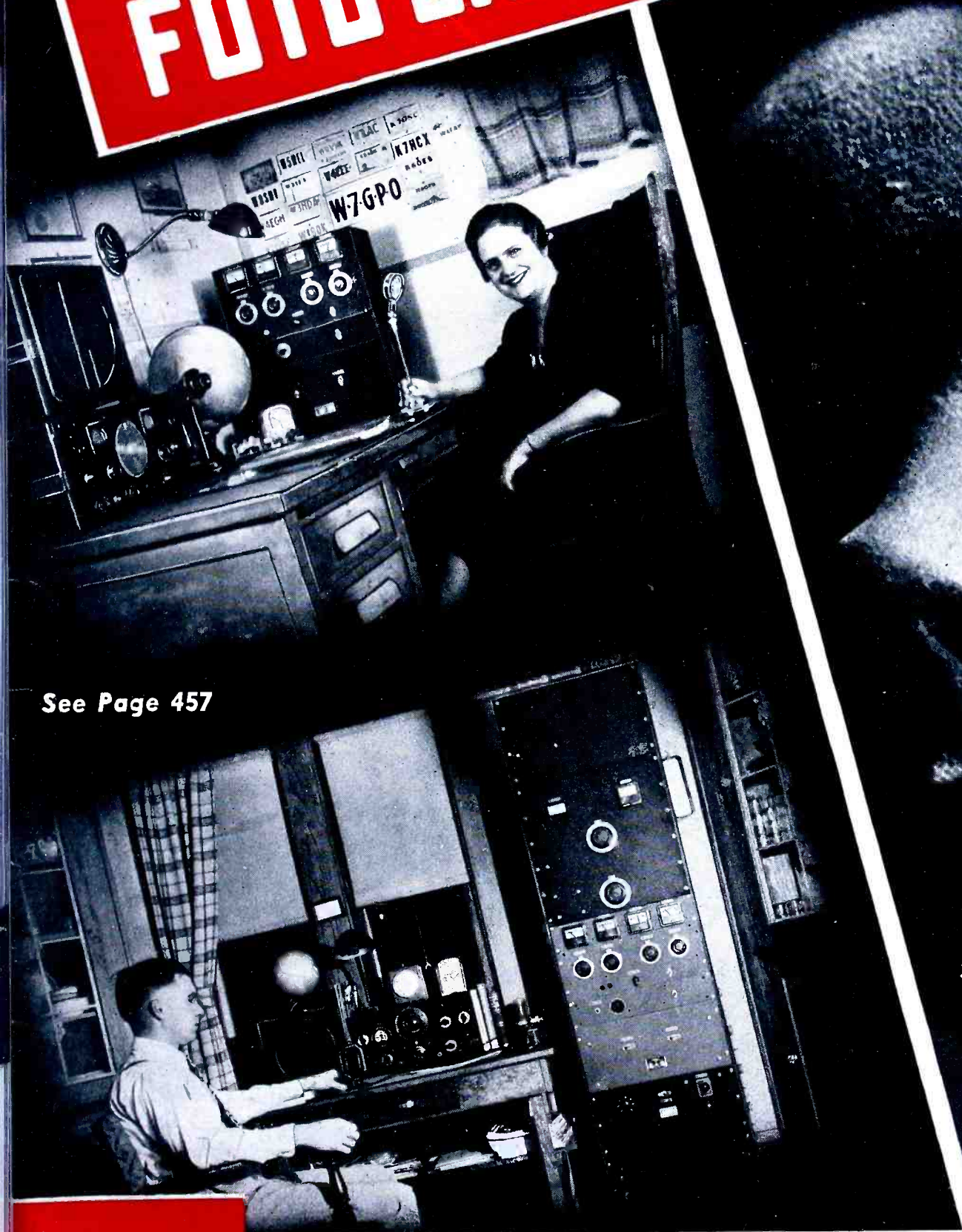


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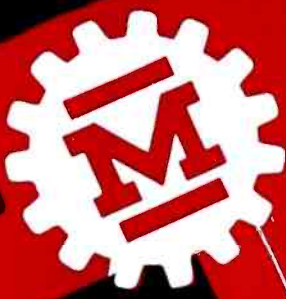
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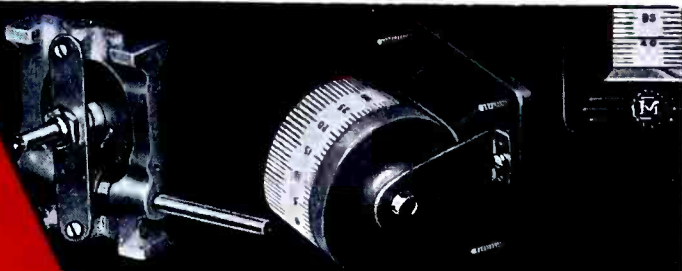


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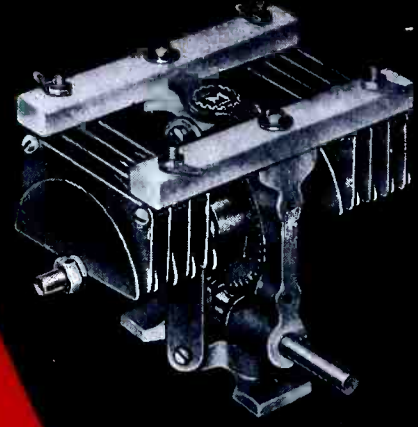


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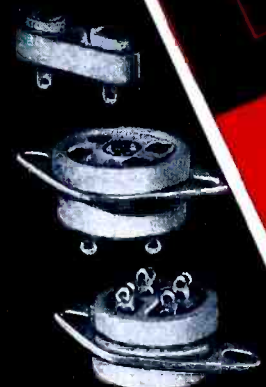
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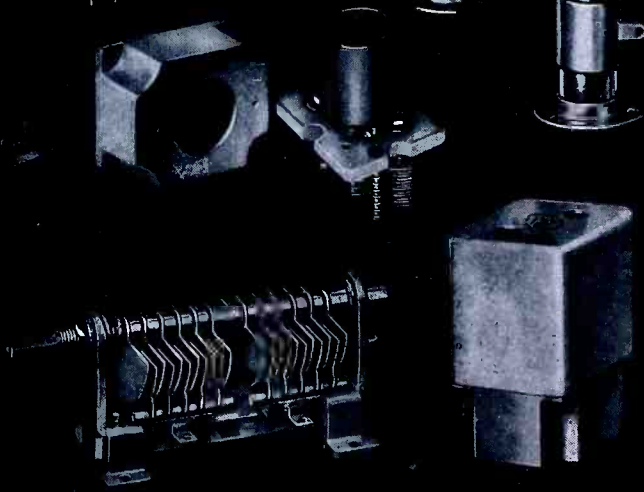
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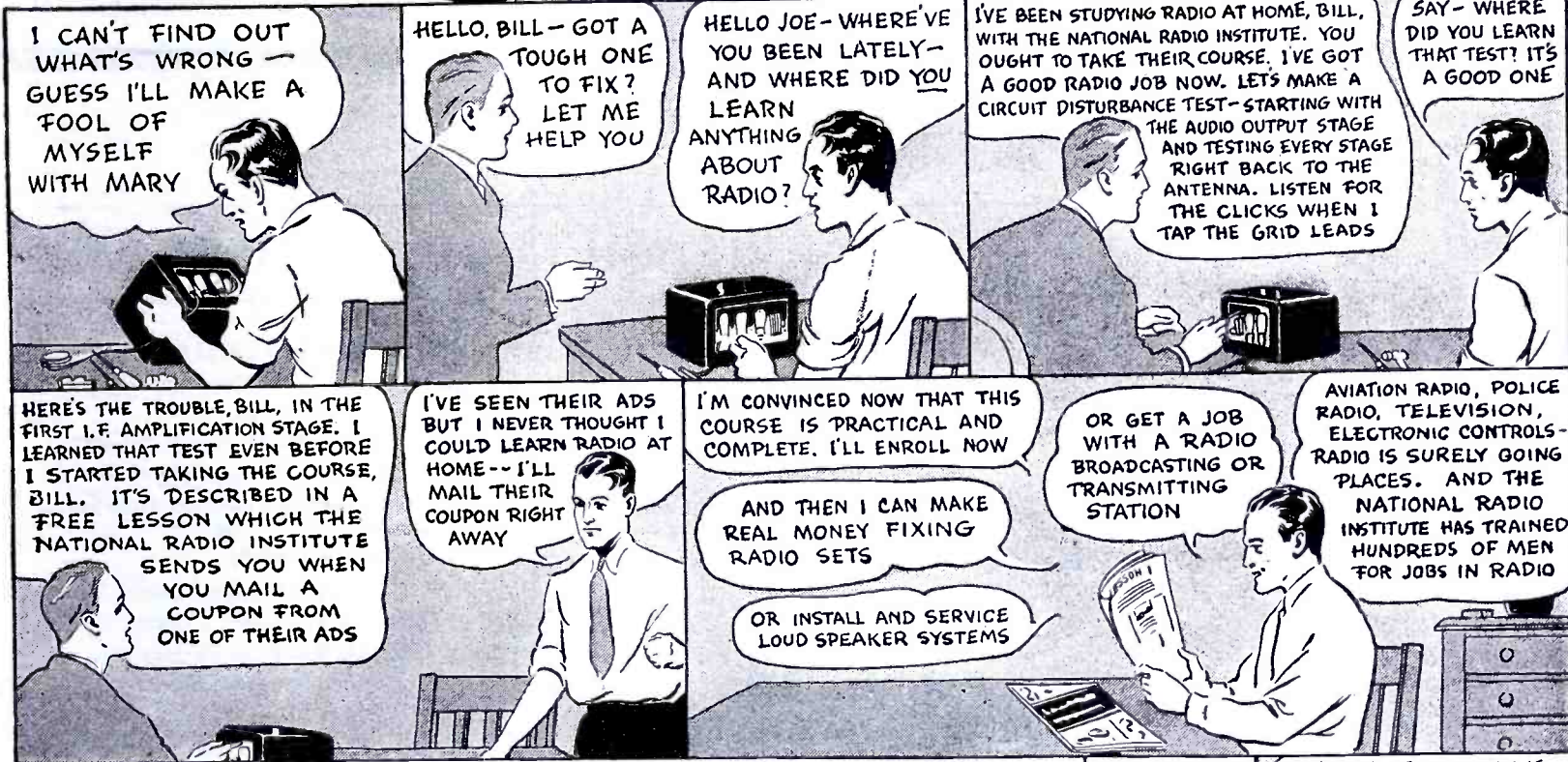
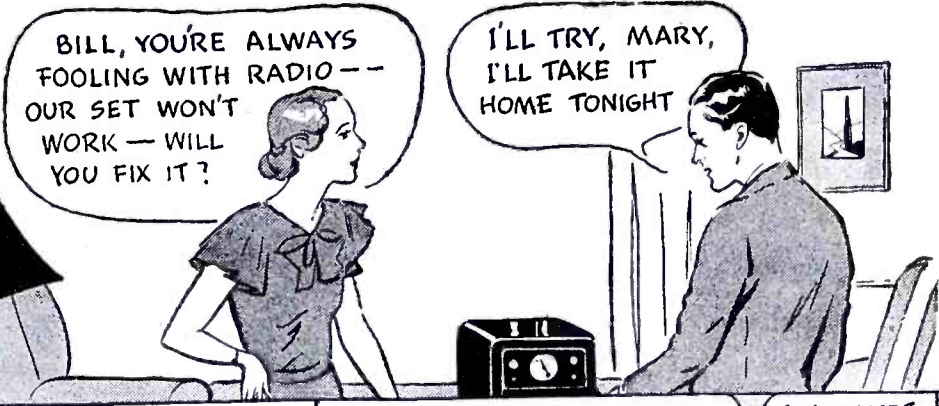


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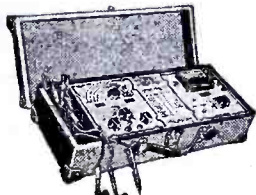
Jobs Like These Go to Men Who Know Radio

Radio broadcasting stations employ engineers, operators, technicians and pay well for trained men. Radio manufacturers employ testers, inspectors, foremen, servicemen in good-pay jobs with opportunities for advancement. Radio jobbers and dealers employ installation and servicemen. Many Radio Technicians open their own Radio sales and repair businesses and make \$30, \$40, \$50 a week. Others hold their regular jobs and make \$5 to \$10 a week fixing Radios in spare time. Automobile, police, aviation, commercial Radio, loudspeaker systems, electronic devices, are never fields offering good opportunities to qualified men. And my course includes Television, which promises to open many good jobs soon.

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December — 1939
Vol. X No. 8

HUGO GERNSBACK, Editor
H. WINFIELD SECOR, Manag. Editor
ROBERT EICHBERG, Television Editor
JOSEPH H. KRAUS, Photo Editor

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January Issue*

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Perry Ferrell, Jr.
Adding a Modulator to the "Ham"
Transmitter—C. W. Palmer, E.E.
A Good 2.5 Meter Transceiver—
Harry D. Hooton, W8KKPX
Beginner's 2-Tube S-W and Broadcast
Set—H. G. Cisin, M.E.
And Another Big FOTO-CRAFT Section

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Cover composition by H. Gernsback and Thos. D. Pentz. Photos show Amateur Radio Stations of Mary E. Roden, W7GPO, and Harlan Fulmer, W9CHF, respectively. FOTO-CRAFT cover feature . . . See page 506.

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Dr. de Forest re- counts some out- standing events in 40 years of radio his- tory, including the invention of the vac- uum tube grid.

Forty Years of Radio*

Lee de Forest, Ph.D.

● IT is not often the happy lot of a prophet to witness within a few years, or even in his lifetime, the fulfillment of his prophecies originally made before a world of indifference, a world of skeptics. Yet such a situation has come to pass in the radio world.

I remember as if it were yesterday that summer afternoon in 1907 when music was first sent out by radio phone. This was from the little laboratory in which I was at work in the old Parker Building in New York City.

In that same laboratory, many months earlier, I conceived and tested the first three-electrode vacuum tube, first with the "control electrode" (a simple band of tinfoil wrapped around the outside of the tube) then with two plates, one on each side of the filament—one the anode, the other the control electrode. And finally with the third electrode in the form of a grid or a perforated plate located between the filament and anode.

Naturally there was considerable history antedating my work in that old New York laboratory that may have an especial interest today. It was in Chicago in 1900 that an accidental discovery of the strange behavior of a gas lamp led me to the train of thought which eventually resulted in the audion. I dare say that history is fairly familiar to many.

In 1907 when the idea of radio broadcasting first occurred, and again in 1910 when the voices of Metropolitan Opera artists, Caruso and Mazcarimi, were for the first time launched upon the ether, and again in 1916 when for the first time regular radio concerts were maintained, from my old station at High Bridge in the Bronx to small but intensely interested audiences; growing in numbers nightly there continued to dawn a widening vision of the astonishing potentialities of the radio broadcast, which vision the last 19 years have been bringing more and more into reality.

Nothing since the earlier days of the discoverers has so appealed to the imagination. No other medium in man's history has demonstrated its unique power for uniting far separated sections of a great country, or a great Empire, for causing to become acquainted dwellers in widely distant districts of the earth.

I predict that as an educational medium, the radio broadcast of *sound and sight* will in time prove second in importance only to the public school. Already we see a closer interlinkage between the people of Canada and ourselves, due to this broadcasting idea. And eventually, after the dictators are all dead and forgotten, and their censorship, like their tyrannies, is forever ended, these benefits will extend even to Europe, between the peoples of the Old World, always heretofore strangers, enemies because strangers, and personally unacquainted.

When in the future this horror which now engulfs them is ended, and the citizens of foreign lands will hear night after night friendly words, music and the songs from across strange frontiers, then gradually will today's feelings of enmity and suspicion, based chiefly upon distance and ignorance of each other, change to understanding and good-will. Thus I maintain that the radio broadcast, with its irresistible educational influence, is destined eventually to prove one of the most potent powers for the abolition of war.

But while on this subject, let us pause here for a comparison—what radio means today to the world in war. In the World War No. 1, radio had proved of immeasurable value at sea in saving survivors of torpedoed ships, in warning of U-boat peril, in direction of naval battles over distances where antique signalling methods were totally useless, between field headquarters and divisional units, and in trench warfare. But to the millions of homes in beleaguered capitals, and throughout nations blockaded and cut off from the world, the widespread networks of radio information did not then exist. Not in 1914 or '18 could millions of listeners hear, as today, from their own Government or others across the seas, the hourly news bulletins, the emphatic words of warning or encouragement from their national chiefs—nor the helpful, or hostile, propaganda for the upbuilding or destruction of their morale, from

*Excerpts from a speech delivered at a meeting of the Veteran Wireless Operators' Association at the New York World's Fair.

(Continued on page 463)

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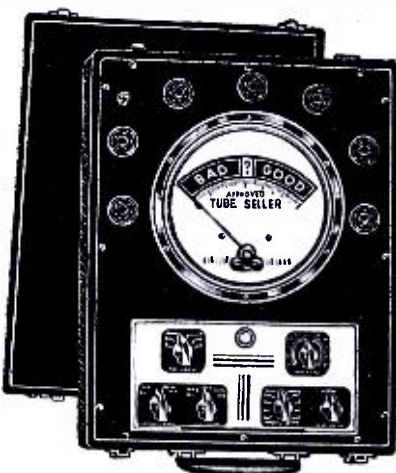
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HUGO GERNSBACH, EDITOR

H. WINFIELD SECOR, MANAGING EDITOR

Vol. X

December, 1939

No. 8

ANNOUNCEMENT

FOR many months we have noticed the increasing interest of our readers in photography. We were particularly impressed by the fact that a large percentage of advertisements in our *Barter and Exchange Department* was concerned with this great hobby. For this reason it was thought advantageous to merge FOTO-CRAFT Magazine with RADIO & TELEVISION. FOTO-CRAFT Magazine, established by this organization, has achieved considerable distinction as a photographic hobby magazine of a *constructive* type.

Inasmuch as RADIO & TELEVISION is read by technical readers, we believe that they will welcome the addition of a photographic section in the magazine.

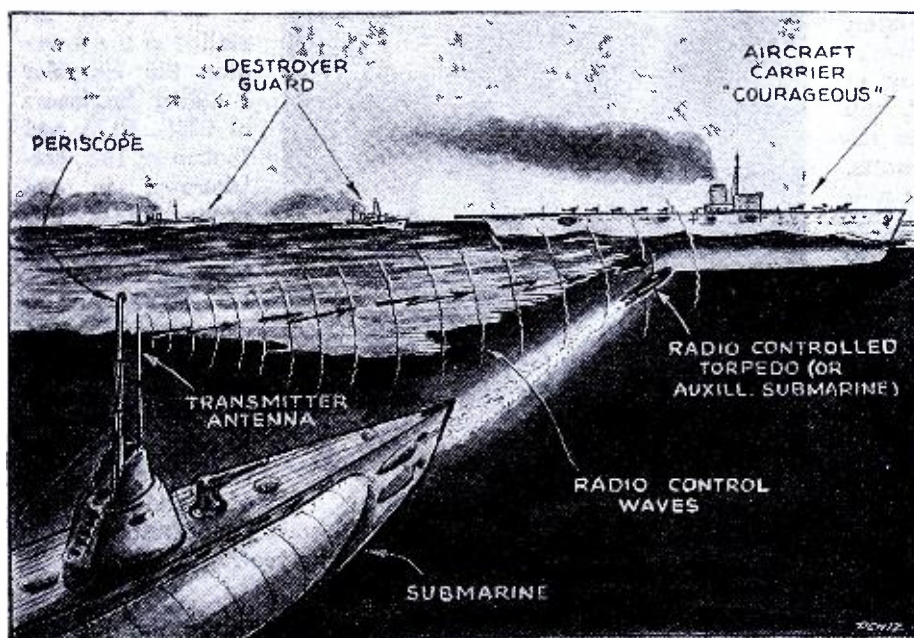
On the other hand, we are confident that the readers of

FOTO-CRAFT Magazine will derive new pleasure as well as technical education from the pages of RADIO & TELEVISION.

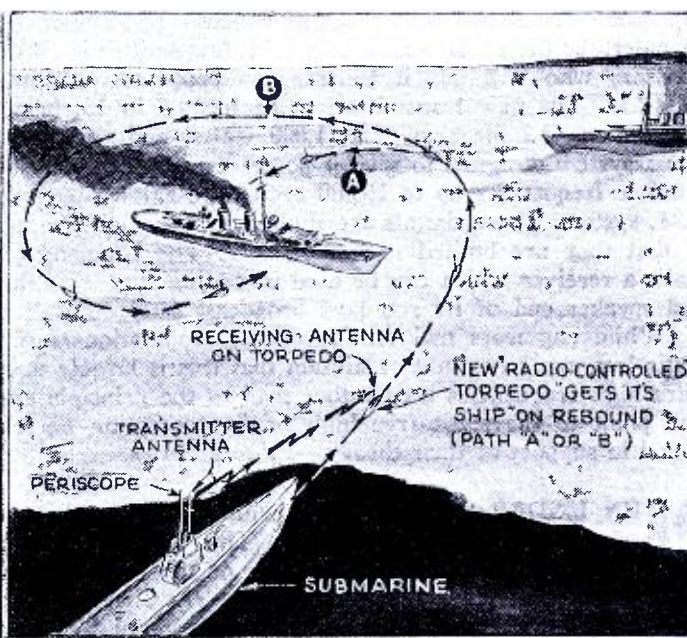
We wish to assure our readers that nothing has been taken away from RADIO & TELEVISION except that some of the departments have been condensed. The same remarks are true of FOTO-CRAFT, which remains the same as far as its editorial contents are concerned. It is our plan that, if the combination proves successful, *both sections of the magazine will be further increased in the future.*

An expression from our readers on the amalgamation of the two magazines will be greatly appreciated.

THE PUBLISHERS.



It is possible that a radio-controlled Sub destroyed the British aircraft carrier *Courageous*.



A cleverly designed radio torpedo "doubles back" to hit its target—if it should miss.

Did RADIO ROBOT SUB

H. W. Secor

Sink the "Courageous"?

● RECENTLY the German radio broadcast carried the news that the British aircraft carrier *Courageous* was sunk by a robot submarine directed by radio waves from a larger submarine lying at a distance. The German report stated that this explained how it was that the English claim to have destroyed the submarine that torpedoed the *Courageous*, and also how the German report that the submarine had returned safely to its base was true, too.

If the story of the radio-controlled robot

Radio, television and facsimile are indispensable to the military experts and their application to the problems of war increases daily.

is to be credited, then the explanation is perfectly clear—the English sank the *robot* sub, while the larger submarine, which con-

trolled the movements of the robot, scurried away to safety and its home port.

Every radio expert knows that such control of the movements of a crew-less submarine or other engines of war can be easily carried out by means of the clever relay-switching mechanisms now available. For example, it is possible to send out a series of dots and dashes which will cause the receiving mechanism to respond only when the proper combination of dots and dashes

(Continued on page 473)

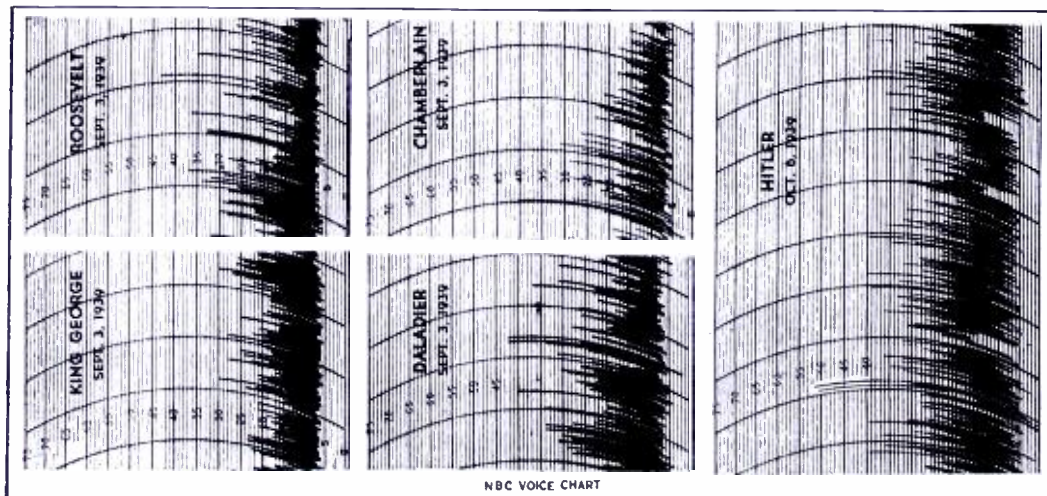
WORLD WIDE RADIO DIGEST

WAR AT PRESS TIME the war now raging in Europe appears to be even more of a "radio war" than has been previously thought. Government-operated stations in all the embroiled powers continuously feed material designed to keep up the morale of the public of its own nationals and to impair the morale of its enemies into the air. Not only this, but rumors of strange new radio devices have begun to circulate. Whispers are that radio-controlled submarines have been responsible for the sinking of mammoth British sea fighters, and it is a known fact that radio-controlled tanks and airplanes have undergone successful tests. A report has recently come out of Europe that the "secret terrible weapon" of which Chancellor Hitler boasted, is a complete radio-controlled army consisting of guns, tanks, planes, etc., none of which requires human presence to give it destructive force. Another rumor has it that the mysterious weapon is a torpedo with a television pick-up in its nose, so that it may be guided directly toward its target by remote control.

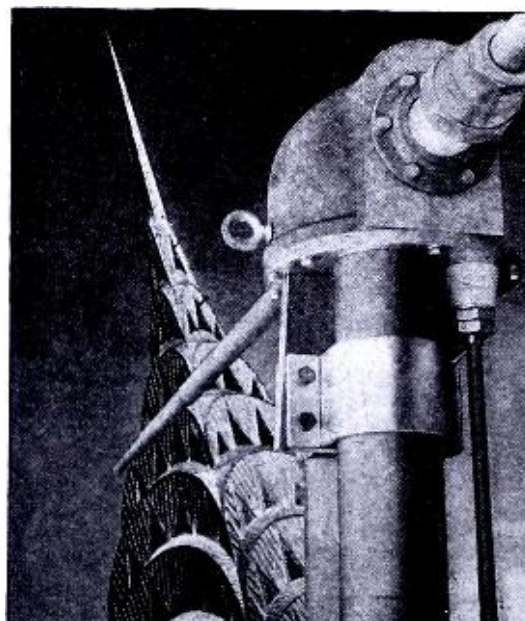
FREQUENCY MODULATION continues to attract the attention of radio stations as well as listeners, and one of the latest to undertake the construction of a F.M. transmitter is Stromberg-Carlson, who will use it to transmit programs originating at WHAM. The new transmitter, to be located in Rochester, will operate on 43.2 megacycles at 1,000 watts, and will use an antenna system designed to give it power equivalent to 4,000 watts. Audible frequencies up to 15,000 cycles are carried over the new F.M. system. These signals are similar to television transmissions in that they are limited to line-of-sight. The company plans to make a receiver which can be used in conjunction with the audio and speaker end of its standard broadcast sets.

(While engineers maintain frequency-modulation is relatively static-less, some engineers maintain that this is largely due to the ultra high frequencies used rather than to the principle employed and point to the static-free high fidelity reception of television sound in support of their theory.—*Editor*)

MEN UNDER STRAIN speak with inflections that may or may not be normally characteristic of their voices. The National Broadcasting Company has made voice graphs, as shown below, of some of the speeches delivered by world leaders. The voice pictures of King George and Premiers Chamberlain and Daladier were made on September 3rd when Britain and France declared war on Germany; that of President Roosevelt was made on the same day when he delivered his historical appeal for unity in the United States. Chancellor Hitler's graph was made on October 6th as he delivered his address to the Reichstag. The height of the recording line indicates the loudness of the voice.



NBC VOICE CHART



ANTENNAS for the Columbia Broadcasting System's television transmissions have at last been installed in the tower atop the Chrysler Building. Engineers of CBS, RCA and Isolantite, Inc., collaborated in the production of this system. A long shot view of the Chrysler Tower and a close-up of the end of one of the antennas are shown at the left. Columbia began to send out test transmissions of sound late this

Autumn and will start image tests shortly after the first of the year.

PICTURES of the top of the KDKA antenna were needed—and this was 710 feet above the photographer! There was no means of getting up to the top outside of using an airplane, and the picture had to be made. So Byron McGill got a four-inch astronomical refractor telescope with a magnifying power of 250. He focused a ground glass camera through the telescope, took the fastest possible film and made a 40th of a second exposure. The result—a swell picture of KDKA's top-most tip!

HOLLYWOOD may surpass New York as a television center, according to local Chambers of Commerce, which point to the fact that the Don Lee station there has been transmitting programs for some years and now plans an augmented schedule. The Hollywood area also claims to have more sets in use and more stars available than any other locality in the U. S.

SPORT **F**OOTBALL

pictures were first brought to the

television screen early this Autumn when a practice match was televised by the National Broadcasting Company. This proved so popular that football, at least for the time being, became a regular NBC feature: the schedule being changed—first, to have a college game on Saturday afternoons and later to provide views of professional matches on Sunday afternoons. Two pickups, as shown in the circles in the picture at the right, are used; the one in the foreground for close-ups and the one up in the press box for general views of the field. A typical scene, as it appears to the camera, is inserted.

BOXING, likewise, won a host of friends when the Baer-Nova fight was televised some months ago. This, indeed, was considered television's "high spot" by many lookers-in. After considerable difficulty in getting permission to stage additional fight telecasts, the NBC finally made arrangements with a large metropolitan sporting club to broadcast images of fights held there every Saturday night.



CONTENTED **C**OWS

may have their "faucets turned on" to the sweet strains of radio music. Now when the master of ceremonies turns to his orchestra and, with tears in his voice, says, "Geeve!" not only does the orchestra give chords, but Bossy gives curds. The midget portable set shown in use by the farmhand, right, is a Majestic; the cow is a Holstein.



CANADIAN and British "hams" have been required to shut down their stations. Within a few hours after experimental transmitting licenses were withdrawn, inspectors called at the homes of license holders and removed the apparatus. In the case of three stations which had been in existence for less than one year, the inspectors took all transmitting equipment, and in one case, made a search for spare parts. In dealing with longer established stations, only crystals, rectifiers, etc., were removed. The Government requested the operators not to replace them and go on the air. Receipts were given for all apparatus taken.

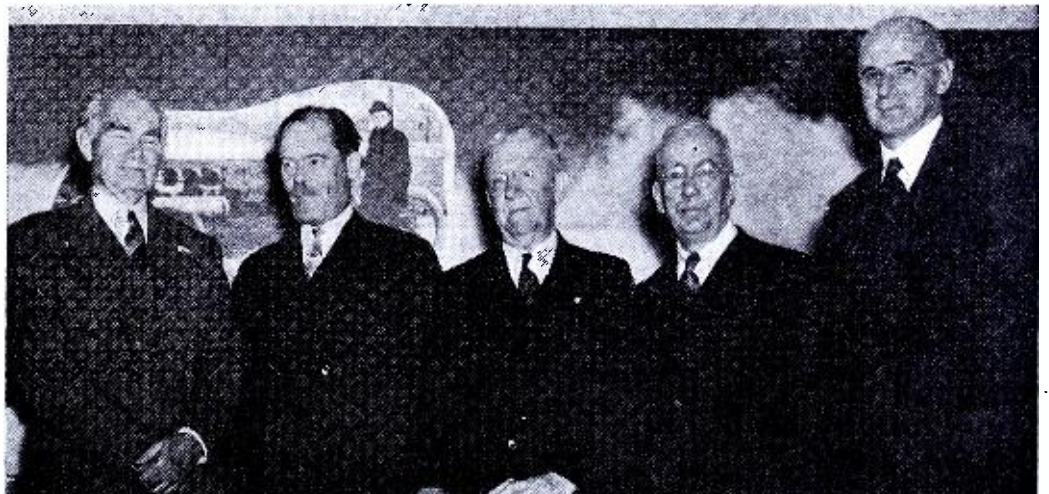
In the first World War, the Government removed not only the transmitters but also receiving equipment.

No word has yet been received as to the restrictions (if any) being imposed upon German amateurs, but one is safe in assuming that similar legislation has been put into effect in the Reich, for a lid was clamped down on *listening* some time ago, as reported on these pages.

FRANK SINGISER at WOR had a radio installed in his chicken coop. This was usually kept tuned to sweet music and the hens laid eggs with machine-gun rapidity. When the hired man changed its tune to war news, the hens went on a strike—but not, according to Frank, on a sit-down strike, unfortunately.

FIVE FAMOUS FIRSTS who gathered at the New York World's Fair on Radio Pioneers' Day. From left to right are: Dr. Lee de Forest, who first put a grid in the vacuum tube and is therefore known as the "Father of Radio", next, Dr. Ernst F. W. Alexanderson, inventor of the Alexanderson alternator and other great radio "firsts"; Major Mack Horton, United States Army, retired, inventor of the trailing antenna for airplanes, and Dr. de Forest's first chief operator; Frank Conrad of Pittsburgh, whose broadcasts so many years ago gave the radio industry its real start; and, finally, Dean Gleason L. Archer of Suffolk University, author of the first history of radio.

RADIO REFLECTIONS are caused by boundaries between hot and cold areas, according to *Science News Letter*. These "radio mirrors" are found not in the *ionosphere* but in the *troposphere* at altitudes of 6,000 to 9,000 feet. A check made by two professors of the University of West Virginia shows that a sharp temperature inversion is a large cause of reflection.



ANTI-MILITARY propaganda transmissions from a station operating on 6.185 mc. (48.5 meters) in the London area are reported by *Practical Wireless*. The authorities are taking steps to locate and seize the transmitter.

INTERNATIONAL RADIO REVIEW

New Television Production Method

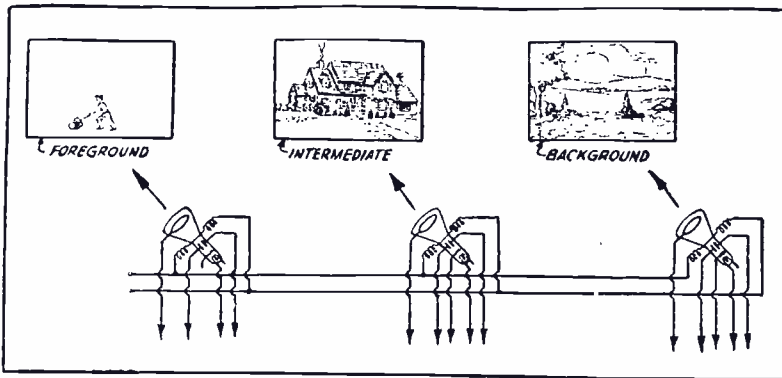


Fig. 1—Three pick-ups blend units into one television scene.

1 THE eminent American engineer, Dr. Alfred N. Goldsmith, has recently secured a U. S. patent on a system which should bring about simplified television production. In Dr. Goldsmith's new system, three separate iconoscopes are used to pick up the foreground, intermediate portion and background of a television scene. As Fig. 1 indicates, a man may be shown cutting grass in front of a large home, set against a beautiful

background. The only object that need be actually present in the studio in full size is the man. The house and background may be miniature settings or paintings, placed close to the other two iconoscopes. Each of the components to be seen is scanned separately and the three images are blended before transmission. They are transmitted as a single image, which is picked up and reproduced on the home receiver.

Anti-Interference Aerial

2 IN order to reduce interference in a received wave, a British group has patented the antenna system shown in Fig. 2, reported in *Wireless World*. The aerial, A, is placed as high as possible to get away from inductive fields and is grounded through a primary coil, L, coupled to a secondary coil, L1, and thence through a balanced transmission line, B, to the receiver at R. At the receiver, the primary of the set input transformer, L2, is protected by a grounded shield, S, and its midpoint

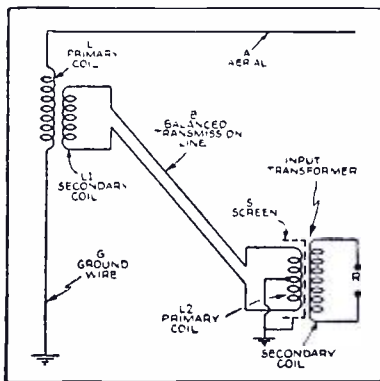


Fig. 2—Antenna cuts interference.

is also grounded. The transmission line is a twisted pair or regular transposed line, designed to match the impedance of the antenna and receiver transformers. As this line is symmetrically grounded, it need not be shielded since any inductive pick-up is automatically balanced out. Line B is to be kept as far away as possible from the ground wire G.

Large Image Tube

3 LARGE pictures from small tubes are made possible by an invention of two Englishmen who recently secured a patent which has been taken over by RCA. The small tube has a metal plate in place of the ordinary screen, and the rear of this plate is given the usual fluorescent coating. The neck of the tube projects through a parabolic mirror so that the images formed on the rear of this plate are reflected from the mirror onto a ground glass screen placed between the tube and the audience. Thus the image from the tube may be enlarged

several times by means of projection, effecting an economy in this usually costly element.

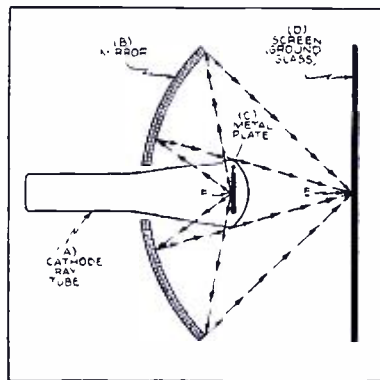


Fig. 3—Mirror lens magnifies image.

Automatic Detuner

4 WHEN a radio set is slightly detuned, interference may sometimes be eliminated. A new condenser, patented by H. J. Parrish, automatically achieves this effect. The con-

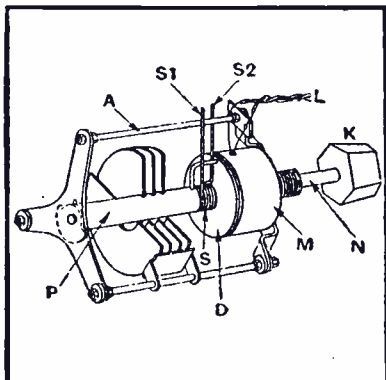


Fig. 4—Condenser detunes itself.

denser, shown in a picture from *Wireless World*, is used in the oscillator of a superhet. The normal setting of the fixed and moving plates of the condenser is as shown, and a spiral spring S, with two extensions, S1, S2, "straddling" the arm, A, tends to restore this position after any deliberate mistuning.

A pot magnet, M, is energized by the control current produced by interfering signals. If control knob, K, is

then moved to one side or other, shaft, N, is "clutched" through disc, D, to shaft, P, so that the condenser plates are moved to detune the set in the way required. To select a new station, the circuit containing the leads, L, is automatically opened by operating the main tuning control knob, thus de-energizing the magnet. At the same time the spring restores the movable plates of the condenser to their normal position.

C-R Tube Safety

5 IF the sweep voltages in a cathode-ray tube fail, the stationary spot is likely to burn the screen at the end of the tube. A re-

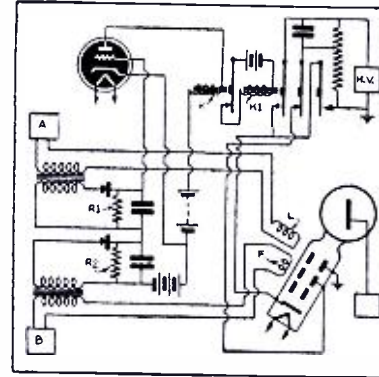


Fig. 5—Increases C-R tube safety.

cently patented circuit, recorded in *Wireless World* (English) and shown in Fig. 5, prevents this trouble. In this diagram, A and B are the generators of the scanning frequencies. These are coupled to rectifiers, R1 and R2, arranged in series with the grid of the control tube, C. Should either A or B fail, the resulting voltage drop reduces the plate current of C, opening relays, K and K1. The latter dis-

connects the high voltage supply from the high voltage rectifier, H.V., thus cutting the scanning beam.

Combination Scanner

6 A COMBINED electronic and mechanical scanning system has recently been patented by Scophony and others, as recorded in *Television and Short Wave World* (London).

In Fig. 6, S represents a two-sided mosaic-cell screen mounted inside a c-r tube. The picture to be televised is projected through lens L to the front of the screen which is being scanned by a stream of electrons from the gun G, causing it to release electrons onto a ring-anode A. The other face of the screen is scanned by a powerful light beam projected from rotating mirror-drum M and disc D, causing electrons to be liberated to a second ring-anode, A1. During the framing period, the

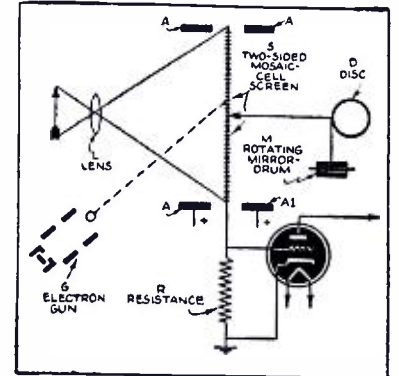


Fig. 6—Scans electro-mechanically.

mosaic cells build up a charge corresponding to each picture element of the image. The changes of potential produced during scanning develop picture signals across the resistance, R.

56 MC. Resonant Line Receiver

7 A SELF-EXCITED oscillator with a modified Gutton-Touly circuit is used in the 56 mc. resonant line receiver described by G. A. Hook (2CIL) in *The T. & R. Bulletin* (English). Tuning lines are two lengths of 3/16" soft copper tubing, each 28" long, spaced 2" apart. The ends of the tubes are bent at right angles, forming sockets for the prongs of tube V1, and condensers, C1 and C2, are located by experiment. The important filament chokes have three-section units of 17 turns of No. 28 wire, closely wound on 5/16" forms.

Grid and plate chokes are 25 turns of No. 36, spaced to 1/2". Quench coils are No. 38 on a 3-section spool 3/4" in diameter. The number of turns is: 1,000, grid; 1,500, plate; and 750 in the coupling coil. Eighty volts is used on the detector screen grid and an aluminum shield is placed between the detector, quench and output stages. Oscillation will be had with about 70 volts on the detector plate, and C1 is moved until the frequency comes within the 56 mc. band (about 17" from the tube). The set is said to be highly efficient.

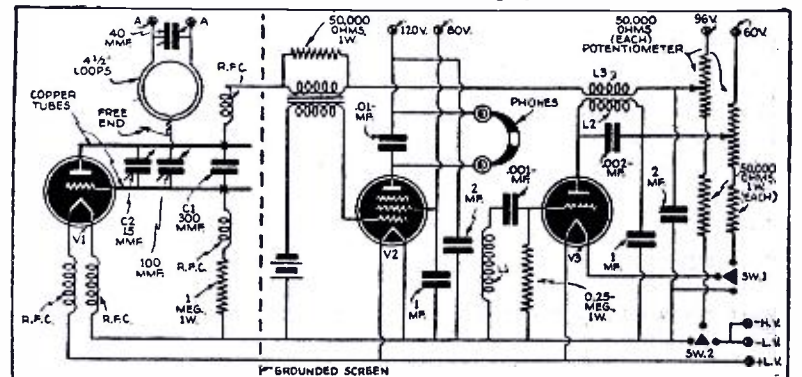


Fig. 7—British "ham's" U.S.W. receiver has many fine features.

New Calls for Short Wave Stations

The Federal Communications Commission has announced final changes in the call letters of U. S. International Short Wave stations.

| Licensee | Old Letters | New Letters |
|--|-------------|-------------|
| Chicago Federation of Labor, Chicago | W9XAA | WCBI |
| Crosley Corporation, Cincinnati | W8XAL | WLWO |
| General Electric Company, Schenectady | W2XAD | WGEA |
| General Electric Company, Schenectady | W2XAF | WGEO |
| General Electric Company, San Francisco | W6XBE | KGEI |
| Isle of Dreams Broadcasting Corporation, Miami | W4XB | WDJM |
| National Broadcasting Company, New York | W3XAL | WRCA |
| National Broadcasting Company, New York | W3XL | WNBI |
| WCAU Broadcasting Company, Philadelphia | W3XAU | WCAB |
| Westinghouse E. & M. Company, Boston | W1XK | WBOS |
| Westinghouse E. & M. Company, Pittsburgh | W8XK | WPIT |
| World Wide Broadcasting Corporation, Boston | W1XAL | WRUL |
| World Wide Broadcasting Corporation, Boston | W1XAR | WRUW |
| Columbia Broadcasting System, New York | W2XE | WCBX |

"Award of Honor" PLAQUE

Given Monthly for the Best
Amateur Station PHOTO

3rd Plaque Award Goes to
M. E. Gross, M.D., W9WQP



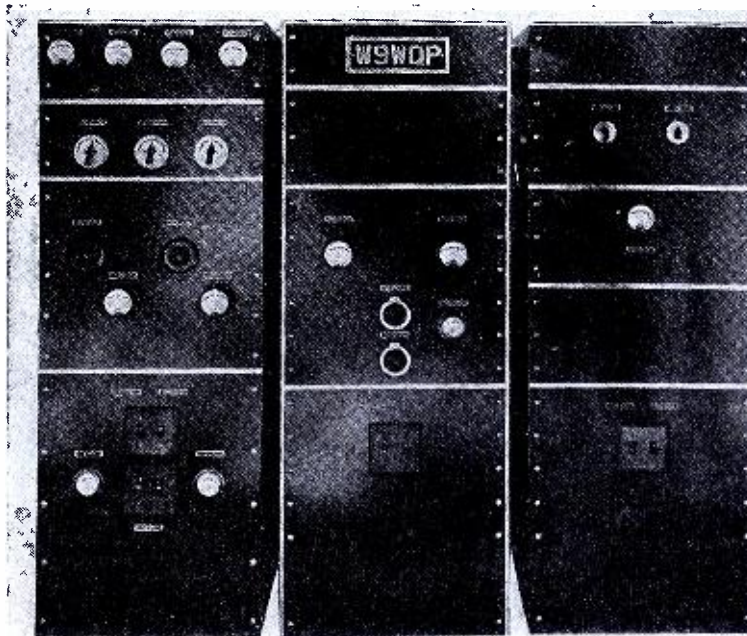
Dr. M. E. Gross in his Ham shack, operated under the call letters W9WQP, at Ladoga, Ind.

● AMATEUR Radio Station W9WQP is located in Ladoga, Ind., and is owned, built and operated by M. E. Gross, M.D.

The station was first licensed in 1936, at which time we were running a pair of 46's in the final amplifier, with 33 watts input, modulated by a pair of 42's class AB. W9WQP operates on the 160 meter phone band only. We do not operate on any other band. Amateur radio is just a hobby with us here, and we are not interested in radio in any other way.

The transmitter, since 1936, has grown to three racks and panels style, which we have built from angle iron and masonite; the masonite panels are finished in black enamel and chrome trim.

W9WQP is home-built from



Here is the superfine Ham transmitter, W9WQP, owned, built and operated by Dr. Gross. The transmitter rack is home-built from angle iron with masonite panels, finished in black enamel and chromium trim.

an Astatic 104-D microphone, to 6C6 to 6C6 pre-amplifier, transformer coupled to two 76's, transformer coupled to two 42's class AB. The speech equipment is coupled to grids of modulator tubes, which are TZ40's, through 500 ohm line. The TZ40's modulator works class B. The speech equipment and modulator have their own power supplies.

The first rack and panels contain the 47 oscillator, 46 first buffer and two 46's second buffer, and two T20's in push-pull driver stage, with their power supplies. The second rack and panels contain final amplifier and power supply, T55's in push-pull, running 250 to 300 watts input. The third rack and panels contain speech equipment, and TZ40's

modulator and their power supply. The receiver is an MC-101X and Peak pre-selector. Per cent of modulation checked by home-assembled oscilloscope. Have worked all districts in United States and several in Canada.

M. E. Gross, M.D.,
Ladoga, Ind.

Note These Important Rules

The photos must be sharp and clear and preferably not less than 5" x 7".

When you submit the photograph of your Ham station, send along a brief description not longer than 300 words, describing the general line-up of the apparatus employed, the size, type and number of tubes, the type of circuit used, name of commercial transmitter—if not home-made, watts rating of the station, whether for c.w. or phone or both, etc., also name of receiver.

State briefly the number of continents worked, the total number of stations logged or contacted, and any other features regarding the station which you think will be of general interest to the reader. Mention the type of aerial system used, especially any unique or new features about it.

Important—Don't forget to send along a good photograph of yourself, if your likeness does not already appear in the picture!

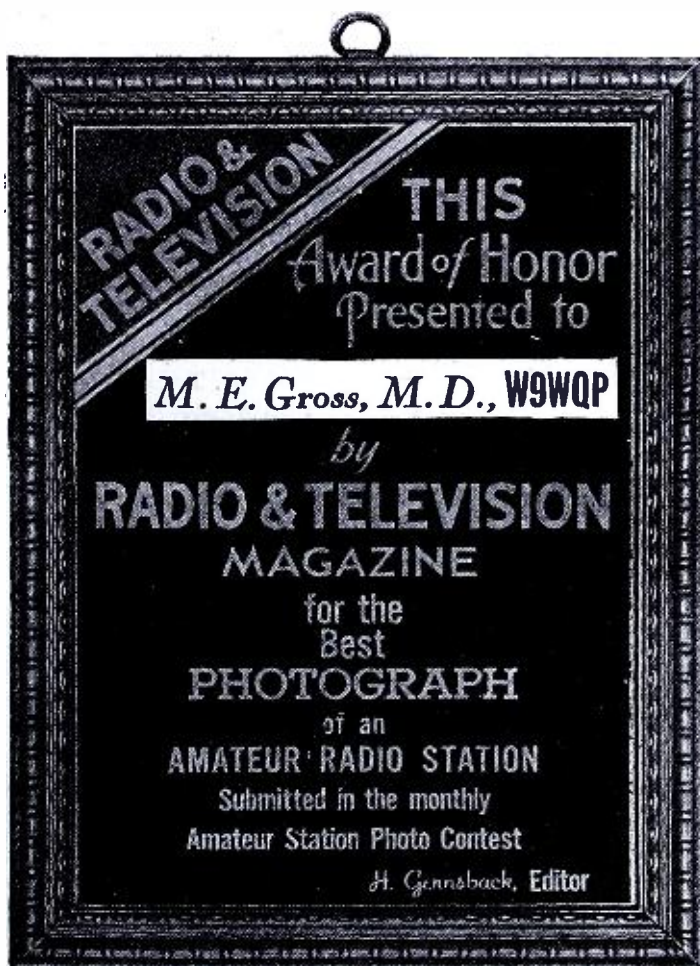
Note that you do not have to be a reader of RADIO & TELEVISION in order to enter the contest. Pack all photographs carefully and the description had best be mailed in the same package with the photos. The Editors will not be responsible for photos lost in transit.

Do not send small, foggy-looking photos because they cannot be reproduced properly in the magazine. If the picture you have or may take of your station is not thoroughly sharp and clear and at least 5" x 7", it would be best to have a commercial photographer take a picture of your station. If you cannot do this, you most probably have a friend who owns a good camera and who can arrange to take the photograph.

Address all photos and station descriptions to Editor, Ham Station Trophy Contest, c/o RADIO & TELEVISION, 99 Hudson Street, New York, N. Y.

the oscillator to final, from microphone to modulators. The line-up is as follows: 47 crystal oscillator, condenser coupled to 46 first buffer, condenser coupled to pair of 46's in parallel second buffer, link coupled to pair of T20's in push-pull, link-coupled to pair of T55's in final amplifier, which in turn is link-coupled to a 240 ft. Zeppelin antenna with 60 ft. feeders; each stage has power supply of its own.

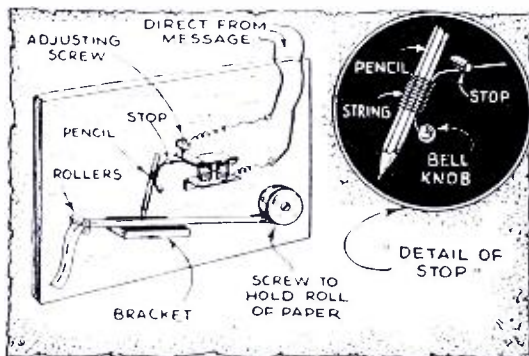
The speech equipment is



Practical Radio Ideas

Simple Code Recorder

● EVERY now and then an amateur operator wishes to try his hand at recording radio code signals. The picture herewith shows one way of accomplishing this result. The recording mechanism was made from an old electric bell. In the original suggestion, made by H. C. Reeves of Napier, N. Z., in the *Australasian Radio World*, a



A pencil or fountain pen may be used to record code signals.

soft lead pencil was used as the recording medium, the grade being either 2B or 3B. A fountain pen has been used by other experimenters.

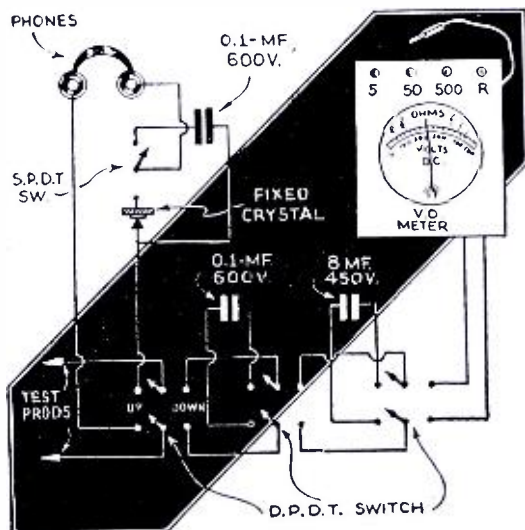
As the resistance of the ordinary bell is but a few ohms, it is best to rewind its magnets with fine wire if the recorder is to be operated directly from the receiving set, or a high resistance relay of 1000 ohms or more may be operated directly from the receiving set and the bell magnet recorder connected to the local terminals of the more sensitive relay. The paper tape should be pulled past the pencil at an even rate by clock-work or an electric motor with suitable gearing.

Handy Testing Device

● A SIMPLE trouble shooter and switching arrangement which I have been using for several years is very handy and easy to operate. Only one pair of test prods is needed for all tests, and one does not have to be plugging them in and out all the time.

Through the use of three D.P.D.T. and one S.P.D.T. toggle switches, as shown, it is possible to make the following tests and many others with the flip of a switch.

1. With all switches in the down posi-



Different tests can be made simply by throwing switches.

tion, you have a continuity tester or resistance tester, using the meter.

2. By flipping the first switch on the right up, you can use the 8 mf. for testing the filter condensers in a radio power supply.

3. By flipping the second switch from the right up, you have the .1 mf. for testing bypass condensers in a radio.

4. By flipping the third switch up, you have the use of a pair of phones which can be used to check each circuit by itself.

5. The single-pole, double-throw switch is used for changing from crystal to condenser, depending on what circuits you are working.

I have this whole arrangement mounted on a 3"x8" panel; the switching arrangement is original with me and I find it to be more handy than the plug-in system.—*Joseph Hillmann.*

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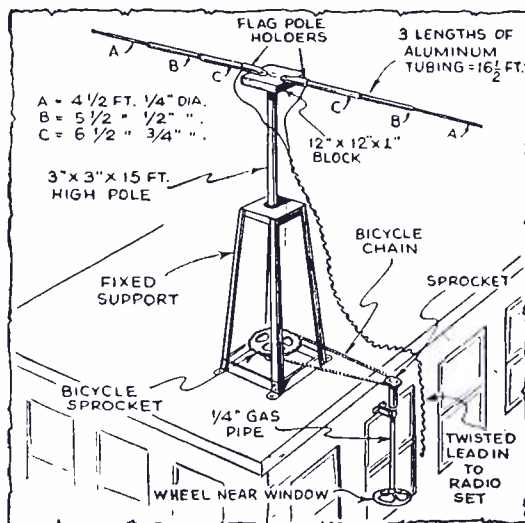
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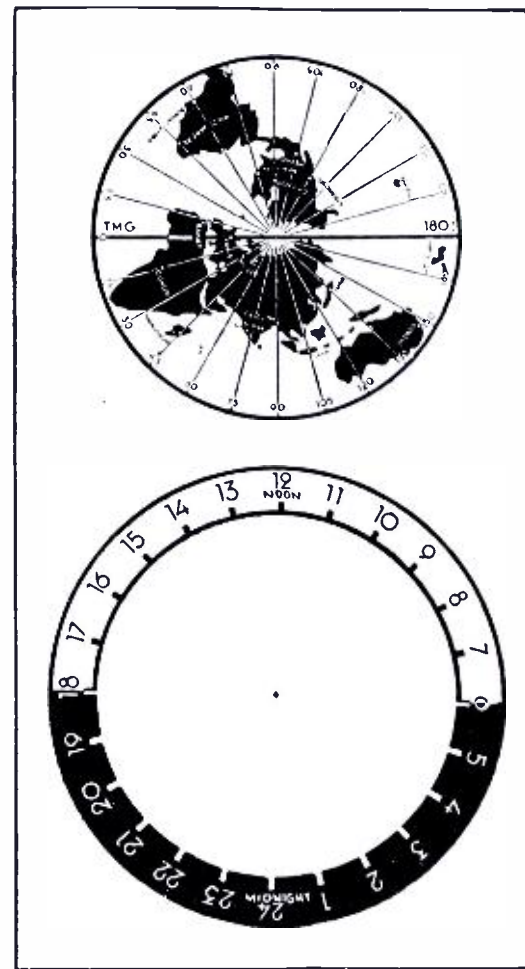
A bicycle chain rotates a "beam" nicely.

