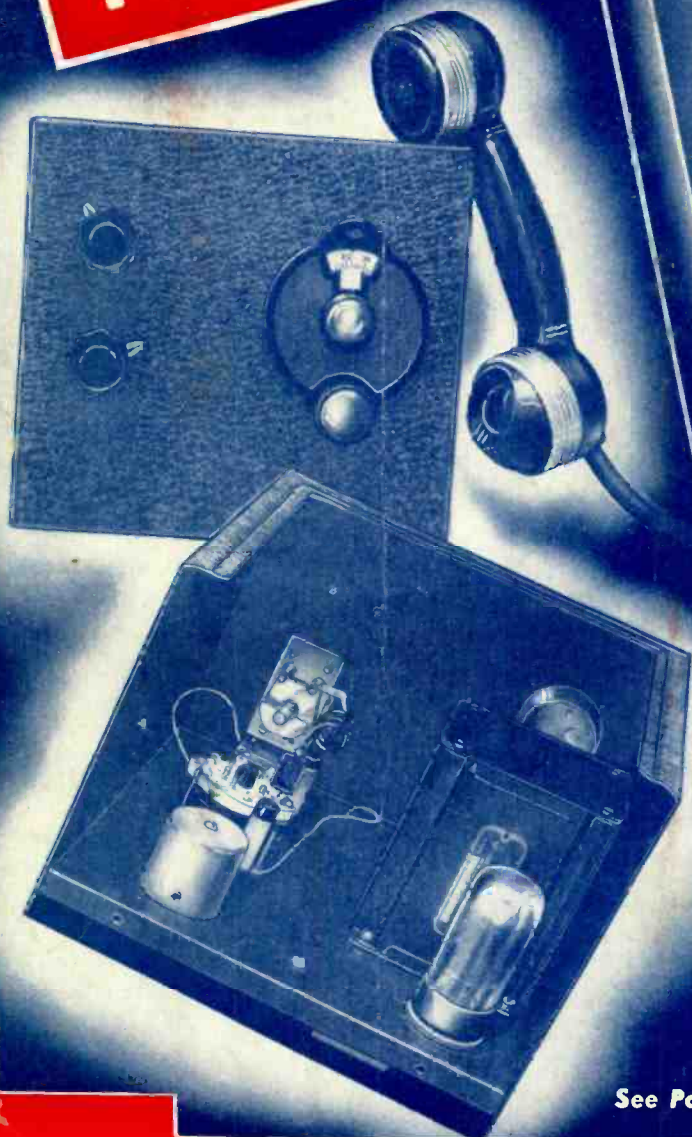


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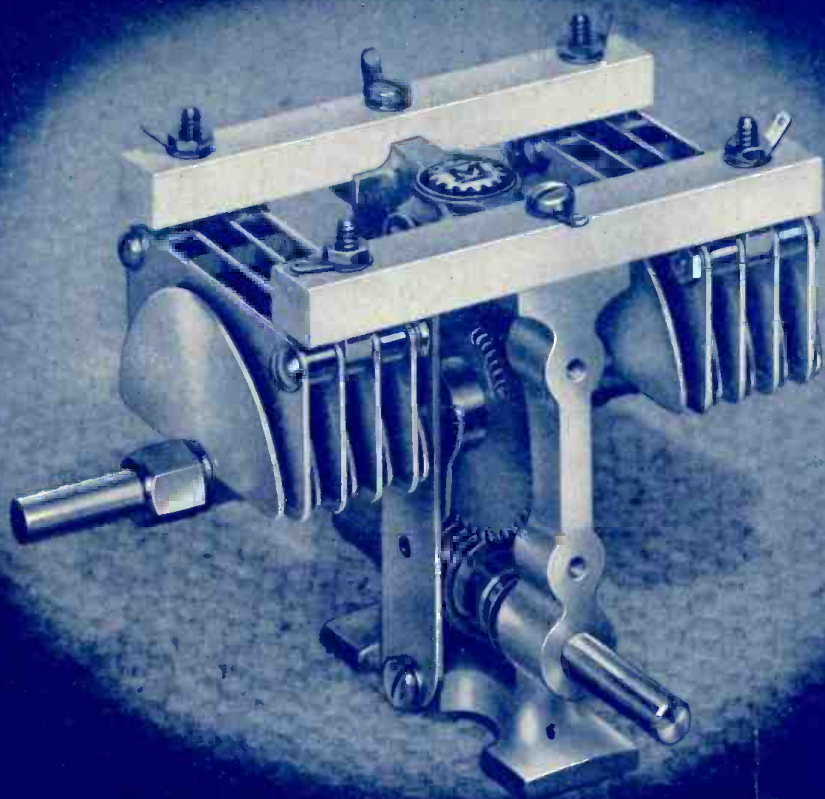
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1940

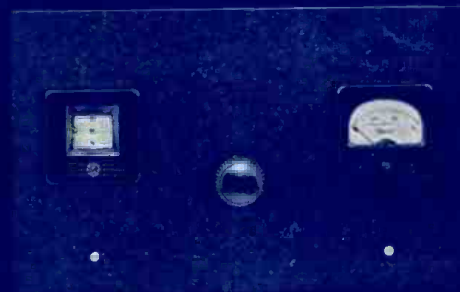


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to BETTER PAY**

The world-wide use of Radio has made many opportunities for you to have a spare time or full time Radio service business of your own. Four out of every five homes in the United States have Radio sets which regularly need repairs, new tubes, etc. Servicemen can earn good commissions too, selling new sets to owners of old models. Even if you have no knowledge of Radio or electricity, I will train you at home in your spare time to sell, install, fix, all types of Radio sets; to start your own Radio business and build it up on money you make in your spare time while learning. You don't need to give up your present job or spend a lot of money going away to school to become a Radio Technician. Mail coupon for my 64-page book. It's Free—it shows what I have done for others—what I am ready to do for you.

MANY MAKE \$5 TO \$10 A WEEK EXTRA IN SPARE TIME WHILE LEARNING

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WHY MANY RADIO TECHNICIANS MAKE \$30, \$40, \$50 A WEEK

Radio is already one of the country's large industries even though it is still young and growing. The arrival of Television, the use of Radio principles in industry, are but a few of many recent Radio developments. More than 28,000,000 homes have one or more Radios. There are more Radios than telephones. Every year millions of Radios get out of date and are replaced. Millions more need new tubes, repairs, etc. Over 5,000,000 auto Radios are in use and thousands more are being sold every day. In every branch, Radio is offering opportunities—opportunities for which I give you the required knowledge of Radio at home in your spare time. Yes, the few hundred \$30, \$40, \$50 a week jobs of 20 years ago have grown to thousands.

JOBBS LIKE THESE GO TO MEN WHO KNOW RADIO

Radio broadcasting stations employ engineers, operators, technicians, and pay well. 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. Television promises to open many good jobs soon.

I ALSO GIVE YOU THIS PROFESSIONAL SET SERVICING INSTRUMENT



Here is the type of instrument Radio Technicians use—an All-Wave Set Servicing Instrument. It contains everything necessary to measure A.C. and D.C. voltages and current; to check resistances; adjust and align any set, old or new. It satisfies your needs for professional servicing after you graduate—can help you make extra money fixing sets while learning.

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January — 1940
Vol. X No. 9

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

*In the
February Issue*

Build Your Own Short-Wave Diathermy
Apparatus—Allan Stuart
2-Inch C-R Tube Television Receiver—
Herman Yellin, W2AJL
A Cathode Modulated Transmitter—
Harry D. Hooton, W8KPX
How to Make a Practical Metal or
Treasure Locator—G. M. Bettis
A Receiver for the Beginner
A New Type V.T. Voltmeter—
Wm. Vissers, Jr.

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You need not hesitate to spend money on parts because the set and circuit are bona fide.

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Cover composition by H. Gernsback and Thomas D. Pentz. Radio photos show Transceiver described by Harry D. Hooton on page 526. Television image photos are described on page 565.

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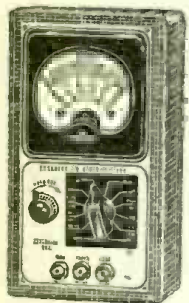
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Extremely careful design and co-ordinated components are used in the construction of the above unit.

TECHNICAL SPECIFICATIONS

3" 1 Ma. D'Arsonval Jeweled movement, overall accuracy within 2% (1000 ohms per volt). D.C. Volts 0-2.5-10-50-250-500-2500. A.C. Volts 0-15-150-1500. Ohms 0-2500-25,000-250,000. D.C. Ma 0-1-10-100-1000 (1 ampere). Output ranges 0-15-150-1500. Decibels -10 to +19, -10 to +38, -10 to +53. Range on ohms reading can be extended to 2½ megohms. Zero adjustment for ohm ranges. Completely self-contained for all ranges. Beautifully frosted etched panel 14 gauge aluminum. Large, easy to read scales with knife edge pointer. Precision matched multipliers and shunts. Simplicity of operation. Housed in custom built leatherette cabinet. Every soldered connection is individually inspected.

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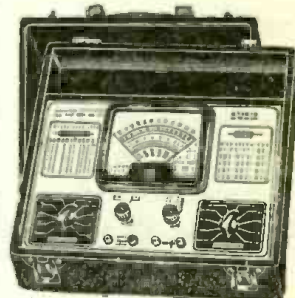
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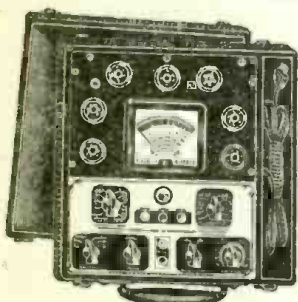


TECHNICAL SPECIFICATIONS

4½" Square D'Arsonval Jeweled Meter 0.1 Ma. sensitivity. (1000 ohms per volt.) D.C. Volts 0-15-150-750. D.C. Ma 0-1-15-150-750. A.C. Volts 0-15-150-750. A.C. Ma 0-15-150-750. Capacity .0005-1 mfd. .05-200 mfd. Ohms 0-500. 500-5 Megohms. Decibels -10 to +19, -10 to +38, -10 to +53. Output ranges 0-15-150-750. Inductance 1-700 henries. Watts, based on 6 M.W. at 0 O.B. in 500 ohms. .006000 to 600 watts. Zero adjustment for ohm ranges. Large, easy-to-read scales with knife edge pointer. Completely self-contained for all ranges. Accuracy on D.C. 2%, all others 5%. Every soldered connection individually inspected. Housed in custom built portable leatherette cabinet. Measures hum in filter systems. 6H6 tube Rectifier (works on 90-130 Volts A.C., 50-60 cycles). Multiplier resistors are completely insulated and sealed against atmospheric conditions. Shunts are wire wound.

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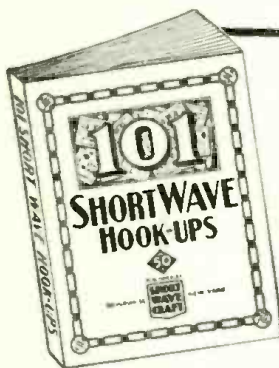
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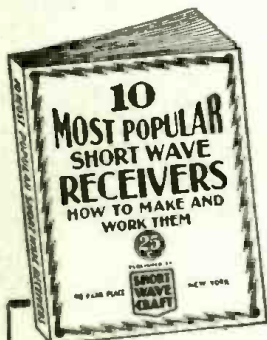
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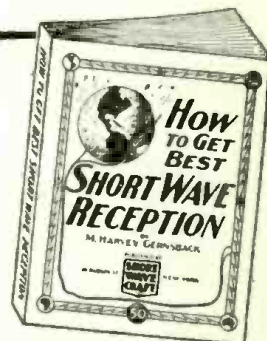


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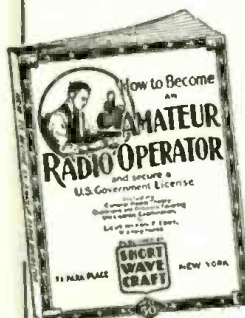
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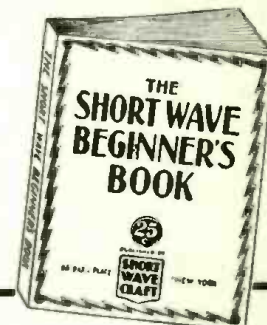


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PENNSYLVANIA
M & H Sporting Goods Co., Philadelphia
Radio Electric Service Co., Philadelphia
Cameradio Co., Pittsburgh

UTAH
Radio Supply, Inc., Salt Lake City

WASHINGTON
Seattle Radio Supply Co., Seattle
Wedel Co., Inc., Seattle

ARGENTINA
Radio Revista, Buenos Aires

AUSTRALIA
McGill's Authorized Agency, Melbourne
BELGIUM
Emil Arens, Brussels

CANADA
T. Eaton & Co., Winnipeg, Man.
Electrical Supplies, Ltd., Winnipeg, Man.
Wholesale Radio Supply, Winnipeg, Man.
Canadian Electrical Supply Co., Ltd., Toronto, Ont.
Radio Trade Supply Co., Ltd., Toronto, Ont.
Canadian Electrical Supply Co., Ltd., Montreal, P. Q.

BRAZIL
Agencia Soave, Sao Paulo

CHINA
China News Co., Shanghai
International Booksellers, Ltd., Shanghai

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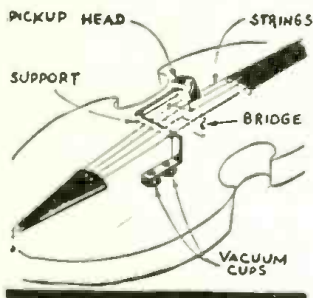
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Facsimile Features "R & T"



RADIO & TELEVISION
Radio Kinks
Edited by Robert Eichberg



Electronic Music
Any old electric pick-up can be employed to make a microphone for use with a stringed instrument, as shown herewith. Remember one thing, however—the music you get from this arrangement cannot be better than the pick-up used. The support may be made of any easily bent metal, such as strip brass, and the vacuum cups can be had at any 10c store. The two leads from the pick-up are connected to any amplifier, as in a radio set or phonograph. The illustration shows how an ordinary violin, for example, may be made to play through a loud speaker. The same system can be used with any other stringed instruments.—*Jack Bittner.*

● **FACSIMILE**—the art of sending printed material and pictures by radio—is winning increasingly great attention throughout the United States. Not only are the entertainment and educational values of this youngest of radio's branches being explored, but it is receiving the earnest investigation of the nation's police departments in the unending war on crime.

Most of the transmissions carried on by the numerous stations in various parts of the country consist of test material—the same cartoon strip repeated night after night, publicity regarding the system used for the transmission, rewrites of news material appearing in earlier editions of the daily papers, etc.

Believing that facsimile needs better material in order to make its popularity grow still more rapidly, RADIO & TELEVISION prepared copy for facsimile transmission and submitted it to the local outlet—WOR-W2XUP—in New York. This copy, a portion of which is reproduced at the left, was well received by persons possessing facsimile reproducers of the Reado type. Most persons now equipped to receive facsimile transmissions are interested in radio largely from

Actual size of facsimile copy, left, is $4\frac{5}{8}$ in. wide. This is first WOR "R. & T." transmission.

Girl's head, right, is but small part of WOR "RCA" copy.

Inside police car, below, is facsimile transmitter-receiver.

radiated throughout the metropolitan area. So successful were these transmissions that W2XUP has scheduled daily broadcasts of *R & T Kinks*, while WOR has been sending out this material the two nights a week on which it uses the Finch system.

On four other nights, this station is experimenting with the RCA facsimile system
(Continued on page 551)



the experimenters' standpoint; therefore, material designed to appeal to the mechanically-minded radio man was chosen for the R & T transmissions. Various kinks taken from the pages of the magazine were photographed and enlarged up to $3\frac{1}{2}$ inches wide—the size needed for facsimile transmission. These were put on the Finch transmitter at Carteret, N. J., and



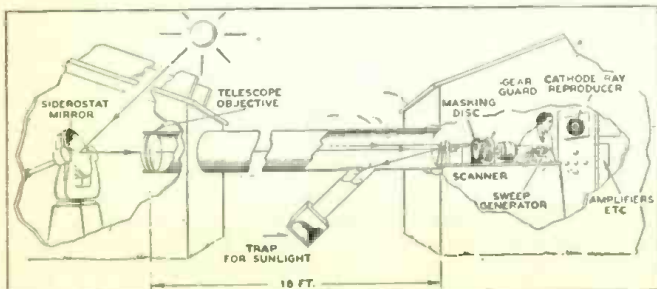
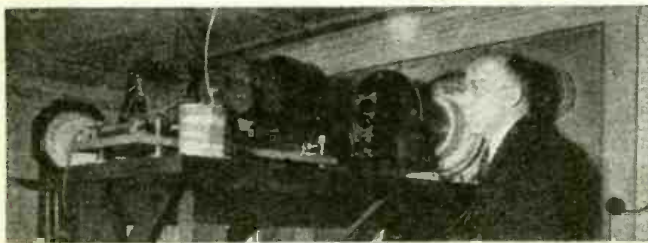
BYRD ANTARCTIC Expedition members will be kept in touch with home through General Electric's shortwave radio "mail bag," as were the two previous expeditions. WGEO, the shortwave station at Schenectady, will transmit messages to the more than 100 men in the expedition on alternate Friday nights at 11 P.M., using a frequency of 9,530 kc.

AUTO LICENSE plates bearing ham call letters are being sought by the Union County Amateur Radio Association of Elizabeth, N. J. Lloyd Fowler, secretary of the organization, has sent a circular letter to local hams as a first step toward preparing a petition to the Commissioner of Motor Vehicles; an enclosed card for the hams to fill out and return will complete the petition. The licenses being sought would look something like this:

W		N
	GSX	J
2		4
		0

SUMMING UP the milestones which radio has passed as he made predictions for 1959, Major Lenox R. Lohr, President of NBC, foresaw greater use of ultra-high frequencies and microwaves, and the establishment of 500 kw. stations as standard, clear-channel outlets. Major Lohr also believes that television will be definitely here by that time.

TELEVISION CAME to the aid of astronomers in the coronagraph developed by Dr. A. M. Skellett of Bell Telephone Laboratories. The brilliance of the sun prevents astronomers from studying the corona of flaming gas which surrounds the sun itself, except when an eclipse blanks out the brilliant disk. Dr. Skellett's invention, shown below in picture and diagram, makes use of a telescope which projects an image of the sun and corona to a mirror and scanning disc. The image of the sun is reflected back to a trap, but that of the corona is scanned by means of a mechanical television system. This corona may be reproduced on a cathode ray tube, may be inspected directly through other means, or may be photographed with suitable apparatus.



TELEVISION IN WAR is being discussed by members of the United States defense forces, according to an article published by the *New York Times*. The possibility of transmitting television images of enemy terrains from airplanes soaring above is being considered as a means for national defense. Such a system would also

enable United States artillerymen to locate the hits made by the shots fired from their batteries.

Thus an observation plane flying above the enemy lines can make pictures or maps of troop movements, ammunition trains or new positions and transmit them to the ground receivers at the moment of making them. Photographs can be taken by the ground crew as the television pictures flash on the screen. The full record thus is recorded, and if the observation plane comes to grief before returning, its work is not lost.

Compact sending sets, known as "jeeps," have been built in this country at a cost of about \$20,000 each. The weight is about that of two radio console type cabinets. The set can be easily operated by one or two men. There is some vibration distortion from the plane engines which occasionally washes out minor details in the pictures received on the ground, but, on the whole, the signals sent back are clear.

Not many observation planes are large enough for two extra crew members, but this is not too much of an obstacle, especially if the object of the flight is sufficiently important. Smaller bombers could be used.

The great job ahead is to find some means of building a universal television machine

that can overcome universal interference. The best authorities say this can be done, but will not take a chance on saying how soon.

MIDGET RADIO transmitters are sent aloft with free balloons in the cosmic ray investigations being made by the U. S. Bureau of Standards. Fifteen experiments were conducted at altitudes ranging up to 100,000 feet. A special vacuum tube circuit connected to the cosmic ray detector caused the transmitter to send out a radio impulse for every sixty rays detected. This afforded an accurate count up to 3,000 rays per minute.

ONE-MAN TRANSMITTING station might be used to describe the cadet of the Cambridge University Officers' Training Corps, pictured herewith. Note that the cadet is equipped not only with phones, microphone, transmitter and power pack, but also has a vertically polarized doublet antenna strapped to his belt. Communications are carried on over ultra-short waves with this system. A similar device was demonstrated



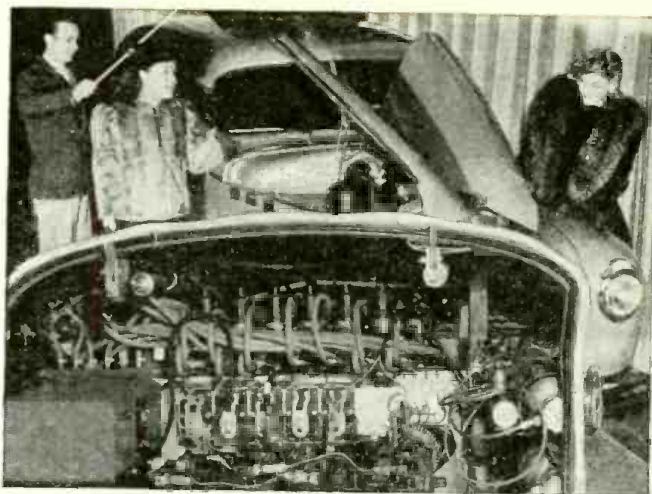
by the British Army more than a year ago when the corps was reviewed by its honorary Colonel, the Duke of Gloucester, younger brother of King George VI. Apparatus of this type is said to be in use by the British units now on active duty at the Western Front. The use of ultra-short waves and low power does much to lessen the likelihood of signals being picked up on enemy receivers.

WORLD WIDE RADIO DIGEST



TELEVISION transmission over telephone cables was an accomplished fact last May when the NBC relayed images of the six-day bicycle race from New York's Madison Square Garden to the transmitter atop the Empire State Building about 11 2/3 miles away. The experiment was not particularly successful. However, engineers of the telephone company are still con-

ducting experiments to so adapt their lines that television transmissions from remote points may be more practical. Tests reported by C. L. Weis, Jr., of the Telephone Company's High-Frequency Transmission Development staff, indicate that at 3,000,000 cycles there is a million times as much loss in a pair of telephone wires as in co-axial cables especially designed for television use. However, through the use of equalizers to make the losses the same for all frequencies transmitted, it is hoped that perfectly satisfactory results will be achieved. The amplifiers, incidentally, are flat from 45 to 3 million cycles. The Columbia Broadcasting System is experimenting with these lines.



RADIO MAGIC controlled the stunts through which the De Soto car, pictured above, went—according to engineers who designed the exhibit. At the commands of the man with the wand, the hood, doors and trunk opened, the windshield wipers waggled to and fro, and the car itself ran short distances backward and forward. The insert shows the inside of the baggage compartment which was used to house the control apparatus. Skeptical visitors at the Auto Show peered under the car looking for concealed wiring connecting to a remote point but found none. Other skeptics peered into the car's crannies looking for a midget who might be operating the gadgets, but none was apparent. Those who believed their eyes went away thoroughly convinced that the car was radio operated.

MAGNETIC MINES are also set off by sound waves, according to recent reports from Britain. The Government there is said to be experimenting with high gain amplifiers and under-water loud speakers, to be used in detonating the mines at a distance so that their ships will be unharmed. It has been calculated that the transmission of sound under water being so much greater than in air, with a good P.A. amplifier system using a metal diaphragm under-water speaker, it will be possible to discharge mines at almost three-quarters of a mile distance.

AN INTERCOLLEGIATE radio broadcasting system to link Brown, Dartmouth, Wesleyan, Harvard and the Massachusetts Institute of Technology over a wire network is being planned by engineers at Brown University, and other colleges are also to be asked to join. Brown already has thirty stations in dormitory and frat houses, the outgrowth of an idea conceived by George Abraham, '40, during his freshman year. There are now 75 members taking care of programs, advertising and technical arrangements at Brown and Pembroke Colleges. The audience is estimated at 2,000 daily, and the transmission on 570 kc. is carried over 30,000 feet of wire. Programs afford entertainment for listeners, and experience for the operators.

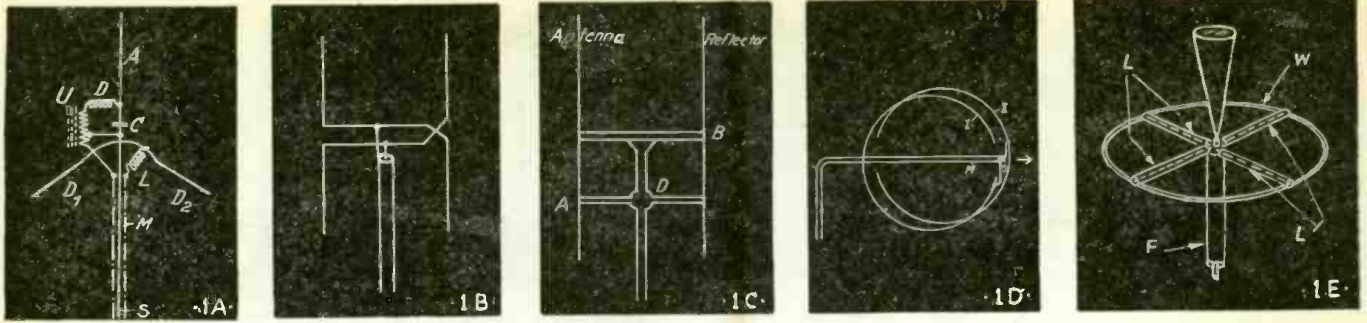


QUEER QUERIES are asked about television, according to engineers with the General Electric exhibit at the N. Y. World's Fair. One example is, "If I run from the transmitter to the receiver, will I be able to see my picture there when I arrive?" Another, "If I leave my name and address, will you send me the negative of my television picture?"

RADIO AND TELEVISION was well represented on a television show, the "Visi-Quiz," broadcast over NBC Station W2XBS in October and November. Left to right in the picture above are: Helen Lee Corbett and Josephine Hough, who tied for first place; Quiz Master Bob Eichberg, Television Editor of R. & T.; R. D. Washburne, managing editor of RADIO-CRAFT; C. P. Mason, editor of Gernsback Publications; and Thomas D. Pentz, Art Director of R. & T. and R-C. The quiz, first of its kind, was designed especially for television, being aimed at the eye as well as the ear. As we go to press, Mr. Eichberg has just staged a second Visi-Quiz.

THE CHINESE are kept in touch with world events by an American woman, Agnes Smedley. A writer and ardent supporter of the Chinese cause, Miss Smedley takes shorthand notes of the news bulletins transmitted by KGEI, San Francisco. These she transcribes and turns over to an interpreter who translates them for the benefit of the Chinese Army. This girl reporter once taught school in a Colorado mining district—a somewhat less exciting career than that which she now pursues.

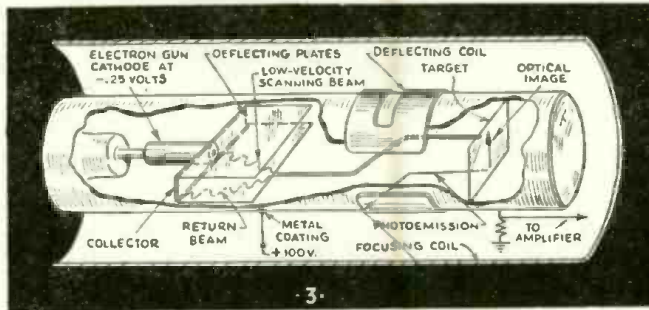
PERMISSION to operate two frequency modulated stations, one at Mt. Washington, N. H., the other at Alpine, N. J., is being sought by John Shepard, president of the Yankee Network. Frequency modulation is relatively static free, due either to the ultra-high frequencies used, or to the ingenious circuit developed by Major E. H. Armstrong. Several stations of this sort are already on the air, and it is believed that the Yankee Network's move may foreshadow a chain of such transmitters. Signals are limited to the horizon, so there is room for a great number in the available bands.



Television Antenna Design

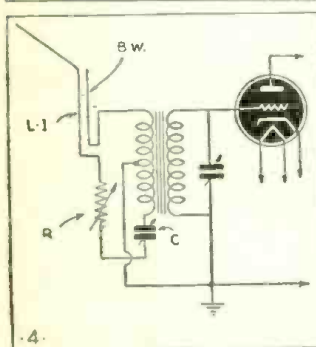
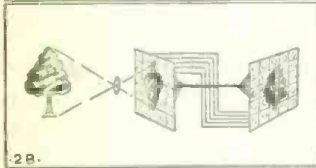
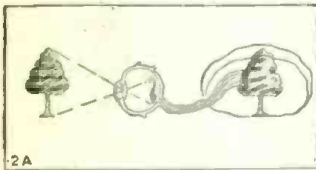
1 VARIOUS forms of television antennas have been designed in England and Germany, where the art has been in progress much longer than here. According to *Rundfunk*, excellent results are achieved by means of the circuits shown. Fig. 1A shows a straight wire with reflector, 1B illustrates a transposed doublet, 1C shows a straight doublet with reflector, and 1D illustrates a type of doublet which may be used when space is at a premium. Another type, 1E, described in *Wireless World of Britain*, shows an arrangement designed to decrease sideband interference. The antenna is an inverted quarter-wave cone connected to the inside conductor of co-axial feeder F. Four quarter-wave concentric lines, L, each short-circuited at the end to a ring of wire, W, provide the compensating circuit and serve as a counterpoise. This also is a German patent.

INTERNATIONAL RADIO REVIEW



Television Analogy

2 *RADIO PAR TUTTI*, of Italy, shows an interesting analogy between the human eye and a television system. In Fig. 2A, one sees how the image of a tree is projected through the lens of an eye onto the retina, and how a network of nerves causes this to form an image in the brain. Fig. 2B shows how a lens projects a similar image onto the sensitive screen of an iconoscope tube, and how a circuit network (or other waves) links this to a receiver, where it is reproduced.



New Pick-up Tube

3 THE Orthicon, a new television pick-up tube, is claimed to have many desirable features. As described by Albert Rose and Harley Iams in the *RCA Review*, this tube is said to be more sensitive to low light levels, to provide greater contrast, to eliminate false dark spots, and to be ten to twenty times as efficient as the iconoscope. It uses both electromagnetic and electro-static scanning, as Fig. 3 indicates.

Low QRN Antenna

4 A NEW type of ballast aerial for interference suppression is shown in Fig. 4. This was recently patented by R. I. Kinross, as reported in *Wireless World of Britain*. Instead of using a shielded lead-in, a "dummy" balancing wire, BW, is run parallel to the ordinary lead-in, L-1, for a distance equal to about half the length of the antenna and lead-in combined. The wires are connected to the primary of the input trans-

former as shown, the variable resistor and condenser (R and C) permitting the interference to be balanced out. Although there is some loss of signal strength, this system is said to be completely noise-free.

Simplified A.F.C.

5 AN arrangement in which the A.F.C. potentials are applied directly to the control grid of the local oscillator is described by *Practical Wireless of Britain*. The diagram of this circuit appears in Fig. 5. The tank circuit includes L1 and C, and its high side is connected to the plate through a blocking condenser C1, but its low side is at ground potential. The control grid is coupled to the tank circuit through the blocking condenser and L2. Local oscillations are impressed upon the first detector through condenser C4, and the A.F.C. lead is connected to the control grid through grid leak R1.

Colored Vision Adapter

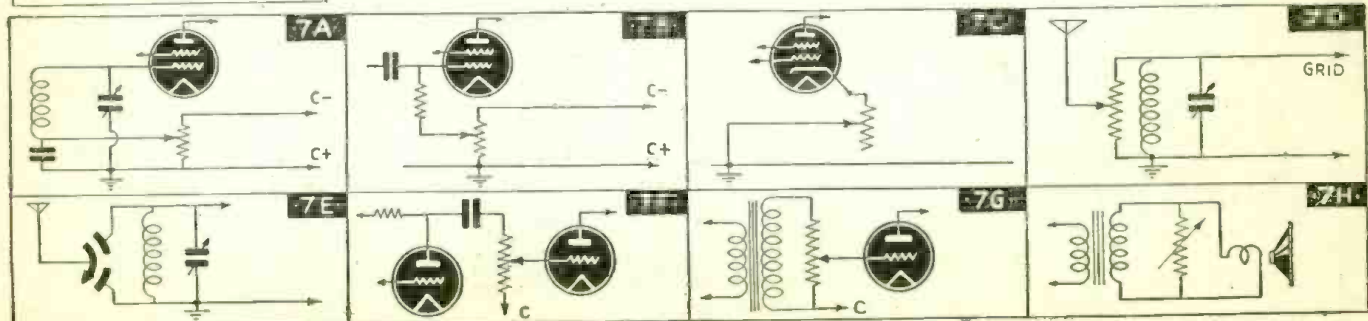
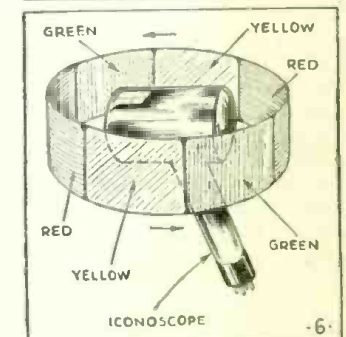
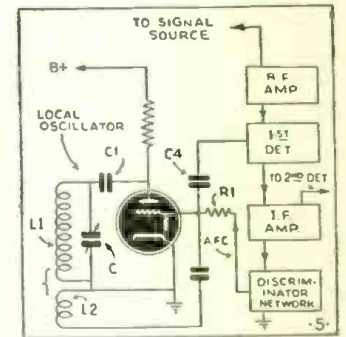
6 AN adapter, which permits colored television to be transmitted over systems using one color iconoscopes and kinescopes, has been patented by D. L. Plaistowe and Marconi's Wireless Telegraph Co., Ltd., according to the British publication. *Electronics and Television & Short Wave World*. Three color filters (red, yellow and green) are carried past the pick-up on an endless belt so that only red rays reach the iconoscope on one frame, only yellow on the next and only green on the third, as shown in Fig. 6, the cycle repeating indefinitely. The filter changeover

takes place during the framing impulse period. A synchronized adapter is used at the receiver.

The changeover takes place so rapidly that full color appears.

Manual Volume Control

7 SEVERAL interesting volume control circuits are shown in *Practical Wireless of Britain*. Two simple methods are illustrated in Figs. 7A and 7B. These control grid voltage in the R.F. stages. Fig. 7C shows how cathode voltage may be varied to control volume, while means of controlling volume by variable resistance in the antenna circuit is shown in Fig. 7D, and variable capacitance in the same circuit at Fig. 7E. Figs. 7F and 7G show two methods of controlling volume by an audio stage, the former being in a resistance-coupled circuit, the latter in a transformer-coupled circuit. Finally, Fig. 7H shows a simple means of controlling volume by means of a resistor directly across the voice coil of a speaker.



MODERN MECHANICAL TELEVISION

Vibrating Mirrors • Reflecting Drums • Oscillating Crystals

Robert H. Kraft

● WHEN one mentions *mechanical* television, most readers immediately picture huge discs whirling at terrific speeds, the final product of which is a coarse sixty line image and a lot of noise. The early discs were large, bulky affairs. They ranged from 2 to 4 feet in diameter, and they quivered and quavered as they spun at speeds that would cause anyone to tremble that ventured into the same room with the monstrosity!

That was the case only a few years ago. Today that is not the case, for mechanical scanners so small that they can be placed in the hand can produce a picture of high definition with little or no noise. It is the purpose of this article to acquaint the experimenter with these mechanical systems of television.

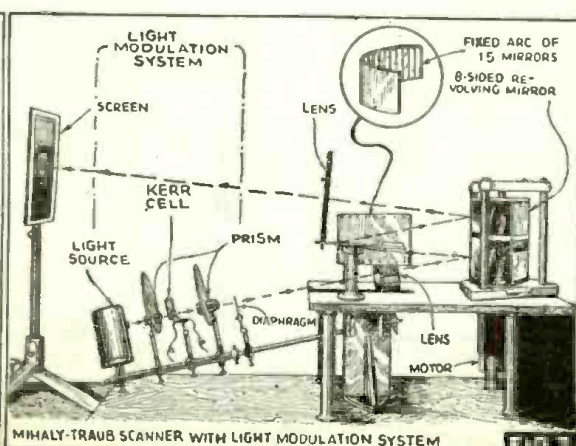
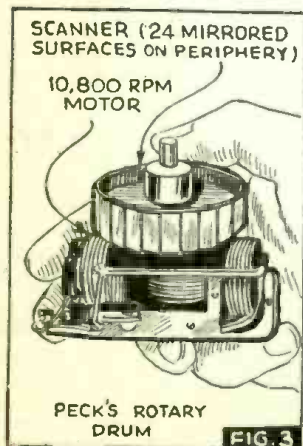
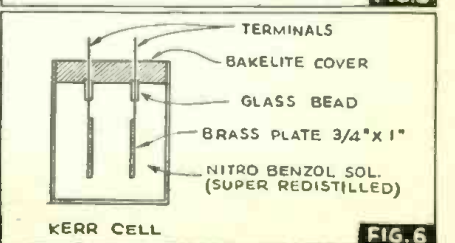
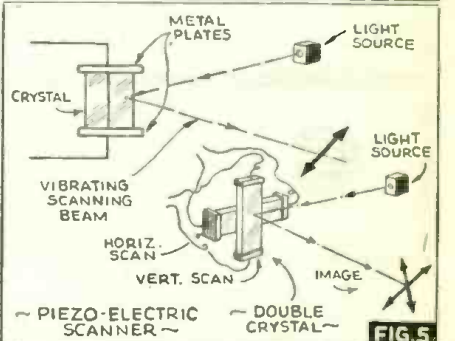
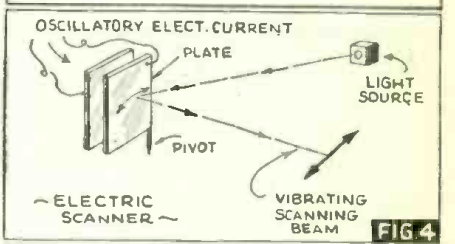
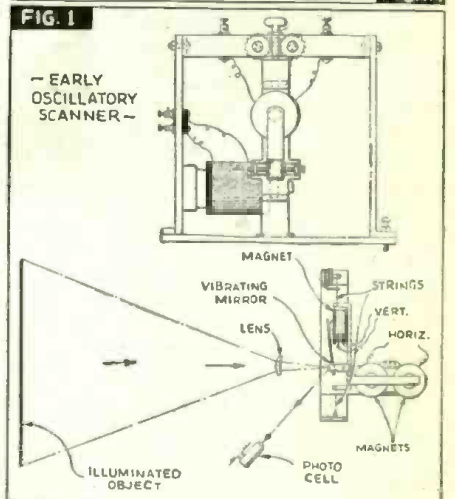
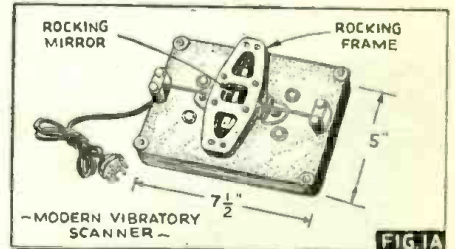
Vibrating Scanners. One of the leading systems employs the oscillatory or vibrator scanner. In this scanning device, a mirror is oscillated in one direction and at the same time in a second direction which is perpendicular to the first direction. This will be clarified if you glance at the diagram of the early oscillatory scanner, Fig. 1. The mirror is attached to a bar which is oscillated in a vertical direction. This assembly is mounted on a frame which is oscillated in a horizontal direction. Tuned strings are used to support the movable frames. These strings are at resonance with the frequency of the current in the corresponding electro-magnets which set the frames into physical motion. Since tuned strings are used to support the movable frames, the shape (oscillogram) of the current passing through the electro-magnets need not be a perfect sinusoidal wave. This is a very important advantage, for in other systems the wave must have a very definite shape if the system is to function at all. At the transmitter, the light reflected from the image by the mirror actuates a photo-cell. At the receiver, a neon lamp or a light modulation system

may take the place of the photocell; the neon lamp or the Kerr cell in the light modulation system is actuated by the amplified output of the receiver. Scanners of this type have been built to produce as high as 8,000,000 elements per second.

Revolving Mirrors. Recent research in Europe and especially in Great Britain has been focused upon mechanical scanners utilizing optical tricks to effect scanning and to increase the amount of light reaching the screen. One of these systems is the English *Mihaly-Traub* system. The light emerging from the light modulation system falls on the bottom row of mirrors of the eight-sided polygon, shown in Fig. 2. The light is reflected to the screen where the image is built up by means of the quarter arc of stationary mirrors and the top mirrors of the rotating polygon. In practice, the best compromise has been found to be the eight-sided polygon together with the quarter arc of stationary mirrors. A multiplying effect is obtained here due to the peculiar optical arrangement. The number of lines appearing on the screen will be the product of the number of mirrors in the stationary arc and the number of mirrors on the rotating polygon. Thus this system can be built to the upper limit necessary for good definition. The system illustrated will reproduce 120 lines. According to its inventors, one of the secrets of the success of this system is that the light from the stationary mirrors is reflected back to the upper row of the eight-sided polygon before the light beam is projected to the screen. This is said to result in a fourfold increase

(Continued on page 542)

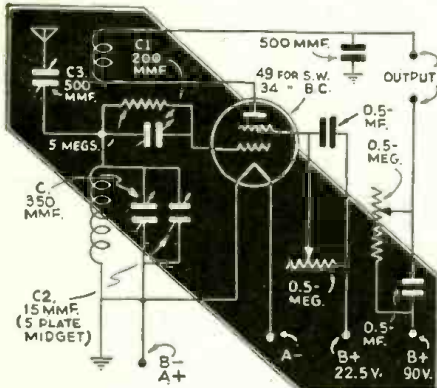
At right—Vibrating scanners; electrostatic condenser type scanner; oscillating crystal scanner; Kerr cell light modulator or valve. Below—Rotating mirror drum scanner and Mihaly-Traub optical system.



Practical Radio Ideas

Changing Tubes Helps S-W Reception

● ONE radio experimenter has found that when using the regenerative detector, the choice of tubes makes a big difference in short wave reception. He found that a 34 type tube is very satisfactory for the ordinary broadcast band, but for short wave reception the substitution of a 49 type tube made a great improvement.

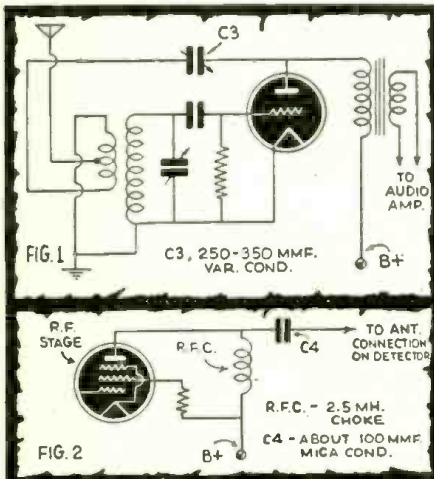


Trying a different tube will often improve S-W reception.

Novel Regen. Idea

● THE accompanying diagram (Fig. 1) is a circuit which eliminates the usual third winding of the detector coil (tickler winding).

To make this type of feed-back in a detector, put twice as many turns on the primary, center-tap it, and connect it to the plate through a 250 or 350 mmf. var. condenser C3, as shown.



Circuit eliminating tickler.

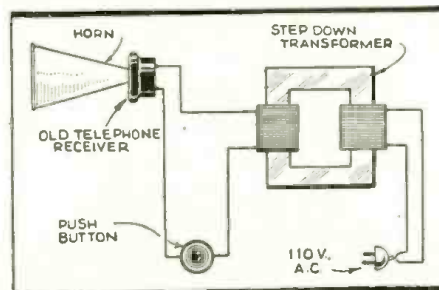
This circuit has only been tried on the broadcast band and probably the number of turns to be added to the original primary will be less for the higher frequencies. The exact amount can be determined by experiment. The correct number, of course, will be that which allows the proper amount of regeneration when C3 is moderately open, so that it can be adjusted when necessary.

Fig. 2 shows how to connect the detector to an R.F. amplifier.—*Dan Knipe.*

Send in your favorite radio "idea." Photos are welcome, but pencil or pen and ink sketches will do. Just write a simple but accurate description of the idea and keep it within 500 words. All articles accepted will be paid for at regular space rates. Address all material to Editor, *Practical Radio Ideas*, c/o RADIO & TELEVISION, 99 Hudson Street, New York, N. Y.

Alarm Made from Headphone

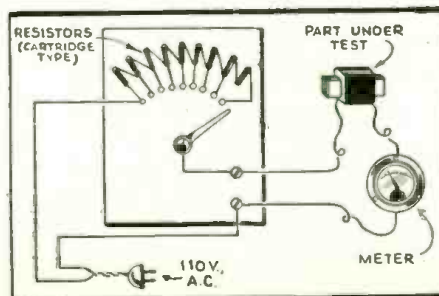
● FOR many signal purposes, an announcer or alarm, made from an old radio or telephone receiver, comes in very handy. The diagram shows how such an alarm device may be operated from a step-down transformer, wiring a push button in series with the headphone, which should be fitted with a horn. The larger the horn, the greater the noise produced. To conform with the Fire Underwriters' rules, no more than 6 to 8 volts should be carried on the low voltage wiring, but if the wires to the receiver are all open and exposed, and rigidly supported on insulators, then a higher voltage may be used on the device.—*JEB REEVES, JR., and DUANE WHITE.*



Old head-phon makes good "alarm."

