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HUGO GERNSBACK
EDITOR

AMATEUR & EXPERIMENTAL RADIO

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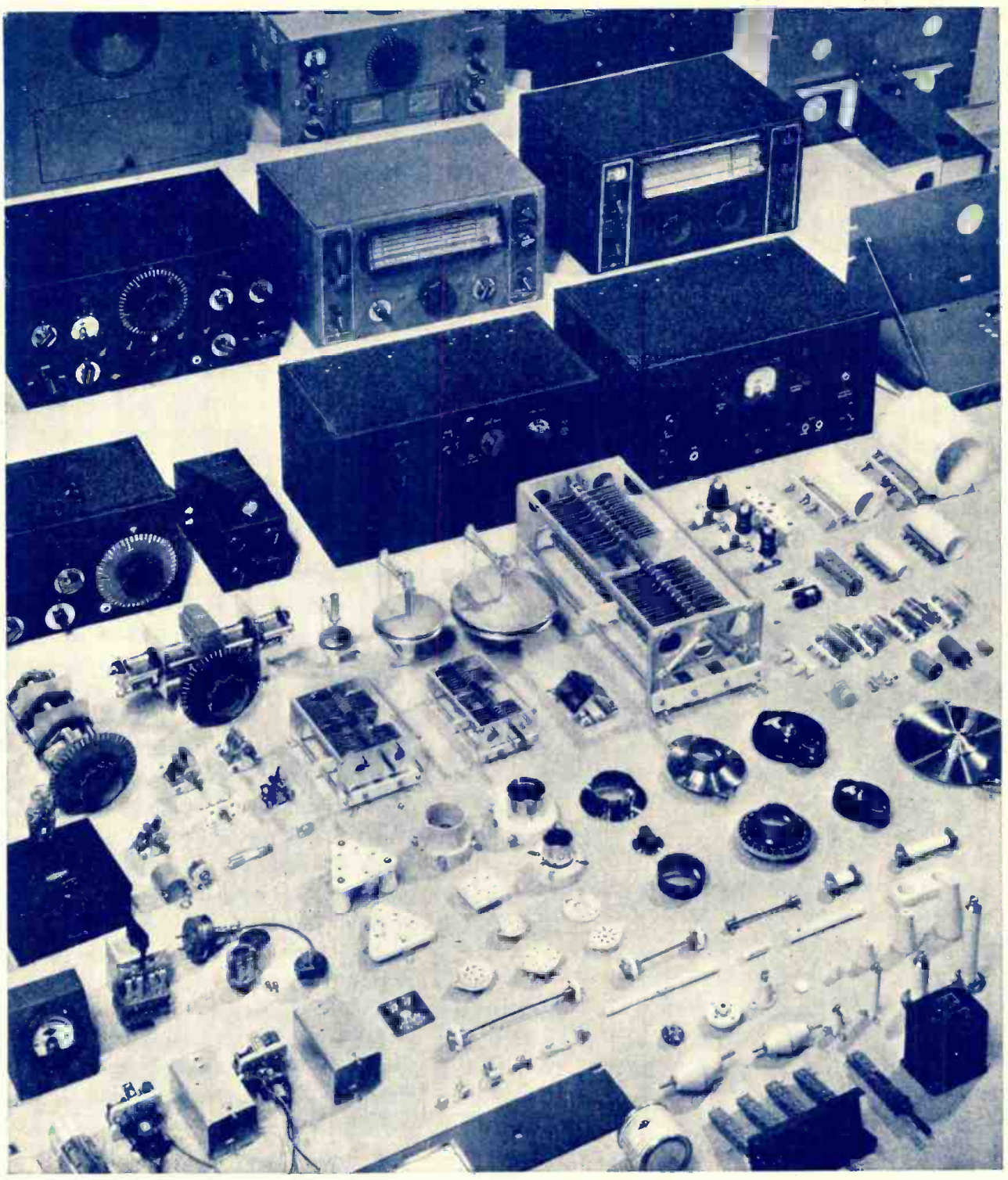
1940



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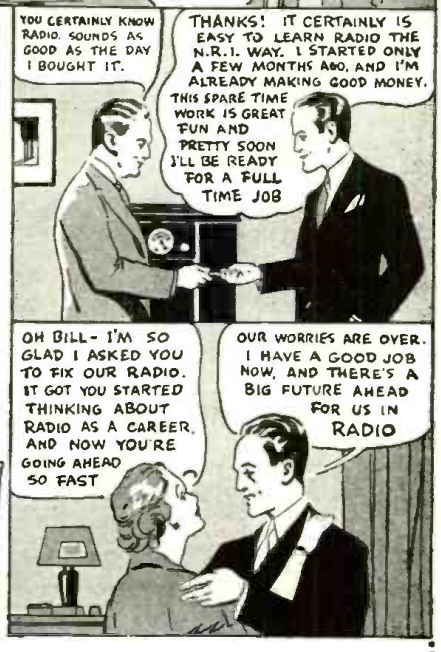

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Radio broadcasting stations employ engineers, operators, technicians and pay well for trained men. Radio manufacturers employ testers, inspectors, foremen, servicemen in good-pay jobs with opportunities for advancement. Radio jobbers and dealers employ 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 newer fields offering good opportunities to qualified men. And my course includes Television, which promises to open many good jobs soon.

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J. E. SMITH, President
Dept. ODB3, National Radio Institute
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RADIO & TELEVISION

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FOTO-CRAFT

April — 1940
Vol. X No. 12

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

In May Issue

Useful Signal Generator for the Ham and Set-Builder, Herman Yellin, W2AJL

10-Meter Rig—Transmitter and Receiver, Howard G. McEntee, W2FHP

How to Build a Television Receiving Antenna, Chas. R. Leutz

A New Sharp Focusing Rotary Beam Antenna, V. P. Barta

A Perfected Communications Receiver, Raymond P. Adams, W6RTL

Making Sports Pictures, Wm. C. Green, Pres. New York News Photographers Association

In This Issue

RADIO — TELEVISION — FOTOCRAFT

Cover composition by Hugo Gernsback and Thos. D. Pentz. Pictures of Fannie Brice by Sidney Desfor of NBC, see page 755. One tube portable works loud speaker, for description see page 713.

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What Do YOU Think?

He Wonts to "Swap" DX Notes

Editor: Ever since my younger brother's photo appeared in the January issue he has come in contact with some very fine DX pals. So being kind of envious, I am submitting my DX corner and a request for some of you DX fellows to drop a line and get acquainted. I would like to correspond with any DXer who has the time to drop me a line.

The receiver shown is a Skyrider SX11, my first SW set, DX, in the past 2 years, has resulted in hearing 126 countries, and to date have QSL's from 103 of these. DX was mostly on 20m phone, but I still go after those elusive SWBC and commercials. Lat-

est QSL's are PK6XX, VU2FQ, ZL2BE, CN8MV, CX8AI, VP2LC, and VK2AGJ. VAC rating here is 28, and my certificate can be seen in the corner of the photo.

May I state at this time that your column, *"Let's Listen In"* is sure crammed full of DX, hot tips and general items that are eaten up by us struggling DXers. Its editor sure can pull in those elusive DX stations. The QSL's he displays makes many a burner of the midnite oil grab for a "crying towel."

So what say, you DXers—how's about dropping a guy a line, to swap DX gossip?

73's is good hunting.

MURRAY BUITEKANT,
1695 Andrews Ave.,
Bronx, N. Y. C.

Likes Our S-W Time Schedules

Editor: Needless to say, I think RADIO & TELEVISION is one of the best, if not actually *the* best radio magazine I have ever read. I have found the short wave time schedules very accurate, and the structural information is concise and yet simple. To me it is a source of much pleasure and I look forward to it each month.

HERMAN MANDELL,
1314 Grand Concourse,
Bronx, New York

Will Swop Photos

Editor: We would appreciate it very much if you will insert our names and address in the SWL Exchange Column.

We swap photos (shack) and SWL cards 100% with any Ham or SWL in any part of the world.

We have contacted 66 countries, 5 continents, 47 states. We are working for a VAC certificate and HAS.

We are just beginners on collecting SWL cards. To date, we have only 621.

"Let's Listen in with Joe Miller" is our favorite section in the RADIO & TELEVISION magazine, as this section has helped us log most of our DX stations.

We have been readers of "R. & T." for a couple of years and will be for many years in the future.

Wishing RADIO & TELEVISION many years of success, 73.

BERNARD & MICHAEL WOZNIAK,
4639 So. Winchester Ave.,
Chicago, Ill.

Has 650 QSL Cards

Editor: I have been a constant reader of your F.B. magazine for the past five years, and I have been going to write you for some time, but just didn't get to it. When I read Stanley Kasper's item in the November issue, I decided to write right away. I think he has a F.B. idea and would like to see it carried out.

I have been SWLing since February last year, and have over 650 cards from 45 states and 25 countries. I have read quite a few items on "hams" QSLing SWLs, and not wanting to get into any arguments will say this: *I do most of my card swapping with SWLs and hardly ever bother the "hams".* I get most of the SWLs' names and addresses from your "Free Barter and Exchange" ads and from the several clubs which I belong to. I will swap 100% with SWL cards shack photos and postal views.

Hoping that you will consider Stanley Kasper's "brain-storm" in the November issue of your F.B. magazine, I remain

MILTON H. BELL,
201 W. Madison St.,
Rochester, Pa.

Porlor Transmitter Works OK!

Editor: I have made the *parlor transmitter* you featured in the Sept. issue. It works fine! I acquired most of the parts through the "Barter and Exchange" columns, too, including the *Ouncer* audio transformer. The whole thing cost me exactly $3.79 including postage.

DANIEL PLATEK,
225 Division Avenue,
Brooklyn, N. Y.

Got Voice from the Past

Editor: As this day marks the second anniversary of my introduction to short wave, I take this occasion to thank the editors of "R. & T." which has rendered possible what little success I have had. Without "R & T." I doubt if I would be listening to short waves, as many stations are very stingy with station *identification.*

With a 1937 model 5-tube Zenith I have VAC five times and VIC three times, although many stations do not answer me. Not alone are the QSLs a source of extreme gratification to me, but the many personal letters I have the pleasure of receiving warm the cockles of my heart. The personal letter from "Polskie Radio" and Czechoslovakia are especially dear to me.

A very touching little event was when I received my regular weekly schedule from Warsaw on the 1st of October. I assure you it caused a lump to rise in my throat. It was like hearing the voice of a departed friend.

I trust you will not be bored by this epistle, as when I appreciate a thing I believe in letting the source know my feelings.

Good luck to "R. & T.," and best 73s from

BERT WOLFE,
3016 Minna Ave.,
Oakland, Calif.

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The Annuals have always been regarded as a standard reference work for every practical branch of radio operation and service. This 1940 edition ably sustains this reputation. Every radio man wants a copy of this valuable book. Just as this book will be of unquestionable value to you, so, too, will every monthly issue of RADIO & TELEVISION. This magazine brings you big value every month. It keeps you intelligently informed about new developments in radio and television. You want the news, want it fully but concisely, want it first—that is why you should read RADIO & TELEVISION regularly.

This very special offer is made for just one purpose—we want you as a regular subscriber. The Annual, whose contents appears at the right, is not sold, but a copy is FREE to you if you subscribe now.

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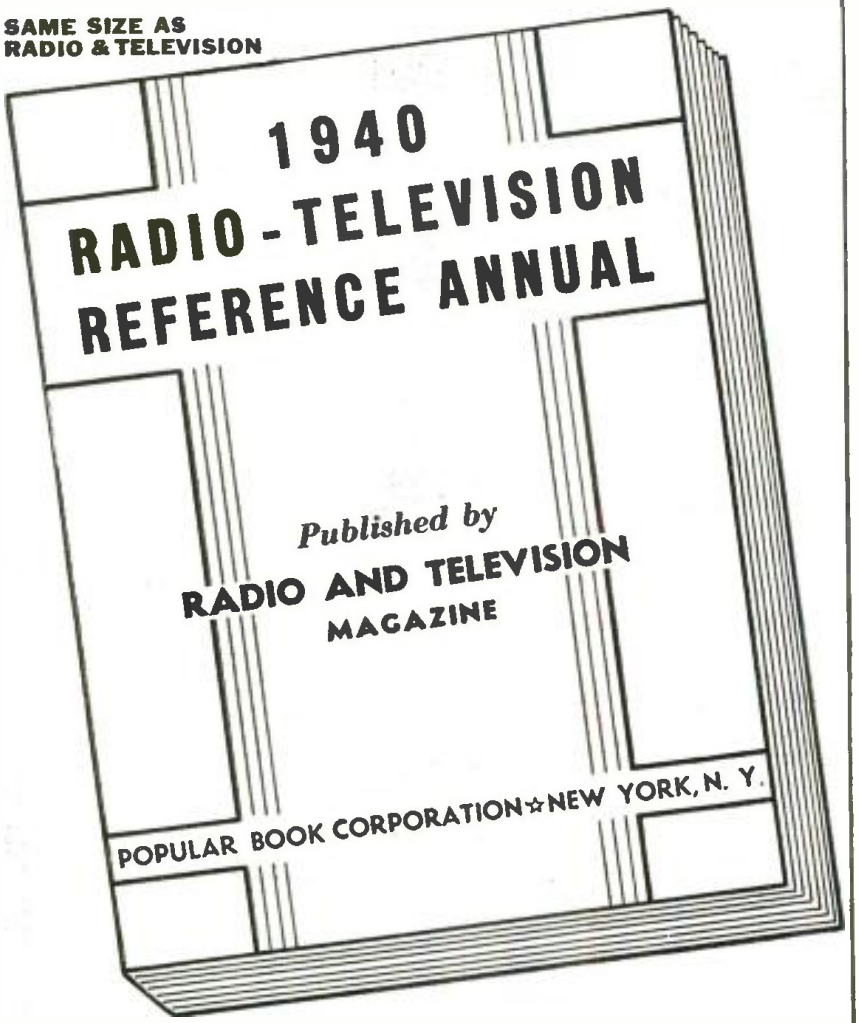

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MORE ADVANCED SET CONSTRUCTION

The "High-Seas 4" Broadcast Lamp Radio—How to Build a 6-Tube 1.4-Volt Short-Wave Superhet for the "Ham" or Short-Wave Fan—Build the "Lunch Box 5" Super Set - a Broadcast Battery Portable—How to Build a Plug-Together 8 Tube Broadcast Set—The "5-in-4" All-Wave Radio for A.C. Operation—An Easily-Built 3-Tube Midget Broadcast Superheterodyne Receiver.

THE SERVICEMEN'S SECTION

Bass Tone Control—Simplified Variable Selectivity—Practical Servicing Pointers—Servicing Universal A.C.-D.C. Receivers—Killing the "Intermittent" Bug—A Service Shop A.C.-to D.C. Power Supply—Sideline Money for Servicemen—Adding A.V.C. to any Screen-Grid T.R.F. Receiver—Iron Particles in Speaker Air Gap.

TEST INSTRUMENTS

A Useful Neon Lamp Tester—An Inexpensive Output Meter—Making Milliammeter Multipliers—Home-Made Frequency Modulator—The Busy Servicemen's V.T. Volt-Meter.

PUBLIC ADDRESS AND AMPLIFIERS

Build this Combination A.C.-D.C. Radio and Inter-Communicator—Speaker Placement in P.A. Work—The Design and Construction of an Inexpensive All-Push-Pull 10-Watt Amplifier—Obscure Sources of Hum in High-Gain Amplifiers—How to Build a High-Fidelity 5-Watt Versatile Amplifier.

"HAM" SECTION

Ultra-High Frequency Antennas—The Beginner's Low-Cost Xmitter—Modulator Meter—Phone Monitor—The Beginner's "Ham" Receiver—2½ Meter Acorn Transceiver.

TELEVISION

How to Build a 441 Line T.R.F. Television Receiver—Useful Notes on Television Antennas.

MISCELLANEOUS

Simple Photo-Cell Relay Set Up—Making a Burglar Alarm—How to Build A.C.-D.C. Capacity Relay—How to Make a Modern Radio Treasure Locator.

USEFUL KINKS, CIRCUITS AND WRINKLES

Making a Flexible Coupler—Two-Timing Chime—A Simple Portable Aerial—An Improvised Non-Slip Screw-Driver. NOTE: The book contains numerous other useful Kinks, Circuits and Wrinkles, not listed here.

(approximately)

45 ARTICLES

(approximately)

170 ILLUSTRATIONS

68 BIG PAGES

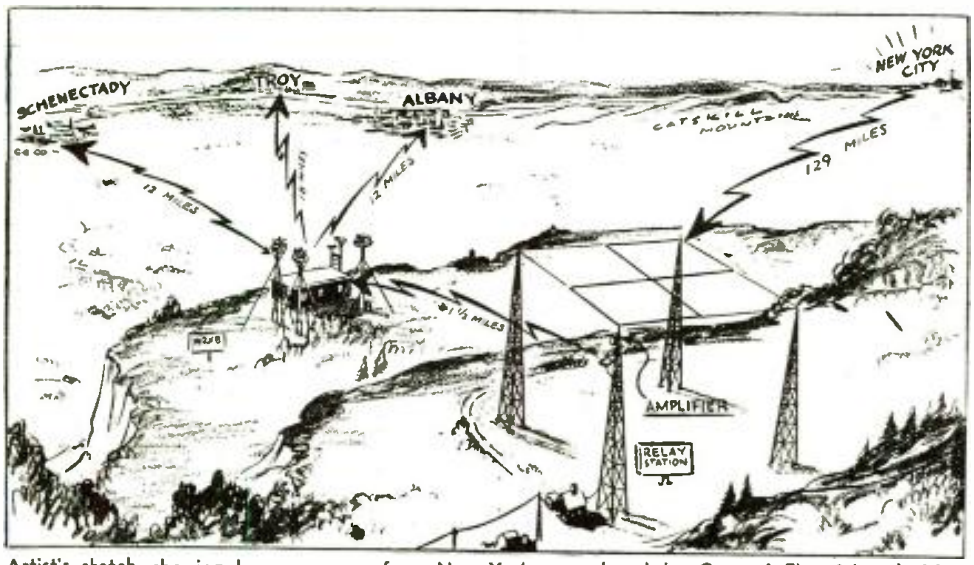
RADIO & TELEVISION
99 HUDSON STREET
NEW YORK, N. Y.

RADIO & TELEVISION
Incorporating
FOTO-CRAFT

HUGO GERNSBACK, EDITOR H. WINFIELD SECOR, MANAGING EDITOR

Vol. X April, 1940 No. 12

Network Television
Proven Practical



Artist's sketch, showing how programs from New York are relayed by General Electric's television transmitter, as well as being fed to the transmitter from the main studio in Schenectady.

FCC Experts Attend Vision Demonstration in Schenectady

● NETWORK television, necessary to give vision to the radio sets of America, was successfully demonstrated to members of the Federal Communications Commission at Schenectady last month. The program, which originated in NBC's New York studios, was picked up in Schenectady homes, 142 airline miles away, thanks to the General Electric's new relay station, working in conjunction with its main transmitter atop the Helderberg Mountains.

Although telecast programs had been received at the Helderberg relay station before in tests, it was the first time that such programs were *rebroadcast* for the entertainment of persons in the area served by the *local* station. Both image and voice were considered excellent by members of the Commission, equally as good as programs originating in the Schenectady studio, thus proving to the Commission *that network television is possible*. So far as known, this was the first time a television program has actually been rebroadcast over any such distance and from a point more than a mile below the line of sight.

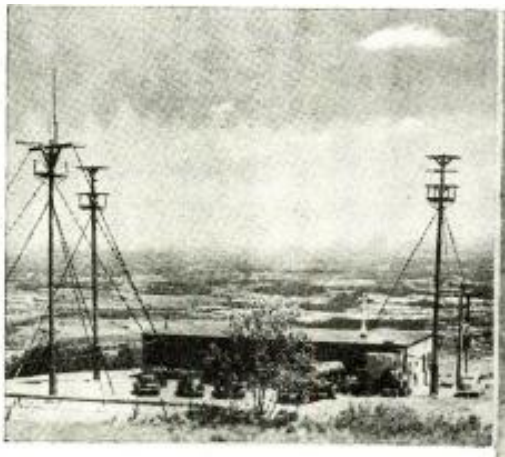
By the use of the new relaying equipment, located 1.2 miles from the main transmitter atop the Helderberg Mountains, 12 miles from Schenectady, television broadcasts from New York City will become available to Capital District residents within the range of the company's station W2XB.

The programs transmitted from New York City are received at the relay station on the 44–50 megacycle band by means of a rhombic antenna that resembles two diamonds placed end to end and supported by four 128-foot towers. The programs then pass through an amplifier, a part of the antenna structure, that increases the signal strength about 20 times before entering a wire line leading to the relay receiving station located beneath the antenna. Here the radio signals from New York are changed to sound and picture signals.

By means of a low-power 10-watt transmitter the picture part of the programs is then relayed, on a carrier wave of 156–162 megacycles from a small transmitting antenna to the main Helderberg station. This transmitter is similar to the diamond-shaped one used to pick up the programs from New York but is only 10 feet across as compared with the 400 feet of the receiving antenna.

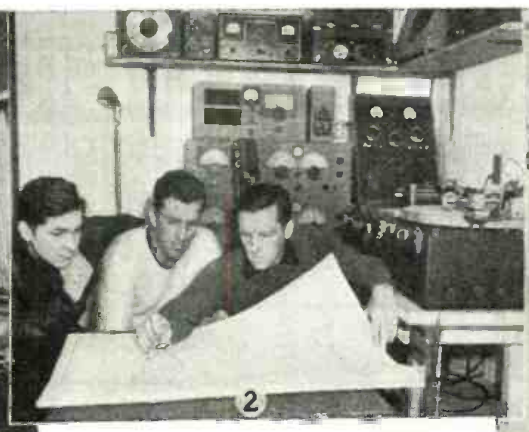
At the main transmitter a dipole antenna picks up the picture part of the relayed program and feeds it to

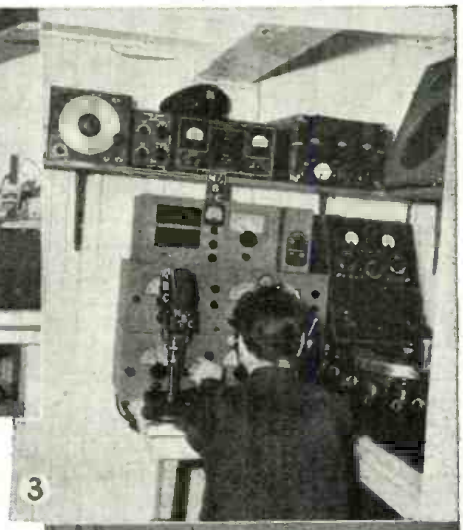
(Continued on page 740)



Above: Main television transmitter 1.2 miles from the relay station, and at elevation of 1,500 feet above sea-level.

Right: One of the towers of the new television relay station. A shack houses the television equipment at the base of the antenna.





Radio to "Can" South Sea Isle Music

● THE Fahnestock expedition, bound for the South Seas, sailed from New York recently. Elaborate radio equipment was carried which will be employed to broadcast special events over the NBC network, including a storm at sea. A short wave portable set will permit relaying the native music from the shore to the schooner, where it will be "canned" on special records for future study. Five tons of radio equipment alone is carried.

1—Director Bruce Fahnestock demonstrates to brother Sheridan the sound recording equipment. In background: radio receiving equipment.

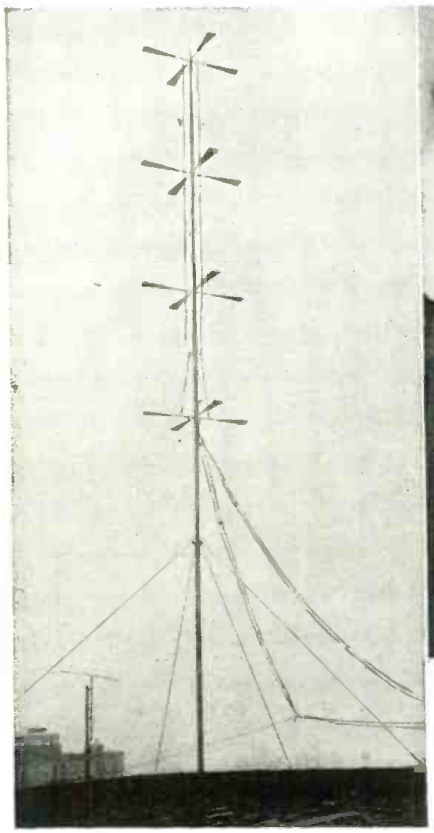
2—Checking the projected course. To right: radio recording machines and amplifier.

3—Frank Chesus, radio operator of the Director II, "on duty."

4—Left to right: Skipper Sheridan Fahnestock, Mrs. Mary Sheridan Fahnestock, Director Bruce Fahnestock, 1st mate Edward Dair.

5—Skipper Sheridan Fahnestock broadcasting from the mast.

Harry Lubcke Tells Plans for Pacific Coast Television



At left: New type television antenna devised for the Thomas Lee station at Los Angeles, Calif. This station has built up a large following among television fans in that locality.

First aid was recently demonstrated by television in a telecast from the well-known Lee station in Los Angeles. The educational possibilities of television are legion.

● APROPOS of the debate before the FCC relative to whether or not television should be frozen into RMA standards of 441 lines per frame, 30 frames per second, Harry Lubcke, Chief Engineer of the Thomas S. Lee station, W6XAO, Los Angeles, has some rather revolutionary ideas which are based on good sound experience.

When the Pacific coast station first opened in 1931, it used the cathode ray system, but at 80 lines—a comparatively *low definition* picture. A few receivers were built and put into use. Meanwhile the station kept improving the definition of its transmissions. A few months ago it was using 330 lines and then shifted to 441. This worked no great hardship on the 300 or 400 television set owners in its service area. Mr. Lubcke said that on the home-made sets—as the majority of them were—*the total expense of shifting to the higher definition was $1 or $2, and a little of the experimenter's time*—so little in fact that he believes servicemen could have done the job for a maximum of $5.00.

Due to the simplicity of changing to a higher definition (which merely means altering the sweep circuits and making sure that all the video frequencies are passed by the television I.F.) he does not feel that it is very important whether television standards are now frozen or not. He does, however, doubt that anybody would regret such

(Continued on page 731)

WORLD WIDE RADIO DIGEST

A MECHANICAL AMPLIFIER which controls large amounts of electric power with but a small input, is seen undergoing the inspection of E. F. W. Alexanderson, above. Through this new G.E. device, one watt of power can be used to control many thousands of watts and the instrument's response is virtually instantaneous.

It is a motor-driven compensated generator with an extra set of short-circuited brushes for each set of poles, and gives accurate reproduction in variations of intensity and time intervals.

Its principal elements are a control field, a short-circuited set of brushes for the armature (set at right-angles to the power brushes) and an output circuit from the armature, with compensating winding.

The overall amplification is approximately 10,000 to 1. The machine is finding many applications in industry.

THREE TIMES STRONGER than any previously known permanent magnet assembly is that shown at right. Designed by G.E., it permits a piece of sintered Alnico to lift *4450 times its own weight*. The new brass and iron mounting permits the flux to pass through *many* air gaps instead of the usual two. A 1 oz. magnet held 200 lbs. in test. Here a magnet is seen supporting a 100 lb. girl. Note size in insert.

INTERCOLLEGIATE RADIO on the short waves links the editorial offices of the *Daily Bruin* of Los Angeles and the *Daily Californian* at Berkeley.

Both are publications of the University of California and offices are 500 miles apart. The Los Angeles station, W6OOZ, operated and sponsored by the University Radio Club, is located in the Psychics Biology station. The Berkeley station is at Eschelman Hall. The stations communicate daily at 5 p.m. to exchange news.

The picture above, illustrating W6OOZ, was taken by Herbert Dallinger.

TELEVISION GROWS 10% weekly, according to a statement by Dr. Alfred Norton, NBC's television head. Other figures show that there are 2,000 sets in use, 89.8% of which are in homes. Average audience is 8,000 persons, only 21% of whom see every show. Dramatic shows have proven most popular, followed by outside special events and feature films. Movie shorts came in a bad fourth. One third of the receivers in use, according to Morton's survey, use 12" tubes, about the same number have 5" tubes and 15% use 9" tubes. Program production costs from $10,000 to $15,000 a week, or from $5 to $7.50 per set per week.

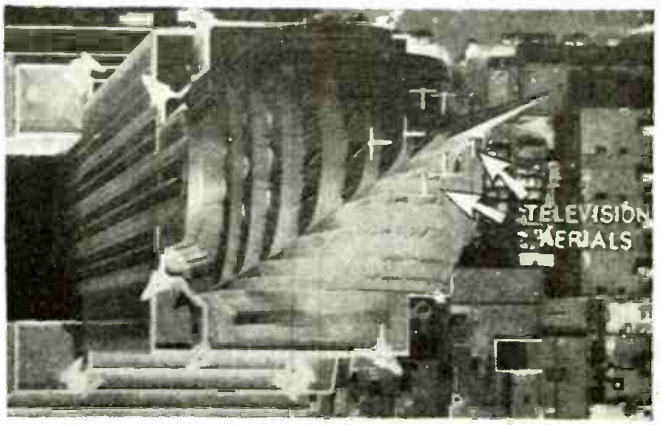
BYRD AND HIS BOYS are shown in the composite photo below listening to "The Mail Bag Broadcast" with G.E. table model receivers.

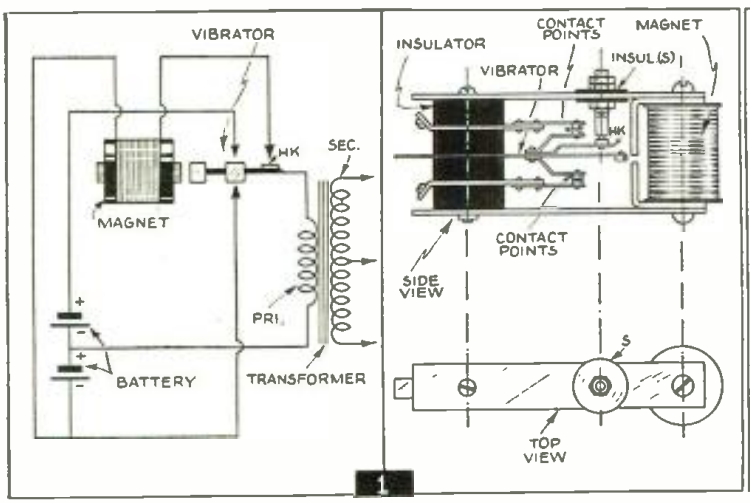
Admiral Byrd actually has his receiver in his cabin, but the artist shifted it in this picture in the interest of good fellowship.

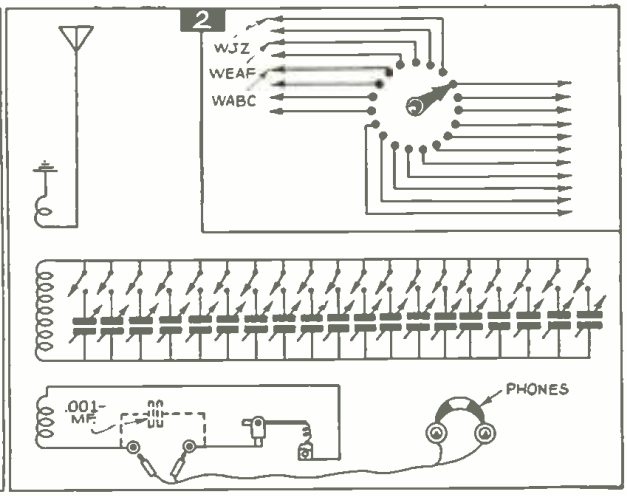
Programs to Little America are being broadcast every other Friday night over WGEO, Schenectady, from 11:30 p.m. to midnight, E.S.T., on 31.48 meters. In this way men in the Antarctic are kept in communication with friends and family.

LOOKING DOWN from an airplane on station W2XAB of the Columbia Broadcasting System, one would see the Chrysler Building with its television antennas as it appears below.

In this picture, the plane is over 42nd Street and cars parked on 43rd can be seen at the top of the picture. Test patterns are being radiated, and it is expected that soon actual programs will take the air. The studios are located in the Grand Central Bldg., which is but a short distance from the transmitter proper. For further details see article on Page 739.







International Radio Review

Vibrator Rectifier

1 AN interesting vibrator rectifier is illustrated in the accompanying diagram and was described in the Danish magazine *Popular Radio*. The vibrator magnet operates from a 4 to 6 volt storage battery. The magnet coil, comprising a bobbin about 1½" long with ½" diameter soft iron core, is wound with 150 turns of No. 24 enameled or D.C.C. magnet wire.

The vibrator spring may be made of phosphor bronze or steel and the contact points may be of silver or tungsten (auto breaker points).

For low power the step-up transformer may be an old audio transformer or an ignition coil. A microphone transformer might also be used. As will be seen, the vibrator sends alternately negative and positive pulses of current through the transformer primary, i.e., the current is fed through the primary first in one direction, then the other.

Tuner for Crystal Detector

2 EITHER a series of switches or push-buttons may be used to instantly tune in the desired station on a crystal detector set as shown in the accompanying diagram, Fig. 2. A series of padding condensers is pre-tuned to the desired stations and the buttons appropriately labeled with the station calls. A 3-winding plug-in coil may be used and a pair of high resistance phones are employed, together with a sensitive crystal detector.

Approximate values of the tuning coil and condenser are as follows: For the broadcast band the coil may comprise about 60 turns of No. 26 wire, wound on an insulating tube 1½" in diameter. The tuning condenser value will be approximately .00035 mf. By providing taps at several spots along the coil, shorter waves—120 meters or lower, can be tuned in with the same condensers. The crystal detector type of receiver is not recommended for the reception of short waves much below 100 meters, but if some of our readers have had unusual success with a crystal detector on short waves, we shall be very glad to hear from them, together with a copy of the hookup used.—*Radio Revista, Buenos Aires, S. A.*

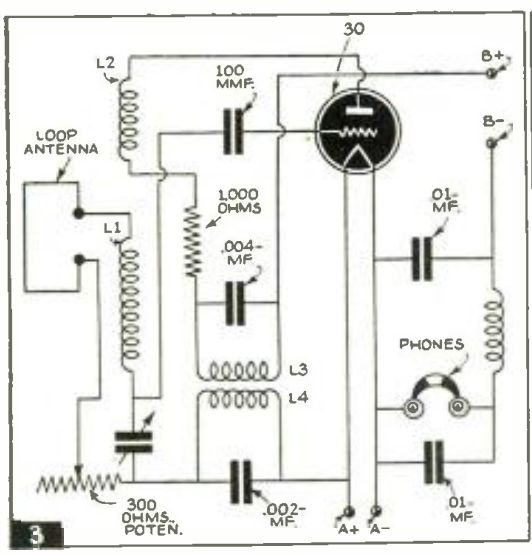
Short Wave Loop Receiver

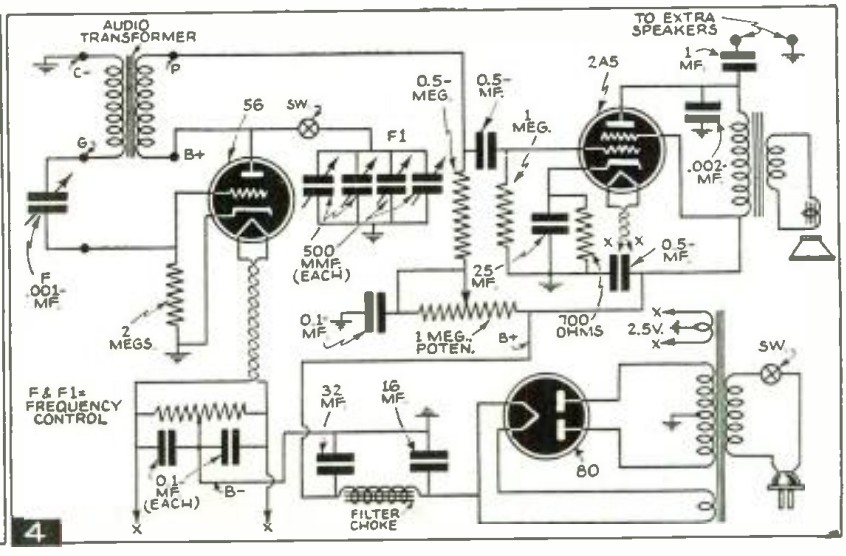
3 A NOVEL short wave receiver using a loop aerial is shown in Fig. 3—the loop comprises 8 turns of wire spaced on a frame measuring 6" by 4" by 1" wide.

The coils L-1 and L-3 are the usual short wave tuning coils suitable for the band which it is desired to tune in. Coils L-3 and L-4 are the interruption frequency transformer. L-3 has 4,000 turns of No. 36 wire, while L-4 has 3500 turns.

With regard to the interruption frequency transformer it is suggested that the windings of several thousand turns be divided into small sections or pies of about 500 turns each. This will help to reduce the distributed capacity of the coils. The pies may be arranged so that those of one

(Continued on page 731)





A dandy portable battery receiver—it uses one tube and gives loud-speaker reception.

The Twinplex Portable 1-Tube

Works Loud-Speaker

Robert W. L. Mark

With spring weather in the offing, this all-wave portable receiver will appeal to many readers. It uses a dual purpose tube, plug-in coils, and a permanent magnet speaker.

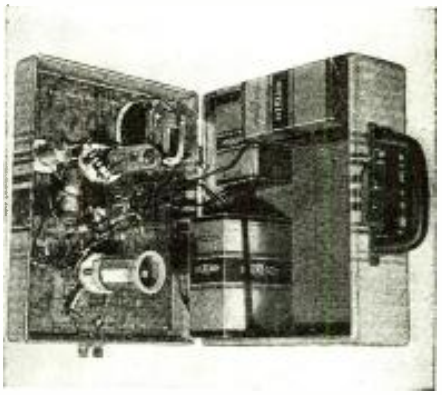
● A LOW-COST efficient, all-wave portable receiver has just been completed and thoroughly tested. It is ideal for use in the car to listen to ham transmitters, for field use, or for the home. In the evening it will receive standard broadcast stations on the speaker with a good antenna. On all bands with a short antenna, even an auto pole type antenna, it provides loud headphone reception. One night we tuned in London on the speaker using no ground and *only three feet of wire connected to the antenna post!* Of course the volume was low, but the station was received! It will pick up short-wave amateurs from all over the country with fine earphone reception when conditions are right. The portable may be built for $5.00 if you have a few spare parts around to start with. It weighs about 5 pounds. For the radio experimenter it is a very practical outfit.

In building this portable, shown in the accompanying photographs, the first consideration was what circuit to use. Naturally, in trying to keep the cost low, we had to use a circuit using few tubes and batteries. After much magazine reading and thought and finally a lot of testing, we chose the popular and justly famous "Twinplex" circuit, using the new 1G6G double tube. This circuit was originally explained in the October, 1939, issue of RADIO & TELEVISION. In our final receiver we made just a few changes. We added a 20 mmf. bandspread condenser, connected in parallel with the main tuning condenser; we used the Hammarlund 4-prong short-wave and broadcast coils instead of home-made coils; and we used 90 volts on the plates of the 1G6G.

Where to Get the Case

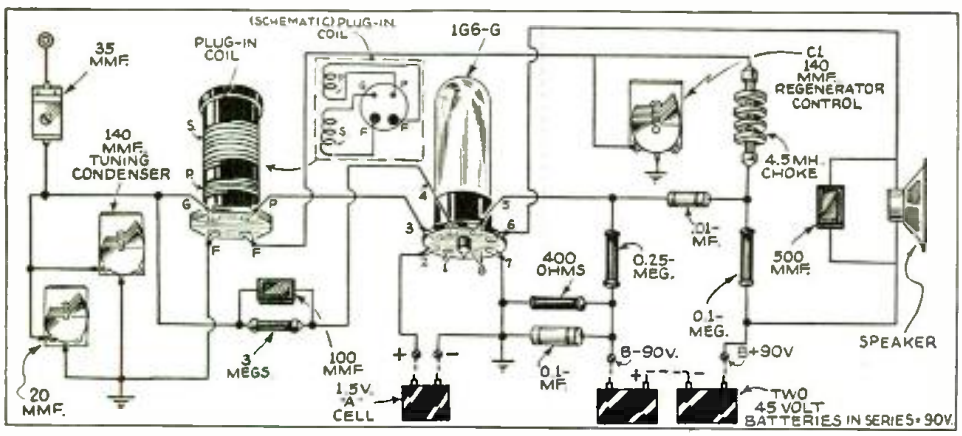
Having chosen the receiver circuit, the next step was to find a suitable case. We were not trying to break all records for compactness, nor did we wish to crowd the parts and thus impair reception. What we wanted was a carrying case that was not too large and was attractive looking. Finally, after a good deal of window shopping, we picked out a woman's vanity case, size 11½" x 9½" x 4½", which can be bought in novelty or department stores for from 50 to 90 cents. This case we knew would hold the set and three batteries easily.

Our next step was to fit the batteries and receiver neatly into this case. We did this by cutting a cardboard piece the same size as the lid of the case. Then we mounted the receiver parts on that cardboard piece, i.e., coil socket, condensers, tube socket, jack and switch. Then, by placing this temporary panel inside the lid, we could see where to place the batteries and how everything would fit. After some manipulation we placed all parts in the position shown in the photographs. Looking at the case closed and with the handle up, the parts on the outside of the panel are as follows: In the center, the main tuning dial, above that the band-spread dial, above that the switch which turns the 90 volts on and off. To the left and above is the regeneration control dial. And to the right and above is the phone jack. The loudspeaker, of course, is in the lower left-hand corner. The hole for the speaker was cut out of the tin with shears and out of the case with a razor blade. Having seen how everything would fit we used the cardboard piece as a pattern and placed it over a panel made of tin cut to fit inside the lid of the case. Then, having drilled the tin panel so as to mount the parts on it, we bolted it to the lid of the case with four corner bolts. Once bolted in position, it was easy to drill the rest of the way through the lid of the case itself. We were surprised to find that the lid drilled very well with only a little trouble with frayed edges.



"Innards" of the all-wave portable receiver.

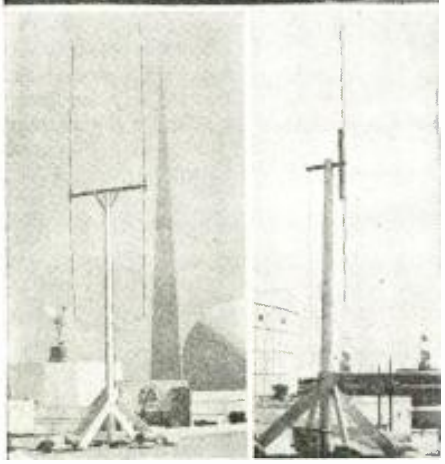
Diagram of 1-tube portable.



Selecting and Mounting the Batteries

The next job, after the receiver was mounted to the lid, was to bolt in the three batteries so that they would stay put, so the receiver could be placed or played in any position. After some shopping around, we decided to use two Eveready 45 volt B batteries, No. 762, and one 1.4 (1.5 V. actually) volt A battery, No. 742. These batteries are small, long-lived, and pack a good sock. In order to strap

(Continued on page 740)



W2USA—*De Luxe Ham Station*

at New York World's Fair

Arthur H. Lynch, W2DKJ
Managing Director, W2USA Radio Club

Amateur Radio's "Mecca" at the New York World's Fair Was Visited By More Than 5,000 Licensed Amateurs, From All Parts of the World; Makes Direct Contacts with Many Foreign Lands and Is Considered One of the Best Designed, Equipped and Operated Anywhere.

● ONE hot day, last summer, Meyer Berger, the well-known columnist of the N. Y. *Times*, who was covering the N. Y. World's Fair, dropped into W2USA and suggested that we drop over to the Brass Rail Restaurant for a Tom Collins. During the course of our conversation, it came out that he had heard something about the interesting communication feats which had been going on as a more or less routine matter, at what he called the "amateur broadcasting station" and he wanted to have more concrete information, so that he could use it in his column.

Top—W2USA, mobile station, mounted in wheel chair, New York World's Fair 1939. Power for transmitter and receiver obtained from chair's storage battery. Receiver used, "Sure-Fire Super-Regen.," described by George Shuart in "R. & T." Next two—10 meter full-wave W8JK Pre-max vertical antenna—photo by K. T. Hill, W2AHC. Double-extended zep antenna used for 5 meters is shown atop the wooden pole.

Formation of the W2USA Radio Club

The first invitation to take over amateur radio activity at the Fair was tendered to Mr. C. B. Cooper, and he suggested that, with the present writer, a nucleus for a suitable steering organization could be formed. Meeting after meeting with members of the other groups which wanted to be associated, either directly or indirectly, with the station were held. A complete plan for installation, design, operation, financing and management was presented to the Fair, as well as to the American Radio Relay League.

