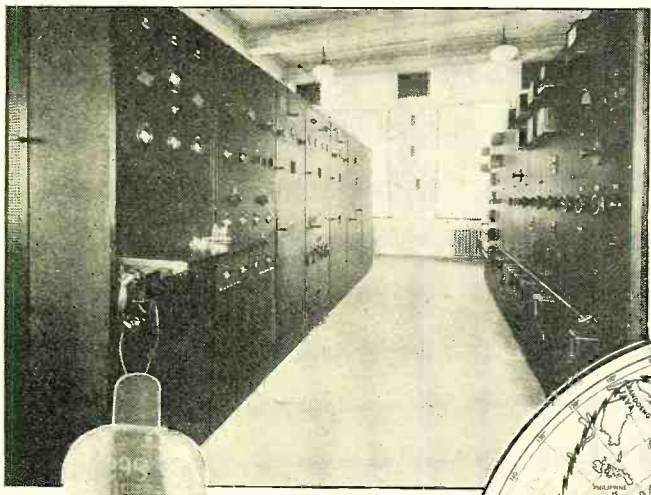
In New York, Bell laboratory workers developed one of the very first vacuum-tube, radio-telephone systems and, through the coöperation of the U. S. Navy, the use of the Arlington radio antenna had been obtained for the experimental transatlantic transmissions. The transmitter installed for the tests had hundreds of newly-developed power tubes.

Night after night, the American scientists in their Eiffel Tower station searched the air for the Paris voice signals without success. But in all this intervening period valuable data on static and interference were entered in their notebooks. War conditions necessitated the granting of minimum test time to these American experimenters in Paris. Some dubious reception was reported, but the first definitely successful test words, "One, two, three, four, five—" and "Hello!"" uttered in Arlington, were heard in Paris on October 9, 1915. Two days later, other fragments of speech were intelligibly received. But it was not until October 23 that the following entry went into the engineers' notebook: "At 5:37 heard the phrase, 'Hello, Shreeve! How is the weather this morning?'" It is from this latter date that the successful bridging of the Atlantic by

WHERE TELEPHONE VOICES JUMP INTO ETHER

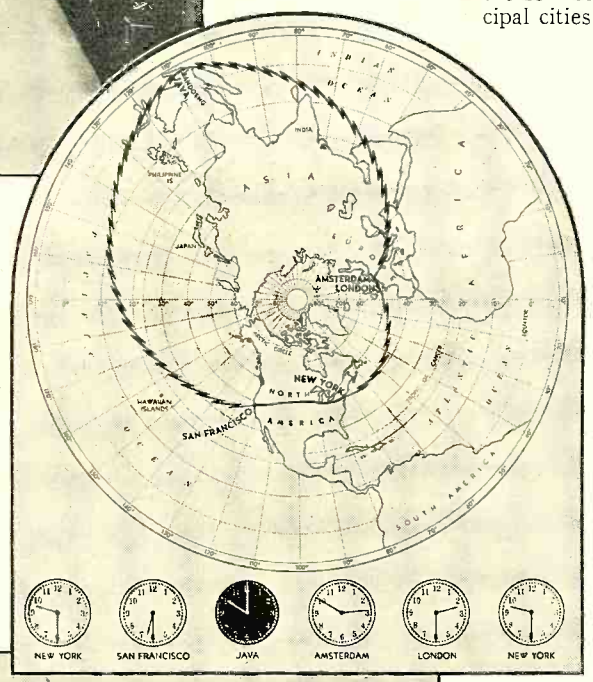
*The radio-telephone transmitting station at Lawrenceville, New Jersey, the American terminal of the transatlantic radio telephone link, where human voices are put on radio waves for transmission to the European terminals, where they are again "captured" and made to travel along telephone wires*





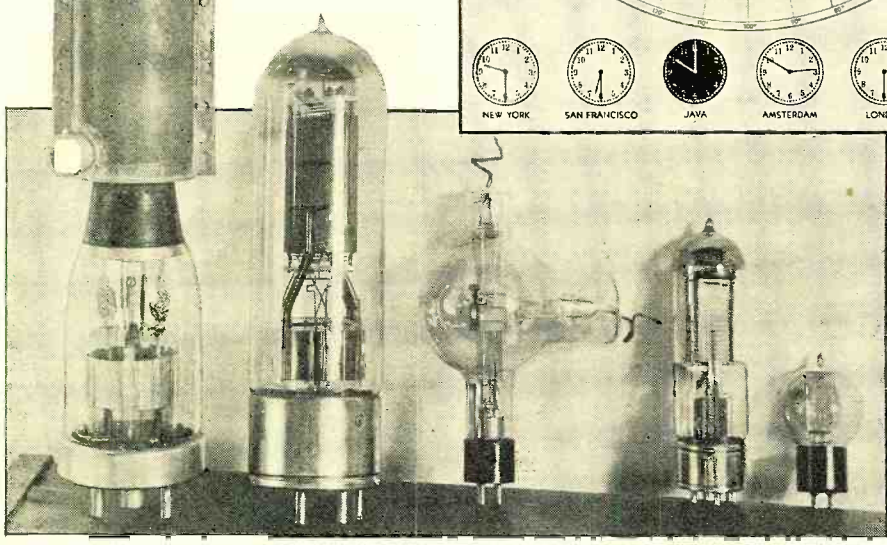
TRANSPACIFIC

*Radio-telephone transmitter at Dixon, California. At left: The transmitting panels. Right: The power control board*




CIRCLES GLOBE

*Right: Path of first two-way telephone message around the world. Clock diagrams show different times, day and night, signals passed through on their world flight*



TUBES USED FOR TELEPHONY

*This group of vacuum tubes are the various types employed for transmitting telephone messages, by radio, from the American stations to different parts of the world. Left to right, the tubes are: type 240A, 10,000 watts; type 212D, 250 watts; type 260A, 75 watts; type 248A, 50 watts and type 205D, 5 watts*

radioed voice is measured by the world.

And now, with a score and one years past since that eventful test, about 93 percent of the world's telephones are available on your home instrument. Consistently, through the years, borrowing on all the great improvements to the radio art, the service became more and more reliable until the process of calling London, Africa or Java is not thought more of a wonder than calling a neighbor a few doors away.

## Service Established

Commercial transatlantic telephone service does not, of course, date back to the initial 1915 tests. The achievements of later years' experimenting contributed to the launching on January 7, 1927, of the first commercial telephone service between the United States and Europe. It was on that day that the London service was opened. This joined, by human voice, the Old World and the New with two-way phone service. And, today, with still added improvements available, overseas radio-telephony links every continent.

All other extensions of the system were applied gradually. The service from the U. S. A. to London was soon available to all of the British Isles. In 1928, service was opened, via the London station, to many parts of Belgium, Holland, France, Germany, Sweden, Norway, Denmark, Switzerland, Spain, Hungary, Czechoslovakia and Austria. Also, this same year, extension to Africa was achieved when the overseas radio service reached Ceuta in Spanish Morocco, Africa.

In 1930, a great stride was made when the South American link was added and the service was made available to principal cities in Argentina, Chile and Uruguay. The following year saw the addition of Java, Sumatra, Bermuda, the Canary Islands and Hawaii to the world roster of the service. In 1933, the Philippines, the Canal Zone and Central American nations were added to the list. The next year saw the addition of Japan to the circuit.

## Now World-Wide

Thus, in less than a decade since the start of commercial transoceanic service, the world had been encircled by the radio-telephone. A recent event that demonstrated the conquering of early obstacles was the impressive round-the-world conversation between Walter S. Gifford, president of the American Telephone and Telegraph Company, and T. G. Miller, head of the firm's long lines department. The pair took part in a novel test to demonstrate the importance of the vacuum tube in making practical globe-encircling radio-telephone connections.

Gifford and Miller sat fifty feet apart for the unique test. Gifford's voice traveled west and reached Miller's ear from the east while Miller's utterances journeyed eastward and arrived from the west. In each of the globe-encircling circuits, 490 vacuum tubes were employed—*a total of 980 for the two-way talk!*

## 1000 Vacuum Tubes

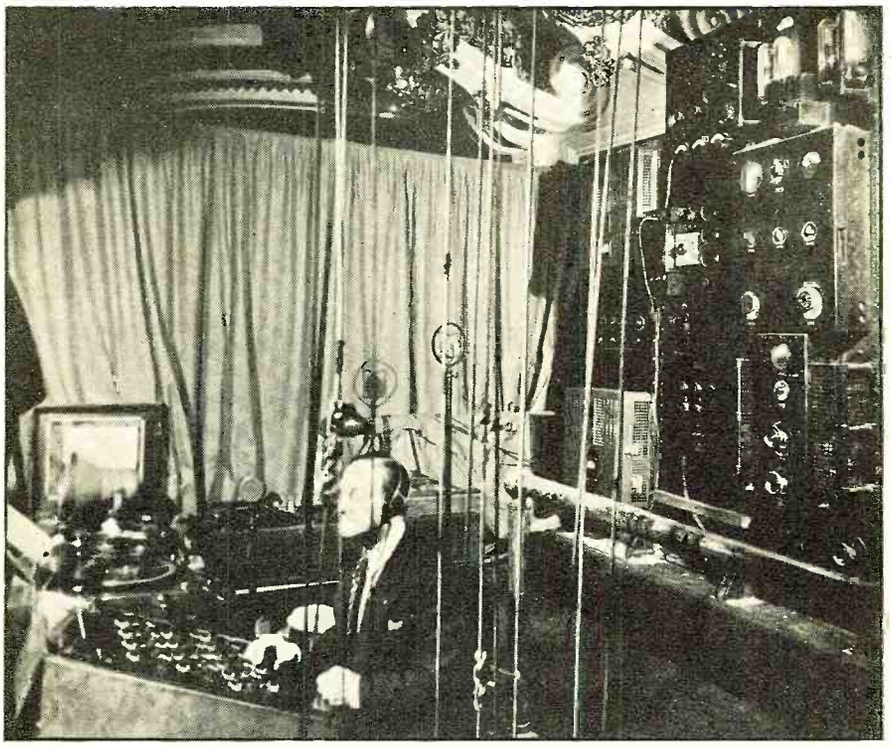
Using almost 1000 tubes for a conversation seems startling. But what a huge task they performed with definitely assured results! A quantity of the total number of tubes was in telephone repeaters between New York and San Francisco. Others were in the special radio-telephone transmitting and receiving stations employed in the hook-ups. Approximately 85 percent of the distance around the world was covered by radio-telephone, the remaining 15 percent by land lines.

The tubes ranged from some no bigger than the average home receiver uses to the giant, water-cooled metal transmitting valves. Electric waves, traveling by wire or radio, diminish in strength or power with distance. Hence, vacuum tubes (*Turn to page* 693)

# WHAT'S *NEW in* RADIO

Every radio man wants to know about new receivers, new amplifiers, new tubes and new equipment and the following pages give you information on such developments

*By* **W. C. Dorf**



VACUUM TUBE MAGIC BEHIND THE SCENES

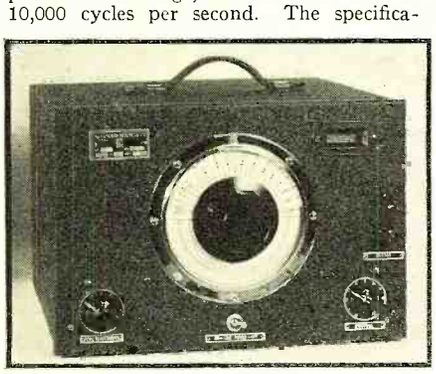
*From his vantage point in a special box, this God of Sound works the elaborate controls which regulate the vacuum-tube, amplifiers that create special sound effects for the mammoth JUMBO show. By manipulating the ropes in the foreground, he relocates the microphones about the circular stage*

### Latest Tuning-Indicator Tube

The National Union Radio Corp. introduces a new cathode-ray tuning indicator tube bearing the type number 6G5. The outstanding feature of the tube is the fact that the triode portion has a variable-mu characteristic which permits the application of a.v.c. voltage, which means that an appreciable movement of the tuning ray shadow is produced on weak signals but an overload on the strong signals is prevented. In brief, the operating voltages for this tube are as follows: heater voltage 6.3, heater current .3 amp. and plate supply and target voltage 250 volts maximum.

### Beat-Note Audio Oscillator

The Clough-Brengle model 79 beat-note audio oscillator is designed to generate a pure audio voltage, variable from zero to 10,000 cycles per second. The specifications show the output to be 27 volts across 5000 ohms, and uniform within 2 decibels over the frequency range of 50 to 10,000 cycles.



### Crystal Microphone for General Use

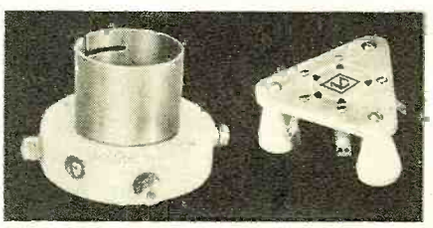
Something different in microphone design is introduced by the Brush Development Company in their model BR2S spherical sound-cell unit. It is universally applicable to public-address work, broadcasting stations, police and amateur transmission. The diameter of the sphere is 2⅜ inches. The microphone is non-directional, has a wide frequency response and output level minus 66 db. Although the instrument is small and light in weight, it is ruggedly constructed.

### New Loudspeakers

The Oxford-Tartak new line of reproducers features the Chromavox series. The features of this speaker are: high fidelity for balanced color-tone, curvilinear diaphragm of inertia-counteracted construction, three-point balanced spring suspension, moisture-proof coil mountings, universal output transformer and high power-handling capacity.

### Recording Equipment

The Universal Microphone Company is producing a new floating head for their professional recording machines to make it possible to record on coated discs regardless of irregularities or rough surfaces on the records. This new unit has adjustments for changing both the vertical and the lateral angularity so as to permit a very fine adjustment of pressure on the stylus.



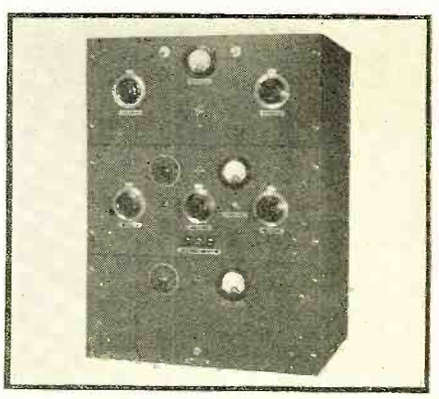
### Two New Sockets

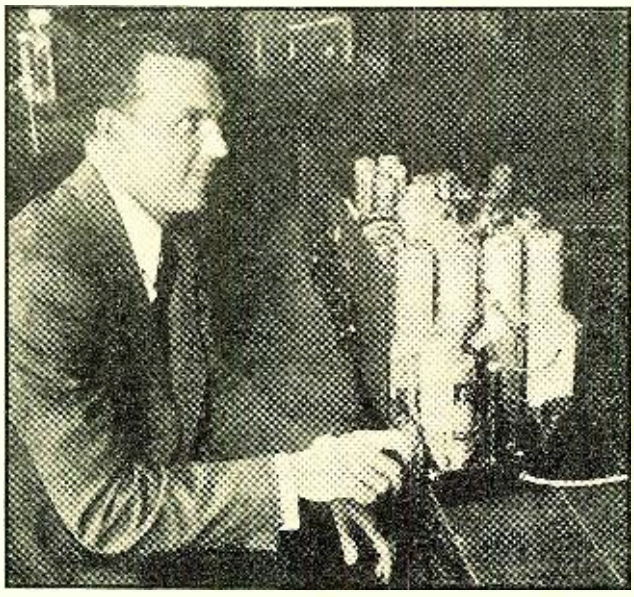
The National Company introduces "Steatite-Isolantite" sockets in several types to meet the requirements of the new transmitting tubes. The socket shown at the left in the illustration is the 50-watt type with metal shell to take care of the new RCA-838 class B modulator. The "Jumbo Isolantite" type socket mounted on stand-off insulators shown at the right is made for the new RK-28 and RCA-803 high-power r.f. pentode tubes. This socket features steel spring reinforced non-turning contracts.

### 40-Watt Amateur Transmitter

The RCA model ACT-40 transmitter has been designed to meet the requirements of the amateur desiring a complete low-powered rig for either c.w. or phone opera-

(*Turn to page* 696)





## Two Jersey Experimenters Explain an Improved Method for—

# Taking the NOISE

**A REPORT on the RADIO NEWS investigation of the new and widely publicized "grid-blocking" system of noise suppression, with a description of a noise-reducing adapter which anyone can build, together with a detailed analysis of the results that may be expected from it—or from any similar units which have recently made their appearance.**

*By* C. Watzel *and* W. Bohlen

THE most baffling problem in radio still remains that of eliminating "noise." The modern radio receiver provides ample selectivity for all requirements; internal tube noise has been reduced to a negligible value, and the sensitivity of the average receiver produced today leaves little to be desired.

The day is definitely drawing closer when we will be able to incorporate an appreciable amount of noise suppression in our receivers. So far as certain types of noise are concerned, this day has actually arrived. The noise suppressor adapter to be described in this article is very definitely a step in the right direction and, as demonstrated in the tests described here, this unit was able in actual practice to eliminate automobile ignition noise and other similar noises which, without the adapter connected, completely ruined reception.

### Type of Interference

Recently the introduction of a new metal tube, the 6L7, has brought about new possibilities for noise suppression circuits and already several developments have been published which incorporate this tube. Rather wide publicity has been given to these developments, with the result that public interest is reaching white heat. For this reason RADIO NEWS encouraged an independent investigation of the possibilities, but before going into a discussion of this system and results obtained it is first desirable to consider the types and characteristics of electrical disturbances which cause radio interference.

Electrical disturbances will affect a radio receiver as waves of high amplitude and low decrement and must be so treated. There are two general types of "man-made" noise. The first is of the "spark-gap" type which we will call "Type 1" and is caused by devices such as automobile spark plugs, doorbells, etc., which produce a spark or series of sparks in operation. Key-clicks and ultra-violet ray machines comes under this classification. This Type 1 noise, as shown on an oscillograph screen, is characterized by a more or less uniform series of pulses having very high amplitude but each lasting a thousandth of a second or less. Some of these devices produce also an additional set of noise peaks of irregular sequence and amplitude which may be called "whiskers." Fortunately, the amplitude of these "whiskers" is low compared to that of the main noise peaks and they are generally much below the signal level.

### Complex Noises

"Type 2" disturbances are caused by motors and are more complex in nature. The main noise peaks are wide and filled in between with a solid "hash" of relatively large amplitude. This "hash" is oftentimes much louder than the signals and causes strong continuous interference, along with the more regular noise peaks.

The radio set itself tends to lengthen the duration of these peaks. The speaker is the worst offender. When actuated by these short pulses the diaphragm continues vibrating after the pulse has stopped. The r.f. and audio circuits will also prolong the impulses. The amplitude of the noise peaks is

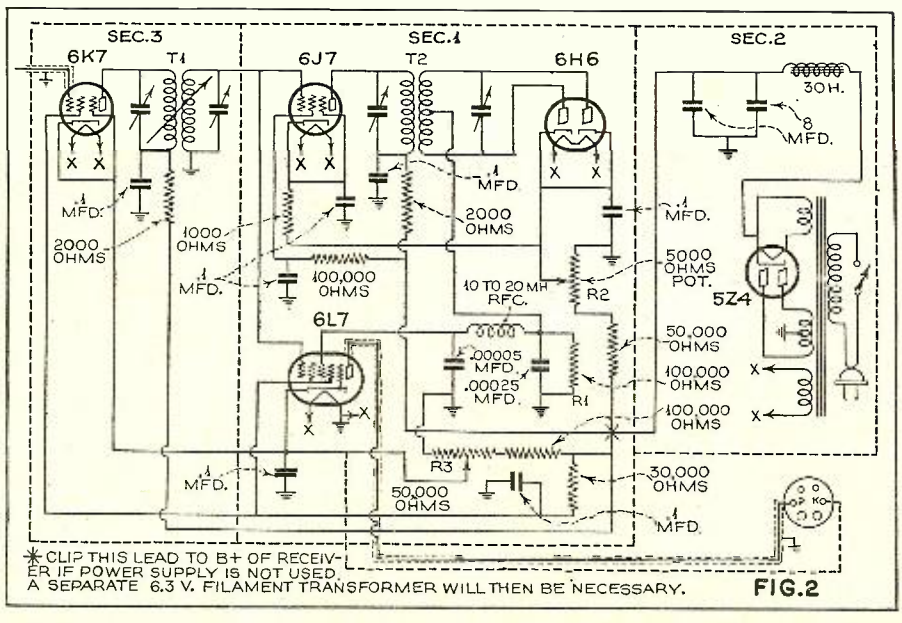
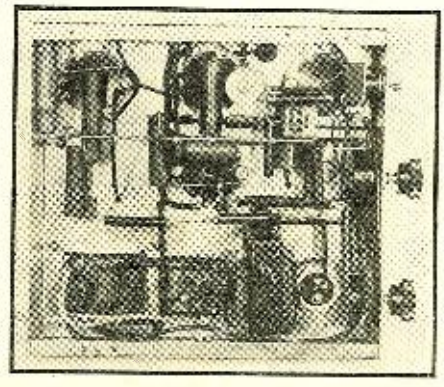


FIG.2



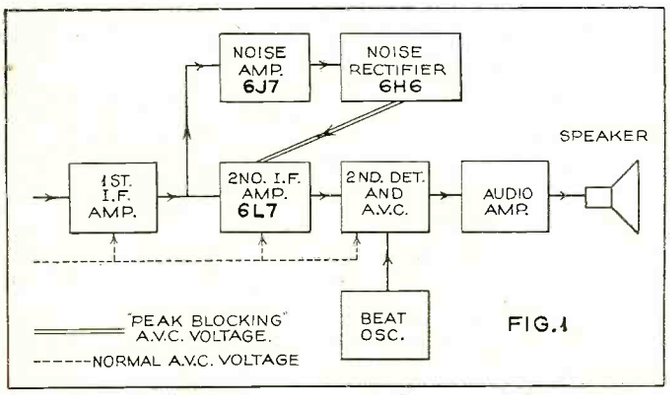
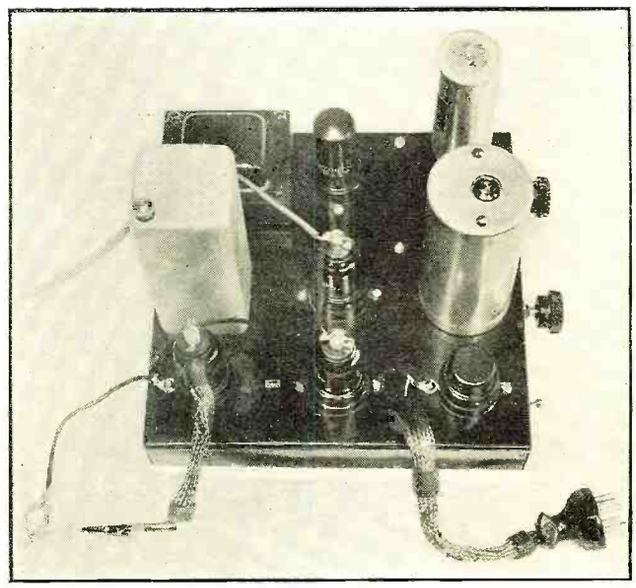


FIG. 1



# *out of* RADIO

often ten or twenty times that of the signal. With the gain control set for good reception of the signal, the noise peaks overload the grids of the various receiver stages, causing blocking and cross-modulation.

### Amateur Problems

One very important point to bear in mind in any study of radio noise is that in the majority of instances a signal is understandable even when the noise voltage is several times as high as the signal voltage. Ignition noise, for instance, will not completely submerge a signal unless its value is many times that of the signal itself. Of course a broadcast program would lose its entertainment value long before the spoken word would lose understandability, but we are primarily interested in this investigation from the standpoint of the DX listener and the amateur operator, and to such understandability is the primary requirement. It should be added at this point that nothing has been developed to date which will eliminate noise to the degree required for high-quality reception of entertainment in a noisy location.

### The Peak-blocking Method

The adapter unit to be described in this article makes use of what is known as the "peak-blocking" method. Incidentally, no claims are made for the originality of this circuit, as it is in several respects similar to other circuits that have been published within the past month or two, notably that of James Lamb, which was described in the February issue of *QST*.

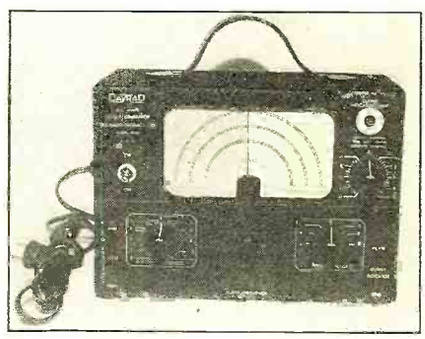
*A request to* QST *for permission to reprint Mr. Lamb's circuit, with full credit to Mr. Lamb and to* QST, *was refused by the editors of that publication. This refusal came as a distinct surprise, especially as the publication of the circuit was planned primarily as an act of editorial courtesy.*—THE EDITORS.

In the "peak-blocking" system the noise peaks are applied to a rectifier tube and the resulting negative d.c. voltage is applied to one of the elements of an r.f. or i.f. tube in such a manner as to block this tube partially or wholly during the infinitesimally small time-periods of the noise peaks. The result is that instead of, say, 200 noise peaks a second to cause an R9-plus rattle on a weak signal, there are 200 periods of silence, each lasting only a thousandth of a second or less—but since the ear cannot detect short periods of silence, the result, as far as the listener is concerned, is that the noise has been removed and the signal left undisturbed.

This blocking action is actually a form of instantaneous automatic volume control. The usual a.v.c. system is relatively slow in action and is designed to hold signals at or near a constant volume. But for "peak-blocking" an instantaneous a.v.c. action, as fast as the noise pulses themselves, is necessary in order that the "period of silence" will be so short as to be inaudible. This requires that in practice the a.v.c. voltage must be applied to an element of the tube that will control its gain but require little or no r.f. filtering. The new type 6L7 metal tube solves this problem. It is a screen-grid, variable-mu r.f. pentode similar to the 58 or 6D6, but has an extra "injector grid" which, while controlling the gain of the tube in the same fashion and with the same control (*Turn to page* 704)

## *All-Wave* SIGNAL Generator

### *By* Samuel Egert



THE design and production problems involved in making a satisfactory all-wave test oscillator present many difficulties. The trend toward wider frequency range in all-wave receiver design requires a corresponding increase in waveband coverage in the signal generator. If harmonics are used to extend the range, one must resort to mental gymnastics to determine the proper setting, wasting time and introducing a possibility of error. Direct-reading dial calibration is also desirable since the large number of alignment points in all-wave receivers would otherwise necessitate frequent examination of calibration charts.

The above points have received particular attention in the new Dayrad Model 30 All-Wave Signal Generator which is shown in the accompanying photographs. This instrument has an extraordinary frequency range, covering all frequencies from 60 megacycles to 60 kilocycles without resorting to harmonics.

The schematic circuit of this oscillator is shown in Figure 1. The apparatus employs three tubes, the filaments of which are wired in series. A 37 connected as a diode serves as a half-wave rectifier for a.c. line operation. The power transformer incorporates an electrostatic shield to minimize r.f. radiation from the power cord and line. Another 37 is used for the audio oscillator, giving a 400-cycle note, and pin-jacks are provided so that the audio oscillator may be used separately for audio circuit testing. A 6C6, connected as a triode to give greater mutual conductance, functions as the r.f. oscillator in a series-feed Hartley circuit with plate modulation. The wide frequency range is covered with but 7 coils through the use of a 460 mfd. (*Turn to page* 701)

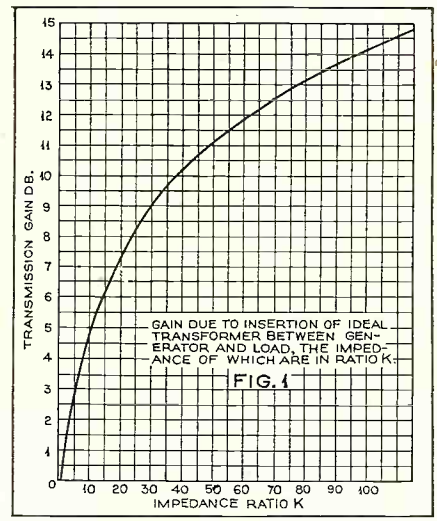
*Some Standard Solutions of*

# TRANSMISSION PROBLEMS

Refreshing your mind on some simplified solutions of problems of electrical transmission of energy from one circuit to another as applied in impedance matching, etc.

Frederic Siemens

*Part Two*




AN ideal transformer may be defined as a transformer which neither stores nor dissipates energy. Using this definition, it is a simple matter to find the gain to be effected by inserting an ideal transformer between a generator and a given load as a function of the ratio of the load impedance to the generator impedance. Let the impedance ratio of the transformer be given by:

$$K = \frac{N_S^2}{N_P^2} = \frac{I_1^2}{I_2^2} = \frac{Z_2}{Z_1}$$

Then the current delivered to a resistance load by a generator coupled to the load through an ideal transformer having the proper ratio is:

$$I_2\sqrt{K} = I_1$$

The ratio of this current to that which would be delivered to the load with the transformer removed may then be taken as a measure of the gain that will obtain if an ideal transformer is inserted between generator and load. That is, the ratio of the currents through the load in the two cases is:

$$T = \frac{K+1}{2\sqrt{K}} \qquad (5)$$

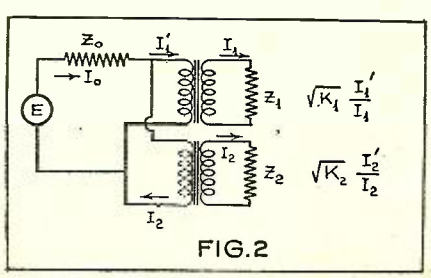
And the power ratio in the two cases is:

$$T^2 = \frac{(K+1)^2}{4K} \qquad (6)$$

Equation (6) serves as a basis for determining the gain to be had by inserting an ideal transformer between any two circuits, the impedances of which are known. Figure 2 is a curve showing the gain to be had by the insertion of a perfect transformer between generator and load and is obtained from (6).

Again this same result may be arrived at by resorting to fundamentals. Thus, suppose that the generator impedance were resistive and of value A and the load impedance were resistive and of value Y and that:

$$Y = 3A$$




Then if a perfect transformer of impedance ratio 3 were inserted between generator and load, maximum power would be delivered to the load, that is:

$$P_1 = \frac{E^2}{4A}$$

If no transformer is used, the delivered power is:

$$P_2 = \frac{3}{16}\,\frac{E^2}{A}$$

Consequently the insertion of the transformer will increase the power delivered to the load by 25% or about 1.5 db. Of course, all physical transformers have some transmission loss (of the order of .25 db. usually, unless it is designated to carry an appreciable direct current in one of the windings) and the actual gain due to the insertion of the transformer will be less than the calculated gain by an amount equal to the loss of the transformer.

Certain approximations may be made without material loss of efficiency, and in the interest of economy it is occasionally necessary to use standard equipment. Thus, impedance matching only insures that maximum power will be delivered to the load. It appears, however, that an impedance mismatch of two-to-one involves a loss of only about 10% or 1 db. This is of the same order of magnitude as the loss in an impedance-matching transformer and consequently, is of no particular consequence since there would be little if any gain resulting from the use of a transformer unless the mismatch was greater than two-to-one.

The use of transformers in series or parallel to deliver different power levels to different groups of loudspeakers or headphones finds numerous applications in hospital and hotel radio installations. If sufficient signal energy were available it would of course be taken care of by ordinary resistance volume controls or resistance pads. It occasionally happens, however, there is no great surplus of signal energy and in such cases it is more economical to use a few transformers than to supply an additional or a larger amplifier. The transformers used must of course be designed for the conditions under which they are to operate, but this usually presents no great difficulty to the designer.

For cases in which it is desirable to use transformers in series or parallel to feed loads at different levels, it is easily shown that there is an optimum transformer ratio which is a function of the number of loads to be fed. It is also a fact that no more loss results from the use of a number of transformers with their primaries connected either in series or parallel than that caused by the use of a single transformer.

As a first case, consider two transformers connected in parallel to a single source. Let the load impedances be $Z_1$ and $Z_2$ and let the generator impedance be $Z_0$. For perfect transformers:

$$I_1' = I_1\sqrt{K_1} \text{ and } I_2' = I_2\sqrt{K_2}$$

Where $I'_1$ and $I'_2$ are the primary currents of transformers 1 and 2 respectively, $I_1$ and $I_2$ the secondary currents, and $K_1$ and $K_2$ the impedance ratios, see Figure 2. The generator current $I_0$ will be:

$$I_0 = I_1\sqrt{K_1} + I_2\sqrt{K_2}$$

and the generator voltages E can be expressed as:

$$E = I_0\left[\frac{Z_0(K_2Z_1 + K_1Z_2) + Z_1Z_2}{Z_1K_2 + Z_2K_1}\right]$$

Substituting for $I_0$:

$$E = (I_1\sqrt{K_1} + I_2\sqrt{K_2})\left[\frac{Z_0(Z_1K_2 + Z_2K_1) + Z_1Z_2}{Z_1K_2 + Z_2K_1}\right]$$

Obviously optimum power transformation will obtain if $dE = 0$. Differentiating E with respect to $K_1$ and $K_2$, the variables in this case, we have:

$$\frac{dE}{dK_1} = \left[\frac{Z_0(Z_1K_2 + Z_2K_1) + Z_1Z_2}{Z_1K_2 + Z_2K_1}\right]\frac{I_1}{2\sqrt{K_1}} + (I_1\sqrt{K_1} + I_2\sqrt{K_2})\left[\frac{Z_0Z_2(Z_1K_2 + Z_2K_1) - [Z_0(Z_1K_2 + Z_2K_1) + Z_1Z_2]Z_2}{(Z_1K_2 + Z_2K_1)^2}\right] = 0 \qquad (7)$$

$$\frac{dE}{dK_2} = \left[\frac{Z_0(Z_1K_2 + Z_2K_1) + Z_1Z_2}{Z_1K_2 + Z_2K_1}\right]\frac{I_2}{2\sqrt{K_2}} + (I_1\sqrt{K_1} + I_2\sqrt{K_2})\left[\frac{Z_0Z_1(Z_1K_2 + Z_2K_1) - [Z_0(Z_1K_2 + Z_2K_1) + Z_1Z_2]Z_1}{(Z_1K_2 + Z_2K_1)^2}\right] = 0 \qquad (8)$$

Multiply (7) by $Z_1$ and (8) by $Z_2$ and subtract:

$$\frac{K_2}{K_1} = \frac{I_1^2Z_1^2}{I_2^2Z_2^2} \qquad (9)$$

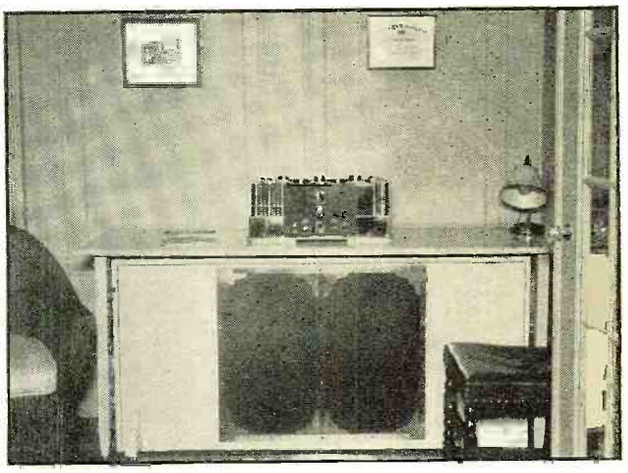
Substitute (9) in (7) and solve for $K_1$ to obtain:

(*Turn to page* 683)

# *Checking Up On A* 23-TUBE SUPERHET

## *(The Scott All-Wave High Fidelity Receiver)*

*By* S. Gordon Taylor
*and*
Laurence M. Cockaday



THE TEST SET-UP IN THE LISTENING POST

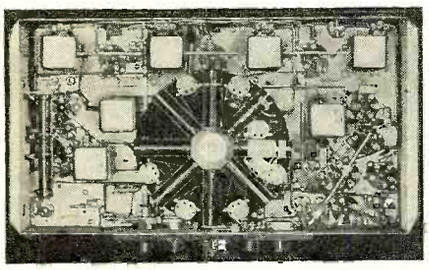
*Here is the 23-tube receiver set up on the test bench during "on the air" tests conducted for the benefit of* RADIO NEWS *readers. The grill work in the large baffle underneath the test bench covers the two high-frequency speakers and the large auditorium speaker. The power unit is on a shelf underneath the receiver*

THE purpose of this series of two articles is to give our readers first-hand information on the technical design and the reception results on this receiver obtained in our Listening Posts by unbiased observers. Continual requests for this information have been received at the editorial offices and the authors paid a visit to the Scott Radio Salon at Rockefeller Center, interviewed Mr. Scott and obtained a standard chassis for the tests. The first article describes the receiver after a full perusal of the manufacturer's technical data and a second article will advise our readers of results obtained during intensive reception tests at our various locations.

ANYONE who is interested in real high-fidelity reception on both the broadcast and short-wave bands and who needs maximum sensitivity for DX work as well as variable selectivity, ranging continuously from wide-band characteristics all the way down to hair-splitting sharpness, will be more than interested in the Scott full-range high-quality receiver. This job, which is a 23-tube superheterodyne, is really made with a watchmaker's skill and care. We have taken it apart and examined every detail, and there is not even a remote corner of the chassis where this is not evident.

PRECISION WORKMANSHIP

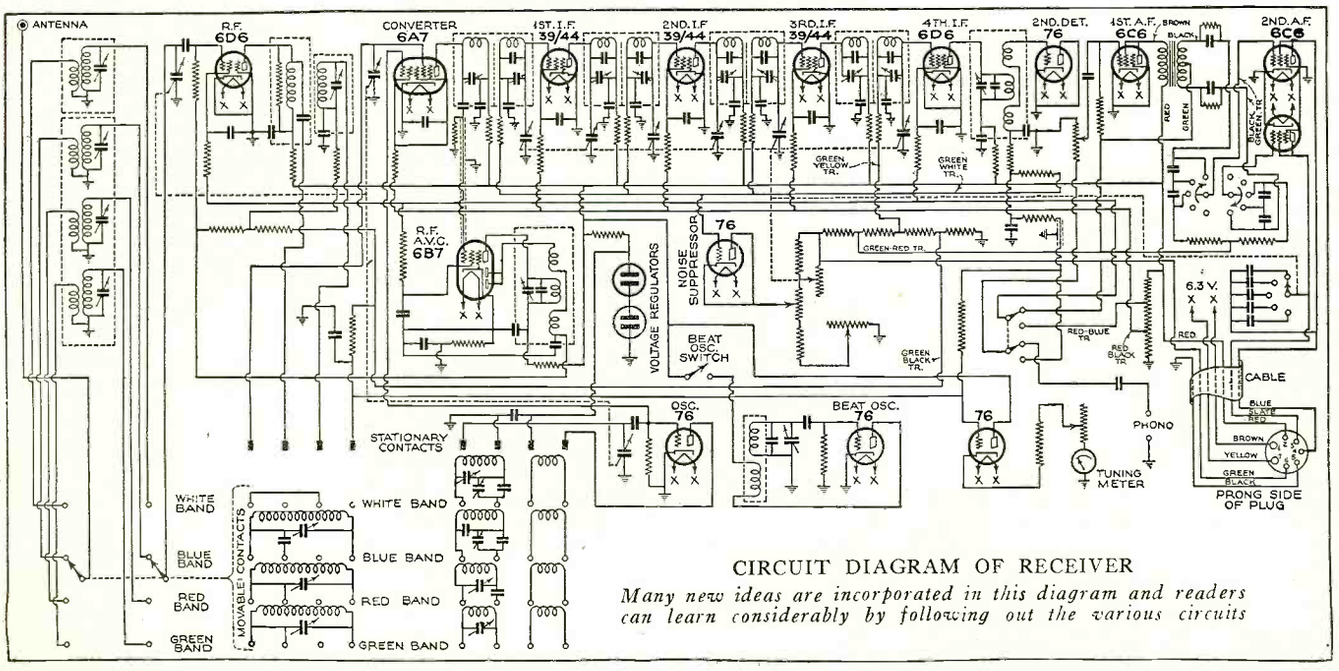
*This beneath-chassis view of the receiver shows the high-standard workmanship applied to even the hidden parts of this well-engineered and manufactured all-wave receiving set. This view is taken with the bottom shield removed*



The set covers the wavelength range from 13 to 555 meters. It is completely shielded from the pick-up of external signals and also the circuits of the receiver are isolated from each other, an added precaution for eliminating instability and guaranteeing maximum sensitivity.

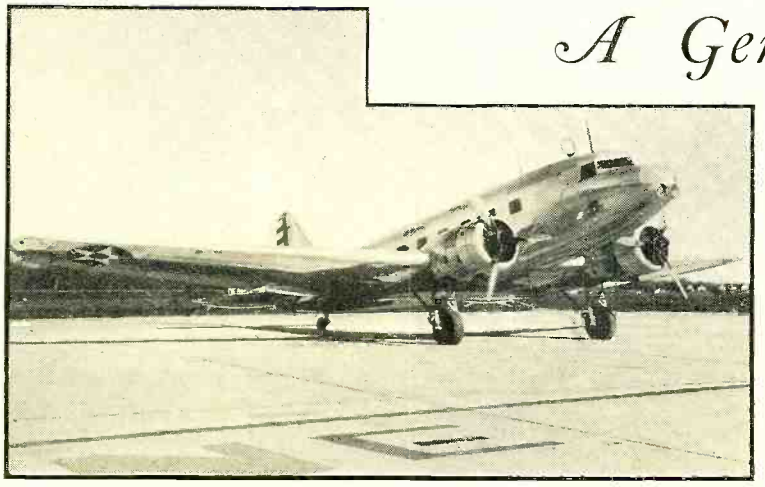
### Design Fundamentals

The wave-bands are divided into four groups. The first wave-band covers the frequencies from 1530 to 540 kc. for receiving regular broadcast stations. The second wave-band covers the frequencies from 1530 to 4000 kc., covering the wavelengths employed by police, airports and the 160- and 80-meter amateur bands. The third wave-band covers the frequencies from (*Turn to page* 703)




CIRCUIT DIAGRAM OF RECEIVER

*Many new ideas are incorporated in this diagram and readers can learn considerably by following out the various circuits*



THE FLYING GHQ "OFFICE"

*The twin-motored Douglas monoplane that now becomes the flying "brain" of the aviation battle fleet, from which issue commanding orders from the air.*

# A General Takes to the RADIO

This latest development of the idea of a flying headquarters, munication to fleets of planes in groups. For the first time a

*By* Hoyt

THE first flying radio flagship in the world is ready here today to roar into the air and carry a commanding general into the thick of battle where he can direct and coördinate his forces to sweep enemy planes from the sky. The flagship, a twin-motored Douglas, was built and equipped for radio for Major-General Frank M. Andrews, commanding general of the GHQ Air Force. Instead of an earth-bound officer, Maj.-Gen. Andrews now becomes an integral part of the fighting units, issuing orders on the battle front based on personal observation and radio information coming into his flagship.

Now, for the first time in history, it is possible for the commanding general of the air force to direct his manœuvers by radio in precisely the same way an admiral directs his battleships, cruisers, airplane carriers and submarines upon a given objective. This flying flagship is not a fighting unit in itself, however; it carries no armaments. But it has a top speed of 205 miles an hour, a cruising speed of 175 miles and a service ceiling of 23,200 feet—well out of range of anti-aircraft guns.

## Powerful Defense Weapon

The significant point of this development is that the army apparently is placing an increasing amount of faith in radio-equipped aircraft to stop aircraft, instead of anti-aircraft artillery. The second point is that this innovation may end the adage, "Generals die in bed," because, despite the speed of this flying flagship and the protection it is given by pursuit planes, there is a real danger in aerial warfare. Major-General Andrews realizes the danger. But he believes the advantage of being in a position to supervise and coördinate the defense of the country more than offsets the personal danger to the commanding officer.

The flagship is equipped with an operating room for the two radio transmitters, a compartment for the commanding general, a larger one for Chief-of-Staff Col. Hugh J. Knerr, and for the information chief, supply chief and tactics chief. In addition, there is a buffet lunchroom, lavatory and baggage compartment.

The chief value of the flying flagship is in its mobility. With the high cruising speed it can cover a large territory and allow the commanding general to personally observe changing conditions. Through the modern radio facilities at hand, he can keep in touch with ship-and-shore stations and other wings of the air force over a wide area.