Rheostat from Radio Resistors

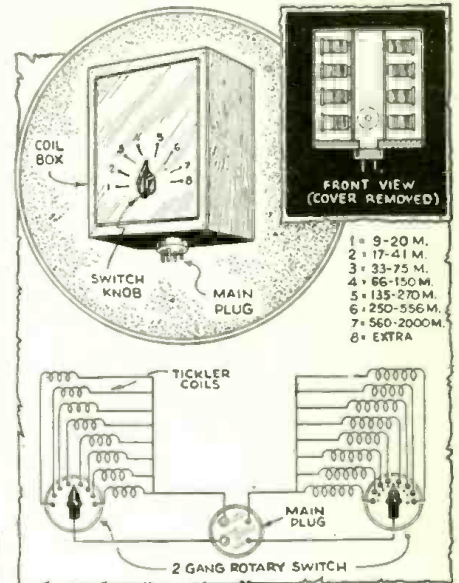
● FOR many test purposes where a fairly weak current only is to be passed, a variable resistance, made from a series of radio resistance cartridges, may be employed, as the diagram shows. If a current of one watt or two watts is to be passed, then the resistors used should be rated at that current capacity, of course; in some cases it may be necessary to connect two or more resistors in parallel for each step in order to provide sufficient current carrying capacity. For example, if a certain step is required to handle 4 watts, then two 2-watt resistors connected in parallel will take care of this load; for 6 watts, three 2-watt resistors connected in parallel would satisfy the demand.



Useful test rheostat made from resistance cartridges and a multi-point switch.

Eight Coils in One

● I HAVE built the device pictured here-with and tried it out—it works fine. Instead of having to plug in eight different coils, I merely plug this unit into the usual coil socket on the set, and by simply turn-

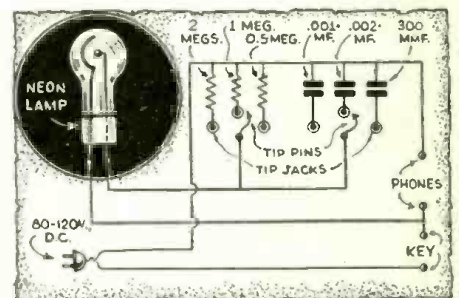


Many bands with one "plug-in" unit; a switch selects the proper coil.

ing a 2-band switch, I can tune in any band desired in a jiffy. Those using five- or six-prong coils can utilize this scheme by using another gang switch or two, as required.—*Orlando Vitone.*

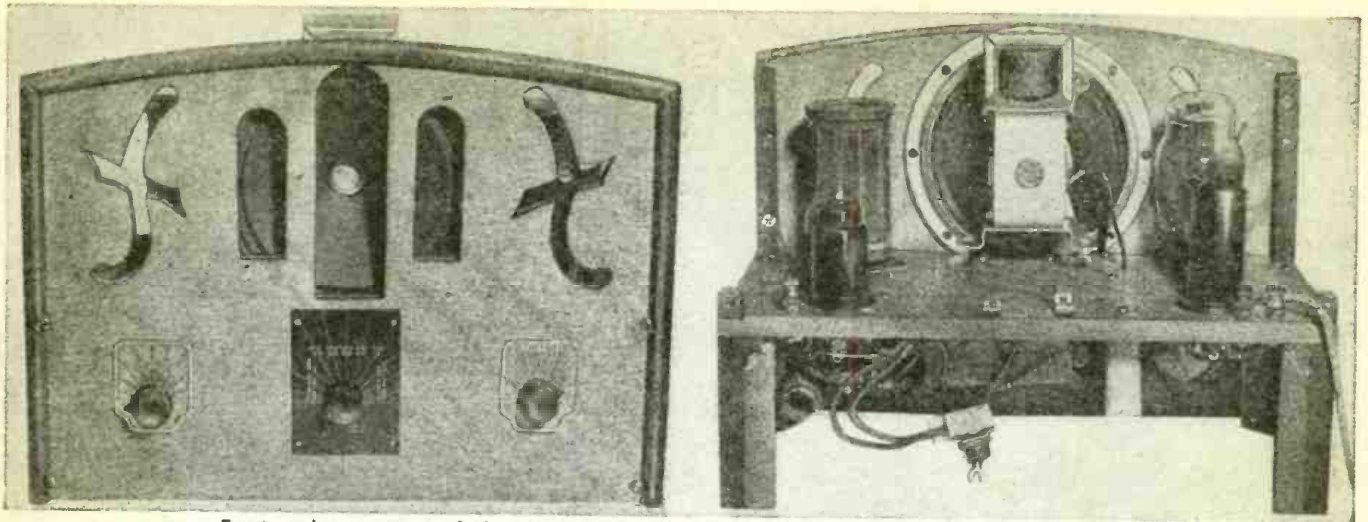
A Simple Oscillator

● A NEON tube, which can be obtained at very reasonable cost today, forms the basis of the handy oscillator shown in the



Simple and useful oscillator made from neon tube and condenser-resistor network.

diagram, and originally described by A. F. Hallett in the *Australasian Radio World*. The applied voltage of 80 to 120 volts D.C. may be either from batteries or a power-supply, and variation in the voltages will cause a corresponding change in the frequency of the note. With the resistances and condensers shown, which may be switched into circuit by means of plugs and jacks, a wide range of tones or frequencies may be obtained, and the tube may be made to oscillate from one oscillation every 15 seconds to several thousand per second. This oscillator forms a handy code practice set.



Front and rear views of the 2-tube "loud-speaker" set. It works on 110 volts, A.C. or D.C.

Beginner's 2-Tube Short-Wave and Broadcast Receiver

H. G. Cisin, M.E.

THIS ingenious little beginner's set meets the requirements of an ordinary A.C.-D.C. home receiver for broadcast reception and a highly efficient plug-in coil short-wave receiver for bringing in police calls, code, amateurs, trans-Atlantic phone conversations and distant foreign stations. On the broadcast band, a standard A.C.-D.C. coupling coil is used without regeneration. Hence, when this set is used as an ordinary broadcast receiver, there are no whistles or other disturbing regenerative effects. Since the set is to be used for local broadcast reception, regeneration is not required on this band. Of course, on the short waves, regeneration is an absolute necessity for distant reception.

A simple single throw, single pole switch is used to open or close the broadcast por-

Features: S-W or Broadcast reception by flipping a switch—loud-speaker operation on two tubes—simple construction.

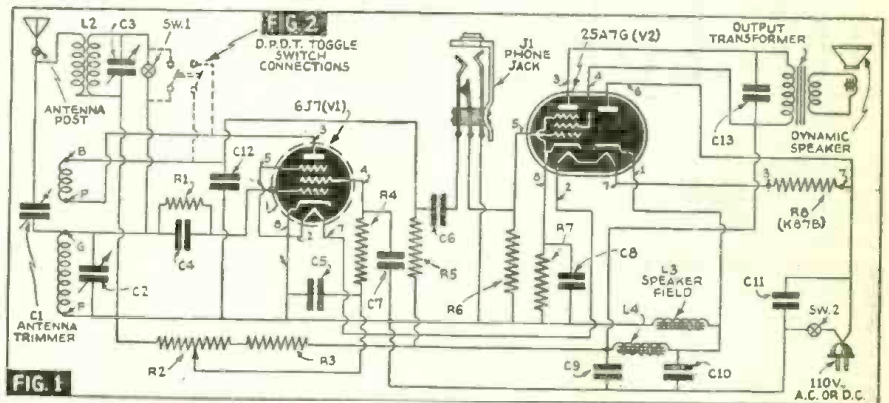
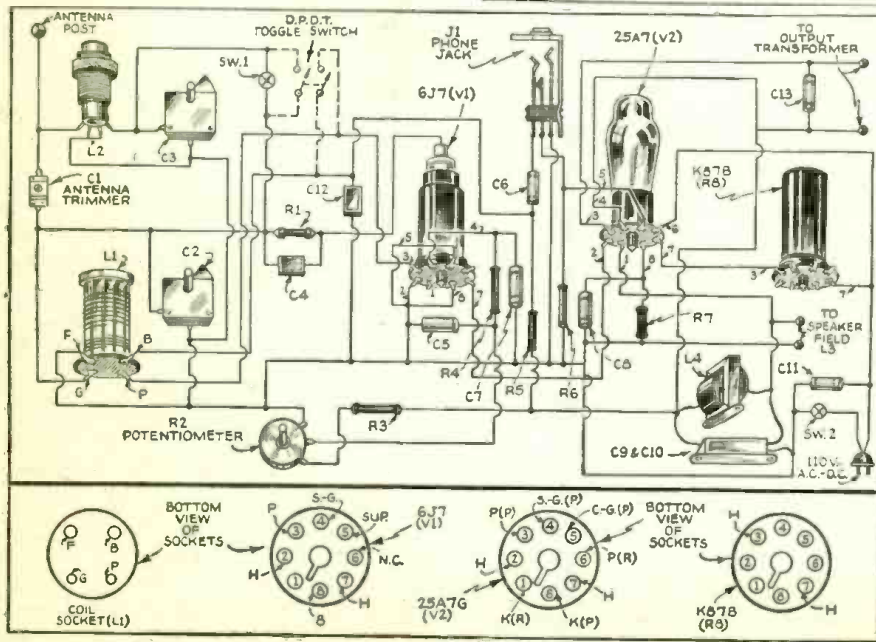


FIG. 1

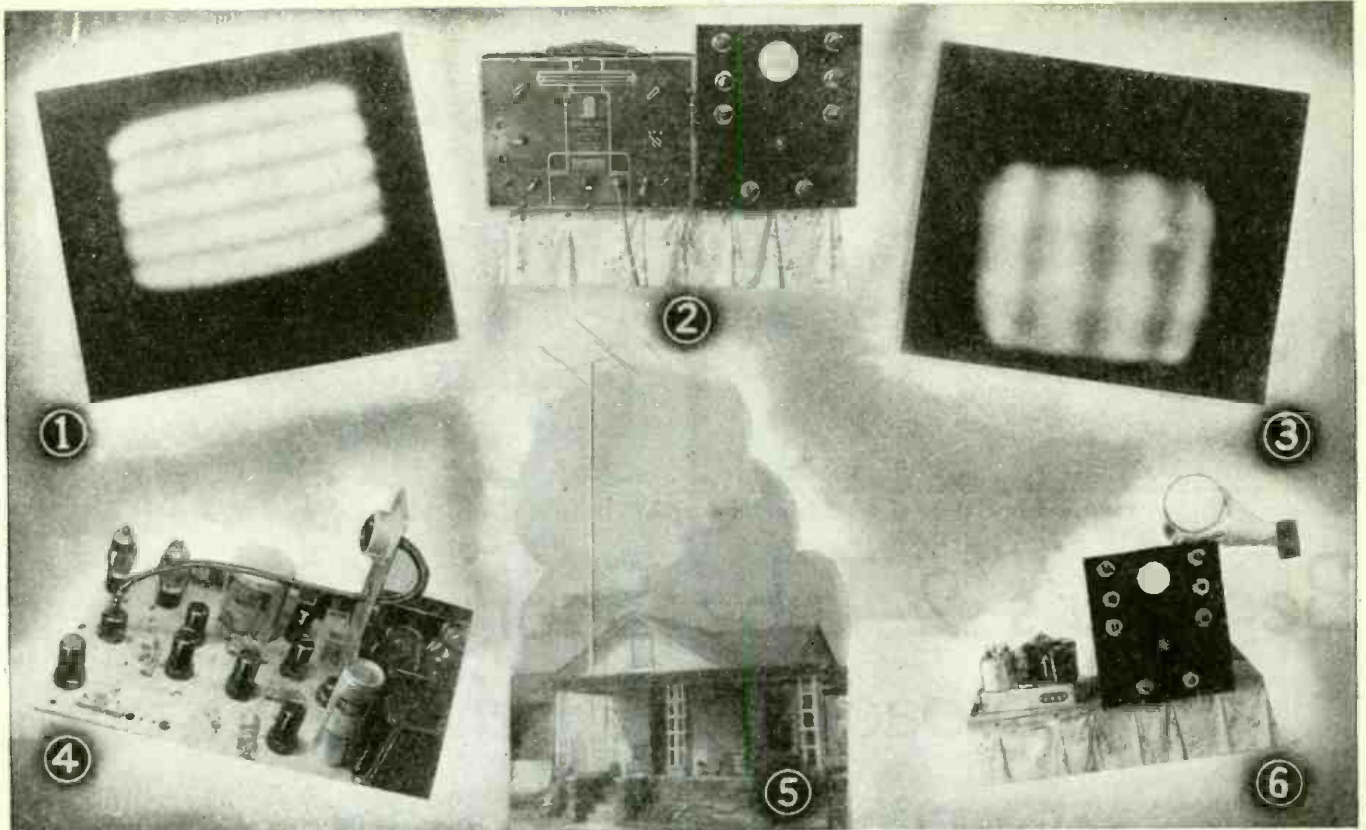
Above—Schematic diagram of receiver. At left—picture diagram.



tion of the circuit. When the switch is open, the set is connected to operate as a *plug-in* short-wave receiver. Closing the switch connects it as a *broadcast* set.

This set uses a 6J7 metal tube and a dual purpose 25A7 tube, the latter combining the functions of power *output* (audio) tube and *rectifier*. When operating as a *broadcast* receiver, the 6J7 serves merely as a tuned detector. When the switch is opened, the 6J7 operates as a tuned *regenerative* detector. The 6J7 is resistively coupled to the pentode portion of the 25A7 tube. The output of this tube is over three-quarters of a watt and hence there is sufficient power to operate a dynamic speaker with fair volume. The rectifier portion of the 25A7 supplies sufficient current for the plate supply of the tubes and also to energize the field of the dynamic speaker.

When used on the short waves, regenera-
(Continued on page 552)



1—Horizontal bands obtained on C-R tube screen with signal generator at resonance, but modulated with 400 cycle audio note. 2—Test equipment at left of photo proved helpful in aligning television receiver. 3—Vertical bands caused by signal generator feeding into television receiver, but tuned slightly off resonance. As resonance is approached, lines become fewer until they disappear at resonance. Signal generator here supplying pure sine wave. 4—"Sound" section of receiver. 5—Antenna doublet and reflector. 6—High voltage supply for 5" C-R tube.

10-Tube "R & T"



Television Receiver

This second article describes the *sound* section, details of the aligning procedure, improvements in the R.F. circuits, details of the low and high voltage power supplies, etc.

● TAKING up the description of the R & T television attachment from where it was terminated in the last issue, we find that the radio frequency amplifiers, low voltage power supply, sound section and antenna installation remain to be considered.

The design of radio frequency amplifiers of suitable characteristics for use in television, and which can be readily switched from station to station, is not practical. None of the manufacturers of Television sets or kits has placed on the market a T.R.F. receiver for this reason. In England, however, where the London station was the only one in operation (since shut down because of war crisis and no others were likely to be put in operation) many T.R.F. receivers were on the market in the lower price ranges. Since the builders of the television described in this series are unlikely to be laymen it was decided that the use of plug-in coils would be a practical solution of the problem. You will, we hope, not consider the plug-in coils a hardship, since using them enables you to hold down the cost of the outfit by making use of home-made coils. It would be difficult to make suitable coils in the case of a super-het, but it's

Ricardo Muniz, E.E.

Associate Member, A.I.E.E.

Instructor Applied Electricity, Brooklyn Technical High School, and Teacher in charge of Television, Asst. Engineer, WNYE, Board of Education Station, (500 watts—41.1 mc.)

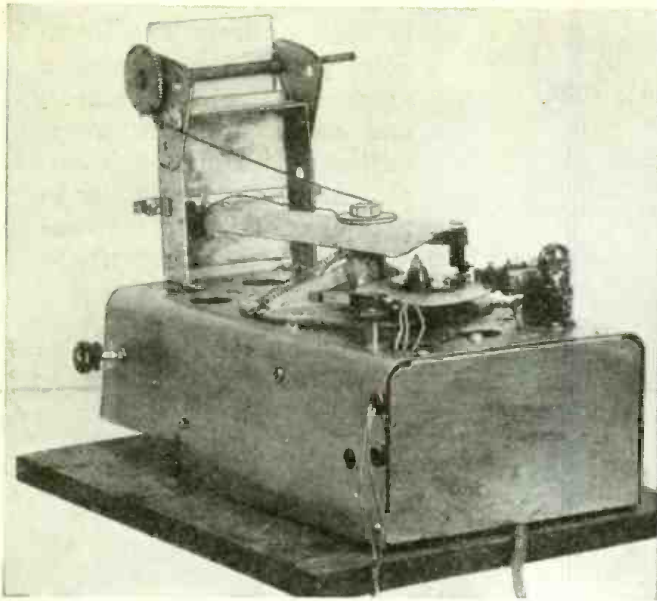
Assisted by Jerrier Haddad

easy with a tuned radio frequency set.

The de-coupling R-C filters shown in plate and screen circuits are of great importance. The tendency of R.F. amplifiers to oscillate when operated at these high frequencies with such high gain pentodes as the 1852 type tube is positively amazing. This tendency, even at high settings of the gain controls, is absent in this design. If the experimenter should decide to change the mechanical layout, he must be sure to keep the various R.F. coils as "un-coupled" as possible. *Keep the coils far apart and at right-angles to each other.* Both stages of R.F. have tuned plate circuits, as this increases the gain far above anything which was found possible with plate resistors. As a matter of fact, it was found possible to sacrifice some of the gain by putting resistors across the tuned circuits, thus in-

creasing the band of frequencies they pass (don't forget the television video carrier, plus modulation, is 4 mc. in width) and therefore the detail on the pictures. The value of this *broadening* resistor is non-critical; the value specified worked fine at 35 miles air-line from the transmitter. It might be possible to improve the range somewhat by not using any resistor in this position, thus increasing the sensitivity; the tendency to oscillate would be increased, however, so watch it. A still lower value of resistance in localities having high signal strength might be used with a slight improvement in picture detail. The first stage has tuned input for maximum efficiency, due to better impedance matching to antenna circuit. The second stage uses a grid resistor input. This arrangement was found to operate as well as tuned input, at the same time reducing the number of tuned circuits and the chances for feed-back. It was found desirable to use a separate gain control on each stage, because in this way they can be adjusted independently. Using the same control for both involves the use of a complex *de-coupling* network, and

(Continued on page 549)



The finished facsimile recorder which yielded excellent pictures for Mr. Harmon.

How I Built A "JUNK-BOX" Facsimile Recorder

W. S. Harmon, Ex-W9UBU

Hundreds of readers have asked for data on a home-built facsimile recorder. Here 'tis! (And we saw fine samples of the recorded pictures, too.)

● ALMOST anyone who has experimented with elementary mechanics and simple radio circuits can build a "junk-box" facsimile recorder that will attach to any set, having 5 watts or more output, to receive printed facsimile material as transmitted by numerous stations in various parts of the United States.

In the following description, the writer refers to various makes of apparatus which he had on hand and utilized in his recorder. Other apparatus can be substituted if it is more readily available.

The basis of this home-built facsimile recorder is the chassis of an old Brunswick radio, the tuning condenser shaft of which is vertical. The condenser plates are removed and the shaft and bearing are used for the stylus arm bearing. Next, the stylus arm (Fig. 3) is made from a piece of sheet aluminum, bent to form a channel, the measurements of which are on the drawings. However, the main thing is to get the proper sweep for the stylus.

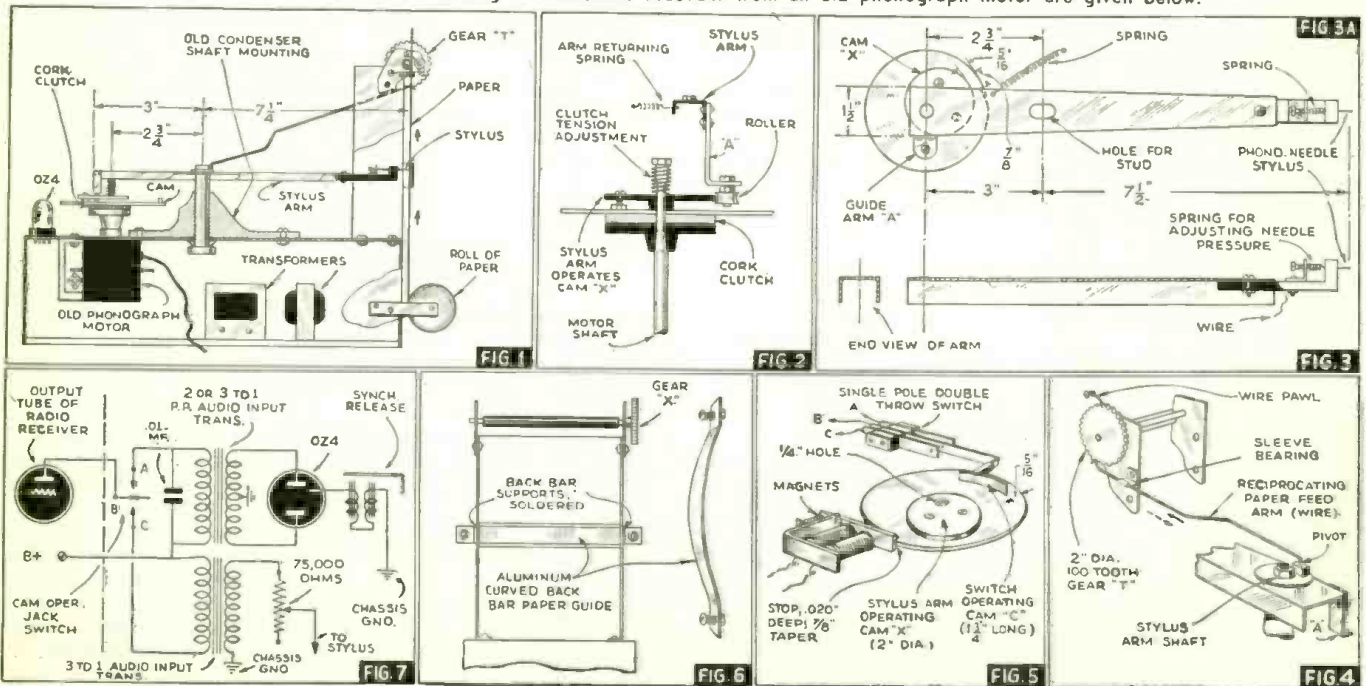
The motor, taken from an old General Electric electric phonograph, is mounted under the chassis. Part of the cast-iron flange on the stylus arm bearing will have to be removed so the motor can be mounted close enough. After the motor is mounted, the turntable is removed from the hub and the hub is replaced (see Fig. 1). Next, cut a piece of cork gasket about 1/32" thick to fit

over the motor shaft. This is the clutch facing. Then cut a 4" circle of fairly heavy sheet iron. This is the clutch plate. The synch. notch is cut in with a file. The cam for operating the switch (see Fig. 5) is made from a piece of sheet iron and is soldered to the clutch plate. It should be long enough to change the current from the stylus to the synch. coil when the stylus is about half way back on the *return* stroke. The coils for the synch. electromagnet were taken from an old magnetic loud speaker.

The cam wheel that operates the stylus is cut from a piece of 1/32" aluminum and is fastened to the clutch plate with two small screws, two nuts being soldered to the clutch plate. A small grooved pulley wheel is attached to the stylus arm with a bracket, as shown in Fig. 2.

The top of the motor shaft is flattened off with a file and a small screw soldered to it. A spring is slipped over this and a nut and
(Continued on page 559)

Constructional details for building this facsimile recorder from an old phonograph motor are given below.





In this smooth-working Transceiver, a 6C5 is used as a super-regenerative detector, and as oscillator for transmitting; a loktal 7C5 is employed as audio amplifier in receiving and as a modulator in transmitting.

Photos at left show front and interior views of the Transceiver. Note the hand-mike in the front view.

A 2.5 Meter Transceiver



● WITH the growing popularity of the ultra-high-frequency bands, more and more amateurs are regretting the fact that their regular transmitters and receivers are not constructed to tune down to 112 megacycles. Results obtained on this band usually are equally as good or better than those encountered on 56 megacycles and the equipment can be made much smaller in physical size. This band is ideal for mobile work; a half wave antenna for 112 megacycles is only about 48 inches long.

In spite of a general belief to the contrary, the use of specially constructed tubes for 2.5 meter work is not an absolute necessity; in fact, almost any standard receiving triode, such as the 76 or 6C5, will operate with good results on this band, provided of course that extreme care is taken when the receiver or transmitter is constructed. The special ultra-high-frequency tubes, such as the acorn types, are, without a doubt, better for the extremely short wave bands, but their higher cost keeps many hams from exploring this interesting region.

The two-tube transceiver to be described is designed especially for mobile work on the 2.5 meter band. As shown in the photographs and in Fig. 1, the construction and circuit are extremely simple. The tube complement consists of a 6C5 as super-regenerative detector-oscillator and a "loktal" 7C5 as audio amplifier-modulator. This unit transmits more power than most transceivers because heavy loading of the antenna is permissible for both transmitting and receiving. The hiss level is extremely low

Harry D. Hooton, W8KPX

and it is quite sensitive when in the receiving position. The radiated interference with

The radio frequency chokes in the grid and plate circuits of the 6C5 may be obtained commercially or wound by the experimenter himself; they are identical in size and appearance, consisting of about 75 or 80 turns

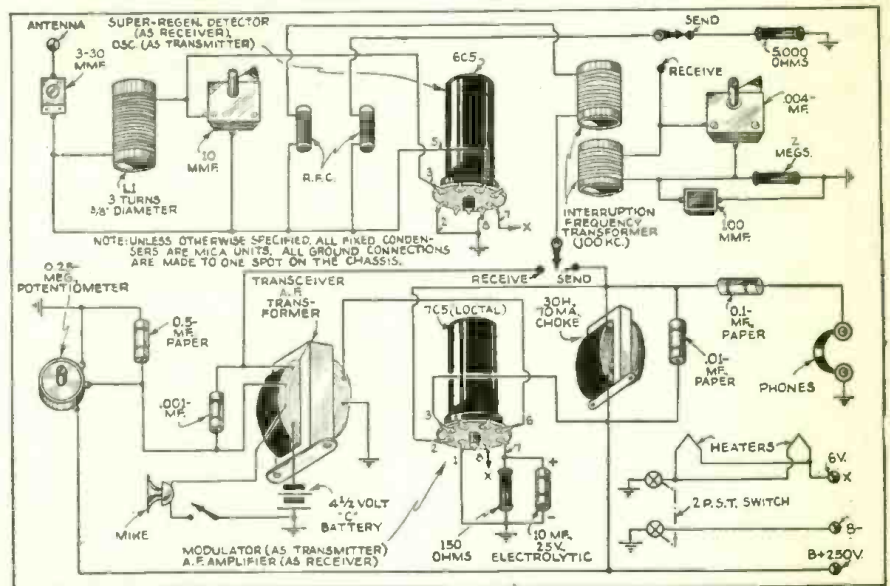


Fig. 1. Diagram of transceiver—although simple it works FB.

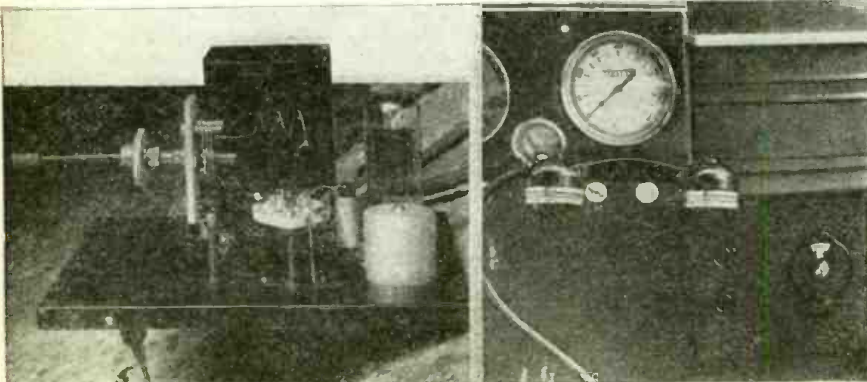
other 2.5 meter units will be much less than in some transceivers, while receiving, due to the separate interruption frequency coil circuit.

of No. 36 d.s.c. copper wire wound close on a 3/8 inch insulating form. The amount of turns is not very critical but it may be necessary to use more or fewer than the number of turns specified in order to eliminate resonant absorption dips which will cause "dead spots" in the tuning range. The R.F. chokes are mounted directly on the 6C5 socket and the rotor terminal of the tuning condenser in order to keep the leads as short as possible.

The interruption frequency coil is the regular manufactured type, being tuned to 100 kc., and is used to provide super-regeneration in the 6C5 tube when receiving. This permits much heavier antenna loading and a lower plate voltage. Either 135 volts from "B" batteries may be used for the plate voltage supply when working mobile, or a small 6/250 volt vibrator power pack may be employed. For fixed station work,

(Continued on page 554)

Photos below show at left—side view of the chassis; at right—Transceiver mounted in car.



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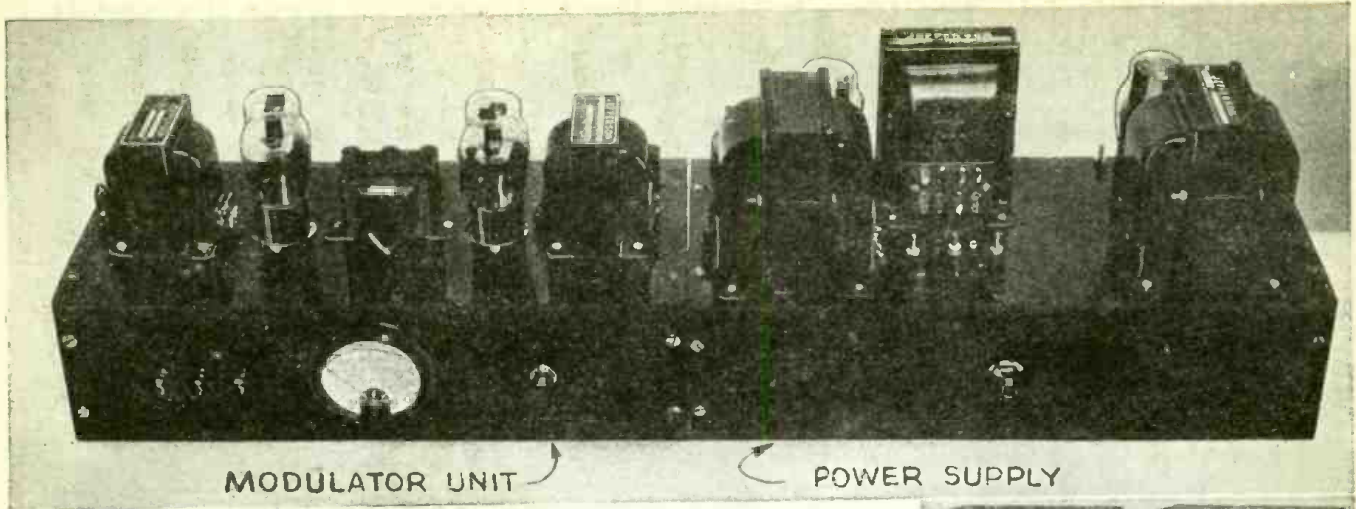
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A Modulator for the HAM Transmitter

No. 7 — Getting Started in Amateur Radio

C. W. Palmer, E.E., Ex. - W2BV

This simple yet very effective modulator enables the Junior "Ham" to convert his transmitter for phone operation.



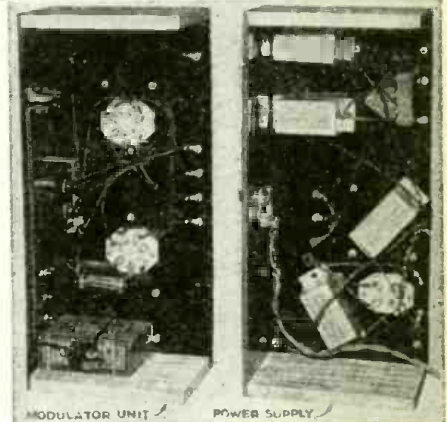
● THE addition of a modulator and amplifier to the transmitter described in the earlier parts of this series* will allow it to be used as a *phone* transmitter to send the human voice instead of *code* signals. Part VI (Oct., 1939, issue) described how a modulator works, gave its function in the transmitter, and showed several typical examples of modulators used in ham rigs.

In this part, a modulator unit suitable in size and design for our ham transmitter will be described. With this unit, the scope of our rig will be widened as we will be able to send both in *code* and *voice* on one of the four bands allotted to amateurs by the Federal Communications Commission.

Our modulator-amplifier unit consists of a speech amplifier tube to increase the strength of currents from the microphone, followed by a Class B modulator. A Class B modulator was chosen for reasons of economy as this is the most efficient of the three types in general use—Class A, Class A prime, and Class B. By Class B is meant that the tube is operated at a much higher output than is possible with the two other methods, and for this purpose special transformers, and supply voltages were chosen. In Class B, the plate current variations are much wider than Class A types, and for this reason a separate power supply was added to the power supply panel. The wide variations in plate current would otherwise cause variations in the voltage supplied to the transmitter, which might result in instability or other troubles.

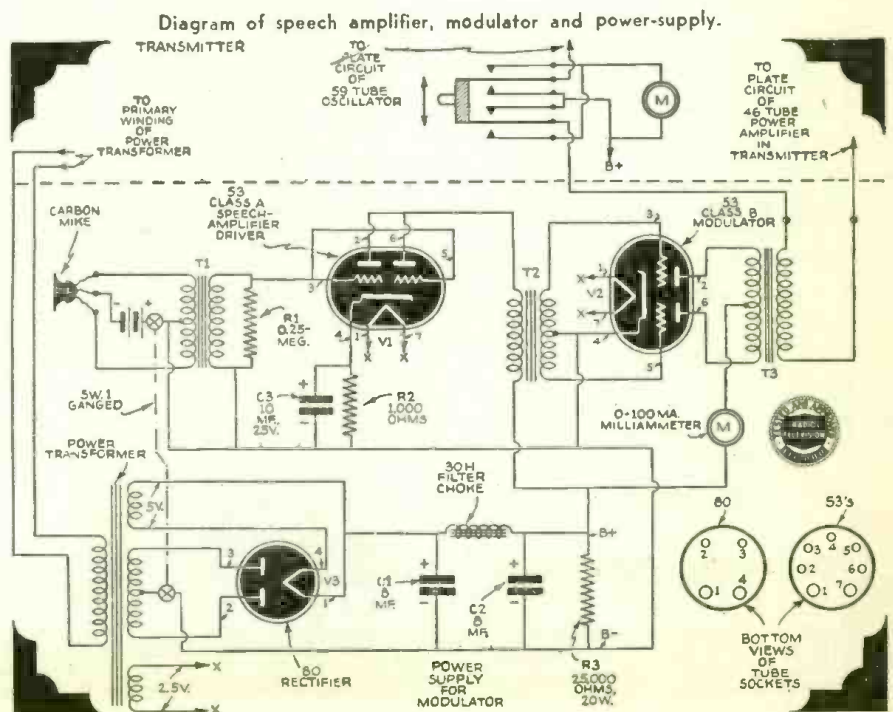
*March, 1939, issue.

An examination of the circuit diagram will show that the modulator is very similar in circuit appearance to an audio amplifier and, as a matter of fact, the tube following the microphone is just that. A carbon microphone was chosen because the number of amplifier stages required with this type of



Top strip of photos shows modulator and power supply. Directly above—bottom views of modulator and power-supply units, respectively.

mike over the more modern dynamic or ribbon mikes is greatly reduced and such a high quality mike and additional amplifier (pre-amplifier) can be added later as ex-
(Continued on page 541)



What Do YOU Think?

He Likes "Foto" Section

Editor,

I have bought your book, RADIO & TELEVISION, since it was called *Short Wave Craft*. To me, it is the best book on the art of radio today. I have seen it progress very rapidly, but the December issue of RADIO & TELEVISION, incorporating FOTOCRAFT, is the best. I am pleased because there is nothing important missing and at the same time a great deal added. Please keep your book like this. Good luck.

HAROLD MORRIS,
1289 Allard Avenue,
Cote St. Paul
Montreal, Que., Canada.

Two Hobbies Not Related

Editor,

You asked for opinions as to the merger of "R. & T." with FOTOCRAFT. I don't like it! I have been reading RADIO & TELEVISION since issue No. 1, and I have every copy of your magazine. I never wrote you and complained about any of the features. Radio is one hobby, and photography is another hobby, altogether different, and there is no possible reason for a merger of this kind. If you want to keep your circulation among radio-minded people, I would suggest you revert to the way you published the magazine previously.

ARTHUR B. JOHNSON,
Broadcasting Committee,
Newark News Radio Club,
325-85th St.,
Fort Hamilton, N. Y.

Radio & Photography Ideal Combination

Editor,

A few days ago I received an announcement that RADIO & TELEVISION and FOTOCRAFT would henceforth be published under the same covers. This news was most welcome, as I have long felt that radio and photography, as hobbies, were closely related.

This new policy will be of great financial aid, also. It will reduce the cost of magazines to those who have been in the habit of buying both. At the same time, I think that it will win newcomers to both the radio and photographic fields. The reason that some people do not know about certain subjects is mainly because they have never had the opportunity to come into contact with them. Those who purchase this new book for the radio section will surely become interested in the section devoted to photography. In this way, many will become interested in a field new to them.

In recent months I have noticed in the section devoted to "Barter and Exchange" that many of the ads are for cameras and photographic supplies. From this it can easily be seen that approximately half of the readers of this magazine are interested in both radio and photography.

Here's hoping for your continued success.

ELMER R. FULLER,
14 Euclid Avenue,
Cortland, N. Y.

He Prefers Radio Subjects

Editor,

I've been a reader of your magazine for six months and I think that it is swell, but I don't like the photography section in the December issue.

WILLIAM SZABO,
15 Harvey St.,
New Brunswick, N. J.
(Continued on page 531)

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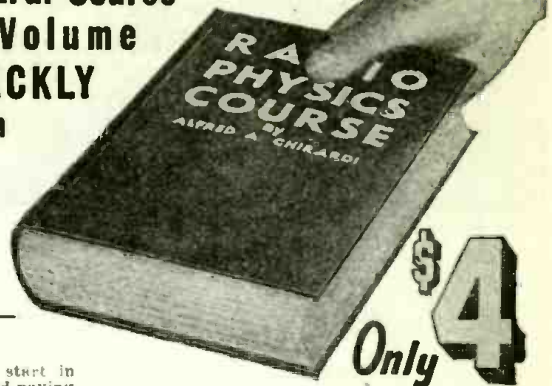
broadcasting and receiving are explained to you in full detail, but without one wasted word. Over Five Hundred diagrams, drawings and photos illustrate the graphic descriptions he gives you. This great book will give you the basic knowledge that is essential for landing any kind of a radio job—in broadcasting studios, in radio service organizations, in plants manufacturing radio equipment, etc., etc.

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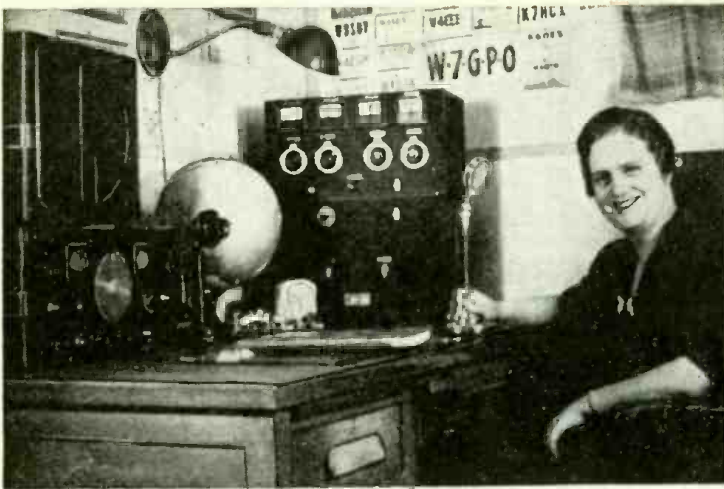
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Mary Roden's Ham station wins the Plaque this time. (Remember her on the front cover last month?)

4th Plaque Award Goes to Mary E. Roden, W7GPO

Editor,

I am a monthly newsstand reader of RADIO & TELEVISION and am enclosing the description of my station and a photo of myself and rig.

Amateur station W7GPO has been on the air since December, 1937, when I received my license. Radio has always fascinated me and now, after nearly two years of operation, I am still fascinated—many times more so than when I started.

My transmitter is a Harvey Model 80-T,
(Continued on page 538)

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.



RADIO TEST-QUIZ

Robert
Eichberg

1. The longest wave in radio transmission is:

- (a) 20,000 cycles (c) 15,000 cycles
(b) 10,000 cycles

2. The "tank" circuit of a transmitter is:

- (a) the watercooling system for tubes.
(b) the circuit which is coupled to the antenna circuit.

(c) a chain of "tank town" broadcasting stations.

3. You are in a lonely spot in Alaska. It is very important that you receive a radio message transmitted by a station on 2100 meters. In checking the old-fashioned receiver at hand, you find that its tuning range falls far short of 2100 meters. The receiver is outfitted with the old type condensers in glass bowls. Knowing that the capacity of a condenser may be changed by changing the dielectric (in this case air) you

(a) fill the spaces between rotors and stators with waxed paper.

(b) pour kerosene from your kerosene stove into the glass container.

(c) collect all the castor oil from the medicine cabinet and pour this into the containers.

4. While listening in on the 600 meter (marine) band you hear an SOS transmitted by a ship and receive a number of messages which mean an important news story. You call up your favorite newspaper

This month's Test-Quiz was prepared by J. G. Hart of the American Radio Institute.

on the telephone and relay all messages to them as they come in. The possible consequences are:

(a) the F.C.C. revokes your station license and prosecutes you for a violation of the Communications Act of 1934.

(b) the newspaper publishes all messages and amply compensates you, knowing that you have not violated any laws.

(c) you are banned forever from the air for having interfered with an SOS call.

5. You are a licensed amateur operator and a friend of yours is returning from a sea voyage. While listening on the 24 meter (marine) band you intercept a radiogram addressed to your friend's mother. You quickly call her up and acquaint her with the contents of the telegram. The mother thereupon calls up the telegraph company, advising them not to bother about the delivery of the radiogram as she already is familiar with its contents. The possible results are:

(a) The Telegraph Company sends you a letter of thanks for expediting the delivery of the radiogram.

(b) the Telegraph Company refunds part

of the charge of the telegram to your friend.

(c) you receive a notice from the F.C.C. calling your attention to the fact that you have violated the Communications Act of 1934.

6. You are a radio operator on board a steamer and wish to obtain some information from a Japanese steamer you are just passing. The Japanese operator speaks only Japanese, you only speak English. Which of the three following means would you employ to obtain the desired information:

(a) send out a CQ asking if any operator has a Japanese-English dictionary handy.

(b) use the list of international abbreviations (Q code and Inf. signal code).

(c) send for the third mate who through his contacts with Geisha girls has picked up some Japanese.

7. The first tunes ever played over the air were:

(a) the broadcasting of "My Country, etc." by KDKA in 1924.

(b) the playing of "God Save the King" by an English amateur in 1921 by varying the speeds of his synchronous spark transmitter.

(c) the broadcasting of the "Star Spangled Banner" by WOR in 1924.

8. By "skin effect" is meant:

(a) the tingling sensation received when
(Continued on page 555)

What Do YOU Think?

(Continued from page 529)

New Combination Suits Him

Editor,

I recently received my December copy of R. & T. AND FOTO-CRAFT combined. I have been an ardent reader of this magazine since the days of the famous *Short Wave Craft*, and I think you have done a fine thing; it is very educational to us readers. After all, it is the *readers'* magazine and not anyone's individually. Therefore, you may get other opinions also, but *right now I am interested mostly in your television articles*, especially compact receivers with less tubes. So, as I see it, this magazine since it started always went a little step farther up in the line until it is good today and will doubtless be still better tomorrow.

JOSEPH ZUK,
513 West Susquehanna Ave.
Philadelphia, Penna.

Interested in "Short Waves" Only

Editor,

With reference to the announcement in "R. & T." regarding the merging of FOTO-CRAFT with RADIO & TELEVISION: As a reader of *Short Wave Craft* and *Radio & Television* since 1931, I am sure that I am not in favor of the merger, and according to what I have heard from other readers around here, this will not find very great favor with readers. For my part I am interested only in what pertains to "short waves."

B. JAMES NEALE,
4162 Ogden Avenue,
Chicago, Ill.

"Foto" Section a Pleasant Surprise!

Editor,

Just received my December issue of "R. & T." and was I surprised when I came upon the FOTO-CRAFT section! Now *you have something there* and I hope it will be kept as part of your "FB" magazine. Although I am a movie camera bug, I always get a kick when I see just how some of those trick shots were made, such as the ones on page 500. Now that you have started this, how about a page on Amateur Movie Making? I have often wondered why R. & T. had never added a few pages on snapshots, etc., and was afraid to stick my neck out, hi! But now it is started. I only hope you keep it rolling. So wishing R. & T. and FOTO-CRAFT all the success in the world. I am

A. WITMAN,
41 Peters Place,
Red Bank, N. J.

Will Make New Friends

Editor,

Having just read the December "R. & T." I must say I was agreeably surprised to note the inclusion of FOTO-CRAFT's interesting news in this already fine magazine.

Knowing any number of radio enthusiasts who are also deeply interested in photography, I feel that both subjects are sufficiently kindred in appeal to actually complement each other in the new make-up of RADIO & TELEVISION. You will doubtless make many new friends besides pleasing present readers more than ever.

All best wishes for a greater success.

Sincerely,

JOSEPH MILLER,
2559 East 28th Street,
Brooklyn, N. Y.