Dr. A. L. Walsh, W2BW, former Director of the Hudson Division of the A.R.R.L., was chosen President. Laurence M. Cockaday, W2JCY, for the very hearty cooperation he gave us and for his active interest in amateur radio, generally, was chosen Vice-President; John Di Blasi, W2LKC, is Treasurer; Kay Kibling, W2HXQ, for similar activity in the formative period of the station, as well as to be Chairman of the Hostess Committee, was made Secretary. Dr. John S. Young, Director of Radio and Television for the N. Y. World's Fair, was made Liaison Director, while the job of Managing Director fell to this story teller. It is doubtful that any group could have functioned more harmoniously and speedily.

Three lower photos show: Fred Seid, W2MQ, handling the CW transmitters and receivers at W2USA; Oscar Oehmen, W2KU, doing a "trick" on the ultra-high frequency set. The transmitter, owned by W2DKJ, was described in the August to October, 1938, issues of *Radio & Television*. Lower photo shows U. S. Naval Communication Reserve boys in action at W2USA.

We formed a corporation, under the laws of New York State, arranged to carry all the forms of insurance and take the other precautions which a regular business would take and arranged to have the station in charge of two regular custodians, who would divide their time on duty to suit themselves. Two well-known and very thoroughly capable old-time operators, Oscar Oehmen, W2KU, and Fred Seid, W2MQ, were chosen for these posts. A limited number of radio manufacturers were solicited for the funds needed for the formation of the corporation and for the defraying of other incidental expenses. This burden was divided equally between the Thordarson, National and Hallicrafters organizations. It is thought that a few additional manufacturers will want to participate with us when the Fair opens, May 11, 1940.

The original equipment used at the Fair Grounds belonged to W2DKJ and, due to certain delays in the securing of our corporation papers and our license, the call letters of the Fair Station were W2DKJ/2 until last Decoration Day. That equipment was operated on the higher frequencies, but that did not mean that our station was confined to anything like the usual local scope of such transmitters. Arrangements were made with several very powerful local stations, which picked up our *high frequency* transmissions and relayed them, automatically, on the other bands.

First Round-the-Clock, Round-the-World Radio Relay

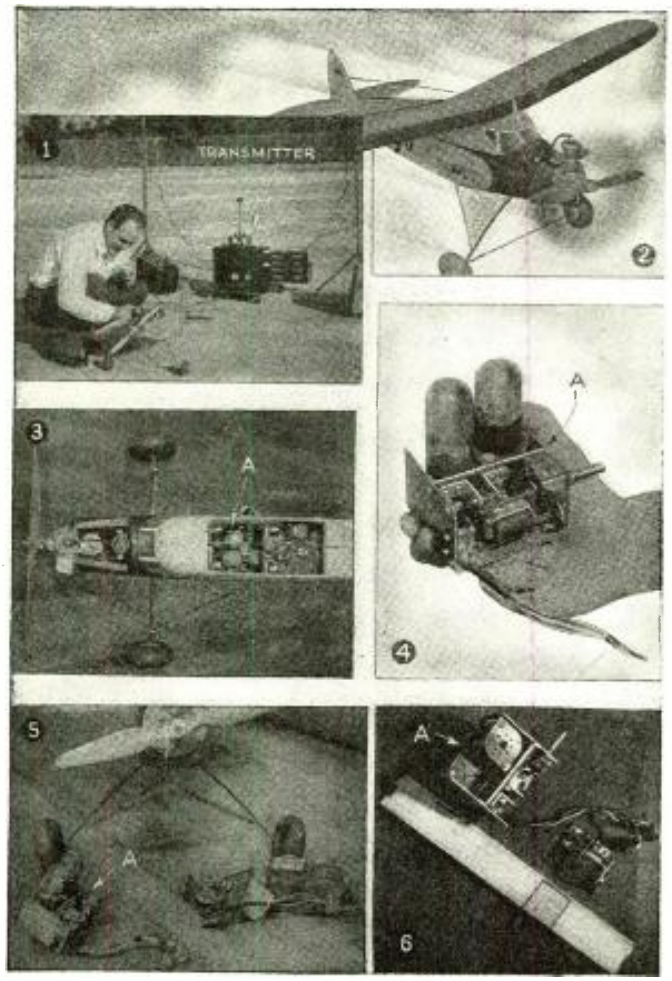
As an indication of the effectiveness of that form of operation we may well refer to the New Year's Day Greeting to amateurs throughout the world which we prepared and sent out for Mr. Grover Whalen, President of the N. Y. World's Fair, 1939. A phonograph record of his greeting was made. Then, beginning at 6.45 a.m., Eastern Standard Time, and continuing for fifteen minutes, as it became midnight and New Year's Day, on the International Date Line, that message was sent out. It was repeated each hour, as it became New Year's Day in various parts of the world.

(Continued on page 741)

Improved RADIO CONTROL for Model Planes

G. Toben

Tiny transmitter gives field operator control of miniature plane in flight.



Pictures above show (1) operator, plane and transmitter; (2) plane in flight; (3) receiver in cockpit — close-up of relay board, A, appears at (6); (4) Receiver unit; (5) receiver removed from plane; (6) 10" rule shows receiver size.

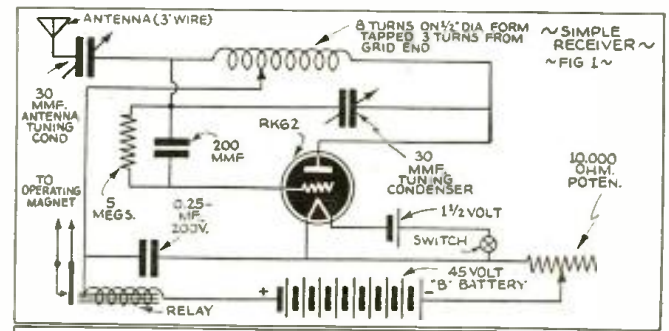
Diagrams at right show: Fig. 1—Simple receiver for use on model plane; Fig. 2—improved, more sensitive receiver; Fig. 3—simple transmitter; Fig. 4—more powerful transmitter.

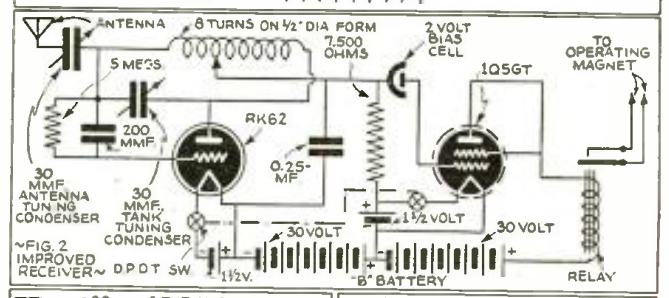
● THE greatest difficulty with radio control circuits up to now has been their lack of sensitivity. Circuits which gave a control power of 15 milliwatts near the transmitter would give little or no control at a distance of one mile. The gas-filled detector tube, RK62, is probably the most sensitive tube available, but when operated in the conventional circuits (Fig. 1) with a high resistance relay in the plate circuit, the maximum controllable current is about 1.2 ma. or 15 milliwatts, where a 10,000-ohm relay is used. Unfortunately the adjustment for maximum controllable plate current corresponds to relatively insensitive operating conditions for the tube. The 1.2 ma. change is just barely enough to give reliable operation of the relay and does not always give freedom from troubles due to vibration and point sticking. In addition, the relay is normally closed and drops open when a signal is received—conditions which do not permit the most sensitive adjustment of the relay.

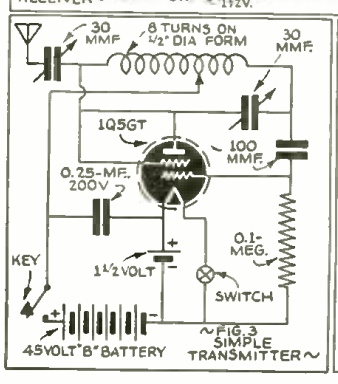
The circuit shown in Fig. 2 has been developed in an effort to overcome these objections in some degree. The 1Q5GT has been added to the conventional circuit as a D.C. amplifier. The RK62 does not have to operate the relay directly, and is now operated at its most sensitive point. The plate current change is then only about .7 ma. for the RK62, but this is enough to give 2.5 ma. change in the plate of the amplifier tube. This represents more than 4 times the pulling power with the same 10,000-ohm relay. A lower resistance relay might give even more contact pressure, but when extreme range and battery life are considered, the high resistance relay seems best. The total battery drain is slightly more than half that of the first circuit and the smallest B batteries are practical. The added complications and greater weight (approx. 8 oz. more) are more than offset by the great increase in sensitivity and the consequent reduction in transmitter size.

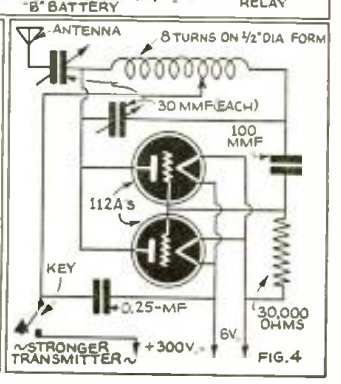
The circuit constants are not critical and the parts may be arranged to suit the convenience of the builder. The first stage-super-regenerative RK62 should be constructed first and adjusted with the help of an 0–1 milliammeter and a pair of headphones. With the antenna connected and the antenna trimmer set at minimum capacity, the plate current should be about .9 ma., and a rushing noise will be heard in the phones. When the transmitter is tuned in, the current will drop to about .2 ma. It is well to try various operating conditions to determine the point of maximum sensitivity and to become familiar with the circuit. Maximum noise in the phones corresponds to maximum sensitivity. Increasing the antenna coupling increases the pickup but reduces the sensitivity and tends to pull the set out of super-

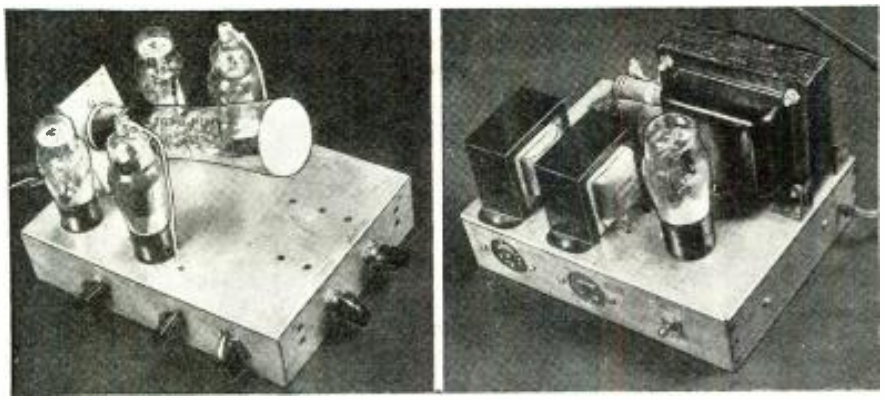
(Continued on page 736)











Part 1 of the 2" C-R Tube Television Receiver appeared in the March issue. The set described has picked up excellent images from leading 441 line stations. With slight changes, a 3" C-R tube can be substituted.

●

Left—2" C-R tube and Sweep-Oscillator unit; Right —power supply.

Low-Cost Experimental *Television Receiver*

Howard C. Lawrence, Jr., W2IUP/3

Part 2—Sweep Oscillators and Power Supply

● THE equipment mounted on the *sweep oscillator* chassis is the circuit for separating the horizontal (line) and vertical (frame) synchronizing pulses from each other, the two sweep oscillators and their amplifiers, the cathode-ray tube for viewing the picture, and the voltage divider for supplying the proper potentials to this latter tube. The circuit for this unit is shown in Fig. 4. Perhaps it would be well to explain briefly the functions of the various parts before going into the construction and adjustment of the unit. The network for separating the horizontal and vertical pulses from each other is made up of R1, C1, R10, R11, R12 and C6. This circuit separates the pulses according to their frequency. The high frequency line synchronizing pulses pass through the small condenser, C1, and develop a voltage across R1, whereas the low frequency frame synchronizing pulses are blocked by C1 and thus develop no voltage that can be applied to the grid of the line oscillator tube. The amount of control voltage applied to this tube is determined by the potentiometer, R1. The R-C combination R10, that portion of R11 between the tap and R10, and the condenser, C6, form a simple low-pass filter to eliminate the high frequency synchronizing pulses from the signal applied to the grid of the low frequency oscillator.

The oscillators and their amplifiers are similar to those used in many cathode-ray oscillographs. The design in this case is somewhat simplified by their being required to work at only one frequency whereas in an oscillograph they must work over a very wide range of frequencies. R2 is a grid current limiting resistor necessary with gas filled tubes. R3 and R4 form a voltage divider to provide the proper operating bias for the 885. By keeping the bleeder current in this divider relatively large the effect of varying R1 on the sweep frequency and amplitude and the effect of R6 on the amplitude can be kept at a minimum. The size of C2 and the total resistance of R5 + R6 determine the frequency at which the circuit will oscillate. R6 has been made large enough that the frequency may be varied over quite a large range to allow for any slight differences in voltage, tubes, etc., that there may be in different sweep circuits built to these specifications. The type 57 triode amplifier follows conventional amplifier design. The size of the amplitude control potentiometer R7 is a compromise between the large size necessary to maintain a linear sweep and the small size necessary to retain the high frequency components of the saw tooth wave to be amplified.[1]

The low frequency sweep is similar to the high frequency sweep in most respects. In this case the R12 and C6 also form a filter to keep the low frequency oscillator from affecting the high frequency oscillator. The condenser, C7, has been returned to

(Continued on page 743)

[1] G. R. Mezger, "Oscillograph Amplifier Design." *Du Mont Oscillographer*, Aug. and Sept. 1937, Page 4. (Du Mont Laboratories publication.)

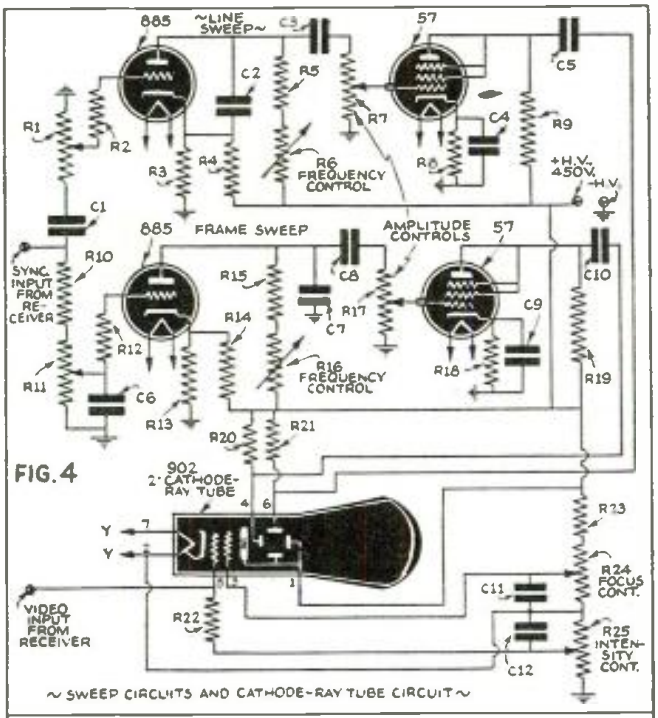


FIG. 4

The Sweep Oscillator circuits and connections to the 2" cathode-ray tube are here shown. Also the power supply circuit.

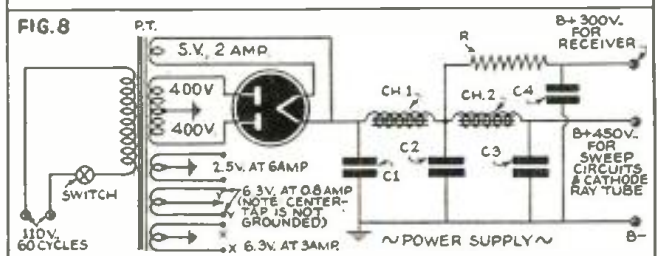


FIG. 5

BASE CONNECTIONS FOR THE 902-2" CATHODE-RAY TUBE (BOTTOM VIEW)

THIS IS THE APPROXIMATE POSITION IN WHICH TO MOUNT TUBE.

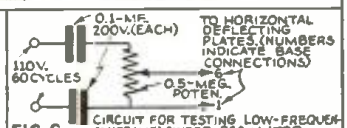


FIG. 6 CIRCUIT FOR TESTING LOW-FREQUENCY (FRAME) SWEEP OSCILLATOR.

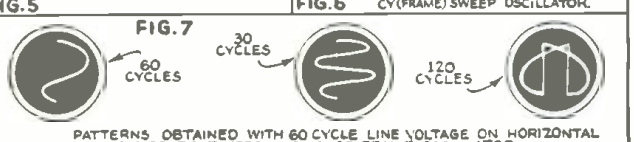


FIG. 7 PATTERNS OBTAINED WITH 60 CYCLE LINE VOLTAGE ON HORIZONTAL PLATES FOR DIFFERENT FREQUENCIES OF FRAME OSCILLATOR.

Cathode Modulator for the W8KPX Transmitter

Harry D. Hooton, W8KPX

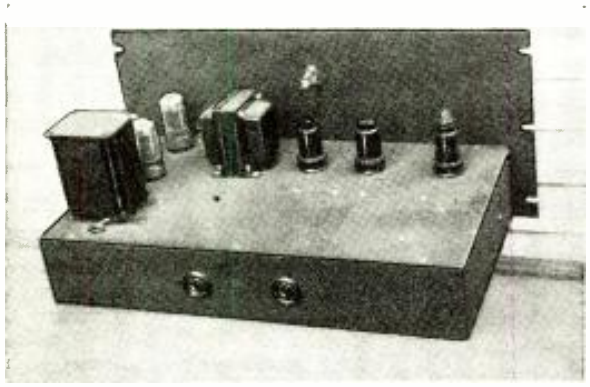
Here is the construction data on an excellent modulator for use with the W8KPX Transmitter described in the Feb. issue. The power-supply unit is also described. A bass-suppressor helps to increase the DX range, especially on 10 meters.

● IN the February issue we described the radio frequency portion of the W8KPX *cathode-modulated* all-band transmitter. In this month's article we shall give the constructional details of the audio unit (or modulator) and the two power supplies.

A *cathode* modulator is not radically different from any other type of modulator or audio frequency amplifier. In fact, almost any good quality *public address* amplifier having a maximum undistorted output of 10 to 20 watts, with slight modifications, will serve as a modulator for an R.F. unit having an input of 75 to 150 watts. The unit to be described *is designed especially for voice* and cuts off sharply at the lower audio frequencies. As most of the audio power generated in a modulator is represented by the *bass* frequencies, attenuation of the frequencies below 200 or 250 cycles, which can be rather easily accomplished *without noticeably affecting the speech intelligibility*, is very desirable for communication work. *Low frequency suppression provides a higher percentage of modulation at the voice frequencies*, which gives the same effect as a substantial increase in power. The main reason why most police transmitter signals cut through the QRM so effectively, is simply due to the fact that the range of the audio equipment is *limited to the voice frequencies only*. In the modulator shown in Fig. 1, *over-modulation*, if the gain is increased to that point, will occur first at the *voice* frequencies which afford intelligibility, rather than at the *bass* frequencies which do nothing but waste power so far as *amateur communication* is concerned.

The tube line-up, as shown in Fig. 1, consists of a 6J7 pentode input from the crystal microphone, resistance-capacity coupled to a 6C5 triode. The *bass-suppression* network is placed between the plate and grid circuits of the first and second 6C5s as

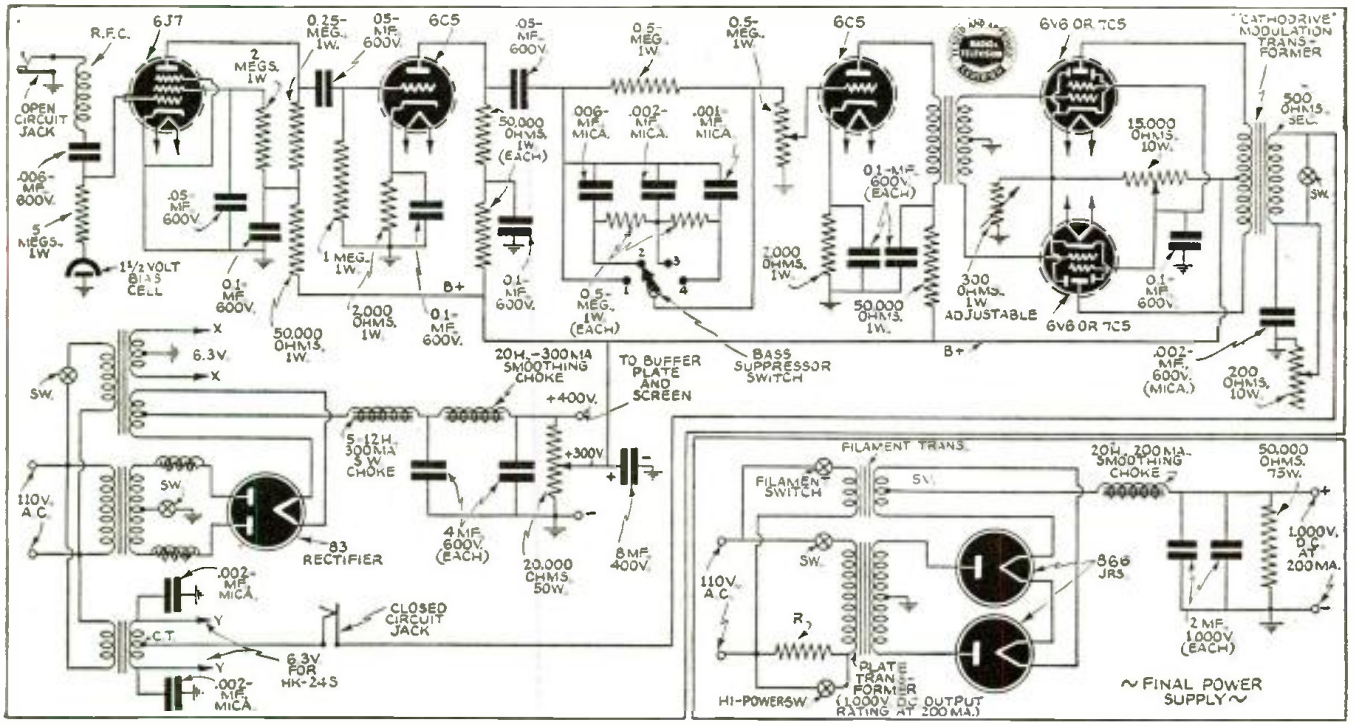
(Continued on page 737)

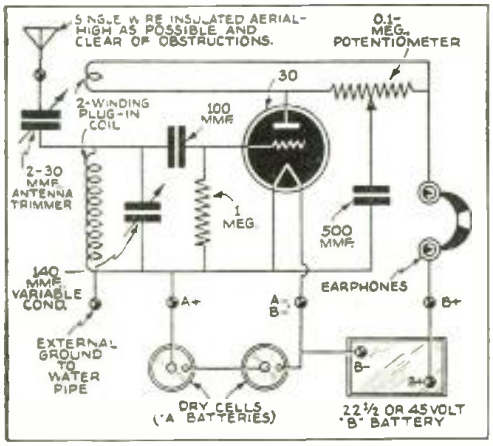


Photos at left show—at top, rear view of Modulator unit. Lower picture—Power Supply for Modulator.

●

Diagram of Modulator and Power Supply. Figs. 1 and 2.





Many of the beginner's questions with regard to a one-tube battery set are answered by the above diagram.

TIPS for the *Radio Beginner*

Including Design, Construction and Operation of Short-Wave Sets

H. G. Cisin, M. E.

Among the many problems which beset the radio beginner are—the source of power to be used—when is an R.F. amplifier necessary—what type speaker to use—the choice of tubes—etc. Mr. Cisin answers these and other questions in the following discussion.

● WE old-timers, who have grown up with short wave radio, are apt to forget that the newcomers must first obtain a basic knowledge of the fundamentals of the art before we can expect them to master the intricate last minute developments.

Many beginners ask an elementary but logical question, prefacing their queries with the apologetic statement, "This question probably sounds silly to you but to me it sure is a puzzler."

These new radio fans are perfectly justified in asking questions and this article is specifically written to aid them in their quest for facts and information about their favorite hobby.

One of the first questions which arises is the selection of the best type of short wave set with which to make a start. Preliminary reading shows the prospective short wave fan that there are many designs available, differing chiefly in the type of power supply and the number of tubes employed.

Battery Operated Sets

If house lighting current is not available, the choice is obviously limited to battery operation. In this case, the beginner's battery-operated set will require an "A" supply and a "B" supply. The "A" supply may consist of a 6-volt storage battery, 2-volt storage battery, or one or two dry cells. The "B" supply may consist of one or more 45 volt radio "B" batteries or a vibrator (or tube) type "B" eliminator.

If the set is to be of the portable type, the power supply is necessarily restricted to dry cell "A" and "B" batteries. The initial cost of these batteries is moderate and, by selecting tubes with low drain filaments, the "A" batteries may last from three to six months depending upon the number of hours the radio is used. On the other hand, if the set is to be strictly for house use, a storage battery is recommended for the "A" supply and large radio "B" batteries for the "B" supply. By using the rectifier type "B" eliminator, it is possible to eliminate the "B" batteries and operate the set solely from the storage battery as in the case of automobile radio sets. This is a highly desirable feature since it does away with battery replacements. Its sole disadvantage lies in the fact that this type of eliminator is expensive, generally costing four or five times as much as the radio set itself.

One of the simple questions which often puzzles the beginner is that of changing from storage battery to dry cell "A" supply or vice versa. This is feasible in practically every case, since the only difference lies in the voltage. A single dry cell "A" battery supplies 1½ volts, while a standard storage battery furnishes 2 volts per cell. Hence, the standard 3-cell, 6-volt storage battery may be used in place of the dry cell, provided a variable resistor (rheostat) is inserted in the filament circuit, in series, to cut down the voltage to the correct value. A 2-volt storage battery may be used interchangeably with dry cells.

When Is a Portable Not a Portable?

Another question which pops up with great regularity is that of using the portable, battery-operated beginner's set on a motor car, truck or bicycle. Practically all beginner's sets require a good aerial and ground for proper reception. This is because they are designed to use as few tubes as possible, so as to reduce cost of materials, tubes, batteries, etc. The automobile radio, on the other hand, has plenty of tubes, with a specially designed radio frequency section, which makes these sets extremely sensitive and permits their use with short, inefficient aerials. The answer to this question, then, is that the average beginner's set is not suitable for use in a motor car or on a bicycle.

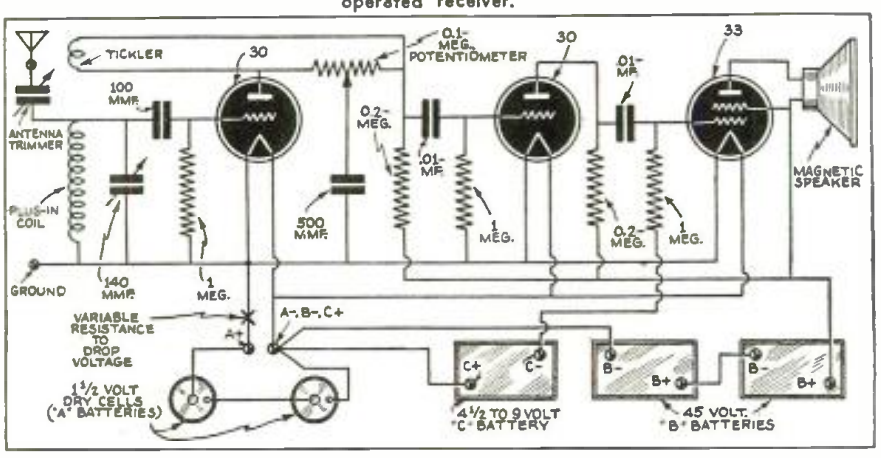
Having decided on a battery-operated set, the next step is to determine the number of tubes to be used. The first thought of the beginner is that if one tube will give good results, two tubes will give results twice as good, etc. However, such is not the case. The choice of the number of tubes is limited entirely by the decision as to whether earphones or loud speakers are to be employed, and what degree of sensitivity is needed.

R.F. Stage—Its Merits

If the set is to be used to operate one or even two sets of earphones, a single tube will suffice and, if correctly used, will give

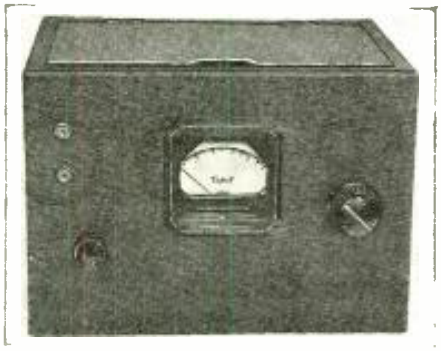
(*Continued on page* 734)

This diagram shows how to add two stages of audio amplification to a one-tube battery-operated receiver.

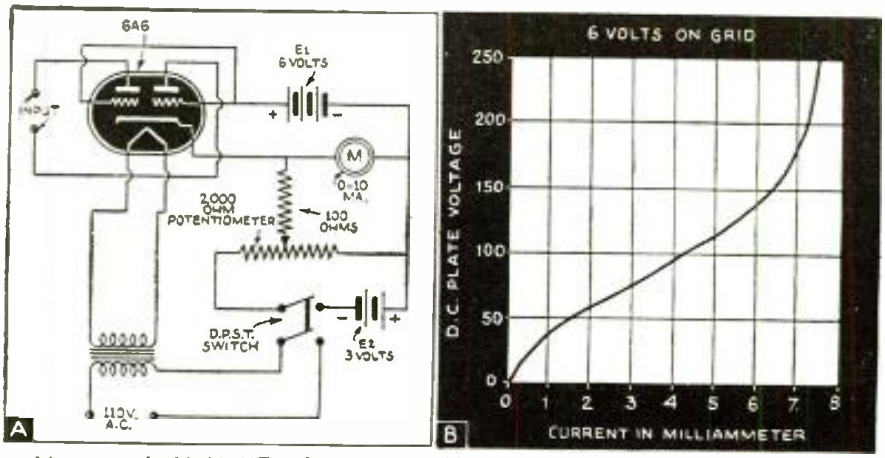


A New Type Vacuum Tube Voltmeter

William Vissers, Jr.



This improved vacuum tube voltmeter is simple to build and very useful.

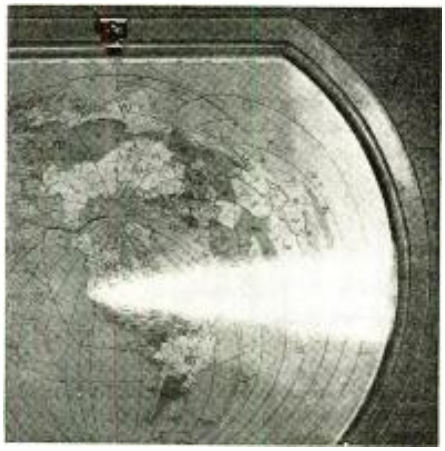


It's easy to build this V.T. voltmeter; the calibration curve for it is shown at the right

● MOST amateurs and experimenters are aware of the advantages of the vacuum tube voltmeter. Its ability to measure voltages without any appreciable current drain makes it invaluable in many fields. The one serious drawback of the less complicated type of meter is its inability to measure medium or high voltages. It is true that bucking voltages can be introduced in the input circuit, but these are often unsatisfactory for the type of measurement to be made, and in addition are often unavailable to the experimenter. This article will describe a meter without these drawbacks, a meter able to measure easily and accurately voltages up to 250 volts A.C. or D.C.

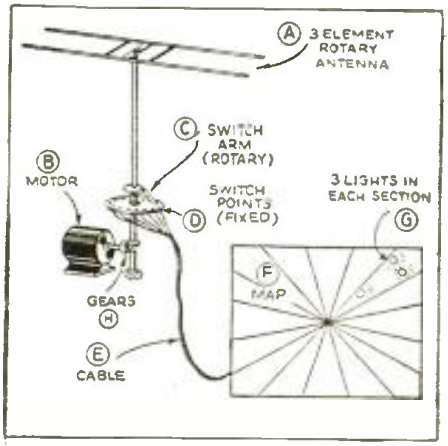
The circuit used is shown in Fig. A. The tube used is a 6A6 and the batteries are of the dry cell type. E_1 is used to supply a positive voltage to the grids of the tube, while E_2, the battery feeding through the potentiometer, is used to send a bucking voltage through the milliammeter, so that the current through the meter can be adjusted to zero when no voltage is applied to the plates of the tube. The 100-ohm, ½-watt resistor is used to prevent a possible meter burnout by incorrect manipulation of the bucking voltage potentiometer. The transformer supplying filament current is connected as shown through one side of the double pole single throw switch back to the line voltage plug. The other side of the switch is connected in series with the bucking voltage battery to prevent current drain through the potentiometer while the meter is not in operation.

(Continued on page 746)



Light flash across world map shows position of beam antenna.

How Amos (of Amos & Andy) Knows Which Way His Aerial Is Pointing



Arrangement of Mr. Gosden's rotary beam antenna and position indicator.

Mr. Freeman F. Gosden is an ardent Ham and his station, W6QUT, was described in considerable detail in the September issue of RADIO & TELEVISION when he was awarded the first of the new series of *Plaques* for the best station photograph submitted in our monthly contest.

● FREEMAN F. GOSDEN ("Amos" in "Amos 'n' Andy") has a directional beam antenna (A) driven by a motor (B) and on the antenna support is a contact (C) which makes circuits via switch plate (D) to carry currents via cable (E) to light box (F) which is divided into 18 segments. If beam is pointed NW, segment of light box which points in that direction is illuminated (G).

Next to the lights is a pane of ground glass. Upon this is mounted the translucent map. A pane of clear glass protects the map on the room side.

The map is an ARRL map which sets flush with the wall into which the light box is recessed. The map is hinged so that it may be swung away to permit repairs and substitutions of burned out bulbs. The light box is three inches deep.

The motor whirls the rotary beam antenna, the contact slides from switch to switch, the lights go on and off behind various segments of the map to indicate which way the beam is pointing and what parts of the world Gosden's signal is reaching with maximum intensity.

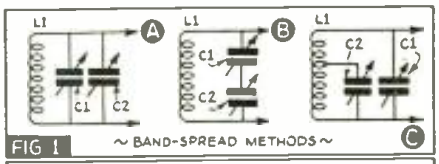
An indicator of this sort is simpler than it appears, and may be made by anyone who has had electrical experience.

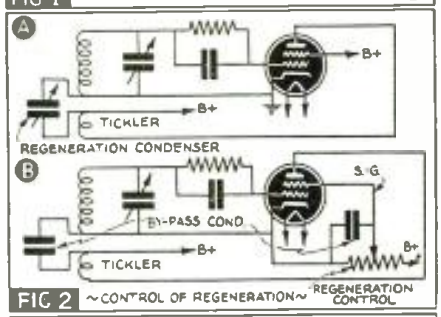
Getting Started in

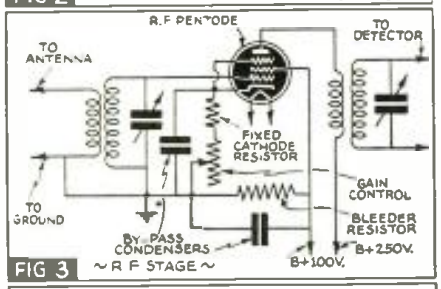
AMATEUR RADIO

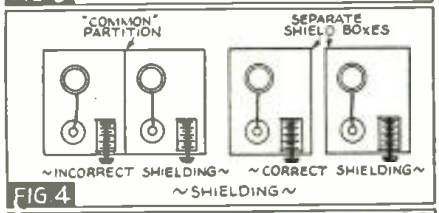
C. W. Palmer, E.E.

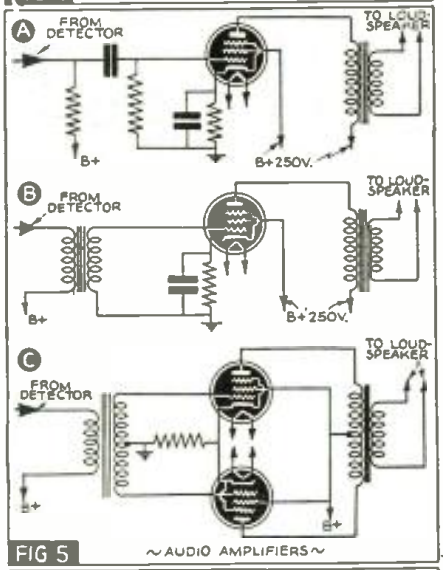
Part 8—Radio Receiver Circuits

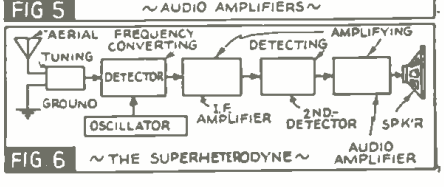












● IN general, two types of receivers are most satisfactory for amateur use—the regenerative and the superheterodyne types. For ultra-high frequency use, the super-regenerative circuit has certain advantages which have made it popular, but for our purpose, we will limit our discussion to the two most commonly used, with especial emphasis on the regenerative circuit because of its simplicity and ease of handling.

As we explained at the beginning of this series, it is assumed that the reader has some knowledge of radio—especially of receivers, and for this reason the basic theory is omitted, giving only such explanations as are necessary to an understanding of the facts presented.

The Regenerative Receiver

The regenerative receiver in its simplest form consists of a tube, a tuned circuit of coil and condenser, and a second coil providing a feedback of current from the output of the tube to its input. However, the volume of sound available from such a set is so small as to be unsuitable for amateur work where signals are often weak and the interference factor on crowded bands has to be contended with. The addition of a stage of audio amplification after the detector tube aids greatly in increasing the volume, while the addition of a stage of radio frequency amplification is almost indispensable, increasing sensitivity and selectivity as well as separating the regenerative detector from the aerial, with resulting improvements in handling ability.

Since the amateur bands—those frequencies in which amateurs are licensed to operate—are composed of comparatively narrow strips of the radio frequency spectrum, widely separated, a single coil and condenser combination cannot tune over all the bands. For this reason, plug-in coils and coil switching arrangements have been devised to permit larger and smaller coils to be connected across the tuning condenser. Plug-in systems have advantages over the switching schemes in simplicity and greater efficiency. In simple sets, the coils are often wound on the bases from discarded vacuum tubes or on insulated forms fastened to tube bases, so that vacuum tube sockets may be used for interchanging the coils. In more complex sets, plug-in arrangements comprising a number of coils are sometimes changed simultaneously by the use of plug-in gangs (metal cans in which the coils are enclosed and provided with plugs at the rear for connecting to matching socket arrangements in the receiver).

Band-Spreading—How Done

Because of the crowded conditions on several of the *ham* bands and to permit the entire width of a dial to cover only the amateur frequencies, *band-spreading* is often used. This consists of applying some means of varying the frequency by only a small amount when shifting the dial from maximum to minimum. In Fig. 1 are shown several of the methods commonly used for band-spreading. At A a small condenser, C2, about 25 mmf., is connected across the regular tuning condenser, C1 (about 140 mmf.). The latter then becomes a band-setting condenser and all the tuning is done with the smaller unit. At B is shown a method of using two condensers in series. The resulting capacity is therefore smaller than either of the two condensers, and the maximum capacity connected across the coil can be varied. By adjusting the two condensers so that one is at maximum, and tuning the other for the minimum frequency end of one of the amateur bands, the other condenser can be used to cover the band from its maximum to its minimum capacity.

Diagrams at right show respectively—band-spread methods; how to control regeneration; how to add an R.F. stage; proper method of shielding; different types of audio-amplifiers, and the elements of the superheterodyne.

At C is shown an arrangement using a tap down on the coil so that the condenser tunes only a portion of the coil.

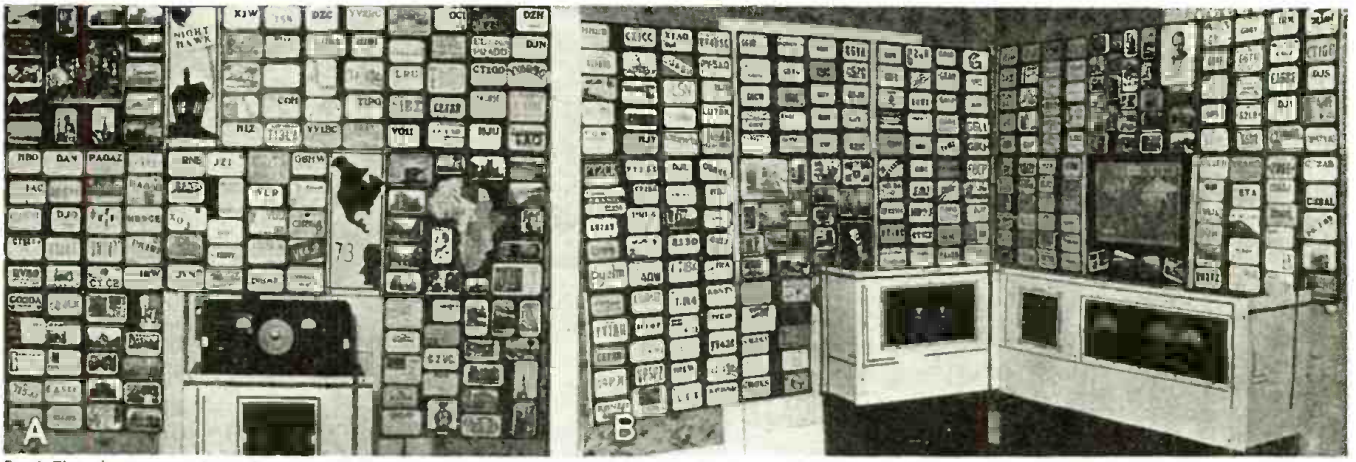
Tapped Coils: Each of these arrangements has certain advantages in simplicity of operation, ability to shift rapidly from band to band, etc. The *tapped coil* method is used in several modern manufactured receivers but is not as popular in home-built sets because of the tap and the fact that manufactured coils cannot be used without modification.

Regeneration in the detector, to provide increased volume and selectivity plus a beating frequency for C.W. (continuous wave telegraph) signals, is controlled by a variety of means. One method, at one time almost universally used, consisting of varying the position of the "tickler" or feedback coil with relation to the tuning or grid coil, has almost entirely disappeared. Plug-in coils made it difficult to shift the coils. More modern methods consist of connecting a variable condenser between plate and grid coils, thus varying the amount of feedback. Another is to connect a variable resistance to the tickler to vary the current through it, while a third, which is quite popular, consists of varying the voltage on the screen grid of the detector tube by means of a variable resistance. See Figs. 2A and B.

In all methods, the *tickler coil* must be mounted at the filament or *grounded* end of

(Continued on page 739)

A Super-Colossal "Listening Post"



Boy! The short-wave fan's Paradise if there ever was one! This elaborate short-wave listening post is owned and operated by Clarence Sargent, 18 Clinton St., Dansville, N. J. Just look at his array of QSL cards! One receiver used is a Hallicrafter Skyrider (in photo at the left). At the right are an RME-69 and a DB-20, together with a home-made 3-tube receiver (in the center cabinet).

What Say—Readers?

Editor:

Here's an idea which will, I believe, boost your circulation and give your "newsstand" readers a break.

Why not publish a coupon in each issue of the magazine, for a period of time; say 12 months? The premium—a really good sized map of the North American continent; the map might be about four by six feet, having outlined on it the various radio divisions, according to the Amateur Station Call Letters, and any other data that will be of interest to short wave listeners.

Or you might use a map of the entire world; a map about ten by twelve feet would be ideal.

A good large map would be very useful to everyone interested in radio. Maps of this type are rather expensive and hard to get; at least that has been my experience.

I have read your magazine for over a year now and have enjoyed every issue. I have kept each one and have quite a library now.

Yours truly,

Wm. M. Barber,
The Avenue Hotel,
Prince Albert,
Saskatchewan,
Canada.

That Ham-QSL Question Again!

Editor:

I have been reading the articles in *What Do YOU Think?* concerning the failure of amateur radio stations to QSL reports.

It is my belief, and most of the members of this organization agree with me, that the fellows condemning the amateur operator who did not QSL, are doing so with little thought and without considering the other side of the problem.

Let's be a little more considerate of the *Amateur*, boys. Report only to stations which you feel can benefit from the report and by all means enclose return postage.

Why not make the amateur feel that he is doing you a *favor* by sending his QSL card, and not take the attitude that every fellow who does not reply is a cheapskate and what not?

The listing of non-QSLing stations, as suggested by Joe Miller in the June issue, is a good one. Our organization has elaborated on that somewhat by listing only those reported by at least three members, and removing the call from the list when three more listeners report not receiving a veri. We believe that procedure is entirely fair to all concerned.

Merton M. Hiatt.
DXers International Exchange Club.
P. O. Box 808, Dryden, Wash.

Geeve a look! A "ham" station of 1910!!

Lookie! A "Ham" Wireless Station of 1910!

Editor:

Herewith a photo of my "wireless" set of 1910-1911. In going through some old papers, I ran across the negatives and had some prints made. I thought that maybe you could use them in Radio & Television.