## Mobility and Speed

In other words, adoption of the flying radio flagship gives a mobility to GHQ far superior to that ever before exercised by any high command. Maj.-Gen. Andrews, for example, could personally direct defensive action at the entrance of the Chesapeake Bay and less than two hours later join a wing over New

IN THE RADIO CONTROL ROOM

*Private Inman tuning in a message from a scout plane as he sits in the radio shack of the flagship. In the background can be seen the various other transmitting and direction-finding apparatus.*

JUST IN CASE!

*Major Eugene L. Eubank, commander of the headquarters squadron, inspecting the "lifeboats" of the flying flagship. These parachute packs are attached to a light harness when used.*

# Air in the First FLAGSHIP

United States Air Force establishes the completely equipped with radio, for com- the air, as well as to other land headquarters General commands battle fleets from the air

## Barnett

"THE GENERAL'S ORDERS" BY RADIO

*Major General Frank M. Andrews, Commanding General of the GHQ Air Force, shown in his private office aboard his flying flagship handing an order to Private Hugh Inman, Radio Operator.*

York City in a bombing attack on enemy naval vessels. At the same time he would be in communication with land forces and airplanes in the Chicago area. This multi-communication radio system is made possible by the two radio transmitters mentioned previously.

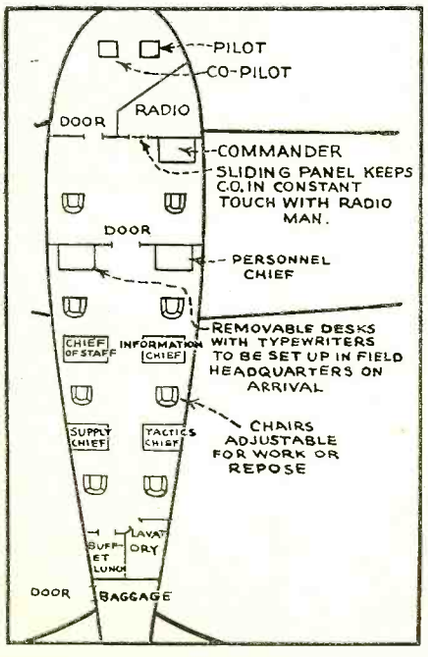
The first, or "command" radio transmitter and receiver installation is operated by the pilot or co-pilot. It has a normal reliable range of 25 miles. This range is limited deliberately so that orders issued to other planes in the immediate vicinity will not be overheard by receiving sets miles away, possibly within the enemy's zone. The limited range also prevents interference in other zones of activity where wing commanders may be issuing orders during combat manoeuvers.

### 750-Mile Radio Range

The larger radio transmitting and receiving unit, called the "liaison" unit, has a normal reliable range of 750 miles and is operated by the radio operator.

The radio room has a door directly behind the co-pilot's seat. The commanding general's office is directly behind the co-pilot's seat. Near the door joining the radio-pilot units and the office of Maj.-Gen. Andrews, a sliding panel within arm's length keeps the C.O. and the radio operator within arm's reach of each other.

With this arrangement, the radioman can hand incoming messages through the small window to Maj.-Gen. Andrews. The general can write an answer or an order which will be sent over the big liaison transmitter or handed to the co-pilot for transmission over the command transmitter. The (*Turn to page* 695)



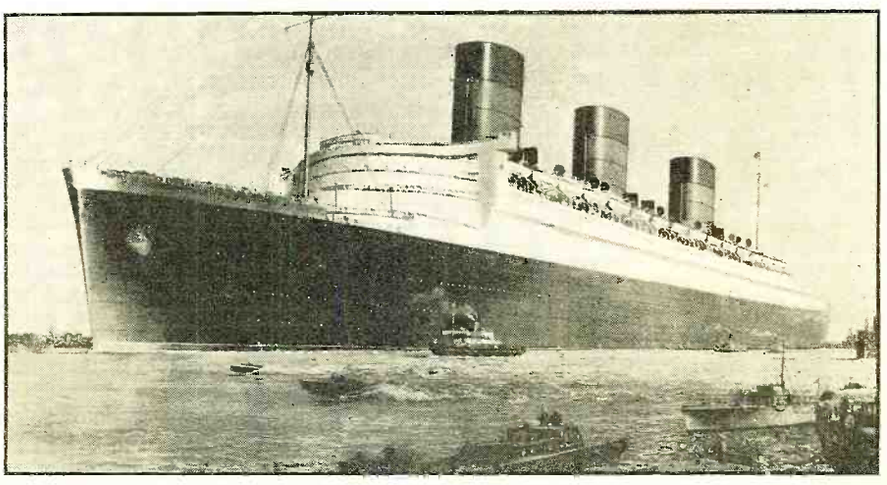

# RADIO EQUIPMENT *for the* "QUEEN MARY"

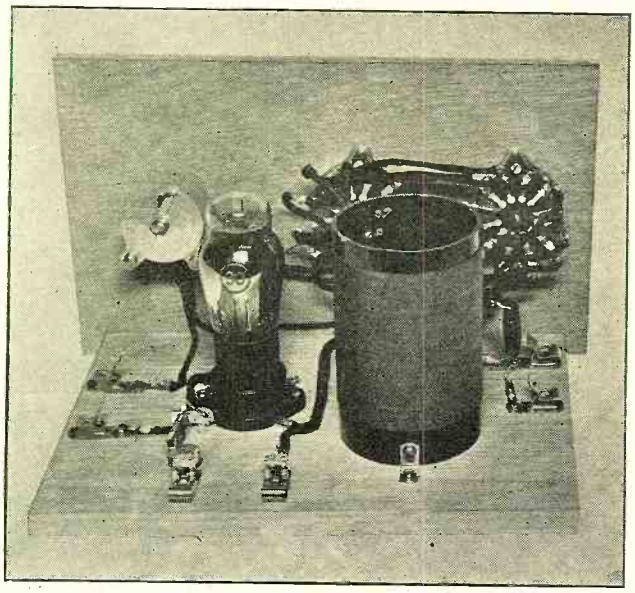
## *By* Samuel Kaufman

ONE of the most elaborate floating radio stations will be the boast of the new Cunard White Star express liner *Queen Mary* when she steams into New York harbor this spring on her maiden voyage. The national pride vested by Britishers in the gigantic vessel can well be understood if all details of the ship's construction and equipment are as thoroughly attended to as the ship's radio quarters.

A total of thirty-two frequencies will be utilized by the *Queen Mary*. Eleven of these will be used for short-wave communication, nine for radio-telephone, seven for long waves and five for medium waves. There will be a minimum of nine antenna systems consisting of one main-wire span of 600 feet, one auxiliary 150-foot span, three short-wave aerials, three receiving strands and one emergency wire.

It is a fair claim of the line that the shipboard equipment is comparable to apparatus usually associated with commercial land stations. The equipment, instead of being centralized in a common radio room, is split up over various parts of the liner. The receiving and transmitting sections are 350 feet apart to permit simultaneous reception and transmission with less probability of mutual interference. (*Turn to page* 698)



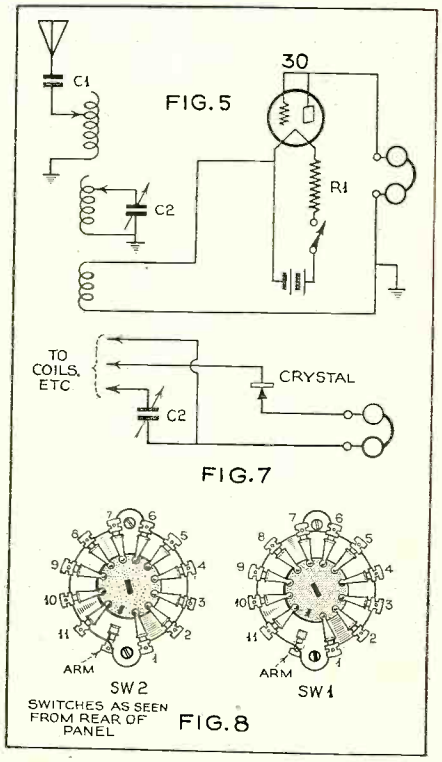


# Practical Construction
# The Radio

This series of articles is presented
desire to obtain a thorough working
those who have some theoretical
the practical experience which is so

## *Part 1—Simple Diode*

***By* John M.**




THIS first article presents constructional details on an efficient receiver of the most simple type, employing a tuned circuit, diode detector and headphones. In addition, a simplified discussion of the theory of operation and of the functions of the various parts is presented. As the series progresses, the model units described will include all types of receivers, also audio-frequency amplifiers, power supply units and just about everything in the line of receiving equipment, all carefully designed for high efficiency.

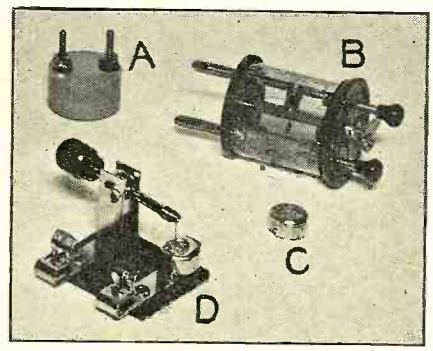
Readers who wish to take maximum advantage of this unusual series will want to build most of the units to be described. If parts from earlier units are again used wherever possible in building subsequent units, the cost can be held to a low figure.

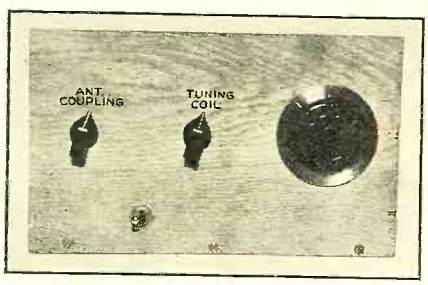
It is recommended that those who follow this series study up on radio fundamentals as they go along. Reading of radio books and periodicals will help materially, or enrollment in a regular radio school or correspondence course will result in a well rounded out training in which are combined both theory and practice.—*The Editors.*

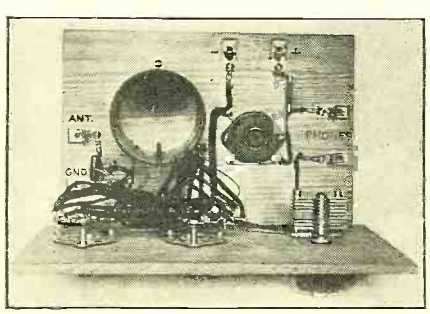
RADIO stations all over the world are sending out radio waves. Just what these waves are, we do not know. We do know, however, that a radio wave has the power to create an electrical pressure in any electrical conductor (such as a wire) and this electrical pressure will cause a current to flow in the conductor. Thus the wave from a radio transmitter causes a minute electric current in any receiving antenna (or other conductor) within its path. The strength of this current will depend on the power of the station, the distance from the station and the length, location and direction of the receiving antenna.

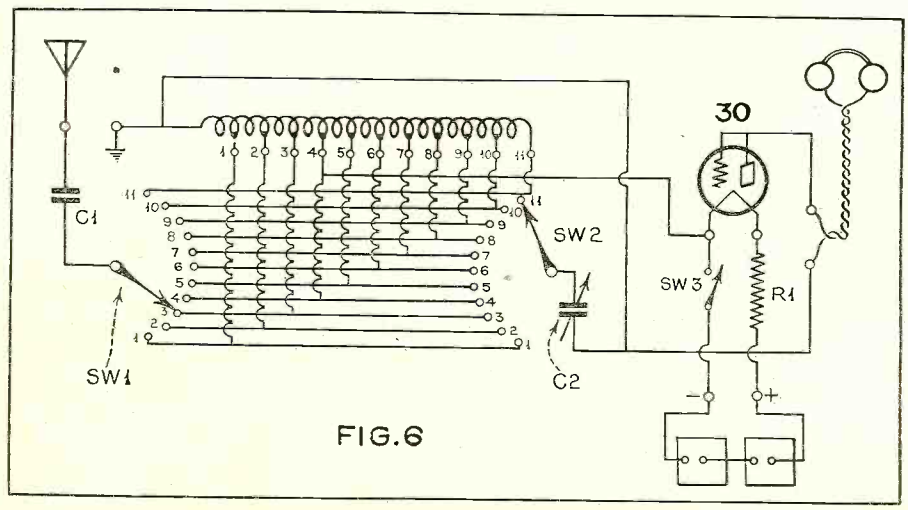
CRYSTAL DETECTORS

*Here are shown several crystal detectors which are suitable for use with the receiver. A: "Philmore" fixed crystal detector; B: German carborundum detector with variable adjustments; C: "Melomite" mounted crystal; D: "Philmore" mounted crystal with holder*



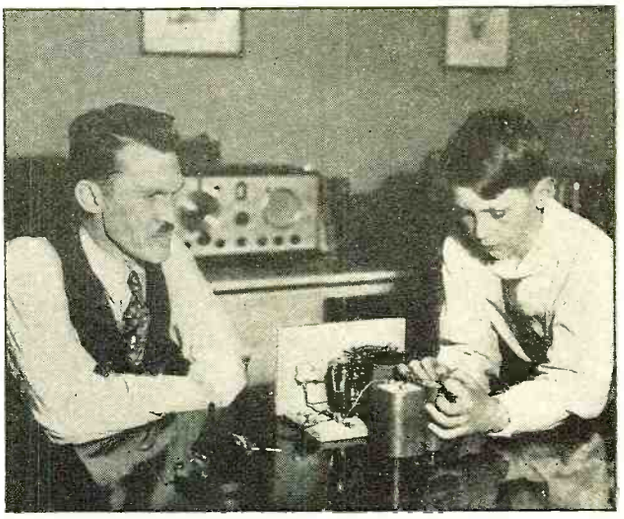
*and Instruction for*

# *Beginner*

for the benefit of beginners who knowledge of radio, and also for knowledge of the subject but lack essential to thorough understanding

## *(or Crystal) Receiver*

**Borst**



THE BEGINNERS OF TODAY WILL BE THE RADIO AUTHORITIES OF TOMORROW

This tiny electric current flows down to the receiver which must convert it back into the original speech, morse code, music, picture, etc., being conveyed by the radio waves. Note that there is no difference in the transmission of telegraph, telephone messages, music or picture. The nature of the wave, the transmitter or the receiver is the same, it is just the translating device (microphone, key, televisor) which differs.

The duties of the receiver are: first, to pick up the small electrical pressures or voltages; second, select the desired signal excluding all others; third, translate the signal into sound (or picture or code message, but in this article let us consider sound only). Before the latter can be accomplished a process, called "detection" must take place.

The natural question will be—what is detection and why is it necessary? Why can't we connect the headphones to antenna and ground and listen for stations? The answer is not so simple.

It is necessary to consider briefly how a radio station works. Most of us are familiar with alternating current or a.c. Any electrical current flowing through a conductor creates an electro-magnetic field around the conductor. If the conductor is coiled up, the field can be concentrated so that the coil will attract iron, nickel or cobalt. This electro-magnetic field represents energy. The energy was supplied by the electrical circuit and now resides in the space surrounding the coil. When the circuit is opened, the field disappears and returns the energy to the circuit by *creating a voltage* or electrical pressure in the coil.

The electro-magnetic field around a conductor which carries alternating current, is constantly collapsing and reversing in direction. It will return its energy to the wire as long as the reversing process is not too rapid. If the reversal occurs frequently (*Turn to page* 698)

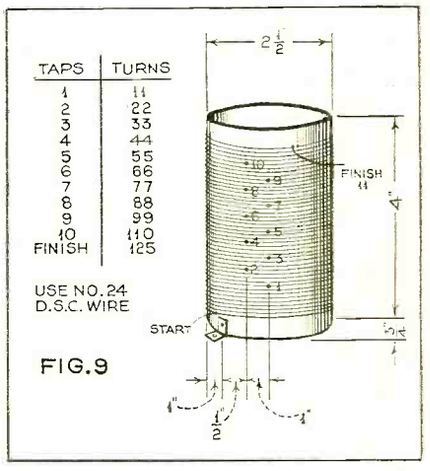



FIG. 9

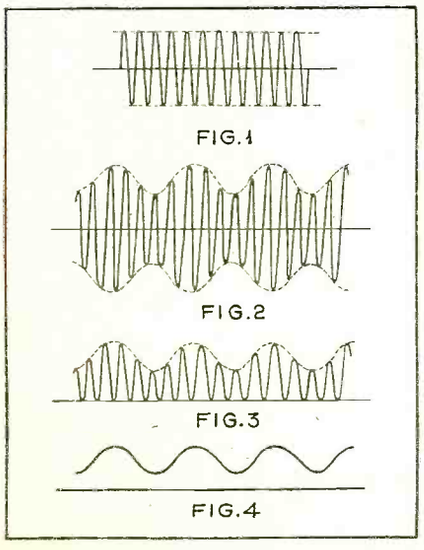


FIG. 1

FIG. 2

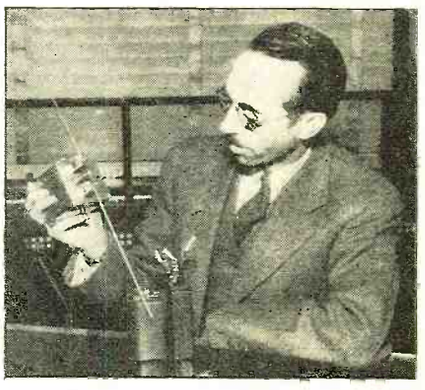
FIG. 3

FIG. 4

*Using*

# Micro-Waves

**By Victor Hall**



A TWO-YEAR search for an efficient radio transmitter capable of being carried in an announcer's coat pocket has yielded a tiny micro-wave set weighing less than a pound and which can easily be held in the palm of the hand. The development of one of the world's tiniest transmitters was announced by Mr. O. B. Hanson, NBC chief engineer. The unit will be employed in broadcasting for relays from out-of-the-way spots where the use of wire microphone connections is impractical.

The transmitter has been used satisfactorily over four-mile distances in early tests. In addition to its use for radio relays, it will be employed for feeding public-address systems from the floors of auditoriums at conventions, fairs, sports meets, etc.

A 3-inch hollow metal cube contains the entire miniature chassis, with two 10-inch rods as antennas. It uses power of two-tenths of a watt. Current is supplied by a special type of 90-volt battery unit. The newest type of miniature "acorn" tube, developed by the RCA laboratories, is employed in the transmitter. The sending apparatus weighs less than a pound, while the battery unit weighs less than four pounds. It is expected that still smaller designs will be achieved through further laboratory work in progress at the time of this writing.

According to Mr. Hanson, earlier researches and investigations in the micro-wave field suggested that work in this band of 300,000,000 cycles and more would permit the midget antenna equipment necessary (*Turn to page* 693)

# The RADIO WORKSHOP

¶ Items of interest for beginners, experimenters and radio constructors.

*Conducted by* **The Associate Editor**

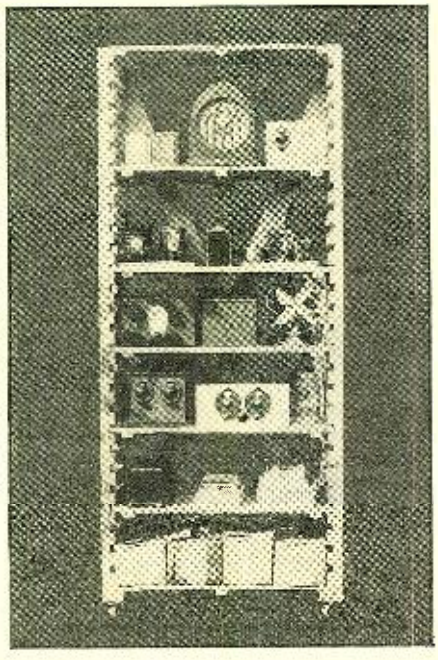
## Something That Every Radio Experimenter Can Use

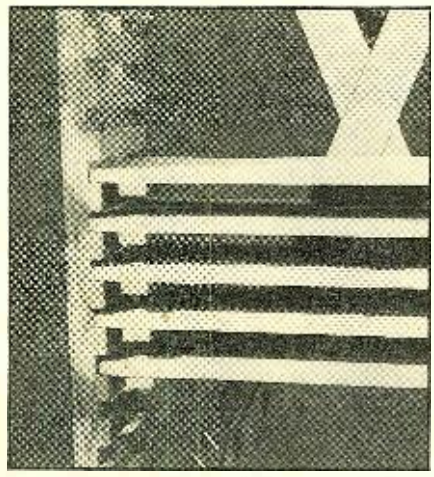
Every radio experimenter at one time or another experiences the difficulty of finding sufficient space to store his ever-increasing radio equipment. We all know how tables can become cluttered with equipment until they cannot accommodate another article and how parts and sets are pushed under the table or in corners until needed. The wooden rack shown in the photographs, completely answered my requirements and now my workshop is not only neater, but I can easily find any radio item without calling on Providence and everyone to help me.

The rack provides a relatively large amount of shelf-space and it is so designed that the shelves can be adjusted to various heights which makes the rack especially suitable for holding a variety of radio equipment such as parts, receivers, transmitting equipment, etc. The rack is mounted on heavy rollers for added convenience.

The depth of my rack is 14 inches, the width 36 inches and height 86 inches. The net inside area of each shelf is roughly 13 by 31 inches and the height above each shelf can be adjusted in steps of 3 inches.

Seasoned pine wood is used throughout in the construction of the rack. Four different sizes, as enumerated below are employed and are easily procurable from any lumber yard. The 2 cross braces on the rack are 1 by 4 inches. Half the thickness of each one of these cross pieces is cut out at the point where they cross and they are locked and screwed together supplying a back brace for the rack. For the 4 uprights and for the 2 bottom cross pieces, 2 by 4 inch material is used. Regular floor material 1 by 4 inches is used for the top, bottom and the removable shelves.





CLOSE-UP OF CONSTRUCTION
*How the sheleves slide in*

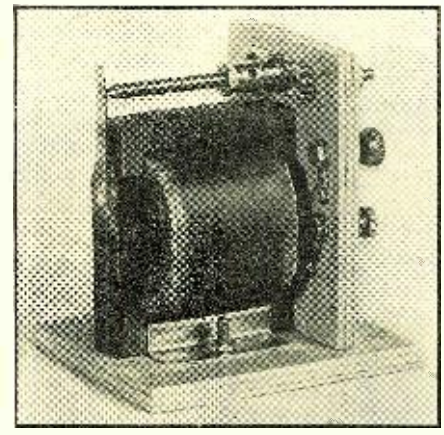
This material is tongued and grooved and for neatness the tongue or groove should be planed off the front and rear board of each shelf. For the cross-ties at the top and bottom, for the shelves and the supports nailed to the uprights, use 1 by 2 inch material. The casters have wheels 2½ inches in diameter, with rims 1 inch in width.

The close-up illustration of the rack shows the shelves, side supports and back cross pieces. The front corner of each shelf has a countersunk hole leading diagonally down through the shelf and into the corresponding side support. Wood screws of the proper length are used to screw the shelves into fixed positions. In the picture, one screw is shown with its head protruding above the top shelf and three screws are shown sticking up from pilot holes in side supports which carry no shelves.

BART CONN,
Bunker Hill, Ind.

## Relay Made from Old Audio Transformer

A highly sensitive relay that will operate on 1 milliampere or less can be made from an old audio transformer. I used a Kellogg 3-to-1 transformer, but any kind may be used if the windings are intact and the core laminations have the form shown in Figure 1. The laminations have two diagonal cuts across the center leg to permit assembly. Remove all the laminations, cut off two small pieces from each as indicated, and re-assemble to form an E-shaped core. A brass clamp around the bottom leg serves to mount the relay on a suitable wooden base. Make the armature from an extra lamination as in Figure 2, bend the small tab of the armature at right angles and solder to the brass clamp. Be sure that the lower end of the armature is in contact with the bottom pole piece.

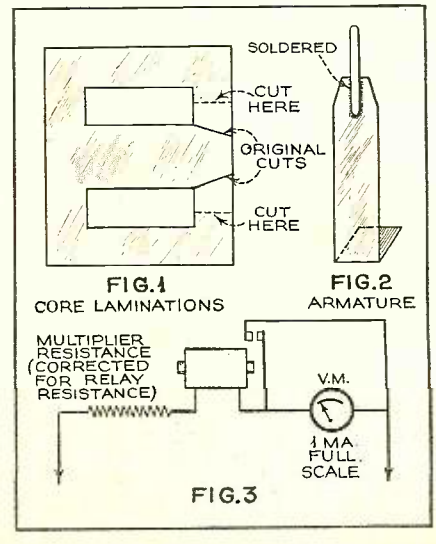


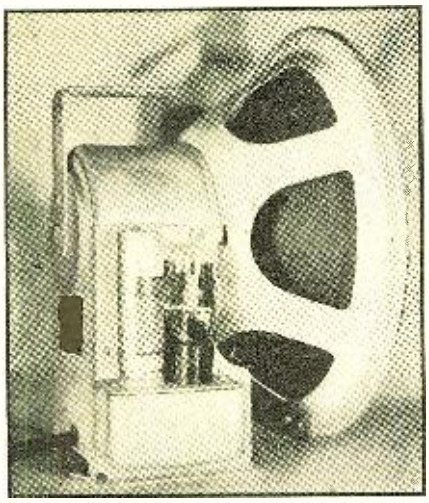
The contacts are self-explanatory, one being a thin strip of brass soldered to the armature, the other a long machine screw working through a binding post and lock nut. The primary and secondary leads are brought out to binding posts on the small panel and allow a choice of connections. Using the primary coil alone, the contacts should close on about 5 milliamperes. Using both coils connected in series-aiding, less than one milliampere will be needed, making the relay ideal for photo-electric and similar work. If heavy currents are to be controlled, an auxiliary power relay or contactor must be used.

Figure 3 suggests a possible use for the relay in protecting a sensitive voltmeter from dangerous overloads.

A correction has to be made for the resistance of the relay winding and the multiplier resistors reduced accordingly.

CHARLES D. SAVAGE,
Portland, Ore.

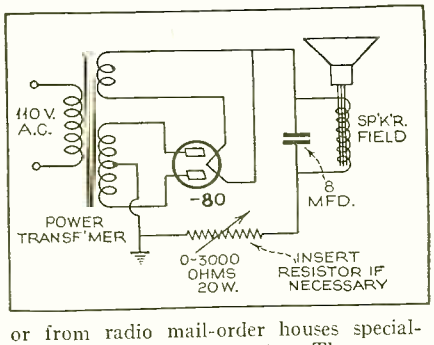




## Field Supply for Dynamic Speakers

There are many dynamic type speakers with field coils designed for excitation from low-voltage power units that have been discarded due to breakdown of the high-capacity filter condensers or the rectifier in the power supply.

Speakers of this type can be reclaimed and put back into service by simply replacing the present low-ohmage field winding with one of high-resistance that can be excited from a power unit employing a type 80 rectifier or similar tube. A typical power unit of this type is shown in the accompanying diagram. High-resistance field coils for all types of speakers are available from the speaker manufacturer




or from radio mail-order houses specializing in replacement parts. The power transformer required for this supply unit should not have a secondary voltage exceeding 375 volts either side of the center-tap.

The photograph illustrates how I mounted the rectifier tube and filter condenser on a rectangular conduit box and cover. Two holes cut in the cover of this box accommodated the tube socket and condenser. The box is bolted with machine screws to one side of the speaker base and all wiring is carried through a hole up to the field coil. The power transformer is mounted on the opposite side of the base.

A variable resistance should be inserted in the negative lead as shown, if the output voltage is too high for the resistance of the field coil available. For a 1000- or a 2000-ohm field winding the resistance should be adjusted to approximately 2000 ohms.

PAUL H. NELSON,
Seattle, Wash.

## Home-made Insulator

I have used this insulator idea with fine success on several antenna lead-in installations, also in running indoor leads near metal molding or tubing. Many applications will be found for using these small inexpensive insulators. The eye screws are obtainable from any 5 & 10c store and

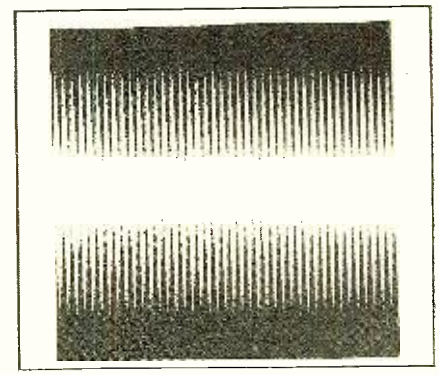
# BLACK LIGHT *for* Sound Recording

### *By* J. P. Hollister

FAITHFUL reproduction of the higher frequencies is necessary for realism in any sound system. In orchestras, the delicate tinkle of the triangle, the vibrant quality of the strings and the vital, sonorous richness of the brass instruments lose character if the higher harmonics are not retained. The emotional qualities of voices frequently record so poorly that many stars of the stage are unable to appear in sound movies.

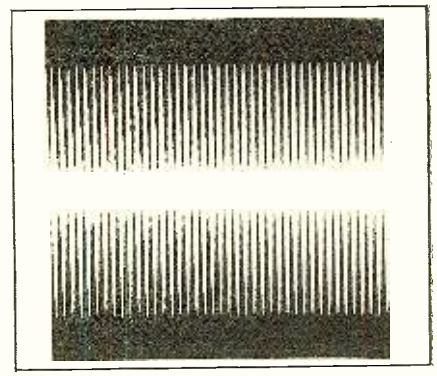
A new method of sound-on-film recording, giving improved reproduction of high frequencies, has just been demonstrated by RCA-Photophone. Ultra-violet (often termed "black" light, since it is invisible to the human eye) is employed in place of the usual white light. In this type of recording system electrical vibrations resulting from sound waves impinging on a microphone are amplified and applied to an oscillograph. A tiny glass mirror is attached to a slender metallic ribbon which is suspended within this unit. Variations in the magnetic field caused by the amplified electrical vibrations induce corresponding vibrations of the mirror. A concentrated beam of light is reflected by this mirror through an optical system upon the sensitized film. The degree of deflection of the mirror, and therefore of the reflected light ray, varies with the strength of the sound picked up by the microphone. The rapidity of deflection is proportional to the sound frequency. The speed of movement of this mirror required for high frequencies is tremendous. For instance, a complete wave image of a 9000-cycle frequency, comprising a back-and-forth movement of the mirror (a single peak on the accompanying photograph), is accomplished and photographed in 1/9000 of one second.

Ordinary photographic film is far more sensitive to violet and ultra violet rays than to yellow and red. Therefore violet photographs lighter and red darker than they appear visually, unless special film and



THE IMPROVED SOUND TRACK

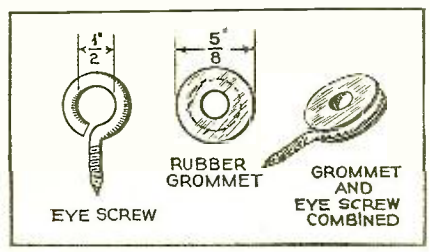
*The upper illustration shows a magnified reproduction of a "sound film" recording made by the ordinary process. Below is a duplicate, recorded by the new process, clearly showing the improved definition*



compensating filters are used. Greatest sensitivity is attained in the ultra-violet region, but glass lenses do not pass these rays. In order to utilize this extreme sensitivity it ultra-violet, which is required for such high-speed photography, lenses of quartz are employed, which pass such rays freely. When white light and quartz lenses are used, as has been the practice, all color components may not be sharply focussed in the same plane. This results in a blurring of the image, as shown in the photographs, and distortion in sound which increases at higher frequencies. In the new method, white light is filtered out and the narrow band of ultra-violet is alone utilized, giving the sharp, brilliant image shown.

At a private demonstration attended by the writer, an orchestral recording by this system was unusually brilliant and colorful in comparison with another recording by the older "white light" method.

the rubber grommets from any radio shop. The grommet is slotted and fits nicely over




the eye of the screw.

FRED E. KNAPP,
San Diego, Calif.

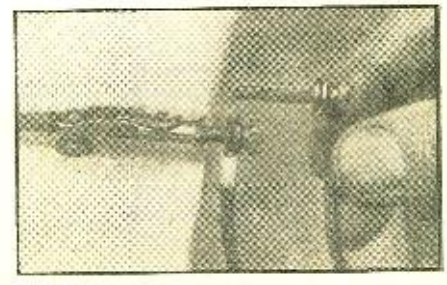
## Home-Made Tip-Jack and Plug

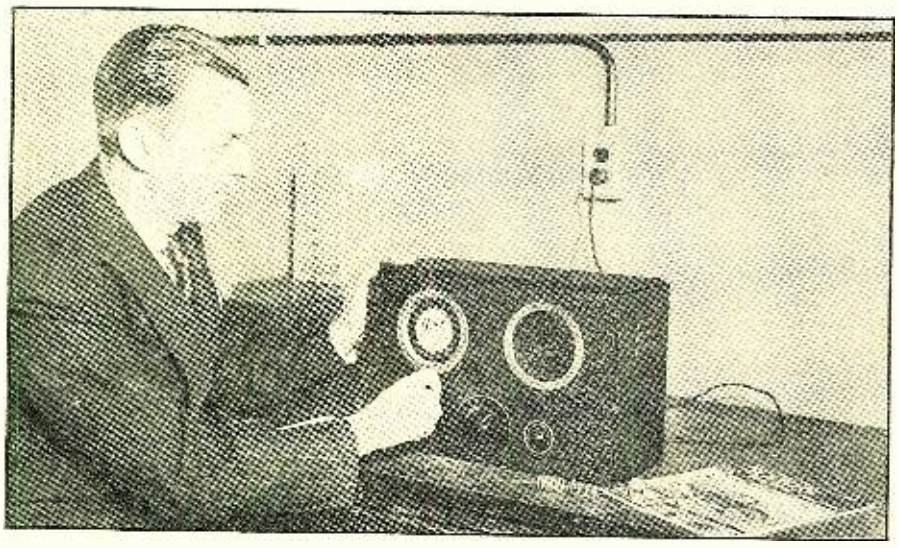
The radio experimenter will find this simple tip-jack and plug a handy device, easily put together.

The tip-jack is made from a discarded electric flat-iron heater-plug contact. As shown in the photograph, it is mounted and fastened to the bench with a wood screw which at the same time secures one of the circuit wires. I used a battery nut as a washer, to raise it up from the level of the table.

The tip-plug is made from the brass stem terminal of a used dry-battery cell and to

(*Turn to page* 689)





*An Effective*

# 2½-555 METER Receiver

*By* William C. Dorf

**THE name of A. J. Haynes will recall to the oldtimers the early days of radio and his achievements with regenerative circuits, especially his well-known DX Circuit and its slogan, "One Thousand Miles for $15.00." In those days his circuit designs had a tremendous following among home set-builders. Now he has brought his old skill into play, in the design of the new 2½- to 550-meter regenerative receiver which has proved surprisingly effective in "on the air" Listening Post tests.**

THIS compact "R-S-R" (regenerative-super-regenerative) 5-tube receiver, complete with an electrodynamic speaker and housed in an attractive crackle-finished metal cabinet, is bound to receive more than passing interest from all types of radio listeners. Not only because it is inexpensive to build, but because it incorporates something new in design. To the best of our knowledge, it is the first instrument to be placed on the market that has complete and continuous wavelength coverage from 555 to 2½ meters (540 kilocycles to 120 megacycles).

Some readers may wonder what the bands under 15 meter save to offer. At the present time there are the amateur phone stations on the 10-meter band which can be heard at phenomenal distances, commercial experimental stations between 6 and 10 meters broadcasting music and speech, amateur phones on 5 meters, and two-way police calls around 7 and 8 meters. This ultra-high-frequency range will come into prominence when television arrives, for both the image signal and the sound accompaniment. In fact, further expansion of radio entertainment will probably all take place in the range below 15 meters.

## A Real Go-Getter

Under test in two New York City Listening Posts, the receiver considerably exceeded expectations. Short-wave stations were tuned in, all on the loudspeaker, from Spain, Italy, England, France, Germany, Colombia, Cuba, Canada (and of course the U. S.), on the 25-, 31- and 49-meter bands. Amateur stations were tuned in on all bands, the most distant being on the 20- and 75-meter bands, and these included all portions of the U. S., most of Canada, and Cuba.

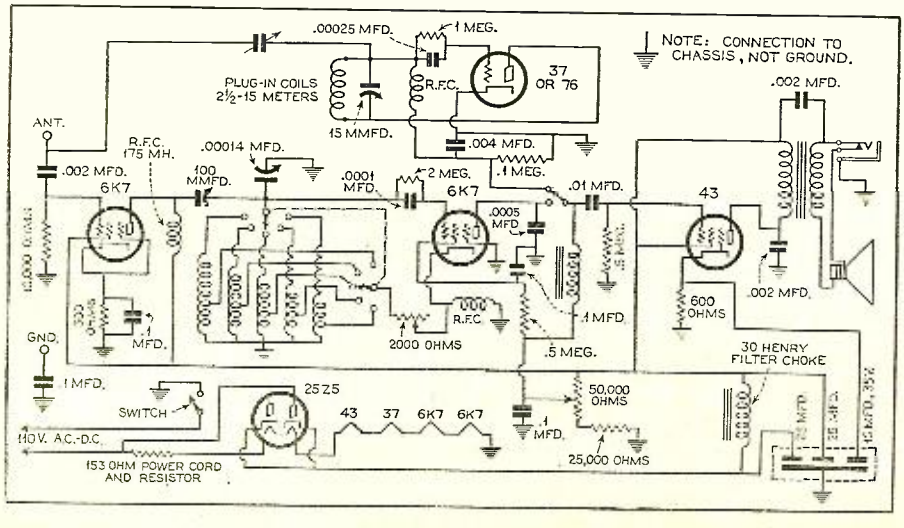
On the regular broadcast band stations in the middle west were tuned in with good volume. Nothing spectacular in the way of DX was attempted because naturally this circuit does not provide enough selectivity to break through the barrage of powerful New York stations during regular hours. Local stations were received with real entertainment value with only occasional evidence of inter-station interference.

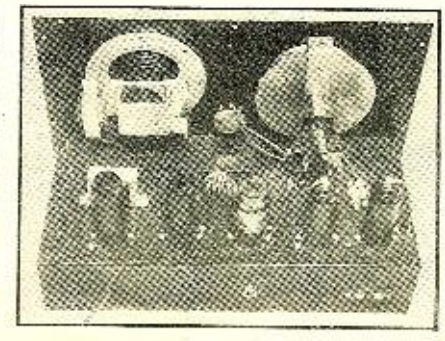
Reception of the 5-meter amateur band proved beyond a doubt that the ultra-high-frequency ranges of this little receiver really work. Any number of 5-meter ham stations were tuned in with every indication that this receiver is as effective as many of the receivers especially designed for this range.

Special attention was given to the possibility of radiation from the super-regenerative detector, and resulting interference with 5-meter reception in neighboring receivers. To check this the receiver was set up 200 feet from one of the RADIO NEWS experimental amateur stations (W2JCR), where a sensitive 5-meter superheterodyne receiver was in operation. The superhet was tuned to a 5-meter signal from our Westchester station (W2JCY) and the "R-S-R" was tuned back and forth across this signal. At no time was interference heard in the superheterodyne. The reason for this undoubtedly lies in the relatively loose coupling between the super-regenerative detector and the antenna, and the low plate voltage applied to this detector.

## Two Tuners in One

Reference to the schematic circuit, shown herewith, discloses that this little set is actually two receivers in one. One tuner, which consists of a 37 tube employed as a super-regenerative detector, covers the range from 2½ to 15 meters. The other tuner consists of an untuned r.f. stage and a regenerative detector and covers all wavelengths from 15 to 555 meters. The audio amplifier stage and loudspeaker (*Turn to page* 694)




# The SERVICE Bench

*Conducted by*

**Zeh Bouck**

*Service Editor*

**NO one has higher respect for the utility of modern test equipment than the writer. Analyzers, testers, tube checkers, oscilloscopes, resistance and capacity bridges or meters, and oscillators are all not merely legitimate but essential components in the equipment of the up-to-date serviceman.**

THERE are many servicemen who, as a matter of habit and routine, have come to rely too much upon their apparatus and not enough on their common sense. Their first move upon entering the home of a client is to unpack an impressive array of gadgets, and proceed to go over the installation with point-to-point, voltage and current measurements. Of course they find the trouble, but, in the cases we have in mind, it takes such servicemen longer than if first they had applied a few of the elementary principles of diagnosis. No M.D. would start in with a stethoscope or an X-ray on a patient suffering from indigestion. There are instances on record where servicemen who have gone over a receiver with a fine-tooth laboratory—if you'll pardon the metaphor—to discover that there was nothing wrong with it, and that the antenna lead was broken an inch or two on the aerial side of the binding-post! Less exaggerated, but equally to the point, are these cases reported by Harry Ronson, Utica, N. Y., who writes: "I was called in to service a Philco Model 20—a table model with a 27, two 24's, two 71A's and an 80. The owner heard me come up the drive and turned on the set before I entered the house. As I came in, the receiver was playing—after a fashion. Music came through, but was badly garbled with a sort of 250-cycle motorboating. As a matter of habit I started unpacking the instruments of torture, although I already suspected some trouble in the push-pull amplifier which would be evident with casual inspection. I asked the usual questions—how long the set had been playing this way, how old the tubes were, and had the trouble started suddenly. The wife answered that the set had gone "haywire" that afternoon, without warning, and the husband told me that he had bought a new set of tubes a few months back.

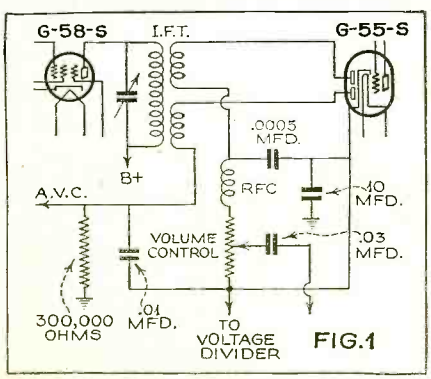


FIG. 1

## A "Bad" Transformer

"By this time, the tubes were thoroughly warmed up, and I felt the 71A's, which are right in the back of the chassis and readily accessible. One of them was about normal temperature while the other was noticeably hotter. Removing the hot tube, the 'wobble' disappeared and the radio played nicely, except for overloading, which suggested that the bias had been cut in half by an open in one-half of the secondary of the input transformer. This suspicion was confirmed by the plate-current click when the tube was inserted in or removed from the defective circuit. Just on general principles, I switch the tubes—but no go with either tube in the hot tube socket.

"I plugged in the soldering iron and by the time I had the chassis out of the cabinet, we were all set for a temporary repair. I hooked the 71A's in parallel, working from the good side of the input transformer secondary — and regretfully slammed close the lid on my shiny array of test instruments! Naturally, I came along with a replacement transformer a couple of days later.

## Noise Galore!

"My next call was only a few doors away—a real ritzy Stromberg, with a racket that sounded as if it might have been caused by one of these antennas that some of tomorrow's servicemen install before they are half-way through their correspondence courses. (I'm not knocking correspondence courses by any means. Took one myself; but didn't try fixing radios until I had finished it, despite the fact that I had been building my own sets for five years. This may be somewhat off the subject, but I don't think students should be encouraged to make 'part time' money in service work while they are still studying. We servicemen have enough legitimate competition from experts. I don't say that even a beginner can't be taught how to install an aerial—but almost invariably they are tempted to try their hands at more serious work, at cut-rate prices to get the job, and the resulting mess reacts unfavorably on servicemen as a whole, not to mention the unfairness of such competition.)

"But to get back to the Stromberg. I proudly unpacked the pill chest, with the idea of disconnecting antenna and ground and setting up the oscillator. However, as I stroked the gleaming chromium plate with my handkerchief, I had sense enough to ask whether or not the noise was chronic and the mistress of the house informed me that she was bothered with the racket only when the refrigerator was running! Sadly I dropped the leads I had been untangling, and closed the carrying case.