(Continued on page 533)



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THERE'S a good reason for the high signal-to-noise ratio in the "HQ-120-X". The first tuned circuit of any receiver controls the signal-to-noise ratio. When an antenna is coupled to this very important circuit, there is usually a detuning effect. This detuning effect lowers the signal-to-noise ratio. The antenna compensator on the "HQ-120-X" provides a control for restoring resonance, regardless of the effects of the antenna system. In high gain, highly selective circuits this control becomes a necessity if peak performance is to be had. Try an "HQ-120-X" and note its superior signal-to-noise ratio.

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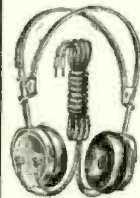
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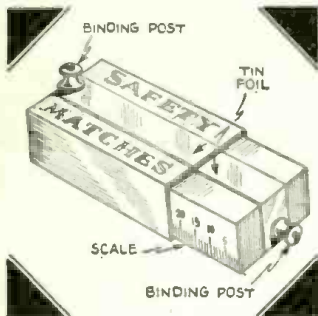
Radio Kinks

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

First Prize Winner

Improved Trimmer

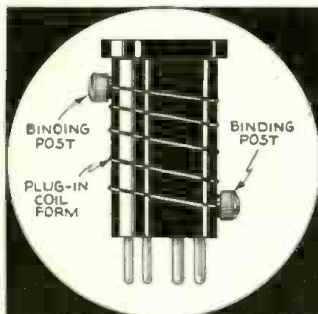
A cheap and easily constructed variable condenser can be made with a safety matchbox and a few short pieces of tinfoil. Two pieces of tinfoil form the two electrodes. One piece is glued to the top of the box frame and the other glued to the



bottom of the sliding portion of the matchbox. A binding post is used on each of these strips of tinfoil in order to facilitate connections. If desirable, a scale can be marked on one side of the sliding member, as shown in the drawing. When the box is entirely closed, the capacity of the condenser is maximum; by sliding the inner section of the box outward, the capacity is reduced.—*W. J. Sharp.*

Quick-Change Coils

The experimenter often wishes to change the winding of short wave plug-in coils. This ordi-

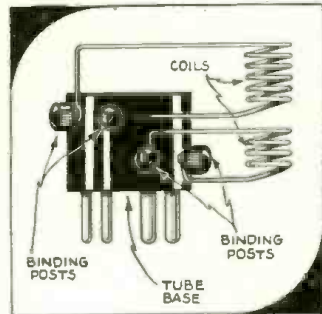


narily entails the labor of unsoldering and resoldering the winding. My method is to mount binding posts on the coil forms, connecting each binding post to a prong. Then the wind-

ings may merely be connected to the binding posts so that no soldering is necessary when a change is made.—*Melvin Levine.*

Plug-in Coil Adapter

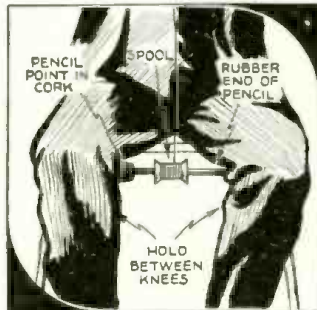
If you wish to try out various coils, not of the plug-in type,



in a set which uses plug-in coils, an adapter can be easily made from an old tube base. Remove the tube from the base and drill the required number of holes in the bakelite walls. Mount binding posts in these holes, connecting each post to a tube prong. Then it is a simple matter to connect the coil to the posts and plug the adapter into the set.—*Marcel Bour.*

Wire Spool Holder

I have found, when winding coils, chokes, etc., the biggest problem is what to do with the spool of wire. It either falls on



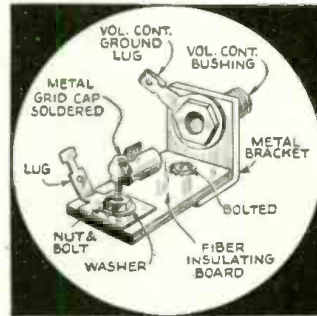
the floor and gets messed up around chair legs, or the wire slides off the end of the spool in loops and gets kinked.

So I take a long pencil, press the sharpened end into a cork, then slide the spool over the pencil and put the pencil between my knees. As I wind the coil, the wire unrolls "smooth as silk." Simple?—*Sol Friedman.*

How to Make Jack

A double contact phone jack is easily constructed from the parts that every experimenter finds in his junk box.

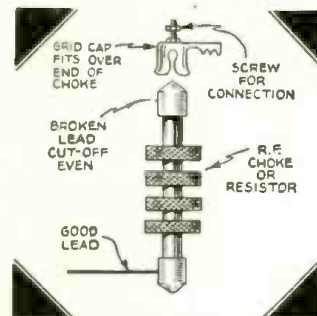
The front contact, which also serves to mount the jack behind the panel, is the bushing from an old volume control. This bushing is fitted through a hole in one leg of a metal angle. To the other leg of the angle is fastened a piece of bakelite or fibre which supports the rear contact. This contact is a metal-tube grid cap supported by a machine screw. A grid cap with



good tension should be used and should be shaped for best contact. A volume control grounding strap makes a fine soldering lug for the front contact; any type lug is used on the rear.—*Charles R. DeKay.*

Emergency Resistor or Choke Connection

If the lead breaks off an R.F. choke or resistor of the type illustrated, the unit need not be junked. An emergency connec-



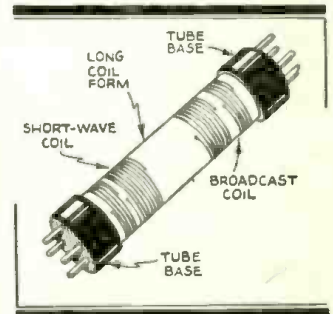
tion can be made even without the use of a soldering iron.

When I broke the lead off my only R.F. choke, I was not in a soldering mood, so I hunted up a grid cap and put it over the metal end of the choke. This particular cap had a hole in the end that just took a 6-32 screw and nut for connections, but one could easily have been drilled. This method can also be used on resistors with uninsulated ends.

Use of the cap allows flexibility in connecting and eliminates unsoldering a lead every time an experimental choke or resistor is tried out.—*Charles E. Baker, Jr.*

2-Band Coil

When you have one coil-form and wish to have both broadcast and short wave coils available for quick change-over, you can use the idea illustrated herewith. You merely wind the primary and secondary of the broadcast coils at one end of the form and the primary and secondary of the short wave coil as far away as possible at the other end. An



old tube base is then affixed to each end of the coil and the windings connected as indicated. Thus, when the coil is inserted with the short wave coil downward, that band is in use, and by reversing the coil, the broadcast band is had.—*Frederick Price.*

R & T On Facsimile

RADIO & TELEVISION Magazine's popular *Kink Page* is now a regular feature of WOR's 710 kc. and 25.7 mc. facsimile transmissions, by means of the Finch system. Watch your local facsimile station for further R. & T. features.

Handy Wire Gauge

If you have on hand coils of wire of unknown size, this size may be easily found by winding a coil one inch in length on a form of any sort. When this has been done, count the turns, which should be as closely spaced as possible. Then refer to a table that gives the number of turns per inch for various sizes and types of wire. For example, a one inch winding of No. 24 s.s.c. will consist of 45 turns, as the table shows.—*Kenneth Moore.*

Wire Table

B. & S. GAUGE	DCC	SCC	DSC	SSC
18	19.0	22.3	22.3	23.6
22	30.0	34.0	34.0	36.6
24	35.3	41.5	41.5	45.3
30	55.3	71.3	71.3	83.1
34	70.0	97.0	97.0	120.0

B. & S. GAUGE	ENAM. SCC	ENAM. SSC
18	24.0	21.7
22	37.7	32.7
24	47.2	39.7
30	92.3	67.4
34	145.0	91.7

What Do YOU Think?

(Continued from page 531)

Wants More Television Articles Editor,

I use a ten-tube Zenith, and to the left of the receiver is the regenerative preselector which uses a single 6J7 metal tube. I also have a calibrated R meter. The diagram for the preselector and the R meter were taken from RADIO & TELEVISION. This pre-selector works very FB and I would not be without one again.

Over my desk is the certificate of the *Short Wave League*, and to the left of it is a certificate of reception from TI4NRH. To the left of this is the certificate of *Official Listening Post Observer*.

I have logged 35 countries on the 20 meter phone band and 18 countries on the short-wave broadcast bands. Out of the 18 countries, I have verified 10. Most of my DXing is done on the 20 meter phone band.



Have been reading RADIO & TELEVISION for three years and enjoyed all of them very much. I like "Let's Listen In" and the "Guest Editorials" best. Have found many of the circuits in the magazine useful. I am in favor of seeing more articles on Television, because I believe we are going to have Television before we know it. There is only one complaint I have to make on the magazine and that is on the Short Wave Station List. The letter I and the number 1 are both typed the same and found that it is rather hard if you don't know the call letters.

I am a member of the *Short Wave League*, *International Round-Table* and I am the *Official Listening Post Observer* for the State of Washington.

Keep up the good work that you have done in the past!

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

R&T Read By the Whole Family! Editor,

As a regular reader of your magazine for the past five years, I would like to express my congratulations. It is the finest magazine of its kind.

I have built several sets from RADIO & TELEVISION and all were excellent.

The gear here consists of: a 15 tube Super-Het, a six-tube Super-Het and the two-tube battery set described in December 1936, number. We do most of our listening on the two-tube receiver, and have obtained fine results with it as a portable set.

I like all the departments of your magazine, and really "go to town" on it as soon as we get our copy. I'll say "our" copy—well I am not the only one in the house that reads your magazine. My father and sister make off with it at every opportunity. Hi!

for January, 1940



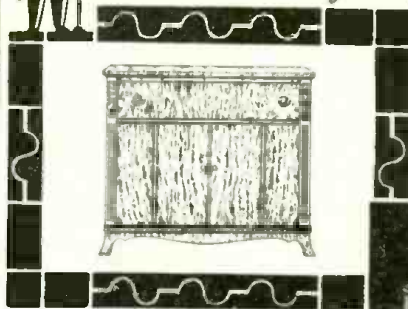
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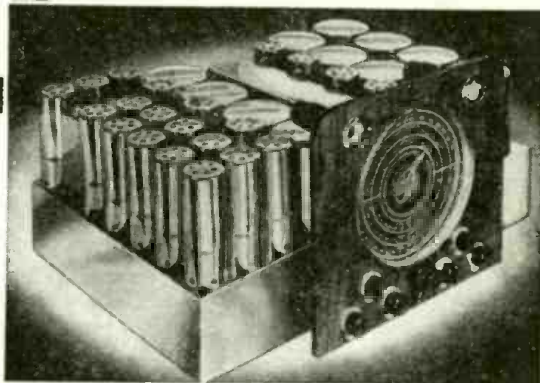
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If there are any SWL's who feel inclined to drop me a line—O.K., shoot it along, Yes we mean the YL's too! I QSL 100%, so let's hear from some of you "live wires."

It's time I sign off here, so I will say 73 and wish your 100% "fine business" magazine the best of luck.

JAMES R. WELCH,
1745 Minn. Ave., S. E.,
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Editor,
You may enter my name as one who will volunteer to answer SWL verification cards.

The speed varies from 12 to 16 words per minute. The frequencies most used are 7040, 7124, 7204 and 7225 kc. SWL cards have helped me in the past, and I hope they continue to do so.

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Television Aerials

? What type of antenna is best for use on the television broadcasts, such as are now being broadcast on the U.H.F. by NBC? Have you any diagrams showing the lengths of the wires, and other helpful hints? I am using an ordinary broadcast antenna and am not obtaining proper signal gain.—Philip Muuroe, Astoria, L. I.

A. Complete constructional detail of television aerials was given in the June, 1939, issue of RADIO & TELEVISION. We suggest that you write our circulation department, ordering a copy of the issue.

Question Box

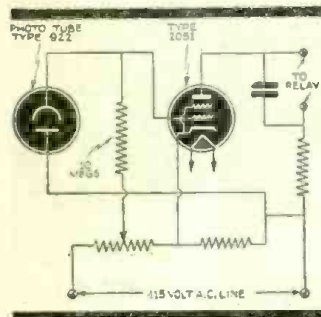


Diagram for photo-electric tube, with amplifier. (No. 1204)

922 phototube the resistance of the tube changes. Since this is connected to a high potential with respect to grid-cathode of the 2051, this causes a positive potential to be applied to the grid of the 2051 tube, and plate current flows, closing a relay or similar device in the plate circuit. When a large grid-resistance value is employed, care should be taken to keep the tube base clean and dry in order to make leakage currents between pins as low as possible, so as to avoid erratic operation.

Single Tube Transceiver

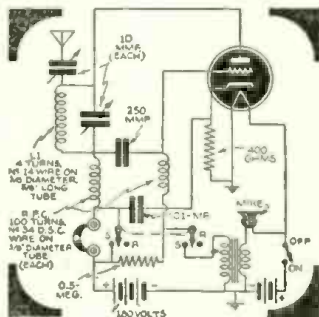
? I intend building a 2½-meter transceiver and am requesting a diagram of such a unit. If possible, can complete data be given showing value of parts together with coil information?—P. M. Schwaben, Detroit, Mich.

A. Here is a diagram of such a unit. It makes use of a 76 tube. This tube has low inter-electrode capacity and high mutual inductance, and thus performs better than most other types of conventional tubes on 2½ meters. It works as a grid modulated oscillator for transmitting, and as a super-regenerative detector for receiving, in the circuit shown. Switching from Send to Receive is done by means of a D.P.D.T. switch. The modulation transformer can be any type of carbon mike to grid transformer with a secondary resistance (grid winding) of from 3,000 to 5,000 ohms. The primary is connected in series with a single button mike and battery. A 6-volt storage battery or 4 dry cells in series will normally provide heater and mike current, as shown in the diagram.

Light-Operated Relay

? I intend to construct a light-operated relay and would like to see published a circuit diagram of such a device. Can you also explain the action of such a circuit when light hits the phototube?—K. L. Meresky, Carlstadt, N. J.

A. Here is one of the latest light-operated relay devices. The action of the circuit is such that when lights hits the



A 1-tube Transceiver, using a 76 tube. (No. 1205)

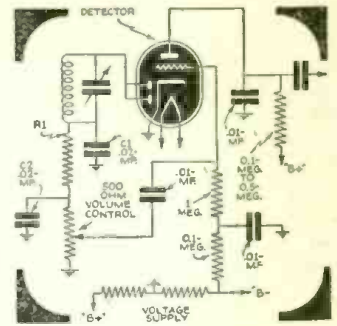
Trouble With Crosley Model 648

? I have a Crosley 648 receiver. When the set is turned on and it warms up, it will not start to play unless the switch is turned on and off a few times. When the 6A8 tube is replaced, the trouble clears up for a while until the tube begins to age. What seems to be the trouble?—Alex Morehouse, Cleveland, Ohio.

A. The trouble you are experiencing is in the 60,000 ohm resistor which is connected from the 6A8 oscillator grid to chassis. This should be replaced with a good resistor of about 75,000 ohms.

Using High-Mu Triodes

? I intend to construct an all-wave receiver and am planning to make use of a high-mu triode such as the 75, 6Q7 or 6F5. I am informed that these duplex-diode tubes are tricky to use and therefore am asking some information in the way of a diagram, showing how they should be used in a superhet. circuit, together with any other information that may be helpful?—Peter Mommsonsk, Meriden, Conn.



Using a high-mu triode tube to best advantage. (No. 1206)

A. The use of such tubes for audio amplifier purposes following a diode detector often results in very bad overloading of the grid circuit, which gives rise to poor quality with high distortion. This is frequently caused by improper filtering of the audio input signal to the grid, resulting in I.F. being also applied to the grid. A high-mu triode usually operates as a detector with very little bias on the grid. For this reason only a very weak signal can be applied to the grid before overloading takes place. A filter designed to remove the I.F. signal applied to the grid is very essential. This filter is shown as C1, R1, C2. Where such a filter has not been already included in the receiver the addition of these parts no doubt will improve the receiver considerably.

Television Query

? I have recently seen television demonstrated at the New York World's Fair and was amazed at the excellent clarity of the images. How much do these television receivers cost? Can they be added to present radio sets? Why are these sets not advertised more extensively than they are? Do they require a great amount of power to operate?—Laura DeMott, Grand Manor, Staten Island.

A. Television sets producing an image approximately 3" x 4" may be had for \$200.00; those producing an image about 7½" x 9½" cost in the neighborhood of \$600.00, including a complete 3-band broadcast and short wave receiver.

No vast amount of electricity is required to operate these sets. The larger television receiver operates on approximately 300 watts.

It is not possible to add television apparatus to one's present radio, except that many of the lower-priced television sets do not have provision for reproducing the accompanying television sound. In this case, the sound is fed through the amplifier and loud speaker on your present set; the image apparatus, however, is entirely separate.

Advertising has not been held up on television. This apparatus has been extensively advertised in the newspapers and magazines.

Radio Interference Problem

? I have a modern multi-tube radio receiver but have experienced considerable interference due to the elevator buzzer in our building. What can I do to overcome this noise, which interferes with the reception of programs?—C. M. Preston, San Juan, Puerto Rico.

A. Ask the superintendent of your apartment house to install a small tubular condenser of about .1 mf. capacity across the buzzer contacts. This will reduce the sparking at the contacts considerably and should eliminate the interference you mention.

A fee of 25c (stamps, coin or money order) is charged for letters that are answered by mail. This fee includes only hand-drawn schematics. We cannot furnish full-size working drawings or picture layouts. Letters not accompanied by 25c will be answered on this page. Questions involving considerable research will be quoted upon request. Names and addresses should be clearly printed on each letter.

SHORT WAVE LEAGUE

DX on the HAM Bands

Edited by Elmer R. Fuller

Ten Best DX Catches

Name	Call	Freq.	Miles
Fitzpatrick	KA1LB	14.02	11,500
Mannheimer	PK3WI	14.05	11,300
Kavanaugh	KA1LZ	14.26	10,700
L. Fuller	ZS1AC	14.115	10,400
Fleming	KA1CW	14.17	10,300
Mannheimer	KA1ME	14.145	10,300
Post	KA1FH	14.275	10,200
Noyes	ZS1CH	14.153	10,000
Hegler	KA1LZ	14.2	10,000
Post	ZS4AA	28.24	9,900

• WELL, we are all here again this month, but what everyone wants to know is: *Where is the DX?* Since the war in Europe has broken out, the DX has been falling off, until now it has fallen nearly as far as it can. For the first time since the beginning of this department a year and a half ago, one of the ten best DX catches is less than 10,000 miles from the observer. Most of the DX being heard is from the stations in the Philippines and the South Americans.

A majority of the South Americans have been placed on a restricted basis. Several of them are allowed to operate only one or two hours a day. The LU's are permitted on the air four hours a day. However, they cannot use more than one frequency, and must speak Spanish whenever talking with Spanish-speaking countries. None of the South American hams is allowed to QSL at any time with anyone within a belligerent country.

From unofficial sources, it has been learned that the South African hams have been ordered off the air, but it appears that this is not being put into practice. They are still coming in—and quite regularly at that. The PK's also have been ordered by the British government to discontinue use of their transmitters, but these are also coming in and "fine business" at that.

In the November issue a grave mistake was made in this department. At that time, we stated that the call KHCTB was an airplane from the Archbold Expedition flying over Australia. This was actually a "flying fortress" on a semi-official flight. (No more may be disclosed about it.—Editor)

The reports for last month are somewhat different than ever before, due to the European war. The chief stations heard during October were the South Americans and the islands of the Pacific.

Reports for the month were received from observers in the following locations:

Arizona	L. Fuller
District of Columbia	Hall
Florida	Lester
Indiana	Kavanaugh
Iowa	Mannheimer
Kansas	Hegler
Kentucky	Taklauer
Massachusetts	Lendzioszek
Minnesota	Post
Missouri	Fleming
Nebraska	Noyes
New Jersey	Fitzpatrick
New York	C. Fuller
North Carolina	Poole
Pennsylvania	Jordan
Rhode Island	Baptiste
Washington	Lang
Wisconsin	Wheaton
Nova Scotia	Poulin

The Asiatics heard last month appear from the reports of our observers to be very scarce. Only four were reported, the lowest in several months. The four are:

Call	Freq.	R	S	Where Heard
J5CW	14.1	5	6	Ia.
J7CB	14.09	4	3	Wash.
XU8AM	14.13	4	4	Ariz.
XU8RB	14.09	3-4	3-5	Minn.

AFRICA—

EK1AF	14.13	4-5	7-8	Ky., D. C., N. C., N. S., Mo., Ind., Ia., Penna.
OQ5AB	28.275	4-5	7-9	R. I., N. J., Ky., Minn., Kans., Fla.

OQ5AE	14.17	4	6	Fla.
ZS1CH	14.05	4	5	Penna., Nebr.
ZS1BL	14.01	5	8	Mo.
ZS1AX	28.18	4	7	Minn.
ZS1AC	14.115	4	5	Ariz.
ZS2X	14.054	3	6	Nebr.
ZS2J	28.2	5	9	N. J.
ZS2BT	28.15	4	7	N. J.
ZS2AH	28.01	4	8	Mo., Minn.
ZS2AZ	14.09	3	4	N. C., Kans., Penna.
ZS4AA	28.1	5	8	N. J., Nebr., R. I., Minn., Kans.

Call	Freq.	R	S	Where Heard
ZS4H	14.11	4	8	Mo., Minn., Nebr.
ZS5T	28.5	5	6-8	R. I.
ZS5Q	14.02	5	9	Mo., Nebr.
ZS5BZ	28.0	5	5-7	Minn., Ind., N. C.
ZS5DA	14.11	5	6	Ind.
ZS5C	14.03	4	5	N. C.
ZS6DY	28.4	5	8	N. J.
ZS6ED	14.	4	4-5	Minn.
ZS6AJ	14.13	4	6	Ind., N. C., Kans., Nebr.
ZS6DW	14.025	5	6	Ia.
ZS6J	14.035	5	5	Ia.
ZS6W	28.19	5	8	Kans.

NORTH AMERICA—

H15X	14.12	5	8	N. S.
K4FOW	28.48	5	7	Penna.
K4FAC	28.0	5	6	R. I.
K4FAM	29.5	5	8	R. I.
K4FAY	29.0	4-5	6-8	R. I.
K4TOW	29.2	5	6-8	R. I.
TG9BA	14.29	5	9	N. Y.
T12FG	14.03	5	8	N. Y.
T13AV	28.17	5	8	N. J.
VE3AFI	14.02	4	8	Fla.
W1AVK	14.	5	8-9	W. Aus.
W1BIC	14.	5	7-8	W. Aus.
W1CND	14.	5	7-8	W. Aus.
W1JFG	14.	5	9	W. Aus.
W2AIZ	14.	5	7-8	W. Aus.
W2GW	14.	5	7	W. Aus.
W2JKO	14.	5	7	W. Aus.
W2TP	14.	5	7-8	W. Aus.
W3DOK	14.	5	8	W. Aus.
W3EOZ	14.	5	7-8	W. Aus.
W3FJU	14.	5	8-9	W. Aus.
W3GEC	14.	5	6-7	W. Aus.
W3HFD	14.	5	8	W. Aus.
W3WN	14.	5	7	W. Aus.
W4BPD	14.	5	8	W. Aus.
W4CLK	14.	5	7	W. Aus.
W5DSA	14.	5	8	W. Aus.
W5CCD	14.	5	7-8	W. Aus.
W5FHI	14.	5	7	W. Aus.
W5FWZ	14.	5	8-9	W. Aus.
W6AQJ	14.	5	9	W. Aus.
W6KNI	14.	5	7-8	W. Aus.
W6LR	14.	5	7-8	W. Aus.
W8JK	14.	5	7-8	W. Aus.
W8NIK	14.	5	8	W. Aus.
W8QAG	14.	5	9	W. Aus.
W8UEL	14.	5	8	W. Aus.
W9ARA	14.	5	8	W. Aus.
W9REU	14.	5	8	W. Aus.
W9NMH	14.	5	8	W. Aus.
W9RUK	14.	5	8-9	W. Aus.
XE1CO	14.155	5	5	N. Y.
XE1GE	14.189	5	8	Fla.
XE2SB	28.5	5	6	Penna.
YNIIT	14.05	5	6	N. C.

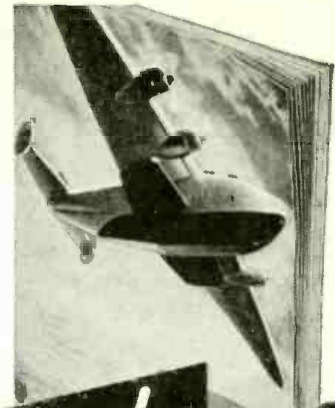
SOUTH CAROLINA—

CE1AS	14.15	4	7	D. C.
CE1AO	14.13	4	5	Wash.
CE2AM	14.12	4	7	Wash., Ind.
CE3CO	14.1	5	6	Penna.
CE3AG	14.003	5	8	Nebr.
CX2BK	14.14	5	8	D. C.
LU1AW	29.6	2-4	3-5	R. I.
LU2BJ	14.06	4	7	Mass.
LU4CZ	14.07	5	6	Wash.
LU4DJ	14.5	5	9	N. S.
LU5CZ	14.075	5	6	Penna.
LU8AB	14.05	5	5	Wash.
OA4AS	14.075	5	6	Mass.
OA4R	14.06	4	6	D. C.
OA4C	14.1	5	5	Wash.
OA4AI	14.013	4	7	Nebr.
PY7AE	14.35	5	6	Ky., Penna.
PY8AG	14.3	5	8	Mass.
YV1AQ	28.35	5	7	N. J., D. C.
YV1AN	14.14	5	9	D. C.
YV4AE	14.17	5	9	D. C., N. S.
YV4AF	14.1	5	8	N. S.
YV4AB	14.14	5	8	Penna.
YV5AE	28.15	4-5	7	Ky., R. I.
YV5ABF	14.05	5	9	D. C., N. S.
YV5K	14.1	5	8	N. S.
YV5ACA	14.15	5	9	N. S.
YV5ACE	14.1	5	4	N. Y.
YV5FV	28.6	3-4	4-5	R. I.

EUROPE—

EA7AB	14.02	4-5	7	N. S.
EI2L	14.0	5	5	Penna.
ES5D	14.05	4	6	Wash., Ind.
ES4G	14.05	4-5	7	N. S.
HA1K	14.08	5	9	N. S.
HA3B	14.02	3	5	D. C.
LX1UU	28.35	5	8	Ky.
ON4A	14.	5	8	N. S.
ON5ZZ	14.015	3	7	Mass.

(Continued on page 541)



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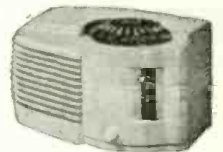


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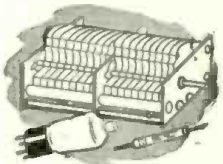
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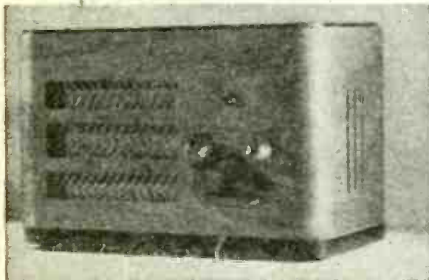
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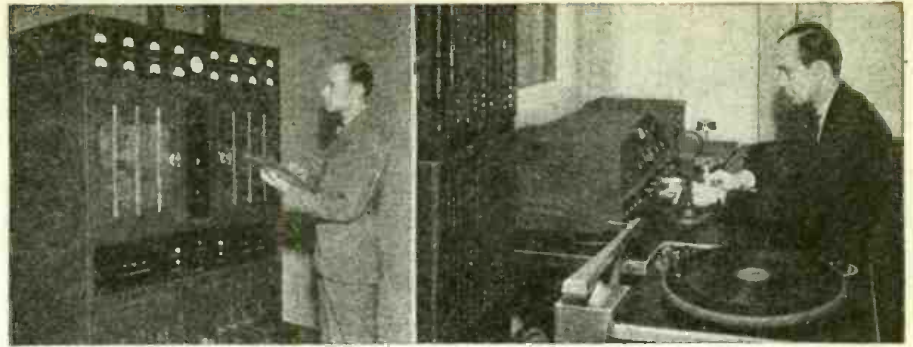
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Left: The W4XA composite transmitter, designed by J. H. DeWitt, Jr., Chief Engineer for WSM and built under his supervision. Checking meters is Harold Walker (W4DWS), Engineer in charge of W4XA operations. Right: Turntables, console and a portion of the W4XA Library, with Director Tom Stewart at the controls.

Ultra-High Frequency Broadcasting

Perry Ferrell Jr.

● DURING the last six months the ultra-high frequency bands have undergone severe changes in station operation, the aftermath of the FCC Order No. 19, which dissolved the old 7- and 9-meter broadcast bands and gave the 31 stations then operating their choice of the new 7-meter band or the revised 11-meter band to do their further experimenting in.

All readers should keep in mind that every broadcasting station on the U.H.F. is an experimental one, both technically and from the standpoint of programs. They are all devoted to research in radio engineering and program planning for the usage of the ultra-high frequencies for "local" broadcasting. Therefore the writer urges all listeners, SWL's and DX'ers to listen for these stations and send reports of reception whenever possible. They'll appreciate it and you'll not only earn a new and unusual verification, but will have done something to aid the progress of radio engineering.

The 11-Meter Band: As defined by international agreement, the band of frequencies between 25,000 kc. and 27,000 kc. is an International Broadcasting band, as is the band between 6,000 and 6,200 kc., better known as the 49-meter band. It has been sadly neglected by all other countries except the United States, which in 1934 granted experimental licenses for operation.

Although we leave ourselves open for contradiction we will say the 11-meter band closely resembles the 10-meter amateur band in general characteristics and when stations are coming through on one, the other should be "open" in the same general direction, as a rule.

To get down to cases, W6XKG, "The Pioneer Short Wave Station of the West," was off the air after reportedly failing to file a program of research and experimentation with the FCC. The latest on renewal of their license has, however, not come through. W6XKG operated on 25.95 mc. from Los Angeles, Calif., with 100 watts and was the favorite of the East coast and Australasian dialers.

W9XOK, St. Louis, Mo., whose broadcasting activities heretofore have been confined to coverage experiments on 35.60 mc., is reported by our faithful California observer, O. Barneson, to be relaying KXOK on 26.30 mc., but badly interfered with by a severe heterodyne. The old transmitter of W9XOK is rated at 100 watts and reports can be addressed to the St. Louis *Star Times*.

W9XPD, the other St. Louis, Mo., broadcaster operated by the St. Louis *Post Dispatch*, has moved down to 25.90 mc. after a very brilliant record on 31.60 mc., where they were heard in 11 countries on 4 continents. W9XZP, the facsimile call for this outfit, shares time on this frequency with W9XPD.

Word is received from Tom Stewart, announcer for W4XA, 26.15 mc., Nashville, Tenn., that this station has a 1 kw. output and is on the air 35 hours each week, from 12 noon-2 p.m. and from 7:30 p.m. till about 11:00 p.m. The QSL issued by this National Life & Accident Insurance Co. outlet is of a very novel brown and cream color done in a unique musical scale.

W9XJL, 26.10 mc., Superior, Wis., is now using a full 250 watts from 9 a.m. to 5 p.m. daily. Much can be said for the fine quality and consistency this station has shown in the last three years and for its excellent verification policy. Our observers in Massachusetts, Connecticut, New Jersey, Florida, Arizona, California and Washington all report an R9 signal whenever the band opens.

W9XA, 26.00 mc., Kansas City, Mo., a little over a year old, has moved to this channel to provide a standard frequency for calibration purposes. The schedule of W9XA is reported to be 10 a.m.-1 p.m. and 3 p.m.-7 p.m., although there seem to be some reports to the contrary and the writer has recently heard them sign off at 5:30 p.m. and announce they would return the following day at noon E.S.T. We like to give particular note to the fine cooperation the personnel of W9XA has shown for the Ham and SWL and how much the fellows are missing the old DX talks and mailbag programs. Instead of a QSL card, giving little or no information, W9XA has devised a special four-page folder which describes the station, transmitter, antenna and personnel. It also editorially outlines the type of service and the purposes of such stations as W9XA. It's well worth your report and stamp for return postage.

W5XD, 25.30 mc., Dallas, Texas, one of the late 9-meter broadcasters, is using 1 kw. on an irregular schedule, but is generally heard between 12 noon and 2 p.m. on week days. The W5XD transmitter is also used for facsimile and can be heard nearly daily on the East coast with a terrific signal. All reports to this station should be sent c/o WFAA.

Other facsimile transmitters in the 11-meter band are: W2XWE, 25.05 mc., from Albany, N. Y., with 500 watts; and W8XUM, 25.20 mc., from Columbus, Ohio, with 100 watts.

W8XNU, 25.95 mc., Cincinnati, Ohio, "has put a consistent signal in here for quite some time and has come through on all but one or two days," says the Arizona UHF ace, W6QLZ. "and we may hear them as late as 10 p.m. local time." On daily from 7 a.m. to 1 a.m. with 1,000 watts into a four-element turnstile array; this is certainly a record of some kind, considering that the turnstile array is supposed to cut off the sky wave!

W2XQO, 25.50 mc., New York City, N. Y., reports Chief Engineer Frank Marx, "operates 12 noon to 9 p.m. daily. The transmitting equipment is a modified 100 watt RCA unit with high

fidelity Class B audio. The output is fed by concentric line to a special coupling at the base of one of WMCA's radiators, where it isolates the WMCA signal but allows at the same time free passage of the W2XQO energy to the top of the tower where is installed a new Bell Laboratories co-axial antenna. The antenna is about 300 feet above ground."

W9XH, 26.05 mc., South Bend, Ind., is reportedly operating each afternoon from 2:30 to 6:30 p.m., although definite information concerning this station is lacking.

WRUW, 25.60, 11.73 & 15.13 mc., Scituate, Mass., an international broadcast station, has been allotted this channel.

WCAB, 25.725, 6.06, 9.59, 15.27 and 21.52 mc., Newton Square, Philadelphia, Pa., WCAU's short wave outlet, has been reported as testing on this channel with a weak signal, which seems strange in view of the fact the licensed power is 10,000 watts!

Scheduled for early operation on 11 meters are: W2XVP, 26.10 mc., New York City, N. Y., part of the Municipal Broadcasting System; W9XTB, Kansas City, Mo., also on 26.10. is to relay WHC.

The 11-meter band affords the DXer a chance to get in on UHF DX if he has only a little time to spend, through its loud signals and low (comparatively for the UHF) frequencies. In regard to the number of DXers listening to 11 meters on a Sunday afternoon, we recall when Everett L. Dillard of W9XA read a letter from this writer over the air. Came the following week and came an influx of letters and postcards to our location all of which said, "Heard your letter read over W9XA last Sunday." It must have been OK, for at last count six states are represented, but your writer didn't hear it; he tuned in 10 minutes too late!

The 7-Meter Band: In all radio there is not another transmitting medium as unusual and of so many mixed strains as the UHF band from 7 meters down.

Even the very inexperienced listener will recognize that there are specifically three kinds of DX possible at these wavelengths: one extending to the ends of the earth, one limited to distances between 400 and 1,100 miles, and a third restricted to a maximum of perhaps 300 miles.

The first mentioned, better known as "sky-wave" DX, is an accomplished fact, although we are not able to begin to expect any degree of consistency, such as we might expect on lower frequencies. Reception of stations 1,800 miles or more distant is to be considered as a freak and open to considerable further study.

The second form is more or less possible a number of times during the spring and summer months of May, June, July and August, and is referred to as "short-skip." It is not quite as erratic in signal strength as its big brother, but is entirely unpredictable as to what time of day or night it will occur.

The last is somewhat more commonplace and is easily noted around 7 to 10 a.m. and again from 7 p.m. to midnight. This effect of extending a station's ground wave coverage is often misconstrued, for it, too, is a freak and many people who hear stations 200 or 300 miles away immediately suppose that they possess a super-sensitive receiver and on sending in a report of reception many stations conclude that they have erred in their calculations and that their station is getting out "something marvelously." Such, although we wish it were so, is often not exactly the case, for the bending earthward of UHF waves within a radius of 300 miles of the station's transmitter is dependent upon three equally important factors: power output, type and location of transmitting antenna, and weather. The effectiveness of the first two needs little consideration, but the definite connection of weather phenomena with signal strength is rather vague, at the present time. A connection does exist, that is assured, and the particular tieup this writer noted is concerned with the very strongest "lower atmosphere bending" possible. During such intervals it was noted that there existed a very heavy low-lying fog over the receiving position, and moving toward the received station, or those stations that were being heard with the best signals.

W2XDA, W2XOY, Schenectady, and Albany, N. Y., are testing on frequencies between 39.42 and 39.54 mc., with frequency and amplitude modulation while determining bandwidth and coverage of the two stations. Licensed for 43.20.

WNYE, 41.10 mc., Brooklyn, N. Y., one of the two non-commercial educational broadcasting stations now in daily operation, supplies historical plays, Spanish, English and French lessons and similar programs to the New York City Public Schools while using a Western Electric 500-watt transmitter. The antenna for WNYE is 450 feet above street level and is a slant excited W.E. co-axial. All reports are appreciated and may be sent to the Brooklyn Technical High School, 29 Fort Greene Place, Brooklyn, New York.

WBOE, 41.50 mc., Cleveland, Ohio, is also using 500 watts and has been heard by our California and Arizona observers. WBOE has experimented with facsimile and has indicated the usefulness of such a system in modern education. Both WNYE and WBOE are active daily around 11 a.m. local time.

W6XDA, 42.30 mc., Los Angeles, Calif., is going to try something a little unusual for UHF broadcasters when it installs a 3-element close-spaced beam antenna pointed in a general

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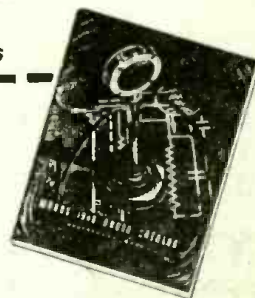
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easterly direction. W6XDA is located in the new Columbia studios in Los Angeles with the present antenna mounted some 150 feet above street level. W6XDA verifies all correct reports with a photographic QSL and has been heard in Pennsylvania, New Jersey and New York.

W1XEH, Hartford, Conn., advises us through J. C. Randall, plant manager for the Travelers Broadcasting Service, has moved from 63.50 to 42.46 mc. in conformance with the new rules. W1XEH will continue to operate with 150 watts output from Avon, Conn., where their transmitting antenna is some 770 feet above sea level. The Cruft Laboratories has in the past collaborated with the Travelers Corporation in research work on comparison of signal strength and weather, principally barometric pressure. All reports of W1XEH will be verified at the above address. 7 a.m. to 1 a.m. is the schedule.

W9XER, 42.46 mc., Kansas City, Mo., is now operating daily, rebroadcasting KMBC with 500 watts. "Their signal is so strong in this neighborhood that they are breaking through the background of my short wave receiver, which doesn't cover their actual frequency," says Merton Meade. Mid-Western DXer. W9XER is owned and operated by the Midland Broadcasting Co., Inc., and is reported to verify.

W1XSO, 42.30 mc., Hartford, Conn., will be on the air by the first of the year with 1,000 watts and frequency modulation, rebroadcasting programs of WTIC.

W3KEZ, 42.60 mc., Camden, N. J., has been heard testing with both amplitude and frequency modulation and utilizing an audio oscillator signal from 20 to 20,000 cycles. This station is licensed as "Experimental—Class 1," and is using special authority for these tests with 1 kw. R.C.A. is the owner.

W2XMN, 42.80 and 117.43 mc., Alpine, N. J., the original frequency modulated station owned and operated by Major E. H. Armstrong, is now heard daily rebroadcasting either WQXR or WABC. The signal from this station is exceptional due to the high power (50 kw.) and the 16-element turnstile antenna that are used. DXers within 120 miles of the station (Alpine is 15 miles north of New York City) should be able to hear it with considerable ease. In regard to that, Major Armstrong says, "For reception of W2XMN, I would advise a half-wave horizontal wire placed as high as possible with a balanced transmission line (no ground) and mounted at right angles to the station."

W1XOJ, 43.00 mc., Paxton, Mass., operated by the Yankee Network, will soon increase power to 50 kw. from the 2 kw. now used. They broadcast.

(Turn the page, please)

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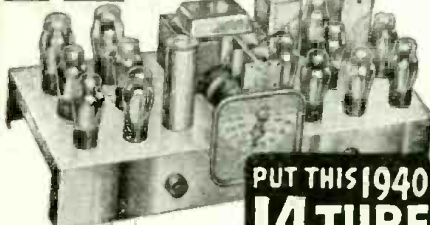
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Ultra-High Frequency Broadcasting

(Continued from preceding page)

cast frequency modulated programs from 8 a.m. to 12 midnight daily and will verify all reports addressed to 21 Brookline Ave., Boston, Mass. W1XOJ receives their programs from Boston via a relay station (WEOD) operating on 133.03 mc., and using a beam directed 3 degrees south of west. WEOD uses 250 watts and is frequency modulated. The writer has logged this station on several occasions, although over 255 miles away, while Allen B. Raymond, Plainville, Conn., hears

them daily at 140 miles! This shows just what can be done on 7 meters.

W1XPW, 43.40 mc., Meriden, Conn., another mountain-top radio station, is broadcasting F-M daily with 1 kw. The programs of WDRC are used. W1XPW is also heard at the writer's location 165 miles away with an R3 to 4 signal.

It has been impossible to consider every 7-meter station in detail, but those not discussed are listed below.

Call	Frequency	Location	Power	Remarks
W2XDG	42.42	Bound Brook, N. J.	.15 kw.	Testing on new frequency.
W2XBF	43.74	New York City, N. Y.	1.00 kw.	Daily in afternoons.
W1XKB	42.38	Springfield, Mass.	1.00 kw.	Under construction.
W2XHG	42.06	New York City, N. Y.	.15 kw.	Testing daily.
W8XWJ	42.06	Detroit, Mich.	.50 kw.	Daily operation.
W9XAZ	42.26	Milwaukee, Wis.	.50 kw.	Under construction.
W8XKA	42.46	Pittsburgh, Pa.	1.00 kw.	Under construction.
W1X	42.60	Boston, Mass.	1.00 kw.	Under construction. F-M.
W2X	42.60	New York City, N. Y.	1.00 kw.	Under construction. F-M.
W8X	42.60	Rochester, N. Y.	1.00 kw.	Under construction. F-M.
W9X	42.60	Milwaukee, Wis.	1.00 kw.	Under construction. F-M.
W9XYH	43.00	Superior, Wis.	1.00 kw.	Under construction.
W2XQR	43.20	New York City, N. Y.	1.00 kw.	Under construction. F-M.
W3X	43.20	Whippany, N. J.	5.00 kw.	Under construction. F-M.
W3XO	43.20	Washington, D. C.	1.00 kw.	Testing daily.
W8X	43.20	Rochester, N. Y.	1.00 kw.	Under construction. F-M.
W2X	43.40	New York City, N. Y.	1.00 kw.	Under construction. F-M.

Notice is called to the fact that a great many of the UHF stations are in the process of construction, and the number of frequency-modulated

(F-M) stations is steadily increasing. From all present indications they will soon be in majority to other types using 7 meters.

I Cover the Pacific Coast!

(P. C. S. Time)

By Lyle M. Nelson

AS regularly as the seasons change, so the interest of Pacific Coast short wave listeners shifts from one continent and group of stations to another. At present, with powerful signals from Latin-American stations on the air, many listeners are turning nightly to South and Central America.

Reception during the past month has been excellent and it will undoubtedly improve further throughout the winter. Powerful daytime European broadcasters appear to be holding their own, while the Latin-Americans are fast approaching the volume of broadcast band stations.

Perhaps the strongest South American at present is LRX of Buenos Aires. Its schedule reveals that the station is on the air from 6:15 a.m. to 7 p.m., although several listeners have reported hearing the station as late as 8 p.m.

Other Argentina broadcasters heard with excellent volume on the Pacific Coast are LRA1 on 9.69 mc. until 6 p.m., and LRA2 near 6 p.m. on Fridays only.

Popular with many Pacific Coast listeners have been the nightly English programs from station CB1180 (11.97 mc.) in Santiago, Chile. From 7 to 7:30 each night, a special program of American dance tunes with announcements in English is broadcast.

In spite of recent announcement that all Colombian stations have moved to the 62 meter band, several listeners have reported HJXC "La Voz de Bogota," on 9.7 mc. Kendall Walker of Yamhill writes that for the duration of the European war no English announcements will be given over Colombian stations.

Peru's OAX4J on 9.34 mc. still is booming through with excellent strength until as late as 9 p.m. Mr. Walker reports receiving a very beautiful verification card from this station.

Several Panama stations are audible during the evenings. The best of these is HP5J on 9.59 mc. HP5J signs off at 7:30. Other Panama stations heard here during the evenings are HP5A on 11.70, HP5G on 11.78, and HP5H on 6.12 mc.

John Cavanagh of Oregon City writes that Australia's VLR on 9.58 mc. is reaching here with good volume as early as 9 p.m. VLR signs off at 6 a.m.

Several listeners, including C. F. Burns of Vancouver, have reported good reception from T1PG of San Jose, Costa Rica. This station, they report, now is broadcasting on 9.62 mc. until as late as 8:30 p.m. The station becomes audible here about 6 p.m.

CXA8 of Colonia, Uruguay, must also be listed among South American "best bets." CXA8 tickles the antenna daily until as late as 8 p.m. on 9.64 mc. Occasionally the station is on the air until as late as 10 p.m.