You will notice MODERN ELECTRICS and an E. I. CO. one inch spark coil, Leyden jars, loose coupler, helix, spark gap and other apparatus. In the photo, I am wearing a pair of Brandes "Trans-Atlantic" phones. These were supposed to have *gold-plated* diaphragms.

I remember I had an electrolytic Wollaston (platinum) wire detector, besides silicon, galena, etc. We used the Morse telegraph code, then, remember? Could write quite a book of my early experiences and my later ones as a commercial sea-going "Sparks." Am now living in a house trailer, and have a Philco all-wave battery-operated superheterodyne. Still listen in on code and copy press "PX" and "WX" and Ham stations. Have been in your old New York store when Mr. Gernsback operated the famous E. I. Co. (Electro Importing Co.). Also among my old films are a lot of sea photos, ships I operated on, and photos of their radio apparatus.

Alas for the "good old days."

Respectfully,

John F. Hilscher,
General Delivery,
Phoenix, Ariz.

He's a "Belonger"

Nicola Cannata's listening post.

Editor:

I am a former Italian telegraph operator, and besides being a member of the *Short Wave League*, I also belong to the Radex Club, World Wide Dial Club, QRC, Spatari R. L. L., IDA and NRC.

With my receiver (Scott Philharmonic 30) I have heard all continents but, unfortunately, I have verified only 19 countries in less than 10 months, as my biggest ambition is to copy code.

Nicola Cannata,
1003 So. Halsted St.,
Chicago, Ill.

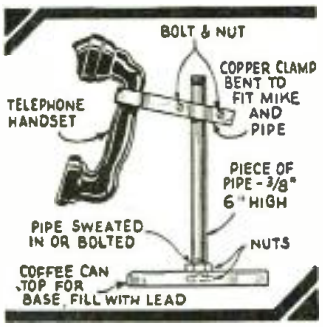
Radio Kinks

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

First Prize Winner

Handset Mounting

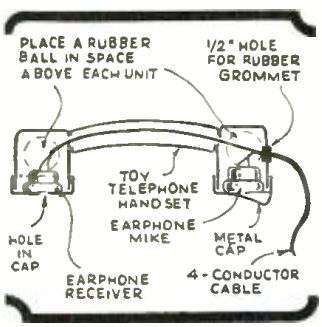
Hams who wish to mount their telephone handset without taking the microphone out of the holder can use a gadget such as is illustrated herewith. A piece



of ⅜" pipe about 6 or 8 inches long is secured and a clamp made out of copper or brass strip is fitted to take it and the handset, which should be held at a convenient position. The top of an old coffee can is next taken and filled with molten lead. This serves as a base and should be sufficiently heavy so that the weight of the handset will not topple it. A hole is then drilled in the center of this base to take the pipe. As lead is soft and does not hold a thread very well, it is best to fasten the pipe to it with nuts top and bottom, as shown. If preferred, however, the pipe can be inserted before the lead is poured into the base, but in this case one must be very careful to avoid burns. It makes a serviceable desk mike and the handset is quickly demountable should one care to use it in the usual way.—*Bob Packsha.*

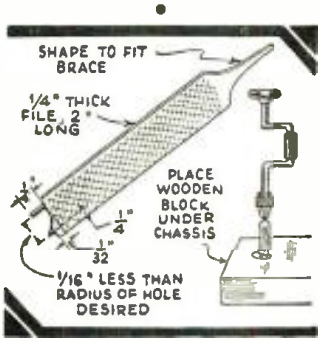
Hand-Mike

A hand set of commercial appearance can be easily assembled from a pair of old head



phones and a toy telephone obtainable in most 10c stores. The head phones, which may be of any type (crystal is preferable) are rewired so that the units are no longer connected to each other. The caps are carefully removed from the toy phone and a small rubber ball dropped into each of the containers to keep the phone units pressed tightly against the caps, which are replaced after the units are installed. The wire may be run as shown in the sketch. A 4-conductor color coded cable makes it easy to connect one phone to the output of the receiver and the other to the input of the transmitter. If desired, rubber or cardboard gaskets may be inserted between the caps of the phone units and the caps of the toy phone in order to minimize the chance of vibration.—*Robert Reuter.*

•



Circle Cutter

A cheap and effective circle cutter is an essential when building sets on metal chassis or when cutting panels. The drawing herewith shows a cheap but highly effective cutter of this type, which can be made from an old file. The file may be softened by annealing it in a gas stove. This is done by heating the file to cherry red, then allowing it to cool slowly. The end is then sawed and filed into the form shown in the illustration. After this, it is reheated to cherry red and plunged into cold water to temper it. The tang (or handle end) should be filed down to fit the jaws of a standard brace. If it does not fit securely it will wobble, resulting in a ragged cut. This home-made tool will prove an aid to the experimenter.—*R. E. Murphy.*

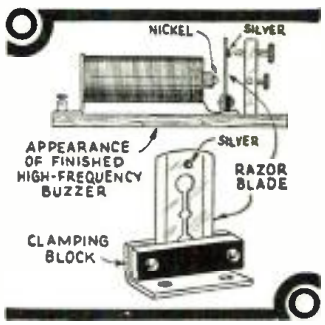
Station Record

The index illustrated herewith is ideal for the SWL to keep a record of stations heard or for the ham to record stations worked. The main indexes in this file are the radio districts of the U.S. and other countries worked. The cards are merely filed alphabetically after the identifying tabs. It makes it very easy for the ham to check back and see all the data on any station with which contact was previously made.—*Laurence Haut.*

•

Hi-Freq. Buzzer

A high frequency buzzer can be made by using a piece of steel for an armature instead of soft iron. Sometimes it is difficult to get a piece of thin steel for it, but a razor blade provides an excellent substitute. The magnet is wound with No. 32 wire and the base is made of wood. The razor blade is held in place by a piece of brass bent into the shape shown in the illustration and screwed down. Solder a piece of nickel to the pole of the magnet facing the armature, so that it does not stick. A piece of silver is also put on the razor blade. This can be taken from an old bell armature. When the battery is connected, a high pitched sound is produced.—*Clarence Ginther.*



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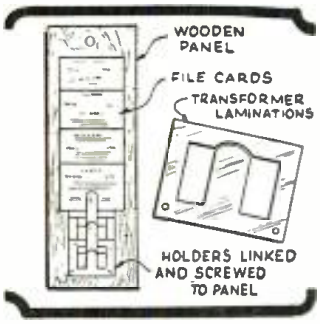
Card File

A very handy card and letter file can be made from old transformer laminations. Those of the type shown in the picture are ideal for this purpose, but practically any other type can be used. By screwing the laminations onto a piece of thin wood or metal, the file can be moved from place to place with ease, or it may be hung in a permanent location. By using every other lamination the addresses of letters placed in the file can be seen at a glance. To assemble this type of lamination it is merely necessary to link them together and place small screws at each end.—*John Sherratt.*



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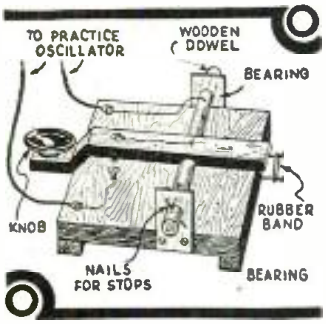
Home-made Key

Wanting a practice key and not wishing to spend any money on one, I constructed one out of apparatus found in the odd parts box. Almost the entire key is of wood, as the drawing shows. The only metal parts are the tops and contacts. Should metal be available, the arm may be made of this instead of wood, and in this case one of the connecting wires may be directly

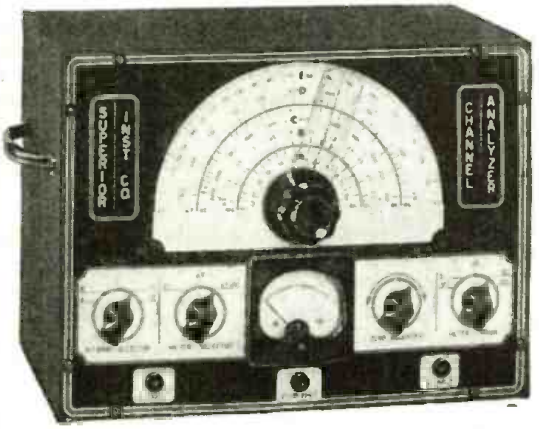


soldered to the arm at the point where it is attached to the bearing rod. Nails are provided in the bearing plate and the dowel rod which carries the key arm. These are to keep the arm from rising too high or otherwise getting into an inconvenient position. Contacts may be made through nails, screws or any other metal driven through the arm and baseboard.—*Hachiro Okada.*

Watch for R. & T. Radio Kinks by facsimile on WOR & WZXUP, Newark, N. J.; WOKO, Albany, N. Y.; and WHK-WCLE, Cleveland, O.

THE NEW CHANNEL-ANALYZER

Follows The SIGNAL from Antenna to Speaker



The well-established and authentic SIGNAL TRACING METHOD of locating the very circuit in which there is trouble, and the very component that causes the trouble, is now for the first time available at a price any radio serviceman can afford.

The CHANNEL-ANALYZER will

- ★ Follow signal from antenna to speaker through all stages of any receiver ever made.
- ★ Instantly track down exact cause of intermittent operation.
- ★ Measure both Automatic-Volume-Control and Automatic-Frequency-Control voltages and circuits without appreciably loading the circuit, using built-in highly sensitive Vacuum-Tube Voltmeter.
  Check exact gain of every individual stage in receiver.
  Track down and locate cause of distortion in R.F., I.F., and A.F. amplifier.
- ★ Check exact operating voltage of each tube.
- ★ Locate leaky condensers and all high-resistance shorts, also show opens.
- ★ Measure exact frequencies, amount of drift and comparative output of oscillators in superhets.
- ★ Track down exact cause of noise.

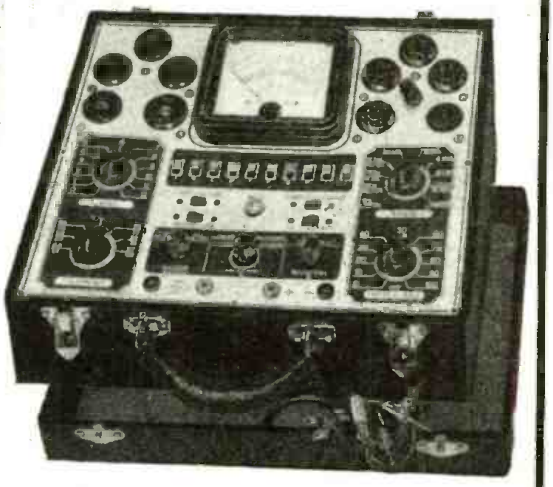
The Superior Channel-Analyzer comes housed in shielded cabinet and features an attractive etched aluminum panel. Supplied complete with tubes, three specially engineered shielded input cables, each identified as to its purpose. Also full operating instructions. Size 13" x 10" x 6". Shipping weight 19 pounds. Only **$19.75**

THE NEW MODEL 1280 SET-TESTER

Combines Models 1240 and 1250

A complete testing laboratory in one unit, the Model 1280 combines the Models 1250 Multitester and 1240 Tube Tester. (See specifications of each below.)

- ★ Instantaneous Snap Switches Reduce Actual Testing Time to Absolute Minimum.
- ★ Spare Socket and Filament Voltages Up to 120 Volts Make the Model 1280 Obsolescence Proof.
- ★ Latest Design 4½ D'Arsonval Type Meter.
- ★ Works on 90 to 125 Volts 60 Cycles A.C.



Even those servicemen who through past purchases know they can always get SUPER-VALUES from Superior, will be amazed and delighted when they read the specifications of this all-purpose instrument and then note the unbelievably low price. The Model 1280 features a 4½" D'Arsonval type meter for easy reading of the various scales, and in line with our new policy of stressing appearance as well as serviceability in our new 1200 line of test equipment, our Model 1280 utilizes an aluminum etched panel, designed for beauty as well as ruggedness. The primary function of an instrument is, of course, to make measurements accurately and when designing test equipment this is our first thought. However, we also appreciate the important part the appearance of an instrument plays in the impression a serviceman makes on his customers, especially on home calls. We have, therefore, paid special attention to the outward design of all of our new instruments. For instance, the panel of this Model 1280 is made of heavy-gauge aluminum and etched by a radically new process which results in a beautiful, confidence inspiring appearance.

Model 1280 comes complete with test leads, tabular data and instructions. Shipping weight 18 pounds. Size 13" x 11" x 6½". Our net price .. **$19.95**

Portable cover $1.00 additional

THE NEW MODEL 1250 MULTITESTER

SLOPING PANEL FOR PRECISE RAPID SERVICING

Etched aluminum panel

Specially designed electronic rectifier enables linear A.C. scale, high stability and little or no temperature drift.

Here is an opportunity to acquire a Multi-Service, Precision Engineered Instrument, for less than you would have to pay for an ordinary Volt-Ohm Milliammeter. Besides making the usual volt, resistance and current measurements (both A.C. and D.C.) this unit accurately measures the CAPACITIES of mica, paper and electrolytic condensers, INDUCTANCE of coils, chokes and transformers, DECIBEL gain or loss, of power amplifiers and public address systems, WATTS output of amplifiers, receivers, etc.

SPECIFICATIONS

Complete A.C. and D.C. Voltage and Current Ranges	High and Low Capacity Scales .0005 to 1 mfd. and .05 to 50 mfd.
D.C. Voltage:—0-15, 0-150, 0-750 volts	3 Decibel Ranges
A.C. Voltage:—0-15, 0-150, 0-750 volts	−10 to +19, −10 to +38, −10 to +53
D.C. Current:—0-1, 0-15, 0-150, 0-750 ma.	
A.C. Current:—0-15, 0-150, 0-750 ma.	Inductance: 1 to 700 Henries
2 Resistance Ranges 0-500 ohms, 500-5 megohms	Watts: Based on 6 mw. at 0 D.B. in 500 ohms .006000 to 600 Watts

Model 1250 works on 90-120 volts 60 cycles A.C. Comes complete with test leads, tabular charts and instructions. Shipping weight 9 lbs. Size 9½" x 11" x 6½". Our net price **$11.85**

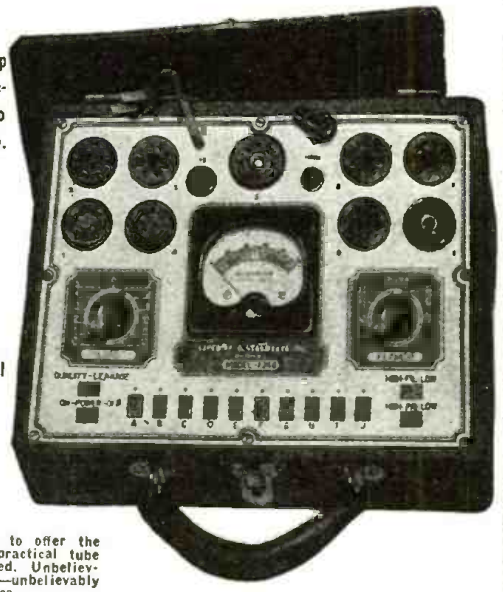
Portable cover $1.00 additional

THE NEW MODEL 1240 TUBE TESTER

Instantaneous snap switches reduce actual testing time to absolute minimum.

Tests all tubes 1.4 to 117 volts.

Sockets for all tubes — No adapters.



Superior is proud to offer the newest and most practical tube tester ever designed. Unbelievably low in price—unbelievably high in performance.

- ★ Tests all tubes, 1.4 to 117 volts, including 4, 5, 6, 7, 7L, octals, loctals, Bantam Jr., Peanut, single ended, floating filament, Mercury Vapor Rectifiers, the new S series, in fact every tube designed to date.
- ★ Spare socket included on front panel for any future tubes.
- ★ Tests by the well-established emission method for tube quality, directly read on the GOOD ? BAD scale of the meter.
- ★ Jewel protected neon.
- ★ Tests shorts and leakages up to 2 megohms in all tubes.
- ★ Tests leakages and shorts in all elements **AGAINST** all elements in all tubes.
- ★ Tests **BOTH** plates in rectifiers.
- ★ Tests individual sections such as diodes, triodes, pentodes, etc., in multi-purpose tubes.
- ★ Latest type voltage regulator.
- ★ Features an attractive etched aluminum panel.
- ★ Works on 90 to 125 volts 60 cycles A.C.

Model 1240 comes complete with instructions and tabular data for every known type of receiving tube. Shipping weight 12 pounds. Size 6" x 7½" x 10¾". Our Net Price..... **$11.85**

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NEW YORK, N. Y.

Question Box

Audio Amplifier

Please publish the circuit diagram for an audio amplifier using a single twin-triode such as the 6N7 in the output stage. The circuit should be suitable for general use around the shack. —Earl Toole, Booneville, Indiana.

A. Here is a diagram of such an amplifier. It makes use of a 6J7, 6C5 and a 6N7. An 80 is used as rectifier.

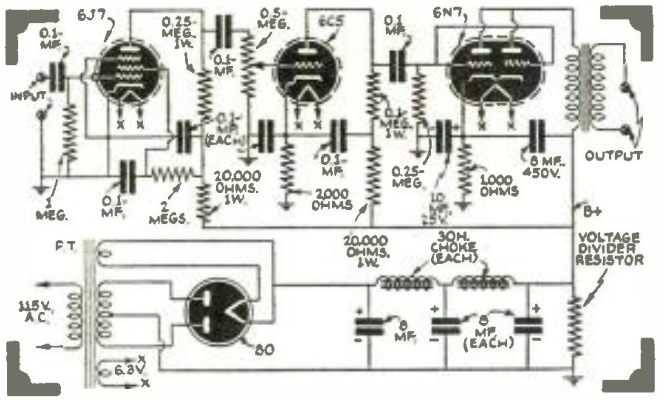


Diagram of handy Audio Amplifier, including rectifier, No. 1212.

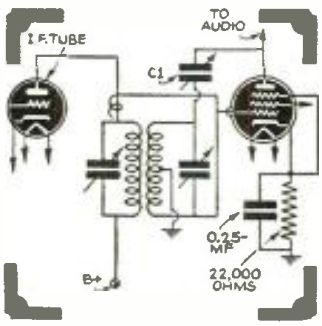
HJ1ABP Is Station Heard

I heard a station on 9.6 megacycles the other Sunday A.M., saying he was located in Cartagena, South America, with call letters which to me were HJ—One—and then I missed the rest. Can you tell me what station I may have been listening to?—Paul Willers, Phila, Pa.

A. The station that you were listening to was evidently HJ1ABP in Cartagena, S.A., which operates on the frequency mentioned above.

Controlling Regeneration

I own one of these midget radios, and it works poorly in my locality. I am informed that improvement can be made by changing the circuit slightly, especially in the detector circuit, by adding regeneration. Can this be done? If so, can you show by diagram the changes that will have to be made?—Paul Fender, Oshkosh, Wis.



How to add Regeneration, No. 1213.

A. Sometimes midget receivers work well in some locations and poorly in others. Poor operation can usually be traced to conditions such as a resonant or anti-resonant antenna or ground system which loads down the circuits and prevents a normal amount of regeneration. We all remember the blooper receivers which were most sensitive when operated right on the point of spilling into oscillation. Such hair-line regeneration is not necessary today. However, a certain amount of regeneration is desirable in small sets since the number of tubes is limited and maximum gain per stage is essential.

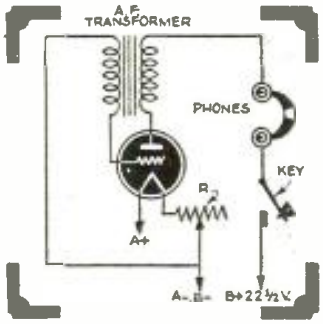
The detector circuit shown here is a balanced circuit common in neutralized amplifiers. The neutralizing condenser, C1, could be made to provide negative regeneration and balance out normal feedback in the tube. On the other hand, it also could be used as a regeneration control by setting it at either side of the balance point.

For best operation, first connect antenna and set receiver in operation. While listening to a weak station, adjust C1 until the volume increases. Increase this control until the set squeals; now tune back slightly so the squeal disappears and the tone quality is best.

Code Oscillator

I would like to construct a simple oscillator in order that I can practice the code. Have you a simple diagram of a one-tube affair?—K. Lear, Watertown, N. Y.

A. Here is a conventional diagram of a one-tube oscillator. Any type of tube can be employed. We have shown one of the battery-operated variety.



Simple Code Oscillator, No. 1214.

Facsimile Recorder Query

Please let me know where I can obtain the paper for recording the facsimile images with the "Junk-Box" recorder described in the January issue. Also tell me how and when the synchronizing signal is sent.—Harold S. Roth, Algona, Iowa.

A. We give herewith the information you have requested on the "Junk Box" Facsimile Recorder.

The paper necessary for recording the facsimile image is special and can be obtained from the Crosley Radio Corporation, Cincinnati, Ohio.

The synchronizing signal is sent before each line to release the catch so that the stylus starts after the release signal, and the stylus returns back over the paper in contact with it. No signal is drawn on the way back; 60 lines are transmitted per minute. One hundred lines per inch on the image provide very good detail.

Frequency Modulation Receivers

Please let me know who makes frequency modulation receivers, suitable for picking up the programs now being broadcast by several stations in New England and also Professor Armstrong's own station just outside New York City located at Alpine, N. J.

A. The following companies are manufacturing frequency modulation receivers: E. H. Scott Radio Labs., Inc.; Stromberg-Carlson Telephone Mfg. Co.; General Electric Co.; National Co., Inc.; Browning Laboratories, Inc. Frequency modulation transmitters are being built by the General Electric Co., and the Radio Engineering Labs., Inc., L. I. City, N. Y.

Replacement Resistors

The 300 ohm, 1 watt resistor in the cathode circuit in my set burned out; can I replace this resistance with some ½ watt resistors (same resistance) I have on hand?

A. You may do this in either of two ways: You might use two 600 ohm resistors rated at ½ watt each, connected in parallel; or again, you might use four 300 ohm, ½ watt resistors, connecting them in series parallel (that is, two parallel groups of resistors, with two of the 300 ohm resistors connected in series in each group). You can use the same method for computing replacement resistors of different values. Lamps are often useful as emergency resistors. Don't forget the resistance is different when lamp is cold than when hot.

Phasing Speakers

What does the term, phasing speakers, mean and what is a method of having multiple speakers phased?—C. Lorin, St. Louis, Mo.

A. By phasing of speakers is meant that they work in step. When multiple speakers are connected together and mounted near each other or one another, the bobbins should operate in synchronism. If a 1.5 volt dry cell is connected across voice coils, whether these coils be in series or parallel, the cones should all move in the same direction.

Frank Conrad, Radio Pioneer, Receives Gold Medal of American Institute

● SHORT wave radio, "today no older than the average college sophomore," will develop into a powerful factor in building international good will and understanding, according to a prediction made at the Hotel Pierre, New York City, by Frank Conrad of Pittsburgh, pioneer in radio broadcasting, in response to the award of the Gold Medal of the American Institute of the City of New York.

Dr. Conrad, who is Assistant Chief Engineer of the Westinghouse Electric & Manufacturing Company, was awarded the annual Gold Medal of the American Institute of the City of New York at a dinner at the Hotel Pierre attended by 200 leaders in various fields of science. The medal citation was for "his pioneering work in short wave and frequency modulation and for his guiding genius in developing the world's first radio broadcasting system."

The Fellowship of the Institute, awarded annually, was bestowed upon William L. Laurence, science news reporter of the New York *Times*, "for a long-sustained preeminent record of reporting brilliantly to the daily press the achievements of science and technology."

Presentations of the medal and fellowship were made by Robert T. Pollock, president of the Institute. Dr. Conrad was presented for the award by David Sarnoff, president of the Radio Corporation of America, who worked with him nearly 20 years ago in making the first demonstration of short wave transmission across the Atlantic. Mr. Laurence was introduced by Oscar Riddle of the Research Staff, Station for Experimental Evolution, Carnegie Institution of Washington.

"The short wave knows no borders and passes freely from one country to another," Dr. Conrad said in his speech of acceptance. "Some nations are using this method to spread their particular ideologies and their pet brands of war propaganda. But the day will come when short waves will find their rightful use as bonds of international understanding and appreciation.

"Broadcasting, and particularly short wave broadcasting," he added, "is developing so rapidly that it is hardly safe to make predictions as to its future, lest the prophecies become matter-of-fact realities before they appear in print. However, the *short waves* offer the only road to expansion of broadcasting. Two developments in the use of short wave bands for a wider dissemination of entertainment and culture appear to be imminent at this time: first, a network of short wave broadcasting stations; second, within a matter of ever-shortening time, the ultra-short waves will be carrying television.

"Since these rather crude beginnings, the technique of short wave broadcasting has advanced daily. Today every nation in Europe displays a keen appreciation of the importance of short wave transmission in the inner-country mass communication. The short wave knows no borders and passes freely from one country to the other. Some nations are using this method to spread their particular ideologies, and their pet brands of war propaganda, it is true, but the day will come when short waves will find their rightful use as bonds of international understanding and appreciation. The present day possibilities of short waves are due not so much to any improvement in its instrumentalities but rather to an understanding of its idiosyncrasies."

A dramatic demonstration of advances in short wave broadcasting was given at the dinner. Dr. Conrad exhibited a replica of the early receiving set which he and Mr. Sarnoff had used in London shortly after the first World War, and with which they picked up a program from Pittsburgh. Then a modern short wave receiving set was tuned in, and C. W. Horn, Director of Research and Development, National Broadcasting Company, explained the ease with which programs from every part of the world are now picked up.

Philco Television Advances

● THREE new achievements in television research were announced recently by William H. Grimditch, vice-president in charge of the Philco Radio & Television Corp.'s engineering laboratories.

1. Better television picture—Television reception of a *605-line picture* instead of the present 441-lines. This gives an increase *of 30 per cent in picture detail.* The new 605-line picture has 24 frames per second in accordance with standard motion picture practice.

2. Plug-In Television—Television reception based on *vertical* wave transmission permitting *built-in vertical loop* antennas.

3. Discrimination against noise—Use of the built-in *loop* antenna to *reduce diathermy and noise interference,* one of television's vexing problems.

Mr. Grimditch added, "One big problem yet to be solved is a better, simpler, stronger, and more reliable synchronizing system to prevent picture slippage before television becomes practical."

The built-in vertical loop antenna eliminates the costly installation of large dipoles, placed atop towers on the user's roof to receive television signals sent horizontally polarized from a television broadcasting station. The built-in vertical loop, which obviates the expensive construction of the dipoles, employs *vertically* polarized waves, in contrast to the horizontally polarized waves.

Left—Rear view of receiver and control panel for the 10 meter mobile rig. Center—The control panel as mounted on the front of the glove compartment. Right—Close-up of control panel.

10 Meter Mobile Rig—

Including Transmitter and Receiver

Howard G. McEntee
W2FHP

● THE popularity of 10 meter *mobile equipment* is growing by leaps and bounds. There are several reasons for this; among them the simplicity of equipment and the possibility of both local and DX contacts. Also, of course, in the springtime many hams turn their thoughts to *portable* work, and the apparatus to be described will give many ideas for such construction.

The receiver uses a very simple *one-tube converter*, the output of which is fed to a conventional auto broadcast receiver. The combination affords remarkably good results if used with an antenna resonant in the 10 meter band, as in the installation to be described.

The converter uses a 6J8G tube which obtains both filament and plate power through the B.C. receiver. The total extra drain on the car battery is only about .5 ampere, and practically all car sets will be able to supply the extra "B" power without trouble.

A rather ancient receiver was the only thing available for this purpose, so it was decided to "hop it up" a bit, while at the same time reducing battery drain as much as possible. This necessitated practically a complete re-building of the set, but the results are well worth it.

All R.F. and I.F. transformers were removed and new ones of the iron core type installed. This provides a great gain in overall sensitivity.

The next step was to see how it might be possible to reduce battery drain without, of course, reducing operating efficiency.

(Continued on page 745)

Diagrams below show how auto broadcast set was rewired for use with 10 meter converter.

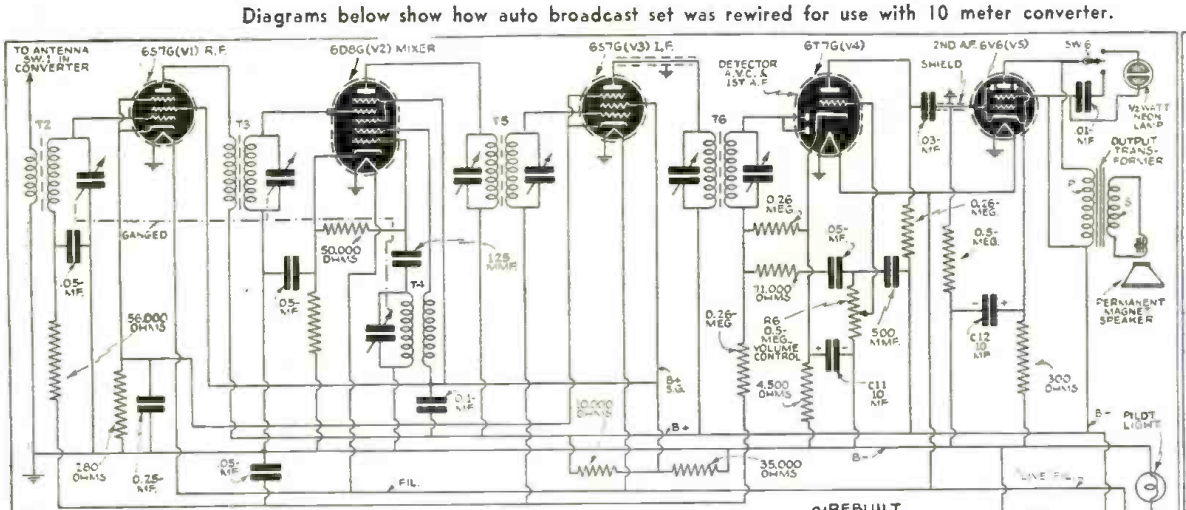


FIG. 1

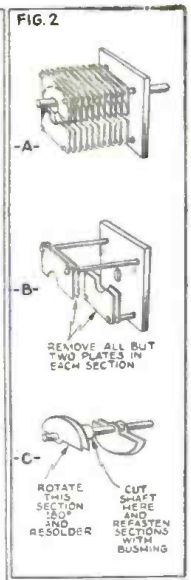


FIG. 2

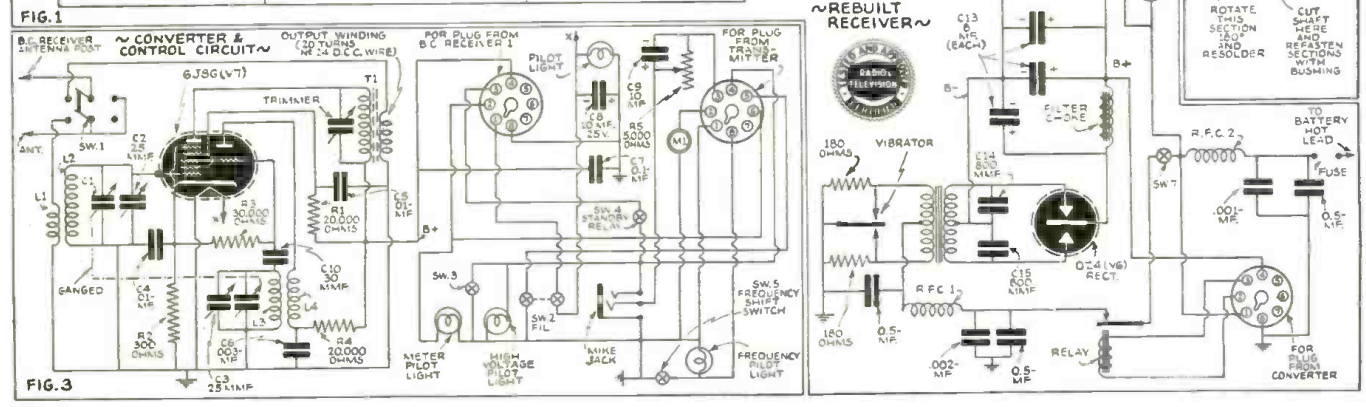


FIG. 3

I Cover the Pacific Coast!

Lyle M. Nelson

(All times are in Pacific Standard)

● SEVERAL new Australian broadcasters, replacing the old Amalgamated Wireless stations, have been reported here on the Pacific Coast. The newest addition to the list has been VLK on 9.58 megacycles. This station, Mr. Kendall Walker of Yamhill reports, is on the air near 4 a.m. irregularly. It is in Sydney, he says.

Other new Australians, reported in this column last month, and now coming in with good volume, are Sydney's VLQ on 9.61 mc. and VLQ2 on 11.87 mc. Both are heard here during the early morning hours, usually from 7:30 to 8:30 a.m. for VLQ and slightly earlier for VLQ2.

In addition to the Sydney stations a new Perth, West Australia, broadcaster has been reported with excellent volume from 4 to 7:30 a.m. on 11.83 mc. This station announces as "VLW3, Perth, West Australia." All reports should be sent to Chief Engineer, c/o the Government Post Office, Perth.

Several Pacific Coast listeners, including Mr. John Cavanagh of Oregon City, have reported India's VUD2 on 15.29 mc. near midnight. VUD2 is located in Delhi and broadcasts on a daily schedule from 10:30 to 12:30 a.m. The station is occasionally heard here from 4:30 to 7:30 a.m.

A new South African station has been reported on 11.77 mc. The station relays the same program as ZRO of Durban and is on the air from 5 to 8:15 a.m. Best reception is near 7 a.m.

Tahiti's FO8AA on 7.10 mc. is again coming through to the Coast. This popular broadcaster is heard every Tuesday and Friday night from 8 to 9 p.m. Typical South Sea Island music with all announcements in French features the program.

The Soviet stations in Moscow are a bit irregular in schedule with some station on the air at almost every hour of the day. Mr. G. F. Burns of Vancouver, Washington, reports RV96 on 15.18 mc. near midnight with excellent volume. A special English program is broadcast from midnight to 12:45 a.m., according to Mr. Burns.

RNE on 12.00 is occasionally heard during this time with the same program. This station also has been reported near 7 a.m. and 8 p.m.

RKI on 15.04 lists transmissions from 4 to 5:30 p.m. for North America although it is generally not well received here until near the end of the broadcast. RAN on 9.60 is also on the air at that time but is rarely heard here.

South Americans on the 62 meter band are coming in well during the late evening. Perhaps the best received at present is HJAB of Barranquilla, Colombia, on 4.78 mc. until 7 p.m. nightly. HJAE of Cartagena also is well received until 7:30 on 4.82 mc. Mr. T. S. Hite of Los Angeles reports good reception from YV1RU of Maracaibo, Venezuela, on 4.81 mc. until 7:30 p.m. daily.

Bangkok's HS8PJ is definitely broadcasting on 7.99 mc. from 5 to 7 a.m. Several listeners reported a new oriental station on this frequency but reported it as a relay of HS8PJ. According to announcements the station has abandoned the 9.51 megacycle frequency and now is broadcasting exclusively on 7.99 mc.

ROUND 'N' ABOUT . . . . from listeners' reports: 2RO on 11.76 mc. sometimes heard here near 2 a.m. Holland's PCJ2 on 15.22 mc. well received near 5 a.m. Has anyone heard RV15 on 4.27 lately? KZRF of Manila heard signing off on 6.14 mc. near 8 a.m. XGOK of Canton, China, heard on 11.65 mc. during early morning hours. ZHP weak on 9.67 mc. from 5 to 6 a.m. KZRM continues to be heard on 9.57 mc. on Saturday and Sunday from 6 to 7 a.m. EIRE, Irish broadcaster, is on 17.84 mc. from 6 to 7 a.m. SBP heard with American transmission from 5 to 5:30 p.m. on 11.71 mc.

"Television" and "Air Waves" Films Popular

● RCA Victor dealers and distributors in all sections of the country are utilizing two new educational films, "Television" and "Air Waves," for an entrée to civic groups and educational institutions. The films were produced by Pathe, for the Radio Corporation of America, National Broadcasting Co., and the RCA Manufacturing Co.

During the month of November the films were shown to 244,707 persons in community and educational groups of nearly every state in the Union and Canada. Audiences ranging in size from 25 to 5,000 gave them unusually favorable reception, RCA officials reported.

The pictures, each comprising one reel with a running time of ten minutes, portray the "backstage" of radio and television problems together with a brief history of each industry.

CORRECTION

The phrase, "non-professional," inadvertently appeared in the article on the Uni-cord which appeared on page 592 of the February issue of this magazine. This unit, as far as is known, is the only small recorder on the market that is powered by a full synchronous motor. The machine not only records but also plays back piano, organ and all difficult music perfectly and without "wow" and waver, states the manufacturer, plus the fact that a musical note recorded at the inside diameter will have the same pitch when played back as the same note cut at the outside diameter.

A 25-Watt A.C.-D.C. Audio Amplifier

Part 2—Conclusion

Francis J. Bauer, Jr., W6FPO

Starting Up the Amplifier

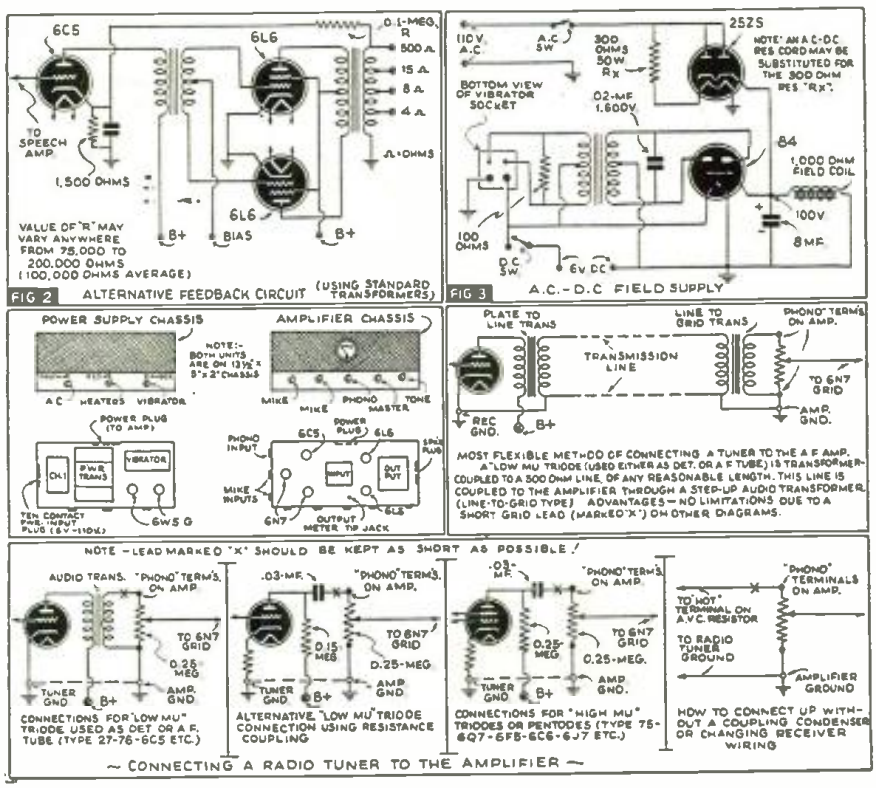
When all the units are completed they may be interconnected, but before starting up the amplifier. it is a good idea to recheck the wiring carefully. A short-circuit. particularly in the high voltage supply line, would damage the rectifier tubes permanently.

Set the bias resistor for the 6L6's at the highest resistor value, and connect a test voltmeter to the plate supply and the amplifier is ready for preliminary tests. It is preferable to make these preliminary tests on A.C. so as to be sure of amplifier performance; then if there should be any irregularity on D.C. operation, it will be immediately apparent and the problem of locating the difficulty will be greatly simplified.

Now turn the left-hand power switch to the ON position. Both green and amber pilot lights should light up. After a few seconds, the test voltmeter should start climbing, rising to about 450 volts and then settling down to about 360 after the power tubes warm up. If the test voltmeter reads about 500 volts and stays there, it indicates that there is no load on the power supply and a wiring error has been made.

After the tubes have warmed up thoroughly and there is no evidence of overheating. adjust the bias resistor until the test voltmeter indicates a drop of –27 volts. This is the proper bias for the 6L6's in class AB and no further adjustments on the amplifier should be necessary.

The speaker field power supply should next be started up and the voltage developed across the field should be measured. It will be between 100 and 120 volts, giving a field exciting power of about 10 watts for a 1000 ohm field.



Circuits above show Feed-back Hook-up and Radio Tuner Tie-ins.

The amplifier may now be checked for hum by slowly opening one gain control at a time, starting with the master control. If the amplifier has been properly built, it should be possible to have all the gain controls wide open without any hum increase in the output. If hum does appear, it probably is an indication that the shielding of that particular stage was either inadequate or improperly done. This test, of course, is made with no microphone connected to the inputs.

As mentioned previously. this amplifier has sufficient gain to permit the use of the usual variety of dynamic or crystal microphone. Dynamic type microphones were used with this particular equipment because they seemed to present the best balance between cost, ruggedness, appearance and performance.

Operation on D.C.

The performance of the amplifier on D.C. is identical with its operation on A.C. *There is one precaution to be observed, however. The tube heaters must be thoroughly warmed up before the vibrator is started. Failure to do so may result in permanent damage to the vibrator or rectifier tubes.*

It will be noticed that the buffer condensers usually associated with vibrator power supplies are entirely omitted. The reason for this omission is obvious. In automobile receivers, where the normal plate voltage runs anywhere from 200 to 250 volts, buffer condensers are rated at 1600 to 2000 volts. Where the plate voltage is 360-375 volts, buffer condensers of much higher rating would have to be used. This in itself may not be objectionable, but the 6W5G rectifiers won't stand the high transient voltages incidental to the heating up process and that is objectionable—and somewhat costly. So in the interest of longer life for rectifier tubes and vibrator be sure to observe this precaution. In every other respect the operation of the amplifier on D.C. is the same as for A.C.

To use the amplifier as a modulator for a phone transmitter it is merely necessary to procure a 500-ohm line to class "C" amp. modulation transformer. Such a suitable transformer is the Thordarson T83M22, which matches a R.F. load of 5,000-6,000-7,000-8,000-9,000-10,000 ohms to a 500-ohm line and is rated at 30 watts handling capacity. Such an arrangement makes it possible to match the modulator to any given R.F. load within reason.

If the amplifier is to be used exclusively for modulation purposes, the rather complicated speech mixer equipment can be dispensed with. For instance, a simple cascaded 6N7 would be adequate as a speech amplifier feeding the 6C5 driver.

Such a simplified circuit arrangement would also be suitable if the amplifier were to be used only in conjunction with a radio tuner. However, in order to preserve the multiplicity of uses of which this amplifier is capable, the writer strongly recommends the circuit modifications outlined in Fig. 4 in order to use the amplifier with a radio tuner.

The builder will find that the amplifier, used in this manner, makes a splendid reproducer for radio music. In the home it can be used at normal room volume to give the rich quality only possible with a good audio reserve—and a good speaker. At the radio shop it can be used to advantage as an "attention getter" because of its outstanding quality of reproduction and volume and in the field, operating on 6 volts, it leaves little to be desired either on radio or "mike." In a word, the equipment as it stands, is hard to beat from the standpoint of flexibility, compactness, and power output.

Parts List

THORDARSON ELEC. MFG. CO.

1—Power transformer T-14R40
1—Filter choke T-17C00-B
1—Output transformer T-17S12
1—Input transformer T-58A70
1—Line-to-voice coil transformer T-53S81

I.R.C.

1—300 ohm 25 w. semi-variable resistor (6L6 bias)
1—1,500 ohm resistor ½ w. (6C5 bias)
2—100,000 ohm resistors ½ w. (6N7 plate)
2—1,000 ohm resistors ½ w. (6N7 bias)
1—50,000 ohm resistor 25 w. wire-wound bleeder
1—200 ohm 1 w. resistor (vibrator)
2—50 ohm 1 w. resistors (spkr. field pwr. supply)
1—20,000 ohm 10 w. resistor (6C5 plate circuit)
4—250,000 ohm volume controls without sw.
1—25,000 ohm tone control without sw.

(Continued on following page)

(Continued from preceding page)

CORNELL-DUBILIER

3—.05 mf. paper condenser 600 v. (coup. and tone control)
1—1 mf. paper condenser 600 v. (6C5 coup.)
2—.5 mf. paper condensers 400 v. (vibrator and across pwr. transformer)
1—1 mf. paper filter condenser (hum bucking filter)
1—8 x 8 mf. dual electrolytic condenser; 450 working voltage
3—Single 8 mf. electrolytics 450 v. (to be connected in parallel for output filter cond.) output 24 mf.
1—8 mf. electrolytic 450 v. for spkr. field supply
3—10 mf. low voltage electrolytics (across 6N7 and 6C5 bias resis.)
1—.02 mf. buffer condenser. 1600 v. (spkr. pwr. supp.)

PAR-METAL PRODUCTS CO.

2—Chassis, complete with bottom plates and covers; size 13½ x 5 in. (amp. and pwr. supp.)
1—Chassis; size approx. 2 x 9 x 8 in. (spkr. field pwr. supp.)