"A trip to the kitchen disclosed a big three-door Servel, of rather ancient vintage, but still a good refrigerator. I inspected the motor—repulsion-induction—and could find nothing wrong with it—no dragging brushes, dirt, or anything that should cause noise except when starting. Going back to the radio, but leaving connecting doors open, I noticed that the noise was somewhat synchronized with the flapping of the drive-belt. I tightened this, and only succeeded in eliminating a bit of mechanical noise (for which I was properly thanked and tacked on four bits to my bill) and the periodicity of the radio noise. It was now a fairly constant swishy crackle. The fact that it was somehow connected with the V-belt sug-

(*Turn to page* 695)

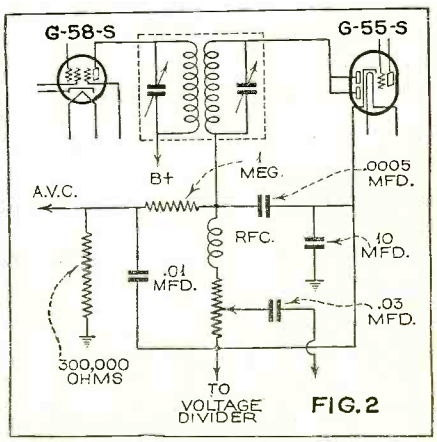
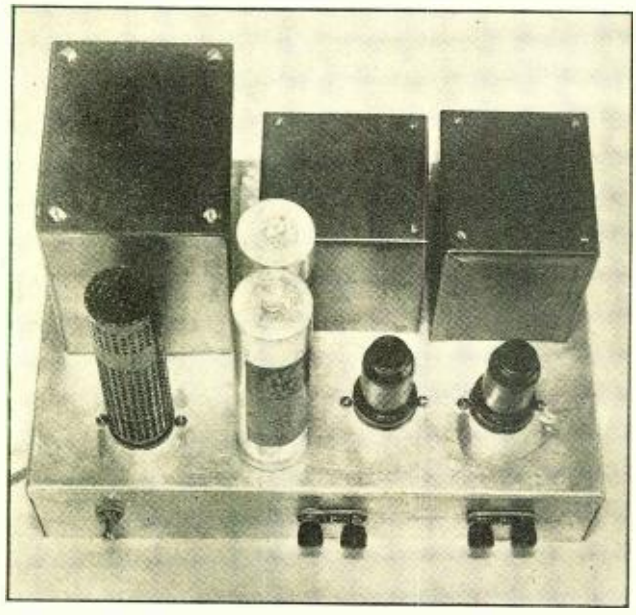


FIG. 2



THE FINISHED UNIT

*A simple and straightforward layout in which every part is self shielded; an aid in obtaining high stability and minimum hum*

# *Servicemen!*

## *Introducing the*

# A. C. PRE-

This preamplifier, the latest product of short of perfection, as judged by the most less, it provides a gain of 58 db., flat

*By* John H.

MANY p. a. amplifiers and many of the speech amplifiers employed in "ham" transmitters have sufficient gain for operation with carbon mikes but not enough for the more modern crystal and velocity types. With the high-impedance crystal types, a loss occurs which is substantially uniform throughout the frequency range and is proportional to the length of the connecting cable. This may be sufficient to render even a high-gain amplifier ineffective if a long line is required. In any p.a. amplifier if an attempt is made to concentrate too much amplification in a single unit, the problem of securing stable operation becomes exceedingly difficult. With resistance-coupled amplifiers, "motor-boating" is likely to result if the amplifier is effective at low frequencies, due to coupling from a common power supply source. With transformer coupling, extreme shielding and balancing precautions must be taken to secure a low hum level. The simplest way out is to use a self-powered preamplifier. Pre-amplifiers are generally battery-operated. When extreme compactness is required, such as for head amplifiers, this form of construction is still necessary. Since the slightest hum in an a.c. operated preamplifier will be enormously magnified by the main amplifier, extreme care is necessary in the layout and construction of such apparatus. In the instrument to be described. the hum level is so low as to be completely inaudible with phones connected to its output circuit. When connected to the main amplifier, with the overall gain adjusted to give full output the amplified hum level is still negligible.

### Has 58 db. Gain

The circuit diagram is shown in Figure 1. As indicated, it employs two resistance-coupled stages using 6C5 tubes. The overall gain is 58 db.

Metal tubes are used throughout, eliminating the need for tube shields which are so often a cause of noise due to poor contacts. The 5Z4 rectifier is slow heating, therefore no bleeder resistor is required. This relieves the chokes of an added current burden and permits better filtration. In the plate circuit of the input tube, a resistance-capacity filter, R3-C2 gives the required additional smoothing to this circuit.

In this design, the output circuit has a relatively low impedance. The usual plate-to-line and line-to-grid transformers are therefore not required. This results in a considerable saving in cost. The plate load resistor of the 6C5 output tube is 20,000 ohms. Using this value, 7 or 8 feet of low-capacity shielded cable may be employed to join the amplifiers with a loss of less than .5 db. at 10,000 cycles. A 250 micro-microfarad condenser connected across the output circuit to simulate cable capacity caused a loss of but .2 db. at 10,000 cycles. While higher gain may be obtained by using a 50,000 or 100,000 ohm plate load, the present gain of 58 db. is more than adequate for p.a. work and avoids complications.

The fidelity curve is shown in Figure 2. This was obtained using the set-up indicated. A General Radio type 377-B low frequency oscillator is employed with a General Radio vacuum-tube voltmeter across its output. A decade resistance box and a laboratory standard fixed 1000 ohm resistor constitute the voltage divider. The 2000 ohm series resistance is used to stimulate the impedance of the new 2000 ohm velocity microphone. The output voltmeter is a RADIO NEWS multimeter using a copper oxide rectifier and Weston meter. The 100 volt scale was employed and the output voltage kept constant at 20 volts. The v.t. voltmeter and output meter were checked against each other and a correction factor used to compensate for the slight frequency error in the output meter.

### Calculating Amplification

The db. gain was calculated by the usual method, multiplying by 10 the logarithm of the ratio of the power in the output circuit under load to that of the input circuit. The output meter load is 100,000 ohms, which introduces more loss at low frequencies than will occur with the usual amplifier input

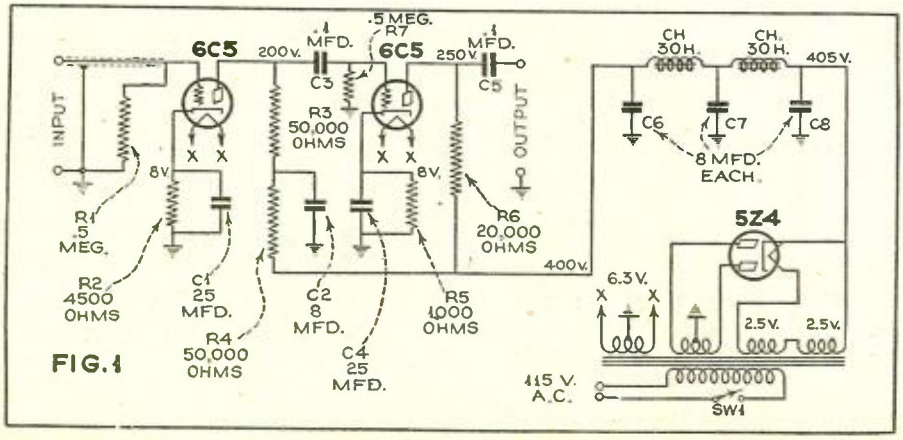
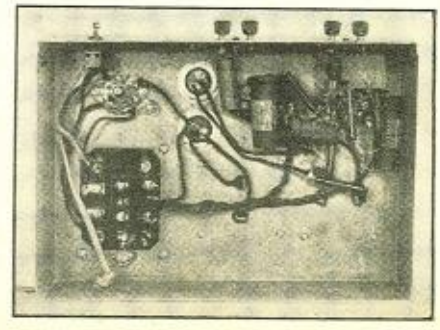



FIG. 1



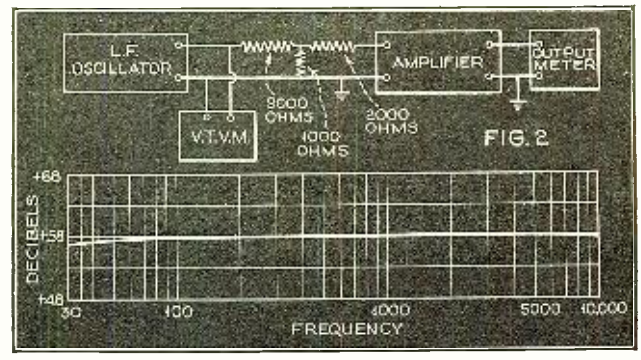
*Amateurs!*

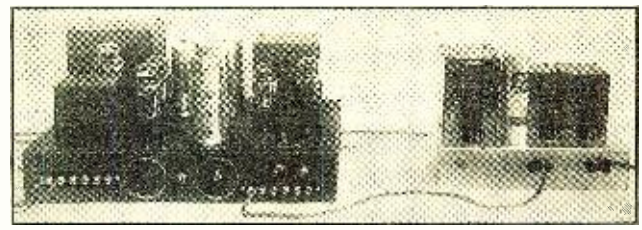
*RADIO NEWS*

# AMPLIFIER

the Radio News Lab. actually is little accurate measurements. Practically hum- within 1½ db. from 30 to 1000 cycles

## Potts



IN ACTIVE SERVICE

*The unit hooked ahead of the 20-watt amplifier in the R.N. Lab. for measurement or test work involving very low inputs. Above, the unusually fine frequency characteristic (actually measured) of the preamplifier*

circuit load. Nevertheless, it is down only .5 db. at 50 cycles and but .13 db. at 10,000 cycles. Even at 20,000 cycles, it is down only .3 db. It should be pointed out, however, that db. ratings for overall gain of amplifiers with resistance input may be confusing. If the input resistance were 5 megohms instead of .5 megohms, the voltage amplification would still be the same though the rating would be 10 db. higher.

### Used with Amplifier

The overall gain of the RADIO NEWS 20-watt amplifier (described in the February and March issues) is 108 db. reckoned on the basis of the input resistance of 500.000 ohms. With a transformer secondary connected, rated at 150,000 ohms, it would be 102 db. When we connect the pre-amplifier, we do not get 108 db. plus 58 db. because the output impedance of the pre-amplifier is 20.000 ohms. This will cause a loss of approximately 14 db. From the input of the pre-amplifier to the output of the main amplifier, the overall gain is therefore 108 db. plus 58 db. minus 14 db., or 152 db. If we connect a 2000 ohm velocity mike to the pre-amplifier the input will then be 2000 ohms instead of 500,000 ohms. This will reduce the effective gain 24 db. making 128 db. overall.

### Crystal Microphones

Crystal mikes have a capacitive reactance equal to a .005 mfd. condenser. At 400 cycles, the reactance is 80,000 ohms. If this were substituted in place of the velocity mike, the insertion loss would be about 8 db. instead of 24 db., making the effective gain 144 db. From this must be deducted cable losses, which will amount to 6 or 8 db. per 100 feet. At lower frequencies, the overall gain is greater and at higher frequencies, less. Compensation is effected in the design of the microphone. Manufacturers of crystal mikes recommend using a 2 to 5 megohm grid resistor to assure best low-frequency response.

How much gain do we actually require? Figuring on a basis of .006 watts at zero level, 15 watts is plus 33 db. If the microphone is rated at -70 db. we require 103 db. overall gain to get this output. For 20 watts, we require 2 db. more, or 105 db.

The filter chokes are laid out with their centers on a line with that of the power transformer and with their cores mutually at right angles. The input tube is opposite choke 2, which will have the smallest external field. The terminal blocks are arranged to give the shortest possible leads. The input grid lead should be shielded.

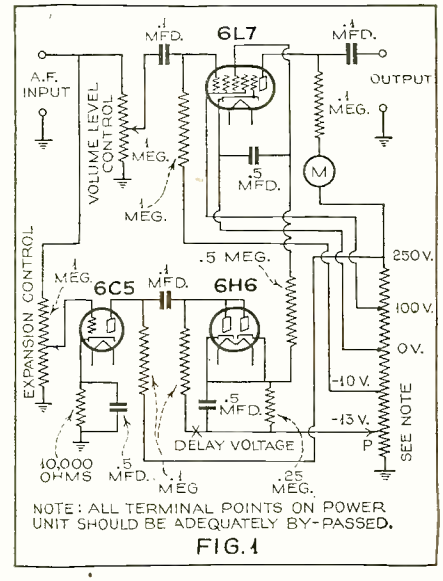
In wiring, the heater leads should be twisted and kept close to the chassis and well away from grid and plate leads. This also applies to the power cord. The tube shield prong on each octal socket should be grounded directly to the chassis. The filament supply for the 5Z4 is obtained by connecting the two 2.5 volt power transformer windings in series-aiding. If connected in series-bucking. (*Turn to page* 695)

# VOLUME EXPANDER

### *By* John M. Borst

RADIO listeners with musically trained ears never have been satisfied with radio reproduction and phonograph reproduction. One of their complaints has to do with the limited volume range of reproduced music. A full orchestra, when playing a fortissimo, may deliver a sound energy 70 decibels above that in the pianissimo passages, a ratio of 10 million to one if measured in watts. Due to limitations of the transmitter, receiver and amplifiers, this same ratio between softest and loudest passages cannot be transmitted. If the volume control is adjusted so the loudest passages will *just* be handled by the tubes without overload, the lowest passages may be lost in the background noise. Therefore, the level is adjusted by the engineer in the control room, bringing the lowest passages up and the loudest ones down. The maximum volume range transmitted by the best stations is only about 50 to 45 db. (30,000 to one). The same is also true of phonograph recordings, which are limited in volume range to about the same degree.

Several different ways have been devised to attempt a restoration of the original volume range at the receiving end. This can be done automatically, but it should be kept in mind that the work can only be done perfectly when the adjustment of compression is also done automatically, otherwise any irregularity in monitoring at the transmitter may result in an unpleasant amplification of this defect. Phonograph records lend themselves better to the process of expansion because they have been monitored very carefully.

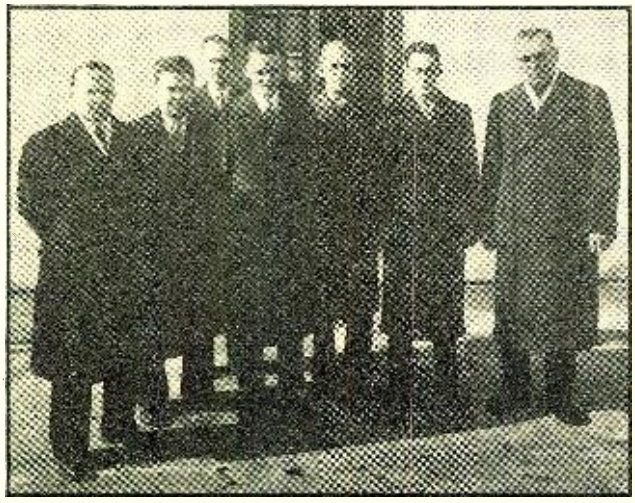



The volume expander described here is primarily intended for use with a phonograph but it will work satisfactorily with broadcast programs of symphonic music as transmitted by the best stations.

The "volume expander" consists of an arrangement which can be likened to a reversed automatic-volume-control system. In other words, instead of cutting down the (*Turn to page* 695)

# The "HAM" Shack

*Conducted by*
Everett M. Walker
*Editor for Amateur Activities*



TO HOLD ANNUAL DINNER AT STAMFORD, CONN.

*The officers and directors of W1CBA, Official Station of the Connecticut Brasspounders' Association, cordially invite neighboring amateurs to attend their annual dinner and hamfest, to be held May 16th. Left to right: G. Wilkins Whitney, Treas.; Frank Bathrick (W1HPU), Vice Pres.; Fred Ells (W1CTI), Director; Lloyd H. Whitney (W1EER), President; G. S. Richards, Secretary; Ralph Nichols (W1CNU), Director; Jack McMahon (W1NE), Director*

## Making A FINAL Amplifier

THE desire for increased power is prevalent among most amateurs. There are a few who glory in working the greatest possible distances with the least possible amount of power. However, increased competition on amateur bands perhaps has done more to encourage increases in power than any other one factor. Consequently, most amateur transmitters are installed with the idea of later adding another final amplifier that will provide average medium power or greater.

### WHOOPEE! LET'S ALL GO!

THE Sixth Annual Dinner and Hamfest of the Connecticut Brasspounders' Association will be held Saturday, May 16, 1936, at 7:30 p.m., at the auditorium of The Stamford Gas & Electric Co., 429 Atlantic Street, Stamford, Conn. This association was founded in December, 1930, and has already had five annual dinners which have been very successful and guaranteed a good time for all attending. Amateurs from all districts are invited. A turkey dinner will be served and speakers prominent in the amateur radio fraternity will address the group. Representatives from A.R.R.L. headquarters and the Division Director, G. W. Bailey (W1KH), will be present. Don Meserve (W1FL), first President and now President of the Eastern Massachusetts Radio Association, will act as Toastmaster.

There will be music, door prizes and a 5-meter station in operation.

Reservations must be made not later than May 12, 1936, with G. Wilkins Whitney, P. O. Box 426, Stamford, Conn. Tickets will be $1.50. Come one—come all!

WITHIN the last year and a half the cost of adding "power" to amateur transmitters had been greatly reduced through the introduction of new tubes that are highly efficient and less expensive than some of the older types. In this category are such tubes as the Eimac, Gammatrons and Amperex high-frequency tubes. With one of any of these tubes it is possible to obtain inputs up to 500 watts and with two tubes inputs of the order of a kilowatt may be used. And the cost of such tubes is less than $25 whereas in the past tubes capable of such inputs were priced more nearly around $100.

Accordingly, it was decided to construct a single-tube amplifier using one of these as a "final" to be added to the five-band transmitter described in last month's issue of RADIO NEWS. An Eimac 150T tube was used, together with some old parts, that had been around the shack for years, and some new ones that helped add to the efficiency of the amplifier.

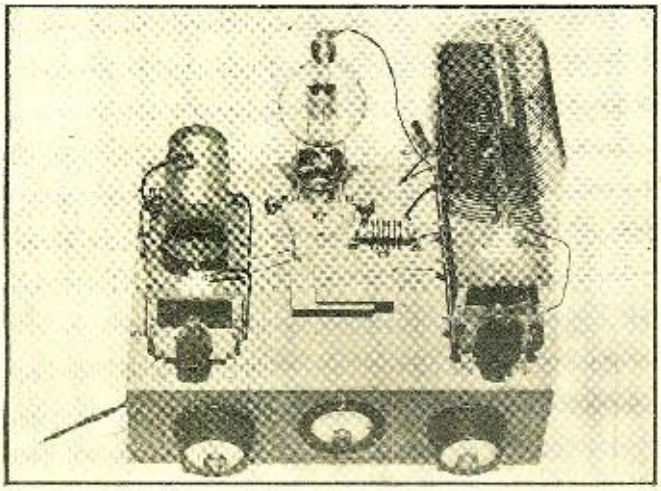
Such an amplifier should be of interest to any amateur who is contemplating an increase in power. In addition to the small cost it is extremely flexible. It may be operated on any one of five bands, namely: 160, 80, 40, 20 and 10 meters. In addition it may be used as a high-powered, crystal-controlled 5-meter transmitter merely by reducing the input on the 150T and tuning the plate tank circuit to 5 meters.

Furthermore, the input may be varied between 100 and 500 watts for C.W. operation and even 600 watts may be "crowded" on, without doing any damage to the tube. For 'phone operation, inputs up to 400 watts may be used without the plate of the tube showing any color under modulation.

In laying out the amplifier, the same type of construction as used on the all-band transmitter was employed. This is essentially "breadboard" type of construction, but made somewhat neater by raising

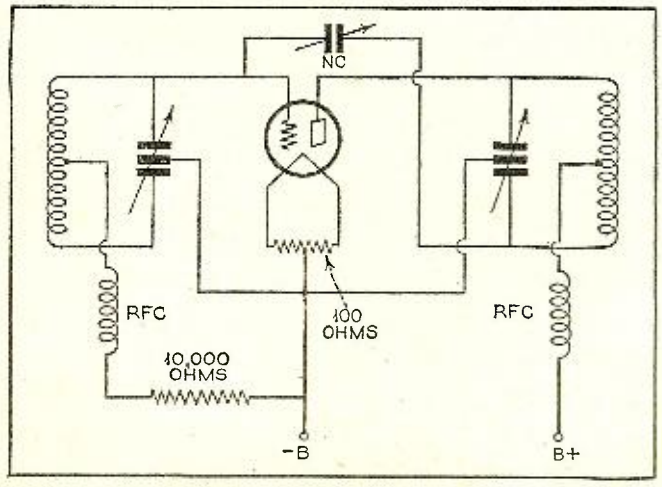
THE 150-T POWER STAGE

*The illustration below shows the completed final stage r.f. amplifier described in this article*



CIRCUIT FOR FINAL AMPLIFIER

*The schematic below gives the diagram for the amplifier unit*



*In Memoriam*

## Hiram Percy Maxim

IT is given to few men to be loved and respected as Hiram Percy Maxim was, particularly by the radio amateurs of the world. His untimely death at 66 years of age on February 17 at Memorial Hospital, La Junta, Calif., where he had been taken a week earlier while en route by train to the West Coast from Hartford, Conn., his home, was shocking news to all who knew him. He was the Ace of amateurs. It was through his efforts that the hobby of more than 60,000 progressed to its present high standard. Feeling the need for organization of this group of experimenters in order that they might exchange ideas, he founded the A. R. R. L. in 1914. Since its inception he was its honored and respected president. Whenever the amateur needed a friend, Mr. Maxim was the one to whom he turned. The radio fraternity knows that though the Haven to which he has gone will be better for his presence, the world will be irreparably the poorer.

# *The* "*ALL-STAR*" Transmitter

## *By* John Strong

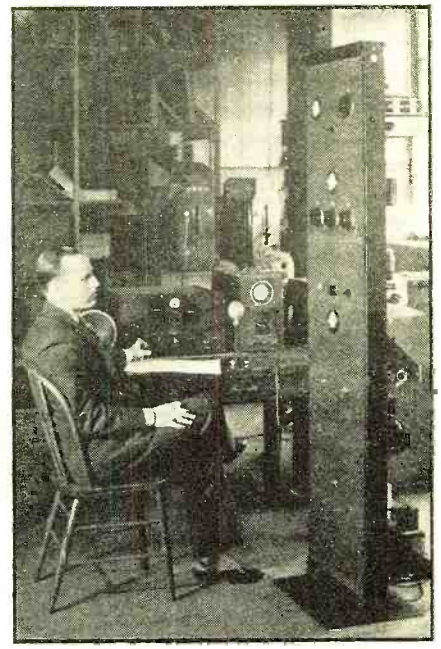
**RECEIVING sets have been available in kit form since the early days of broadcasting. But, the idea is comparatively new in the transmitter field. There have been several small-powered transmitters available in this form in the past. Now, a group of radio parts manufacturers have co-operated on the design of a small and medium-powered kit transmitter that will meet the requirements of the most exacting amateur.**

UNDER the name "All-Star Transmitter," a number of excellent units are now available in rack-and-panel form which may be begun with a 40-watt, radio-frequency unit and expanded, as fast or as gradually as the builder wishes, to larger units such as a 400-watt 'phone or 500-watt c.w. transmitter. All that is necessary to assemble them is a soldering iron, screw driver and a pair of pliers. They give the appearance of a "professional" rack-and-panel rig when completed.

Operation is provided on any of the principal amateur bands, namely: 20, 40, 80 and 160 meters. The sponsoring manufacturers are: The Thordarson Electric Manufacturing Company, of Chicago; The Hammarlund Manufacturing Company, of New York; The Cornell-Dubilier Corporation, of New York; The Triplett Electrical Instrument Company, of Bluffton, Ohio; The Ohmite Manufacturing Company, of Chicago; The E. F. Johnson Company, of Waseca, Minn., and the Crowe Name Plate Manufacturing Company, of Chicago.

The starting unit is a 40-watt c.w. transmitter. Latest technical innovations are incorporated in it, including pentode r.f. amplifier tubes. These tubes simplify operation and adjustment in that no neutralization is required on any of the four

(*Turn to page* 701)

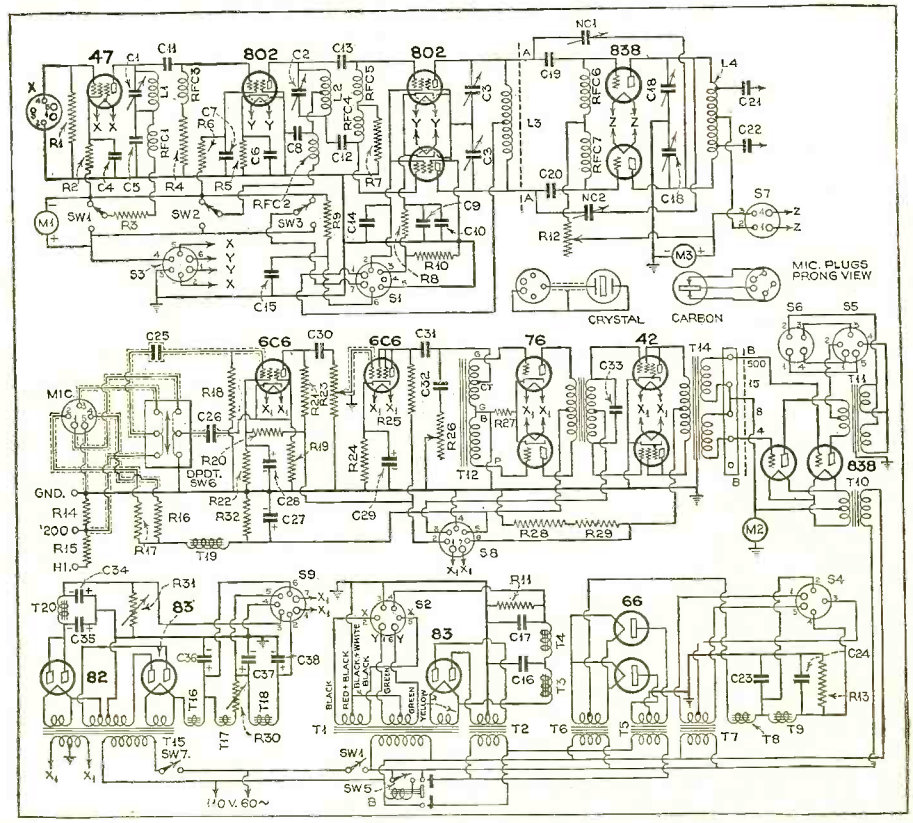


COMPACT AND EFFICIENT

*Harold Dee, W9MAJ, of Chicago, Illinois, operating one of the new All-Star transmitters in the 9th amateur district*

THE COMPLETE DIAGRAM

*The circuit below gives the technical details of the new All-Star transmitter that can be obtained sectionally in kit form and assembled by the amateur*



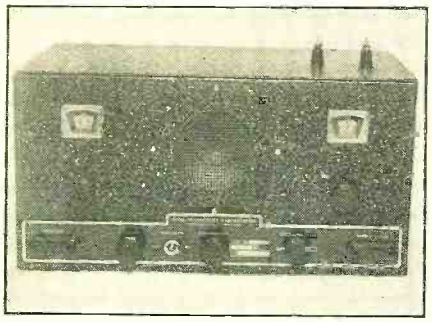

the baseboard five inches and providing a small front panel for mounting meters. The amplifier baseboard is 14 to 18 inches. Space was conserved by the use of deck L/C (condenser-coil) circuits for both the grid and plate. In addition to providing a convenient layout this method also facilitates short leads and easy access to coils for quick changing.

The grid (or input) circuit is at the left of the baseboard thereby making it add on easily to the all-band transmitter which now becomes an exciter unit. The plate "tank" circuit is at the right.

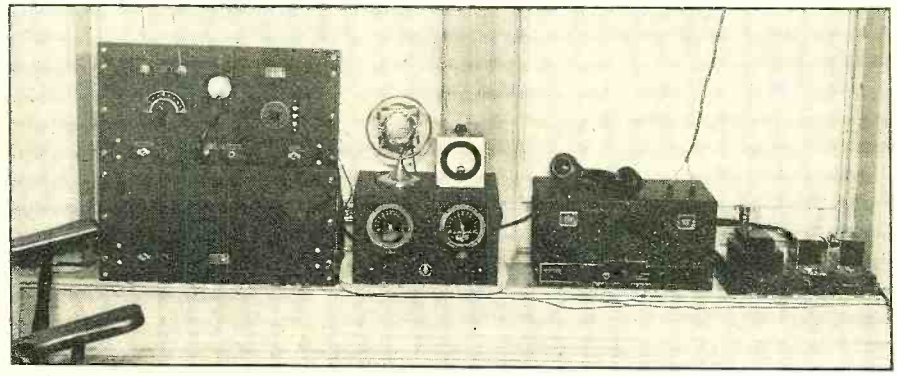
### Deck Construction

Construction of the "decks" is extremely simple. Most all variable condensers have corner screws which lend themselves well to the mounting of the secondary baseboards for coils. At each of these a 2¼-inch angle is fastened, providing a support for the coil base. The base material in this case was a hard form of composition not much unlike bakelite. Almost anything may be used: bakelite, hard rubber, or any other insulating composition. On the plate tank circuit sub-baseboard space was provided which overhangs the condenser for mounting an antenna coupling coil. In each case the coils are mounted

(*Turn to page* 700)

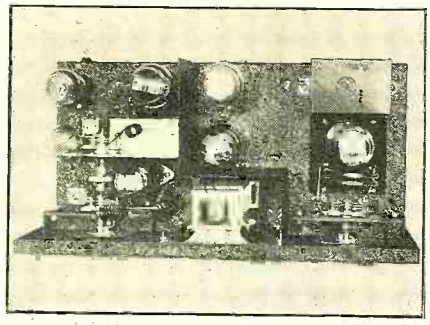


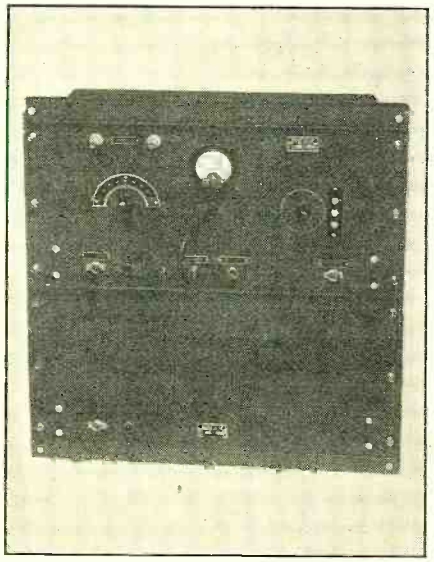
R-T-L DUPLEX
TRANSMITTER-RECEIVER



THE SET-UP AT THE AUTHOR'S STATION, W2JCR

*The "U.H.F. Corner" at the author's listening post. Here the two transmitters described were put through their "on the air" tests in actual communication with other amateurs. The receiver shown between the transmitters is the Lafayette superhet described last month and on top of it is the meter used in measuring relative strength of 5-meter signals heard*





THE "PEAK,"
MODEL X-4 TRANSMITTER

*The 5-Meter Range Beckons!*

# The Transmitter

## *By* S. Gordon Taylor

*Part Three*

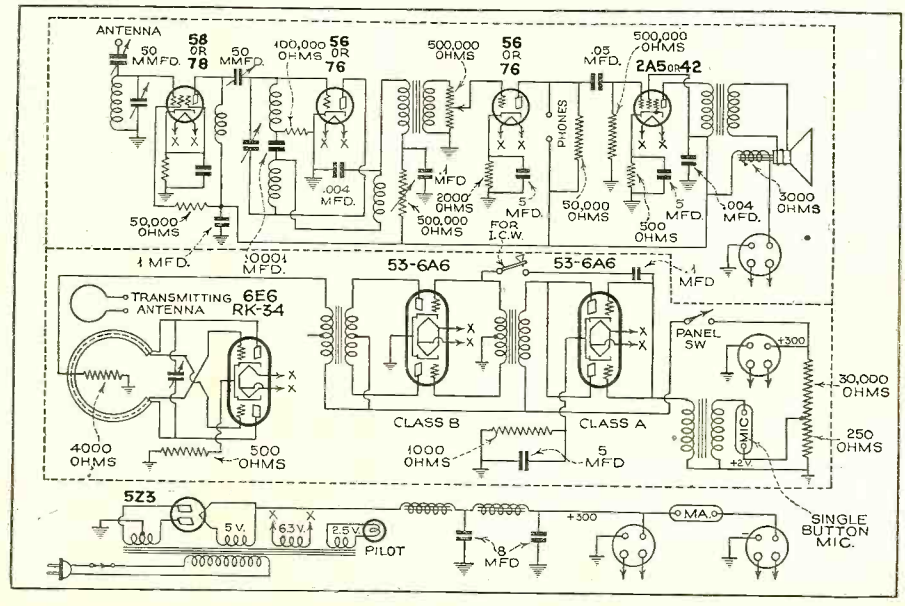
TRANSMITTERS used on ultra-high frequencies (below 10 meters) have heretofore been of such a purely experimental nature that very few of them have been put into commercial production except those designed for specialized services such as two-way police communication. There have been, of course, a number of transceivers on the market, but transceivers are very definitely not recommended for use by the experimenter or the amateur because of the terrific amount of interference that they cause when in the "receive" position. In fact, many of them transmit interference (when receiving) over almost as wide an area as they cover with their transmitted signals.

The two ultra-high-frequency transmitters which have been placed on the market thus far are shown in the accompanying illustrations. Both of these have been given thorough operating tests by RADIO NEWS and both of them proved to be highly dependable in everyday operation, contacting 5-meter amateur stations throughout the New York metropolitan area. Both are in the low-power class, each operating with approximately 25 watts input to the oscillator.

### Peak Model X-4

This transmitter is of the rack-and-panel type. The upper panel includes the r.f. and modulator portions while the lower panel (*Turn to page* 701)

THE CIRCUIT FOR THE R-T-L DUPLEX UNIT



# M.O.P.A. *for* 5 *and* 10 Meters

## *(Crystal on Ten)*

### *By* The Editor

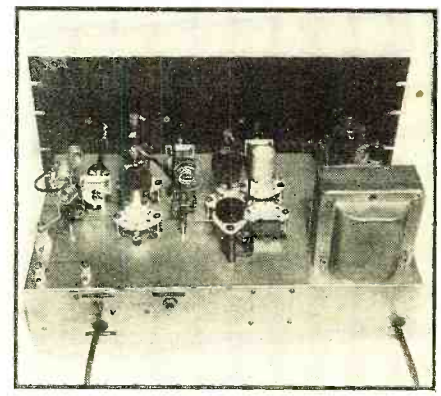
**AMATEURS now are becoming aware that self-excited oscillators for ultra-high-frequency transmission are the cause of most of the transmission troubles encountered on these bands. Interest in M.O.P.A. (master-oscillator, power-amplifier) transmitting circuits is increasing at a rapid pace, but many efforts to use such circuits, especially on 5 meters, have met with difficulties due to lack of proper "excitation." The designers of this fine new unit have produced a job which has ample excitation and excellent frequency stability.**

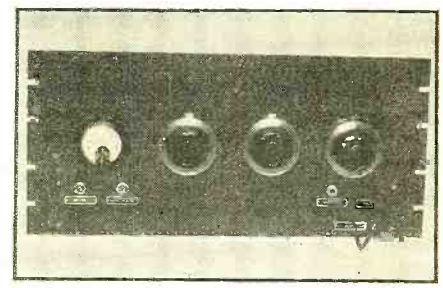
THE progressive "ham" operator who is looking for a first-class M.O.P.A. transmitter that will give him really exceptional results on the 5-meter band, as well as crystal control for 10-meter work, will be interested in this new design (by Glenn Pickett, W2IDV) which is being produced by Custom Builders. The unit, illustrated in the accompanying pictures, is built on a standard rack-mounting panel and chassis and utilizes three 89 tubes, the first as an oscillator and the remaining two as power amplifiers. Power is furnished by a 5Z3 power pack incorporated in the chassis. This transmitter, when tested at the Westchester Listening Post in conjunction with a high-quality 15-watt modulator, brought in most satisfactory reports of reception during one evening's tests. The Listening Post is located at North Pelham, New York and such stations as the following were worked using an input of only 25 watts although considerably higher powers than this can be obtained: W2IVO of Allendale, New Jersey reported signals of "great stability" and "broadcast quality" R7 to 8; W2HGB, White Plains, New York R7; W1AVV, Stamford, Connecticut R7; W2JT, Midland Park, R8;

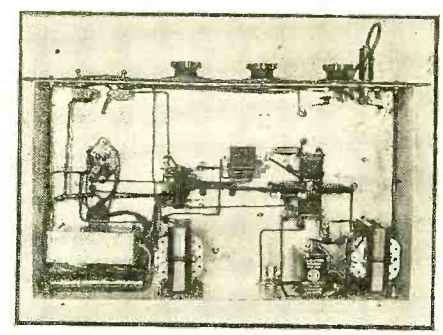
(*Turn to page* 699)

TESTS AT NORTH PELHAM, N. Y.

*Glenn Pickett, right, and his brother Ronald bring the new M.O.P.A. transmitter to the Westchester Listening Post for the benefit of* RADIO NEWS *readers. At right: Three views of the transmitter showing the panel, the "works" and the wiring*

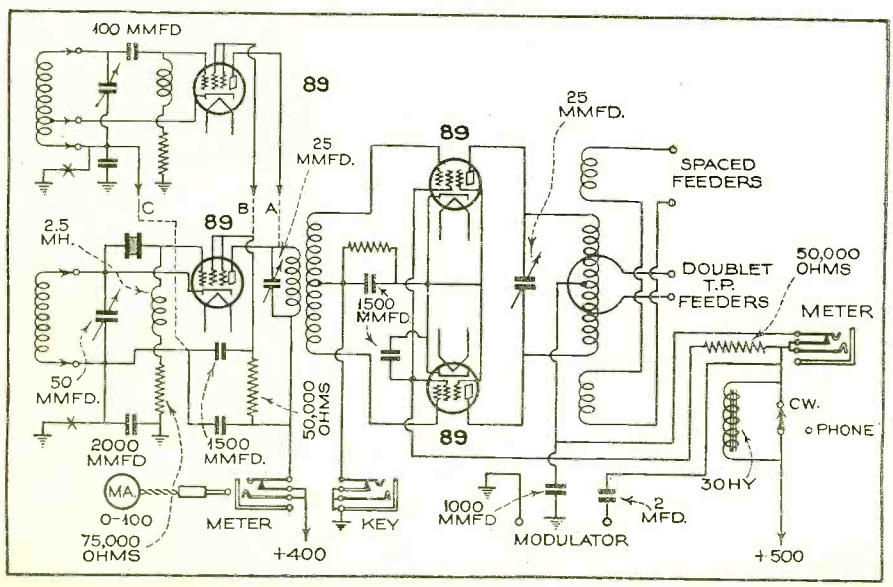


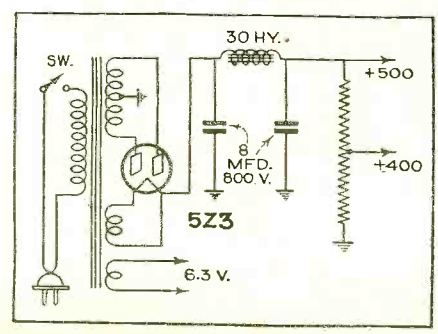




THE CIRCUIT EMPLOYED

*The two diagrams, below, show the details of the circuit of the transmitter and the power unit, both of which are incorporated on the same chassis*



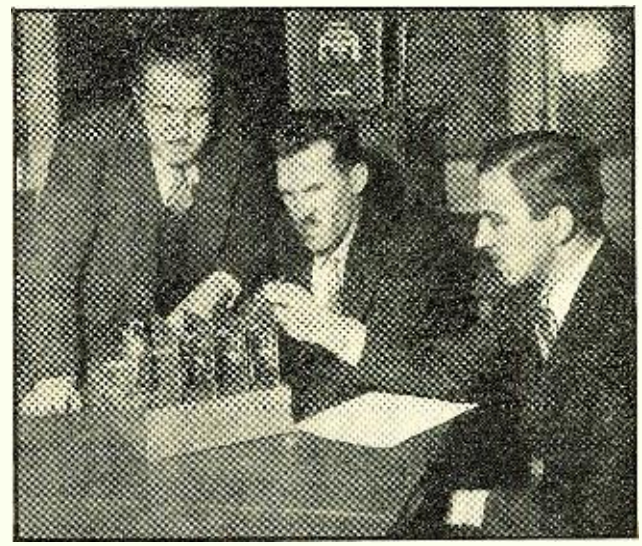



# A Real U. H. F. Superhet

## (Getting Set for Television!)

A preliminary discussion of a new ultra-high-frequency receiver which combines variable selectivity and unusual sensitivity with an extremely low noise level

**By Ralph Clark**



GETTING THE LOW-DOWN

*The author (right) pointing out the highlights of the partly assembled final model of his receiver to the editors. This model will be described in a constructional article to appear as soon as tests have been completed*

ACTIVITIES on the ultra-high frequencies above 20 megacycles (below 15 meters) are due to increase tremendously during the months to come. Heretofore these ranges have been occupied almost exclusively by amateurs, operating in their assigned bands at 2½, 5 and 10 meters. Today licenses have been issued for a number of commercial stations and more are being issued daily for services such as high-fidelity broadcasting, television, 2-way police systems. etc.

These increased activities mean a number of things. In the first place, they mean that the broadcast range is once again being extended. Successively it has been extended downward in wavelength to 25 meters, then to 19, 16, 13 and now it is once again being widened out to include wavelengths in the vicinity of 5 meters. This will result in increasing interest in these ultra-high frequencies for the short-wave and broadcast listener. Television is definitely approaching introduction to the public and will without question utilize ranges as low or lower than 5 meters. This will, of course, interest the entire radio public.

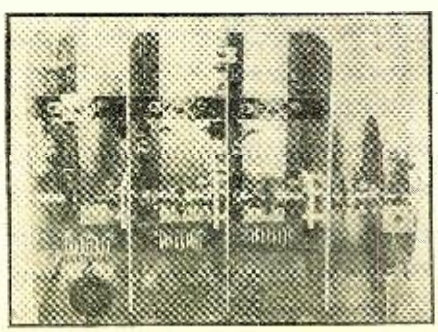
Possibly the single group to be most affected by these new services will be the amateur fraternity. They have heretofore been permitted wide leeway in their 2½- and 5-meter bands, both in the type of transmitting equipment employed and in operating practices. With commercial services opening up in immediately adjacent channels there will have to be some radical changes in both their transmitting equipment and practices. In fact, during the past few months many have seen the handwriting on the wall and are voluntarily replacing their transmitters with various types of frequency-stabilized equipment having improved modulation systems, with the result that cleaner, more stable signals are being put on the air.