Noticeably absent in the propaganda broadcasts from Berlin have been any derogatory remarks about the French. It seems that German propagandists are attempting to win the war by using the radio as an instrument to separate the Anglo-French alliance. All broadcasts show a hatred of the British, but nothing is said of the French.

The latest German schedule for North America is as follows: From 1:50 to 7:50 p.m. over DJD on 11.77 and DXB on 9.61 mc.; from 1:50 to 5 p.m. over DJL on 15.11 mc.; and 5 to 6 a.m. over DJB on 15.20 mc.

The English reply is heard here nightly on Transmission 6 from 6:40 to 8:30, with a complete news resumé at 8 o'clock. GSD on 11.75 mc. is the best received of the stations carrying this program, although both GSC on 9.58 mc. and GSB on 9.51 mc. can be heard.

ROUND 'N' ABOUT—From listeners' reports: RNE now on the air from 6 to 10:30 p.m. on 12.00 mc. Heavy code interference sometimes blots out reception... COCQ is on 8.83 mc. at present... PMN, on 10.26 mc., occasionally heard as late as 8 a.m.... Several New Zealand stations will soon be on the air... Mysterious Soviet station on 15.39 mc. heard in early mornings... ZBW on 9.53 mc. is excellent here from 5 to 7 a.m. daily... JZI on 9.54 mc. now is carrying the Pacific Coast program from 9 to 10:30 p.m. daily... MTCY still coming in with good volume... A new Hungarian station, HAD, will make test transmissions on 11.85 and 9.62 mc. in the near future... The 62 meter band is alive with Spanish-speaking broadcasters during early evening... Radio Tananarive is on 5.80 mc. from 9:30 to 9:45 p.m.

Award of Honor

(Continued from page 530)

and most of my operation is on the 10- and 20-meter bands. On 10 meters, only phone operation is used, and this is the band I use most frequently because of the swell contacts and friendships I make there. On 20 meters, only C.W. operation is used, and if I keep on I may eventually use C.W. more than phone as it holds a fascination of its own that I can't explain. Other bands operated are 40- and 80-meter C.W. However, these latter two bands are operated only about 10 per cent of the other two. The line-up of the rig is a 616 crystal oscillator and doubler, using an RK20 in the final. The RK20 is suppressor grid modulated by a 6F6 modulator, and that is

driven by a high-gain amplifier using a 6J7 and 6C5. The output on phone is about 18 watts, and on C.W. about 85 watts. On 10 meters I use a half-wave vertical antenna; a horizontal Zepp is used on the other bands, due to its flexibility. The receiver is a Hallicrafter model SX16.

In the 625 contacts made, are included all U. S. districts comprising 46 states, and also Canadian, Mexican, Hawaiian and Alaskan stations. After I receive W.A.S., I will try for W.A.C.

MARY E. RODEN, W7GPO,
319 N. Lincoln Street,
Pendleton, Ore.

Let's Listen In with Joe Miller

• HERE we are, starting a new year of DX, and, though somewhat premature, with this coming out in mid-December, we are taking this opportunity to wish all of you brother DX hounds the very best o' luck and DX in 1940.

Quite a few of the boys are mentioning the poor conditions lately, which, coupled with the effect the war situation has had on short waves (mostly, of course, on the ham bands), makes the gathering of DX news all the more difficult. So we will devote a good deal of attention to that always interesting phase of DXing—logging the commercial phone stations.

We have often "cooled off" a tuner who liked to brag about his ham DX by asking him what commercial DX he had verified. Usually, the chap could mention very few good catches, which, in our opinion, made very little of his ability as a real DXer.

Why? Rather easily explained. To get good amateur DX, one of course needs a good receiver, one or two good antennae, a fairly good location, and then needs merely to "park" on 10 or 20 meters and "log" each call as it is heard. Reading any DX periodical, a fellow very easily learns when each band delivers its best results.

But—can't anyone, with some experience and similarly good equipment, do just about as well? Right! Of course, some experience will always help him to be better, but the argument, taken in the main, is sound.

Taking the commercials, however, is entirely another matter, and how—as our DX friends will certainly attest! Hearing an inverted speech Xmsn. the average DXer will pass over it as hopeless, but a good DXer will try to identify it by combing the nearby frequencies for its contact station. If such is heard, this chap will then have to consult quite a number of magazines and station lists for possible identification.

A good DXer will be able, by the mere sound of an inverted or clear speech carrier, to judge from what part of the world a certain signal is being received, aided no little by the certain frequency and time heard. That sort of knowledge can be gained only by many hours of usually vain tuning, but what is heard is real DX!

Keep in mind, too, the fact that whereas some ham DXers with better locations, antennae and receivers can outdo most other OMs, the commercial DX can be heard by all, as most of these of necessity are high-powered, to be able to establish reliable contact with most of the world. Therefore, it would seem the commercials, more than any other type of DX, would serve as a test of the real DXer. However, let this not serve as a defraction from the DX feats of some ham DXers, who, by their perseverance and many hours (often early A.M.) spent at the dials, have amassed an imposing list of amateur DX.

ALL TIMES E. S. T.

JAPAN

JZI, 9.535 mc., Tokyo, has replaced JZK on the Overseas Program, time 12:1:30 a.m. JZK, 15.16 mc., now back to 4:30:5:30 p.m. for So. America, and 8:30:9 p.m. for eastern No. America. JZI also shares the China and South Seas program with JZJ, 11.80 mc., from 7-9:30 a.m. JYW, 7.257 mc., with JZJ, 2-4 p.m. for Europe. JZJ shares with JZK on 4:30:5:30 p.m. Xmsn. Hope you can straighten this out. West Coast DXers claim JZI covers KGEI and DJN.

ITALIAN EAST AFRICA

I2AA is the new call for IABA, still on 9.65 mc., but now on a new sked of 3:30:5:30 a.m. and 11 a.m.:2:30 p.m. Of course, the best time for U. S. is the first broadcast. Address reports to I2AA, Addis Ababa.

MADAGASCAR

Radio Tananarive evidently has either another frequency, or has cancelled their 9.51 mc. transmissions, now being heard on 9.87 mc. Most likely RT is still on same sked, being on 10.95 and 9.87 mc. from 12:30:12:45, 10-11 a.m., and 2:30-4 a.m. ex. Suns. Also, on 6.069 mc. 12:30:12:45, 3:30:4:30, 10-11 a.m., and on Suns. 2:30:4 a.m.

YUGOSLAVIA

YUG. 15.24 mc., or YUE, 11.735 mc., Belgrade, BC to No. America at 7-9:05 p.m. The I.D.A. notes that before s.o., a 12 note horn signal is heard several times, preceding National Anthem. New list of calls and frequencies sent by OM Gus Gallagher, W6, follows: YUA, 6.10; YUB, 6.10; YUC, 9.505; YUD, 9.505; YUE, 11.735; YUF, 15.24; YUG, 15.24 mc. As YUD and YUF are listed for So. America, and YUE and YUG for No. America, it appears that different calls for same frequencies indicate certain frequencies will have other calls, when directed to different continents. Here's a good chance to add this hard-to-get country to your verified country list.

ALBANIA

ZAA, 7.85 mc., has a new sked of 6:30:8:30

a.m. and 12:20:4:30 p.m. Best heard near end of latter broadcast.

MANCHUKUO

MTCY, 11.775 mc., Hsingking, 20 kw., is being heard with a very FB signal on their No. America and Hawaii broadcast from 1:30:2:20 a.m., when music with news in English is heard. Also heard 9:50:10:50 a.m. and 4-4:50 p.m.

CHINA

XGOX, 15.19 mc., Chungking, which was bombed in Sept., is now back as strong as ever from 9-11 p.m. Evidently it was rebuilt in very short time.

INDO-CHINA

Radio Saigon, 11.78 mc., with 12 kw., is really coming in these a.m.'s, one of the finest Asiatic sigs to be heard. Sked is 12:15:12:45, 6-6:45 a.m., with English news at 6:30. You just can't miss 'em on latter Xmsn. Also on 6.116 mc., same sked, 1 kw. power, i.e., same latter Xmsn., but on earlier Xmsn. is on 11:45 p.m.:12:15 a.m.

FRENCH SOMALILAND

FZE8, 17.28 mc., Djibouti, often fones Paris near 8:30 a.m., when heard here with a FB signal, using French in clear speech. Easily identified by their calling Paris.

BURMA

VVS, 12.87 mc., Mingaladon, is also heard frequently near 6 a.m.-7 a.m. when contacting VVN, 13.35 mc., Fort Madras, India. Both of these sigs are really well heard, with the typical Asiatic flutter.

EGYPT

SUZ, 13.83 mc., Cairo, frequently contacts Rugby, England. GBB, 13.58 mc., near 11 a.m. However, we've heard it as late as 1 p.m. and as early as 6 a.m., so keep after this commercial every a.m. when possible. SUV, 10.055 mc., also heard, but not so frequently, or as well, usually in mid-afternoon, 3-5 p.m.

BELGIAN CONGO

OPL, 20.04 mc., Leopoldville, heard near 11 a.m. here. Usually can be heard contacting Belgium between 9:30:11:30 a.m., with a good signal here, often R 7-8. Also, OPM, on 10.14 mc., really pounds in, when heard on regular contact time bet. 2-3:30 p.m.

THAI

HSP, 17.741 mc., Bangkok, should be tuned for also, being occasionally heard when conditions are good, in early a.m., using inverted speech. Best bet is near 6 a.m. Another Bangkok fone is HSE2, 19.016 mc., which is often used in place of HSP, usually with JVE, 15.66 mc., Tokyo, anywhere between 11 p.m.-6 a.m.

FED. MALAY STATES

ZGB, 13.643 mc., Kuala Lumpur, is often a good bet, phoning PLO, 10.68 mc., Bandoeng, Java, using inv. speech, with good sigs on both. Usual contact time is 7:45:8:15 a.m.

Try for the Javanese phones listed on page 299 of Sept., 1939, issue "R. & T." These are well reported anywhere from 5-11 a.m., best from 5:30-8 a.m., always strong signals. List was erroneously captioned Japanese.

Merton M. Hiatt, Dryden, Washington, asks that we list several special broadcasts to be dedicated to the DXers' International Exchange Club of Dryden. Glad to do it. OM TGI and TG2, Guatemala, will broadcast on Dec. 17, 2:30-2:45 a.m., E.S.T. TG2 is on 6.195 mc., and, we believe, TGI is on 5.855 mc., though latter freq. not certain. Also, YN3DG, or YNDG, on 13.90 mc., will do a special on Dec. 24 at 12:30:1 a.m., E.S.T. These stations will be well heard, no doubt.

Due to lack of good reports on ham DX, we will omit Ham Stardust this month, hoping for better luck next month. Though with conditions as they are, we'll keep right on hoping. Only 10 meters has supplied any DX lately, and then only a few stations. Try this hand around 10 a.m.-noon for east U. S. On 20, the Asiatics coming in quite well last month seem to have "passed out," much to our regret, though we'll keep trying.

Several inquiries received as to where one can obtain addresses of foreign amateur stations. One can do so by writing the Radio Amateur Call Book, Inc., 608 So. Dearborn St., Chicago, Illinois, U. S. A. Their Call Book lists every amateur station in the world. These Call Books are issued quarterly, one for each season.

Let's hear from some of you boys as to this commercial DX piece, and maybe a few reports from you on same?

Anyway, again our best wishes and—keep plugging! Very 73.

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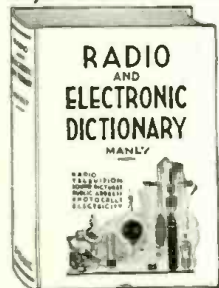
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BOOK REVIEW

CATHODE MODULATION, by Frank C. Jones, contains 86 pages, size 8 1/2" x 11", illustrated. Published by Pacific Radio Publishing Co., Inc., San Francisco, Calif.

The ingenious spiral binding of this handsome volume makes it convenient for the worker with radio to keep it open before him for steady use.

The book begins with an introduction on cathode modulation and its evolution, then proceeds to discuss the theory of this system thoroughly. Components, tank circuits, circuit adjustments, etc., are also considered in the first portion of the book. Part 2 deals with amplifier circuit constants, and tube characteristics for cathode modulation. Part 3 takes up the description of cathode modulation radiophone transmitters and many other circuits are given, together with coil winding data.

For any one interested in or wishing to know more about cathode modulation systems (for which many fine things are claimed) this book should admirably fill the bill.

The **A.R.R.L. ANTENNA BOOK**, by George Grammer and Byron Goodman of the headquarters staff of the A.R.R.L., contains 144 pages, size 8 1/2" x 9 1/2". Published by the American Radio Relay League, Inc., of West Hartford, Conn.

This book gives what is probably the most thorough study of antennas that has yet reached this reviewer's desk. Perhaps the best idea of its scope is to cite the following chapter heads: Wave Propagation; Antenna Fundamentals; Ground Effects; Feeder Systems; Half-Wave Antennas; Long Single Wires; Multiband Antennas; Driven Arrays; Parasitic Arrays; "Y" Antennas; Rhombic Antennas; Antennas for 160 Meters; U.H.F. Antennas; Special Antenna Systems; Finding Direction; Supports and Construction; Rotating Mechanisms; Receiving Antennas. The book is profusely illustrated with diagrams, graphs and some photographs. Formulas are given wherever necessary. That the book is authoritative is assured, for its publishers are among the best in the United States.

HAMMARLUND SHORT WAVE MANUAL, published by The Hammarlund Manufacturing Co., Inc., New York, N. Y., contains 31 pages and index, size 6" x 9".

This book, which has now run through five successful editions, is of interest to any experimenter or short wave listener. It gives complete instructions for construction ranging from simple one-tube short-wave receivers all the way up to highly efficient transmitters. Also included are a two stage pre-selector, a short wave converter, power supplies and the various components which go to make up an excellent transmitter. For those who are interested in the ultra short waves, a 5-meter super-het, employing five of the latest tubes, is likewise treated.

Sponsored Programs to Be Broadcast on Short Wave

• **SPONSORED** radio programs will be heard regularly round the world for the first time in the near future, it was revealed in the announcement of the Westinghouse Electric & Manufacturing Company that its international stations, WPIT at Pittsburgh and WBOS at Boston, plan a short wave service available to advertisers.

The change from experimental classification to commercial status for short wave broadcasting results from a recent ruling of the Federal Communications Commission.

FEATURES in the JANUARY 1940 issue of RADIO-CRAFT

- Frequency-Modulated Programs on Your Present Receivers!—With This Easily-Built F.M.-A.M. Ultra-Shortwave Adapter—Part II—Construction and Circuit Details
- Home-Made Dynamic Tester for Servicing Receivers
- Servicing Questions and Answers
- Wireless Microphones for Professional P.A.
- Television Design Factors
- Sound Engineering—Free Design and Advisory Service for Radio-Craft Subscribers
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RT-1-40

A Modulator for the HAM Transmitter

(Continued from page 528)

perience and the pocket-book permit.

The second tube of the modulator unit is the actual modulator tube which transfers the amplified current variations representing the voice or music to the R.F. portion of the transmitter, thus varying the output of the transmitter. This tube also resembles very closely an audio amplifier and in fact is really a Class B audio amplifier tube. The only real difference is that its output is arranged to feed into (or modulate) a radio transmitter instead of a loudspeaker. For this reason the output of the modulator terminates in a special transformer instead of the usual speaker coupling transformer.

The appearance of the modulator panel is made to match the R.F. panel and power supply panel in size and general appearance. The parts are mounted on a flat bakelite panel supported on two wooden end pieces. All parts are readily available for repair, adjustment or changes when it is desired to modernize or elaborate on the original unit.

Construction

The construction of the modulator is just as easy as the two units already made. Holes are cut in the panel for sockets and transformers, placing the parts in the positions shown in the photos. The exact position of parts is not important, though the general layout seen in the photographs should be followed closely so that trouble will not be encountered from unwanted feedback or coupling.

The wiring should be neat in appearance and the soldered connections carefully made. No detailed instructions are necessary, as the details given in the early parts of this series apply. A list of parts for the modulator and power supply appears at the end of this article.

Power Supply

The power supply is very similar in design to the one used in the transmitter proper. Instead of a type 82 tube, though, a type 80 is substituted. The characteristics of the type 80 are more suited to the varying requirements of the Class B modulator than the 82, though either tube may be used.

The wiring and design of the power supply require no detailed description; a power transformer feeds the rectifier tube and supplies filament current to the two type 53 tubes. The rectifier tube is followed by a filter consisting of a 30-henry choke and two condensers, and a bleeder resistor to keep the output voltage as stable as possible. The positions of the parts of this power supply, which is mounted on the previously unused end of the power supply panel, can be seen in the photos. This layout should be followed closely to avoid trouble from interaction between the two power supply units mounted on the same panel.

Adjustment

The adjustments of the modulator are very simple. A double-pole single-throw switch turns on the battery to the microphone and the plate voltage to the modulator at the same time. A plate current milliammeter indicates the current flowing through the two tubes of the modulator. With no sound in the microphone, this meter should show a reading of 35 to 40 milliamperes while, with a strong tone, it should jump to about 50 milliamperes. Care must be used to prevent the current from increasing beyond 50 ma. as the modulator unit will then be overloaded, and distorted or unintelligible signals will result. A little practice in talking into the mike will soon

indicate the proper distance and strength of voice to use.

When the plate milliammeter indicates 50 ma., the modulator is said to be (about) 100% modulated: that is, the current variations are between zero and the maximum capability of the modulator unit. Less than 100% modulation cuts down the transmitter efficiency, and more causes serious distortion. For these reasons the modulator must be operated just below the 100% modulation point.

Later in this series we will make and discuss a *modulation monitor unit* which will indicate just what percentage of modulation we are using but, for the present, experience can be gained by actual use of the phone transmitter "on the air"—that is when we have received operator's and station tickets from the district radio inspector's office. Don't try putting your rig on the air before these necessary papers are obtained, as this is a serious offense and is punishable with a heavy fine or prison sentence. It isn't worth it!

Parts List—Modulator and Power Supply

R.C.A.

- 2—Type 53 tubes; V1, V2
- 1—Type 80 tube; V3

JEFFERSON ELECTRIC CO.

- 1—Microphone transformer, type 467-262; T1
- 1—Class B input transformer, type T2; No. 467-448
- 1—Class B output transformer, type T3; No. 467-446
- 1—Power transformer, type 465-151; PT
- 1—Filter choke, type 466-410; Ch

TRIPLETT ELEC. INSTR. CO.

- 1—Type 323 0-100 milliammeter; M

INTERNATIONAL RESISTANCE CO.

- 1—250,000 ohm 1 watt resistor; R1
- 1—1,000 ohm 1 watt resistor; R2
- 1—25,000 ohm 20 watt resistor; R3

SPRAGUE PRODUCTS CO.

- 1—10 mf. 25 V. electrolytic condenser; C3
- 2—8 mf. 500 V. electrolytic condensers; C1, C2

MISCELLANEOUS

- 1—4-prong wafer socket
- 2—7-prong wafer sockets
- 1—Double-pole single-throw toggle switch; SW1
- 1—Bakelite panel 7 x 15 x 3/16"
- 1—Bakelite panel 4 x 15 x 3/16"
- 10—Insulated binding posts
- 1—Eveready 4 1/2 V. "C" battery; B
- 2—Wood blocks; screws, wire, etc.

Short Wave League

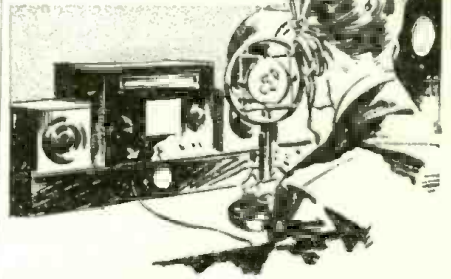
(Continued from page 535)

OCEANIA—

K6NYD	14.21	5	9	N. J., Ind., Fla.
K6PMC	14.175	5	9	Mass.
K6LEJ	14.225	4	7	Mass.
K6FKN	14.22	5	6	Mass.
K6MVA	14.155	5	7	Ky.
K6ILW	14.188	4	7	Fla.
K6OQM	28.75	4	8	Fla.
K6RVU	14.37	4	7	Fla.
KA1LZ	14.105	4	6	N. J., Wash., Ind., Kans.
KA1LB	14.02	5	8	N. J., Mo.
KA1ME	14.26	3	7-8	Mass., Ariz., Mo., Ia., Kans.
KA1CS	14.17	4	6	Mo., Minn., Ia., Kans.
KA1CW	14.17	4	8	Mo., Ind.
KA1MM	14.13	5	6	Wash.
KA1FH	14.275	5	6-8	Minn., Ind., Kans., Ariz.
KA1BB	14.265	5	6	Kans.
PK3WI	14.05	3	5	Ia.

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Modern Mechanical Television

(Continued from page 521)

of light, as the screen angle is doubled. The importance of a picture of high brilliancy will be pointed out later.

Peck Rotary Drum. Another very interesting scanning device formerly used in the United States was the Peck Rotary Drum. It consisted of a drum of twenty-four (24) mirrors pitched at different angles with reference to the axis of the drum. Thus horizontal scanning was accomplished by the revolution of the drum, and vertical scanning by the different degrees of inclination of the mirrors. Apparatus of this sort was designed to reproduce straight or interlaced pictures of from 45 to 503 lines per frame. The motor used to rotate the drum was of the synchronous type and the one illustrated in Fig. 3 was rated at 1/100 h.p. Synchronism was to be maintained by means of pulses transmitted with the video component. At the receiver, an amplitude separator and a gaseous triode in conjunction with the synchronous motor were to utilize these pulses to maintain synchronism. It was a system similar to this that was used in the fall of 1937 to flash news in the Toronto and New York areas.

Electrostatic Scanner. A mechanical scanning device about which few television experimenters know is the electrostatic scanner, shown in Fig. 4. The principle of this system is similar to that of the electrostatic sound reproducer. The source of physical motion is a plate free to vibrate in the vicinity of another plate. Thus the source of motion in this system is nothing more than an electrostatic condenser, one of whose plates is free to vibrate, and the other fixed. When the condenser is charged, there is an attraction force which pulls the movable plate nearer to the fixed plate. When it is discharged, there is a certain restoring force supplied by the elasticity of the diaphragm (or movable plate) which pulls it back into initial position. It can be seen, therefore, that the diaphragm will vibrate in accordance with the voltages applied across the plates. The disadvantages of this system are that the sources of power loss are many, electric charges are prone to leak off before they can be put to use, and that there is liable to be considerable loss due to hysteresis.

Piezo-Electric Crystal. Another unusual scanning device is the piezo-electric scanner. The principle of this system is that certain crystals will oscillate physically when an alternating current is applied to them. The oscillation of the crystal is in synchronism with the current applied to the crystal. Thus the crystal is used as the source of motion in this system. Two crystals may be used, one to effect horizontal deflection, the other for vertical deflection, as in Fig. 5. The method of applying this motion to an optical element may be similar to that used in the vibratory scanner employing electro-magnetism. Rochelle Salt crystals may be used; their low cost is an advantage.

Light Modulation. A typical light modulation system is shown in Fig. 2—the Mihaly-Traub. Practically all modern systems of mechanical television utilize such an arrangement, because the light intensity is much greater than could be realized with a neon lamp. As can be seen, the light beam passing through the first prism is directed to the optical element (mirror) through the Kerr cell (Fig. 6), an analyzing prism, and a diaphragm. The first prism polarizes the light beam. The Kerr cell has the property of rotating the plane of polarization. In other words the Kerr cell can twist a beam of polarized light so that it will not reach

the optical element. The average Kerr cell operates at potentials of about 300 volts. The intensity of the light reaching the screen is practically dependent upon the intensity of the light source.

A bright picture is desirable not only because it can be projected, but because it has an optical effect upon the eye which apparently increases the definition. This, in turn, reduces the number of lines a mechanical system must utilize in order to render a picture of high (apparent) definition. A bright picture reduces eye strain; this adds to the comfort of the on-looker.

It can be seen that the intensity of illumination of a mechanical system is dependent upon the intensity of the light source. Although some of our leading lamp companies have developed lamps of high intensities with high efficiencies for television purposes, the light source need not be elaborate. An ordinary 7½-volt automobile lamp may be used.

Advantage of Mechanical Scanning. The advantage that a mechanical system has over an electronic system with regard to brilliancy is very apparent. In the electronic system, illumination is the function of the impact of electrons upon a fluorescent screen. The brilliancy of the electronic picture may be intensified by increasing the voltage applied to the tube. This results in even faster destruction of the screen. Furthermore, the power of illumination comes from an amplifier whose output must be essentially flat over a wide range of frequencies, at peak pressures of several thousand volts. Such power is expensive and involves the use of elaborate apparatus to produce it.

When a cathode ray beam is modulated downward in a television tube, it varies in diameter about 50%. This leaves black lines which must be "filled-in" by closer scanning. For this reason a mechanical system in which scanning spot size does not vary need use only one-half the number of lines that an electronic system uses to obtain the same effective detail.

(No mechanical scanning system for 441 lines is available on the American market; several television inventors claim they have such devices and these are the ones referred to in this article.—Editor)

Messages to Byrd on the Air

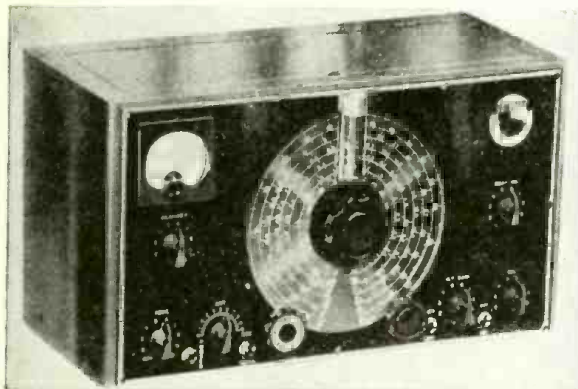
● **RADIO** again will supply the link between the third Byrd expedition and civilization. From the short-wave transmitting station of the General Electric Company at Schenectady, WGEO, radio communication will be maintained with Admiral Richard E. Byrd and his men in the Antarctic. The station sends on a wave length of 31.48 meters, and is still equipped with the directional antenna successfully employed in the broadcasts to the earlier Byrd expeditions. This antenna was designed by Dr. E. F. W. Alexanderson, radio consulting engineer of the General Electric Company. Its effect is to increase the signal volume in one direction of this 100-kilowatt station about twenty times.

Friday nights starting at 11 o'clock will be the time when the short-wave radio mail-bag will be transmitted in the direction of the South Pole for the Byrd expedition to pick up.

For receiving the programs Admiral Byrd has been supplied by General Electric with two new types all-wave receivers. These will pick up signals from 16 to 550 meters, which takes in all short-wave stations now in operation, and in addition all the popular broadcasting stations.

Newest

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The new Guthman U-50 11-tube superhet, with latest Gun-Sight Tuning device fitted with lens.

New Super With Controlled Regeneration

I. L. GLERUM

• AN ingenious tuning indicator, which gives a magnified reading of the markings on the spun-chrome dial, is used on the new Guthman U-50 11-tube superhet. Known as Gun-Sight Tuning, this consists of a cylindrical lens with a magnifying power of 2.35. It is mounted in such a way that it becomes part of the dial illuminating system, thus making it still easier to take accurate readings. It permits more than twice as many calibration points on the large $7\frac{3}{4}$ " dial and gives the equivalent of 4.77 feet on the "F" band and proportionately less on the other bands, because of the smaller diameter of the dial scale. The lens has an etched center line on each side, parallel with its length. This eliminates parallax.

The dial itself has 332 degrees rotation for 180 degrees of the variable condenser and is driven with friction discs on a plate directly behind the dial, with a ratio of $16\frac{1}{2}$ -to-1. This affords an over-all vernier action of approximately 33-to-1.

Controlled regeneration in the I.F. system gives I.F. gains from 9 to 68 microvolts, depending on the control setting (all measurements are taken with 100 milliwatts as standard output), variable band width and single-signal operation. The accompanying curves, Fig. 1, illustrate the possibilities of obtaining almost any desired I.F. condition. The non-symmetrical curve No. 1 as a result of regeneration, shows the single-signal effect. This effect is augmented by the R.F. and Ant. stages through careful coil design.

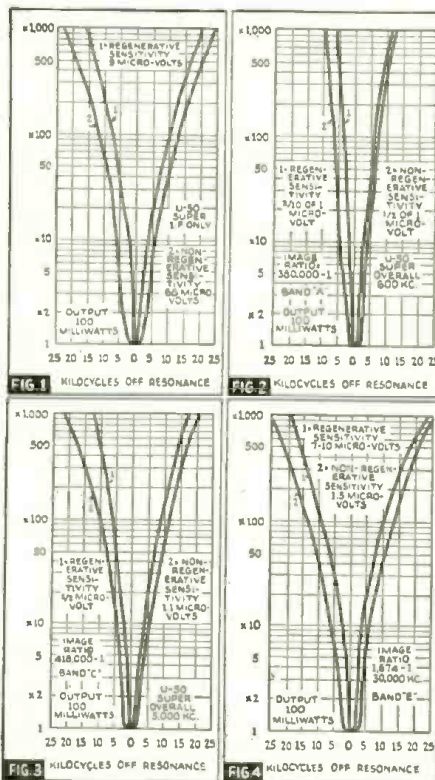
All I.F. units are permeability tuned and have silver mica fixed capacities across their coils, for stability. Even the B.F.O. has the same silver mica condenser and coil set-up, with the iron core adjusting screw brought out through the front panel for pitch control.

Under actual operating conditions this receiver was set up to zero beat WVW, using its own B.F.O., and an oscilloscope used to show drift. After the first warm-up period no drift was indicated and the receiver, without readjustment, remained zero beat during the test period of 72 hours, the manufacturer states.

All bands have an R.F. stage with the exception of the "F" band. As can be seen in Curves 2, 3 and 4, the image rejection on all bands is remarkably good. The switch is so designed that all Pri. and Sec. circuits are shorted out when not in use.

Antenna coils are designed with a minimum of capacity coupling and loosely coupled primaries, and a small variable connected from antenna to grid for exact settings. The R.F. stage coils are also designed along similar lines with the capacity coupling as low as possible, for good image rejection. To get maximum sensitivity at the high frequency end of each band, the coils are so designed that the greatest "Q" is obtained at the high frequency end of its tuning range. The "Q" of all R.F. and antenna coils in all bands exceeds 170, and in some bands, where necessary to keep the gain constant across dial, reaches 250. Inasmuch as ultra-high frequency reception is (with the exception of freak conditions) quasi-optical an R.F. stage is not included in the "F" (5 meter) band. High sensitivities are not required for the same reason, and the U-50 without an R.F. stage on the "F" band gives sensitivities of 2 to 5 microvolts over the 64 to 30 meg. range. The "E" band, having a considerable overlap, gives the operator high sensitivity on the popular 10 meter band. ALL sensitivities are down to generator leakage or below 2/10 of one microvolt on all bands

Below — Resonance curves for different conditions are reproduced below.



(with the exception of "F"), with the receiver in a regenerative condition.

As in previous models, the 6B8 tube is again being used as A.V.C. detector, first audio, and noise-silencer tube.

The noise silencer control should be adjusted so that the signal, after first being set to the desired level, is slightly attenuated. Any signal then coming in at a higher level than the level previously set, decreases the sensitivity for the duration of the noise.

A tone control is included, and helps considerably in eliminating high-pitched noise and adjacent interference at short waves.

Other conveniences, such as SEND-RECEIVE switch on the front panel, A.V.C. ON-OFF, headphone jack, and an S-meter working independently of the A.V.C. switch, are included in this receiver.

For portable operation, a plug is provided in the rear of the chassis, and a synchronous vibrator supply plus a six volt battery, will furnish the necessary power.

Although not included as a regular feature, for the convenience of those desiring a 100 kc. oscillator for calibration purposes, a socket is provided, and a hole for the switch as well as for the coil mounting.

Following the 6B8 tube is a conventional phase inverter, followed by two 7C5 tubes in push-pull, giving 12 to 15 watts output.

This article prepared from data supplied by courtesy of Edwin I. Guthman & Co.

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The amplifier is designed for 110 volt, A.C.-D.C. operation. The four tubes used are wired in series, and the balance of the voltage is used in the ballast tube. Of course, for D.C. operation the proper polarity must be observed.

The circuit uses a type 6C8-G tube in the first audio stage and also for phase inversion. For circuits where the plate voltage is about 110 volts, type 25L6 tubes are best for power output requirements. A 25Z5 or 25Z6 tube serves as the half-wave rectifier.

The entire operation of the amplifier can be traced by starting at the input. The 500,000 ohm volume control is used in a voltage divider circuit to control the volume. The 250,000 ohm fixed resistor is included to increase base response when the amplifier unit is used for phono reproduction. This resistor may be omitted if the increase of base response is not wanted or if the amplifier is used with a S. W. set.

The first triode section of the 6C8-G is used as a resistance-coupled amplifier. The signal is amplified in this section, shifted in phase 180°, and coupled to one of the 25L6 tubes. The other 25L6 tube in the push-pull circuit needs a signal 180° out of phase with respect to the signal fed to the first 25L6 tube. This means that the signal must be passed through the second triode section of the 6C8-G tube for this purpose. This second triode section does this phase inversion (180° change), but its amplification is nullified by reduction of the signal in the same proportion as the tube amplification factor.

An effective tone control is also incorporated in the grid circuit of the power output tubes.

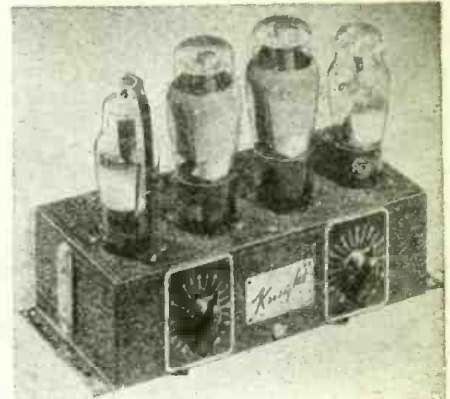
Since the plate current for the two 25L6's is obtained directly from the beginning of the filter, a large filter condenser of 40 mf. is used at this point. For the screen grids of these tubes and for the plate voltage of the first stage, additional filter action is provided by a small choke and another 10 mf. electrolytic condenser.

The assembly of the amplifier is very simple since a drilled and formed chassis base can be obtained. After the larger parts are mounted, the filament circuit should be wired. A test for "light" in the tubes can be made and the other wiring completed.

An external P.M. (permanent magnet) type speaker should be used. These speakers can be secured in several different physical sizes and with the correct output transformer to present 2,000 ohm load to the output stage.

Radio experimenters and short-wave fans will find this amplifier an interesting and useful project, both in the building and in the application.

This article prepared from data supplied by courtesy of Allied Radio Corp.



A 4-watt amplifier of interest to every experimenter, suitable for phonograph "pick-up" as well as radio reception.

Parts List for 4-Watt A.C.-D.C. Amplifier

- 1—4-prong socket
- 4—Octal sockets
- 1—6-prong socket
- 1—Phono input jack
- 1—Metal tube grid gap
- 3—250,000 ohm, 1/4 watt resistors
- 1—500,000 ohm volume control, with switch
- 1—3,000 ohm, 1/4 watt resistor
- 2—100,000 ohm, 1/4 watt resistors
- 1—15,000 ohm, 1/4 watt resistor, ±5%
- 1—250,000 ohm tone control
- 1—75 ohm, 10 watt resistor
- 1—Small filter choke
- 1—.1 mf., 200 volt condenser
- 2—.05 mf., 400 volt condensers
- 1—.005 mf., 400 volt condenser
- 2—.002 mf., 400 volt condensers
- 1—10-40 mf., 150 volt electrolytic condenser
- 1—Line cord and plug
- 1—Roll of hook-up wire
- 2—Indicator plates
- 2—Small knobs
- 1—Punched chassis base
- 1—4-prong plug
- 1—8" speaker (P.M. type) and output transformer
- 1—2-conductor cable for speaker

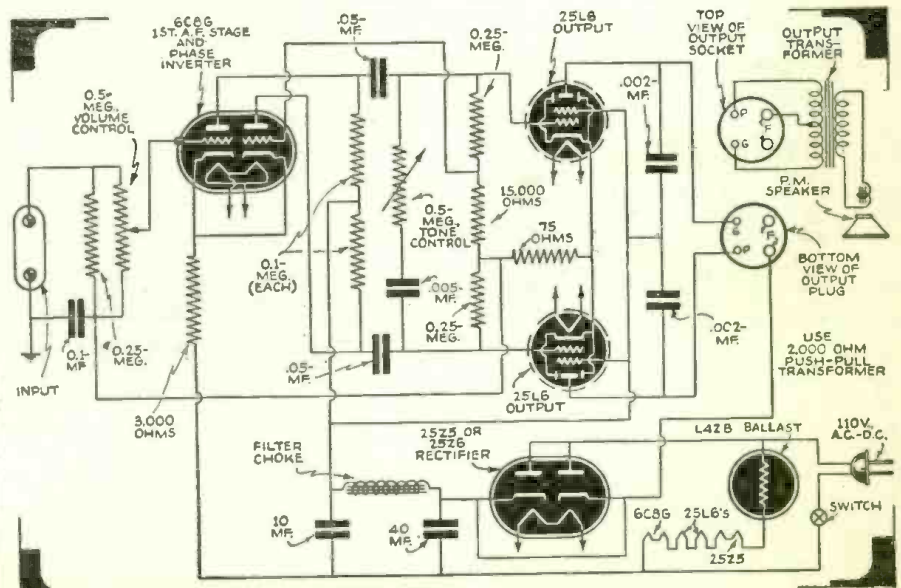
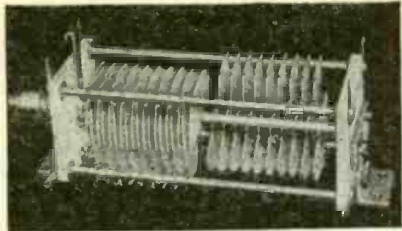
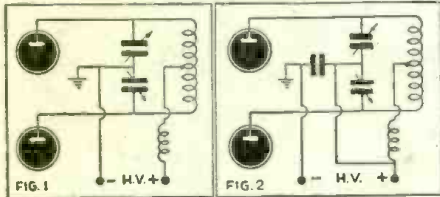


Diagram for building the 4-watt amplifier.

New Transmitting Condenser



New transmitting condenser; circuit connection at Fig. 2.

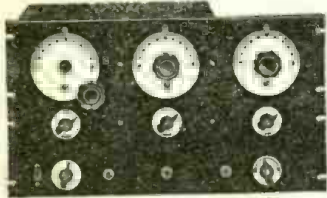


• THERE are two methods of connecting a variable condenser in push-pull amplifier circuit. Both are shown in the accompanying diagrams. Fig. 1, shows the full D.C. plate potential across the condenser and as a result the actual peak voltage during operation is equal to the D.C. plate voltage, plus whatever R.F. voltage may be developed. In Fig. 2, we have a circuit where only the R.F. voltage exists across the condensers. Naturally, lower voltage condensers can be used in this circuit and the saving in cost is considerable. The only disadvantage of this circuit lies in the fact that the whole frame, as well as the control shaft, is at high D.C. potential and it must be well insulated from the ground side of the circuit. The operator also must be very careful not to come in contact with the shaft in order to avoid what might be a fatal shock.

The variable condenser shown was designed to take advantage of the circuit in Fig. 2, and avoid the danger of personal shock to the operator from the control shaft, as well as eliminating the special mounting arrangements necessary in order to insulate the condenser. This new condenser is the Hammarlund "HFB" and has Isolantite end plates which insulate the mounting feet. The danger of shock has been overcome by an insulated control shaft; the entire rotor assembly is electrically isolated.

Soldered brass plate construction is used in order to reduce series contact resistance. After assembly, the entire unit is cadmium plated to reduce corrosion and present a pleasing appearance. The many improvements incorporated provide a smaller, more efficient unit with higher effective voltage rating. The condenser illustrated is a 65 mmf. dual with .100" plate spacing. The overall length between Isolantite panels is 7 3/4" and the width and height are 1-13/16". The "HFB-65-F" can be used in circuits with 2,000 volts 100% plate modulated. Small physical size of the new condenser fits right into the new mode of transmitter design. Complete hardware is supplied with the unit for either panel or base mounting.

New Electron-Coupled Exciter Transmitter



• A NEW E.C.O. all-band switch Exciter-Transmitter and voltage regulated power supply has been developed by the Browning Laboratories. This apparatus is cooperatively sponsored by Amphenol, Cardwell, Cornell-Dubilier, Kenyon, Ohmite, Par-Metal, and Raytheon.

Painstaking electrical and mechanical designs coordinate in making the E.C.O.'s stability comparable to the better grade X-cut crystals. The E.C.O. allows operation in any portion of any amateur band from 10 to 160 meters inclusive. The circuit is so arranged that crystals may be used if desired.

A brochure and circuit diagram may be obtained from your jobber or from any of the cooperating manufacturers.

New Condenser Seal

• A NEW and improved method of sealing both dry-electrolytic and by-pass units is now employed on all Consolidated condensers, according to a recent announcement made by Consolidated Wire & Associated Corps. All their condensers are now end-sealed with a specially developed material which the manufacturer states offers greater resistance to moisture and assures longer life with trouble-free performance. The condenser illustrated is an inverted type, lock nut mounting, dry-electrolytic in drawn metal container.



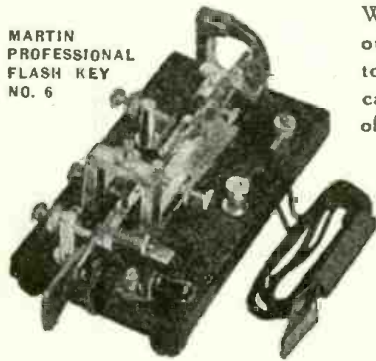
Helpful Gift Catalog

• CAMERAS and radio sets, especially appropriate gifts, receive major attention in the new and profusely illustrated Christmas catalog of Radio Wire Television, Inc. Radios occupy 20 pages, and 32 pages are devoted to gifts suitable for camera fans. For the youngsters there are 8 pages of train sets and 2 pages of educational toys. Finally there is an illustrated listing of a large number of electrical appliances for the home.

Announcement

We wish to announce the sale of the patents and all interests in the complete line of Martin Flash Keys to J. H. Bunnell & Company, of 215 Fulton Street, New York City.

MARTIN
PROFESSIONAL
FLASH KEY
NO. 6



We are taking this opportunity of expressing our thanks to you for your patronage and to assure you that the Bunnell Company will carry on the manufacture and distribution of them.

**Martin Research & Mfg. Company
New York City**

The J. H. Bunnell Company takes pleasure in announcing the purchase of the patents and exclusive rights to manufacture and distribute the complete line of Martin Flash Keys.

As one of the oldest manufacturers of telegraph equipment in the industry, we are glad to welcome this product to our regular line of Keys, Sounders, Relays, Repeaters, Recording equipment, and allied instruments.

**J. H. Bunnell & Company
Bunnell Building, 215 Fulton St.
New York City**

DON'T FAIL TO GET THIS SHORT WAVE COIL DATA BOOK

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

Contents Briefly Outlined

S-W Tuning Inductance Charts • Coil Data for T. R. F. Receivers • One Tube Oscillodyne • Two Tube Bandspreaders • The Mono-Coil • 2-Tube Old Reliable • 2-Tube Globe Trotter • 2 Winding Coils—10-500 Meters • Doerle 3-Tube "Signal Gripper" Electrified • 3-Tube Bandspreaders for the Ham • General Coverage Coils on Ribbed Forms • Coil Data for Superhet or S-W Converter • Ultra S-W Coils • Switch Coils for S-W Superhets • Experimental Coils • S-W Antenna Tuner • Most Popular S-W Tuning Circuits • Self-Supporting Transmitting Circuits Employing Coils Described • All Band Antenna Tuner for Transmitting • Plug-in Coils for Exciters • Frequency-Wavelength Conversion Chart.

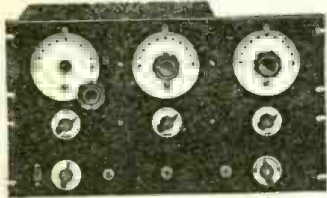
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97 HUDSON STREET NEW YORK, N. Y.**



New Electron-Coupled Exciter Transmitter



• A NEW E.C.O. all-band switch Exciter-Transmitter and voltage regulated power supply has been developed by the Browning Laboratories. This apparatus is cooperatively sponsored by Amphenol, Cardwell, Cornell-Dubilier, Kenyon, Ohmite, Par-Metal, and Raytheon.

Painstaking electrical and mechanical designs coordinate in making the E.C.O.'s stability comparable to the better grade X-cut crystals. The E.C.O. allows operation in any portion of any amateur band from 10 to 160 meters inclusive. The circuit is so arranged that crystals may be used if desired.

A brochure and circuit diagram may be obtained from your jobber or from any of the cooperating manufacturers.

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Newest Radio Apparatus

New RCA Receivers

• THE four new RCA Victor radio receivers pictured here fill almost any need of the person who wishes to have broadcast and—in some instances—short-wave reception.

At the upper left is shown Model K-105 which features a 9-tube chassis, in addition to the Magic Eye tuning indicator, push-button tuning, a tuned R.F. stage, 3-gang condenser, 12-watt push-pull audio system, and a built-in loop antenna controlled from the instrument panel.

At the upper right is Model U-20, 7-tube radio-phonograph. Among its features are a built-in loop antenna, automatic mercury-controlled turntable START and STOP switch, top-loading crystal

battery drain up to 30%. It is but little larger than a brief case, and has its full vision dial conveniently located beneath the carrying handle. Other features of the three models in which this set comes are a fool-proof switching system for changing from battery to house current and back, an automatic ON-OFF indicator, a tuning range of 1650 to 530 kc., low-drain tubes, and a superheterodyne hook-up with six tuned circuits, using three magnetite core transformers for best selectivity.