Bicycle Chain Rotates Beam

● THE accompanying sketch shows a simple method whereby a beam antenna can be quickly rotated and placed in any desired direction. Two bicycle sprocket wheels, together with the necessary length of bicycle chain, serve to mechanically link the mast supporting the beam and the control shaft. Of course, it is best to have a rigid support mounted at least one-third the way up the beam mast, provided with a collar inside which the mast can rotate; but a simpler method, using 4 guy wires to anchor the mast in position, may be used.—*G. T. Barron.*

"World Time" Indicator

● REVOLVING or sliding rule computers have been in use by radio fans the world over, but the accompanying picture shows a very novel design which just recently appeared in the French publication, *Le Haut-Parleur.*

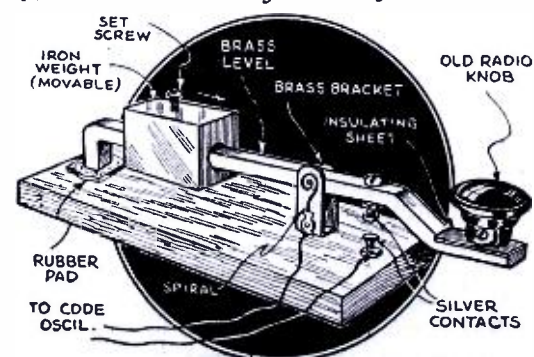


By redrawing these dials larger a fine "time chart" results.

As will be seen, the drawing of the various continents on the revolving portion makes it easy to rotate this dial to the desired position, as the geographical position you have in mind is right before you on the chart. This chart should be redrawn to a diameter of at least six inches. By putting in the fractional divisions of the hours, the device will prove most useful to every short wave listener.

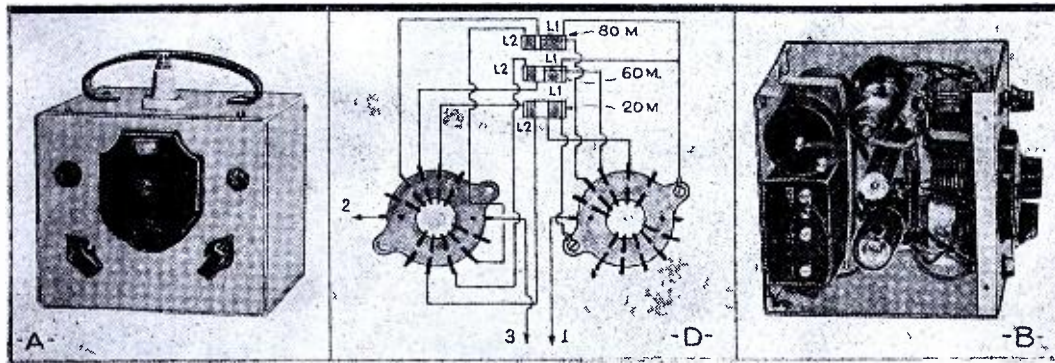
Easily-Made Key

● THE illustration shows one of the simplest imaginable practice keys. It is made from a piece of brass or other metal bar, pivoted as shown in another piece of brass bent to a U-shape. The contact screws may be faced with bits of silver, or they may be points obtained from an old bell. The sliding balance weight at the rear of the key enables the operator to set this weight at any desired point along the key lever and anchor it in place by means of the set-screw.—*Shelly Presenty.*



Simple adjustable practice key.

"Tiny Tim" Receives 'Em All



This 2-tube battery receiver makes a fine portable. Actual tests gave headphone reception across the Pacific. Set uses new 1.4 volt low drain tubes.

Left—Outside and inside views of receiver, with coil-switching scheme.

Below—Wiring diagram of 2-tube receiver, showing regenerative detector and audio amplifier.

● HERE is a 2-tube receiver which can be built in a cabinet measuring but 5" x 6" x 6" which will bring in world-wide short-wave stations on a pair of headphones. This clever little receiver, which was nicknamed "Tiny Tim" by its designer and builder, Mr. J. Ferrier, can be built at a very nominal cost. It can be operated on one 45 volt "B" battery and one 1.5 volt "A" battery, plus a small 3 volt "C" battery. Coil data to cover the usual 20, 40 and 80 meter bands is given herewith.

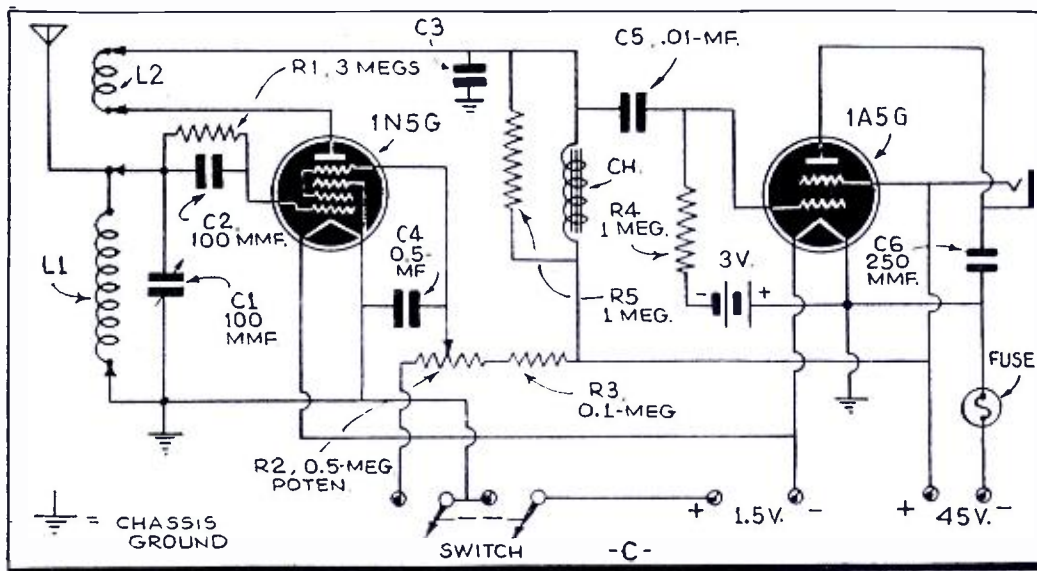
(All coils wound on 1/2" diameter forms)

| Band | L1 | L2 |
|-------|---------------------|---------------------|
| 20 m. | 12 t. No. 26 d.s.c. | 13 t. No. 28 en. |
| 40 m. | 24 t. No. 28 en. | 18 t. No. 30 d.s.c. |
| 80 m. | 46 t. No. 34 d.s.c. | 30 t. No. 38 en. |

m—meters wavelength.

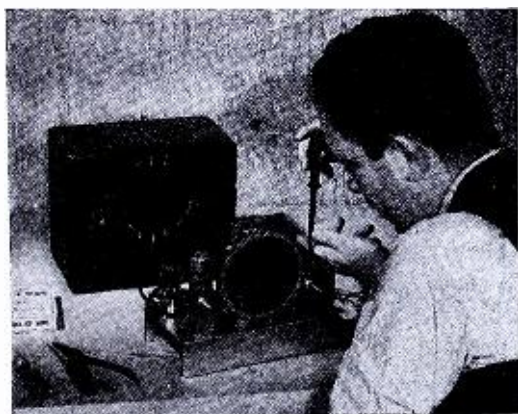
American "ham" stations have been heard in Australia on the 20-meter phone band, and Mr. Ferrier states that this little set has brought in short-wave stations in 20 countries on 20-meter phone.

(Continued on page 477)



A Four-Tuber for Learners

John T. Wilcox, W2CLS



With this kit, even the beginner can build a 4-tube receiver.

● THE receiver here described is an excellent model for anyone wishing to learn the steps in building a set, and provides instructive experience with R.F. stage operation, detector operation, resistance coupling and A.C.-D.C. line operation principles, ganged tuning, by-passing, filtering, shielding, etc. It is therefore to the student, and to the hobbyist, in the intermediate stages of training that the Lafayette kit containing all parts for construction of this little receiver has been dedicated. Not only will it provide invaluable experience and knowledge, but when completed will serve as a highly practical midget receiver for use at home. With this idea in mind a walnut cabinet complete with speaker cut-out and decorative grill has been made

available. This cabinet, shown in one of the accompanying photographs, is 10 inches long, 8 1/2 inches high and 5 3/4 inches deep.

The circuit employed is an up-to-the-minute version of T.R.F. application, utilizing the most modern advances in the art of broadcast receiver design. Basically it is quite conventional in that it does not introduce any trick circuits.

Four of the most modern tubes provide one T.R.F. stage, detector, beam-power output stage and the A.C.-D.C. power supply. The tuning elements of the R.F. and detector stages are ganged for single dial control. Gain is controlled by a potentiometer in the input circuit which simultaneously varies the amount of signal input and the sensitivity (bias) of the R.F. stage so that tremendously strong signals can be handled without overloading.

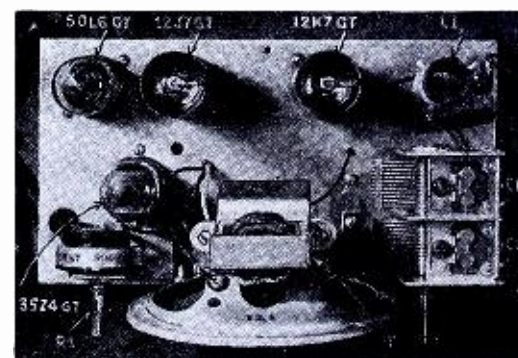
Perhaps the most novel feature of this little receiver is the selection of tubes so that the total required filament voltage, with all filaments connected in series, is just satisfied by normal line voltage without resorting to the use of a line cord or other form of series or shunt resistors. Thus the 12K7GT R.F. tube and the 12J7GT detector each requires 12 volts, the 50L6GT requires 50 volts and the 35Z4GT requires 35 volts for filament supply. Connected in series the total requirement is 109 volts and satisfactory operation is therefore obtained directly from any 115-volt line, the tube design being such that variations above or below

the exact rated values resulting from high or low line voltage, have little effect on operation.

With one side of the line, one end of the filament series, and all cathodes (directly or indirectly) "grounded" to the chassis, it is apparent that a considerable A.C. potential exists between the cathodes and filaments of some of the tubes. To avoid hum which might otherwise result from this condition, the filaments are arranged in such a way that the tube circuit which is most susceptible to hum has its filament connected to "ground" (where A.C. potential between cathode and filament is least), and the least susceptible is connected at the "high" end of the series of filaments. Thus, in the circuit diagram it is seen that the detector filament is "grounded." Then in order come the R.F. stage, output stage

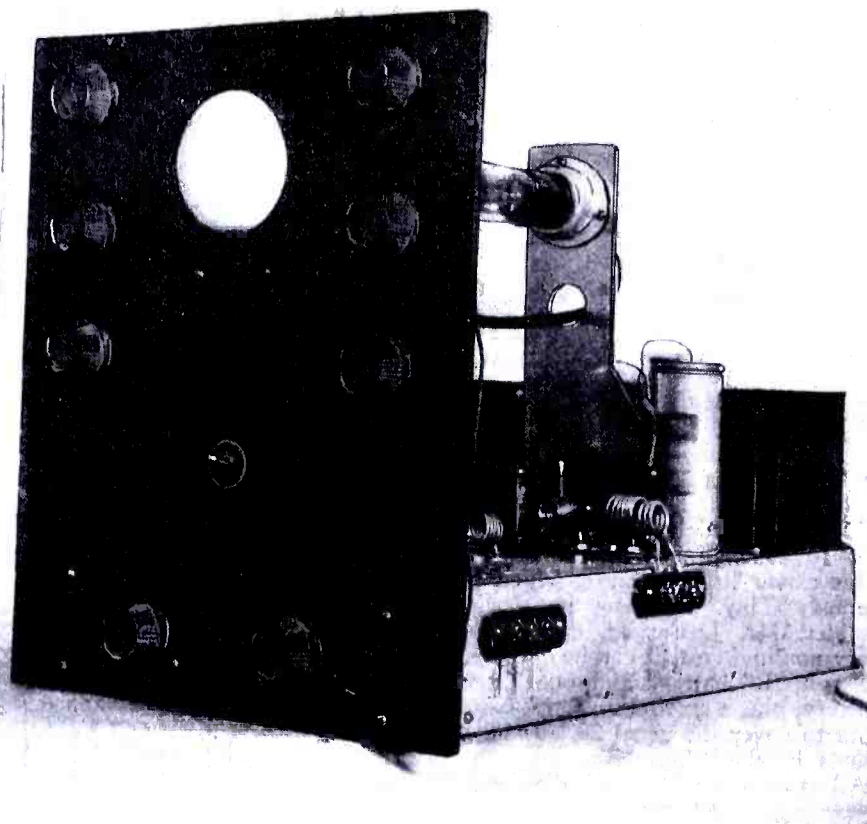
(Continued on page 472)

Top view of receiver.





Left — Doublet aerial erected at Monmouth Beach, N. J., where successful television reception with this set was obtained over a distance of 35 miles.



The completed 3" C-R tube image receiver.

To save tubes was one object of this design, using tuned radio frequency instead of a superhet circuit. New multi-vibrator sweep circuits save 3 tubes and simplify construction. Good image reception was demonstrated 35 miles away from the NBC transmitter in New York.

The 10-Tube "R & T" Television

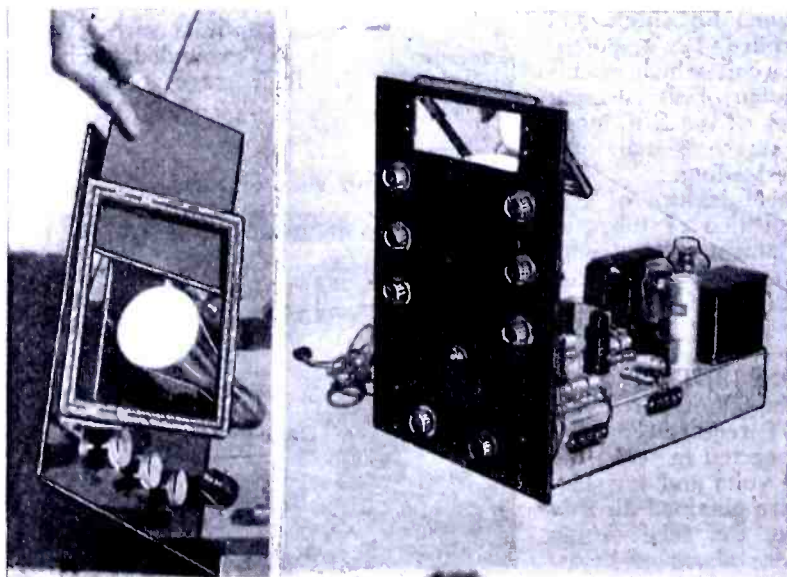
• THE television receiver illustrated is one of the lowest cost televisions which can be turned out by the amateur, experimenter or serviceman and yet produce satisfactory and reliable results. This television attachment can be made at a cost of about \$55.00 (including 3" C-R tube and 10 amplifier, oscillator, rectifier and detector tubes).

Choice of Picture Tube: In deciding upon the picture size, the 1" and 2" cathode-ray tubes were considered, but it was decided that the 3" tube was the minimum size which would be tolerable to the viewer. The author has spent enough hours viewing pro-

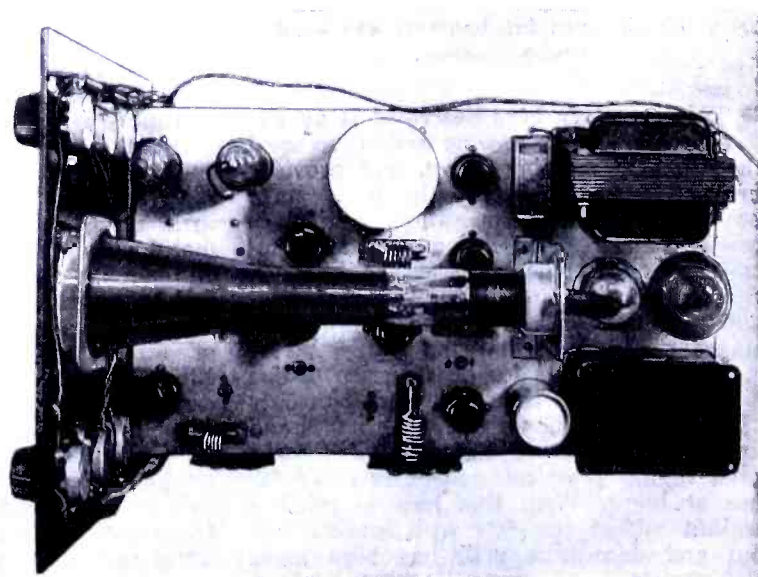
grams on green-screened tubes to be quite sure that nothing other than a *white* screen will do. Accordingly the RCA Kinescope 906-P4 3" dia. tube was chosen as the picture tube and the receiver built around this tube.

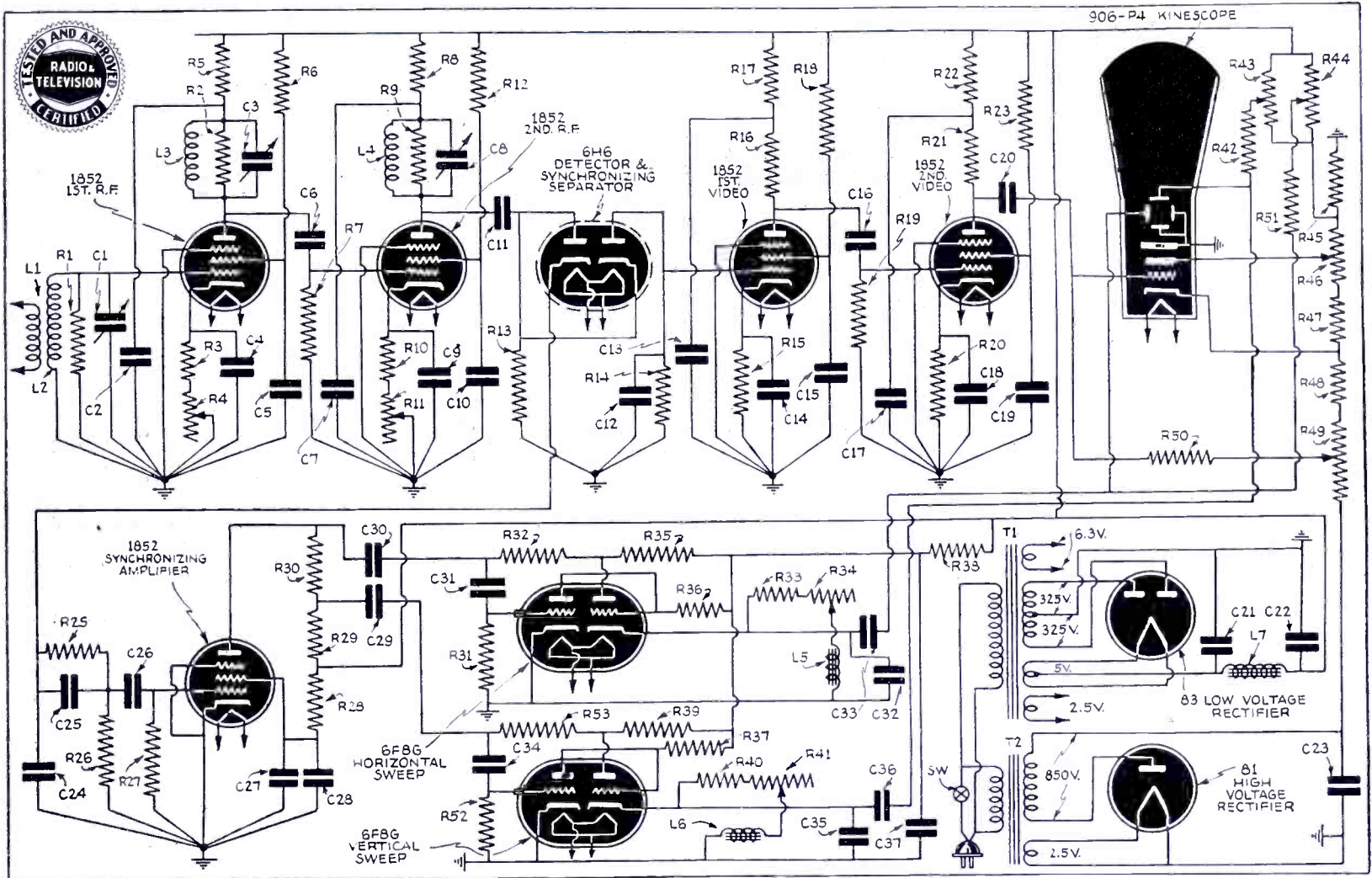
Choice of Sweeps: In the technical bulletin which accompanies the 906-P4 Kinescope there is given a circuit diagram of a synchronizing pulse amplifier, followed by suitable sweep circuits using type 884 Radiotrons as oscillators and type 6F6's as amplifiers. A power supply using two 81's is also shown. These circuits are carefully designed and very satisfactory. In the interest of

In the first model of the receiver a mirror was used to view the image on the end of the vertical C-R tube.



The final design of the T.R.F. receiver has the C-R tube mounted horizontally, as photo below shows.





Wiring diagram of 10-tube Image Receiver; sound section not shown.

Receiver



Ricardo Muniz, E.E.
Associate Member, A.I.E.E.

(Instructor of Applied Electricity at the Brooklyn Technical High School; Operator at WNYE, the Board of Education Station, on 41.1 mc.)

Assisted by Jerrier Haddad

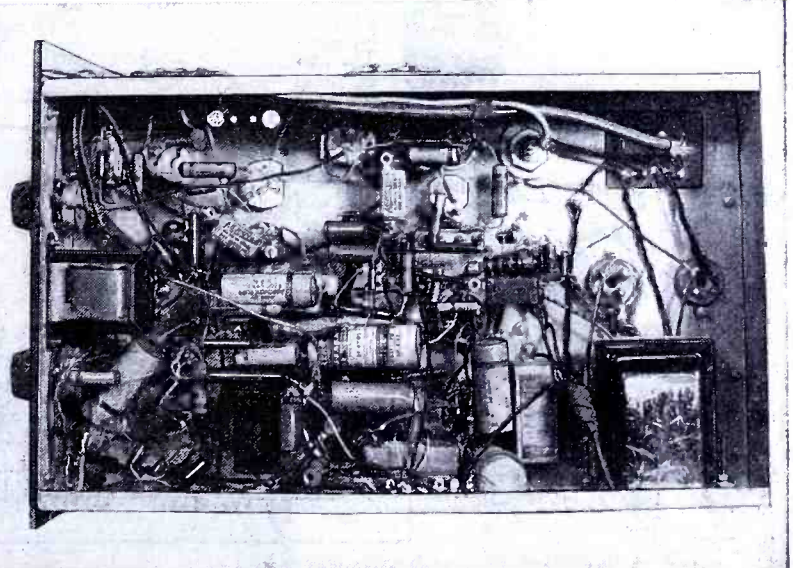
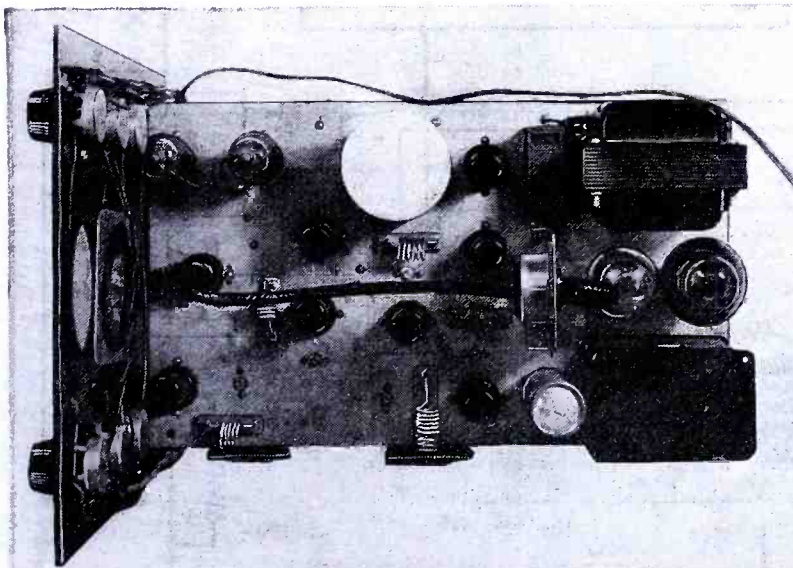
maximum economy, however, the author experimented with various other sweep circuits and power supplies. It was found that the multivibrator type of sweep circuit using two 6F8-G's as shown in the circuit diagram gave very satisfactory results, and a power supply using one 81 tube and using less filtering as shown was found to operate satisfactorily. *Three tubes are thus eliminated, in the interests of economy, from the number required in this portion of the circuit.*

Kinescope Circuit Controls: If the constants given in the parts list and the circuit shown here are followed carefully it will be

found that the aspect ratio is correct and that the vertical and horizontal oscillator frequencies can be brought into synchronism with the transmitter by using the controls provided. It will also be found that the range of the *vertical* and *horizontal* "centering" controls is ample. The chokes shown are essential to preserve linearity of the sweeps and thus prevent compression of the picture at any of its edges. If for any reason it is desired to change the sweep frequency beyond the range of the controls provided, alter the values of C32 and/or C35. To adjust the aspect ratio, alter

(Continued on page 475)

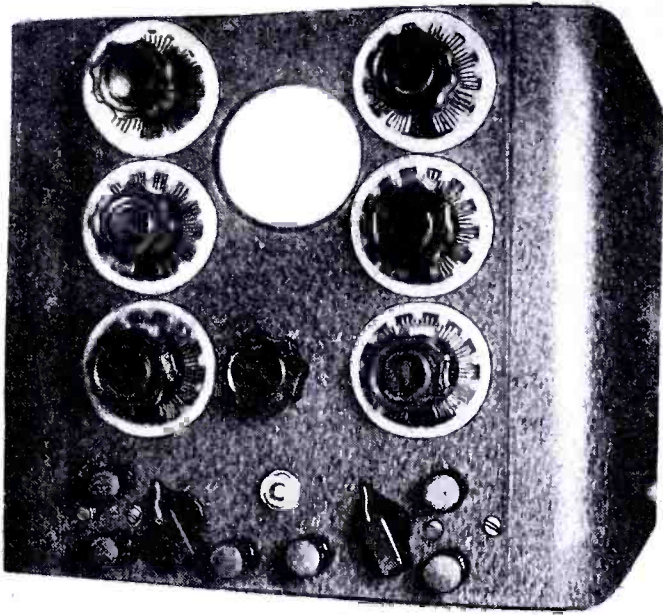
Photo at left, below, shows another top view with C-R tube removed. Right—A bottom shot.



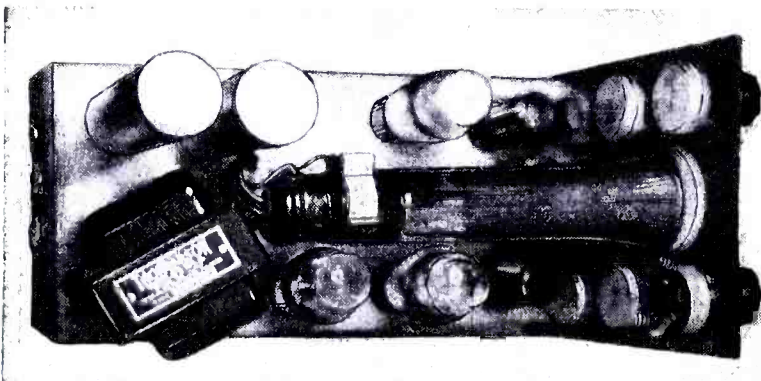
A Versatile Oscilloscope

Uses 2" C-R Tube

Herman Yellin, W2AJL



Front view of 2" Oscilloscope.



Top view of Scope—it has features of big Scopes.

Below—Diagram of Oscilloscope, using 2" dia. Cathode Ray tube.

The features usually found in much larger 'Scopes are incorporated in this low-priced job. Amplifier and power-supplies are built in. How to use it for television reception will be described later.

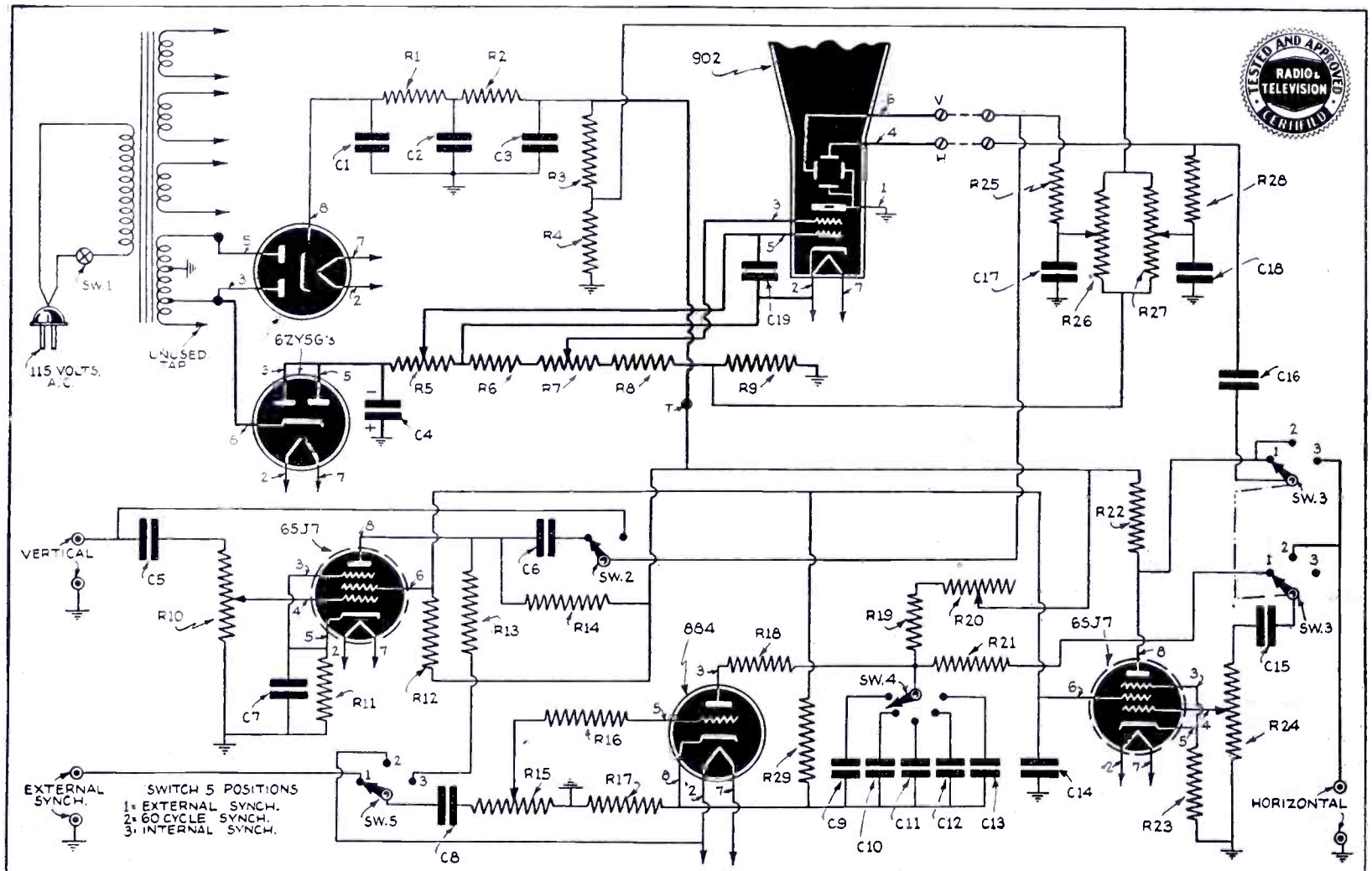
● MOST serious radio enthusiasts have, at some time or other, experienced the need for an oscilloscope. Capable of measuring and picturing many different types of wave shapes both of a recurrent and transitory type, its many advantages and capabilities are too numerous to mention.

For average use, a cathode ray tube having a diameter of two inches is just about the right size. It furnishes a large enough image for all practical purposes without the disadvantages of the complicated high voltage power supply required by the larger tubes.

Although the cathode ray tube can be used by itself without any auxiliary equipment, it is advantageous to have certain of its adjuncts built into the oscilloscope in order to facilitate the ready application of the scope to different problems.

Single Stage Amplifier Desirable

The deflection sensitivity of the type 902 C-R tube is approxi-
(Continued on page 479)



Forty Years of Radio

Lee de Forest, Ph.D.

(Continued from page 451)

friend and for able—which today brings directly to every thinking person an intimate realization of this unbelievable and monstrous thing which is engulfing our civilization.

And now once again as historian. As I try to comprehend the incomprehensible magnitude of the radio industry—in long distance communications over land and sea, in aviation, for signaling and for safety in flight and landing in a hundred novel applications in industry constantly multiplying and in broadcasting count the many tens of thousands to whom it has given new employment (directly and indirectly), consider the thousands of millions of dollars which the varied radio and tube industries have earned in the past twenty years—my memory harks back to the time when I strove vainly to interest a few wealthy college classmates in financing the development of that industry's first beginnings!

But, loving music as I did I was impelled and compelled in my early work in radio, to devote my efforts ceaselessly to the widest dissemination of music. That motive more than any other inspired my efforts from 1907 onward to develop the radio broadcast—a task which fascinated me for fifteen years. The results today achieved in bringing to untold millions all the rich treasure of music, of voice and instrument, are to me a reward more meaningful, more satisfying, more intimately my own, than all wealth.

When one seriously considers the human side of this broadcasting idea and its possibilities he must admit that it possesses potentialities for universal education, which can be compared only to that brought through the past five centuries by the art of printing. Only this new revolution will grow to maturity in another decade in that of 500 years—a graphic commentary on the acceleration of man's present progress.

And radio is having a marvelous influence on the youth of this country. An editor of a technical publication who answers thousands of replies yearly told me recently that the intelligence shown in the inquiries from young men today had demonstrated an almost unbelievable advance when compared with that of letters sent to him a few years ago. The circulation of scientific magazines is growing at an enormous rate, and general interest in science is developing tremendously in this country. The chief reason for this astonishing awakening can be quite definitely credited to radio.

It is a favorite prediction of mine that radio will make an electrical nation out of the United States, that it is bound to exercise a profound influence in keeping us the leading nation of the world. The benefits of radio will spread into countless fields of human endeavor; they will radiate to a degree which our imagination can scarcely glimpse.

And soon, all in good time, mingled with the present sounds of sweet music and their voices, we shall see, emerging from the void of night, from the empty air (or perhaps from the end of a small copper tube) the beautiful faces of those who dutifully sing, smiling down upon us from large white screens within our homes.

And interesting world events, scenes multiplied a million times so that populations in distant cities may behold as they transpire—all such promises shall be realized.

And beyond all these what other marvels, yet undreamed?

Who can say what the future of this Science of the Radio and the Electron will not unfold?

Present Conditions of European Amateurs

● FROM our Official Listening Post Observer in France, we have learned that the following restrictions have been placed on amateur radio. This is as of September 24.

France: All French amateurs received a letter from the Government notifying them that all of their licenses are suspended for the duration of the present war. The transmitters are to be "disarmed," with tubes, coils, etc., removed. The power supplies shall also be disconnected from the transmitter and from the power lines. The transmitting antennas shall be taken down.

England: All licenses are removed, not suspended as in the case of France. This includes all stations, even to the private broadcast stations, leaving just one station to serve the British public. This is being operated under the call "London W1."

Others: Amateurs in many other countries have also been removed or suspended from the air. Among these are Poland, Sweden, Latvia, Estonia, Roumania, Italy, Germany, Jugoslavia and Russia.

Our observer reports that the "hams" in Portugal, Norway, Greece and perhaps Rive, will be left on the air.

Outside Europe, all French colonies have been ordered off the air. These are Algeria, Morocco, Tunisia, French West Africa, Madagascar, Re-

(Continued on page 496)

for December, 1939

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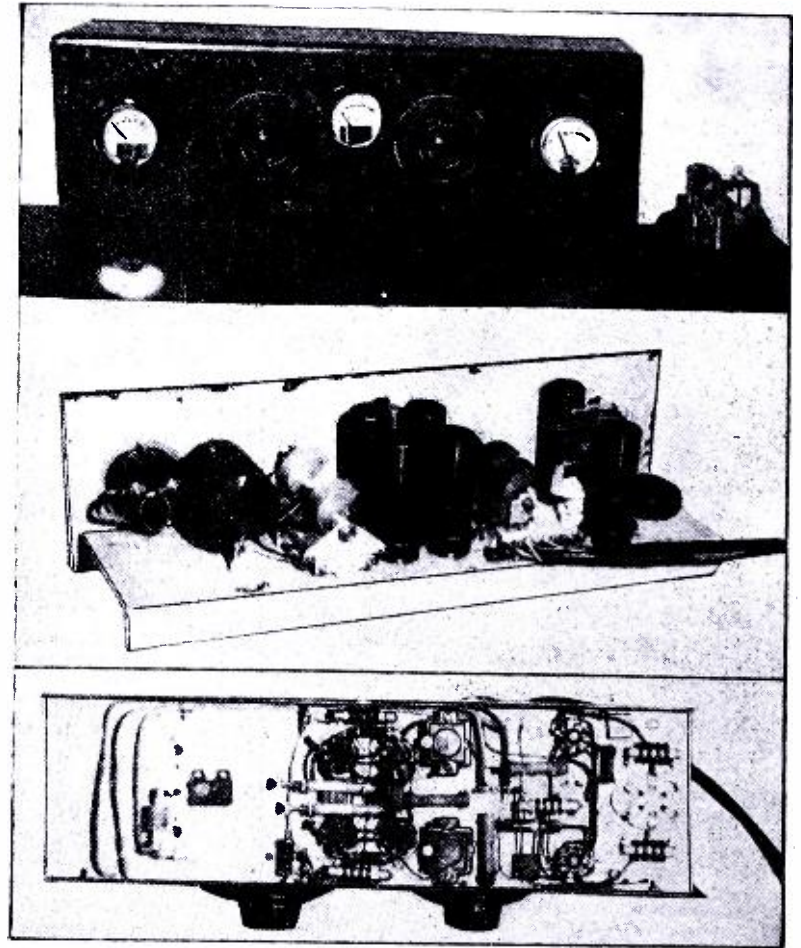
An Economical 100 Watt Xmitter for Junior HAMS

W. J. Hoffert, W5HVB

This transmitter is a dandy for new Hams—low in cost and simple to build. It uses six 6L6 tubes for oscillator and final stages, with push-pull line-up to provide greater power. Multi-band operation is provided. The adjustment of the transmitter is described.

● A COMMON need among amateurs is a good transmitter at low cost. There are plenty of commercial jobs that are really good and almost an infinite number of plans and circuits for the builder to choose from, but most of these include costly features which do not add to power output or quality of signal.

The amateur of limited means needs a transmitter with these features: (1) Sufficient power for satisfactory operation; (2)



Front, rear and bottom views of the 100-watt transmitter.

Low cost for transmitter and power supply; (3) Good signal; (4) Mechanical and electrical simplicity; (5) Stability; (6) Portability; (7) Multi-band operation; (8) Efficiency.

The transmitter to be described was designed to include these features.

To meet the first requirement it was considered necessary to have at least 100 watts output, which most hams seem to agree is sufficient to afford consistent and satisfactory contacts.

The second requirement was met without sacrificing any of the others, by taking full advantage of available tubes and component parts and by careful electrical and mechanical design. All refinements which would not contribute to efficient operation were omitted, but none of the really necessary features were slighted. That the remaining requirements were fulfilled will be evident after a study of the circuit and mechanical layout.

6L6 Tubes Used for Oscillator and Final

In designing the transmitter, the *final* stage was considered first, the object being to select a circuit and tube combination which would provide the required output for the least investment in transmitter and power supply parts. Four 6L6s in parallel push-pull were selected because they are capable of 125 watts output with a tube cost of about \$5.00. Also, 6L6s do not require a high voltage, thus effecting a further saving in the cost of the power supply.

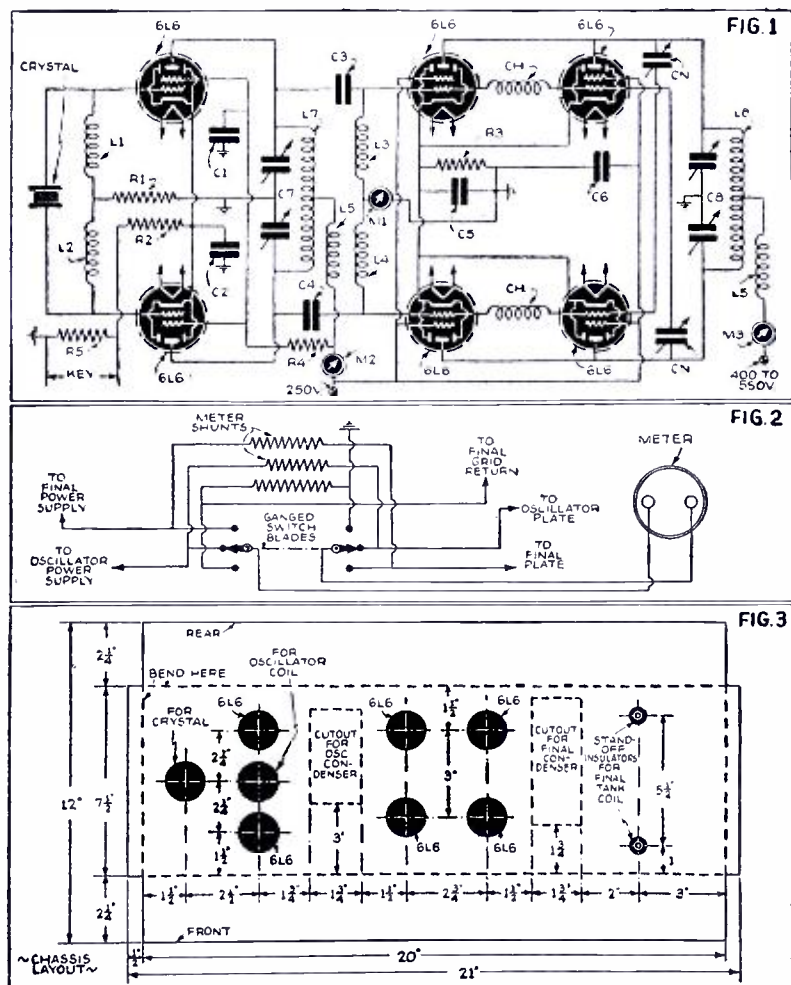
Since 6L6s were to be used in the final it seemed logical to use the same type of tube for the *oscillator*. After experimentation with 14 different combinations of oscillator circuits and tubes, an oscillator with two 6L6s in push-pull was selected because of the reliability, stability, and electrical and mechanical symmetry possible with a push-pull oscillator and final.

A keying and biasing system was chosen which affords break-in operation, prevents high voltage across the key, and protects the final from excessive plate and screen dissipation when the key is up.

Multi-band operation is accomplished by using plug-in coils and a separate crystal for each frequency. In all cases, the final is operated at the crystal frequency. This scheme was found to be the most economical. A set of coils and crystals for each of the common CW bands, 80, 40, and 20 meters, cost much less than would doubling and band-switching circuits for the same frequencies. Since there are only two stages, the transmitter can be put on any of these three bands very easily.

(Continued on page 482)

Diagram of Mr. Hoffert's transmitter.



What Do YOU Think?

A SWL Voice from England!

Editor,

I have been a listener for 2 years and in that time my brother and I have heard 110 countries on phone with 56 of them QSL'd. Among our best cards are: OQ5ZZ, CR7BH, XZ2DY, JDY, KZRM, KA1BH, VK2DI-ME-NQ-NS & 4JP. Mine include: VQ2CM, ZE1JA, XZ2EZ-JB, VS7RA-RF, VU2FQ-JG-LJ, KA1ME, VE5AHU (N.W.T.), VK3ED-4PF-6MW, K6OJL-OQE & ZL4GM. The receiver is a 6 tube S.H. and the antenna is a 60 foot dipole.

We are not allowed to send photos to neutral countries, so I have enclosed a card. I will exchange 100% with SWL's anywhere.



I have just bought September RADIO & TELEVISION, the world's best radio magazine. Joe Miller's column is my favorite, and your *World Short Wave Station* list is invaluable when listening throughout these dreary black-out nights.

I will be pleased to exchange cards, lists of QSL's received, heard, etc.

Wishing your magazine and all concerned the very best of luck and 73.

RAY SMALL, BSWL 1179,
24 The Paddocks,
Wembley Park,
Middx., England.

Sept. 12th, 1939.

An Echo from Switzerland

Editor,

I have already started work on the converter recently described in R. & T. I am very much interested in the Ham section of your magazine, as it is of great value to me.

I should like to say a word on the fearful massacre of spelling one sees on many Veri's and SWL cards. Why one can't use orthodox spelling certainly beats me. Abbreviations such as QRT, QSL, QSBX, etc., are perfectly all right, but ones like 4, U, Ur, Mni, etc., are dreadful. I do not for one instant suppose that I can do anything about it, but most of my friends agree with me; it really doesn't take any longer to write.

I was interested in Ian Porter's letter in which he says that SWL cards cost him \$4.00. Here I have to pay \$5.00 per 200.

I have had very good luck with the Ham bands over here. I have VAC and 54 countries in 3 months. My log-book totals up 473 stations. I have sent cards to about 150, and I have already received 80 veris. I am hardly troubled by QRM except by the vacuum cleaner and the electric heating. I will gladly exchange cards with anybody.

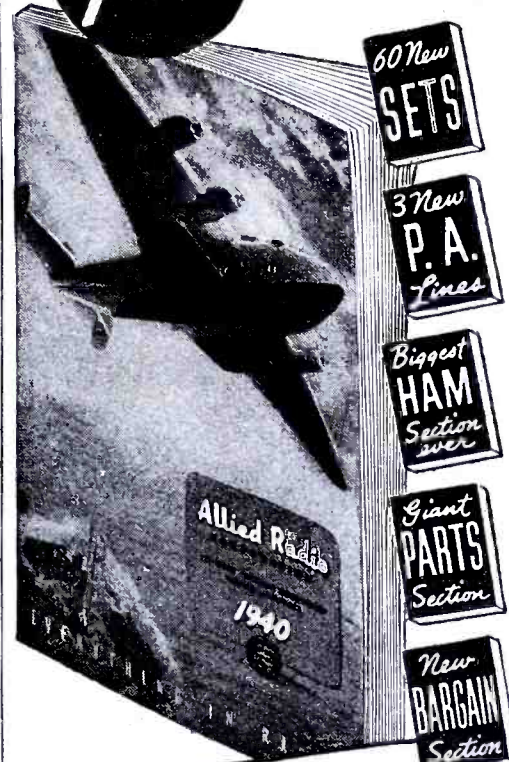
Wishing your fine magazine best of luck.

R. R. LONGYEAR,
Les Chatillons,
Genthod,
Geneva, Switzerland.

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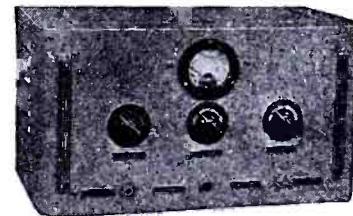
This "Ham" Will Answer All CWL Cards

Editor,

I have just read a letter by Allan Murphy concerning reports for CW hams. I heartily agree with Mr. Murphy and wish to be one of the first to volunteer to answer all CWL cards that check with my log book. Besides getting more cards on the CW bands, there are a lot more DX stations to be found there. Whenever I have sent cards to CW hams, I received about 90% results. My own "rig" is on 14380, 14320, and the corresponding frequencies on 7 mc. amateur band. I wish to thank Mr. Murphy for his idea and give him my 73 (best regards) and best luck when he takes his exam.

GILBERT B. DEVEY, W8RTU,
1305 Greensburg Ave.,
East McKeesport, Penna.
(Continued on page 467)

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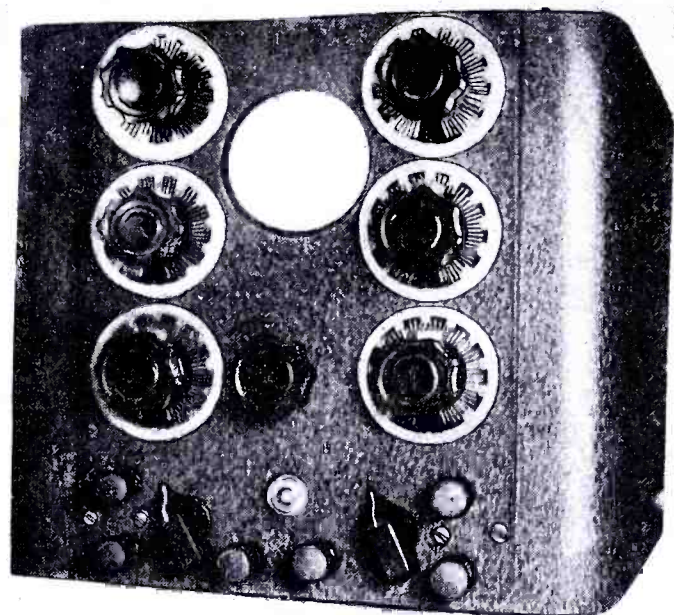
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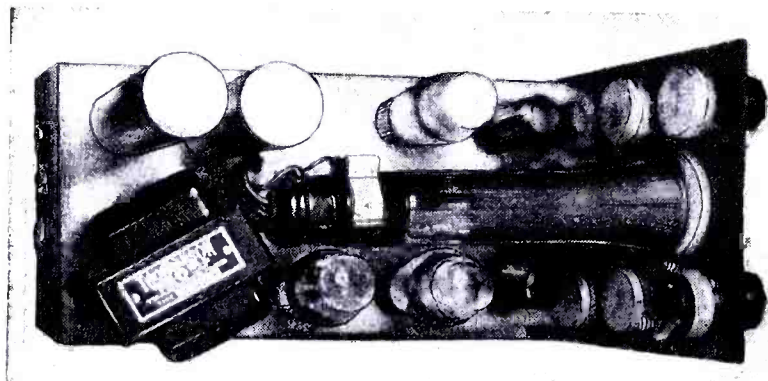
A Versatile Oscilloscope

Uses 2" C-R Tube

Herman Yellin, W2AJL



Front view of 2" Oscilloscope.



Top view of Scope—it has features of big Scopes.

The features usually found in much larger 'Scopes are incorporated in this low-priced job. Amplifier and power-supplies are built in. How to use it for television reception will be described later.

● MOST serious radio enthusiasts have, at some time or other, experienced the need for an oscilloscope. Capable of measuring and picturing many different types of wave shapes both of a recurrent and transitory type, its many advantages and capabilities are too numerous to mention.

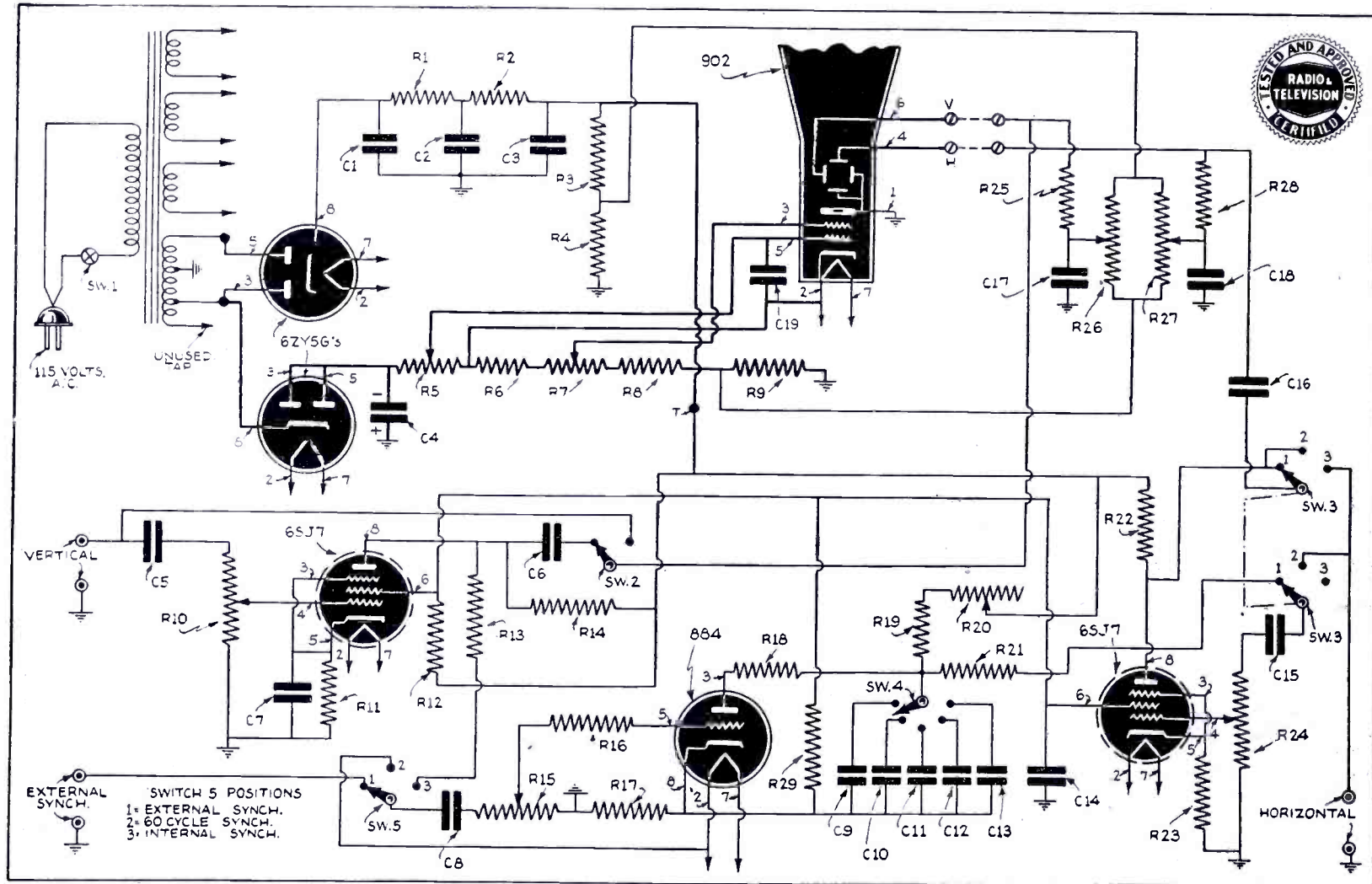
For average use, a cathode ray tube having a diameter of two inches is just about the right size. It furnishes a large enough image for all practical purposes without the disadvantages of the complicated high voltage power supply required by the larger tubes.

Although the cathode ray tube can be used by itself without any auxiliary equipment, it is advantageous to have certain of its adjuncts built into the oscilloscope in order to facilitate the ready application of the scope to different problems.

Single Stage Amplifier Desirable

The deflection sensitivity of the type 902 C-R tube is approxi-
(Continued on page 479)

Below—Diagram of Oscilloscope, using 2" dia. Cathode Ray tube.



Forty Years of Radio

Lee de Forest, Ph.D.

(Continued from page 451)

friend and foe alike—which today brings directly to every thinking person an intimate realization of this unbelievable and monstrous thing which is engulfing our civilization.

And now once again as historian: As I try to comprehend the incomprehensible magnitude of the radio industry—in long distance communications, over land and sea, in aviation, for signalling and for safety in flight and landing, in a hundred novel applications in industry, constantly multiplying, and in broadcasting count the many tens of thousands to whom it has given new employment (directly and indirectly); consider the thousands of millions of dollars which the varied radio and tube industries have earned in the past twenty years—my memory harks back to the time when I strove vainly to interest a few wealthy college classmates in financing the development of that industry's first beginnings!

But, loving music as I did, I was impelled and compelled, in my early work in radio, to devote my efforts ceaselessly to the widest dissemination of music. That motive more than any other inspired my efforts from 1907 onward to develop the radio broadcast, a task which fascinated me for fifteen years. The results today achieved in bringing to untold millions all the rich treasures of music, of voice and instrument, are to me a reward more meaningful, more satisfying, more intimately my own, than all wealth.

When one seriously considers the human side of this broadcasting idea and its possibilities, he must admit that it possesses potentialities for universal education, which can be compared only to that brought through the past five centuries by the art of printing. Only this new revolution will grow to maturity in another decade instead of 500 years—a graphic commentary on the acceleration of man's present progress.

And radio is having a marvelous influence on the youth of this country. An editor of a technical publication who answers thousands of replies yearly told me recently that the intelligence shown in the inquiries from young men today had demonstrated an almost unbelievable advance when compared with that of letters sent to him a few years ago. The circulation of scientific magazines is growing at an enormous rate, and general interest in science is developing tremendously in this country. The chief reason for this astonishing awakening can be quite definitely credited to radio.

It is a favorite prediction of mine that radio will make an electrical nation out of the United States, that it is bound to exercise a profound influence in keeping us the leading nation of the world. The benefits of radio will spread into countless fields of human endeavor; they will radiate to a degree which our imagination can scarcely glimpse.

And soon, all in good time, mingled with the present sounds of sweet music and their voices, we shall see, emerging from the void of night, from the empty air (or perhaps from the end of a small copper tube) the beautiful faces of those who distantly sing, smiling down upon us from large white screens within our homes.

And interesting world events, scenes multiplied a million times—so that populations in distant cities may behold as they transpire—all such promises shall be realized.

And beyond all these what other marvels, yet undreamed?

Who can say what the future of this Science of the Radio and the Electron will not unfold?

Present Conditions of European Amateurs

● FROM our Official Listening Post Observer in France, we have learned that the following restrictions have been placed on amateur radio. This is as of September 24.

France: All French amateurs received a letter from the Government notifying them that all of their licenses are *suspended* for the duration of the present war. The transmitters are to be "disarmed," with tubes, coils, etc., removed. The power supplies shall also be disconnected from the transmitter and from the power lines. The transmitting antennas shall be taken down.

England: All licenses are removed, not suspended as in the case of France. This includes all stations, even to the private broadcast stations, leaving just one station to serve the British public. This is being operated under the call "London W1."

Others: Amateurs in many other countries have also been removed or suspended from the air. Among these are *Poland, Sweden, Latvia, Estonia, Bourmanca, Italy, Germany, Jugoslavia* and *Russia*.

Our observer reports that the "hams" in *Portugal, Norway, Greece* and perhaps *Eire*, will be left on the air.