RCA

2—6L6G tubes
1—6C5 tube
2—6N7 tubes
1—25Z5 tube
1—84 tube

TRIPLETT

1—0-15 volt A.C. voltmeter (output meter)

INCA

1—Filter choke type D1 (second filter choke)
1—Auto radio type vibrator transformer (spkr. field pwr.) Thordarson T-14R36 or T-14R35 (Inca or Hadley equivalent suitable)

ELECTRONICS

1—Vibrator No. 490
1—Auto radio vibrator univ. 4 prong (spkr. field supp.) (Philco, Mallory or Meissner)

CUTLER-HAMMER

2—SPST toggle sw. (A.C. ON-OFF and vib. ON-OFF)
2—SPST toggle sw. (A.C.-D.C. spkr. field supply)
1—Heavy duty DPDT sw. (amp. D.C. ON-OFF)

AMPHENOL

7—Octal sockets
4—5-prong sockets (spkr. and pwr. supp. outlets)
1—4-prong socket (auto radio vib.)
2—6-prong sockets (electronic heavy duty vib.)
1—5-prong socket (84 tube)

YAXLEY

3—Tip jacks (for phone input and output meter)
2—Open circuit jacks (for mike inputs)

RAYTHEON

2—6W5G tubes

PEERLESS

1—12 or 14 inch dynamic speaker capable of handling 20 or 30 watts; 1,000 ohm field. 16 ohm voice coil

MISCELLANEOUS

2—A.C. line cords and plugs
1—A.C.-D.C. cord 160 ohms (for 25Z5 rect.)
1—10 contact power plug (Jones No. P-310-CR)
2—10 contact power plugs (Jones No. S-310-FHT)
2—Battery clips 50 amp. capacity
5—Control plates (mike, phono, master and tone) (Crowe)
5—Bar knobs
1—Battery cable; No. 10 stranded wire rubber covered
1—5-conductor cable and plugs (for amp. pwr. supp.)
1—250 foot voice coil line with plugs (optional)
Miscellaneous bolts, nuts, hookup wire, shielding, plugs and fittings not mentioned above
1—Mechanical phono motor in case and crystal pickup (Astatic; Brush)
1—Dynamic or crystal microphone, complete with cable (one shown is American "Clipper" dynamic type D7T)
3—Pilot lights complete (red, amber, green) [Yaxley]
1—Speaker case (special) [Home-made]

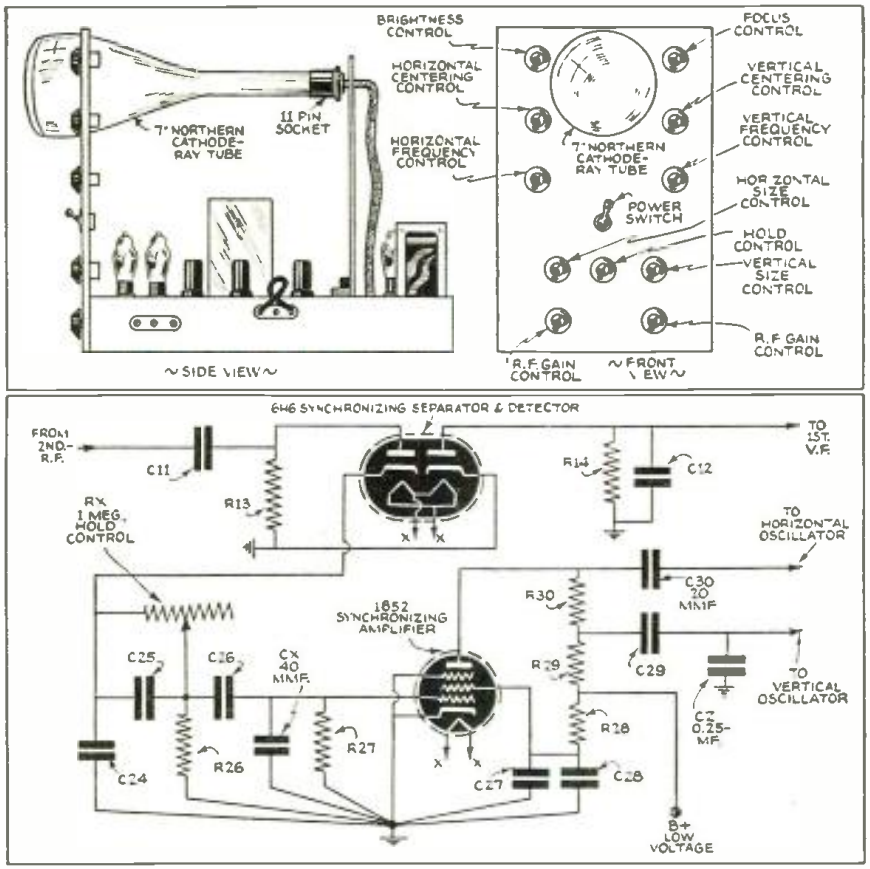
Coil Data for Diathermy App.

• HERE is the coil winding data for the high frequency output coils L1 and L2. (See Feb., 1940, issue.) The center-tapped plate coil L1 has 15 turns of No. 10 enameled wire, tapped at the center. This coil (air core) is wound to have a diameter of 2½" and the turns are spaced ⅛" apart.

The secondary or output coil has 4 turns of No. 10 enameled wire, wound on a diameter of 1½" and the turns are spaced ⅛" apart. The output coil is positioned so as to be inside the center of the tank or plate coil. By varying the number of turns in use in each coil, the frequency can be radically changed.

Adapting "R & T" Television Receiver for 7" Tube

Ricardo Muniz, E.E.



Diagrams above show the easily made changes in the "R. & T." television receiver, which adapts it for use with 7" dia. cathode-ray tube. This size tube gives images about 4" x 5", an ideal size and very entertaining.

● THE author's attention has been attracted for some months to a 7" picture tube which sells for little more than the price of a 5" picture tube. This article shows how it may be used in the "R. & T." televisor. Some minor changes which have improved reception are also described.

The 5" tube installed in the "R. & T." televisor for the article appearing in the February issue of RADIO & TELEVISION has been performing quite nicely now for about two months. Picture quality is sharper than many superheterodyne televisors are producing. The inherent tube damping, at these ultra-high frequencies, has been found sufficient, without the need for putting damping resistors across the tuned circuits, to give good band pass and therefore sharp pictures. The old "itch" to experiment and "improve" came however and proved irresistible.

The first step was to acquire a "Northern" NOO7-T4 Type cathode ray television picture tube. This tube plugs into the same 11 prong socket as the 5" tube used previously. This socket was erroneously listed in the February issue—it is a Naald Type 211 FC. The tube has a T4 phosphor which fluoresces white when the cathode ray beam strikes it, giving black and white pictures as did the 5" and 3" diameter tubes used previously. The new picture size is 4¼" x 5¾" roughly. The new 7" tube was inserted directly in place of the 5" tube for a preliminary test. It was found that the gain provided by the sweep amplifiers was more than ample to deflect the beam of this tube and produce a normal picture size. The brilliance however was too low for comfort, although the picture was perfect when viewed in a fully darkened room.

Televisor which used 10 tubes including sound section with 3" picture tube and 14 tubes with 5" picture tube now operates 7" picture tube with no additional tubes and only minor changes.

It will be noted that in the February "R. & T." a Kenyon Type T 203 transformer was specified, but that the 1500 volt tap was used. Increasing the accelerating anode voltage by shifting to the 2200 volt tap on T. was found to produce very good brillance. The focussing and brilliance were further improved by changing R23 in the high voltage bleeder from 1 megohm to 500,000 ohms.

The 7" tube now performed very well indeed—so well in fact—that it was sought to further improve the set. As a consequence certain changes, all minor ones, were made in the receiver, which brought about improved performance.

The most notable change was the addition of a hold control. The clipper circuit and synchronizing amplifier are reasonably automatic in maintaining % clip at the required value of 15% but the replacement of R25 (2 meg.) by a 1 megohm pot, was found to improve synchronizing qualities. This new control permits the clipping % to be adjusted somewhat to accommodate locations having weak signal strength. A study of the T-111 standard television signal will show that the synchronizing pulses comprise the upper 20% of the modulation envelope. Clipping too much will mix picture with synch.—too little may reduce synch. below operating level.

A 40 mmf. condenser, Cx, was connected from grid of synch. ampl. to ground, to further reduce R.F. at this point; this improved synch. A .25 mf. cond. connected from *Vert.* synch. output of synch. amplifier to ground, helped clear "line" synch. pulses out of this lead; synchronization was further improved. Changing C30, the *horizontal* synchronizing pulse output condenser from the synchronizing amplifier from .0005 to .00002 mf. helped clear these pulses up. These changes all improved picture stability when low signal strength was encountered. Pictures are now *rock-steady!*

Both the *horizontal* and *vertical* frequency controls were found to be operating near one end of their range. R36 in the *horizontal* oscillator was changed from 25,000 ohms to 50.000 ohms; C35 in the vertical saw-tooth oscillator was changed from .2 mf. to .1 mf. This corrected the condition.

Linearity of picture was not quite as good with the 7" tube as it had been with the 5" tube. The picture was found to be slightly inpressed at the bottom and at the left side. This was improved by changing R2 and R8.

The changes were made in large measure under the skilled hands of Andy Tait, recent graduate of Brooklyn Technical High School and last term president of the Television Club there.

Parts List

INTERNATIONAL RESISTANCE CO.

1—1 meg. potentiometer, Rx
1—50.000 ohm, 1 watt resistor; replacing R36 (See December, 1939, R. & T.)
1—500.000 ohm, 1 watt resistor; replacing R23 (See February, 1940, R. & T.)

CORNELL-DUBILIER

1—.25 mf., DT-4P-25 condenser, Cz
1—.00002 mf. 5W-5Q2 condenser; replacing C30 (See December, 1939, R. & T.)
1—.00004 mf. 5W-5Q4 condenser, Cx
1—.1mf. DT-4P1 condenser; replacing C35 (See R. & T., December, 1939)

NORTHERN MFG. CO.

1—N007-T4 Television picture tube (7" dia.)

ALDEN PRODUCTS CO.

1—211 FC-11-prong, large cathode-ray tube socket

Harry Lubcke Tells Plans

(Continued from page 710)

freezing for a moderate period because it might give the industry the "go ahead" which it has been awaiting.

Programs transmitted by the Don Lee station, according to Mr. Lubcke, are quite different from those being emitted by the NBC station in New York, while the Eastern station has been concentrating to some extent on complete shows—i.e. a play or athletic contest lasting for an hour or more—the Don Lee station has been stressing variety shows. The longest play they have run so far has been a 40 minute production of Hamlet featuring Fritz Liebert, a noted Shakespearean actor.

Although only about 300 to 400 sets, most of them home-made, are in use in the W6XAO area, six makes are on sale. In their order of importance these are: RCA, General Electric, Gilfillan (manufactured by a local distributor), Stromberg-Carlson and a few Stewart-Warner and Du Mont receivers. Most of the apparatus in use is using 12" tubes

The Hollywood station is on the air approximately 10½ hours a week, 60% of this time being occupied by films. The production end is using travelogs, commercial films and others. They also keep a 16 millimeter camera available to make sure all newsreel jobs are covered. To date they have covered 2 fires, a hurricane, an aquaplane race, a Tournament of Roses parade, etc. Being so favorably located in regard to the entertainment industry, the station has been able to put on a number of well known actors, such as Bobby Breen, Morton Downey, Reginald Denny and others.

Its permanent production staff consists of 7 technical men and 2 production men on full time. In addition there are 3 part time assistant production men. Union stage hands, camera men and make-up men are also employed as are various entertainers. The present station uses an antenna 200 ft. above the street and 1000 watts power.

International Radio Review

(Continued from page 712)

winding are placed in between those of the other winding. In other words, the primary and secondary parts are interspersed alternately. This special transformer has an air core and windings may be placed on a cardboard or other insulating tube.

The tube used is a 30 type, the phones of 2,000 ohms or more resistance and while the original hook-up in *Radio Tecnica*, Buenos Aires, shows a floating grid it is advisable to insert a grid leak from grid to filament.

Audio Oscillator and Siren

4 AN audio oscillator capable of being tuned over a considerable range is particularly desirable for tuning range for a radio receiver or for the purpose of creating powerful siren-like sounds from a loud-speaker. The diagram, Fig. 4, appeared in *Radio Revista* of Argentina; the hook-up is simple and the apparatus employed usually is available about the experimenters' shack. An audio transformer is used to provide feed-back through the 56 tube and the oscillating frequency is varied over the scale by the .001 mf. variable condenser connected in series with the primary; other changes in the audio frequency note are made by adjusting the group of four .0005 mf. condensers connected in parallel with the plate of the 56. Additional speakers may be connected to the terminals so marked.

Be Sure to See Page 708 for Important New Subscription Offer!

"Award of Honor" Plaque
For Best HAM STATION PHOTO

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This Month Goes to
George H. Shenberger, W3FEI

George H. Shenberger

Some Transmitter! And George informs us it is all "home-built." FB-OM!

Editor,

This station is the result of continual reading of the old *Short Wave Craft*, now RADIO & TELEVISION.

I have every copy of your magazine since 1931 and these issues are often referred to. I find if it's radio, it's in RADIO & TELEVISION!

W3FEI was licensed in 1935; at first a 210 Hartley oscillator was used. As time progressed many "rigs" were built, used and improved, and the result of each was noted. The transmitter now in use is entirely *home-built*, including the enclosed steel relay rack.

The R.F. line-up starts with a 47 xtal oscillator; two frequencies may be used, the switch controlling either xtal is panel-mounted.

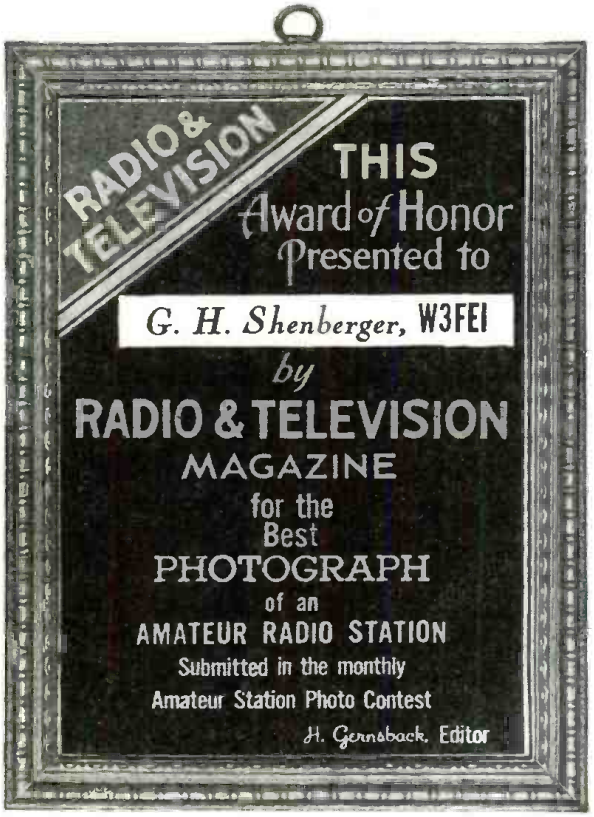
As a TZ20 is used as a doubler, another TZ20 is used as a second buffer, which is link-coupled to a 100 TH in the final stage.

An impedance antenna network is coupled to the final tank coil, which produces high efficiency for most antennas. Also mounted in the rig is an over-modulation indicator, calibrated to read modulation percentage.

A pair of TZ20's are used as class B modulators, with the grids connected to a 500 ohm line

•

Here is the new "Award of Honor" Plaque which measures 5" x 7" in size. It is handsomely executed in colors on metal, and is framed, ready to hang on the wall. The letters appear in gray against a beautiful black background, and we are sure that our amateur friends who are awarded one of these new "badges of merit" will be more than pleased with it. The name of the winner will be suitably inscribed.



to the output of the 12-watt speech amplifier.

Each R.F. stage is isolated from one another by the use of aluminum shield boxes.

On the desk is seen a Breting 12 receiver; next comes the remote control box with built-in key-click filter. To the extreme right is the frequency meter.

The rig is used on 20 and 40 meters c.w. with a power input of 300 watts, while on 20 and 75 meters 150 watts is used.

The antenna now in use is a 130-foot end-fed Hertz. This "sky-wire" is used both for transmission and reception, thanks to a home-made antenna relay which costs less than $2 to construct.

Many enjoyable contacts have been made, which includes 45 states and 30 foreign countries.

In closing, let me say I appreciate your swell magazine, and hope for its continued success.

GEORGE H. SHENBERGER, W3FEI.
316 N. Mulberry Street.
Lancaster, Pa.

Note These Important Rules

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

The pictures will be judged for the general lay-out of the station, the quality of workmanship exhibited, and the appearance of the photograph itself. The judges will also consider neatness as an important point.

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, and which type of aerial you use for transmitting and receiving; also what type of break-in relay system, if any, is used.

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. You are not limited to one picture, but may submit as many different views as you like.

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

Tips for the Radio Beginner

(Continued from page 718)

better and more efficient results than a greater number of tubes. On the other hand, if a loud speaker is required, then at least three tubes are recommended. In these beginner's short wave sets, the best circuit for distance reception is one which employs a regenerative detector. A one-tube regenerative set, under favorable conditions, if properly designed and constructed, can pick up distant short wave stations from Europe, Australia and Asia with amazing ease and regularity, with ample earphone volume. Many beginners want to know if an additional R.F. stage is necessary. Experience indicates that the untuned R.F. stage is neither necessary nor highly desirable. Even a tuned R.F. stage ahead of a regenerative detector may not, under all conditions, increase the distance possibilities; one of its major purposes is to give better selectivity on local stations, but for distance reception it adds to the expense and is not essential in a beginner's receiving set. It also prevents reradiation of "squeals" if the detector should oscillate.

Adding Audio Amplifier

When it is necessary to operate a loud speaker, this can be done by adding a single audio stage to the regenerative detector, using transformer coupling between the detector and the output tube. Present day practice, however, has discarded the audio transformer in this type of receiver, for the cheaper resistance coupling method, which uses two small resistors and a fixed condenser in place of the costly audio transformer. By using two audio stages instead of one, loud speaker volume is obtainable. It should be understood that only fairly strong stations will be obtained with full loud speaker volume. An additional tube may be used to increase the volume still further, possibly with two power tubes arranged for push-pull operation in the output stage, but in no case should too much be expected from weak signals emanating from the other side of the world.

What Speaker to Use?

As regards the choice of speakers, these are limited in battery-operated sets to *magnetic* and *permanent magnet dynamic* speakers. The straight dynamic speaker with field coil is *not* recommended for use in a battery set, due to the fact that it requires a separate field supply which constitutes a heavy drain on the battery. The ordinary magnetic speaker is sensitive, but generally lacks volume and tone quality. It has the advantage that it requires little power and is quite inexpensive. Magnetic speakers are available in various sizes, and can be obtained in very small sizes down to two inches in diameter. The best speaker for the battery-operated set is the permanent magnet dynamic speaker. This type has excellent tone quality, better volume than the magnetic speaker and is more efficient. It costs approximately 25% more than the magnetic. While the p.m. dynamic speaker gives results closely approximating the straight dynamic speaker, *it requires no current to energize its field,* since the permanent magnet takes the place of the field winding. Hence it uses no more current than an ordinary armature type magnetic speaker.

Choice of Tubes

The next step concerns the choice of tubes. In a battery-operated set, there are two special points to be considered. These are the voltage at which the filaments operate and the current required by these filaments. For battery operation, it is possible to em-

ploy tubes having 6.3 volt, 5 volt, 3 volt, 2 volt or 1.4 volt filaments. If 6.3 volt tubes are used, the type having lowest current drain is preferable. For example, beginners often decide to use a 6F6 tube in a battery-operated receiver because they have read some place that this tube has a power output of 13 watts. They know that it requires a filament supply of 6.3 volts or a little less, which can be obtained from the ordinary storage battery. They fail to take into account the fact that this tube needs .7 of an ampere to heat the filament correctly! If they took the time to figure out that this is more than 4 watts, they would quickly see the futility of choosing such a tube. Even the ordinary 6.3 volt tubes, such as the 6C6, 6D6, 6J7, 6K7, etc., which require .3 ampere filament current, are not recommended for battery operation. However, new 6.3 volt tubes are now available which draw only 0.15 ampere filament current and these are the ones to select if battery power is to be used.

As regards the choice between 2 volt and 1½ volt tubes, the filament requirements as to current are practically the same. The chief advantage of the newer type 1.4 volt tubes is that they require one dry cell "A" battery instead of two, making them more suitable for *portable* receivers. Similarly many of the 1.4 volt tubes require lower plate voltage ("B" supply) for maximum efficiency. Here again, this feature is especially introduced to lighten the portable receiver.

As regards the various types of tubes for battery sets, there are triodes, pentodes, screen grid tubes, dual purpose tubes, standard base, octals, loctals, etc. It seems that every time one turns around a new type tube make its début.

In spite of this progress in the development of radio tubes, the old-time lowly 2-volt 30 type tube continues to bring in distant foreign stations. This merely means that for all practical purposes, an ordinary 30 triode tube will give good results in a one-tube regenerative receiver. The 30 tube employs a 2 volt filament and its filament draws .06 ampere. This current drain is practically the same as that of the newest loctal type dry cell tubes.

Two Methods of Changing Bands

The next step is the method of covering the various short wave bands. There are two methods now in general use. One consists of the use of a number of fixed coils which are connected in the circuit by a switching arrangement. This is called a "switch-band" method. The other method involves the use of plug-in coils. These latter consist of a number of coils, with windings differing in number of turns and in the diameter of the wire, wound on regular plug-in coil forms or on tube bases. These are plugged into an ordinary socket, exactly as one inserts a radio tube. If it is desired to cover the broadcast band, a broadcast coil having a large number of turns is inserted in the coil socket. If the 10 to 25 meter short wave band is to be tuned in, then a short wave coil having only a few turns of larger diameter wire is plugged into the coil socket.

The plug-in coil is generally designed to be tuned by a .00014 mf. single gang variable condenser. These coils usually possess two windings, one having a greater number of turns, and having the variable condenser connected across it. The other winding, with the lesser number of turns is called the "tickler" winding. This is generally shunted by a variable resistor, known as a *potentiometer*, which serves the purpose of controlling the regeneration. These, then, are the main features of the beginner's battery-operated short wave receiver.

Television "Sigs" Collide

● COLLISION of television signals between a Philadelphia station and a New York station, the first since the birth of the infant science, has resulted in a tentative agreement to share time between Station W3XE, operated by Philco in Philadelphia, and CBS Station W2XAX of New York.

The agreement blasted the currently popular scientific theory that television broadcasting is limited to the horizon, giving rise to a wider scope in television research.

Interference was first noted on television receivers in the Philadelphia area when both the audible and visible programs of both stations were mutually disturbed beyond recognition.

Until the present report of the television signal clash between the two stations ninety miles apart and each well beyond the other's horizon, the popular scientific theory assumed that the transmission of television waves in high frequencies was limited to the optical horizon, the point at which the curvature of the earth obstructs further vision.

The agreement, the first time-sharing arrangement in television's short history, was necessitated by the fact that both stations operate on the same frequency band (50 to 56 megacycles). Philco will transmit television programs between midnight and noon daily, and on Wednesday, Friday and Sunday evenings after 6 p.m. The Columbia station will confine its television broadcasts to all other times.

Improved Radio Control for Model Planes

(Continued from page 715)

regeneration. With these adjustments completed, the 1Q5GT may be hooked up. When the RK62 is drawing .9 ma.. the 1Q5GT will be biased beyond cutoff. When a signal is received, the plate current of the RK62 drops and the bias on the 1Q5GT disappears. causing it to draw a heavy plate current and operate the relay.

From the relay on, the control is pretty much up to the ingenuity of the builder. There are probably hundreds of good ways to operate the controls of the plane. In this plane. we have used the relay to operate a sequence reversing switch taken from a toy electric train. which in turn operates the rudder control motor. The operation is cyclic. i.e.. first impulse—right, second—center, third—left. etc.

The total weight, including the control motor. is just over 2 pounds, which is small enough to be carried in any of the standard planes of approximately 6-foot wing-spread. even with the small motors. The only changes necessary are movable control tabs and a reinforced landing gear. A special plane is not necessary.

The B batteries may be either two W2OPIs or a single W4OPI. Separate pen-light cells are used for each filament. The batteries should be fastened securely near the front end to prevent damage to the plane in event of a crack-up.

Fig. 3 shows a simple transmitter. which is invaluable for bench testing and for distances up to ¼ mile. Fig. 4 shows the more powerful set-up used for control over longer distances.

Parts List

All Tuning condensers
Cornell-Dubilier: 30 mmf., No. 113 type
200 mmf. grid condensers
C-D (pee-wee type)

Plate by-pass condensers
(C-D) 200 volt, .25 mf. bakelite molded

Tubes
RK62—RAYTHEON
1Q5GT—RAYTHEON
112A—RAYTHEON

Bias cell
2 volt—MALLORY

Relay
Special lightweight 10,000-ohm Radio Control model

Batteries
W20-PI—GENERAL BATTERY CO.
Pen-light cells—GENERAL BATTERY CO.

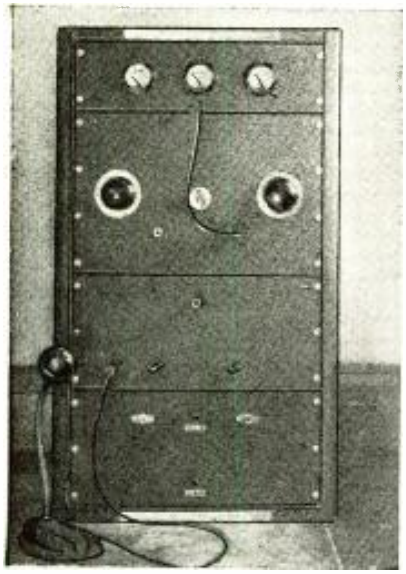
BOOK REVIEW

THE RADIO AMATEUR'S HANDBOOK by the Headquarters Staff of the A.R.R.L., contains 575 pages, size 6½" x 9½" and is profusely illustrated. Published by the American Radio Relay League, Inc., West Hartford, Conn.

The 1940 edition of this book is more than just a new edition—it is an entirely new book. It contains 32 chapters completely covering practical radio operation and construction. Included are two chapters which introduce the newcomer into this fascinating field, and four chapters which cover the essential elements of radio theory as applied to principles and design. Fourteen chapters are found in the construction and adjustment section, ranging from workshop practice through to the elimination of broadcast interference. A new section gives complete data on transmitters. The remainder of the book is devoted to separate sections—one on antennas, antenna design and construction, another on high frequencies, etc. Other chapters cover measurements and measuring equipment, station assembly, Government regulations, emergency and portable equipment, miscellaneous information such as tables, etc. At the rear of the volume is a catalog section describing approved amateur apparatus. This book is well worth the money and really should be in the hands of every one who is now engaged or hopes to be engaged in amateur operation.

Cathode Modulator for the W8KPX Transmitter

(Continued from page 717)



The complete Transmitter.

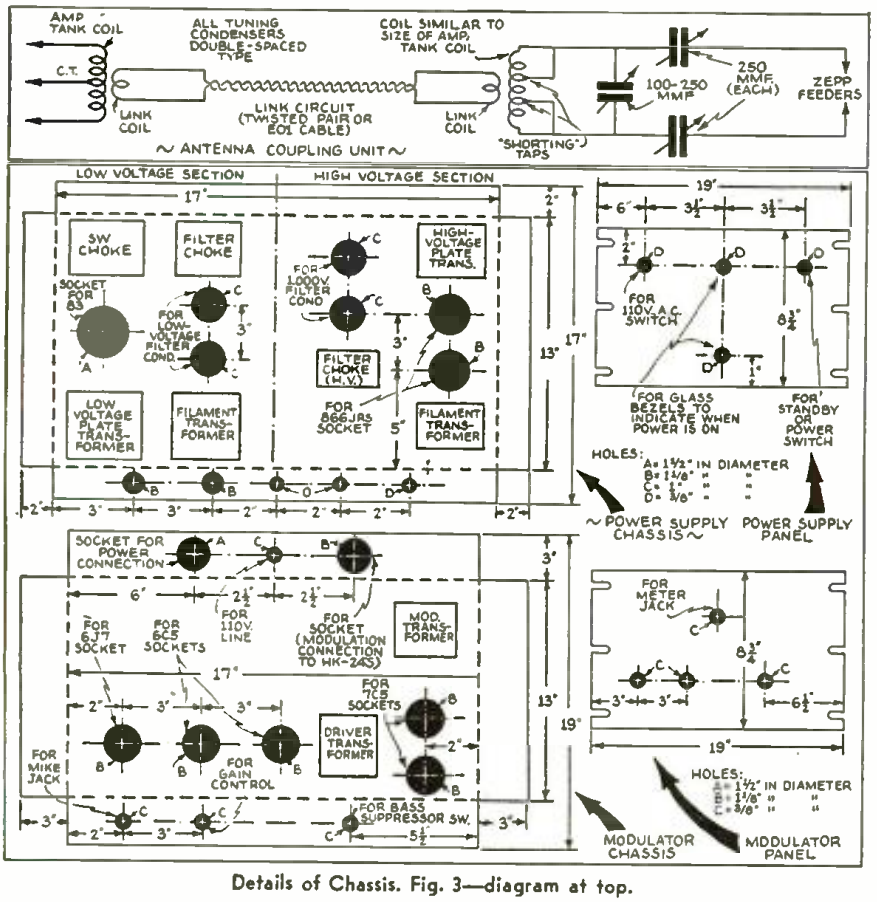
shown. The second triode is transformer coupled to the Class AB 6V6 or 7C5 tetrode modulators. The output or modulation transformer from the modulator tube plates terminates in a 500 ohm winding, which is approximately the correct impedance for matching the cathode input circuit of most R.F. amplifiers.

Modulator Construction Simple

The construction of the modulator is not difficult. Extreme care in the placement of the parts, especially the transformers, and the wiring between the "hot" grid and plate circuits and associated parts, is necessary to insure stability and good speech quality. All of the grid and plate leads, including those to and from the volume or "gain" control and the transformers, are enclosed in the usual shielded copper "braidite" which is suitably grounded to several points on the chassis. The liberal use of decoupling filters and high capacity by-pass condensers eliminates any possibility of induced hum getting into the audio channel. *Keep the wiring as short and direct as possible.* Place the electrolytic and paper condensers *close* to the parts which they bypass in order to obtain a short, direct, low-impedance path to ground for the undesired currents. A 2.5 millihenry R.F. choke helps to prevent radio frequency currents from feeding into the speech amplifier, while the entire crystal microphone jack is enclosed within a metal shield to keep out any stray hum currents from the 6J7 input circuit. If metal tubes are employed, it is necessary only to ground the shells to the chassis by means of a short piece of heavy copper wire from the "No. 1" terminal of the socket; if glass or "G" type tubes are employed, the usual shields must be used in order to obtain the necessary stability. No shielding is required for the modulator tubes although, if the 7C5s are used, the metal base lug which comes out at the center of the socket should be connected to ground.

Power Supply Units

The two power-supply units are built up on a single 2½ x 13 x 17 inch chassis and 8¾ x 19 inch standard panel. The low voltage supply gives a maximum of 425 volts



Details of Chassis. Fig. 3—diagram at top.

at 300 milliamperes, rectified and filtered D.C., for operation of the crystal oscillator, the RK-39 buffer-doubler and the modulator. The rectifier is an 83 mercury vapor type using choke input to the filter. The condensers used for the low voltage filtering are heavy duty wet electrolytics of the 600 volts D.C. *working voltage* rating. All filter chokes are of full 300 milliamperes rating. The various intermediate voltages required are obtained by means of slider taps on the 20,000 ohm, 50-watt bleeder resistor as shown in Fig. 2. Each tap is bypassed to ground with an 8 mf., 450 volt electrolytic condenser to prevent any possibility of hum reaching the oscillator and modulator circuits through these leads.

The high voltage power supply is very simple, consisting of a pair of 866 Jrs. as rectifiers for the 1100-0-1100 volts A.C. supplied by the 200 milliampere transformer. Choke input is used with two 4 mf., 1,000 volt oil-filled paper condensers across the output. Using a 50,000 ohm, 75-watt bleeder for this power supply, a D.C. plate voltage of 1,000 volts for the two HK-24s is readily obtained. Since this high voltage is used on the R.F. final amplifier only, the filter system used is quite adequate and there is very little, if any, hum on the carrier. The regulation is very good due to the fact that the HK-24s draw only about 150-175 milliamperes when fully loaded, which is considerably under the rating of the transformer.

Rack and Panel Construction

The finished transmitter is, as the photographs show, built up entirely in standard rack and panel type construction and is mounted in a "de luxe" 35½ inch steel cabinet. All power leads, with the exception of the 1000 volt lead to the plate circuits of the HK-24s, are cabled and terminate in plugs and sockets, which facilitate the disconnection and removal of any unit for service.

No provision for *antenna tuning* has been incorporated in this particular design and it is suggested that an external tuner, such as that shown in Fig. 3, be used. If Zepp or untuned feeders are used, the coupler may be placed at the point where the feeders enter the room. Link coupling by means of the usual twisted pair or "EO-1" cable can then be used between the unit and the final tank circuit of the transmitter.

This transmitter has been in almost constant use on the 160 and 10 meter amateur phone bands for the past two months, during which time dozens of contacts have been made. In nearly all cases the reports have been very favorable with many comments on our exceptionally "good voice quality."

The *bass suppression* has been especially helpful on 10 meters, where we have worked through to the K6's a number of times!

The author will be glad to hear from those who build this cathode-modulated transmitter. All letters will be answered provided a stamped and self-addressed envelope is enclosed for the reply. Address the author in care of RADIO & TELEVISION.

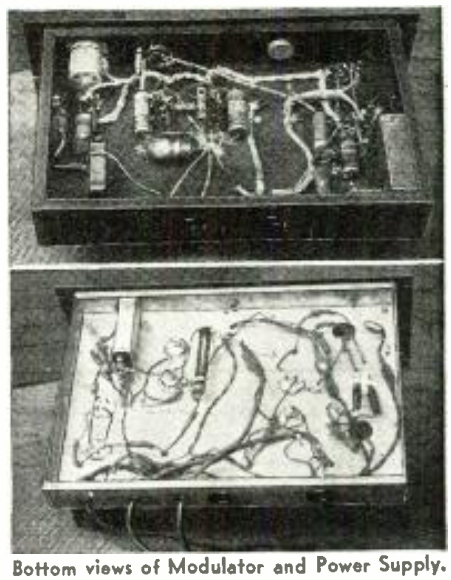
Parts for "W8KPX" Modulator

KENYON
1—Cathode-drive modulation transformer, for p.p. 2A3's or 6V6's

STANCOR
1—Polypedance driver transformer, type 4762
1—Plate transformer, 400 V. D.C. after filter at 300 ma. Type P4024
1—Swinging choke, 8-25 henries, 300 ma. Type C-1403
1—Smoothing choke, 12 henries, 300 ma. Type C-1413
1—Multiple filament transformer, 5 volts at 6 amp. and 6.3 volts at 6 amp. Type P-4022
1—Single filament transformer, 6.3 volts at 6 amperes. Type P-3064
1—Single filament transformer, 5 volts at 6 amp. Type P-3062
1—Plate transformer, 1,000 volts D.C. after filter at 200 ma. Type P-4030
1—Smoothing choke, 15 henries, 200 ma. Type C-1721

I.R.C.
1—Metallized resistor, 5 megohms, 1 watt
1—Metallized resistor, 2 megohms, 1 watt
1—Metallized resistor, .25 megohms, 1 watt
1—Metallized resistor, 1 megohm, 1 watt
4—Metallized resistor, 50,000 ohms, 1 watt
3—Metallized resistors, 500,000 ohms, 1 watt
2—Metallized resistors, 2,000 ohms, 2-watt
1—Wire-wound resistor, 200 ohms, 10 watt (adjustable)
1—Wire-wound resistor, 300 ohms, 10 watt (adjustable)
1—Wire-wound resistor, 15,000 ohms, 25 watt (adjustable)
1—Wire-wound resistor, 20,000 ohms, 50 watt (adjustable)
1—Wire-resistor, 50,000 ohms, 75 watt

CORNELL-DUBILIER
2—.006 mf. mica condensers. Type 9
5—.002 mf. mica condensers. Type 9
1—.001 mf. mica condensers. Type 9
3—.05 mf. paper dielectric tubular condensers, 600 volts
6—.1 mf. paper dielectric tubular condensers, 600 volts
2—4 mf., 600 volt "Dykanol" transmitting filter condensers. Type TLA 6040
2—2 mf., 1,000 volt "Dykanol" transmitting condensers. Type TLA 100020
1—8 mf., 400 volts electrolytic condenser. Type KR-508



Bottom views of Modulator and Power Supply.

TRIPLETT
1—Round, D.C. milliammeter, 0-100 ma.
1—Round, D.C. milliammeter, 0-200 ma.
1—Round, D.C. milliammeter, 0-50 ma.

BUD
2—8¾x19 inch black crackle steel panels. Type 1254
2—13x17x3 inch steel chassis. Type 660 or 773
1—5¼x19 black crackle, 3-hole meter panel. Type 440
1—"De luxe" cabinet. 35x22x14¾ inches. Type CR-1745

RAYTHEON
1—6J7 tube
1—83 tube
2—6C5 tubes
2—7C5 or 6V6 tubes

TAYLOR
2—866 Jr. tubes

AMPHENOL
3—"Octal" bakelite, ring-mounting sockets
2—"Loktal" ceramic sockets for 7C5's
3—4-prong steatite sockets for rectifier tubes

BRUSH
1—"HL" communications microphone, crystal type

MISCELLANEOUS
2—Heavy-duty double-pole, single-throw switches. Toggle type
1—Single-pole, four position rotary switch (band-change type)
1—Lot hardware, solder, wire, etc.

Getting Started in Amateur Radio

(Continued from page 720)

the tuning coil and the number of turns should be kept as small as possible, consistent with good results. The detector must oscillate over the entire band if maximum sensitivity is to be obtained and C.W. signals are to be received.

Adding R.F. Stage

As stated previously, the regenerative type short-wave set is greatly improved by the *addition of a stage of radio frequency amplification* between the aerial and the detector tube. The tuning control for such an amplifier may be operated independent of the detector tuning, or it may be *ganged* with it by using two variable condensers on one shaft. While not as convenient to operate, separate controls have advantages for the beginner's set, especially in simplicity of construction.

The circuit of a typical R.F. amplifier for an amateur receiver is shown in Fig. 3.

Shielding is often used in amateur sets as well as manufactured ones, to separate the currents in the different tube circuits. Metal walls surrounding all the parts in an individual vacuum tube circuit are the most practical way to accomplish this separation. Fig. 4 shows the preferred way of shielding. Common partitions between circuits, especially when one of these is an oscillating detector, should never be attempted. The shielding is carefully "grounded" to the point of zero signal voltage—which is ordinarily the chassis or one side of the filament wiring to the tubes.

Another method of shielding, perhaps equal in effectiveness to "stage" shielding, is to enclose the individual parts (coil, tube, condenser, etc.) of an amplifier or detector in individual shield cans or boxes. This presents some mechanical difficulty when plug-in coils are used.

The signal strength at the detector tube can be built up to greater volume for a loud-speaker or for intensifying very weak signals by means of an audio amplifier. Several typical A.F. amplifier circuits, suitable for short-wave receivers, are shown in Fig. 5.

The Superheterodyne

The superheterodyne receiver has many advantages of flexibility of operation, greater sensitivity and volume, plus a greater ability to separate stations (selectivity) especially in so-called single signal types, over the simple regenerative receiver. However, it is not a set for the beginner to tackle until several more simple sets have been made and operated.

The *superhet.* differs from other circuits in that the signals are changed from one frequency to a second lower frequency where better efficiency can be obtained in the amplifiers. These fixed amplifiers are known as *intermediate frequency* amplifiers and in amateur receivers are usually tuned to between 450 and 500 kilocycles. The change in frequency is accomplished by means of a frequency converter circuit which consists of a detector and oscillating tube. These two circuits are tuned simultaneously by means of variable condensers, to the signal frequency and a frequency higher or lower than the signal. The interference of the two signals, one against the other, produces a third signal of lower frequency (difference frequency) and by proper selection of parts and adjustment this lower frequency can be made to equal the frequency at which the I.F. (intermediate frequency) amplifier is tuned.

A block diagram, Fig. 6, shows the general arrangement of circuits in a superhet.

In Part IX we will describe the construction of a reliable, though simple, receiver for the ham station.

The foregoing articles in this series appeared in the following issues: Part 1, Feb., 1939; Part 2, March, 1939; Part 3, May, 1939; Part 4, July, 1939; Part 5, Sept., 1939; Part 6, Oct., 1939; Part 7, Jan., 1940.

C.B.S. PREPARES TELEVISION SHOWS

• ALTHOUGH no date has been set for the commencement of the program schedule, it appears now that the Columbia Broadcasting System will be putting television programs on the air within the current year.

During the past few months, the CBS television program staff under the direction of Gilbert Seldes has been intensifying the study of program needs, which has been in progress for several years.

For the past several months, Columbia Broadcasting television engineers have been adjusting the test pattern of the television transmitter in the Chrysler Building, resulting in steady improvement in the image and, in the opinion of Dr. Peter C. Goldmark, CBS chief television engineer, the transmitter should be satisfactorily aligned within another two months.

Difficulties that arise out of changes in standards, such as the introduction of single side-band transmission, and which have complicated the situation for CBS, necessitating last minute changes in equipment and involving additional costs and delays were described recently by Paul W. Kesten, CBS vice-president, at the FCC television hearing in Washington. Mr. Kesten pointed out that it was fortunate that CBS had not been on the air at the time, as the changes in standards would have involved program interruption followed by impaired reception by sets already in homes.

As a result of *closed-circuit* program experiments, it was found that replacement of the iconoscope type camera by the new *orthicon* type was required if the acting area were to conform to the CBS program approach. Four orthicon type cameras have been on order since last August but the delivery date has not been definitely set.

After the installation of these new cameras, the CBS studio will be equipped with twelve vision channels, seven of which will be for *floor cameras* and five for various kinds of *film scanners* and other special uses. Three additional orthicon type cameras will be assigned to a self-powered mobile unit which is now being designed and for which a license application has been made to the Federal Communications Commission. This mobile unit is expected to operate on 336,000 to 348,000 megacycles.

Work is proceeding, Dr. Goldmark said, on a system of lighting which will be bright enough for the new cameras without glare to the performers, flexible enough to permit varied program production, and cool enough so that the performers and staff will not be subjected to constant discomfort.

CBS has made an exhaustive analysis of this problem and as a result of tests on many different light sources, an experimental installation of radically different character has now entered the design stage.

At the recent hearing before the Federal Communications Commission, CBS offered three proposals, without expressing preference, which in its opinion would protect broadcasters and public against the dangers of quick set obsolescence.

Solution 1: *fixing* the standards now for a ten-year period and *telling people they are fixed* and that they can count on any set they buy, or

Solution 3: *not* fixing the standards now and *telling people they are not fixed* and they *cannot* count on any set they buy, or

Solution 2: in between these alternatives, fixing such flexible standards that neither public investment nor broadcasting investment will be jeopardized by change.

During the CBS testimony it was pointed out that it may not be necessary to increase the number of scanning lines for television images at an early date. It was contended that transmission and reception are not yet as perfect as they might be on 441 lines, and that at least 100% improvement can be expected from better definition, greater contrast, and more perfect gradation without any change in standards.

These improvements would be effected partly in transmitting equipment, and partly by the receiver manufacturer.

"As a result of questions raised at the hearing," Dr. Goldmark said, "CBS is continuing studies of adjacent channel interference in the New York area to see whether two stations can operate in a single city side by side in the ether. Tests are also to be made in collaboration with other television experimenters on the simultaneous use of horizontal and vertical polarization of transmitted signals to determine to what extent interference can be diminished between stations operating on the same channel in different cities."

Twinplex Portable

(Continued from page 713)

them into place in the position shown in the photographs, we used metal straps that are used in packing boxes. As we did not want the bolts to show, we held the straps in place with wood screws. The wires from the batteries are long and flexible so that the portable may be opened and closed without disconnecting any wires. The wires are soldered to the prongs of battery clips which are then placed permanently in the battery holes. By using just the prongs of the clips, a good connection is made without taking up any space. (The batteries fit very close together.)

The antenna and ground posts are mounted on the edge of the lid of the case, so that they will be out of the way and allow a very direct line from the antenna to the coil and tuning condenser. The speaker is a 3-inch magnetic type, which is very satisfactory. If space is at a premium, the latest 2-inch speaker may be used.

You cannot go wrong on this circuit or the portable construction and for the amateur experimenter it will prove not only interesting and fun to build, but an excellent portable outfit. Battery receivers have the great asset of producing radio reception with noise-free, high quality tone.