Pictured at the lower right is a table phonograph known as Model R-60. Among its features are a silent automatic mercury ON-OFF switch for the turntable motor, a 3-point high frequency tone control, and an improved pick-up in a molded plastic tone arm. The instrument is said to be



Top left—RCA 9-tube console with built-in loop antenna; top right—Model U-20 7-tube radio-phonograph; lower left—New "portable" for battery or 110-volt A.C. or D.C. operation; lower right—Table phonograph Model R-60, with molded plastic tone arm.

pick-up, push-pull audio system, and 2-band reception. The phonograph is concealed under the top lid. At the lower left is the new portable Pick-Me-Up model which operates on either batteries or A.C. or D.C. from the power line. This receiver features the "Current-Cutter" which cuts "B"

particularly popular for use in adult meeting rooms, for counter demonstrations of records, and for young people either at home or away at college.

There are also many other interesting units in the new RCA line.

Unique New Condenser and Resistor Analyzer



• THE Tel-Ohmike, a compact new condenser and resistor analyzer just announced by the Sprague Products Company, sets a new vogue in economical instrument design in that it permits the Serviceman to utilize his own milliammeter and

voltmeter. As a result of using these instruments which he already has, he gets a modern, obsolescence-proof instrument at a saving of the cost of these two meters.

Tel-Ohmike includes an extremely wide range of capacity and resistance, measures the characteristics of condensers under exact working voltages; has direct-reading scales which give quick, visual indication of all factors measured, and permits direct measurement of insulation resistance up to 10,000 megohms of such components as oil condensers under high voltage up to 1,000 volts. Its capacity measurement range is from .000010 mf. to 2,000 mf., and for resistance measurement it covers from .5 ohms to 5 megohms. Power factor of electrolytic condensers may be measured on direct-reading scales up to 50% power factor, and it also measures leakage current of electrolytic condensers.

Pin-jacks are also provided for connecting the Serviceman's own voltmeter and milliammeter, to set the working voltage of the condenser under which all measurements are made. This is the first time this has been possible and means making tests under the exact working voltage of the condenser. Thus leakage current, insulation re-

sistance, power factor and capacity are determined under actual working conditions.

Tiny Metal-Cased Electrolytics

• THE new Cornell-Dubilier BR series of tiny, tubular electrolytic capacitors are only about one-fifth the size and weight of the older "can" type electrolytics for equivalent capacity and voltage ratings. They also cost less, permit more speedy replacement of older types, and are available in a wide variety of capacity and voltage ratings—from 4 to 40 mf., 25 to 500 volts, working.

Each BR capacitor is hermetically sealed, enclosed within an aluminum container over which is fitted a varnished cardboard sleeve. Bare wire leads are riveted to rubber-capped bakelite ends, and in most applications the capacitors can be supported by their own leads. Where this is not desirable, they can be supplied with metal mounting straps for chassis mounting.

The aluminum foil is of the highest purity and is etched by an exclusive electro-chemical process which eliminates all possibility of subsequent corrosion. A number of other unique design features, combined with rigid control of raw materials and manufacturing processes result in capacitors of excellent electrical characteristics. Type BR's are available in single and dual capacity ratings.

J. H. Bunnell to Make Martin Keys

• J. H. BUNNELL COMPANY, of New York City, just announced the purchase of the patents and exclusive manufacturing rights in the Martin Flash keys and will add to their complete line of Telegraph Keys, Sounders, Relays, Repeaters, Recording Equipment and allied instruments.

The Bunnell Company is one of the oldest manufacturers of telegraph equipment in the industry, and is well known to amateurs from the earliest days of this now world-wide hobby.

New Amateur & Com. Rec.

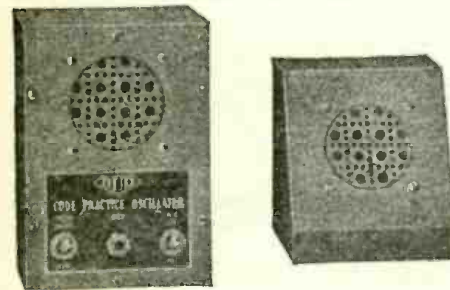
• THE new Howard 436 just announced is a 7-tube amateur and commercial receiver with frequency coverage from 540 kc. to 43 mc. (553-7 meters). It is also available for 150-400 kc. (750-



2,000 meters). Among its features are noise limiter, inertia knobs, and new type electrical band-spread, with a scale over 8 inches in length.

Code Practice Oscillator

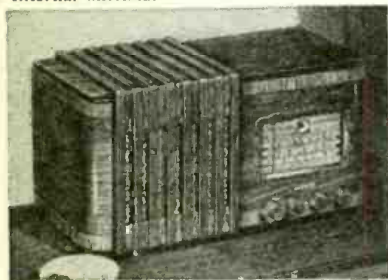
• A VERY neat Code Practice Oscillator operating on 115 volts A.C. or D.C. and suitable for either individual or group code instructions, has recently been announced by Bud Radio, Inc. This oscillator is complete with built-in dynamic speaker and tube and the pitch of its note may be changed by means of a switch on the panel. Provision is made on the rear of the oscillator chassis for an additional speaker and extra key for two-way communication. The oscillator is also



handy for furnishing a constant tone source for checking modulation percentage or P.A. coverage, and may be used as a keying monitor for a transmitter.

Lafayette Table Model

• A NEW de luxe table model A.C.-D.C. super-heterodyne, the Lafayette Model D-33, just announced by Radio Wire Television, Inc., is appropriate either for table or mantel mounting. The built-in loop antenna permits "local" station broadcast reception without any external wire connections but for distant stations and all short-wave reception provision is made for connecting an external antenna.



The tuning range, in 3 bands, includes 540-1,650 kc., 2.2-7 mc. and 7.5-24 mc. Tuning is simplified through use of a "slide-rule" dial, and an electron "eye" tuning indicator. Tips, jacks and switch permit connection for phono or television sound reproduction.

Crystal Mike

• THE new Model 44X crystal microphone of the Turner Co. gives selective-directional pick-up of sound, and allows the operator to choose the sound he wishes to amplify. It has a 13-15 db. differential between front and rear pick-up, so that the microphone may be considered dead at the back. This eliminates audience noises and background disturbances, helps eliminate reflections, and reduces feedback problems, permitting microphone operation under bad acoustical conditions.

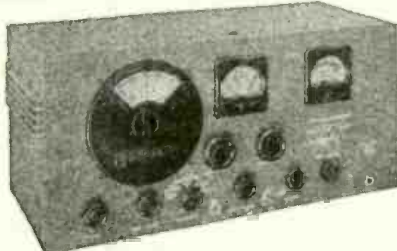
The 44X has a 90 degree tilting head, for semi- and non-directional operation. The level is unusually high; -58 db. with 25-foot cable set. Fifty

foot lines are possible without frequency discrimination, and with minimum loss of level, and response is claimed to be exceptionally smooth from 30-10,000 cycles. The unit has a moisture-proofed crystal, automatic barometric compensator, and is blast proof as well as mechanical shock-proof.

Calibrated Band-Spread

• THE latest Hallicrafters receiver, the Skyriider "Defiant" SX-24, offers to hams and others of modest circumstances a communications set which incorporates substantially all modern, practical developments plus some outstandingly advanced features.

The band-spread dial is calibrated directly in frequency for the amateur ranges from 10 to 80 meters, with the conventional 0-100 division calibration for use in other commercial and short-wave band-spread ranges. In the 10-meter ham range, for example, tuning drift does not exceed 2 kc. during a test period of one hour and from a cold start. This is due to temperature compensated circuits.



Other features include: Four selectivity positions—broad, sharp, crystal phone and crystal c.w.; signal-strength meter calibrated in "S" units and db., automatic noise limiter, continuous coverage from 540 kc. to 43.5 mc., crystal filter, beat-frequency oscillator with pitch control, tone control, provision for remote stand-by switching, built-in power supply for 115 volt A.C. operation and provision for operation from batteries or vibrator supply.

Nine tubes are employed.

"Slo-Blo" Fuses

They are a dual purpose fuse having a simple fuse link and a resistor element which provides the heat inertia or time lag.

The spring serves not only to open the circuit,



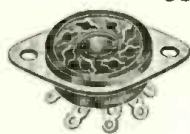
SPRING RESISTOR FUSE LINK

but to take up the expansion of the link, thus preventing crystallization on repeated heating and cooling.

On severe overloads the fuse link melts as a conventional fuse. But on prolonged overloads the resistor heats up and melts the fusible alloy connecting the link.

"Slo-Blo" fuses are offered by Littlefuse, Inc., in the small 3AG size 1 1/4" long by 1/4" diameter. There are nine ratings offered in the range between 1 ampere and 1/100 ampere.

Rugged Socket



vibrate, and the socket can be used over and over again by experimenters.

The sockets are obtainable in various colors of bakelite, or in steatite, mica-filled bakelite and polystyrene, with 4 to 11 contacts, with standard RMA spacing to take all standard types of tubes. Made by the American Phenolic Corporation.

Tube Power Ratings

• THE Federal Communications Commission has just released a bulletin showing the approved power ratings of vacuum tubes for operation in the last stages of broadcast (350-1600 kc.) stations. Outputs from 50 to 100,000 watts are shown in the first chart, which is for high-level or plate modulation. A second table shows outputs from 25 to 75,000 watts for low-level modulation or last R.F. stage operating as linear power amplifier. Another table shows outputs from 25 to 500 watts for grid modulation in the last stage (25% operating efficiency), and the fourth table gives outputs from 250 to 2,500 watts for similar circuits with 35% efficiency. Some twelve makes of tubes are specified according to power and application in these tables. An additional table lists equipment approved by the FCC for use in broadcasting stations.

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MODEL 200 with variable condenser, covers 150 to 6000 kilocycles. List Price\$17.95

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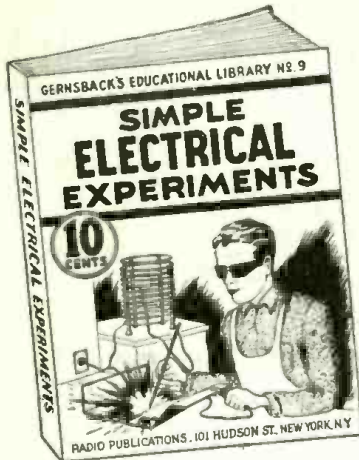
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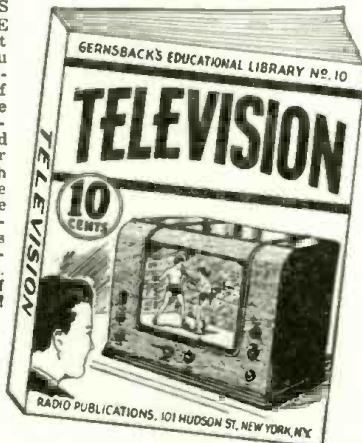
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NO. 9—SIMPLE ELECTRICAL EXPERIMENTS

Over 100 interesting and practical electrical experiments are described in this book, covering every branch of electricity—from simple experiments with magnets to high frequency "stunts". Among the experiments, all of which are clearly illustrated with special drawings, we find: Experiments with Magnets, Static Electricity, Transformers, Induction, Motors, High Frequency Machines, Switches and Lamps, Polarity Experiments, Dimmers, etc. All of the experiments described can be carried out with simple apparatus, most of which can be found about the home. Further, anyone can make them and this book becomes at once not only instructive but highly entertaining as well!

NO. 10—TELEVISION

Every one is asking the question—How does television work? This book explains all of the different systems of television from the simplest to the most complex. It describes in A-B-C style just how the image is scanned, how the scene is picked up by the television camera and broadcast to your home. Various types of television receiving systems are described in easily understood language, and the book is very completely illustrated with dozens of special drawings. The book tells how the accompanying sound for television images is picked up and transmitted and answers hundreds of other questions which the student and layman ask daily.

AND HERE ARE 8 MORE 10c BOOKS

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NO. 2—HOW TO MAKE THE MOST POPULAR ALL-WAVE 1- and 2-TUBE RECEIVERS

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NO. 4—ALL ABOUT AERIALS

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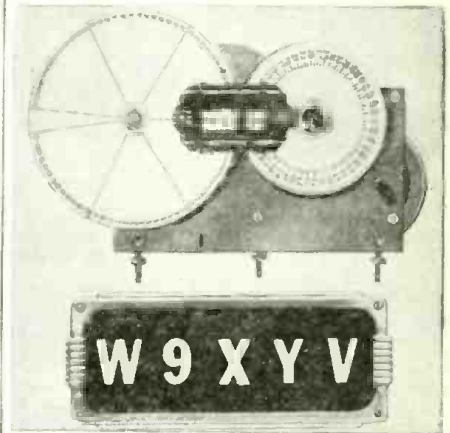
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Mathematic Precision Tuner

• THE No. 530 mathematic precision tuner, being produced by Crowe Name Plate & Mfg. Co., is one of the finest precision tuners yet seen. It has a ratio of approximately 72 to 1 in 360 degrees of rotation, and the reading of the two dial scales combined covers 600 graduations in 180 degrees of condenser rotation. As the picture shows, the various gear drives have spring take-up to prevent back lash. Only the readings which appear through the window, shown in the front view of the instrument, are seen on the panel. The rest of the equipment is behind the panel.



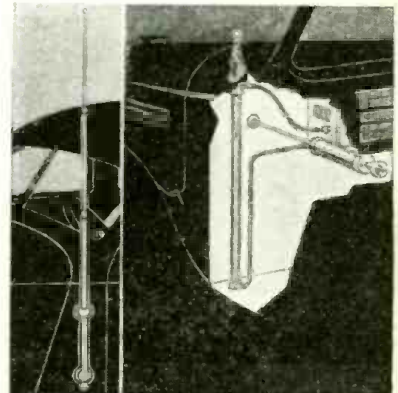
Crowe is also making a new call letter plate for use by Ham stations. The emblem is finished in chrome and black, with translucent green call letters. The overall size, including the reflector box, is 6 1/16" long by 2 9/16" high by 1 3/4" deep. It comes complete with a reflector and has a candleabra bulb socket to take either 110 volt or 6 volt bulbs. Two complete sets of call letters are included with each emblem, and if additional letters are necessary, these are supplied without extra charge.

Automatic Auto Antenna

• A COMPLETE line of eight low-cost auto antennas featuring an automatic telescopic cowl antenna which may be instantly adjusted in length from the driver's seat, has been announced by the RCA Manufacturing Company. All of the new models are equipped with "soundproof" ceramic insulation.

Operated by a compact pneumatic plunger mechanism which is located under the dashboard, the automatic antenna may be lengthened or shortened from inside the automobile with only a stroke or two of the plunger. A small push-button on the plunger handle controls the pneumatic retraction and extension operations. Finished in chromium, the antenna extends only three inches above the hood when not in use. Fully extended, it measures 42 inches.

The RCA Deluxe Cowlantenna is a side mounting, four-section antenna, equipped with two ceramic insulators. It measures only 29 3/4 inches



when closed and when fully extended, 100 inches.

Four Hoodtennas, which are installed on concealed brackets for under-hood mounting, also feature anti-rattle construction to eliminate mechanical and electrical noise pick-up. A four-section, 100-inch telescopic antenna fitted with two "soundproof" insulators, the Deluxe Hoodtenna is mounted on sturdy, brass plated brackets held in place by self-tapping metal screws. A similar 3-section model measures 94 1/2 inches, fully extended. All antennas include a 33-inch shielded cable.

The inexpensive Di-Pole antenna for under-car installations is fitted with adjustable brackets for easy installation, it eliminates ignition interference through its improved balanced design.

(Continued on page 555)

10-Tube "R & T" Television Receiver

(Continued from page 524)

ganging them mechanically brings them too close together and makes the leads longer.

It is not desirable to make one stage of fixed gain and the other variable, because if the gain of the fixed stage is left high, it will oscillate in regions of high signal strength; if it is left low, pictures will not be satisfactory in regions of low signal strength. Again this point has been carefully thought out and tested by actual experiment, as have most of the other controversial points in this set. With the able assistance of first one and then another of his students the author tried practically everything—even arrangements which were thought hopeless. The coil data for the CBS coils to operate at the same trimmer settings will be published in *RADIO & TELEVISION* as soon as possible.

Power Supplies

The low-voltage power supply is conventional except that it is somewhat better filtered. Hum spoils picture reception at levels which would be inaudible in a sound receiver. The best parts are used here because the voltage regulation must be excellent due to the fluctuating load imposed by the scan oscillators. A power supply having poor regulation would cause a darkening of portions of the picture and also give it ragged edges. Looking at the high voltage supply for a moment, this type of supply, in which the positive is grounded, is standard oscilloscope practice, but unless well filtered will introduce hum in the picture. Grounding the negative instead will reduce this tendency. If you have trouble from this source, be careful before you make the change. I have not tried this out and shall not predict just what additional changes might be needed in the rest of the set. A few are obvious, but I would not want to risk missing even one, and so will not make any recommendations in this direction except *caution!*

Antennas

Many antennas were tried at Monmouth Beach, N. J., where the author has a summer bungalow: indoor, simple dipoles aimed in all directions both low and high, simple dipoles with reflector both low and high. It was found that the difference between one antenna and another was seldom startling. A simple dipole, low down and outdoors, was a little better than the same one indoors. Turning it made slight difference except in a very narrow beam at its dead spot. Raising it from a 6 foot elevation to one 25 feet up made more of a difference. The simple dipole 25 feet off the ground worked very well. (It was shown in the photo last month.) Raising it to 40 feet made little difference in signal strength, but did reduce the already small amount of automobile ignition interference somewhat. Adding a reflector to it further improved the signal-to-noise ratio. With this antenna, the interference from auto ignition was entirely eliminated except from the infrequent trucks passing directly in front of the bungalow or parked in front of it while making deliveries.

"Sound" Section

Now for the sound section. This was, believe it or not, one of the biggest headaches in designing the set. The design presented herewith should not give anyone any headaches, however, as it is not critical. We started our experimental work by getting on the wrong track right away. Since this was a television attachment, we figured on trying to use an ultra-short wave converter as the sound section and feed this into the

antenna and ground posts of a standard broadcast receiver. This method had worked well in connection with the articles "Television Experiments with a Servicing Oscilloscope," which appeared in *Radio-Craft*, August, 1938, September, 1939. But putting the converter on the same chassis as the telly set proved to be a horse of a different color. It didn't work out at all, because the oscillator in the converter insisted upon getting mixed in with the picture, creating some very beautiful patterns but making simultaneous operation out of the question. The sound worked well alone but was useless because it obliterated the picture. We decided to try one stage of T.R.F. followed by a detector, this to go to the phonograph input connections on a standard broadcast receiver. We used the same R.F. circuit which had panned out on the vision end and a triode detector circuit suggested by amateur C. E. Sharpe of nearby Portaupeck, N. J. This worked immediately and the addition of an R-C filter in the detector plate circuit took the last "bug" out of it. The diagram and parts list are self-explanatory. Radiotrons 1852 and 6J5 are used, the 1852 as R.F. amp., the 6J5 as bias type detector. The sensitivity and selectivity proved more than adequate. The addition of a conventional A.F. stage and speaker would take the whole outfit out of the television attachment class and make it a complete televisor. The Bklyn. Tech. Television Club is building the sound section, complete with A.F., to go with the silent telly kit it assembled last year, and we'll be able to report to you on how it worked soon. The coil information is found in an accompanying diagram.

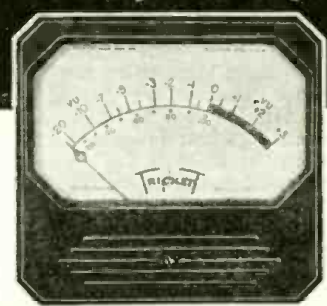
The B voltage and other voltages are obtained from the low voltage power supply of the video set—another reason it must be able to "give," without complaining or suffering, large voltage regulation. The mounting of the parts of the sound section is shown in the accompanying photographs and drawing. If the layout is changed, take care not to put the sound section too near the scan oscillators, as there is a tendency for these to cause a noise in the audio. If the complete sound section is made instead, take care not to mount the loud-speaker near the 1852 vision R.F. tubes, as they are somewhat microphonic and you will produce broad bands of varying width which will move down your picture. It is preferable to mount the speaker in a separate box.

Since the frequencies which television station use are in the ultra-high frequency spectrum, the behavior of newly constructed receivers is likely to be erratic and unpredictable. The specifications which are given here for coils, layout and other lumped constants are, therefore, likely to be incorrect when the same circuit is wired by another person. A few words of advice gleaned from practical experience will help you in "shooting" the trouble. If either the sound or video does not, at first, work properly and if it is found, after very careful rechecking of the wiring and measurement of the various voltages, that no signal comes through, the best thing to do is to use a good Signal Generator, like the Supreme Model 582 shown in the photograph, as a source of "sure" signal. The use of the signal generator eliminates the antenna, lead-in and telecast transmitter as possible sources of trouble; it also provides, in many locations, a stronger signal than is available from the antenna. Set the generator so that one of its harmonics falls on what is approxi-

(Turn to page 550)

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mately the television frequency.

The signal generator is used on the third or fourth harmonic. When operated in the "wide open" output position it supplies enough output to permit you to tune each stage and section of the receiver. One of the photos shows the bar pattern obtained on the Kinescope screen from the signal generator set on 15.05 kc., whose third harmonic is 45.25 and with the 400 cycle modulation cut in. Another photo shows pattern obtained without modulation but with signal generator tuned a few % off frequency. Since even 1% is a lot at these high frequencies, it is best to calibrate or make a mark on the scale of the signal generator at the exact point, by operating it near a television which is properly tuned to W2XBS and adjusting it in until the bar pattern is strongest. This was found necessary. A single stage R.F. amplifier in conjunction with the signal generator will help a lot, too, because you want plenty of input in lining up a new set, so that you can get something through no matter how badly off tune you start out. This R.F. amplifier is to be described in an article at a later date.

The coils for the tuned circuits should be re-wound, adding a turn and then, if not successful, taking a turn off the original specified number. If the trouble has not yet been found, it may be that the distributed constants of one tuned circuit are different from those in the following or preceding circuits. Suspecting this, add a turn to the coil whose circuit leads are shortest and/or take a turn off the coil whose circuit leads are longest. Care should be taken, in deciding upon the correct number of turns, that the trimmer condenser setting for maximum signal does not fall on either the *all-in* or *all-out* position of the trimmer. If the procedure outlined above is followed

patiently it will be found that you have, more than likely, corrected the trouble.

In designing the *video* receiver herein described a well considered guess was made as to the number of turns to put on the coils. From experiment we found that six turns was exactly right for our particular layout. Since the *sound carrier* frequency is higher than that of the *video* (49.75 mc. as compared with 45.25 mc.) one turn less was used on the coils of the *sound* section of the set. This, too, was found to be correct but it was much more difficult to line up the sound section trimmers, because of the comparative narrowness of the audio modulated carrier and due to the great selectivity of the circuits. Careful tuning, however, was all it took to get this section working.

If the builder will take care to have all of his tuned circuits the same distance from the tubes and have his wiring of each R.F. stage as nearly identical as possible, the problems discussed above will be greatly simplified.

The R-C filters provided for the purpose of *de-coupling* the various stages from their power supplies should be enough to prevent any circuit from breaking into self-oscillation; should oscillation be found to take place, however, due to changes in layout, etc., coil shielding may be used. The shields, found unnecessary in our layout, must be as large as possible and identical for each coil. The only remaining "out" if oscillation still persists is to decrease the gain of the stage in question by increasing the cathode resistor, or by introducing *degeneration* by returning the cathode bypass condenser to a tap on the bias resistor. The tap should be approximately 10% of the way down from the cathode, with the bottom end of the condenser grounded.

The sound unit was designed with no gain

controls because the volume can be controlled on the sound receiver which is used in conjunction with this "telly" attachment.

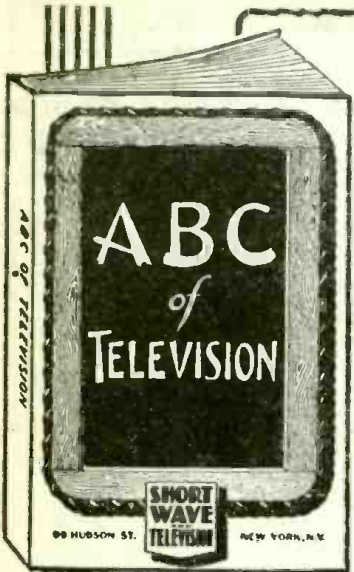
If the signal is much too strong, increase the value of the bias resistor in the sound R.F. stage. A shielded cable should be used from the sound unit 6J5 Radiotron detector to the audio amplifier, which may be the *phono end* of any broadcast receiver. If care is taken in adjustment and construction, *high fidelity* sound programs will result. If, instead of feeding the output to an audio amplifier, the builder wants a self-contained set, the least troublesome line-up to follow the 6J5 Radiotron would be a 6C5 triode driver followed by a 6F6 pentode power amplifier, the author believes.

Rosin core solder should be used, and all connections wiped clean. Flux should never be allowed to stay on a connection as it causes corrosion and also a high resistance ground at high frequencies.

An oscilloscope can be used in conjunction with the signal generator if desired, though this is not necessary because, provided your low frequency work is O.K., the kinescope will serve to indicate circuit conditions very well. The oscilloscope is most valuable in the low frequency end of the set; testing the scan oscillators, tracing down hum, etc.

Final setting of the trimmer should always be made on the telecast test pattern and sound. You want the setting that gives you the best picture and clearest sound. Of course if we all had "labs" like RCA, Philco, Du Mont and others, we would not suggest lining up on the signal—but under the circumstances we found it the only way to get the best out of the set.

I wish to acknowledge again the good work of Jerrier Haddad, who did all the
(Continued on opposite page)



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- CHAPTER 4—The use of the cathode ray tube in television receivers; necessary associated equipment used in cathode-ray systems.
- CHAPTER 5—How a television station looks and how the various parts are operated.
- CHAPTER 6—The Iconoscope as used for television transmission in the RCA system.
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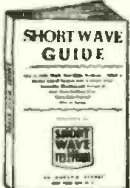
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construction work, and Andy Tait, who put up the final antenna. I also want to express my appreciation to radio amateur C. E. Sharpe for his suggestion on the detector and to Engineer Harry Zion for his suggestions.

Parts List—Sound Section

CORNELL-DUBILIER (Condensers)

- 4—.01 mf. type DT6S1 (paper); C1, C4, C5, C10
- 3—.25 mf. type DT6P25 (paper); C6, C8, C9
- 1—.0001 mf. type 5W-5T1 (mica); C7

HAMMARLUND MFG. CO.

- 2—25 mmf. air padding condensers, type APC25; C2, C3

INTERNATIONAL RESISTANCE CO.

(Resistors)

- 1—160 ohm, type BT-1; R1
- 1—5,000 ohm, type BT-1—R2
- 1—60,000 ohm, type BT-1; R3

- 1—2 megohm, type BT-1/2; R4
- 1—50,000 ohm, type BT-1; R7
- 1—500,000 ohm, type BT-1; R6
- 1—100,000 ohm, type BT-1; R5

RCA (Tubes)

- 1—1852 tube
- 1—6J5 tube

AMERICAN PHENOLIC CO.

- 2—Super Mip Octal sockets

AMERICAN RADIO HARDWARE CO.

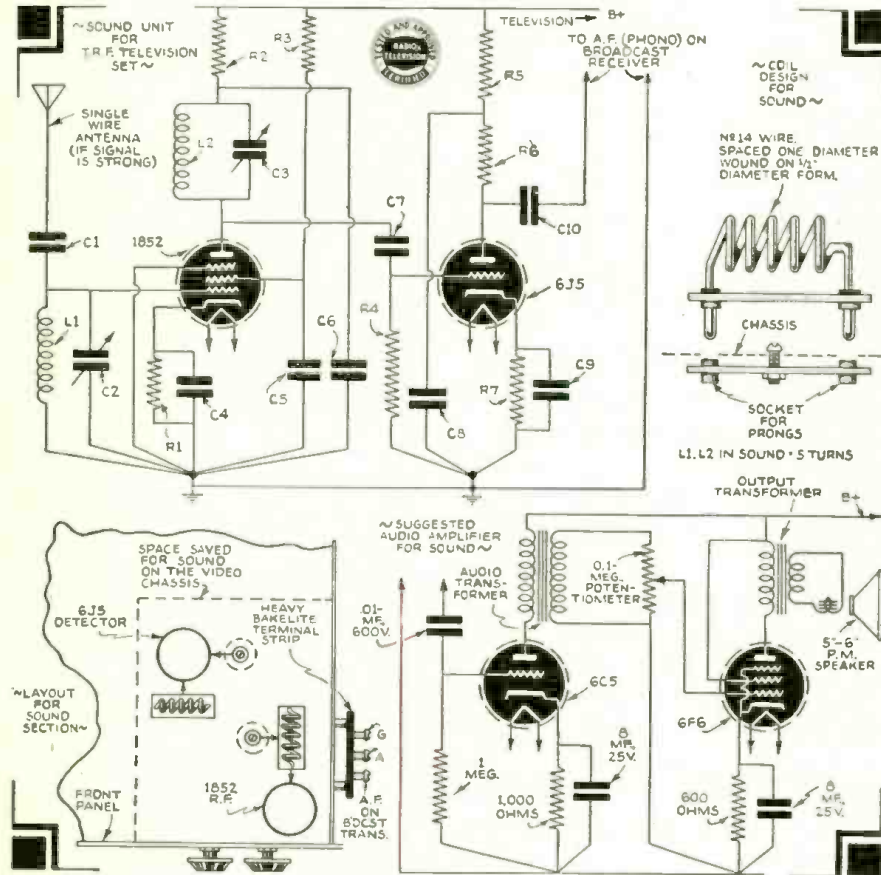
- 2—Plug-in coil forms
- 2—Plug-in coil sockets
- 3—Terminal output strips

CORNISH WIRE CO.

- Hook-up wire

Coil Data

L1, L2—5 turns of No. 14 wire on 1/2" dia. form, spaced one (wire) diameter (No. of turns varies with hook-up).



Facsimile Features "R & T"

(Continued from page 517)

which, instead of printing a reproduction 3 1/2 inches in width and of infinite length, produces sheets which carry type and pictures covering an area 8 x 11 inches. The paper size is slightly larger than this. Excellent half-tone (photograph) effects are secured with the RCA system; the girl's head reproduced with this article is actual size, exactly as it was cut from material received during a WOR-RCA transmission.

The Finch system, which was used to transmit the *R & T Kinks* as previously mentioned, has also been the subject of experiment by the Police Department in Bergen County, N. J. A photograph appearing with this article shows a transmitter and receiver as installed in a police car during these tests. The police were said to have been well pleased with this mobile unit, which merely replaced the microphone and

speaker in the police car. One advantage that facsimile has over radio communication in police work is that it permits photographs of wanted men to be transmitted to the cars; with sound radio only descriptions can be so sent. It also enables the officers in the patrol cars to make their reports in writing, thus saving both time and paper work at headquarters.

Facsimile is likewise finding its uses with armies and navies, aviation and shipping companies, public utilities, and other industries where point-to-point communication systems are needed, and written records are desirable. It is even expected that facsimile may win as wide public acceptance for home installations as has radio, when the material which is transmitted compares favorably with radio broadcasting, from the standpoint of general interest.



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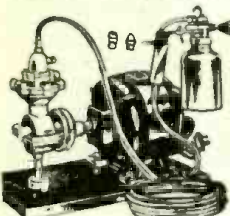
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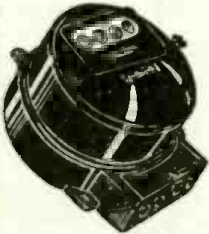
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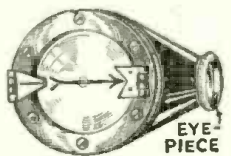


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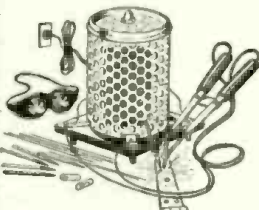


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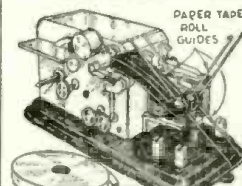
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Beginner's 2-Tube S-W & B. C. Receiver

(Continued from page 523)

tion is controlled by means of a 75,000-ohm potentiometer controlled so as to vary the screen-grid voltage of the 6J7 tube. This is the control at the left of the panel. When the set is operated as a broadcast receiver, this potentiometer serves as a volume control.

A study of the schematic diagram will show that if the plug-in coil is removed, when operating as a broadcast receiver, this will open the plate circuit. The simplest way to overcome this difficulty is to take an extra 10-meter coil, remove the longer winding and use only the tickler winding, and insert this in the coil socket for broadcast reception. However, those who wish to dispense with this added operation, may do so readily by the use of a double-pole, single-throw switch, arranged as shown in Fig. 2, to connect the plate of the 6J7 in the circuit properly when the switch is thrown for broadcast reception.

Filtering, in this receiver, is accomplished by means of a 300-ohm filter choke, shunted on either side by sections of the electrolytic condenser. The same electrolytic condenser also contains sections used to by-pass the cathode of the 25A7 pentode and the screen grid of the 6J7.

The *Beginner's Two* employs a standard A.C.-D.C. power supply with the filaments of the two tubes connected in series across the line, and including in the same filament circuit a ballast tube for reducing the filament voltages to the proper operating values.

When the receiver is operated as a *short-wave* set, an antenna trimmer connected in series with the antenna circuit gives the proper antenna control needed to tune-in weak distant stations.

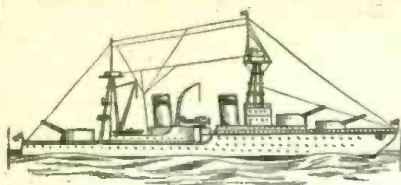
This antenna control is dispensed with when the set operates as a broadcast receiver. In order to assure proper selectivity on the broadcast band, the broadcast tuning condenser is connected in parallel with the short wave tuning condenser, and its value is selected so that the total maximum capacity of the two parallel condensers is equal to the maximum value required for tuning the fixed broadcast coil. Since each variable condenser may be tuned by an independent control, this gives greatly increased selectivity over that obtainable from a single tuned detector circuit. Therefore, this set should be more suitable for tuning out a broad local station than the average three-tube broadcast receiver having a single tuned stage.

The *Beginner's Two* is highly efficient on the *short-wave* band. Initial tests under favorable conditions brought in England, Germany, France and Italy on the loud-speaker. Clips are provided at the rear of the set for earphone reception, if this is desired.

The construction of this receiver furnishes the home set-builder with an idea of the attractive way in which a radio panel-chassis may be built of wood without special tools.

The front panel is 11 1/4" by 8 1/2" high and is made of 3/16" wood, trimmed at the sides and top with decorative molding. The speaker opening consists of three holes, cut as shown in the illustration, with ornamental holes cut out at either side to complete the symmetry of the design. This type of work can be done with a small jig saw. If such a saw is not available in the home workshop, the local carpenter will be glad to cut these

(Continued on opposite page)



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simple openings in the panel at a very modest charge.

The chassis proper is made of the same kind of wood as the panel; the two side supports are 4 3/4" by 3 3/8" high and the chassis deck 11" by 5 1/4". A hole is cut in the chassis deck to permit the speaker to rest partly below the deck.

The speaker may be mounted directly on the chassis deck or it may be fastened to the rear of the front panel by means of small wood screws. The holes are drilled in the chassis deck to permit tubes and coils to pass through. The sockets are then fastened on the underside of the deck. In fastening the sockets, it is preferable to use small machine screws and nuts rather than wood screws, since the former method prevents the sockets from being pushed out of place when coils or tubes are inserted. The entire panel-chassis arrangement may be fitted into a suitable wood cabinet if desired.

This receiver is recommended to the beginner for the following reasons. It uses a simple circuit with only two operating tubes, but nevertheless is capable of giving excellent results. It is constructed on a wood rather than a metal chassis, thereby eliminating many possibilities of short-circuits through the metal. Its dual function as a broadcast and short-wave receiver make it a desirable set to own. It is an economical set, not only because the parts may be obtained at reasonable cost, but also because it is really a combination of two sets for the price of one.

List of Parts

HAMMARLUND (Condensers, Coils and Sockets)

- 1—19-plate, 140 mmf. variable tuning condenser, type MC-140-M (C2)
- 1—34-plate, 250 mmf. variable tuning condenser, type MC-250-M (C3)
- 1—Antenna trimmer, 3 to 35 mmf., type EC-35
- 1—Set short-wave plug-in coils, 17 to 270 meters, type SWK-4 (L1)
- 1—4-prong Isolantite coil socket, type S-4 (For L1)
- 3—8-prong (octal) Isolantite tube sockets (For V1, V2 and R8)

CORNELL-DUBILIER (Condensers)

- 1—Mica condenser, .0001 mfd., type 1W (C4)
- 1—Mica condenser, .0005 mfd., type 1W (C12)
- 3—.01 mfd. tubular paper condensers, type DT-4S1 (C6, C11, C13)
- 1—1 mfd. tubular paper condenser, type DT-4P1 (C5)
- 1—Two-section dry electrolytic condenser. Section C9—16 mfd., 200-volt; Section C10—8 mfd., 200-volt
- 2—Tubular electrolytic condensers, 5 mfd., 50 volts, type EDJ-3050 (C7, C8)

I.R.C. (Resistors)

- 3—1 meg., 1/4 watt fixed resistors (R1, R4, R6)
- 1—600 ohm, 1 watt resistor (R7)
- 1—20,000 ohm, 1/2 watt resistor (R3)
- 1—200,000 ohm, 1/4 watt resistor (R5)
- 1—75,000 ohm potentiometer (R2) with switch (Sw. 2)
- 1—280 ohm, 50 watt ballast tube, type K87B (R8)

NATIONAL UNION (Tubes)

- 1—6J7 metal tube (V1)
- 1—25A7G glass tube (V2)

MISCELLANEOUS

- 1—Toggle switch, single pole, single throw (SW1)
- 1—Dynamic speaker with 4,500-ohm impedance output transformer and 3,000-ohm field (L3)
- 1—Phone jack (J1)
- 1—Line cord and plug
- 1—Roll hook-up wire
- 1—Screen grid clip
- 3—Knobs
- Dials
- Standard broadcast antenna coil (L2)
- Wood panel, wood chassis

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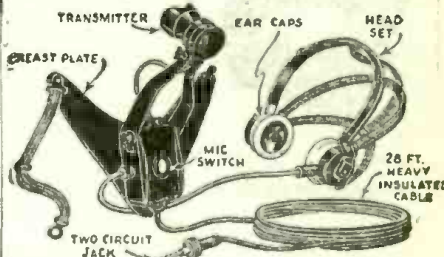
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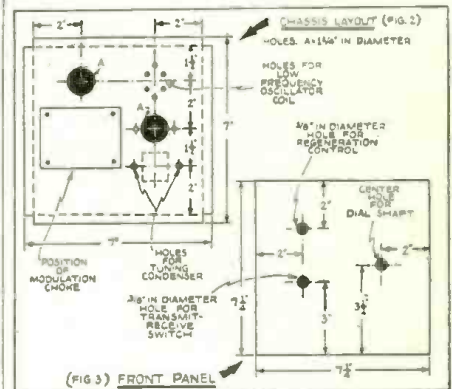
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A 2.5 Meter Transceiver

(Continued from page 526)

the power can be taken from a small A.C. pack, which will be much more economical to operate. The output from the transmitter, with 200 volts on the plate of the 6C5 at 2.5 meters, is about $\frac{3}{4}$ watt. This is sufficient for communication over the usual line-of-sight distances. The 7C5 acts as the modulator when transmitting, and as audio amplifier when receiving. The audio output, when in the receiving position, is sufficient for the operation of a small magnetic speaker at moderate volume and gives plenty of volume for the 2,000 ohm headphone. The 250,000 ohm regeneration control may be adjusted to the point of maximum sensitivity and lowest hiss level.

The construction of the transceiver is not difficult. However, extreme care must be used in wiring and in mounting the various parts. The 6C5 is placed in an inverted position with its top protruding through the chassis as shown in the photographs. This allows the coil to be mounted by its own leads, directly on the tube socket and the tuning condenser, cutting down the length of the wiring to the minimum.



Chassis and panel details.

Keep the leads short! By "short leads" we mean wiring directly between the parts and without turns or bends. A lead two inches in length is excessively long on 2.5 meters! Solder each connection as carefully as possible and clean away all excess resin from the joint by means of a small brush and carbon tetrachloride. Make sure that the connections are really soldered and not merely stuck together. Bad or poor connections usually mean zero results on this band. The metal shell of the 6C5 is *not* grounded to the chassis; by leaving it "floating" the circuit seems to oscillate more readily.

The antenna is the regular commercial adjustable type. In the installation as made by this constructor, the antenna is mounted on the ventilator of the automobile, just in front of the windshield. On other cars the mounting conditions will vary but it should be kept as high as possible and in the clear. If mounted too low, the body of the car may cause distortion of the transmitted wave and may make communication difficult in certain directions.

Coil Data

Band	Turns	Spacing	Wire
2 1/2 meters	3	1/4"	No. 14 E

Coil is wound on $\frac{3}{8}$ " diameter form and then slipped off; spacing is the distance between turns. NOT the length of the coil. It may be necessary to pull out or compress the turns slightly in order to set the frequency on the 112 mc. band. The R.F. chokes are wound with No. 36 d.s.c. wire on a $\frac{3}{8}$ " diameter form. The turns are close-wound, 70 to 80 being required according to the coil and lead constants. See text for details.

(Continued on page 555)

Parts List, 2.5 Meter Transceiver

NATIONAL COMPANY

- 1—Type C-SRR metal cabinet, 7 1/2" x 7 1/2" x 7"
- 1—Type OSR low frequency oscillator coil (100 kc.)
- 1—Type 8 prong "octal" socket, isolantite insulation
- 1—Type TX-9 insulated shaft coupler
- 1—Type TX-11 flexible shaft
- 1—Type UM-15 ultra-high-frequency tuning condenser (15 mmf.)
- 1—Type BM dial, No. 1 scale (0-100-0)

KENYON (Transformers)

- 1—Modulation choke, type T-153, 30 henries, 90 ma.
- 1—A.F. transformer with 200 ohm microphone winding, type KA-114M

UNIVERSAL

- 1—Microphone-headphone set, S.B. mike, 2000 ohm phone

CORNELL-DUBILIER

- 2—Mica condensers, 100 mmf., type 5W
- 1—Mica condenser, 1000 mmf., type 1W-5DT
- 1—Paper condenser, .1 mf., 600 volts, type SM
- 1—Paper condenser, .5 mf., 600 volts, type SM
- 1—Paper condenser, .01 mf., 400 volts, type SM
- 1—Electrolytic condenser, 10 mf., 25 volts, type BR

AMERICAN RADIO HARDWARE CO.

- 1—No. 10 2 1/2 meter transceiver antenna, with mounting base

MISCELLANEOUS

- 1—4-pole-2-position "send-receive" switch (band-change type)
- 1—6C5 metal tube
- 1—7C5 "loktal" tube
- 1—Bakelite socket for 7C5 tube

Newest Radio Apparatus

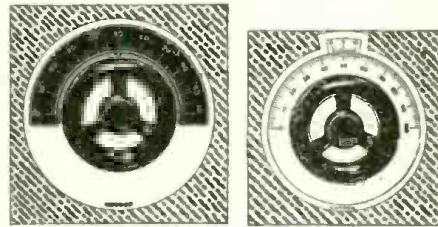
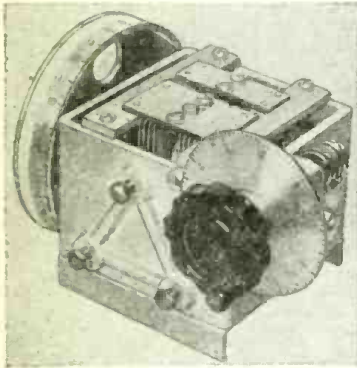
New Condenser for H.F. Circuits

THE type 755-A condenser, recently developed by General Radio Company, is designed for high and u.h.f. radio equipment, such as standard signal generators, oscillators and measuring circuits. Five sides are shielded and copper-plated brass terminal strips are mounted on mycalex insulators on the unshielded side. A spring loaded worm and gear drive provides a ratio of 15 to 1. Ball bearings are used on the main shaft. The total

number of scale divisions is 1500—15 on the main scale and 100 on the worm scale. The maximum capacitance of the instrument is 145 mmf. and the minimum 8.5 mmf. Its equivalent series inductance is .0055 mh. at minimum capacitance setting.

Tuning Control Line

A LARGE number of models marks the Gordon Specialties Company's line of tuning controls. These include those of the hand wheel type with scales and pointers, or with dials and vernier markers, all made of heavy gauge brass, finished in satin chrome plate. There is a list of 126 markings of standard or Deluxe size name plates for use with both types of these controls. Bakelite hand wheels with flanged knobs are also available with or without metal pointers, for use where no scales or dials are needed.



Radio Test-Quiz

(Continued from page 530)

touching the antenna of a low-powered transmitter.

(b) the tendency of an R.F. current to travel along the outer surface of a conductor.

(c) the shock received when a transmitter's filter condensers are touched immediately after the transmitter has been switched off.