With the noted improvements in amateur operation, and the introduction of new services on the (*Turn to page* 694)

**Editor's Note:** *It is a privilege to present this preliminary article on the ultra-high-frequency superheterodyne which Mr. Clark has developed. Mr. Clark, Executive Vice President of the Television Corporation of America, is especially well qualified for such development work. In the television field he has carried on a great deal of experimental work which has resulted in approximately 100 patents and patent applications relating primarily to television and u.h.f. radio. He is the owner of amateur station W2IRM, which is well known around New York for its crystal-controled signal on 5 meters. In times past his station at Clark University (WCN) was said to have been the first broadcasting station in the United States to be licensed by the Department of Commerce. He may also be remembered by old-timers under his previous amateur station calls 1ABO and 1XZ.*

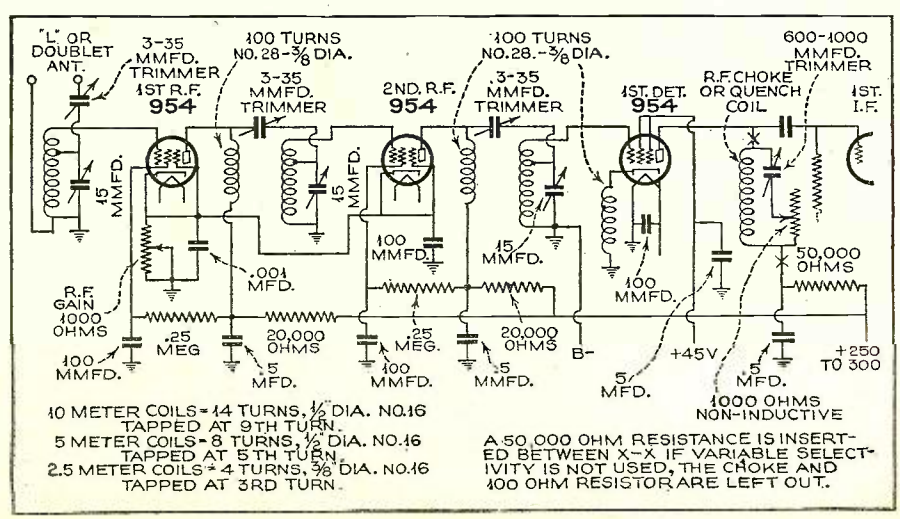
INPUT STAGES

*A close-up of the r.f. assembly with the shielded cover removed. From left to right the stages are: first t.r.f., second t.r.f., autodyne detector. The three type 954 "acorn" tubes are shown in their sockets on the partitions*



THE R.F. CIRCUIT

*The schematic circuit of the preselector and first detector stages showing the tuned i.f. circuit in the detector plate. In the conventional u.h.f. superheterodyne a resistance would be connected between the points marked "X" instead of the tuned circuit shown*



# SHORT-WAVE STATION LIST

## *(Police, Fire and Television Stations)*

### Municipal Police Radio Stations

*CP—Construction permit*

| call | location | kc. | w. |
|---|---|---|---|
| KACA | Atchison, Kans. | 2422 | 50 |
| KACE | Olympia, Wash. (C.P.) | 2414 | 50 |
| KACF | Chickasha, Okla. | 2450 | 50 |
| KACI | Eureka, Calif. (C.P.) | 2422 | 100 |
| KACJ | Wenatchee, Wash. | .... | .. |
| KACK | Bellingham, Wash. | .... | .. |
| KACL | Altus, Okla. (C.P.) | 2450 | 50 |
| KACM | Big Spring, Texas | .... | .. |
| KACN | San Buenaventura, Calif. (C.P.) | 2414 | 50 |
| KACO | Tracy, Calif. (C.P.) | 2414 | 15 |
| KACP | Ponca City, Okla. | .... | .. |
| KACQ | Kalalock, Wash. | .... | .. |
| KACR | Seminole, Okla. (C.P.) | 2450 | 50 |
| KGHG | Las Vegas, Nev. | 2474 | 50 |
| KGHK | Palo Alto, Calif. | 1674 | 20 |
| KGHM | Reno, Nev. | 2474 | 50 |
| KGHN | Hutchinson, Kans. | 2450 | 50 |
| KGHP | Lawton, Okla. | 2450 | 50 |
| KGHS | Spokane, Wash. | 2414 | 100 |
| KGHT | Brownsville, Texas | 2382 | 100 |
| KGHU | Austin, Texas | 2442 | 100 |
| KGHV | Corpus Christi, Texas | 2382 | 50 |
| KGHW | Centralia, Wash. | 2414 | 50 |
| KGHX | Santa Ana, Calif. | 2490 | 400 |
| KGHY | Whittier, Calif. | 1712 | 50 |
| KGHZ | Little Rock, Ark. | 2406 | 100 |
| KGJX | Pasadena, Calif. | 1712 | 400 |
| KGOZ | Cedar Rapids, Iowa | 2466 | 50 |
| KGPA | Seattle, Wash. (C.P. for 500 watts) | 2414 | 250 |
| KGPB | Minneapolis, Minn. | 2430 | 400 |
| KGPC | St. Louis, Mo. | 1706 | 500 |
| KGPD | San Francisco, Calif. | 2466 | 400 |
| KGPE | Kansas City, Mo. | 2422 | 500 |
| KGPG | Vallejo, Calif. | 2422 | 7.5 |
| KGPH | Oklahoma City, Okla. | 2450 | 250 |
| KGPF | Santa Fe, N. M. | 2414 | 25 |
| KGPI | Omaha, Nebr. | 2466 | 400 |
| KGPJ | Beaumont, Texas | 1712 | 100 |
| KGPK | Sioux City, Iowa | 2466 | 100 |
| KGPL | Los Angeles, Calif. | 1712 | 500 & 200 |
| KGPM | San Jose, Calif. | 2466 | 50 |
| KGPN | Davenport, Iowa | 2466 | 100 |
| KGPO | Tulsa, Okla. | 2450 | 100 |
| KGPP | Portland, Ore. | 2442 | 500 |
| KGPQ | Honolulu, T. H. (C.P. for 500 watts) | 1712 | 100 |
| KGPR | Minneapolis, Minn. | 2430 | 400 |
| KGPS | Bakersfield, Calif. | 2414 | 50 |
| KGPW | Salt Lake City, Utah | 2406 | 100 |
| KGPX | Denver, Colo. | 2442 | 400 |
| KGPZ | Wichita, Kans. | 2450 | 250 |
| KGZA | Fresno, Calif. | 2414 | 500 |
| KGZB | Houston, Texas | 1712 | 200 |
| KGZC | Topeka, Kans. | 2422 | 50 |
| KGZD | San Diego, Calif. | 2490 | 500 |
| KGZF | Chanute, Kans. | 2450 | 25 |
| KGZG | Des Moines, Iowa | 2466 | 100 |
| KGZH | Klamath Falls, Ore. | 2442 | 25 |
| KGZI | Wichita Falls, Texas (C.P. for 200 watts) | 2458 | 50 |
| KGZJ | Phoenix, Ariz. | 2430 | 100 |
| KGZM | El Paso, Texas | 2414 | 100 |
| KGZN | Tacoma, Wash. | 2414 | 100 |
| KGZO | Santa Barbara, Calif. | 2414 | 100 |
| KGZP | Coffeyville, Kans. | 2450 | 50 |
| KGZQ | Waco, Texas | 1712 | 50 |
| KGZR | Salem, Ore. | 2442 | 50 |
| KGZT | Santa Cruz, Calif. | 1674 | 100 |
| KGZU | Lincoln, Nebr. | 2490 | 200 |
| KGZV | Aberdeen, Wash. | 2414 | 50 |
| KGZW | Lubbock, Texas (C.P. for 150 watts) | 2458 | 50 |
| KGZX | Albuquerque, N. M. | 2414 | 50 |
| KGZY | San Bernardino, Calif. | 1712 | 50 |
| KNFA | Clovis, N. M. | 2414 | 50 |
| KNFB | Idaho Falls, Idaho | 2458 | 500 |
| KNFF | Leavenworth, Kans. | 2422 | 50 |
| KNFE | Duluth, Minn. | 2382 | 400 |
| KNFH | Garden City, Kans. | 2474 | 50 |
| KNFI | Mount Vernon, Wash. | 2414 | 50 |
| KNFJ | Pomona, Calif. | 1712 | 50 |
| KNFP | Everett, Wash. | 2414 | 50 |
| KNFM | Compton, Calif. | 2490 | 25 |
| KNGE | Cleburne, Texas | 1712 | 50 |
| KNGF | Sacramento, Calif. | 2422 | 400 |
| KNGH | Dodge City, Kans. | 2474 | 50 |
| KNGJ | El Centro, Calif. | 2490 | 50 |
| KNGK | Duncan, Okla. | 2450 | 50 |
| KNGM | Rapid City, S. D. | 2450 | 50 |
| KNGN | Norfolk, Nebr. | 2490 | 25 |
| KNGO | Portable, County of Okla. | 2450 | 50 |
| KNGP | Shreveport, La. | 2430 | 100 |
| KNGT | Muskogee, Okla. | 2450 | 50 |
| KNGU | Yakima, Wash. | 2414 | 50 |
| KNGV | Salina, Kans. | 2422 | 50 |
| KNGW | Brownwood, Texas | 2458 | 50 |
| KNGX | Portable, City of Los Angeles | 1712 | 200 |
| KNGY | Lodi, Calif. (C.P.) | 2414 | 50 |
| KNHB | Green Bay, Wisc. (C.P. for 2362 kc.) | 2382 | 50 |
| KNHC | Ada, Okla. | 2450 | 25 |
| KNHE | Fort Smith, Ark. | 2406 | 50 |
| KNHF | Denton, Texas | 1712 | 50 |
| KNHG | Prescott, Ariz. | 2430 | 10 |
| KNHM | Fargo, N. D. | 2442 | 50 |
| KRPW | Galveston, Texas | 1712 | 50 |
| KSW | Berkeley, Calif. | 1658 | 400 |
| KVP | Dallas, Texas | 1712 | 500 |
| WAKA | Huntington, Ind. (C.P.) | 2490 | 50 |
| WAKB | New London, Conn. (C.P.) | 2466 | 50 |
| WAKD | Chattanooga, Tenn. (C.P.) | 2474 | 100 |
| WAKE | Oshkosh, Wis. (C.P.) | 2382 | 100 |
| WAKF | Everett, Mass. (C.P.) | 1712 | 50 |
| WAKG | Clearwater, Fla. (C.P.) | 2466 | 50 |
| WAKH | Bloomfield, N. J. (C.P.) | 2430 | 50 |
| WAKZ | Freehold, N. J. | .... | .. |
| WCK | Belle Isle, Mich. | 2414 | 500 |
| WKDU | Cincinnati, Ohio | 1706 | 500 |
| WMDZ | Indianapolis, Ind. | 2442 | 400 |
| WMJ | Buffalo, N. Y. | 2422 | 500 |
| WMO | Highland Park, Mich. | 2414 | 50 |
| WNFP | Niagara Falls, N. Y. | 2422 | 125 |
| WPDA | Tulare, Calif. | 2414 | 150 |
| WPDB | Chicago, Ill. | 1712 | 500 |
| WPDC | Chicago, Ill. | 1712 | 500 |
| WPDD | Chicago, Ill. | 1712 | 500 |
| WPDE | Louisville, Ky. | 2442 | 200 |
| WPDF | Flint, Mich. | 2466 | 150 |
| WPDG | Youngstown, Ohio | 2458 | 250 |
| WPDH | Richmond, Ind. | 2442 | 50 |
| WPDI | Columbus, Ohio | 2430 | 200 |
| WPDK | Milwaukee, Wis. | 2450 | 500 |
| WPDL | Lansing, Mich. | 2442 | 50 |
| WPDM | Dayton, Ohio | 2430 | 400 |
| WPDN | Auburn, N. Y. | 2382 | 50 |
| WPDO | Akron, Ohio (C.P. for 250 watts) | 2458 | 100 |
| WPDP | Philadelphia, Pa. | 2474 | 500 |
| WPDR | Rochester, N. Y. | 2422 | 200 |
| WPDS | St. Paul, Minn. | 2430 | 500 |
| WPDT | Kokomo, Ind. | 2490 | 50 |
| WPDU | Pittsburgh, Pa. | 1712 | 400 |
| WPDV | Charlotte, N. C. | 2458 | 250 |
| WPDW | Washington, D. C. | 2422 | 400 |
| WPDX | Detroit, Mich. | 2414 | 500 |
| WPDY | Atlanta, Ga. | 2414 | 400 |
| WPEA | Syracuse, N. Y. | 2382 | 400 |
| WPEB | Grand Rapids, Mich. | 2442 | 500 |
| WPEC | Memphis, Tenn. | 2466 | 400 |
| WPED | Arlington, Mass. | 1712 | 100 |
| WPEE | Brooklyn, N. Y. | 2450 | 400 |
| WPEF | Bronx, N. Y. | 2450 | 400 |
| WPEG | New York, N. Y. | 2450 | 500 |
| WPEH | Somerville, Mass. | 1712 | 100 |
| WPEI | E. Providence, R. I. | 1712 | 50 |
| WPEK | New Orleans, La. | 2430 | 250 |
| WPEM | Woonsocket, R. I. (C.P.) | 2466 | 50 |
| WPEP | Kenosha, Wis. | 2450 | 100 |
| WPES | Saginaw, Mich. | 2442 | 100 |
| WPET | Lexington, Ky. | 1706 | 500 |
| WPFA | Newton, Mass. | 1712 | 50 |
| WPFC | Muskegon, Mich. | 2442 | 50 |
| WPFE | Reading, Pa. | 2442 | 100 |
| WPFG | Jacksonville, Fla. | 2442 | 400 |
| WPFH | Baltimore, Md. | 2414 | 500 |
| WPFI | Columbus, Ga. | 2414 | 50 |
| WPFK | Hackensack, N. J. (C.P. for 500 watts) | 2430 | 200 |
| WPFM | Birmingham, Ala. | 2382 | 400 |
| WPFN | Fairhaven, Mass. | 1712 | 100 |
| WPFO | Knoxville, Tenn. | 2474 | 400 |
| WPFP | Clarksburg, W. Va. | 2490 | 30 |
| WPFQ | Swarthmore, Pa. | 2474 | 50 |
| WPFS | Asheville, N. C. | 2474 | 500 |
| WPFT | Lakeland, Fla. | 2442 | 50 |
| WPFU | Portland, Me. | 2422 | 100 |
| WPFV | Pawtucket, R. I. | 2466 | 50 |
| WPFW | Bridgeport, Conn. | 2466 | 50 |
| WPFX | Palm Beach, Fla. | 2442 | 50 |
| WPFY | Yonkers, N. Y. | 2442 | 400 |
| WPFZ | Miami Beach, Fla. | 2442 | 100 |
| WPGA | Bay City, Mich. | 2466 | 50 |
| WPGB | Port Huron, Mich. | 2466 | 50 |
| WPGD | Rockford, Ill. | 2458 | 50 |
| WPGF | Providence, R. I. | 1712 | 150 |
| WPGH | Albany, N. Y. | 2414 | 300 |
| WPGI | Portsmouth, Ohio | 2430 | 100 |
| WPGJ | Utica, N. Y. | 2414 | 100 |
| WPGK | Cranston, R. I. | 2466 | 50 |
| WPGL | Binghamton, N. Y. | 2442 | 400 |
| WPGN | South Bend, Ind. | 2490 | 100 |
| WPGO | Huntington, N. Y. | 2490 | 25 |
| WPGP | Muncie, Ind. | 2442 | 100 |
| WPGS | Mineola, N. Y. | 2490 | 400 |
| WPGT | New Castle, Pa. | 2482 | 50 |
| WPGU | Cohasset, Mass. | 1712 | 50 |
| WPGV | Boston, Mass. | 1712 | 500 |
| WPGW | Mobile, Ala. | 2382 | 400 |
| WPGX | Worcester, Mass. | 2466 | 100 |
| WPGZ | Johnson City, Tenn. | 2474 | 50 |
| WPHA | Fitchburg, Mass. | 2466 | 50 |
| WPHB | Nashua, N. H. | 2422 | 50 |
| WPHD | Steubenville, Ohio | 2458 | 100 |
| WPHF | Richmond, Va. | 2450 | 400 |
| WPHG | Medford, Mass. | 1712 | 50 |
| WPHI | Charleston, W. Va. | 2490 | 50 |
| WPHJ | Fairmont, W. Va. | 2490 | 100 |
| WPHM | Orlando, Fla. | 2442 | 50 |
| WPHN | Tampa, Fla. | 2466 | 100 |
| WPHO | Zanesville, Ohio | 2430 | 50 |
| WPHP | Jackson, Mich. | 2466 | 50 |
| WPHQ | Parkersburg, W. Va. | 2490 | 50 |
| WPHV | Bristol, Va. | 2450 | 50 |
| WPHY | Elizabethton, Tenn. | 2474 | 100 |
| WPHZ | Oil City, Pa. | 2482 | 50 |
| WQFA | New Haven, Conn. | 2466 | 100 |
| WQFB | Macon, Ga. | 2414 | 50 |
| WQFC | Gainesville, Fla. | 2466 | 50 |
| WQFF | Monessen, Pa. | 2482 | 50 |
| WQFG | Roanoke, Va. | 2450 | 100 |
| WQFH | Lynchburg, Va. (C.P.) | 2450 | 50 |
| WQFI | Petersburg, Va. | 2450 | 50 |
| WQFJ | Oneonta, N. Y. (C.P.) | 2414 | 50 |
| WQFK | Clearwater, Fla. (C.P.) | 2466 | 50 |
| WQFL | Oak Park, Ill. | 1712 | 50 |
| WQFM | Wilkes-Barre, Pa. | 2442 | 50 |
| WQFN | Winter Haven, Fla. (C.P.) | 2442 | 50 |
| WQFO | Lancaster, Ohio | 2430 | 50 |
| WQFQ | Lafayette, Ind. | 2442 | 50 |
| WQFS | Hibbing, Minn. (C.P.) | 2382 | 50 |
| WQFU | Sharon, Pa. (C.P.) | 2482 | 50 |
| WQFV | Augusta, Ga. | 2414 | 250 |
| WQFX | Waukegan, Ill. | 1712 | 100 |
| WQFY | Mansfield, Ohio | 2474 | 50 |
| WQFZ | Ottawa, Ill. (C.P.) | 2458 | 250 |
| WRBH | Cleveland, Ohio | 2458 | 500 |
| WRDQ | Toledo, Ohio | 2474 | 200 & 400 |
| WRDR | Grosse Pointe Village, Mich. | 2414 | 50 |
| WRDZ | Ft. Wayne, Ind. | 2490 | 200 |

### State Police Radio Stations

| call | location | kc. | w. |
|---|---|---|---|
| KACB | St. of Washington, Portable-mobile | 2490 | 10 |
| KACC | Fairfield, Iowa | 1682 | 500 |
| KACD | Atlantic, Iowa | 1682 | 500 |
| KACG | St. of Washington, Portable-mobile | 2490 | 10 |

*(Turn to page 687)*

### Experimental Television Stations

#### 2000-2100 Kilocycles

| Call Letters | Power (Watts) | Company | Location |
|---|---|---|---|
| W2XDR | 500 & 1000 | Radio Pictures, Inc. | Long Island City, N. Y. |
| W8XAN | 100 | Sparks-Withington Company | Jackson, Mich. |
| W9XK | 50 & 100 | University of Iowa | Iowa City, Iowa |
| W9XAK | 125 | Kansas St. Col. Agr. & Apl. Sc. | Manhattan, Kansas |
| W6XAH | 1000 | Pioneer Mercantile Company | Bakersfield, Calif. |

#### 2750-2850 Kilocycles

| | | | |
|---|---|---|---|
| W3XAK | 5000 | National Broadcasting Co., Inc. | Portable |
| W9XAP | 2500 | National Broadcasting Co., Inc. | Chicago, Ill. |
| W2XBS | 5000 | National Broadcasting Co., Inc. | Bellmore, N. Y. |
| W9XAL | 500 & 150 | First Natl. Television Corp. | Kansas City, Mo |
| W9XG | 1500 | Purdue University | W. Lafayette, Ind |
| W2XAB | 500 | Atlantic Broadcasting Corp. | New York, N. Y. |

#### 42,000-56,000, 60,000-86,000 Kilocycles

| | | | |
|---|---|---|---|
| W2XAX | 50 | Atlantic Broadcasting Corp. | New York, N. Y. |
| W6XAO | 150 | Don Lee Broadcasting System | Los Angeles, Calif. |
| W9XAL | 150 & 500 | First Natl. Television Corp. | Kansas City, Mo. |
| W1XG | 500 | General Television Corp. | Boston, Mass. |
| W9XD | 500 | The Journal Company | Milwaukee, Wis. |
| W2XBT | 750 | National Broadcasting Co., Inc. | Portable |
| W2XF | 5000 | National Broadcasting Co. Inc. | New York, N. Y. |
| W3XE | 1500 | Philco Radio & Television Corp. | Philadelphia, Pa. |
| W3XAD | 500 | RCA Manufacturing Co., Inc. | Portable |
| W3XEP | 30000 | RCA Manufacturing Co., Inc. | Camden, N. J. |
| W10XX | 50 | RCA Manufacturing Co., Inc. | Portable-Mobile |
| W2XDR | 1000 & 500 | Radio Pictures, Inc. | Long Island City, N. Y. |
| W8XAN | 100 | Sparks-Withington Company | Jackson, Mich. |
| W9XK | 100 | University of Iowa | Iowa City, Iowa |
| W9XAT | 500 | Dr. George W. Young | Portable |

# THE DX CORNER

S. GORDON TAYLOR

*(For Broadcast Waves)*

## New L. P. O. Appointments

Several new appointments have been made since the complete list was published last month, as follows:

R. L. Pelkey, New Haven, Connecticut
Raymond S. Swenson, Rockford, Illinois
Donald Barnes, Grinnell, Iowa
John Havranek, Wilber, Nebraska
Paul J. Crowley, Rochester, New York
George J. Karesh, New York, New York
W. Russell DuCette, Seattle, Washington
Art Ling, Ottawa, Ontario, Canada
Reginald Pick, Leipzig, Germany

## Correspondence Wanted

Most DX'ers like to carry on correspondence, particularly with foreign countries, and the following list of names and addresses offers an excellent opportunity to establish such contacts.

Eric W. Watson, 37 Chancellor St., Shirley, Christchurch, New Zealand, would like to correspond with DX listeners and amateurs in the U. S. and European countries.

W. O'Brien, 111 Hastings St., Waltham, S. I., Christchurch, New Zealand, invites correspondence from DX'ers in the U. S. and Canada.

W. Russell Du Cette, 633 4th Avenue West, Seattle, Washington, would like to hear from other DX'ers living in or around Seattle with the object of comparing notes on DX reception.

Floyd Hammond, Pleasant Street, Dexter, Maine, would like to correspond with foreign readers, particularly those located in Asia, Africa or Hawaii.

Raphael Geller, 1652 Radcliff Avenue, Bronx, New York, invites correspondence from Australia, New Zealand, and the U. S. west coast.

A. T. Yamamoto, 5116 Oi-Izuruishi-machi, Shinagawa-ku, Tokyo, Japan, would be very much interested in correspondence with any DX'ers outside of Japan and guarantees to answer all letters received.

## Foreign Stamps

DX'ers will find it less expensive to include the proper foreign stamps when asking for foreign verifications. Such stamps can be obtained at their face value plus a nominal handling charge from "The Stamp Window, Ltd.", formerly "The I.D.A. Stamp Exchange", P. O. Box 237, Geraldine, Montana, or information as to the operation of this organization may be obtained from this same address.

## GCDXC Expands

Word comes from the Globe Circlers DX Club that this organization has taken over the Mid-Co DX Exchange (MCDXE). Dues are being increased from $1.25 to $1.50 per year. This includes a subscription to "The Hot Spot". Any DX'er desiring further information may obtain same by addressing Raymond S. Swenson, Publicity Manager, 2325 Tenth St., Rockford, Illinois, or club headquarters at 254 Cleveland St., Brooklyn, New York. A sample copy of "The Hot Spot" may be obtained by sending a request to this later address.

## National Radio Club

John C. Kalmbach, Jr., Publicity Manager of the National Radio Club, requests that the attention of readers of the DX Corner be called to his organization. This club issues a DX news bulletin weekly from September 1st to May 31st and monthly during the summer. This bulletin contains 6 pages of both broadcast band and short wave news and is mailed to all members. Membership dues are $1.25 per year with no initiation fee. Club stationery and stickers are available to members at small cost. Anyone desiring further information on this club should write to Robert H. Weaver, President, 603 West Market St., York, Pennsylvania.

## DX CALENDAR

Below are given lists of special and periodic DX broadcasts which are scheduled up to May fifteenth. 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.

### AN OBSERVER FROM "DOWN UNDER"

*Observer Alex. N. Chalmers is Junior Announcer and DX correspondent for Station 4ZP (620 kc., .5 kw.), Invercargill, New Zealand, and in his spare time serves as N. Z. observer for the DX Corner*


### PREPARING STATION LISTS

*Few readers realize the amount of work involved in preparing accurate station lists. Here is John M. Borst checking station correspondence against his card files in preparing one of the lists published monthly in* RADIO NEWS. *Shown with him is Miss Alice Rozanski, well known to most Observers as the secretary who acknowledges L. P. O. reports*

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

## SPECIALS

April

| Day | Hour | Kc. | Call | State | Kw. | Club |
|---|---|---|---|---|---|---|
| 1 | 2-2:30 | 1310 | WEBR | N. Y. | .1 | CDXR |
| 2 | 3-3:15 | 1500 | KVOE | Calif. | .1 | NNRC |
| 4 | 4:30-5:30 | 1200 | CKNX | Ont. | .05 | CDXR |
| | 5-6 | 1370 | WMFO | Ala. | .1 | NNRC |
| | 7-8 | 1210 | WSBC | Ill. | .1 | NNRC |
| 5 | 2-3 | 1310 | CJLS | N. S. | .1 | NNRC |
| | 3-4 | 1150 | XEFL | Mex. | .25 | URDXC |
| | 3-4 | 1200 | CHAB | Sask. | .1 | CDXR |
| | 3-5 | 1450 | CFCT | B. C. | .075 | CDXR |
| 6 | 3-5:10 | 1400 | WIRE | Ind. | .5 | NNRC |
| 8 | 2:30-3 | 1370 | WHBQ | Tenn. | .1 | NNRC |
| 9 | 2-3 | 1270 | CMKC | Cuba | .15 | NNRC |
| **10** | **4:20-4:40** | **1210** | **WMFG** | **Minn.** | **.1** | **R. News W. Johnson** |
| 11 | 5-6 | 1370 | WMFO | Ala. | .1 | NNRC |
| | 7-8 | 1210 | WSBC | Ill. | .1 | NNRC |
| **13** | **2-2:20** | **1420** | **WJBO** | **La.** | **.1** | **R. News Golson** |
| | 5:45-6 | 1500 | WGAL | Pa. | .1 | NNRC |
| 14 | 3-3:30 | 1210 | CKBI | Sask. | .1 | NNRC |
| 15 | 2:30-3 | 1370 | WHBQ | Tenn. | .1 | CDXR |
| 18 | 3-4 | 1010 | CHML | Ont. | .05 | CDXR |
| | 5-6 | 1370 | WMFO | Ala. | .1 | NNRC |
| | 7-8 | 1210 | WSBC | Ill. | .1 | NNRC |
| 19 | 1-1:30 | 600 | WICC | Conn. | .5 | CDXR |
| | 3-5 | 1450 | CFCT | B. C. | .075 | CDXR |
| | 3:30-4:30 | 1370 | KFRO | Texas | .1 | CDXR |
| | **3:30-5:30** | **1420** | **KNET** | **Texas** | **.1** | **R. News Davis** |
| | 4-5 | 630 | WGBF | Ind. | .5 | CDXR |
| | 4-6 | 1310 | KVOL | La. | .1 | CDXR |
| | 5-6 | 1010 | CHML | Ont. | .1 | CDXR |
| 25 | 2:30-4 | 1200 | KADA | Okla. | .1 | |
| | 5-6 | 1370 | WMFO | Ala. | .1 | NNRC |
| | 7-8 | 1210 | WSBC | Ill. | .1 | NNRC |
| 27 | 12-3 | 1420 | WPAR | W. Va. | .1 | CDXR |
| | 5:45-6 | 1500 | WGAL | Pa. | .1 | NRC |
| 30 | 5:30-6 | 1310 | WRAW | Pa. | .1 | CDXR |

May

| | | | | | | |
|---|---|---|---|---|---|---|
| 1 | 5-6 | 1200 | CKNX | Ont. | .05 | CDXR |
| 2 | 5-6 | 1370 | WMFO | Ala. | .1 | NNRC |
| | 7-8 | 1210 | WSBC | Ill. | .1 | NNRC |
| 9 | 5-6 | 1370 | WMFO | Ala. | .1 | NNRC |
| | 7-8 | 1210 | WSBC | Ill. | .1 | NNRC |
| **11** | **2-2:20** | **1420** | **WJBO** | **La.** | **.1** | **R. News Golson** |
| 13 | 2:30-4 | 1370 | WHBQ | Tenn. | .1 | NNRC |
| 14 | 3-3:30 | 1210 | CKBI | Sask. | .1 | NNRC |

## PERIODIC

The times shown for the following stations are, so far as could be determined, correct at the time of preparation. However, the hours of these periodic broadcasts are shifted frequently and it will probably be found that some of them will have changed hours by the time this appears in print.

*Daily—*
7:30 a.m. — 1050kc., KFBI, Abilene, Kansas, 5 kw. (tips)
8:30 p.m. — 1310 kc., WTRC, Elkhart, Ind., .1 kw. (tips) (exc. Sunday)

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

*Thursdays—*
12:30-1:15 a.m. — 1390 kc., KLRA, Little Rock, Ark., 1 kw. (MCDXE)
2-2:15 a.m. — 1300 kc., KFAC, Los Angeles, 1 kw. (tips)
3:30 a.m. — 740 kc., KMMJ, Clay Center Nebr., 1 kw. (tips)
**8:45-9 p.m.** — **1420 kc., KCMC, Texarkana, Ark. 1 kw. (Radio News) (tips)**
11-11:15 p.m. — 1010 kc., CKCK, Regina, Sask., .5 kw. (tips)

*Fridays—*
8 p.m. — 1320 kc., WORK, York, Pa., 1 kw. (NRC) (tips)
8:45-9 p.m. — 1530 kc. W9XBY, Kansas City, Mo. 1 kw. (tips)

*Saturdays—*
12:01-12:30 a.m. — 980 kc., KDKA, Pittsburgh, Pa., 50 kw., (tips)
10-10:15 a.m. — 830 kc., WEEU, Reading, Pa., 1 kw. (tips)

*Sundays—*
12:45-1 a.m. — 640 kc., KFI, Los Angeles, Calif., 50 kw. (tips)
12:45-1 a.m. — 1250 kc., WTCN, Minneapolis, Minn., 1 kw. (tips)
12-45-1 a.m. — 1400 kc., WIRE, Indianapolis, Ind. .5 kw. (tips)
12-45-1 a.m. — 1470 kc., WLAC, Nashville, Tenn., 5 kw. (tips)
**1-1:15 a.m.** — **1420 kc., KGGC, San Francisco, Calif. 1 kw. (Radio News) (tips)**

## ANNOUNCERS AT RADIO-NORMANDIE

*Francine Lemaitre and Roland Violatte, announcers whose voices are often heard by those who can tune in this famous French station*

Photo—Courtesy Observer Trice

| | |
|---|---|
| 1-5 a.m. | 1210 kc., TGW, Guatemala, Gua., 10 kw. |
| 2 a.m. | 730 kc., CJCA, Edmonton, Alberta, 1 kw. |
| 2-5 a.m. | 1380 kc., CMBX, Havana, Cuba, .25 kw. |
| 4-5 a.m. | 1310 kc., KROC, Rochester, Minn., 1 kw. |
| *Monthly—* | |
| 2-4 a.m. | 1420 kc. WJBO, Baton Rouge, La. 1 kw. (1st Sunday of each month) |

## 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. 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 1 (New England)—Observers Hammond, Tyndall, Foss, Grabowski, Pelkey, Lawton; Column 2 (New York, Ontario)—Observers Ling, Crowley, Goss, Kentzel, Tomlinson; Column 3 (Pennsylvania, Maryland, Virginia)—Observers Kocsan, Wilson, Gordon, Rank, Trice; Column 4 (Illinois, Ohio, Nebraska, Minnesota)—Observers Swenson, Truax, Shields, Havranek, Johnson; Column 5 (Texas, Missouri)—Observers Davis, Meade, Kimmons; Column 6 (Alberta, Washington, California)—Observers DuCette, Clancy, Hunt, Allen, Sholin.

| Kc. | Call | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|
| 546 | HAL | | – | 1 | – | – | – |
| 560 | MTCY | | – | – | – | – | * |
| 570 | 2YA | | – | * | – | 3 | 4 |
| 574 | Stuttgart | | – | 2 | – | – | – |
| 590 | JOAK-2 | | – | – | – | 5 | 3 |
| 592 | Vienna | | – | 1 | – | – | – |
| 600 | PRH2 | | – | – | * | – | – |
| 601 | CNR | | 2 | – | – | – | – |
| 610 | JODK-2 | | – | – | – | 5 | 3 |
| 620 | Brussels I | | 2 | 2 | – | – | – |
| 625 | T1PG | | – | 8 | 10 | 8 | – |
| 625 | JOTK | | – | – | – | – | 3 |
| 638 | Prague | | – | 1 | – | – | 2 |
| 640 | 5CK | | – | – | – | 4 | 5 |
| 648 | Lyon-la-Doua | | 4 | 2 | – | * | – |
| 650 | CX6 | | – | – | – | – | 8 |
| 650 | 1YA | | – | 4 | 4 | 4 | 4 |
| 658 | Cologne | | 2 | 1 | – | – | – |
| 660 | XGOA | | – | – | – | – | 5 |
| 670 | LS4 | | 8 | 8 | – | – | 8 |
| 670 | 2CO | | – | – | – | 4 | 5 |
| 670 | JFAK | | – | – | – | – | – |
| 690 | 6WF | | – | – | – | – | 5 |
| 695 | Paris-PTT | | – | 6 | – | – | – |
| 700 | JOKK | | – | – | – | – | – |
| 710 | LS1 | | – | – | – | – | 8 |
| 710 | 7NT | | – | – | – | * | – |
| 710 | JOJK | | – | – | – | – | – |
| 713 | I1RO | | 5 | 2 | – | – | – |
| 720 | 3YA | | – | 5 | 3 | 3 | 4 |
| 730 | 5CL | | – | – | – | 4 | 5 |
| 740 | Munich | | 1 | 1 | * | – | 1 |
| 740 | 2BL | | – | – | – | 4 | – |
| 750 | KGU | | – | 2 | * | 2 | 2 |
| 770 | JOHK | | – | – | – | – | – |
| 780 | JOPK | | – | – | – | – | – |
| 785 | Leipzig | | 1 | 1 | * | * | – |
| 790 | LR10 | | 3 | 1 | – | 6 | – |
| 790 | 4YA | | – | 4 | * | 3 | 4 |
| 790 | JOGK | | – | – | – | – | – |
| 795 | EAJ1 | | 7 | 6 | – | – | – |
| 800 | 4QG | | * | – | – | 4 | 5 |
| 804 | West Regional | | – | 6 | – | – | – |
| 810 | CX14 | | 9 | – | – | – | – |
| 810 | JOCK-1 | | 5 | – | – | – | * |
| 814 | Milan | | – | 2 | – | 3 | – |
| 830 | LR5 | | 3 | 1 | * | 7 | 1 |
| 830 | 3GI | | – | – | – | 4 | – |
| 830 | JOIK | | – | – | – | – | – |
| 840 | CMQ | | * | – | – | – | – |
| 841 | Berlin | | 9 | – | – | – | – |
| 850 | CX16 | | – | 8 | – | – | – |
| 859 | Strasbourg | | * | 2 | – | – | – |
| 868 | Agen (France) | | * | – | – | – | – |
| 870 | LR6 | | 3 | 8 | – | 7 | 8 |
| 870 | JOAK-1 | | – | – | – | – | 3 |
| 877 | London Regional | | – | 6 | – | – | – |
| 895 | Limoges | | – | 6 | – | – | – |
| 904 | Hamburg | | 2 | 1 | * | – | – |
| 910 | LR2 | | – | – | – | * | 8 |
| 913 | Toulouse | | 4 | 6 | – | – | – |
| 920 | JOQK | | – | – | – | – | – |
| 923 | PRF4 | | – | 7 | – | – | – |
| 932 | Brussels II | | – | 2 | – | – | – |
| 941 | Algiers | | – | 2 | – | – | – |
| 950 | LR3 | | * | – | – | – | – |
| 950 | Breslau | | – | – | – | – | – |
| 959 | Poste Parisien | | 3 | 2 | * | 1 | – |
| 960 | YV1RC | | * | 6 | – | * | – |
| 968 | Bordeaux SudOuest | | – | 6 | – | – | – |
| 970 | JOBG | | – | – | – | – | 3 |
| 980 | JOXK | | – | – | – | – | * |
| 986 | I1GE | | – | 1 | – | – | – |
| 986 | Torun | | – | 1 | – | – | – |
| 990 | LR4 | | 3 | 8 | – | 7 | 2 |
| 990 | 2GZ | | – | – | – | 4 | – |
| 995 | PFBI | | – | 3 | – | – | – |
| 1004 | Bratislava | | – | 1 | – | – | – |
| 1013 | Midland Regional | | 4 | * | – | – | – |
| 1017 | PRB9 | | 8 | 7 | – | 7 | – |
| 1020 | 2KY | | – | – | – | – | 5 |
| 1031 | Koenigsberg | | – | 2 | – | – | – |
| 1040 | Rennes | | 2 | 1 | 2 | * | – |
| 1050 | PRF6 | | – | – | – | – | 8 |
| 1050 | CX26 | | – | 8 | 8 | – | – |
| 1050 | JOHG | | – | – | – | – | – |
| 1070 | LR1 | | 3 | 8 | 8 | 7 | 8 |
| 1077 | Bordeaux | | 2 | 2 | 2 | * | – |
| 1085 | JOBK-2 | | – | – | – | – | 5 |
| 1095 | EAJ7 | | – | 6 | – | – | – |
| 1104 | Madona | | – | 1 | – | – | – |
| 1110 | 2UW | | – | – | – | 4 | – |
| 1113 | Radio-Normandie | | 3 | * | 2 | * | – |
| 1115 | LS5 | | – | 8 | – | – | – |
| 1120 | PRH3 | | * | 8 | – | – | – |
| 1120 | 4BC | | – | – | – | 4 | 5 |
| 1140 | I1TO | | 2 | 2 | – | – | – |
| 1140 | 4YO | | – | – | – | – | 5 |
| 1150 | LR8 | | – | 8 | – | 7 | – |
| 1167 | Monte Ceneri | | – | * | – | – | – |
| 1170 | 4TO | | – | – | – | 4 | – |
| 1175 | JOCK-2 | | – | – | – | – | 2 |
| 1176 | Copenhagen | | – | 1 | – | – | – |
| 1180 | 3KZ | | – | – | – | 4 | – |
| 1185 | Nice-Corse | | – | 5 | – | – | – |
| 1190 | LS2 | | 3 | 1 | – | 8 | 8 |
| 1190 | 2CH | | – | – | – | 4 | – |
| 1195 | Frankfurt | | 2 | M | * | 1 | – |
| 1213 | Lille | | – | 6 | – | – | – |
| 1215 | TGW | | – | * | – | * | 3 |
| 1222 | I1TR | | – | 2 | * | – | – |
| 1225 | PRE3 | | – | 7 | – | – | – |
| 1230 | LS8 | | – | 8 | – | – | – |
| 1231 | Gleiwitz | | – | 1 | – | – | – |
| 1240 | WKAQ | | M | 8 | * | * | 2 |
| 1258 | Kuldiga | | – | 1 | – | – | – |
| 1267 | Nurnburg | | – | M | – | – | – |
| 1280 | PRG3 | | – | 7 | – | – | – |
| 1285 | Dresden | | – | 1 | – | – | – |
| 1290 | WNEL | | – | 8 | – | * | – |
| 1294 | Dorbirn | | – | 1 | – | – | – |
| 1320 | KGMB | | – | 3 | – | * | – |
| 1330 | Bremen | | – | 1 | – | – | – |
| 1348 | Konigsberg | | – | 1 | – | – | – |
| 1375 | Berne | | – | 6 | – | – | – |
| 1393 | Lyon | | – | 6 | – | – | – |
| 1410 | HI1A | | – | – | – | – | – |

## ANOTHER NEW ZEALANDER

*Observer Eric Watson, Christchurch, New Zealand, is well known in DX circles, both for his DX accomplishments and as executive of the N. Z. DX Radio Association*

## Station Notes

The following notes concerning station changes, etc., were gleaned from reports of Observers whose names are shown in parenthesis at the end of each item. Unless otherwise indicated all hours given are Eastern Standard Time.

**CJCA** broadcasts special programs Sundays at 2 a.m. for its northern listeners (Clancy).

**CJIC**, 1500 kc., tests 19th and 20th of each month, 3:11-3:19 a.m. (Parfitt).

**CJOC** is now on 950 kc. instead of 1230 kc (Clancy).

**CJRC** now testing on 630 kc. (Biss).

**CKSO**, 930 kc., tests 19th and 20th of each month, 3:11-3:19 a.m. (Parfitt).

**CMBZ**, "El Mundo-Salas", 14 San Rafael St., Havana, Cuba (Walter Johnson).

**CMCF** operates daily 10 a.m. to midnight. DX programs 11th and 21st of each month 1-2 a.m., now employs 540 watts power. Address reports to Oscar Guitierrez, Prado 9, Havana, Cuba. No return postage required. (Kentzel, Walter Johnson, Trice).

**CMCG**, station address: "La Balear", Malecon No. 340, Havana, Cuba (Walter Johnson).

**3GI**, station address: National Broadcasting Service, H. P. Brown, Postmaster-General Department, Gippsland Regional, Sale, Victoria, Australia (Walter Johnson).

**HI1A**, Dominican Republic, 1410 kc., operates 11:40 a.m.—1:40 p.m. and 7:40 p.m.—9:40 p.m. daily (Sholin).

**HIT**, Dominican Republic, heard several mornings until 5:45 a.m. transmitting on 1080 kc. Announcements are made in Spanish and English (R. L. Young).

**HIX**, 800 kc., 700 watts operates Sundays 7:40—10:40 a.m., weekdays 12:10-1:10 p.m., 4:40-5:40 p.m., also Tuesdays and Fridays, 8:10-10:10 p.m. (Meehan, Kentzel).

**KFDM** Contrary to recent rumors this station does want reports and will verify (Parfitt).

**KGBU**, 900 kc., Alaska, granted 1 kw. night; 5 kw. day (Meehan).

**KGGC** tips period changed to begin at 10 p.m. PST Saturday, instead of 9:30 p.m. (Covert).

**KGU**, 750 kc., 2.5 kw., broadcasts 11:45 a.m.—4:30 a.m. (Sholin).

**KIEM** new frequency check time: 5-5:20 a.m., second Monday of each month, 1450 kc. Will have new 500 watt Western Electric transmitter in operation by the time this appears in print.

**KIRO**, 710 kc. 500 watts is on till 5 a.m. (Du Cette).

**KXA**, 760 kc., 500 watts is on from 1-4 a.m. (Du Cette).

**LR1**, new address: Calle Maipu 555, Buenos Aires (Edbrooke).

Poste de l'Ile de France is now on 1366 kc. from 1348 kc. (Pellatt).

PTT (Grenoble), 592 kc. is increasing power to 30 kw. (Pellatt).

PTT (Nice) 1183 kc., 60 kw. announces "Ici Nice—Cote d' Azur". This is not to be confused with the Nice station on 1276 kc. which is an entirely different station (Pellatt).

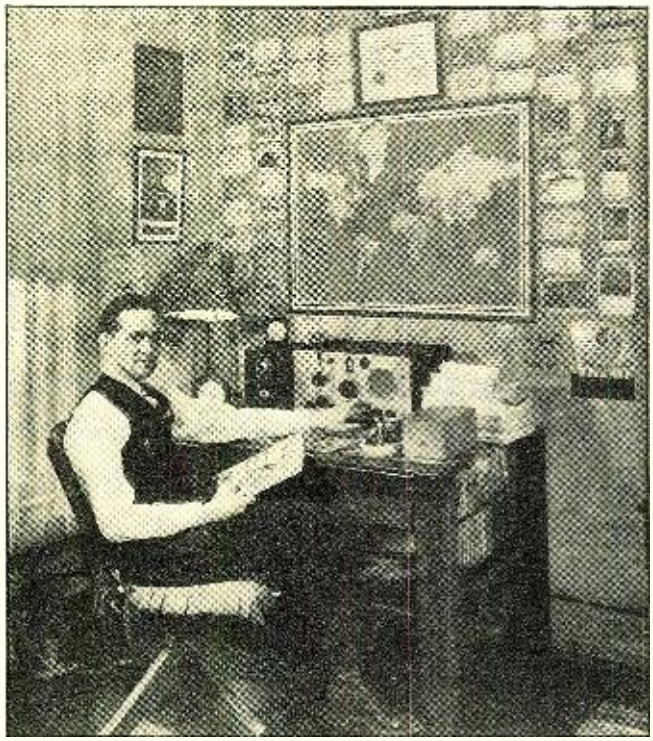
Radio Cote d'Azur changed from 1249 kc. to 1276 kc. (Pellatt).