Outside Europe, all French colonies have been ordered off the air. These are *Algeria, Morocco, Tunisia, French West Africa, Madagascar, Re-*

(Continued on page 496)

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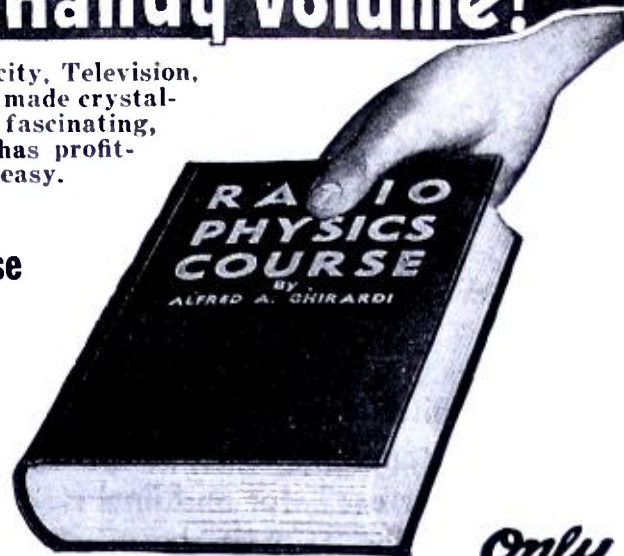
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Radio Kinks

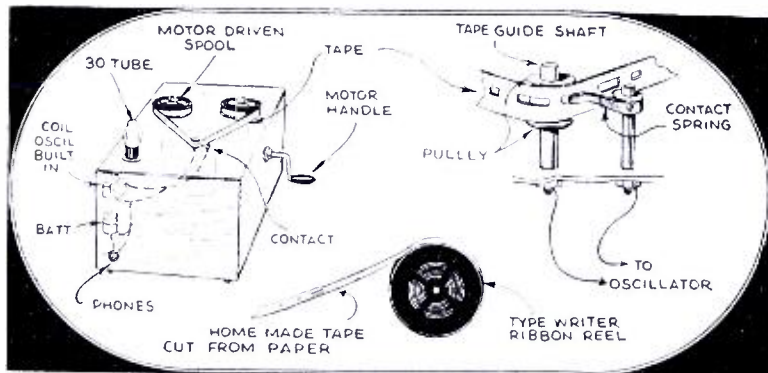
Each month the Editor will award a 2 years' subscription for the best kink submitted. All other kinks published will be awarded eight months' subscriptions to RADIO & TELEVISION. Read these kinks; they will be of real use to you, besides indicating what is wanted. Send a typewritten or ink description with sketch of your favorite to the Kink Editor

Automatic Code Machine

First Prize Winner

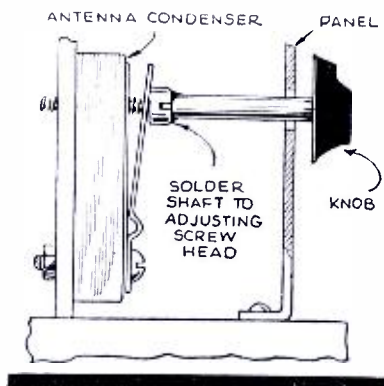
If you have a phono motor, you can easily convert it into a machine for automatically transmitting code for practice purposes. The accompanying diagram shows how this is done. The motor, with the turntable removed, is mounted in a convenient box just large enough to house it, together with an oscillator or buzzer. An old typewriter spool is placed on the turntable shaft to act as take-

up, and a free pulley is provided to serve as one contact, while an arm is mounted nearby to serve as the other. The tapes are home-made, being cut from paper with a razor blade and wound on old discarded typewriter ribbon spools each of which will hold about 20 to 50 sentences. The detail of the contacts is not critical so long as the arm is rounded in order to avoid tearing the paper.—*A. H. Jones.*



Tuning Semi-Fixed Condensers

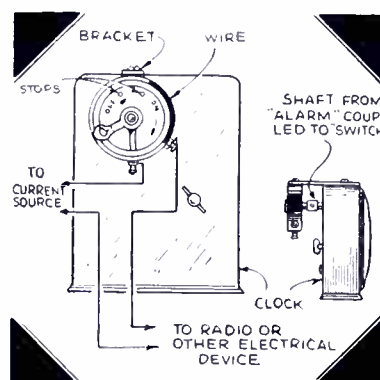
When you want to tune a mica antenna coupling condenser from the front of the panel, just solder a shaft onto the set-screw on the condenser. Then it can be mounted on the panel, a knob put on the shaft and you are all ready to go. As the difference between prices of mica and air-tuned condensers is quite great, this is a good kink for the experimenter who cannot afford to spend much money.—*Jefferson Boyce.*



Radio Time Switch

A switch to turn your radio on at a predetermined hour can easily be made from an old rheostat and an alarm clock. Re-

move the resistance wire from the rheostat and rewind it with heavy bare copper wire, as illustrated. Then file a slot in the end of the shaft to receive the

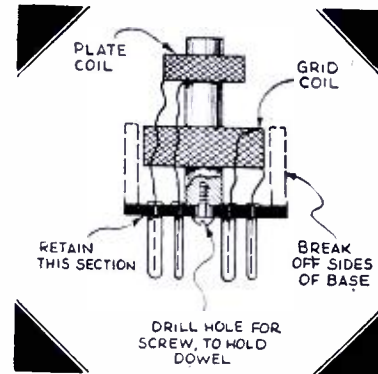


key of the alarm wind in the clock. Mount the rheostat in such a way that when the alarm goes off, it will turn the shaft of the rheostat.

There are two holes for pegs on the back of the rheostat, and if a peg is placed in the hole marked "ON," the clock will turn the radio set or other device on when the alarm sounds. If the peg is placed on the hole marked "OFF," the rheostat will revolve until the arm is free from the wire and the set will be turned off.—*John C. Larson.*

Commercial Type Coil

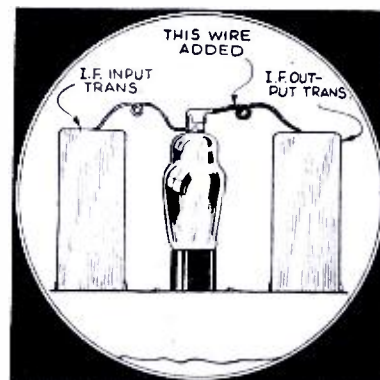
My receiver is a little 4-tube affair using plug-in coils and, while winding a set of them, I found that I did not have a form big enough for the broadcast band. So I took an old tube base and a dowel type antenna coil from the junk box. I broke the sides of the tube base off until it was flat and then drilled a $\frac{1}{8}$ " hole in the middle of the tube base bottom. I then got a



bolt that would fit the threads of the coil form and mounted it with the plate coil going to the plate and one of the filament prongs, the secondary going to the grid and the other filament prong of the tube base.—*Howard Young.*

Beat Note On Super

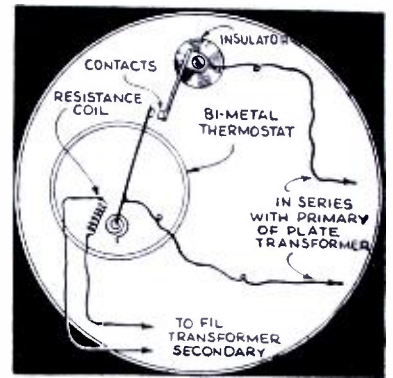
Here is a kink for obtaining a beat note on a superhet to aid in receiving code signals. This is accomplished at no expense and little or no effort, simply by connecting one end of about No. 24 D.C.C. wire to the control grid of the I.F. tube at the cap and pushing the other end down inside the output I.F. transformer until regeneration is obtained. The wire should be adjusted so as to obtain regeneration without motorboating. This connection can only be used when receiving code. When wanting to hear phone stations, simply pull the wire out of the I.F. transformer, as it can be easily replaced. Tone of signal is varied by turning main tuning condenser across code signal till it gives



desired tone. A regeneration control could be incorporated in the cathode circuit if desired.—*Robert E. Lloyd.*

Time Delay Relay

So that the plate voltage will automatically turn on some time after the filament voltage has

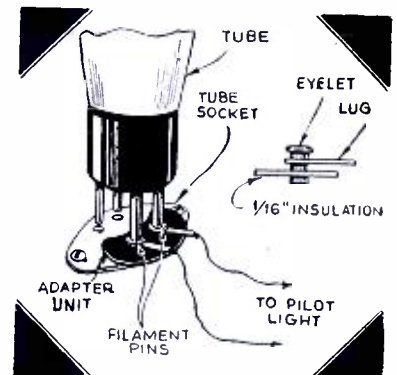


been applied, the device shown in the accompanying sketch was built. Parts required are a ten-cent store thermometer of the bi-metal type, a two-inch length of resistance wire, such as sold in the same store for use in electric toasters, a standoff insulator, and a pair of silver contacts.

When the line switch of the set is turned on, the heater element connected across a winding of the filament transformer becomes warm, causing the arm of the thermometer to move until the contact in series with plate transformer is closed. This turns on the plate voltage. Of course, it is necessary to use separate filament and plate transformers in this particular system. The arm of the standoff insulator may be adjusted to afford any degree of time delay.—*Bill Curran.*

Pilot Light Adapter

Here is a novel way to connect a pilot lamp or dial eliminator to the filament supply. Ob-



tain a sheet of insulating material about 2" square, drill two $\frac{1}{8}$ " holes so that the filament pins of the tube will slide into them. Cut the material to form a half moon, then pin two lugs over the holes with brass eyelets. This simple adapter may then be placed between the tube and the socket and can be used to supply a pilot bulb flashlight when inspecting the wiring of the set.—*Liam O'Keeffe.*

Proud of His V.A.C. Certificate

Editor,

Herewith a photo of my "listening post." I use a Hallicrafter Sky Champion receiver and have verified 30 countries and all continents, as you can see by the handsome V.A.C. certificates (awarded me by R&T) on the wall of which I am very proud. I



Doug White in his listening den.

have only been reading R&T for a few months and sure think it is the best Radio Magazine. I enjoy "On The Ham Bands" and "Let's Listen In" best; especially the QSL cards which are reproduced. I would be pleased to answer all SWL cards and will swap shack photos 100%.

DOUG WHITE, 6513-18 N. E.,
Seattle, Wash.

We Helped Him Learn Trade

Editor,

I have been reading RADIO & TELEVISION magazine for a year now, and I enjoy every bit of it. The "Let's Listen In" department is fine; as a matter of fact I have found all of the magazine interesting, and it has helped me a lot in learning the radio servicing trade.

I have built a few of the sets from your magazine, and I had excellent results with all of them. I had such good results with the *Two-tube Doerle* receiver that I thought I would pass it on to you. Here are the countries I tuned in on the loud-speaker: England, Mexico, Central and South America, Cuba, Canada, and the United States. These were all short-wave broadcasting stations. I also had good luck with the amateur SW bands. The set was changed slightly; I use a 57 as an electron-coupled detector and a 2A5 in Class A for the output.

I would like very much to see more sets like the S.W.&T. Communications Receiver, designed by Mr. Shuart and described in the August 1937 issue.

Wishing the "gang" and the editors of RADIO & TELEVISION best of 73.

ERNEST W. LANG,
438 23rd South,
Seattle, Washington

Likes the 1- and 2-Tube Receiver Circuits

Editor,

I wish to compliment you on your fine work done on the September issue. Boy, when I saw those swell 1- and 2-tube receiving set circuits was I glad! I think that more of these kinds of circuits will help you win more friends, besides the many you already have.

DONALD NELSON, 138 Johnson Ave.,
Dumont, N. J.



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Single signal to **HIGH FIDELITY**

HIGH SENSITIVITY in a communications receiver is only usable when the proper degree of selectivity is also available. If selectivity is not sufficient, no amount of sensitivity will permit satisfactory reception. Here, the new Series 200 "Super-Pro" stands supreme. The extremely high sensitivity available in the "Super-Pro" is always usable because of the continuously variable selectivity characteristics. The I.F. band width control varies the selectivity from approximately 3 kc. to 16 kc.; in addition to this feature, the variable selectivity crystal filter permits the selectivity to be varied from 2 1/2 kc. down to better than 100 cycles. The operator can adjust the selectivity of the new "Super-Pro" to a point where interference is reduced sufficiently to permit reception of the desired signal. This optimum point of selectivity permits the greatest possible fidelity without interference. The selectivity of the I.F. amplifier in the new "Super-Pro" is varied by mechanically changing the coupling between the primary and secondary of the I.F. transformers. This method provides a smooth control of selectivity.

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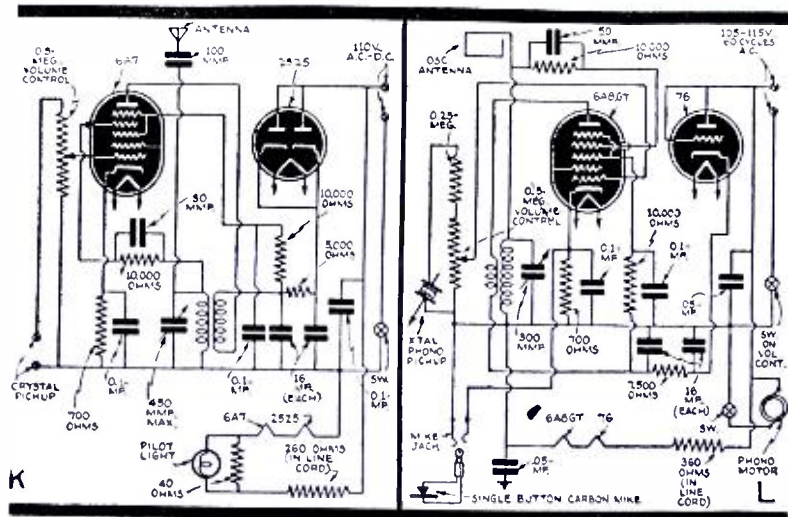
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Question Box

Wireless Record Players

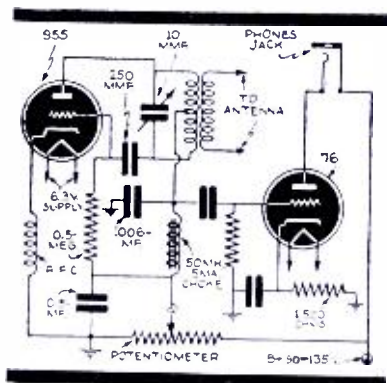
? Since wireless record players were recently announced, could you print a diagram or two of any makes of wireless players that may be constructed by the average radio experimenter? I am informed that they are not very difficult to build.—J. K. Morehouse, Schenectady, N. Y.

A. The two diagrams shown herewith illustrate two different types of wireless record players. One is the *Knight* and the other the *Lafayette*. As complete data is given in each diagram, the



Hook-ups of two wireless record players. (No. 1201)

experimenter should have no trouble in the construction of either. It will be noticed in the diagram of the *Lafayette* wireless player (see L) that a radiator is connected to the oscillator coil. This is used as an antenna and will give satisfactory results, especially if this radiator is included in the power line cord.



Super-regenerative 2 1/2 meter receiver. (No. 1202)

A. Here is a circuit diagram which is self-explanatory. Super-regeneration is secured by means of a blocking grid-leak condenser system. An R.F. choke is sometimes necessary in the cathode circuit to secure super-regeneration. For earphone operation the audio stage uses impedance coupling as shown. If loud-speaker operation is desired, it would be best to use a 41 pentode. For super-regeneration control a potentiometer of 200,000 ohms is employed. Insufficient detector plate voltage will result in audio howl.

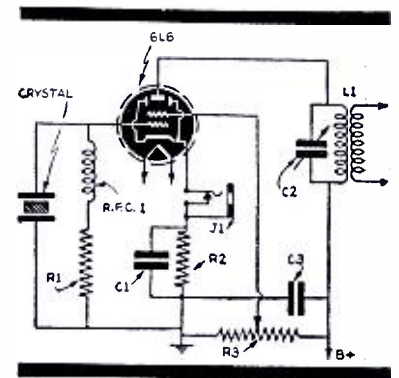
Facsimile Printer Data

? After reading an article in one of your late issues on facsimile, I became very much interested and have decided to get one of the kits and assemble it myself. Now, what I would like to know is, can you show by diagram how I may connect such a printer to my present eight-tube super in order that I may be able to receive the facsimile programs as broadcast from the broadcasting stations sending facsimile programs?—Lawrence McPhilbin, Bronx, N. Y.

A. Complete data together with a diagram showing how such a printer may be used in conjunction with your present receiver was published in the June, 1939, issue of RADIO & TELEVISION. Write our circulation department requesting them to send you a copy of this issue; enclose 25 cents.

6L6 Crystal Oscillator

? I am rebuilding my transmitter and am planning to use a 6L6 in a crystal-controlled oscillator stage. Could an oscillator circuit be published showing how such a tube can be used, with the necessary constants?—K. L. M., Los Angeles, Cal.



Crystal-controlled 6L6 as oscillator. (No. 1203)

A. A diagram of a 6L6 in a crystal-controlled oscillator stage is shown here. The values of the parts are as follows:
C1—.01 mf.
C2—100 mmf.
C3—.01 mf.
R1—100,000 ohms
R2—200 ohms
R3—20,000 ohms, 50 watt
RFC1—2.5 mh., 125 ma.
J1—Single circuit closing jack

Wants Good Antenna

? In looking over many of the magazines I have failed to find an antenna suitable for use in the U.H.F. bands. I would like to know if you could provide an antenna layout or some data to which I could refer on the subject.—Harold Mann, Newark, N. J.

A. There are any number of different type antennas that can be employed for use on the U.H.F. bands. Of course it is advisable to install an antenna that is expressly designed for use on these bands. One such type antenna was shown in diagram No. 1184, which appeared in the Question Box in the June, 1939, issue.

Locating Noise

? Somewhere in our vicinity we are being troubled with noise, evidently coming from a leaky street lighting transformer, or from some nearby loose electrical connection. Can an ordinary battery-operated portable or battery-operated receiver be used as a noise locator to help in determining its origin?—Paul Finkley, Wichita, Kansas.

A. If you undertake the task yourself, almost any type of portable or mobile radio receiver will suffice as a noise locator. As you approach the source of disturbance the noise level will increase in the receiver, and of course will decrease as you move away. If an auto radio receiver is employed as the noise locator then the AVC action should be temporarily grounded. This is best done by grounding the AVC bias line to the chassis. A simple battery-operated receiver will serve very nicely. No matter what type of receiver is employed, a pair of headphones and a vertical rod antenna should be used. The volume control should be turned up only far enough to bring the noise in within the range of audibility. As the source of noise is approached, the noise level should be turned back so that the noise is always at a comparatively low level. In this manner one may definitely establish the source of noise.

Reducing Voltage

? I have a 750 volt power transformer and now would like to reduce it so I may use it in my receiver, which only needs a transformer providing 400 volts. Can it be done?—Leon Cope-land, Brooklyn, N. Y.

A. If you wish to sacrifice the filament windings on this transformer you could use a small step-down transformer ahead of the 750 volt unit. Or a resistor of the proper value (as determined by the current used) may be connected in series with the primary or secondary of the transformer. However, it would not only be best, but more economical to purchase an entirely new transformer for your specific need.

SHORT WAVE LEAGUE

DX on the HAM Bands

Edited by Elmer R. Fuller

Ten Best DX Catches

| Observer | Call | Distance |
|---------------------|-------|----------|
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| Burns E. Hegler | PK4KS | 11,900 |
| Dick Mannheimer | PK4MM | 11,900 |
| Major Lester | PK3WI | 11,800 |
| Edward Lendzioszek | PK1WI | 11,700 |
| Edward Lendzioszek | KA7EF | 11,600 |
| Burns E. Hegler | PK1TM | 11,600 |
| Roy Matthews | CO2WM | 11,500 |
| Edward C. Slaughter | PK4RM | 11,300 |
| William Dean Noyes | ZS6AJ | 10,800 |

● AT last, one of our observers has reached the ultimate in DX, as far as distance is concerned. Major Lester, observer for Florida, reports hearing PK4KS on 14.23 mc. at R4-S6. This station is on the island of Sumatra, and is approximately halfway around the earth from Major Lester, or 12,400 miles. This is the first time that one of our observers has reported a station at that distance.

Now that the war seems to be on in earnest, we see that many of our good DX stations are being taken "off the map." From our observer in Ontario, Canada, it is learned that the Canadian amateurs have not only been ordered off the air, but have been ordered to tear down their rigs so that there will be no possibility of their being used. From this we can see that it will probably be some time before we hear from the Canadian hams again.

We are sorry to hear from our observers in England and France that it will not be possible for them to send us further reports until after the European war is over. The hams in both of these countries are now off the air, and this has one advantage: the Scandinavian countries have been coming in and with very good signals. Also, ES5D in Esthonia has been heard by several of our observers. A few German and Russian stations have been heard, but it is doubted if these are legal stations. They sound like bootleg calls and are probably not in the locations which they disclose.

During November, thanks to "Ama-Touring" and the IDA, there will be two special transmissions from YL2CD at Riga, Latvia. These will be on November 12 and November 19, from 10 to 10:10 a.m. The frequency used both times will be 28.08 mc.

We have some information which we have gathered in regard to some of the stations and it should be of help to you. Most of it has been furnished by Robert Hatcher of Richmond, Virginia.

ALGERIA—FA3JY, 14.09, sends picture card (yellow and blue).

BAKER ISLAND—KF6PUL, heard on 28.4 in the afternoon. Will QSL.

BOLIVIA—CP1BA heard on several occasions but will not QSL.

BURMA—XZ2DX—very rare—QSL'ed after two reports and a long letter were sent to him.

CANARY ISLE—EA8AE and EA8AS—heard often and with good signals but will not QSL.

CANTON ISLE—KF6DHW, on 14.3, heard usually at night, will QSL. Send reports to Charles Calley, Department of Interior, Honolulu, Hawaii. He uses a black and white card with picture.

CHOSEN—J8CG, on 14.32, early a.m., says that he will QSL.

GUATEMALA—TG9BA and TG9JG will verify but TG9AA will not.

ISLE OF MAN—G5CZ verifies with a green and white card. Is now probably off the air.

ICELAND—TF3C will not verify reports.

JAPAN—The Japanese quite often will be found to verify reports sent to them. The following are known to QSL: J2MI, J2KG, J5CC, J7CR, J2QN, J2JJ sends a black card with bright red letters on it. J2QN used a white card with red and blue letters and a picture of his shack on it. J3CX also states that he will QSL.

MALTA—ZB1L sent his card, but only after ZB1R had a hand in it. This seems to be a very hard station to verify.

JAVA—PK2AY—uses a flashy QSL card.

LITHUANIA—Send out a very pretty card in four colors. It shows a picture of the world and the Lithuanian flag. Also sends a picture of his shack.

TAHITI—FO8AA—heard calling W6's and testing quite often. Does not QSL.

U.S.S.R. (Russia)—U9AV on CW sends a letter saying that he cannot use QSL cards and cannot use phone over there. He says, however, that the SWL's over there can send out reports and QSL with others outside Russia.

Our observers were active last month, and a brief summary of their reports follows:

From Asia, we had 8 stations reported by our observers.

From Africa, 21 stations' sigs reached the U. S. Fifteen North American stations were heard by our observers, and 37 U. S. hams were picked up in Western Australia.

The South Americans were well received, too, as 33 were heard by U. S. observers.

Europeans continued to come in, despite the war, 6 good catches being had last month.

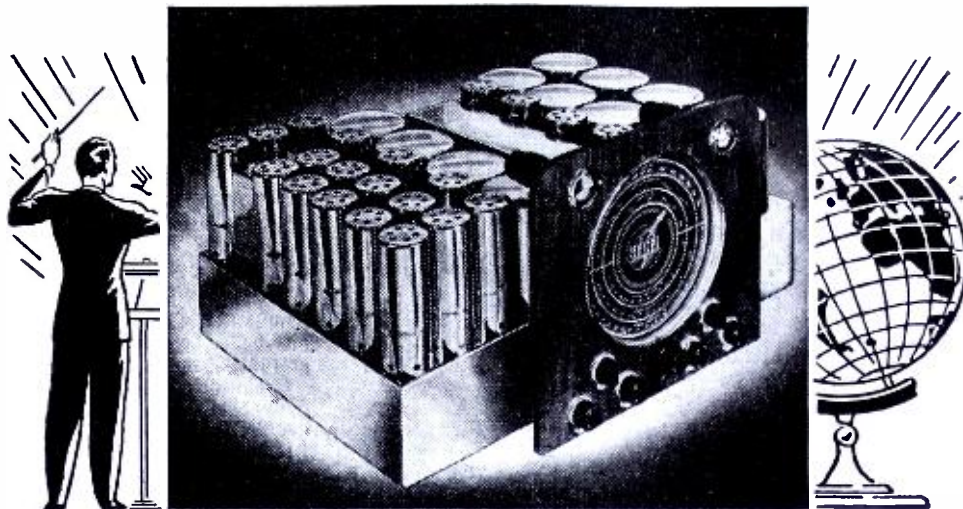
Finally, Oceania provided the largest list, with 45 stations received.

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Complete List of SW
Broadcast Stations

Reports on station changes are appreciated.

| Mc. | Call | Station | Mc. | Call | Station | Mc. | Call | Station |
|--------|-------|---|-------------------------------|-------|---|-------------------------------|-------|---|
| 42.020 | VK2MA | SYDNEY, AUSTRALIA., 7.14 m. Addr. Amal. Wireless Ltd., 47 York St. Daily 1-7 am. | 21.570 | WCBX | NEW YORK CITY, 13.91 m. Addr. CBS, 485 Madison Ave. 8 am.-12.30 pm. | 17.755 | ZBW5 | HONGKONG, CHINA, 16.9 m., Addr. P.O. Box 200. Dly. 11.30 pm.-1.15 am., 5-10 am., Sat. 9 pm.-1.30 am., Sun. 5-9.30 am. Operates irreg. |
| 31.600 | W1XKA | BOSTON, MASS., 9.494 m., Addr. Westinghouse Co. Daily 6 am.-1 am., Sun. 8 am.-1 am. Relays WBZ. | 21.565 | DJJ | BERLIN, GERMANY, 13.92 m., Addr. Broadcasting House. Irreg. | End of Broadcast Band | | |
| 31.600 | W1XKB | SPRINGFIELD, MASS., 9.494 m., Addr. Westinghouse Co. Daily 6 am.-1 am., Sun. 8 am.-1 am. Relays WBZ. | 21.550 | GST | DAVENTRY, ENG., 13.92 m., Addr. (B.B.C., London) 5.42-10.15 am. | 17.310 | W2Y7B | HICKSVILLE, L. I., N. Y., 17.33 m., Addr. Press Wireless, Box 296. Tests 9.30-11.30 am. except Sat. and Sun. |
| 31.600 | W3XEY | BALTIMORE, MD., 9.494 m., Relays WFBR 4 pm-12 m. | 21.540 | WPIT | PITTSBURGH, PA., 13.93 m., Addr. Grant Bldg. Relays KDKA 5:30-8 am. | 17.280 | FZE8 | DJIBOUTI, FRENCH SOMALI-LAND, 17.36 m. Test XMSN 1st Thurs. each month 8-8.30 am. Next B.C.S. Oct. 5 & Nov. 2. |
| 31.600 | W2XDV | NEW YORK CITY, 9.494 m., Addr. Col. Broad. System, 485 Madison Ave. Daily 6-11 pm.; Sat. and Sun. 1:30-6, 7-10 pm. | 21.530 | GSJ | DAVENTRY, ENG., 13.93 m., Addr. (See 21.550 mc.) 5.42 am.-12 n. | 15.550 | CO9XX | TUINICU, ORIENTE, CUBA, 19.29 m., Addr. Frank Jones, Central Tuinicu, Tuinicu, Santa Clara. Broadcasts irregularly evenings. |
| 31.600 | W9XHW | MINNEAPOLIS, MINN., 9.494 m. Relays WCCO 9 am.-12.30 am. | 21.520 | WCAB | PHILA., PA., 13.94 m., Addr. Col. Broad. Syst., 485 Madison Ave., N. Y. C. 12 n. to 3.45 pm., exc. Sat. | 15.510 | XOZ | CHENG TU, CHINA, 19.34 m. Daily 9.45-10.30 am. |
| 31.600 | W3XKA | PHILADELPHIA, PA., 9.494 m., Addr. NBC. Relays KYW 9 am.-10 pm. | 21.510 | 2RO16 | ROME, ITALY. 13.94 m. 9-9.55 am., irregularly. | 15.370 | HAS3 | BUDAPEST, HUNGARY, 19.52 m., Addr. Radiolabor, Gyali Ut 22. Sun. 9-10 am. Daily 8-9 pm. |
| 31.600 | W5XAU | OKLAHOMA CITY, 9.494 m., Sun. 12 n-1 pm., 6-7 pm. Irregular other times. | 21.500 | WGEA | SCHENECTADY, N. Y., 13.95 m., General Electric Co., 8-11 am. | 15.360 | DZG | ZEESEN, GERMANY, 19.53 m., Addr. Reichspostzenstralamt. Tests irregularly. |
| 31.600 | W9XUY | OMAHA, NEBR., 9.494 m. No sked. known. | 21.480 | PHI3 | HUIZEN, HOLLAND, 13.96 m., Addr. N. V. Philips, Hilversum. Irregular, 6.10-9.35 am. | 15.360 | — | BERNE, SWITZERLAND, 19.53 m. Irreg. 6.45-7.45 pm. |
| 31.600 | W4XCA | MEMPHIS, TENN., 9.494 m., Addr. Memphis Commercial Appeal. Relays WMC. 10 am.-6 pm. | 21.470 | GSH | DAVENTRY, ENG., 13.97 m. (See 21.550 mc.) 5.42 am.-12 n. | 19 Met. Broadcast Band | | |
| 31.600 | W8XAI | ROCHESTER, N. Y., 9.494 m., Addr. Stromberg Carlson Co. Relays WHAM 7:30-12.05 am. | 21.460 | WRUL | BOSTON, MASS., 13.98 m., Addr. University Club. 10 am.-12 n. Except Sat. and Sunday. | 15.340 | DJR | BERLIN, GERMANY, 19.56 m., Addr. Br'dcast'g House, 4.55-10.50 pm. to C.A. |
| 31.600 | W8XWJ | DETROIT, MICH., 9.494 m., Addr. Evening News Ass'n. Relays WWJ 5 am.-11.30 pm. Sun. 7 am.-11 pm. | 21.450 | DJS | BERLIN, GERMANY, 13.99 m., Addr. Broadcasting House. 12.05-7.55 am. To Asia. | 15.330 | WGEA | SCHENECTADY, N. Y., 19.56 m., Addr. General Electric Co. Relays WGY, 11.15 am.-6 pm. |
| 31.600 | W5XD | DALLAS, TEXAS, 9.494 m., 11.30 am.-1.30 pm. Ex. Sat.-Sun. | 19.020 | HS6PJ | BANGKOK, THAI, 15.77 m. Mondays 8-10 am. See 15.23 mc. | 15.330 | KGEI | SAN FRANCISCO, CALIF., 19.56 m., Addr. General Electric Co., 6.30-11.15 pm. to So. America. |
| 26.500 | W9XTA | HARRISBURG, ILL., 11.32 m. 1-4 pm. | 18.450 | HBF | GENEVA, SWITZERLAND, 16.26 m., Addr. Radio Nations. Fri. 8.45-10.45 am. | 15.320 | OZH | SKAMLEBAK, DENMARK, 19.58 m., Sun. 8 am.-1:30 pm. |
| 26.450 | W9XA | KANSAS CITY, MO., 11.33 m., Addr. Commercial Radio Eqpt. Co. 10 am.-1 pm., 3-7 pm. | 16 Met. Broadcast Band | | | 15.310 | GSP | DAVENTRY, ENG., 19.6 m., Addr. (See 17.79 mc.) 12.57-5.15 am., 12.22-3.25 pm. |
| 26.400 | W9XAZ | MILWAUKEE, WIS., 11.36 m., Addr. The Journal Co. Relays WTMJ from 1 pm. to midnite. | 17.850 | TPB3 | PARIS, FRANCE, 16.8 m., Addr. (See 15.245 mc.) 8.30-10 am. | 15.300 | YDB | SOERABAJA, JAVA, N. E. I. 19.61 m., Addr. NIROM. 10.30 pm.-2 am., Sat. 7.30 pm.-2 am. |
| 26.150 | W9XUP | ST. PAUL, MINN. 11.47 m., Rel. KSTP 8 am.-1 am. | 17.845 | DJH | BERLIN, GERMANY, 16.81 m., 8-8.55, 9-11 am. | 15.300 | XEBM | MAZATLAN, SIN., MEX., 19.61 m., Addr. Box 78, "El Pregonero del Pacifico." Irregularly 9-10 am., 1-2, 8-10 pm. |
| 26.100 | W9XJL | SUPERIOR, WIS., 11.49 m., Relays WEBC daily, 10 am.-8 pm. | 17.840 | HVJ | VATICAN CITY, 16.82 m. Heard 12 n. on Wednesday. | 15.300 | 2RO6 | ROME, ITALY. 19.61 m., Addr. (See 2RO, 11.81 mc.) 5.10-5.55 am.; 10 am.-12.06 pm.; 1.40-2.30; 3-5.30 pm. |
| 26.050 | W9XTC | MINNEAPOLIS, MINN., 11.51 m., Relays WCTN 10 am.-9 pm. | 17.840 | EIRE | MOYDRUM, ATHLONE, EIRE, 16.82 m., Addr. Radio Eireann. 7.30-9 am.; Even dates 11.30 am.-3.30 pm., 4.30-5 pm.; Odd dates 11.30 am.-1 pm. | 15.290 | VUD3 | DELHI, INDIA, 19.62 m., Addr. All India Radio. 9.30-11.30 pm., 1.30-3.30 am., 7.30 am.-12.30 pm. |
| 26.050 | W9XH | SOUTH BEND, IND., 11.51 m., Addr. South Bend Tribune. Relays WSBT-WFAM 2.30-6.30 pm., exc. Sat. and Sun. | 17.830 | WCBX | NEW YORK CITY, 16.81 m., Addr. CBS, 485 Madison Ave., N. Y. C. 8 am.-6 pm. Irregular. | 15.290 | LRU | BUENOS AIRES, ARG., 19.62 m., Addr. El Mundo. Relays LRI, 7-9 am. |
| 25.950 | W6XKG | LOS ANGELES, CAL., 11.56 m., Addr. B. S. McGlashan, Wash. Blvd. at Oak St. Relays KGFJ 24 hours daily. DX tips Mon., Wed. and Fri. 2:15 pm. | 17.820 | 2RO8 | ROME, ITALY. 16.84 m., Addr. (See 2RO, 11.81 mc.) 5-8.45 am. | 15.280 | DJQ | BERLIN, GERMANY, 19.63 m., Addr. Broadcasting House. 12.05-2.30 am., 4.50-10.50 pm. |
| 25.950 | W8XNU | CINCINNATI, OHIO, 11.56 m., 7 am.-1 am., Sun. 8 am.-1 am. | 17.810 | GSV | DAVENTRY, ENGLAND, 16.84 m., 5.45-8.50 am. to Far East. | 15.270 | H13X | CIUDAD TRUJILLO, D. R., 19.65 m., Relays HIX Sun. 7.40-9.40 am. Tues. and Fri. 8.10-10.10 pm. |
| 25.900 | W9XPD | ST. LOUIS, MO., 11.6 m., Addr. Pulitzer Pub. Co. Relays KSD. 3-5:15 p.m. | 17.800 | OIH | LAHTI, FINLAND, 16.85 meters, 4-9 am. | 15.270 | WCAB | PHILA., PA., 19.65 m., (Addr. See 21.52 mc.) 4-6 pm. exc. Sat. and Sun. Sat. 12 n.-6 pm., Sun. 3-6 pm. |
| 25.500 | W2XQO | NEW YORK CITY, N. Y. 11.76 m., Noon-9 pm. | 17.790 | GSG | YUNNAN. SEE JOE MILLER ARTICLE. (China News Section.) Page 471. | 15.270 | WCBX | NEW YORK CITY, 19.63 m., Addr. (See 21.570 mc.) Daily exc. Sat. and Sun. 1-3.30 pm., Sun. 1-2.30 pm. |
| 25.300 | W9XOK | ST. LOUIS, MO., 11.86 m., Addr. St. Louis Times-Star, Relays KXOK. | 17.785 | JZL | TOKYO, JAPAN, 16.86 m. Irregular. | 15.260 | GSI | DAVENTRY, ENG., 19.66 m., Addr. (See 17.79 mc.) 12.57-5.15 am., 12.22-3.25 pm. |
| 25.300 | W2XJI | NEW YORK, N. Y. 11.86 m., Addr. Bamberger Broad. Service, 1440 Broadway. Relays WOR 12 n.-6 pm. | 17.780 | WNBI | BOUND BROOK, N. J., 16.87 m., Addr. Natl. Broad. Co., 8 am.-4 pm. to Europe, 4-9 pm. to So. Amer. | 15.250 | WSLR | BOSTON, MASS., 19.67 m., Addr. University Club. Daily exc. Sat. and Sun. 10 am.-12 n. |
| 21.640 | GRZ | DAVENTRY, ENG., 13.86 m., Addr. B.B.C., London. Unused at present. | 17.770 | PHI2 | HUIZEN, HOLLAND, 16.88 m., Addr. (See PHI, 11.730 mc.) Daily 7.40-8.45 am. Mon. & Thurs. 7.40-9 am. Sun. 6.40-10.05 am. | (Continued on page 486) | | |
| 21.630 | WRCA | BOUND BROOK, N. J., 13.8 m., Addr. N.B.C., N. Y. C. 8 am.-4 pm. to Europe. | 17.760 | DJE | BERLIN, GERMANY, 16.89 m., Addr. Broadcasting House. 12.05-8.45 am., 4.50-9 pm. Also Sun. 11.10 am.-12.25 pm. | | | |

All Schedules Eastern Standard Time

Let's Listen In with Joe Miller

● DX—well, there's some, but the war situation has certainly altered the usual setup of stations. Also, many reports may not find easy access to their destinations, so don't be too expectant of answers to reports mailed these days.

The I.D.A. Beta Chapter in New York City was royally received by the I.D.A. Jersey Chapter, at Haddon Heights, N. J., last month, led by Lem Cavileer, Jersey I.D.A. president. In the annual Chapter softball game, the N. Y. Chapter at last won, 21 to 20, so we won't have to "wait till next year!" (Remember—the Dodgers?)

Here's to DX:

CHINA

A number of letters have been received from China, including registered mail, and even one by registered air mail via *China Clipper*, all these from the Chinese Radio Administration. Our 2 friends in Chungking, Mr. T. Y. Woo, Deputy Director-General, and Mr. Sherman Wang, Secretary of the China Information Committee, are keeping us well informed.

It was with a distinct sense of loss that we were informed by our Chinese friend in Phoenix, Arizona, Mr. Ying Ong, of the bombing of the Chinese National Administration's station, XGOX-XGOY, on September 3, just a week after our last letter from there was mailed to us.

Mr. Ong has informed us that XGX of Yunnan has now replaced the former XGOX-XGOY in the service of the Central Broadcasting Administration, using 2 frequencies. XGX, 17.80 mc., 9-10:40 p.m., with news in English at 9:50 p.m. to North America. XGX, 11.90 mc., 5:30-7:20 a.m., 7:20-7:50 a.m., 8-11 a.m., 11:10-11:30 a.m., 2-4:20 p.m., 4:30-6:20 p.m. These transmissions are directed, in order, to the following: N.E. China, Japan, So. China, U.S.S.R., China, Europe. English news on 11.90 mc. at 6:30 a.m. and 9 a.m.

XPSA, 7.01 mc., Kweiyang, China, relays the XGX 9 a.m. English news. XPSA operates 5:30-11 a.m., 5-6 p.m. XMHA, 11.855 mc., Shanghai, now has a daily schedule of 7 p.m. to 11 a.m., best heard, of course, in early morning.

All Chinese stations may be reported to: China Information Committee, P.O. Box 107, Chungking, China. For XMHA address Mr. E. L. Healey, 445 Race Course Road, Shanghai, China.

YUGOSLAVIA

YUG, 15.24 mc., and YUC, 9.505 mc., are the new 10 kw. transmitters now on the air in parallel with YUA, 6.10 mc. YUG transmits 7:30-9 p.m. for North America, and YUC 4:5-30 p.m. with English news at 4:15 p.m. The QRA we believe will be OK is YU—, Radio Belgrade, Belgrade, Yugoslavia.

ITALIAN EAST AFRICA

IABA, 9.65 mc., Addis Ababa, formerly Ethiopia, has a new schedule of 4:30-5:30 a.m. and 11 a.m.-2:30 p.m. Doubtless the early a.m. transmissions will be much easier to receive. Reports can be QSL'd direct or via Ministry of Marine, Rome, Italy. Direct QRA, E.I.A.R., Addis Ababa, Italian East Africa.

MANCHUKUO

MTCY, 11.775 mc., Hsingking, is being well received in the U.S. judging from numerous reports. Schedule is 1:30-2:30 a.m. for North America, and 9:50-10:50, 11-11:50 a.m. to Europe. Also, MTCY is on 6.125 mc., from 4-9 a.m. This is a nice catch and should be heard quite well this winter. Address MTCY, The Voice of Manchukuo, Hsingking, Manchukuo.

BELGIAN CONGO

The station on 6.14 mc., formerly known as Radio Leo, has informed DXers that their actual call is OQ2AA. With a Sunday schedule of 5:35-7 a.m., this station will be heard this winter, we are certain. Address reports to this station at Leopoldville.

NETHERLANDS EAST INDIES

YDX, 7.22 mc., at Medan, Sumatra, has a schedule of 6-8:30 a.m., when best heard, then relays the NIROM network (such as PLP, PMN) from 8:30-10:30 a.m. and 10:30 p.m.-2 a.m. This is quite a DX catch on the new 7 mc. SWBC band.

Reported are quite a few of the Javanese commercials. Jack Buitekant, W2, reports YBF, also at Medan, on 9.93 mc., often near 6 a.m., and his brother, Murray, goes him 2 better by reporting QSLs of YBF and YBG! Really nice going. Jack also reports PLU, 9.85 mc., Bandoeng, around 7 a.m.

Murray Buitekant reports PMA, 19.345 mc., 9:30 a.m.; PLL, 13.60 mc., at 7:45 a.m.; PLJ, 14.630 mc., at 8:30 a.m., all at Bandoeng. FB OM!

All reports on commercials should be sent to Ir. P. C. Arends, Engineer, Java Wireless Stations, Bandoeng, Java. Reports on SW broadcasts should be sent to: N.I.R.O.M., Batavia, Netherlands East Indies.

SIAM

This country's name has been changed to Thai, which name will henceforth be used in mentioning any stations in what was formerly Siam.

HSP, 17.174 mc., Bangkok, has been reported by Gus Gallagher, W6, at the unusual time of 8 p.m. This must be another frequency used by

this famous commercial phone, as we have only heard it on 17.73 mc. Ordinarily, HSP is heard in the Eastern half of the U. S. in the early a.m., ranging from 5-8 a.m. Jack Buitekant heard HS8PJ, 9.51 mc., which is always a nice catch. Try for this often good signal daily except Monday from 7-10 a.m., best near 7 a.m. Address all reports on Thai stations to Mr. Phra Aram, Radio Station HS—, Saladeng, Bangkok, Thai.

ASIATIC DX

INDO-CHINA—Radio Saigon, 6.116 mc., heard very FB by Ralph Gozen, W2, almost daily, with English station announcement at 7 a.m. by woman. Immediately following is English news until 7:15 a.m.

FEDERATED MALAY STATES—ZHJ, 6.10 mc., Penang, one of the old-timers in Asiatic DX broadcasters, was heard by Gus Gallagher, W6, at 7 a.m. on its daily except Sunday transmissions of 6:40-8:40 a.m. FB, OM!

MACAO—CRY9, 6.08 mc., at Macao, which is Portuguese China, was also logged by Gus Gallagher on a Monday, 9-10 a.m. CRY9 broadcasts Mondays 8:30-10 a.m.

TAHITI—FO8AA, 7.10 mc., at Papeete, now is being operated on Saturdays 12:01-3:30 a.m., and will be well heard this winter, especially in the West.

ALBANIA—ZAA, 7.85 mc., Tirana, is still in operation, now under the Italians, on a daily schedule of 6:30-8:30 a.m., which, if signal is heard on this frequency, should make identification easy, as no other station operates on above schedule, anywhere near this frequency. Address reports to ZAA, Radio Tirana, etc.

PHILIPPINES—KZIB, 9.492 and 6.04 mc., now on daily 6-10 a.m., from Manila. A 3-note musical chime is heard hourly.



Well, the present shambles on the "other side" has certainly done it! When tuning nowadays over a normally jammed stretch of megacycles on 10 and 20 meters, one is fortunate to hear more than 2 or 3 stations at a time, outside of the good ol' U. S. For compensation, one will find, to his pleasant surprise, that whatever is heard will be really good DX, as the war had a selective effect on amateur DX by prohibiting the activity of all the hams who usually blotted out the weaker, better DX. So that now, when a signal is heard, one can be almost certain of a good catch.

This is particularly true of Asia, whose hams now are heard as never before in A.M.s as the powerful VK's no longer QRM them out of the DX picture. South Africans, though their government declared war, are still permitted to operate, so that an occasional ZS may vie with the Asiatics on the 20 meter band.

Not much news, but all good DX:
CHINA—XU1B, 14160, by Murray Buitekant and Ralph Gozen, W2. XU8ZA, 14050; XU8RJ, 14255; XU8RB, 14090, also by Ralph. Others heard are XU0A, 14125; XU6KL, 14030; XU8AM, 14080; XU8ET, 14090; XU8HG, 14270; XU8LA, 14120; XU8MC, 14280; XU8RM, 14150, 14280, all good DX for any U. S. DXer.

JAPAN—J4CT, 14100, by Ralph Gozen, and J5CW, by Murray Buitekant. Latter has 2 frequencies, 14070, 14090, and only J5 on air. Others are J2KG, 14200; J2KN, 14050; J2NG, 14140; J2NQ, 14250; J2KJ, 14050; J2XA, 14160; J3CX, 14170; J7CB, 14080. Japs are permitted to operate in A.M.s from 2-4 and 8-10 a.m.

JAVA—PK4MM, at Sumatra, heard on 14000 by Ralph Gozen. Also heard are PK1JR, 14060; PK1MF, 14050; PK1OG, 14080; PK1RI, 14030; PK1TM, 14060; PK1VM, 14075; PK2AY, 14030, by Jack Buitekant, W2; PK2LZ, 14030; PK3BD, 14070; PK3HI, 14290. Also in Sumatra, PK4KS, 14040; PK4RM, 14010.

Many Philippine hams are now heard easily, so we won't take up space listing them, we'll let you OMs do it in your log books—we hope!

From Burma, XZ2BH, 14100, is reported by Ralph Gozen, W2. FB! Also VS2AL, 14080, F. M. S., by Ralph.

From Northern Rhodesia, VQ2WP, 14050, by Ralph, and VQ2CM, 14040, by Jack Buitekant, were reported just before the war ban.

VQ2JM, 14120, Mauritius, is a real DX catch reported by Ralph.

OQ5AA, 14080; OQ5AB, 14295; OQ5AE, 14400; OQ5RC, 14080, are all reported from Belgian Congo, mostly in mid-afternoons, when best heard.

CR6AF, 14200, heard at 6 p.m., from Angola, Portuguese West Africa by OM Roger Legge, Ama-Touring Editor for I.D.A.

We hope to be on the air soon with a new receiver, which should really do things in a big way!

If war conditions permit, YL2CD, Latvia, will broadcast a 10 meter special for I.D.A. on 28080 on November 12 and 19, 10-10:10 a.m., E.S.T. Good luck es hunting to all you fellow DX bugs!



RADIO'S No. 1

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If you're connected with radio or sound, this book can be of tremendous help. It's BIG—188 pages of receivers, xmitters, parts, tubes and supplies. All the nationally advertised names. It's COMPLETE—even has the hard-to-get items out of manufacture. It's UP-TO-DATE—includes a complete stock of television apparatus, Build-it-Yourself Kits, etc. You can't beat the quality—or the low prices. Speedy service. Mail the coupon below for your FREE copy of catalog No. 78 TODAY.

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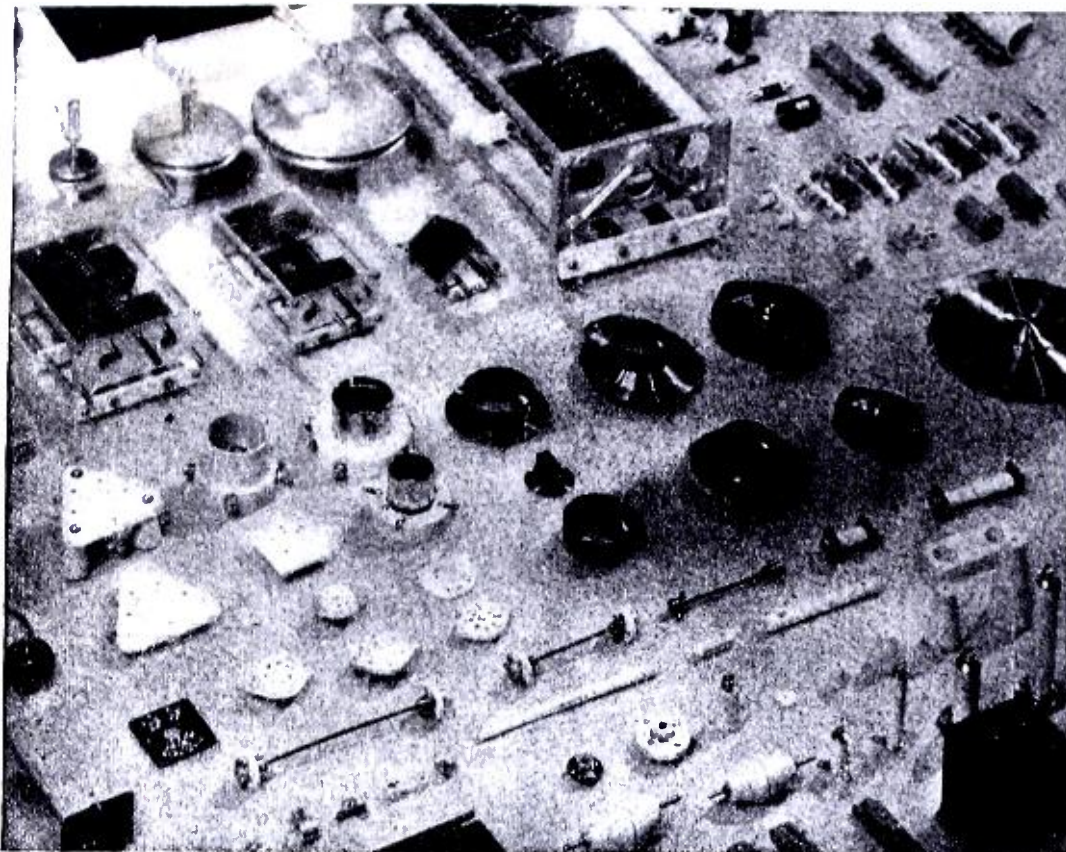
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I will help you get the right receiver and see that you are 100% satisfied. We stock all receivers—more than 25 models of all makes. Write for full information.

You can buy on 6% terms financed entirely by myself so you buy with less cost—more convenience—quicker delivery.

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You get prompt shipment from the world's most complete stock of communications receivers. Shipment from factory if you wish.

| Model | Cash Price | Down Payment | 12 Monthly Payments |
|------------|------------|--------------|---------------------|
| HQ-120X | \$129.00 | \$25.80 | \$9.11 |
| SX-24 | 69.50 | 13.90 | 4.90 |
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| Breting 6 | 32.40 | 6.48 | 2.28 |

Similar terms on all other receivers. Complete stock of all amateur parts at lowest net wholesale prices.

Bob Henry
W9ARA
HENRY RADIO SHOP
 Butler, Missouri

A Four-Tube for Learners

(Continued from page 459)

and rectifier. In this way hum from this source is minimized.

The output transformer comes mounted as a part of the 5-inch electro-dynamic

speaker, the field coil of which also serves as the power-supply choke. The only antenna required is a length of wire, permanently attached to the finished receiver, which may be dropped on the floor, strung around the baseboard or picture molding, etc.

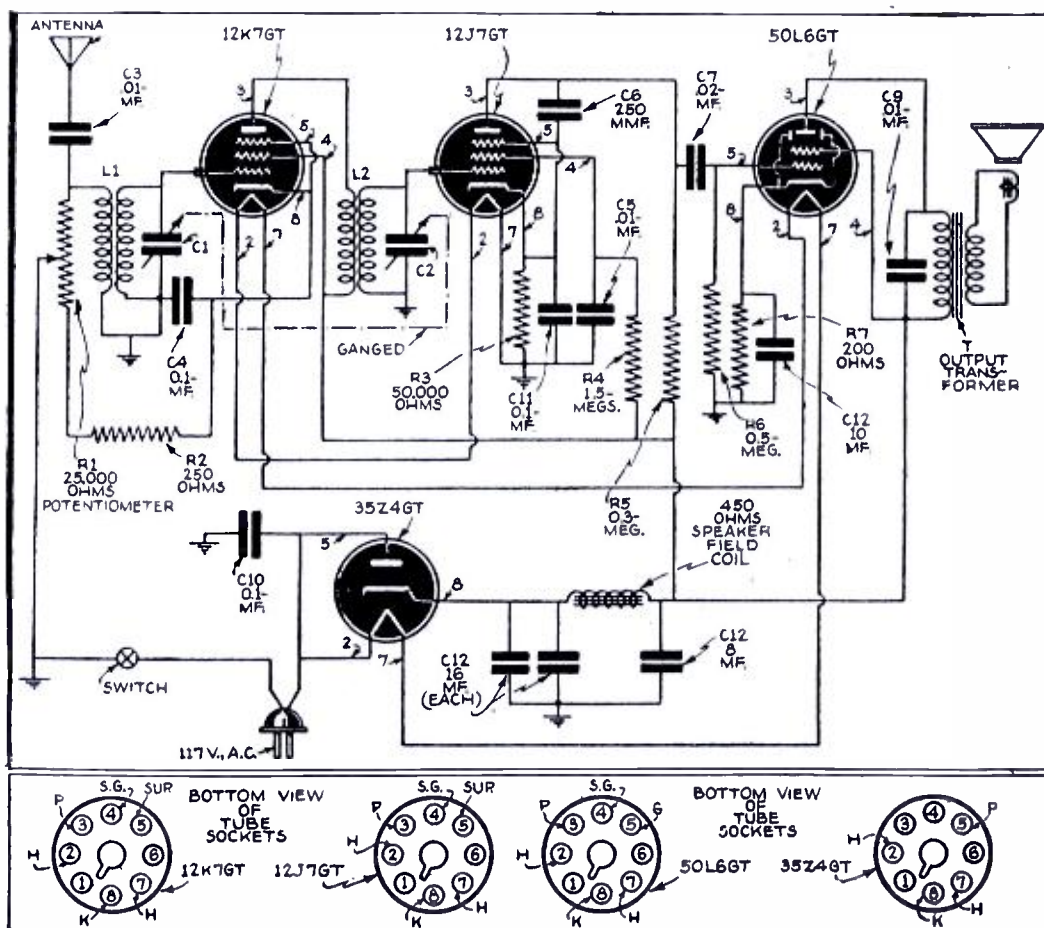
As in all A.C.-D.C. receivers, the chassis is "hot" and should not be touched or connected to an external ground while plugged into the line.

The use of the 12K7GT R.F. tube and 12J7GT detector combine to provide surprisingly high sensitivity. Added to this is the extremely high power sensitivity of the 50L6GT which enables it to provide high output from even weak signals. Altogether this little receiver is capable of very respectable performance, in many ways equalling more complicated superheterodynes. Wiring instructions are included.

Data for this article supplied by courtesy of Radio Wire Television, Inc.

Parts List

- 2—2-gang variable condensers, .000365 mfd.—C1, C2
- 3—.01 mf., 40 v. condensers—C3, C5, C9
- 3—.1 mf., 400 v. condensers—C4, C10, C11
- 1—.00025 mf. mica condenser—C6
- 1—.02 mf., 600 v. condenser—C7
- 1—Filter condenser, 16 x 16 x 8—200 v., 5 x 5—35 v.—C12
- 2—Kit R.F. coils, 1 Ant., 1 R.F.—L1, L2
- 1—25,000 ohm volume control—R1
- 1—½ watt, 250 ohms—R2
- 1—50,000 ohms—R3
- 1—1½ megohms—R4
- 1—300,000 ohms—R5
- 1—½ megohm—R6
- 1—200 ohm—R7
- 1—Switch for R1—SW
- 1—Transformer above 200 ohm—T
- 1—Dynamic speaker, 450 ohm field
- 2—Tube shields
- 4—Octal sockets
- 1—Line cord and plug
- 1—A.C.-D.C. aerial cord
- 1—One lug terminal strip
- 17—Screws, 6/32 x 3/8", right-hand
- 22—Nuts, 6/32 x 3/4
- 22—No. 6 lock washers
- 2—Screws, 6/32 x 1/4"
- 3—Condenser mounting lugs
- 2—Rubber grommets, 1/4 x 5/16"
- 2—Grid clips
- 25 feet hookup wire
- 18" resin core solder
- 1—Chassis and volume control
- 1—Pr. speaker brackets
- 2—Knobs with set screws for 1/4" shaft



Did Radio Robot Sub Sink the "Courageous"?

(Continued from page 453)

has been picked up. For instance, individual selective ringing of a telephone bell on a tugboat is carried out daily in New York harbor, where a fleet of tugs are equipped with radio telephone apparatus.