9. The number of Kennelly-Heaviside layers is:

- (a) one (c) three
- (b) two

10. The names of the Kennelly-Heaviside layer or layers are:

- (a) A and B (c) E and F
- (b) K and H

11. The height of the first K-H layer is:

- (a) 1000 to 1100 Km. (c) 500-600 Km.
- (b) 90-125 Km.

12. The height of the second K-H layer is:

- (a) 200-225 Km. (c) 1000-1100 Km.
- (b) 250-350 Km.

13. According to the Electron theory, how does the electric current flow?

- (a) from positive to negative.
- (b) from negative to positive.
- (c) from the center of the conductor and flowing in both directions.

14. A "wave-trap" is:

- (a) a part of a circuit which enables messages to be stored while the operator is absent.
- (b) a circuit which helps to eliminate unwanted signals.

(c) a super-antenna, which catches weak radio waves.

15. The electrolyte of an Edison cell is composed of:

(Continued on page 556)



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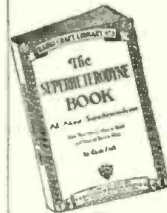
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- No. 6. BRINGING ELECTRIC SETS UP-TO-DATE
- No. 13. ABC OF AIR CONDITIONING
- No. 14. POCKET RADIO GUIDE
- No. 15. ABC OF REFRIGERATION
- No. 16. PRACTICAL RADIO CIRCUITS
- No. 17. SERVICING WITH SET ANALYZERS
- No. 18. POINT-TO-POINT RESISTANCE ANALYSIS
- No. 19. PRACTICAL RADIO KINKS AND SHORT CUTS
- No. 20. THE CATHODE RAY OSCILLOSCOPE
- No. 21. BREAKING INTO RADIO SERVICING
- No. 22. NEW RADIO QUESTIONS AND ANSWERS
- No. 23. PRACTICAL PUBLIC ADDRESS

RADIO PUBLICATIONS • R&T 140 • 99T Hudson Street, • New York, N. Y.

I have circled below the numbers of books in the RADIO-CRAFT LIBRARY SERIES which you are to send me. I have included my remittance in full, at the price of 50c each. (Stamps, checks or money orders accepted).

2 6 13 14 15 16 17 18 19 20 21 22 23
 Name _____ Address _____
 City _____ State _____
 All books are sent postage prepaid

COMMERCIAL NOTICES 10¢ A WORD

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

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

ART
FOR ART STUDENTS STEREO-scope Pictures of Art Models, 20 or more pairs of pictures to a set, \$1.00 Per set express collect, \$1.50 per set express prepaid. Free Stereoviewer with first order. Hannelly's, 218 S. Wabash Ave., Chicago, Illinois.

CORRESPONDENCE COURSES
CORRESPONDENCE COURSE in educational books, all newly used. Sold, rented, exchanged. All subjects. Satisfaction guaranteed. Cash paid for used courses. Complete details and bargain catalog. Free. Send name Nelson Company, N-210 Manhattan Building, Chicago.

USED CORRESPONDENCE COURSES and Technical Books Bought, Sold, Rented, Exchanged. Catalog Free. V. W. Vernon, Benagar, Ala.

INSTRUCTION
LEARN CODE SIMPLE METHOD 25c. Codemaster, Box 8363, Pittsburgh, Pa.

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

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

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

PRINTING
COMMERCIAL PRINTING AT MOST reasonable prices. All work guaranteed. Samples and prices on request. H. E. McKale, 6 Forest Place, Fredonia, N. Y.

QSL-CARDS-SWL
100 NEAT SWL CARDS PRINTED with your name and address, 6cm; postpaid for \$1. Bunch of samples and RST Chart for five cents in stamps. WIBEK, 78 Warrenton St., Springfield, Mass.

SWL'S QSL'S NEW STYLES. 75c and \$1.00 for 150, 2 colors, postpaid, free samples. W3DEE, Maple Shade, N. J.

SWL'S-QSL'S-COLORFUL. Econo-mical. Samples. Made. 819 Wyandotte, Kansas City, Mo.

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

RADIO KITS
RADIO KITS-\$3.95 UP. COM-plete. Single band; all-wave; 5-10 tubes. Save 50%. Parts catalog Free. McGee Radio, P-2045, K. C., Mo.

FOR SALE (NON COMMERCIAL) 3¢ A WORD

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

SELLING OUT SERVICE TEST equipment. Have approved A.C. D.C. Voltmeter, Superior Signal Generator, Audio Oscillator, Tube Tester, Analyzer and other shop or shack equipment. Send stamp for particulars. G. Barker, West Bridgewater, Mass.

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

FOR SALE-PAIR NEW 35 T9 \$8.00. New Simpson Hammer \$10.00. 250 Watt all-band, phone and c.w.

transmitter, complete with everything, six months old. \$150.00, original cost. \$350.00. Incorporates rack and panel construction, r.f. line-up, 6LG-809-400th speech, 50, pair of 50, pair of 2A3's and a pair of 6Z40's Class B modulators. Antenna throw-over relay, six meters, four power supplies, and pilot lights on the panel. 15 Watt 160 meter phone rig, worked all districts. \$25.00. Many extras. Send for complete list. Ben Hobbs, W3HYP, cx-WBIG, 30 S. Pennsylvania Avenue, Atlantic City, N. J.

RECONDITIONED, GUARANTEED all tube receivers and transmitters. Nearly all models cheap. Ten day free trial. Durling December many models

at extra 25% discount from regular prices. Terms. List free. W3ARA, Butler, Missouri.

FOR SALE: 300 WATT A.C. PIONEER Genemotor powered by 4 cycle Johnson Air Cooled Motor all on same base mounting. Motor just been reconditioned. Excellent for Sound Truck and other uses. Cost \$79.50, will sell for \$45 immediately. Kimberly's Radio Service, Hawkinsville, Ga.

DON'T BUY A RECEIVER UNTIL you get my free list of reconditioned, guaranteed Receivers! Practically all models at money saving prices. Trade-in Time. Exchanges. Send your list. W2VAL, 12 West Broadway, New York.

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.

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

WANTED: ALMOST ANYTHING radio or photography. Have Poth Derby with F 2.5 lens, also reflex camera, enlarger, several good lenses and many other bargains in photography and radio. Merrill L. Winner, 1546 Sherman St., Williamsport, Pa.

HAVE ANSLEY D7 (A.C.-D.C.) portable radio phonograph (5 tube super) with records, in good condition. For what have you? John Basta, 31 Lake Street, Brooklyn, N. Y.

I AM INTERESTED IN OBTAINING high quality printed QSL cards. Must be excellent workmanship. Block shadow lettering. Good color combination. Original designs. Appreciate samples on such. Irlene Goldstone, 332 Alabama Avenue, Brooklyn, N. Y.

HAVE EILEN 7C RECEIVER. 2 1/2-10 meter transceiver. 2 1/2-10 receiver, radio parts and tubes. Want Instructograph, quality typewriter and test equipment. Ildore Samkofsky, 213 S. 3rd St., Brooklyn, N. Y.

HAVE ONE AND TWO TUBE RADIOS, radio parts, oil paintings. Want radio parts, old radios, old magazines, books, etc. John Haynes, Doe Run, Missouri.

HAVE 1.4 VOLT NEW DELCO R1401 portable, several 2 volt battery receiver, with tubes. Want good typewriter, Friglet 0-50, 0-200 milliammeters, crystal mike, Instructograph, with wireless tapes. Send list. Zachry Radio, Ashdown, Ark.

WANT RIDERS MANUALS 1 TO 9 volumes, swap Remington portable typewriter with carrying case. Also have 6 or more apartment house wall phones with receivers complete. Jensen, 211 East 200 St., Bronx, N. Y.

I NEED A PRESLECTOR AND bug. Will trade or pay cash. W5HQW, 1705 Ave. O, Galveston, Texas.

SWAP: 7-TUBE AIRLINE. GHQ model motor. 12" Utah spr., 4-tube Essex B.C., 2-46's for: 6LG's, 809's, 600-0-600 transformer, mike, 660 m. xtals, good S-W test, Wallace Bralcy, 208 Stanton, Ames, Iowa.

I WANT A MYSTIC MIKE SET, also electroplating kit. Have numerous items on photography, music, books and courses to offer in exchange. Send your swap list. George Homer, 1305 W. Harrison St., Chicago, Ill.

HAVE TENNIS RACKET, SCOUT uniform, first aid kit, traveling kit with razor. Total value \$10. Want small SW receiver, radio parts. Winslow Hall, Glenwood Ave., Portland, Me.

WANTED-COMMUNICATIONS R-E-ceiver. Hallcrafters. Howard, other recent factory built set. Trade Corona portable. Supreme tube tester. 4-5-6-8 or 9 broadcast sets. Radio parts. W. E. Jensen, 359 Aberdeen, Rochester, N. Y.

WANTED: "GAS ENGINE" FOR model airplane or "Hlandee Tool." Have large assortment of new radio parts, few tools and meters. Have "Everitt's Communication Engineering." Details first letter. Chas. Rainwater, 1502 So. Washington, Marion, Ind.

WILL SWAP TEST OSCILLATOR, Hexdrite ohmmeter, self-powered pre-selector using an octal-based rf pentode in a regenerative circuit, for receivers, miscellaneous parts, and test instruments. J. H. Hood, 37 Club Drive, Greenville, S. C.

HAVE 12 FOOT DURALUMIN VER-tical antenna, earphone adapter with on and off switch, 7 late new tubes, Brandes earphones. Trade for nice electric shaver or what have you. Herman Fischer, 626 Carlton Ave., Brooklyn, N. Y.

SWAP TOURAINE AND CIE BRASS trumpet complete with mouthpiece, music holder, mute, and Conn case for 125-writer, low power emitting tubes or parts, or what have you? Jack Spencer, 613 W. La. Ave., Ruston, La.

WANT RADIOS, A USED RCA rer, and 6LG pushpull xmitr. Trade with xtals and send keys. Jiro Mukai, K60TK, 447 N. Clark St., Chicago, Ill.

TRADE 1-100 watt Airline amplifier, speaker selector box, 8 speakers with metal bases. Less mike. Used twice. Perfect cond. Value \$170.00. Let me know what you have. Eugene Cheney, Box 88, Rudd, Iowa.

DICTIONARY-WEBSTER'S LARGE unabridged in two volumes like new, latest edition. Swap for radio books, magazines. J. Bannon, 412 Seneca St., Oil City, Penna.

WANTED-A SKY BUDDY OR similar S.W. receiver. Have 1 cylinder 2 1/2 hp. engine, radios, parts, guitar, stamps and some cash. Terrence Genes, Box 505, Lake View, S.C.

WILL TRADE A 6D6 OR A 6C6 tube for a 19 tube. Both tubes are in good condition. John O'Brien, 867 Broadway, Fall River, Mass.

WANTED HALLCRAFTER SKY Buddy must be in good condition. Will swap 37 allwave "Truetone" console in very good condition cost \$57, when new. Wric Coulton Perkins, 182 Collins St., Hartford, Conn.

WANTED: GOOD 8MM PROJECTOR, splicer, titler, and exposure meter. Trade: Erlinrude Fisherman model outboard motor, used 15 hours, and radio equipment from my 500 watt 20 meter fone rig. Air Mail appreciated. WTBCU, Jerome, Idaho.

- (Continued from page 555)
- (a) diluted sulphuric acid.
 - (b) solution of potassium hydrate with lithium hydrate.
 - (c) distilled water.
16. What is meant by "bonding" an airplane?
(a) the guarantee of a bonding company against claims against the Airplane Company.
(b) the connecting of all metal parts of the plane.
(c) carrying U.S. mails, including Treasury bonds.
17. How many distress calls are being used in radio?
(a) one (c) four
(b) two
18. Conversion from meters into kilocycles may be effected by:
(a) multiplying the meters by 468,000.
(b) dividing the meters into 300,000.
(c) dividing the meters into 468,000.
19. An R.F. burn is suffered through:
(a) touching the antenna of a live transmitter.
(b) placing two fingers across the high voltage transformer terminals of a live transmitter.
(c) by sitting in close proximity to the R.F. field generated by a powerful transmitter.
20. A buffer stage is:
(a) a prop used in television studios.
(b) a radio-frequency amplifier.
(c) a go-between between jobber and dealer.
21. What is meant by equalizing a telephone line:
(a) an equalizer consisting of a parallel resonant circuit and resistance shunted across the telephone line.
(b) adjusting the telephone lines to equal length needed for high quality transmission.
(c) charging an equal rate for like distances.
22. The maximum percentage of second harmonics allowed broadcast transmitters is:
(a) 5 percent (c) 10 kilocycles
(b) 0.05 percent
23. The correct plate voltage is applied to a transmitting tube when it is:
(a) white hot (c) no glow at all
(b) cherry red
24. The Heising modulation system employs:
(a) class A modulation
(b) class B modulation
(c) class C modulation
25. What frequency deviation is allowed to broadcasting stations?
(a) 5 cycles (c) 5 K.C.
(b) 50 cycles

Answers to Quiz

- 1. b
- 2. b
- 3. c
- 4. b
- 5. c
- 6. b (Q code and Int. signal code)
- 7. b
- 8. b
- 9. b
- 10. c
- 11. b
- 12. b
- 13. b
- 14. b
- 15. b
- 16. b
- 17. c (SOS, Mayday, Pan, and XXX, the so-called urgent signal)
- 18. b
- 19. a
- 20. b
- 21. a
- 22. b
- 23. b
- 24. a
- 25. b

New Catalogs

Montgomery Ward

• A COMPLETE catalog of sound equipment has just been issued by Montgomery Ward. A large portion of this valuable book deals with the selection of sound systems for churches, mortuaries, auditoriums, ballrooms, schools and institutions. Other sections deal with choosing microphones and speakers, and the placement of such units. Descriptions of amplifiers, ranging from 12 to 100 watts output, are also given. Other pages of the book are devoted to portable equipment, loud speakers, microphones, record changers, turntables, pick-ups, recorders, hearing aids, inter-communicators, and accessories.

Solar Mfg. Corp.

• THE latest catalog of the Solar Manufacturing Corporation is crammed full of illustrations and specifications of this capacitor line. Condensers included in this catalog, No. 10A, are of the dry, wet, paper, mica and trimmer types. Also shown in the book are two models of capacitor analyzers, and the "Exam-eter," which performs a vast variety of functions in analyzing circuits and components.

E. F. Johnson

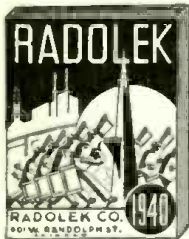
• THE new E. F. Johnson Company catalog No. 966, describing radio transmitting equipment, covers several types of variable condensers. Inductors of the rotating coil, tube-socket, edge-wise wound, and R.F. choke types, are likewise described. The catalog further discusses the well-known Johnson "Q" and Johnson "Q" beam antenna systems. Other small items, such as sockets, insulators, bushings, etc., are also covered.

Cornell-Dubilier

• THE newest catalog published by Cornell-Dubilier Electric Corp., No. 168A, is devoted to the "Test-Mike" and "Service-Mike," used for A.C. motor starting capacitor tests. The catalog covers the locked-rotor torque test, various methods of making tests, selection of capacity value, making permanent repairs, check on overloads, and includes other service notes. There are also connection diagrams and a diagram of switch positions. The catalog, which consists of eight large pages, also carries complete descriptions, with pictures, of the two new test instruments.



New Radolek Catalog



• THE new Radolek Company catalog contains 164 pages crammed with information on the latest receivers, components, and accessories, together with several interesting special sections. For example, this catalog also shows sewing machines, electric clocks, and appliances, Christmas tree decorations, electric trains and equipment, etc. Of interest to those who earn money from radio work is a low-cost electric sign advertising radio servicing. Many items of test equipment are also included, although most of this catalog is still of principal appeal to the ham and experimenter. Recording equipment and phonographs have a prominent place in the catalog.

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

BARTER and EXCHANGE FREE ADS (continued)

WANTED '37 AND '38 ISSUES Radio, also 1 or 2 53's. Have 10 usable 01A's and cash. State offer. Franklin Penner, 100 Riddle Bldg. 4, Apt. 2, Havensville, Ohio.

TRADE: A LINCOLN RADIO AND Television course, complete with explanation questions, for a typewriter, small printing press, power wood working tools. B. C. Summers, Gen. Del., San Francisco, Calif.

HAVE WESTERN ELECTRIC TIME relay, new tubes in cartons and loose, meters, tube tester, stamps, post-cards, camera, etc. Meter shop, waver parts. George Rod, 3510 Lake Park, Chicago.

TRADE CAMERA, TRIPOD, RARE view cards, radio parts, speakers, tubes, meters, tone testers, relays, pickups, magazines, manuals, fence charger, etc., for what have you? Wiggins, 6307 Kenwood, Chicago.

WOULD LIKE INSTRUCTOGRAPH code machine or Candler System. Will trade receiver or 5 meter equipment or all hand transmitter. Leo Laitz, 803 Logan North, Minneapolis, Minn.

WANTED: COMPLETE N.R.I. course. Swap 1000 unused postcard views for what? Jos. McGuire, 5022 So. 38th St., Omaha, Nebr.

HAVE 28 BIKE SPEAKERS, I.F. transformers, condensers, tubes, Radio-Craft magazines and vacuum cleaner motor, etc. Want Sky Buddy or similar S.W. receiver or parts. Lloyd Deano, 524 Catin Ave., New Orleans, La.

WILL TRADE U.S. CANADIAN and foreign stamps for radio books, magazines and parts. Will exchange stamps, postcards, etc. Lawrence Sutherland, Box 295, Pleton, Nova Scotia, Canada.

HAVE 3 TUBE A.C. RECEIVER, 10-200 meter Plug-in coils included. A-1 condition. Also types 30, 32, 33 tubes. Want 2 meter transmitter or what have you? E. Herman, Eltinkville, S.I., N.Y.

SWAP 12" SPEAKER FOR A 6L6 or 6L8G tube or a key or a good antenna. So how about it? 73, 88, 99. QRA Eber. F. Diehl, Jr., 309 So. 17th St., Camp Hill, Penna.

HAVE 1-8" DYNAMIC SPEAKER 1100 ohm field (Magnavox). Trade for 6" or 8" magnetic speaker in good condition. Bevel Dorte, 2209 S. Charlotte, San Gabriel, Calif.

1/2 HP GASOLINE ENGINE, ELECTRIC drill, Argus printer-enlarger, bicycle, oscilloscope, etc. Want motorcycle, vacuum pump, meters, transmitting tubes, what have you? Your list for mine. Eskil Karlson, 610 Elm Court, Erie, Penna.

WANTED APRIL 1939 RADIO NEWS and code machine. Have Short Wave Crystal, 1939 Radio News, Radio Television Data Book, and other things to swap. Exchange lists. S. Pindroff, 2652 Woodland Ave., N.S. Pitts., Pa.

WILL TRADE "MODERN POSTAGE Stamp Album", almost new, with 658 different stamps including 68 U.S. stamps. Will trade for good 10 to 160 meter receiver. Will pay cash also. George Altes, Farmington, Minn.

HAVE 12A7, 6F7, 6A7, ETC. TUBES, mica cond., No. 8 portrait lens, 8" fan. Want 25A7GT tube, 40 MFD filter, mini-camera, fixed xtal detector, test equipment, photometer, enlarg. lens, Geo. Choulnard, 4599 Papineau, Montreal, Canada.

HAVE P.E.-RELAY VOLUME CONTROL, time relay, 400-0-400 milliammeter Weston, 0-74 0-150 volt meter, W.W. meters, octal sockets, S.W. S.W. parts. For what? Wagner, 4743 Washington Blvd., Chicago.

WANT: ARGUS, DETROLA, Perfect or other candid camera. Have typewriter, rfc, transceiver, radio-phonograph AC-DC portable, parts, box camera, Univex candid (folding) Stevens target rifle, mikes, power supply, radio handbooks. Hoyer, Jamul, Calif.

WANTED—ANY KIND OF GOOD battery receiver of books about radio. Have Winchester 22 rifle and Chem-Craft outfit worth \$5 each. Both in A1 condition. Deaton Stoner, R.F.D. 2, Mt. Carroll, Ill.

WANTED: F.B. 160 METER RIG and first class short wave receiver. Will trade high school course, candid camera or R.T.I. radio course for either. Paul M. Jenkins, Box 255, Lenoir City, Tenn.

HAVE LARGE NUMBER RESISTORS and condensers, fixed-variable, transformers, coils, several QST, 1930-31-32 and other radio magazines. Want anything of value. Clair Vandermeer, 308 S. Greene, Spokane, Wash.

WILL TRADE TWO OFFICIAL BOY Scout triple-barrel sets for what have you in radio equipment, stamps or covers. Steve Finnekan, 723 So. Federal Ave., Mason City, Iowa.

WANT 22 RIFLES, TELEPLEX, typewriter, or what have you? Have 3 and 4 tube SW sets AC-DC, 6 tube AC 5 meter superb, V-O-M meter and parts. Jack Klein, 1983 Bryant Ave., Bronx, N.Y.

HAVE S.W. RADIOS AND PARTS. Want wind musical instruments, sax and other horns. Albert Hartman, 542 5th Avenue, Brooklyn, N.Y.

WILL GIVE TEST EQUIPMENT, camera meters, transformers, sockets, resistors, condensers, speakers, tubes, camera, Winchester, etc. for S.W. receiver, old coins, etc. Send list. Roe, 5726 Green St., Chicago.

HAVE SUPERIOR SIGNAL GENERATOR, power supplies, carbon mikes, power transformers, variable condensers. Will swap for testing equipment or small phone transmitter. Henry O. Hudnall, Putney, W. Va.

HAVE NEW INSULINE CONVERTER, transformers, condensers, speakers, new and used tubes, Radiart books on auto radios, panels, etc. Would like good short wave receiver. All mail ans. Gordon Temple, 12 Cross St., Westboro, Mass.

WHAT WILL YOU SWAP FOR 7 tube Thordarson rec. Lastman folding camera FT.9, Fotli Derby F.2.5 with case, cost new \$37.00. Need Rider Manuals, Instructograph, signal generator, F. Anderson, 2301 W. Dartmouth, Flint, Mich.

TRADE WEBSTER AMPLIFIER with speaker, magnetic piano pickup, radio, etc. Want 35 mm camera and/or enlarger. Or what? My camera like "Elton 3B" 3 tube battery. 10 Railroad St., Maynard, Mass.

YOUR CHOICE OF ANY TYPE tubes, speakers, magazines, etc., for your discarded test equipment and radio parts. Dennis, 1923 Cullom Ave., Chicago.

WANT PHONOGRAPH MOTOR, test equipment, record player, Instructograph. Have tubes, condensers, radio parts, magazines, etc. Nathan N.Y.

WANT S.W. RECEIVERS NOT IN working order. Have about 25 Look Mags, 15 Cosmopolitan, 30 pulp mags., Poplar Science, R. & T., etc. Also has radio parts. Abe Levinsky, 103 H. Meyer St., Brooklyn, N.Y.

WILL TRADE "NATIONAL SW-3" 2 volt battery motor or 1 1/2 volt portable. Have "Fairbanks-Morse" 2 volt battery like "Elton 3B" 3 tube battery, all-wave set and "Pocket Sportset", kit. Alexander Podstepny, 217 Pine St., Phila., Penna.

I HAVE A REMINGTON "DeLUXE" elec. dry shaver (new) one Schick (used), an RCA record player. I want a good microscope, camera or Argus Midget, Wayne W. Guest, 221 Central Park, Houston, Texas.

HAVE THORDARSON 40 WATT amplifier, 1-12" Utah dynamics. Want Hall-farer receiver or what have you? W. J. Weightman, 132 N. 5th St., Middletown, Indiana.

SWAP MAYTAG GAS ENGINE (late model) 17.50 Velvet electro-shaver, 3 tube Doerle (power pack transformer burnt out), speaker, earphones for good short wave receiver, White Wing Poultry Yards, Clarence Westerberg, Route 2, Lynden, Wash.

SWAP: PLANS ON MODEL RAILROADING, small gasoline engines. Also have many used phonograph records, magazines, radio parts, etc. Will swap for what have you? Send for list. Harry Weitz, 80 Lawrence St., Oswego, N.Y.

FOR TRADE 38 REPEATING RIFLE and drum type electric outside sign. Want phone transmitter or short wave receiver. J. H. Bennett, Tuscola, Ill.

WANTED MINERALS, WILL SWAP radio parts or do photo work for them. All letters answered. Howard Schultz, 3519 E. 104th St., Cleveland, Ohio, U.S.A.

WILL SWAP 50 VOLUMES OF good modern and classical novels—no trash—for SW receiver, transmitter, radio equipment, radio course, or books on radio. Jerome Joseph, 11600 Temple Ave., Cleveland, Ohio.

HAVE RADIO PHYSICS COURSE, S.W. rec. 5-550 meters, tube checker, electric clock, meters, aerial kits, jewelers supplies, watch bands, etc. Want xtal, smitter, "Hande Grind-er". Gerald Samkofsky, 215 S. 3rd Street, Brooklyn, N.Y.

HAVE "STRATOSPHERE 10" transceiver 2 1/2 to 2000 meters, all coils, would like 16MM projector, Sky Buddy, all letters answered. Miguel Anzelo, 318 East 70 St., New York City.

WANT NEW TUBES FOR PHILCO No. 70, card file, console phonograph, Emerson's Efficiency course, Sheldon's Business Building, Have 8 vol. Salesmanship course, Marden Success Library, Haddock's Business Power, Frank Handshue, Scrville, Ohio.

HAVE FOLLOWING GOOD TUBES: 6C8, 6D6, 70, 76, 43, 80, 53, 56, 57, also 8" magnetic spkr. and headphones, would like small 3 or 4 tube receiver. Benjani Fernandez, Ave. F dez No. 1, Stop 12, Santurce, P. R.

HAVE WESTON 506, 425 METERS, 5 meter receiver, Radio Physics Course, 7 tube 5-550 receiver. Want test or ham equipment. Helen Wax, 225 Rodney Street, Brooklyn, N.Y.

WANTED AC-DC AMATEUR BAND revr., also Dynamotor or motor generator. Have 4 tube battery portable, 6 inch Photo cell (new), 5 meter transmitter, radio parts. Write for list. Dave Luch, Rt. 5, Box 750, Stockton, Calif.

WANTED—A CRATER NEON TUBE, used in Television receivers from 1929 to 1934. Write me and state price. W. C. Ebel, C.T.C. U.S.S. Arizona, Long Beach, Calif.

I HAVE A THREE TUBE S.W. radio, A.R.E.L. 1939, 58-56-80, Will trade for Univex 8MM camera of late model. Robert C. Dole, 10 Clinton Ave., Rutland, Vt.

HAVE DIESEL ENGINEERING course, Diesel Engine catalog 2 and 3, Diesel application plan book, Diesel Progress 14 issues, interested in radio equipment. Riders Manuals, Robert Savot, Box 103, Monaca, Pa.

HAVE COMPLETE ZENITH AND Philco service manuals and new Supreme 531 Oscilloscope. Will trade for what? Paul Bahr, Marion, Indiana.

HAVE BAND SWITCH 6V8, 6N7, 807, power supply, xtal, tubes, motor switching. Also have 25 watt 6L6 complete no junk. Want good ham receiver FB7 or Marion Mace, 205 E. Houston St., Sherman, Texas.

WANTED: RM69 AND DR20 OR HRO Senior in exchange for Hammarlund stal Super Pro. Complete. William Quigley, 102 Ave. S. Brooklyn, N.Y.

WILL EXCHANGE EXPERT PHOTO finishing for radio equipment. Also have several slightly used 6 volt to 35. Don Borden, 723 E. Newall Street, Flint, Michigan.

HAVE 5 TUBE RADIO; WOULD like small SW receiver or what? Will swap picture postcards with anyone. Would like correspondence with stamp collectors. Walter Monk, 51 Vineyard St., Providence, R. I.

WANT SW3 (6-VOLT MODEL) OR Sky Buddy or Howard receiver, Vibrac, genemotor, wind-charger. Have radio parts, rifle hunting and fishing equipment, Popular Mechanics and Popular Science magazines, cash. Thlen E. Sterner, Marataville, Ohio.

WANT SIGNAL GENERATOR ALSO Cornell Dubilier Capacitor. Have Hawaiian Tremola, Remington single shot 22 rifle, Model No. 176 AC-DC Crosley midjet two band receiver. George Genrich, 7 Brownell Ave., Hartford, Conn.

HAVE 635-6C5-25A6-25Z6 AC-DC transceiver, Ellen 7C receiver, 4 tube 2 1/2-10 receiver, W.C. Howard, Hall-farer or National receiver. Shelton Radio Club, 215 S. 3rd St., Brooklyn, N.Y.

WOULD LIKE TO HEAR FROM someone having a good D.C. code Practice oscillator. Would also like a few pen friends interested in amateur radio, that are over 30. Mrs. Lucy Jennings, Gladys, Va., U.S.A.

HAVE PIN TABLE, 35 MM ROYAL movie projector, Philco radio model 38, blow torch, bat. charger. Have 18 MM projector and camera or Harry Parker, WJGF, Sylva, N. C.

WILL SWAP Candler Junior Code Course complete and in good condition. What have you? Paul Boer, Route 3, Box 390, Santa Ana, Calif.

WANT TEST INSTRUMENTS, FILTER and mica cond., Photometer, RK62 tube, used Leica camera or photo equipment, round magnet, Have many tubes, mags., Kodak 16 MM F/1.9 lens, 6" Utah speaker, G. Choulnard, 4599 Papineau, Montreal, Canada.

GILBERT ERECTOR SET No. 7 1/2 with electric engine, also boys popular books for photo enlarger, camera, Sky Buddy or what have you? Matthew Trachinsky, 747 East Fifth Street, New York, N.Y.

WANTED TO BUY USED CODE instructor or code records in good condition. Will correspond with radio interested persons anywhere in the world. Kenneth Bry, Manvel, North Dakota.

SWAP: 1 ENLARGER 6.3 BAUSCH and Lomb lens and complete dark-room equipment, for 1936 Sky Buddy or similar S.W. receiver. All letters answered. James Grubbs, 93 Westbury Park, Watertown, Conn.

WANTED: HALLICRAFTER 'R' meter, Trimm headphones, 6H6, 6K7, 6L7, 6J7 metal tubes, volt-ohm meter. Give lowest price, model nos. and condition of article. Swap fotos. Daniel Platak, 225 Division Ave., Brooklyn, N.Y.

WILL SWAP SHORT WAVE T.R.F. chassis 8" Rolla speaker with 58"-57"-56" and 2A5, 5 sets Octo coils, good working order for typewriter or cash, cheap. Thomas Solomech, 66 Broadway, Howard Beach, L. I., N.Y.

SWAP—5 TUBE SUPERHET KIT, 2 tube regenerative S.W. radio, 1 tube preselector, 2 power packs. Want portable broadcast receiver, crystal record player, magnetic or crystal pickup. Frank Medon, 133 Morningside Ave., Yonkers, N.Y.

(Continued on following page)

BARTER and EXCHANGE FREE ADS (continued)

World Short-Wave Stations

Corrections only this month—Full List next month.

Eastern Standard Time

Mc.	Call	Station Name	Time
26.500	W2XQO	NEW YORK CITY, N. Y.	11.32 m. Noon-9 pm.
26.150	W4XA	NASHVILLE, TENN.	11.47 m., noon-10 pm.
26.100	W9XJL	SUPERIOR, WIS.	11.49 m. Relays WEBC daily. 9 am.-5 pm.
26.050	W9XTC	MINNEAPOLIS, MINN.	11.51 m. Relays WCTN 10 am.-8 pm.
26.000	W8XUJ	CINCINNATI, OHIO.	11.54 m. 2-3 pm.
26.000	W9XA	KANSAS CITY, MO.	11.54 m., Addr. Commercial Radio Eqpt. Co. 10 am.-1 pm., 3-7 pm.
25.950	W6XKG	LOS ANGELES, CAL.	11.56 m., Addr. B. S. McLaughlin, Wash. Blvd. of Oak St. Relays KGFJ 24 hours daily. DX tips Mon., Wed. and Fri. 2.15 pm. Temp. off air.
25.950	W8XNU	CINCINNATI, OHIO.	11.56 m., 7 am.-2, 3 pm.-1 am. Sun. 8 am.-2, 3 pm.-1 am.
25.250	W2XUP	NEW YORK CITY.	11.88 m. 4-5 pm.
21.630	WRCA	BOUND BROOK, N. J.	13.87 m. Addr. N.B.C., N. Y. C. Noon-3.30 pm. to Europe.
21.570	WCBX	NEW YORK CITY.	13.91 m. Addr. CBS, 485 Madison Ave. 8 am.-12.30 pm. to Europe.
21.540	WPIT	PITTSBURGH, PA.	13.93 m. Addr. Grant Bldg. Relays KDKA 6.30-8 am.
21.520	WCAB	PHILA., PA.	13.94 m. Addr. Col. Broad. Syst., 485 Madison Ave., N. Y. C. 12 n. to 6 pm., exc. Sat. to So. Am.
21.470	GSH	DAVENTRY, ENG.	13.97 m. 5.42 am.-12 n. to Africa.
21.460	WRUL	BOSTON, MASS.	13.98 m. Addr. University Club. 10-11 am. except Sat. and Sun. to Europe.
18.040	KHE	KAHUKU, HAWAII.	16.63 m. Sats. 8.30-9 pm.
17.850	TPB3	PARIS, FRANCE.	16.68 m. Addr. (See 15.245 mc.) 5-10 am.
17.845	DJH	BERLIN, GERMANY.	16.68 m. 12.05-7.50, 8-11 am.
17.840	EIRE	MOYDRUM, ATHLONE, EIRE.	16.82 m. Addr. Radio Eireann. 8.30-10 am.; Even dates 12.30-4.30 pm., 5.30-6 pm.; Odd dates 12.30-2.30 pm.
17.820	2R08	ROME, ITALY.	16.84 m. Addr. (See 2R0, 11.81 mc.) 5-8.45 am., 6-7.25 pm. to So. Am.
17.810	GSV	DAVENTRY, ENGLAND.	16.84 m. 5.42 am.-noon to Far East.
17.790	GSG	DAVENTRY, ENG.	16.86 m. Addr. B.B.C., London. 5.42 am.-12 n., 1.35-3.30, 12.22-1.30 pm. to Africa. News, 6.30, 8.15, 11 am. to No. Am.
17.780	WNB1	BOUND BROOK, N. J.	16.87 m. Addr. Natl. Broad. Co., 9 am.-4 pm. to Europe, 4-11 pm. to So. Amer.
17.760	DJE	BERLIN, GERMANY.	16.89 m. Addr. Broadcasting House. 12.05, 7.45, 8-11 am., 4.50-9 pm. Also Sun. 11.10 am.-12.25 pm.
15.410	RV96	MOSCOW, U.S.S.R.	19.47 m., 6-11 am., 8.55-10.30 pm.
15.370	HAS3	BUDAPEST, HUNGARY.	19.52 m. Addr. Radiolabor, Gyali Ut 22. Sun. 9-10 am.
15.360	DZG	ZEESEN, GERMANY.	19.53 m. Addr. Reichspostzenstrahlamt. Tests irregularly. Ams.
15.350	—	LUXEMBURG (no call).	19.54 m., 7 pm.-3 am. approx.
15.330	WGEA	SCHENECTADY, N. Y.	19.56 m. Addr. General Electric Co. Relays WGY, 11 am.
15.320	OZH	SKAMLEBAK, DENMARK.	19.58 m. Sun. 8 am.-1.30 pm. Dly. 1-1.30 pm.
15.310	GSP	DAVENTRY, ENG.	19.6 m. Addr. (See 17.79 mc.) 12.57-5.15 am. to Near East. 3.50-6 pm. to No. Am. News 4.45 pm.
15.310	YDB	SOERABAJA, JAVA, N. E. I.	19.60 m. Addr. NIROM. 10.30 pm.-2 am., Sat. 7.30 pm.-2 am.
15.300	2R06	ROME, ITALY.	19.61 m. Addr. (See 2R0, 11.81 mc.) 4.10-4.55 am.; 10 am.-12.06 pm.; 1.40-2.30; 3-5.30 pm.; 7-9.30 pm.
15.280	DJQ	BERLIN, GERMANY.	19.63 m. Addr. Broadcasting House. 12.05-11 am., 4.50-10.50 pm.

HAVE STEVENS SLIDE-ACTION repeating .22 cal. rifle in good condition. Want communications receiver or what have you. H. C. Patchen, 23 Grand St., Sidney, N.Y.

HAVE C MELODY SAKOPIHON IN good condition to trade for a ham receiver or David Parker, Sylva, N.C.

I'LL SWAP PARTS OR TUBES for a chassis and panel such as Ellen 54 or HF-5, Fulltone 5, also 57, 55, 56, 2A5, 50 for 7B, 6FT, 39 and or 6A7. Francis Baber, Packanack Lake, N. J.

WANT - PORTABLE TYPEWRITER in good condition. Give particulars. Have-8 watt portable public address system, developing and printing equipment. Raco AC 3 tube SW receiver cost \$12. some cash. Wayne Wenker, Wellman, Iowa.

WANT RIFLES, RADIOS OR AMPLIFIERS for a LaSalle Extension University Course in Accounting. Write: C. H. Heldenbrand, Staplehurst, Nehr.

WANT A HAMMARLUND "SUPER PRO", preferably one which needs repairing. Will pay in cash. Charles Yoss, 232 Webster Ave., Jersey City, N.J.

WILL SWAP A 400 V. AT 200 MILL power supply with 2.5 filament and also a 1-tube receiver, for transmitting equipment or what have you. Donald Peterson, 7 Evergreen St., DuBois, Penna.

WANT 8 MM CAMERA AND PROJECTOR and auto receiver. Have Howard 10 tube short wave 6 band receiver. Also have used radio parts. Jerome Kosmoski, U.S. Army Communication Station, Augusta State Airport, Augusta, Maine.

WANT PAIR OF 3" CONDENSER lenses; tripod, unmounted 33 mm color filters or mounted to fit 37 mm lens. Have transmitting and receiving eqpt., parts. Herman Vellin, W2AJL, 351 New Lots Ave., Brooklyn, N. Y.

TRADE SUPREME 27 OSCILLOSCOPE, "Automatic" tube and set tester; Superior V.T. voltmeter; Bernard Oscillator; 600W Radiant Heater for new or used tubes, parts, etc. Bob H. Flennings, 722 N. James St., Rome, N.Y.

WANTED: DONATION A.C. MARINE type receiver by nearly blind ex-Commercial Operator. Send express collect. Address: A. Hulfish, Wildwood, N.J.

WANT MOST ANYTHING IN TEST- ing equipment such as oscillator, analyzer, Rider Manuals, 6V., 6 Amp., or better power supply. Have number of parts, ear radio, short wave set. C. Pollack, Chanute, Kans.

HAVE RECORD CHANGERS, amplifiers, speakers, radios, parts, picture films, testera, motors, etc. Want windcharger, sound head projectors, mikes, pickups, radio and movies sound film, bench saw or band saw. Warren W. Wigner, 1220 Fairview, Fort Wayne, Ind.

HAVE PARTS FOR 6V6 OSCILLA- tor; Atwater Kent 40, wackine, less speaker; back issues radio mags; many radio parts. Want electric trains or Unrex 8 mm movie camera. Write - Les Fuller, Jr., Seligman, Ariz.

WANTED - GOOD TRANSMITTER, have 1/2 Jr. Black Decker drill, 510ux two speed portable sander, bolts, Model NC Derricks, portable spray, all practically new, write, E. Hillcocks, 1524 West 23rd, Indianapolis, Ind.

I HAVE X MITTING TUBES, phones, speakers, power supplies, 3 tube S.W. receiver, mikes, and many parts. Want stat. mike, floor stand P.A. equipment. Send for list. J. G. Manchester, 6806 Meadow Lane, Chevy Chase, Maryland.

WANT GOOD MOVIE CAMERA with or without projector, or fast candle camera. Will swap 5-inch C-R tube, other tubes. Noiseless portable typewriter, perfect condition. Robert Eichberg, 782 West End Ave., New York, N.Y.

WILL EXCHANGE FOR WHAT have you 125 copies back issues of Short Wave & Television, Radio News. All Wave Radio and Radio Index magazines in good condition. Robert Seaward, 1550 Avoca Place, Jacksonville, Florida.

WANTED: COMPLETE CANDLER code course, radio parts. Can offer cash or trade. I have 20 gauge shotgun and N.W. Taxisdermy Course. Send trade particulars to Henry F. Heckert, 901 Howard, Indianapolis, Iowa.

HAVE ONE CRYSTAL SHURE Microphone, stand and 25 ft. cord cost \$24.50 3 months ago, also portable electric tattooing outfit. Will trade for anything of equal value. Chic Estabrook, 1003 E. 4th St., Ladysmith, Wis.

HAVE 8 MM AND 35 MM MOTION picture camera and projector, radio amateur parts, outboard motor, guns. Want microscope, ship's bell clock. RCA 16 mm sound camera and original negatives of still and motion pictures of far away lands and peoples. Wm. Hanson, Niles, Mich.

WILL TRADE SPANISH GUITAR and type 546 and 59 tubes for small hand-powered mimeograph, in good condition. N. Hansen 826 S. 4th St., Aurora, Ill.

TRADE FOR SOME GOOD RADIO parts a Radio Servicing book, High School Self Taught book, 50 different issues of Popular Educators, Harper's Electricity book for boys, Alfred Nienit, 230 East Spruce Street, Chisholm, Minn.

HAVE INSTRUTOGRAPH, 8MM film, etc. Want 902, acorn, moon plate and eraser tubes; 8 mm equipment, fast 127 camera, Will trade or pay cash. Raymond Zitta, 28-28 47 St., Long Island City, N.Y.

SWAP: NEW THREE-QUARTER size bass fiddle (bridge) complete with strings, extra bridge, bow and \$12.00 cover for Skryder Dehant or Howard 460 or what have you. Cost \$125.00. Arthur T. Daugherty, 153-08 90th Ave., Jamaica, N. Y.

SEND FOR MY LIST OF AMATEUR equipment. Have fine mike, meters, tubes, power components, 14 tube receiver, multimeter, 22 tubes in-circuit, will trade for other articles. Dean Cooper, 17 So. 17th St., Fort Dodge, Iowa.

WANTED: HAND POWERED COIL winder. I will pay cash or trade. Carl O. Hefks, Route 2, Laverne, Okla.

HAVE 300V POWER SUPPLY. Trade in New England for 50,000 ohm potentiometer, 2 inf. 300V condensers, set 4 prong coils, and 20 or 35 MF midset variable condenser. D. Thomas Silvaggio, 50 Steuben Street, Providence, R.I.

WANT TELEPLEX OR MAC OSCIL- lator, will pay cash or trade. Also want key and D.B. mike. Have 6 tube 5 meter superhet, V.O.M., magazines and parts. Jack Klein, 1983 Bryant Ave., Bronx, N. Y.

HAVE SKY BUDDY, S19, will trade for either 100 or CW transmitter or W8BQW, 1705 Ave. O, Galveston, Texas.

SEND ON YOUR RADIO PARTS list. Plenty of receiving and transmitting parts for trade. Want mike, signal generator, audio oscillator, and U.S. stamps. Carl A. Kowarski, 1250 Superior Ave., Fort Wayne, Indiana.

WANTED: BACK ISSUES OF "Radio World" magazine. Will trade radio equipment, books, or pay cash. Jack Lynch, 3727 W. 13th St., Chicago, Ill.

WANT F.4.5 UNIVEX CAMERA and projector. Have: "Principles of Radio" - Henney; "Ghirardi's Radio Physics Course", 1928; "Mallory Radio Service Encyclopedia"; and RCA Technical Press "Television" Vol. II. Fred Oldenburg, 18451-11 Mill, Roseville, Mich.

SEND FOR MY BIG LIST OF radio and movie equipment, all A1 condition. Want to swap for anything in good line. Send your will send you mine. Roland Taylor, Thiden, Illinois.

WANTED 40M CRYSTAL FREQ. around 7140k, other transmitting parts. Interested in photography. Have "dolly" (3.5 lens. Compur shutter 1 sec. to 1/200 sec. Have late model Sky Champion Jimmy and Freddy Ankelian, 605 Park Ave., Union City, N.J.

I HAVE A HAMMARLUND COMET Pro. Am in great need for original metal cabinet for same. Will pay cash or swap anything you may need for one. W2LZX, Jack Quittell, 1218 Carroll St., Brooklyn, N.Y.

HAVE RADIO COURSE BY RADIO Television Institute. Paid \$125. Trade for good hand camera. State price, size and make of camera. Archie Thompson, Seaside, Oregon.

WANTED: A.C. SHORT WAVE RE- ceiver two tubes or more. Send description of radio and what you want for it. Lew Molteni, 608 Seventh St., Union City, N.J.

TRADE 2 SETS OF 2 WINDING coils about 15 to 200 meters for one set of 3 winding coils such as Ellen or Radio Trading Co. Trade for good 9K8Gs. Box No. 243, Packanack Lake, New Jersey.

WANTED TESTING EQUIPMENT. Will trade a 16 MBL motor driven movie projector and films or old U.S.A. coins. For multimeter, meters, 0-1 M.A. or what have you. Write: Vincent Davis, 511 Division St., Toledo, Ohio.

SWAP: COMMERCIAL 1938 ELEC- trically operated pin ball machine. \$75.00 new. Trade for Sky Buddy or any AC-DC short wave set. Child Knight, Jr., Long Beach Road, York Beach, Maine.

BRAND NEW NATIONAL RADIO Institute course in Radio & Television plus equipment to trade for guns and optical equipment in good usable condition. Luther Williams, Jr., Box 334, Route No. 1, Monroe, N. C.