Radio Normandie (Fecamp) broadcasts an

(*Turn to page 693*)

# The DX for the

## Conducted by Laurence



SYSTEMATIZED DX'ING BRINGS THE RESULTS

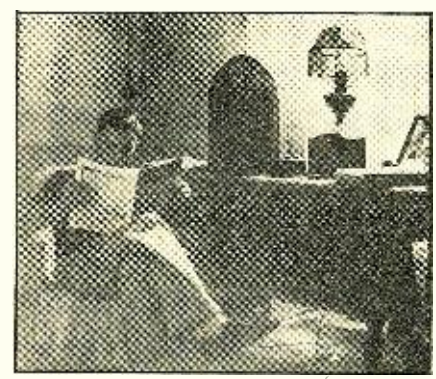
*Caleb A. Wilkinson, Official Observer for Arkansas, believes in orderliness in his DX Corner both as to arrangement of apparatus and the methods for systematic DX'ing. He relies on a Superskyrider, with a Peak preselector, for the wonderful results he has obtained*

**THE thirty-eighth 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, Vice-President; **U. S. Radio DX Club**, Geo. E. Deering, Jr., President; **Radio Club Venezolano**, Venezuela, President, R. V. Ortega; **World-Wide Dial Club**, President, Howard A. Olson; **International 6000- to 12,500-Mile Short-Wave Club**, Oliver Amlie, President, Thomas H. Tynan, 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; **National Radio Club**, Robert H. Weaver, President; **Universal Radio DX Club**, Charles C. Norton, 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 organi-



FROM FAR-OFF MALTA

*At right, Edgar Vassallo, L.P.O. for Malta, shown listening in to DJN at 3 p.m. local time. His receiver for night work is a Magic Brain RCA Victor*

## THE WORLD'S ORIGINAL ORGANIZATION OF

### S.W. PIONEERS
### Official RADIO NEWS Listening Post Observers

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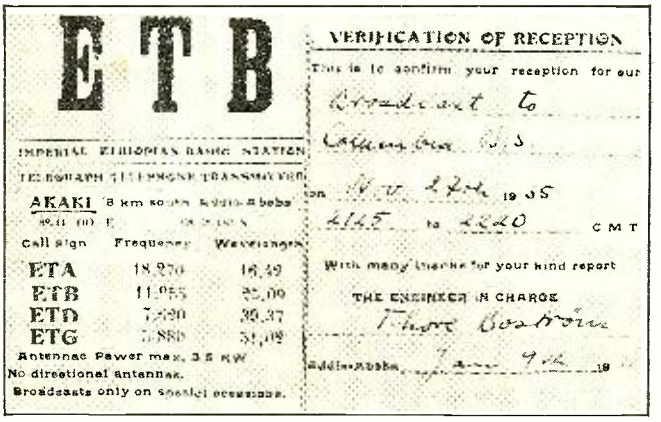
# Corner SHORT WAVES

## M. Cockaday




HERE'S ONE YOU WOULD LIKE TO HAVE
*The highly-prized verification card of the Addis Ababa Imperial Stations above is one that any DX'er would value above all others at this time. It was "earned" by Ian C. Morgan of Montreal, Canada*

zation 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.

### New Recommendations for Station Reports

Anyone who thinks that conducting this department and preparing the World Short-Wave Time-Table is an easy job would quickly change his mind if he were to sit in for one month on the actual work involved. Of course, it is easy to criticize and to complain if an individual report does not appear when the sender thinks it should. But just remember, fellows, that your editor spends practically all of his "free" time at home Saturdays, Sundays, holidays, evenings, in going over and coordinating the information from more than four thousand individual station reports sent in by our observers and listeners each month. These have to be picked and chosen between, as very seldom are any of them complete and at least 50 percent have some slight inaccuracy which must be checked up by our own Listening Post.

We feel, however, that the effort is worth while and that the material published is of great help to a large group of our readers. We have also stated that we cannot answer these report letters but that the information contained in them will be used (and credit given) to swell our list of published reports. These come in to the DX Corner from all over the world and each Observer's effort is thus well repaid, for what one misses another will hear and the consolidated material gives us the most complete and up-to-date list that it is possible to obtain. Your editor and our readers in general are grateful for the information you send in.

To make the work as efficient as possible it is now recommended that our Observers send in reports on post cards at any time during the month that the stations are being logged. This allows the work of the editor to be spread out better during the month instead of an enormous batch being received around the 20th. And please remember to *keep your information on stations logged specific!* It is recommended that the reports now be arranged in two ways. The first is for New Stations Heard. The second way is for Station Changes.

No other information than this should be included on the card except the Observer's or listener's name and address and the fact that he is a listener or an Observer for that territory. (*Turn to page* 676)

A REAL FELLOW FROM KANSAS
*Meet Bill Schumacher of Ellis, Kansas, L.P.O. in that state and one of the most reliable at logging hard-to-get stations*

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**Norway**, Per Torp.
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**Peru**, Ramon Masias.
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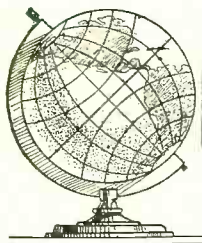
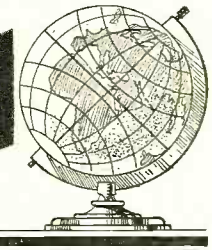
**South West Africa**, H. Mallet-Veale.
**Spain**, Jose Maria Maranges.
**Straits Settlements**, C. R. Devaraj.
**Sweden**, B. Scheierman.
**Switzerland**, Dr. Max Hausdorff.
**Turkey**, Hermann Freiss, M. Seyfeddin, A. K. Onder.
**Venezuela**, Francisco Fossa Anderson.



# WORLD SHORT WAVE TIME-TABLE

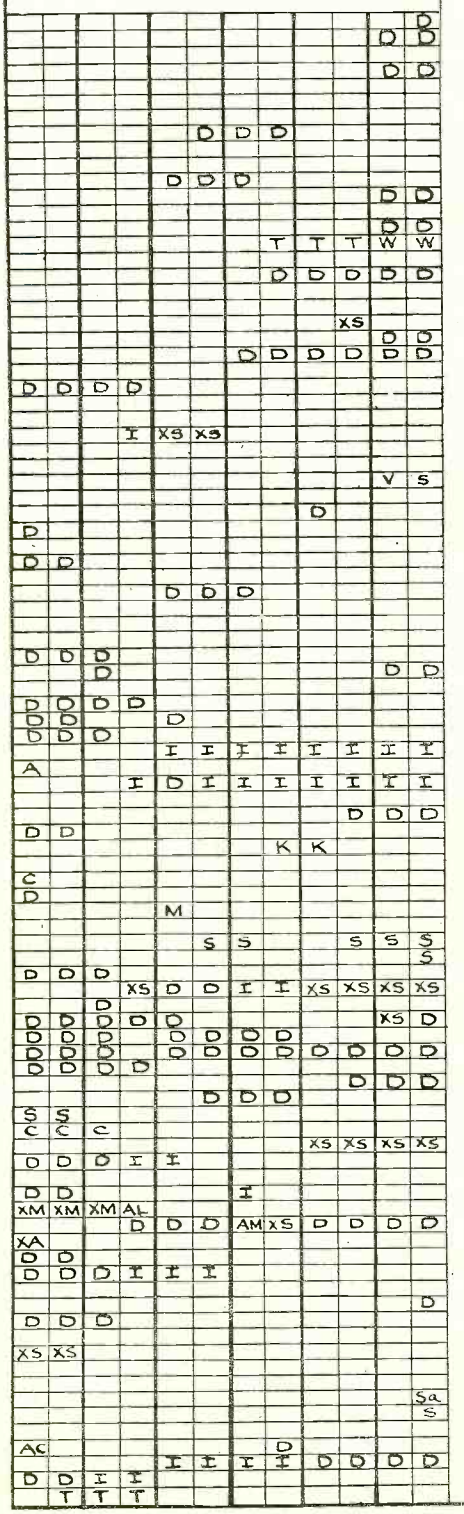


*Compiled by* LAURENCE M. COCKADAY

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

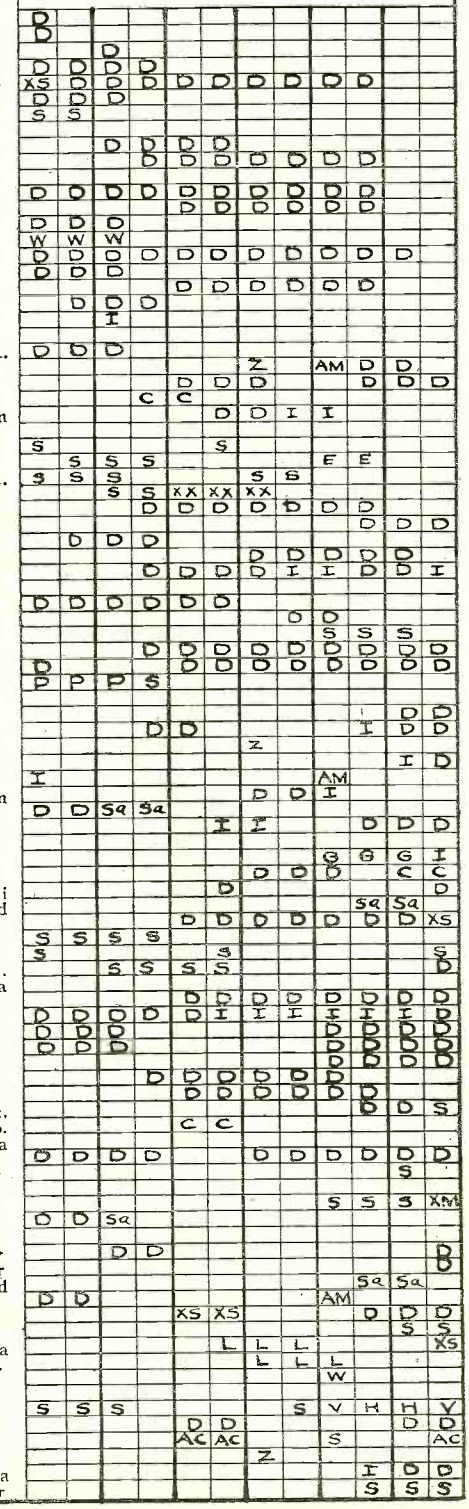
| | | | | | | | | | | | | FILL IN LOCAL TIME | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8 | 9 | 10 | 11 | M | 1 | 2 | 3 | 4 | 5 | 6 | 7 | EASTERN STANDARD TIME | 8 | 9 | 10 | 11 | N | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 01 | 02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

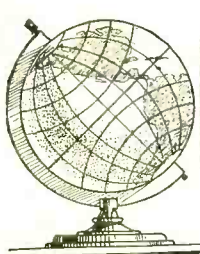
## HOURS OF TRANSMISSION



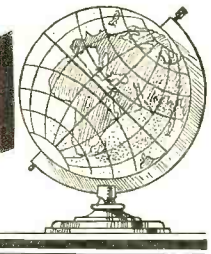
| Wave-length Meters | Call Letters | Frequency Kc. | City Country |
|---|---|---|---|
| 13.93 | W8XK | 21540 | Pittsburgh, Pa. |
| 13.93 | GSI | 21530 | Daventry, England |
| 13.94 | W2XE | 21520 | New York, N. Y. |
| 16.86 | GSG | 17790 | Daventry, England |
| 16.87 | W3XAL | 17780 | Bound Brook, N. J. |
| 16.89 | DIE | 17760 | Zeesen, Germany |
| 19.52 | HAS3 | 15370 | Budapest, Hungary |
| 19.56 | DJR | 15340 | Zeesen, Germany |
| 19.57 | W2XAD | 15330 | Schenectady, N. Y. |
| 19.62 | LRU | 15290 | Buenos Aires, Arg. |
| 19.63 | DJQ | 15280 | Zeesen, Germany |
| 19.65 | W2XE | 15270 | New York, N. Y. |
| 19.66 | GSI | 15260 | Daventry, England |
| 19.68 | FYA | 15244 | Pontoise, France |
| 19.71 | PCJ | 15220 | Huizen, Holland |
| 19.72 | W8XK | 15210 | Pittsburgh, Pa. |
| 19.74 | DIB | 15200 | Zeesen, Germany |
| 19.76 | GSO | 15180 | Daventry, England |
| 19.82 | GSF | 15140 | Daventry, England |
| 19.84 | HVJ | 15121 | Vatican City |
| 19.85 | DJL | 15110 | Zeesen, Germany |
| 19.95 | RKI | 15040 | Moscow, U. S. S. R. |
| 20.55 | JVH | 14600 | Nazaki, Japan |
| 21.25 | HI5ABE | 14120 | Cali, Colombia |
| 22.00 | SPW | 13635 | Warsaw, Poland |
| 22.73 | ORP | 13200 | Ruysselede, Belgium |
| 22.95 | VPD | 13075 | Suva, Fiji Islands |
| 24.52 | TFJ | 12235 | Reykjavik, Iceland |
| 24.83 | CT1CT | 12082 | Lisbon, Portugal |
| 25.00 | RV59 (RNE) | 12000 | Moscow, U. S. S. R. |
| 25.21 | CT1GO | 11900 | Parede, Portugal |
| 25.25 | FYA | 11880 | Pontoise, France |
| 25.27 | W8XK | 11870 | Pittsburgh, Pa. |
| 25.30 | GSE | 11860 | Daventry, England |
| 25.36 | W2XE | 11830 | New York, N. Y. |
| 25.36 | W9XAA | 11830 | Chicago, Ill. |
| 25.38 | GSN | 11820 | Daventry, England |
| 25.40 | I2RO | 11810 | Rome, Italy |
| 25.43 | DJO | 11795 | Zeesen, Germany |
| 25.44 | W1XAL | 11790 | Boston, Mass. |
| 25.49 | DID | 11770 | Zeesen, Germany |
| 25.53 | GSD | 11750 | Daventry, England |
| 25.58 | PHI | 11730 | Huizen, Holland |
| 25.58 | CJRX | 11730 | Winnipeg, Canada |
| 25.60 | FYA | 11720 | Pontoise, France |
| 25.62 | HJ4ABA | 11710 | Medellin, Col. |
| 27.93 | JVM | 10740 | Nazaki, Japan |
| 28.12 | CEC | 10670 | Santiago, Chile |
| 28.14 | JVN | 10660 | Nazaki, Japan |
| 29.04 | ORK | 10330 | Ruysselede, Belgium |
| 29.24 | PMN | 10260 | Bandoeng, Java |
| 30.43 | EAQ | 9860 | Madrid, Spain |
| 31.00 | CON | 9677 | Macao, Asia |
| 31.05 | CT1AA | 9660 | Lisbon, Portugal |
| 31.14 | I2RO | 9635 | Rome, Italy |
| 31.27 | HH3W | 9595 | Port-au-Prince, Haiti |
| 31.27 | HBL | 9595 | Geneva, Switzerland |
| 31.28 | W3XAU | 9590 | Philadelphia, Pa. |
| 31.28 | VK2ME | 9590 | Sydney, Australia |
| 31.28 | PCJ | 9590 | Huizen, Holland |
| 31.28 | HP5J | 9590 | Panama City, Pana. |
| 31.32 | VK3LR | 9580 | Lyndhurst, Australia |
| 31.32 | GSC | 9580 | Daventry, England |
| 31.35 | W1XK | 9570 | Millis, Mass. |
| 31.38 | DJA | 9560 | Zeesen, Germany |
| 31.45 | DJN | 9540 | Zeesen, Germany |
| 31.48 | W2XAF | 9530 | Schenectady, N. Y. |
| 31.48 | LKJI | 9530 | Jeloy, Norway |
| 31.55 | GSB | 9510 | Daventry, England |
| 31.58 | PRF5 | 9501 | Rio de Janeiro, Braz. |
| 31.58 | HJU | 9500 | Buenaventura, Colo. |
| 31.61 | VK3ME | 9490 | Melbourne Australia |
| 31.82 | COCH | 9428 | Havana, Cuba |
| 32.88 | HAT4 | 9125 | Budapest, Hungary |
| 32.89 | CP6 | 9120 | La Paz, Bolivia |
| 34.19 | HCJB | 8775 | Quito, Ecuador |
| 34.29 | ZCK(ZBW) | 8750 | Hong Kong, China |
| 34.62 | CO9JQ | 8665 | Camaguey, Cuba |
| 36.50 | ZP10 | 8220 | Asuncion, Paraguay |
| 38.20 | HC2JSB | 7854 | Guayaquil, Ecuador |
| 38.48 | HBP | 7797 | Geneva, Switzerland |
| 39.95 | JVP | 7510 | Nazaki, Japan |
| 40.51 | HI3ABD | 7406 | Bogota, Colombia |
| 40.65 | XECR | 7380 | Mexico City, Mex. |
| 41.20 | HI1ABD | 7281 | Cartagena, Col'mbia |
| 41.80 | CR6AA | 7177 | Lobito, Angola, Afr. |
| 42.15 | HB9B | 7118 | Basle, Switzerland |
| 42.31 | SM5SD | 7090 | Stockholm, Sweden |
| 42.37 | VP3MR | 7080 | Georgetown, B. G. |
| 43.48 | HI3C | 6900 | La Romana, D. R. |
| 44.14 | HIH | 6796 | San Pedro, D. R. |
| 44.44 | JVT | 6750 | Nazaki, Japan |
| 44.71 | TIEP | 6710 | San Jose, Costa Rica |
| 45.00 | HC2RL | 6667 | Guayaquil, Ecuador |

## HOURS OF TRANSMISSION





# WORLD SHORT WAVE TIME-TABLE



*(Continued from the Previous Page)*

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

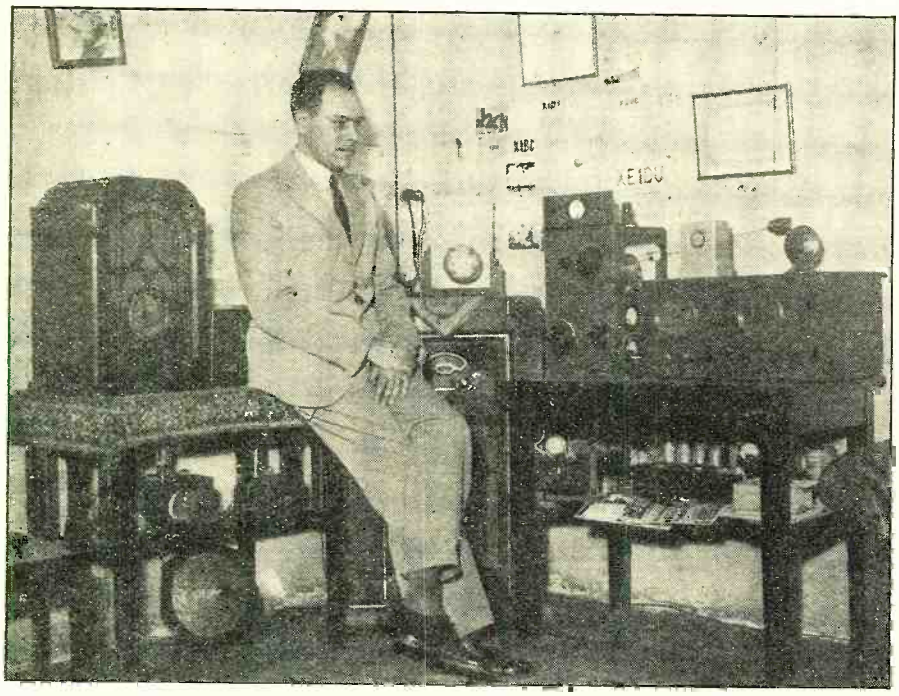
| | | | | | | | | | | | | FILL IN LOCAL TIME | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8 | 9 | 10 | 11 | M | 1 | 2 | 3 | 4 | 5 | 6 | 7 | EASTERN STANDARD TIME | 8 | 9 | 10 | 11 | N | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 01 | 02 | 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 |
|---|---|---|---|
| 45.34 | PRADO | 6616 | Riobamba, Ecuador |
| 45.38 | RV72 | 6611 | Moscow, U. S. S. R. |
| 45.80 | TIRCC | 6550 | San Jose, Costa Rica |
| 46.01 | YV6RV | 6520 | Valencia, Venezuela |
| 46.22 | HJ5ABD | 6490 | Cali, Colombia |
| 46.28 | HI4D | 6482 | Trujillo, D. R. |
| 46.50 | HJ4ABC | 6451 | Ibague, Colombia |
| 46.53 | HJ1ABB | 6447 | Barranquilla, Col. |
| 46.80 | TIPG | 6410 | San Jose, Costa Rica |
| 47.00 | HI3U | 6383 | Santiago, D. R. |
| 47.06 | YV4RC | 6375 | Caracas, Venezuela |
| 47.24 | HRP1 | 6350 | San Pedro Sula, D. R. |
| 47.51 | HIZ | 6315 | Trujillo, D. R. |
| 47.62 | YV12RM | 6300 | Maracay, Venezuela |
| 48.15 | OAX4G | 6230 | Lima, Peru |
| 48.19 | HJ1ABH | 6225 | Cienaga, Colombia |
| 48.48 | HI1A | 6188 | Santiago, D. R. |
| 48.54 | HJ3ABF | 6180 | Bogota, Colombia |
| 48.70 | CJRO | 6160 | Winnipeg, Canada |
| 48.78 | HJ2ABA | 6150 | Tunja, Colombia |
| 48.78 | YV3RC | 6150 | Caracas, Venezuela |
| 48.78 | HJ5ABC | 6150 | Cali, Colombia |
| 48.78 | COKG | 6150 | Santiago, Cuba |
| 48.86 | W8XK | 6140 | Pittsburgh, Pa. |
| 48.89 | CR7AA | 6136 | Lourenzo Marques, A. |
| 48.92 | ZGE | 6132 | Kuala Lumpur, F.M.S. |
| 48.94 | COCD | 6130 | Havana, Cuba |
| 48.94 | CT1GO | 6130 | Parede, Portugal |
| 49.02 | W2XE | 6120 | New York, N. Y. |
| 49.04 | HJ1ABE | 6116 | Cartagena, Col. |
| 49.10 | CHNX | 6110 | Halifax, N. S. |
| 49.10 | GSL | 6110 | Daventry, England |
| 49.18 | HJ4ABB | 6100 | Manizales, Col. |
| 49.18 | W3XAL | 6100 | Bound Brook, N. J. |
| 49.18 | W9XF | 6100 | Chicago, Ill. |
| 49.20 | ZTJ (JB) | 6098 | Johannesburg, Africa |
| 49.26 | CRCX | 6090 | Toronto, Canada |
| 49.32 | VO7LO | 6083 | Nairobi, Kenya, Afr. |
| 49.34 | HP5F | 6080 | Colon, Panama |
| 49.34 | W9XAA | 6080 | Chicago, Ill. |
| 49.34 | ZHJ | 6080 | Penang, S. S. |
| 49.35 | DIM | 6079 | Zeesen, Germany |
| 49.41 | OER2 | 6072 | Vienna, Austria |
| 49.42 | HH2S | 6070 | Port au Prince, Haiti |
| 49.42 | VE9CS | 6070 | Vancouver, B. C. |
| 49.46 | HJ4ABL | 6065 | Manizales, Colombia |
| 49.50 | W8XAL | 6060 | Cincinnati, Ohio |
| 49.50 | W3XAU | 6060 | Philadelphia, Pa. |
| 49.50 | OXY | 6060 | Skamlebaek, Denm'k |
| 49.59 | GSA | 6050 | Daventry, England |
| 49.63 | HJ3ABI | 6045 | Bogota, Colombia |
| 49.65 | HJ1ABG | 6042 | Barranquilla, Col. |
| 49.67 | YDA | 6040 | Batavia, Java |
| 49.67 | W1XAL | 6040 | Boston, Mass. |
| 49.67 | W4XB | 6040 | Miami, Fla. |
| 49.67 | PRA8 | 6040 | Pernambuco, Brazil |
| 49.75 | HP5B | 6030 | Panama City, Pana. |
| 49.75 | VE9CA | 6030 | Calgary, Alberta, Can. |
| 49.83 | DIC | 6020 | Zeesen, Germany |
| 49.83 | XEUW | 6020 | Mexico City, Mex. |
| 49.85 | ZHI | 6018 | Singapore, Malaya |
| 49.90 | HJ3ABH | 6012 | Bogota, Colombia |
| 49.92 | COCO | 6010 | Havana, Cuba |
| 49.95 | HJ1ABJ | 6006 | Santa Marta, Col. |
| 49.96 | VE9DN | 6005 | Montreal, Canada |
| 50.00 | XEBT | 6000 | Mexico City, Mex. |
| 50.00 | RV59 | 6000 | Moscow, U. S. S. R. |
| 50.17 | HIX | 5980 | Trujillo, D. R. |
| 50.20 | HJ2ABC | 5976 | Cucuta, Colombia |
| 50.21 | XECW | 5975 | Xantocam, Mexico |
| 50.26 | HVJ | 5969 | Vatican City |
| 50.42 | HJN | 5950 | Bogota, Colombia |
| 50.45 | FIQA | 5946 | Tananarive, Mad. |
| 50.50 | TG2X | 5940 | Guatemala City, G. |
| 50.59 | HJ4ABE | 5930 | Medellin, Colombia |
| 51.02 | YV8RB | 5880 | Barquisimeto, Ven. |
| 51.06 | HRN | 5875 | Tegucigalpa, Hond's |
| 51.28 | YV5RMO | 5850 | Maracaibo, Ven. |
| 51.63 | YV7RMO | 5810 | Maracay, Ven. |
| 51.72 | YV2RC | 5800 | Caracas, Venezuela |
| 51.90 | OAX4D | 5780 | Lima, Peru |
| 52.45 | YV10RSC | 5720 | San Cristobal, Ven. |
| 70.21 | RV15 | 4273 | Khabarovsk, Siberia |
| 79.58 | HB9B | 3770 | Basle, Switzerland |

HOURS OF TRANSMISSION

A—Thursday, Sunday
C—Monday, Wednesday, Friday
D—Daily
E—Tuesday, Thursday
F—Friday
G—Tuesday, Thursday, Saturday
H—Wednesday, Thursday, Sunday
I—Irregularly
K—Monday, Friday
L—Wednesday, Saturday
M—Monday
N—Monday, Wednesday, Thursday
P—Except Tuesday, Wednesday
R—Thursday, Friday, Saturday
S—Sunday
T—Tuesday
Th—Thursday
V—Sunday, Wednesday
W—Wednesday
Xth—Except Thursday
Y—Sunday, Monday
Z—Tuesday, Friday
AC—Monday, Thursday, Saturday
AF—Tuesday, Friday, 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
XS—Except Sunday
XX—Tuesday, Thursday, Friday
XY—Except Tuesday, Sunday



REPRESENTING MEXICO

*Manuel Ortiz G. of Mexico City, L.P.O. for the country of that name, is justly proud of his DX Corner. South and Central America are his hunting grounds but he can circle the globe too. His amateur call is XE1DU*

# The DX Corner (Short Waves)

(*Continued from page 673*)

A standard form for this would be the following:

**New Station**—W2XAF, Schenectady, New York, 21.4 meters, 9530 kc., daily 4 p.m. to midnight, E.S.T.

Station changes should be reported as follows:

**Station Change**—HCJB, Quito, Ecuador, has changed frequency from 8333 kc. to 8900 kc. Schedule same as before.

It is believed that this new form of reporting will be more efficient in the way of handling and will enable us to get all reports in the issue for which they were intended.

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

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

### EUROPE

**DJC**, Zeesen, Germany, 6020 kc., 5-8 p.m. E.S.T. (Herman).

**DZA**, Zeesen, Germany (old call DJI), 9675 kc., experimental 5-7 p.m. E.S.T. (Partner, Wilkinson, Lee, Moore).

**DZB**, Zeesen, Germany (old call DJJ), 10042 k.c., experimental 8-10 p.m. C.E.T. (Westman, Partner).

**DZH**, Zeesen, Germany, 14460 kc., experimental 6-8 p.m. C.E.T. (Partner. Westman).

**DGU**, Nauen, Germany, 9609 kc., Thursday 7:30 p.m. E.S.T. (Ellsworth).

**PCJ**, Huizen, Holland, 25.5 meters, 11730 kc., 8-11 a.m. E.S.T. (Donaldson).

**GSH**, Daventry, England, 49.1 meters, broadcasts Big Ben chimes 3 a.m. in England at 10 p.m. E.S.T. Closes down with "God Save the King" (Loke).

New British Transmitters soon to be on the air are as follows:

AN INDIAN EXPERIMENTER

*Meet Official Observer A. H. Dalal of Broach, India, who keeps an accurate account of Asian, African and European transmissions on the short waves*

**GSN**, Daventry, England, 25.38 meters, 11820 kc. (Donaldson).

**GSO**, Daventry, England, 19.76 meters, 15180 kc. (Donaldson).

**GSP**, Daventry, England, 19.6 meters, 15310 kc. (Donaldson).

**GSK**, Daventry, England, 11.47 meters, 26100 kc. (Donaldson).

**HB9AQ**, Switzerland, reported heard on 85.06 meters (Byrns).

**EAQ**, Madrid, Spain, 9860 kc., 5:15-9:30 p.m. E.S.T. Program in English from 7-7:30 p.m. E.S.T. (Ortiz, Lawton, Hamilton).

**I2RO-1**, Rome, Italy, 49.3 meters, reported heard Mondays, Wednesdays and Fridays, 6-7:30 p.m. E.S.T. (Rogers, Anca, Gavin, Holmgren, Marco, Westman, Dickes).

**I2RO-3**, Rome, Italy, 31.13 meters, reported heard Mondays, Wednesdays, Fridays, 6-7:30 p.m., E.S.T., with the American Hour in English. (Loke, Gavin, Holmgren, Marco, Westman, Dickes.)

**I2RO-4**, Rome, Italy, 25.4 meters, 8:15-9 a.m., 9:15-11 a.m., 11:30 a.m.-12:15 p.m., E.S.T. (Craig, Marco, McCormick, Dickes.)

**I2RO**, Rome, Italy, 11.81 megacycles, has given news in English, Hindustani, Chinese and other languages since January 1st at 9 a.m. to noon. (Dalal.)

**HAS3**, Budapest, Hungary, 15370 kc., reported heard Sundays 8 a.m., E.S.T. (Sauberlich, Reilly, Dressler, Gavin.)

**HAT2**, Budapest, Hungary, reported heard testing on 6840 kc. (Donaldson.)

**HAT4**, Budapest, Hungary, 9125 kc., reported heard 6:30-7 p.m. (Rich, Wilson.)

**CTV2**, Monsante Radio, Lisbon, Portugal, 11148 kc., heard testing and rebroadcasting irregularly. (Donaldson.)

**CT1AA**, Lisbon, Portugal, reported changed frequency to 9660 kc. (Another observer reported change to 9750 kc.) Reported heard 6-7 p.m., Tuesdays, Thursdays and Fridays. (Reilly, Koehnlein, Marco, Salazar, McCormick.)

**FTK**, Ste. Assise, France, 15,880 kc., reported heard testing with Saigon, 9:25 a.m., E.S.T. (Wilson.)

**LKJ1**, Jeloy, Norway, 9530 kc., reported heard 5-8 a.m. and 11 a.m.-5 p.m. (DeLaet, Hynek.)

**SM5SD**, Stockholm, Sweden, 7090 kc., 30 watts, reported heard Saturdays, 7-8 a.m., E.S.T., with Swedish

A LONG ISLAND DX'ER

*Greetings from Thomas Tynan, of Elmhurst, another Vice President of the 6000-12,500 Mile Broadcast-Short-Wave Club. Do we see a "veri" from HAT hanging there?*

and English announcements. Reports requested. (Scheierman.)

**SPW**, Warsaw, Poland, 13,680 kc., reported heard Monday, Wednesday and Friday, 11:30 a.m.-12:30 p.m., E.S.T. (Marco.)

**RKI**, Moscow, U.S.S.R., 15,040 kc., reported heard Thursday and Sunday mornings at about 8-1:30 a.m. (Sauberlich, Pickering, Costes.)

**RNE**, Moscow, U.S.S.R., 12,000 kc., reported heard Sundays 10-11 a.m. and Saturdays about 10:30 a.m. (Costes.)

**Malta**—No Maltese broadcasting station is under construction, but the Rinella Naval Wireless Station transmits B.B.C. news bulletins with Maltese translation at 1 p.m. on 1322 kc. approximately, (Vassallo.)

### ASIA

**RV15**, Khabarovsk, U. S. S. R., 4273 kc., reported heard daily with musical programs 7:30-8:55 a.m., E.S.T. (Baadsgaard), 2:30 a.m.-11:30 p.m., E.S.T. (Costes), 5-10:30 a.m., E.S.T. (Wolf).

**RIR**, Tashkent, U. S. S. R., 10,090 kc., reported heard at 7 a.m., E.S.T. (Moore.)

**CQN**, Macao, 9540 kc., reported heard Mondays, Wednesdays and Fridays until 8:30 a.m. (Costes.)

**XGO**, Nanking, China, 7580 kc., reported heard 12 midnight, E.S.T., irregularly. (Costes.)

**ZCK**, Hongkong, China, 8750 kc., heard irregularly asking for reports; relays Daventry, with Big Ben, London, striking 2 o'clock. (Costes, Sholin, Craft, Moore, Rogers, Gavin, Baadsgaard.)

**JIB**, Tyureki, Taiwan, Formosa, 10.535 kc. (also JIC on 5890 kc.). A letter to Observer Sholin from these stations states he is the first American to correctly report reception. (Sholin.)

**JVP**, Nazaki, Japan, 39.95 meters, 7510 kc., reported heard 7-10 a.m. and testing with music on Mondays and Thursdays, 4-5 p.m., E.S.T. (Baadsgaard, Westman, Fletcher, Sholin.)

**JVN**, Nazaki, Japan, 10,660 kc., testing with musical program for east coast America, Mondays and Thursdays, 4-5 p.m., E.S.T.; also heard 12 midnight-1 a.m. daily. (Westman, Devaraj, Kemp, Reilly, Gallagher.)

**F3ICK**, Chi-hoa, Saigon, Indo China, 6116 kc., 10 kw. 11 p.m.-8 a.m. (Donaldson, Devaraj.)

**VUB**, Bombay, India, 9565 kc. now broadcasts only two days a month irregularly. (Dalal.)

**YID**, Baghdad, Irak, 67.07 meters

(*Turn to page* 690)

# Backstage in Broadcasting

## At Home and Abroad

HELEN MARSHALL

BARBARA BLAIR ("SNOONEY")


WALTER TETLEY


FRANK FAY

*By* Samuel Kaufman

WE'VE spoken before on these pages about the abundance of beautiful girls in broadcasting who should be great assets when commercial television arrives. Now, along comes Nils T. Granlund (the N. T. G. of pioneer radio days) to strengthen our viewpoint. Granlund, who has staged many Broadway cabaret revues, is known as a leading authority on feminine beauty and, as such, was requested to select "Miss Radio of 1936." Well, he found the competition among the comely stars so keen that he couldn't narrow the choice down to one. Hence, three stars were awarded his decision—all of NBC. Harriet Hilliard, Helen Marshall and Dorothy Lamour are the N. T. G. choices; the first two are blondes and the third a brunette. All are songsters.

THE tremendous growth in short-wave program interest is largely due to the great technical advances which, at small expense, give the radio enthusiast a wide variety of the leading program features of all nations. The army of short-wave fans, in recent seasons, was augmented through the inclusion of high-frequency bands in standard radio receivers by leading manufacturers, making it possible for a broadcast fan in the U. S. A. to tune in Christopher Stone from London as easily as Graham McNamee from New York. In recognition of the close alliance, from the program angle, in foreign and domestic broadcast schedules, these pages will carry observations and photographs of world-wide radio features. So, when such photographs as Gertrude Lawrence (England) and the Viennese Waltz Girls pop out at you on these pages, keep in mind that, although those persons may be broadcasting thousands of miles away, it's just a fraction of an inch of a dial twist that can bring them into your home.

IF the talkies hadn't snatched Snooney from the radio studios a few seasons ago, it is our guess that she would have arrived at broadcast stardom a long time ago. But now, back from Hollywood, Snooney has a fresh start and a darn good one on Fred Waring's Tuesday CBS program. Her real name is Barbara Blair, but the Snooney monicker seems the one that she's best identified by. Her forte is childish chatter and, while this might limit the choice of material, she has found the knack of making the talent seem quite entertaining.

ONE of the most versatile child radio actors the writer met on his studio rounds is Walter Tetley. He's on so many programs at both NBC and CBS that he's a very busy young man, indeed. Last year he appeared on more than 150 programs—a few of them are Show Boat, The Lady Next Door, Town Hall Tonight and The New Penny. He is in very heavy demand and has filled widely contrasting rôles, giving his voice unique twists to accurately portray assigned characterizations. Although his name has not been plugged to any great extent on the air, he is obviously headed for an eventual starring air vehicle of his own.

IT is not unusual for a guest star to turn a one-time contract into a new agreement for an extended series. And it seems that Rudy Vallee's Thursday NBC Fleischmann Hour is the starting point for several such new permanent stars. Frank Fay is the latest. The comedian of the stage and screen "caught on" immediately and was signed for a total of fifteen weeks on Rudy's series. But his big reward is due in July, when he will be starred on his own program sponsored by Royal Gelatin, another division of Standard Brands, Inc.

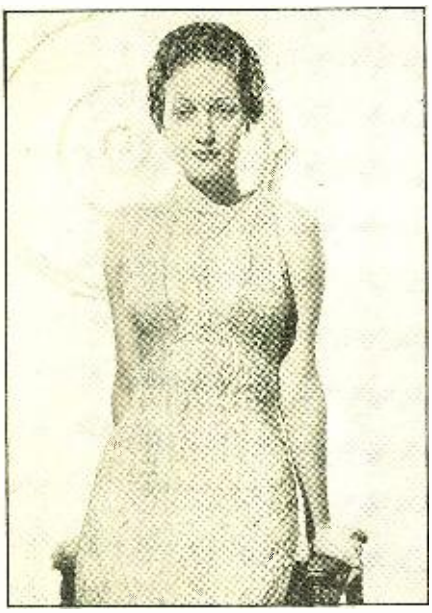
IN certain foreign lands radio as well as the press is under strict government censorship. This has been especially noted in recent short-wave broadcasts from Rome, where, perhaps, especial checking on program material is deemed necessary by the war conditions that prevail. One recent afternoon, when the New York headlines described heavy Italian losses in Ethiopia, a woman news commentator over 2RO, in a program intended for English-speaking nations, branded the news stories as imaginative. Instead, she would have American

## *Heard Across the Seas*

CHRISTOPHER STONE

"VIENNESE WALTZ GIRLS"

GERTRUDE LAWRENCE



DOROTHY LAMOUR

listeners understand, the day's gains in Ethiopia were more in Italy's favor. This is a typical instance of a clash in statements over foreign stations and the American press.

ED WYNN, who has been sans a sponsor for a long, long time, is back in the radio limelight once again. This time he has a new sponsor, new network and new comedy character. He is presented as Gulliver, the Traveler, patterned after the Dean Swift classic's central figure. The classic, "Gulliver's Travels," was written two centuries ago, but there is every indication that Wynn's jokes will be more up to date than that. The Plymouth Division of the Chrysler Corporation is paying the bills for the new Wynn series.

A PROMINENT addition to the 1936 schedule of radio headliners is Mary Pickford. Her series, entitled "Parties at Pickfair," is presented Tuesdays over CBS direct from her home in the swank West Coast movie colony. The programs, spon-

(*Turn to page* 689)

HARRIET HILLIARD

# *Servicemen's* PRIZE CONTEST

## *Announcement of Awards*

**Zeh Bouck**
*Service Editor*

## FIRST PRIZE

Let us enter the establishment of Joaquin Arzuaga, "Experto en Radio," who, according to his letter-head and evidence at hand, employs "Equipo Moderno" for "Servicio Guarantizado." However, before passing through the by no means modest portals, we pause momentarily to inspect the attractive show windows (Figure 1) that contribute a decorative touch to Rua Allen in San Juan. The interior (Figure 2) is equally pleasing to the eye, and, in progressing to the service shop itself, one is tempted to try the easy chairs, or at least to filch a daisy for a boutonnière. We find the genial Señor Arzuaga

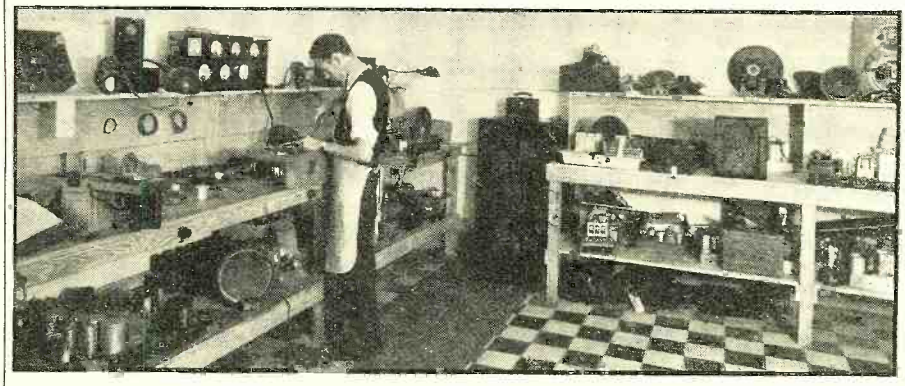


FIGURE 3

(who, by the way, has bound volumes of RADIO NEWS from 1926 on) behind the cash register, which we take it, is an active bit of "equipo" in this establishment. In the store proper, parts and accessories are on display in show cases and on shelves—experimental work and set building being indulged in on a greater scale in Puerto Rico than in the States (relatively, of course). The two signs—on and below the cash register—suggest that the customers make certain that they have exactly what they wish, and indicate the cash nature of the business conducted at Allen 70.

Passing into the service shop (Figure 3), we find further evidence of activity, and plenty of room, shelf and otherwise, in which to carry it out! The equipment, for the greater part, is Weston, and consists of the usual apparatus including ohmmeters, analyzers, tube checkers and oscillators. A complete set of the finest tools available contributes to the pleasure and efficiency in working in this shop.

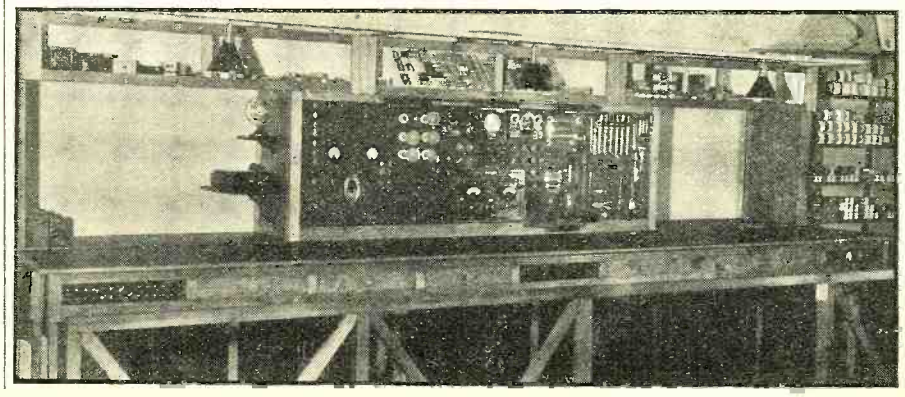
*Hasta luego*, Señor Arzuaga!

## SECOND PRIZE

Many servicemen have played with the idea of trolley-mounted test equipment, but we have never before seen the arrangement so effectively executed as in the photograph of Figure 4, showing the service shop of the Walton Radio and Electric Company, Sabetaa, Kansas.

The main bench is 15 feet, 7 inches long, and provides ample room with individual lighting for three servicemen working simultaneously. The test panel, which also carries the tools, is 6 feet long and rides on tracks. A reversible motor moves it at will from one end of the bench to the other. From left to right, the equipment on the mobile unit consists of a microphone, turntable and pick-up, loudspeaker, amplifier, resistor and capacity bridge, lamp-bank, neon pilot lights, a Supreme 385 automatic, R. C. A. modulator, oscilloscope, R. C. A. oscillator, sockets

FIGURE 4



## THIS MONTH'S WINNERS

FIRST PRIZE—To Joaquin Arzuaga, Apartado 111, Allen 70, San Juan, Puerto Rico. $10.00 for his excellent Service Shop with evidence of plenty of business on the Bench!

SECOND PRIZE—To the Walton Radio & Electric Company, Sabetaa, Kansas. $5.00 for the Neatest Layout your service editor has ever seen, and the ingenuity of its Trolley-Car Equipment!

THIRD PRIZE—$4.00 to Charles A. Kohr, 715 George Street, York, Pa., for a highly efficient Bench, and for adopting the Plug and Jack System to radio servicing!

Congratulations and best wishes from RADIO NEWS and its servicemen readers!

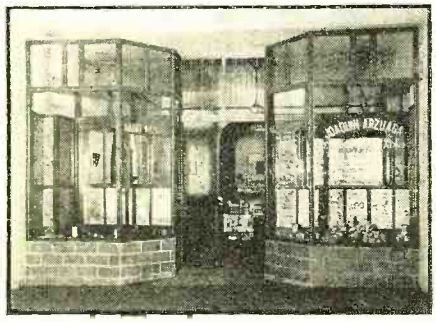


FIGURE 1

for all tubes, and the tool section. The mobile unit has its own shaded lighting system.

The three small panels on the bench are, from left to right, a battery panel with an ammeter in the circuit at all times, the 110-volt panel, and a 24- to 38-volt panel with voltmeter, ammeter and voltage control.

Replacement parts are neatly and systematically arranged on shelf space that is as adequate as the remainder of the layout. Our congratulations to the designers of and workers in this service shop!