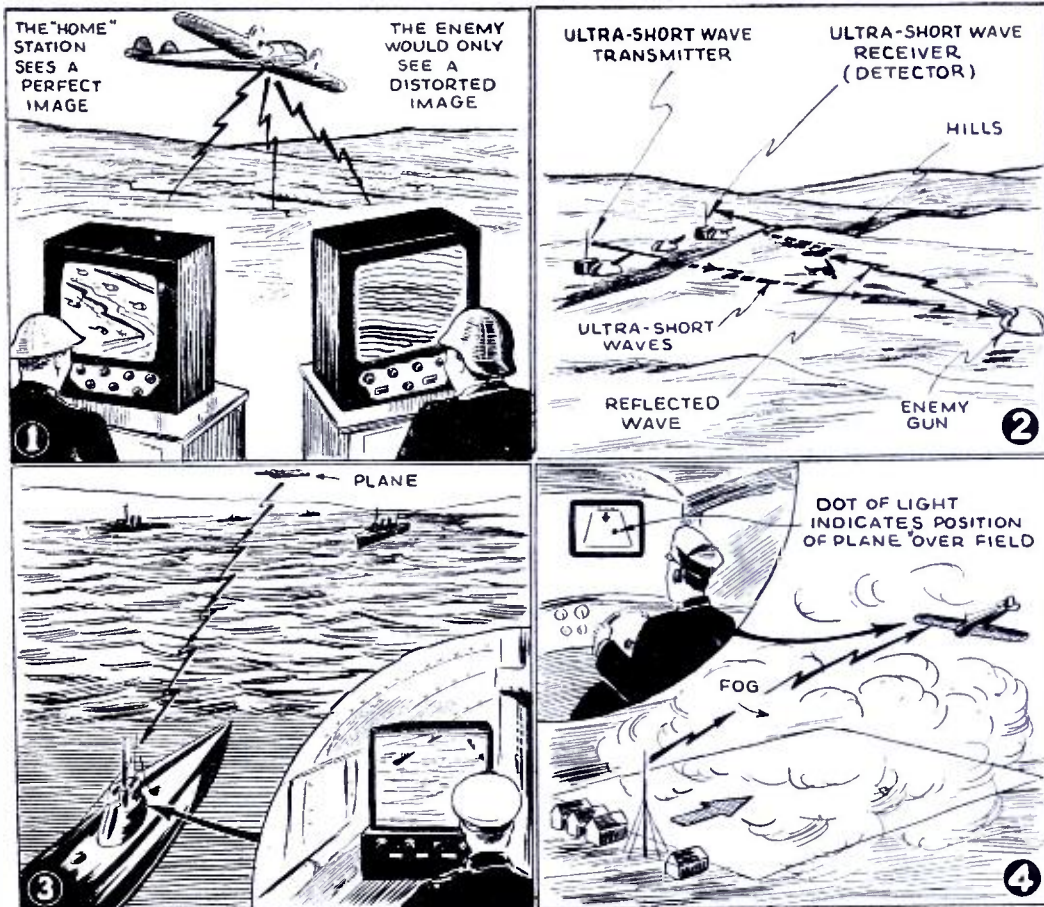
It will also be remembered by many readers that the U. S. Navy directed the movements of an old warship (crew-less) used as a target for bombing, and airplanes have been made to take off, and maneuver in the air and land again—all by radio control from the ground.

John Hays Hammond, Jr., is credited with inventing a radio-directed torpedo which, if it should miss its target, will circle around and strike it from the opposite

image of the field to the pilot aboard the plane, but they also provide for the transmission of a spot of light (or flying target), which indicates the position of the plane at any instant over the field. In this way the pilot can actually see just where he is at any moment, with respect to the field; his height can be judged from his altimeter.

Mr. Hammond believes that his television system can be extended so as to guide submarines and other war vessels through mine-infested harbors and rivers.

A recent invention employing submarine television has been patented whereby the television camera is lowered down into the water in some form of sub-sea observation



Novel war inventions—(1) scrambled television images, (2) short-wave gun and tank detector, (3) television guide for subs, and (4) televisor for landing planes.

side. One of his newest inventions is a secret television system for military purposes, in which the images are scrambled so that if the enemy should pick up the signals, he would see nothing but a blur on the screen. Television and facsimile are of great importance to military and naval engineers, as they make it possible quickly to transmit drawings, maps, and other data of a graphical nature.

There are various ways in which a television, or even a facsimile image can be distorted at the transmitter in some pre-arranged manner, and at the receiving station the operator will, of course, know ahead of time (or by the frequent transmission of a cueing signal) just when to adjust the apparatus so as to correct for the distortion.

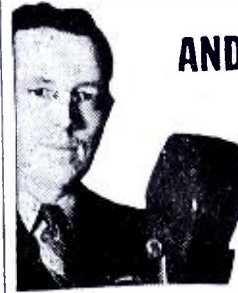
Among the uses of television for war is that of showing the pilot of an airplane an image of the landing field, which may be covered by fog. Not only do some of the television inventions provide for flashing an

chamber. It is difficult, however, for such a camera to see very far under water as, even with powerful lights, vision through water is restricted to a rather limited area, unless some genius finds a way to utilize infra-red or other rays to extend the range of visibility through the water.

A patent was recently issued to R. A. Fliess of New York City for a system of detecting enemy aircraft, even if hidden by a smoke screen or a cloud, by utilizing the reflection of ultra short waves. With his system it is possible to pick up the reflected short waves from the enemy plane or airship and to cause this to form an image on the screen of the television receiver. In the same manner, large guns or tanks camouflaged by stone walls or trees can be spotted by sweeping the ultra short wave beam over the enemy territory, and watching for reflections on the television screen.

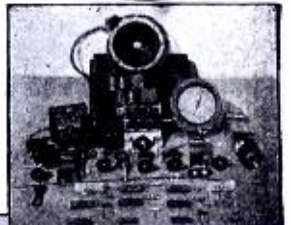
One inventor has devised a pair of spectacles sensitive to the infra-red ray which are given off by the hot engines and exhaust

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DOERLE MODEL BS-6 BAND SWITCH RECEIVER

A powerful sensitive, and selective short wave and broadcast receiver covering 12 to 550 meters in 5 steps. No plug-in coils to change. Simply turn the wave band selector switch and enjoy reception on any wavelength within these limits.



Uses two 6K7G, one 6C5G one 43, one K42A ballast and one 25Z5 rectifier tubes, screen-grid RF amplifier, screen-grid electron coupled regenerative detector—powerful 2 stage audio frequency amplifier with pentode output stage—rectifier and complete built-in power supply. Hum free in operation.

Beautiful, heavy, black crystal finished metal chassis, panel, and cabinet. Illuminated, large, vernier type aeroplane dial. Smooth and effective regeneration control. Highly efficient electron-coupled oscillator of good stability.

Built-in high quality dynamic loudspeaker. Automatic headphone jack permitting the use of phones if desired.

*Operates from your regular 110 volt house current.

*Delivers good loudspeaker volume on all short wave and broadcast stations under fair conditions.

*Simple and efficient bandswitching system.

*Dimensions are approximately 14" x 7 1/4" x 7". Shipping weight is 18 pounds.

KIT OF ALL PARTS

Including pre-wired coil circuit, otherwise unwired less tubes, but including Dynamic Speaker, Beautiful Cracked Cabinet, Drilled & Assembled Chassis, Airplane Dial.

AMATEURS:

Model BS-6-AB has same specifications as BS-6 except that it has special band-spread circuit for 20-40-80-160 M bands and is equipped with plate voltage cut-off switch. Add \$1.00 to above price.

13⁵⁰

Wired and tested, complete with tubes, ready to use, nothing else to buy\$17.50
Note: Also available in battery model at same price upon special order.

MODEL 3TE

● DESIGNED for the short-wave "fan" who wishes to construct an inexpensive yet highly efficient set which will produce excellent results, this compact short-wave receiver uses a minimum of parts in a time-tried circuit. The entire set may be constructed for only a few dollars and will give excellent results.

Uses 76 Detector, 76 Audio and 76 Rectifier. 8 1/2 to 600 meters.

Kit with all necessary parts, including assembled metal chassis, all five coils less tubes\$3.50

Wired, complete, ready to use with tubes \$6.50



EILEN RADIO LABS.

297 DeKalb Ave., Dept. 12 Brooklyn, N. Y.

pipes of enemy planes. This inventor also believes that his scheme can be put into operation by military plane pilots, so that they could judge the contour of the ground below, due to the upward radiation of infrared rays.

Television cameras and ultra short-wave transmitters, carried in planes for the purpose of picking up images of enemy territory, troop movements, gun emplacements,

etc., and transmitting these images back to receiving stations behind the lines, have been the subject of experiments by the various armies. Just how active a role television will play in the present war activities in Europe will probably not be known until this action is concluded.

Television cameras mounted in planes would permit artillery officers to see just where their shells were falling.

New 5000 Ohms/Volt Tester

By M. N. BEITMAN

● SERVICEMEN and experimenters will find construction of test equipment worth while because of educational and economic reasons. The sensitive meter kit shown schematically in Fig. 1 combines eleven most commonly used scales, permitting the testing of resistance, D.C. voltage, and current present in any radio circuit.

On the panel you will mount the fan-shaped meter, three jacks, eleven position rotary switch, 50,000 ohm control for zero adjustment, and the toggle switch which is closed for resistance measurements. The resistors used in conjunction with voltage measurements are of the 5% accuracy type; the remaining resistors are of the 2% type.

You will find the assembly and wiring a simple job. Most connections will center around the three-gang switch. The two small 7 1/2 volt "C" batteries used may be placed in the case you will employ for this tester.

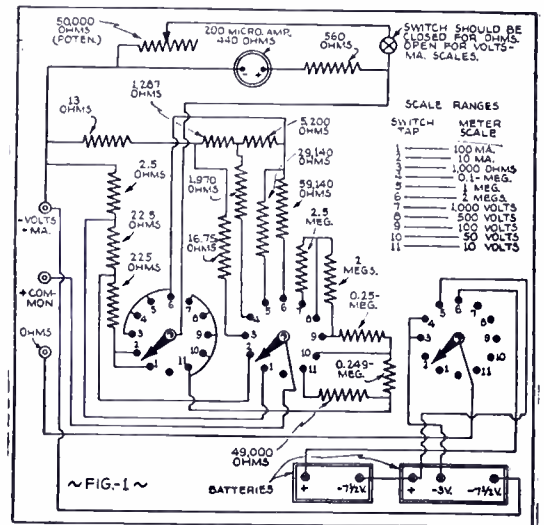
In using the volt-ohm-milliammeter tester, select the point on the switch corresponding to the scale you wish to use. The range chart shown may be mounted on the panel for handy reference at all times. The common red prod is left connected to the center jack. The black prod is shifted between the other two jacks for tests of voltage, current and resistance. For resistance measurements, the toggle switch should also be closed and the variable resistor adjusted for zero on the resistance scale, being used while the prods are shorted together.

This meter kit will be found well adapted for all radio checking and servicing. The high sensitivity of 5,000 ohms per volt will aid in obtaining accurate results in critical circuits and measuring up to 2 megohms without any external batteries.—Data supplied by courtesy of Allied Radio Corporation.

KNIGHT 5000 OHM PER-VOLT VOLT-OHM-MILLIAMMETER

- 1—Foundation meter, 200 micro-ampere movement, internal resistance 440 ohms.
- 1—Multiplier Resistor Kit, consisting of:
 - 1—13 ohm wire-wound precision resistor
 - 1—16.75 ohm wire-wound precision resistor
 - 1—560 ohm wire-wound precision resistor
 - 1—1287 ohm wire-wound precision resistor
 - 1—1970 ohm wire-wound precision resistor

- 1—5200 ohm wire-wound precision resistor
- 1—29,140 ohm semi-precision carbon resistor
- 1—49,000 ohm semi-precision carbon resistor
- 1—59,140 ohm semi-precision carbon resistor
- 1—249,000 ohm semi-precision carbon resistor
- 1—250,000 ohm semi-precision carbon resistor
- 1—2 1/2 megohm semi-precision carbon resistor
- 1—2 megohm semi-precision carbon resistor
- 1—50,000 ohm Yaxley potentiometer
- 1—Shunt Resistor Kit, consisting of:
 - 1—2.5 ohm wire-wound precision resistor
 - 1—22.5 ohm wire-wound precision resistor
 - 1—225 ohm wire-wound precision resistor
- 1—Schematic wiring diagram
- 1—3 deck, 11 point switch
- 1—11 point indicating plate
- 2—7 1/2 volt "C" batteries, Burgess
- 2—Black insulated jacks
- 1—Red insulated jacks



Circuit of Tester.

NEW CATALOGS

New Insuline Catalog

● INSULINE Catalog No. 205 incorporates the most complete set-up this company has ever offered the parts jobber. Among the lines which have been enlarged are: Metal chassis, cabinets, tools, transmitting equipment, hardware, etc. The prices have been revised to conform with present market conditions, although quality has not been sacrificed. Among new items featured are a universal resistor cord which fills all replacement needs as it provides various values from 22 to 330 ohms, a new "tennascope" built-in antenna, television antennas, transmitting cables, etc.

Resistor Bulletin

● WARD LEONARD'S new revised Circular No. 507 lists a wide variety of wire-wound fixed resistors, adjustohm resistors, vitrohms rheostats, line voltage reducers, parasitic suppressors, antenna loading inductances, etc. It has 4 pages.

"RME" Catalog

● THE new Catalog No. 89 of the Radio Mfg. Engineers, Inc., describes a large number of excellent communication receivers, band expanders, pre-selectors, combination units in cabinets and panel racks, frequency inverters, noise suppressors, ultra short wave receivers, I.F. transformers, and other units and components.

Amphenol Describes Products

● AMPHENOL Catalog No. 57-J (American Phenolic Corp.) lists one of the most complete lines of sockets, plugs, connectors, etc., available to the radio industry, as well as a series of insulators, sockets, sheet, rod and tubing, made of polystyrene, an ultra low loss insulating material. A number of different types of coaxial cables, insulated with Amphenol 912, are also listed in this

catalog. Some of the items featured are: Adapters, coil forms, connectors, coil dope, plugs, etc., in addition to the above.

Test Set Catalog

● WITH the emphasis on quality in test equipment, Radio City Products Company has just issued the new 1939-40 edition of its catalog. The book encompasses the complete RCP line of test equipment—tube testers, combination tube and set testers, analyzer units, signal generator and special instruments. Under each model illustrated the performance specifications and price are listed. Inquiries are invited for special industrial electrical test units and production line testers.

Copy of the new 12 page Catalog (No. 121) can be obtained on request.

(Continued on page 481)

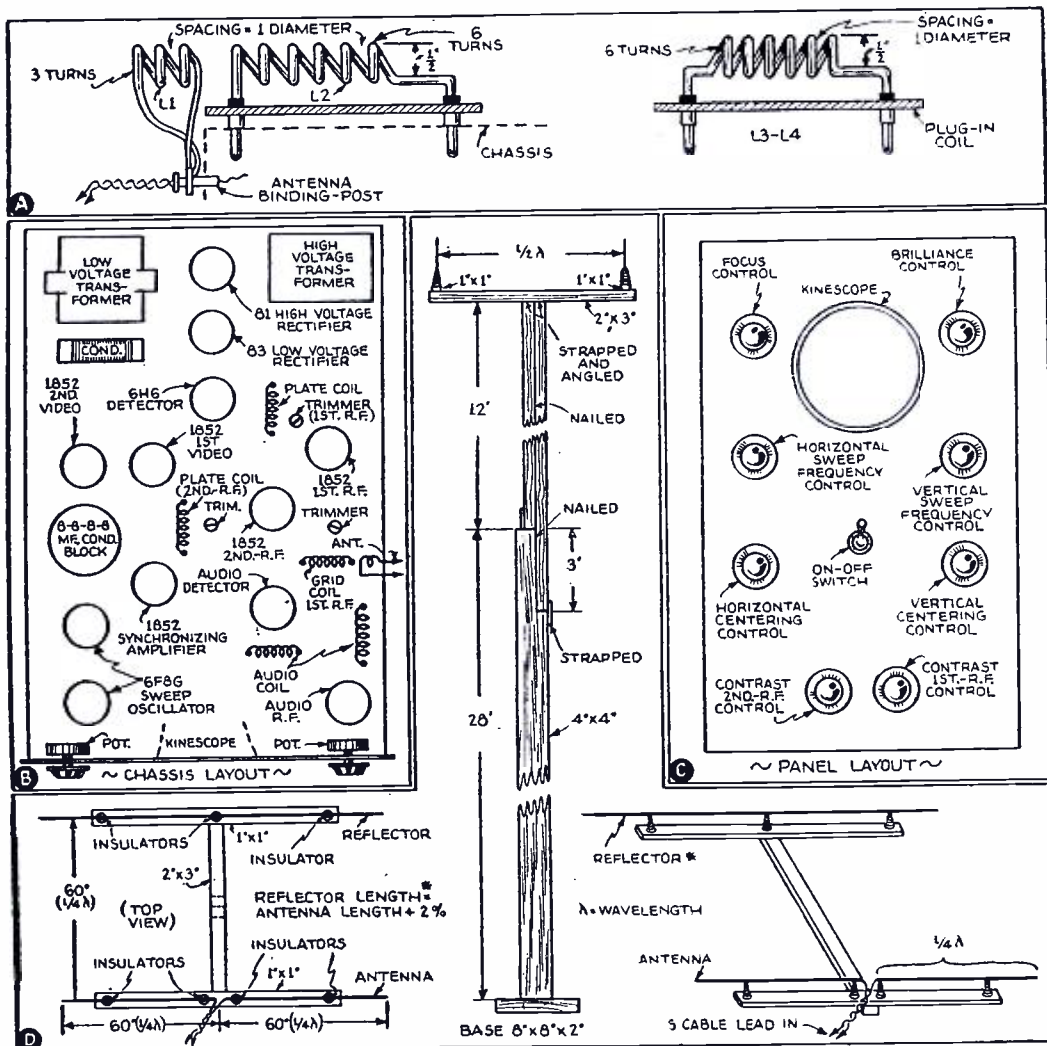
NOTE! In writing to the Service Department of RADIO & TELEVISION to request any of the catalogs mentioned on these pages, you MUST use a separate sheet of paper or separate post card, bearing your name and address, for each catalog desired. Write your name and address and the name of the catalog you want on the paper or card—not more than one catalog will be sent on each sheet of paper or card. If more than one catalog is requested on one sheet of paper or card, only the first mentioned catalog thus requested will be sent.

10-Tube "R & T" Television Receiver

(Continued from page 461)

R36 for the horizontal size or R37 for the vertical size. Potentiometer R34 is the horizontal sweep frequency control, R41 the vertical; Potentiometer R49 is the brilliance control; Potentiometer R46 is the focus control. The brightness or brilliance of the picture is controlled by the grid bias on the Kinescope. It will be noted in the Kinescope section of the power supply diagram that the positive is grounded and that the Kinescope cathode is connected some way up on the voltage divider resistance chain, thus making the grid more negative than the cathode and so supplying the bias. Some positive potential from the low voltage power supply is put on the centering

point where the picture almost fades from view. The clipping of the synch. pulses from the modulation signal is done in the circuit tied on to the grid of the synch. amplifier. The bias is automatically maintained at a high enough value to keep the tube at "cut-off" for the modulation, but low enough so that the synch. pulses are amplified by this tube. One half of a 6H6 is used to supply the synch. pulse system with detected signal of the correct polarity. It will be noted that this half of the 6H6 is connected in the opposite direction from the one supplying the video amplifier stages. Each half thus supplies the correct polarity of detected signal to its own load. Reversing the picture



Details of Chassis Layout, Antenna, etc.

controls so as to increase their range. The focus control varies the potential, which is positive with relation to the cathode, on Anode No. 1 in relation to Anode No. 2, which is grounded, and therefore at maximum positive potential with respect to the other electrodes in the Kinescope.

Synchronizing: Synchronizing impulses are fed to the sweeps from the synchronizing amplifier 1852 pentode through condensers C30 and C29. C30 has a high reactance to the vertical (or low) frequency pulses while C29 lets them through easily. These synchronizing pulses are of the correct polarity and of sufficient strength to trigger the sweeps strongly and hold them in perfect time with the transmitter. The synch. amplifier was decided upon to assure a "rock-steady" picture and it certainly does its job. The set holds synch. even when the gain controls are turned down to the

detector would give us a negative image on the kinescope screen, like a photographic film. If one or three video amplifier stages had been used instead of two, it would have been necessary to connect the picture detector in the opposite direction.

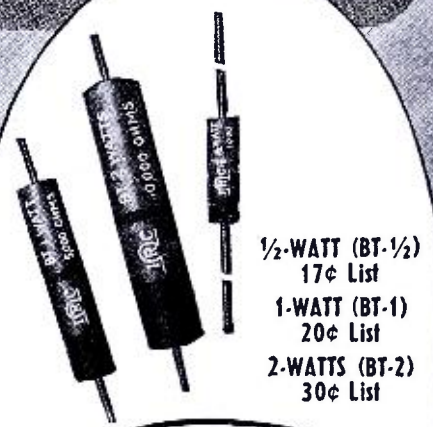
Getting a Picture: Once the Kinescope is supplied with power, the proper sweep circuits are connected to its deflecting plates and these triggered by suitable synchronizing pulses, a raster (sweep pattern) will appear on the screen. It will be possible to control the brightness of this raster and to bring into focus the many (441) fine horizontal lines of which it is composed. In order to have a picture appear, however, it will be necessary to supply a modulated voltage to the grid of the Kinescope, which will cause the brightness of the scanning spot to increase or decrease as it moves, thus painting a picture for us. This modu-

WHAT IS AN "EXPENSIVE" RESISTOR?

You can buy resistors at almost any price—but, remember, you generally get just about what you pay for. One lost service customer, one callback as the result of trouble with a "cheap" resistor can cost far more than you can possibly save on dozens of resistor "bargains."

Insist on IRC Insulated Metallized Resistors—the finest most reliable resistors at any price. You can rely on them any time, any place, under the most severe conditions. They are a good investment in long, satisfactory performance. They are the least expensive resistors to use because they are the best resistors for protecting your reputation for highest quality workmanship on every job.

INTERNATIONAL RESISTANCE CO.
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INSULATED

Metallized
RESISTORS

"They Stay Put"

H. G. CISIN'S NEWEST SPACE EXPLORER

MODEL 7-B (7-BAND)

SHORT WAVE—B'CAST—LONG WAVE
ALL ELECTRIC DUAL BEAM POWER COMMUNICATIONS RECEIVER

SEVEN OVERLAPPING BANDS—8¼ to 2000 meters. Professional Band Spread, Dual Beam Power, Communications Set.

POWERFUL, SENSITIVE, SELECTIVE—Ultra-Modern Features include: Dual Beam Power Output; Built-in Full Toned Electro-Dynamic Speaker. Patented Cisin A.C.-D.C. Circuit; Low-loss Air Dielectric Band Spread on all bands; Self-Contained Power Supply Precision Filtered to eliminate hum; Full Vision Dial; Antenna Control; Headphone Jacks; Dual Regeneration Control; Each Beam Power tube furnishes over 2 watts undistorted power to dynamic speaker giving Full Loud Speaker Volume; Studio Tone Quality; Sturdy drilled metal chassis. Verified long distance reception reported by many owners. Gives professional results, but plans are so clear anyone, even a novice, can build this set successfully.

Uses 100% Metal Tubes rather than low-priced "g" type tubes in carefully engineered patented circuit. Designed to operate two or more speakers.

Complete assembled kit
Find-All chassis parts incl.
drilled chassis (unwired,
less tubes, coils, speakers)



\$6.95

Newly Developed Circuit
requires neither Ballast
Tube nor Heater Cord.

Set of Following Matched Metal Tubes

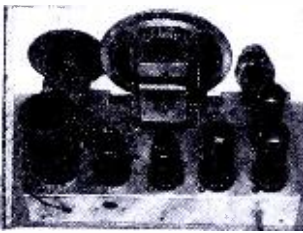
1-6J7; 1-6C5; 2-25L6 Beam Power; 2-25Z6 rect's. \$4.45
Four S.W. Coils, 8¼ to 200 m. \$1; two B'cast coils, 200-600 m. \$1; Long Wave Coil and L. W. Unit \$1; Wired and Tested \$2.50 extra; Dynamic Speakers, each \$1.95. Shpg. wt. 7 lbs. No circulars available.

SPECIAL—SPACE EXPLORER 7-B, wired, laboratory tested, all coils, except long wave, set of matched tubes, one speaker, ready to use **\$17.45**

NEW—Pre-Selector attachment permits Space Explorer to be used as Pre-Selector—\$1 additional

SENIOR MODEL METAL TUBE SPACE EXPLORER

SHORT WAVE—B'CAST—LONG WAVE
ALL ELECTRIC BEAM POWER—7-BAND COMMUNICATIONS RECEIVER



SEVEN OVERLAPPING BANDS—8¼ to 2000 meters. Professional Band Spread, Beam Power, Communications Set. **POWERFUL, SENSITIVE, SELECTIVE**. Features include: Beam Power Output; Built-in Dynamic Speaker; Patented Cisin A.C.-D.C. Circuit; Band Spread on all bands; Self-Contained Power Supply; Precision Filtering; Antenna Control; Headphone Jacks; Dual Regeneration Control; Full Loud Speaker Volume; Studio Tone Quality; drilled assembled metal chassis.

\$5.95

Complete Senior Space Explorer Kit of all chassis parts, drilled assembled chassis, Power Supply and clear, simplified wiring diagram (unwired, less tubes, coils and speaker). Matched Metal Tubes include 1-6J7, 1-6C5, 1-25L6, 1-25Z6 rect; 1-55A Ballast, \$3.75; Four S.W. Coils 8¼ to 200 meters \$1; Two B'cast Coils 200 to 600 m. \$1; Long Wave Coil 550 to 2000 meters \$1; Full Toned Dynamic Speaker \$1.95; Attractive cabinet \$1.50; Wired and tested \$2.25 extra, shipping weight 7 lbs. Send stamp for Circular. 25% deposit on all C.O.D. orders.

SPECIAL—Senior Space Explorer, Complete Assembled, Wired, Factory Tested Chassis, with all coils 8¼ to 600 meters, set of matched metal tubes, built-in dynamic speaker, ready to use **\$15.35**

H. G. CISIN'S FAMOUS MODEL 3AE

ALL ELECTRIC S.W. & B'CAST. AIR SCOUT JR.

\$3.20 WITH PHONE
Less Tubes Unwired

A splendid beginner's set. Holds wonderful records. Also brings in thrilling short wave and broadcast entertainment. Works from any A.C. or D.C. house current. Easiest set to build. Employs newest metal ballast tube. Speaker mounts on attractive panel. Range 9½ to 550 meters or to 1500 meters with special long wave coil. Complete Kit includes: Earphone, broadcast coil, 70 to 200 meter coil. Panel, Chassis, High Grade Variable Condenser, Potentiometer, Antenna Trimmer, Dial, Sockets, Knobs, Wires, Resistors, Condensers, and all other required parts including instructions and diagram.



MODEL 3A-E
Pat. No. 2,086,256

ONLY **\$3.20** With Phone (Less tubes, unwired)

Following Auxiliary Parts are available: 9½ to 20 meter coil (foreign) 25c; 15 to 45 meter coil (foreign) 25c; 40 to 80 meter coil (foreign) 25c; 5" Find-All Loud Speaker \$1.25; Complete Antenna Kit 50c; Wood Screw Kit 10c. Tubes for Model 3A-E Complete matched set \$1.35; Long Wave Unit and Coil \$1. Double Earphones \$1.40. Bandspread Attachment 75c. Air Scout Jr. Model 3AE wired extra \$1.00.

NOTE: If you already have earphones, two extra foreign coils may be substituted in model 3AE. Circulars available on 3 Tube Battery model 3B at \$3.45; One Tube Short Wave Kit at \$1; One Tube B'cast Kit \$1; Two Tube Electric Transmitter \$1. Send for 4-page circular reproducing letters from satisfied customers telling of foreign stations received on our famous sets.

H. G. CISIN, CHIEF ENGINEER
ALLIED ENG. INSTITUTE, Dept. 5-59
85 WARREN ST., NEW YORK, N. Y.

lated voltage is supplied by the last video frequency amplifier stage.

The Video Amplifier: The video amplifier corresponds roughly to the audio amplifier in a sound receiver, but the problems involved in its design are much more complex. Phase shift, the delay of some frequencies a few micro-seconds longer than others, and the wide band-pass required present many problems.

To show all the transmitted detail it is necessary to amplify in the video amplifiers a band of frequencies 4,000,000 cycles wide, without attenuating the highest nor the lowest more than any other frequency in the band.

To benefit fully from this wide band-pass, it will also be necessary that no frequency be delayed more than another in the amplifier. Specially designed chokes in the plate load circuits of the V.F. amplifiers are used to bring this about; they are used in conjunction with a relatively low load resistor value. The writer found experimentally that the addition of these chokes in this case did not in any way visibly improve the picture, and they were therefore omitted. When using a 3" Kinescope it is not possible to reproduce all of the transmitted detail, because of the size of the focal spot with relation to the entire raster. Practical tests showed that the videos had ample hand-pass and small enough phase shift without the compensating chokes to drive the Kinescope to its peak of detail reproducing ability. The R-C filters in the plate circuits were found necessary to prevent oscillation in the V.F. stages. Condenser coupling was used; this removes the D.C. component of the video signal and prevents the background or overall brightness from being controlled by the signal. Since the different features in a program do have differing overall average brightness, it will be necessary to operate the brightness control manually once in a while to maintain the most pleasing value. Automatic D.C. restorers or brightness setters are simple and will be described in a subsequent article. (Also see article by Peter Scozzari in the November issue, page 399.)

A diode detector is used because it is the simplest way to obtain high fidelity detection in the video spectrum. A triode or pentode detector will yield higher sensitivity and output but, unless very "fussily" designed and adjusted, will lose picture detail. Many video circuits show an R.F. filter following the detector to prevent R.F. from entering the video amplifiers where it might induce these to oscillate. This was not found necessary. A properly designed filter was tried (as may be seen in the photograph) but was found to produce no practical effect. It was therefore omitted from the final model and from the circuit diagram herewith.

The radio frequency amplifiers, low voltage power supply, and the antenna installation will be discussed in the next article, along with the circuit and details of the sound section of the television attachment. The complete circuit diagram of the video section and of the power supplies will be found in this first article, as will layout diagrams and a diagram of the antenna finally used at Monmouth Beach, N. J., where the author developed this outfit. Monmouth Beach is roughly 35 miles air-line from the television radiator atop New York's Empire State Building (58 miles by road) and good images were received there with "gain" to spare. Photographs of the complete set, including sound, supplement the diagrams in making clear to the constructor the manner of assembly. It is the author's belief that dimensioned large size drawings of the drilling of the chassis are not required by the majority

of experimenters, as many will probably prefer to change it somewhat to suit individual convenience. The Kinescope was originally mounted vertically at the front of the chassis (a mirror was used to view picture) to get it away from the field of the power supplies at the rear of the chassis. It was experimentally determined that the field was not strong enough to have any effect, and the horizontal mounting was adopted, with the leads extended from the old socket to the new by a cable. This cable was experimentally determined to have no ill effects on results.

I wish to acknowledge the able assistance of Jerrier Haddad, President of the Television Club at the Brooklyn Technical High School and senior student at that institution, who did all the construction work on the set. I also wish to thank Andy Tait, leader of the construction group of the Television Club and senior at Tech for his untiring assistance in the antenna tests, which resulted in the one shown in the sketch.

The parts list of the entire outfit (except the sound) is given herewith.

Parts List—Video Section

AMERICAN PHENOLIC CO.

- 8—Super sockets, MIP-54-8
- 2—4-prong sockets, MIP-4T
- 1—7-prong socket, MIP-7LT
- 8—Knobs

INSULINE CORP. OF AMERICA

- 1—Electralloy chassis, No. 1517
- 1—Bakelite panel, 15 x 12 x 3/16 inches
- 3—Plug-in strips for plug-in coils, No. 1634
- 3—Plug-in coil jack bases, No. 1633

AMERICAN RADIO HARDWARE CO.

- 3—6-terminal mounting strips
- 3—4-terminal mounting strips
- 1—Package of bus bar, No. 2538
- 1—Package 6-32 by ½" N.P.R.H. machine screws
- 1—Package 6-32 small hex. nuts N.P.

CORNISH WIRE CO.

- 4—25-foot coils Braidite radio hook-up wire
- 1—Power cord and plug

RCA RADIOTRON (tubes)

- 5—Type 1852
- 1—Type 6H6
- 2—Type 6F8G
- 1—Type 81
- 1—Type 83
- 1—Type 906-P4 Kinescope

INTERNATIONAL RESISTOR CO. (Resistors)

- 3—2500 ohm, ½ watt, BT½—R1, R2, R9
- 4—160 ohm, ½ watt, BT½—R3, R10, R15, R20
- 2—10,000 ohm potentiometers—R4, R11
- 2—10,000 ohm, 1 watt, BT1—R5, R8
- 4—60,000 ohm, 1 watt, BT1—R6, R12, R18, R23
- 2—250,000 ohm, ½ watt, BT½—R7, R19
- 2—10,000 ohm, ½ watt, BT½—R13, R33
- 1—3500 ohm, ½ watt, BT½—R14
- 7—5000 ohm, 1 watt, BT1—R16, R17, R21, R22, R30, R48, R53
- 2—2 megohm, ½ watt, BT½—R25, R27
- 1—4000 ohm, ½ watt, BT½—R26
- 2—100,000 ohm, 1 watt, BT1—R28, R47
- 1—20,000 ohm, 1 watt, BT1—R29
- 1—500 ohm, ½ watt, BT½—R40
- 2—1 megohm, ½ watt, BT½—R31, R52
- 1—5000 ohm, ½ watt, BT½—R32
- 1—50,000 potentiometer, 2 watts—R34
- 2—2500 ohm, 1 watt, BT1—R35, R39
- 1—25,000 ohm potentiometer, 2 watts—R49
- 1—25,000 ohm, 1 watt, BT1—R36
- 5—500,000 ohm, 1 watt, BT1—R37, R42, R45, R50, R51
- 1—5000 ohm, 2 watt, BT2—R38
- 2—100,000 ohm potentiometers, 2 watts—R41, R46
- 2—1 megohm potentiometers—R43, R44

HAMMARLUND MFG. CO.

- 3—25 mmf. air-padding condensers, type APC25—C1, C3, C8

AEROVOX CORPORATION

- 7—.01 mf. mica condensers, 450 W.V., type 484—C2, C4, C5, C7, C9, C10, C33
- 1—.0001 mf. mica condenser, 450 W.V., type 1462—C6
- 1—.001 mf. mica condenser, 450 W.V., type 1462—C11
- 1—.00002 mf. mica condenser, 450 W.V., type 1462—C12

- 1—8-8-8 mf. filter condenser block, type E450—C13, C17, C27, C37
- 2—50 mf. paper condensers, type PR25—C14, C18
- 2—1 mf. paper condensers, 450 W.V., type PM475—C15, C19
- 2—16 mf. dry electrolytics, 450 volts, type PRS450—C21, C22
- 3—1 mf. paper condensers, 450 volts, type 484—C25, C28, C31
- 1—.05 mf. paper condenser, 450 volts, type —C26
- 3—.002 mf. condensers, 450 volts, type 484—C29, C31, C34
- 1—.2 mf. condenser, 450 volts, type 484—C35

CORNELL-DUBILIER CORPORATION

- 1—.1 mf. 1000 volt paper condenser, DT10P1—C20
- 1—1 mf. filter condenser, 1500 volts, TL.A15010—C23

SOLAR MANUFACTURING CO.

- 1—.00001 mf. mica condenser, 450 volts—C24
- 1—.0005 mf. condenser, mica—C30

THORDARSON ELEC. MFG. CO.

- 1—Low voltage transformer, type T13R15—R1
- 1—12-henry choke, type T17C00-B—L7
- 1—250-henry choke, type T93C20—L5
- 1—1,080-henry choke, type T29C27—L6

KENYON TRANSFORMER CO.

- 1—High voltage transformer, type T-208—T2

"Tiny Tim" Receives 'Em All

(Continued from page 459)

Two of the new 1.4 volt tubes are used, as the diagram discloses, and instead of using plug-in coils, the coils are switched into circuit as required. The case measures 5" x 6" x 6" and may be built of aluminum. An insulated antenna terminal is mounted on top of the cabinet next to the carrying handle. As shown in the diagram, a 1N5G tube is used as the regenerative detector, and a 1A5G tube as the audio amplifier. A ½ meg. potentiometer, R2, controls the regeneration by varying the screen voltage on the detector. A standard type 4-pole, 5-position band switch is used which leaves room for experimenting with other coils. If the builder only desires to cover three bands, then he may employ a 3-pole, 3-position switch. The set covers from 15 to 95 meters in three bands; the first band covers from 15 to 28 meters, the second from 27 to 48 meters, and the third from 47 to 95 meters.

The tuning condenser has a capacity of .0001 mf., and the A.F. coupling choke may be a standard iron core A.F. impedance, or it may comprise a small audio transformer (about three-to-one ratio) with the primary and secondary windings connected in series. Insulate the phone jack from the metal panel; the protecting fuse, if used, may be of the 2.5 volt, 60 ma. type. The "A" battery drain is very small or about 100 ma. In order to break the "B" battery circuit when the set is not in use, a double-pole, single-throw switch should be used so as to break the "A" and "B" circuits simultaneously. The antenna, about 3 feet long, can be made from three pieces of copper or brass tubing, sliding inside one another, and each piece may be 12" long. One of the new compact type 1.5 volt "A" batteries may be used, with a midget style 45 volt "B" unit.—*Courtesy The Australasian Radio World.*

[If desired, the builder may use a larger size tuning coil so as to bring in the broadcast stations, and this coil may comprise 126 turns of No. 28 wire for the grid coil, and 28 turns of No. 34 for the tickler. Use a .00014 mf. tuning capacity for this B.C. coil. Wound on 1½" dia. form.]

Parts List

- 1—Aluminum case and bracket (see text)
- 1—.0001 mf. midget variable (tuning) condenser (C1)
- 1—Phone jack
- 1—D.P.S.T. toggle switch
- 1—Wave-change switch
- 2—Octal valve sockets
- 1—Audio choke (Ch.)
- 4—¼" brass spacers
- 4—1" nuts and bolts
- 1—60 m.a. fuse and holder
- 3—Coils, wound to specifications (see text)
- 2—Black midget pointers
- 1—Midget dial
- 1—.5 meg. potentiometer (I.R.C.)
- 1—Pair headphones

I.R.C. (Resistors)

- 1—3 meg., ½ watt carbon
- 2—1 meg., ½ watt carbon
- 1—.1 meg., ½ watt carbon

R.C.A. (Tubes)

- 1—1N5G
- 1—1A5G

Fixed Condensers

- 1—.00025 mf. mica
- 2—.0001 mf. mica
- 1—.01 mf. tubular
- 1—.5 mf. tubular

EVEREADY (Batteries)

- 1—45-volt "B" battery
- 1—1.5 volt "A" battery
- 1—3 volt battery, for "C" voltage

MISCELLANEOUS

- 1—Doz. ⅜" nuts and bolts
- 1—Doz. ¼" nuts and bolts
- Push back (solid and flexible)

CORRECTION NOTICE

In the Parts List accompanying the article on "All-Wave Space Explorer Six" on page 299 of the September issue, the values of Resistors R4 and R7 were given as 330 ohms. This is incorrect; the right values are 300,000 ohms (½ watt) each.

OPPORTUNITY FOR SERVICEMEN!

CASH IN ON RADIO NOISE ELIMINATION PROFITS!

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SPRAGUE PRODUCTS CO.
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WESTERN UNION TELE-RECORDING SET

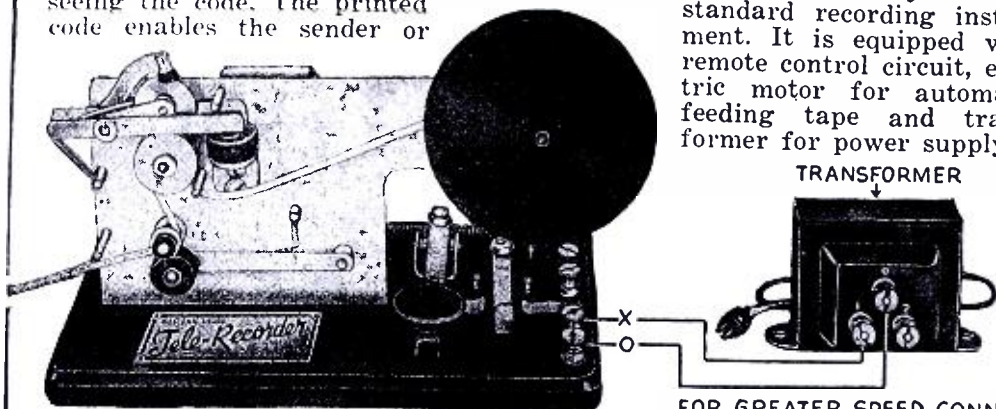
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Sturdy in construction. Easily operated by a novice or a licensed amateur.

A complete, practical, self-contained Telegraph Recording Set. It is specially designed to record dots and dashes on a moving tape, and affords a simplified method of hearing and seeing the code. The printed code enables the sender or

receiver to check not only the message but also the accuracy of the message in code.

You can actually send, receive and record messages in code—just like a standard recording instrument. It is equipped with remote control circuit, electric motor for automatic feeding tape and transformer for power supply.



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I Cover the Pacific Coast!

Lyle M. Nelson

(All hours listed are P.S.T.)

AS winter approaches, South and Central American stations on the low frequency bands begin furnishing the major interest for Pacific Coast listeners. At present best reception is usually on the 31 meter band. However, the 49 meter band has shown remarkable improvement and should further improve during December.

One of the most powerful of the Latin-American stations heard here at present is LRX of Buenos Aires on 9.66 mcs. LRX is on the air nightly from about 5:30, when it becomes audible here, until 7. Best reception is near the end of the broadcast. According to recent announcements, several new frequencies, among these 9.69, 11.73 and 6.18 mcs., will soon be put on the air.

Most of the Cuban stations are as reliable as locals with COCH on 9.43 the best received. Other Cubans heard here with excellent volume during the evenings have been COGF, 11.81 mc., in Matanzas; COCX on 11.74 mc.; COCM on 9.82; COBX on 9.23 mc.; and COCQ on 8.85 mc., all in Havana. Both COCM and COCQ vary in frequency a great deal.

Several listeners, including Kendall Walker of Yamhill, Oregon, have reported good reception from TIPG of San Jose, Costa Rica, on 9.62 mcs. as late as 8:30 p.m. TIPG is audible here from about 6 p.m., Mr. Walker reports.

Also reported by Mr. Walker is station TI4NRH of Heredia, Costa Rica. TI4NRH is weakly audible from 6 to 7 p.m. on 9.67 mc. on Tuesdays and Saturdays, he says. Other listeners have reported the station broadcasting irregularly near 7 p.m.

Although not in South or Central America, Tahiti's lone broadcaster, FO8AA, has been one of the best DX catches of the month. This station has shown remarkable improvement and now is audible here from 9 to 11:30 p.m. on Tuesdays and Fridays. FO8AA broadcasts on 7.10 megacycles and is sometimes blotted out by strong code interference.

A new station believed to be a new frequency of CR7BH of Mozambique, Portuguese East Africa, is now broadcasting about 7 a.m. daily on 15.24 megacycles. Jack McCliment of Portland, Ore., writes that the station relays the broadcasts of CR7BH daily from 6:30 to 8 a.m.

Mr. McCliment and John Cavanagh of Oregon City both report "Radio Boy-Landry" of Saigon, Indo-China, on 11.69 megacycles near 5 a.m. irregularly. The regular schedule for this station lists transmissions on 9.66 mcs. from 4 to 6 a.m. daily.

Most of the South and Central American stations on the newly created 62 meter band have not as yet begun to come through. This band was not put to any great use last winter and predictions on how stations on it will come through this winter cannot be made. However, several stations on this band should be heard here with good volume during the winter months.

Round 'n' About . . . from listeners' reports: New Oriental transmitter being heard irregularly on 5.72 megacycles in early morning hours . . . New Soviet station heard on 15.41 mc. daily from 5:30 to 8 a.m. and from 6 to 7:30 p.m. . . . MTCY of Manchukuo is well received daily from 10:30 to 11:30 p.m. . . . VPD of Suva is weak on 9.54 mc. every morning from 2:30 to 4 a.m. . . . OIE of Lahti, Finland, now heard broadcasting on 15.19 mc. about 6 a.m. . . . Swedern's SBT on 15.16 mc. is coming in with fair volume on Wednesdays and Saturdays from 5 to 6 p.m. . . . SBP on 11.71 also carries the program but is not heard here . . . YN1IP on the air about 7 a.m. Sundays on 7.26 mc. . . . Haiti will have a new powerful transmitter on the air by the first of the year . . . HP5J of Panama City heard signing off on 9.59 mc. at 7:30 p.m. nightly . . . English announcement is given . . . CXA2 of Montevideo, Uruguay, also signs off the air at 7:30 p.m. . . . COGK on 8.96 mc. broadcasts until 7:30 p.m.

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SHORT WAVE COIL DATA BOOK

Every experimenter knows that the difference between a good and a poor radio set is usually found in the construction of short-wave coils. Coil winding information is vitally important and in the new coil book all "dope" appears. There're illustrations which give instructions on how to wind coils, dimensions, sizes of wire, curves and how to plot them. Every experimenter needs this book—it also contains complete data on all types of receiving coils, together with many suitable circuits using these coils. Also complete data on various types of transmitting coils with many transmitting circuits such as exciters and amplifiers using the various coils described.

Contents Briefly Outlined

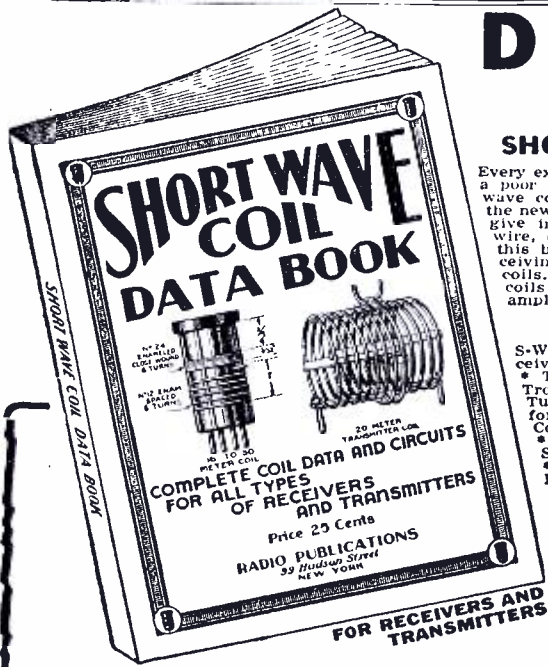
- S-W Tuning Inductance Charts
- Coil Data for T. R. F. Receivers
- One Tube Oscillodyne
- Two Tube Bandspreader
- The Mono-Coil
- 2-Tube Old Reliable
- 2-Tube Globe Trotter
- 2 Winding Coils—10-500 Meters
- Doerle 3-Tube "Signal Gripper" Electrified
- 3-Tube Bandspreader for the Ham
- General Coverage Coils on Ribbed Forms
- Coil Data for Superhet or S-W Converter
- Ultra S-W Coils
- Switch Coils for S-W Superhets
- Experimental Coils
- S-W Antenna Tuner
- Most Popular S-W Tuning Circuits
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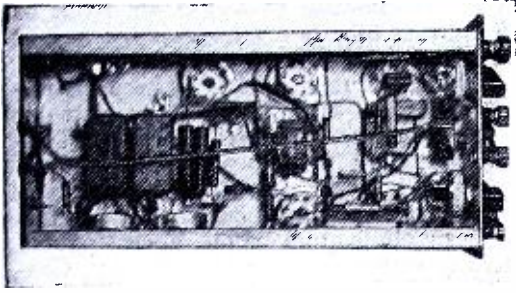
Announcement of Award In QSL Contest

A prize in the QSL contest, announced in the October issue of RADIO & TELEVISION, was won by Dick Mannheimer, an SWL of Des Moines, Iowa. Mr. Mannheimer's entry was so far ahead of the others received that it was virtually a "walk-away" for him. His winning message follows: **K5AH! XE3AH! VK3US. LU8A.B CE4AC VK4KS OA4R F8'N'T. ("Ah! Ah! U.S.A. backs R'n' T.")**

Other 1 year's subscription winners will be announced shortly.

A Versatile Oscilloscope

(Continued from page 462)



Bottom View of Instrument

mately $\frac{1}{4}$ mm. per volt; that is, if 20 volts (D.C.) are applied to a set of plates, either horizontal or vertical, a line two inches long will be traced on the screen. It is therefore advisable to have a *single stage amplifier* to amplify any small voltages that it is desired to measure. Since external voltages are generally measured on the vertical set of plates, this amplifier is connected to the vertical plates. Actually the vertical plates are really in a horizontal plane, but they produce a vertical trace, because the trace of the beam of electrons against the fluorescent screen is at right angles to the plane of the deflecting plates.

The horizontal plates are used for the *time sweep* which serves to spread the trace across the screen at some definite time rate. For most general use, a sawtooth oscillator is required for this horizontal sweep, which in the writer's scope was generated by an 884 gas triode tube. This in turn was amplified by a single stage amplifier using a 6SJ7 tube, similar to the vertical amplifier. Note the lack of a cathode bypass condenser in this amplifier. A pair of 6ZY5G rectifier

tubes, one for supplying voltages for the amplifier tubes and the other for supplying anode voltages to the 902, complete the tube complement of the scope.

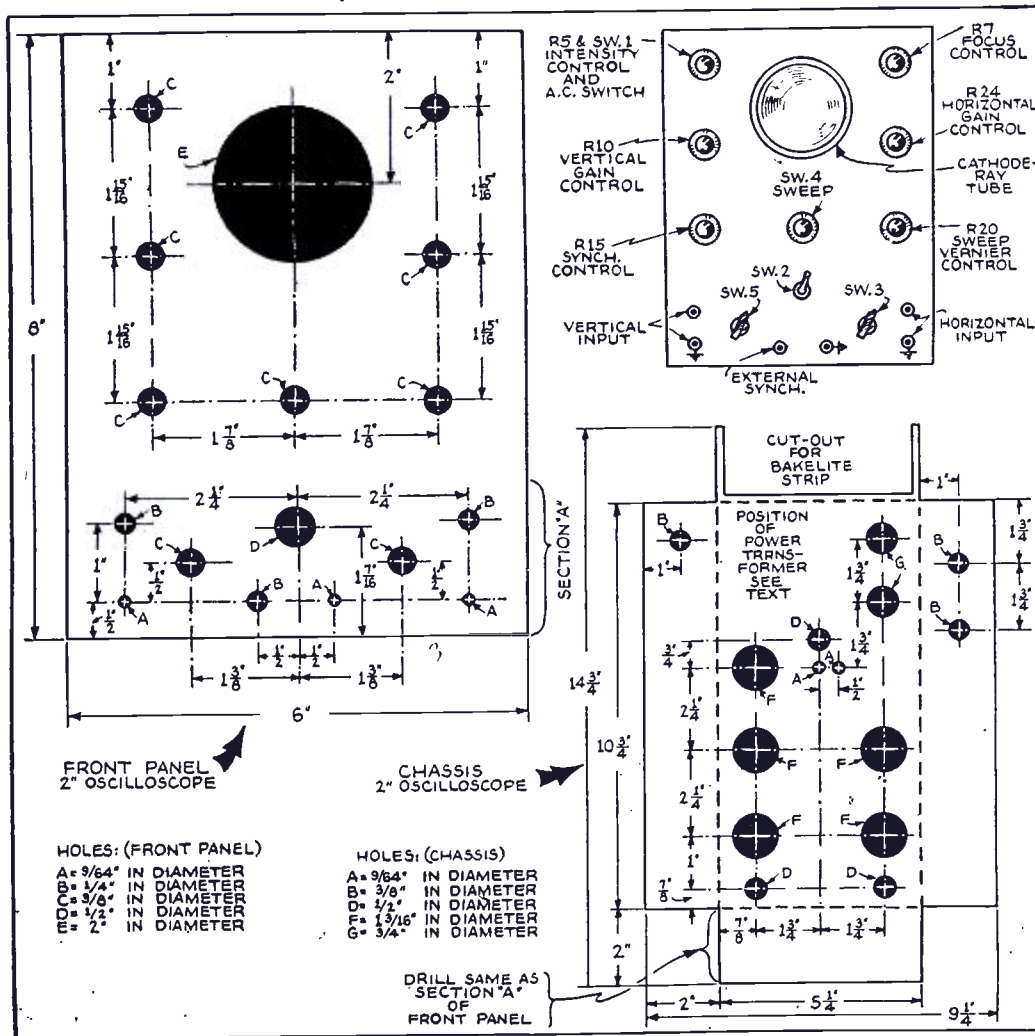
Does Things Big Scopes Do

Many operating conveniences have been built into this scope—conveniences and accessories generally found only in the larger scopes, but which are no less necessary for the operation of a 2-inch unit. Before describing the "innards" of the scope, we might make mention of the chassis and cabinet. The chassis is $5\frac{1}{4}$ " x $10\frac{3}{4}$ " x 2" and fastened to the 6" x 8" panel by the three switches. Chassis and panel are furnished with the new Bud oscilloscope cabinet which was specially designed for this use. Reference to the several photos and layout drawings will show where all the components are mounted. Some juggling with the position of the power transformer will be necessary, since it is quite close to the 902 tube socket. This caused a little distortion of the beam spot; instead of a perfectly round spot, we had a slightly elongated spot. Turning the transformer at an angle produced the desired round spot.

All controls on front panel.

Except for the horizontal and vertical *centering controls*, all the controls were mounted on the front panel. These two controls, R27 and R26, are mounted on the side of the chassis and the new plug-in shaft type controls were used so that after the chassis was fastened into the cabinet, the control shafts were then inserted through previously prepared half-inch holes in the cabinet. Not only do they allow the spot

Layout Details of Chassis and Panel.



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to be positioned in the exact center of the screen for ordinary work, but for special uses the axis may be displaced from the center of the screen.

The remaining controls are all mounted on the panel, and in enumerating them we will give their purpose and functions.

The *intensity control* R5, varies the bias to the 902 grid, which in turn varies the current to Anode No. 2. Decreasing the bias voltage increases the second anode current and increases the spot size as well as the intensity. A line switch SW1 is mounted on the intensity control.

The *focusing control* R7, varies the voltage applied to Anode No. 1, as varying the ratio of voltages applied to the two anodes changes the focusing of the spot on the screen.

The *vertical gain control* R10 merely controls the gain of the single stage vertical amplifier, which is quite similar to an ordinary audio amplifier. The *horizontal gain control* R24 performs a like function for the horizontal amplifier, used to amplify the sawtooth sweep voltages when using the internal sweep. It can also be used to amplify external sweep voltages.

When using the sweep oscillator, it is desirable to synchronize the oscillator with some of the voltage applied shunted to the vertical plates. R15 allows us to vary this synchronizing voltage in order to obtain perfect synchronization.

Oscillator sweep frequency is controlled by switch SW4, which gives a *coarse* frequency adjustment, and R20 which is the *fine* frequency adjustment control. The switch varies the oscillator frequency in five ranges up to approximately 25,000 cycles. The sixth position on the switch is not connected, thus stopping the 884 from oscillating. On any one of the ranges, R20 gives a continuous variation of oscillation in that range.

A single-pole double-throw toggle switch, SW2, throws the vertical amplifier on or off. When applying high voltages to the vertical plates, it is not necessary to use this amplifier. Also, when measuring R.F. voltages, it is necessary to apply them directly to the deflecting plates without the aid of the amplifier.

SW5 is a single-pole, 3-position rotary switch used for obtaining synchronization voltage from different sources. The most common way is internally, through the vertical amplifier output. Another way is from some external source; a pair of binding posts is provided for this purpose. The last method is 60 cycle synchronization and is particularly helpful when making hum measurements on audio amplifiers.

The last switch, SW3, is a double-pole, 3-position rotary switch used in the horizontal plates circuit. In position No. 1 the horizontal amplifier is employed for amplifying the sawtooth oscillator sweep voltage. In position No. 2, the input of the horizontal amplifier is connected to a pair of binding posts so that an external sweep voltage can be used. Position No. 3 allows us to connect an external sweep voltage directly to the horizontal deflecting plates without the use of the amplifier, and is particularly useful for R.F. measurements.

Besides a warning to the constructor against the comparatively high voltages encountered in this scope—about 500 volts—we might warn the builder against *burning* the fluorescent screen. Too bright a spot, or a stationary bright spot, will cause the screen to burn, leaving dark spots or lines. Therefore always *keep the spot moving* and *keep the brilliance as low as possible!*

It will be noticed that the rear drop of the chassis has been cut out and a piece of bakelite mounted there. On this strip are the binding posts, enabling us to make con-

nections directly to the deflecting plates and to disconnect the amplifiers entirely if it is so desired. A single terminal is also provided; this is connected to the 902 control grid, thus allowing us to use the scope as the viewing tube in a *television receiver* at some later date.

If the constructor wishes to keep his initial cost as low as possible, he can start out with a minimum of parts. These need include only the cathode ray tube and a power supply such as is shown in the diagram. Because of the slight current drain, this power supply is quite simple. Focussing and intensity controls only are necessary. Centering controls can be dispensed with, since a good new tube not placed near a magnetic field will generally have the spot near the center of the screen. If the spot is not near the center, the tube has probably been bounced around a bit. A simple method of centering would make use of a pair of cheap magnets, so positioned as to bring the spot to the center of the screen.

A voltage divider across the 110 volt A.C. line will furnish us with a 60-cycle sine wave sweep, which, while not as satisfactory for most purposes as a sawtooth wave, will still be quite satisfactory.

(A television receiver built around this scope will be described in an early issue.—Editor)

Parts List

I. R. C.

- 2—1000 ohm ½ watt, type BT½, R-11, R-23
- 1—1500 ohm ½ watt, type BT½, R-17
- 1—20,000 ohm ½ watt, type BT½, R-6
- 4—100,000 ohm ½ watt, type BT½, R-8, R-9, R-14, R-22
- 1—25,000 ohm ½ watt, type BT½, R-16
- 3—1 megohm ½ watt, type BT½, R-13, R-25, R-21
- 1—2 megohm ½ watt, type BT½, R-28
- 1—750,000 ohm ½ watt, type BT½, R-19
- 1—300 ohm ½ watt, type BT½, R-18
- 1—2000 ohm 2 watt, type BW-2, R-1
- 1—2500 ohm 2 watt, type BW-2, R-2
- 1—250,000 ohm 1 watt, type BT-1, R-3
- 1—50,000 ohm 1 watt, type BT-1, R-4
- 1—40,000 ohm 1 watt, type BT-1, R-29
- 1—75,000 ohm 1 watt, type BT-1, R-12
- 1—25,000 ohm potentiometer, type 11-120, R-5
- 1—50,000 ohm potentiometer, type 11-123, R-7
- 1—100,000 ohm potentiometer, type 11-128, R-15
- 2—100,000 ohm potentiometers, plug-in shaft type 6449, R-26, R-27
- 1—1 megohm potentiometer, type 13-137, R-10
- 1—2 megohm potentiometer, type 13-139, R-24
- 1—5 megohm potentiometer, type 11-141, R-20
- 1—Switch for control R-5, No. 21

SOLAR MFG. CO.