List of Parts

HAMMARLUND

2—Variable condensers, type HF-140, 140 mmf.
1—Antenna compensating condenser, 35 mmf.
1—20 mmf. variable condenser (bandspread)
1—Octal Isolantite socket
1—4-prong Isolantite socket
1—Set all-band plug-in coils

I.R.C. (Resistors)

1—Grid-leak resistor, 3 megs.
1—Resistor, 400 ohms, ½ watt
1—Resistor, 0.1 meg., ½ watt
1—Resistor, 0.25 meg., ½ watt

Fixed Condensers

1—Condenser, 0.01 mf., 200 volt
1—Condenser, 0.1 mf.
1—Condenser, 100 mmf.

C. F. CANNON CO.

1—Pair 2,000 ohm headphones (if used)

NATIONAL UNION RADIO CORP.

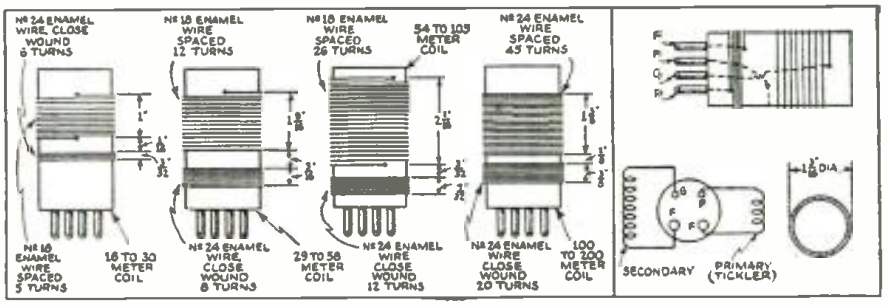
1—1G6-G tube

NATIONAL CARBON CO. (Eveready)

1—No. 6, 1.5 volt drycell (A battery)
2—45 volt B batteries (No. 762)

Miscellaneous

1—3-inch dia. magnetic speaker
1—Antenna stand-off insulator
1—R.F. choke, 4.5 mh.
1—Ground binding post
1—Twin headphone binding post
1—3-inch tuning dial
1—Tuning knob
Chassis, miscellaneous hardware, etc.



Coil Winding Data

Network Television

(Continued from page 709)

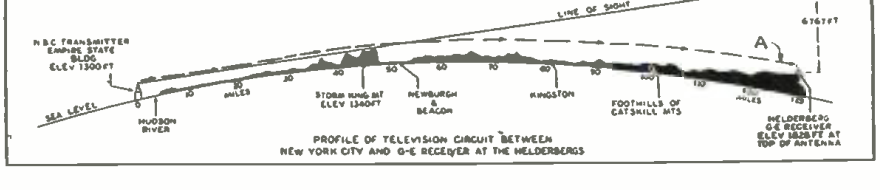
the transmitter where the frequency is converted to the 66-72 megacycle level and amplified to 10 kilowatts.

The sound part of the program is relayed from the receiving station to the main transmitter by wire line. There it modulates a standard 10-kilowatt ultra-high frequency transmitter, and the programs are then broadcast from two antennas above the transmitter to listeners in the Capital (Albany) District.

The relay station is located 129 air line miles from New York City and stands 1,700 feet above sea level, with the rhombic antenna 128 feet above. The main transmitter is at an altitude of 1,520 feet with 60-foot antennas above.

General Electric's television transmitter has been operating experimentally with programs every Monday night for several weeks. Now with the relay station in operation, permitting NBC programs to be added to the local station's programs, it is expected the new local station will soon be officially opened.

Sketch, showing curvature of the earth between New York and Schenectady and how the relay receiver, although mounted atop a mountain, 1800 feet above sea level, is still more than a mile below the line of sight from New York and 129 miles distant.



W2USA—De Luxe Ham Station

(Continued from page 714)

An outstanding job of relaying that message was done for us by Laurence Cockaday, W2JCY; Perc Collison, W2IXE, and Frank Carter, W2AZ. We at the shack (and shack it was, in those days—a temporary cardboard structure inside the empty shell of what was to become the Communications Building, with no heat and no ventilation) got a great thrill when, following one of our transmissions, W2JCY told us to listen for Bryan Groom, GM6RG, over in Scotland, who was receiving us through W2JCY and re-relaying our message, so that it could be heard throughout the U.S.A., where it could not have been heard otherwise, due to skip-distance peculiarities. Bryan, at that time, was booming through like a local broadcasting station.

Far-Off Tibet

A bit later in the day, W2JCY called us again; this time with a message. The message was a reply to our New Year's Greeting. It was from a llama priest, who had heard the message in his temple in Lhasa, Thibet, after it had been relayed by David R. Crawford, W3FPI, the Radio Officer of the American motorship "Potter," operating an amateur station on ten meters. The priest's call is AC4BZ; he is Teng Fu of Omiload Temple. The steamer was 100 miles east of Aden, Arabia, in the Persian Gulf, at the time. The complete route of the outgoing and the return messages were as follows: W2DKJ/2 to W2JCY, on 5 meters: W2JCY to the American motorship on 10 meters and the amateur marine mobile station to the priest in Thibet. The return message followed the same route, reversed.

Hundreds of reports were received, as a result of that first round-the-world round-the-clock radio relay.

Present Service

The U.S. Naval Communication Reserve, however, under the direction of C.E.R. Fred Seid, W2MQ, has been using and continues to use the facilities of W2USA for their weekly "maneuvers" and drills, utilizing several complete channels, simultaneously.

It was early recognized that no end of traffic could be solicited from visitors, at the Fair. However, a study of that type of traffic, originating at other expositions, led us to the conclusion that our facilities could be used to much better advantage than handling the usual "rubber-stamp" type of message, of doubtful importance with its accompanying temptation for relaying or terminating stations to forget it.

Many thousands of messages were handled, however, even though they were not solicited. We believe that the percentage of deliveries was rather high. For several months after the Fair started, in the absence of other facilities, practically all of the traffic was handled by relay, from W2USA to the stations of Kay Kibling, W2HXQ, at Rye, N. Y., and Viola Grossman, W2JZX, at East Rockaway, L. I. These two ladies, in addition to their activity, on the air, put in any number of hours, at the Fair station, itself, entertaining out-of-town amateurs and their friends.

Now, we have some fourteen different antennas, each designed for a different service. As may be seen, in the accompanying illustrations, we have most modern equipment. Except for the five meter station, all the apparatus has been loaned to us by a large group of manufacturers.

At present, there is no amateur service which we do not cover, except those above the five meter band and arrangements for these higher frequencies will be completed before the spring opening of the Fair. (See a Simple 2½ Meter Transmitter, in RADIO & TELEVISION for March, 1940.)

Volunteer operators, from various radio clubs, in all parts of the N. Y. Metropolitan area, are helping us to keep our station on the air every Monday, Wednesday and Friday night, on most of the amateur bands, during the time the Fair is closed down. The Naval Communication Reserve continues its regular Friday night activity and that is followed by our regular weekly résumé of amateur radio activity, which is sent out on all the amateur bands, at 9:45 p.m. Eastern Standard Time, in the form of a regular QST. In addition to the various transmitters, actually located at W2USA, our weekly QSTs are picked up and relayed by W2HXQ, with a kilowatt on both 75 and 160 meters; W2IXE, on 5 meters; W2IXY, with a kilowatt, on 20 meters; and more or less regularly, by W1KTF, with a kilowatt on 10 or 160 meters. The coverage we get on these QSTs is practically worldwide. An expansion of our relaying activities, to include a great many more stations for the forthcoming season is planned. Only recently we received a card from KA1LZ in Manila, reporting our 20 meter sigs. R5-S9.

Forty Traffic System

A new traffic handling organization, not much more than a year old, has been brought into being by the indefatigable efforts of Nils Michelson, W2LSD, who has, with members of his group, done an excellent job of shooting out traffic, from W2USA, using the C.W. set-up which we have put on that service, on an exclusive basis. In fact, each of the set-ups we have, are used for one type of service.

(Continued on following page)

(Continued from preceding page)

The boys of the "F.T.S.", as the Forty Traffic System has come to be known, have done most of the traffic-handling from W2USA, since they joined us and they have given the ladies, previously mentioned, an opportunity to devote themselves to other duties.

Our Blind Operators

For nearly the entire time the Fair was open, during the 1939 season, W2USA maintained one separate station which was regularly manned by blind operators. Through the co-operation of Dr. Merle Frampton, of the N. Y. Institute for the Education of the Blind, we were permitted to have the services of his Instructor of Radio, Robert Gunderson, W2JIO, and one of his assistants, Nick Kovak, W3IEU. For the greater part of the time these two fellows were helping us, they used a low-powered rig on 160 meters. The coverage they were able to get out of it was remarkable. Occasionally, they operated on the 75 meter phone band also. It is doubtful that any two members of our staff were more capable operators or were better liked by the fellows and girls they used to contact.

One stunt, arranged by "Bob" Gunderson, for the entertainment of several hundred students, at the N. Y. Institute for the Education of the Blind, designed to illustrate how amateur radio could be used, was the two-way demonstration which he arranged between his own station, located at the Institute, and W2USA's portable mobile station, which, for that job was operated from one of the electrically driven wheelchairs, at the Fair Grounds. A running description of the Fair, was sent out from the little station, in the chair, as it rolled around the Fair Grounds. The speech was picked up, at the Hall of Communications, where it was fed into one of the larger transmitters, and then picked up at the Institute, where it was put over a loudspeaker system, in the Institute's auditorium. Return conversation followed a reverse route.

One of the greatest thrills any of the regular staff of W2USA experienced was provided by a young, blind boy, from Baltimore, who was visiting the Fair, with his parents and some friends. He had heard Bob Gunderson and Nick Kovak mention that other blind operators would be permitted to operate W2USA, if they brought their licenses with them. He had never operated on the 5 meter band, so we started him there. Before his folks were able to tear him away, they had missed several of the earlier trains, on which they had been figuring, and it was rather well into the night before they left. And, by the way, he was a very good operator.

Discipline

From the outset, it had been our desire to make W2USA the sort of station in which all amateurs would be able to have an active part. That was one of the reasons for the determination to have as many stations as possible retransmit our regular QSTs. In addition to that sort of phone activity, we suggested that most of the traffic leaving the Fair would go out on the ultra-high frequencies and be forwarded by other stations, on other bands. There were two main reasons for this decision: we are not favorable to the use of bands which are capable of causing interference at a distance being used for short-haul contacts, except in emergencies, and then only *real* emergencies; receiving conditions at the Fair Grounds are so bad, that much better service could be had if stations a few miles distant were used. There is another very sound reason, namely; operators who were interested in traffic-handling would be able to use their own transmitters, at whatever hours were convenient for them, to say nothing of the desirability of operating a transmitter and receiver with which they were entirely familiar.

Any visiting U.S.A. licensed radio amateur, who had his license with him was permitted to operate one of the stations which was covered by the class of his license. Photostat copies of licenses are not satisfactory for such operation. There is some confusion of thought, on that point. A photostat of the STATION LICENSE, when in mobile or portable operation, away from the main station, or when the station is operated by another operator, is satisfactory, IF the operators have their licenses with them. For instance, there were many occasions when our mobile and other portable stations were used, at distances away from W2USA. In those cases, each location was supplied with a photostat copy of the station license (W2USA); a letter of authorization from the Secretary of the W2USA Radio Club, but the operators were required to have their own licenses with them, in addition.

Contacts with Home Stations

As a result of previous contacts with our station or from hearing our weekly QSTs, most of the visiting amateurs had their licenses with them. Our register carries the names of more than 5,000 licensed amateur visitors. It is affectionately known as the Golden Book. About thirty-five percent of all those who visited the station, actually handled one or more of the rigs for us, during their visits, while an even greater number used some of our facilities to talk to folks in their home towns, while some of our own operators manipulated the controls.

Then, too, any number of fellows brought their QSL cards with them. One wall of the station has been reserved for visitors' cards, while the other walls have been divided to hold the cards from all the U. S. Districts and the foreign countries.

The influx of prominent radio amateurs, from nearly every corner of the globe, to W2USA, was well begun by the visit of Bryan Groom, GM6RG, who was with us for the official opening of the Fair and the official opening of W2USA which took place the same day.

The first actual message received at W2USA was addressed to Mr. Grover Whalen by W6QUT (Freeman F. Gosden, "Amos" of the famous team of "Amos 'n' Andy").

Our Equipment

Transmitters and receivers have been chosen to do a specific job and they have been set up with what is believed to be the ideal antenna system for that particular job. The results which have been achieved have been most gratifying and it is thought that many other amateurs will find some of the circuits which we have devised, to be of benefit to them. For that reason full details of the equipment, as well as the layout of the shack itself and the various aerials will be given, with details which will permit duplicating them, as well as a description of the results which have been accomplished with each.

Our Service

Late one afternoon, a Filipino lady visited us. One could tell from her face that she was greatly distressed. She told us that she had had a report from Manila, that her youngster had been taken to the hospital with an attack of appendicitis; that an operation had been performed and that, despite much cabling, she had not been able to obtain any definite report. She was in the employ of the government and was four months out, on a seven months trip, which was to take her around the world. "Was there", she asked, "any way in which she could talk directly with her husband, who was in Manila?"

Receiving conditions at the Fair, on twenty meters are not very good, at best, and talking to Manila, at will, just isn't done. We secured all the information we could and then communicated with Frank Carter, W2AZ, who was contacting several stations in the Philippines, every morning. Through him, we ascertained that the report of the illness was correct, but that an operation had not been necessary and that the youngster was to leave the hospital in a few days. Some weeks later, we had another visit from the lady. She had her husband with her. He had traveled several hundred miles out of his way so as to thank us in person for the service which W2USA had given his wife.

A very interesting technical point in connection with that contact with Manila, was the fact that W2AZ could not hear the Philippine stations replying to his call that particular morning. On the other hand, the operator of the station of the Archbold Expedition, in New Guinea, PK6XX, told him that he was being heard satisfactorily and to go ahead with his message. Shortly thereafter, an operator in Manila, who happened to know the lady who visited our station, had her husband on the telephone; then he called the hospital where the youngster was and gave both reports to the station in New Guinea, from which they were repeated to W2AZ and then to W2USA, from which they were telephoned to International House, in New York, where the lady was staying.

Many similar instances occurred. Arrangements were made, through our station, for an amateur, stranded in Cuba, as a result of a strike on the boats to Miami, to talk with his mother; make arrangements to fly home, leaving his car behind him. A Chicago youth, who had hitch-hiked his way east, spent several days at the Kibling home, in Rye, until his mother could give us full instructions for getting him back home. When the Fendler boy and some of his Boy Scout friends were lost in the Maine mountains, several QSTs were sent out from W2USA, asking amateur radio operators in that vicinity to look for W2HXQ, which was used to keep the boy's family in contact with his father, who was leading the searching party.

The Sun Goes Down

As we were finishing our second Tom Collins, it began to rain and Meyer Berger suggested that we drop into the station again. He seemed to feel that, with so much of real interest going on, that he had all he needed for a suitable column. As we entered the door, we were greeted by Viola Grossman. She told us that she had been talking on twenty meters, with another lady operator, Miss Mary Palmer, W5DEW, of Port Arthur, Texas. Miss Palmer is better known among amateurs as "The Texas Dew Drop".

The remainder of the incident is thoroughly covered in the following quotation from Mr. Berger's column, "At the Fair," in the N. Y. *Times* for Aug. 9, 1939, which happened to be the next morning.

". . . . 'It's Mary Palmer down in Port Arthur, Texas,' she told Mr. Lynch. 'Death message.' Miss Palmer was trying to locate a Harry Pitman, an electrical man, living in Brooklyn. 'Mother passed 10 a.m., heart attack,' the message read. Oscar Oehmen located Pitman by telephone on East 42nd Street, Brooklyn. The whole thing took about 4 minutes. 'Everything okay,' he reported. 'Pitman's leaving by plane tonight for Texas. Tell Mary okay.' We left the booth softly and went walking in the rain."

Low-Cost Television Receiver

(Continued from page 716)

ground instead of to the cathode of the 885 in order to include R13 as a current limiting resistor in the discharge circuit. If this had been done in the case of the high frequency sweep the return time of the beam would have been too long. The compromise on the size of the amplitude control potentiometer led to the use of a much higher resistance because of the lower frequency of oscillation. The large size of C10 is necessary to give good low frequency response.

If desired, type 884 and 6J76 tubes may be used as sweep oscillators and amplifiers. These tubes have 6.3 volt heaters, but since the heater drain on the power transformer is such that it is usually necessary to provide an extra heater transformer, and since a 2.5 volt heater winding will be needed later should a type 906 3" cathode-ray tube be used, there is no real advantage in the use of 6.3 volt tubes.

This unit was built on a 7 x 9 x 2 inch steel chassis. Only good quality parts should be used in the construction, if stability of operation is to be expected. Heater current wires should be twisted to reduce the magnetic field around them and the wiring of the two sweep circuits should be kept apart so that they do not interact. The two-inch cathode-ray tube is mounted on a stand made of sheet aluminum, the approximate position of the tube socket being shown in Fig. 5. The exact position can be determined by inspection of the deflection plates in the tube; the two plates nearest the screen should be horizontal, and the two plates that are connected together within the tube should be toward the bottom and right of the picture. If a tube socket of the type that mounts in a circular hole by means of a locking ring (Amphenol) is used, the socket may be rotated to the proper position after the tube is in place. The focus and intensity controls are mounted on the front of the chassis below the viewing screen. The frequency, amplitude, and synchronizing controls are mounted along the sides of the chassis near the tubes with which they are associated. The picture will help to make this clear. A terminal strip is provided on the back of the chassis for connection to the receiver output.

When this unit is completed, put in all the tubes except the 885 high frequency oscillator. Using the circuit shown in Fig. 6, apply some of the 60 cycle line voltage to the horizontal deflection plates. With the image receiver connected to the power supply (but with the receiver output not connected up) to load the supply in the same manner it will be loaded in actual use, turn on the power. As the cathode-ray tube warms up a horizontal line caused by the A.C. line voltage will be seen on the screen. Adjust the focus control to produce a sharp line and the intensity control to give the minimum intensity necessary. This latter adjustment is to keep from *burning* the screen. As the 885 warms up it will begin to sweep the beam in a vertical direction. The frequency control is then adjusted to give an oscillation frequency of 60 cycles. To aid in this adjustment the patterns that will be produced at 30, 60 and 120 cycles are shown in Fig. 7. The position of the frequency control at 60 cycles should be marked on the chassis for future reference. The 60 cycle line voltage is then disconnected and the 885 high frequency oscillator put in place. With both tubes oscillating a solid green field will appear. If a suitable oscillator is available, the high frequency oscillator can be similarly adjusted to about 13,000 cycles, although this is not necessary. In adjusting the high frequency oscillator a small amount of coupling between the test oscillator and the synchronization input circuit, furnished by a short wire connected to the sync. input and laid near the leads from the test oscillator, will be helpful.

The Power Supply

One power supply is used for the complete image receiver and associated equipment. This power supply is similar to those used with sound receivers, except that the output voltage is slightly higher and greater filtering is used here than is customary in most sound work. In order to keep the output voltage to the cathode-ray tube chassis as high as possible, thus insuring a small bright spot and more nearly linear sweeps, condenser input is used to the filter and the high voltage for the receiver is taken off after the first filter section. Chokes having a relatively low D.C. resistance are desirable in order to keep down the voltage drop in them. It is important to note that the heater winding for the cathode-ray tube is not grounded, since the cathode of this tube is connected to one side of the heater inside the tube.

This power supply was built on a 7 x 9 x 2 inch steel chassis. Two tube sockets were provided for connection to the power cables from the receiver and sweep chassis. The circuit for this supply is shown in Fig. 8.

Receiving a Picture

The antenna used will have considerable effect on the results obtained. It should be an antenna designed for the reception of ultra-high frequency signals. Any of the conventional five meter type antennas will be satisfactory if mounted in the clear and in the highest possible location. The polarity of the transmitting antenna should be determined so that the receiving antenna can be mounted to take advantage of this. Television antennas are in general horizontal. Nine feet is the proper length for a half wave antenna for the two television bands most used at present. A half wave antenna fed at the center with spaced feeders is satisfactory in most cases, while the same antenna fed with twisted pair wire such as is used on many broadcast doublet installations is satisfactory where signal losses in the line can be tolerated. A horizontal antenna should be mounted at right angles to the direction of the transmitter.

To tune in a signal plug earphones into the video monitoring jacks. Tune in the video carrier of the desired station with the main tuning control. This video carrier sounds something like the hum of a radio diathermy machine, except that there is a lot more "hash" present. Next adjust the first detector and antenna trimmers to give maximum signal. Turn up the intensity control on the sweep chassis and adjust the focus control to give the picture sharp edges. Adjust the two size controls to give a rectangle roughly three units high by four units wide. Now set the 60 cycle oscillator control to the 60 cycle position previously marked. A dark horizontal line will be seen moving up or down on the screen. Adjust the low frequency sync. control and the 60 cycle speed control until this line moves slowly off the top of the picture and stays off. The vertical oscillator is then in sync. Care should be taken not to turn up the I.F. gain control

(Continued on following page)

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so far that it overloads one of the stages. This will cut off the sync. pulses and it will be impossible to obtain proper synchronization. Now adjust the high frequency sweep speed and sync. controls until the picture begins to take form. As the proper line frequency is approached a series of dark lines will be seen, sloping downward to the left or right. The wider these lines the nearer the oscillator is to the proper frequency. The picture will suddenly take form as the oscillator jumps into sync. After the picture has been tuned in, the receiver should be *detuned* a little to the low frequency side of the carrier to obtain single side-band reception. This will improve the detail of the picture. If the receiver is *detuning* too far the picture will appear as a "bas-relief." Focus and contrast (I.F. gain) controls should then be readjusted to give the best picture.

Those who wish to experiment when there is no transmitter on the air will find that a self-quenched super-regenerative receiver gives a good signal. Such a receiver radiates a carrier modulated at a high frequency, usually between 15 and 100 kc. When tuned in on the television receiver this signal can be used to synchronize the horizontal oscillator. A series of vertical dark bars will appear on the screen. Several things can be told by inspection of these bars. For instance, if the lines are evenly spaced they indicate a linear horizontal sweep. If the lines are bent at the top it indicates that the horizontal and vertical sweeps are interlocking, and that it is taking the horizontal considerable time to get back in step.

The Sound Receiver

The receiver for the television sound may be any of the conventional types used for ultra-high frequency reception. A superheterodyne is preferable, because it allows better quality reception of the *high fidelity* sound transmitters used in television work.

Parts List for Sweep and Cathode-Ray Tube Section

I.R.C.

R2 —50,000 ohm, ½ watt
R3 —500 ohm, ½ watt
R4 —100,000 ohm, 2 watt
R5 —750,000 ohm, ½ watt
R8 —3,000 ohm, ½ watt
R9 —100,000 ohm, 1 watt
R10—10,000 ohm, ½ watt
R12—20,000 ohm, ½ watt
R13—1,000 ohm, ½ watt
R14—100,000 ohm, 2 watt
R15—750,000 ohm, ½ watt
R18—5,000 ohm, ½ watt
R19—100,000 ohm, 1 watt
R20—200,000 ohm, ½ watt
R21—200,000 ohm, ½ watt
R22—1 meg., ½ watt
R23—50,000 ohm, 2 watt

RCA (Tubes)

2—885
2—57
1—902 C-R tube (2" dia.)
1—80 rectifier

AEROVOX

C1 —.0002 mf. mica
C2 —.001 mf. mica
C3 —.002 mf. mica
C4 —.1 mf. tubular paper
C5 —.005 mf. mica
C6 —.05 mf. tubular paper, 200 volt
C7 —.25 mf. tubular paper, 200 volt
C8 —.1 mf. tubular paper, 200 volt
C9 —10 mf., 25 volt electrolytic
C10—.25 mf., 200 volt tubular paper
C11, C12—.1 mf., 200 volt tubular paper

CLAROSTAT

R1 —50,000 ohm potentiometer
R6 —2 meg. potentiometer
R7 —½ meg. potentiometer
R11—50,000 ohm potentiometer
R16—2 meg. potentiometer
R17—2 meg. potentiometer
R24—50,000 ohm potentiometer
R25—15,000 ohm potentiometer

Parts List—Power Supply

T—Power transformer (KENYON) giving 800 volts at 100 ma., center-tapped; 2.5 volts at 6 amps. for the sweep oscillators and amplifiers; 6.3 volts at 0.8 amps. for the 902; 6.3 volts at 3 amps. for receiver; 5 volts at 2 amps. for the rectifier. [In the first model a Thordarson T13R07 and two separate filament transformers were used. (See text.)]

CH1, CH2—30 henry at 75 ma. (KENYON K-350)

C1—8 mf., 475 working voltage electrolytic condensers (AEROVOX)

C2, C3, C4—8 mf., 450 volt electrolytic condenser (AEROVOX)

R—2,000 ohm, 20 watt voltage dropping resistor (I.R.C.)

Sw.—S.P.S.T. toggle switch

10 Meter Mobile Rig

(Continued from page 726)

The first step in this direction was replacement of all tubes with low drain types. The following are used: R.F.—6S7G; Mixer—6D8G; I.F.—6S7G; detector and first audio combined—6T7G; A.F.—6V6; rectifier—0Z4. This reduced the drain by 1.2 amperes and a further reduction was brought about by installation of a permanent-magnet dynamic speaker in place of the field coil style formerly used.

It is a good idea to replace the vibrator in old sets, for, while the old one may still work satisfactorily, it will often produce considerable high frequency "hash". A *new* vibrator was found to give a bit higher output voltage with slightly reduced battery drain. The changes made as specified brought about a reduction of 2.5 amperes, which is really worthwhile.

A socket for connection to the converter is fastened to one side of the case, near the rear so as to be out of the way.

A relay RY was mounted in the car receiver, the contacts of which break the main battery lead to the power unit. This relay receives current from the transmitter and operates whenever the transmitter is on. Thus the receiver "B" power is turned off, which prevents feedback, and the drain on the car battery is cut to only an ampere or so.

A ½ watt neon bulb with the resistor removed is connected directly across the output transformer with a switch SW6 to open the circuit when desired. This neon bulb serves as a simple *noise silencer*, when the audio gain is turned up rather high. The switch is a double throw type, the other side connecting a condenser across the circuit for *tone control* purposes.

This about completes the *re-building* work, and the revised receiver circuit is shown in Figure 1. Only general ideas for the work are given since the job will be different for each receiver. Needless to say, a very careful alignment job is done when the work is finished.

The converter itself brought up the problem of "where to mount?" The glove compartment seemed the logical place. However, the feminine part of the family vetoed this, since there would be no place to keep the usual junk assortment found in many such receptacles. It was then decided to build the unit entirely on the compartment cover, making it only two inches deep. This scheme worked out beautifully, as there is plenty of panel room, yet there is a good deal of space still available behind the converter.

An extra cover piece was obtained from the car dealer for about 80c, and layout work proceeded. Besides the tuning dial, a meter for the transmitter and all switch controls are included on the panel.

In many cars, the loud speaker grill in the dash is removable, and a plate fitted in its place makes an excellent converter panel.

The cover piece of this particular car, a 1938 Ford (the same also fits a 1939 and possibly other models), is made in two pieces, the front sheet, and a back plate. The two are firmly fastened together and form a fine base for the various parts.

The vernier dial is mounted through a hole cut in the back plate by means of brackets. There was some indecision when it came time to fit a dual section condenser C1 in place, but this was solved by cutting down a so-called balancing condenser. This is a unit as shown in Fig. 2, with a single rotor and two sets of stator plates. It is cut down as shown in the drawing. The rotor must be cut in half, the rear section rotated 180°, and fastened back in place by means of solder and a small bushing. Only two fixed and two movable plates are left for each section.

The transformer, T1, Fig. 3, is a 1500 kc. I.F. unit and is cut down as follows: Carefully saw the wooden dowel that holds the coils, and remove the lower winding. Its associated trimmer may also be removed. The output winding consists of 20 turns of No. 24 DCC wire close wound on the dowel. The case is cut down to a total height of 1¾".

The tube socket is fastened to the upper side of the case as is the rod upon which the oscillator coil is wound, the tube hanging upside down in its steatite socket.

All R.F. coils are of No. 14 tinned copper wire, the antenna coil being self-supporting. L1 is 5 turns of insulated wire inside the ground end of L2.

All fixed condensers in the R.F. circuits are of the mica type, and leads should be kept *short* and *direct!* A heavy bare wire was run from the ground lug of the tube socket to the rotor connection of the tuning condenser, and *every* R.F. ground made to this wire.

Included in the diagram of the receiver is the complete *transmitter control* circuit, which will be described in detail in the next issue. The audio volume control R5 has a double-pole switch mounted on it; one section of this turns on the converter filaments, the other turns on the transmitter heaters. Since the tuning dial pilot lamp is connected to the converter circuit, and the meter illumination bulb to the transmitter power supply, they both act as pilot lamps to show when the various circuits are functioning.

There is little to do to get the converter working if the coils are made to dimensions given. Both antenna and oscillator circuit air trimmers (C2 and C3) should come to resonance at about midscale. When the unit is set in operation the first chore is to tune the trimmer of T1 until the hiss from the speaker is loudest. This should be done with the B.C. set tuned very close to 1500 kc. Now, vary C3 until a signal on 10 meters is picked up. An oscillator or a harmonic from another amateur band may be used. Lastly, vary C2 until the background noise is highest. The ignition noise from a nearby auto motor is ideal for this.

The case for the converter was made of two pieces of 2" aluminum channel strip, used as top and bottom, with a piece of

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1/16" sheet bent to form ends and back. Holes were cut for plugs to the B.C. receiver and the transmitter and for the antenna lead.

The next article—Part 2—will describe completion of the installation, including the transmitter, its power supply, and the antenna.

LIST OF PARTS
(Including transmitter control parts also)

SYLVANIA
V1, V3 type 6S7G (B.C. receiver)
V2 type 6D8G (B.C. receiver)
V4 type 6T7G (B.C. receiver)
V5 type 6V6 (B.C. receiver)
V6 type 0Z4 (B.C. receiver)
V7 type 6J8G (converter)

MALLORY
V1B—Replacement Vibrator (to fit B.C. set being rebuilt)

CROWE
1—Dial, #124
2—Knobs, #284
2—Knobs, #591
2—Pilot lamps, #6115

BUD
C1, Balancing condenser, #LC1673
C2, C3, Air trimmer condenser, #LC1642
SW1, DPDT switch, #SW-1120
SW3, 4, 5,—SPST switches, #SW-1115
SW6, SPDT switch, #SW1118 (B.C. receiver)
1 Panel, 7" x 16" thick, #PA987
2 Channel strips, #AC262
1 three-circuit jack, #J1326

TRIPLETT
M1—150 ma. meter, #321, rear illuminated

JENSEN
SPK—permanent magnet speaker, #ST455 (in B.C. receiver)
1—transformer, #EZX1010 (in B.C. receiver)

CORNELL-DUBILIER
C4, C5—.01 mf. mica, #1W5S1
C10—30 mmf. mica, #5W5Q3
C6—.003 mf. mica, #1W5D3
C7—.1 mf. paper, #DT4W1
C8, C9—10 mf. 25 V. electrolytic, #BR102A
C11, C12—10 mf. 25 V. electrolytic. #BR102A (in B.C. receiver)
C13—8-8-8 mf. 450 V. electrolytic, #JRC5888 (in B.C. receiver)
C14, C15—.0008 vibrator condensers, #DT16T8 (in B.C. receiver)

I.R.C.
R5—5000 ohm wire wound variable, #W-5000
SW2—DPST switch (on R5) #22
R1, R4—20,000 ohm, 1 W. carbon, #BT1
R2—300 ohm ½ W. carbon, BT ½
R3—30,000 ohm ½ W. carbon, BT ½
R6—.5 megohm variable, #D13-137 (in B.C. receiver)
SW7—DPST switch (on R6), #42 (in B.C. receiver)

J. W. MILLER CO.
T1—1500 kc. I.F. transformer, #F612 W1
T2—antenna coil, #624A (in B.C. receiver)
T3—R.F. coil, #624RF (in B.C. receiver)
T4—Oscillator coil, #624K (in B.C. receiver)
T5—175 Kc. I.F. transformer, #F612K1 (in B.C. receiver)
T6—175 Kc. I.F. transformer, #F612 K2 (in B.C. receiver)
RFC 1 & 2—chokes, #5221 (in B.C. receiver)

GUARDIAN
RY—6 V. relay, heavy duty contacts, #115E2 (in B.C. receiver)

AMPHENOL
9—Octal bakelite sockets, #M1P8 (6 in B.C. receiver)
1—Octal steatite sockets, #RS58
1—insulator (for L3, L4) #66-2
1—Connector, #80C
1—Connector, #80M
2—Plugs, #PM8

A New Type Vacuum Tube Voltmeter

(Continued from page 719)

For actual operation the procedure is as follows: After the double pole single throw switch is thrown in ON position, and the tube allowed to warm up for a minute or two, the potentiometer is adjusted until the milliammeter reads zero. The meter can then be calibrated by using a known voltage supply, impressing it across the input plates and noting the current reading.

Several different voltages may be used to obtain sufficient points for a smooth calibration curve. In D.C. measurements the same plate should always be connected to the positive polarity as reversing the plates will often throw off the calibration to a slight degree. On A.C. the calibration is the same except that no such precaution as to polarity must be observed. The A.C. calibration will be *slightly different* from the D.C. calibration.

After the meter has been calibrated it can be used for a multitude of purposes. In connection with audio amplifiers it can be used to measure the amplification of different stages. In measurement work it can be used to measure extremely high resistances, and by using a calibrated variable condenser, and an A.C. voltmeter, the meter can be calibrated to measure low capacities.

This meter will perform any of the measurements of the ordinary vacuum tube voltmeter and in addition does not require a high "B" voltage on the plates. It undoubtedly will be a welcome addition to any experimenter's laboratory.

If different voltage ranges are desired, a different size milliammeter may be used, and proper calibration curves obtained by using various values of grid voltage.

Facsimile Broadcast Stations Using the Finch System

Call Letters	*Location*	*Frequency*	*Owner*	*Power Watts*
WLW	Cincinnati	700 Kc	Crosley Corporation	50,000
WOR	Newark, N. J.	710 Kc	Bamberger Broadcasting Co.	50,000
WGN	Chicago, Ill.	720 Kc	WGN, Inc.	50,000
WHO	Des Moines, Ia.	1000 Kc	Central Broadcasting	50,000
WSM	Nashville, Tenn.	650 Kc	National Life & Ins. Co.	50,000
KSTP	St. Paul, Minn.	1460 Kc	National Battery Broadcasting	50,000
WCLE	Cleveland, O.	610 Kc	Cleveland Plain Dealer	500
WHK	Cleveland, O.	1390 Kc	Cleveland Plain Dealer	2,500
WOKO	Albany, N. Y.	1430 Kc	WOKO, Inc.	1,000
WGH	Newport News, Va.	1310 Kc	Hampton Roads Broadcasting	250
W8XUF	Jackson, Mich.	43.9 Mc		100
W2XBF	New York City	43.74 Mc	W. G. H. Finch	1,000
W2XUP	New York City	25.25 Mc	Bamberger Broadcasting Co.	100
W8XUJ	Cincinnati, O.	25.02 Mc		1,000
W2XWE	Albany, N. Y.	25.05 Mc		500
W4XIH	Nashville, Tenn.	25.25 Mc		1,000

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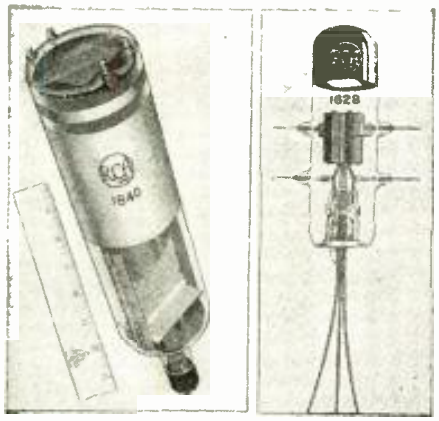
NEW RADIO APPARATUS

New RCA Tubes

● THE new 1628 is a three-electrode tube of the high-perveance type designed for use as an oscillator or R-F power amplifier at ultra-high frequencies. It can be operated at maximum ratings at frequencies as high as 500 megacycles and with reduced ratings as high as 675 megacycles. The maximum plate dissipation of the 1628 is 40 watts in class C telegraph service. Some of the features of the 1628 contributing to its high-frequency performance are: double-helical filament center-tapped within tube to minimize the effects of filament lead inductance; double grid and plate leads which are brought out of the tube through individual seals to eliminate common impedances between tank and neutralizing circuits; and tantalum plate and grid closely spaced to increase plate efficiency at high frequencies by decreasing electron transit-time between filament and plate.



The 1840 is a special form of cathode-ray tube designated as the *Orthicon*. It is intended for "picking up" a scene to be telecast and converting it to an electrical signal. This new tube utilizes a low-velocity beam for scanning. Outstanding advantages of the Orthicon are: (1) it has high operating sensitivity, (2) its signal output is free from "dark spot" and other spurious signal, (3) its current-output vs. light-input characteristic is linear, (4) it operates with an anode supply of 250 volts, (5) it does not require keystone correction, and (6) its constant black-signal level simplifies d-c restoration.

The 1848 Iconoscope is also a special form of cathode-ray tube intended for "picking up" a scene to be telecast. This type features small size, high resolution capability, and high sensitivity. Because of these features, the 1848 is especially suited for use in *portable* television cameras.

Feeder Spreaders

● A NEW line of spreaders for antenna feeders has been introduced by Bud Radio, Inc. They are made of Dupont lucite, a new water-clear thermoplastic that has remarkable insulating properties at radio frequencies. All models in the line are ⅜" in diameter and are drilled to pass wires up to No. 12. Locking screws are provided in each end to clamp wires in place. The wire spacing in the various models varies from 2", 4", 5" and 6".

Marine Radio

● A NEW line of two-way communication outfits for private and commercial boats has been announced by Marine Radio Corp. The line includes 5 models rated from 10 to 100 watts, and all have many desirable features. This equipment not only permits the amateur or professional navigator to communicate with other boats having radio equipment but also enables him to be connected to any land telephone station which has radio facilities, thus putting him in communication with the rest of the civilized world. Marine radio phones are available for operation on from 1 to 10 radio frequencies and 2 types of receivers are afforded, one of which is kept on pre-tuned frequencies, while the other is continuously tunable from 550 kc. to 250 mc. The apparatus may be operated on 6, 12, 32 or 110 volts D.C. or 110 volts 60 cycle A.C.

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Allied Radio Corp.	Mail Order	Spring Catalog		Free	727
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Approved Technical Apparatus Co.	Test Equipment	24-page Catalog		Free	735
Bliley Electric Co.	Parts Mfr.	Engineering Bulletin	E-6	10c	733
		Bulletin	E-7	Free	
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National Company, Inc.	Set & Parts Mfr.	Catalog		Free	I.F.C.
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Radio & Technical Publ. Co.	Radio Textbooks	Circulars on each Book		Free	725
Radolek Co., The	Mail Order	1940 Radio Profit Guide		Free	767
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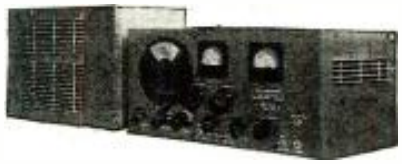
Vibroplex Co., Inc.	Code Machine	Illus. Catalog		Free	745

Preselector

● THE Howard Model 650 Preselector consists of a completely self-contained 2-stage high-gain preamplifier with tuning range of 540 kc. to 43 mc. This preselector may be used to feed any type of receiver or other radio apparatus. The input may be obtained from a standard antenna or from rotatable loops. Four loops are furnished for different frequency coverage. Compass scale at base of loop indicates direction of loops.

12-Tube Amateur Receiver

● A DE LUXE, 12-tube amateur communications receiver, the new Super Defiant, has just been introduced by Hallicrafters, Inc. This new receiver is said to have all the essentials of the well known SX-17 Super Skyrider, plus the basic design of the Skyrider Defiant, together with improvements of its own.



The announcement features especially more preselection, and more and better audio. This is accomplished by its greatly improved crystal action and an effective automatic volume control circuit which keeps most signals at uniform audibility and eliminates distortion. In addition, an automatic noise limiter reduces interference by as much as 70%.

The receiver also claims unusual sensitivity.

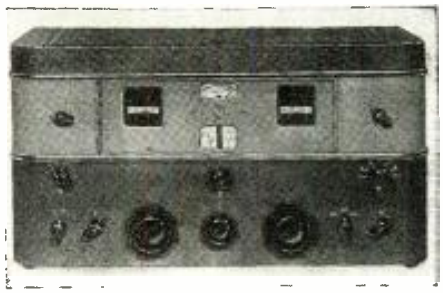
The overall range is from 540 kc. to 42 mc. in four bands. Every function is controlled from the front panel. It operates on 110 volt 50-60 cycle A.C., and may be adapted to D.C. operation if desired.

New RCA Communication Receiver

● A NEW medium-priced radio receiver designed to provide maximum performance for *amateur radio* communication, as well as for general use, has been announced by the RCA Manufacturing Company.

Designated as "General Purpose Communication Receiver Model AR-77," the new instrument is complete with built-in power supply, variable selectivity crystal filter and tubes. An eight-inch permanent magnet dynamic loudspeaker giving an unusually high degree of sensitivity and faithfulness of reproduction, and housed in a metal cabinet to harmonize with the receiver, is recommended for use with the AR-77.

The AR-77 has three outstanding new features: polystyrene insulation, which contributes to improved reception by keeping circuit losses at a minimum; "stay put" tuning, which insures against bothersome frequency drift; due to temperature; and negative feedback (applied at will by a special switch) which provides better audio fidelity by smoothing out and extending the audio response.



Another important feature is a new calibration of the two illuminated tuning dials, so the operator can tell at a glance to what part of the radio spectrum the receiver is tuned. Only the calibration of the range in use is visible. Apertures in the slide shutters installed in the dial openings move up or down with the setting of the range switch.

In addition, the bandspread calibrations have been extended to nearly the full rotation of the dial for the 10, 20, 40 and 80-meter amateur bands, making "split-kilocycle" readings possible.

Selectivity is variable in six steps employing an efficient I-F crystal filter circuit. The average sensitivity throughout the tuning range is about two microvolts for 2-to-1 signal-to-noise ratio.

An improved "noise limiter" circuit (with variable adjustment) has been devised for making signals intelligible through local auto ignition and certain other types of electrical interference.

Power consumption is only 70 watts. The metal cabinet is 20⅛" wide, 10½" high and 11⅝" deep.

Stromberg-Carlson New F-M Models

● A REVISED and enlarged circular showing every current Stromberg-Carlson in the line including the new interim models has just been issued, giving data on *frequency modulation* and *television*. The circular contains a chart showing all the features of each chassis. Tuning and tonal features are illustrated and described. It also shows and describes the new Stromberg-Carlson No. 6 Antenna Kit, Wave Wizard and Headphone Kit.

11-Tube de Luxe Phono-Radio

● ALLIED RADIO CORP. presents a new de luxe instrument in the Knight 11-tube 3-band Phono-Radio with RCA record changer. This new model incorporates a new three band Superhet receiver (540-1720 kc., 2.3-7.5 megs., 7.5-24 megs.) and built-in antenna. Six push-buttons are provided for automatic tuning.

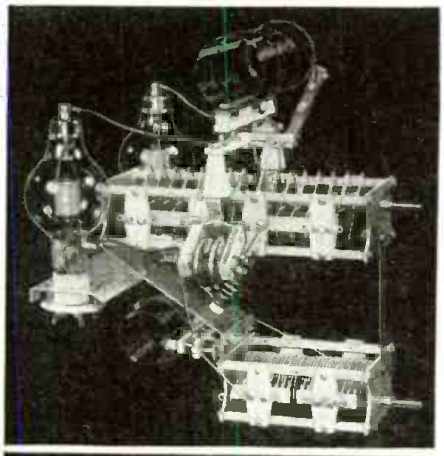
Other features include: 12-inch dynamic speaker; bass compensation and bass booster; preselector stage; full A.V.C.; continuously variable tone control; television connection, etc.

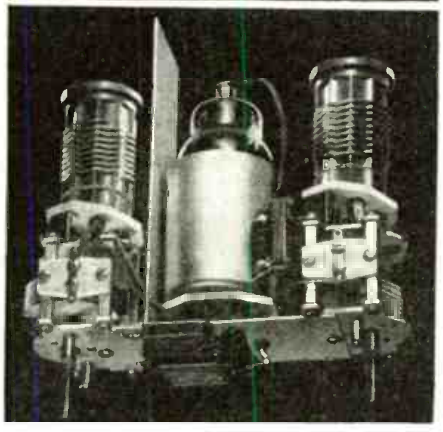
The phono section includes a new wide-range, top loading RCA crystal pickup and an RCA automatic record changer, which will load up to eight 10-inch or seven 12-inch records.

Heavy-Duty Bombarder Capacitors

● MICA capacitors for heavy-duty commercial services, such as high-frequency C.W. furnaces, are available in a wide variety of capacity ratings in the Cornell-Dubilier Type 75A units. The capacity range is from .001 to .05 mf. Maximum current ratings are from 7 to 100 amperes at 100 kc. and 45 to 80 amperes at 3000 kc. At 300 and 1000 kc. currents up to 125 amperes can be safely handled.