## THIRD PRIZE

Any service bench built around an oscilloscope (center panel, in Figure 5) is likely to be a modern conception. Charles

FIGURE 2

A. Kohr writes of his service shop: "With the exception of the R. C. A. oscillator and the Philco all-purpose tester, the equipment was designed, constructed and arranged by the writer. It consists of condenser and resistor banks, parallel blocks providing a variety of condenser tests for capacitors from 25 mmfd. to 20

(*Turn to page* 694)

# RADIO PHYSICS COURSE

ALFRED A. GHIRARDI

## Lesson 52. Resonance

IN a series circuit, resonance occurs when the inductive reactance is equal to the capacitive reactance, and the only opposition to the current flow is then the ohmic resistance as shown at (B) of Figure 1. We then have the condition:

$$X_L = X_C$$

Since $X_L = 2\pi f L$ and $X_C = \frac{1}{2\pi f C}$,

subsituting these values in the above equation gives

$$2\pi f L = \frac{1}{2\pi f C}$$

multiplying both sides by f we obtain

$$2\pi f^2 L = \frac{1}{2\pi C}$$

dividing both sides through by $2\pi L$ gives

$$f^2 = \frac{1}{4\pi^2 L C}$$

taking the square root of both sides of this equation we obtain

$$f = \frac{1}{2\pi \sqrt{L C}} \qquad (20)$$

in which f = frequency in cycles per second at resonance.
L = inductance in henries at resonance.
C = capacitance in farads at resonance.

This is one of the most important equations in radio work, for from it are derived the equations used in calculating all tuned circuits, filters, wavemeters, oscillators, etc.

If L is expressed in microhenries and C is in microfarads, equation (20) may be written as

$$f = \frac{159{,}000}{\sqrt{L \text{ (microhenries)} \times C \text{ (microfarads)}}}$$

In Figure 1 a current, I, flows in a circuit consisting of a coil and condenser in series. The counter e.m.f., $E_L$, built up by the inductive action is maximum when current is changing at a maximum rate, for it is then that the magnetic field produced by the windings is changing at the greatest rate. When the current is maximum, this voltage is at zero, for then there is no change in flux, but when the current starts to decrease, this counter-voltage increases from zero, in the same direction as that of a voltage in phase with the current, for the magnetic field is collapsing and tending to keep the current flowing in the same direction.

The counter-voltage built up by the condenser when current I flows through the circuit (charging and discharging the condenser), is shown by $E_C$. This counter-voltage is maximum when the current is zero, for then the negative plate of the condenser has its maximum number of electrons and its charge is maximum; and is zero when the current is maximum. When the current starts to decrease to zero, this counter-voltage increases from zero, but this time it is in a direction opposite to the line voltage, for the condenser is now charging.

It can be seen that these counter-voltages are opposite in sign (direction in which they would cause a current to travel) at all times, and, if they are of equal magnitude, they will neutralize each other. Thus, if resistance were not present, there would be nothing to block the passage of current through this circuit, so that for even a small impressed voltage the current would be infinite, no matter what size the condensive and inductive elements were, as long as the capacitive reactance was equal to the inductive reactance

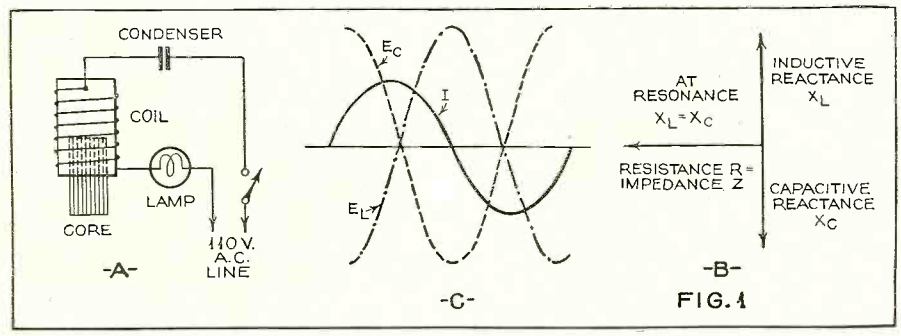



*Figure 1—Effects of resonance in a series circuit.*

(dielectric and hysteresis losses neglected).

Looking at the condition of resonance from the physical point of view we can see that at resonance the frequency, capacitance and inductance are all of such values that the time required to charge and discharge the condenser, and that required to build up current and let it die down in the inductor are exactly equal and are timed with each other so that there is a maximum continuous exchange of energy between the collapsing magnetic field of the inductor and the consequent charging of the condenser; the discharging of the condenser and consequent building up of the magnetic field in the inductor. At resonance these impulses are timed exactly so that while the condenser is discharging, the field in the inductor is building up; and while the field is dying down the condenser is being charged so they help each other. At any other frequency they would not take place exactly in step with each other, and so some opposition between the two would result at intervals. Therefore, less current would flow.

## Advancing Backwards

NEW YORK—Senator Copeland's ship safety bill does not promote safety at sea, but completely disregards the constitutional rights of the radio officers, in the opinion of the A.R.T.A. Among the reasons for this contention, the president, Mr. Haddock, cites some of the provisions of the bill which increases working hours for operators to 12 hours minimum, it places the officers at the mercy of the F.C.C., which can revoke their licenses at will and further interferes with his personal liberty.

## Transmission Problems

(*Continued from page 652*)

$$K_1=\frac{Z_1}{Z_0}\left[\frac{I_1^2Z_1}{I_1^2Z_1+I_2^2Z_2}\right]=\frac{Z_1}{Z_0}\left[\frac{P_1}{P_1+P_2}\right] \quad (10)$$

Similarly:

$$K_2=\frac{Z_2}{Z_0}\left[\frac{I_1^2Z_2}{I_1^2Z_1+I_2^2Z_2}\right]=\frac{Z_2}{Z_0}\left[\frac{P_2}{P_1+P_2}\right] \quad (11)$$

Where $P_1$ and $P_2$ are the powers delivered to $Z_1$ and $Z_2$ respectively. In case of n transformers, it follows that the best impedance ratio for the nth transformer will be:

$$K_n=\frac{Z_n}{Z_0}\left[\frac{I_n^2Z_n}{I_1^2Z_1+I_2^2Z_2+\cdots I_n^2Z_n}\right]=\frac{Z_n}{Z_0}\left[\frac{P_n}{P_1+P_2+\cdots P_n}\right] \quad (12)$$

If these ratios are used, it is easily shown that the impedance of the n primaries in parallel will be $Z_0$. Therefore, maximum power will be absorbed from the generator, and since the secondary impedances are matched, the transformers will transmit maximum power less the usual transformer losses. In case the transformer primaries are to be connected in series, similar treatment shows that the best impedance ratios are:

$$K_n=\frac{Z_n}{Z_0}\left[\frac{P_1+P_2+\cdots P_n}{P_n}\right] \quad (13)$$

The transmission losses in this case will be identical with the case of parallel primaries.

It is a simple matter to arrive at the above conclusions without the aid of anything other than simple algebra. Thus, assume for simplicity a case in which two transformers are to be connected in multiple. First the combined load impedance must be equal to that of the generator for maximum power transfer. The reflected impedances are:

$$\frac{Z_1}{K_1} \text{ and } \frac{Z_2}{K_2}$$

Thus the first relation is:

$$Z_0=\frac{Z_1Z_2}{K_2Z_1+K_1Z_2}$$

Since the power will divide between two parallel resistances inversely in proportion to their values, it follows that:

$$\frac{P_1}{P_2}=\frac{Z_2K_1}{Z_1K_2}$$

Solving for $K_1$, it follows that:

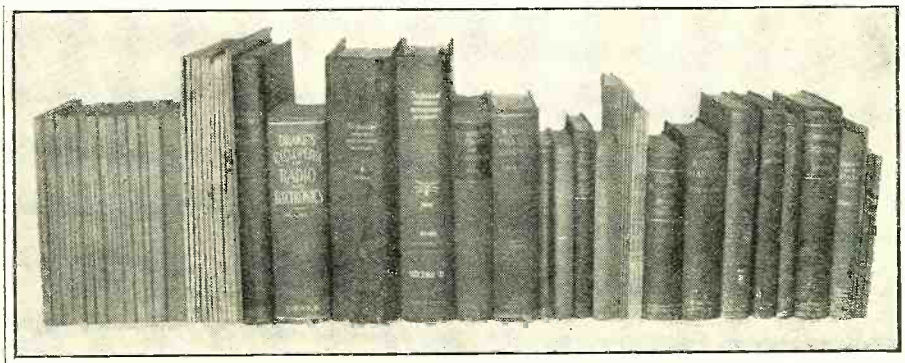
$$K_1=\frac{Z_1}{Z_0}\left[\frac{P_1}{P_1+P_2}\right]$$

which is equation (10) above.

Let us take a simple problem to illustrate the use of equation (12). Suppose we have a public-address system capable of delivering 12 watts. Let it be required that 10 watts be furnished to a loudspeaker load in an auditorium at 500 ohms, and 2 watts to guest room loudspeakers at an impedance of 250 ohms. Let the output impedance of the public-address system be 500 watts. Then if we use parallel transformers, we have form (12):

$$K_1=\frac{Z_1}{Z_0}\left[\frac{P_1}{P_1+P_2}\right]=\frac{250}{500}\left[\frac{2}{12}\right]=\frac{1}{12}$$

(*Turn to page 689*)



# THE TECHNICAL REVIEW

CONDUCTED BY ROBERT HERTZBERG

*Phenomena in High-Frequency Systems,* by August Hund, McGraw-Hill Book Co., 1936. According to the preface, this book deals not only with high-frequency phenomena but also with phenomena within parts of apparatus and systems which are used in the radio-frequency as well as the communication field. Besides the subject of radio, as we know it, Mr. Hund devotes considerable space to electronics. Photocells, gaseous (filamentless) tubes are among those discussed. The work is a reference book for students and teachers as well as research workers; a considerable knowledge of mathematics is employed.

The chapter headings are as follows: I, Actions and effects in space-discharge devices; II, High-frequency generators; III, Voltage and current changers; IV, Phase changers; V, Frequency changers; VI, Rectification and inversion of currents; VII, Voltage, current and power amplifiers; VIII, Theory of electrostruction with special reference to piezo electricity in quartz; IX, Electromagnetic theory; X, Theory of the ionized layer; XI, Lines of long and short electrical length with special reference to antenna problems; XII, Directive systems; XIII, Theory of recurrent networks.

*Perpetual Trouble Shooter's Manual,* Volume VI, by John F. Rider. Published by John F. Rider, 1936. The sixth manual contains upwards of a thousand diagrams of commercial receivers which appeared since Volume V was published. None of these diagrams was printed in any of the earlier manuals. This time Mr. Rider introduces double-page diagrams. Some of the larger receivers have schematics which are so complex that it severely taxes the eyes when they are reduced to one page. The new double pages are a decided improvement. All through the book it is apparent that an effort was made to improve the legibility.

For the first time directions are given for alignment with the cathode-ray oscillograph. This is in the case of the RCA D22. This receiver also employs volume expansion and automatic record changing. Full service data are given on these features. The amount of written directions is increasing, which is necessary with the newer, more complex equipment. Some other of the latest large receivers include the Zenith "Stratosphere" 25-tube receiver, the Atwater Kent employing automatic tuning, etc.

*Police Radio Operators' Manual,* published by General Electric Co., 1935. This manual is intended for persons who wish to prepare themselves for the examination to obtain a commercial radio-telephone operator's license. It contains most of the necessary information of use to operators of police radio transmitters and receivers. Much of the material is in the form of questions and answers. We recognize most of the questions being of the type asked by the radio inspector. No doubt the booklet will prove of value to people who are called upon to operate police radio equipment.

*Where to Buy, Rent and Borrow 16 mm. Films,* published by Victor Animatograph Corp., 1936. The title practically explains the purpose of this booklet. It is a list of nearly all available sources of 16 mm. films, both silent and sound films, with the titles of the films and other essential information. Distribution is from the advertising department of the Victor Animatograph Corp., Davenport, Iowa. Free copies are limited to one per person; additional copies will be supplied at 50c each.

## Review of Articles Appearing in the February, 1936, Issue of the Proceedings of the Institute of Radio Engineers

*Some Engineering and Economic Aspects of Radio Broadcast Coverage,* by Glenn D. Gillett and Marcy Eager. The results of a quantitative study of the major factors affecting radio broadcast coverage are given for a frequency range from 200 to 2000 kilocycles and for transmission conditions covering the range normally experienced in the United States.

*A New Tube for Use in Superheterodyne Frequency-Conversion Systems,* by C. F. Nesslage, E. W. Herold, and W. A. Harris. Detailed description of the construction and application of the 6L7 tube.

*Design of Audio-Frequency Amplifier Circuits Using Transformers,* by Paul W. Klipsch. The purpose of this paper is to make available design data for transformer circuits with resistive loads, whereby the choice of value of the load resistance can be made to produce any desired frequency response curve.

*An Experimental Study of Parasitic Wire Reflectors on 2.5 Meters,* by A. Wheeler Nagy. This paper presents the highly interesting results of experimental investigations of the energy distribution in a horizontal plane due to the juxtaposition of a vertical antenna and parallel parasitic rod-shaped conductors.

*A Method for Determining the Residual Inductance and Resistance of a Variable Air Condenser at Radio Frequencies,* by R. F. Field and D. B. Sinclair. When using a variable air condenser as a reactance standard at radio frequencies, it is important to know the variation in effective capacitance and power factor with frequency. This paper describes a method of measuring the residual impedances causing such variations.

*Eddy Currents in Composite Laminations,* by E. Peterson and L. R. Wrathal.

Discrepancies in the familiar theory of eddy current shielding arise when the laminations of a core are not homogeneous. A method of overcoming the difficulty is described.

*Cathode-Ray Oscillograph Investigations on Atmospherics,* by Harold Norinder. An analysis of the true nature of the wave forms of atmospherics, when they show rapid time variations, can be obtained with cathode-ray oscillographs with high-speed recording. The author describes the arrangement that he has employed for recording and analyzing "static," with his relay construction of high-voltage cathode-ray oscillographs.

*Optimum Operating Conditions for Class B Radio-Frequency Amplifiers,* by W. L. Everitt. A theoretical analysis of the efficiency and output of a triode operating as a Class B amplifier is made. It is shown that for a given tube, plate voltage and plate loss, there is a definite value of load impedance that gives maximum output.

## Review of Contemporary Literature

*Operating Noise Silencing Circuits,* by George Grammer. QST, March, 1936. Valuable and practical suggestions for taking the "bugs" out of the popular Lamb noise-silencer circuit, which has taken the amateur field by storm.

*Measurement of the Impedance of the Human Body.* General Radio Experimenter, February, 1936. Accurate measurement of the impedance of the human body is now revealed to be of clinical value to the physician. Diagnosis of certain ailments is facilitated.

*Class B and AB Audio Amplifiers,* by Glenn Koehler. Electronics, February, 1936. This excellent article was written to aid in designing output transformers for Class B and AB amplifiers, to describe the way they operate and to give an approximate method of determining the load resistance and power output. rectifier type r.f. voltmeter, or by the use of a rectifier-type dummy load, transmitter power may be measured within 10 percent accuracy.

*How Shall We Solder the Radio Chassis?* by Clifford L. Barder. Radio Engineering, February, 1936. An article dealing with soldering fluxes and chassis treatment, of interest to production engineers.

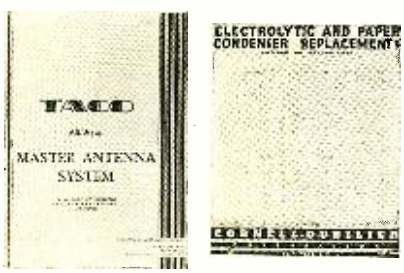
*Reactance and Resistance in Parallel.* Aerovox Research Worker, January, 1936. Contains a valuable chart that will save engineers and experimenters many weary hours of calculation.

*Amateur Transmitter Circuits,* published by Standard Transformer Corporation, Chicago, Ill. 8½ by 11 inches, 32 pages. A useful booklet for the transmitting amateur. Contains seventeen circuits with complete lists of parts and specifications.

## Free Bulletins

### Information on a New Antenna System

RADIO NEWS offers through the courtesy of the Technical Appliance Corp. this 8-page booklet describing in detail and complete with illustrations the new Taco all-wave antenna system for multiple-set operation. To obtain this folder, simply send in your request to RADIO NEWS, 461 Eighth Avenue, New York City.




### Condenser Replacement Bulletin

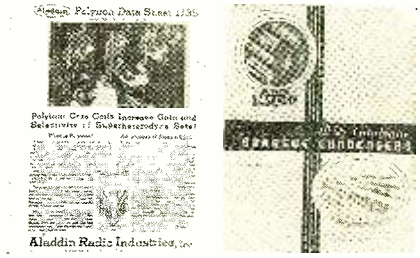
Catalog No. 129 of the Cornell-Dubilier Corporation is a handy six-page folder listing electrolytic and paper condenser replacements. The information is unusually complete, and includes the manufacturers' original part number, the C-D replacement number, capacity and working voltage and physical dimensions. Copies of this folder are obtainable free of charge from RADIO NEWS, 641 Eighth Avenue, New York City.

### Two Bulletins

The July and August 1935 issues of the "Aerovox Research Worker" feature two instructive articles, namely "Simple Methods of Measuring Resistance" and "The Proper Use of Resistors to Extend Meter Ranges". Copies are available free of charge from RADIO NEWS, 461 Eighth Avenue, New York City.

### An Interesting Folder

The Aladdin Radio Industries, Inc., data sheet No. 1135 tells what Polyiron is and how it is used in the construction of radio and intermediate frequency coils. The folder outlines the advantages of transformers with Polyiron cores over the air-core inductance. Copies can be obtained free of charge from RADIO NEWS. 461 Eighth Avenue, New York City.




### 1936 Condenser Catalog

Every serviceman, dealer and radio experimenter will be desirous of obtaining a copy of the new Sprague catalog. It is a 12-page book listing their "600 line" of dry electrolytic condensers, motor starting replacement condensers, units for interference elimination and the new midget line. To obtain a free copy write to RADIO NEWS, 461 Eighth Avenue, 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 December, 1935, and January, February and March and April, 1936, issues. The majority of these booklets are still available to our readers free of cost. Simply ask for them by their code designations and send your requests to RADIO NEWS, 461 Eighth Avenue, New York, N. Y. The list follows:

**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.

**Ja1**—1936 Allied Radio Corp. Catalog—114 pages listing radio receivers, service and amateurs' parts, P.A. equipment, etc. Free.

**Ja2**—Radio Parts Catalog, of Insuline Corporation of America. Free.

**Ja3**—Book Circulars of Alfred A. Ghirardi. Free.

**Ja4**—Latest Wholesale Radio Service Co. Catalog—listing receivers, sound equipment, amateur and service replacement parts, etc. Free.

**F1**—Catalog of Radio Parts. The National Co., Inc. Free.

**Mh1**—Sound Equipment catalog. Inter-World Trading Corp. Free.

**Mh2**—Radio Parts catalog of Bud Radio, Inc. Free.

**Mh3**—Amateur Equipment catalog of Wholesale Radio Service Co., Inc. Free.

**Mh4**—Tube Tester Booklet of Supreme Instruments Corp. Free.

**A1**—Condenser Replacement Manual of P.R. Mallory Co., Inc. Free to servicemen.

**A2**—"Your Future in Radio", 32-page book of Sprayberry Academy of Radio. Free to readers seriously considering a modern education in radio.

**A3**—Radio Capacitor Catalog of Solar Mfg. Co. Free.

### New Transmitter Guide

Both the beginner and the advanced amateur will find the new 32-page Thordarson Transmitter Guide interesting and instructive reading. It contains complete technical data on more than a dozen different transmitter units ranging in power from 6 to 1000 watts. The book includes circuit constants, coil data and parts lists. We are sure that every amateur will want a copy of this new book as it is well worth several times the slight amount of 15 cents asked for it. Copies may be ordered from RADIO NEWS, 461 Eighth Avenue, New York City.

## RV59 Increases Power

MOSCOW, U. S. S. R.—According to a statement by Lt. Col. Philip R. Faymonville, U. S. military attaché at Moscow, RV59 will double its power both on 12,000 and 6,000 kc. The present power is 20 kw. The new transmitter will be housed in the Palace of Labor on Chotny Road.


# SHORT-WAVE PAGE

**WITH the coming of spring many short-wave listeners will be seen trudging up to their roofs to examine their sky wires or antenna systems. We say "systems" because we have found through personal contact with radio fans that few of us rely on one aerial, but have at least two to experiment with. Of course, each day brings new people into this fast-growing army of short-wave listeners and to these and the oldtimers we dedicate this "air-minded" article. Several of the statements that we are going to make may cause you to "think," and after you have gone through this mental exercise we suggest that you examine the work you have done in the past on your aerials.**

THE first item of importance (and we will prove this to you) is that certain connections on your aerial *must be soldered!* Twisting wires together just will not do. If there is anything that will cause more noises in your receiver than a poor aerial connection, we would like to know what it is!

Many of our readers are in a position where they can only put up what might be termed an ordinary antenna. Even this type of aerial should be erected with care. Briefly we will describe what we call an "ordinary antenna." The length should be about seventy feet. Number 12 or 14 enamel wire is preferred. Erect the aerial as far above the roof as possible. At each end of the aerial use two insulators. Use twisted lead-in wire, and one of these wires should be soldered to the aerial and the other wire may be soldered to that portion of the wire between the insulators. Bring your twisted pair down to your receiver. The lead-in wire, that has been soldered to the aerial, should be connected to the antenna post of your receiver. The other lead-in wire should be connected to a ground—but not the ground post of your receiver. Do not think you are "grounding your aerial, as the wire that goes to the ground is in no way connected to the aerial. After almost twelve years of experimenting in the "antenna field" we will say that this is the easiest erected and most reliable antenna for all-around reception.

Now we will enumerate a few "don't and do's" of aerial construction. Where we specify soldered joints, do so! But *really* solder it! Here is a timely hint on soldering. Copper wire must be heated hot enough for solder to flow on it. Do not run hot solder on cold copper wire, as it will not hold.

How few radio experimenters really know how to erect a directional antenna? Why? Because they do not even know where the countries lay from their home. Have you ever seen a radio serviceman (called in to put up an aerial) carrying a compass? But nearly every aerial kit on the market today informs you in the construction data that it *is* directional! What good is this kind of an aerial if it is installed incorrectly? Possibly it is placed in a position to "attempt" to lure signals from a place on the earth where no station is in operation! Many of our readers have consulted us on this question of directional antennas. We have found, by going into the details, that the majority of these fans who are complaining about poor reception on long-distance DX stations, that their antenna was erected in just the opposite position from the way they thought they had it.

Do not think that you can line up a directional antenna with the aid of a globe map of the world. That is "out." We often smile when we see reference made to the "great circle track." These last three words are often used by people who do not know what the words imply. The average short-wave fan would not understand the charts that are used in the maritime profession for plotting the great circle route, but *they could understand how to use a Mercator Chart for installing a directional antenna!*

Possibly it is during periods of poor reception that things that we might have passed by on our tour of the dials cause us to stop and think. During "silent periods" recently the Australian stations were heard every morning. We recall being asked how it is possible for these fairly low-powered stations to be heard even during country-wide poor reception. Here is our explanation from personal observations.

Across the North Atlantic, between the eastern portion of the United States and the Azores, there sometimes occur magnetic disturbances known to mariners as "variations." These variations affect a compass aboard a ship as much as ten degrees to the west and increase yearly, six minutes. Another condition that masters have to contend with is that between the Azores and the English Channel there is a magnetic disturbance that causes a variation of five degrees to the west with an annual decrease of five minutes. These disturb-

ances run in a northerly and southerly direction. One can readily see that the radio signals transmitted from the European stations have to come across these magnetic fields.

The foreign short-wave "locals" have in their favor high power, directional antennas and are operating on high frequencies. The distance to be covered is not more than 3500 miles. Reception of these stations, as all short-wave listeners will agree, is sometimes variable regarding signal strength. Our contention is that atmospheric disturbances, combined with the magnetic disturbances, sometimes interfere with the signals of the foreigners. If the variations over the North Atlantic disturbs a ship's compass, what will it not do to electrical waves?

Now we will go to the Pacific Ocean. There are variations or magnetic disturbances there also. These variations have the same effect on a compass, but the disturbances in the Pacific run in a southeasterly and northwesterly direction. There are certain parts of the Pacific where a ship's compass is deflected by this variation thirty-five degrees west. In the writer's opinion, the reason we can depend on the Australian stations being heard here throughout the year is that their signals are not disturbed by the magnetic fields because the signals pass along the same magnetic path, whereas the European signals have to "jump across" these fields.

## Serviceman's Diary

(*Continued from page* 644)

the faults of the radio industry, the harassed serviceman, so why worry? Brought in a replacement chassis of the same model which I had in the truck and installed same. Told her we would place her chassis on test in the shop and check it over carefully. Would probably take a week or ten days. Checked over her installation carefully, particularly the antenna and ground. Told her to use the set as much as possible and watch for a recurrence of the trouble, hoping sincerely that the fading would continue. Promised to make her set as good as the one on loan.

Stopped off for two tube-replacement jobs on the way back to the shop. Returned to find an auto-radio job waiting. Motorola in Cadillac V-8. Usual trouble, blown vibrator buffer condenser. Replaced same and called it a day.

Spent the evening at an IRSM lecture with the boss. A demonstration of the cathode-ray oscillograph as applied to radio servicing. Both of us were much impressed, particularly from the showmanship angle. Customers would undoubtedly be far more convinced that servicing is a technical job if they could actually see a radio wave rather than listen to talk about it. The improvement effected in aligning can also be visually demonstrated —a convenience since, when the reserve of sensitivity is high, it is otherwise rather difficult to convince a customer that a real job has been done, especially when DX is of no interest. The demonstration was received with considerable enthusiasm and undoubtedly many more will add it to their equipment, as we have.

Arrived home to find my own set inoperative for the second time in ten days. It is an old Radiola 64, patched here and there with a heterogeneous assortment of replacement condensers and resistors. Another section of the voltage divided gone this time. My wife threatens to spend fifty cents and have a real serviceman fix it so it will stay fixed. Shows me an ad—'Radio Repairs—50 trained radio engineers —6 months guarantee—50 cents." "Doubled and re-doubled," say I. "If you can find one of those birds who won't charge twice as much as legitimate servicemen." Ho-hum—a continuous stream of half-dollars —cathode-ray wave-forms—other forms—rugs, batteries and stations fading away—"I'm sleepy!"

## S.W. Station List

(*Continued from page* 669)

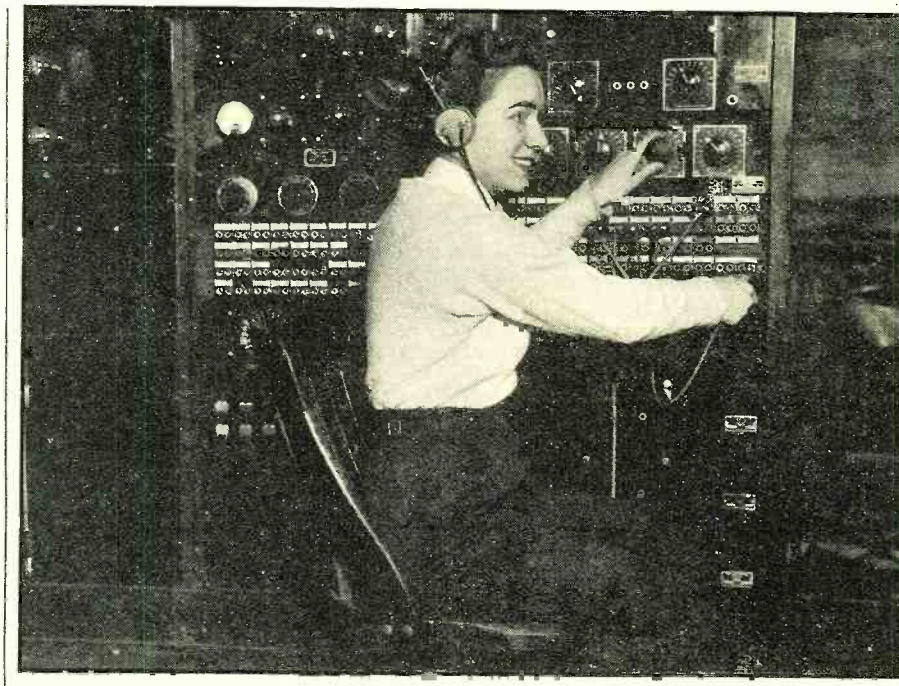
| call | location | kc. | w. |
|---|---|---|---|
| KACH | St. of Washington, Portable-mobile | 2490 | 10 |
| KGHA | St. of Washington, Portable-mobile | 2490 | 10 |
| KGHB | St. of Washington, Portable-mobile | 2490 | 10 |
| KGHC | St. of Washington, Portable-mobile | 2490 | 10 |
| KGHD | Seattle, Wash. | 2490 | 50 |
| KGHE | Snoqualmio Pass, Wash. | 2490 | 50 |
| KGHO | Des Moines, Iowa | 1682 | 400 |
| KGHQ | Chinook Pass, Wash. | 2490 | 10 |
| KGHR | State of Washington, mobile | 2490 | 10 |
| KGZE | San Antonio, Texas | 2482 | 500 |
| KIUK | Jefferson City, Mo. (C.P.) (2500 w. day—1000 w. nite) | 1674 | 2500 |
| KNFC | State of Washington, S. S. Governor Isaac I. Stevens | 2490 | 50 |
| KNFD | State of Washington, S. S. Governor John R. Rogers | 2490 | 50 |
| KNFG | Olympia, Wash. | 2490 | 50 |
| KNFK | Bellingham, Wash. | 2490 | 50 |
| KNFL | Shuksan, Wash. | 2490 | 10 |
| KNFN | Waterloo, Iowa | 1682 | 400 |
| KNFO | Storm Lake, Iowa | 1682 | 400 |
| KNFQ | Skykomish, Wash. | 2490 | 10 |
| KNFR | State of Washington, mobile (Snow Plow) | 2490 | 10 |
| KNFS | State of Washington, Mobile | 2490 | 10 |
| KNFT | State of Washington, Portable-mobile (Snow Plow) | 2490 | 10 |
| KNFU | State of Washington, mobile | 2490 | 10 |
| KNFV | State of Washington, mobile | 2490 | 10 |
| KNFW | State of Washington, mobile | 2490 | 10 |
| KNFX | Alpowa Camp, Wash. | 2490 | 10 |
| KNFY | Ilwaco, Wash. | 2490 | 10 |
| KNFZ | Hells Crossing Camp, Wash. | 2490 | 10 |
| KNGA | Satus Pass Camp, Wash | 2490 | 10 |
| KNGB | Yakima, Wash. | 2490 | 50 |
| KNGC | Vancouver, Wash. | 2490 | 50 |
| KNGD | Walla Walla, Wash. | 2490 | 10 |
| KNGQ | Wenatchee, Wash. | 2490 | 50 |
| KNGR | Spokane, Wash. | 2490 | 50 |
| KNGZ | Ephrata. Wash. | 2490 | 10 |
| KNHA | State of Washington, mobile | 2490 | 50 |
| KNHD | Redwood Falls, Minn. | 1658 | 400 |
| WBA | Harrisburg, Pa. | 190 | 300 |
| WBR | Butler, Pa. | 190 | 300 |
| WDX | Wyoming, Pa. | 190 | 300 |
| WJL | Greensburg, Pa. | 190 | 500 |
| WMB | W. Reading, Pa. | 190 | 300 |
| WMP | Framingham, Mass. | 1666 | 1000 |
| WPEL | W. Bridgewater, Mass. | 1666 | 1000 |
| WPEV | State of Massachusetts, Portable | 1666 | 50 |
| WPEW | Northampton, Mass. | 1666 | 1000 |
| WPGC | S. Schenectady, N. Y. | 1658 | 1000 |
| WPGG | Findlay, Ohio (Temporarily on 1596 kc.) | 1682 | 500 |
| WPGQ | Columbus, Ohio (Temporarily on 1596 kc.) | 1682 | 400 |
| WPHC | Massilon, Ohio (Temporarily on 1596 kc.) | 1682 | 400 |
| WPHE | Culver, Ind. | 1634 | 1000 |
| WPHK | Wilmington, Ohio (Temporarily on 1596 kc.) | 1682 | 400 |
| WPHS | Culver, Ind. | 1634 | 1000 |
| WPHT | Cambridge, Ohio (Temporarily on 1596 kc.) | 1682 | 400 |
| WPHU | Jasper. Ind. | 1634 | 1000 |
| WPSP | Harrisburg, Pa. | 1674 | 1000 |
| WQFD | Columbia City, Ind. (C.P.) | 1634 | 1000 |
| WQFE | Seymour, Ind. | 1634 | 1000 |
| WQFP | Springfield, Ill. (C.P.) | 1610 | 1000 |
| WQFR | State of New York. Portable | 1658 | 250 |
| WQFT | State of Ohio. Portable (Temporarily on 1596 kc.) | 1682 | 100 |
| WQFW | Columbia City. Ind. | 1634 | 1000 |
| WQPC | Chicago, Ill. (C.P.) | 1610 | 1000 |
| WQPD | Duquoin, Ill. (C.P.) | 1610 | 1000 |
| WQPF | Effingham, Ill. (C.P.) | 1610 | 1000 |
| WQPG | Sterling, Ill. (C.P.) | 1610 | 1000 |
| WQPM | Macomb, Ill. (C.P.) | 1610 | 1000 |
| WQPP | Pontiac, Ill. (C.P.) | 1610 | 1000 |
| WRDS | E. Lansing, Mich. (5000 w. day—1000 w. nite) | 1642 | 5000 |
| W4XBL | St. of North Carolina, Portable | 1706 | 500 |

### Marine Fire Radio Stations

| call | location | kc. | w. |
|---|---|---|---|
| WEY | Boston, Mass. | 1630 | 50 |
| WKDT | Detroit, Mich | 1630 | 500 |

### LZ-129 Talks to America

FRIEDRICHSHAFEN, GERMANY—During a trial flight of the new Zeppelin LZ-129, radio-telephone and telegraph communications were maintained with stations in America and Canada. The best phone connection was with Chatham, Canada.



# QRD? QRD? QRD?

CONDUCTED BY GY

GREAT work is being accomplished on the ultra-short waves, and because of the theories which are being exploded new channels for broadcasting, television or telegraphy may soon be opened for commercial use. The old theory that these ultra-short waves (above thirty megacycles) have a certain positive distance line has been knocked into a cocked hat by the fact that a St. Louis station, W9XPD, has been heard west of the Rockies and the emanations from the xmtr on the top of the Empire State Building, 1250 feet high, have been picked up in New England and elsewhere.

ENGINEERS and amateurs experimenting on the ultra-high frequencies always have had in mind what they have been taught as a fact that the approximate distance for these waves was from 5- to 30-mile radius or really limited to a local area. But now that reports are coming in from other stations, they are mindful of the remarks of Marconi that it is always dangerous to *put limitations on any wireless waves!* In the beginning, he was told by skilled mathematicians that wireless waves would stop at the curvature of the earth, that the range was limited to 185 miles at the most, but time has exploded all such reckoning. This is added hope for the ultra-short wave engineers and because of the slight knowledge which is available at this date, the FCC is not handing out many licenses on these waves.

A new radio measure, which has for its author Dr. Royal S. Copeland, is expected to be passed by this present Congress. The bill amends the Communications Act so as to include vessels operated by U. S. shipping companies and makes provisions for equipment and authority over "ops." It requires, amongst other things, as follows: A minimum of two ops on passenger ships and on cargo ships which are not fitted with an automatic alarm, and continuous watches by ops on both classes of ships; a radio operator shall have at least six hours "off duty" within twelve hours immediately preceding the time of sailing, and the number of hours an operator may perform duty must be limited; the master of the ship shall have supreme control of radio equipment, ops, watches and radio service of the ship; that radio equipment be installed in all motor lifeboats . . . etc. and etc. But we still think that there should be at least three men on board such vessels, standing continuous watches, and we also think (well, at least we are allowed to think and have opinions) that a radio operator should be listened to with respect on the subject of equipment and signals. Well, perhaps even this shall come to pass.

The old story of telling the wife that it really is a business conference and not a poker game is just going to be an old bedtime story since the first steps are being taken to inaugurate a television-telephone service in this country. Announcing acceptance by the A. T. & T. of the terms of a permit granted by the FCC, Dr. F. B. Jewett said that work would start immediately on a coaxial tel-tel cable between New York and Philadelphia.

The first field tests of television by RCA will begin very shortly. This was revealed in the annual report of the RCA and it is emphasized that this experimental test does not mean that a regular television service is at hand. This is only pioneering to estimate and define its possibilities under actual workng condtions. The xmtr will be on the Empire State Building which will be connected by radio with the television studio now being constructed in the NBC plant in Radio City, New York City. It will have to be determined how far the xmtr can send good television pictures; also with what consistency and regularity pictures may be transmitted with the system in its present state of development. These and other practical answers must be found before television can be placed on a regular schedule which, it is hoped, will be in the near future.

Another field once dominated by man has been conquered by woman—this one a mere 18 years old and actually working at her chosen profession. She is Eleanor Thomas (see heading photo) a mathematical genius for a girl, excelling in the intricacies of wavelengths and kilocycles, who found life on a college campus too prosaic. She has just been graduated in radio-television engineering at First National Television, Inc., Kansas City, and holds the post of assistant engineer in charge of the control room at Station W9XBY. She is the youngest member of her sex to pass the difficult examinations for a first class license from the Federal Communications Commission and is authorized to operate any television or broadcast station in the United States. Her license number is P-17-492.

Due to some real heavy weather off the Atlantic Coast, quite a few of the vessels at sea had tough going of it this past winter. Amongst those who couldn't make it were the disabled Furness liner, Nova Scotia, which was taken in tow by her sister ship, the Eastern Prince. After the New York bound Nova Scotia sent out an urgent distress call, the Eastern Prince raced for 110 miles to get to her, and towed her a distance of 300 miles back to Bermuda. Also, the Greek steamer Stephanos Costomenis was snatched from the open hatchway of Davey Jones Locker by the timely arrival of the SS City of Newport News. Due to an error in radio position given, the City of Newport News kept chasing the Greek steamer for twenty-four hours before she found her. If she had arrived two hours later than she did, the Greek captain states that the 33 men rescued would have had quite a wet time of it. Fortunately for all concerned, there was a radio aboard.

And so to the hay loft, with visions of perfect harmony and understanding between ship-owners and operators, broadcast officials and technicians, and P-T-P men and radio-telegraph executives. Even dreams come true! With all the various new-fangled types of services and apparatus coming out each day there might, in time be a dearth of good radiomen—which will make such dreams come to pass. So, with hopes, ge . . . 73 . . . GY.

## Backstage

(*Continued from page 679*)

sored by members of the ice industries throughout the U. S. A., feature Mary as hostess in her own living room. The roomy mansion was especially wired for use as a studio. "America's Sweetheart" will draw on noted actors, writers, directors and others of the movie capital as guests of her broadcasts. Al Lyon's Cocoanut Grove Orchestra has the musical assignment for the Pickford presentations.

## Radio Workshop

(*Continued from page 659*)

this plug is attached the other connecting wire to complete the circuit when the plug is inserted into the jack. The knurled shank of the plug makes a secure fit into the prongs of the jack.

FRANK W. BENTLEY, JR.,
Missouri Valley, Iowa.

*This Department is a regular monthly feature for Experimenters. Send contributions to the Associate Editor.*

## Transmission Problems

(*Continued from page 683*)

Transformer 1 then presents a primary impedance of 3000 ohms (= 12 × 250. And:

$$K_2 = \frac{Z_2}{Z_0}\left[\frac{P_1+P_2}{P_2}\right] = \frac{500}{500}\left[\frac{12}{10}\right] = \frac{6}{5}$$

Transformer 2 then presents a primary impedance of 600 ohms (= $\frac{6}{5}$ × 5000). And

$$Z_0 = \frac{600 \times 3000}{3600} = 500 \text{ OHMS}$$

If series transformers were be used, we have form (13):

$$K_1 = \frac{Z_1}{Z_0}\left[\frac{P_1+P_2}{P_1}\right] = \frac{250}{500}\left[\frac{12}{2}\right] = 3$$

And transformer I presents a primary impedance of 83.33 ohms (= $\frac{250}{3}$).

$$K_2 = \frac{Z_2}{Z_0} = \left[\frac{P_2}{P_1+P_2}\right] = \frac{500}{500}\left[\frac{10}{12}\right] = \frac{5}{6}$$

And transformer 2 presents a primary impedance of 416.67 ohms ($\frac{5}{6}$ × 500).

$Z_0 = 83.33 + 416.67 = 500$ ohms

In general it is better practice both from the standpoint of system and transformer design to use parallel primaries. Moreover it is usually possible to select standard transformers for parallel operation with ratios that are sufficiently close to meet most conditions, in practical cases. Suppose in the example above one of the loads should be disconnected. If it were the 10-watt load, then due to the impedance mismatch a loss of about 5 db. would result (see Figure 2) and 3.75 watts would be delivered by transformer 1, i.e., less than 3 db. above the normal value. If the load were disconnected from transformer 1, then the increase in level delivered by transformer 2 would be about .8 db. In neither case would an open-circuited load be serious enough to notice.

### More Enjoyable Short-Wave Reception at Hand in Static Reduction

*By C. A. Morrison*

Horizons are expanding. Vistas of increased enjoyment of short-wave reception appear. In the near future 'favorite programs from over seas' will be as much of a daily entertainment necessity as are top-notch domestic offerings of today. Reception will be increasingly pleasant as new devices promise elimination of natural static. Giant super-power transmitters using perfected beam antennas, improved knowledge of high frequency phenomena, and more efficient receiving antennas portend the elimination of fading. Reception free of noise and interference will come eventually, with legislation that will clear the over crowded short-wave channels and make it illegal to operate equipment creating man-made static.


HE PRIZES THIS ONE

*Mr. Quaglino, L.P.O. for France, listens to COCH at Havana, Cuba, regularly. He has heard them ever since they used the call COC, as this verification card will testify*

# The DX Corner (Short Waves)

(*Continued from page 677*)

reported heard. (Byrns.)

**HS(?),** Bangkok, Siam, 10.07 megacycles closes down about 10 a.m. E.S.T. asking for reports to HSH(?) ,(Howald, Costes, Vassallo.)

**ZGE,** Kuala Lumpur, F.M.S., 6132 kc. reported heard Sundays and Tuesdays 6:40-8:40 p.m. (Sholin.)

**YDB,** Sourabaya, Java, 9640 kc. reported heard 10-11 a.m. and 4:30-10:30 a.m. (Moore, Partner, Pilgrim, Baadsgaard.) L.P.O. Gallagher says 4-5 a.m.; L.P.O. Costes says 10-11 a.m.

## AFRICA

**Addis Abeba** is the correct spelling of Addis Ababa according to a letter of verification received by J. E. Moore, L.P.O. for California. The frequency of ETA is 18270 kc. (Moore.)

**EA8AF,** Santa Cruz de Tenerife, Canary Islands is an amateur station operating on 14150 kc. heard 3:30 p.m. E.S.T. (Trice, Messer, Flora.)

**CNR,** Rabat, Morocco, 8035 kc. reported heard 2-5 p.m. Sundays. (Smith.)

**ZE1JR,** Salisbury, Southern Rhodesia, is an amateur engineer operating on 14044 kc., 7260 kc. and 7290 kc., 50 watts. (Wickham.)

**FIQA,** Tananarive, Madagascar, 50.42 meters reported 10-11 a.m. E.S.T. (Loke.)

**VQ7LO,** Nairobi, Kenya, 6083 kc. reported heard 2 p.m. E.S.T. (Devaraj.)

## AUSTRALASIA

**VK3ME,** Melbourne, Australia, has changed frequency to 9520 kc. (Johnson, Dalal, Scott.)

**VIZ3,** Fiskville, Australia, 11495 kc. is used to relay important speeches and events to the U. S. A. (Baadsgaard, Cox.)

**VK2ME,** Sydney, Australia, 9590 kc. now heard Sundays 5:30-11 a.m. E.S.T. (Wolf, Howald, Dalal, Scott, Sollenberger.)

**VK3LR,** Melbourne, Australia, 9580 kc. 4-7:30 a.m. daily. (Sands, Young, Craft, Scott.)

**PNI,** Makassar, Celebes, N.I., 8775 kc., 330-430 a.m. (Hynek.)

## NORTH AMERICA

**TFJ,** Reykjavik, Iceland, 12235 kc., reported heard Sundays 1:40-2 p.m. (Flick.) CJRO and CJRX Winnipeg, Manitoba, Canada, 6150 kc. and 11730 kc. respectively reported 8 p.m.-midnight. (Skatzes.)