HAVE HUNDREDS OF HIGH quality stamps to swap for radio parts, radio magazine, 8mm movie film, etc. W. M. McDonald, 271 Pearl St., Cambridge, Mass.

WILL TRADE KODAK FOLDING camera, F8.3 anastigmat lens. Speeds to 1/100 second. Both reflex as direct view-finders. Attractive black ripple finish, Bright chromium trimmings. For 2 1/2 meter transceiver. Robert Kenney, 23 Willard, Cambridge, Mass.

WANTED PRINTING PRESS, table selfeed type adj. postcard to 8x10", 200 capitals, 2000 of each letter, number, characters, of 1/16-1/32" type. State what you want in exchange. Schultz, 1140 Chicago Ave., Chicago, Ill.

HAVE 1/4 H.P. HOLTZER-CABOT A.C. 110 Vt. motor, 25 cycles, old radios, parts, guitar, Gilbert chemistry set, etc. Want small receiver, parts, headphones, etc. Letters answered. Robert Camp, 1042 Water St., Moosic, Pa.

HAVE CRYSTAL RADIO, 17 JEWEL Waltham Watch, Spanish Guitar, \$20 fishing reel, .25-20 repeating rifle, many other articles. Want tent, A-1 camping equipment, rifles, C. Moore, 211 East 108 St., Los Angeles, California.

I WOULD LIKE TO TRADE FOR A 75 meter crystal or 100 meter crystal. I have all kinds of radio parts and tubes to trade for crystals. Write: Richard Kershaw, 848 University St., Springfield, Mo.

TRADE - VOIGTLANDER BRIL- liant camera. like new. F7.5, Compur shutter, carrying case, Leadt exposure meter, for National, Howard or Hall-crafter communications receiver. Morris Harwood, 3104 Edgewood Ave., Richmond, Va.

SWAP PAIR OF GE 456 KC IRON core IF transformers. Brand new. Want 0-300 MA meter. W2MFD, 332 Alabama Avenue, Brooklyn, N. Y.

WILL SWAP GERMAN 1889 stamps, new in sheets for Reflex camera with better than 3.5 lens. Dick Cockrell, P.O. Box 6086, Houston, Tex.

HAVE BRAND NEW TENOR banjo; tubular ice skates, 10 1/2, almost new; saltwater rod and reel; 2" speaker. Want: Guitar, radio parts, good S.W. rcvr. or 22 rifle. Seymour Glickman, 225 Division Ave., Brooklyn, N.Y.

SWAP CLASS B OUTPUT TRANS- former, 1" oscilloscope, QST. Projection Engineering, 160 meter xtal, DC voltmeter, speaker. Want xtal pickup, mike Melssner 4-5 band coil assembly. D. Buca, 43 Hasen Ave., N. Tonawanda, N.Y.

COMPLETE RCA SW CONVERTER, 9 tube BC receiver, Atwater Kent BC receiver, 110 volt phonograph motor, earphones, speakers and many radio parts to trade for Super Clipper, Sky Buddy, Howard 430, Billy Epps, Minneapolis, Texas.

WANTED: SKY BUDDY 1938-39 model in A-1 condition. Swap for radio and movie equipment, all A1 condition. Want to swap for anything in good line. Send your will send you mine. Roland Taylor, Thiden, Illinois.

WANT XMITTER PARTS. Will exchange motion picture and photographic equipment or pay cash. Send list. All letters answered. Francis Lendziowek, 40 Emerald Place, East-hampton, Mass.

HAVE 5 TUBE A.C. S.W. SUPER- het extremely well built, Hammarlund I.F.'s, steatite sockets, and enclosed in a s.w. 5 cabinet. Selective and sensitive on all waves. Ideal for the ham. Will trade. J. B. Singer, 4529 N. Spaulding, Chicago.

WANTED-40 METER CRYSTAL about 7.128 KC, good Eco. high voltage transformer, typewriter. What do you need? W2LHL, RR3, Box 300B, Terre Haute, Ind.

WANTED U.S. AND BRITISH Colony stamps. Will swap midjet radios, 'A' and 'B' power supplies, radio tubes, power trans, speakers, condensers, etc. David Rudolph, 84 West 188 Street, Bronx, N.Y.

RCA MODEL 160 OSCILLATOR, 151 Oscilloscope Solar condenser analyzer and bridge and tube tester. Trade for Leica G, Contax II, Retna II. If interested, write Palace Theatre, Vinton, Iowa.

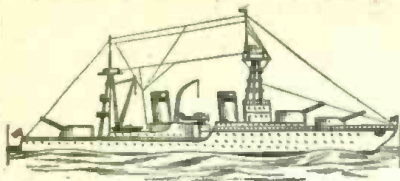
WANTED: MIKE AND TRANS- former, typewriter, Billy 3645-3625 KC, 866. Have: 160-80 meter crystals, bug, 15 power supplies and transformers (National, Knight, RCA, etc.) tubes, CW transmitter. What have you? W7GPP, The Dalles, Oregon.

HAVE COLLOGE CHEM-KIT, USED only 2 months. Will trade for 2 or 3 tube S.W. receiver. Charles Moskowitz, 314 East 52 St., Brooklyn, N.Y.

WANTED - COMBINATION TUBE tester and set analyzer. Have 5x3 Kellogg printing press and outfit. Larry Neustadt, 104-15 103 Street, Ozone Park, N.Y.

WANTED 8 MM PROJECTOR, 8 MM camera and a real good code key. I have for trade 53 lessons of N.R.I. Radio Course. Let me hear from you. P. B. Long, Carthage, Miss.

(Continued on opposite page)



Model Warship Prints

Also Complete Models

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Radio Control Print—See Below

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TESLA-ODUDIN HI-FREQ. COILS

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- 36" Sp'k Tesla-Oudin Coil.....40c
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 - 8" Sp'k Tesla-Oudin Coil.....40c
(1/4 K.W. Exc. Trf. Data included FREE!)
 - 8" Sp'k Oudin; 110 Vt. "Kick Coil" type.....40c
 - 3" Sp'k Tesla Works on Ford Sp'k Coil.....40c
 - 1" Sp'k Violetta Hi-Freq. Coil.....40c
- FREE with order for \$1.00 or more—20 Triaks with Hi-Freq. Coils" (40c separate)

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20 ELECTRIC PARTY
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Loads of Fun!

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Locator.....40c



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50c
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Stamps, Cash or Money Order

TECHNIFAX

1917 S. State St. Division RT-140 Chicago, Ill.

simple openings in the panel at a very modest charge.

The chassis proper is made of the same kind of wood as the panel; the two side supports are 4 3/4" by 3 3/8" high and the chassis deck 11" by 5 1/4". A hole is cut in the chassis deck to permit the speaker to rest partly below the deck.

The speaker may be mounted directly on the chassis deck or it may be fastened to the rear of the front panel by means of small wood screws. The holes are drilled in the chassis deck to permit tubes and coils to pass through. The sockets are then fastened on the underside of the deck. In fastening the sockets, it is preferable to use small machine screws and nuts rather than wood screws, since the former method prevents the sockets from being pushed out of place when coils or tubes are inserted. The entire panel-chassis arrangement may be fitted into a suitable wood cabinet if desired.

This receiver is recommended to the beginner for the following reasons. It uses a simple circuit with only two operating tubes, but nevertheless is capable of giving excellent results. It is constructed on a wood rather than a metal chassis, thereby eliminating many possibilities of short-circuits through the metal. Its dual function as a broadcast and short-wave receiver make it a desirable set to own. It is an economical set, not only because the parts may be obtained at reasonable cost, but also because it is really a combination of two sets for the price of one.

List of Parts

HAMMARLUND (Condensers, Coils and Sockets)

- 1—19-plate, 140 mmf. variable tuning condenser, type MC-140-M (C2)
- 1—34-plate, 250 mmf. variable tuning condenser, type MC-250-M (C3)
- 1—Antenna trimmer, 3 to 35 mmf., type EC-35
- 1—Set short-wave plug-in coils, 17 to 270 meters, type SWK-4 (L1)
- 1—4-prong Isolantite coil socket, type S-4 (For L1)
- 3—8-prong (octal) Isolantite tube sockets (For V1, V2 and R8)

CORNELL-DUBILIER (Condensers)

- 1—Mica condenser, .0001 mfd., type 1W (C4)
- 1—Mica condenser, .0005 mfd., type 1W (C12)
- 3—.01 mfd. tubular paper condensers, type DT-4S1 (C6, C11, C13)
- 1—.1 mfd. tubular paper condenser, type DT-4-P1 (C5)
- 1—Two-section dry electrolytic condenser, Section C9—16 mfd., 200-volt; Section C10—8 mfd., 200-volt
- 2—Tubular electrolytic condensers, 5 mfd., 50 volts, type EDJ-3050 (C7, C8)

I.R.C. (Resistors)

- 3—1 meg., 1/4 watt fixed resistors (R1, R4, R6)
- 1—600 ohm, 1 watt resistor (R7)
- 1—20,000 ohm, 1/2 watt resistor (R3)
- 1—200,000 ohm, 1/4 watt resistor (R5)
- 1—75,000 ohm potentiometer (R2) with switch (Sw. 2)
- 1—280 ohm, 50 watt ballast tube, type K87B (R8)

NATIONAL UNION (Tubes)

- 1—6J7 metal tube (V1)
- 1—25A7G glass tube (V2)

MISCELLANEOUS

- 1—Toggle switch, single pole, single throw (SW1)
- 1—Dynamic speaker with 4,500-ohm impedance output transformer and 3,000-ohm field (L3)
- 1—Phone jack (J1)
- 1—Line cord and plug
- 1—Roll hook-up wire
- 1—Screen grid clip
- 3—Knobs
- Dials
- Standard broadcast antenna coil (L2)
- Wood panel, wood chassis

Don't miss the article in next month's issue:
HOW TO BUILD A POWERFUL SHORT-WAVE
DIATHERMY APPARATUS.

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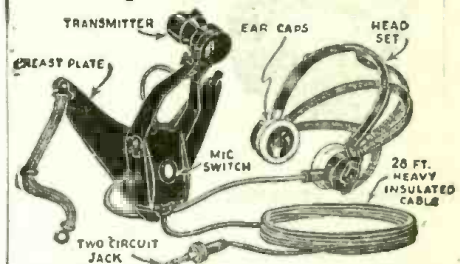
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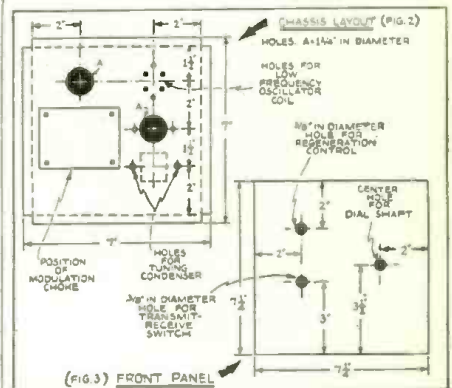
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A 2.5 Meter Transceiver

(Continued from page 526)

the power can be taken from a small A.C. pack, which will be much more economical to operate. The output from the transmitter, with 200 volts on the plate of the 6C5 at 2.5 meters, is about $\frac{3}{4}$ watt. This is sufficient for communication over the usual line-of-sight distances. The 7C5 acts as the modulator when transmitting, and as audio amplifier when receiving. The audio output, when in the receiving position, is sufficient for the operation of a small magnetic speaker at moderate volume and gives plenty of volume for the 2,000 ohm headphone. The 250,000 ohm regeneration control may be adjusted to the point of maximum sensitivity and lowest hiss level.

The construction of the transceiver is not difficult. However, extreme care must be used in wiring and in mounting the various parts. The 6C5 is placed in an inverted position with its top protruding through the chassis as shown in the photographs. This allows the coil to be mounted by its own leads, directly on the tube socket and the tuning condenser, cutting down the length of the wiring to the minimum.



Chassis and panel details.

Keep the leads short! By "short leads" we mean wiring directly between the parts and without turns or bends. A lead two inches in length is excessively long on 2.5 meters! Solder each connection as carefully as possible and clean away all excess resin from the joint by means of a small brush and carbon tetrachloride. Make sure that the connections are really soldered and not merely stuck together. Bad or poor connections usually mean zero results on this band. The metal shell of the 6C5 is not grounded to the chassis; by leaving it "floating" the circuit seems to oscillate more readily.

The antenna is the regular commercial adjustable type. In the installation as made by this constructor, the antenna is mounted on the ventilator of the automobile, just in front of the windshield. On other cars the mounting conditions will vary but it should be kept as high as possible and in the clear. If mounted too low, the body of the car may cause distortion of the transmitted wave and may make communication difficult in certain directions.

Coil Data

Band	Turns	Spacing	Wire
2 $\frac{1}{2}$ meters	3	$\frac{1}{4}$ "	No. 14 E

Coil is wound on $\frac{3}{8}$ " diameter form and then slipped off; spacing is the distance between turns. NOT the length of the coil. It may be necessary to pull out or compress the turns slightly in order to set the frequency on the 112 mc. band. The R.F. chokes are wound with No. 36 d.s.c. wire on a $\frac{3}{8}$ " diameter form. The turns are close-wound, 70 to 80 being required according to the coil and lead constants. See text for details.

(Continued on page 555)

Mc. Call
15.270 WCBX NEW YORK CITY, 19.63 m., Addr. (See 21.570 mc.) Daily exc. Sat. and Sun. 1-3.30 pm., Sun. 1-2.30 pm. to Europe.

15.260 GSI DAVENTRY, ENG., 19.66 m., Addr. (See 17.79 mc.) 12.57-5.15 am., 12.22-3.30 pm.

15.250 WSLR BOSTON, MASS., 19.67 m., Addr. University Club. Daily exc. Sat. and Sun. 10 am.-11 am. to Europe.

15.245 TPA2 PARIS, FRANCE, 19.68 m., Addr. 98 Bis. Blvd. Haussmann. "Paris Mondial" 5-10 am., 1.30-5 pm. to Asia, 12.30-1.30 pm. to No. Am.

15.240 YRO14 ROME, ITALY, 19.68 m. Irregular.

15.240 YUG BELGRADE, YUGOSLAVIA. 19.68 m., 7-9.05 pm. to N. America.

15.210 WPIT PITTSBURGH, PA., 19.72 m., Addr. (See 21.540 mc.) 8 am.-3 pm.

15.200 DJ8 BERLIN, GERMANY, 19.74 m., Addr. (See 15.280 mc.) 12.05-7, 8-11 am. Also Sun. 11.10 am.-12.25 pm.

15.195 TAQ ANKARA, TURKEY, 19.74 m., 5.30-7 am. Sat. 6.30-8.30 am.

15.180 GSO DAVENTRY, ENG., 19.76 m., Addr. (See 17.79 mc.) 3.50-6 pm.

15.180 RV96 MOSCOW, U.S.S.R., 19.76 m., 11.55-2, 3-4 am., 7-8.50 pm. to No. Am. News at 12.03 pm.

15.170 TGWA GUATEMALA CITY, GUAT., 19.77 m., Addr. Ministre de Fomento. Daily 12.45-1.45 pm.; Sun. 1.45-5.15 pm.

15.160 JZK TOKYO, JAPAN, 19.79 m. 12 m.-1.30 am. to Canada & Hawaii, and Pacific U.S. 8-9 pm. to Eastern U.S. 4.30-5.30 pm. to S. America. 7-9.30 am. News at 12.03 am., 8.15 pm.

15.140 GSF DAVENTRY, ENG., 19.82 m., Addr. (See 17.79 mc.) 3.30-5.15 am., 10.45 am.-noon, 3.50-6; 6.20-9.15 pm.

15.130 WRUW. WRUL BOSTON, MASS., 19.83 m., Addr. World-Wide B'cast'g Foundation. University Club. Mon.-Fri. 3-5, 8-11.30 pm.; Sat. 1.45-5.30 pm.; Sun. 10 am.-12 n.

15.120 HVJ VATICAN CITY, 19.84 m. Tues. 10.30-11 am., Sun. 1-1.30 pm. to No. Am. Wed. 2.30-3 pm.

15.120 CSW4 LISBON, PORTUGAL, 19.84 m., 7-9 am.

15.110 DJL BERLIN, GERMANY, 19.85 m., Addr. (See 15.280 mc.) 12.10-2, 8-9 am., 10.40 am.-4.25 pm. to Africa.

15.100 ZRO12 ROME, ITALY, 19.87 m. Irreg. 4-5.30, 6-7.25, 7.30-9 pm.

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14.920 KQH KAHUKU, HAWAII, 20.11 m. Sats. 8.30-9 pm. Sun. 9-9.30 pm.

14.535 HBJ GENEVA, SWITZERLAND, 20.64 m., Addr. Radio Nations. Broadcasts Wed. 6.45-8.15; 8.40-10.15 pm. to No. Am. News in English 9.30-9.35 pm.

13.900 YNDG LEON, NICARAGUA, 21.58 m. Sat. 9.30-10 pm.

12.486 HIIN TRUJILLO CITY, DOM. REP., 24.03 m. 6.40-10.40 am., 5.10-10.40 pm.

12.235 TFJ REYKJAVIK, ICELAND, 24.52 m. (Temp. shut down, due to war.)

12.000 RNE MOSCOW, U.S.S.R., 25 m. 6 am.-6.30 pm. Freq. breaks. 7-8.50, 9-10 pm.

11.900 XGOY SZECHWAN, CHINA, 25.21 m. 5.30-7.35, 7.40-11, 11.10-11.30 am., 2-4.20, 4.30-6.20 pm. News 6.15-9 am.

11.890 VLR3 MELBOURNE, AUSTRALIA, 25.23 m. 3.30 pm.-12.30 am.

11.885 TP811 PARIS, FRANCE, 25.24 m., 8 pm.-12.30 am. to No. Am.

11.885 TP812 PARIS, FRANCE, 25.24 m. (See 15.245 mc.) 6-7.45 pm. Beamed to S. A.

11.870 WPIT PITTSBURGH, PA., 25.26 m., Addr. (See 21.540 mc.) 3-11 pm.

11.870 YUM2 MADRAS, INDIA, 25.26 m. M.W.F. 3.30-4 am.

11.840 OLR4A PRAGUE, BOHEMIA, 25.35 m., Addr. Czech Shortwave Sta., Praha XII, Fochova 16. Daily 7.55-10.15 pm. to No. Am.

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WANTED: A "6" VOLT AMPLIFIER, about "6 to 12" watt output. Have B eliminator, 7 tube 2.5 V radio, old guns. What have you. Send me your list. Russel Netterol, Evansville, Minn.

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A "Junk-Box" Facsimile Recorder

(Continued from page 525)

washer are used to adjust the clutch tension. The paper advance rollers are made from 1/4" shaft and moved by a 100-tooth gear soldered to the end of one shaft. The ratchet arm is made from a bicycle spoke pivoted to the stylus arm shaft and is adjusted so it moves the gear one tooth on each return stroke of the stylus. A piece of rubber hose is slipped over the 1/4" shafts to make them the right size and to grip the paper, much the same as the rolls in a typewriter. The stylus needle holder is cut from a piece of bakelite, as is shown in Fig. 3. A phono needle is used as stylus. The OZ4 tube is mounted above the chassis and the transformers are all mounted below. The correct placing of the switch cam and the stylus cam can best be found after the machine is completed. The volume control, Fig. 7, is to control the printing current.

There is some change from the Crosley system. I used two audio transformers instead of one, but a simpler switch system. The plate of the output tube of the receiver is connected to the center blade of the cam operated switch. The wire joining the two transformer primaries goes to B+ on the receiver, and the two remaining primary terminals connect to the outer blades of the switch. It may be necessary to reverse these latter two connections. The .01 mf. by-pass

condenser is shunted across the synch. transformer to by-pass the 2000 cycle printing signal. The rubber paper rollers work perfectly and are more easily constructed than the sprocket (and perforated paper) system.

I use alternating current to print with but it works just as well on D.C. The only machine work necessary is to true up the clutch disc and stylus cam in a small lathe. The back bar and paper guides are the most important thing to have as nearly perfect as possible. After the stylus arm was mounted, I used it to scribe the arc for cutting the paper guides, and then formed the back bar to fit them.


The speed control on the motor should be set just a little more than 60 r.p.m. at first. After the machine is operating, it may be slowed down till the synch. latch just ticks the stop on the clutch plate.

Final reminders are that care should be taken to see that the governor is working properly and the motor well oiled, and that the slip clutch should be just tight enough to drive the stylus.

Anyone with ordinary skill and a knowledge of how facsimile works can construct this machine. I built this one about six months ago and to date I have never seen a factory-made facsimile recorder.

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<p>Mc. Call</p> <p>11.826 XEBR</p> <p>11.810 ZRO4</p> <p>11.800 COGF</p> <p>11.800 XGOK</p> <p>11.790 WRUL</p> <p>11.780 OFE</p> <p>11.780 —</p> <p>11.775 MTCY</p> <p>11.715 TPA4</p> <p>11.040 CSW5</p> <p>10.065 TIEMT</p> <p>10.050 DZB</p> <p>9.870 FIQA</p> <p>9.855 EAQ</p> <p>9.815 COCM</p> <p>9.740 CSW7</p> <p>9.690 TI4NRH</p> <p>9.690 LRAI</p> <p>9.685 TGWA</p> <p>9.680 TPB</p>	<p>HERMOSILLA, SON., MEX., 25.37 m., Addr. Box 68, Relays XEBH. 9.30-11 am., 8-10.30 pm.</p> <p>ROME, ITALY, 25.4 m., Addr. E.I.A.R., Via Montello 5. Daily 4.30-8.45 am., 10 am.-3 pm., 6-7.30 pm.</p> <p>MATANZAS, CUBA, 25.42 m., Addr. Gen. Betancourt 51. Relays CMGF. 6 am.-9 pm.</p> <p>CANTON, CHINA, 25.42 m. 6-8.35 am.</p> <p>BOSTON, MASS., 25.45 m., Addr. (See 15.130 mc.) Sun. 10 am.-12 n.; Mon.-Fri. 3-5 pm.; Sat. 1.45-5.30 pm.</p> <p>LAHTI, FINLAND, 25.47 m. Addr. (See OFD, 9.5 mc.) 1.15 am.-12.05 pm.</p> <p>SAIGON, INDO-CHINA, 25.47 m. 12.15-12.45, 6-6.45 am.</p> <p>HSINGKING, MANCHUKUO, 25.48 m. Addr. Central Broadcasting Station. 1.30-2.30 to No. Am. 9.50-10.50 am., 4-4.50 pm.</p> <p>PARIS, FRANCE, 25.61 m. (See 15.245 mc.) 6-7.45, 8 pm.-12.30 am. to No. America.</p> <p>LISBON, PORTUGAL, 27.17 m., Addr. Nat. Broad. Sta. 12-3.45 pm. Sun. 10 am.-3.45 pm.</p> <p>SAN JOSE, COSTA RICA, 29.81 m., 4.30-8 pm.</p> <p>ZEESEN, GERMANY, 29.85 m. Addr. Reichsposistenstralamt. Irregular afternoons.</p> <p>TANANARIVE, MADAGASCAR. 30.40 m. (See 10.950 mc.)</p> <p>MADRID, SPAIN, 30.45 m., Addr. P. O. Box 951. 6-7.30, 7.45-8.30 pm. to No. Am.</p> <p>HAVANA, CUBA, 30.57 m. Addr. Transradio Columbia, P. O. Box 33. 8-12.30 am. Relays CMCM.</p> <p>LISBON, PORTUGAL, 30.80 m. Addr. Nat. Broad. Sta. 4-5.30, 5.45-9 pm. to No. Amer.</p> <p>HEREDIA, COSTA RICA, 30.96 m., Addr. Amando C. Marin. Apartado 40. Tue., Th., Sat. 9-10 pm. Sun. 7-8 am.</p> <p>BUENOS AIRES, ARG., 30.96 m., 10.30 am.-1, 5.30-9 pm. 7-9 pm. Sat. and Sun.</p> <p>GUATEMALA CITY, GUAT., 30.96 m. Daily 10-11.30 pm.; Sun. 7-12 pm.</p> <p>PARIS, FRANCE, 30.99 m. "Paris Mondial" 8 pm.-12.30 am. to No. Am. News 8, 11.30 pm., 12.15 am.</p>	<p>Mc. Call</p> <p>9.670 WRCA</p> <p>9.650 I2AA</p> <p>9.635 ZRO3</p> <p>9.620 CXA6</p> <p>9.610 DXB</p> <p>9.600 RAN</p> <p>9.595 —</p> <p>9.590 VUD2</p> <p>9.580 VLR</p> <p>9.530 KGEI</p> <p>9.510 GSB</p> <p>9.492 KZIB</p> <p>9.465 TAP</p> <p>9.030 COBZ</p> <p>8.950 COKG</p> <p>8.830 COCQ</p> <p>7.850 ZAA</p> <p>7.520 KKH</p> <p>7.490 EAJ43</p> <p>7.280 TPBII</p> <p>6.900 HI6H</p> <p>6.807 HIH</p>	<p>BOUND BROOK, N. J., 31.03 m. Addr. NBC, N. Y. C. 4 pm.-1 am. 3.30-5.30 am., 11 am.-2.30 pm.</p> <p>ADDIS ABABA, ETHIOPIA, 31.09 m., 3.30-5.30 am., 11 am.-2.30 pm.</p> <p>ROME, ITALY, 31.13 m., Addr. (See 11.810 mc.) 12.07-3 pm., 5.30-9 pm. to No. Am. News at 7.30 pm.</p> <p>MONTEVIDEO, URUGUAY, 31.19 m. 10.30 am.-12.30, 3.30-9 pm.</p> <p>BERLIN, GERMANY, 31.22 m. 4.15-4.30, 4.55-10.50 pm. to No. Am.</p> <p>MOSCOW, U.S.S.R., 31.25 m. Daily 6-7, 7.8-50 pm. to No. Am. 9-10 pm. News at 7 pm.</p> <p>MOYDRUM, ATHLONE, EIRE, 31.27 m. Radio Eireann. 2.30-4.30, 5.30-6 pm. on odd dates.</p> <p>DELHI, INDIA, 31.28 m. Addr. All India Radio, 1.30-3.30 am., 6.30 am.-12.30 pm., 9.30-11.30 pm. News at 7.45 am.</p> <p>MELBOURNE, AUSTRALIA, 31.32 m. Addr. Box 1686, G. P. O. Mid.-9 am. ex. Suns. Sun. 12-7.30 am.</p> <p>SAN FRANCISCO, CAL., 31.48 m., Addr. Gen. Elec. Co. 12-3, 7 am.-12 n. to Asia.</p> <p>DAVENTRY, ENGLAND, 31.55 m., Addr. (See 9.580 mc.—GSC) 12.57-3.15 am., 6.22-9.15 pm., 9.37 pm.-12.30 am.</p> <p>MANILA, PHIL. ISL. 31.60 m. 6-10 am. and 8.30 pm.-2.40 am.</p> <p>ANKARA, TURKEY, 31.70 m. 12 n.-5 pm. Sun. 11.30-4 pm.</p> <p>HAVANA, CUBA, 33.32 m., Radio Salas Addr. P. O. Box 866. 7.45 am.-1 am. Sun. 7.45 am.-12 m. Relays CMBZ.</p> <p>SANTIAGO, CUBA, 33.52 m. Addr. Box 137. 5-9.50 pm.</p> <p>HAVANA, CUBA, 33.98 m., 6.50 am.-1 am.</p> <p>TIRANA, ALBANIA, 38.25 m. 6.30-8 am., 12.20-4.30 pm.</p> <p>KAHUKU, HAWAII, 39.89 m. Sun, 9-9.30 pm. Sat. 7.30-8 pm.</p> <p>TENERIFE, CANARY ISL., 40.05 m., 7-7.45, 8-9.30 pm. and Irreg.</p> <p>PARIS, FRANCE, 41.21 m., 10.15, 12.45, 1.30-5 pm.</p> <p>TRUJILLO CITY, D. R., 43.48 m., 7.40-8.40 pm.</p> <p>SAN PEDRO DE MACORIS, DOM. REP., 44.08 m. 7-9.40 pm. Sun. 5.20-6.40 pm.</p>
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Abbreviations Used by HAMS

<p>About</p> <p>Again</p> <p>Ahead</p> <p>Ampere</p> <p>Any</p> <p>Australian Amateur</p> <p>Broadcast Listener</p> <p>Bad</p> <p>By</p> <p>Breaking</p> <p>Believe</p> <p>Brass Pounders' League</p> <p>Vibroplex Key</p> <p>Check</p> <p>Circuit</p> <p>Call</p> <p>Congratulations</p> <p>Card</p> <p>Could</p> <p>See you later</p> <p>Continuous wave</p> <p>Dead head</p> <p>Delivered</p> <p>Distance</p> <p>And</p> <p>Fine business, excellent</p> <p>Filament</p> <p>From</p> <p>For</p> <p>Frequency</p> <p>Go ahead (resume sending)</p> <p>Good-bye</p> <p>Give better address</p> <p>Good evening</p> <p>Going</p> <p>Good morning</p> <p>Gone, good night</p> <p>Ground</p> <p>Amateur, brass pounder</p> <p>Laughter, high</p> <p>Here, hear</p> <p>Heard</p> <p>Have</p> <p>Interrupted continuous wave</p>	<p>ABT</p> <p>AGN</p> <p>AHD</p> <p>AMP</p> <p>ANT</p> <p>AUSSIE</p> <p>BCL</p> <p>BD</p> <p>BI</p> <p>BKG</p> <p>BLV</p> <p>BPL</p> <p>BUG</p> <p>CANS</p> <p>CK</p> <p>CKT</p> <p>CL</p> <p>CONGRATS</p> <p>CRD</p> <p>CUD</p> <p>CUL</p> <p>CW</p> <p>DH</p> <p>DLD</p> <p>DX</p> <p>ES</p> <p>FB</p> <p>FIL</p> <p>FM</p> <p>FR</p> <p>FREQ</p> <p>GA</p> <p>GB</p> <p>GBA</p> <p>GE</p> <p>GG</p> <p>GM</p> <p>GN</p> <p>GND</p> <p>HAM</p> <p>HI</p> <p>HR</p> <p>HRD</p> <p>HV</p> <p>ICW</p>	<p>"Lid"—poor operator</p> <p>Later, letter</p> <p>Milliamperer</p> <p>Motor-generator</p> <p>Milliamperes</p> <p>Master Oscillator</p> <p>Nothing doing</p> <p>Nothing</p> <p>No more</p> <p>Number—near</p> <p>Now</p> <p>Old boy—official broadcast</p> <p>Old man</p> <p>Operation</p> <p>Operator</p> <p>Official relay station</p> <p>Old timer</p> <p>Old woman</p> <p>Please</p> <p>Poor operator</p> <p>Are, all right. OK</p> <p>Received</p> <p>Receiver</p> <p>Radio Inspector</p> <p>Say</p> <p>Said</p> <p>Says</p> <p>Signature</p> <p>Signals</p> <p>Signature, initials</p> <p>Schedule</p> <p>Thermocouple</p> <p>Thanks</p> <p>Thing</p> <p>Tomorrow</p> <p>That</p> <p>You</p> <p>Your, you're</p> <p>Vacuum tube</p> <p>Very</p> <p>Word</p> <p>Worked</p> <p>Working</p> <p>Will</p> <p>What, watt, wait</p>
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Edited by
Robert Eichberg

FOTO-CRAFT

SECTION

UNDER-WATER Photography

*Box Camera and Balloon Enable YOU to
Take Actual Photographs Under Water*

● ANY simple box camera can be used for under-water photography when provided with an easily made, inexpensive, waterproof cover. Except for the camera, the total cost of the outfit should not be over 30c.

The apparatus needed to make the waterproof jacket is merely a large toy balloon, a flat watch crystal and a piece of string. An opening is made in the balloon at the point *opposite* the inflating stem. The watch crystal, which must be considerably larger than the lens of the camera used, is then forced into the stem from the inside of the balloon; the bead on the stem will prevent it from coming out. Although the elasticity of the stem will probably hold the crystal firmly, a string may be tied as shown on the drawing for added safety, after the camera has been inserted.

Film is inserted in the camera in the usual way and wound until ready for the first exposure. The camera is put into the balloon and its lens carefully centered behind the watch crystal. The balloon is then drawn tight—but not stretched excessively—

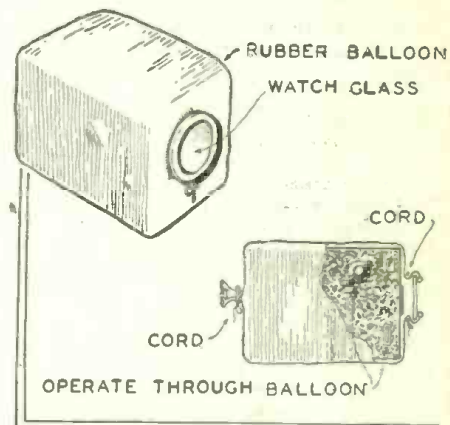
around the camera, and the opening through which the camera was inserted is pulled together and bound tightly, as shown. For extra safety, the part which remains may then be folded over and bound again; either a cord or a rubber band may be used. After this has been done, the safety cord, shown tied between the crystal and the camera, may be applied.

The camera is now ready to make its first *under-water* exposure, which is done by taking it into the pool, tank, ocean, or what have you, aiming it in the general direction of whatever you want to photograph, and pressing the shutter release *through the rubber*. After the shot has been made, the film may now be wound to the next exposure by operating the wind key *through the balloon*. The user must not attempt to turn the key too far for each part of the revolution, as this might cause the balloon to tear. In fact, as a safety measure, it is best to lift the camera out of the water when winding the film.

(Continued on page 571)



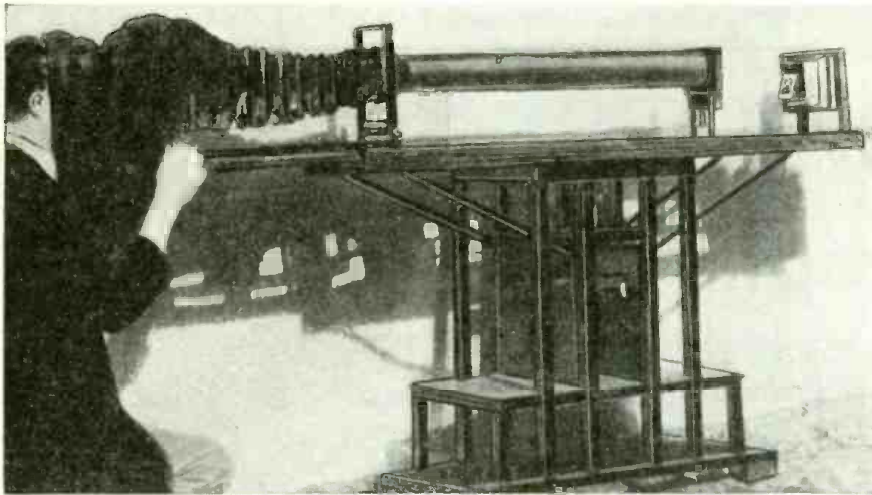
Photograph above, and two at bottom of page, were made with under-water camera.



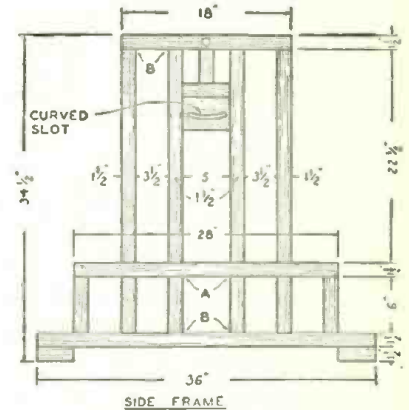
How box camera is adapted for under-water photography.



Making a PHOTOGRAPHIC TABLE



Dr. E. Bade



Side view of table frame.

● A PHOTOGRAPHIC table made especially as an aid in taking pictures seems, at first glance, to be a useless piece of furniture. This is not the case. In fact, it is an absolute necessity in many fields of endeavor. When it is absent, makeshifts must be used and these are seldom satisfactory for any length of time.

Such a photographic table is wellnigh indispensable for copying, for taking pictures in their natural size, for taking pictures of objects that are to be enlarged upon the film and for taking pictures with the microscope. In addition such a table is excellently adapted for table-top work and for experimental photography of many kinds.

This table is of peculiar design. Although of normal proportions, it can be extended to a length of about 10 feet simply by pulling out its two drawers, one on each side. In addition, it is made to swivel, so that it can be tilted upward or downward. All this makes it a versatile aid to any photographer.

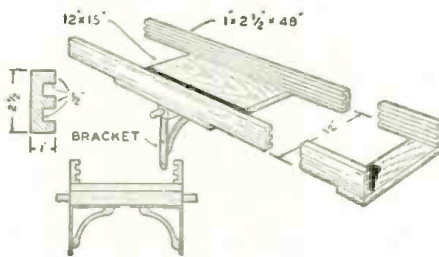
The table itself consists of a framework of any design between which the swiveling and extensible top rests. A convenient and simple design is illustrated. Here the two sides are built up out of 1 1/2-inch square wood. The longest bottom piece is 36 inches in length. This receives a block of wood at each end for legs. The next shorter is 28 inches while the shortest top rail is only 18 inches in length. The top rail has a 3/4-inch hole in its exact center through which the table top pivots.

The two side frames are joined together by means of three boards. One of these is a shelf made the entire length of the 28-inch rail and having the width of the table, which is 15 inches. Further rigidity is provided by two short upright boards which divide the shelf into three compartments.

Before the frames can be joined together, the pivoting table top must be completed and the pivot inserted into the holes of the table. The pivot itself is one of these

1 1/2-inch squares of wood 15 inches in length. One and a half inches of each end is rounded off to a diameter of 3/4 of an inch. These should fit snugly but not tightly into the drilled hole of the top table rail.

The sliding table top is later fastened to this pivoted piece of wood. But before its construction is begun, a method of fastening it firmly in any position must be worked



Detail of grooved rack

out. The simplest solution to this problem is found by using two 6-inch angle irons—one on each side—firmly screwed to the pivotable strip. If longer angle irons are available, use them.

The lower free end of the angle iron is now fastened to each side of the table. This is accomplished by nailing a small piece of wood near the top of the table and below the pivot. This board receives a curved slot which follows the motion of the rotating angle iron. Hold the piece of wood in position and scribe this curve with a nail or pencil and then cut a 1/4-inch slot. A bolt and winged nut will then hold the table level or at any desired angle.

The two drawers of the sliding table are now made. The two side strips are 1 inch thick, 2 1/2 inches wide and 4 feet long. Each of these strips receives two grooves 1/2 inch apart, 1/2 inch wide and 1/2 inch deep. If a plane for this type of work is not available, a chisel can be used. Bore a slanting hole

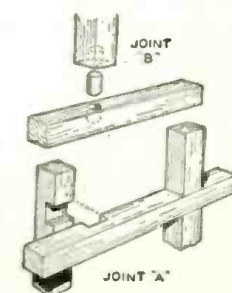
in a piece of wood, provide a guide on one side with a strip of wood and adjust the chisel as a plane by wedging it tight. Be sure to leave a hole for the chips cut out by the chisel to come out.

To attach the grooved strips to the pivot, a board 12 inches wide and about 14 inches long is fastened opposite the angle irons. The grooved strips are screwed to the outer edges of this board with the grooves facing inward. Each outer extremity of the grooved strip receives a similar board on its under side.

A further stiffening of the pivoted table top can be carried out by bringing a strip of wood from each end of the table down to the angle irons.

The table is now assembled. While the glue in the joints is hardening, the sliding top is made. This consists of two identical frames, each of which slides in its own set of grooves. These frames are covered with thin plywood, which gives strength and rigidity to each top. A stop is placed at each end of the groove so that the table can only be drawn out in one direction.

After staining and varnishing or painting the table, it is ready for use. In its closed condition the table serves for many types of work such as copying, etc. Extended it serves as a macrophotographic camera. Then, too, many experiments in photography can be carried out on this table. It is somewhat like an optical bench in that all parts can be readily lined up for whatever may be undertaken.



How joints are dovetailed.

A Universal Pan Head

Inexpensive Accessory Easily Made

Victor H. Wasson

● A SWINGING, tilting head is an accessory that has become almost a "must" to the serious amateur, especially those who indulge in cinematography as well as still shooting. A tripod is an absolute necessity for absolutely rock steady filming, and a pan head to follow every action no matter in which direction it moves is an absolute necessity to the tripod. The device described fills the bill in as efficient a fashion as the most elaborate equipment, and barring appearance, is the equal of any.

It is obvious that any device that is to swing through every possible arc and point in any direction, must of necessity be a universal joint. An examination of the heads commercially available will evidence this fact; they are all glorified universal joints. The universal joint in itself is a marvel of modern engineering, but the principles are simple and the building of one for our purpose is a pleasure once the materials are available. And that's the reason for this article. After much running around in circles I found that the materials were staring me in the face and available in every hardware store in the land.

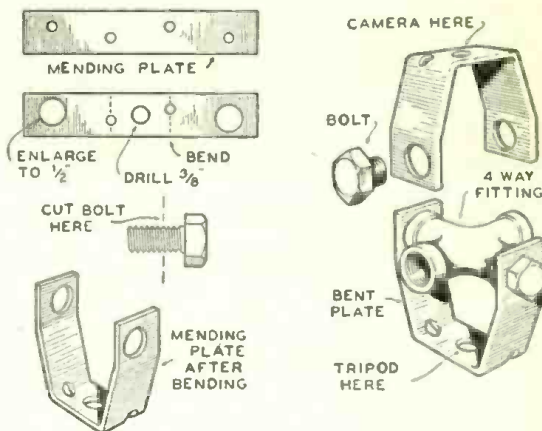
The complete list of materials is:
One four-way cross fitting of 1/2" pipe.

Two 5-inch mending plates.
Four 1/2" Hex head S. A. E. bolts.
One 3/8" stove bolt, 1/2" long, with nut.

The first step is to cut the four S. A. E. bolts to a length that will allow their being threaded into the four openings in the cross fittings. The shortest S. A. E. bolt is too long for our purpose, so we will have to cut off all but four threads. Don't leave
(Continued on page 574)



Drawings at right show how to drill, mark and bend mending plates to make universal pan head, and how to assemble finished parts after bending has been completed. Five-inch mending plates are used.



Flash Synchronizer for Focal Plane Shutter

W. H. B. Cowan

● A FLASH synchronizer will more than double the pleasure and usefulness of your camera. This one is built into a Graflex, and can be easily adjusted to work at the maximum brilliancy of the flash. Simple in construction, it does not mar the appearance of the camera, as it has only one working part—a flat spring. It does not interfere with the manual adjustments of the shutter for tension or curtain aperture, and is always ready for use. The few parts needed to build it can be purchased at any radio supply house for considerably less than one dollar. Two phone-tip jacks, about one foot of No. 16 wire, a single circuit spring switch and an 8/32 bolt and nut are all it will be necessary to buy.

Mount the phone tip jacks near the front of the camera, on the left side, in such a position as to avoid interference with the bellows. Then solder a short length of wire to each of the lugs of these jacks projecting inside the camera. These wires are run along the top of the inside compartment, through the viewing compartment and out the right side of the camera to the contacts of the spring switch. Only one insulated wire was used, the bare wire being connected to the movable spring which is ac-

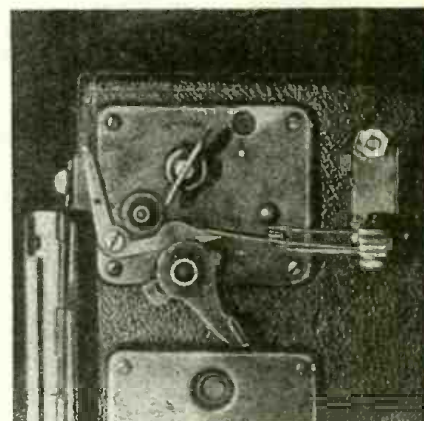
tuated by the tripping lever "M" and thus grounded to the mechanism.

A flat piece of brass, one half inch wide by 2 1/4" long, drilled and bent as shown in the drawing, holds the spring switch. It is fastened to the side of the camera with the 8/32 bolt. The contacts of the switch are adjusted to remain open with about 1/16 inch gap between them. This adjustment is made by bending the spring near its fixed end with a pair of pliers. Once made, it will need no further attention.

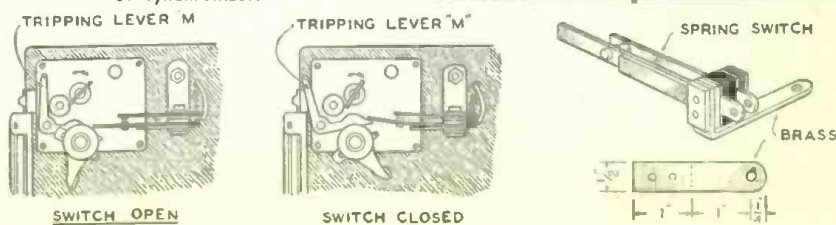
The entire switch is next adjusted to make contact just before the mirror reaches the top position inside the camera. Use a test lamp, and adjust switch and mounting by loosening the 8/32 nut and moving it to

the front or rear of the camera with the bolt as an axis.

To advance the time of the flash, move
(Continued on page 571)



Photograph above, right, shows flash synchronizer as attached to Graflex. Drawings below illustrate synchronizer before and after shutter has been released. Lower right—detail of synchronizer.