New Hammarlund Apparatus





• HAMMARLUND'S new "PA-500" push-pull amplifier, for use in amateur transmitters using RK-38, 100-T and similar tubes, is shown in the uppermost illustration. The voltage rating of the apparatus should be sufficient to obtain outputs up to and above 500 watts. The unit comes in kit form and is assembled as shown. It has been engineered so that short, efficient wiring may be used. The manufacturer takes care to point out that the two plate leads should be kept the same length. A circuit diagram supplied with the unit is standard for all triodes, and the values are also approximately standard. Some latitude is allowed so that the builder can change values of such components as the grid leak, etc., to conform with the types of tubes.

Lower picture shows Hammarlund "BD-40" foundation unit. This unit employs parallel or shunt feed in order that the condenser rotors and other framework may be grounded. To secure efficient shielding, the screen by-pass condenser, the cathode by-pass condenser and the cathode resistor are mounted under the base plate. The two blocking condensers are mounted on the screws which support the vertical shielding so these are automatically grounded.

NEW CATALOGS

Capacitor Manual

CAPACITOR MANUAL FOR RADIO SERVICING, of pocket size (5⅜"x7⅝"). Published by Cornell-Dubilier Electric Corporation, South Plainfield, New Jersey.

Just off the press and free to servicemen through jobbers is the new Cornell-Dubilier "Capacitor Manual for Radio Servicing," a speedy guide to the selection of standard C-D capacitors for use as replacements in all existing types of receivers.

Radio set manufacturers' names appear alphabetically, and under each are listed the manufacturer's models. For each model the data given includes capacitor values in each circuit, working voltages, C-D standard capacitor types recommended for replacement, references to basic filter and bypass circuits (over 165 of which are given in the rear section of the Manual), manufacturer's original parts numbers, and volume and page of the Rider Manual in which the complete schematic circuit can be found for checking complete circuit of the receiver.

Variety of recommended replacement capacitor types has been reduced to an absolute minimum, requiring smaller stocks with rapid investment turnover for the serviceman. And, inasmuch as all recommended types are standard, stocks can be replenished speedily from local jobbers with assurance of fresh stock. All recommended capacitors are the correct and most economical types for each particular job.

SIGMUND CATALOG

The new 118-page radio catalog just published by the Sigmund Radio Supply Co. for 1940 is one of the most comprehensive that this company has as yet put out, and all prices shown are list, so that hams and others may take orders direct from it without disclosing their net prices. The catalog is arranged according to manufacturers and includes an extremely wide range of tools, parts, accessories and complete equipment. It features such well-known products as National Union, Taylor, and Eimac tubes, Brush Crystal phone, Webster-Chicago amplifiers, Jensen speakers, Shure microphones, Precision test equipment, General Industries turntables, Bliley tubes, RME receivers, Hammarlund and National Union condensers, Thordarson transformers, National receivers and transmitters, Mallory switches, Ohmite resistors, Esico soldering irons, Burgess batteries, etc. It is a catalog which should be in the files of anyone who is interested in buying or selling radio equipment.

New Meissner Book

The new Meissner book "How to Build Radio Receivers" includes complete instructions on 28 different models and has 18 pages of television data. The book begins with charts of handy radio formulae and a table showing relations between capacity frequency and inductance. This is followed by general construction heads, after which is data on radio coils and circuit applications. Next comes an interesting chapter on the design and construction of receiving antennas, after which a television section containing numerous diagrams is shown. Data on a Meissner television receiver is also included. After this comes instructions to build sets such as a 14 tube, 5 band traffic master, and others. Also shown are signal boosters, ultra short wave converters, phono oscillators, signal calibrators and many other interesting circuits for battery socket current receivers all the way from 2 tubes up. This book is not free but is nominally priced.

COMMERCIAL NOTICES 10¢ A WORD

Under this heading only advertisements of a commercial nature are accepted. Remittance of 10c 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.

CLUBS

LIFETIME MEMBERSHIP $1.00—Monthly Bulletins. Free stickers, stationery. Universal All-Wave League, Box 8363B, Pittsburgh, Pa.

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, D-210 Manhattan Building, Chicago.

DIATHERMY MACHINES

DIATHERMY, SHORT-WAVE Therapy, and ultra short-wave therapy machines custom-built by radio engineer at considerable saving over commercial machines; 6 meters, 16 meters or any other frequency specified can be furnished. Machines substantially built with high patient safety factor. 250-300 watts output. Neat Professional appearance. Automatic safety time switches. All necessary pads and electrodes. For sale only to physicians, hospitals, and sanatariums. Prices from $195.00 to $300.00. Not for sale to the general public. Write for further information giving your own specifications and requirements. Allan Stuart, 1015 Wilson Ave., Teaneck, N. J.

EMPLOYMENT WANTED

YOUNG MAN, GRADUATE RADIO-television-sound pictures course, desires practical experience, advanced training assisting in installation, service or experimental applications. Box 89, Radio & Television, 99 Hudson St., New York.

INSTRUCTION

$120.00 ELECTRICAL ENGINEERing Course; 60 cloth-bound lesson books. Good condition. $15.00. Harry Ackerson, Box 322, Ramsey, N. J.

MISCELLANEOUS

RECHARGE DEAD DRY BATTERIES. Simple 25c details. John Churney, Streator, Ill.

MOTION PICTURE EQUIPMENT

BEADED SCREENS EASILY MADE! Enhance your home movies or projected stills with a brilliant beaded Screen! Glass beads, covering 20 square feet, with directions for applying, only $1.00. Finest, $1.25. Send stamp for your free copy of Titling Tips. D. A. Gard, 54 West 74 Street, New York.

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

QSL'S SWL'S $.75, $1.00 FOR 150, any two colors, samples. W3DEE, Maple Shade, New Jersey.

QSLS — SWLS — FREE SAMPLES. Meade, 819 Wyandotte, Kansas City, Mo.

RADIO

PLYWOOD MASTS, KNOCKED down, all parts cut to size ready for assembly, details and prices on request. Millard P. Koopman, 385 "D" Street, South Boston, Massachusetts.

REMOTE CONTROL PLANS, Description, Interpretation, 50c. Liggetts, 824 Passmore, Philadelphia.

RADIO DIAGRAMS

ANY RADIO DIAGRAM 25c. Specify manufacturer, model. Radio magazine free. Supreme Publications, 3727 West 13th, Chicago.

FOR SALE (NON COMMERCIAL) 3¢ A WORD

Under this heading we accept advertisements only when goods are offered for sale without profit. Remittance of 3c 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.

FOR SALE—LIKE NEW, 1939 Model S-20 Hallicrafters Sky Champion $35.00. A. E. Miller, 14112 Baldwin Ave., East Cleveland, Ohio.

FOR SALE: ALL SHIPPED ON TEN day free trial. FB7s $9.00, SW3s $9.00, Sky Buddies $15.00, Sky Chiefs $19.00, PR-10s $24.00, Patterson PR-10 preselectors $8.90, Sky Champions $29.00, Sky Challengers $39.00, SX-12 Skyrider Commercials $44.00, S-16 Super-Skyriders $64.00, RME-69s $89.00, HRO Sr. $129.00, Super Pro $129.00. Many other models cheap. Write for free list. Bob Henry, W9ARA, Butler, Missouri.

GOOD UNIVEX 8MM. PROJECTOR with 50-ft., Comedy $10.00 Postpaid. Howard H. Brown, Edgerton, Wisconsin.

MARTIN ALTO SAXAPHONE. GOLD plated, original pads, like new. Also three way case. Cost $225.00. Sell $75.00. W3CHF, 247 N. Payson Street, Baltimore, Maryland.

HAVE HAMMARLUND'S SUPER Pro standard model 15-560 meters bought Feb. 1939 is in perfect condition like new cost $238.00 with 15 inch speaker will sell for $109.00 sent C.O.D. express charges prepaid or for $99.00 sent express charges collect. M. G. LaChance, 26 Howard Street, Lewiston, Maine.

HOWARD 438X RECEIVER. PERfect condition, used four months, $45. Harry Ball, Route 2, Hornell, New York.

SPEED GRAPHIC—2¼x3¼, WITH 105 mm., F4.5 Kodak anastigmat lens with Compur shutter; complete with film pack adapter and Kalart flash gun. Outfit in perfect condition. Cost $127, few months ago. Need cash immediately. Sell for $100. B. Malkin, 1514 N. 6th St., Phila., Pa.

FOR SALE: CANDLER CODE Course. W8RMB, 843 Dow Street, Dayton, Ohio.

FOR SALE—SUPREME OSCILLOscope #535, Frequency Modulator #529; R.C.A. Test Oscillator #153, Service Notes, T. Wojciechowski, 2830 Fulton St., Brooklyn, N. Y.

SACRIFICE, 25 TELEVISION HI Voltage Rectifiers 2V3G, in sealed cartons, $1.00 each, regular price $3.00. Ed. Norris, Jr., 1254 Kenwood Ave., Camden, N. J.

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

SACRIFICE FOR CASH, ONE 250-300 watt T-40 phone transmitter. In good condition, used very little. Write for description and price. W5HGA, Cleveland, Miss.

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 Photographic fields for Radio, Photographic and other merchandise.

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

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 department interesting and helpful to our readers.

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

AIR KING PORTABLE BATTERY superheterodyne receiver for trade. Brand new batteries. Broadcast, police bands. Self-enclosed antenna. Extremely sensitive, featuring AVC. Want 10 Meter Transmitting Equipment, or? Irving Goldstene, 332 Alabama Avenue, Brooklyn, New York.

HAVE 1.4 VOLT RADIOS, ONE AND two tube radio parts. Oil paintings. Want old time calling cards, or what? John Haynes, Doe Run, Missouri.

HAVE ONE 0Z4G SYLVANIA Vapor Auto Radio Tube new in sealed carton. Want 16 MM movie projectors and film. Also desire correspondents in various sections. C. W. Philpot, 315W Main Street, Laurens, S. C.

WANT XTALS, SPEECH AMPLIfier, 852's, T200's, HF100, 200, 300, T55's, etc., 810's or? Meters, tank condensers. Have AC generators, receivers. Junior Pasquale, 45 Main St., Wellsville, N. Y.

SWAP: 6J7, 6C6, 42, 6A7, 75 SET OF plug in coils and 100 MFD. Variable condenser midget for 160 meter Bliley crystal or Brush crystal earphone. James Gruhuskas, 93 Westbury Park Rd., Watertown, Conn.

TRADE: HAVE TUBES SUCH AS 01a, 12, 42a, 811s, mikes; 2-button condenser. Want to trade for anything of value in the camera or telescope line. Fred E. Herman, 2834 West Fullerton Ave., Chicago, Illinois.

WILL TRADE 5X7 F8 DOUBLE ext. Eastman Premo for Sky Buddy or similar receiver. Clarence Mangan, RD3, Warren, Pa.

WANT CAMERA WITH FAST LENS; portable recorder and microphone. Have typewriter, sun lamp, pool table, Falstaff books, photographic processes and goods, electrical experimental kit. Let's swap. George Homer, 1305 W. Harrison St., Chicago, Ill.

HAVE A 1938 SKY BUDDY TO swap for anything of equal value. Irvin M. Cutler, 147 W. Main Street, Norristown, Pa.

WILL BUY OR TRADE FOR: ELECtric locomotives, receivers, small rigs, parts, good or as is. Ernie Kelly, Congress, East McKeesport, Pa.

WILL GIVE A THREE FOOT Racon horn with a unit, for 110 volts 15 watts, in exchange for a shot gun gauge 20 or 22. Mike Bayona, 245 Canal Street, New York City.

HAVE EASTMAN 16 MM PROjector, Eastman folding Kodak, Vibroplex, radio parts. Want U. S. coins. All inquiries answered. Kenneth Steele, Angola, Indiana.

INTERESTED IN OBTAINING RAdio parts for short wave sets and transmitters. Also want test equipment and DC to AC converter. What do you want? George Pidherny, 54 E. 100 Street, New York City.

WANT 1938 "SKY-BUDDY" OR equal, movie camera or oscilloscope. Will trade new Sprayberry Advanced Radio Course. Also have high volt neon sign transformer and used radios. Howard Johnson, Box 150 A, Saginaw, Minn.

PORTABLE PUBLIC ADDRESS system, amplifying guitars, Spanish and Hawaiian types, saxophones, trade for photographic equipment. Also trade 3¼ x 4¼ Graflex for 4 x 5 Graflex. Want 4 x 5 size enlarger and movie equipment. Earl Murray, Cordele, Ga.

TRADE RADIO PARTS FOR YOUR collection of photos of Amateur and S.W.L. stations. Also want Handee Grinder or what have you? Want Howard "R" meter, Morris Harwood, 3104 Edgewood Ave., Richmond, Va.

WANT 2½ TO 15 METER RECEIVER —prefer ultra Sky Rover. Have Rider books, speakers, parts list. John Moskal, 85 Gardner Ave., South Attleboro, Mass.

WANTED: 6L6 XMITTER AND power supply for same. Will swap used Candler course for good semi-automatic key. Warren Harding Wilson, Glen Ullin, N. Dak.

WANTED: A GOOD, USED SECOND hand radio speed key. Will pay cash if reasonable. Roy Kolehmainen, CCC Co. 3710, Waterville, Minnesota.

(Continued on opposite page)

Short Wave Station List

(Revises only published this month; for complete list see last issue.)

Mc.	Call	
21.570	WCBX	NEW YORK CITY, 13.91 m. Addr. CBS, 485 Madison Ave. 8 am.-12.30 pm. to Europe. Irregular.
21.550	GST	DAVENTRY, ENG., 13.92 m., Addr. (B.B.C., London) 5:40-8:45, 9-9:15, 9:30-11:30 am.
21.530	GSJ	DAVENTRY, ENG., 13.93 m., Addr. (See 21.550 mc.) 5.40-8.45 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. & Sun. Sun. 12 n.-2.30 pm. to So. Am.
18.480	HBF	GENEVA, SWITZERLAND, 16.26 m., Addr. Radio Nations. Fri. 8.45-10.15 am.

16 Met. Broadcast Band

17.970	KHE	KAHUKU, HAWAII, 16.69 m. Sa's. Suns. 8.30-9 pm. Also irreg. at 5 pm.
17.840	EIRE	MOYDRUM, ATHLONE, EIRE, 16.82 m. Addr. Radio Eireann. 7.30-8.30, 9-10 am.
17.830	WCBX	NEW YORK CITY, 16.81 m. Addr. CBS, 485 Madison Ave., N. Y. C. 8 am.-12.30 pm. to Europe.
17.810	GSV	DAVENTRY, ENGLAND, 16.84 m., 7-8.45, 9-11.30 am. to No. Amer. News, 8.15, 11 am.
17.790	GSG	DAVENTRY, ENG., 16.86 m., Addr. B.B.C., London. 5.40-8.45 am.
17.780	WNBI	BOUND BROOK, N. J., 16.87 m., Addr. Natl. Broad. Co., 9 am.-4 pm. to Europe, 4-8.15 pm. to So. Amer.
17.765—TPB3		PARIS, FRANCE, 16.89 m. Addr. 98 Bis. Blvd. Haussman, "Paris Mondial." 5-10 am.

19 Met. Broadcast Band

15.310	GSP	DAVENTRY, ENG., 19.6 m., Addr. (See 17.79 mc.) 2-5 am., 11.52 am.-1.25 pm. to Near East, 1.35-3.30 pm. News 2 pm. to No. Am.
15.300	2RO6	ROME, ITALY, 19.61 m., 4.10-4.55 am.; 10 am.-12.06 pm.; 12.20-12.40, 1-1.35 pm. for N.A.; 1.40-2.30; 3-5.30 pm., 7.30-9 pm. to N.A.
15.295	TPB4	PARIS, FRANCE, 19.61 m. 5-5.30, 7.30-8 am. to Africa.
15.290	VUD3	DELHI, INDIA, 19.62 m. Addr. All India Radio. 8-10.30 am., 11.30 am.-2.30 pm., 9.30 pm.-12 m.; Mon. 1-4 am.; Tues., Thurs., Fri., Sat., 1-3.30 am.; Wed. 2-4 am.; Sat. 9.30 am.-3.30 am.
15.290	LRU	BUENOS AIRES, ARG., 19.62 m., Addr. El Mundo. Relays LR1, 8-10 am.
15.260	GSI	DAVENTRY, ENG., 19.66 m., Addr. (See 17.79 mc.) 12.57-5 am., 12-3.30 pm. to Africa.
15.200	DJB	BERLIN, GERMANY, 19.74 m., Addr. B'c'st'g. House; 12.05-6; 9.15-9.30 am.; 6.30-9, 11.10-11.40 am., 4.55-9 pm. for N.A. News 6.45-8.30 and 9.15 am.
15.195	TAQ	ANKARA, TURKEY, 19.74 m., News in English at 7.15 am.
15.140	GSF	DAVENTRY, ENG., 19.82 m., Addr. (See 17.79 mc.) 3.30-5, 9-11.30 am., 3.50-6 pm.
15.120	HVJ	VATICAN CITY, 19.84 m. Tues. 8.30-9, 10-10.30 am., Suns. 1-1.30 pm. to N.A. Wed. 8.30-9 pm.
15.040	RKI	MOSCOW, U.S.S.R., 19.95 m. Works Tashkent near 7 am.; 8.30 pm. to N.A. 8.30-9 pm. in French.

End of Broadcast Band

11.945	CB1180	SANTIAGO, CHILE, 25.12 m. 4.50-11 pm.

25 Met. Broadcast Band

11.900	XGOY	SZECHWAN, CHINA, 25.21 m. 5.30-7.35, 7.40-9, 9.30-11, 11.10-11.50 am. 2-4.20, 4.30-6.20 pm. News 6.15 am., 5 pm.
11.895	—	MOSCOW, U.S.S.R., 25.22 m., Occ. near 6 pm.

* Operation uncertain.

Mc.	Call	
11.885	TPA3	PARIS, FRANCE, 25.24 m. (See 15.245 mc.) 1-4, 10.15 am.-5.15 to Asia and Africa.
11.880	VLR3	MELBOURNE, AUSTRALIA, 25.25 m. Daily 3.30-7.15 pm., 9 pm.-2.15 am. Sat. 3.45-10.30 pm., Sun. 12.01-2.15 am.
11.880	TPB7	PARIS, FRANCE, 25.25 m., 4.45-7.45 pm. to S.A., 8 pm.-12.45 am. to N.A. News 8.03, 11.30 pm, 12.15 am.
11.870	VLQ2	SYDNEY, AUSTRALIA, 25.27 m., 2.30-3.30 am.
11.860	GSE	DAVENTRY, ENG., 25.30 m., Addr. (See 11.75 mc.) 3.30-5 am. to Far East. 6.22-9.15 pm. to S.A.
11.845	TPC8	PARIS, FRANCE, 25.33 m., 11.30 am.-12.30 pm. to N.A. News 12.20 pm. 1.45-5 pm. to Madagascar.
11.830	VLW3	PERTH, W. AUSTRALIA. 25.36 m. 1-5 am.
11.790	WRUL	BOSTON, MASS., 25.45 m., Addr. (See 15.130 mc.) 2-5 pm. Suns. 10 am.-12 noon.
11.780	—	SAIGON, INDO-CHINA. 25.47 m. 5.45-10.15, 10.30-11 am. 6.30-7.15, 11.45 pm.-12.45 am. News 6, 10.30 pm.
11.760	2RO15	ROME, ITALY, 25.51 m., 10 am.-12 noon, Afts., and 7.30-9 pm. irr.
11.750	GSD	DAVENTRY, ENG., 25.53 m., Addr. B.B.C., London, 12.57-5, 11.52 am.-3.30, 3.50-6 pm., 9.37 pm.-12.30 am. to N.A. News 3.50 and 4.45 pm., 9.45, 11 pm.
11.740	HVJ	VATICAN CITY, 25.55 m., Weds. 9-9.30 pm. to S.A.
11.735	LKQ	OSLO, NORWAY, 25.56 m., 4.30-8.50 am., Sun. 2.30-8.50 am.
11.735	YUE	BELGRADE, YUGOSLAVIA, 25.56 m. 7-9.05 pm. to N. A. irreg.
11.730	WRUW-WRUL	BOSTON, MASS. 25.57 m. Addr. World-Wide B'cast'g Foundation, University Club. Sun. 2-8 pm.; 5.30-8.30, 8.45-10.30 pm.
11.725	JVW3	TOKYO, JAPAN, 25.59 m. 1-7 am. Irr.
11.720	CJRX	WINNIPEG, CANADA, 25.6 m., Addr. James Richardson & Sons, Ltd. Daily 4 to 8.30 pm.
11.710	YSM	SAN SALVADOR, EL SALVADOR, 25.62 m., Addr. (See 7.894 mc.) 1-2, 7-9.30 pm. Irr.
11.705	SBP	MOTALA, SWEDEN, 25.63 m., 1-4.30 pm. Sun. 3 am.-4.30 pm. Daily 8-8.30 pm. to N.A. News 8 pm.
11.700	HP5A	PANAMA CITY, PAN., 25.64 m. Addr. Radio Teatro, Apartado 954. 7-10.40 am. 5-10.45 pm. Sun. 6-10.45.

End of Broadcast Band

11.650	XGOK	CANTON, CHINA, 25.75 m., 7-9 am. News 8.10 am.
11.402	HBO	GENEVA, SWITZERLAND, 26.31 m., Addr. Radio Nations. Mon., Wed. 6.45-8.15 pm. Tues. 12.45-2.15 pm. Sat. to 2 pm.
9.855	EAQ	MADRID, SPAIN, 30.45 m., Addr. P. O. Box 951. 5.30-7.30, 7.45-8.50 pm. to N.A. News 8.40 pm.
9.815	IRF	ROME, ITALY, 30.57 m., Works Egypt afternoons. Relays 2RO, 5.20-5.40 am., 12-12.25 pm. Daily 1.50-2.30, 6-7.25, 7.30-9 pm. to N.A.
9.805	COCM	HAVANA, CUBA. 30.54 m. Addr. Transradio Columbia, P. O. Box 33. 8 am.-12.30 am. Relays CMCM.
9.780	HH3W	PORT-AU-PRINCE, HAITI, 30.67 m. Addr. P. O. Box A117. 1-2, 7-9 pm. Sun 1-2, 5-8 pm.

31 Met. Broadcast Band

9.683	HNF	BAGHDAD, IRAQ. 30.98 m. 6 am.-3 pm. Oper. uncertain.
9.680	TPC23	PARIS, FRANCE, 30.99 m. "Paris Mondial" 6-7.45 pm. 8 pm.-12.30 am. to N.A. News, 8, 11.30 pm., 12.30 am.
9.665	2RO9	ROME, ITALY. 31.04 m. 12.20-1, 1.19-5.30, 6-9 pm.
9.660	LRX	BUENOS AIRES, ARG., 31.06 m., Addr. El Mundo. Relays LRI, 5.30-6.45 am., 10.15 am.-11 pm.
9.660	HVJ	VATICAN CITY, 31.06 m. Sun. 5-5.30 am., 8.30-9.45 pm.; Thurs. 8.30-9.45 pm.
9.650	DJV	BERLIN, GERMANY, 31.09 m. Irreg. 4.50 pm.-1 am. for S.A.

(Continued on following page)

BARTER and EXCHANGE FREE ADS (continued)

SWAP TYPEWRITER, CAMERAS, projector, radio, mike, phono motor, pickup, books, records, etc. Want photo equipment, 16mm films, musical instruments. Swap lists. M. Epstein, 2953 Ruckle St., Indianapolis, Indiana.

WANT SUPERHETERODYNE 5 band coil unit with R.F. stage complete with switch and condenser. Will swap brand new I.R.C. resistors. Aerovox condensers. Write me about values of same. Albert McCartan, 2 Elm St., Dover, N. J.

WANT: COMMUNICATIONS RECEIVER—20 to 50 watt P.A.-crystals, test equipment. Have 250 varieties U.S. stamps and 25 thousand duplicates. Also pair RCA-210. Lawrence Pleasant, P.O. Box 58, Mattoon, Ill.

WANTED, CASH WAITING, GOOD used test equipment, Rider's manuals, new tubes, parts, ¼" electric drill. 40 to 100 watts amplifier. I have a good supply of parts, tubes, etc. Joseph Geviado, 159 Sabin Street, Pawtucket, Rhode Island.

CHECK WRITER, GOOD CONDITION, also fine pot, valued at $12.00. Will swap for xmitting parts or testing equipment, or what have you? A. J. Banas, 1313 W. 3rd St., Plainfield, N. J.

SWAP—LATEST TUBE AND RADIO analyzer—Pathe movie camera. Lincoln radio engineering course, radio parts, books, French phone, etc.—wants 10 watts or higher P.A. system—complete. Write: Romeo Beaulieu, 161 Cliff Rd., Wellesley, Mass.

WILL SWAP LATE 1938 MODEL Sky Buddy with added band-spread and standby switching arrangement—for what? Morris M. Rosen, W2KNP, 562 West 144th St., New York City.

SWAP A CANDID CAMERA, VERY good shape, a 20 dollar camera, for short wave receiver or radio parts. Charles Johnson, 413 Second St., S. E. Jamestown, N. Dak.

WILL PAY CASH FOR A USED record changer, prefer "Garrard". G. E. Hamilton, 170 West Third St., Mansfield, Ohio.

HAVE RIFLES, GOLD RINGS, GUITar, mandolin, electric motors and other articles of value to trade for radio, radio parts, typewriter, duplicator, printing press, clarinet or what have you? J. Bell, 1216 So. Presa, San Antonio, Texas.

WANTED: A.C. SHORT WAVE RECeivers two tubes or more. Send description and condition. Will pay cash. Moe Shanker, 32 Goodale Rd., Mattapan, Mass.

HAVE 20 WATT XTAL CONtrolled 40 M. xmitter complete with power supply and key. Trade for O-gauge electric trains and equipment, tracks, signals, etc. Make trade offer. M. Frank Green, 2606 Taylor Ave., Baltimore, Md.

WANT TEST INSTRUMENTS. HAVE assortment, radios, tubes, parts, test instruments and cash. Swap lists. J. Y. Moore, Box 437, Davidson, N. C.

I HAVE ONE L. E. S. COURSE IN Electrical Engineering and one C. L. course in Neon sign work with working kit. Would like to exchange for radio test instruments. Write Alva Crouch, 633 W. Main St., Thorntown, Ind.

HAVE G. E. PHONO MOTOR AND turntable and magnetic pickup. Want instructograph tapes or 1939 or 1940 radio handbook. Robert Cooke, 421 West 5th St., Marion, Indiana.

HAVE NEW 1940 MEISSNER phono-oscillator, Sonora crystal pickup record player, 1938 Silvertone A.C. 8 tube 3 band receiver, model 4610. Interested in starting ham station. Leon Chacona, 309 E. Buffalo St., Ithaca, New York.

HAVE 1300 ALL DIFFERENT stamps. Modern postage stamp album, 60 extras, stamp finder, perforation gauge, 230 stamp news and stories in stamps. Want Sky Buddy, Howard 430, xmitter. Jefferson Boyce, Rt. 2. Box 312, Centralia, Wash.

WANT ¼ H.P. AC MOTOR, PORTable BC set, .22 rifle, or what have you? Have copy Ghirardi's "Radio Physics Course", 5 meter superheterodyne. Vincent Morsa, 58 Bushwick Ave., Brooklyn, New York.

HAVE DYNAMIC AND MAGNETIC speakers, tubes, dials, transformers, condensers, etc., also Rem .22 slide repeating rifle in A-1 condition, worth $15.00. Want P. A. system or what have you. E. J. Steigmeyer, 308 So. Cowen St., Garrett, Ind.

HAVE 450 SUPREME ANALYZER. Philco oscillator, 2 Weston Meters, 0-7V, 0-15 amp. 2 new Readrite 0-10 amp., 0-5V. Want small pack camera needn't be working, jumbo meter, Argus A, B, E, Rusconi, 6942 Ave., K., Houston, Texas.

TUBE TESTER, SET ANALYZER. Philco Signal Generator, service manuals, parts, speakers, modern test bench, encyclopedias, tube manuals, Modern Radio Servicing, radio course, complete radio servicing laboratory, trade for car equal value, or? Jesse E. Williams, Route 1, Galena, Kans.

HAVE EASTMAN AUTO FOCUS enlarger perfect condition, also good photographic books to trade for cameras, movie cameras and projectors. Describe fully. Will pay cash differences. Hoyt Reischling, 818 North Alamo, San Antonio, Texas.

WANT SKY BUDDY OR SIMILAR S. W. receiver. Have RCA Radiola broadcast set complete with seven tubes less speaker, 3 tube A. C. short wave set, tubes and coil, Robert Webb, 264 Stocking St., Mobile, Alabama.

COMMERCIAL S.W. RECEIVER, camera wanted, what have you? Will give tubes, all kinds, test perfectly. Also have several broadcast receivers less cabinets. Graham Polonsky, 31 Acorn St., Lynn, Mass.

WANTED: ALMOST ANYTHING—Handee tool, midget radio, enlarger. Have: tools, cameras, single earphones, microscope, motors, stamps, jig saw machine. Hale Duncan, 1268 Park Ave., New York, N. Y.

SWAP POWERFUL, ADJUSTABLE surveyors glass; 5"x3" printing press with type. Magnetic phono pick-ups, tubes, speakers, radio supplies, power transformers, crystals, for signal generator. Robert Oja, 417 Pine St., Calumet, Mich.

HAVE RADIO PARTS, TUBES, RElays, mikes, xtals, pick-ups, magazines, manuals, books, fence chargers, etc. Want test equipment, meters, S.W. receiver, old coins, rifles, typewriter, camera, telescope, etc. Send your list, Roby, 6303 Kenwood, Chicago.

TRADE MIDWEST 7 TUBE SET, usable, and pair No. 9 black leather boots, new, for Do-All DeLuxe, Portable Clipper, or Super-Clipper. C. J. Hanrahan, 314 North 4th St., Mechanicsville, N. Y.

WANT SMALL REFLEX CAMERA, typewriter, photo enlarger, or other photographic equipment. Have 127 Rigona f2.9, case, 6 tube radio, 2 men's wrist watches, 2 electric razors, etc. Some cash. Jack Cansler, Dickson, Tenn.

SWAP — RADIO PARTS, FILM, Screen Fun, Pic., Mike, welding torch, Tuska coil and tran. Drummer's supplies. Make trade offers. Dominick Mele, P. O. Box 17, Sta. A, New Haven, Conn.

WANT CANDLER OR NRI COURSE or Instructograph machine. Have 400 V. D.C. power supply, many midget condensers. Will also pay cash for above. Eugene Warbington, Norcross, Ga.

WILL EXCHANGE TWO ALBUMS of assorted U. S. stamps approximately 2,000, also Drake's Radio Cyclopedia for noise limiter or crystal earphones. Or state terms. John Kuhn, 226 S. Mt. Olivet Lane, Balto, Md.

WANTED: PRESELECTOR. HAVE new Shure Master electric razor, 1 8" dynamic speaker, 1 power supply for 8 tubes mounted on large chassis, 2 8 tube transformers. Trade for? J. A. Ketchum, Hamilton Place, Nashville, Tenn.

TRADE FIRST EDITION OF A.R.R.L. Handbook, radio magazines, stamps, $25 meerschaum pipe and case. Want Howard "R" meter or what have you to trade? Hilda Scott, 2911 Griffin Ave., Richmond, Va.

HAVE A. C. RECORD PLAYER, archery tackle, microscope, spring turn table, radio parts, etc. Want signal generator, service manuals, short wave receiver, or? Arthur Dawes, Hazleton, Iowa.

NO VOLTAGE VELETRON MIKE. Delta wood lathe without motor, Zeiss medical microscope, small ham oscilloscope, All Star senior, speaker, 1975 crystal; pair T240s, high frequency buzzer, archery bow, model 20 Cine 8 camera. W5HVX, Box 936, Wink, Texas.

HAVE MODULATION TRANSFORMers, meters, chokes, movie camera, microscope, telescope, Gernsback's manuals, address system, 6L6 transmitter, A.C. generator. Need typewriter, transceiver, desk transmitter, drill, receiver, test equipment, wrist watch. W8QKU, 2748 Meade, Detroit.

EXCHANGE GADGETS, IDEAS, etc. Would like to hear from anyone interested in acoustics and reproduction of sound. K. Buchester, 8 Mark Street, New Farm, Brisbane, Australia.

WANT GOOD S.W. RECEIVER OR recording equipment. Have complete 6L6 25 watt amp., 110 A.C. generator, 6 volt motor generator, large assortment of radio parts. Harland Stuart, Spooner, Wis.

OLD STAMP COLLECTION, Rider's Manual, Rider's Testing Systems, electrical eng. books, Swiss watch. Swap for—Charles Atlas Course, typewriter, small radio, microscope, telescope. E. R. Wright, 549 Elizabeth St., Salt Lake City, Utah.

10-160 METER PHONE TRANSmitter wanted. Give complete description and lowest price for cash. W. M. McDonald, 271 Pearl, Cambridge, Mass.

HAVE NEW MEISSNER THREE tube midget all-wave receiver kit, dynamic speakers, carbon mike, tubes and parts. Want automatic code teacher with tapes or? Ralph Saber, 107 S. Albion Pl., Atlantic City, N. J.

WILL TRADE OR PAY CASH FOR: Recording head with feed screw and motor, velocity crystal mikes. Dynamotor 300 volts 100 mills. Ans. all letters. Edward Krunsky, 1504 Jenny Lind St., McKeesport, Pa.

WILL TRADE COMMON TUBES, speakers, or long wave receivers for transmitting or test equipment. Cecil Dunigan, Formoso, Kansas.

WANTED HALL SX-17 OR SX-24 receiver, crystal and speaker and any good 25 to 50 watt phone and CW transmitter. Send for list of valuable items to swap. Al Donahue, 442 Center St., Freeland, Pa.

WANTED: LAFAYETTE 6 VOLT transceptor or any other battery receiver-transmitter in good condition. Have to trade a complete violin course by U. S. School of Music in good condition. M. C. Ball, Boyd, Oregon.

BEST CASH OFFER TAKES AN automatic omnigraph code machine in good condition or will trade for any good crystal or dynamic microphone. Richard Settle, 2609 Monroe St. N.E., Washington, D. C.

ASTRONOMICAL TELESCOPE—modulation transformers—cameras—transceiver—stop watch—transmitter—vibropack—motor. Want sailboat or? Bill Heffner, 404 Sherman St., Albany, N. Y.

WANT KELSEY PRINTING PRESS 3x5—Hammarlund 1½" 4 prong coil forms and radio parts. Would like to carry on correspondence with anybody in the world. Henry Skotnicki, 23 Woodley Court, Meriden, Conn.

SWAP A COMPLETE 8MM UNIVEX movie outfit, 20 gauge shot gun, complete N.W. Taxidermy course for good used radio parts. Write Henry F. Heckert, 901 Howard, Indianola, Iowa.

WILL EXCHANGE RADIO PARTS, tubes, etc. Want correspondence with hams, SWLs and YLs all over the world. I will answer 100%. Address Ralph M. Stearns, 59 Pleasant Street, Saco, Maine.

HAVE CHEMICALS, CHEMICAL apparatus, and minerals. Also chemistry and physics books. Want xmitting tubes and parts, power pack, or any kind of radio parts. Marion Keithly, 1410 S. Warren, Sedalia, Missouri.

TRADE RCA-RK 40 ALLWAVE doublet antenna system in original carton, 1938 Callbook, shortwave magazines, for good phonograph records used only with electric pickup. Send list. Curtis Samp, Brewster, Minnesota.

HAVE PHILCO, MAJESTIC CAR radios, need repair; single button hand mike, S. W. converter, code oscillator, electric clock, S. W. mags, parts and tubes. Want 35 M.M. camera. Harry Campbell, 28 Coyle St., Portland, Me.

HAVE 6L6 TUBE (METAL), 5 TUBE AC-DC "Kent" radio, electric pants presser. Want plate camera (f.6.3 or faster). Letters only. R. A. Supplee, 242 Walnut Avenue, Trenton, N. J.

WANT PORTABLE BATTERY OR A.C. battery combination. Have good 5 tube broadcast Airline, 39 Amateur Handbook, electric razor, trumpet and case, Mac Key with bell transformer, Camera with photoflash, some cash. Dale Nichols, Hickman, Nebraska.

TRADE—HOWARD 438X RECEIVER, complete with crystal-filter and speaker. Set of Browning bandswitching electron-coupled oscillator coils. All correspondence answered. Harry Ball, Route 2, Hornell, New York.

TRADE—ONE SUPER SEVEN RECeiver and radio parts. Full information upon request. W86KP, 600 S. Boston St., Galion, Ohio.

TRADE—S-19 SKY BUDDY (USED 2 months—A-1 condition) looks Brand New. Will consider repeating rifle .22. Best offer takes it. Clarence O. Schwengel, 123 N. Bedford St., Madison, Wisc.

WANTED: TUBE TESTER SET analyzer and set of Rider manuals. Have many things to swap. Joseph B. Moore, Elkland, Pa.

WANT A GOOD PRE-SELECTOR. Will trade a 7 tube standard broadcast receiver, speaker to match, or Keystone 16 MM projector. Both in excellent condition. Herman Fischer, 626 Carlton Ave., Bklyn, N. Y.

HAVE ACSW-3 AND COILS, 20-40-80 xtals, amateur parts, xformer, etc., and Scott album with some foreign stamps. Want 0.1 milliammeter, U.S. gold coins, etc. Allan Larsen, Box 335, Chapman, Kansas.

HAVE ELECTRIC ROBOT, MOVES arms, legs and head, 5 inches tall, complete. Trade for anything interesting in electricity or radio, as electric eye, mystic mike, code recorders, etc. Sol Friedman, 500 S. 182nd St., New York City.

(Continued on following page)

BARTER and EXCHANGE FREE ADS (continued)

MAJESTIC RADIO CHASSIS, POWER packs, tubes and parts, 90 and 91 models, also fiction books, for test equipment, radio books or service manuals, typewriter, rifles or what? E. Becker, 1830 Agnes, Kansas City, Missouri.

WANT ANYTHING ON TRANSmitters, meter, tubes, coils, socket, (books). Trade V. condenser—.0001 mfd. 23 plates, .000035, .000050 mfd.; books (S.W.C.) parts and other things. Chas. Squires, 606 West 135th St., New York City.

TRADE: PORTABLE 10 METER RECeiver, over 30 tubes, $5 worth U.S., foreign stamps, old radio sets, many parts. Need typewriter; old motorcycle, radio course, bug key. Write Billy Ferguson, 312 N. Madison St., Kosciusko, Miss.

HAVE CONN, C, MELODY SAXophone, Silver-gold bell, pearl keys, and case in good shape. Want test equipment, service manuals or? H. J. LeGrand, Benton, Mo.

WANTED: COMBINATION OR SEParate tube and set tester. Have: 6 volt power pack, B eliminator, 6" auto and 8" pm speakers, 0-5 voltmeter, new and used pairs and tubes. Milo Helland, McCallsburg, Iowa.

WANTED: N.R.I. OR SOME OTHER late radio course, also test equipment. I have several tubes and parts, also 6 watt p.a. system, or will pay cash. A. E. Berglin, Bayard, Nebr.

WANT TO SWAP TUBES FOR plug in broadcast coils, 6 prong and radio books. Grady Vaughn, Jr., Route 1, Simpsonville, S. C.

WILL SWAP CANDLER JUNIOR code course for a model airplane gas engine, washing machine gas engine, electric drill, or what have you? Arthur Harris, 215 E. Madison St., Easton, Pa.

SWAP—PARTS, POWER SUPPLY, tubes, stamps, for 40 meter xtal. Also want xtal mike. Have some cash. C. Milton Tinker, Jr., West Main St., Niantic, Conn.

WANTED TO SWAP: 6L6—6C5—6J7—33—6Z4—1C5G — 1E4G — 35/51, also Weston model 280 volt Ohmmeter. All in A1 condition. For what have you? Stephen Lesko, P. O. Box 243, Nanty-Glo, Pa.

SWAP SW3, 6V. DC to 250 V. 40 MA power supply, 12A7 receiver parts kit (with tube), 7,500 V. neon sign xformer, and phones for xmitting power xformers, smoothing chokes, xtals, or what? Arthur Guy, Cochrane, Wisconsin.

HAVE 12 GA. BROWNING AUTOmatic shotgun, good condition. Trade for 8 mm movie camera with 1.9 lens or better. Pay cash for used films, 8 mm, travel, comedies. H. W. Hanson, 1730 Rosecrans St., San Diego, Calif.

HAVE AN A BATTERY ELIMINAtor, also B & C eliminator, have not been used. Will trade for tube tester. Also RCA Victor chassis with 5 new tubes and speaker. Millard Smith, St. Ignace, Mich.

WANTED: A GOOD USED P. A. System, 20-35 watts output with mike. Have cash. Brand new hot water car heater, and Oldsmobile car radio. Wm. Chuhka, Freeland, Pa.

HAVE MANDOLIN WITH STRINGS, in A-1 condition, has flat back. New Model, N. R. I. course, photographic supplies, radio amateurs handbook, back issues of R & T magazine. John Basta, 31 Lake St., Brooklyn, N. Y.

WANT TO TRADE LARGE AMOUNT of quality amateur radio equipment, including: mike, receiver, meters, transmitting tubes and parts for good reflex camera, canoe, rifles, binoculars, etc. Dean Cooper, 17 So. 17th St., Fort Dodge, Iowa.

WANT PHONO-MOTOR, P. P. INPUT transformer, Crosley radio parts, SW-3 band spread coils, V. O. M. Have rifles, stamp catalog and album, guitar. E flat alto and C melody saxophones. W. J. Closson, 295 8th St., Troy, N. Y.

WANT PRE-SELECTOR, CRYSTAL headphones. Meters—Have magnetic pickup, fence charger, time-relay, short wave parts, radio magazines, handbooks, etc. H. A. Wagner, 6305 Kenwood, Chicago.

TRADE: 160-80 METER CRYSTALS, $8.00 bug, Supreme 85PL tube tester, 300V power supplies, tubes, NC100XA, dials, relays, mike. Wanted: Meissner signal shifters, oscilloscope, photoelectric cell equipment, 40 meter crystals. B. D. Dawson, W7GPP, The Dallas, Oregon.

WANT SHORT WAVE EQUIPMENT, preferably set. Have 1300 stamps, mostly foreign, chemistry set, toy train transformer, radio parts and tubes. Also four tube battery broadcast set. Also other equipment. Roger W. Minard, Jr., North Hudson, N. Y.

BING CROSBY, BUSS COLUMBO and Paul Whiteman's old records wanted (excepting Deccas). Will buy for cash or trade radio parts or records. Send your list, state condition and value. Fred Halvorsen, 5525 Newport, Detroit, Mich.

AM INTERESTED IN BUYING moderately priced used communications receiver, particularly Guthman U-50. Please state price and condition. O. A. Rasmussen Jr., 269½ Lumpkin, Athens, Georgia.

HAVE HALF WORN BOOKS TO exchange for any radio parts or meters of any type. Mr. Charles Larsen, 738 E. 45th St., Bklyn, N. Y.

HAVE TRIPLETT TUBE TESTER No. 1210A, Merriam Webster New International dictionary, Webster's Universal unabridged dictionary (2 vol.) radio books and magazines. Want Perfex 44-2.8 lens camera or? T. Wojciechowski, 2880 Fulton St., Bklyn, N.Y.

1937-5T—SKY BUDDY—GOOD CONdition—Will exchange for a good high power rifle. Give full particulars on gun—model—make—caliber—condition, etc. Elton Nelson, Pine Hurst, Idaho.

HAVE 2½ TO 5 METER TRANSceiver, uses 2-42's and 80 with built in power supply. A-1 condition. Also coil for 10 meter operation. Trade for what have you? Robert Smith, 33 Erwin, Dukane, Pa.

HAVE 800 FEET 16 MM. FILM, "Argonne Forest", "The Last Supper", "Our Gang Comedy"; others on two 400 foot reels. Want used Sky Buddy receiver or what in ham radio. Harold Yarrington, 70 Wooster Ave., Waterbury, Conn.

WANTED 35 MM ENLARGER OR Sky Buddy receiver or other short wave set. Have Dolly camera ½ V.P.; F4.5, Radio parts, magazine and book. Joseph C. Oechslein, Jr., 41 Overlook St. (14) Pittsburgh, Pa.

HAVE XTAL. GERNSBACK MANual, 5-10 meter receiver, cartoned tubes. Want good V. O. M. or camera, Dolly, Wirgin, Helen Wax, 225 Rodney St., Bklyn, N. Y.

WANTED: SHORT WAVE RECEIVer, complete with coils and speaker. Give details. Have: seven tube broadcast receiver, tubes, parts, earphones, power supplies, eight inch magnetic speaker. Michael Crawley, 7 Walnut Street, Pompton Lakes, N. J.

TRADE: RADIO PARTS, TUBES (30, Ola's, 27's, 71a, 80, 26's, 24A's, 58, 6c6, 6D6, 37, 42 others) Power supplies, broadcast set. For: all kinds meters, microphone or key. Russel Van Orden, Pompton Lakes, N. J.