**VE9EW,** Ontario, Canada, 34.8 meters and 23 meters, reported heard Wednesdays and Sundays at 8 p.m., E.S.T.; reports are requested to check up on new transmitting invention. (Hammersley.)

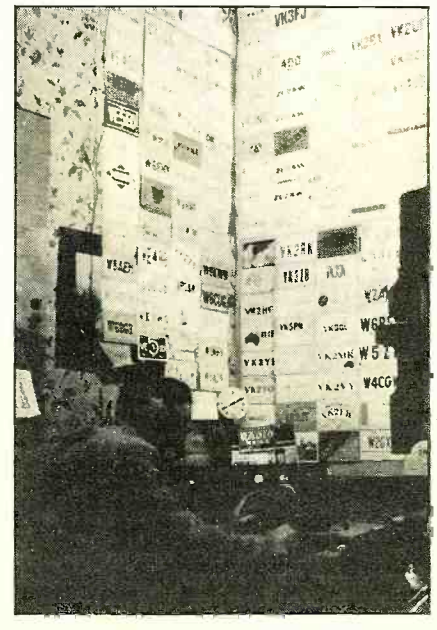
**K7VH,** Juneau, Alaska, is reported heard about 7-9 p.m. working west coast American amateur stations on the 20 meter band; exact frequency is 14242 kc. (Sauberlich.)

**CFU,** 5714 kc. heard rebroadcasting news 8-9 p.m. (Williamson.)

**WXA,** Juneau, Alaska, reported

NEW ZEALAND DX CORNER

*Meet DX'er J. Lunn, of Dunedin, who is so intent on "fishing on the ether lanes" that he can hardly stop even to have his photograph taken*



heard on 5960 kc. at 11 p.m. E.S.T. (Wolf.)

**KEI**, 9.49 megacycles and Keg, 9.91 megacycles, Bolinas, California, heard testing with VK2ME. (Cox.)

**KKL**, Bolinas, California, 15475 kc. reported heard Thursdays 9:25 p.m. (Ellsworth.)

**KEE**, Bolinas, California, 9715 kc. reported heard Saturdays, Sundays and Wednesdays at 11 p.m. relaying N.B.C. programs to Honolulu irregularly other nights. Philip Morris programs to Honolulu. (Bews, Moore.)

**KKQ**, Bolinas, California, 11950 kc. heard irregularly around 1-3 p.m. relaying N.B.C. programs to Honolulu. (Akins, Bews, Howald, Sauberlich.)

**KEL**, Bolinas, California, 19 meters relays N.B.C. (Graham.)

**W9XBY**, Kansas City, Missouri, 1530 kc. heard 1:50 a.m. (Zelinka.)

**W2XBJ**, Rocky Point, New York, 7.4 megacycles reported heard. (Gallagher, Byrns.)

**W1XK**, Millis, Massachusetts, has an experimental on 18.98 megacycles irregularly broadcasting stock market reports at 4 p.m. (Sauberlich.)

**W1XAL** reported heard on about 10980 kc. Is this correct? (Dickes.)

**KCMC**, Texarkana, Arkansas, 1420 kc. has a new DX tips programs Thursday nights by J. F. Halsey, O.L.P. Broadcast Band and J. Hartshorn, O.L.P. Short Waves for Radio News.

**W9XAA**, Chicago, Illinois, has a new transmitter on 11830 kc. reported heard 2:15-3 p.m. and 11:45 p.m.-12:02 a.m. some listeners say 1 p.m. onward, still other listeners report 5:15-6:15 p.m. The new transmitter is at Downer's Grove, Illinois. (Jacobs, Cummins, Moore, Graham, Atkinson, Johnson, Jensen, Hynek, Ellsworth, Partner.)

**WOEH**, the Philippine Clipper heard talking to airports. (Graham.)

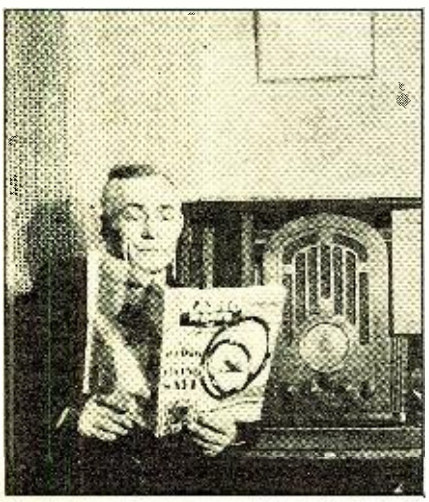
**WYYD**, Bolling Field, Washington, heard testing 6500 kc. (Graham.)

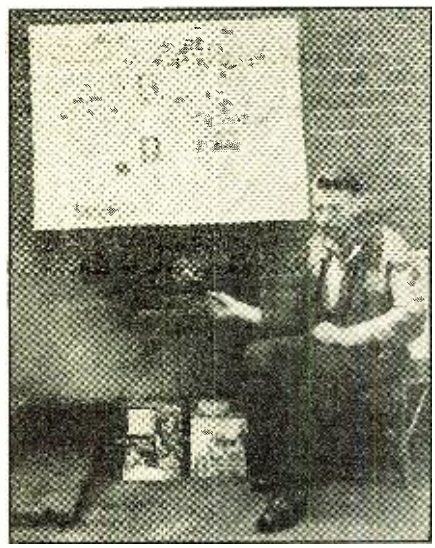
**W1XER**, is the new call of Station W1XAV, the ultra-short-wave outlet of WNAC, Boston, Mass. (Gould.)

**W8OUR**, Delaware, Ohio, on 80 meters c.w. is an amateur station, L.P.O. Skatzes has been using to contact all U. S. amateur districts.

### MASSACHUSETTS HEARD FROM

*Observer Hamilton, of Somerville, almost forgets his receiver when* RADIO NEWS *comes around each month, but when he finishes absorbing the information in it he goes back to his RCA 128 with added zest and knowledge*





### HIS PLACE IN THE SUN

*Mr. W. Barron, of Wanganui, New Zealand, vice president of the 6000-12,500 Mile Club, insisted that there be "light" for photographing the main essentials of his DX Corner. He took his equipment to the roof for this purpose. One of these essentials is, of course, the current issue of* RADIO NEWS

**W6XAI**, Bakersfield, California, is an experimental high-frequency station heard up to 11 p.m. E.S.T. (Wolf.)

The following stations have harmonics on the short-wave band: WLS, Chicago, harmonic on 6.6 megacycles and 7.78 megacycles; WJJD, Chicago, harmonic on 6.75 megacycles. This is also true of WHO, Des Moines. (Sauberlich.)

**WHIO** in 1260 kc. is now experimenting with 5-meter phones for the Man on the Street programs. The 5-meter call is W10XBG. (DeLaet.)

**W9XAZ**, Milwaukee, Wisconsin, 9.5 meters, 31.6 megacycles reported heard 10:30 a.m.-3 p.m. (Parker.)

**W9XPD**, St. Louis, Missouri, is another newspaper station on 9.5 meters reported 10 a.m.-3 p.m. E.S.T. (Parker.)

**W8XAI**, Rochester, New York, heard on 9.5 meters irregularly. (Parker.)

**W9XEH**, heard between 9.5 and 10 meters. (Parker.)

**W8XAB**, Cincinnati, Ohio, 12080 kc. reported heard 5 p.m. EST. (Sauberlich.)

**XEXA**, Mexico City, Mexico, reported on 6170 kc., 6140 kc., and 6180 kc., 7:45 to 9 a.m. and 9 to 10 p.m. EST. (Young, Dickes, Hull, Johnson, Pattner, Gavin, Anca.)

**XEUW**, Vera Cruz, Mexico, 6020 kc. reported heard 8 p.m. to 12:30 a.m. EST. (Hynek.)

**XDE**, Mexico City, Mexico, reported heard on 31.16 meters. (Byrns.)

**XEME**, Merida, Yucatan, Mexico, 8190 kc. reported heard 6 to 11 p.m. EST. (Craft.)

**CO9WR**, Sancti Spiritus, Cuba, 11790 kc. reported heard 5 to 9 p.m. EST (Gavin) and 8 to 10 p.m. except Sunday. (Wilkinson.)

**CMX3**, Havana, Cuba, 19.25 meters heard Sundays 4:15 p.m. EST. (Loke.)

**COC9D?**, Havana, Cuba, 15200 kc. reported heard Sunday 1 p.m. EST. (Rich.)

**CO9JZ**, Cuba, reported heard testing on 20 meters. (Graham.)

**COCD**, Havana, Cuba, 6130 kc. reported heard. (Leutenberg.)

**CO9AC**, Santiago, Cuba, heard on about 24.30 meters afternoons. (Coleman.)

**CO9GC**, Santiago, Cuba, reported heard on 12280 kc., 4 to 8 p.m. EST. Is this an harmonic? (Sauberlich.) They are also reported on 6150 kc. 7:45 to 10 a.m. (Gavin.)

**HIL**, Trujillo, D.R., 6505 kc. reported heard 8 to 10 p.m. EST. (Anca.) O.L.P. Hynek sends the frequency as 6528 kc. and he reports hearing the station Saturdays 8 to 10 p.m. EST.

**HIG**, Trujillo, D.R., 6280 kc. heard daily except Sundays 7 to 10 p.m. EST. A calf moo'ing is the interval signal. (Chambers, Johnson.)

**HI9B**, Santiago de Los Caballeros, D.R., 6050 kc. reported heard at noon and also 5 to 7 p.m. EST. (Betances, Flora, Salazar, Ballina, and Donaldson.)

**HIT**, Trujillo, D.R., 6630 kc. reported heard 11 to 12 p.m. and daily except Sundays 6 to 8 p.m. EST. (Chambers, Kuslan, Miller, Dickes, Betances.)

**HIX**, Trujillo, D.R., 5980 kc., 700 watts, reported heard Sundays 7:40 to 10:40 a.m., Tuesdays and Fridays 12:10 to 1:10 p.m., 4:40 to 5:40 p.m., 8:10 to 10:10 p.m. EST. The rest of the week heard 12:10 to 1:10 p.m., 4:40 to 5:40 p.m. EST. Leutenberg, Lowe.) O.L.P. Sauberlich reports hearing the station at 9:30 p.m. Saturdays.

**HI1A**, Santiago de Los Caballeros, D.R., 6185 kc., 50 watts, reported heard 11:40 a.m. to 1:40 p.m. and 7:40 to 9:40 p.m. EST. (Messer, Trice, Moore, Gavin.)

**HI3U**, Santiago de Los Caballeros, D.R., 6383 kc., 25 watts, heard 5 to 8 p.m. and after 12 midnight EST. (Foshay, Johnson.)

**HI4V**, Trujillo, D.R., is now transmitting on 6475 kc. Signs off before 10 p.m. EST. (Johnson.)

**HI1J**, San Pedro de Macoros, D.R., 5865 kc., 48 watts, reported heard 11:40 a.m. to 1:40 p.m. and 6:10 to 8:40 p.m. EST. (Trice.) O.L.P. Gavin says 8:30 to 10 p.m. EST.

**HI5N**, Trujillo, D.R., 6132 kc. reported heard 8 to 11:30 p.m. EST. (Gavin.)

**HI1S**, Puerto Plata, D.R., 6420 kc., reported heard noon to 2 p.m. EST and 6 to 8 p.m. EST. (Young, Chambers, Betances, Anca, Hamilton.)

**HH2S**, Port au Prince, Haiti, 6070 kc. reported heard 7 to 10:15 p.m. EST. (Gavin, Miller, Morgan.)

**HH2Y**, Port au Prince, Haiti, reported heard on 31 meters. (Salazar.)

**HH3W**, Port au Prince, Haiti, 9595 kc. reported heard 7 to 9 p.m. and 12 to 1 p.m. EST. (Chambers, Skatzes, Green, Betances, Turner, Wilkinson, Dodge, Hammersley, Wilson, Miller, Salazar, deLaet, Johnson, Hull, Flora, Kentzel, Trzuskowski.) This station's call is HH2W when working on the "ham" bands.

**HHA3**, Haiti, 9640 kc. reported heard 7 to 7:15 p.m. EST. (Lamb.)

**VRR4**, Kingston, Jamaica, 11595 kc. reported heard. (Wilson.)

## CENTRAL AMERICA

**YNVA**, Managua, Nicaragua, 8590 kc. reported heard 8 to 10:30 p.m. EST. (Anca.) O.L.P. Rivas says frequency is 8150 kc.

**YN1OP**, Managua, Nicaragua, 14280 kc. reported heard Sundays 7 to 7:30 a.m. EST with a special broadcast. (Sauberlich, Lee.)

**YNLF**, Managua, Nicaragua, has changed wavelength to 50.22 meters, 5775 kc. heard 5 to 11:30 p.m. EST. (Flick, Johnson.)

**TIPG**, San Jose, C.R., 47 meters, one of the best 49-meter band stations, 8 to 10:30 p.m. EST off and on until after midnight. (Skatzes.)

**TIEP**, San Jose, C.R., 6710 kc., 7:30 to 12 p.m. EST. (Horwath, Brainerd.)

**TI8WS**, Puntarenas, C.R., 7540 kc., 7 p.m. to 12 midnight EST. (Ortiz, Hynek.)

**TIRA**, Cartago, C.R., 49.31 meters reported heard. (Byrns.)

**TITE**, San Jose, C.R., 45:09 meters. (Byrns.)

**TGS**, Guatemala City, 5713 kc., 200 watts reported heard Wednesday, Tuesday and Sunday 6 to 9 p.m. EST. (Johnson.)

**HRN**, Tegucigalpa, Honduras, 5875 kc., 6-7 p.m., 8-9 p.m. Sundays 8-12 p.m. program in English. (Marco, Young, Hartman, Betances, Deterly, Rodriguez, Gavin, Wolf.)

**HRH**, Salem (?), Honduras, 5780 kc. reported heard 7:40 p.m. E.S.T. (Messer.)

**HRP1**, San Pedro Soula, Honduras, 6350 kc. heard 5 p.m. E.S.T. (Sauberlich, Coleman.)

**HP5K**, Colon, Panama, heard testing on 6010 and 6030 as well as various other frequencies after 11 p.m. (Hammersley.)

**HP5B**, Panama City, Panama, 6030 kc. off at 10:05 p.m. (Norman.)

## SOUTH AMERICA

**VP3MR**, Georgetown, British Guiana, 7080 kc. 6-9 p.m. (Donaldson, Lawton, Vassallo, Pickering, Chambers, Loke, Harris, Houghton.)

**VPM**, location unknown, 11700 kc. heard 8-8:20 p.m. E.S.T. with an announcer's voice announcing "Hello B. A." preceded by 4-note gong signals. (Lamb.)

**HJN**, Bogota, Colombia, 5950 kc., 11:45-12 midnight. (Norman.)

**HJU**, Benaventure, Colombia reported heard on 9500 kc. (Kentzel, Messer, Gallagher, Johnson, Rodriguez, Hammersley, Shumacker, Moore, Lamb, Wilson, Rich.)

**HJ1ABG**, Barranquilla, Colombia, 6042.5 kc. 12-1 p.m., 6-10:30 p.m. and on Sundays 1-3 p.m. (Foshay, Coover.)

**HJ1ABD**, Cartagena, Colombia, 41.2 meters reported heard Saturdays 1-4 p.m. (Loke.)

**HJ3ABI**, Bogota, Colombia, 49.56 meters reported heard. (Byrns.)

**HJ1ABE**, Medellin, Colombia, soon to change frequency to 9500 kc., 1000 watts. (Foshay.)

**HJ4ABC** (?) Pereira, Colombia, 6080 kc. reported heard. (Johnson.)

**HJ4ABC**, 6451 kc. formerly HJ4ABJ at Ibaque, Colombia, reported heard. (Craft, Rodriguez, Kentzel, Johnson, Stabler.)

**HJ4ABP**, Medellin, Colombia, 6135 kc. (Johnson, Gallagher, Ortiz.)

**HJ4ABD**, Medellin, Colombia, 5750 kc. reported heard. (Wilkinson.)

**HJ3ABF**, Bagota, Colombia on 6170 kc. daily until 12 p.m. On Sundays broadcasts opera until 12:30 p.m. E.S.T. (Craft.)

**YV6RV**, Valencia, Venezuela, 6520 kc., 11 a.m. to 2 p.m. and 5 to 10 p.m. E.S.T. (Skatzes.)

**LRU**, Buenos Aires, Argentina, 15290 kc., 5000 watts, heard 2 to 6:50 p.m. E.S.T. (Hansen, Pilgrim, Schumacher, Costes, Wickham, Edbrooke.) Also heard from 11 a.m. onwards.

**LRX**, Buenos Aires, Argentina, 9580 kc. testing between 10:15 a.m. to 2 p.m. E.S.T. (Costes, Hammersley.)

What Spanish-speaking station is

heard on 15.3 meters Sunday nights 6:45 to 9 p.m. E.S.T.? Is it LRU, Buenos Aires? (Sauberlich, Moore.)

**CEC**, Santiago, Chile, 10670 kc., 5 to 6:45 p.m. E.S.T. (Dressler.)

**OCI**, Lima, Peru, 47.97 meters, reported heard. (Byrns.)

**OAX4D**, Lima, Peru, 5780 kc. reported as best South American station after 11 p.m. E.S.T. (McKay, Cox.)

**CB615**, Santiago, Chile, 6150 kc., reported heard 7 to 10 p.m. E.S.T. (Chambers.)

**CE960**, Santiago, Chile, 9600 kc. reported heard 6 to 10 p.m. E.S.T. (Chambers, Pilgrim, Gallagher, Moore, Skatzes, Hammersley, Edbrooke.)

**HCK**, Quito, Ecuador, has changed frequency to about 5890 kc. heard 9-10 p.m. E.S.T. (Smith.)

**HC1PQ**, Quito, Ecuador, 6680 kc. reported heard until 11:30 p.m. E.S.T. (Stokes, Andrews.)

### OCEANIA

**KKP**, Honolulu, Hawaii, 16030 kc. heard irregularly 11:30 p.m. E.S.T. (Hull, Wolf.)

**KKO**, Kahuku, Hawaii, heard at about 15300 kc. relaying programs to N.B.C. at 7:45 p.m. E.S.T. onward. (Christoph.)

**KKH**, Kahuku, Hawaii, 7520 kc. relays KGMB Mondays 12:30 a.m. E.S.T. (Lawton.)

**KIO**, Hawaii, 25.12 meters heard testing with music 5:15 p.m. (Loke.)

**K6BAZ**, Howland Island, 20.9 meters; an amateur heard at 5:30 p.m. (Loke.) New station in Tahiti testing on 7.1 megacycles Tuesdays and Fridays 11-12 midnight; call sound like FZ or F3 to start with. (Harris.)

**VPD**, Suva, Fiji Islands, 13075 reported heard 12:30-1:30 a.m. E.S.T. (Pickering, Costes, Craft, Bower.)

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

W. G. Graham, Ed. McKay, R. W. Sahlbach, Virgil Scott, Roderick C. Owen, Russell L. Eley, Shirley Brown, George W. Osbahr, A. H. Dalal, H. J. Dent, Baron von Huene, Arthur Church, George Illenberger, Daniel Henry Carey, Rafael Penalver y Ballina, Kenneth Dressler, G. L. Harris, E. R. Wickham, Kenneth Duncan, Leonard Deutsch, Leo Herz, Thaddeus L. Grabek, Charles Spielman, Frank Clarke, Donald T. Silbert, Gus Sochor, Warren Hartman, John G. McConomy, Jose Rodriguez Rivas, Raymond Anderson, Clayton D. Sands, Arni Sigurdsson, Harry E. Kentzel, Fletcher W. Hartman, H. Thursten Clarke, Ralph Clarke, Rodney M. Craig, H. Kemp, John Hartshorn, F. T. Reilly, Gabriel M. Costes, J. F. Snyder, Jr., Eugene S. Allen, H. Westman, D. A. Seneviratne, Harry Wolf, Gerald Liccione, C. H. Skatzes, Clarence Morman, Fred Cost, Edward DeLaet, Howard E. Sauberlich, George C. Sholin, G. W. Twomey, Leonard Trinkle, Fred M. Craft, James P. Dod, Caleb A. Wilkinson, L. C. Hanna, J. F. Edbrooke, L. M. Jensen, Orval Dickes, Ian Foote, Hugo Lindquist, E. M. Siren, Oliver Amlie, C. A. Fraul, George L. Loke, L. D. Brewer, A. F. Dittmann, Louis Kuslan, Don Adams, R. O. Lamb, Richard H. Graham, James M. Coleman, Thos. Fallon, O. Ingmar Oleson, Robert Herman, Joe Stokes, Ian Cleveland Morgan, Charles Holt, C. McCormick, Gideon Brainerd, Don E. Sollenberger, James E. Moore, Jr., Frank J. Flora, V. L. Jacobs, A. B. Coover, Robert B. Hammersley, R. S. Houghton, A. V. Deterly, Harold H. Flick, Wm. Koehnlein, Trzuskowski, L. T. Lee, Jr., Edgar J. Vassallo, Augusto Anca, George James Ellsworth, Lewis Miller, Werner Howald, Jack Bews, Forrest W. Dodge, L. Cummins, Bruce Holmgren, Carleton L. Whittaker, Juan Manuel Salazar, Salvatore G. DeMarco, George H. Fletcher, Leon Stabler, George C. Akins, J. T. Atkinson, Louis Horwath, Jr., Paul E. Byrns, Bill Schumacher, Jerry M. Hynek, Robert Rogers, Frank Wheeler, Reeve Owen, R. Homsher, Roy T. Denkler, Robert A. Curtis, Floyd M. Murphy, Frank Emerson, Roy Sikus, Robert H. Weaver, Ed Brandon, M. Michaelson, Raymond S. Swenson, Paul V. Trice, Dwight Williamson, E. W. Turner, H. F. Gould, Fred A. Pilgrim, Arthur Leutenberg, Charlie E. Hansen, Roy I. Christoph L. Judson Greer, A. Krsynsky, Gordon L. Rich, J. R. Saladin, Fred C. Lowe, Jr., Boris Scheierman, J. Edwin Wilson, R. C. Messer, Harold W. Bower, Duncan T. Donaldson, J. Wendell Partner, G. C. Gallagher, Walter F. Johnson, Morgan Foshay, Albert Pickering, A. T. Hull, Jr., R. L. Young, C. R. Devaraj, Manuel E. Betances, Walter L. Chambers, A. Belanger, A. B. Baadsgaard, Malcomb L. Gavin, Isaac T. Davis, Arthur Hamilton, Manuel Ortiz G., Thomas F. Tynan, Jack Lunn, R. Allen, Spencer E. Lawton, H. H. Parker, Laurent Gagnon, D. W. Parsons, Frank Sakely, Frank Nosworthy, Al Monoghan, Stanley E. Armsby, W. H. Capell, William J. Flanders.

## Micro Waves

(*Continued from page 657*)

for the desired compactness. Micro-waves, he declared, also offered a phenomenal degree of penetration through intervening structures, so the tiny waves were employed in developing the new portable transmitter.

Experimenters with micro-waves may occasionally have the opportunity of picking up the NBC miniature transmitter when the program events originate within a short distance from their homes. Some of the earliest pioneer work on midget transmitters and receivers for utilizing these micro-waves was sponsored by RADIO NEWS during the latter part of the year 1934 and the beginning of 1935. A full description of these experiments and a detailed explanation of the apparatus can be found in the articles on ¾ meter transmission and reception (with the acorn tube) in the May, June, July, and August 1935 issues of this magazine.

## "Hello, Shreeve"

(*Continued from page 648*)

in telephone repeaters, radio transmitters and radio receivers, build up and re-amplify the waning waves. Bell statisticians bring forth the fact that, on the two-way Gifford-Miller test, the various amplifications of power along the route—to compensate for power decreases and deflations—amounted to the total of 1,000,000 times 1,000,000 times 1,000,000, and so on for 33 multiplications in power.

The wide scope of radio-telephone facilities available to the public today can be discerned in studying the route of the circuits used in the Gifford-Miller talk. The route of the call was through San Francisco, Java, Amsterdam, London, and back to New York. Mr. Gifford's voice, from New York, crossed the continent over land lines through St. Louis and Los Angeles to San Francisco and then to the Bell short wave transmitter at Dixon, California. Leaping 9,000 miles across the Pacific to the overseas station of the Netherlands Telephone Administration at Bandoeng, Java, it was transferred to another short wave circuit spanning the distance of 7,000 miles to Amsterdam. Then it was carried by submarine cable to the London trunk exchange and, in turn, to the British Post Office station at Rugby. The relay from Rugby was received by the American Telephone and Telegraph Company station at Netcong, New Jersey, and telephone cable completed the circuit to New York.

Miller's utterances, traveling in the opposite direction, were put on the air at the telephone company's transmitter at Lawrenceville, New Jersey. Received at Baldcock, England, the impulses, by wire, were conveyed to Amsterdam, for short wave relay to Java for retransmission to California. Wire lines completed the cross-country circuit to New York.

Thus the radio voice has dramatically conquered space. Present-day, world-wide service is a far cry from a Bell engineer's report in 1926 that "the chief obstacle to regular radio telephone service between New York and London is the lack of a reliable and stable connecting circuit." Constant research and technical advancements have triumphed. America's part in the development of the splendid 1936 service deserves abundant praise.

## The DX Corner (Broadcast Band)

(*Continued from page 671*)

English program every morning, 3-4 (Wheatley).

**VAS**, Glace Bay, N.S., 652 kc. verifies reception (Loke).

**WATL** DX program, midnight—7 a.m. Sundays (Parfitt).

**WBNY**, a new station operating 7-8:30 a.m., 10 a.m.—2 p.m., 3 p.m.—midnight, daily (Kalmbach).

**WCAX** does not desire reports from listeners (Parfitt).

**WEDC** is silent on Tuesday mornings (Parfitt).

# Prize Contest

(*Continued from page* 681)

mfd. The various ammeters and voltmeters can be used separately or in a combination of circuits meeting almost every conceivable test emergency. All equipment is controlled through a main switch with a pilot light to indicate when it is closed. Flexible wires, running through weighted pulleys, permit the overhead lights to be moved for the most convenient lighting. The equipment is portable, and can be removed in a few minutes for work in the field. This eliminates duplication of equipment, with a considerable monetary saving, and is highly desirable in flood areas, such as that in which

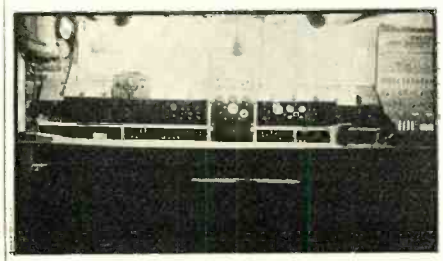


FIGURE 5

my shop is located, as was recently demonstrated when rising waters made a quick exodus necessary!"

The most interesting feature in this shop is the plug and jack arrangement whereby any desired connections can be made to receivers being serviced with a minimum of effort and time. All wires are strung through weighted pulleys in conventional telephone switch-board style, leaving the surface of the bench unobstructed by other than wires completing essential circuits.

That Mr. Kohr has not neglected the sales promotional value of display is indicated by the Philco "General Replacement" parts board on the extreme right.

# U. H. F. Super

(*Continued from page* 668)

u.h. frequencies, there will be a crying need for improved receivers for operation in these ranges. The present receivers are well suited to the reception of frequency-modulated and over-modulated signals, but are by no means suited to reception of the type of signals that are now making their appearance, especially with selectivity becoming a problem on the 5 and 10 meter bands.

With some advance knowledge of the foregoing conditions, the author has been working for some time to determine the requirements for a really suitable receiver to be used in the region between 2½ and 15 meters, and to design a receiver which would meet these requirements. The latest experimental model seems to meet all of the predetermined requirements and, judging from tests to date, represents a distinct improvement over the super-regenerative and superheterodyne receivers now in common use in the u. h. f. range. When present tests are brought to a satisfactory conclusion, this receiver, built up in final form, will be presented to readers of RADIO NEWS in a constructional article. It is hoped that this can be accomplished in time to be included in the next issue.

For the time being, let us consider the requirements for such a receiver. It must have adequate sensitivity to meet all requirements. It must be selective enough to permit proper separation of stations, yet, contrarily, it must be broad enough to "hold" the signals from self-excited oscillators so commonly employed in amateur telephony on the 2½- and 5-meter bands. In fact it should be capable of adjustment to a much lower order of selectivity than this, to permit reception of television signals, some of which may be modulated at up to 1,500,000 cycles. Above all it must have a far more favorable signal-to-noise ratio than do present-day u. h. f. receivers. Finally, it should be capable of tuning throughout the range from 2½ to 15 meters.

It seems a simple matter to state these requirements, but to find means for meeting them is a different matter. Experience at lower frequencies indicated that a combination of tuned radio-frequency and superheterodyne circuits offered the most likely possibility from the standpoints of sensitivity and selectivity. Super-regeneration is definitely out because of the objectionable hiss and the inherent broad-tuning characteristics. Experiment also shows that the complications involved in combining the superheterodyne and super-regenerative principles make this idea impractical. The one objection to employing a superheterodyne circuit seemed to lie in its reputation for bringing up the level of man-made noise.

Considerable time was spent in checking to determine the cause for the unfavorable noise level encountered with superhets and it was found to lie largely in the general use of resistance-coupled i.f. amplifiers. It was discovered that a superheterodyne receiver using 1 stage of t.r.f. ahead of the first detector was much less noisy than one without such a preselector stage. The addition of a second preselector stage brought about still further noise reduction. In fact a model using 2 tuned r.f. stages, autodyne detector-oscillator and 2 stages of resistance-coupled i.f. produced such improved results, as compared with the usual u.h.f. superhet that the goal was apparently reached so far as both sensitivity and noise level are concerned. (The circuit of this model, up to the detector output circuit is shown herewith.)

Incidentally these i.f. amplifiers are generally assumed to resonate broadly at about 10 to 100 kc. and they actually do. The amazing thing found as a result of this study was that they also have another extremely broad resonant frequency in the range of 10,000 to 30,000 kc. At these latter frequencies man-made noise is very prominent and it was apparently this characteristic that was causing the high noise level where adequate preselection was not employed ahead of the first detector. The noise, forcing its way through the circuit of the first detector, was being amplified at this high i.f. This peculiarity was also brought to our notice by Frank J. Deller (W2BRE) as the result of an independent investigation which he conducted. He determined also that a tuned impedance in the plate circuit of the first detector, in place of the conventional resistance, provided greatly improved selectivity and reduced noise, and that by including a low-value variable resistance in this tuned circuit the selectivity could be made variable.

These latter ideas, passed on by W2BRE, were incorporated in the model receiver mentioned above, with the result that this receiver met the requirements for low noise and selectivity set forth above. Selectivity, with the series resistor all out, was such as to provide excellent results on the 10-meter band, which is fairly crowded with amateurs, and was far too good for use in the reception of signals suffering from frequency modulation on 5 meters. By placing all of the resistance in the circuit the tuning was again broadened to approximately that of a straight resistance-coupled i.f. job, permitting excellent reception of these "wobbly" signals.

Further broadening of tuning, as required for high-definition television transmissions may be accomplished as above but with the plate impedance of the i.f. amplifier tuned to a much higher frequency (in the vicinity of 10,000 kc.). At such a frequency the resistance-coupled amplifier is much broader than at its low-frequency resonant range and, of course, the high-frequency tuned impedance circuit is likewise broad.

# 2½—550 Meter Receiving Set

(*Continued from page* 660)

may be connected to either of these tuners at will by means of a small switch on the front panel. The lower frequencies are tuned by means of the main airplane dial while the ultra high frequencies are tuned by means of the large pointer knob at the lower center of the front panel.

Small self-supported plug in coils are employed to cover the ultra high frequency range while from 15 meters up there are 5 overlapping tuning ranges any one of which is selected at will by means of a switch on the front panel. The receiver operates from any 110 volt a.c. or d.c. line and any ordinary type of antenna may be employed. The loudspeaker is included in the receiver and a headphone jack is provided at the rear of the chassis. Thus the receiver is an entirely self-contained, line-operated job and has all the neatness in appearance of a regular commercial receiver.

For those who prefer to build their own, and who at the same time wish to economize, the receiver is available in kit form for under $15, complete except for tubes. Those who do not have the ability or the inclination for construction work can procure it built up ready for operation for something under twice this figure. Both the kit and the built up receiver are produced by the Radio Construction Laboratories. Readers desiring further information concerning the circuit, parts, etc., may obtain it by addressing inquiries to A. J. Haynes in care of RADIO NEWS.

# The Service Bench

(*Continued from page* 661)

gested the possibility that it was frictional electricity generated somewhat after the manner of brake static in auto-radio installations.

"I came back the next day with five square feet of copper window screening, lined the inside of the motor-compressor compartment, and grounded the screen. Result—100% elimination of noise!

## Majestic Model 460

"The Majestic Model 460 and others with similar a.v.c. and second detector circuits, use a double-untuned secondary in the second i.f. transformer, which has a habit of "going open." Lacking the exact duplicate, we devised a circuit change which results in a substantial improvement in the overall performance of the set and uses the small standard i.f. transformers most servicemen carry in stock. The accompanying diagrams, Figures 1 (the original circuit) and 2 (the revised circuit with the new i.f. transformer) explain the substitution. The new transformer and the 1-megohm blocking resistor for the a.v.c. are the only new parts required."

*Don Blair, Franklin, Pa.*

## A Model Test Panel for the Small Service Shop

In our heading this month is an example of a cleverly arranged, inexpensive, compact, test panel which possesses much merit for the small service shop. On a "compressed asbestos panel measuring only 32 by 48 inches has been arranged an 8-inch dynamic test speaker with impedance-selecting switches at the upper left, an 8-inch magnetic test speaker at the upper right, an all-wave oscillator at the top-center, a multimeter and set analyzer below it, a capacitator bridge and leakage tester at the right, and substitution condenser and resistor switches.

A spare power-supply unit, and the phono turntable with crystal, low—and high—impedance pick-ups at the right also from part of the equipment. Space is also provided for spare parts and tubes, manuals, reference books and case-history records.

This test panel was constructed during spare time by the servicemen in the Technical Radio Service Shop of 587 Amsterdam Avenue, New York City.

# A.C. Preamplifier

(*Continued from page* 663)

no voltage will result.

In operation, care should be taken to use only shielded cable to the microphone. The shielding should extend right up to the input to the pre-amplifier, in order to prevent pickup of extraneous voltages.

## Parts List

C1, C4—Aerovox electrolytic condensers, type PR-25, 25 mfd., 25 volts
C2, 6, 7, 8—Aerovox electrolytic condensers, type GG-5. 8-8 mfd., 450 volts
C3, C5—Aerovox tubular paper condensers, type 484, .1 mfd., 400 volts
Ch1, 2—Amertran filter chokes, 30 henry, type Z-904
R1—I.R.C. carbon resistor, 500,000 ohms, 1 watt
R2—I.R.C. carbon resistor, 4500 ohms, 1 watt
R3, R4—I.R.C. carbon resistor, 50,000 ohms, 1 watt
R5—I.R.C. carbon resistor, 1000 ohms, 1 watt
R6—I.R.C. carbon resistor, 20,000 ohms, 1 watt
1—S.P.S.T. toggle switch
T1—Amertran power transformer, type U-971, 600 v. c.t., 2.5/2.5/6.3 c.t.
1—Cadmium-plated steel chassis—7½ x 11 x 2½ inches, not drilled
2 double binding post strips
3 octal wafer sockets
2 6C5 Raytheon metal tubes
1 5Z4 Raytheon metal tube
6 feet parallel or twisted pair, power cord
Hookup wire
1 dozen nickel plated brass screws—6/32—½" with nuts and lock washers

# Volume Expander

(*Continued from page* 663)

gain of the amplifier when loud signals come in, it increases the gain.

Figure 1 illustrates a practical circuit built around the new metal tube 6L7. This tube is a "hexode," a mixer tube having two grids for the application of control voltages, suitably shielded by screens.

The audio signal is applied to the inner grid of the 6L7 and at the same time to another amplifier tubs 6C5. After being amplified by the 6C5, the signal is rectified by a 6H6. Note that the rectifier is so connected so as to generate a voltage which is *positive* with respect to a reference point on the voltage divider. This positive voltage is applied to the other control grid of the 6L7, where it reduces an initial very large negative bias. The original bias keeps the amplification of the tube low but when a signal comes in the gain is increased in proportion to the strength of the signal. This increases low passages only slightly and loud passages a good deal. As the name implies, the amount of expansion can be controlled by the "expansion control" knob. It is also possible to have the expansion applied only to signals above a certain minimum level. This is done by biasing the rectifier tube.

The potentiometer P is adjusted for each 6L7 tube; a plate current of .15 ma. is recommended when no signal is coming in.

The time constant of the control voltage is generally adjusted to .25 to .5 second. This is considered the most satisfactory adjustment. If the time constant is too short, the reproduction sounds unnatural, especially on speech. Of course, when the time constant is too long, the desired effect will not be realized. Technical data for this application of the 6L7 was obtained through the courtesy of RCA engineers.

# Radio Flagship

(*Continued from page* 655)

General also is in a position to receive suggestions from his staff, who are farther behind him, pass judgment and hand them on to the radio operator.

The liaison radio unit operates either by voice, continuous wave or tone-modulated continuous wave. It is powered by a 50-ampere generator and a large storage battery. The generator is hooked to one of the two 710 horsepower aviation engines and supplies energy for both radio sets when the plane is in the air. Should the commanding general ground his flagship for any reason, the battery will supply sufficient energy for about two hours continuous operation.

In addition to the transmitting equipment, the airplane has a direction-finder radio loop and a "homing" device which enables the pilot to follow the radio beam of any broadcasting station, commercial or otherwise, directly to its antenna.

The ship also has an automatic or "robot" pilot. Maj. Gen. Andrews claims he can couple the homing device and the robot pilot—it has been done experimentally—but he prefers to depend upon manual control of the flagship for regular flying.

Practical tests of the equipment are being made here at Langley Field virtually every day. The commanding general takes his flagship into the air, surrounded by an escort of fighting ships, and holds manoeuvers over a wide territory, coordinating combat, pursuit and bombers in a coordinated attack or defense exactly as an Admiral, from the control tower of his flagship at sea, concentrates his squadrons of destroyers and his cruisers, battleships, submarines and airplane carriers upon a given objective.

This development seems to foreshadow the day when each wing commander will have an individual radio-equipped flagship in which to keep in constant touch with his squadrons.

# WHAT'S NEW IN RADIO

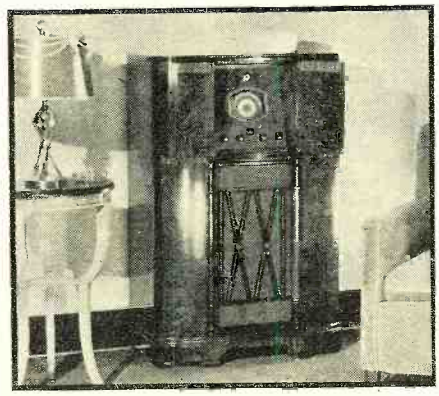
WILLIAM C. DORF

(*Continued from page* 649)

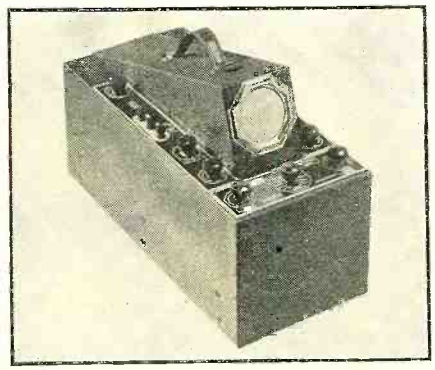
tion. It consists of three units and a cabinet rack; namely, the antenna unit, r.f. amplifier and the modulator unit. The tubes in the r.f. unit are: one 47, one 802, two 801's and one 83. The tubes in the modulator are: two 57's, two 45's, two 801's and one 83. Plug-in coils are available for 20, 40, 60, 80 and 160 meters.

## A Distinctive Radio Receiver

The new RCA model C13-2 console employs 13 tubes and covers a frequency range from 140 to 60,000 kcs. It incorporates a 12-inch speaker, new cathode-ray



tube for exact tuning, new type tuning dial, a dual-speed tuning control, and delivers 15 watts power output.



## A New Instrument

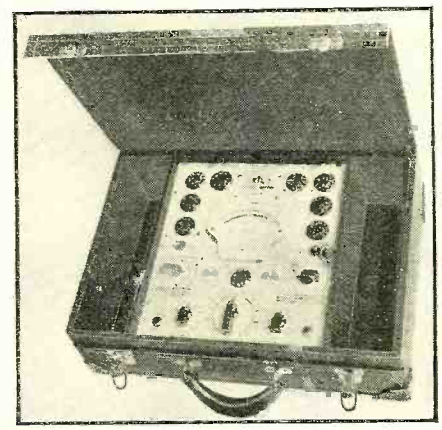
The Triumph Manufacturing Company announces the new model No. 800 oscillograph which features simplicity of operation, new cabinet design and layout for convenient angle view of cathode-ray tube, self-contained synchronizing sweep circuit and extra-wide sweep-range. It is designed to have a linear sweep-frequency range of 20 cycles to 50,000 cycles and it is possible to synchronize and lock 2 cycles of a 100 kc. wave and photograph it with this instrument. The oscillator is especially suited to the requirements of laboratories and industrial plants.

## Improved Transmission Cable

An announcement was recently received on the Lynch improved "Giant-Killer" twin conductor cable. The outside rubber casing is extremely rugged, made to withstand practically any kind of mechanical abuse. The two conductors are twisted and each conductor is stranded and each wire is tinned, which is a convenience in soldering joints. "Laytex" insulation is employed on each conductor to make the conductors acid and moisture proof.

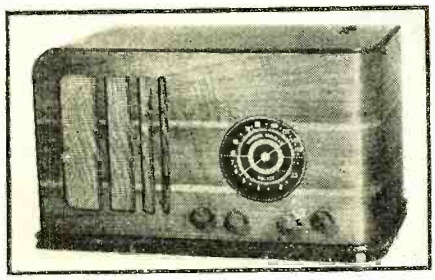
## Something New—Volume Expander

The Crosley 1936 De Luxe receiver line incorporates a new development called the "Auto-Expressionator." It is designed to restore the full expression range of tones as they are played in the studio—before the tones are monitored by the station control engineer, necessary because of the electrical limitations of the transmitting equipment. The loud signals that have been compressed at the station are restored to their entire fullness and likewise the soft passages that were increased in volume for transmission are now automatically reduced to the original tone level as rendered by the artist or orchestra. Briefly, the device is similar to an a.c. Wheatstone bridge. The two small bulbs shown in the photo are placed in separate arms of the bridge, they are similar in appearance to flashlight bulbs but have special filaments. Unbalancing the bridge (which occurs on strong signals) causes a greater proportionate increase in volume than normally would be obtained. An important adjunct to the device is the automatic bass compensator—on weak signals, volume is reduced more on the high frequencies than on the low notes, preserving a better aural balance.



## An Efficient Tube Checker

Here is an attractive and workmanlike tube tester produced by the Radiotechnic Laboratory. This model M instrument uses the current-voltage ratio method for checking tubes. The tester is provided with 8 sockets to take care of all present day tubes and new tubes that may be introduced in the future. The instrument includes a short-circuit and leakage tests, condenser and continuity tests, and by means of a panel switch the meter can be disconnected from the testing circuits and connected to jacks to serve as a voltmeter with a 100-volt range and sensitivity of 1000 ohms per volt.

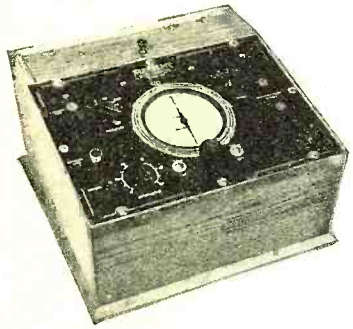


## Two New Table Receivers

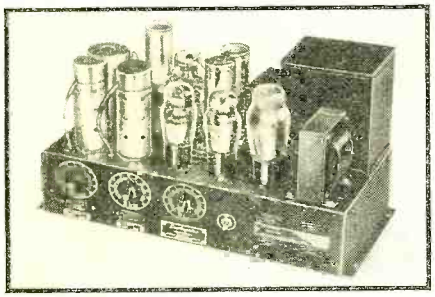
The Westinghouse Electric Supply Company announces two attractive table model receivers, the "Jubileer" and the "Trumpeter" for their "Golden Jubilee" receiver line. The "Trumpeter," illustrated above, is a 5 tube a.c. operated superheterodyne covering the regular broadcast and police bands.