- 1—8 x 8 x 8 mf. 500 volt electrolytic No. D838, C-1, 2, 3
- 1—8 mf. 450 volt electrolytic, No. D808, C-4
- 7—.1 mf. 400 volts paper, No. MP4147, C-5, C-8, C-12, C-15, C-6, C-16, C-19
- 2—.1 mf. 600 volts paper, No. MP4140, C-17, C-18
- 1—.05 mf. 400 volts paper, No. MP4145, C-7
- 1—.02 mf. 600 volts paper, No. MP4137, C-11
- 1—.5 mf. 600 volts paper, No. SO265, C-13
- 1—.001 mf. mica, No. MW1227, C-9
- 1—.005 mf. mica, No. MW1239, C-10
- 1—4 mf. 450 volt electrolytic, M404, C-14

RCA MFG.

- 1—2" cathode ray tube, type 902
- 2—6SJ7
- 2—6ZY5G
- 1—884

BUD MFG. CO.

- 1—Cabinet and chassis, No. C-1755
- 1—SPST toggle switch, No. 1003, SW-2

THORDARSON

- 1—Power transformer, No. T-92R33

CROWE NAME PLATE & MFG. CO.

- 6—Dial plates, No. 841-B
- 7—Knobs, No. 591

AMERICAN PHENOLIC CORP.

- 5—Steatite octal sockets, No. RSS8
- 1—Cathode ray tube socket assembly with bracket, No. 913

P. R. MALLORY

- 2—2-circuit, 3-contact rotary switches, No. 3223J, SW-5, SW-3 (use as single circuit)
- 1—1-circuit, 6-contact rotary switch, No. 1316L, SW-4

The Battle of Asheville

By L. R. McDonald, W8CW



Ted R. McElroy, winner of code test at 75.2 W.P.M.

L. R. McDonald, the author.

the relay out of adjustment. It was finally adjusted to our satisfaction, but caused a certain amount of trouble during the contest.

As the professional contest started, Ted McElroy was seated about six feet from the Creed machine, while W4CRV, an old railroad operator, and I sat side by side, about fifteen feet from the machine. The tape came through smoothly and it was music to my ears. I waited until about half a line had been sent, then started copying behind. This was at 50 w.p.m. and W4CRV copied right along. Through successive speeds I had no difficulty nor strain in copying until about 65 w.p.m. had been reached, when I found I had to quit watching the audience, and settle down to business. W4CRV dropped out later.

I heard Ted Mac's typewriter stop for a long period during the 65-word spurt and I thought I had him. He tells me the stuff jumbled up badly during that speed and he lost some of it. I heard it jumble up myself, but managed to retain the continuity of the story and wrote every word. At 70 w.p.m. the same thing occurred again, the stuff just simply jumbled up due to the relay flopping, and both of us missed the same words, proving it was really a machine fault. At 70 I was copying with some difficulty, but putting it all down. I copied all through the 75 w.p.m. lap, but some of the words in the first line came to me jumbled so badly, that in figuring them out, I had to drop almost a line behind, so that by the time I had figured them out and written down the poorly transmitted words, I had lost the greater part of a line of well sent stuff. I therefore left a gap for the judges to see, and went on, finishing the 75 w.p.m. round in good shape. When, at higher speed, the machine "broke up," Ted was often able to fill in by a sort of sixth sense.

It was practically a tie up to 75 w.p.m., but since the contest was to determine speed alone, Theodore R. McElroy retained his title, and I admire him as the fastest operator I have ever known.

Walter Candler could hardly believe it when he saw his two students copying at 75 w.p.m. It goes without saying that he was immensely pleased. Walter has been using Ted Mac and me for "guinea pigs" since 1919 in developing his code courses, and 75 words per minute gave to him and to the world the final proof that he had been right from the beginning.

New Catalogs

(Continued from page 474)

Burstein-Applebee

● THE new Burstein-Applebee 1940 complete catalog No. 56 contains 160 pages. There are sections on home and auto radios, communication receivers, P.A. systems, accessories, wire and cables, condensers, resistors, volume controls, transformers, analyzers and testers, batteries and chargers, tubes, electrical goods, tools and service aid, and an index in detail. In addition to the more usual radio devices there are descriptions of typewriters; electrical appliances, such as waffle irons, toasters, juicers, stoves, clocks, spotlights, replacement elements for irons and percolators, etc. There is a wide variety of tools for the service man, ranging from power drills and saws to pliers and hex wrenches. There are various paints, lacquers, enamels and dopes; and, of course, the major portion of the catalog is devoted to radio receivers, microphones, antennas and set components.

Aerovox

● THE new Aerovox general catalog for 1939-40 contains 28 pages, listing condensers, resistors and test instruments. This new issue has more items and more listings, and is therefore of greater interest to all radio workers, than any of the

● A NUMBER of stories have been written about the world championship code contest held in Asheville, N. C. In response to a request by RADIO & TELEVISION, I am giving here, for the first time, my own version of the contest. We used a Creed tape transmitter, and upon testing it out with a test tape, found



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company's previous catalog. The condensers are described not only as to working voltage but also as to dimensions and methods of mounting. The resistors are also thoroughly described. Among the instruments featured are a capacity and resistance bridge, an inductance and capacitance checker, a capacitor selector, an interference analyzer, and an emergency capacitor for refrigeration work.

New C-D Catalog for Amateurs

● THE Cornell-Dubilier Electric Corporation has recently issued a new 1939-40 16 page edition of its catalog, Radio Capacitors for All Requirements. Listed as No. 175-A in the series, this catalog deals with Mica, Paper, Dykanol, Wet and Dry Electrolytics for Amateurs and servicemen, gives a complete description and listing of the company's capacitor test instruments and Quietone interference filters. Many new types of capacitors recently developed in the manufacturer's laboratories are described for the first time in this catalog.

Xtal Catalog

● BLILEY ELECTRIC CO.'S crystal catalog G-11 covers general communication frequency quartz crystals, holders and ovens, for frequencies from 20 kc. to 30 mc. It should be of interest to radio engineers, station operators, purchasing agents and experimenters interested in the application of quartz crystals for frequency control, for use in filters, or for special optical and electrical applications. This 16-page publication does not list amateur frequency products.

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100-Watt Transmitter

(Continued from page 464)

The schematic diagram is shown in Fig. 1. Little need be said about the circuit because it is simple enough to be self-explanatory.

Two Power Supply Voltages

It will be noted that two supply voltages are indicated. It was intended that the transmitter be operated on two power supplies. One of 250 to 300 volts for the oscillator is sufficient to give adequate driving power for the final, and is also the correct value for the screens of the "final". The second power supply may be between 400 and 550 volts.

The keying resistor, R5, should be just large enough to stop the oscillator when the key is up. The value shown was found correct for most cases. The object of this resistor is to prevent high voltages across the key and to keep a load on the oscillator power supply when the key is up. This results in less voltage drop when the key is down and consequently a better note. This resistor also reduces key clicks.

The final stage is cross-neutralized. Neutralization is necessary, especially in this type of final, because the oscillator plate circuit and the final in this particular hook-up make a tuned plate-tuned grid oscillator circuit, and the final will oscillate by itself unless it is properly neutralized.

Only a cathode resistor is used to bias the final. This method positively protects the tubes when the oscillator is stopped, but has one disadvantage in that the biasing voltage will vary with the load when the final is delivering power. The resistor shown in the schematic and parts list is of the semi-variable type, so that the resistance can be varied. If the final is to operate efficiently, this cathode resistor must be adjusted so that the cathodes are about 60 volts positive with respect to ground for the operating condition.

The parasitic chokes shown between the grids of the final amplifiers suppress any tendency toward parasitic oscillation, which is an objectionable feature of parallel push-pull amplifiers. These chokes are home-made by winding about 30 or 40 turns of enameled wire on a 10,000 ohm, 1 watt resistor.

The circuit diagram indicates a meter for each stage and for the grid-return of the "final." A single meter may be used for all current measurements, if desired. The wiring for this arrangement is shown in Fig. 2. A two circuit, three position switch and appropriate shunts will be needed if this arrangement is to be used.

Layout Details

The arrangement of parts is quite clearly shown by the photographs. Most amateurs have parts on hand which will be used in the construction job, so exact specifications for the chassis will be useless. However, the recommended dimensions are given in Fig. 3, which shows the position of all tube, crystal and oscillator coil sockets. The oscillator plate coil is mounted with its axis parallel to the front panel and at a 90 degree angle with the final tank coil. The oscillator condenser is mounted between the oscillator tubes and the final. This arrangement makes possible very short connecting leads to the oscillator plates and the final grids. The final tank coil and condenser are mounted to the right of the final amplifiers. The neutralizing condensers are placed under the chassis and are mounted directly on the tube sockets.

The specifications for the final stage tank coils need not be covered here, since the

subject is adequately covered in any of the hand-books.

In operation, the transmitter is easily tuned and adjusted. If the oscillator coil indicated in the parts list is used, it will be necessary to remove about two turns from each end. The final is neutralized in the usual manner and the transmitter is ready for operation.

Under normal conditions, the oscillator plate current will be 75 to 100 milliamperes, the final grid current will be about 50 milliamperes and the final may be loaded up to 300 milliamperes. The coupling on the final will depend on the type of antenna. For a Zepp antenna, 3 or 4 turns at the center of the final tank coil will be sufficient.

In operating the transmitter, two precautions should be observed. First, the oscillator voltage should not be applied for any length of time without voltage on the final plates, because screen dissipation will be excessive and the tubes may be damaged. Second, never operate the transmitter with voltages in excess of 300 volts on the final unless the final is loaded either by the antenna or a dummy antenna. Since the final is cathode biased, plate dissipation will be excessive unless it is delivering power to a load. Also, the high R.F. voltage in the final tank circuit, when unloaded, may cause arcing over within the base of one of the tubes. If these precautions are observed, high plate voltages may be safely applied even when metal tubes are used. The transmitter shown in the photographs has been in operation for several months with 600 volts on the plates of the finals with absolutely no tube trouble.

The photographs shown are of a transmitter built to be mounted in an old Atwater Kent, Model 20, receiver cabinet. This makes a neat, compact job, but the parts must be crowded together and only metal tubes can be used. With care the transmitter can be made to fit this cabinet.

The original model was thoroughly tested under various conditions. It could easily be loaded up to 100 watts output on 80 or 40 meters and with careful adjustments would deliver 125 watts to an antenna or dummy load. Of course power should be reduced somewhat on 20 meters.

The total input for screens, plates and filaments of both stages at full load is about 210 watts. That means an overall efficiency of better than 50 percent.

Parts List

AEROVOX

C1—.002, type 1467
C2—.002, type 1467
C5—.002, type 1467
C6—.002, type 1467

BUD

C7—No. 911, 100 mmf. per section, dual condenser
C8—No. 331, 75 mmf. per section, dual condenser
L1—No. 1212, 2.5 mh. R.F. choke
L2—No. 1212, 2.5 mh. R.F. choke
L3—No. 1212, 2.5 mh. R.F. choke
L4—No. 1212, 2.5 mh. R.F. choke
L5—No. 876, 2.5 mh. R.F. choke
L6—No. 1212, 2.5 mh. R.F. choke

BARKER & WILLIAMSON

L7—MC Baby inductor, for band selected

NATIONAL

Cn—Type NC600 neutralizing condenser

IRC

R1—2 watt, 25,000 ohms, type BT2
R2—10 watt, 150 ohms, type AB
R3—25 watt, 500 ohms, type DHA, semi-variable
R4—10 watt, 5000 ohms, type AB
R5—2 watt, 5000 ohms, type BT2

AMPHENOL

6—Super MIP octal sockets
2—MIP 5-prong sockets

SANGAMO

C3—.00015, 1000 volt mica
C4—.00015, 1000 volt mica

MISCELLANEOUS

6—Tubes, type 6L6
M1—0-100 ma. meter
M2—0-200 ma. meter
M3—0-500 ma. meter
Chassis, as per Fig. 3
L8—Home-made tank coil for band selected
Ch—Parasitic chokes (see text)
2—No. 302 cone type stand-off insulators

BOOK REVIEW

THE BASSETT HANDBOOK OF ROTARY BEAM DESIGN FOR 1939. Paper covers, contains 42 pages, illustrated, size 6 1/4" x 9 1/4". Published by Chamberlin Bassett Research Corporation, Niles, Mich.

This book is a valuable treatise for every "ham" and student of short-wave engineering. Diagrams and formulas are given showing the radiation characteristics of the dipole type aerial, the design of the rotary beam—with the correct lengths of the different elements, the effect of tilting the array, etc. Further sections describe the advantages of the three and four element arrays, and a very important part of the booklet describes and illustrates, with diagrams, the highly important subject of transmission lines and feeding the rotary beam arrays. Amateurs will find particularly interesting the section on concentric feeders (co-axials), with diagrams showing how to connect. The new co-axial antenna for amateur and police use is described, as well as television co-axial antennas. Automatic motor drive and indicating mechanisms for rotary beams are described, as well as transformers for connecting concentric feeders with antennas and terminal apparatus.

THE AMPLIFICATION AND DISTRIBUTION OF SOUND by A. E. Greenlees, A.M.I.E.E., with stiff cloth covers, contains 254 pages, size 6" x 8 3/4". Published by The Sherwood Press, Cleveland, Ohio.

This book should prove very valuable to every student of radio, service men and all others interested in any way in the subject of audio frequency amplifiers, loud speakers and P.A. systems. The first part of the book treats on the fundamentals of radio circuits, including a special treatment on the decibel and what it means. Chokes and transformers are discussed with simple diagrams, as is the operation of amplifiers for audio frequency amplification. Among the subjects covered and described in the performances of amplifiers are—the decibel gain of amplifiers, harmonic distortion, frequency response, noise level, power consumption, performance measurements, amplification, output power measurements, etc. Later chapters deal with amplifying equipment, the use of radio receivers in P.A. systems, microphones, record reproduction, loud speakers, installation planning, distribution lines and load matching, maintenance of equipment, and central installations.

TELEVISION AND SHORT-WAVE HANDBOOK, by F. J. Camm, contains 272 pages, size 5 1/2" x 8". Published by Fortuny's, New York, N. Y.

British images are composed of 405 rather than 441 lines and the British waves are polarized vertically instead of horizontally. This tends to be somewhat confusing to the American experimenter whose only source of knowledge has been a book prepared for those familiar with the British system. However, the author of this book, who is editor of several technical and radio magazines, has covered the subject of television from its earliest beginnings up to the iconoscope and cathode ray tube.

An interesting section of the volume deals with short wave circuits for receivers, adapters, converters and wave meters. A portion of the book is devoted to a dictionary of television terms, while other sections describe aerial systems, etc. One criticism is that in the table of cathode ray tubes given, the only makes that appear are those of British and Continental manufacturers.

TECHNICAL MANUAL, compiled and published by Hygrade Sylvania Corporation, contains 263 pages, size 4 1/2" x 9 3/8".

This new technical tube manual is thoroughly up-to-date for this manufacturer's diversified line, including many of the new dual purpose tubes and even some television receiving and picture tubes. The tubes are listed numerically and alphabetically for ready reference. Each listing gives the physical appearance, socket connections, characteristics and applications of the tubes. An additional index is provided at the front of the book in order to facilitate reference to its contents. In addition, there is a section on the fundamental properties of vacuum tubes, definitions of various terms used, general tube and circuit information, and several pages of diagrams showing receiver and amplifier circuits. Another highly valuable section is a chart giving bias resistor values for standard types of tubes used with various plate voltages and in divers applications. The appendix also gives fundamental laws of electricity, and tells which of Sylvania's tubes are interchangeable with those bearing other manufacturers' type numbers.

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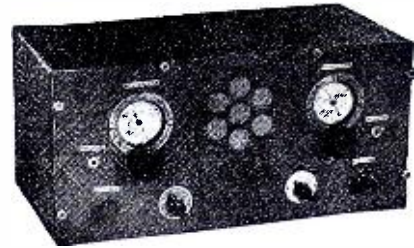
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RADIO AND EDUCATION by David Sarnoff contains 27 pages, size 5 3/8" x 6 1/4".

In this valuable volume Mr. Sarnoff, President of RCA and Chairman of the Board of NBC, gives his opinion of the application of radio for education, as delivered in an address at the 75th Annual Convocation of the University of the State of New York.

Mr. Sarnoff traces radio from the days of Marconi to the present time and tells of the early years of broadcasting in 1920 and the rise of the industry thenceforward. He touches upon the passage of the act which created the Federal Radio Commis. (now the F.C.C.) and tells how the NBC was created by RCA in the Fall of 1926. Considerable space is given to the work of the NBC Advisory Council, five members of which are eminent in the world of education. Mr. Sarnoff points out that only 30% of NBC's time is paid for, the remaining 70% being devoted to "sustaining" programs—many of which are educational. Among the latter are music, news and public affairs, religion, drama and literature, and agriculture. Mr. Sarnoff also makes mention of the television service inaugurated in April of this year. He closes his booklet with a discussion of American traditions and the American system of broadcasting.

TELEVISION, published by David McKay, Philadelphia, contains 68 pages, size 5" x 7 3/8".

M. G. Scroggie, the author, is a consulting radio engineer and has endeavored in this volume to give a simplified explanation of television and how it works. The book, printed in Great Britain, may appear slightly unfamiliar to American radio fans, as motion pictures are referred to as cinema and various other Anglicisms are used. However, for one who wishes to get a good grounding in the elements of television, the volume may prove useful.

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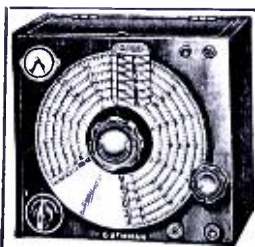
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Newest Radio Apparatus

New Tape Recorder

● COMPLETELY self-contained is this practical telegraph-recording instrument. It offers both visible and audible means of transmitting and receiving code.

Recording of dots and dashes on moving tape is performed by means of an inked disc. Printed tape enables both sender and receiver to recheck messages.

Improvement of transmission technique, as well as code knowledge, is made possible. As a practice device, the Tele-Recorder may be used individually, or in combination with other units.

It is not necessary to be present at the set in order to receive messages. Automatic recording takes down the code.



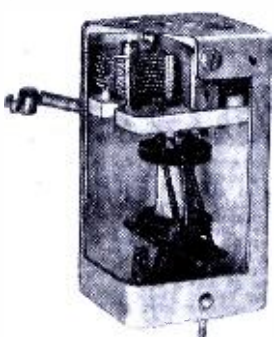
The unit is entirely self-contained, working directly from A.C. house current through the transformer supplied with the kit. Operation of the key may be made to produce a buzzer signal only, or a printed record on tape moved by a built-in electric motor.

When two units are connected, the send-receive switch on either instrument causes recording at both receiver and transmitter. When the send-receive switch is set at neutral, only the buzz-signal operates between sets. This saves tape.

The units may be used satisfactorily over considerable distances, particularly with A.C. current. The only requirement is that the connecting wires be of ample size.

The Tele-Recorder, introduced by Willor Mfg. Corp., may be operated with standard dry cells where electricity is not available.

I.F. Transformer



● THE new National I.F. transformer makes use of two air dielectric condensers isolated from each other by an aluminum shield and mounted on a low loss ceramic base. The coils are Litz wound on a polystyrene form and thoroughly impregnated with liquid Vietron. Such features as these make the HRO exceptionally stable and enable it to give excellent performance under

adverse conditions in all types of climate.

Acoustic Phone Cap

● A NEW type of headphone, being manufactured by Paul Jarnak, is said to afford full dynamic sound reproduction. Built into the cap of the phone is a type of acoustic labyrinth which is claimed to build up audible frequencies. The inventor and



manufacturer has certificates from leading testing laboratories to substantiate his claims. The phones are available in complete headset units, or the caps may be had separately to attach to practically any standard make of headset.

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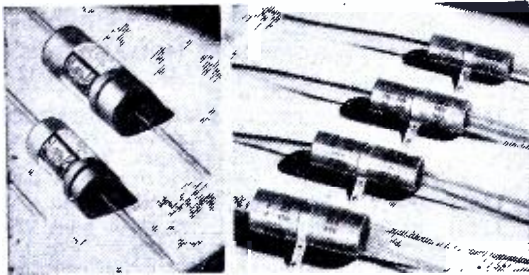
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New Tubular paper capacitors at left: dual electrolytics at right.

Dual Electrolytics: Cornell-Dubilier Type BRL tubular electrolytic condensers are dual units with a common negative lead and polarity clearly marked. Each unit is supplied with a sturdy mounting strap around its center. Only three solder connections are needed instead of four, as would be the case were individual capacitors employed. These capacitors provide the excellent physical and electrical characteristics of the well-known BR Type and are available in voltage ratings of 25, 50, 150, 250, and 450 D.C.

New Cat. No. 175A describing these units is sent free on request.

Sprague Introduces Three Universal Spade Bolt Condenser Types



● THREE new spade bolt type tubular cardboard dry electrolytic condensers recently announced by the Sprague Products Company are designed to serve as universal replacements for the condensers of this type now used in many popular radio receivers. Known as the Type SB Condensers, these units are equipped with spade bolt mounting and are of the sealed type construction. They include an 8-8 mf. 450 working volts unit capable of withstanding a surge of 525 volts; and 8-16 mf. 450 v. unit with a surge of 525 volts; and a 12-16 unit of 200 working volts and handling a surge voltage of 225 volts.

These condensers are described in the new Sprague 1939-40 Catalog just off the press, copy of which will be sent upon request.

Band Switching Assemblies

● A NEW series of band switching assemblies for amateur transmitting applications has just been announced by Bud Radio, Inc. Three units are included in this new line, and all are designed for operation from 10 to 100 meters. Each unit requires a 100 mmf. condenser of suitable spacing to tune all bands.

The OCS-1 band switch assembly is intended for use in a pentode oscillator or buffer stage that is capacity coupled to the following stage. A maximum input of 50 watts may be applied to the stage using this unit.



The XCS-1 band switch assembly is designed for use in push-pull grid or plate circuits, or single ended plate circuits where plate neutralization is used. All of the coils in the assembly are center-tapped and center-linked. This unit is intended for operation in stages where the input power does not exceed 100 watts.

The XCS-2 assembly is intended for use in single-ended pentode plate circuits and single-ended grid circuits.

Frequency Generator



● DUE to the demand for an accurate, inexpensive 100-1000 kc. frequency standard, the Browning Laboratories has recently announced the Browning frequency generator. It incorporates extremely stable 100-1000 kc. oscillators which can be set independently to

their respective frequencies by zero beating against WWV's standard frequency. The accuracy of setting these oscillators against WWV is at least 1 part in 200,000. Either audio modulation or a pure R.F. signal may be obtained and the amplitude of either varied by means of an attenuator. A mixer tube is incorporated so that signal generators, oscillators, exciters, transmitters, etc., may be checked accurately at 100 kc. intervals by the zero beat method without auxiliary apparatus. The accuracy of the check points is claimed to be at least 1 part in 40,000. The apparatus is available either in kit form or laboratory built.

Balanced Line Cable Set with New Microphone

● A NEW Dynamic Microphone, Model 33D, being produced by the Turner Co., has a 25 foot Balanced-Line changeable cable set, which permits operation under noisy circuit conditions.

Turner Model 33D is full satin-chrome finished in streamline style and is ruggedly built for recorder or P.A. work, and is ideal for the ham. It will withstand bad climatic conditions, and reasonably rough handling.

The head tilts over a full 90 degree range, allowing semi- or non-directional pick up. Long lines of 100 feet are possible with high impedance, and thousands of feet with low. It has a good output level of -54dB at high impedance, and a range of 40-9000 cycles without peaks to cause feedback. The built-in transformer is free from hum pick up. This unit is available in 50 ohm design and in 200 or 500 ohms (high impedance) with a 25 foot removable cable set.

The Turner 33X Crystal microphone is the same in appearance as the 33D Dynamic.

The New Tubes

● TWO new tubes have been announced by RCA. First of these is the type 828 Transmitting Beam Power Amplifier which is a multi-electrode tube with a maximum plate dissipation of 80 watts (ICAS) for class AB₁ and Class C telegraph service. It contains a suppressor, has beam power features, and is designed especially for class AB₁ modulator and A.F. power amplifier. It is also well suited for use in R.F. applications as an R.F. power amplifier, frequency multiplier, oscillator, and grid or plate-modulated amplifier. Two 828's in class AB₁ will deliver 300 watts with only 1% distortion. Neutralization is unnecessary in adequately shielded circuits and the tube may be operated at frequencies as high as 30 mc. and at reduced ratings up to 75 mc. It is equipped with the new "micanol" base. Some of its characteristics are as follows: Filament voltage A.C. or D.C., 10; filament current, 3.25 amps; transconductance, 4,500 micromhos. The tube is designed to operate with a maximum of 2,000 volts on the plate, and its plate dissipation is 80 watts maximum. Two tubes employed in push-pull class AB₁ with a similar plate voltage will produce 385 watts maximum signal power output. When used in Class B telephony with 1,500 volts on the plate, a single tube will produce 41 watts output, and when used as a grid-modulated R.F. power amplifier in Class C telephony, the same conditions obtain. When used as plate-modulated R.F. power amplifier in Class C telephony with 1,250 volts on the plate, 150 watts power output can be obtained, and when used as an R.F. power amplifier and oscillator in Class C telephony, 1,500 volts on the plate can be used to provide an output of 200 watts.

A booklet prepared by the manufacturer gives further characteristics of this tube.

811 Transmitting Triode is designed for Class B modulator service in which two tubes can modulate 100% an R.F. amplifier with 450 watts input. No grid bias is required at plate voltages up to 1,250. This tube may also be used as an R.F. amplifier and frequency doubler. Some of its characteristics are as follows: Filament voltage (A.C. or D.C.) 6.3; filament current, 4 amperes; as A.F. power amplifier and modulator, Class B, plate voltage, 1,500; maximum signal power output, 225 watts. As R.F. power amplifier, Class B telephony, maximum plate voltage, same; power output, 25 watts. As plate-modulated R.F. power amplifier, Class C telephony, maximum plate voltage, 1,250; power output, 120 watts. As R.F. power amplifier and oscillator, Class C telephony, maximum plate voltage, 1,500; power output, approximately, 170 watts.

This tube likewise is described in an 8-page booklet produced by the manufacturer.

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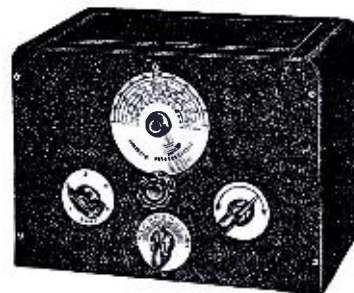
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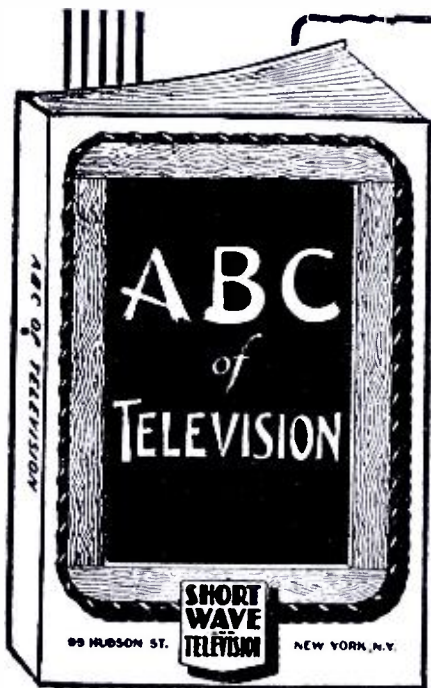
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CHAPTER 3—Need for a large number of picture elements; need for broad channel width in transmission of high-fidelity television signals.
CHAPTER 4—The use of the cathode ray tube in television receivers; necessary associated equipment used in cathode-ray systems.
CHAPTER 5—How a television station looks and how the various parts are operated.

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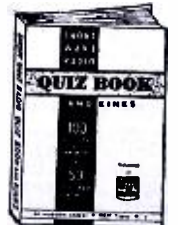
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Mc. Call
 11.970 M12X CIUDAD TRUJILLO, D. R., 25.07 m., Addr. La Voz de Hispaniola. Relays HIX Tue. and Fri. 8.10-10.10 pm. Sun. 7.40-9.40 am.

25 Met. Broadcast Band

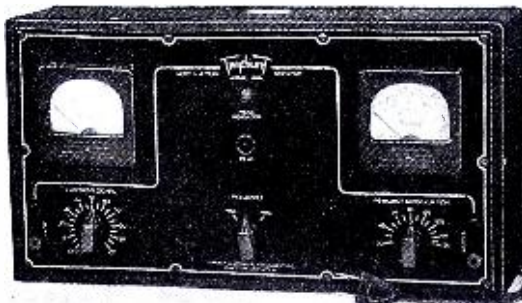
11.940 T12XD SAN JOSE, COSTA RICA, 25.13 m. La Voz del Pilot. Apartado 1729. 7.30 am.-noon, 4-10 pm.
 11.910 CD1190 VALDIVIA, CHILE, 25.19 m., P. O. Box 642. Relays CB69 10 am.-1 pm., 3-6, 7-10 pm.
 11.910 — HANOI, FRENCH INDO-CHINA. 25.19 m. "Radio Hanoi", Addr. Radio Club de l'Indochine. 3.45-4.15 am., 7-9.30 am., 150 watts.
 11.900 XEW1 MEXICO CITY, MEXICO, 25.21 m., Addr. P. O. Box 2874. Mon., Wed., Fri. 3-4 pm., 9 pm.-12 m. Tues. and Thur. 7.30 pm.-12 m., Sat. 9 pm.-12 m., Sun. 12.30-2 pm.
 XGX YUNNAN. SEE JOE MILLER ARTICLE (China News Section.) Page 471.
 11.895 2RO13 ROME, ITALY. 25.23 m. Irregular 6-9 pm.
 11.885 TPB11 PARIS, FRANCE, 25.24 m., 8.30-11 pm. beamed to U.S.
 11.885 TPB12 PARIS, FRANCE, 25.24 m. (See 15.245 mc.) 6-8.15 pm. Beamed to S. A.
 11.880 VLR3 MELBOURNE, AUSTRALIA. 25.25 m. 3.30 pm.-3 am.
 11.870 WPIT PITTSBURGH, PA., 25.26 m., Addr. (See 21.540 mc.) 1-10 pm.
 11.870 YUM2 MADRAS, INDIA, 25.26 m. M.W.F. 3.30-4 am. Irregular.
 11.865 — BERNE, SWITZERLAND. 25.28 m. Irreg. 8-9 pm. to No. Amer.
 11.860 GSE DAVENTRY, ENG., 25.30 m., Addr. (See 11.75 mc.) 12.57 am.-12 n.; 1.45-3.25 pm.
 11.855 XMHA SHANGHAI, CHINA. 25.31 m. 5-11 am.
 11.855 DJP BERLIN, GERMANY, 25.31 m., Addr. (See 15.200 mc.) 12.05-2 am., 4.50-10.50 pm.
 11.850 CB1185 SANTIAGO, CHILE, 25.32 m. Sat. 6-11 pm. and irreg.
 11.850 OAX2A TRUJILLO, PERU, 25.32 m. Testing on this freq. (See 12.200).
 11.840 KZRM MANILA, P. I., 25.35 m. Addr. Erlanger & Gallinger, Box 283. 9 pm.-10 am. Irregular.
 11.840 CSW LISBON, PORT., 25.35 m. Nat'l Broad. Station. 11.30 am.-1.30 pm. Irregular.
 11.840 OLR4A PRAGUE, BOHEMIA, 25.35 m., Addr. Czech Shortwave Sta., Praha XII, Fochova 16. Daily 6.45-9 pm.
 11.830 WCBI CHICAGO, ILL., 25.36 m., Addr. Chicago Federation of Labor. Irregular 7 am.-6 pm.
 11.830 WCBX NEW YORK CITY, 25.34 m., Addr. Col. Broad. System, 485 Madison Av., N.Y.C. Daily exc. Sat. and Sun. 4-6 pm.; Sun. 3-6 pm.; Sat. 1-6 pm. Daily 6.30-10 pm.
 11.826 XEBR HERMOSILLA, SON., MEX., 25.37 m., Addr. Box 68. Relays XEBH. 9.30-11 am., 1-4 pm., 9 pm.-12 m.
 11.810 2RO4 ROME, ITALY, 25.4 m., Addr. E.I.A.R., Via Montello 5. Daily 4.30-8.45 am., 10 am.-2.30 pm., 6-9 pm.
 11.805 OZG SKAMLEBAK, DENMARK, 25.41 m. Addr. Statsradiofonien. Irreg.
 11.801 DJZ BERLIN, GERMANY, 25.42 m. Addr. See 15.280 mc. 4.50-10.50 pm. To No. America. Irregular.
 11.800 COGF MATANZAS, CUBA, 25.42 m., Addr. Gen. Betancourt 51. Relays CMGF. 2-3, 4-5, 6 pm.-Mid.
 11.800 JZJ TOKYO, JAPAN, 25.42 m., Addr. Broadcasting Co. of Japan, Overseas Division 7-9.30 am., 2-4, 4.30-5.30 pm.
 11.795 DJO BERLIN, GERMANY, 25.42 m. Addr. (See 15.280 mc.) Irreg.
 11.790 WRUL BOSTON, MASS., 25.45 m., Addr. (See 15.130 mc.) Sun. 10 am.-12 n.; Mon.-Fri. 3-5 pm.; Sat. 1.45-5.45 pm.
 11.780 — LUXEMBURG, LUXEMBURG, 25.47 m. Radio Luxemburg. Heard 8.30-10 pm.
 11.780 HP5G PANAMA CITY, PAN., 25.47 m., Addr. Box 1121. Noon-1 pm., 6-10 pm.
 11.780 OFE LAHTI, FINLAND. 25.47 m. Addr. (See OFD, 9.5 mc.) 1.05-3 am., 5-6.20, 10 am.-12.30 pm.

Mc. Carf
 11.775 MTCY Hsingking, Manchukuo, 25.48 m. Addr. Central Broadcasting Station. 1.30-2.15 am.
 11.770 DJD BERLIN, GERMANY, 25.49 m., Addr. (See 15.280 mc.) 11.30 am.-4.25 pm., 4.50-10.50 pm.
 11.760 TGWA GUATEMALA CITY, GUAT., 25.51 m. (See 17.8 mc.) Irregular 10-11.30 pm. Sun. 6-11.30 pm., irregular.
 11.760 XETA MONTEREY, MEX. 25.51 m., Addr. Box 203. Relays XET, n.-3.30 pm. and evenings.
 11.760 OLR4B PRAGUE, BOHEMIA, 25.51 m. Addr. (See 11.840 mc.) Daily exc. Sun. 8.25-10.05 am.
 11.750 GSD DAVENTRY, ENG., 25.53 m., Addr. B.B.C., London, 12.57-5.15 am.; 12.22 pm.-3.25; 3.45-6; 6.20-9.15 pm.; 9.37 pm.-12.30 am.
 11.740 SP25 * WARSAW, POLAND, 25.55 m.
 11.740 HVJ VATICAN CITY, 25.55 m. Tues. 8.30-9 am.
 11.740 CR6RC LOANDA, ANGOLA, 25.55 m., Tues., Thurs., Sat. 2-3.30 pm.
 11.735 COCX HAYANA, CUBA. 25.57 m. P. O. Box 32. Daily 8 am.-12 m. Sun. 8 am.-1 am. Relays CMX.
 11.735 LKQ OSLO, NORWAY, 25.57 m. 4.30-6.40 am., Sun. 2.30-6.40 am.
 11.730 PHI HUIZEN, HOLLAND, 25.57 m., Addr. N. V. Philips' Radio.
 11.730 WRUW-WRUL BOSTON, MASS., 25.58 m., Addr. World-Wide B'cast'g Foundation, University Club. Sun. 2-7 pm.; Mon.-Fri. 5.30-7.45, 8-11.15 pm. Sat. 6-8 pm.
 11.725 JWV3 TOKYO, JAPAN, 25.57 m. Now on regular schedule from 1.15 am. daily on, and irregular from 4-7.30 am.
 11.720 CJRX WINNIPEG, CANADA, 25.6 m., Addr. James Richardson & Sons, Ltd. Daily 6 pm.-12 m., Sat. 6 pm.-Sun. 4 am.
 11.720 ZP14 VILLARICA, PARAGUAY, 25.60 m. Mon. to Fri. 5-8 pm., Sat.-Sun. 11 am.-6 pm.
 11.718 CR7BH LAURENÇO MARQUES, PORTUGUESE E. AFRICA, 25.6 m. Daily 12.05-1, 4.30-6.30, 9.30-11 am., 12.05-4 pm., Sun. 4-7 am., 10 am.-2 pm.
 11.715 TPA4 PARIS, FRANCE, 25.61 m., (See 15.245 mc.) 6-8.15, 8.30-11 pm. to No. America.
 11.710 YSM SAN SALVADOR, EL SALVADOR, 25.62 m., Addr. (See 7.894 mc.) 1-2.30 pm.
 11.710 — SAIGON, FRENCH INDO-CHINA. 25.62 m., Addr. Boy-Landry, 17 Place A Foray. 7.30-9.45 am.
 11.705 SBP MOTALA, SWEDEN, 25.63 m., 1-4.15 pm. Sun. 3 am.-4.15 pm. Wed and Sat. 8-9 pm.
 11.700 HP5A PANAMA CITY, PAN., 25.64 m. Addr. Radio Teatro, Apartado 954. 10 am.-1 pm., 5-10 pm. Sun. 6-10 pm. 7-8.30 am.
 11.700 CB1170 SANTIAGO, CHILE, 25.65 m. Addr. P.O. Box 706. Relays CB89 10 am.-2 pm., 3.30-11 pm.

End of Broadcast Band

11.676 IQY ROME, ITALY. 25.7 m. 5.20-5.40 am. ex. Sun., Daily 12.07-12.56, 1.50-2.30 pm.
 11.535 SPD * WARSAW, POLAND, 26.01 m., Addr. 5 Mazowiecka St. 6-9 pm.
 11.402 HBO GENEVA, SWITZERLAND, 26.31 m., Addr. Radio Nations. 1st Sun of mo. 12.45-2.30 am., 1.45-2.30 pm. Mon. 6.45-8.15 pm., 8.45-10.15 pm., Tues. 12.45-2.45 pm. Sun. 8.45-10 pm.
 11.040 CSW5 LISBON, PORTUGAL, 27.17 m., Addr. Nat. Broad Sta. 11 am.-4.30 pm. Sun. 10 am.-4.30 pm.
 11.000 PLP BANDOENG, JAVA, 27.27 m. Relays YDB. 6-9 pm., 10.30 pm.-2 am., 4.30-10.30 or 11 am. Sat. until 11.30 am.
 10.950 FIQA TANANARIVE, MADAGASCAR, 27.40 m., Addr. (See 9.38 mc.) 12.30-45, 10-11 am., 2.30-4 am., 8.45-10 pm.
 10.670 CEC SANTIAGO, CHILE, 28.12 m. Irregular.
 10.660 JVN NAZAKI, JAPAN, 28.14 m. Broadcasts daily 1.50-7.40 am. Works Europe irregularly at other times.
 10.535 JIB TAIHOKU, TAIWAN, 28.48 m. Works Japan around 6.25 am. Broadcasts, relaying JFAK 9-9.55 am., 1-2.30 am. Sun. to 10.15 am.

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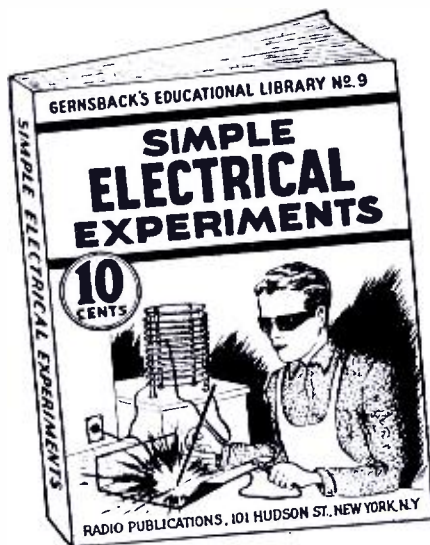
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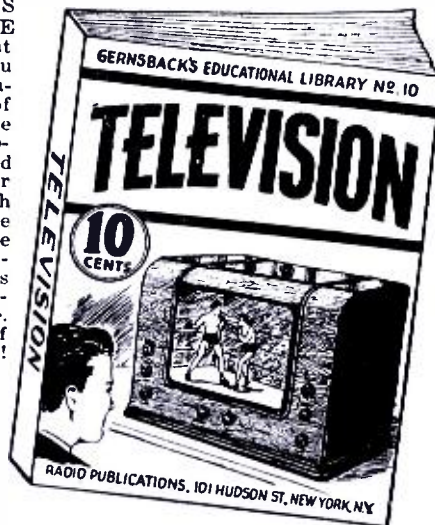
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| 10.360 | EAJ43 | TENERIFE, CANARY ISL., 28.96 m., 3-4.30, 5-7, 7.45-8.45, 9-10 pm. |
| 10.350 | LSX | BUENOS AIRES, ARG., 28.98 m., Addr. Transradio International. Tests irregularly. |
| 10.330 | ORK | RUYSSELEDE, BELGIUM, 29.04 m. Broadcasts 1.30-3 pm. To Belgian Congo. Works OPM 1-3 am., 3-5 pm. |
| 10.260 | PMN | BANDOENG, JAVA, 29.24 m. Relays YDB 6-9 pm., 10.30 pm.-2 am., 4.30-10.30 or 11 am., Sat. to 11.30 am. |
| 10.220 | PSH | RIO DE JANEIRO, BRAZIL, 29.35 m., Addr. Box 709. Broadcasts 6-7 pm., Mon. 8-8.30 pm., Fri. 7-7.30 pm. |
| 10.100 | — | DEUTSCHE FREIHEITS SENDER, 29.70 m., loc. in Germany, under-cover. 4-5 pm. |
| 10.050 | TIEMT | SAN JOSE, COSTA RICA, 29.85 m., 4.30-8 pm. |
| 10.050 | DZC | ZEESEN, GERMANY, 29.16 m., Addr. (See 15.360 mc.) Irregular. |
| 10.042 | DZB | ZEESEN, GERMANY, 29.87 m., Addr. Reichspostenstralamt. Irregular. |
| 9.985 | COBC | HAVANA, CUBA, 30.05 m. Addr. P. O. Box 132. Relays CMBC 6 am.-12 mid. |
| 9.925 | JDY | DAIREN, MANCHUKUO, 30.23 m. Relays JOAK daily 7-8 am. Works Tokyo occasionally in early am. |
| 9.892 | CPI | SUCRE, BOLIVIA, 30.33 m., 11 am.-n., 7-9 pm. |
| 9.855 | EAQ | MADRID, SPAIN, 30.45 m., Addr. P. O. Box 951. 7.30-8, 8.40-9 pm. 3.45-4.05, 4.45-5.05 am., also. |
| 9.830 | IRF | ROME, ITALY, 30.52 m. Works Egypt afternoons. Relays ZRO, 12-12.25 pm. Thurs. Daily 12.40-1.15-2.30, 6-9 pm. |
| 9.815 | COCM | HAVANA, CUBA, 30.57 m. Addr. Transradio Columbia, P. O. Box 33. 8-1 am. Relays CMCM. |
| 9.785 | HH3W | PORT-AU-PRINCE, HAITI, 30.66 m. Addr. P. O. Box A117. 1-2, 7-9.15 pm. |
| 9.755 | ZRO | DURBAN, SOUTH AFRICA, 30.75 m. Addr. S. A. Broadcasting Corp., P. O. Box 4559, Johannesburg. Daily exc. Sat. 11.45 pm.-12.50 am. Daily exc. Sun. 5.30-7, 9-11.15 am. Sun. 5.30-7. |
| 9.740 | CSW7 | LISBON, PORTUGAL, 30.80 m. Addr. Nat. Broad. Sta. n.-2 pm., 6-9 pm. for No. Amer. |
| 9.730 | CB970 | VALPARAISO, CHILE, 30.83 m., 6.30-11.30 pm., or mid. |
| 9.708 | COCQ | HAVANA, CUBA, 30.90 m. Addr. 25 No. 445, Vedado, Havana, 7-1 am. Sun. 6.55 am.-1 am. |

31 Met. Broadcast Band

| | | |
|-------|--------|---|
| 9.705 | — | FORT DE FRANCE, MARTINIQUE, 30.92 m., Addr. P. O. Box 136. 6-8.10 pm. Irr. to 9.30 pm. |
| 9.695 | JIE2 | TYUREKI, TAIWAN, 30.95 m. 9.05-10.20 am. |
| 9.690 | T14NRH | HEREDIA, COSTA RICA, 30.96 m., Addr. Amando C. Marin, Apartado 40. Mon. to Thur. 6-9 pm., Fri. 4-9 pm., Sat.-Sun. 5.40-9.40 am. |
| 9.690 | LRA1 | BUENOS AIRES, ARG., 30.96 m., 6-9 pm. Mon-Thur., 4-9 pm. Fri., 7-9 pm. Sat. |
| 9.690 | — | TANANARIVE, MADAGASCAR, 30.96 m., 12.30-12.45, 3.30-4.30, 10-11 am., Sun. 2.30-4 am. |
| 9.690 | ZHP | SINGAPORE, MALAYA, 30.96 m. Sun. 5.40-9.40 am., Wed. 12.40-1.40 am., Mon.-Fri. 4.40-9.40 am., Sat. 12.25-1.40 am., 4.40-9.40 am., 10.40 pm.-1.10 am. (Sun.) |
| 9.690 | GRX | DAVENTRY, ENGLAND, 30.96 m., Addr. See GSC, 9.58 mc. 12.17-6 pm.; 6.20-9.15 pm. |
| 9.685 | TGWA | GUATEMALA CITY, GUAT., 30.96 m. Daily 10-11.30 pm.; Sun. 7-10.45 pm. |
| 9.683 | HNF | BAGHDAD, IRAQ., 30.98 m. 6 am.-3 pm. |
| 9.680 | TPB | PARIS, FRANCE, 30.99 m. "Paris Mondial" 6-11 pm. |
| 9.675 | — | SAIGON, INDO-CHINA, 31.01 m., Addr. 17, Place A. Foray, "Radio Boy-Landry," 7.30-9.45 am. Irreg. |
| 9.675 | DJX | BERLIN, GERMANY, 31.01 m., Addr. (DJD, 11.77 mc.) 10.40 am.-4.25 pm. To Africa. |

Mc. Call
 9.670 WRCA BOUND BROOK, N. J., 31.03 m. Addr. NBC, N. Y. C. 6 pm.-1 am.
 9.665 2RO9 ROME, ITALY, 31.04 m. 12.40-1, 1.37-5.30 pm., 6-6.30 pm.
 9.660 LRX BUENOS AIRES, ARG., 31.06 m., Addr. El Mundo. Relays LRI, 6-6.45 am.-9.15 am.-10 pm.
 9.660 HVJ VATICAN CITY, 31.06 m. Sun. 5-5.30 am.
 9.650 WCBX NEW YORK CITY, 31.09 m. (See 21.570 mc. for addr.) 10.30-11.30 pm.
 9.650 CS2WA LISBON, PORTUGAL, 31.09 m., Addr. Radio Colonial. Tues., Thurs. and Sat. 4-7 pm.
 9.650 IABA ADDIS ABABA, ETHIOPIA, 31.09 m., 3.55-4.05, 4.15-4.45, 11 am.-noon, 1-3 pm. Suns. 3.30-3.55 am.
 9.645 JLT2 TOKYO, JAPAN, 31.10 m.
 9.640 CXAB COLONIA, URUGUAY, 31.12 m., Addr. Belgrano 1841, Buenos Aires, Argentina. Relays LR3, Buenos Aires 5 am.-10.45 pm. Sat. to 1 am.
 9.635 2RO3 ROME, ITALY, 31.13 m., Addr. (See 11.810 mc.) 12.07-3 pm., 5.30-9 pm., also Mon. 3.50-4.05 pm., Fri. and Sat. 4-4.20 pm.
 9.630 JFO TAIHOKU, TAIWAN, 31.15 m. Relays JFAK. 4-10.30 am.
 9.620 CXA6 MONTEVIDEO, URUGUAY, 31.19 m., 6 to 9 pm.
 9.610 LLG OSLO, NORWAY, 31.22 m., 3-6, 8-9, 11 pm.-mid.
 9.610 DXB BERLIN, GERMANY, 31.22 m. 4.50-10.50 pm. to No. America.
 9.606 ZRL KLIPHEUVEL, SOUTH AFRICA, 31.23 m., Addr. P. O. Box 4559, Johannesburg. Daily, exc. Sat. 11.45 pm.-12.50 am. Daily exc. Sun. 3.20-7.20, 9-11.45 am., Sun. 3.30-4.30 or 4-5, 5.30-7, 9-11.45 am.
 9.600 RAL MOSCOW, U.S.S.R., 31.25 m. Daily 1-1.30, 4-4.30, 6-9 pm. (English 7-8.30 pm.)
 9.600 CB960 SANTIAGO, CHILE, 31.25 m., 8-11.30 pm.
 9.600 GRY DAVENTRY, ENG., 31.25 m., Addr. See GSC, 9.58 mc. Irregular.
 9.595 — MOYDRUM, ATHLONE, EIRE, 31.27 m., Radio Eireann. 12.30-4.30 pm. Irreg.
 9.595 HBL GENEVA, SWITZERLAND, 31.27 m., Addr. Radio Nations. Irregular.
 9.590 HP5J PANAMA CITY, PANAMA, 31.28 m. Addr. Apartado 867. 12 n. to 1.30 pm., 6.30-10.30 pm.
 9.590 VUD2 DELHI, INDIA, 31.28 m. Addr. All India Radio, 1.30-3.30 am., 7.30 am.-12.30 pm., 8.30-10.30 pm.
 9.590 PCJ HUIZEN, HOLLAND, 31.28 m., Addr. (See 15.220 mc.) Sun. 2-3, 7.15-9.25 pm. Tues. 1.45-3.30, 7-8.30, 8.45-10.15 pm., Wed. 7.15-8.40 pm., Fri. 8-9 pm.
 9.590 VK6ME PERTH, W. AUSTRALIA, 31.28 m., Addr. Amalgamated Wireless of Australasia, Ltd. 6-8 am. exc. Sun.
 9.590 VK2ME SYDNEY, AUSTRALIA, 31.28 m., Addr. Amalgamated Wireless of Australasia, Ltd., 47 York St., Sundays only, 12 m.-2 am., 5-8.30 am.
 9.590 WCAB PHILADELPHIA, PA., 31.28 m. (Addr. See 21.52 mc.) Mon., Thurs. & Sat. 6.30 pm.-2 am., Wed. 9 pm.-2 am.
 9.580 GSC DAVENTRY, ENGLAND, 31.32 m., Addr. B. C., Portland Pl., London, W. 1, 1.35-3.25, 3.45-6, 6.22-9.15 pm.; 9.37 pm.-12.30 am.
 9.580 VLR MELBOURNE, AUSTRALIA, 31.32 m. Addr. Box 1686, G. P. O. Daily 3.15-8.30 am.
 9.570 KZRM MANILA, P. I., 31.35 m., Addr. Erlanger & Galinger, Box 283, Wkdys. 4.30-6 pm. m. tof. 5-9 am., Sat. 5-10 am., Sun. 4-10 am.
 9.570 WBOS BOSTON, MASS., 31.35 m., Addr. Westinghouse Electric & Mfg. Co. 7-1 am., Sun. 8 am.-1 am.
 9.566 OAX4T LIMA, PERU, 31.37 m., 7-8, 11.30 am.-1.30 pm.
 9.560 XGAP PEKING, CHINA, 31.38 m. Addr. S. Yoshimura, Dir. Peking Central Sta., Hsi-chan-an-chieh, Peking. 4-9 am.
 9.560 DJA BERLIN, GERMANY, 31.38 m., Addr. Broadcasting House. 6.30-10.50 pm.
 9.550 HVJ VATICAN CITY, 31.41 m., Sun. 5-5.30 am., Wed. 2.30-3 pm.

Mc. Call
 9.550 TPBII PARIS, FRANCE, 31.41 m. Addr. (See 15.245 mc.) 11.15 am.-7 pm., 9.30 pm.-mid. Irreg.
 9.550 WGEA SCHENECTADY, N. Y., 31.41 m., General Electric Co., 5.15-8.15 pm. to So. Amer.
 9.550 OLR3A PRAGUE, BOHEMIA, 31.41 m. (See 11.840 mc.) Irreg. 4.40-5.10 pm.
 9.550 XEFT VERA CRUZ, MEX., 31.41 m. 10.30 am.-4.30 pm., 10.30 pm.-12.30 am.
 9.550 YDB SOERABAJA, JAVA, 31.41 m., Addr. N.I.R.O.M. Daily exc. Sat. 6-7.30 pm., 10.30 pm.-2 am.-4.30-10.30 am. Sat. 7 pm.-2 am.
 9.550 VUB2 BOMBAY, INDIA, 31.41 m., Addr. All India Radio. 9.30-10.30 pm., 1-3.30 am. 5-6 am. also.
 9.540 DJN BERLIN, GERMANY, 31.45 m., Addr. (See 9.560 mc.) 12.05-2.30, 9.30-11 am., 4.55-10.50 pm. to So. Amer.
 9.538 VPD2 SUVA, FIJI ISLANDS, 31.46 m., Addr. Amalgamated Wireless of Australasia, Ltd. 5.30-7 am., exc. Sun.
 9.535 SBU MOTALA, SWEDEN, 31.46 m. 4.15-5.05 pm.
 9.535 JZI TOKYO, JAPAN, 31.46 m. 12 m.-1.30, 7-9.30 am.
 9.535 — SCHWARZENBURG, SWITZERLAND, 31.46 m., 1-2 pm. 6.45-7.45, 8-9 pm.
 9.530 KGEI SAN FRANCISCO, CAL., 31.48 m., Addr. Gen. Elec. Co., 7 am.-12 n. to Asia.
 9.530 WGE0 SCHENECTADY, N. Y., 31.48 m., Addr. General Electric Co. 3-11 pm.
 9.530 VUC2 CALCUTTA, INDIA, 31.48 m. Addr. All India Radio. 2.06-4.06 am. 10 pm.-2 am.
 9.526 XEDQ GUADALAJARA, GAL., MEXICO, 31.49 m., N.-4.30 pm., 7 pm.-midnight.
 9.526 ZBW3 HONGKONG, CHINA, 31.49 m., Addr. P. O. Box 200. 5-10 am., 11.30 pm.-1.15 am. Sun 5-9.30 am.
 9.525 OQ2AA LEOPOLDVILLE, BELGIAN CONGO, 31.49 m. 5.25-7 am.
 9.525 LKC JELOY, NORWAY, 31.49 m., 4.30-10.30 am., Sun. 2.30-10.30 am.
 9.523 ZRG ROBERTS HEIGHTS, S. AFRICA, 31.5 m., Addr. (See ZRK, 9.606 mc.) Daily exc. Sun. 5-7 am.; Sun. 5.30-7 am.
 9.520 OZF SKAMLEBAK, DENMARK, 31.51 m. Addr. Statsradionfonien, Heibergsgade 7, Copenhagen, 8-9.30, 6-9.05 am. and 8.30 pm.-2.40 am.
 9.520 YSH SAN SALVADOR, EL SALVADOR, 31.51 m., Addr. (See 7.894 mc.) Irregular 6-10 pm.
 9.520 RV96 MOSCOW, U.S.S.R., 31.51 m., 1-6 pm. (English 3-3.30, 4.30-5 pm.)
 9.510 GSB DAVENTRY, ENGLAND, 31.55 m., Addr. (See 9.580 mc.—GSC) 12.57-5.15 am., 6.22-9.15 pm., 9.37 pm.-12.30 am.
 9.510 FIQA TANANARIVE, MADAGASCAR, 31.55 m. Addr. Le Directeur des PTT, Radio Tananarive, Administration PTT. 12.30-12.45, 10-11 am., 2.30-4 am.
 9.510 HS8PJ BANGKOK, THAI, 31.55 m. Daily Ex. Mon. 8-10 am.
 9.510 — HANOI, FRENCH INDO-CHINA, 31.55 m. "Radio Hanoi", Addr. Radio Club de L'Indochine. 12 m.-2 am., 6-10 am. 15 watts.
 9.503 XEWW MEXICO CITY, MEX., 31.57 m. Addr. Apart. 2516. Relays XEW. 7.45 am.-12.30 am.
 9.501 PRF5 RIO DE JANEIRO, BRAZIL, 31.58 m., 4.45-5.55 pm. Ex. Suns.
 9.500 VK3ME MELBOURNE, AUSTRALIA, 31.58 m., Addr. Amalgamated Wireless of Australasia, 167 Queen St. Daily except Sun. 4-7 am.
 9.500 OFD LAHTI, FINLAND, 31.58 m., Addr. Finnish Brct. Co., Helsinki. 12.15-5 pm.
 9.497 KZIB MANILA PHIL. ISL., 31.59 m., 6-9.05 am. and 8.30 pm.-2.40 am. Irreg.

End of Broadcast Band

9.465 TAP ANKARA, TURKEY, 31.70 m., 11.30 am.-5 pm.
 9.445 HC0DA GUAYAQUIL, ECUADOR, 31.77 m., 8.15-10.15 pm., exc. Sun.
 9.437 COCH HAVANA, CUBA, 31.8 m., Addr. 2 B St., Vedado. 8 am.-11 pm. Sun. 8 am.-10 pm.