WILL TRADE 12 JIG SAW PATterns for 12 of yours, also have lots of radio parts, Muskrat traps, old records, what have you? Kenneth Morgan, 307 Main St., Port Washington, N. Y.

4 UNIT TRIPLETT ANALYZER, No. 1200 A. Meter master tester, No. 1231 All Wave oscillator, 1 free point tester, and No. 1210A Master tube checker, for used Skyrider, SX24 or 23 or Howard 460. R. J. Monson, Clayville, Va.

WANTED: KODAK, HAVE PR. OF xtal fones, 20 mtr xtal., new P. E. cell, new 616g's, many other parts and some cash. M. L. Nielsen, Rock Rapids, Iowa.

NEED NOISE SILENCER, XTAL filter. Trade Sky Buddy for earlier type receiver (Sky Champ), etc. Also have electric eye set up with relay, very sensitive. Jack Hedlundh, 127-15 14th Ave., College Point, L. I., N. Y.

SWAP DOERLE 6 TUBE COMmunications receiver and coils—57—58—2A3, 5Z3, 224 tubes—photo cells—exciter lamps, for camera and photo equipment, radio parts. A. R. Daniel, Box 204, Gilbertsville, Ky.

WANTED: 4-5 FOOT GAS MODEL with good motor, for W. E. carbon mike, Prof. harmonica, Agfa midget box camera, 50 outdoor mags. All parts are nearly new. Wayne Summerlin, 48 Magnolia, Lafayette, Georgia.

HAVE PHOTOGRAPHY EQUIPment, trimming board, telescope tripod, trays, ferrotypes, print roller, Eastman book—How to Make Good Pictures. Brand new ac-dc radio, never used. Want Teleplex or Instructograph equipment. Eddie Fazenbaker, Box 673, Westernport, Md.

SWAP 450 WATT 10 METER Xmtr, Breting 12, Oscillograph converter and 10 meter mobile phone rig. For light airplane, licensed, in good condition. Have manuals and service eqipment. Leif Johnson, W7EUY, 2210 Harrison, Everett, Wash.

HAVE BLUEBIRD ELECTRIC clothes washer with electric wringer, 25 gallon copper tank, Westinghouse motor. Used less than year, A-1 condition. Come see it. Want radio equipment. Wm. Bunnell, 1250 St. Nicholas Ave., N. Y. C.

HAVE ELECTRICAL ENGINEERing books and precision calculating rule. Trade for Rider's Manuals. Write for list of books, also state what manuals you have to trade. Robert Soulsby, 609 Lee St., Montgomery, West Va.

HAVE LOT OF TEST EQUIPMENT, all Rider and Gernsback Manuals, Ghirardi books, etc. Will trade for old jewelry and watches. What have you? R. G. Browning, 102 S. 5th St., Darby, Pa.

WILL TRADE 18 LATE ISSUES OF Popular Science and a 1939 radio amateur callbook for phono pickup, also cash if needed. Carl Seibert, 77 Main St., Oberlin, Pa.

HAVE THORDARSON CONDENSER checker, 7 tube 5 to 550 meter receiver. Want Howard receiver, typewriter, tube checker or? Sara Pflanzer, 29 Bartlett St., Bklyn, N. Y.

TRADE ELECTRONIC RELAY UNIT complete in cabinet, baby Brownie camera, for transmitting equipment; meters, tubes, condensers, etc. John Rupert, W8SXM, Jackson, Ohio.

HAVE 35 WATT CW XMTR WITH power, 300 v., 100 ma. power supply—could use small receiver, preselector, 5 meter converter, meters, etc., pay cash for bargains. W9VGS, 1305 EB, Hutchinson, Kansas.

HAVE STAMPS FROM ALL OVER the globe. Many U. S. and British Colonials, both mint and used, old and new issues to swap for radio equipment. J. Weiss, 547 E. 105th St., Cleveland, Ohio.

HAVE NUMBER OF XMITTER, receiver parts es speech equipment to exchange for good 160-80-40 xtals. Write for list. W9GZD, Paul Bossoletti, 825 Third St. So., Carrington, N. Dak.

SWAP 3 TUBE S.W. SET, AC-DC (coils and phones), will operate speaker. Also 6 tube table "Automatic" 2 band set. Want 2½-10M. converter or preselector—8-16 M.M. camera, projector. Elwood Brooks, 1636 E. 36th, Cleveland, Ohio.

SHORT AND LONG WAVE SET wanted, 2-3-4 tubes. Have broadcast parts tubes trans, gang con., etc. What have you? M. Berggren, 16 Emerson, Baldwin, L. I., N. Y.

HAVE BRAND NEW GLASS, BATtery, metal and g type tubes, also resistors, condensers, meters, books and miscellaneous. Want meters, technical books, and what have you? David Rudolph, 615 Livonia Ave., Bklyn, N. Y.

SWAP—MOVIE PROJECTOR, TYPEwriter, lathe, jig saw, radio tubes, books, magazines, etc. Want printing press and supplies, large mirror, films, camera, tools or? G. H. Hopper, 9 Copley St., Auburn, N. Y.

TRADE GENEMOTOR 53 LESSONS radio course, 8" magnetic speaker. Will trade for photo finishing outfit, 1/5 H.P. gasoline engine or portable radio. All letters answered. P. B. Long, Carthage, Miss.

TRADE 300 WATT TRANSMITTER complete with three power supplies, bias supplier, watt ham meter, keying relay, antenna system. Many extras; for good Eastman or Bell Howell movie camera. Howard Stage, Moose Lake, Minn.

HAVE PRACTICALLY NEW EIMAC 35T tube and radio parts to swap for exposure meter or photo equipment. Herman Yellin, W2AJL, 351 New Lots Ave., Bklyn, N. Y.

TRADE "MODERN HOME MEDIcal Adviser," cost $2.25, flashlight screwdriver 10¼ inches cost $1.15, "Modern Radio Operation" cost 35c. Want R. T. I. course, "Radio & Electronic Dictionary". Send stamp for list. Alexander Podstepny, 217 Pine St., Phila., Pa.

WANTED: HOWARD 430 OR SKY Buddy receiver in A1 condition. Will trade a world wide stamp collection in album. 1500 mounted stamps with catalog value of $40.00. Harry Williams, Springvalley Farm, Hillsboro, Texas.

HAVE 6-250 V. AUTO POWER SUPply, RCA 1016 3000 v. transformer, crystals, 242A, 210's, other radio parts. Want factory built receiver, Vibroplex, electric trains, good condition. M. Buck, 1644 Anthony Ave., Bronx, N. Y.

HAVE FRANZ SHUBERT'S UNfinished symphony, 3 12" records, A1 condition. Lionel 1089 outfit complete, very good condition, worth $12.75. Modern album, 600 stamps. Trade for good table model radio. Matthew Komarski, 4424 N. 19th St., Phila, Pa.

WANT TYPEWRITER, GENEMOTOR 6V-110 V. A.C. mike, radio parts or? Have radio parts, 8 tube G E battery set, 6 tube RCA electric power pack, "B" eliminator, chemistry set. Eddie K. Friesen, Neche, N. D.

WANTED: REPEATING RIFLE, outboard motor, small printing press, small row boat, small trailer; have saxophone, clarinet, bass drum, 12 watt amplifier, 16 mm. Irwin Movie Camera. Inman, 1341 Cambridge St., Cambridge, Mass.

SWAP NATIONAL SW3, TUBES, ten coils and power pack all in excellent condition for condenser analyzer. Rider's manuals, electric drill, or what have you? Edwin Ritter, 890 Bryce Rd., Kent, Ohio.

HAVE PHONE XMITTER, TEST equipment, phono-turntables, cash, etc. Want oscilloscope, outboard, sporting goods, or what have you. J. G. Cheatham, Route 3, Box 765, Texarkana, Ark.

(Continued on opposite page)

(Continued from preceding page)

Mc.	Call	
9.650	I2AA	ADDIS ABEBA, ETHIOPIA, 31.09 m., 3.30-5.30 am. Sun. 2.30-5.30 am. 8 am.-2.30 pm.
9.645	VLW2	PERTH, W. AUST., 31.10 m., 3-10.30 am. Suns to 9.30 am.
9.640	CR78E	LOURENCO MARQUES, MOZAMBIQUE, 31.09 m. Addr. P. O. Box 594. 2-4 pm to Europe.
9.630	2RO3	ROME, ITALY, 31.15 m., Addr. E.I.A.R. via Montello 5. Irreg. 1-2 am. 12.07-3 pm., 6-9 pm. to N.A. News at 7.30 pm.
9.620	TIPG	SAN JOSE, COSTA RICA, 31.19 m. 7-9.30 am., 12-2, 6-11.30 pm.
9.615	VLQ	SYDNEY, AUSTRALIA, 31.21 m. Adar. Dept. of Inform. 2-4, 6.30-7, 7-8 to N.A. 8.15-8.45, 10.30-11.30 am. to N.A.
9.610	DXB	BERLIN, GERMANY, 31.22 m. 12-2.30, 4.15-4.30 pm., 4.55 pm.-1 am. to N.A. News at 4.15, 6, 8.15, 10.30 pm. 12 Mid.
9.607	HP5J	PANAMA CITY, PANAMA, 31.23 m. Addr. Apartado 867. 12 n. to 1.30 pm., 6.30-10.30 pm.
9.595	EIRE	MOYDRUM, ATHLONE, EIRE, 31.27 m. Radio Eireann. 12.30-4.30, 5-6 pm.
9.590	VUD2	DELHI, INDIA, 31.28 m. Addr. All India Radio, 6.30 am.-12.05 pm. 5 pm.-12 m., Mon., Tues., 1-4.10 am. Wed. 2-4 am. Thur., Fri., Sat. 1-3.30 am. Sat. 5 pm.-3.30 am.
9.590	PCJ	HUIZEN, HOLLAND, 31.28 m., Addr. N. V. Philips' Radio Hilversum. Sun. 1.40-3, 7.15-8.15, 8.25-9.50 pm.; Tues. 1.45-3.30, 7-8.30, 8.45-10.15 pm.; Wed. 7.15-8.15, 8.25-8.40 pm. to N.A.
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. Irregular.
9.580	GSC	DAVENTRY, ENGLAND, 31.32 m., Addr. B. B. C., Portland Pl., London, W. 1. 12.57-1.45, 11.52 am.-3.30; 3.50-6 pm., 6.22-9.15, 9.37 pm.-12.30 am. to N.A. News 3.50, 4.45, 6.30, 7.30, 9.45 and 11 pm.
9.580	VLR	MELBOURNE, AUSTRALIA, 31.32 m. Addr. Box 1686, G. P. O. 2.30-9, 9-9.30 am.
9.570	VVM2	MACHAS, INDIA, 31.35 m. All India Radio. 9-10.30 pm., 2.30-4 am.
9.560	XEFA	MONTERREY, MEXICO, 31.38 m. 10 am.-Midnite.
9.560	DJA	BERLIN, GERMANY, 31.38 m., Addr. Broadcasting House, 9 am.-10.50 pm. Also early am. prog.
9.550	HVJ	VATICAN CITY, 31.41 m., Sun. 5-5.30 am., 8.30-9.45 pm. Wed. 2.30-3 pm. Thur. 8.30-9.45 pm.
9.550	VUB2	BOMBAY, INDIA, 31.41 m., Addr. All India Radio. 9.30-11.30 pm., 2-4 am. (Sat. 1-3.30 am.); Sat. 9.30 pm.-4 am., Sun. 5-6 am. also.
9.528	VUC2	CALCUTTA, INDIA, 31.48 m. Addr. All India Radio. 10-11 pm., 12 m.-1 am., 2-4 am. Sat. 10 pm.-2 am.
9.520	—	PARIS, FRANCE, 31.50 m., 8 pm.-12.30 am. to N.A.
9.510	GSB	DAVENTRY, ENGLAND, 31.55 m., Addr. (See 9.580 mc.—GSC) 12.57-3.15 am., 9-11.30 am., 1.45-3.30, 3.50-6, 6.22-9.15, 9.37 pm.-12.30 am.

End of Broadcast Band

9.465	TAP	ANKARA, TURKEY, 31.70 m. 5.30-7 am., Sat. 6.30-8.30 am. Sun. 5.30-7.30 am. Daily 11 am.-4.30 pm.
9.375	COBC	HAVANA, CUBA, 32.00 m. 7 am. to 12 mid. Sun. 7 am.-10.30 pm.
9.345	HBL	GENEVA, SWITZERLAND, 32.11 m., Addr. Radio Nations. Mon., Wed., 8.45-10.15 pm.
9.280	LYR	KAUNAS, LITHUANIA, 32.33 m. Daily Operating Irr.
9.234	——	BUCHAREST, ROUMANIA. 32.54 m. 12.02-5 pm.
9.230	COCY	HAVANA, CUBA, 32.50 m. G. No. 509 Vedado. 12 .-12 midnite.
9.175	HCIGQ	QUITO, ECUADOR. 32.70 m., Mon. Wed., Sat. 9-10.30 pm.
9.135	HC2CW	GUAYAQUIL, ECUADOR, 32.84 m., 11 am.-1, 7-11 pm.
9.125	HAT4	BUDAPEST, HUNGARY, 32.88 m., Addr. "Radiolabor," Gyali-ut, 22. Daily 7-8.30 pm.

Mc.	Call	
8.960	COKG	SANTIAGO, CUBA, 33.48 m. Addr. Box 137. 5-9.50 pm.
7.960	HS8PJ	BANGKOK, THAI, 37.69 m. 7-10 am.
7.500	VQ2CM	LUANSHYA, NORTH RHODESIA, 40.00 m., Mon., Fri. Noon-12.30 pm.
7.440	FG8AH	POINT-A-PITRE GUADELOUPE, F.W.I., 40.32 m., 6-7.10 pm., Sun. 9.30-11 am. P. O. Box 125.
7.310	VIG	PORT MORESBY, PAPUA, 41.01 m., 1st and 3rd Sats. each month. 3-5 am.
7.280	TPB2S	PARIS, FRANCE, 41.21 m., 1-4, 10.15 am.-4.15 pm. to Asia-Africa.
6.695	TIEP	SAN JOSE, COSTA RICA, 44.81 m., Addr. Apartado 257, La Voz del Tropico. Daily 7-Midnight.
6.445	COHI	SANTA CLARA, CUBA, 46.55 m. Addr. Parque Vida! 5. 7 am.-12.15 am.
6.395	HI9B	SANTIAGO, D. R., 46.92 m., 7.40-8.40 pm.
6.375	COCQ	HAVANA, CUBA, 47.06 m. 7 pm.-1 am.
6.300	OAX4G	LIMA, PERU, 47.62 m., Addr. Apartado 1242. Daily 6-12 mid.

49 Met. Broadcast Band

6.190	HVJ	VATICAN CITY, 48.47 m., Sun. 8.30-9 pm. to Brazil, 9-9.30 pm. to Canada. Sun. & Wed. 9.30-10 pm. to N.A.
6.170	WCBX	NEW YORK CITY, 48.62 m. Addr. Col. B'cast System, 485 Madison Ave., 12 m.-2 am., Fri. & Sat.
6.150	CJRO	WINNIPEG, MAN., CANADA, 48.78 m., Addr. (See 11.720 mc.) 8.30 pm.-1.30 am. News 10.45 pm.
6.140	KZRF	MANILA, PHILIPPINES, 48.86 m. 5-11 am. Sun. 4-11 am.
6.132	COCD	HAVANA, CUBA, 48.93 m., 10 am.-11 pm.; Sun. 10 am.-9 pm.
6.130	VLW	PERTH, W. AUST., 48.94 m. Irr. tests.
6.120	WCBX	NEW YORK CITY, 49.01 m., Addr. See 6.170 mc., 12 m.-2 am. exc. Fri. & Sat.
6.110	GSL	DAVENTRY, ENGLAND. 49.1 m. Addr. B.B.C. London. 6.22-9.15 pm., 9.37 pm.-12.30 am. News to N.A. 6.30, 7.30, 9.45-11 pm.
6.105	HJFB	MANIZALES, COL., 49.14 m., Addr. P. O. Box 175. Dly. 5.30-10 pm. Sat. to 11 pm. Sun. 2.30-5 pm.
6.055	HJFA	PEREIRA, COLOMBIA, 49.55 m., 9 am.-Noon, 6.30-10 pm.
6.040	WRUL	BOSTON, MASS., 49.65 m., Addr. University Club. Sun. 2-9 pm., 5.30-8.30 pm. Daily.

End of Broadcast Band

5.975	VONG	ST. JOHNS, NEWF'L'D, 50.21 m. Addr. Broad. Corp. of Newfoundland. 4.30-9.30 pm.
5.758	YNJAT	LEON, NICARAGUA, 52.10 m., 7-10.20 pm.
5.725	HCIPM	QUITO, ECUADOR, 52.40 m. Mon. Tues. Thurs. 8-10 pm.

60 Met. Broadcast Band

5.035	YV5RN	CARACAS, VENEZUELA, 59.58 m., 4-11.30 pm., Sun. 8.30-11.30 am., 3.30-10.30 pm.
4.990	YV3RX	BARQUISIMETO, VENEZ., 60.12 m., 10 am.-9.30 pm.
4.975	YV1RJ	CORO, VENEZ., 60.31 m., 5.30-10 pm.
4.960	VUD2	DELHI, INDIA, 60.48 m., Addr. All India Radio. 6.30 am.-12.05 pm.
4.920	VUM2	MADRAS, INDIA. 60.98 m. Addr. All India Radio, 5.30 am.-12.05 pm.
4.900	YV6RT	BOLIVAR, VEN., 61.22 m. 5.30-9.30 pm.
4.885	HJDP	MEDELLIN, COLOM., 61.42 m., 8 am.-2, 6-10.30 pm.
4.880	VUB2	BOMBAY, INDIA, 61.48 m. Addr. All India Radio, 6.30 am.-12.05 pm.
4.865	HJFK	PEREIRA, COLOMBIA, 61.67 m., 6.05-10.30 pm.
4.840	VUC2	CALCUTTA, INDIA, 61.98 m. Addr. All India Radio. 6.30 am.-12.05 pm. Sun. from 7.30 am.
4.825	HJED	CALI, COLOM., 62.17 m., 7 am.-6 pm., 7-10.30 pm.

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WANTED: OLD RADIO SETS, tubes, parts, books and magazines for an educational exhibit. Submit description. Charles R. Leutz, Jr., 9015 Myrtle Ave., Glendale, Queens, N. Y.

TRADE A BROWNIE CAMERA FOR what have you in radio parts. James White, 24 Garden St., Meriden, Conn.

HAVE GHIRARDI RADIO PHYSICS course, brand new tenor banjo, salt water rod and reel, ice skates, and cash. Want: Good S.W. receiver. Seymour Glickman, 225 Division Ave., Brooklyn, N. Y.

SWAP KEYSTONE MODEL C movie camera for a good little switch band all wave receiver, 4 to 7 tubes. Plug-in will do, if good. John L. Hoffman, 625 Valley Ave., Yonkers, N. Y.

WANT RIDER'S MANUALS. RADIO books and test equipment. Will swap phonograph records, radio sets and parts. Eugene Patterson, 745 South West St., Winchester, Indiana.

WANTED: SHOULDER STRAP model Motorola portable receiver. Have 1937 Sky Buddy to exchange. A. Veryzer, 11 Vail St., Islip, Long Island, N. Y.

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40 METER CRYSTAL WANTED. Will trade a dynamic speaker, 9 inches in diameter, field 2500 ohms. Richard J. Walker, 2351 Champlain St. N.W., Washington, D. C.

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TRADE 12 ELECTRICAL MACHINIST, metallurgy books; also two 80 meter crystals. Want microscope, tube tester, Gernsback manuals or Eastman fractional ounce scales with weights; or what? W. S. Crooks, Box 15, Stow, Ohio.

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WANTED PORTABLE BATTERY radio or binoculars. Have radio parts, tubes, 4 tube A.C. radio (good), old coins, 2 wind chargers—6 volt, etc. What have you? Walter Luetgers, Evansville, Minnesota.

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HAVE TWO UY-224 TUBES, TWO UY-227's, one C324-A, one 24, two 45's, one 80. Want 2 or 3 tube S.W. receiver or what have you. Samuel Rosen, 63 Woolson St., Mattapan, Mass.

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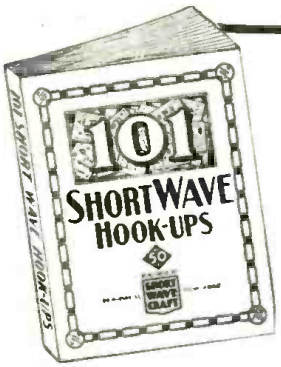

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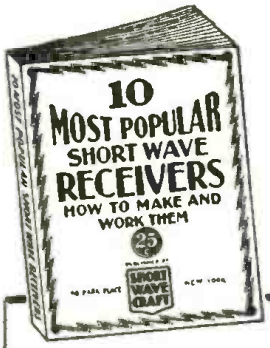

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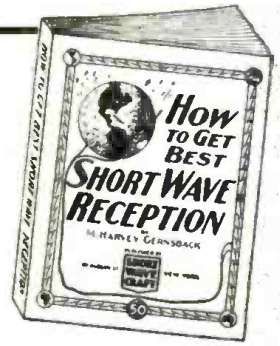

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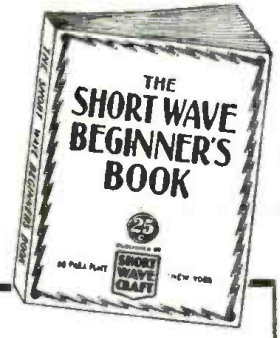

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FOTO-CRAFT

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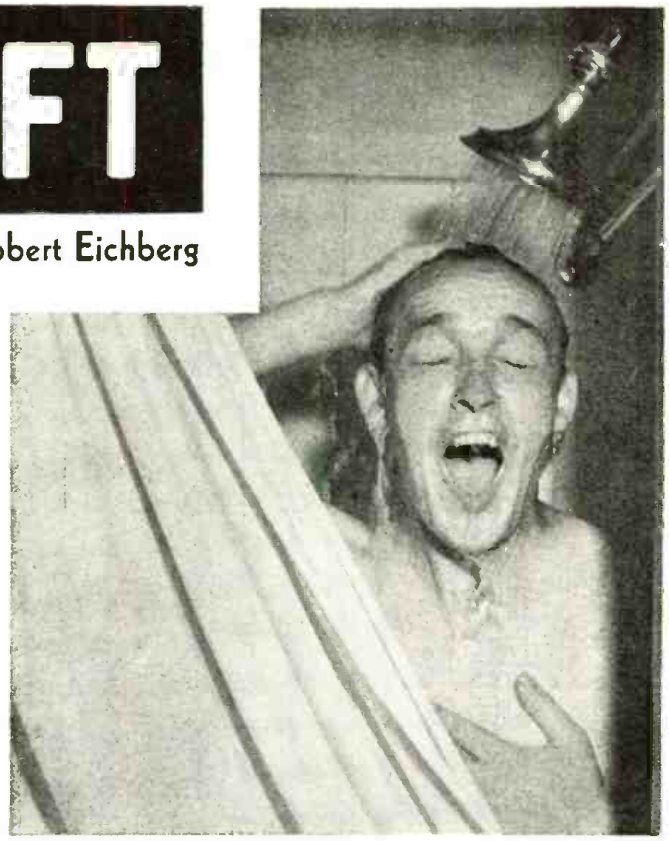


For Good Action Pictures

Use Your Head!

Sid Desfor
National Broadcasting Company

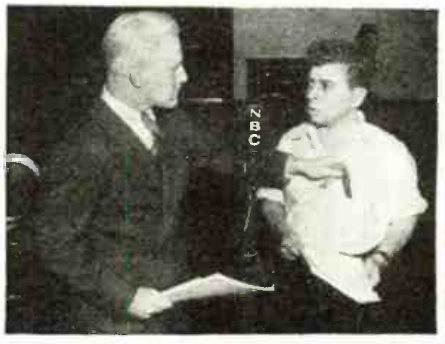
● YOU might be the possessor of wonderful camera equipment. You might have years and years of experience behind you. You might have enviable opportunities to scoop the world with great *action* shots, by being on the spot when momentous news is in the making, or being the father of the cutest children who are always doing the cutest things. And yet, despite all this, you might be a bad action photographer, unless your brain serves you as well as your equipment, your experience, your opportunities, or your children.

Let's assume, for example, that you want a picture of your pretty 18-year-old daughter, Abigail, who aspires to sing at the Met. You want an action picture in which she is singing, of course. So you ask her to sing, or to pretend she is singing, and you focus the camera on her, click the shutter. When you look at the developed print, you gasp. Abigail's face looks like she's just seen a mouse, and Abigail happens to be a girl who fears mice more than cannibals. So you try again, after checking the lighting, the camera, and Abigail's makeup. The result, alas, is pretty much the same, except this time Abigail looks the way she does when she's been swimming, and her beau held her head under the water too long, and she's just come up for air. So you give up in disgust, and take a picture of Abigail smiling on the front lawn. But you're disappointed about not getting a singing shot.

In the course of getting action shots of dozens of singers, actors, actresses, musicians and sundry personalities at the National Broadcasting Company, I've encountered the same trouble. It took me some time to solve this knotty problem, but I finally succeeded, and through simple brainwork—not through improving my camera technique. Or maybe psychology, or plain horse-sense, would be the word for it.

Singers, like most other people, are camera shy. For some reason, no matter how gorgeous they are when there's no camera pointing at them, like a shotgun (or so they feel), when they realize their picture is going to be taken, their faces assume the most grotesque expressions imaginable. And there's only one way to overcome this difficulty: to loosen and relax them and give them back their native rhythm; in other words, to get them into that mood they have when they are performing before an audience. Have them sing for a while, and

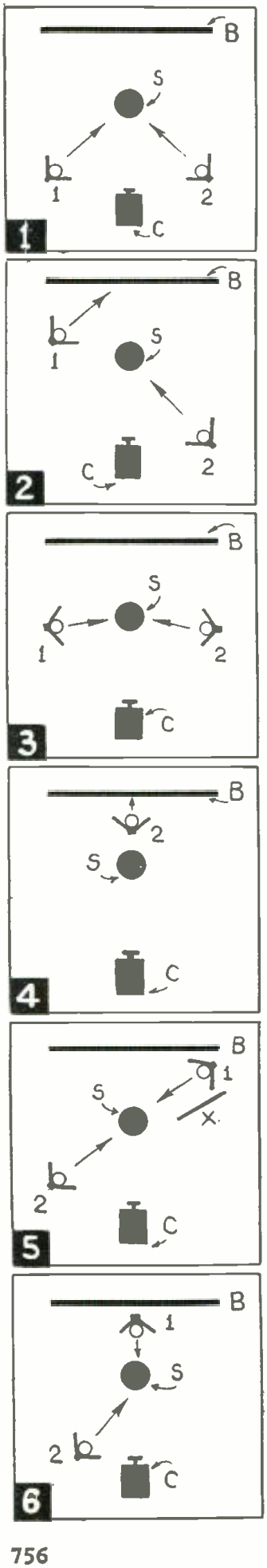
(Continued on page 762)



Top, left—A famous actress "emotes" only when goaded into doing so. *Top, right*—Ross Graham, Cities Service baritone, poses under the shower for a "singing in the bath" shot. (His expression is due to cold water.) *Other pictures* (right) were made in studio during Aldrich Family show. Top, awaiting the starting cue; center, during the show; bottom, a posed action shot. Front cover pictures are of Fannie Brice in action.

Make Better Indoor Shots

Day or Night



● ALMOST everyone knows the basic elements of taking night snapshots—that is, high speed film, two or three Photoflood bulbs, and any camera—even the simplest and most inexpensive of box types. In fact, I expect most readers have made indoor shots. Therefore, in this article, let us concentrate on the essentials of making such pictures better.

Good indoor photography is largely a matter of *position*, and by that I don't mean merely the position of the camera in relation to the subject. The positions of the lights and background in relation to the subject are just as important, in most cases, as the placing of the camera.

Let us take a concrete example—a person to be pictured, with a light wall as a background. If you want the wall to appear light in tone, it is essential that it be close behind the subject. Or, putting it another way, that it be nearly as close to the *lights* as the subject is. On the other hand, if you wish the wall to appear darker, it should be farther away from the subject and the photo lights.

There is a very simple principle here—the fact that light diminishes according to the *square* of the distance. For example, suppose a subject (or background) is four feet from your photo lights. Now double this distance, increasing it to *eight* feet, and the illumination on the subject will be only *one-fourth* as bright. Triple the distance, making it *twelve* feet, and the illumination is only *one-ninth* as strong. Therefore, you see, the distance from light to subject plays a big part in indoor exposures, and must be correct for best results.

From the pictorial standpoint, this principle of light action is quite valuable. It enables you to make a background lighter or darker at will, simply by changing the relative distance of light and background. I hope the principle is quite clear to you. In practice, it is perfectly simple, and a few minutes of experimenting will demonstrate it.

So much for the question of distances. Just as important—perhaps even more so—is the

(Continued on page 765)

In picture at top, left, sunshine coming through a window provides all illumination. Note how reflections from bedspread illuminate shadows. In picture at bottom of page, all light comes from right. Try different lighting effects with subject such as this. Picture at top, right, is "flash shot." Camera was placed right distance from dog, asleep under kitchen stove. Shutter was set for "time" exposure. Then photographer turned off kitchen lights —opened shutter—awakened the dog —and flashed the flash bulb. Then shutter was closed.

Diagrams at left show how to change the position of flood lights to obtain different effects. *S* stands for subject, *C* for camera, and *B* for background. The number 1 indicates a No. 1 photo flood in cardboard reflector, and 2 indicates a No. 2 bulb. At top (1) is regular 45-degree lighting. Next (2) a dramatic effect, with one light directed on the background. (3) a striking effect, with light on subject from either side. (4) a silhouette, with one light behind subject and turned toward wall. (5) backlighting, with a light to right, behind the subject. (Note shield "X" which keeps light from shining into the camera lens.) At bottom (6) "halo" lighting, with one light behind the subject, shining through hair.

Fundamental Facts for

Home Movie Makers

Philip C. Bennett,

Univex engineer, gives expert advice on how to get "studio quality" pictures with home movie equipment.

● ALL the rules of photography are not worth the value of a snort of snuff if a man doesn't get good pictures with them. Therefore, let's have just a simple discussion on the fundamentals of making movies.

If we keep the art on a basis of common sense, we should get good pictures. The best amateur movies that I have seen—from a technical viewpoint—resulted from the use of common sense. Every reel was so consistently good that I thought there must be some unusual trick in the set-up. I asked the amateur how he did it, and he answered, "I'm an unusual fellow. I don't know nothin' from nothin' about photography, and I admit it. But I've got enough sense to follow the instruction book because I figure that the camera company knows how to get pictures with its camera. I do exactly what it says, *I don't interpolate and I don't guess.* For instance, if the exposure table calls for an f:5.6 opening under certain conditions on a particular day, I don't wonder about it. I just set f:5.6 on the lens and start shooting. The result is that I always get swell pictures, and that's all I want."

It is good sense to know our camera. Most of us would not drive a car out in traffic unless we first knew how to handle the controls by instinct. Well, taking movie scenes is like going out into traffic. We have to know how to operate a few simple parts on the instrument well. Then we can devote our efforts to maneuvering in and out of the many possibilities for pictures.

Next, it is downright important to get the *right* exposure. The best production in the world, even in a professional picture, would be next to useless if the camera man overexposed or underexposed to such an extent that the details are lost.

It is not absolutely necessary to use an exposure meter for this. *Follow the exposure table generally issued with each camera.* The manufacturers go to great lengths to be sure that the table is accurate. They have done all the worrying for us. Therefore, we can use their information and be very sure of getting good pictures.

Of course it is permissible to use exposure meters also. Many people do. However, don't think that the meter will immediately solve all exposure problems. We will have to experiment—take data for all shots on the first several reels of film and compare them with the results. This is necessary because cameras, shutters, lenses, and other equipment generally vary from the theoretically perfect. Also, different people would get different readings on the same subject due to personal differences in eyesight. Thus, if the pictures come out consistently overexposed, then it is necessary to try a full "stop" smaller than each reading on the meter. If the pictures are consistently underexposed, it would be advisable to increase the exposure by a full "stop" over each meter reading.

Keep the lens clean, because a dirty lens will render cloudy pictures. If we can get properly exposed, clean-cut movies, our families and friends will forgive many other failures in our scenes. It is a good idea to carry a small camel's hair brush with the camera in order to clean the lens before each workout.

The discussion regarding the mechanical features can be ended with just one more reminder. *Let's treat the camera gently and carefully.* Preserve it as a trusted servant.

Most probably there are at least two types of films available for your movie camera. Learn the characteristics of each and know how to use it. For instance, in the Univex line, we have a Standard film, which is sensitive mainly to the blue component of light, and slightly to red, green, and yellow. Then we have a Panchromatic film sensitive to all colors. Naturally, each film has special adaptations for which it is most efficient.

The art angle of our movie making can fill volumes. However, we can save expense by substituting observation. Study the professional pictures shown in theatres. If we will observe carefully the details in each of the scenes, we will soon begin to think along the same lines. And then it is only natural that we will use the same methods in our own work.

Here are some very obvious examples that can be deduced. Notice that there are at least 75% close-ups in every scene. Distant shots are used, but they are more of a flavoring than the meat of the scene. Also, none of the scenes is short. Indeed, it is a very rare instance when a scene is less than ten seconds long. In those cases, the scene flit by so quickly that they make only a shallow impression on the observer. A con-

(Continued on page 767)

Avoid "swinging" the camera. If necessary to "pan" a shot, hold camera and body rigid, and swing slowly from hips.

Shots of a roadside sign taken close-up tell you just where you went, and are more effective than formal titles.

Dust the front surface of your lens at frequent intervals with a clean camel's hair brush that is kept for this purpose only.

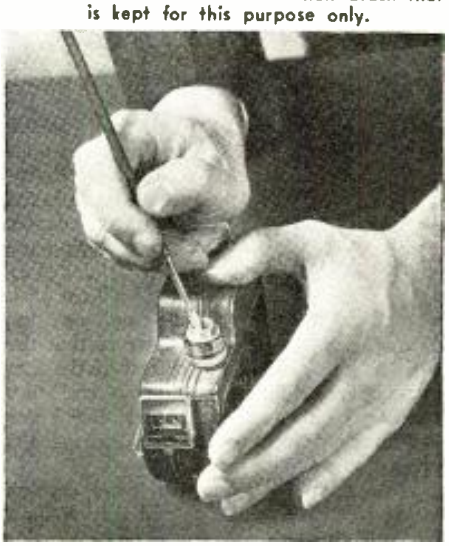
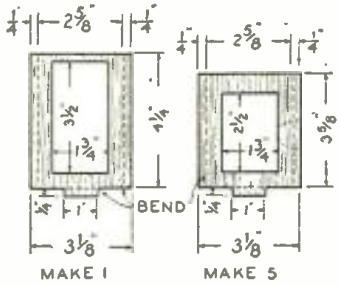


Foto Hints & Kinks

How to Make a Tank for Six Cut Film for 25c

● A PIECE of scrap stainless steel was obtained at a tinner's shop for 25c. Its dimensions were 36" x 5" (or its equivalent in small pieces can be used). Five pieces were cut out 3⅝" x 3⅛" and one piece 4½" x 3⅛". The center of each piece was



knocked out with a cold chisel and the edges filed down smoothly so that the film would not be scratched. Then the sides and bottom strip of each piece were bent over so that the film would not slip out, and so that each piece was a complete film holder by itself. Then the six holders, with the long one in the center to act as a handle, were soldered together in three places with three strips of the same metal about ¼" wide, one on each end and one on the bottom.

A piece 9" x 5" was cut and bent into a rectangular sleeve shape, two sides 3" wide and two sides 1½" wide and soldered at one end. Next a bottom was cut out and soldered to this, and the whole thing made water-tight. A cover was cut out to fit very snugly, making the whole tank light-proof. All soldered joints were painted with an acid proof paint. This tank is for 2¼" by 3¼" films, and holds only eight ounces of solution.

Larger tanks for larger size film can be made at a slight increase in cost.

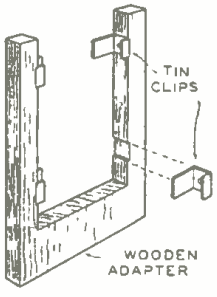
Two of these tanks have been in use now for a couple of years, and they are just as good as the day they were first made.—*Rubin Cohn, Middletown, Conn.*

Naturalist's Film Adapter Kit

● AMATEUR photographer naturalists who use 9 x12 cm film packs and double extension bellows cameras for nature studies often find it needlessly expensive to use the larger size film for all close-up pictures. A large image on a small film with the aid of the enlarger would serve the purpose equally well.

An adapter kit to permit the use of 6.5 x 9 cm film packs in the regular 9 x 12 cm adapter is easily constructed in a half hour's time from a strip of white pine lumber and a piece of tin.

Lay a used 9 x 12 cm pack on the pine board and mark the outside dimensions exactly, sizing for thickness as well. Cut out the block as marked.



Center a 6.5 x 9 cm pack on the block for width, drawing the lines with a square. Insert the block in the regular adapter after removing the safety slide. Lay the 6.5 x 9 cm pack face up on the adapter so that the tab end of the film opening coincides with the tab end film opening of the adapter. Mark the lower end limit of the small pack, drawing the cross line with the square.

Drill small holes in both lower corners at the intersection of side and bottom lines

and cut out the block with coping saw. Two countersunk notches on each side receive the tin pack retainers. The front ears of the retainer clips should be only long enough to hold the pack firmly. The rear may be continuous.

Two right angle clips of tin, inserted after the adapter kit is in the regular adapter, prevent the small pack from slipping upward when pulling tabs.

As most nature photography is done by focusing on the ground glass, the small size film limits can be marked in pencil upon the ground glass. For last minute checkup, dots of India ink may mark the limits on the view-finder.

While the pack is slightly off center endwise, the tabs of the small pack extend fully and are as easily accessible as with the regular pack.

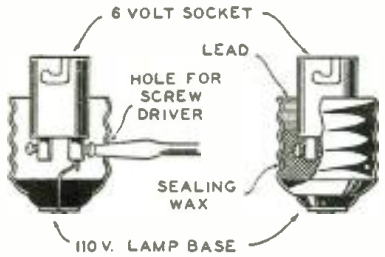
A little experience and the fact that it is off the center is forgotten. Even free hand wire finder press work may be undertaken with the small film, and there is a distinct advantage in using a large film lens on smaller size film. It is also a good teacher of utilizing all the film area when using the regular 9 x 12 cm size.—*E. Peter Smith.*

Feature Articles Wanted

The FOTO-CRAFT section is in the market for feature articles showing **how to use or construct** *photographic equipment and accessories. All must be practical and should be accompanied with photographs or sketches. No material will be returned unless accompanied by self-addressed, stamped envelope.*

Enlarger Lamp Adapter

● BECAUSE I was handicapped by not having 110 volt lights to operate my enlarger, I made a light from old auto parts, to run from a six volt storage battery,



which proved very successful. I am giving details of the light below. The following materials are needed: 1 discarded 110 volt light bulb; 1 headlamp socket and plug (such as used in Model T Ford); small quantity of sealing wax; small quantity of lead or babbitt; 1 headlamp reflector (from Model T Ford).

Remove the glass and insulation from the bulb, leaving only the brass base and the center wire. Shorten the wire by doubling it so that it will fit into the plug, which should first be put in the socket. The wire is fastened in the plug, and a hole is drilled in the brass lamp base so that a screwdriver may be inserted to tighten the screw in the plug. The sealing wax is then poured around the plug to the edge of the socket and after this has hardened and the plug is tight, the molten lead or babbitt is poured around the socket to the edge of the brass base. The wax acts as an insulator and the lead gives the contact to the upper portion of the base.

The reflector is made by cutting the headlamp reflector to the size of the original reflector in the enlarger, and it may be soldered to the socket, leaving plenty of room to insert the 32 candlepower bulb. A 50 candlepower bulb may be used if stronger light is desired, as there is plenty of ground glass and opal glass in the enlarger to diffuse the light sufficiently.

The bulbs spoken of are regular automobile headlight bulbs.

This light will fit the receptacle in the enlarger and may be removed from the enlarger just as easily as the regular enlarging light.—*Harold E. Gardner, Somerset, Penn.*

Dodging Contact Prints

● FOR those of us who use larger cameras, it is a nuisance to have to make projection prints in order to dodge, vignette, or do a hundred other tricks that can only be done with an enlarger. It was a particular nuisance to me as I used half 5 x 7 films in a view camera for portraiture, and had to make many vignetted proofs, all of which took too much time on the enlarger.

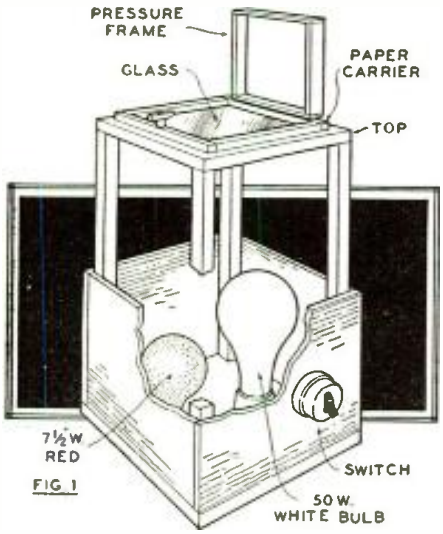


FIG. 1

This contact printer is simple to build and has a very low construction cost. All sorts of trick printing can be done with it.

The main principle of this contact printer is to have free space in which to use vignetters and dodgers and to hold the negative and paper in contact between a sheet of clear glass and one of amber glass (the back one). In this way, it is possible to follow the progress of dodging through the back of the paper. Sizes given are for the one I made; they may be varied to meet individual requirements.

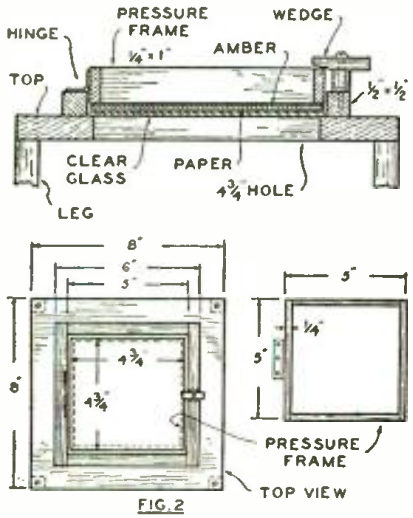


FIG. 2

The box (Fig. 1) is constructed of a ½" square wood framework 14" high, an 8½" square baseboard ½" thick; and ¼" plywood painted white on the inside is used to cover the first six inches of the framework. It contains a 50 watt white bulb and a small 7½ watt red bulb which is always on (Fig. 3). The switch of the white bulb can be bolted to the plywood at any convenient point.

FOR THE BEST photo hint published each month, a 2-years' subscription to Radio & Television will be awarded.

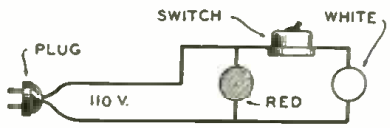
For the next five best, 1-year's subscription each will be given. All others appearing in this department will receive 8-months' subscriptions.

Photo hints may be illustrated with photographs, crude drawings, or need not be illustrated at all. However, the person submitting the hint must have tried it.

This month's Prize Winners are: 1st Prize, Rubin Cohn, other awards to E. Peter Smith, Harold E. Gardner, Joseph Diamond, Charles Mondy, Louis Kent, Reg. O. Lissaman.

The 5" x 5" negative and paper carrier consists of an 8" x 8" piece of ½" wood, nailed over the top of the framework, which has four supports. It has a 4¾" square hole in its center. The boundaries of the carrier are two ½" square pieces 6" long, and two 5" long (Fig. 2).

Pressure is provided by a 1" x ¼" square frame. This is hinged to one of the boundary pieces of the carrier and locked by a 2" high wedge which is whittled into shape by a cut and try method. The wedge is held by one 4" bolt and, turning it forces the pressure frame down. A 5" x 5" piece of clear glass and one of transparent amber glass hold the negative and the paper. Amber glass is necessary at the back of the paper to prevent fogging through the back. I have found that the 8" between the top of the lamphouse and the carrier is plenty of space in which to work and even with

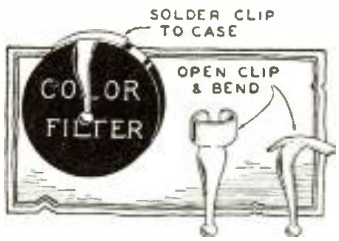


ELECTRICAL CIRCUIT
FIG. 3

double weight papers the work can easily be followed through the back. Because of the distance between light and negative, no diffusion is necessary.—*Joseph Diamond, Brooklyn, N. Y.*

Filter Clips

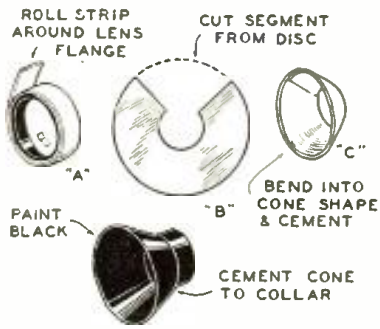
● DON'T run the risk of losing your filters! If you are accustomed to carrying one or two filters with you, here is a simple and novel method which will insure them against loss. Obtain several pencil clips from your local dime store—five cents will cover the cost of these—and open the section of the clip which fits around the pencil until it is but slightly curved, to conform to the shape of your filter case. If



the cases are of bakelite, a high-grade cement will secure them safely; if they are made of metal, solder the clip. Your filters may now be clipped to your vest or coat pocket, where they will remain firmly in place whether you are bending over to obtain an unusual shot, or racing after a five-alarm fire.—*Charles Mondy.*

Lens Shade Made of Celluloid

● FLEXIBLE, sturdy, inexpensive sunshades for either cine or still cameras may be made by using a sheet of medium



weight celluloid, a bottle of movie splicing cement, and a little flat black paint.