## Signal Generator

Servicemen and laboratory engineers will be interested in the Supreme model 189 signal generator. It employs an electron-coupled circuit, has 4 controls, uses 3 tubes



and features a direct reading airplane type dial. The instrument is enclosed in a sturdy wood cabinet.



## High-Gain Amplifier

Eight tubes are employed in the Lafayette model 251A amplifier, consisting of two type 75's for the pre-amplifier stage, one 6A6 for the mixer, one -76 for the voltage amplifier, one -42 for the driver stage and two -42's for the power output stage. The unit is designed to have a gain of 124 db. and a power output of 15 watts.

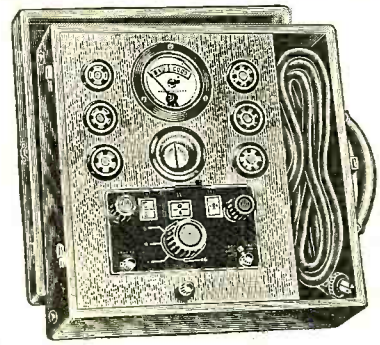
## Metal-Tube Adapter

The Alden model 950 metal-tube adapter enables the serviceman to check all types of metal and metal-glass tubes in any

standard tube checker. For all tests the adapter simply plugs into the type 36 tube socket of the tester. The unit incorporates the proper resistors to test individually each section of the type 6H6 double diode with protection to both tube and instrument.

## A New Instrument for the Serviceman

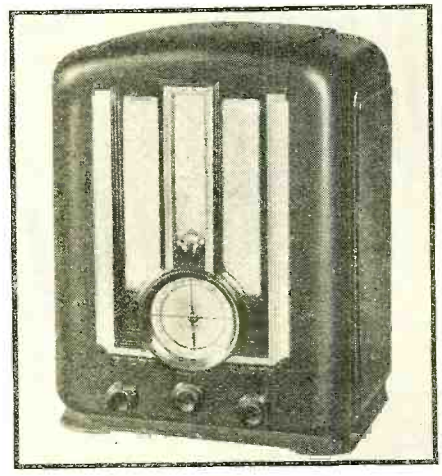
The Webber Model 30 "Neon Glo" tube tester features simplicity of operation with quick setting of controls and illuminated test positions for accurate readings on an English reading type dial. It is capable of testing all types of tubes in present day use including the metal tubes,



without the use of adaptors. It incorporates a "Neon Glo" condenser testing circuit.

## Receiver Mounted in Bakelite Cabinet

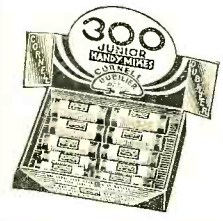
This announcement concerns the Pilot 150 and 200 series receivers enclosed in a strikingly designed solid bakelite cabinet, trimmed with chromium striping. The model 150 is a 2-band battery set equipped with the latest developments, employing 5 tubes and having an undistorted output of .7 watt. The style 200, also dual-wave



band, operates on either a.c. or d.c., uses 5 tubes and employs a special 5-inch dynamic type speaker.

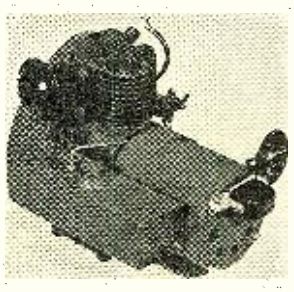
## Condenser Kits

For the convenience of servicemen, Cornell-Dubilier is producing three kits of as-




sorted electrolytic condensers to take care of practically every service requirement. Kit HK-3 comprises two each of 1, 2, 4 and 8 mfd. capacity. Kit HK-2 has the same capacity assortment but higher volt-

age ratings, and kit No. 4 contains 10 assorted capacities of 4 to 25 mfd. in various voltage ratings.



## Compact Gas-Engine Generator

This single-cylinder, 4-cycle gas-engine generator has an output of 150 watts, sufficient current to operate a radio set, charge batteries or mechanical power for washing machines and other electrical apparatus. This new power unit, made by the Pioneer Gen-E-Motor Corp., has push-button starting, automatic governor, ammeter, gas-tank and muffler. There should be a wide demand for a power unit of this kind from farmers and country homes without benefit of line supply.

## A New Speaker

The latest product from the Wright-DeCoster Company is their new "Nokoil" reproducer with a performance comparable to an electro-dynamic type speaker. As the name implies, no field coil is employed and therefore, no field current is required and the speaker mounts in a smaller space. High-flux density is made possible through the use of a new magnetic material known as "Alnico". It is available in 6 and 8 inch models.

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# Queen Mary

(*Continued from page* 655)

The receiving station is situated on the boat deck between the first and second funnels of the three-funnel liner. The radio structure occupies an area of about 800 square feet and contains eight operating positions. Control of all the radio apparatus on the ship is centralized here. The transmitters, although 350 feet farther aft than the receiving units, are operated by remote control. This large radio-control room contains the radio-telephone exchange, the emergency equipment and the chief business office for the handling of passengers' radiograms. The transmitting section contains four large sets, each capable of maintaining continuous communication with both sides of the Atlantic throughout every crossing. Telephones link the radio room with the ship's bridge and other vital positions.

A unique robot control for the transmitters is located in the radio-control room. Every operator will have a dial in front of him. The dial—not unlike the ordinary telephone type—when turned to prescribed combinations, will start up or shut down a transmitter 350 feet away, increase or diminish its power, or switch to any required wavelength.

Duplicate equipment is also provided in the radio power plant.

Radio-telephone equipment of entirely new design will permit the simultaneous use of facilities by two passengers. One could engage in two-way conversation with someone in New York and the second with someone in Europe. Telephone booths in convenient positions will be provided for the ship-to-shore voice service, but the facilities will also be available through any of the 500 staterooms included in the ship's telephone system.

# The Radio Beginner

(*Continued from page* 657)

enough, or the *frequency* (number of cycles or vibrations per second) becomes high enough, some of the energy in the electro-magnetic field travels away—is radiated. Therefore, the name radio-frequency. There is no sharply defined limit of radio frequency, but generally it is assumed to be from 25,000 cycles per second up. Frequencies lower than this, when sent through a loudspeaker, are translated into *audible* tones hence the term "audio-frequency".

Each broadcasting station, when it is "on the air", is sending out a steady wave at some particular radio frequency, and this is called the carrier wave. As a performer in the broadcast studio speaks into the microphone this carrier wave *varies in amplitude or strength* in accordance with the movements of the microphone diaphragm and the carrier is then said to be "modulated". Figure 1 graphically portrays the carrier wave at a moment when no sound reaches the microphone. Figure 2 shows the carrier wave when "modulated" by speech or other sound at the microphone.

An exact replica of this wave will reach the radio receiver and must there be converted back into sound. The first step in this conversion process is called detection. A perfect detector is nothing but a device which will permit electrical current to flow in one direction only and not in the reverse direction. When the received signal passes through this detector, it may be represented as in Figure 3. When such a current as that of Figure 3 flows through an electrical device which does not permit the fast variations of the individual radio frequency pulses (the headphone is such a device), the result is an average current, as shown in Figure 4.

The simplest receiver that could be made would consist of a headphone and a detector connected between aerial and ground.

It is more satisfactory and more reliable to use a vacuum tube as a detector as it requires no adjustments of any kind, and so the receiver described here employs a type 30 tube.

This tube contains a filament, a grid and a plate. When the filament is heated, electrons will flow from the filament to the plate and grid (which is connected to the plate externally) but not vice versa.

The tuned circuit consists of the usual coil and condenser and in order to keep the condenser capacity small and still cover the required broadcast range, it is necessary to tap the coil and use a switch to employ any desired part of it. The next problem is to collect the signals and bring them to the tuned circuit. This could be done by running the received currents, on their way from aerial to ground, through another coil on the same form as the tuning coil. The combination would work as a transformer, the antenna winding being the primary and the tuned winding the secondary. The winding which serves as primary had better be variable, too, because the smaller this part, the better the ability of the tuned circuit to separate the signals but the more turns there are in it the louder the signals.

When a crystal detector is used, the detector circuit becomes as shown in Figure 7.

When all the parts have been procured, construction may proceed in the following order.

Beginning with the panel, the centers for the holes should be marked off.

The screws for joining baseboard and panel should be ¼ inch from the bottom edge of the panel. The hole for switch 3 is located 3 inches from the left edge and 1½ inches from the bottom. Drill the holes to fit the various parts.

The panel may now be screwed to the baseboard and all other parts except the coil mounted on the baseboard, as shown in the photographs. The tube socket should be turned so as to have the large holes towards the back of the baseboard.

After all parts except the coil are mounted, as much as possible of the wiring should be completed. A study of Figures 6 and 8 and the photographs will help. The middle lug of C2 should be the grounded side while one of the outer lugs is connected to the moving arm of SW2.

When looking at the back of the panel the switches appear as in Figure 8. Connect point 1 of SW1 to point 1 of SW2, point 2 of SW1 to point 2 of SW2, etc. At the same time solder a few inches of wire to each point of SW2 except to point 11. These wires will later be connected to the taps on the coil.

Figure 9 and the pictures show the proper location of the taps with reference to the mounting brackets. First drill the holes for the mounting brackets at such a distance from the lower edge that the brackets will be level with the edge of the tubing. Then drill two holes for fastening the beginning of the winding.

When taking off a tap, twist a little loop in the wire, but be careful not to break the wire. The taps of the coil in the illustration are in two vertical rows. Making it much easier to make connections as the taps are spaced well apart. When the coil is finished, scrape the insulation from the taps and tin the exposed wire loops.

Mount the coil in the proper position and solder the wires from SW2 to the proper taps. From point 1 on SW2 to tap 1, from point 2 to tap 2, etc.

In operating the receiver remember that the right-hand switch, SW2, and the dial both control the frequency of the tuned circuit. For the lowest frequency use the highest taps. The condenser in itself has not enough range to cover the whole broadcast band, so it will be necessary to go to lower taps for higher frequency. The condenser allows you to make finer adjustments.

Switch one adjusts the coupling of the antenna. The set will be more selective if the switch is set on the lower taps. On the other hand, the higher taps make the stations come in stronger. The best compromise has to be found.

For best results we recommend the use of a rather long and high antenna.

## Parts List

C1 Aerovox mica condenser type 1467, .00025 mfd.
C2 Hammurlund "Star" midget variable condenser
SW1, SW2, Yaxley one-gang 11 point switches, non-shorting, type 1211
Bud 2¾ inch dial
Bakelite coil form, 2½ inches in diameter, 4 inches in length
¼ lb. magnet wire, number 24, d.s.c.
4 Fahnestock clips, 1 inch overall
2 small angle brackets (for mounting the coil)
1 baseboard, wood, 6 x 9 x ½ inch thick
1 panel, wood, 10 x 6 x ¼ inch thick
1 pair of Acme headphones

When using tube as detector, add:

1 Eby basemount socket, 4 prong
R1—15 ohm filament resistor
SW3 s.p.s.t. toggle switch
2 Fahnestock clips, 1 inch overall
2 Burgess "Little six" dry cells
1 type 30 tube

When using crystal detector, add:

1 crystal with holder

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# A New M.O.P.A.

(*Continued from page* 667)

W2AMJ, Bergenfield, New Jersey, R8. On 10 meters, the following stations were worked: W5EME, Tyler, Texas; W9TTU, Wichita, Kansas, R8 to 9; W5EAI, Shreveport, Louisiana, R6 to 7. The 10-meter test was over a period of two hours and even when the transmitter was used as M.O.P.A. on these frequencies (crystal also was tested) the receiving stations reported they could not tell the difference from M.O.P.A. or crystal control.

During these tests a cathode-ray oscilloscope was hooked to the tank coil of the final stage and when modulating 100% no wave-form distortion could be seen on the oscilloscope. When the oscilloscope was connected to the plate of the oscillator, during 100% modulation of the amplifier, no modulation was present in the oscillator stage.

A glance at the circuit and the photographs will bring to light the following essentials. To use the job on 10 meters all that is necessary is to pull the oscillator coil out of the socket, in which it is shown in the rear-view photograph, and place it in the front socket. This is indicated in the diagram by showing two separate oscillator circuits, either one of which is obtained by making the change just described. When used on 5 meters the first-stage plate circuit is used for doubling, with the oscillator working on 10. The two 89's in the next stage are used as a push-pull power amplifier, working into a conventional tank circuit with a split output-coil for coupling to the feeders. The transmitters gives very fine results on a half-wave matched impedance antenna, using spaced feeders, on a Johnson Q as well as other type antennas using twisted-pair feeders.

The 0 to 100 milliammeter may be plugged into the power amplifier or oscillator plate circuits for making readings from the front of the panel. This meter is shown at the left of the front panel with the plug and two jacks at the lower right. Below the meter are two snap switches, one of which turns the set "on and off," and the other cuts the plate voltage for "send-receiver." The three tuning dials control (left to right) are for the grid oscillator adjustment, the plate oscillator adjustment and the tank tuning for the final stage.

Looking at the rear of the chassis one can see the a.c. power cord at the extreme right, with the modulator cord at the left and above that the c.w. or phone switch and the jack for "keying."

Not only does this new M.O.P.A. transmitter work exceptionally well but it is built well mechanically, giving a shipshape commercial look to any amateur station where it would be employed. Both it and the modulator can be mounted in a small rack to make a complete medium-power, high-efficiency job. Anyone desiring more information on this unit may write to Glenn Pickett, care of RADIO NEWS, and letters will be forwarded to him for answering and additional details.

# The "Ham" Shack

(*Continued from page* 665)

on porcelain stand-off insulators, fitted with "banana" plug receptacles. This facilitates coil changing.

The tube is mounted between these two circuits and to the rear of the baseboard. Immediately in front is the neutralizing condenser. This is homemade. Inasmuch as the total capacity of the 150T is about 7 micromicrofarads, it is easy to make. It consists of two pieces of 1/16-inch aluminum each 3 by 3½ inches mounted on porcelain standoff insulators arranged to have a spacing of about one-half inch. A 1-inch standoff insulator is used for the lower plate and a 1¼-inch insulator for the upper one. The additional spacing is obtained by adding an extra nut on the taller insulator. The bottom plate is made secure with lock washers, while smoothed brass ones are used for the upper one. This facilitates variability even when the nut is extremely tight and at the same time insures rigidity, which is essential. The aluminum plates should be polished with steel wool and the edges and corners rounded in order to avoid leakage points that might induce arcing, as it will be noted this condenser is directly across the high voltage applied to the plate.

The amplifier represents a good all-around unit that is in keeping with modern amateur practice and provides ample power for the average amateur. The list of parts follows:

## List of Parts

1—Cardwell XG110KD split stator condenser
1—Hammarlund split-stator condenser; (the one used is an old style no longer manufactured, but a Hammarlund TCD100X or similar type may be used).
1—E. F. Johnson "50 watt type" socket
1—Hammarlund CH-500 transmitting radio frequency choke coil
1—National 2½ millihenry, 125 milliampere choke coil
1—10,000 ohm 100 watt Ohmite resistor with variable tap
1—100 ohm 20 watt center tapped resistor

Plate tank coils for all frequencies excepting 10 and 5 meters are Western "Air Wound" coils. Sizes for 160 meters, 38 turns 5 inches in diameter; 80 meters, 28 turns 4½ inches in diameter; 40 meters, 18 turns 3½ inches in diameter; 20 meters, 10 turns 3½ inches in diameter. The two lower frequency coils are wound with No. 12 and the two higher frequency coils with No. 10. All are wound to a mounting length of 7½ inches.

Grid coils of a similar type but wound with smaller wire may be used. However, in this particular amplifier a number of coils available were used. For 160 meters a 48-turn coil, wound with No. 14, on a 3-inch form, was used; for 80 meters, a 30-turn No. 14 wire coil, 2½ inches in diameter; 40 meters, 18-turn coil, 2½ inches diameter; 20 meters, 9 turns 2½-inches diameter; 10 meters, 4-turns 2½-inches in diameter.

The plate coil for 10 meters is made of copper tubing and is 4 turns of ¼ inch copper tubing, widely spaced and 2½ inches in diameter. Plate coil for 5 meters consists of two vertical ½-inch copper tubes, 18 inches high and 1 inch apart. The size of the "linear coil" is adjusted by a "shorting" bar.

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# Television

(*Continued from page* 645)

receiving set that when a formal Harbord-Sarnoff television statement is issued, there's plenty more activity behind the RCA portals than they care to speak about. RADIO NEWS predicted the establishment of this station in the October, 1935, issue!

But while the transmitter is atop the Empire State Building, the studios are located in the NBC portion of the RCA Building in Radio City—a bit less than a mile away. It was formally announced that the studios and transmitter will be linked by radio, but it is understood that a coaxial cable will be laid between the two structures to serve as a transmission line for the visual programs. RCA, ever with a finger-to-the-lips "shush-ing" attitude on television, hastily added the following paragraph to its annual report: "This does not mean that regular television service is at hand. It will be necessary to coordinate a number of important elements before television on a regular basis of service can be established. For example, it will have to be determined how far the television transmitter can send good television pictures; also with what consistency and regularity pictures may be transmitted with the system in its present state of development. We must investigate and define the possibilities of the television camera for indoor and outdoor pick-up."

With the start of these television transmissions, under the three-point plan announced last year, a "limited number" of television receivers would be placed at strategic points of observation "in order that the RCA television system may be tested, modified and improved under actual service conditions."

Limited number? RADIO NEWS learns that the contemplation of distributing 2,000 to 3,000 receivers was made by the company. Also, as early as last February, this magazine knew of one individual in Manhattan who already was invited to accept a set for use with the Empire State transmissions.

The editors and reporters of RADIO NEWS have been following television's progress through the preliminary and laboratory stages for many years. In recent months, the RCA "family" was contacted at least once a week on the matter and, outside of officials refusing to comment on the matter at all, the only remark on every official's lips was: "Television will *supplement* broadcasting, not *supplant* it!" The italics represent the words they all emphasized in a like manner.

There is every indication that the apparatus of Dr. Zworykin, including the "iconoscope," will be used in the initial transmissions and first crop of receivers. Great changes are said to have been made in this equipment since it was first announced. Only a few weeks ago, the Camden laboratories ripped all of its vision apparatus apart and rebuilt it along modified lines.

At NBC, the hushing attitude on television would have provided an excellent background to an Eno Crime Clues or Sherlock Holmes dramatization. Everything was a big secret! "Something's going on but we can't talk about it!" was the most of a statement you could get out of anyone in authority.

However, the whispers and reports seeping through the Radio City corridors indicate that one of the third floor studios is *now* rewired and rebuilt for television. The chief change in the constructional features of the room is a new air-conditioning unit to compensate for the terrific heat emanating from the various television lights. One report was that lantern slides would be used to provide "scenery." This method would eliminate the cumbersome task of moving scenery in and out of the small television studio.

The next big note in American television advancement was the final authorization to A.T.&T. to construct the coaxial television cable between New York and Philadelphia. Strict rulings were laid down by the Federal Communications Commission that no television monopoly could be set up under the grant. The F.C.C. ordered that no "unjust or unreasonable discrimination or undue or unreasonable preference" be made between different commercial users of the equipment.

Engineers of RCA seem resigned to 343 lines at the start of operations, although Europe uses about 60 more.

The Farnsworth apparatus and other systems have been detailed in earlier issues of RADIO NEWS in first-hand reports of editors who visited the respective laboratories. Our editors have also witnessed "secret" television demonstrations in "natural color" but believe this will be perfected later.

Glimpsing in at London, we find that the B.B.C. operations, under the supervision of Mr. Gerald Cock, should be in regular use, too, by the time you read this story. London goes Radio City one better in offering programs on a talent as well as technical basis, right from the start. It is understood that a daily, sub-divided, three-hour visual performance will be the order of the British television day from the studios atop Alexandra Palace. It is conceded that British sight-broadcasting will be commercially sponsored from the start. This was authorized in the British Post Office Television Committee report.

In 1930, the Bell Telephone Laboratories gave a press demonstration of a two-way telephone-television system, whereby the speakers sat in respective booths a few miles apart and saw as well as heard each other. But it took Germany to introduce the method commercially.

Last March saw the beginning of the first commercial long-distance television-telephone service. The rate, between Berlin and Leipzig was about $1.40 in American currency for three minutes. Clear images were seen at each end of the connection in an 8-inch square frame. The service was launched by the Postal Ministry in connection with the Leipzig Fair.

Some of the predictions embodied in this article may be offset temporarily by whims and fancies of the companies controlling the television processes. It is likely, too, that the Government licensing procedure may be entangled in the political uncertainties of a Presidential election year.

Anyway, RADIO NEWS sets this forth as an "earful" of tomorrow's "eyeful."

# All-Star Transmitter

(*Continued from page 665*)

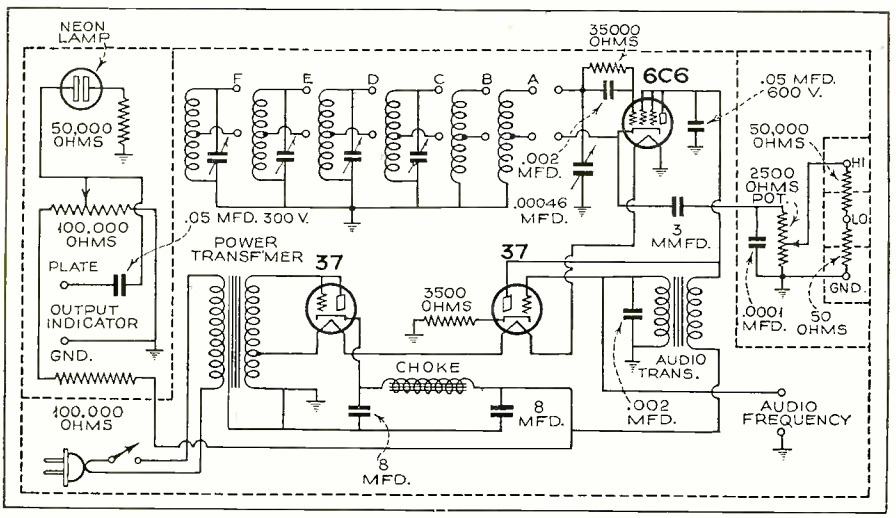
bands it is desired to operate. Thus four-band operation may be accomplished with only two crystals. A 47-type tube is employed as crystal oscillator feeding through capacity-coupling to an 802-type buffer stage which in turn drives a pair of 802's in push-pull. Automatic bias is used throughout, eliminating the use of batteries. Block-grid keying in the push-pull stage provides for telegraph communication and eliminates key clicks. Band changing is accomplished by means of plug-in coils.

There are three controls and one meter provided on the front panel. The one at the left controls the final tank circuit; that in the middle is for the buffer tank and that at the right controls the oscillator stage. A single 0-200 milliammeter is provided, with a switching arrangement, that permits reading the plate current in any of these circuits.

The power supply for the 40-watt unit is designed to give 600 volts at the required current with good regulation. A blank front panel is provided, equipped with switches for filament and plate circuits. An 83-type tube serves as rectifier.

If it is desired to convert this 40-watt c.w. transmitter into a 'phone rig, all that is necessary is a speech-amplifier unit capable of delivering about 18 watts of audio power. A companion unit that resembles in construction the r.f. section also is available. This is designed to modulate both plate and screen elements of the 802's simultaneously. Later it may be used as a driver for more powerful modulators when a larger final amplifier is added.

The audio amplifier is designed to work directly from a crystal or carbon microphone, and supplies current for the latter type. It also may be operated from a low-impedance line or from the output of a radio receiver. It will modulate the 40-watt unit, 100 percent, when working into a proper load. The tubes used are two 6C6's in resistance-coupled, cascade stages, driving a pair of 76's in push-pull which in turn feed into a pair of 42's in push-pull. Power supplies are contained in another separate unit.



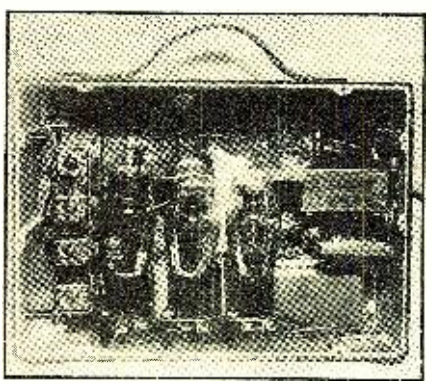

# Signal Generator

(*Continued from page 651*)

variable condenser. The two-range attenuator is coupled to the cathode of the 6C6 through a very small capacitance so that reaction of the attenuator on the tuned circuit is negligible. The four high-frequency coils are individually aligned to the dial calibration at the factory by small trimmer condensers. Although these padding condensers are sealed, they may be simply readjusted to compensate for any slight frequency changes which may result from abnormal climatic conditions or changes in tube and circuit characteristics.

Special care has been devoted to the shielding of the instrument and its component circuits. The chassis is enclosed in a cast aluminum case. The entire attenuator circuit is carefully shielded from the oscillator and additional shielding is used for the directly-calibrated dial. The neon tube output indicator, which is also built in, is likewise shielded. The mechanical design and rugged construction enable it to withstand hard service.

The dial is glass-enclosed, assuring protection to the indicator and a permanently attractive appearance. The panel is of bakelite, carefully engraved and finished. Two sets of test leads, one of which is shielded, are supplied. Also, a special lead furnished for use with the output indicator permits convenient connection to the output tube. The entire instrument presents a distinctly professional appearance.



# The Transmitter

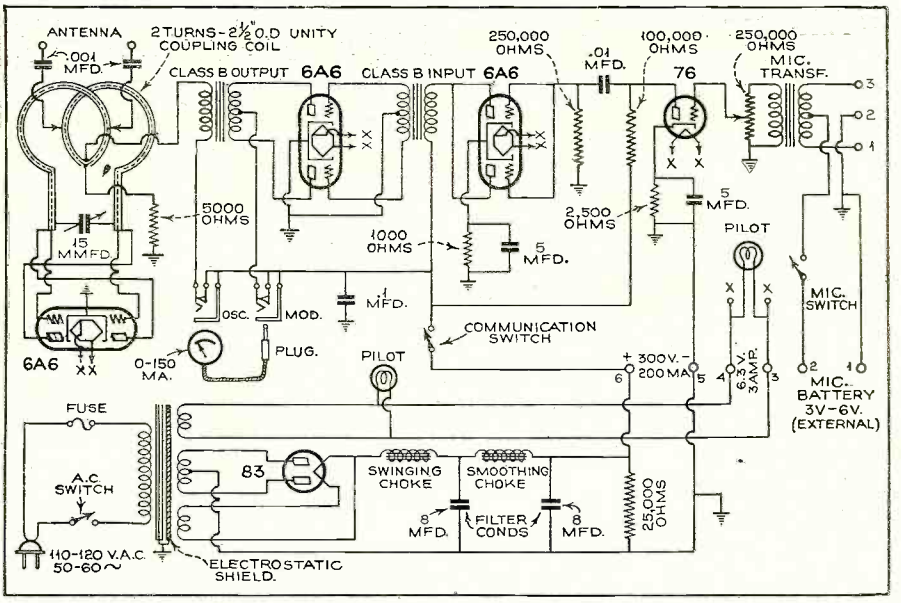
(*Continued from page 666*)

provides the power supply for both, and also for the Peak superheterodyne receiver or other receiver having similar power requirements.

The transmitter as shown in the circuit of Figure 2 consists of a 6A6 oscillator in a unity-coupled circuit, with the antenna coupled by means of movable clips on the plate tank. The 6A6 is a double triode tube, the two sections being used in push-pull in this particular application.

The 6A6 oscillator is modulated by a 6A6, Class B, driven by another 6A6 with the two triode sections connected in parallel. Ahead of this is one stage of speech amplification employing a 76 tube. The input transformer is suitable for use with either a single- or a double-button carbon microphone and its three terminals primary are brought out to the front panel.

A milliameter mounted on the front panel is provided with a cable and plug so that it can be used to measure either the oscillator plate current or that of the modulator tube, thus pro-




viding a close check on the operation of the transmitter.

If a microphone other than a carbon microphone is employed a preamplifier will normally be required and there is a Peak unit (full a.c. operated) available for this purpose. The output of such a preamplifier is connected to input terminals 1 and 3 of the transmitter and when so connected the microphone switch is out of the circuit. The overall size of the transmitter is 20 inches high, 20 inches wide and 7 inches deep. Behind the panel both sections are completely enclosed in steel cabinets, crackle-finished to match the rack and panels. The Peak X-4 transmitter is manufactured by the Eastern Radio Specialty Company.

## R.T.L. Model TR—53-6A6

This equipment, as shown in figure 3, includes both a transmitter and a complete receiver in a single case. The photograph of the inside with the cabinet removed shows the 4-tube receiver at the left of the main partition, and the transmitter at the right. The model illustrated is designed for operation on the 5-meter amateur band but other coils for both the transmitter and the receiver are available to provide coverage of any other portion of the ultra-high-frequency spectrum. The receiver portion of this equipment was described in the second article of this series, last month.

The transmitter uses either a 6E6 or an RK34 as a unity-coupled oscillator. The antenna is inductively coupled to the tank by means of a single turn coil connected to the insulated terminals on top of the cabinet. This low-impedance input circuit is suitable for use for transmission lines such as twisted pair or concentric cable. It is readily adaptable to other types of transmission lines of higher impedance. The modulator may be either a 53 or a 6A6, class B, and is driven by either a 53 or a 6A6 operating class A. The input circuit is designed for use with a carbon microphone and the microphone current is supplied by the transmitter without resorting to the use of batteries.

This equipment is admirably suited for portable-mobile work and is, of course, equally well suited for use in a permanent location, its small size being an advantage in either case.

One novelty incorporated in this transmitter is the provision of pin jacks at the rear into which a key may be plugged for i.c.w. code transmission making the use of an external buzzer or oscillator unnecessary.

The front panel controls include the receiver tuning knob, upper left, and the transmitter tank tuning, upper right. Along the lower edge of the panel are the phone tip jacks, the receiver volume control, the speaker off-on switch, regeneration control, the standby switch and the microphone tip jacks.

This equipment is manufactured by the Radio Transceiver Laboratories and the overall size of the cabinet is 15 inches long, 7½ inches high and 7½ inches deep. To facilitate transportation small cleats are incorporated on the ends of the cabinet to permit attachment of a leather sling or carrying handle.

## INDEX TO ADVERTISERS

# 23-Tube Super

(*Continued from page 653*)

4000 to 10,000 kc. for bringing in all the foreign short-wave broadcast stations of the world operating on frequencies lower than 10,000 kc. (but including EAQ), as well as the 40-meter amateur band. The fourth wave-band covers the frequencies from 9.5 megacycles to 22.6 megacycles, which included the high-frequency foreign short-wave broadcasting stations and the 20-meter amateur band. The frequencies of these four bands are accurately calibrated directly on the dial.

The receiver proper, a circuit diagram of which is shown herewith, is mounted on a chromium-finished chassis of extra heavy material of great rigidity to prevent sagging and circuit misalignment. The rigid control panel contains the following controls: at top the tuning window with its four differently colored calibrations, on which the moving shadow of the tuning meter needle appears. The central upper control is for tuning and it contains a very smooth high-speed-low-speed knob. Below this is the wave-change switch for selecting the desired bands. At the extreme left is the knob for the volume control. The knob next to this is the bass control. At the extreme right is the selectivity-high-fidelity control. The knob next to this controls sensitivity. Located directly below the wave-band switch is a tiny push-button switch for energizing the beat oscillator.

Looking at the circuit diagram for a moment, we see at the left the four tuned input circuits, working into a 6D6 tube utilized as a r.f. amplifier. The output of this circuit is applied to a 6A7 converter tube, while a 6B7 tube serves as an amplified automatic volume control for the r.f. stage. Three 39/44 tubes serve as intermediate-frequency amplifiers with full plate-and-grid tuned i.f. transformers. The fourth i.f. tube is a 6D6 working into a 76 second detector, resistance coupled to a 6C6 first audio, which in turn is coupled push-pull to two 6C6 tubes for feeding the final amplifier, located on a separate chassis with the power pack. The two chasses are coupled together by a cable-and-plug as shown in the lower right-hand corner of the diagram. Four other 76 tubes on the receiver chassis are used for noise suppression, signal oscillator, beat-frequency oscillator, and an amplifier-rectifier for the tuning meter. Adjustment of the beat-frequency oscillator can be made from the rear of the chassis.

Two binding posts are located on the back of the chassis for phonograph connection and two other binding posts located near these (toward the center of the set) are for the aerial and ground connections. A Scott Super antenna can be attached at this point if desired. The set worked excellently with the various standard antenna arrangements available in our Listening Posts.

The power unit and amplifier utilizes a double power-pack with a 5Z3 full-wave rectifier and an 83V full-wave rectifier and with 4 type 2A3 tubes in push-pull parallel as the output stage. This gives ample power for even the lowest notes, for high-fidelity reproduction. The circuit of the power-amplifier-power-pack unit will be given next month.

The receiver, under tests in our Listening Posts, was equipped with a Scott auditorium model speaker which has good response up to about 8500 cycles and two high-frequency speakers, which make it possible to extend the range out to approximately 16,000 cycles. During the tests the complete receiver, with the speakers mounted on a large baffle, as shown in the photograph, reproduced full orchestras with amazing power and naturalness without any trace of noticeable distortion. It was a pleasure to sit back and listen to the violins coming through on the very highest notes and really sounding like violins rather than the squeaks that are usually heard on reproduction from receivers of lesser fidelity. It certainly was enjoyable to hear the rich, full tones of the individual instruments, standing out pure and clear, with all their harmonics present. Speech itself takes on a new meaning over the radio when listened to so that every shade and intonation is reproduced perfectly. We understand that the manufacturers are bringing out a new program volume range expander unit that can be attached readily to this set to delimit reproduction still further.

The usable sensitivity for this receiver runs an average of about six-tenths of a microvolt, which indicates a very high signal-to-noise ratio and allows the receiver's great sensitivity to be instantly available on those weak signals that are usually "hashed up" by noise in the receiver itself.

The selectivity, as mentioned before, is continuously variable and runs between the limits of 2 kilocycles and 16 kilocycles. It is also interesting to know that this maximum sensitivity is obtained with the receiver in its most selective condition, which allows the operator to bring in distant stations with maximum volume and selectivity.

During our tests a careful check was made on the automatic volume control system which really incorporates 2 separate a.v.c. controls, one on the first r.f. tube and converter and the second one operating on the intermediate-frequency ampli-

fier. This gives the set what we consider to be the finest a.v.c. action that we have tested.

During the "on the air" tests that we have conducted to date at various locations in our Listening Posts, in the city, in the suburbs and in the country, we have found that there was virtually no station on the short waves that we went after that could not be picked up satisfactorily, receiving conditions being average. We have listened to even low-powered short-wave stations from all points of the globe and on days and nights when receiving conditions were good even the weak stations came in with tremendous volume and the volume control had to be turned way down for normal reception. We have never noticed a single case of reception where interference could not be cleaned up and eliminated if the two stations in question were not operating on exactly the same frequency. We also might mention that this receiver was used exclusively this month for logging the stations for our World Short-Wave Time-Table. Although we do not like to leave our readers guessing as to just what stations were heard, we are afraid that we will have to leave the actual stations logged to a list which will follow in Part Two, which article will also give the necessary details regarding operation, adjustment and tuning.

# Noise Eliminator

(*Continued from page* 651)

characteristics as the regular control grid, is isolated from the elements of the tube carrying the r.f. voltages. This injector grid can be used for application of the "peak-blocking" voltage, while the regular constant volume a.v.c. voltage may be applied to the control grid.

Figure 1 represents in a simplified block diagram one practical application of the "peak blocking" method of noise suppression. Except for the "noise amplifier" stage and the "noise rectifier" stage the receiver is a standard short wave superhet having a normal system of a.v.c. The "noise amplifier", in parallel with the second i.f. stage, amplifies the noise peaks to an amplitude sufficient for the "noise rectifier" to convert into a negative d.c. bias-voltage high enough (about 10 or 15 volts) to block the 6L7 second i.f. tube.

This "peak blocking" principle has also disadvantages. A strong signal will block the receiver the same as a noise peak. It is therefore necessary to provide a "noise control" which will set the threshold action of the noise amplifier-rectifier section above the level of any signal being received. This limitation is responsible for two disadvantages. One is that only noise having peak voltages higher than the signal level can be suppressed.

The other disadvantage of this method of application arises when a relatively weak signal, of say an R4 level, is being received. The noise control will then be set at a suitable threshold level to attain suppression of the maximum amount of noise. If an interfering signal of greater strength then comes on it will naturally block the receiver completely. The noise control will have to be set at a value higher than that of the interfering signal to eliminate this blocking.

The foregoing description of the "peak blocking" system of noise suppression is based on the assumption that the noise being received is of the character of automobile ignition interference, described as type 1. Suppression of type 2 noise, which has less sharply defined peaks and a high level of "hash" between them, is a different matter.

In order to present more clearly what can and what can not be done in the way of noise suppression with the "peak blocking" system we will describe our own tests with the experimental unit shown in this article. The unit was first tested with the original BRL-8 receiver described in the January and February, 1936, issues. An RCA Oscillograph was used to visually check the results heard. An automobile parked in the driveway with the engine running was used to produce the type one noise. A vacuum cleaner running in the same room made plenty of type two noise.

The first test was made using the vacuum cleaner. This put an R9 hash into the receiver. Various c.w. fone and broadcast stations were tuned in but no matter what adjustments were made no improvement in signal-to-noise ratio was apparent on any kind of station. The reason for this result was apparent from the picture of the noise on the oscillograph screen. The noise appeared on the screen as an almost solid hash with broad peaks extending not much above the hash level.

Tests on the interference from the auto in the driveway were on the other hand successful and distinctly gratifying after the experience with the vacuum cleaner. On any signal of lower value than the noise, this auto QRM could be completely eliminated. Even on a very weak R2 or R3 signal the R9 auto QRM could be wiped out. This was corroborated from an examination of the oscillograph screen.

Further tests were made in the RADIO NEWS Laboratory, located on the eighteenth floor of a large New York City office building. Receiving conditions here were quite different from the first suburban test location. All signals were weak, no auto QRM could be heard at that height from the street, and the high noise level from machinery in the building appeared to be predominantly of type two. Very little improvement in signal-to-noise ratio as far as the building noise level was concerned could be noticed. Next some type one noise was artificially manufactured by means of a spark coil and gap. The antenna lead of the receiver, a Scott superhet of ancient vintage, was run within two or three inches of this spark gap, causing a racket in the speaker that drowned out every other sound. A weak broadcast signal was then tuned in with the spark coil turned off. When the coil was again turned on the signal was wiped out entirely, but upon properly adjusting the noise control knob the spark coil interference became completely inaudible leaving the signal as clear and loud as before the coil had been turned on.

While this circuit can be engineered into the design of a new superhet and will effectively suppress certain kinds of noise, building a universal adaptor unit to work with any superhet is a horse of a different color. There are several very good reasons for this opinion. In order to effect practical construction of an adapter it is necessary to include the 6L7 control tube in the adapter. This means relatively long, shielded grid and plate leads to this tube. The capacity thus added will in many cases prevent the trimmer condensers which tune these two circuits from being brought into resonance after the adapter unit is hooked on, in which case either the affected i.f. transformer trimmers must be altered so as to allow for this added capacity, or the receiver realigned for a somewhat lower intermediate frequency.

Another major disadvantage of an adaptor unit is the increased instability caused by its use. The long leads to the control tube in the adapter cause part of this trouble.

Section 1 of the circuit diagram is the only part really essential for operation of this circuit with a good superhet. A super with only one i.f. stage has not enough gain to operate the noise rectifier tube and the extra stage of i.f. in the unit (section 2) using the 6K7 tube, is necessary. An optional arrangement with a super having two i.f. stages is to take the first i.f. tube out of its socket and let the 6K7 stage replace it. The variable selectivity i.f. transformer T1 will then give greater selectivity than before. It is inadvisable to convert a two i.f. stage super into a three-stage affair using this converter. Too much instability will usually result. The use of the built-in power supply (section 3) is also optional.

When hooking the unit to the receiver, it can be done in two ways: either the extra i.f. stage can be used or it can be cut out. If the i.f. stage is to be included, the shielded grid cable runs from the cap of the i.f. stage to the grid clip of the first i.f. stage in the receiver, while the 6L7 and the 6J7 have their grid clips connected together and to the i.f. transformer on the unit. Further, the plate shielded cable is plugged into the vacant receiver socket and the ground-lead from the unit is clipped to the chassis of the receiver.

When the i.f. stage is cut out, the joined grid clips of the 6L7 and 6J7 should be removed and the shielded grid cable connected to these two tubes instead of to the 6K7. Then the 6K7 can be removed.

Once the capacity loading and any tendency to instability has been overcome adjustment of the unit is simple. The i.f. amplifier of the receiver, including transformer T1, if the extra i.f. stage is used, should be aligned for exact resonance as usual. The 6H6 tube should be out of its socket during the lining up process. The 6H6 is then replaced and the trimmers of transformer T2 are adjusted for best suppression of noise. The noise and gain controls will have to be juggled during this latter process.

## PARTS LIST

1 Aerovox dual electrolytic filter condenser, type GG5, 8 mfd.
2 Aerovox tubular by-pass condensers, type 484, .1 mfd., 400 v.
5 Aerovox tubular by-pass condensers, type 284, .1 mfd., 200 v.
1 Aerovox midget mica condenser, type 1467, .00005 mfd.
1 Aerovox midget mica condenser, type 1467, .00025 mfd.
1 Hammarlund r.f. choke, Ch-8, 10 mh.
1 Hammarlund variable coupling i.f. transformer, type VT-465
1 Hammarlund diode i.f. transformer, type ATT-465CT
2 I.R.C. resistors, 2000 ohm, ½ w.
1 I.R.C. resistor, 1000 ohm, ½ w.
1 I.R.C. resistor, 50,000 ohm, 1 w.
3 I.R.C. resistors, 100,000 ohm, 1 w.
1 Electrad potentiometer, type 278, 5,000 ohms
1 Electrad potentiometer, type 205, 50,000 ohms
1 U.T.C. power transformer, type UH-1
1 U.T.C. filter choke, type PC-6
5 octal sockets 1 chassis, 8 x 8½ x 2
1 toggle switch 1 6-prong plug

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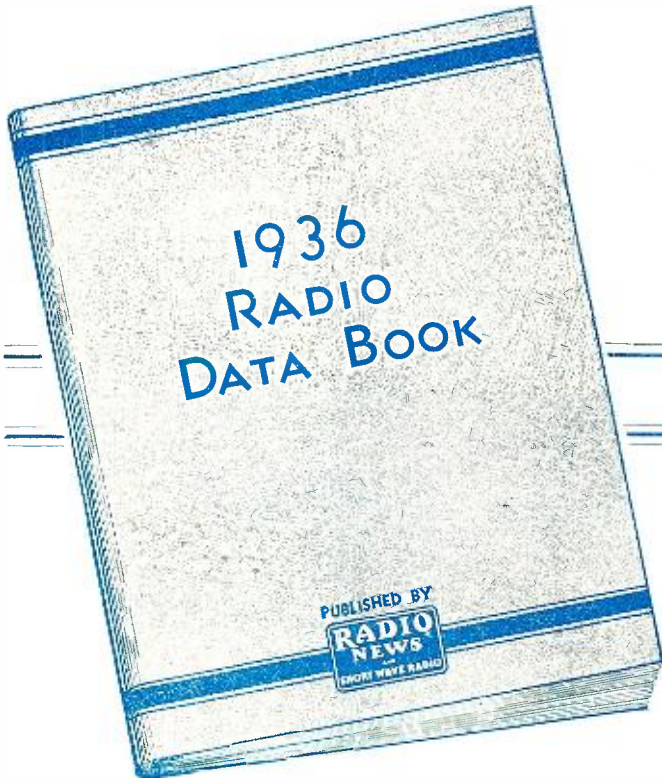


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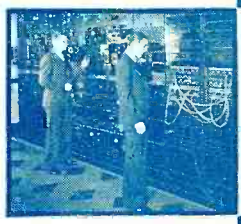

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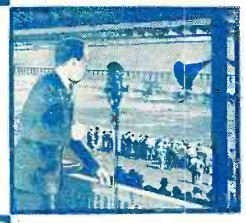

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