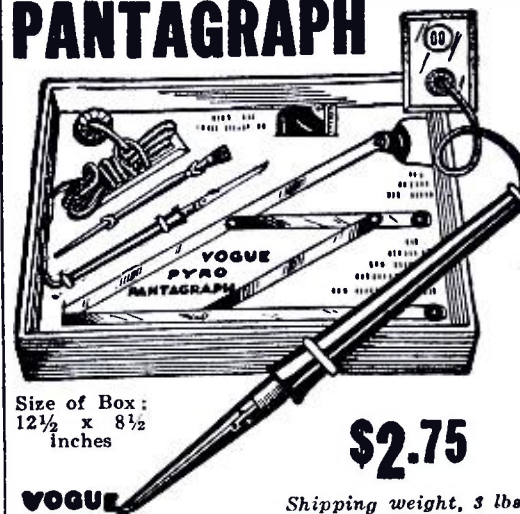


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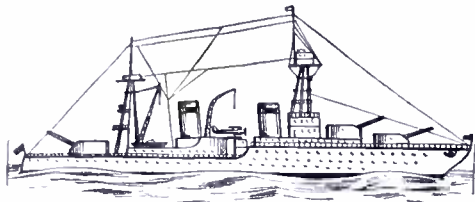
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versal, 7-11.30 pm.
- 9.355 HCIETC QUITO, ECUADOR, 32.05 m.,
Addr. Teatro Bolivar, Thurs. un-
til 9.30 pm. 8-11 pm. Sats.
- 9.350 COCD HAYANA, CUBA, 32.08 m., Addr.
Box 2294. Relays CMCD 10 a.m.-
11.30 pm. Sun. 10 am.-9 pm.
- 9.345 HBL GENEVA, SWITZERLAND, 32.11 m.,
Addr. Radio Nations. Sun. 7-7.45,
8-8.45 pm. Mon. 6.50-8.15 pm.
- 9.340 OAX4J LIMA, PERU, 32.12 m., Addr. Box
1166, "Radio Universal." 12 n.-
3 pm., 5 pm.-indefinite.
- 9.295 HI2G CIUDAD TRUJILLO, D. R., 32.28
m. 6.40-8.40 am., 11.40 am.-2.10
pm., 3.40-4.40 pm.
- 9.280 LYR KAUNAS, LITHUANIA, 32.33 m.
Daily 12-12.40 am., and 2.30-3
pm. Sun. 1.30-2.15, 6-7.45, 11.30
am.-1.15 pm., 2-3.30 pm.
- 9.200 ZMEF SUNDAY ISLAND, 32.61 m., Confs.
ZIL5, N.Z. 1.45-2.15 am. Irreg.
- 9.200 COBX HAYANA, CUBA, 32.61 m. Addr.
San Miguel 194, Altos. Relays
CMBX 8 am.-11.30 pm.
- 9.188 HC2AB ECUADOR, 32.65 m., nightly to 10
pm.
- 9.170 HCIGQ QUITO, ECUADOR, 32.72 m., Mon.
Wed., Sat. 9-9.55 pm.
- 9.125 HAT4 BUDAPEST, HUNGARY, 32.88 m.,
Addr. "Radiolabor," Gyali-ut,
22. Daily 7-8 pm., Sat., 6-7 pm.
- 9.124 HC2CW GUAYAQUIL, ECUADOR, 32.88
m., 11 am.-1, 7-11 pm.
- 9.100 COCA HAYANA, CUBA, 32.61 m. Addr.
Galiano No. 102. Relays CMCA
Noon-1.15 am. Irreg. to 3 am.
- 9.091 PJCI CURACAO, D. W. INDIES, 33
m., 6.36-8.36 pm., Sun. 10.36 am.-
12.36 pm.
- 9.030 COBZ HAYANA, CUBA, 33.32 m., Radio
Salas Addr. P. O. Box 866. 7.45
am.-1.15 am. Sun. 7.45 am.-12 m.
Relays CMBZ.
- 8.965 COKG SANTIAGO, CUBA, 33.44 m. Addr.
Box 137. 9-10 am., 11.30 am.-1.30
pm., 3-4.30, 5-6, 10-11 pm., 12
m.-2 am.
- 8.960 TPZ2 ALGIERS, ALGERIA. 33.48 m. Tues.
12.30-1.30 pm.
- 8.841 HCJB QUITO, ECUADOR, 33.5 m.
7-8.30 am., 11.45 am.-2.30 pm.,
5-10 pm., except Mon. Sun. 12 n.-
1.30 pm., 5.30-10 pm.
- 8.830 COCQ HAYANA, CUBA, 33.98 m., 6.55
am-1 am.
- 8.700 HKV BOGOTA, COLOMBIA, 34.46 m.
Tues. and Fri. 7-7.20 pm.
- 8.665 COJK CAMAGUEY, CUBA, 34.64 m.,
Addr. Finlay No. 3 Altos. 11.30
am.-12.30 pm., 3.30-6, 8-9 pm.
- 8.665 W2XGB HICKSVILLE, N. Y., 34.64 m.,
Addr. Press Wireless, Mon. to
Fri. News at 9 am. and 5 pm.
- 8.580 YNPR MANAGUA, NICARAGUA, 34.92
m. Radiodifusora Pilot. 12.45-2.15,
6.45-10.15 pm.
- 8.572 — BUCHAREST, ROUMANIA, 35.02
m., 8.15-10.30 am., 4-7 pm.
- 7.894 YSD SAN SALVADOR, EL SALVADOR,
37.99 m., Addr. Dir. Genl. Tel.
& Tel. 7-10.30 pm.
- 7.870 HCIRB QUITO, ECUADOR, 38.1 m. La
Voz de Quito. 8.30-11.30 pm.
- 7.854 HC2JSB GUAYAQUIL, ECUADOR, 38.2 m.
11 am.-2, 4-11 pm.
- 7.797 HBP GENEVA, SWITZERLAND, 38.48 m.,
Addr. Radio-Nations.
- 7.614 CR6AA LOBITO, ANGOLA, 39.39 m.,
Mon., Wed., Sats. 2.30-4.30 pm.
Also 7.177 mc.
- 7.520 RKI MOSCOW, U.S.S.R., 39.89 m., 1-7,
8.30-9 pm. (English 4.30-5 pm.)
- 7.520 KKH KAHUKU, HAWAII, 39.89 m., Fri.
9-10 pm., Sat. 1-1.30 am., 9.30-10
pm.
- 7.490 EAJ43 TENERIFE, CANARY ISL., 40.05 m.,
8-9.30 pm. and Irreg.
- 7.450 TI2RS SAN JOSE, COSTA RICA. 40.27 m.
"Radioemisora Athena". 7-11 pm.
- 7.440 FG8AH POINT-A-PITRE GUADELOUPE,
F.W.I., 40.32 m., 6-7.10 pm., also
9-10.30 pm. Irreg. P. O. Box 125.
- 7.410 HCJB4 QUITO, ECUADOR, 40.46 m., 7-
9.30 pm. irregularly.
- 7.380 XECR MEXICO CITY, MEX., 40.65 m.,
Addr. Foreign Office. Sun. 6-7
pm.
- 7.310 VIG PORT MORESBY, PAPUA, 41.01 m.,
2nd & 4th Sats. each month.
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| 7.295 | JIE | TYUREI, TAIWAN. 41.13 m. 9.05-10.20 am. |
| 7.280 | TPB12 | PARIS, FRANCE, 41.21 m., 10.15 am.-5.15 pm. |
| 7.260 | CSW8 | LISBON, PORTUGAL, 41.32 m., addr. Emissora Nacional de Radiodifusao, rua do Quelhas. Tue., Thur., Sat. 4.05-5 pm. |
| 7.260 | GSU | DAVENTRY, ENGLAND, 41.32 m. Irregular. |
| 7.258 | JVW | TOKYO, JAPAN. 41.34 m., 2-4 pm. |
| 7.250 | YDA | TANDJONGPRIOK, JAVA, 41.38 m., Addr. N.I.R.O.M., Batavia, 10.30 pm.-2 am.; Sat. 7.30 pm.-2 am. |
| 7.230 | GSW | DAVENTRY, ENGLAND. 41.49 m. 12.57 am.-12 n. To Europe. |
| 7.220 | YDX | MEDAN, SUMATRA, N. E. I., 41.55 m. Daily exc. Sat., 10.30 pm.-2 am. Sat. 7.30 pm.-1.30 am. Irreg. to 9 am. |
| 7.200 | Y15KG | BAGHDAD, IRAQ, 41.67 m., 7.30 am.-4 pm. |
| 7.200 | YNAM | MANAGUA, NICARAGUA, 41.67 m. Irregular at 9 pm. |
| 7.177 | CR6AA | LOBITA, ANGOLA, PORT. WEST AFRICA. 41.75 m., Mon., Wed., and Sats. 2.45-4.30 pm. Also see 7.614 mc. |
| 7.128 | YN3DG | LEON, NICARAGUA, 42.09 m., 2-2.30, 8.30-9.30 pm. ex. Suns. |
| 7.100 | FO8AA | PAPEETE, TAHITI, 42.25 m., Addr. Radio Club Oceanien. Tues. and Fri. 11 pm.-12.30 am. |
| 7.088 | PIIJ | DORDRECHT, HOLLAND, 42.3 m., Addr. Dr. M. Hellingman, Technical College. Sat. 11.10-11.50 am. |
| 6.990 | XEME | MERIDA, YUCATAN, 42.89 m., Addr. Calle 59, No. 517, "La Voz de Yucatan desde Merida." Irregular. |
| 6.977 | XBA | TACUBAYA, D. F., MEX., 43 m. 9.30 am.-1 pm., 7-8.30 pm. |
| 6.970 | XPSA | KWEIYANG, CHINA, 43.05 m., 5.30, or 6-11 am. |
| 6.960 | 2ZB | WELLINGTON, N. Z., 43.10 m., Mid.-7 am. |
| 6.880 | XOJD | HANKOW, CHINA, 43.60 m., 6-8.30 am. |
| 6.805 | H17P | CIUDAD TRUJILLO, DOM. REP., 44.06 m., Addr. Emisoría Diaria de Comercio. Daily exc. Sat. and Sun. 12.40-1.40, 6.40-8.40 pm. Sat. 12.40-1.40 pm. Sun. 10.40 am.-11.40 am. |
| 6.790 | PZH | PARAMARIBO, SURINAM, S.A. 44.16 m., Addr. P. O. Box 18. Sun. 8.40-10.40 am. Tues. & Fri. 5.40-8.40 pm. 1st & 3rd Thurs. monthly 6.40-8.40 pm. |
| 6.775 | HIH | SAN PEDRO DE MACORIS, DOM. REP., 44.26 m. 7-9.40 pm. Sun. 5.20-6.40 pm. |
| 6.730 | H13C | LA ROMANA, DOM. REP., 44.58 m., Addr. "La Voz de la Feria." 12.30-2 pm., 5-6 pm. |
| 6.720 | PMH | BANDOENG, JAVA, 44.64 m. Re-lays N.I.R.O.M. programs. 4.30-11 or 11.30 am. Also Sat. 9.30 pm.-1.30 am. |
| 6.690 | TIEP | SAN JOSE, COSTA RICA, 44.82 m., Addr. Apartado 257, La Voz del Tropico. Daily 7-11 pm. |
| 6.675 | HBQ | GENEVA, SWITZERLAND, 44.94 m. Addr. Radio-Nations. Sun. 1.45-2.45 pm. |
| 6.660 | H15G | TRUJILLO CITY, D. R., 45.05 m., to 8.40 pm. |
| 6.635 | HC2RL | GUAYAQUIL, ECUADOR, 45.18 m., Addr. P. O. Box 759. Sun. 5.45-7.45 pm., Tues. 9.15-11.15 pm. |
| 6.630 | HIT | CIUDAD TRUJILLO, D. R., 45.25 m., Addr. "La Voz de la RCA Victor." Apartado 1105. Daily exc. Sun. 12.10-1.40 pm., 5.40-8.40 pm.; also Sat. 10.40 pm.-12.40 am. |
| 6.625 | PRADO | RIOBAMBA, ECUADOR, 45.28 m. Thurs. 9-11.45 pm. |
| 6.610 | YNLG | MANAGUA, NICARAGUA. 45.39 m. Emisoría Ruben Dario. 1.30-2.30, 6-10.15 pm. |
| 6.600 | H16H | TRUJILLO CITY, D. R., 45.45 m., 7.40-8.40 pm. |
| 6.565 | H15P | PUERTO PLATA, D. R., 45.70 m., 5.40-7.40, 9.40-11.40 pm. |
| 6.558 | H14D | CIUDAD TRUJILLO, D. R., 45.74 m. Addr. Apartado 623. 12.30-2, 6-8 or 9 pm. Except Suns. |
| 6.550 | XBC | VERA CRUZ, MEX., 45.8 m. 8.15-9 am. |

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| Cannon, C. F., Co. | Parts Mfr. | Folder | T-12 | Free | 467 |
| Capitol Radio Eng. Inst. | Radio School | 48-page Booklet | | Free | 480 |
| Cornell-Dubilier Elec. Corp. | Parts Mfr. | Catalog | 175A | Free | 485 |
| Coyne Electrical School | Trade School | Electrical Catalog | | Free | 451 |
| | | Radio Catalog | | Free | |
| Dodge's Institute | Radio School | Catalog | | Free | 481 |
| Eilen Radio Labs. | Set & Kit Mfr. | Circular | | Free | 474 |
| Goldentone Radio Corp. | Set Mfr. | 1940 Bargain Catalog | | Free | 483 |
| Guthman, Edwin I., & Co. | Set & Parts Mfr. | Catalog | | Free | 484 |
| Hammarlund Mfg. Co. | Set & Parts Mfr. | Folder | RT-12 | Free | 467 |
| Harrison Radio Co. | Mail Order | Information | | Free | 487 |
| Henry Radio Shop | Mail Order | Information | | Free | 472 |
| Instructograph Company | Code Machine | Information | | Free | 481 |
| International Resistance Co. | Parts Mfr. | Literature | | Free | 475 |
| Jarnak, Paul | Parts Mfr. | Circular | | Free | 478 |
| Mass. Radio School | Radio School | 60-page Catalog | | Free | 481 |
| Meissner Mfg. Co. | Parts Mfr. | Information | | Free | 482 |
| Midwest Radio Corp. | Set Mfr. | 1940 Catalog | | Free | 484 |
| Millen, J., Mfg. Co., Inc. | Parts Mfr. | 1939-40 Catalog | | Free | I.F.C. |
| National Company, Inc. | Set & Parts Mfr. | Catalog | 300 | Free | 472, I.B.C. |
| National Radio Institute | Radio School | 64-page Book | | Free | 449 |
| National Schools | Radio School | Literature | | Free | 481 |
| New York Y.M.C.A. Schools | Trade School | Booklet | | Free | 481 |
| Olson Mfg. Co. | Set Mfr. | Bulletin | RT-12 | Free | 478 |
| Radio & Technical Publ. Co. | Radio Textbooks | Circulars on each Book | | Free | 463 |
| Radio Train. Assn. of Amer. | Radio School | Book | | Free | 481 |
| Radio Wire Television Inc. | Mail Order | 1940 Radio Catalog | 78 | Free | 471 |
| | | Xmas Catalog | 79 | Free | |
| Radolek Co., The | Mail Order | 1940 Radio Profit Guide | | Free | 479 |
| RCA Institutes, Inc. | Radio School | Catalog | | Free | 481 |
| Reo Radio Co. | Test Equipment | 1940 Bulletin | | Free | 483 |
| Rosicrucians, The | Fraternal Society | Book | | Free | 484 |
| Sargent, E. M., Co. | Set Mfr. | Information | | Free | 483 |
| Scott, E. H., Radio Laboratories, Inc. | Set Mfr. | Literature | | Free | 469 |
| Solar Mfg. Corp. | Parts Mfr. | General Parts Catalog | 9S | Free | 467 |
| | | Transmitting Catalog | 2X | Free | |
| | | Condenser Testers Cat. | CBCC-1 | Free | |
| Sprague Products Co. | Parts Mfr. | Interference Manual | | 25c | 477 |
| Sprayberry Acad. of Radio | Radio School | 52-page Book | | Free | 473 |
| Teleplex Co. | Code Machine | Booklet | S-12 | Free | 480 |
| Triplett Electrical Inst. Co. | Parts Mfr. | Catalog | | Free | 487 |
| Turner Co., The | Parts Mfr. | Information | | Free | 469 |
| Ward, Montgomery & Co. | Mail Order | Amateur Radio Catalog | | Free | 477 |
| Willor Manufacturing Corp. | Code Machine | Illustrated Folder | | Free | 478 |

COMMERCIAL NOTICES 10¢ A WORD

Under this heading only advertisements of a commercial nature are accepted. Remittance of 10¢ per word should accompany all orders. Copy should reach us not later than the 10th of the month for the second following month's issue.

AGENTS WANTED
300% PROFIT SELLING GOLD Leaf Letters for Store Windows; Free samples. Metallic Co., 446 North Clark Chicago.

CORRESPONDENCE COURSES
CORRESPONDENCE COURSES and educational books, slightly used. Sold, Rented, Exchanged. All subjects. Satisfaction guaranteed. Cash paid for used courses. Complete details and bargain catalog Free. Send name. Nelson Company, M-210 Manhattan Building, Chicago.

USED CORRESPONDENCE RADIO
Courses and Technical Books Bought, Sold, Rented, Exchanged. Free Catalog: V. W. Vernon, Henagar, Alabama.

INSTRUCTION
NOW A COMPLETE NEW RADIO training course is yours—on free will terms. Write Radio Training Center, 222 Portage Ave., Winnipeg, Man.

\$120.00 ELECTRICAL ENGINEER-
ing Course; 60 cloth-bound lesson books. Good condition. \$18.00. Harry Ackerson, Box 322, Ramsey, N. J.

PATENT ATTORNEYS
INVENTORS — PROTECT YOUR rights before disclosing your invention to anyone. Form "Evidence of Conception"; "Schedule of Government and Attorneys' Fees" and instructions sent free. Lancaster, Allwine & Rommel, 436 Bowen Building, Washington D. C.

QSL—CARDS—SWL
100 NEAT SWL CARDS PRINTED with your name and address sent postpaid for \$1. Bunch of samples and RST Chart for five cents in stamps. W1BEF, 78 Warrenton St., Springfield, Mass.

SWLS, QSLs, ONE COLOR, 75c
150, two colors \$1.00 150 (postpaid). Samples. W3DEE, Maple Shade, N. J.

SWLS, QSLs, colorful, economical.
Samples. Meade, 819 Wyandotte, Kansas City, Mo.

RADIO DIAGRAMS
ANY RADIO DIAGRAM 25c. SPECI- fy manufacturer, model. Radio maga- zine free. Supreme Publications, 3727 West 13th, Chicago.

PHOTOGRAPHY
ADVANCED AMATEURS, ATTEN- tion! Improve your technique and get more fun out of your hobby. Read American Photography every month, the magazine for both technicians and pictorialists. Send today for free sam- ple copy and a copy of our 40-page book catalog. Camera House 120, 353 Newbury Street, Boston, Mass.

FOR SALE (NON COMMERCIAL) 3¢ A WORD

Under this heading we accept advertisements only when goods are offered for sale without profit. Remittance of 3¢ per word should accompany all orders. Copy should reach us not later than the 10th of the month for the second following month's issue.

SELL SUPERSPORT DOLLY, F2.9,
or trade for Korelle Reflex or other good reflex camera. Univex Mercury F3.5. Offers? Paul McKinley, 87 East Alexandrine, Detroit, Michigan.

FOR SALE: BRAND NEW N.R.I.
analyzer. Priced right. H. E. Manliss, Colorado, Texas.

DON'T BUY A RECEIVER UNTIL
you get my free list of reconditioned, guaranteed Receivers! Practically all models at money saving prices. Trading. Time Payments. Send for list. W2AVA, 12 West Broadway, New York.

FOR SALE, LES-TET 5-10 CON-
verter kit with built in power supply \$17.00. 5 tube "Ham" receiver with built in speaker, power supply \$15.50. Both for \$30.00. Bill King, 912 Tower Road, Winnetka, Ill.

FOR SALE, \$15.00, 4 CYCLE WATER
cooled 1/2 HP model motor, all com- plete ready to run, runs fine, 1 1/2" x 1 1/2" bore stroke. Price \$25.00. Melvin Fitzgerald, Elmwood, Wisconsin.

UNIVEX PROJECTOR WITH FILM
\$7.95, screen \$1.00, 8 m.m. art films, 100 ft. \$2.95, 50 ft. \$1.95. The above shipped C.O.D. Howard H. Brown, Edgerton, Wisconsin.

SUPER CLIPPER COST \$29.50, 18
in A1 condition, will sell for \$10.50, sent express collect. M. G. Lachance, 26 Howard St., Lewiston, Maine.

SW3 \$9.00, SKY BUDDY \$15.00,
EW7 \$17.00, Sky Chief \$21.00, S9 Super - Sky rider \$29.00, AC-R-155 \$34.00, Sky Champion \$39.00, Sky Challenger \$39.00, AC-R-175 25 or 60 cycle model \$49.00, Sky rider Com-

mercial \$49.00, other sets. Terms. List free. W9ARA, Butler, Missouri.

GENTS' NICE WARM DRESS OVER-
coat size 38, black Kersey cloth, fur collar, inner lined with genuine coon, coat very warm, \$20. Melvin Fitz- gerald, Elmwood, Wisconsin.

SACRIFICE! ACE "DO-ALL" DE-
luxe Six tube T.R.F. Receiver, 2 1/2 to 3000 meters. Dynamic speaker. Complete \$8.50 (Cost \$26.25 new). Sangamo Watthour (electric light) meters. Used, but perfect. \$2.90. Robert Lang, 227 Greenwch Street, New York City.

WILL SELL GOLD FILLED RAIL-
road watch like new or trade for Graflex or other high grade camera. Dudley Damp, % Breeder Publications, Union Stock Yards, Chicago, Ill.

BARTER AND EXCHANGE — FREE!

NO ADVERTISEMENT TO EXCEED 35 WORDS, INCLUDING NAME AND ADDRESS

Space in this department is not sold. It is intended solely for the benefit of our readers, who wish to buy or exchange anything in the Radio, Television and Photo- graphic fields for Radio, Photographic and other mer- chandise.

As we receive no money for these announcements, we can- not accept responsibility for any statements made by the readers.

Copy should reach us not later than the 10th of the month for the second following month's issue.

Use these columns freely. Only one advertisement can be accepted from any reader in any one issue. All dealings MUST be above board. Remember you are using the U. S. mail in all these transactions and therefore you are bound by the U. S. Postal Laws. Describe anything you offer accurately and without exaggeration. Treat your fellow men the way you wish to be treated. We welcome suggestions that will help to make this de- partment interesting and helpful to our readers.

WANTED—ARGUS CAMERA A OR
AF for Ghirardi's "Radio Physics Course"; R.T.I. Radio Servicing Course; Agfa Clipper; Baby Brownie; Scott Album with 1100 stamps. Thomas C. Vaughan, Winchester, Penn.

WANTED—RECORDING EQUIP-
ment, good speed camera Graflex or? Also good movie camera, Howard 430, Sky Buddy or? receiver. Have radio transmitters, mikes, tubes, crystals. Frank Pasquale, Wellsville, N. Y.

HAVE ONE AND TWO TUBE
short wave sets, power packs, parts, speakers. Want old U.S. coins and stamps. John Haynes, Doc Run, Missouri.

WANTED LARGE STAMP ALBUM,
U.S. and foreign. Have all kinds of radio parts to trade. C. Kowalski, 1239 Kinsmoor Ave., Fort Wayne, Ind.

HAVE EILEN TC RECEIVER, EILEN
HF 35 S-W transmitter cabinet and HF-20 S-W transmitter cabinet. Want portable typewriter, test equip- ment, or photographic equipment. I. S. Kofsky, 215 S. 3rd St., Brook- lyn, N. Y.

HAVE MIKE, AMPLIFIER, SPEAK-
er, phono motor, pickup, radio, cameras, classical records and piano rolls. Many others. Want 16 mm. films and equipment. Swap Hsts. M. Epstein, 2953 Ruckie St., Indianapolis, Ind.

WANTED: ASTATIC D-104 OR
similar crystal mike. Send details and price first letter. Donald D. Warnock, Eastern Howard County Radio Club, Converse, Indiana.

HAVE SPARTON WIRELESS REC-
ord player, good condition. Also RCA-Victor Electrola motor board, mod. T-5. Want volt-ohm-milliam- meter. Trade good trumpet and case for baritone horn. J. H. Hood, 37 Club Drive, Greenville, S. C.

WANTED: C ANDLER CODE
Course Vibroplex bug, or portable radio. Have: Zenith radio, dynamic speaker and power pack. Write for details. Paul Trautwein, 40-25 206 Street, Bayside, N. Y.

SWAP CRYSTAL PICKUP, TURN-
table, mike, amplifier, speakers, meter, parts, radio magazines, for good A.C. short wave receiver. Ask for parts list. Stanley Kasper, 933 East 30th St., Erie, Penna.

HAVE UNIVEX CAMERA AND
PROJECTOR, 1939 model, with 3.5 lens, all in A-1 condition. What have you? John Basta, 31 Lake Street, Brooklyn, N. Y.

WANT RADIO APPARATUS FOR A
beginner. Will pay cash or trade electrical, chemistry and physics books. List on request. Please write me. All letters answered. Mr. O. H. Ketchum, 7822 Whitsett, Los Angeles, Calif.

MAGAZINE FANS—TRADE YEARS
subscription Popular Science 1937 for same number radio magazines, any issue after 1935. Also 5 issues Bill Barnes Air Trails 1938. All perfect condition. Clifford Campen, 3210 Woodland Ave., Baltimore, Md.

HAVE TRIPLETT DeLUXE SET
tester 1601. Outdoor, Photo, Popular Science and other magazines. Also books. Want communications receiver Howard, Hallierafter, NC, or? Geo. E. Tomka, 1627-31, Lorain, Ohio.

HAVE A.C. WIRELESS PHONE-
oscillator with two 6A7 tubes in good order. Want A.C. SWR with 3 tubes or more, with or without tubes. Answer all letters. William Brewer, 852 East 169 Street, Bronx, N.Y.C.

HAVE A CAPACITY RELAY—RE-
places photocells in many uses, as a protective device or for experimental purposes. Circuit included. Want Jones or other handbook. Mr. I. Hindus, 322 Alabama Ave., Brooklyn, N. Y.

WANT BRITISH COLONY AND
airmail stamps for 5 metal tube SW receiver, 5 meter super, crystal xmtr. 5 meter MOPA and lots of parts, tubes, also U.S. stamps and covers. W2IAG, 2807 Claffin Ave., New York, N. Y.

HAVE 2 GANG BAND SWITCH,
complete with five mounted colls. Tunes 13 meters to broadcast, with .00014 condenser. Electron coupled, designed for maximum stability. Trade for? Irving Goldstone, 332 Alabama Avenue, Brooklyn, N. Y.

WANTED—VOLTS, I AND II OF
Short Wave Chart. Will pay face value and postage for any or all issues. Have new tubes and late magazines and parts to swap. Don Yocum, Bettis- ville, Ohio.

TRADE—PHILCO 9 TUBE B.C.
radio (& S.W.), trickle charger, new Ranger 22 rifle, for factory built S.W. revr. or good tech. radio books. V. T. Judd, 109 S. Nice St., Frackville, Pa.

WANTED—A USED WIRELESS
phono oscillator with phono pickup arm. Also want used code instructor recordings. John Antonio, Box 32, Elkland, Penna.

HAVE 46 QST 1931-1934, Ghirardi
Radio Physics Course, 1 1936 ARRL Handbook, 1100-0-1100 1KW trans- mitting transformer. All in perfect condition. Want service instruments or meters. C. Portler, 6 Pleasant St., Potsdam, N. Y.

WANTED: CANDLER JUNIOR CODE
course. Swap Cooke electrical course or cash. Marlon Hilburn, Nevada, Iowa.

SWAP: NEW '39 CROSLLEY AC-DC
midget, radio books, magazines, parts, test equipment, 3-band coil kit. Want: Argus 35 MM enlarger, electric shaver. Stamp for list. John J. Vilkas, 1515 South 49th Court, Cicero, Ill.

(Continued on opposite page)

Mc. Call

6.550 TIRCC SAN JOSE, COSTA RICA, 45.8 m.,
Addr. Radioemisora Catolica
Costarricense. Sun. 11 am.-2 pm.,
6-7, 8-9 pm. Daily 12 n.-2 pm.,
6-7 pm., Thurs. 6-11 pm.

6.540 YNIGG MANAGUA, NICARAGUA, 45.87
m., Addr. "La Voz de las
Lagos." 1-2.30, 8-10 pm. Except
Sundays.

6.490 TGWB GUATEMALA CITY, GUAT., 46.2
m. La Voz de Guatemala. Daily
7.45-9 am. 12.45-3.45 pm., 7.30
pm.-12.15 am. Sun. 10.30 am.-5.15
pm., 7 pm.-12 m.

6.480 HIIL SANTIAGO DE LOS CABALLEROS,
D. R., 46.28 m., Addr. Box 356.
9.40-11.40 am., 7.40-9.40 pm.

6.470 YNLAT GRANADA, NICARAGUA, 46.36
m., Addr. Leonidas Tenoria, "La
Voz del Mombacho." Irregular.

6.455 HI4V SAN FRANCISCO DE MACORIS,
D. R., 46.44 m., 11.40 am.-1.40
pm., 5.10-9.40 pm.

6.420 HIIS SANTIAGO, D. R., 46.73 m., 5.40-
7.35 pm. Ex. Sun.

6.400 TGQA QUEZALTENANGO, GUATEMALA,
46.88 m., Mon.-Fri. 9-11 pm. Sat.
10 pm.-1 am. Sun. 1-3 pm.

6.388 HI9B SANTIAGO, D. R., 46.95 m., Mon.
6-6.45, 8-8.45 pm.

6.384 ZIZ BASSETERRE, ST. KITTS, W. IN-
DIES, 46.99 m. 4-4.45 pm., Wed.
7-7.30 pm.

6.357 HRPI SAN PEDRO SULA, HONDURAS,
47.20 m., 6-7.30 am., 2-4 pm. &
Irreg. to 10 pm.

6.340 HIIX CIUDAD TRUJILLO, D. R., 47.32 m.,
Sun. 7.40-10.40 am., daily 12.10-
1.10 pm., Tues. and Fri. 8.10-10.10
pm.

6.335 OAXIA ICA, PERU, 47.33 m., Addr. La Voz
de Chiclayo, Casilla No. 9. 8-
11 pm.

6.324 COCW HAVANA, CUBA, 47.4 m., Addr.
La Voz del Radio Philco, P. O.
Box 130. 6.55 am.-12 m. Sun. 9.55
am.-10 pm.

6.310 HIZ CIUDAD TRUJILLO, D. R., 47.52 m.
Daily except Sat. and Sun. 11.10
am.-2.25 pm., 5.10-8.40 pm. Sat.
5.10-11.10 pm. Sun. 11.40 am.-1.40
pm.

6.298 OAX46 LIMA, PERU, 47.63 m., Addr.
Apartado 1242. Daily 7-10.30 pm.

6.280 HIIG TRUJILLO CITY, D. R., 47.77 m.,
7.10-9.40 am., 11.40 am.-12 pm.,
3.40-9.40 pm.

6.243 HIIN CIUDAD TRUJILLO, D. R., 48 m.,
Addr. "La Voz del Partido Dom-
inicano." 12 n.-2 pm., 6-10 pm.

6.238 HRD LA CEIBA, HONDURAS, 48.12 m.,
Addr. "La Voz de Atlantida." 8-
11 pm.; Sat. 8 pm.-1 am.; Sun.
4-6 pm.

6.210 SAIGON, INDO-CHINA, 48.28 m.,
Addr. Radio Boy-Landry, 17 Place
A. Foray. 4.30 or 5.30-9.15 am.
11.45 pm.-1 am.

49 Met. Broadcast Band

6.200 HI8Q CIUDAD TRUJILLO, D. R., 48.36
m. Irregular.

6.190 KGEI SAN FRANCISCO, CAL., 48.47 m.,
Addr. Gen. Elec. Co. 12 m.-3 am.

6.190 JLK TOKYO, JAPAN, 48.47 m. 8-9.30
am.

6.190 HVJ VATICAN CITY, 48.47 m., Mon.,
Wed., Thur., Sat. 2-3.30 pm.,
Tues., Fri. 2-3 pm. Thur. also
3-3.30 pm.

6.190 T62 GUATEMALA CITY, GUAT., 48.47
m., Addr. Dir. Genl. of Electr.
Commun. Relays TGI Mon.-Fri.
6-11 pm., Sat. 6 pm.-3 am. Suns.
7-11 am., 3-8 pm.

6.185 HIIA SANTIAGO, D. R., 48.5 m., Addr.
P. O. Box 423. 7 am.-5 pm.

6.170 WCBX NEW YORK CITY, 48.59 m., Addr.
Col. B'cast System, 485 Madison
Ave., 12 m.-2 am., in Nov. and
Jan.

6.163 HI5N MOCA CITY, D. R., 48.75 m. 6.40-
9.10 pm.

6.150 HJDE MEDELLIN, COLOMBIA, 48.78 m.,
9.30 am.-1 pm., 5-11.30 pm.

6.150 CJRO WINNIPEG, MAN., CANADA,
48.78 m., Addr. (See 11.720 mc.)
Daily 6 pm.-12 m., Sun. 5-10 pm.

6.180 ZP14 VILLARRICA, PARAGUAY, 48.78
m. 4-6 pm.

6.148 ZTD DURBAN, SOUTH AFRICA, 48.8 m. Addr. (see ZRO, 9.753 mc.) Daily 11.20-3.45 pm., Sat. till 4 pm., Sun. till 3.20 pm.

6.147 ZEB BULAWAYO, RHODESIA, S. AFRICA, 48.8 m. Mon., Wed., and Fri. 1.15-3.15 pm.; Tues. 11 am.-12 n.; Thurs. 10 am.-12 n. Sun. 3.30-5 am.

6.140 WPIT PITTSBURGH, PA., 48.83 m., Addr. Westinghouse Electric & Mfg. Co. Relays KDKA 10 pm.-12 m.

6.140 OQ2AA LEOPOLDVILLE, BELGIAN CONGO, 48.83 m. Suns. 5.35-7 am.

6.140 SP48* WARSAW, POLAND, 48.83 m. Irregular.

6.137 CR7AA LAURENCO MARQUES, MOZAMBIQUE, PORT. E. AFRICA, 48.87 m. Daily 12.05-1, 4.30-6.30, 9.30-11 am., 12.05-4 pm., Sun. 5.7 am., 10 am.-2 pm.

6.130 VP38G GEORGETOWN, BRIT. GUIANA, 48.94 m. 9-10 am., 2.15-6.30 pm., Sun. 5.30-11.30 am., 3-5 pm.

6.130 TIEM SAN JOSE, COSTA RICA, 48.94 m. "El Mundo" Apartado 1049. 11 am.-11 pm., Sun. 10 am.-6 pm.

6.130 CHNX HALIFAX, N. S., CAN., 48.94 m., Addr. P. O. Box 998. 7 am.-11.15 pm. Sat. 8 am.-11.30 pm. Sun., Noon-11.15 pm. Relays CHNS.

6.130 HS4PJ BANGKOK, THAI, 48.94 m. Daily Ex. Mon. 8-10 am.

6.130 LKJ2 JELOY, NORWAY, 48.94 m. Noon-6 pm.

6.125 CXA4 MONTEVIDEO, URUGUAY, 48.98 m., Addr. Radio Electrico de Montevideo, Mercedes 823. 8 am.-Noon, 2-10 pm.

6.122 HP5H PANAMA CITY, PAN., 49 m., Addr. Box 1045. 10 am.-1 pm., 5-11 pm.

6.122 FK8AA NOUMEA, NEW CALEDONIA, 49.00 m., Radio Noumea, Addr. Charles Gaveau, 44 Rue de l'Alma., Wed. & Sats. 2.30-3.30 am.

6.120 WCBX NEW YORK CITY, 49.01 m., Addr. See 6.170 mc., 12 m.-2 am. in Dec. and Feb.

6.117 XEUZ MEXICO CITY, MEX., 49.03 m., Addr. 5 de Mayo 21. Relays XEFO 9 am.-1 pm., 7 pm.-2 am.

6.116 — SAIGON, FR. INDO-CHINA, 49.05 m., 6 or 7 to 9.30 am., 11-11.30 pm.

6.115 OLR2C PRAGUE, BOHEMIA, 49.05 m. (See 11.40 mc.)

6.110 GSL DAVENTRY, ENGLAND, 49.1 m., Addr. B.B.C. London. 6.22-9.15 pm., 9.37 pm.-12.30 am.

6.110 XEGW MEXICO CITY, MEX., 49.1 m., Addr. La Voz de Aguila Azteca desde Mex., Apartado 8403. Relays XEJW 11 pm.-1 am.

6.105 HJAB MANIZALES, COL., 49.14 m., Addr. P. O. Box 175. Dly. 5.30-10 pm. Sat. to 11 pm. Sun. 2.30-5 pm.

6.100 YUA BELGRADE, JUGOSLAVIA, 49.18 m. 1-3, 6.30-8.30 am., Noon-6.30 pm.

6.100 WNBI BOUND BROOK, N. J., 49.18 m., Addr. Natl. Broad. Co. 9 pm.-12 m.

6.097 ZRK KLIPHEUVEL, S. AFRICA, 49.2 m., Addr. S. African Broad. Co., Johannesburg. Daily 12 n.-4 pm., Sun. 12 n.-3.20 pm.

6.097 ZRJ JOHANNESBURG, S. AFRICA, 49.2 m., Addr. S. African Broad. Co. Daily exc. Sat. 11.45 pm.-12.50 am.; Daily exc. Sun. 3.15-7, 9-11.30 am. (Sat. 8.30-11.30 am.) Sun. 3.30-4.30 or 4-5 am., 5.30-7, 8.40-11.30 am.

6.095 JZH TOKYO, JAPAN, 49.22 m., Addr. (See 11.800 mc., JZJ.) Irregular.

6.090 ZNS NASSAU, BAHAMAS, 49.26 m., Addr. Dir. of Tel. East St., Nassau. 1.30-2, 8-9 pm.

6.090 CRCX TORONTO, CAN., 49.26 m., Addr. Can. Broadcasting Corp. Daily 6.45 am.-4 pm., Sun. 9.30 am.-11 pm.

6.090 ZBW2 HONGKONG, CHINA, 49.26 m., Addr. P. O. Box 200. Irregular.

6.090 ZHJ PENANG, FED. MALAY STATES, 49.26 m. 6.40-8.40 am., except Sun. also Sat. 11 pm.-1 am.

6.083 VQ7LO NAIROBI, KENYA, BRIT. EAST AFRICA, 49.31 m., Addr. Cable and Wireless, Ltd. Mon., Fri. 5.30-6 am., 11.15 am.-2.15 pm., also Tues. and Thurs. 8.15-9.15 am.; Sat. 11.15 am.-3.15 am.; Sat. 11.15 am.-3.15 pm.; Sun. 10.45 am.-1.45 pm.

6.080 WCB1 CHICAGO, ILL., 49.34 m., Addr. Chicago Fed. of Labor. Relays WCFL irregular.

BARTER and EXCHANGE FREE ADS (continued)

HAVE 2 HAMMARLUND VARIABLE coupling, 465 K.C., air tuned. I. F. trans., ten Hammarlund, 6 prong, isolantite, plug-in coil forms. Want condenser analyzer or what? William Bunnell, 1259 St. Nicholas Ave., New York City.

HAVE POPULAR MECHANICS, Short Wave, Radio Craft back issues. Radio & Television to date. Want scenery picture books or someone with movie projector to show me films. C. Holstein, 246 E. 118 St., Bronx, N. Y.

SWAP—NEW INBOARD MARINE engine, battery b.c. superhets AC, AC-DC radios, portables, battery, electric; amateur mounted crystals. Want—standard automatic or repeating shotgun, 12 or 16 gauge, back numbers R&T, J. Kubik, Gt. Barrington, Mass.

WANTED—USED POCKET SIZE vol-ohm meter in good condition. Will pay cash. Please write. Mike Riley, Hartford, Ky.

HAVE COMPLETE FIXED STATION, emergency portable communications equipment, radiophone-rw, Collins, RCA, Billey; mikes, tubes, with own 110v a.c. generators, PA system, test equipment, miscellaneous parts, power supplies. Trade all. Radio WMOQU, 76 Hanover St., Wellsville, N. Y.

WILL PAY CASH OR TRADE FOR Jensen peridynamic baffle in good shape. (Model KM). State price or what you need. John Cram, Upper Sandusky, Ohio.

WANTED—GOOD SIGNAL GENERATOR. Have tubes and parts, radio mags, or cash. Leroy Ellis, 205 So. 10, Richmond, Indiana.

SWAP 65, 1932-1939. MODEL AIRPLANE News magazines; 39, 1936-1939. Flying Aces; and 24, 1937-1939. Air Trails; for radio parts or? Mike Shuleva, 3007 Sackett Ave., Cleveland, Ohio.

WANTED SCOTT PHILHARMONIC or Phantom, also a Garrard record changer. Offer or trade Silver-Marshall 15 stamps, books, magazines, etc. Will pay part cash. C. R. Adams, 230 W. Ridge Ave., State College, Pa.

CANDID FANS, I HAVE A CANDID camera I would like to swap for a telegraph key (not a bug) or 20, or 10 meter crystal. Write for particulars. Al Fisher, 31 Woodland Ave., Laconia, N. H.

WANT: SET 4-PRONG OCTO COILS, 100 mfd., dual 15 or 25 midget var. x-mitting parts. Exchange 2900 ka. tal, 160 d.c. voltmeter, speakers, etc., cash. Norman C. Kellerman, 71 Freund St., Buffalo, N. Y.

HAVE AC SW3 RECEIVER WITH tubes, 8 sets of general coverage coils and three bandspread coils. Want Bb clarinet or Browning preselector type 5DXP. M. C. Nickerson, Box 24, Corcoran, Calif.

SWAP MIMEOGRAPH AND EQUIPMENT, hipboots, loudspeaker, soap and dispensers, Vogue radio-mike, stamp album, etc., for: SW receiver. Instrotograph, tapes, keys, transmitter, oscillator, radio-course, or what? S. Racovsky, 2510 Adams, Huntington, N. Y.

HAVE LOADS OF RADIO PARTS to trade. Will trade for parts or tubes. Send your list I'll send mine. Paul Bahr, Marion, Indiana.

WANTED TRANSMITTING TUBES, crystals, condensers, etc. Also want ten meter equipment. Have receiver tubes, parts and meters. Write to me about what you have and want. Linley W. Holmes, 414 South Sixth Street, Brainerd, Minn.

WILL TRADE RADIO PARTS AND transmitting parts for D.C. radio servicing equipment, also 6v. D.C. generators with 2 inch pulleys, for a 2 tube all wave battery radio. Answer all. Rlenhold Odenbach, Iola, Alberta, Can.

HAMS, SWL's START NEW HOBBY. Will trade 1375 stamps, from 152 countries, and duplicates for Sky Buddy, Super Clipper, 430 or like communication receiver, Edward Sassaman, 229 E. Grant St., Alliance, Ohio.

SWAP: NEW PORTABLE RADIO, 8 tube combination, battery-electric set (value \$24.95) for used Sky Buddy or small c.w. transmitter (Utah preferred) (\$15. transceiver). Must be good condition. Willard L. Haskell, Jr., Chachapacasset Rd., Barrington, R. I.

WANTED—SHORT WAVE CONVERTER, have radio parts in exchange. Stanley Vandross, 141 Mayflower Ave., New Rochelle, N. Y.

TRADE—TRIMM FEATHERWEIGHT phones for snare drum or what have you. F. Vieweger, 1411 S. 17th St., Manitowoc, Wis.

HAVE GHIRARDI'S RADIO PHYSICS, tube checker, midget radios, electric clock, tubes, parts, radio mags, radio books. Want camera, bug, xtals. Trade tenor banjo, case, for mandolin. G. Sankofsky, 215 S. 3rd St., Brooklyn, N. Y.

HAVE 1000 VIEW POSTCARDS OF many countries up to 35 years old. Green Flyer motor and Toman Pickup. meters. Want radio parts. Higgins, 8303 Kenwood, Chicago.

SWAP 441 LINE TELEVISION AND receiver brand new, partially finished on three sections, for anything of value. David Gross, 1263 Coney Island Ave., Brooklyn, N. Y.

HAVE AC, AC & DC RADIOS AND parts, technical magazines. Want soy beans or soy flour ground on stones or dry wild berries. M. Wolkoff, 12 N. Perth Street, Philadelphia, Pa.

ULTRA-STRATOSPHERE "10" coils 2 1/2 to 550 meters, tubes wanted. Will swap many xmitting and receiving parts. Send list of type of parts you are interested in getting. James Dolan, Box 855, Woonsocket, R. I.

WANTED—USED R.M.E. 69 RECEIVER in good condition. Will pay cash or will trade power supplies (300V), AC-DC receiver, binoculars etc. Write: Wallace Balla, 251 Flax Hill Road, South Norwalk, Conn.

HAVE FISHING TACKLE, COST \$4. Good for the beginner. Also have a pr. of size 5 ice skates (rubular). Will trade for printing of SWL cards or most anything. Bill Waddler, 29 Day St., Fall River, Mass.

WANT 1939 SKY BUDDY MUST work. Have a Univex 8mm. camera and projector in first class condition. \$25 when new, also have a Philco 4 tube a.c. super. John Nauman, West Branch, Mich.

SWAP A 12" SPEAKER FOR A Call Book or a 6L6 or 6L6G tube. QTH. Eber F. Diehl, Jr., W5H12, 309 So. 17th St., Camp Hill, Penna.

WANTED: NATIONAL SW3 OR any 3 or 4 tube A.C. 6.W. set. Cash or trade. Have speaker, dials, coils, trans., etc. Describe. James Robinson, R. R. 3, Jackson, Ohio.

WOULD LIKE TO SWAP RADIO News and Radio-Craft magazines for test equipment and also have Sky Buddy. Please write to R. Derry, 1719 Upland St., Pgh., Penna.

WANT MANUALS, TEST EQUIPMENT, electric drill, factory built all-wave radio, Contax or similar camera. Have courses, books, binoculars, piano accordion, car radio, formulas. Will exchange lists, write. P. Villepigue, So. Western, Chanute, Kans.

INTERESTED IN TRADING STAMP duplicates. Have cameras, old radio, etc. Would like to correspond. Louis Eckstein, 10509 Drexel Ave., Cleveland, Ohio.

TRADE 48 ACRES MICHIGAN lake land and Scott Deluxe 15 tube receiver for 30 tube Scott Philharmonic receiver. D. M. Newbold, Upper Sandusky, Ohio.

WANT XTAL, HANDBEE GRINDER, speed key, 0-1 ma. meter, Have tubes, "Radio Physics Course", parts. Helen Wax, 225 Rodney St., Brooklyn.

WHO HAS AN ASTATIC D-104 microphone for trade. Can also use 10 meter xmitting equipment. State needs, have plenty of everything. M. Levine, 332 Alabama Ave., Brooklyn, N. Y.

HAVE FOUR TUBE BROADCAST receiver. Will receive over 21 stations. Want millimeter, 1.000 shot air rifle. Radio Amateur Course or books. What have you? Will answer all. Bill Wardlow, 422 Jackson Ave., Elizabeth, N. J.

WANT ANY KIND RADIO EQUIPMENT. Will exchange Remington P.O. Special typewriter, violin (less strings) and 200 books (150 recent publications). James A. Cullen, 30 Oakland St., Salem, Mass.

SWAP: THREE 8 INCH JENSEN P.M. speakers, 0-1 D.C. milliamperemeter, stamps, album, A.C. receiver transformers, tubes, two amp. battery charger, new Astatic crystal pick-up for Rider's Manuals, test equipment. E. B. Hancock, 825 1/2 W. Tenth St., Dallas, Texas.

TRADE NEW FAIRBANKS-MORSE 4 tube 2 and 6 volt battery superhet. "Ellen 3B" 3 tube battery all-wave set. Want "National SW3" 2 volt battery model, or 1 1/2 volt portable. Alexander Podstepny, 217 Pine St., Phila., Penna.

SWAP: COMPLETE NEW SET 8 volumes, leather binding, Eleventh edition, perfect condition, Bernarr MacFadden's "Encyclopedia of Health and Physical Culture." Want receiver 5-10-20-40 meter bands, complete, working. J. E. Greenbaum, WILLIG, 1862 North Ave., Bridgeport, Conn.

NEW AUGUST 39—\$125. N.R.I. course, Practical Radio, Advanced Radio Servicing, Merchandising and Television, about 70 books, trade for items equal value. Preferably short wave receiver. John H. Strang, 332 N. Jefferson, Peoria, Ill.

HAVE SEVERAL SMALL S.W. RADIOS also numerous radio parts, tubes, etc. Want Radiola model 21 receiver. Write for information. Harry Matzke, New Auburn, Wis.

SWAP NEW 0-1 BEEDE MILLAMP meter, regenerative receiver tubes and coils, RCA magnetic 100A miugel all current broadcast for what have you. Harry Winthrop, 302 Thlrld Street, Jersey City, N. J.

WANTED: SEPT OR MEMO 35 MM camera, also Rider Practical Testing Systems. G. W. Deuchler, Route 6, Omaha, Nebr.

WANT NEW N.R.I. RADIO COURSE, also good Sky Buddy receiver and amateur's radio call book. J. T. DeBryce, Box 754, Big Sandy, Tenn.

SWAP—RADIO PARTS, TUBES, B eliminator, A eliminator, motorcycle speedometer, 1 1/2 HP gasoline engine. Want: SW rcvr., xmitter, xtals or what have you. Walter Blumer, Jefferson, Wis.

WANT: ARGUS A-2-F, C2 OR C3, Detrola, E or similar and case. Have: Columbia phono-radio portable, mike, speaker, 30-33 transceiver, 2 1/2 to 10 meters with power supply, typewriter, Stevens .22 target rifle. Hover, Jamul, California.

TRADE INTERNATIONAL CORRESPONDENCE School Master Craftsman course, new, worth \$125. Want late National Radio Institute course and transmitter parts. S. C. Reed, Lenexa, Kansas.

SWAP 35 WATT TRANSMITTER. Want bug, good mike, oscilloscope, high power transformers or vibrators, high power tubes, antenna parts, for what have you. Offers immediately answered. W2MIZ, Gregory Flyer, 5702 14 Ave., Brooklyn.

WANT S.W. RECEIVER OR CODE course. Have 1/4 h.p. motor; electric fan, 14" blade, no guard; \$25 Eastman folding post card camera; hockey skates, size No. 8; Conn alto saxophone. Earl Prentz, 309 Ontario S.E., Minneapolis, Minn.

WOULD LIKE TO TRADE RADIO magazines, parts, tubes, meters, diagrams and ideas with beginners. Answer 100%. Wagner, 6307 Kenwood, Chicago.

WISH TO BUY USED GHIRARDI'S "Radio Physics Course." State edition, price and condition. All offers answered. Arthur R. Ross, 1317 So. 27th St., Fort Dodge, Iowa.

WANT ENLARGER. HAVE NEW D-104 mike, 35T, tubes, meters and parts. Hernian Yellin, W2AJL, 351 New Lots Ave., Brooklyn, N. Y.

HAVE PLENTY OF STAMPS FROM all over the globe to swap for radio equipment. J. Weiss, 547 E. 105 St., Cleveland, O.

SWAP—JIFFY PANTS PRESSER, value one dollar, pair 3 power binoculars with built-in compass. I want something in radio. D. Nelson, 138 Johnson Ave., Dumont, N. J.

HAVE GLEBEET CHEMICAL SET in good condition, including chemicals. Want any kind of radio equipment. What have you? F. Butler Roberts, 626 Chestnut St., Emmaus, Pa.

SUPREME MODEL 502 TUBE AND set tester, 2" cathode-ray tube, 1852 tube. Will swap for good "Ham" receiver or "Ham" parts. E. Marko, W2MFO 25-73 45 Str., Astoria, L.I.C.

SWAP: 1/6 HP MOTOR, JIG SAW, 100 mfd. variable condenser and wood lathe for 300 V., 100 ma. vibrator (6 V. primary) 0-150 ma. Triplett meter, 807 tube. Carl Strohmeier, 1 Stanley Drive, Catonsville, Md.

I HAVE 1200 STAMPS IN ALBUM, 100 picture postcards, many short wave receiving parts, in exchange for good 7 mc. crystal, 6L6 (G) tube. John Dehler, 692 Melrose Ave., Bronx, N. Y.

WANT CRYSTAL MIKE, 75 AND 10 meter crystals, 913 tube, all in good condition. Have 3569 BC3 crystal, 0-100 ma. D.C. Simpson meter and cash. State full details. L. C. Bohn, W2LRT/1 P.E.A., Exeter, N. H.

HAVE TYPEWRITER, 1/2 H.P. motor, Weston Photronic relay, 12-inch Jensen dynamic speaker. Want good S.W. receiver, test equipment. Riders Manuals, or other radio apparatus. Fredric Fish, 42 Lilac St., Manchester, Conn.

WILL TRADE A.C. SW-3 RADIO receiver for a good crystal microphone. Robert Sachtleben, W2LHX, Clifton, New Jersey.

WANTED—CHEAP FOR CASH THE following: Printing press, duplicator and supplies, cameras, photographic equipment, used radio courses, radio parts and movie projectors. Write: M. W. Zmood, 222 Portage Ave., Winipeg, Man., Canada.

WANTED—1/4 HP, A.C. OR D.C. 100 volt motor and 1/5 hp gas engine. Have radio parts to trade. Terrence Genes, Lake View, S. C.

TRADE THREE TUBE A.C.-D.C. S.W. receiver (coils, phones) and 6-tube table "Automatic." Interested in 2 1/2 to 10 M. receiver and 16M. projector and camera. Elwood Brooks, 1638 E. 36, Cleveland, Ohio.

(Continued on following page)

BARTER and EXCHANGE FREE ADS (continued)

HAVE READRITE ANALYZER. W.E. telephones. "French type." .22 cal. rifle. RCA portable radio. Need xmitting tubes, xtals, high voltage xformers, or what have you. R. E. Murphy, 7511 Georgetown Road, Bethesda, Md.

WANT AIR ROMER, OMNIGRAPH dials, 22/32 Smith. Have Remington .22 rifle, receiver and tang peep sights, Browning and Remington auto shot-guns, also Winchester 410 skeet pump. R. Welker, 406 No. Harvey, Oak Park, Ill.

WILL GIVE USED RADIO PARTS for your rolls and return postage. Or what have you? Lupo, 1408 E. 63rd St., Chicago.

TRADE—TUBES, 210, 282A, 841, etc. For other low-power xmitting equipment. Need mike, code machine, crystals. Lawrence Pleasant, P.O. Box 58, Mattoon, Illinois.

WANT SERVICE MANUALS, TEST instruments, radio parts and phono pickup. Will trade phonograph records, S.W. converter, radios and various radio parts or cash. Eugene Patterson, 745 South West St., Winchester, Indiana.

WANTED—NO. 10 ERECTOR OR 110-Gauge locomotive. No. 5318 American Flyer train outfit. Will trade Freed-Eisenmann 6-tube battery radio or will buy trains cheap. John E. Evans, 1016 Easthigh Avenue, Oskaloosa, Iowa.

WANT A GOOD SHORT WAVE RECEIVER. Have set of five large volumes (slightly used) on Mechanical and Electrical Engineering. Were used as textbooks in International Correspondence course. E. Kulze, 137-19 Carson St., Springfield, L. I., N. Y.

HAVE TWO-TUBE 110 VOLT A.C.-D.C. all wave set with four plug-in coils in A1 condition. Will swap for second edition of "Ghirardi's Radio Physics Course." M. Lachance, 26 Howard St., Lewiston, Maine.

HAVE LOTS OF TUBES IN GOOD shape, including 6L6s, 6F6s, 45s, 80s, 27s, etc. What have you? Chas. Hoffman, R.R.5, Box 300B, Terre Haute, Ind.

WANTED FOR CASH: MECHANICAL television parts, used. Plate Neon lamp, crater lamp, etc. Must be in working condition. Ray Zitta, W2M0A, 28-26 47 St., Long Island City, N. Y.

1920 RADIO NEWS, RADIO, SHORT Wave & Television, first and fifth edition ARRL Handbook, new, never used. DeLuxe MacKey. Want Howard 430. Morris Harwood, 3104 Edgewood Ave., Richmond, Va.

WANTED: PHOTOS OF SWL'S OR Hans' shacks as I am making a collection. Also, I correspond in U.S.A. Interested in SWL first letter received only. Parke, Woodhouse Grove School, Apperley Bridge, Bradford, Yorks, England.

16MM DUOGRAPH MOTOR DRIVEN projector and Baby Cyclone model airplane engine. Both need work. Swap for Clavin's or similar receiver kit. Also want RME Preselector or 510-X. Bob Lang, 753W Duarte, Arcadia, Calif.

WANTED—RADIO PARTS. Will trade or pay cash. Henry F. Heckert, 901 Howard St., Indianapolis, Iowa.

WANTED—GOOD SKY BUDDY OR Howard short wave radio. Have to trade .22 automatic rifle, radio tubes, transformers, condensers, resistors and various other radio parts. Write Montie Earl Smith, Jr., Selmer, Tenn.

STAMP COLLECTORS IN LATIN America, British Empire, everywhere! I want airmails, new issues, collections. Will give U. S., foreign stamps. Also Lang 5-tube A.C. midget, perfect condition. Charles Lasky, 162-13 Hillside Avenue, Jamaica, N. Y.

WANTED: 8MM PROJECTOR, 200 watts or more. In exchange for radio receiver parts or new tubes, also have Triplet analyzer in need of repairs. Wm. F. Freshke, 1531 Highland, Chicago, Ill.