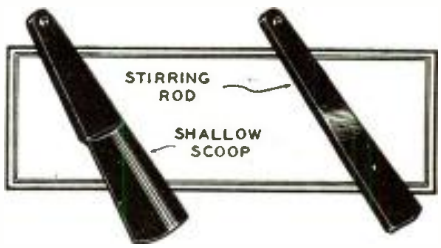
First take a narrow strip of celluloid (A) long enough to encircle the lens flange at least twice. Wrap it snugly, cementing it as you proceed, then snap a heavy rubber band around it until it sets.

Next cut a circle (B) of celluloid of the proper diameter for the size of shade wanted, and remove a segment from it like a piece of pie. Twist the circle into a cone shape (C) and cement it together. After it has set thoroughly, cut a section from the closed end of the cone so that the opening will match in size the diameter of the collar on the lens, and then cement the shade extension to the collar.

Coat the completed shade, inside and out, with flat black paint.—*Louis Kent, Madrid, Nebr.*

Old Panels Make Foto Gadgets

● DISCARDED radio panels are readily cut into strips by means of a hack saw. These strips, shaped as shown in the accompanying sketch, can be used to make small scoops, paddles or stirring rods. The scoops may be made of the requisite size to measure out chemicals, without weighing, for



compounding developers and other baths. Either bakelite, hard rubber or similar moulded plastics can be used, as these have the advantage of being non-absorbent so that they do not become saturated with the chemicals. With so much material available one need have no hesitancy in making a complete set of rods, paddles, etc., so that each may be kept with its individual tray or graduate. An attractive finish can be given to these little implements by means of fine sandpaper.—*Reg. O. Lissaman.*

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, the Editors are now able to present this unexcelled course.—Editor

RICARDO

No. 5

The Miniature Camera Viewpoint

WHERE does the miniature camera score over its bigger brothers in the pictorial field—and, just as important to know, what are its disadvantages?

Without a doubt, the remarkable improvement in the design of lenses and camera mechanism for these small cameras, together with the advance made in sensitivity and fine grain for negative material, have made possible a much wider field for the pictorialist. They offer a much greater variety of subjects and less restriction as to lighting conditions.

But, to gain the full advantage of these enterprising little cameras, extra care must be given to certain factors.

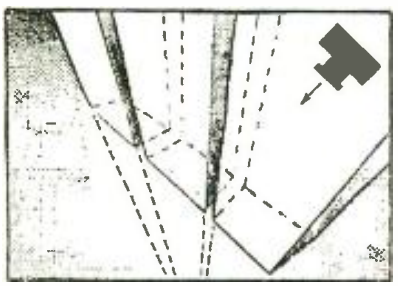
The ultimate end of every exposure is the print, and no matter what size negative we make, we are not wholly satisfied unless we can enlarge it up to our favorite size of print. If that happens to be a large size and the negative is small, the enlarging process may become bothersome.

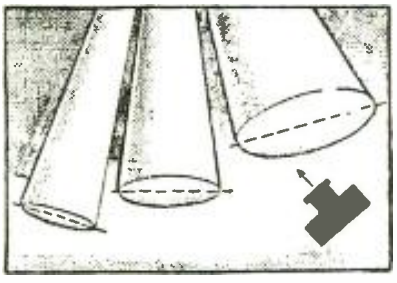
When this is the case, there grows a tendency to make the image as large as possible on the negative in order to cut down the magnification to a minimum—and that is where the biggest drawback to the miniature camera and its normal-focus lens begins to show itself.

With this lens there is only one way to make the image larger, and that is by approaching the subject as close as possible. This is quite in order unless the subject has a considerable depth of field, compared with the distance between the nearest object and the lens, and when the objects in it also have known sizes or proportions.

A few minutes' study of the diagram at the right will show why such sudden and unpleasant perspective is caused by approaching too close to the subject. There is little or no danger of this when using the normal-focus lens on "infinity."

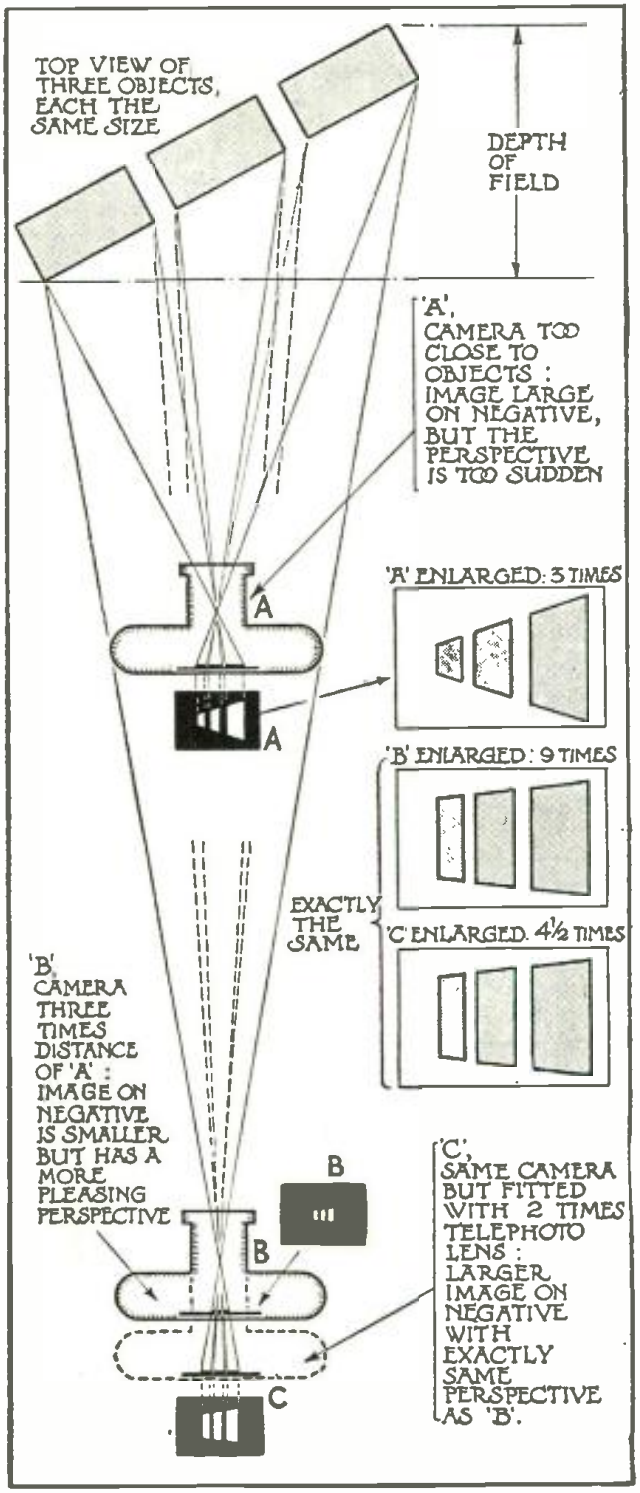
This diagram deals only with the subject-matter in the exact center of the lens axis, but as soon as it appears lower or higher, as shown by the smaller sketches on the left, another vanishing point of perspective comes into play and then we get distortion both ways. As almost every miniature camera has the plane of its film or plate fixed centrally in relation to the axis of the lens, it is impossible to remedy this fault and this provides yet a further point to watch. This, from the pictorial point of view, can spoil completely whatever other good qualities the print may possess.



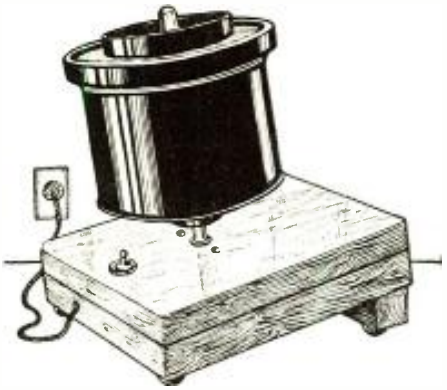


To make it quite clear to understand, three regular objects only are included in all three diagrams, but it is an easy enough matter to substitute the more usual objects and realize why much unnecessary blame has been laid on the miniature camera from the pictorial point of view. After all, a miniature camera gives precisely the same perspective as any other used from the same standpoint.

(Next month—"Backgrounds and Framing")



Home Made Tank Agitator Saves Developing Bother

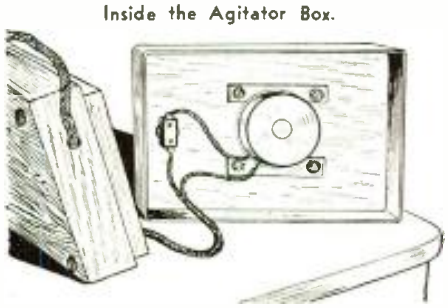


The Finished Tank Agitator.

● THE bother of continually agitating film in a daylight developing tank is obviated by the use of an automatic agitator. This may be constructed from parts which almost any radio-minded photographer is likely to find lying around in the junk box. The writer has made small and highly effective tank agitators from such parts and a small motor.

The first agitator consisted of a toy motor which ran from 110 volts A.C. This motor had little power but turned up 1750 r.p.m.—

Inside the Agitator Box.



a speed obviously far too fast for tank agitation.

The speed was reduced and the power increased by using an old vernier dial which had a ratio of 240 to 1, using a one-thread worm gear on teeth at the periphery of the dial. The motor was coupled to the shaft of the worm gear by means of a piece of soft rubber tubing so that accurate alignment was unnecessary. While this agitator was extremely effective it was noisy, and the writer wished for something that could be operated silently during the wee small hours of the night.

The second agitator (illustrated herewith) was simplicity itself to build and the only expense was for an electric clock motor. This motor, sold by a mail order house, has built-in reduction gearing so that the shaft revolves at 3 1/3 r.p.m.—a usable speed for tank agitation. The shaft has an 8/32 thread at the end. This motor was mounted on a blank plate, such as is used on electric wall switch boxes, and the shaft extended through a hole therein.

However, it was seen that the weight of the tank might injure the small bearings of the delicate gear train, so a standard ball bearing was centered directly over the shaft and the outer race sweated to the plate. A standard ¼" spacer was driven through the center race of the bearing and the shaft screwed into it. Then a 4" radio dial was secured and the shaft hole in it extended up through the knob. The dial was then affixed to the spacer extending through the ball bearing, but with its knob side downward.

This plate carrying motor and dial was then installed in a cigar box and a block of wood ½ inch high nailed to the bottom of the box to provide tilt. Rubber feet, to deaden vibration, were put at all four corners and an old radio toggle switch was inserted in one side of the line leading to the motor. It worked perfectly and is highly recommended to FOTO-CRAFT fans.

Exposing Popular Photo *Fallacies*

A New Department for Beginners

● THERE are a lot of beliefs held by the amateur photographer which will be of use to him only if he forgets them as rapidly as possible. Perhaps the foremost of these is the one universally held by the beginner—that dark room technique is difficult, mysterious and costly.

Many a man has refrained from developing that prized roll of film through the fear that he will spoil it. Instead of doing the work himself he takes it to the drugstore. Remember, the first roll of film developed by you in your bathroom will come out better than the average drugstore work 99 times out of 100.

Nor is the necessary equipment expensive. All you need is 3 nice clean soup plates, a 5c M-Q tube, about 15 cents worth of hypo, and a 10c store thermometer.

The easiest method is to lay a board across the bathtub, and set the 3 soup plates on it, filling the one on the left with developer made from the contents of the MQ tube, the center one with cold water, and the 3rd one with the acid fixing bath made from the hypo. Instructions for making the developer and the fixer appear on the containers. The thermometer, which should be dipped in shellac or varnish and allowed to dry before using, is required to take the temperature of the various solutions, for the time of development depends on this temperature. The information as to the time required for various temperatures appears on the M-Q tube.

The first attempt at development should be made at night. One enters the bathroom, mixes the various solutions, pulls down the dark shade on the window, (if there is no dark shade, hang an old blanket over the window) turns out the light, kicks a towel up against the crack at the bottom of the bathroom door—and goes to it.

The paper backing of the film is unrolled to the point where the film itself ends. This film is grasped firmly in the hand and pulled from the roll. Care should be taken not to allow the film to kink when this is done, but if it does kink it can be straightened out through the hand which will grasp the other end. The end of the film nearest the spool will be found stuck to the paper backing with a piece of adhesive. This is pulled loose from the film. If you have clips to hold the film so much the better; if not, it can be held between the fingers.

Now, in the dark, run the film through the plain water a few times to make it soft and limber. This is done by holding one end of the film in the water and *raising the lower hand* as the *upper hand* is *lowered*. When the film has been "dunked" 5 or 6 times, it will be sufficiently limp and may then be transferred to the developer through which it is immersed in the same way. As you immerse it first, sing out "Start" to an assistant who is outside where there is enough light to watch a clock. Keep pulling the film up and down through the developer until your assistant shouts "OK" at the time specified on the instructions on the M-Q tube. Don't worry if you are a few seconds early or late in removing the film from the developer. You will find it matters very little whether you give it as much as 20 seconds more or less.

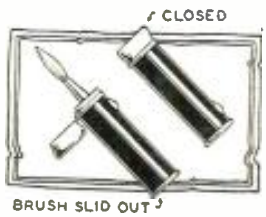
After removing the film from the developer, run it through the cold water bath in the center dish 3 or 4 times to stop the development. Then run it 8 or 10 times through the bath in the hypo dish. You can now turn on the light and can keep drawing the film through the hypo for another 10 or 15 minutes with the light on. Unless the film is to be kept as a matter of historical record, you will find that 5 to 7 minutes in the hypo will be sufficient. However, if the film is to be preserved for long periods let it soak in the hypo for 15 minutes to ½ hour.

(Continued on page 762)

More Photo Kinks

Lip Stick Lens Brush Holder

● HERE is a novel and handy container for your lens brush. Secure a small camel's hair brush, such as those supplied with various medicines for external application; cut off the handle and seal the brush in an empty lipstick holder (the type which slides in and out). To assure firm anchorage of the brush, pour hot paraffin or sealing wax in the small section where the lipstick had been attached previously. You now have a dust-proof, pocket-sized brush ready for active duty whenever needed.—*O. C. Ingram.*



Exposing Popular Photo Fallacies

(Continued from page 761)

If you have a dish deep enough to contain the film you may pour the hypo into this and merely let the film soak in it, rocking the dish every few minutes. It is not necessary to agitate it continuously in the hypo.

A good safe way to figure the proper time of fixing is to know how long it takes for the film to lose all of its milky smoky appearance. This usually takes from 5 to 7 minutes; then leave the film in another 5 to 7 minutes, in other words leave the film in the hypo twice as long as it takes all the milky appearance to vanish. Then put the film in a deep dish and leave it under *gently* running *cold* water for 15 minutes to one hour.

After this you may take the film out, punch a hole in one end of it and hang it up to dry. Drying will be facilitated if you go over the film in one direction with a wad of cotton which has been soaked in water and squeezed out as dry as possible.

(To be continued)

For Good Action Photos

(Continued from page 755)

talk to them informally between notes. Let them loosen their larynx, and get into the feel of a concert. All artists, as soon as they start functioning at their particular art, lose that mood of strangeness which overcomes them when a camera is pointing ominously in their face. *Then* take their picture, and I'll bet it'll surprise you. In the case of Abigail, you won't go around complaining that she might be pretty, but is as unphotogenic as a gargoyle. That vague quality of being photogenic depends as much on the photographer as on the subject. The photographer, as well as his subject, must *give*, instead of just taking.

That also goes for practically every kind of action picture, whether it be a boy in a fighting pose, a child expressing surprise, a woman knitting, a girl acting, a man sledding, ad infinitum. Let us look at those last two instances, for very recently I have had experience trying to get good action shots of them.

Photographing an Actress

First, a girl acting. I had to get a series of good action pictures of one of NBC's star actresses for a feature story a man in our Press Department was writing. We'll call her Helen, since I still work for NBC. I went down to watch her act during a few broadcasts, and gleefully thought what a swell pix I'd be able to take of her. She was a wonderful actress, and her face seemed the kind that a camera loves. So I had her up to our photo studio one afternoon, asked her to pose, and aimed my camera at her. The result was appalling. Like so many other people who look like swell subjects, her face was dead, flat, blank. You would have thought she was the hammiest of ham actresses to see her pose before a camera. I said to her: "Will you please act out a part for me so that I can get in some action?" Her answer was this: "I act over the *radio*—people just hear me speak, and don't look at me. That's absurd!" I knew that it would be hopeless to argue with her, to make her understand that the radio audience visualizes the performers, thinks of them as real people, and likes to see them in action. So I decided

to do the only other possible thing: I got her madder'n'hell and MADE her act. I said: "If you ask me you CAN'T act!" At that, Helen's mouth opened indignantly, her face became red with rage and she snorted angrily. In short, she threw one of the best tantrums it's been my fortune to encounter. And I was prepared for it. As soon as it all started, I had my camera up before my face, and was shooting merrily away. I wish I had a few assistants along to shoot angle shots I was too busy to take. But as it was, I got a set of pictures that were acclaimed by a number of newspaper and magazine editors as the best set of action pictures they'd ever seen. If they only knew! At any rate, I succeeded by getting Helen to relax, in this instance by making her mad. But it was the only method, and after all, all's fair in love, war and picture-taking.

Snapping a Radio Star in Action

Then there's the set of pictures of Ezra Stone, one of NBC's finest actors (Henry Aldrich on the radio), whom I had to shoot sledding. I went up to Westchester with him, bought a sled, found a nice rolling hill, and asked him to coast down the hill. I trained my camera on him—but didn't shoot; Ezra's expression, instead of being blank and flat like Helen's, indicated an exaggerated joy for the sport. Exaggerated to the point of incredulity. It was the old story; he was posing, posing obviously and hammily. Instead of being loose, relaxed, natural, his emotions were frozen stiffly across his face. So I asked him to coast down again. This time some real animation lit up his face. I asked him to try again, and he really began to look as though sleigh-riding was the best joy in his life. He got the feel of the thing, began to forget the bogeyman standing at the bottom of the hill with camera in hand, and coasted down a few more times. Then I was ready. I stood near the hill's foot, placed him on the sled a few yards up from me, told him to push off, and he coasted slowly past me. Then my shutter began to click. We repeated this a few times, and I came back to the studio, developed the films, and out came a swell set of prints. They were every bit as good as real candid shots of Ezra Stone sledding, and having the time of his life, could possibly have been. If you ask me, it's all too simple to be called brainwork. A little bit of fundamental psychology is all you need.

When Patience Rewarded Me

There are a lot of other things I'd like to talk about, but have spent so much time on the "getting-your-subject-into-the-mood-of-the-thing" angle, that I'll just mention them sketchily. First—the necessity of patience. That is important. If you're ever shooting pix at a welcoming, a convention, or any sort of meeting, bide your time, and the chances are that you'll come away with a better set of prints than the photographer who clicks away indiscriminately. Last August, for example, I was assigned to follow Mayor LaGuardia and Charley McCarthy, of NBC fame, around for the day, and to return with some good pictures. Nothing out-of-the-ordinary happened for a few hours, so the rest of the photographers left, one by one, after acquiring a dozen routine shots. I hung around, however, and finally the *break* came. Charlie and the Mayor were about to sign their name in the Fair's Register, under those of England's King and Queen, who had been there not many days before. Charlie picked the pen up, hesitated, and said: "How do you spell X, anyway?" The Mayor threw his head back, guffawing, and I walked away with a swell picture and a better caption. Moral: *be patient and you will be rewarded.*

Second, if you expect there's going to be a mob around a certain setting—for example, at the arrival of a celebrity on a train—first pick your spot, one in a good position (view, distance, etc., considered), and have your camera focused on the spot where the subject will be. Then just watch and wait, and when the subject emerges, you won't have to worry about those preliminaries. If hemmed in tightly by a surrounding crowd of other photographers, newsmen and onlookers, hold your camera over your head in the direction of the action. This particularly applies if you're not very tall—so long as the camera is well focused and aimed in advance.

Third, if your subject is allergic to flash bulbs, take him by surprise, so that they won't anticipate the flash with a squint. This can be done by crouching slightly, focusing the camera on him, then standing up straight, making sure that the camera is in the same position, thus fooling the subject into thinking that you won't shoot in that position. Most of them think that you *can't* shoot, without peering into the finder. Then—with the camera at your chest and an informal conversation flowing—flash your bulb, and the results will be minus squints, furrows and tautness.

And lastly, a little matter that's more important than it might sound. Remember to carry a five- or six-foot string around with you the next time you go out to take pictures without a tripod. This string might serve as a valuable substitution for the contraption when a long exposure is necessary. Simply tie the string around the camera, let it dangle on the floor (the string, that is) step on it so that the string is taut—and you'll have a steady camera. Once your subject is relaxed, incidentally, another little trick might come in handy in this respect. It helps in keeping away from flat lighting and in adding some highlighting to the subject, when it's not feasible to lug two extensions around with you. The trick is simply the use of a bridge lamp as a substitute for the second extension. You train the lamp on the subject, remembering of course the highlights you want brought out, keep your foot near the lamp plug, and then shove the plug in as you shoot the gun. The results will be practically the same as though a second extension were used—if you can maneuver all that without parting with your muscular control.

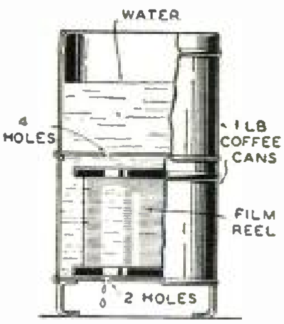
3 Cameras and How I Use Them

Because of the multifarious action work I do, I use three cameras. A 4 x 5 Speed Graphic for straight "news" shots, with Zeiss Tessar lens, 5¼ in., F 4.5. Where I can't use a flash, however, because of certain physical restrictions or the subject's allergy to the sudden blinding flash (as in the case of Toscanini), and when lighting permits, I then turn to my Contax with an F 1.5 lens, which ordinarily I use strictly for action shots. In cases of this sort, when flashes are not practicable, and your speed is slower than 1/25 of a second, the string trick method mentioned a while back will come in particularly handy.

Then there's my Rolleiflex, which, because it can hold a lot of film, I use for feature stories which require a whole series of pictures telling a story. This camera is 2¼ by 2¼, and has an F 3.5 lens. When, for example, I went aboard the Fahnestock schooner, which sailed in January for the South Seas to make a series of broadcasts back to this country, I used my Rolleiflex, for I had to climb up riggings, go down into the hold, and wander all over the boat in order to get a complete set of pictures.

Dripolator Miniature Film Washer

● ANY miniature film developed in a daylight tank reel may be efficiently washed in fifteen minutes in the dripolator film washer. This washer can be constructed from two one-pound coffee cans. Fit them snugly together, one atop the other. Now drill *four* 1/16 inch holes in the center circle of the top can and *two* holes in the bottom of the second can. The drilling should be done from the *inside* to prevent any possible clogging by sediment.



Four short wire legs are spot soldered to the bottom unit, and a seam of lead run around the cover joint to make it water tight.

In use, the bottom unit will always remain full while the water seals the top unit. It is advisable to paint both inside and out of both cans with a coat of asphaltum or aluminum paint in order to stop rust formation.—*E. Peter Smith.*

Transferring Photos to Lockets and Watch Cases

● YOU may often have seen pictures transferred to lockets, watch dials and so forth.

The method herewith given is extremely simple, and with it anyone can do good work from the start without any experience in photography. It makes a perfect, transparent film that appears as if the photograph was taken directly on the watch case or dial, or on whatever object you have placed it upon.

First prepare the following mixture: Collodion, 4 oz.; Vence turpentine, 1 dr.; Camphor Spirits, 10 drop; and 95% Alcohol, 1 ounce. Flow this solution over the photograph that is to be transferred and carefully lay it aside to dry for fifteen minutes, or longer. Then paste this print *face down* on a clear glass using regular photo paste or common library paste for this work. Allow to dry for at least one hour, then with the bowl of a spoon or a finger, rub the picture from the center out, wetting with cold water from time to time until all the paper backing is rubbed off, and put the glass with the picture on it into a bowl of hot water. The composition will free itself from the glass.

Place the film on a piece of ordinary paper and cut to the desired size. (It is usually best to cut it in the shape of a disc to fit watch cases.) Place this disc back into the warm water and the film will float and the paper will go to the bottom.

The case that is to receive the picture is coated with a solution of Gum Acacia. Then very carefully place the picture in the right position and attach it firmly by pressing with a silk cloth. The best place to put the picture is either on the inside cover or on the dial of a watch. If placed on the dial, the picture will show in every detail, yet the figures on the dial will show through clearly.—*E. R. Trabold, Omaha, Nebr.*

Better Indoor Shots

(Continued from page 756)

angle at which you place your lights in relation to the subject. Obviously you can put a light anywhere—at the subject's feet, over his head, at his left or right, even squarely in front of him, or behind him. Now mark you, I'm not saying that any one of these positions is *best*. All are good for purposes of experimenting and studying effects, but the *best* position depends entirely on the picture subject and the effect you want.

Generally speaking, a light from one side should be partly balanced by light from the other side, *but never equalize them*. If you use a strong light at the right, try one about half as strong at the left. Start with the lights at about a 45-degree angle to the subject; then modify their positions—up and down, right or left, slightly nearer or a bit farther back, until you get the effect you want. After each change, study the subject from the camera's position. Note the size, shape, and transparency of the shadows, especially on a person's face. Such observation is important, whether you are checking an unusual effect or simply striving for a good likeness.

In experimenting, you can place the lights at any distance you prefer, but before making the exposure, measure the actual distance chosen, and adjust your lens opening and shutter speed accordingly. A reliable exposure guide—one of the inexpensive pocket types—is an extremely valuable aid in calculating such adjustments. I wouldn't be without one. Camera shops also have *free* leaflets containing directions, diagrams and picture suggestions.

Pictures of Interiors

Perhaps it hasn't occurred to you, but with modern high speed film, pictures of rooms can easily be taken at night by means of the regular home lighting. For this, only short time exposures are necessary, and there are exposure guides now on the market which cover just that type of lighting.

I'll give you a sample exposure from one of these guides.

Just assume that the room you want to picture is of *average* size with light walls, and the total electric illumination is 400 watts. Then a time exposure of 5 to 10 seconds will suffice to get a good picture, using a box camera loaded with high speed film. That exposure, you will observe, is so short that you could include a *person* in the picture, in order to give it a more homelike quality. And, of course, with *more* light in the room, even *shorter* exposures can be given.

There is a definite advantage in taking these pictures by regular home lighting. Briefly, the room will appear more natural. Your lights can be used in any combination, and one or two bridge or table lamps can even be included in the picture. However, if such lamps are included, the shades should be adjusted so that bright direct light will not shine into the camera lens.

And now to outline a typical lighting arrangement— Suppose you have three 100-watt bulbs in a ceiling fixture and two 60-watt bulbs in table lamps on either side of the fireplace. These table lamps can be included in the picture, and if there happens to be a small fire in the fireplace, so much the better. The exposure for this scene would be approximately four seconds with a box camera; or about three seconds with a more expensive camera set at f/11.

Exposure is less in this case because you have *direct* light from the three 100-watt bulbs in the ceiling fixture. If these bulbs were *shaded*, of course there would be less light and a somewhat longer exposure would be required.

The exposures I have given are based on nigh *speed film*. Don't make a mistake and use a film that is intended more for daylight pictures, or your shots will turn out very much *under*exposed.

So much for lighting and exposure. Now for some other suggestions: First, and most important, don't try to include *too much* in each picture. Otherwise you'll get crowded pictures, that aren't sufficiently homelike.

Second, avoid head-on views except when your room has a prominent central object such as a fireplace or attractive bay window. Generally it is best to shoot more or less diagonally across the room.

A third suggestion is to place your camera so that it includes more floor than ceiling. Too much ceiling will make a picture look top-heavy. Try placing the camera on the edge of a table—then it will be about the right height. As you know, a firm support of this sort is necessary for all time exposures. Keep the camera perfectly *level*.

A fourth suggestion—leave the furniture in the room in its normal position, except for pieces that happen to be quite close to the camera. Furniture in front of the camera should be moved to one side so your picture will have an *open* foreground.

Fifth, use a small lens opening, such as f/11 or f/16. This will give you the depth of field you need to get everything in the picture sharp.

"Indoor Sunlight" Pictures

Usually sunlighted pictures are made out-of-doors, but have you ever thought of looking indoors for sunny picture opportunities? There's a marvelous field here, and one that has been far too much neglected.

Wherever sunshine comes through a window or illuminates a corner of a room, there is opportunity for a sunshine picture. Pose a subject in the sunlit corner—for example, your small daughter playing with her dolls, or your son playing with the train he got for Christmas—and you have a delightful picture setting.

Often the surrounding walls will pick up sunshine and reflect it so that your subject is lighted from several directions and you obtain a play of light which adds unusual quality and depth to the picture. Beautiful pictures can be obtained by a combination of sunshine coming through a window, and artificial light from photo bulbs. For example, place your child on a sunny window seat. Then arrange your photo lights as you would for a regular snapshot at night, so that they illuminate the child's shadow side. The combination of sunlight and artificial light, when properly arranged, will illuminate all strong black shadows, and you can obtain beautiful high-key effects, which are especially appropriate for child pictures.

Oftentimes, stray beams of sunlight will come into a room, and if there is any dust or smoke in the air, you will find beautiful sunbeam effects. These, too, are worth looking for and they make wonderful pictures. Usually they require short time exposures, but this is no trouble. All you need do is place your camera on a table, or other firm support, adjust it to include the scene that you want, and make the time exposure. Just as quickly as you can operate the

(Continued on following page)

(Continued from preceding page)

shutter when set on "Time" will generally suffice. This may be around a half second. Try a lens opening of say f/8.

Interesting effects can be obtained when sunbeams slant downward to the floor. If you will place a toy, a flower, or some other small object just at the bottom of the sunbeam so that the shaft of light leads to it, and then take the picture, you will be pleased with the result. In making these pictures, take care to give an exposure full enough to pick up some detail in the shadows. This added exposure allows the sunbeam to build up with greater brilliance.

Interesting effects of backlighting can be obtained with a sunny window. If you have a cat, for example, with soft white fur, place it on a sunny window sill. The sunlight shining through the fur will surround the pet with a beautiful light halo which makes a splendid picture.

Charming silhouettes can be made by using a window which looks out on a sunny outdoor scene. Just place your subject at the window, in profile. Turn out any room lights and make an exposure which would be correct for the outdoor scene, or but a trifle longer. Since the light indoors will be much less than the light outdoors, you will obtain an attractive silhouette effect.

Keep your eyes open for sunshine pictures indoors. There are opportunities wherever sunlight streams through curtains, through a window shutter, across the flowers in a window box. Sometimes a window frame will cast an interesting pattern of shadow on a wall, and this pattern may make an appealing picture by itself, or add interest to some other subject that you place in the sunlighted area.

Load up your camera now and prepare to begin a collection of day and night pictures in your home. Such pictures are a valuable addition to any album.

Tray Thermometer

● A 10-CENT store thermometer of the type with a wooden back is ideal for conversion into a tray thermometer for photographic work. The back is cut off at about 40 degrees on the scale and the lower part removed. The upper part, which remains attached to the thermometer tube, is coated with melted paraffin or bakelite varnish to make it impervious to the developer, hypo and other solutions. The thermometer may be floated in the developing tray, or may be rested in the corner thereof; in either case, temperature of the solutions may be taken throughout development. Of course, a separate thermometer should be used for each tray but as their cost is so small, the expense is negligible. Even if you have a regulation photographic thermometer, it is desirable to keep one of these in the dark room for use in emergencies.—*Jimmy Lesko.*

WOODEN BACK CUT AWAY

Next Month—

Don't miss the feature article on . . . .

SPORT PHOTOGRAPHY

Written by an Expert.

The Reader Speaks

R. & T. Now a "Double Bargain"

Editor,

I enjoy every bit of RADIO & TELEVISION and must say you are improving all the time. Now that *Foto-Craft* is incorporated, you have really given me a double bargain in a magazine, for incidentally, photography is another of my major interests.

Thanks a million!

A. T. KOBAYASHI,
Okanagan Centre, B.C.
Canada.

Radio & Photography Closely Related

Editor,

Since I have been, for the past 3 years, doing quite a bit of photographic work, I like the new addition of *Foto-Craft* to your magazine; I used to buy *Foto-Craft* occasionally when it was a little pocket-sized mag. I'm going to have some stuff for it very soon.

The cranks in your "Vox Pop" columns are all wrong when they cry that there is no relation between radio and photography—I have found a closer inter-relation between radio and photography than I have ever been able to explain, as I know no end of radio men who are also "photo bugs." What the dickens, as long as the parent magazine doesn't suffer, why kick because we now get two magazines instead of one, and all for the price of one.

WILLIAM J. VETTE, *Editor,*
Capital Features Service.
1650 Pearl St.,
Denver, Colorado.

Approves of Foto-Radio Combination

Editor,

I think the combination of *Foto-Craft* and RADIO & TELEVISION is O.K. if in the future both sections are increased somewhat. Let's see more experimental receiver circuits in the future issues of R. & T. I get my copies at the newsstand and think you have a fine magazine.

I believe that the swapper's column is a very "fine business" part of your magazine.

PAUL ANKERMAN,
404 Lima Street,
Wapakoneta, Ohio.

Doesn't Like Combination

Editor,

In the past I will admit that your magazine was swell, but now that it has been incorporated with *Foto-Craft* I think that its standard is at a very low level. I do not see how radio and photography are related in any way. I think that all of the readers of this magazine should cast a vote, stating their opinion on the new set-up. Many other local SWL's have the same opinion that I have. A word to the wise is sufficient. Or is it?

JOHN FITZPATRICK,
18 First St.,
Port Reading, N. J.

Likes "Foto" Section

Editor,

Congratulations on the amalgamation. It's a mighty good move and very much appreciated. But the outstanding feature is still the *"Barter and Exchange"* section. Man, you have no idea how that section helps us "duds." I am both an aviator and a "Ham."

Let's see if we can't get some good feature articles, reports, and some "experience" yarns to fill out the issue a bit.

ALEX C. JASAITIS,
1126 Elizabeth Ave.,
Grand Rapids, Mich.

He Prefers ALL-Radio Mag.

Editor,

I am a Short-Wave Listener and a Beginner in Radio and have been a newsstand reader of RADIO & TELEVISION for the last two years.

The new section *(Foto-Craft)* which has been added to R. & T. I think could be taken out, since it has little relationship to radio. I suggest that this section be given over entirely to Radio Beginners, since many beginners buy this magazine, because of your free ads., etc.

When I buy a magazine on a special subject I don't care for a lot of other "Hooey" in it.

Best wishes for a greater and a wider circulation of your magazine.

FRANCIS BERKSHIRE,
Masontown, Penna.

Fundamental Facts for Home Movie Makers

(Continued from page 757)

venient way to time the length of a scene for say ten seconds is to count moderately slowly, "one-one thousandth, two-one thousandth," etc., up to say, "ten-one thousandth."

Of course the *lighting effects* in professional movies are exactly right. Obviously we amateurs cannot expect to be that perfect in the comparatively small amount of time devoted to our home movie making. However, there is at least one blanket method that can be used for all pictures. Whether indoors or outdoors we can always strive to get sufficient light and comparatively even lighting on all of the subject. Occasionally, trick shots are desired with heavy shadows, but generally for unusual effects only.

Panoraming is used very frequently in movie making. Often it is very much misused. To be successful with it, do not rush the panoraming. Clamp the two elbows to the sides and hold the camera steady on the initial scene for at least ten seconds. Then start a slow sweep from left to right avoiding jerks, and *remember to deliberately make a slow sweep.* Incidentally, when following a moving subject, keep it centered in the picture.

This last phase of fundamentals involves editing. It is not absolutely necessary to splice small reels of film into one big reel, nor is it necessary to make titles, nor to edit the films just to hear "Oh's" and "Ah's" from our friendly audience. But it does help to get successful movies. Our families and friends will then think that we are even better photographers than we suspect of ourselves. This is only natural since editing includes eliminating the "pot boiler" scenes. In other words, we will be polishing up our movies, just as the Hollywood people do.

Index to Advertisers

PHOTOGRAPHY SECTION

(While every precaution is taken to insure accuracy, we cannot guarantee against the possibility of an occasional change or omission in the preparation of this index.)

What's New

"Photographs", A Study by N. I. A. A.

● ONE of the real thorns in the side of industrial advertising men for years has been the problem of obtaining good photographs of industrial subjects. In an effort to tear down this barrier once and for all time, the Mason-Dixon Chapter of the National Industrial Advertisers' Association has just completed, and put into the form of a 4-page illustrated folder, a study on methods of taking and using photographs.

Entitled, "Photographs, Their uses in industrial advertising, and directions for taking them", the study analyzes three types of industrial photographs—the "Record", "Installation" and "Dramatizing" types. In taking conventional record photos for catalog use, for example, the folder gives advice on the preparation and illumination of the subject, the type of film to be used and the best camera settings.

The recommendations offered for taking installation photographs are given with a view toward naturalness in the finished print. The folder definitely suggests that a photographer should work under the personal supervision of the advertising man or, if this is not possible, he should at least be given specific instructions as to what views to take.

Pointing out the difficulty of laying down definite rules for taking the dramatizing type of photograph, the folder, instead, lists three "musts": (1) Always indicate, or actually show, life or movement; (2) Have the photograph made for the particular job at hand; (3) Excepting for very special use, keep away from the "salon" type of view. In other words, do not make the photograph so artificial or so clever that your product is overlooked or your selling story is completely submerged.

In addition to these resumes covering the three types of photographs, the study also contains a summation of the definite standards and rules to be followed in taking all sorts of industrial pictures. Included in this concise outline is valuable information concerning photographic releases, interior and exterior requirements, background highlights, care of prints, and many other extremely helpful aids in the production of good photos.

New Self-Reflecting Photoflood Lamp, with Black Neck

● AND now: a self-reflecting photoflood lamp *with a black neck*. This new refinement applied to the 500-watt Mazda photoflood lamp R2, a revolutionary light source introduced last year, was announced by General Electric's lamp department.

The black opaque coating, on the outside and extending for two inches from the lamp's base to a point beyond the lamp's interior aluminum reflecting surface, is designed to prevent stray light from escaping.

The new black-neck feature was developed in response to unforeseen uses to which professional and amateur photographers have been putting the R2 lamp. One and sometimes two such photofloods are often used with the flood source, or sources, very near and just ahead of the camera.

In cases of this kind, the opaque coating prevents stray light from spilling backward through the lamp's neck and into the camera lens.

Index to Advertisers

RADIO SECTION

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HERE'S the PROOF!

DOLLAR FOR DOLLAR . . . WATT FOR WATT

RCA's Top Them All!

Note in particular the last two columns of this chart comparing popular RCA Transmitting Tubes with leading competitive makes. Here you have proof positive that RCA's give you more for your money in terms of power input per dollar than any other air-cooled transmitting tubes on the market . . . And, back of this, stands the world-wide reputation for reliability that is your guarantee of longer life, and finer performance in *every* respect.

The reason is simple: RCA has never rated tubes "up to the hilt." Previously, RCA ratings were based on continuous service in the world's most exacting commercial applications. These ratings are still in use, but are known as the RCA CCS Ratings (Continuous Commercial Service). Meanwhile, the new ICAS Ratings (Intermittent Commercial and Amateur Service) have been developed to pave the way for intelligent use of the big extra measure of RCA quality for amateur applications where the call is for dependable power—and plenty of it—for the least possible money.

It pays to buy RCA's for real economy.

Ask your RCA distributor for November Ham Tips containing complete construction article on RCA-812 Transmitter shown in December QST.

Manufacturer's Tube Type	Tube Classification	Plate Dissipation/ Watts ●	D-C Plate Input # Watts ●	Amateur Net Price ●	Watts Input Per $ □	Ratio of Watts Input Per $ Competitive Type To RCA Type (%) ▲
RCA-802	Pentode	13	33	$3.50	9.44	100
Tube A	Pentode	10	27.5	4.50	6.11	65
Tube B	Pentode	10	27.5	3.95	6.95	74
RCA-804	Pentode	50	150	15.00	10.0	100
Tube A	Pentode	40	120	15.00	8.0	80
RCA-806	Triode	225	1000	22.00	45.5	100
Tube A	Triode	200	750	22.00	34.1	75
Tube B	Triode	200	875	21.50	40.7	89
Tube C	Triode	200	750	18.50	40.5	89
Tube D	Triode	150	600	15.00	40.0	88
Tube E	Triode	250	1050	24.50	42.9	94
Tube F	Triode	150	1000	24.50	40.8	89
RCA-807	Beam Tetrode	30	75	3.50	21.4	100
Tube A	Beam Tetrode	25	60	3.50	17.2	80
Tube B	Beam Tetrode	25	60	3.00	20.0	93
RCA-809	Triode	30	100	2.50	40.0	100
Tube A	Triode	25	79	2.50	31.6	79
Tube B	Triode	20	56	2.25	24.9	62
Tube C	Triode	25	112	3.50	32.0	80
RCA-810	Triode	150	620	13.50	46.0	100
Tube A	Triode	125	400	13.50	29.6	64
Tube B	Triode	150	600	15.00	40.0	87
Tube C	Triode	100	400	13.50	29.6	64
Tube D	Triode	125	315	13.50	23.4	51
Tube E	Triode	100	500	12.50	40.0	87
RCA-811/812	Triode	55	225	3.50	64.3	100
Tube A	Triode	40	115	3.50	32.8	51
Tube B	Triode	55	225	6.00	37.5	58
Tube C	Triode	60	225	6.95	32.4	50
Tube D	Triode	50	260	6.75	38.5	60
Tube E	Triode	70	300	6.00	50.0	78
Tube F	Triode	50	225	6.95	32.4	50
Tube G	Triode	65	175	3.95	44.3	69
Tube H	Triode	65	175	3.95	44.3	69
RCA-814	Beam Tetrode	65	225	17.50	12.85	100
Tube A	Beam Tetrode	50	170	17.50	9.72	75

\# Class C telegraph ratings—ICAS values used for RCA types.
● Data based on published values as of Oct. 15, 1939.
□ Factor W/in has value shown in fourth column.
▲ Approximate.

RCA Radio Tubes

FIRST IN METAL—FOREMOST IN GLASS—FINEST IN PERFORMANCE

RCA MANUFACTURING CO., INC., CAMDEN, N. J. A Service of The Radio Corporation of America

FROM COAST TO COAST

a Sweeping Demand for

the SUPER DEFIANT SX-25

Amateurs from coast to coast acclaim this new, de luxe model, amateur receiver as the finest ever developed for anywhere near this price. And orders have been pouring in far beyond our expectations.

The SUPER DEFIANT, *at $50 less*, offers even better performance than that of the famed SX-17. Its general circuit is based on the proved efficiency of America's BEST selling receiver, the Skyrider DEFIANT, and, in addition, it has important improvements and refinements of its own that definitely step up all former standards of value.

You wanted *more preselection*. Now you can have it. You wanted *more* and *better audio*. The SUPER DEFIANT gives it to you. You wanted less noise, less distortion, easier tuning. All this, and more, you get in this new Hallicrafters triumph.

Your distributor is now ready to supply you with the new SUPER DEFIANT. See him and learn for yourself why there is such a demand for this exceptional amateur receiver.

NOTE THESE OUTSTANDING FEATURES

- Two Stages Pre-Selection
- 540 kc to 42 mc in 4 bands
- Calibrated bandspread dial for 10 to 80 meter amateur band provides frequency meter tuning
- Compensation in Oscillator Circuit for Frequency Stability
- Better Signal-to-Noise Ratio
- Improved Crystal action
- Automatic Noise Limiter
- 12 Tubes
- 6-Step Variable Selectivity
- S Meter calibrated in "S" and "DB" Units
- Push-Pull output
- All functions controlled from front panel
- 115 volt 50-60 cycle AC operation
- Battery or Vibrapack socket for DC operation
- Dimensions: 19½" x 11⅛" x 9½" high.

COMPLETE with SPEAKER, CRYSTAL AND TUBES

$99.50

the hallicrafters inc.

CHICAGO, U.S.A.

WORLD'S LARGEST BUILDERS OF AMATEUR COMMUNICATIONS EQUIPMENT