HOWARD 430, LIKE NEW, FOR higher priced receiver, used. Have genuine reflex roll camera, Intoscope, 25 dollars worth chemicals and apparatus. Remington Portable. Want Allineter, H.V. power supply, radio equipment. W9PDC, Crookston, Minn.

WANTED—23- OR 30-TUBE RADIO, state cash price. Have Hallcrafters, pickups, turntables, Triplet tube tester, auto radios, DeForest radio course, transformers, meters, tubes, speakers, RCA phonograph oscillator. O. Klein, 2235 N. 39th St., Milwaukee, Wis.

WANT GHIRARDI'S RADIO PHYSICS Course, also A.R.R.L. publications, have 5-tube A.C.-D.C. S.W. receiver, less speaker and tubes. Mr. Bogaczyk, 327 Putnam St., West Hazleton, Pa.

TRADE GOOD CODE OSCILLATOR, teaches code fast, for watch repairing course or some tools, radio books, telescope, small gas model motor or what have you. Trade radio plans and ideas. Lloyd Day, Bengough, Sask., Canada.

HAVE AUTO RADIO, JIG SAW, bug, 0-50 milliammeter (Weston) speaker, small 6 volt generator, Ford spark coil. Want good short wave receiver or anything of value. Ralph Saber, 107 S. Albion Place, Atlantic City, N. J.

I WANT AN INSTRUCOGRAPH OR similar code machine with tapes. Must be in good condition. Will pay cash. Leonard Fuerst, P.O. Box 91, Orland, Calif.

WANT RADIO PHYSICS COURSE, radio books, manuals or code courses. State condition and value. Also want amateur equipment. Have .22 and .32 rifles, S.W. sets and parts, J. E. Smith, Box 612, Spindale, N. C.

SWAP 40 WATT C.W. XMITTER, 6L6, 807 less crystal, all-band operation, power supply on one chassis, many parts and tubes to go with it, for what have you? Leonard Wright, 59 Creighton St., No. Cambridge, Mass.

TRADE "ULTRA PRECISION INSTRUMENTS," A.C. oscillator, Stewart-Warner R-100-A chassis, small wood lathe, circle saw, airplane mechanics home study course. Will trade for testers, parts, or what have you. Kelsey, 415 E. 15, Tulsa, Okla.

TRADE QST'S—JANUARY, 1922, TO December, 1938, excellent condition. Want National NC100X or RME69, or make offer. Hilda Scott, 2911 Griffin Ave., Richmond, Va.

SWAP: EIGHT TUBE COMMUNICATION receiver, complete transmitter, or power supplies (up to 1,200 volts) for: Excellent copying camera (about \$3.5) enlarger, etc. W8PLN, 3546 East 112 St., Cleveland, Ohio.

HAVE COMPLETE CW XMITTER with power supply, mike meters, books and others for swap. Need crystals. Speed X key. Pauline White, Box No. 26, Pittsville, Md.

WANTED: POWER TRANSFORMER, 400 to 600 volts, at about 100 mils., 83 mercury vapor 0-1, 0-10 milliammeter. Jack Jefferson, 36-15 168 St., Flushing, N. Y. W2MKY.

WANTED: ONE KEY WITH switch. Will trade pickup and RCA motor. Buyer to pay postage both ways. James Wilson, Jr., Box 409, Sheffield, Alabama.

WANTED: CODE MACHINE WITH tapes, communication receiver with crystal, 450 watt phone and cw transmitter. Philco receiver model 37-643 or 38-643. Pay cash for good buy. John Kozma, 337 E. 13 St., New York

HAVE AN 8MM PROJECTOR AND also 5-tube S.W. receiver, for what have you. Joseph B. Ribinski, 219 Nepperhan Ave., Yonkers, N. Y.

HAVE 8-TUBE S.W. RECEIVER, parts, earphones, magazines and cash; for small receiver, old license plates, old National Geographic and other old books. Charles Paulaitis, R.D. 1, Lawrence Corner, Eimer, N. J.

WANTED—IP501 RECEIVER, COMPLETE with amplifier and long wave loader. Must be in first class condition and priced reasonable. R. G. Summers, 319 W. Utica, Buffalo, N. Y.

WILL EXCHANGE UNDERWOOD typewriter for receiver or some good radio parts. Will answer all mail received. Luther Schnake, 1608 Campbell Ave., Des Plaines, Ill.

HAVE NEW AND OLD LIONEL train sets, one 27 and four 26's tubes, electric pants presser. Want A-12A7 and AN (0-1 ma.) meter. D. Nelson, 138 Johnson Ave., Dumont, N. J.

WANTED: SMALL A.C.-D.C. Amplifier of about six watts. Have cameras, enlarger, lenses, etc. What is your offer? Dutch Winner, 1548 Sherman St., Williamsport, Penna.

WILL TRADE B PLAT BOEHM System wood clarinet and case (cost \$75) for late model Sky Buddy and receiver or transmitter parts, or what have you. Carl H. Stello, 1601 Broadway, Kansas City, Mo.

WILL EXCHANGE RADIO PARTS, tubes, Weston meters, books, etc., or pay cash for old U. S. coins, or gold coins of any country or issue. All inquiries answered. Kenneth Steele, Angola, Ind.

SWL EXCHANGE

UNITED STATES

MIGUEL ANGELO, W4H124, 318 East 70 St., New York City.

JOHN ANTONIO, Box 32, Etkland, Penna.

JAMES ARP, 421 Mulberry St., Williamsport, Pa.

JOHN L. BALLIN, W4OH56, 40 East 66 St., New York, N. Y.

O. BARNESON, 3060 Rosewell St., Los Angeles, Calif.

LEONARD N. BARRETT, 1704 Barnard Avenue, Waco, Texas.

JOHN BASTA, 31 Lake St., Brooklyn, N. Y.

CHAS. E. BAXA, 2678 N. Halsted St., Chicago, Ill.

MILTON BENSON, 1 No. Main St., So. Hadley Falls, Mass.

PHILIP BRADY, Box 67, McComb, Miss.

F. E. CAMPBELL, JR., 405 E. 4th St., Berwick, Pa.

ROBERT CHASE, 231 Henry St., New York, N. Y.

DONALD CHISHOLM, 18 Mountain Ave., Wakefield, Mass.

GEORGE CRYDER, Box 299, Delaware, Ohio.

MERRILL DAWSON, Wiley Ford, West Va.

FRANK DRASAL, JR., 801 N. Castle St., Baltimore, Md.

ADOLPH R. DVORAK, JR., 428 South Lincoln, Madison, Neb.

AL G. ELARTON, 5430 Carpenter St., Downers Grove, Ill.

JOHN PETER GAWEI, 96 Jewett Parkway, Buffalo, N. Y.

NORMAN E. GLOVER, 1520 Proctor St., Port Arthur, Texas.

DAVID GUTHRIE, South Hill, Virginia.

HENRY F. HECKERT, 901 Howard St., Indianola, Iowa.

DAVID HERBERT, JR., Box 709, Lancaster, Calif.

LARRY HILKOWITZ, 31 Post Ave., New York City.

DR. J. P. HOTCHKISS, 1430 Hyde Park Blvd., Chicago, Ill.

BOB JOHNSON, P. O. Box 146, Logan, W. Va.

GORDON C. JOHNSON, 2908 E. 6th St., Superior, Wisc.

KAZUO KANAI, R.F.D. Box 84, Auburn, Calif.

E. KULZE, 137-19 Carson St., Springfield, L. I., N. Y.

LAVOYD KUNEY, Fayette, Ohio.

BOB LARSON, 618 North June Street, Hollywood, Calif.

JOHN LONG, 9406 Georgia Ave., Silver Spring, Md.

VERT MANDELSTAMM, 738 S. Park St., Saginaw, Mich.

MERT MEADE, 819 Wyandotte St., Kansas City, Mo.

JOHN T. MEEHAN, 242 Governors Ave., Medford, Mass.

BILL MILLER, 88 Greenwood Drive, Milburn, N. J.

LEWIS MOLteni, 608 Seventh St., Union City, N. J.

JOHN MOSKAL, 85 Gardner Ave., So. Attleboro, Mass.

LOYALL MUMBY, WISW1, 36 Burr Avenue, Middletown, Conn.

RAYMOND NORRIS, W9SWL, 935 N. Humphrey Ave., Oak Park, Ill.

"CASE" F. OLIVER, 23 Beech Street, Dexter, Maine.

BOB W. PACKSCHER, 268 East 237 St., Woodlawn He., Bronx, N. Y.

PAT R. PATTERSON, 911 St. Charles Ave., N. E., Atlanta, Ga.

E. PAVLIDIS, 139 W. 7th Ave., Conshohocken, Pa.

ALBERT PICKERING, West Medway, Mass.

GLENN S. PIDGE, 431 Azusa Ave., Azusa, Calif.

DANIEL PLATEK, 225 Division Ave., Brooklyn, N. Y.

VICTOR POLITI, 1024 Unquowa Rd., Fairfield, Conn.

BILL RASINS, 6611 S. Rockwell Street, Chicago, Ill.

LYLE M. B. RATHBUN, 145 South Ave., Syracuse, N. Y.

JACK ROOMY, 429 Stratton Street, Logan, West Va.

JAMES E. RUST, R. R. 2, Greentown, Ind.

LAVON RIDDLE, E. High St., Rockville, Ind.

RICHARD SPERLING, 100 Warner Street, Newport, R. I.

GEORGE SMITH, JR., 79 Sewall St., Augusta, Maine.

ED STANTON, Box 260, York, S. C.

VINCE and MARIE STASEN, 5347 Priscilla St., Philadelphia, Pa.

JAMES SUGIYAMA, R.F.D. Box 151, Auburn, Calif.

JAMES TOTH, 11702 Crofton Road, R.F.D. 10, Cleveland, Ohio.

J. I. VAUGHT, P. O. Box 1424, New Orleans, La.

W. J. WALLACE, 1929 High St., Ashland, Ky.

AUSTIN WARDMAN, 832 Linden Avenue, East Pittsburgh, Pa.

DONALD D. WARNOCK, Eastern Howard County Radio Club, Converse, Ind.

W. J. WRIGHTMAN, 132 N. 5th, Middletown, Ind.

JACK WELSH, Kingston, Ill.

BERNARD and MICHAEL WOZNIAK, 4639 South Winchester Ave., Chicago, Ill.

GEORGE E. WOLFE, W6HPB, 1925 Railroad Ave., Oroville, Calif.

DON R. YOCOM, Bettsville, Ohio.

CARL YOUNGQUIST, 1121-12 St., Lorain, Ohio.

| Mc. | Call | Station |
|-------|-------|---|
| 6.080 | CRY9 | MACAO, PORTUGUESE CHINA, 49.34 m., Tues. 8.30-10 am. |
| 6.080 | HP5F | COLON, PAN., 49.34 m., Addr. Carlton Hotel, 7-9 pm. |
| 6.079 | DJM | BERLIN, GERMANY, 49.34 m., Addr., Broadcasting House. Irregular. |
| 6.077 | OAX4Z | LIMA, PERU, 49.35 m. Radio National 7 pm.-1.30 am. Except Sun. |
| 6.075 | VP3MR | GEORGETOWN, BRI. GUIANA, 49.35 m. Sun. 7.45-10.15 am.; Daily 4.45-8.45 pm. |
| 6.070 | CFRX | TORONTO, CAN., 49.42 m. Relays CFRB 6.30 am.-11 pm., Sun. 9 am.-11 pm. |
| 6.070 | VE9CS | VANCOUVER, B. C., CAN., 49.42 m. Sun. 1.45-9 pm., 10.30 pm.-1 am.; Tues. 6-7.30 pm., 11.30 pm.-1.30 am. Daily 6-7.30 pm. |
| 6.069 | FIQA | TANANARIVE, MADAGASCAR, 49.42 m., Addr. (See 9.51 mc.) 12.30-12.45, 3.30-4.30, 10-11 am., Sun 2.30-4.30 am. |
| 6.065 | SBO | MOTALA, SWEDEN, 49.46 m. Relays Stockholm 4.15-5 pm. |
| 6.060 | YDD | BANDOENG, JAVA, 49.5 m., 5.30 am. on. |
| 6.060 | WLWO | CINCINNATI, OHIO, 49.5 m., Addr. Crosley Radio Corp. Relays WLW. |
| 6.060 | WCAB | PHILADELPHIA, PA., 49.5 m. Sun., Tues., Fri. 6.30-11 pm.; Wed. 6.30-8.30 pm. |
| 6.055 | VK9MI | S.S. KANIMBLA, 49.54 m. (Travels between Australia and New Zealand.) Sun., Wed., Thurs. 7-7.30 am. |
| 6.054 | HJAA | PEREIRA, COLOMBIA, 49.55 m., 9 am.-Noon, 6.30-10 pm. |
| 6.050 | GSA | DAVENTRY, ENGLAND, 49.59 m., 12.17-6, 6.20-9.15 pm. |
| 6.045 | XETW | TAMPICO, MEXICO, 49.6 m. Irregular 7-11 pm. |
| 6.040 | WDJM | MIAMI BEACH, FLA., 49.65 m. 1-3 pm., 9 pm.-2 am., Sun. 4-6 pm. Relays WIOD. |
| 6.040 | WRUL | BOSTON, MASS., 49.65 m., Addr. University Club, Sun. 2-7 pm.; Sat. 6-8 pm. Daily exc. Sat. and Sun. 5.30-7.45 pm. |
| 6.033 | HP5B | PANAMA CITY, PAN., 49.75 m., Addr. P. O. Box 910. 10.30 am.-2, 6-10 pm. |
| 6.030 | CFVP | CALGARY, ALTA, CAN., 49.75 m. Thur. 9 am.-1 am.; Sun. 12 n.-12 m. |
| 6.030 | RV96 | MOSCOW, U.S.S.R., 49.75 m. 1-6, 7-9 pm. (English 3-3.30, 7-8.30 pm.) |
| 6.030 | OLR2B | PRAGUE, BOHEMIA, 49.75 m. (See 11.875 mc.) Off the air at present. |
| 6.023 | XEUW | VERA CRUZ, MEX., 49.82 m., Addr. Av., Independencia 98. 10 pm.-1 am. |
| 6.020 | XEXA | MEXICO CITY, MEX., 49.83 m., Addr. Dept of Education. Daily 8-11 am., 2.30-4 pm., 7.30 pm.-12.45 am. Sun. 1.30 pm.-12.45 am. |
| 6.020 | DJC | BERLIN, GERMANY, 49.83 m., Addr. (See 6.079 mc.) 11.30 am.-4.30 pm., 4.50-10.50 pm. |
| 6.017 | H13U | SANTIAGO DE LOS CABALLEROS D. R., 49.84 m. 7.30-9 am., 12 n.-2 pm., 5-7 pm., 8-9.30 pm.; Sun. 12.30-2, 5-6 pm. |
| 6.015 | PRA8 | PERNAMBUCO, BRAZIL, 49.85 m., Radio Club of Pernambuco, 4-9 pm. |
| 6.010 | OLR2A | PRAGUE, BOHEMIA, 49.92 m. Addr. (See OLR, 11.84 mc.) Irreg. |
| 6.010 | COCO | HAYANA, CUBA, 49.92 m., Addr. P. O. Box 98. Daily 7.55 am.-12 m., Sun. until 11 pm. |
| 6.010 | CJCX | SYDNEY, NOVA SCOTIA, 49.92 m. Relays CJCB 7 am.-12.30 pm. |
| 6.007 | XYZ | RANGOON, BURMA, 49.94 m., 6.30-10 am., 9-11 pm., Sat. 9.30-11 pm. |
| 6.007 | ZRH | ROBERTS HEIGHTS, S. AFRICA, 49.94 m., Addr. (See ZRK, 9.606 mc.) Daily exc. Sun. 9.30 am.-3.30 pm (to 4.45 pm. Sat.), Sun. 8.40 am.-12 n., 12-15-3.15 pm. Daily exc. Sat. 11.45 pm.-12.50 am. |
| 6.005 | HP8K | COLON, PAN., 49.96 m., Addr. Box 33, La Vox de la Victor. 7-9 am., 10.30 am.-1 pm., 5-11 pm. |
| 6.005 | CFCX | MONTREAL, CAN., 49.96 m., Can. Marconi Co. Relays CFCF 6.45 am.-12 m.; Sun. 8 am.-10.15 pm. |

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| Mc. Call | |
| 6.005 VE9DN | DRUMMONDVILLE, QUE., CAN., 49.96 m., Addr. Canadian Marconi Co. |
| 6.002 CXA2 | MONTEVIDEO, URUGUAY, 49.98 m. Addr. Rio Negro 1631. Relays LS2, Radio Prieto, Buenos Aires. 5.30-10.30 pm. |
| 6.000 XEBT | MEXICO CITY, MEX., 50 m., Addr. P. O. Box 79.44. 10 am.-1.45 am. |
| 6.000 — | MOSCOW, U.S.S.R., 50 m., 3.30-4 pm., in Czech. |
| 5.990 ZEA | SALISBURY, RHODESIA, S. AFRICA, 50.08 m. (See 6.147 mc., ZEB.) Sun. 3.30-5 am. |

End of Broadcast Band

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|--------------|---|
| 5.977 CS2WD | LISBON, PORTUGAL, 50.15 m., Addr. Rua Capelo 5. 3.30-6 pm. |
| 5.975 OAX4P | HUANCAYO, PERU, 50.16 m. La Voz del Centro del Peru. 9-11 pm. |
| 5.968 HVJ | VATICAN CITY, 50.27 m. Off the air at present. |
| 5.950 HH2S | PORT-AU-PRINCE, HAITI, 50.37 m., Addr. P. O. Box A103. 7-9.45 pm. |
| 5.940 OAX2A | TRUJILLO, PERU, 50.51 m., Tue., Thu., Sat., Sun. 7-10 pm. |
| 5.900 ZNB | MAFEKING, BRI. BECHUANALAND S. AFRICA, 50.84 m. Addr. The Govt. Engineer, P. O. Box 106. 6-7 am. 1-2.30 pm. Ex. Suns. |
| 5.900 TILS | SAN JOSE, COSTA RICA, 50.85 m. 6-10 pm. |
| 5.885 HI9B | SANTIAGO, D. R., 50.95 m. Irregular 6-11 pm. |
| 5.875 HRN | TEGUCIGALPA, HONDURAS, 51.06 m. 1.15-2.16, 8.30-10 pm.; Sun. 3.30-5.30, 8.30-9.30 pm. |
| 5.855 HI1J | SAN PEDRO DE MACORIS, D. R., 51.25 m., Addr. Box 204. 11:40 am.-1.40 pm., 6.10-8.40 pm. |
| 5.825 TI6PH | SAN JOSE, COSTA RICA, 51.5 m., Addr. Alma Tica, Apartado 800. 11 am.-1 pm., 6-10 pm. Relays TIX 9-10 pm. |
| 5.813 TI6PH2 | SAN JOSE, COSTA RICA, 51.59 m., Addr. Senor Gonzalo Pinto, H. |
| 5.810 YONG | ST. JOHNS, NEWFOUNDLAND, 51.6 m., Add. Broad. Corp. of Newfoundland. |
| 5.790 TGS | GUATEMALA CITY, GUAT., 51.75 m. Casa Presidencial, Senor J. M. Caballeroz. Irregular. |
| 5.735 HC1PM | QUITO, ECUADOR, 52.28 m. Irregular 10 pm.-12 m. |
| 5.460 YNOP | MANAGUA, NICARAGUA, 52.40 m., 8.30-9.30 pm. Sun. 2-3 pm. |
| 5.300 ZIK3 | BELIZE, BRIT. HONDURAS, 56.6 m., Tue., Thurs., Sat. 1.30-2, 8.30-9 pm. |
| 5.145 OKIMPT | PRAGUE, BOHEMIA, 58.31 m., Addr. (See OLR, 11.84 mc.) Irregular. |
| 5.145 PMY | BANDOENG, JAVA, 58.31 m. 5.30-11 am. |

60 Met. Broadcast Band

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| 5.040 YV5RN | CARACAS, VENEZUELA, 59.52 m., 4-11.30 pm., Sun. 8.30-11.30 am., 3.30-10 pm. |
| 5.020 YV4RQ | PUERTO CABELLO, VENEZ., 59.76 m., testing nightly. Off 9.20 pm. |
| 5.010 YV5RM | CARACAS, VENEZ., 59.88 m., 3.30-10 pm., Sun. 8 am.-10.30 pm. |
| 4.990 YV3RX | BARQUISIMETO, VENEZ., 60.12 m., 10 am.-11 pm. |
| 4.970 YV1RJ | CORO, VENEZ., 60.36 m., Irreg. |
| 4.960 VUD2 | DELHI, INDIA, 60.48 m., Addr. All India Radio. 7.30 am.-12.35 pm. |
| 4.960 YV5RS | CARACAS, VENEZ., 60.48 m., Irreg. |
| 4.950 YV4RO | VALENCIA, VENEZ., 60.61 m., Noon-1, 6-10 pm. |
| 4.940 YV5RO | CARACAS, VENEZ., 60.73 m. |
| 4.930 YV4RP | VALENCIA, VENEZ., 60.85 m. Irreg. |
| 4.920 YV5RU | CARACAS, VENEZ., 60.98 m., 6.30-7.30, 10.30 am.-1, 3.30-10 pm. |
| 4.920 YUM2 | MADRAS, INDIA. 60.98 m. Addr. All India Radio, 6.30 am.-12.10 pm. |
| 4.910 YV1RY | CORO, VENEZ., 61.10 m., 6.30-9.30 pm., ex. Sundays. |
| 4.905 HJAG | BARRANQUILLA, COLOM., 61.16 m., 11 am.-11 pm., Sun. 11 am.-8 pm. |
| 4.900 YV6RT | BOLIVAR, VEN., 61.22 m. Signs off at 9.30 pm. |
| 4.900 HJCH | BOLIVAR, VENEZ., 61.22 m., Signs off at 9.30 pm. |

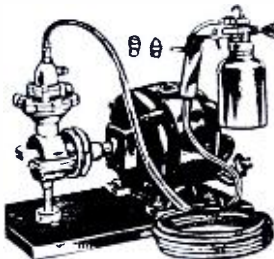
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ITEM NO. 46
Kit less motor, but with gun **\$6.36**
Your Price

ITEM NO. 47
The complete kit including 1/4 HP motor **\$14.53**
Your Price

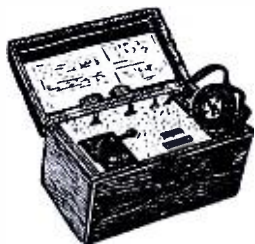
WESTINGHOUSE WATTHOUR METER

Completely overhauled and ready for immediate service. Designed for regular 110-volt, 60 cycle 2-wire A.C. circuit. Servicemen use it in their shops to check current consumption of sets, soldering irons, etc. Keeps costs down. If dismantled, the parts alone would bring the price. The elaborate gear train could be used as a counter on machines of various kinds. Simple to install: 2 wires from the line and 2 wires to the load. Sturdily constructed in heavy metal case. Size: 8 1/2" high, 6 1/4" wide, 5" deep, overall. Ship. Wt. 14 lbs.



ITEM NO. 33
Your Price **\$4.50**

PORTABLE TELEGRAPH AND BUZZER FIELD SETS

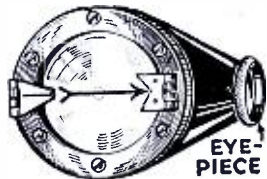


Made for military use by Western Electric. A wonderful buy if only for the parts it contains. Never been used. Good for code practicing, signaling, communications, etc. Contains 2-tone, high-frequency buzzer with platinum contacts, telegraph key, telephone switches, earphone, condensers, transformers, chokes, etc. A \$50 value easily. Complete in wooden case with diagram and instructions. Ship. Wt. 12 lbs.

ITEM NO. 16 **\$5.45**
Your Price

SPERRY GYROSCOPE LIQUID COMPASS

Made for U.S. Signal Corps; sensitive and accurate. Quick readings easily made from top; accurate readings of graduations through focusing magnifying lens on side of instrument. Complete with level sights and russet leather carrying case. Excellent for boats, boy scouts, campers, hikers, etc. A few turns of wire around its case makes it usable as a galvanometer. Ship. Wt. 3 lbs.



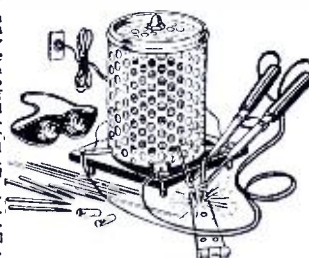
ITEM NO. 12
Your Price **\$1.85**

WELDING! BRAZING! SOLDERING!

3-IN-1 PORTABLE ELECTRIC TORCH

WORKS FROM 110 VOLTS A.C. OR D.C. LINE

This electric torch is not a gadget or a toy but a sturdily built outfit using the finest materials. With it you are able to do professional type of welding, brazing and soldering work, regardless of whether or not you've had previous experience. It will do a thousand and one jobs: fender welding, auto body repairs, bumpers, cylinders, tanks and industrial repairs—ideal for steel fitters, plumbers, sheet metal jobs, engineers, maintenance men, radio and bicycle repair men, etc. Works on aluminum, brass, copper, iron, steel and other metals.



The 3-in-1 electric torch is so simply constructed that even a boy can operate it after reading the simple and concise instructions furnished with the unit. Not necessary to know how to strike an arc! All you do is plug the torch into the light socket, adjust the carbons per instructions, and presto—you have an electric arc, ready for work. The outfit comes complete with power unit, electric cord, electrode holder, carbons, welding rods, blazing rods, solder flux, goggles, and instructions.

Save money! Do your own repairing. Earn money by doing repairing for others. Simple, practical, durable and safe to handle—that's why the price is amazingly low. Don't delay—order one today. Ship. Wt., 8 lbs.

ITEM NO. 50 **\$6.95**
Your Price

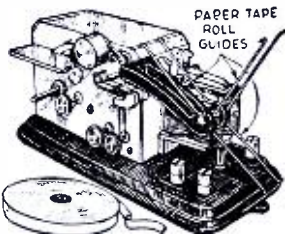
U. S. NAVY BAUSCH & LOMB TELESCOPE



Precision-built for U. S. Navy use as finders on large calibre guns. CAMERA FANS!—Use IT FOR CLOSE-UPS OF DISTANT PICTURES. Optical system comprises 7 lenses and erector and eyepiece draw tubes. Object lens 2" variable; eye lens 15/16"; exit pupil 0.2" to 0.05". Angular field 3°30'. Power 3 to 10; erect image; cross hairs used. Net wt. 3 lbs. Original cost said to be over \$1.30. Ship. wt. 10 lbs.

ITEM NO. 25 **\$14.95**
Your Price

TELEGRAPHIC TAPE RECORDER



A wonderful buy! Apparatus makes a written record of code and similar messages on paper tape. An ideal machine for learning code or teaching code to groups. Radio men can easily adapt it to short-wave receivers for taking permanent records of code messages. Double pen permits simultaneous recording of two messages. Pens are operated by battery and key while tape feeder

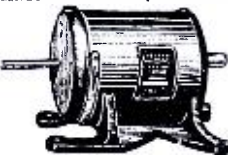
is spring driven (hand wound). Case made of solid brass on heavy iron base. Completely reconditioned. (Less tape; easily obtained anywhere.) Original cost \$85.00. Ship. Wt. 20 lbs.

ITEM NO. 20 **\$19.95**
Your Price

VARIABLE SPEED UNIVERSAL MOTOR

FOR 110 VOLTS, A.C. OR D.C.

Made for Dictaphone machines by American Gramophone Co. Used, but in excellent condition. Special lever control permits variable speeds up to 3000 r.p.m. 1/4" shaft extends from both sides of motor. Measures 7 1/2" x 3 1/2" diam. overall. Ship. Wt. 6 3/4 lbs.



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| 4.880 | VUB2 BOMBAY, INDIA, 61.48 m. Addr. All India Radio, 7.30 am.-12.30 pm. |
| 4.880 | YV6RU BOLIVAR, VENEZ., 61.48 m., 6.30-9.30 pm. except. Sundays. |
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| 4.865 | HJBJ SANTA MARTA, COLOM., 61.67 m., 5.30-10.30 pm. |
| 4.860 | YVIRL MARACAIBO, VENEZ., 61.73 m., 11 am.-1 pm., 4.30-10.30 pm. |
| 4.855 | HJCF BOGOTA, COLOM., 61.80 m., 7 pm.-mid. ex. Sundays. |
| 4.850 | YVIRZ VALERA, VENEZ., 61.88 m., 11.30 am.-1, 5.45-8.45 pm. |
| 4.845 | HJCD BOGOTA, COLOM., 61.92 m., 6-11.30 pm. |
| 4.840 | VUC2 CALCUTTA, INDIA, 61.98 m. Addr. All India Radio, 6.30 am.-12 n. |
| 4.840 | YV4RX MARACAY, VENEZ., 61.98 m., 6-11 pm. ex. Sundays. |
| 4.835 | HJAE CARTAGENA, COLOM., 62.05 m., 7 am.-6, 7-11 pm. |
| 4.830 | YV5RH CARACAS, VENEZ., 62.11 m., 5-9.30 pm. (Sun. to 10.30 pm.) |
| 4.825 | HJED CALI, COLOM., 62.17 m., 7-11 pm. ex. Sundays. |
| 4.820 | YV3RN BARQUISIMETO, VENEZ., 62.24 m., 11.30 am.-1.30, 5.30-9.30 pm. |
| 4.815 | HJBB CUCUTA, COLOMBIA, 62.31 m. |
| 4.810 | YVIRU MARACAIBO, VENEZ., 62.38 m., 10.45 am.-12.45 pm., 4.30-10.30 pm. |
| 4.800 | YVIRV MARACAIBO, VENEZ., 62.50 m., 10.45 am.-12.45 pm., 4.30-10.30 pm. |
| 4.795 | HJDX MEDELLIN, COLOMBIA, 62.57 m., 9.30-10.30 pm. |
| 4.795 | HJFC PEREIRA, COLOM., 62.57 m., 9 am.-noon, 6.30-10.30 pm. ex. Sun. |
| 4.790 | YV5RY CARACAS, VENEZUELA, 62.63 m., 5.30-8 pm. |
| 4.785 | HJAB BARRANQUILLA, COLOM., 62.69 m., 4.30-10.30 pm. ex. Sundays. |
| 4.772 | HJGB BUCARAMANGA, COLOM., 62.87 m., Nightly to 10.45 or 11 pm. |
| 4.745 | HJXC BOGOTA, COL., 63.23 m., Addr. Apartado 26-65, 12 n-2 pm., 5.30-11 pm., Sun. 6-11 pm. |
| 4.560 | HC2ET GUAYAQUIL, ECUADOR, 65.79 m., Wed. & Sat. 8-10 pm. |

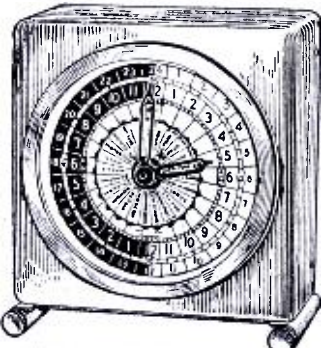
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Here is really the first new clock advancement in 200 years—three clocks in one, a world-time clock. It is revolutionary! It is years ahead! The Sky Pilot WORLD-TIME CLOCK is the only clock designed for use anywhere in the world. For short-wave fans this clock offers great convenience—it is educational and at the same time indicates world time differences. In a few seconds you can determine the correct time in London, Moscow, Hawaii, Tokyo, Buenos Aires, Halifax—anywhere. American made—it is exceptionally easy to operate. It carries a guarantee of ninety days against defects in material or workmanship. In modernistic design, it is made of brushed brass—measures 5 1/4" high by 4 3/4" wide—and has convex crystal.

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European Amateurs

(Continued from page 463)

union Islands, French Indo-China, French India and French Oceania.

In the British Empire many stations have been ordered off the air, but as yet they have not obeyed this order. Licenses have been suspended in India and South Africa. The Belgian Government has suspended those amateurs in Belgian Congo, and the Netherlands Government, those in Netherland Indies. However, it is thought that some of the PK's will continue to operate as before.—ELMER R. FULLER, *Listening Post Editor.*

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF MARCH 3, 1933

Of Radio & Television, published monthly at Springfield, Mass., for October 1, 1939.

State of New York }
County of New York } ss.

Before me, a Notary Public in and for the State and county aforesaid, personally appeared Hugo Gernsback, who, having been duly sworn according to law, deposes and says that he is the editor of the Radio & Television, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, Popular Book Corporation, 99 Hudson Street, New York City; Editor, Hugo Gernsback, 99 Hudson Street, New York City; Managing Editor, H. Winfield Secor, 99 Hudson Street, New York City; Business Managers, none.
2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member must be given.) Popular Book Corporation, 99 Hudson Street, New York City; D. Gernsback, 99 Hudson Street, New York City; H. Winfield Secor, 99 Hudson Street, New York City.
3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state). None.
4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.
5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the twelve months preceding the date shown above is

(This information is required from daily publications only.)

(Signature of publisher) H. GERNSBACK.
Sworn to and subscribed before me this 29th day of Sept. 1939.
MAURICE COYNE.
(My commission expires March 30, 1940.)
New York County Clerk No. 582.

December, 1939 RADIO-CRAFT

War News Via Radio

Newest Hi-Fi 9-Tube Superhet. Introduces "Harmonic Conversion"

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Emission vs. Mutual Conductance Test

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The book is recommended for students, instructors, engineers, service men, experimenters, salesmen and everyone in any way associated with radio. **ONLY**

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SECTION

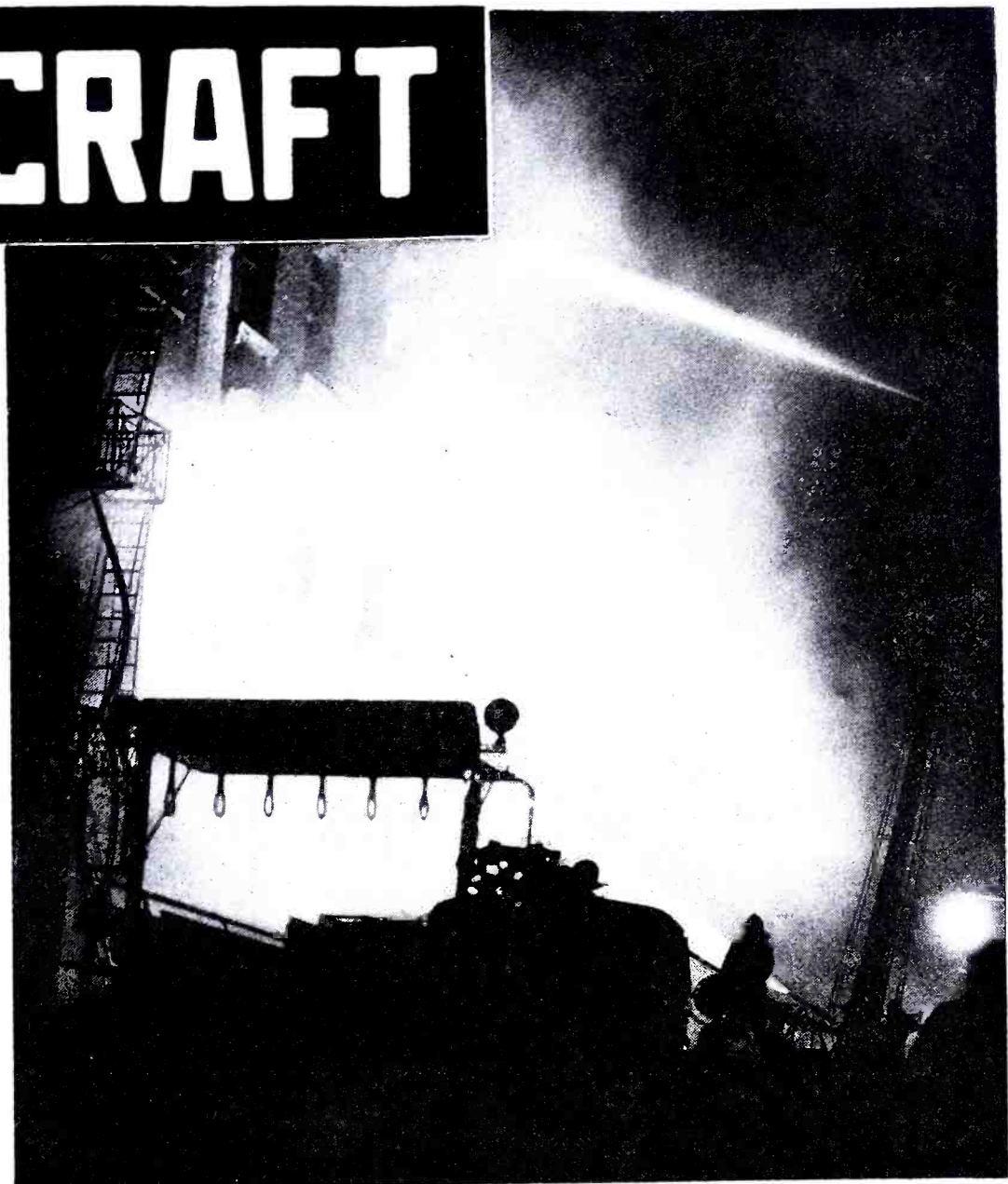
JOSEPH H. KRAUS, *Managing Editor*

"Fire Buff" Photographer

EVERY big city has its "Fire Buffs"—men in any walk of life, who chase fire engines to the scene of action.

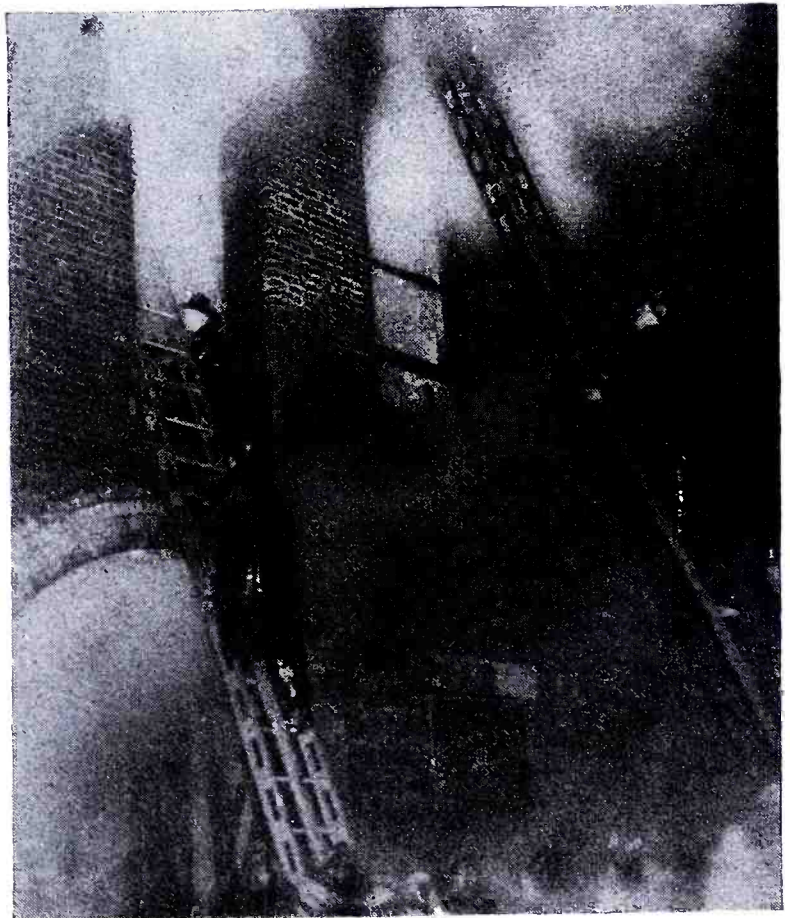
But New York City has an Official Fire Buff (the only one in New York), who has been given a Fire Department Fire Line Pass, to permit him to go through fire lines wherever formed—he is Bill Herries.

Bill Herries uses a regulation press camera with flash equipment and also a smaller "candid" camera. He does his own developing and enlarging. Of prime importance to his ability to get timely pictures is his Emerson Radio, constantly tuned to receive Police calls. As soon as the calls come in, Bill jots down the location. His camera and equipment remain close at hand and ready for immediate use. As soon as he comes home from a fire, regardless of the hour, the photos are developed, printed and rushed to the newspaper offices. Newspapers demand "scoops"—hot pictures!



Bill Herries, Official Fire Buff photographer, jots down a few notes. Other picture was taken at the warehouse fire shown above.

Above—A four-alarm warehouse ablaze in freezing weather. The water spray coated the camera with a layer of ice.



A Course in Composition

In response to many hundreds of requests for articles on the subject of Photographic Composition, and by special arrangement with the Amateur Photographer and Cinematographer, FOTO-CRAFT is now able to present this unexcelled course.—Editor

(1.) Points for Beginners

By RICARDO



Sloping Verticals

ONE of the first surprises the beginner receives is that when the camera is tilted buildings appear to be falling over either forward or backward.

If, as often is the case, we cannot see the top of the building in the view-finder when the camera is held horizontally—the correct position—and we tilt the camera until it is “all in,” we shall eventually see something like that in the first sketch. All the vertical lines will converge toward the top, causing the entire building to appear to be falling backward, while the walls on the left and right of the illustration will be falling in. The nearer we are to the subject and the greater the tilt, the more exaggerated will be the sloping effect.

If the camera is pointed downward instead of upward the opposite effect will be seen. Instead of the lines vanishing toward the top of the print they will slope toward the base, much as they do in the second sketch creating a peculiar “top heavy” sensation that is most unnatural.

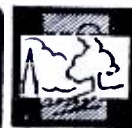
This is no fault of the camera or lens, and it cannot possibly be prevented with the popular types of

cameras which are not fitted with rising lens panels or with swing backs. What is the best thing to do? If it is imperative that the entire building be included, then you must point the camera up (or down), but it is only by special arrangements in enlarging that the distortion can be remedied. It can never be removed in contact prints.

Watch the View-finder!

MOST folding cameras are fitted with reflecting view-finders that are “reversible,” i.e., designed for both horizontal and vertical pictures. One cannot very well go wrong in deciding which way to turn the view-finder to suit either of the two picture positions, but it is very easy to forget that in neither position will the camera include everything that is seen in the view-finder.

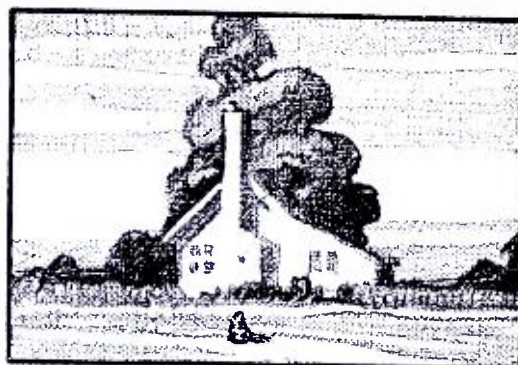
For example, the center sketch, which is intended to be a much-magnified view of the top of one of these view-finders, includes a typical landscape. If it is decided to make it a vertical picture, then the parts of the subject visible in the side margins (shown shaded in the lower



Choosing the Best Viewpoint

UNLESS the beginner has had some previous training or has some appreciation of grouping and arranging, there is a strong tendency to place the main point of interest in his subject, no matter whether it is a portrait or a landscape, in the exact center of the view-finder.

Strange as it may seem to the uninitiated, this is not the strongest point in the picture, nor is it the most attractive position from the pictorial point of view.



A glance at the two comparative sketches will show this more clearly. Because of its strong contrast of tone, size and shape, the house is undoubtedly the *motif*, and the first illustration shows how

stiff and formal a central position can be. There is no variety of spacing round the building, the sky is the same depth as the ground, there is an equal space on either side. Now compare this with the lower sketch, and note how a slight alteration of position has made all the difference. It has lost its “rigidness” from being too central, and there is now a feeling of more variety in the general arrangement or composition.



sketch) will not be included in the film, and this must be allowed for. Conversely, if the camera is held horizontally with the view-finder to suit, then everything that is seen in the top and bottom margin (shown in the top sketch) will be excluded from the film.

This is usually the reason why the heads and feet get cut off when the photographer is too close to his subjects.

Another point to bear in mind with these reversible view-finders is that they should always be turned as far as they will go when reversing their position. If this is neglected, then all the vertical and horizontal lines will be seen in the negative to be sloping one way.

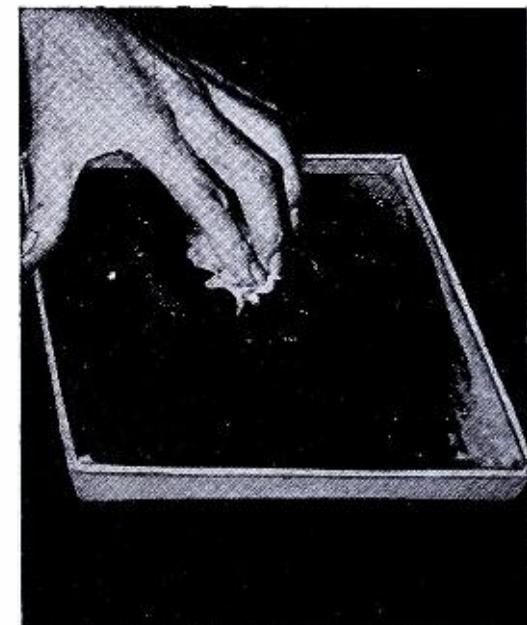


A contact print without vignetting. Compare with the photograph in the last column.

IN almost any paint shop you can purchase painter's smalts. This is a hard black or blue sand-like glass generally used by sign painters. Either color will be satisfactory and about 10 cents worth will be sufficient.

Procure a box which formerly held cut film (about 5" x 7" or 8" x 10"), and about 1/4" in from the edge, cut out the top all around. Within this frame place a sheet of clear glass and bind the edges with tape so that the sand will not come out. Into this glass-bottomed container, pour enough of the painter's smalts to produce a layer about 1/8" thick.

Referring to the photographs, you will see how this is used as a vignetter. The first operation is to place this box on top of the negative which has previously been located on a sheet of glass, or the printing box, so that light will shine through it. With the finger, poke away the smalts from the face of the subject and shape it so that



This shows the sandbox with the fingers pushing the smalts to the proper shape.

Better Vignettes

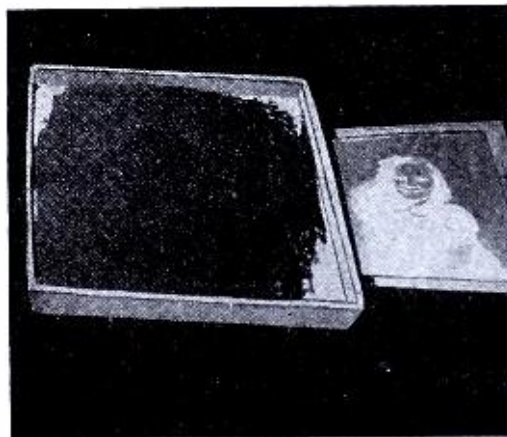
In this article, the author describes a simple method for getting those nice, soft edges around prized portraits. The system may be utilized either when making contact prints or projection enlargements.

By E. R. Trabold

only that part of the picture wanted in the print will show through.

On top of this hole in the layer of smalts lay a sheet of white tissue paper. This is merely for the purpose of softening the edges of the vignette.

When making a print, place this prepared sandbox on the ground glass found in most printing boxes. (The ground glass is usually about 1/2" below the plain sheet of glass which is flush with the top of the

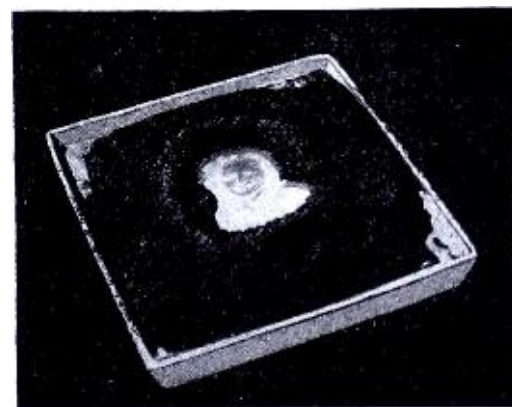


This photo shows the sandbox and the negative on the printer.



Unfortunately our reproduction does not do justice to this beautiful vignette in which there is perfect blending to the clear white paper.

printing box. If your printing box does not have a ground glass or flashed opal glass diffusing plate, the sandbox may be mounted a short distance below the surface plate on any suitable bracket. Now locate
(Continued on page 505)

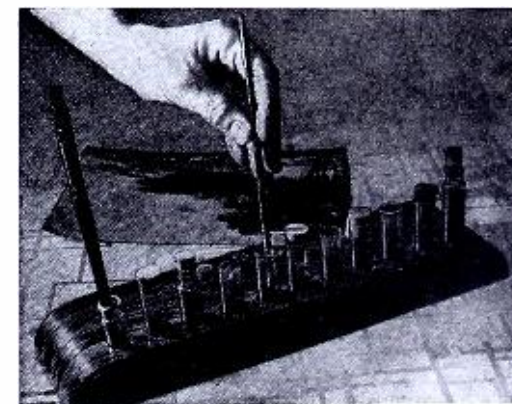


The sandbox set over the negative and the vignette ready for the next stage clearly described in the text.

Stand for Photo Water Colors

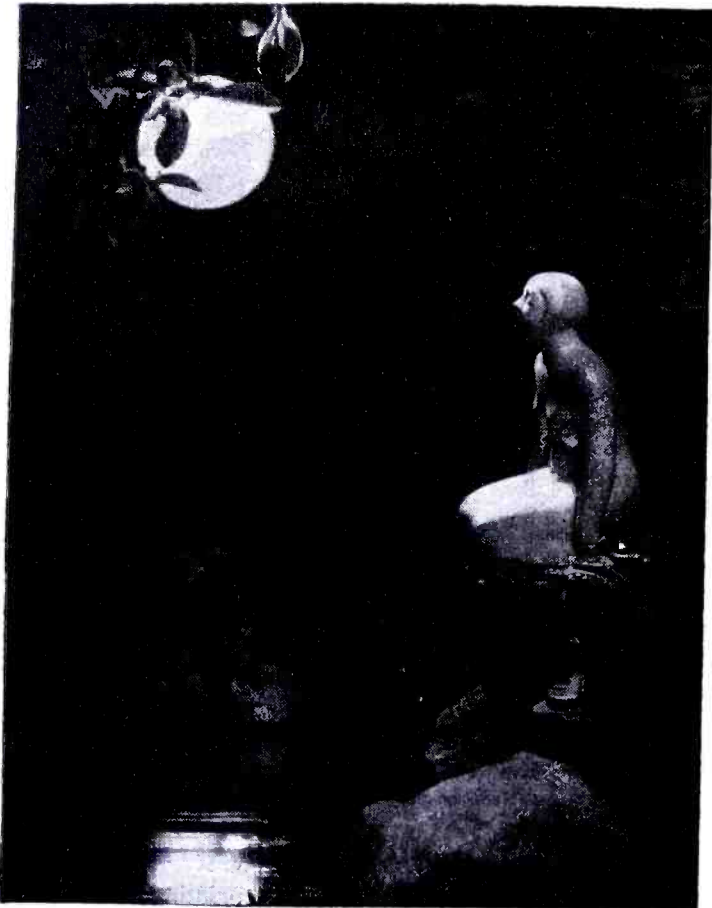
IF you have done any amount of water color tinting on your favorite prints you will know what a nuisance several small pans of water color can become. They clutter the desk and are likely to be spilled with the least accidental touch. If you use the divided pan supplied on the lid of many color boxes the colors are apt to run together. Also, any color left after the work is done must be discarded. This is a waste of perfectly good color material. Taking these disadvantages into account, I constructed a water color stand that overcame every one of them.

The stand pictured above was made from a piece of wood discarded from a bandsaw at a local furniture factory. The dimensions are 3" x 13" x 1 1/2". The quarter-round at
(Continued on page 511)



Those who are artistically inclined and like to color photographs will find that a rack of this type facilitates the handling of colors and eliminates many of the usual, often-repeated manipulations necessary when preparing the colors for use.

Table Top Photography



"Enchanted Night."

Waldemar Raschke.



Illumination by Flash Powder. Panatomic X film was used in a Leica at f: 6.3. Enlargement is on Kodabrom paper F-3.

NOW that the winter months are upon us again and the nights are long, photo enthusiasts do not have as much opportunity for outdoor photography as they did during the longer daylight hours and vacations of the summer period. Nevertheless, those circumstances need never deter the dyed-in-the-wool photo craftsman. There is always indoor photography with its photo-flood and photoflash lighting, table top photography, as well as photos made with the aid of the microscope.

In a previous issue we announced a monthly Table Top Photo Contest offering \$15.00 in prizes; \$10.00 for the first prize, and \$5.00 for the second prize. The prize winner this month is Waldemar Raschke, who writes as follows:

"Perhaps a few words as to how the enclosed picture was evolved would be of interest to you.

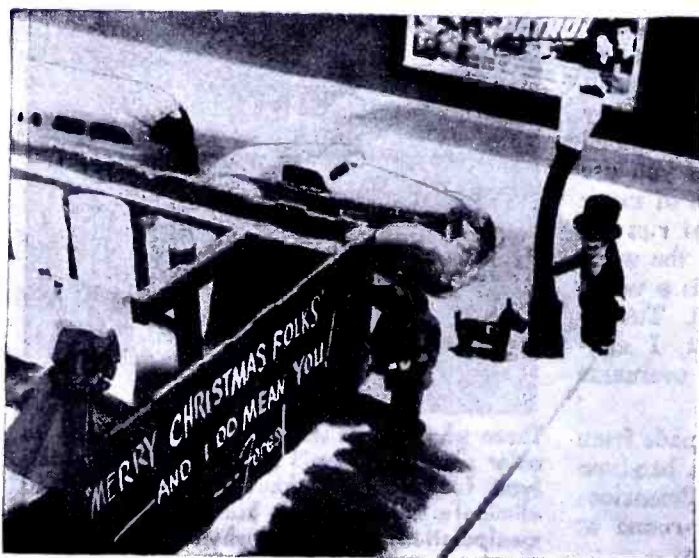
"About a week before I got hold of the second number of your excellent magazine, I studied the profile of the little plaster

lady with some hazy idea of using her in a Table-Top setting. She isn't much good. Her all-over complexion is a pasty off-white with an imitation mother-of-pearl sheen. She isn't even finished off nicely. Along her arms and sides mold ridges show, which had to be scraped off first. But somehow the lines of this little ten-cent figure have a certain appeal, and when I read about your contest, it was just the incentive I needed to set the old think-box percolating and I cast about for ways and means to put the little beauty in a picture. So I took one of my 11 x 14 trays out in the garden and started digging for plants which would not look too gigantic in proportion to her. A piece of sod with some closely growing, freshly trimmed grass; a handful of moss; a few pebbles and stones; a piece of broken mirror, and my props were complete except for the main detail: I had to have a moon. An old 8" x 10" paper envelope, opened flat, gave me my jet black night sky. In this I cut an inch-and-a-half hole and pasted a

piece of yellow copy paper in back of it. This was stiffened with a piece of cardboard with a corresponding hole and set up in the tray as a background. A small 20-watt lamp, centered in back of the round hole, gave me a luminous moon with just the right amount of light. Plants, pebbles and stones were draped around on top of the mirror, the little lady set upon a rock, and the whole thing lit up with a 100-watt bulb in a goose-neck reading lamp.

"Now the thing began to shape upon the ground glass of my trusty old 5 x 7 view camera, but it still looked pretty crude. I got the back-lighting effect on the figure

(Continued on page 509)



Right—This illustration shows how the photo at the top of the page was taken. Lighting is from overhead floods with a two-second exposure. Panatomic X Film.

Left—Here is an interesting bit of Table Top Photography. You can imitate the style for any occasion and send greeting cards to your friends.

The illustration at the right shows "snow" being sprinkled on the setting to produce the photo shown at the left.



Constructing a Portable Darkroom

A versatile unit which performs every darkroom duty and with which you can load film tanks, print, etc.

By Jack A. Schulz

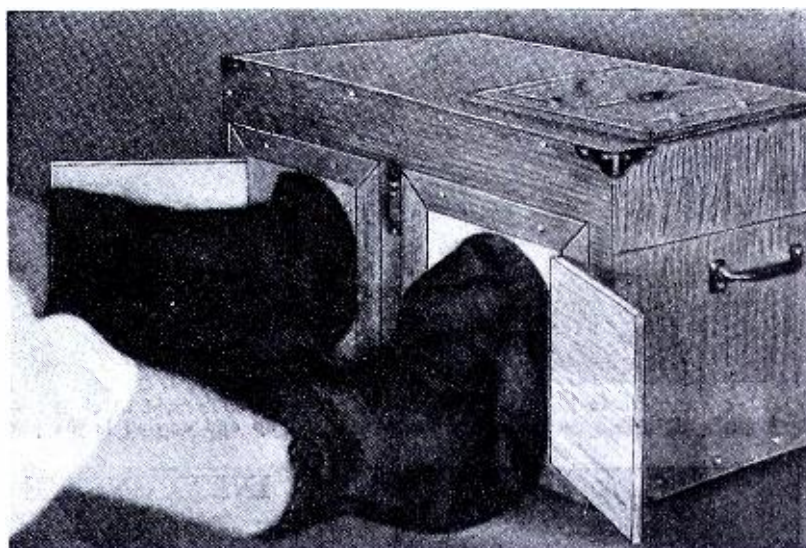
HERE is a portable darkroom which will appeal to many readers. The box is designed as a compact unit to simplify the darkroom problem for apartment house dwellers, shutter-bugs on vacation trips, or minifans whose business keeps them traveling. With its five-star features, it will prove its worth many times over.

Feature 1—A light-proof changing box for loading film tanks or making adjustments to a camera loaded with film.

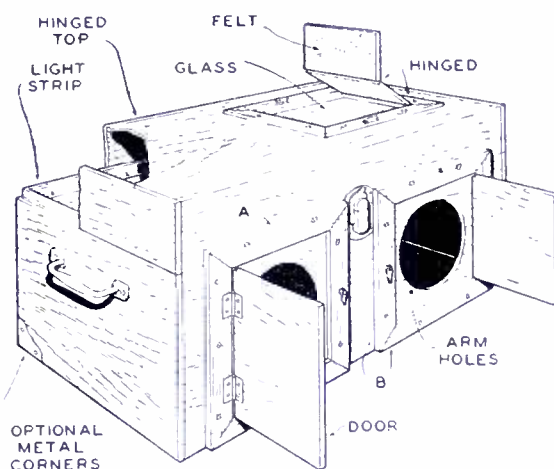
Feature 2—With a light-housing in place in the top of the box it can be used for contact printing.

Feature 3—A camera with an extension on its back can be placed in front of the light-housing in the box and used as an enlarger.

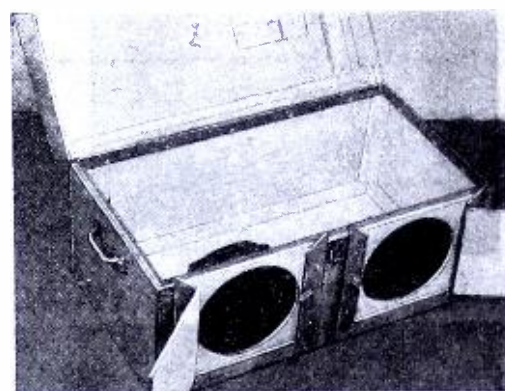
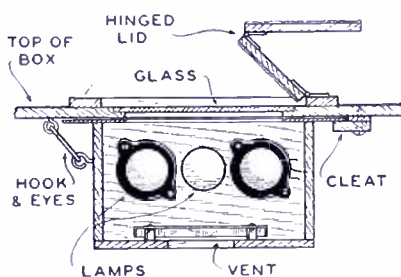
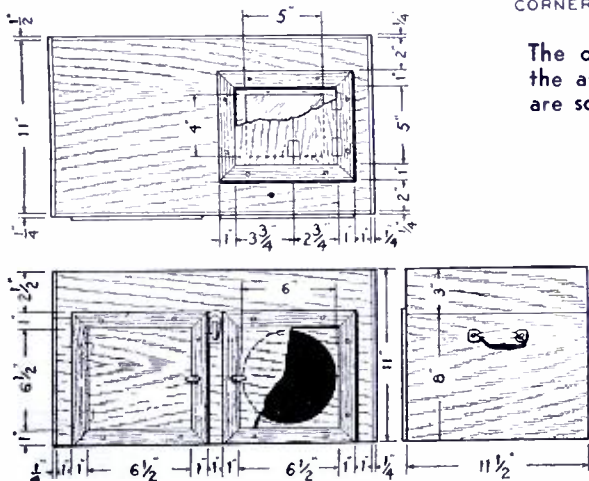
Feature 4—The extension on the back of the camera makes it suitable for copy work because it gives the equivalent of a double-extension bellows. The ground-glass focusing which can be worked out for any camera
(Continued on page 511)



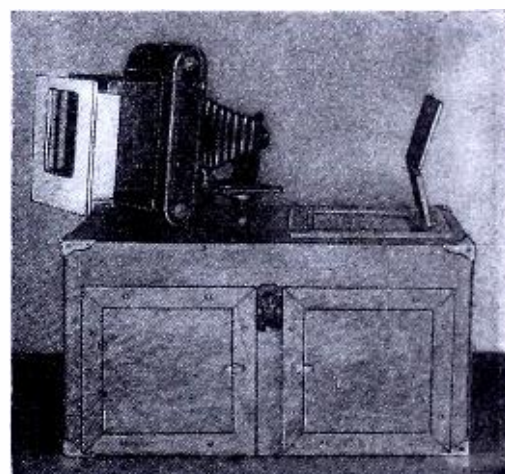
This is the manner in which the unit is used for loading films in film tanks. The top opens to admit the apparatus which will be required.



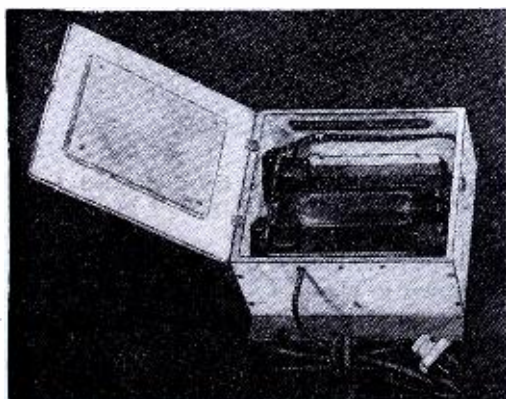
The diagram above gives one a good idea of the assembly. Note that strips A of the frames are screwed to the top; the other three sides B are attached to the front. Fig. 1.



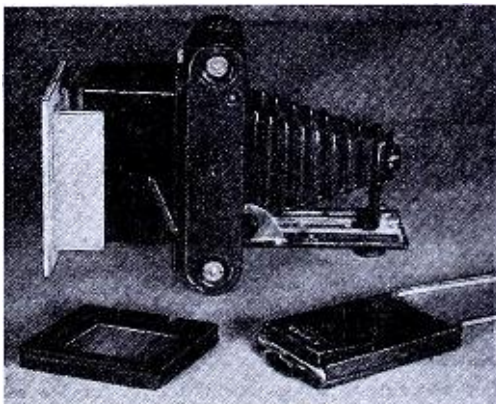
By this unique construction, the box is made light-tight.



When ready for printing, the hinged lid is employed as in a regular contact printer. Below is the set-up for making projection prints.



Light box completed and ready for use. See diagram in center column for its mounting in the "darkroom."



Box attached to camera so that it can be used either for projection printing or copying.

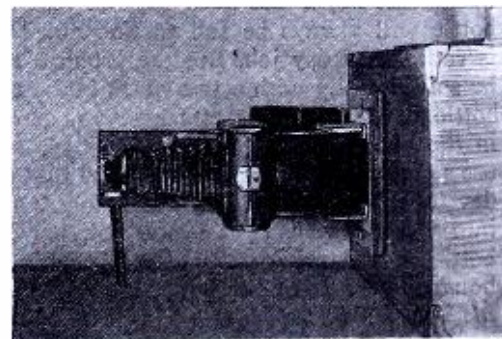
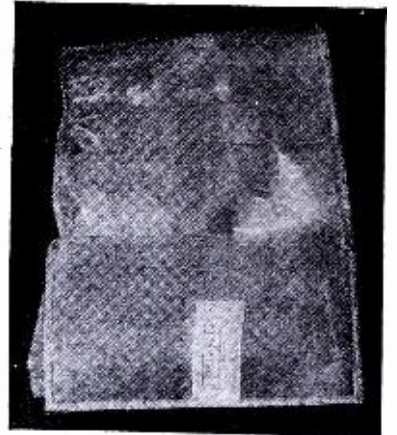
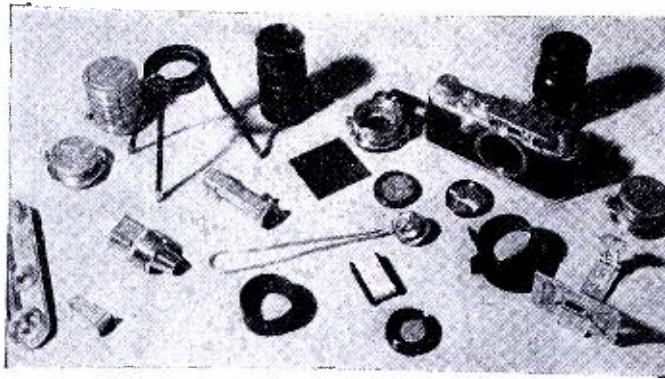
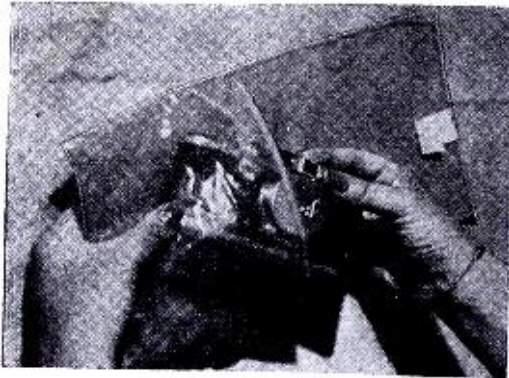


Photo Hints and Kinks



These photographs show the case, the equipment which it holds, and illustrate how the case is rolled up and carried in the pocket.



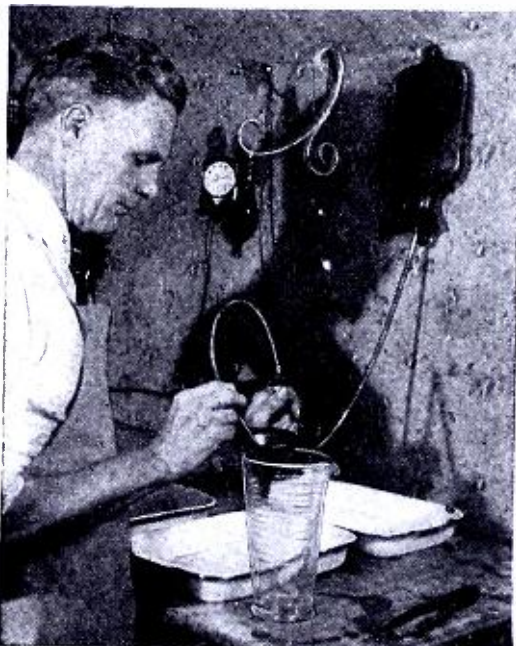
INEXPENSIVE CARRYING CASE FOR MINIATURE CAMERA.

THE carrying of the miniature camera and its accessories has always given camera fans a headache. Ready-made cases are expensive and it often is difficult to locate a case which will fit the equipment which the average camera enthusiast has available; but he need not despair, because in nearly every five- and ten-cent store the customer can purchase an oilskin or pliofilm tobacco pouch for 10 cents. This is large enough to carry the camera, extra lenses, range finder, sun shade and much other equipment without damage to the different pieces, and kept reasonably free from dust even when the case is carried in the

pocket. Another decided advantage that such a case has is that it is waterproof.

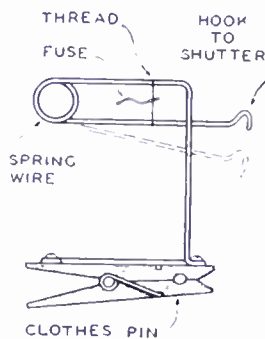
Some camera enthusiasts, finding the waterproof beckoning to them, have deemed it advisable to enclose the minicamera in a pliofilm case into which a hole has been cut to allow for introduction of the lens. The mechanism of the camera is operated *through* the pliofilm case. In this way, the camera is fully protected against spray and particularly sand which would damage its delicate mechanism. Nor is the tobacco pouch suitable for only the small camera. Some of the larger sizes can be accommodated as well.—*W. S. Kals.*

PREVENTING OXIDATION.



THE average fotocraftsman knows that developer, kept in bottles, oxidizes rapidly when the bottles are not full. Consequently, many workers use glass marbles which they drop into the bottle after some of the developer has been used so that the bottle will always be full to the top. This is rather a messy job. But the problem can be solved easily with a two-quart hot water bottle fitted with a hose attachment as shown in the photograph. Fill with developer and use as much as you want. If you find that the developer is too cold, dip the whole bottle into warm water. If it is too hot, put the bottle in the refrigerator for a couple of hours. The cost of the bottle is 49 cents.—*M. Van Buskirk.*

SELF-TIMER FOR YOUR CAMERA.

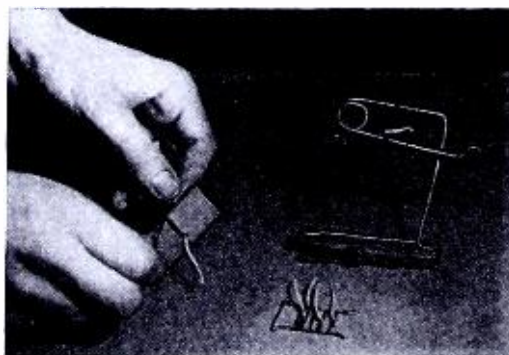


Here are the details for a new, unique self-timer which can be attached to the average camera. The spring is released when the fuse burns the thread.

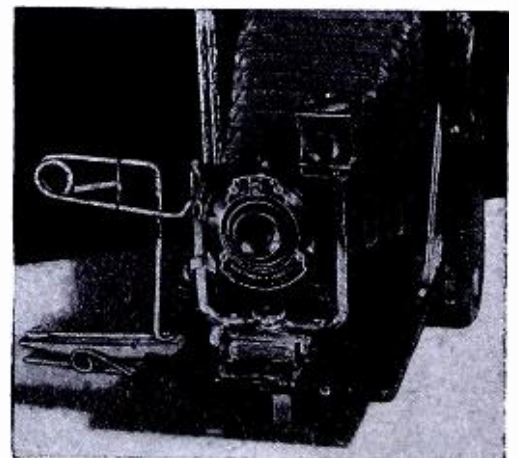
A straight pin passed through the camera's release button and bent into a hook, forms the connecting hook to the wire spring. The wire spring is kept tensed by a loop of cotton passed over it to which a fuse is tied. Fuses are made by soaking a length of cord in a saturated solution of saltpeter and allowing it to dry.

Fuse loops can be prepared in advance by tying loops of cotton around a cardboard pattern cut to the proper size. These fuses

A LENGTH of clothes hanger wire bent into a spring at one end and screwed to a wooden clip at the other, as shown in the photo, will make a very dependable self-timer. When clipped to the camera, it is set off, automatically, by a lighted fuse, giving the photographer ample time to get into the picture.



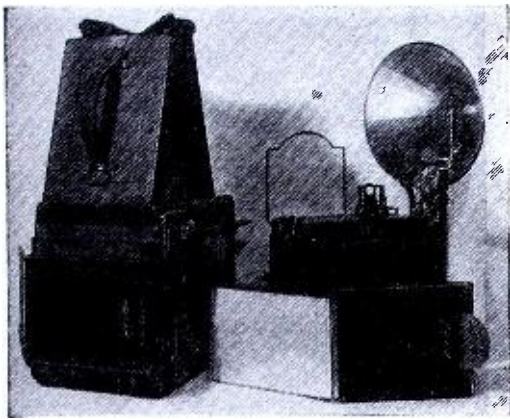
This photograph shows how the fuses for the self-timer are made in quantity. Sliding one of these loops over the spring holds the spring in an inoperative position long enough for the photographer to get into the picture.



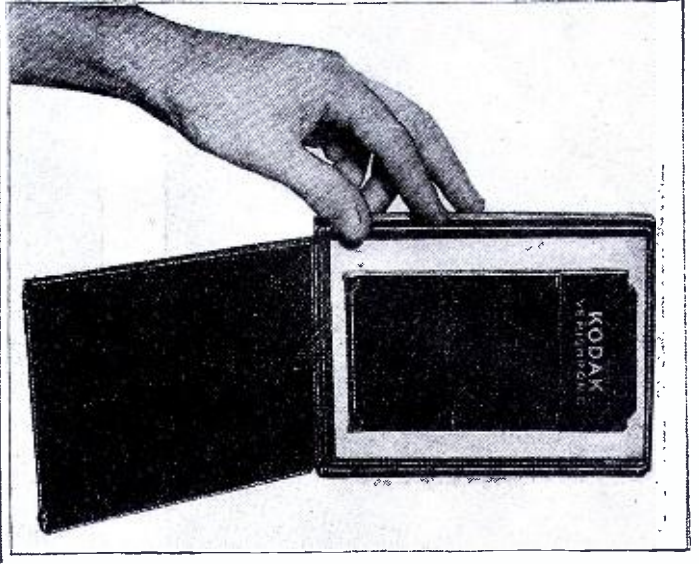
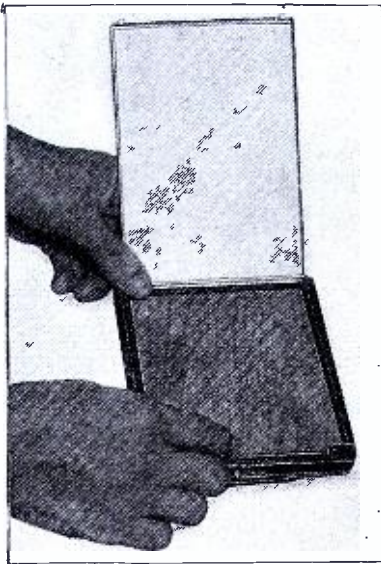
This photograph shows a timer attached to the camera. A simple clamp fixes it to the bed.

are kept in readiness on a "U" shaped wire, as shown in photo.

The wooden clip, to which the self-timer is attached, permits it to be clipped to almost any camera. The timing of the device can be set by the length of fuse attached. A cigarette is all that is necessary to set it off.—*Louis Hochman.*



Above—Grafic and Graflex cameras with adapters made as described and further illustrated in the two photos at the right.



SIMPLE ADAPTER CUTS FILM COSTS.

FOR the camera fan who owns a 4x5 film pack camera, a simple adapter may be constructed at little or no cost, and it will enable him to reduce his film size to 2½" x 4¼".

First, cut a piece of three-ply veneer to fit inside the present 4x5 film pack.

Then place the 2½ x 4¼ film pack on the piece of veneer and draw a line around it. Cut along this line with a coping saw and

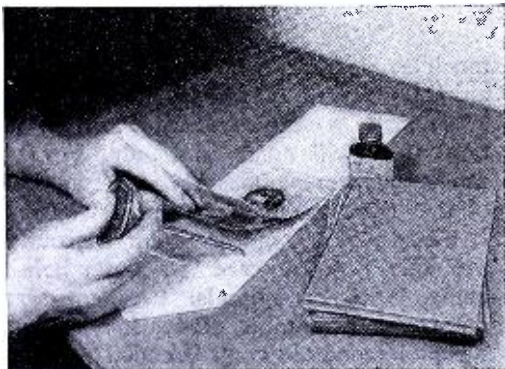
fit the film pack into the cut-out. When satisfied that the fit is tight all around, paint the wooden frame a dull black and your adapter is ready for use.

For the amateur or professional photographer who has occasion to shoot large quantities of film, a substantial saving of film cost will be noted when this home-made adapter is used. Furthermore, in view of the fact that most pictures are enlarged and

often only a relatively small portion of the film is projected to any size, the adapter will be suitable for all except very special occasions.

It is recommended that if this change is made, the ground-glass of the camera or the view-finder be ruled with India ink lines to define the new picture area. The details of this are not given in the photos above but will be self-evident.—*Globe*.

OILCAN GLUE APPLICATOR.

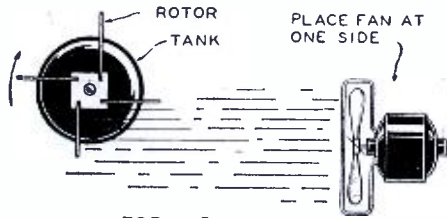


WHILE working in a portrait studio, I often had to paste large numbers of prints in folders. I found that I could do a speedier and cleaner job as follows:

Pour some LePage's glue into an oilcan and thin it with a little hot water, stir it well. The glue is applied as shown in the photo.

An oilcan with a long bent nozzle is the best for this purpose. These oilcans may be purchased for 10 cents.—*A. Trauffer*.

WIND-DRIVEN AGITATOR.



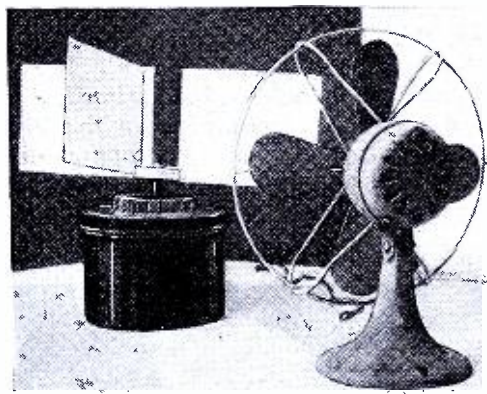
TOP VIEW
This is the top view of the apparatus set up and ready for action.

THIS device is an instrument to provide agitation for film developing tanks. It is simple, practical, easy to construct and may be made to fit any tank with an agitator arm.

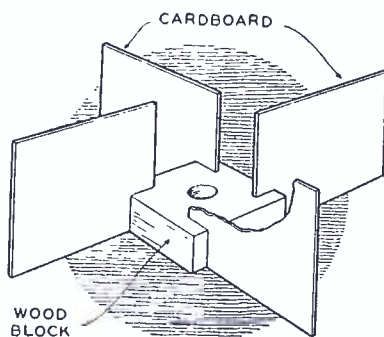
It consists simply of a small block of wood with a hole in the center to accommodate

agitator arm and four slits, one on each side of the block, to hold four cardboard rectangles. The agitator arm is glued into the hole in the block of wood. The cardboard rectangles are glued into the slits made on sides of block.

All other procedures in development go on as usual, but instead of turning arm by hand, simply turn fan current on cardboard rectangles and they will make the agitator arm revolve.—*Kenneth Brunner*.



Actual photograph of the equipment. The diagram below shows how the "windmill" is made.

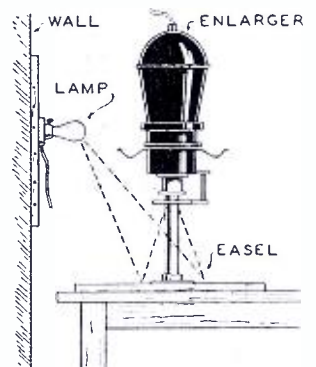


VISUAL EXTINCTION PHOTO-METER FOR ENLARGING.

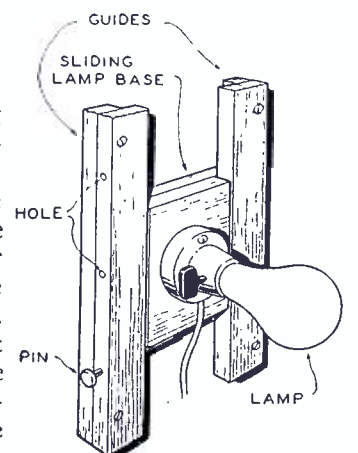
THE purpose of this article is to acquaint the amateur photographer with a simple, easily constructed meter to act as a guide

in projection printing. While the system to be described is completely adequate, it naturally does not offer the wider versatility of the commercial enlarging meter. However, its extremely low initial cost and ease of operation, plus the subsequent saving of time and photographic materials, will earn for it a place in many darkrooms.

In brief, the equipment necessary is an electric light bulb of very low wattage, a socket, switch for the bulb and wire, all of which may be obtained in the five- and ten-cent store. Depending on the intensity of the light bulb used in the enlarger, a 5-, 7½- or 10-watt white or frosted bulb will be required. It is well to note, at this point, that in determining the best position in which to place the meter-bulb, the trial and error method will be followed. Hence, do not attach the socket permanently to the wall but make allowance for

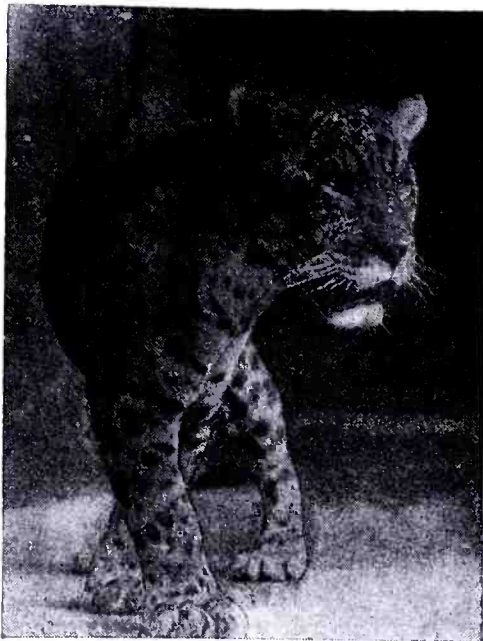


This extremely simple method will enable you to get the right exposure for your enlargements.

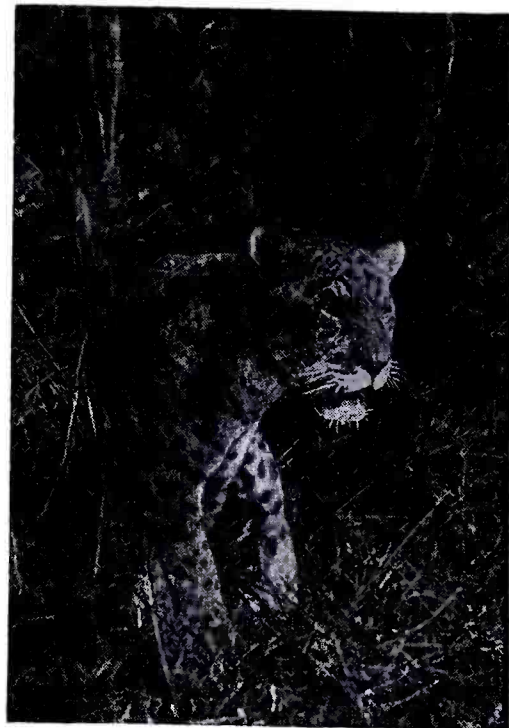


Limited adjustment of the lamp may be had by this arrangement. Lamp may be shifted for different types of paper instead of changing exposure time.

(Continued on page 505)



Above—Jaguar photographed in the Zoo. Left—A suitable setting; right—the final picture.



Putting Them Where They Belong

By Dr. E. Bade

THE average print from films taken during a trip to the Zoo is a great disappointment. This is not due to any defect in the negative, but rather to the confined space in which the animals are kept. Here the cages, bars, buildings and in fact the entire surroundings which make up the foreground and background are very annoying. These show up only too plainly and thus spoil the entire effect.

How much better would such a photograph be if the animal could be taken out of its confining surroundings and placed in a natural setting. Then one would have a real picture.

It is not difficult to transform such a common run of picture into a print that breathes atmosphere by simply removing all civilizing props. Double printing, printing in or dodging can be used, but for this particular type of work it is rather difficult and messy. A much simpler way of attaining the same result is by means of "collage." Here the animal is cut out and pasted in the desired position on a suitable background. The whole is then retouched and, after rephotograph-

ing, as many prints can be made as desired.

The method in detail is extremely simple. An 8" x 10" enlarging paper is cut into four 4" x 5" pieces. The negative containing the animal is focused on a white card 4" x 5" in size so that it takes up almost all of its space. The enlarging paper is then brought into position and exposed. At least two prints should be made. One is for the cut-out, the other is used as a guide for re-touching.

After the animal has been printed, a suitable negative is selected from the file to act as a background. No incongruous objects such as telephone poles, houses, etc., should be visible. It should simulate, as

much as possible, the type of country the animal selected naturally would inhabit. Here many a scenic vacation shot or portion of it will come in handy. For velt, grassy plain or pampas almost any close-up of the taller wildblown grasses will serve. If a scene of a pond or swampy ground is available, it could serve as a water hole for many types of animals. Close-up scenes from the mountains serve for mountain sheep or mountain goat. Wooded and forest scenes are ideal for deer, moose and even bear.

The negative, after examination for its suitability, is placed in the enlarger and it is blown up to a full 8" x 10" print. Here care must be taken to see that the background and the animal are in proportion. This is not at all difficult if the 4" x 5" animal print is first cut out and then placed in position on the projected background. Then any difference in size between animal and background will become evident.

When the background is suitable to the object, remove the animal cut-out, place
(Continued on page 510)



American Red Fox photographed in winter in its den. Left—A landscape suitable for the fox; right—picture formed by the method described.



Better Vignettes

(Continued from page 499)

the negative over the hole in the smalts and adjust until the best position is obtained. Fasten the negative in place so that it cannot be moved, add the usual bordering mask and print.

To use this vignetting system with your enlarger, simply suspend the smalts box from the enlarger and about two or three inches below the lens. The suspension should be quite rigid. With the negative in the film carrier, project the image and manipulate the smalts until the desired shape is produced.

Photo Hints and Kinks

(Continued from page 503)

possible changes in position. The socket may be secured advantageously to the wall about four feet above the easel while preliminaries are carried out.

The principle underlying the use of this device is that of visual extinction; that is, a given intensity of shadow will always be neutralized or dispersed by the same intensity of light.

With the negative in place, the enlarging lens throws an image of given intensity upon the easel below. When the meter-bulb is turned on, the emanating light rays tend to neutralize the shadows of the image. By adjusting either the distance from meter-bulb to easel, the lens aperture, or both, a point may be reached at which the image on the easel will be almost obliterated or neutralized. We have arrived at the point of visual extinction.

Now, with no further alterations, and using the same negative, if we switch off the meter-bulb and enlarger and load the easel with sensitized paper, we can proceed to run off a series of test strips by switching-on the enlarger (while the meter-bulb is off); and then, by following our favorite enlarging routine we may easily determine the optimal time of exposure.

The writer prefers an interval of about thirty to forty seconds as this time is relatively short, yet long enough to permit dodging and other manipulations used in enlarging.

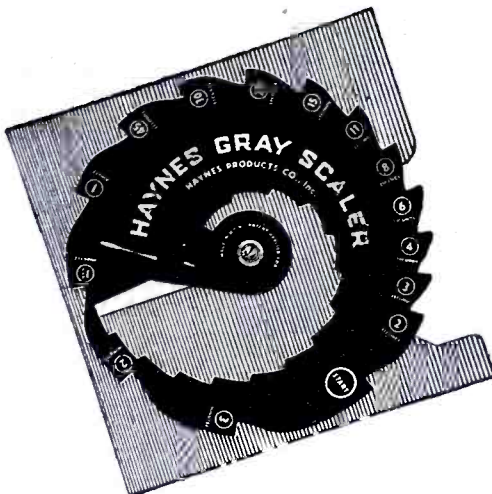
Let us assume, then, that the optimal time found by these test strips is thirty seconds. We now have a standard which will be applicable to all enlarging work. Thus, by maintaining the meter-bulb at the exact point previously determined we can place any printable negative, regardless of its density, in the film carrier and then by varying the lens aperture to permit more or less light to pass, depending on whether the negative is dense or thin, we again arrive at our point of visual extinction. Automatically we know that a thirty second exposure will yield a good print.

It is important to remember that this interval of thirty seconds is a constant for the type of paper used, provided the meter-bulb remains in place. Therefore, if the individual worker prefers an exposure time of less than thirty seconds, it is necessary to bring the meter-bulb closer to the easel when making the original determination of the point of visual extinction, or else to employ a meter-bulb of greater wattage. These measures tend to bring about an increase in the intensity of the image light rays hitting the easel, because the lens aperture will have to be opened wider before the point of visual extinction will be a diminution in the printing time. Conversely, should the worker prefer an exposure time longer than thirty seconds he can either

(Continued on page 508)

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COVER PHOTO—By Leroy Carlson

Technical Data:
5x7 Agfa Universal View Camera. 6" Schneider Xenar Lens. Exposure: 2 sec. at F.32. Eastman Commercial Pan Film. Developed in Pyro—8 minutes. Printed on Kodabrom No. 3. Developed in D 72.

Most Bizarre Photographs



The most Bizarre photograph this month was received from Jerome Koven, and is shown above. Careful examination will reveal that the head of the "victim" comes up through the opening in an extension table. The paper plate has been cut to accommodate the neck of the "meal."



This photograph was made with the subject lying on the floor upon a dark wine-colored rug for the background. The spotlight effect was obtained by placing a cone of cardboard in front of the reflector of a photoflood bulb at a distance of about six feet. Exposure 1/2 second at F.16 on Panatomic X film.



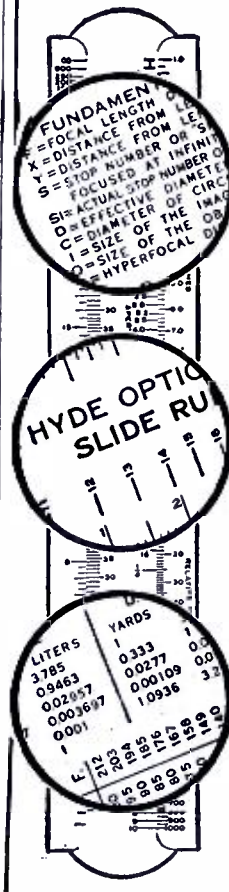
Distortion was obtained by tilting the enlarging easel to almost 45 degrees while printing—T. D. Pierce.

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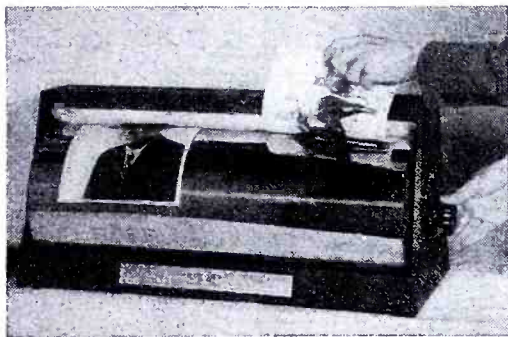
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What's New

AU REVOIR to two splendid contemporaries, *Zeiss Magazine* and *Leica Photography*; the suspension of both is a direct result of the war. May they return to complete the job they so ably started—and soon.

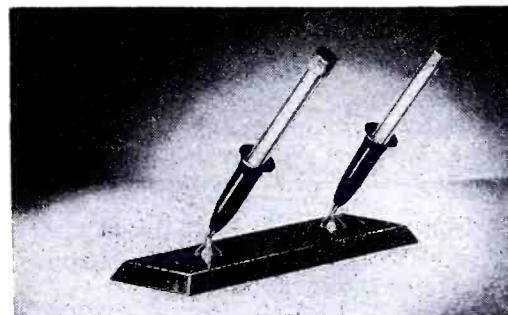
PRINTS will be dry and flat in 4 to 8 minutes if they are placed in the *Roto Electric Dryer* made by *Warren Electric Appliance Co.* (Warren, Pa.). Simply turn the chromium drum by hand.



A NEW line of reels and humidors for 8 and 16 mm. movie film has been introduced by *Lafayette Camera* division of *Radio Wire Television, Inc.* (New York, N. Y.).

SO you want to know something about lenses and shutters? *Eastman Kodak Co.* (Rochester, New York) has prepared a splendid booklet by that name which anyone can get for only 15 cents—and it's worth a lot more.

A TWIN desk set for splicing movie films has been brought out by *Besbee Products Corporation* (Trenton, N. J.). *Besbee* is producing many novelties for the movie making fans.



LAP dissolves and other theatre-movie effects which require backwinding of film in the camera can be made with *Filmo 8 mm.* equipment. The attachment can be installed on any *Filmo* double eight camera.

A NEW reflector kit which can be used with floods or flash lamps, made of card stock, with adapter rings for attaching to standard home lighting fixtures, has just been introduced by *Agfa Ansco Corporation* (Binghamton, N. Y.). A slide-rule type of exposure calculator is included in the outfit.

A SOFT, wide brush in a flexible leather handle has been developed by *Photographic Arts Supply Co.* (New York, N. Y.) and is shown in the illustration below.



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WE should find some excellent photography at two important salons, judging by information received. The first is under the auspices of the *Y.M.C.A. Movie and Camera Club of Des Moines, Iowa*; the second sponsored by the *New England Museum of Natural History, Boston, Mass.*

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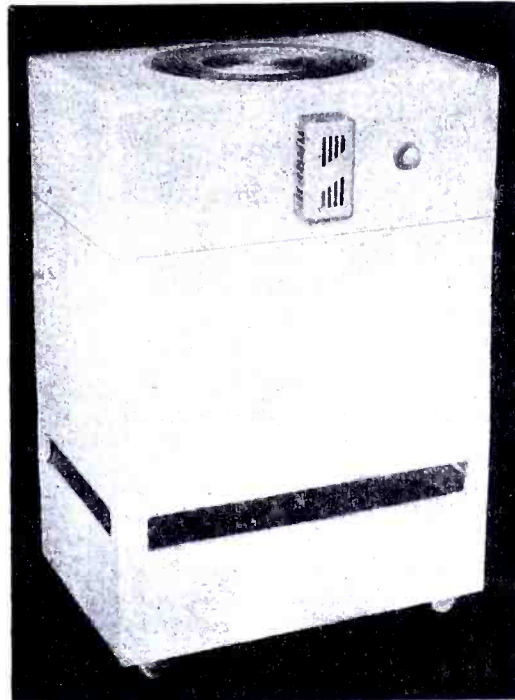
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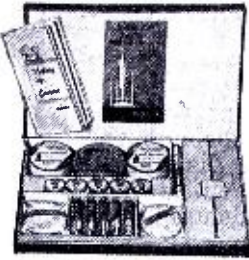
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Photo Hints and Kinks

(Continued from page 505)

place the meter-bulb farther from the easel or use a bulb of lower wattage. These measures will result in a diminution in the intensity of light falling on the easel from the negative, as a smaller lens aperture will be found necessary to reach the point of visual extinction.

It is well when determining the original trial exposures to bear in mind the following precautions:

- 1—To employ fresh paper of the type usually used by the individual worker.
- 2—To use an aperture midway between the widest and smallest available for the enlarging lens.
- 3—To select a negative the density of which most nearly represents that of the average in use by the particular individual.

If these precautions are followed, one will find that sufficient latitude to cover all ordinary work rapidly and efficiently has been secured. One may still further widen this latitude by experimentally determining the optimal exposures for all the types of projection paper one is likely to use. In this way a slower paper will necessitate a longer exposure, or an adjustment of the meter-bulb closer to the easel, while a faster paper will require opposite measures.

One last word of counsel: The amateur may perhaps be confused as to the exact interpretation of "the point of visual extinction," but this is actually of little consequence provided he arrives at his own definition and adheres rigidly to it throughout his work.—M. S. Albin, M.D.

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for Visual Extinction Photometer—M. S. Albin, M.D.
for Oil Can Glue Applicator—Arthur Trauffer, Davenport, Iowa.

Questions & Answers

Negatives from 35mm Film.
Is it possible to make negatives from 35mm motion picture film? If so, how long an exposure should be given?—Donald Curtis, Marlborough, Mass.

Yes, you can make negatives by using the same method which you would employ in making contact prints. Insofar as exposure is concerned, this would depend upon the size of the lamp, its distance from the printing frame, the density of the negative and, to a more limited extent, upon the film stock.

We would recommend that you "waste" one film in making test exposures after substituting a 10-watt lamp for the light in your contact printer. Flip the switch of the printer on and off again instantly. With the second exposure, give two flips, then four, six, eight and sixteen. Develop by the usual "Time and Temperature" method. This

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series should tell you the correct exposure to give for the film stock. If you know the ratio between your film stock and a printing paper, you can make a contact print (negative) on printing paper, and then divide the correct exposure so determined by the number of times your film is faster than the paper.

Moving Backgrounds for Film Titles.

I am doing titling and I would like to know how the combination of the title and the moving background is made. Is it a double exposure? I have tried that with some luck. Can you suggest a better way? —*Ralph Anteen, Everett, Mass.*

This is a relatively simple operation. The titles are painted on, or the letters are fastened to glass. The backgrounds, immediately behind the letters, are moved as desired. In professional motion picture work a strip of film of the lettering is superimposed on another which shows the scenic effect and the print is made through both.

Uneven Light in Enlarger.

Your August issue gave dimensions and illustrations for making a home enlarger. I have built it, but there is one thing that seems to bother me. When I switch the light on, it throws a very strong light in the center of the picture. Do you think the 200-watt lamp is too powerful, or is it too close to the negative?—*Nicholas Caputi, Astoria, N. Y.*

It is not likely that you will need a 200-watt lamp in this enlarger. Would recommend that you use a 75-watt opal (not frosted) bulb, and that you use a piece of opal glass between the lamp and the negative.

Cold Light for Enlarging.

Can you give any authentic information regarding cold light for an enlarger (such as used in neon signs)? I am considering using the blue and white tube. Please state all the disadvantages of this type of light. —*R. Metcalfe, Cleveland, O.*

There are more advantages than disadvantages. The actinic value of the light is much greater than ordinary illumination. The cost for current is lower. Exposures can be prolonged without danger of overheating the negative, and generally the light is more evenly distributed. Its disadvantages are that the much higher voltage needed for operating the lamp must pass through heavy insulated cables and holes will have to be made in the enlarger to accommodate the wires. A transformer is an additional piece of equipment which must be located convenient to the enlarger and there is the ever-present danger of getting the fingers across the high voltage terminals.

Soon to be placed upon the American market is a new "cold light" for enlarging which screws into the regular socket of any enlarger. This article was invented by the Editor of this department.

Table Top Photography

(Continued from page 500)

all right but the 'scenery' in back stood out like a noon-day landscape and my 'pool,' with the moon reflection, was just a piece of mirror. With some more black paper, I killed all of the background illumination, retaining just enough spotlight effect on the figure and a bit of light for the plants. I could not quite get the silhouette effect I desired for the foliage, but made up for that by having a bit of leafage on the face of the moon.

"The ripples were another neat stunt. Smears of black drawing ink on the glass

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THE EDITORS of FOTO-CRAFT are in the market for pictures and articles.

However, all manuscripts must be informative and be in keeping with the slogan of this magazine, which is "The Constructive Foto Magazine." Articles, therefore, should tell how to make, or how to do things or teach people how to use their camera and equipment more effectively, or to teach them how to appreciate photographic values. We definitely are not interested in "pretty" pictures and generalities in the text. \$10.00 will be paid for the Most Bizarre photo accepted and published each month.

All manuscripts will be paid for at regular space rates; payment to be made after publication. Special rates will prevail for feature material and where otherwise specified.

Mail all manuscripts to FOTO-CRAFT, publication office, 99 Hudson Street, New York, N. Y. Manuscripts must be accompanied by self-addressed stamped envelopes and are submitted at the author's risk.

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H. Gernsback

Editor

NO. 1122

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R&TF12

Gentlemen: Please reserve for me and mail to me as soon as possible your FOTO-CRAFT Press Card. In order to be eligible, I enroll as a reader of FOTO-CRAFT and I enclose herewith \$1.00 (cash, money order, U. S. stamps) for a special 7 months' subscription to FOTO-CRAFT, incorporated with RADIO & TELEVISION. There will be no charge whatever, for the Press Card or for any service that goes with it.

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Age.....Sex.....I have taken photographs since (state how long).....

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References (give names and address of two people or establishments who know you).....

Name.....

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

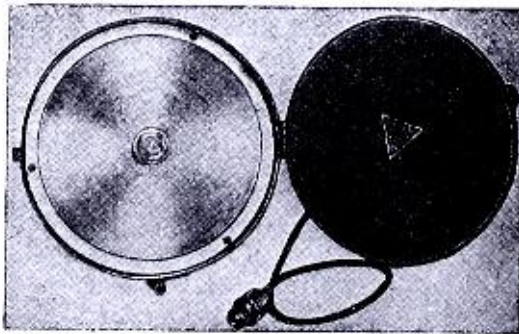
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didn't work. They dried up matt and didn't have any life. My next try was a few daubs of vaseline and that was just the thing: Transparency and sparkle, and the reflected round spot broke up most realistically. One more light in front, a 60-watt in a bridge lamp for taking the blackness out of the shadow side (and I wish I had kept it farther away!), a little final adjusting and shifting and I exposed the thing on a 10-year-old W & W panchromatic plate, and developed it in some stale 'soup' that should have gone down the spout long ago.

"Even the prints were made on Azo E with an expiration date of September, 1929. Luck or not—there is the picture.

"I had two other prints made by a professional of this negative—which, by the way, is as snappy as a Spring morning—and they don't compare with mine. He did not have any soft paper, and this old stuff is all I had. I forgot to mention the exposure time, which was three minutes at about f:32."

The second prize winner is Platt W. Dockery. All of the pertinent data concerning his Table Top Photographs will be found in the captions of the "war" pictures.

In third place is Forest J. Sorenson, who describes the method used for the making of Christmas cards as follows:

"I made the set out of wallboard and painted it with water colors. In order to make the Ivory Snow (soap) stick to the top edge of the fence, clothes line, lamp post and tops of the toy cars, I wetted them with plain water with a small brush and sifted the Ivory snow on as shown.

"Two photoflood bulbs in reflectors, one on each side of the set, were used for general illumination. The spotlight was held over the lamp post to make a ring of light around the post on the ground.

"Agfa Super Pan Press cut film was exposed for 1 second at f:22 for the close-up, and ½ second at f:11 for the long shot. Taken with a 3¼ x 4¼ Speed Graphic. The prints are straight enlargements from the full negative."

TABLE TOP PHOTOS

\$15.00 in Prizes Monthly

In this Table-Top Foto Contest, two photographs must be submitted with each entry; the first will show the picture entered and the second should show how the photo was made (viz., a long shot).

All entries must be accompanied with a short description telling how the pictures were made, giving, in addition lighting information, film data, stop, exposure, and any pertinent information concerning print control.

This is a monthly contest and will continue until further announcement.

All entries must be in our hands by the 15th of the month.

Entries which do not win prizes will be returned if accompanied with a stamped self-addressed envelope.

For the best table-top photos (two needed to constitute an entry), submitted each month, a First Prize of \$10 will be paid. For the next best, a second prize of \$5 will be paid. Any others accepted and published will be paid at regular space rates.

No entries smaller than four by five inches will be accepted, but the entries may be either contact prints or enlargements.

Address all entries to Editor Table-Top Contest, care Foto-Craft.

Putting Them Where They Belong

(Continued from page 504)

enlarging paper in position and print. When dry, mount the animal on the background with photo paste, cement or glue. But before this is done, gently sandpaper the back of the print along the outer margins. This leaves a tissue-thin paper and when the animal is pasted in position, the cut out edges are almost invisible. Keep the mount under pressure until dry.

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In view of the fact that the camera will focus to less than 3 1/3 feet, no supplementary lens equipment is needed.

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Now a slight amount of retouching usually is necessary. This will be very easy to do if a matt paper has been used for then, all work can be done with a pencil. The retouching consists primarily in placing shadows under the animal where necessary and bringing smaller portions of the foreground in front of the animal. This may consist of nothing more than a few blades of grass across the paws which representation is easily accomplished with a few strokes of the pencil.

Mount the pasted combination print on cardboard for stiffness and rephotograph it at leisure. Prints made from such a negative look as if taken "on location" and no "monkey business" can be detected.

Stand for Photo Water Colors

(Continued from page 499)

each end was the original cut of the hand-saw. This feature is merely a matter of appearance. Eleven small pill bottles of uniform outside diameter were procured at a local drug store. Eleven holes of a bore equal to the outside diameter of the bottles were then drilled in a row along the top of the stand to a depth of one inch. The grain in the wood was tinted with various attractive colors and the whole given three coats of shellac, with a light sanding with fine sandpaper between coats. Immediately after the final coat a piece of thin green felt was stuck to the bottom (the wet shellac acting as an adhesive). After the shellac had dried the overlapping edges of the felt were cut flush to the edge of the stand with a razor blade. This felt bottom will protect high finished surfaces from being scratched.

When using the stand for tinting simply fill with water the number of bottles required; then dissolve small strips of color (cut from the color book), in the water.—
Harry Hingley.

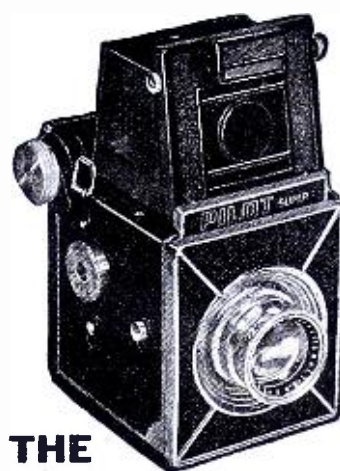
Constructing a Portable Darkroom

(Continued from page 501)

is extremely useful for other types of work. Feature 5—Ample space is provided for carrying trays, printing paper, camera, film, film tank and chemicals.

One piece of plywood (1/4" 3-ply wood) two feet by six feet, and sixteen feet of 5/8" quarter-round molding will be enough to construct the box. This will cost about \$1.25. The metal fittings can be secured at the "dime" store.

The pictures show the details of construction but some of the procedure may need some explanation: Cut four pieces of plywood to 11" x 20". From the outside, screw the quarter-round to the pieces which are to be the top and bottom. Countersink all the screw holes so there will be no projections on the outside to catch on clothing. Cut the quarter-round with a 45° angle at the ends for a snug fit at all four corners. Cut the armholes in the piece which is to be the front and then screw the front and back pieces to the top and bottom pieces. The box will now be open on both ends. Be sure that the box is perfectly square, lay it on a piece of plywood, and draw around it to mark out the end pieces. Screw some quarter-round to the front and back pieces at the ends so that the end pieces will have support at all four sides. V-stripping may also be used on the front and back pieces as the picture shows. These pieces must be cut in two, leaving a gap of about 3/4" at the place where the saw cut is to be made to cut off the top of the box. This saw cut



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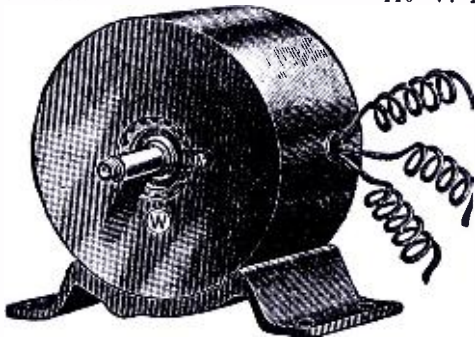
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MONEY-BACK GUARANTEE

WELLWORTH TRADING COMPANY

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should be marked on the front and back as soon as they are on the box so that when the end pieces are screwed on, there will be no mistake of putting a screw in the wrong place.

Be sure to cut the lid in two and hinge it in the middle. This will speed up the printing operation considerably. Cut away a portion of the edges of the opening in the top of the box so that a glass plate can be fitted flush with the surface of the box top.

After the top has been cut off, some narrow strips of pressed wood or orange crate slats are screwed to the edges of the lower part of the box to serve as a light trap at the opening. The box needs little more than a finish on the outside, a coat of black paint inside, and metal trimmings.

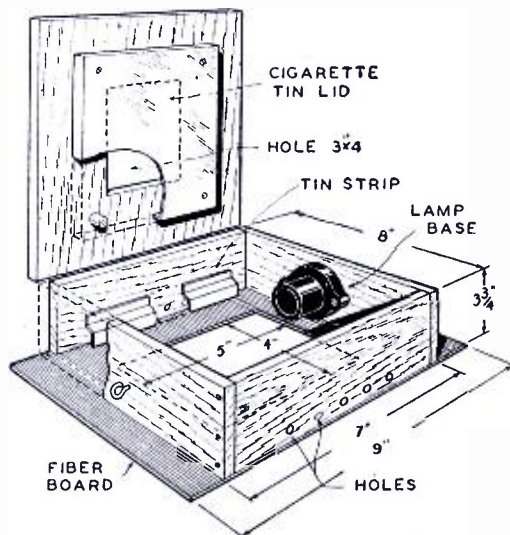
The sleeves are made from any lightproof material. The ends are sewed to elastic so that they will fit snugly around the arms. The inner ends are sewed to metal rings (made of heavy wire) which may be screwed down to the box so that no stray light can get into the box.

The light housing for the box was made a portable unit because the author also uses it on a home-made enlarger which is too large to carry around. In the portable darkroom, the light housing may be made more permanent if desired. The essential feature, which, by the way, will work for any enlarger, is the use of the tubular lights. Space is saved in their installation, there is a total of 120 watts of light which is surprisingly cool in operation, and evenness of illumination is assured. Ventilating holes at the sides are not essential but it is best to cut a vent in the bottom of the box and place a "flat 50" cigarette tin lid over it as the illustration shows. Use some steel wool to remove the paint so that the under side will act as a reflector behind the lights. Glue a strip of felt all around the edge of the box to make it light-tight and finish to suit your taste.

The extension is about 1 1/2" for a 4" or a 5" lens and about 2" for a 6" lens.

With the completion of the camera extension, the truly portable darkroom is completed. When in use for loading a film tank, keep a piece of heavy black paper in the contact printing frame in the top of the box to keep out any light which might leak through the cut in the middle of the lid.

An adaptation which some readers may want to consider is a conversion to make it possible to develop films in the box by inspection. The opening in the top of the box can again serve by using a box-like viewer with a ruby glass in the side to admit the right kind of light.



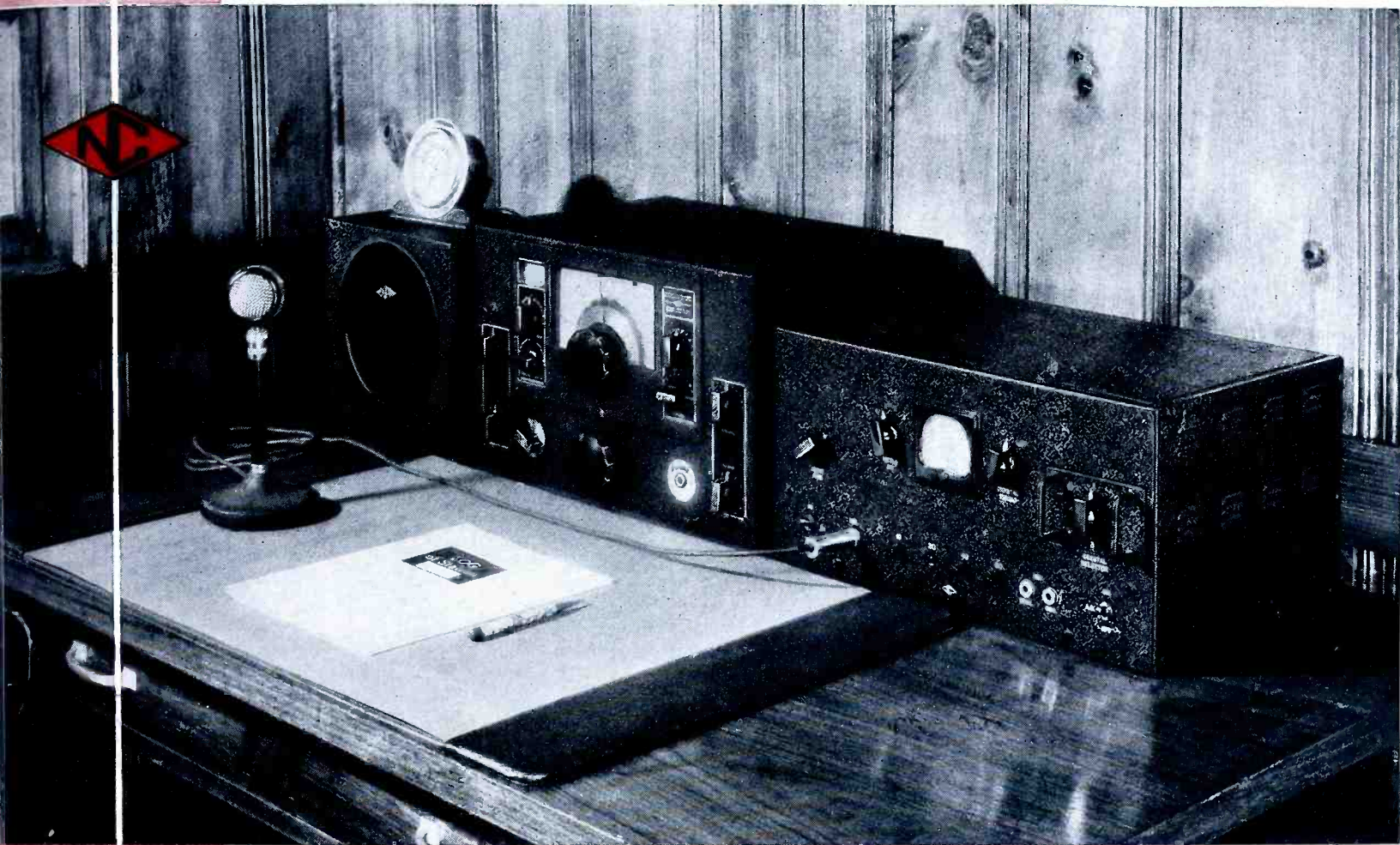
Details for the construction of the light box are given in this diagram. Naturally, if the portable darkroom is made larger or smaller, these dimensions must be changed.

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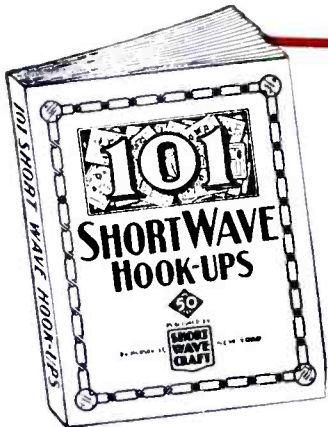
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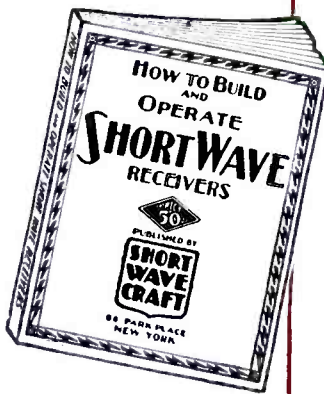
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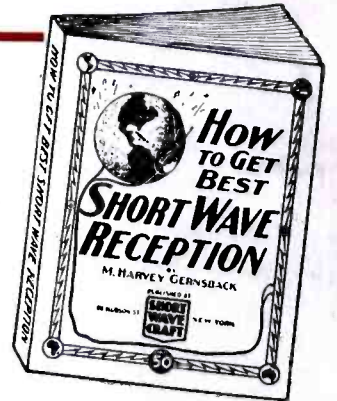
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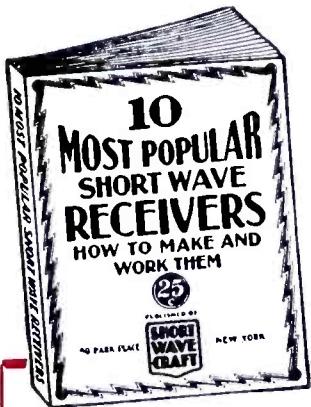
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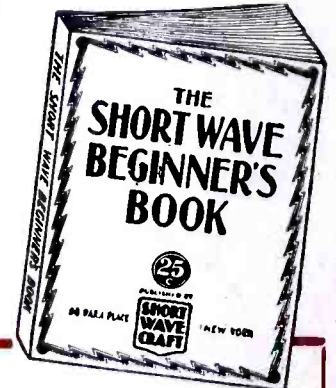
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