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

By RICARDO

No. 2

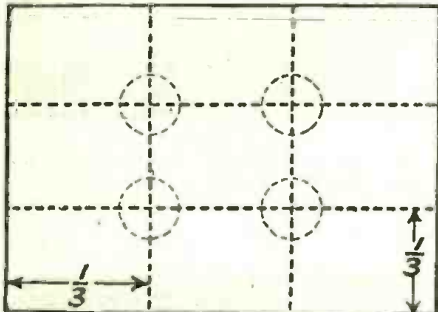
Placing the Main Point of Interest

FOLLOWING the advice given in last month's series about placing the main point of interest a little to one side and either higher or lower than the exact center of the picture space, here is a simple device worth remembering.

Imagine that all four sides of your view-finder or the ground-glass focussing screen are divided into three equal parts as shown in the first sketch. This will provide four points of intersection, popularly known as the "thirds."

If the most interesting part of the picture, whatever the subject may be, is placed on or near any one of these four points, it will be found that the position is pleasing. At the same time, this is a great help toward making the whole picture into a more attractive arrangement.

The second sketch shows the principle put into practice. The most interesting feature, the old lady, is to one side of the center, with the head and shoulders on one of the "thirds." It should be added that it is immaterial whether the picture is upright or horizontal—the principle remains the same and should be applied if possible.



Avoid the Commonplace

ALTHOUGH the camera has now lost a lot of its novelty compared with ten or more years ago, there is still a fair amount of shyness on the part of many people being photographed.

Yet results similar to that in the first sketch are still to be seen in beginners' snaps,

Left—This pose lacks interest. Below—See what a little change in pose did for this picture.

where a few moments' thought together with a few more seconds taken in arranging the group would have made all the difference between a "pose" and a picture.

It is much better to ask the subject to look a little to one side, with the head in the same direction as the eyes. Better still, give him something to look at or do, and if it is sufficiently interesting the less likely will the presence of the camera be remembered, and a more natural pose be obtained.

Where several figures are to be included, allow one of them to occupy the interest of all the others. This will not only make a much more pleasing arrangement, but will contribute toward more interesting expressions and a greater variety of positions. To attempt unconnected poses, using a group of people with no common interest, is extremely difficult, and the beginner would do well to master the suggestions offered.



How to Avoid Distortion in Figure Subjects

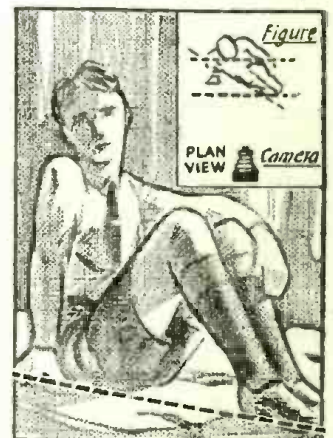
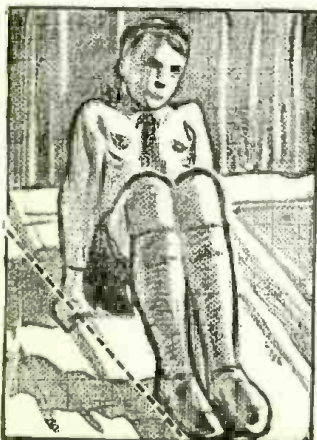
GROTESQUE proportions, like those in the first sketch, are far too common in novices' snaps, and here are the reasons and two alternative ways of avoiding them.

The first is that, owing to the figure being "end on" to the camera, the nearer parts are unavoidably depicted by the lens out of all normal proportion to the farther parts, the head and shoulders. Another reason is the camera was much too near to the subject for this particular pose.

If the camera were taken to about ten yards from the subject instead of about one yard, the head and shoulders would have appeared in natural proportion to the feet, but this would have resulted in the size of the image in the negative being far too small for a contact print and so necessitating an enlargement. This, however, is the only cure when it is essential that the pose and viewpoint be unaltered and when a normal lens is being used on the camera.

If, however, the figure must be large on the negative, the alternative is to change the viewpoint of the camera. Move to one side so that the baseline of the figure is nearer level, as shown by the second sketch. This will automatically place the figure to a "broadside" position, when one can approach quite near and still be sure of good proportions.

Below—Wrong angle—bad distortion.



Above—Good angle—pleasing picture.

Photographing Television Images . . .

Robert Eichberg

● THE newest field for the camera fan is television—although his equipment will not enable him to transmit or receive television images. It will, however, enable him to make a permanent record of the transitory images which flit across the screens of television receivers.

The writer began his experiments with television photography with the inauguration of the NBC station, W2XBS, on April 30th, 1939, and since then has taken at least one picture of every television broadcast and usually from six to sixteen pictures per show.

Various cameras and films were used in this series of experiments. The first were conducted with a television receiver providing images approximately 3" x 4" in size. It was, of course, necessary to use a close-up portrait lens in order that these small images could be recorded with fair size upon the film. Cameras available were two post-card size outfits; one with an F:8 lens, the other with an F:4.5; a 5 x 7 plate camera with an F:5.6 lens; a one lens reflex taking a 1 5/8" x 2 1/4" picture with an F:3.5 lens, and a typical minicam with an F:2 lens and using 35 mm. film.

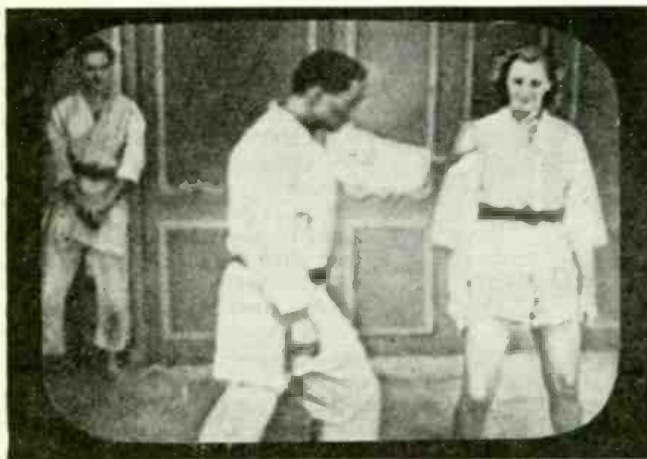
Except on the largest of the cameras, the usual portrait attachment proved inadequate when taking pictures of the small 3" x 4" image, and a further means of enlarging was sought. Experiments were conducted with various lenses, and the writer finally obtained a ten-cent store magnifying glass which he mounted concentrically with the camera lens. There was surprisingly little distortion as a large magnifying glass was secured and only the central portion of it used. With it, he was able to cover the entire negative in a reflex camera.

After taking several hundred shots, the reflex was finally selected as being most suited for this particular type of work. The larger cameras, having slower lenses, were unable to stop the motion in the image when slow enough shutter speeds to give adequate exposure were employed. The minicam, using a special close-up attachment coupled to the range finder, was able to get sharp pictures but it was difficult to determine at what time to make the shot, as it was hard to follow the screen action through the finder. The reflex not only permitted sharp focusing of the image, but also enabled the user to watch both his focus and the image until the actual moment of shooting. A two-lens reflex would undoubtedly have worked as well, but none was available.

(Continued on page 571)



Shown above is the type of receiver which was used in making the television photographs reproduced below. Actual size of image is about 7 1/2 by 9 1/2 inches, which reduces to about 3/4 by 1 1/4 inches on the negative.

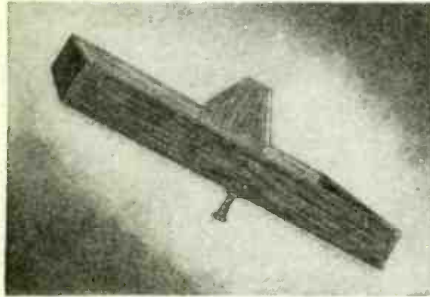


FOR YOUR CONVENIENCE the items on these pages have been arranged and classified in such a way that those which interest you may be easily removed and pasted in a scrap book.

This month's Prize Winners are: 1st Prize, J. R. Pollock, Helena, Mont.; other five are: G. W. Johnson, Big Falls, Minn.; E. Lanpher, Somerville, Mass.; A. J. Friesen, Berkeley, Calif.; C. B. Pike Cape Girardeau, Mo.; and J. Solem, Sutton's Bay, Mich.

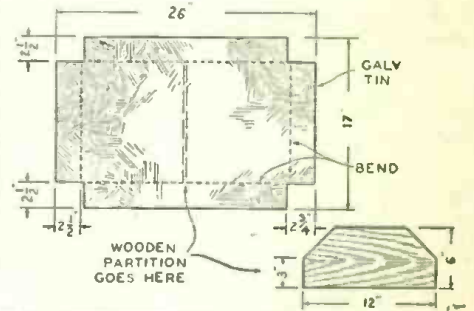
Foto Hints

PRINTING: Easily Made Automatic Print Washer

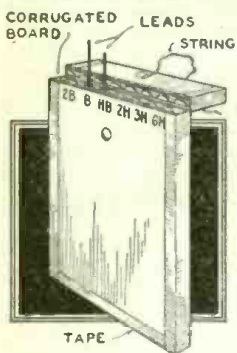


● **SECURE** a piece of galvanized tin 26 x 17 inches, and cut a rectangle from each corner $2\frac{3}{4} \times 2\frac{1}{2}$ inches. The cut will be in the direction of the length of the tin. Now measure and mark a $2\frac{1}{2}$ -inch border around the entire uncut edge of the piece. Next make a 90° angle by bending along the marked border. The result will be a pan with $2\frac{1}{2}$ -inch sides and with two slots at either end.

A center board is then installed with two (Continued on page 570)



RETOUCHING: Case for Leads

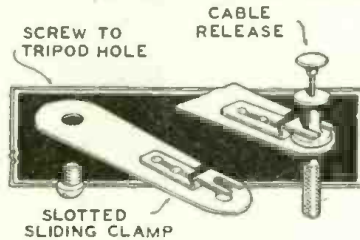


● **ALL** you need is a stiff piece of corrugated board, some scotch tape, a couple of paper fasteners and a piece of string to make a case for your retouching leads. Cut the cardboard about $6\frac{1}{2}$ " long by 3" wide with the corrugated folds running lengthwise. With a

razor blade or sharp knife make a clean cut from side to side about one inch from the top. Cut only through the top and inner sections, and bend back to make a hinge. Then bind all the outside edges and the "hinge" with scotch tape.—Priscilla M. Pennell.

GADGETS: Body Release

● **THE** advantages of having the shutter release on the camera body are well known. For any camera with the tripod screw near the end of the case, the device

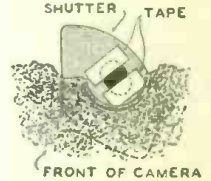


illustrated allows the installation of such a release without marring the camera body. A $\frac{1}{4}$ " 20 screw fits through the hole in the gadget and fastens into the tripod socket. A cable release is placed in the manner shown and screwed into the shutter.—A. J. Friesen.

IMPROVEMENTS: Shutter

● **MODERN** films are sensitive, and some require much greater speed than a box camera shutter provides.

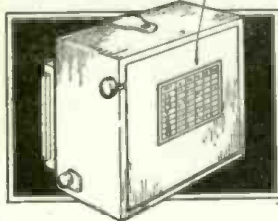
The shutter in this type of camera is a flat metal sector with an opening pierced through it. When the shutter is tripped, this sector makes about half a revolution, and the light is permitted to fall on the film as long as the shutter opening is over the lens aperture. By shortening the size of the shutter opening, its speed can be increased. This can be done by stretching two small pieces of photographer's scotch (or adhesive) tape over the ends of the shutter opening, leaving the opening in the middle about half its previous size.—Jay Solom.



GADGETS: Chart

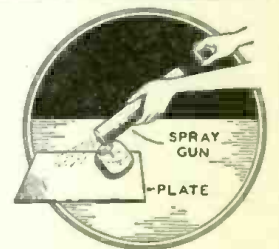
● **IF** you have a depth of focus chart which is on too large a paper for convenient use, here is a simple method for overcoming this handicap. Set the camera up for copy work and reduce the chart on film. In making the print, over-expose both film and paper slightly to achieve greater contrast. A couple of coats of lacquer are then given the print to preserve it, and it is ready to be cemented to the front cover of your camera. The writer reduced a 4×7 chart to about $1\frac{5}{8} \times 2\frac{1}{4}$ inches.—R. Dixon Rigg.

REDUCED DEPTH OF FOCUS CHART



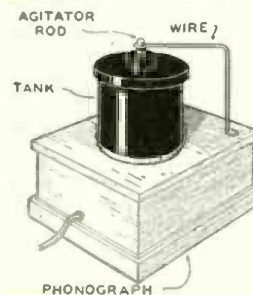
PRINTING: Ferrotyp Plate Polish in Spray

● **FOR** those of you who use a liquid polish on squeegee plates, here is a handy and foolproof method for applying the fluid. Fill an ordinary insect spray with polish, hold it quite close to your plate and spray on a little at a time. Aside from the convenience, this system proves to be economical as well since it is impossible for the liquid to spill or be wasted. Evaporation may be prevented by making a small plug or cap for the tube which leads from the container to the air nozzle. The type of sprayer which has a glass container is preferred.—W. J. Resseger.



GADGETS: Lens Brush

● **A** SMALL paint brush is almost indispensable when making enlargements. To protect this brush from dust and at the same time keep it ready for instant use, keep it in a small screw-top tablet bottle as shown in the accompanying photograph. If your brush is too long for the bottle you intend to place it in, cut off part of the handle. Always insert the brush handle-end first when placing it in the bottle. The brush is used to clean negatives.—Robert Scott.



DEVELOPING: Tank Agitator from Phonograph

● **REMOVE** the turntable from an old phonograph and substitute a wooden turntable of the same diameter as your film tank. Now attach a tin or brass wall to the rim so that when the tank is set in this it will be held securely. When the wooden turntable is set on the shaft of the motor and the tank is in place, attach a piece of heavy wire to the top of the phonograph and extend it upward to a height slightly over the film tank, then bend it at right-angles over the tank and around the agitator knob.—Edward Lanpher.

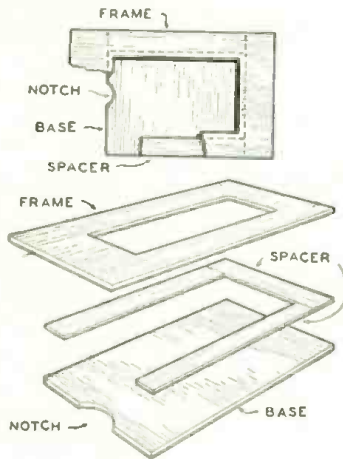
and Kinks

FOR THE BEST photo hint published this month, \$10.00 will be paid. For the next five best, \$3.00 each will be paid. All others appearing in this department will be paid for at regular space rates. 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.

ENLARGING: Paper Easel

● FOTOCRAFTSMEN

will find that cardboard easels for holding enlarging paper make for quicker manipulation and more even borders. When making prints of the same size, it will be found that with these easels a great many prints can be turned out rapidly and without the usual buckling. The diagram illustrates how the easels are made. The cardboards are cut to shape, as shown, and then glued together. The notch in the one board enables the operator to remove the paper with the utmost ease. Easels of this type should be made in various sizes so that the individual will be able to switch from one size of paper to another in a moment without confusion or loss of time.—H. F. Link.



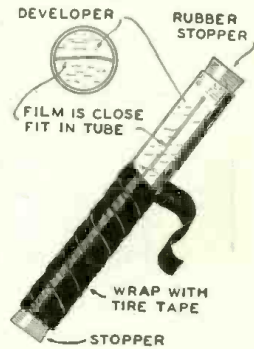
ANNOUNCEMENT

Beginning with the next issue, Foto Hints & Kinks Prize awards will be as follows: For the best Hint or Kink, 2 years' subscription to Radio & Television; for the 5 next best, 1 year's subscription; for all others used, 8 months' subscription.

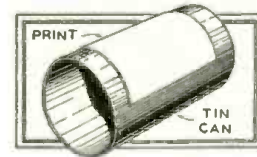
GADGETS: Tank and Ferretotype

● DEVELOPING tanks and ferretotype plates are easily constructed, cost but a few cents, and do the work efficiently.

The first is a simple glass tube, which can be obtained from any chemical supply house. The length of the film to be developed determines the length of the tube. It is made light-tight by securely wrapping black tire tape around the glass. To develop the film, pass it through the cylinder; insert a stopper in one end; pour in the developer; and insert a second stopper at the opposite end of the tube. Development time is the same as it would be in any other tank.



The second developing tank is made from an ordinary tin cigar container. Drug stores or cigar stores are usually glad to supply these gratis. Hooks or rollers are fastened to this can to accommodate the film. In this way two or three rolls of film can be developed at the same time. Pack film can also be used in this tank.



For making glossy prints any type of can will be found suitable to furnish a high luster. Simply tear the label off the can and place the film face down on it. When dry, the print will peel off in a gloss. For more rapid drying, heat the can by filling it with hot water. The print should be dry in five or ten minutes.—Charles B. Pike.

DARKROOM: Inexpensive Darkroom Scale—FIRST PRIZE

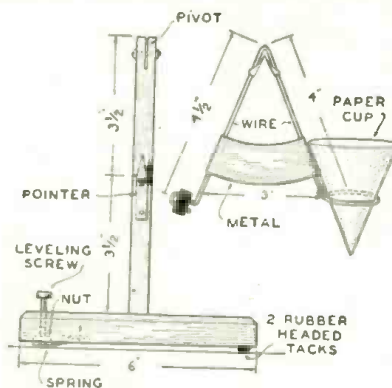
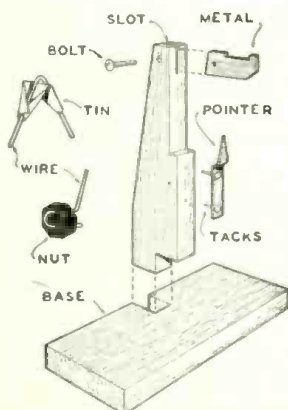
● THE scale illustrated is sufficiently accurate to answer every requirement of the average amateur. It has no loose parts or weights to get mislaid, and once accurately calibrated it requires no further attention. Its sensitivity can be increased if one wishes to do so. For instance, it can be made of lighter materials, and the scale itself can be placed further from the pivot, thus giving larger calibrations.

The accuracy of the finished scale depends primarily upon two things: The accuracy of the weights used in calibration, and the care with which the calibrations are made. Bear this in mind and your scale will be precise enough for any need.

wood, and the dimensions can be varied to suit your own ideas. The pivot at the top is made of brass, tin or other fairly rigid sheet metal, and should be mounted in the upright in such a way that the top edge is *exactly at right-angles* to the vertical front of the standard, and parallel with the base.

The swinging member can be made of any kind of wire which is fairly rigid and

bring the left leg down to a position within

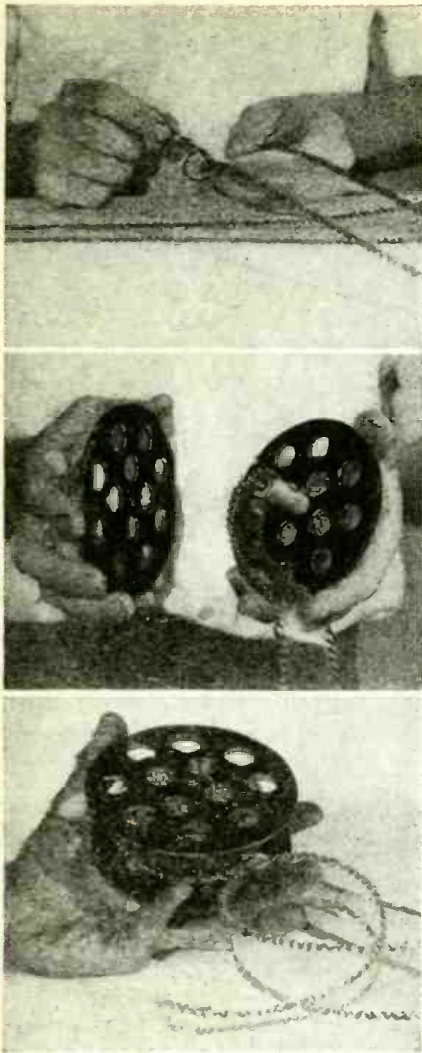


should be *no heavier* than is necessary. About 14 or 16 gauge is preferable. A ring is bent at the bottom of the right-hand leg of such size as to fit the cup one wishes to use, which in the case of the scale illustrated is an ordinary paper drinking cup. At the bottom of the other leg a sharp bend is made which will fit tightly through the hole in the weight, which can be a nut, a

brass sleeve, or other object which will bring the left leg down to a position within

about 10° of the vertical, with the empty cup in place in the ring. Now from any thin, stiff metal cut a piece for the bearing at the top. It should be approximately the shape shown, and should be bent to resemble an inverted "V". The lower corners are now crimped around the two wire legs, and lightly soldered to maintain the correct angle with the vertical.

A combined support for the "dial," or calibration segment, and brace for the wire legs is now cut from sheet metal—an old film pack will do. This should be in the shape of a segment of a circle, using the vertex of the V-bearing as a center. It should be cut wide enough to accommodate your calibrations, and long enough to crimp tightly around both wire legs. Cut a piece
(Continued on page 570)



Home-Made 35mm Reel for Developing in Tank

Only slight modifications permit this system to be used with larger film sizes

Albin Nowak

● AN inexpensive 35 mm. film reel which will prove equal in performance with reels costing ten times as much, can easily be made by anyone in a short while with the simplest of materials.

Two disks 4½ inches in diameter are cut from an old radio panel and a ¼-inch hole drilled in the center of each. Around these holes, ½-inch holes are drilled in a circular pattern. All rough edges are then smoothed with emery cloth or sandpaper.

The spacer is made from a round piece of wood 1½ inches long and ½-inch in diameter. A ¼-inch hole is drilled through it, after which it is waterproofed by boiling in paraffin.

For the apron, a discarded strip of 35

mm. film 5½ feet long is needed. It is soaked in hot water until it softens and the emulsion is scraped off. Two lengths of heavy string about 12 feet long are boiled in paraffin to waterproof them, and each is laced spirally through the perforations along one side of the film strip, until the end is reached, where it is knotted. After both sides are laced, the apron is fastened to the spacer by means of a nicked thumb tack. A ¼-inch nicked bolt 2 inches long holds the two disks and spacer together, thus completing the reel.

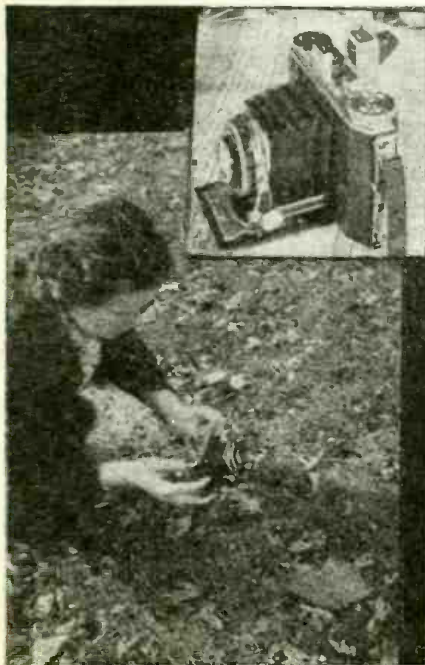
The film to be developed is fastened to the apron (near the spacer) with a piece of adhesive tape, and the film and apron wound upon the reel until the end is reached, where a second strip of adhesive tape is used.

The film stays on the reel during the developing, fixing and washing processes and is then removed, wiped and hung up to dry. The reel should also be hung up to dry after being used. With reasonable care this reel will last many years.

Pictures at left show, top to bottom, lacing paraffined cord through perforations in edge of apron (old film with emulsion removed); the reel, with apron attached to separator and end plate removed to expose construction; the reel completely assembled and ready for use. Easy loading is an attractive feature of this device.

Low-Angle View-Finder for Minicams

Harold Varellas



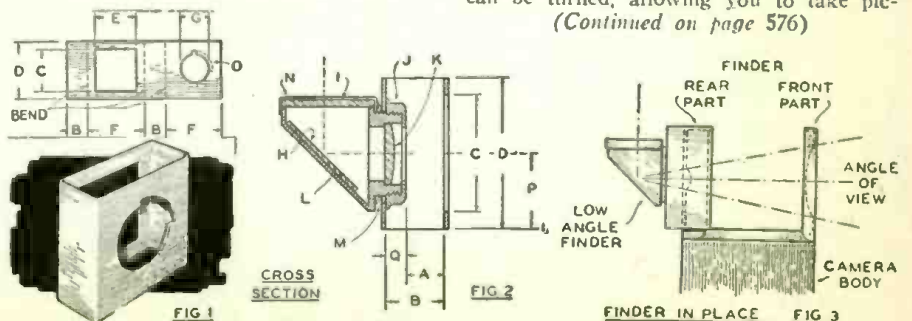
● MOST everybody who owns a modern "Minnie" with an eye-level view-finder of either the folding or the tubular type has at some time or other wished he had a camera of the reflex type so he could take that unusual low-angle shot without rolling around on his stomach or back to see what he is getting. My camera has the two-glass type folding view-finder, and to get away from the above antics and also to be less conspicuous in taking some candid shots I

devised a simple and inexpensive adapter, which is small, easily slipped on the camera and takes little space to store it in your carrying case or vest pocket.

First of all secure a bright waist-level view-finder of the type most usually found on the older folding cameras. These can be purchased from any camera supply store for as little as twenty-five cents. Next get a piece of cardboard or thin metal approximately 3/64-inch thick. Lay out the adapter, following Fig. 1, and using the legend for your dimensions. The slot "O" should be used only when your waist-level finder has a small ear which acts as a stop for limiting the angle at which the view-finder can be turned, allowing you to take pic-

(Continued on page 576)

Below, Figs. 1 and 2, give full details for making low-angle view-finder. (Dimensions appear at end of article.) Fig. 3 shows how unit is mounted. Photos at left illustrate the finder attached to a minicam, and show its actual use.



The Reader Speaks

Historical Table Tops

Editor:
You ought to be proud of yourself. FOTO-CRAFT rates Number One on my Hit Parade of photographic periodicals. (Boyl! What a mouthful.)

I hope to see some articles on Bromoil and Table Top photos.

My history teacher knowing I am a "Shutterbug," assigned me to make pictures of historic scenes. I thought of Table Top photos. At present, I own an Argus Model A and a Graflex with an F4.5 lens. I would appreciate any suggestions.

Yours 'til the prints fade,

EDDIE BROWN.

New York, N. Y.

See December issue.—EDITOR.

Good Plans

Editor:
I have made several things for my camera from the very good plans in your magazine. Keep up the good work. I would like to see plans for a rangefinder! Many thanks.

W. R. JONES.

Crown Point, Ind.

Here is an idea some alert reader can develop.—EDITOR.

Most Valuable Magazine!

Editor:
About two weeks ago I went to a magazine stand to get a photographic magazine. There I saw RADIO & TELEVISION incorporating FOTO-CRAFT. I looked through it and decided to buy it. When I got it home I began to read it and found it had some of the most valuable information about photography that I ever saw assembled in one magazine. I hope you have many years of success.

A true FOTO-CRAFT reader,

BARNEY KARBAND.

Kansas City, Mo.

Buys to Save

Editor:
At last I have found the perfect magazine for the amateur camera fiend.

After buying almost every other publication on photography to find hints on how to make equipment, being very mechanically inclined. I came upon the first three copies of FOTO-CRAFT in a second-hand book store. Needless to say, I bought all three. After looking them over I set out to buy the latest copy, but I looked all over Jamaica Plain without success until I found one in a store in Roxbury. Now I know what photo magazine to buy hereafter—and save money.

WILLIAM T. EATON.

Jamaica Plain, Mass.

A Double Thrill

Editor:
With regard to FOTO-CRAFT, I can truthfully say that your articles dealing with photographic equipment that can be inexpensively made at home are of the greatest interest to me. I find the suggestions helpful and practical, and experience as much pleasure from their manufacture as from the fine results I obtain.

HAROLD M. HORACK, M.D.

Philadelphia, Pa.

We'll Have to Turn it Inside Out

Editor:
The October was my first issue of FOTO-CRAFT, and it certainly hits the spot. At last, from the dozens of so-called "photographic" magazines, one that is new and refreshingly different stands out. (Pardon the jelloish adjective.) Don't be misled, gentlemen, your cover does need an improvement. More than one of us amateurs has passed yours up for a less-deserving publication, and all because of the outside, which gave no clue to the gems of wisdom contained within. More power to you.

ALFRED COTCHER.

Philadelphia, Pa.

Supersensitizing Positive Movie Stock

Editor:
I am a movie fanatic mostly, though I have a still camera and enlarger. I process all of my film and I get a lot of "dope" on negatives which I use in my reversing process of 16mm. I have tried supersensitizing film (movie positive) with wonderful results. By a longer development it really is fast.

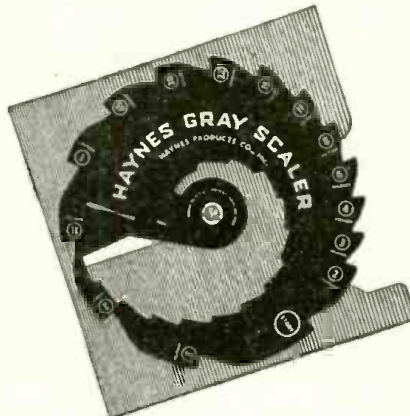
You have a mighty fine magazine and I never miss a copy. The Hugo Gernsback publications usually are good. I made my acquaintance with them through the "Electrical Experimenter" and still have clippings in my scrap book from that magazine published a good many years ago.

ARTHUR A. BOWERS.

Kalamazoo, Mich.

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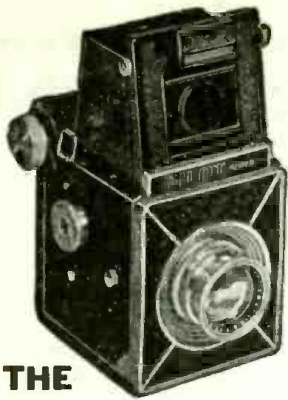
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Automatic Print Washer

(Continued from page 566)

wood screws on each side, and four across the bottom.

The last step, soldering the two bolts beneath the center-board on each side of the bottom completes the washer. A coat of aluminum paint, if available, will be found desirable. You now have a print washer equally efficient for use under water tap or shower bath.—George W. Johnson.

Darkroom Scale

(Continued from page 567)

of white paper just slightly smaller than this segment, and cement it smoothly to the face.

Now hang this unit on the supporting standard, place the cup in its ring, and adjust the weight to its proper position. Solder the weight firmly to the wire so that it cannot possibly shift.

Calibrations are now in order, and can be made very easily if one can borrow a set of weights. Just put the weights in the cup, in turn, allow the scale to come to rest, and with a sharp pencil place a mark upon the scale exactly opposite the needle pointer. After all divisions are complete, remove the unit from the standard, and rule the graduations with a ruling pen and India ink.

If weights are not available they can be made without a great deal of trouble as follows:

(Avoirdupois.) Cut a rectangular piece of tin or other sheet metal, and trim small strips off of one end, until you have as nearly an exact ounce as it is possible for you to get. Carefully bisect this piece, making two pieces of 8 drams each. Bisect one of these, giving two pieces of 4 drams each. Bisect one of these, and in turn one of the resulting 2-dram pieces.

You now have pieces weighing 8 drams, 4 drams, 2 drams, and two pieces of 1 dram each; a total of 16 drams, or 1 ounce. With them you can get any number of drams from 1 to 16, and should now calibrate your scale accordingly.

Now for the grains. You probably (?) recall that one dram is equal to 27.34375 grains, but for our purpose a division of 27 parts is sufficiently accurate. Therefore we will divide one of our 1 dram pieces into 9 parts, by cutting it into thirds, both ways. For many of us, the 3-grain weights will give sufficiently small divisions on the scale, but if we want to divide one of them into three parts we will get pieces weighing one grain each.

After calibrating with the above weights your scale is complete. It is practically fool-proof, and cannot get out of adjustment, except for leveling, which should be done each time it is used.

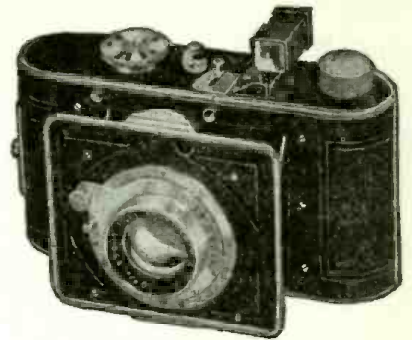
In using it, it is important to bear in mind that the cup should always be placed squarely in the ring, in such a position that the material being weighed will be in the center. This is particularly necessary when calibrating, and it is best to fold up some of the larger weights in order to center them as well as possible.—J. R. Pollock.

How to Take Portraits

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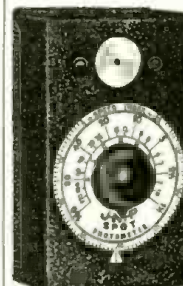
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Under-Water Photography

(Continued from page 561)

Unless a very transparent balloon is used, it will of course be impossible to see the film numbers appear in the window at the back of the camera. However, by carefully observing the number of turns of the key necessary to move the film one frame, it can be manipulated easily without watching the window when the rubber jacket has been applied. This original count may be made while shooting a roll of film before the camera is inserted in its protective balloon.

Photographing Television Images

(Continued from page 565)

Both visual extinction and photo-cell exposure meter readings taken of the screen indicated that the ideal stop would be about F:3 for the ideal exposure—1/15 second. 1/15 second would be perfect, as this would give the photographer two complete scanings of the image. However, the camera used was not equipped with speeds slower than 1/20th except for bulb, therefore 1/20th was used. Likewise, the widest lens opening was F:3.5. This was used and the screen of the television set was brought to slightly more than normal operating brilliance to compensate for the camera's limitations.

Various films were tried. The fine grain films were used with no hope of success—so the writer was not disappointed. These films were far too slow to record the little light that was available from a television tube when the reflex was used. However, in the minicam, good results were obtained with films of the Finopan and Panatomic types. For use with the reflex, it was necessary to use either Agfa Superpan-Press or Eastman Super XX.

When a new and larger television set, providing an 8x10 inch image was secured, the rather tricky close-up lens was abandoned in favor of a standard Eastman portrait attachment, used in conjunction with the F:3.5 lens on the Pilot reflex. In operation, the lens is set for the closest possible work and the portrait attachment applied. The shutter is set for 1/20th second and the photographer sits at the receiver. When anything good comes on, he merely steps before the cathode-ray tube and moves the camera into focus with the image. Then, when interesting action is taking place, the release is pressed and the picture recorded for all time.

Flash Synchronizer

(Continued from page 563)

the switch toward the front; to retard it, move the switch toward the back of the camera. Then tighten the nut, and the adjustment will be permanent.

To operate, place the reflecting mirror in "Viewing Position." Set the tension to "6" and aperture to "0." Plug the leads from the photoflash holder into the phone tip jacks, and "shoot."

The lamp will flash and be at maximum brilliancy when the mirror is up and clear of the lens. The curtain will be open over the entire face of the film to be exposed. When the mirror reaches its top position, the curtain will close. The exposed film can then be removed or replaced.

The actual exposure of the film during this period is 1/75 second.

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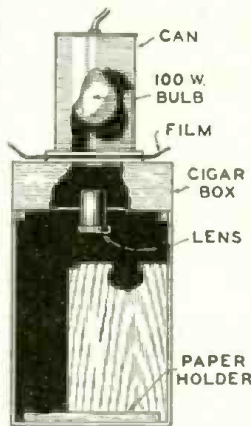
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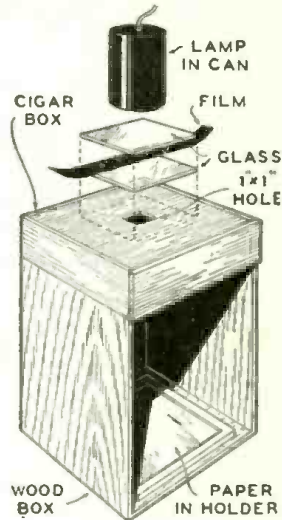
Fixed Focus Enlarger

● A **FIXED** focus enlarger especially designed to produce "blow-ups" from 16 mm negative can be made from a cigar box, a tin can and little else. The accompanying drawings give an idea of how this useful little item can be built. A closed compartment is built in the upper end of a cigar box, the lower end of which serves as an easel to hold the enlarging paper. In the upper side of this compartment, a hole is cut about one inch square and over this is cemented a glass plate. A tin can large enough to hold a 100-watt lamp is next secured and a socket mounted in its closed end. A simple metal clamp is made to hold a piece of opal or ground glass to the other end of the can which, by the way, should be long enough so that there is at least two inches of space between the light bulb and the glass.



Directly under the square hole, a round hole is made of a size adequate to take a short focus projection lens. The enlarger is now ready for use.

A strip of negative is placed over the glass on the top of the cigar box and the glass on the can is set on top of the film. The enlarging light is then switched on, and the projection lens moved backward or forward until the image is sharp on the

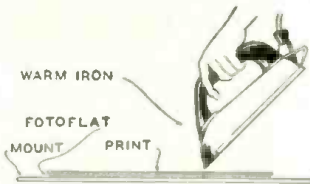


easel. After this, a drop of cement may be used to hold the lens in place.

As no ventilation is provided, just switch the light on long enough for each enlargement. Turn it off when moving the film or changing the paper, to avoid overheating.—Murray Bloom.

Mounting Large Prints

● **THOSE** who have salon-size prints to mount on standard 16 x 20 cards will find that the simplest method is to get a package of 11 x 14 Fotoflat, a 12 x 15 aluminum cookie sheet of the heaviest grade, and a



smooth, flat board of about the same dimensions to serve as pressure distributor and foot protector.

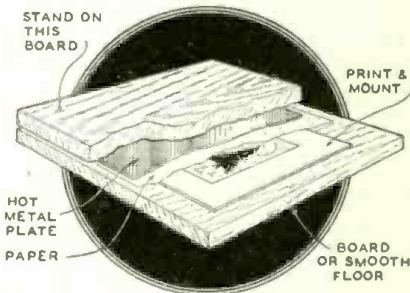
A sheet of Fotoflat is laid on the back of the print and "tacked" thereto by touching it briefly in four or five small areas with the tip of a warm—not hot—flatiron. Any excess tissue should be trimmed off even with the edges of the print.

Next, the print is placed as desired on the mount and the iron again brought into play to tack the print to the mount, after which the mount is laid on the floor and the face of the print covered with a sheet of plain, clean, unwrinkled paper.

The cookie sheet is then heated on the kitchen stove, either on top or in the oven, until a slight hiss is elicited on touching

it with a moistened finger. If on top of the stove, it may be necessary to move the sheet about to secure even heating. When at the correct, hissing temperature, it is lifted with a pair of pliers and quickly laid over the paper-covered print. The board is immediately placed on top of the aluminum and one stands on the board for three minutes.

That is all there is to it. If done correctly,



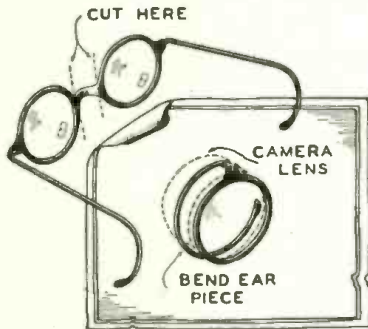
the results should be perfect, for this method complies with the rules for dry mounting, namely that the necessary degree of heat be applied to the whole surface of the print in one impression and heavy pressure maintained until the temperature has lowered sufficiently for the adhesive to set. Aluminum is better than any other metal for this purpose, as it takes on and disperses heat rapidly. Obviously the same equipment will

serve as well for smaller prints, such as 10 x 12 or 8 x 10.

Use this procedure only with Fotoflat, for the older type of slower melting shellac-coated dry mounting tissue requires a greater duration of heat than can be maintained by the thin aluminum plate.—N. H. McCall.

Improvised Filter

● A THOROUGHLY usable filter can be easily improvised from an old or new pair of cheap sun-glasses. One of the lenses,



with its frame, is cut off at the nose piece. The ear bow is left attached and is used to fasten the filter over the camera lens. The usual cheap glasses have frames which can be bent easily when heated by being left in hot water. Do not use an open flame, as this material is highly inflammable.

The accompanying illustration shows all necessary details. Some care must be used in selecting the glasses if the images are to be free from distortion. Before selecting a lens to use, hold it between you and some object and move it around; if the object, as viewed through the lens, neither moves nor changes its shape due to the lens motion, the lens will be satisfactory. Flat lenses are better than those of the curved type for this purpose.—Richard Mahm.

Lusterless Black Paint

● AN excellent lustreless black paint for coating the inside of enlargers or any other surface which requires a dull, flat black can be made by pulverizing an old phonograph record and adding wood alcohol.

Before you break up the record, be sure it is of the all acetate kind *without* paper in the middle. (Most of the older records do not have this paper center.) Then add just enough alcohol to dissolve the particles. Over night or a full day is usually required for dissolving. Thin out with more alcohol and use a clean, soft bristle brush.

This inexpensive paint dries quickly and gives jet black surface.—Jack Williams.

Decreasing Paper Contrast

● DID you ever get in a jam by running out of *soft* or *medium* grade paper and have only a harder or more *contrasty* paper to work with?

If you have, you will appreciate this stunt which most all professionals know but of which few amateurs have ever heard. Project your print as usual on the contrasty paper, then *before putting it into the developer tray* immerse in plain water from 2 minutes to 5 minutes, depending upon the paper you are using and the effect you wish to obtain. Take the paper out of the water and follow usual procedure; developer, stop bath and fixing bath.—J. Williams.

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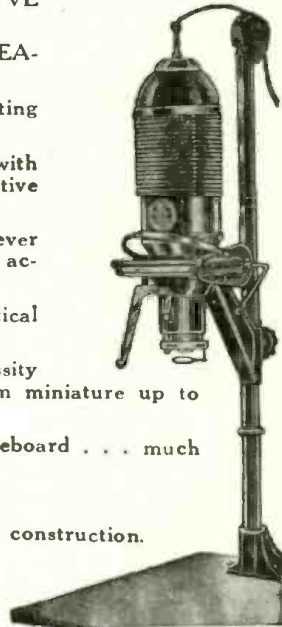
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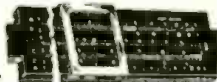
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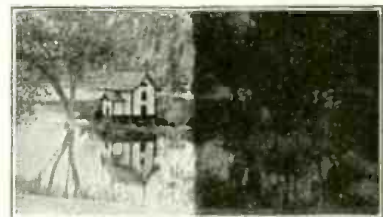
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FOTO-CRAFT, 99 Hudson Street, New York City R&T-1-40

Gentlemen: Please reserve for me and mail to me as soon as possible your FOTO-CRAFT Press Card. In order to be eligible, I enroll as a reader of FOTO-CRAFT and I enclose herewith \$1.00 (cash, money order, U. S. stamps) for a special 7 months' subscription to FOTO-CRAFT, incorporated with RADIO & TELEVISION. There will be no charge whatever, for the Press Card or for any service that goes with it.

I agree to abide by the rules printed on the reverse of the press card as printed in your announcement above. I also give you herewith information for your records.

Age.....Sex.....I have taken photographs since (state how long).....

Photographic equipment now owned.....

References (give names and address of two people or establishments who know you).....

Name.....

Address.....City.....State.....

TABLE TOP PHOTOS

\$15.00 in Prizes Monthly

ANNOUNCEMENT

Due to the fact that no table-top photographs were received during the previous month, no award is made in this issue. However, the contest continues. The rules follow:

In this Table-Top Foto Contest, two photographs must be submitted with each entry; the first will show the picture entered and the second should show how the photo was made (viz., a long shot).

All entries must be accompanied with a short description telling how the pictures were made, giving, in addition lighting information, film data, stop, exposure, and any pertinent information concerning print control.

This is a monthly contest and will continue until further announcement.

All entries must be in our hands by the 15th of the month.

Entries which do not win prizes will be returned if accompanied with a stamped self-addressed envelope.

For the best table-top photos (two needed to constitute an entry), submitted each month, a First Prize of \$10 will be paid. For the next best, a second prize of \$5 will be paid. Any others accepted and published will be paid at regular space rates.

No entries smaller than four by five inches will be accepted, but the entries may be either contact prints or enlargements.

Address all entries to Editor Table-Top Contest, care Foto-Craft Section, R. & T.

Universal Pan Head

(Continued from page 563)

any more of the length since the tapping in the cross fitting is tapered and a longer bolt cannot be threaded into it.

Now enlarge the holes in the ends of the mending plates so that the S. A. E. bolts may be passed through. This is easily accomplished by running a 1/2" ream or drill through the holes already in the plates. A 3/8" diameter hole must be drilled in the center of each of the plates. These holes are to take the 3/8" bolt that engages your tripod socket and the screw on your tripod.

Next bend the mending plates into a "U" shape so that the 1/2" holes in the ends will come opposite the openings in the cross fittings as shown in the illustrations. It will be found that the original holes near the center of the plates are in just the right position to make this bending most easy.

Now work the holes in the plates into position over the openings in the cross fittings, as shown, and insert the S. A. E. bolts, which have been sawed off so that they will go in far enough to seat against the plate. Turn them up tight with pliers so that it is necessary to exert a little force to move the mending plates.

You will see that it is possible to move the plates around one axis or the other formed by the cross fitting so that the plates may be placed in any position desired. It only remains to fasten the head to camera and tripod.

First pass the tripod screw through the 3/8" hole drilled in one of the plates and thread on the nut from the 3/8" stove bolt. Turn this nut up tight. Next pass the 3/8" bolt through the hole in the other mending plate and into the tripod socket of your camera.

As shown in the photographs the camera may be tilted to any desired angle, the plates moving around the axes formed by the cross fitting. Infinite combinations of these motions will result in an infinite number of camera angles.

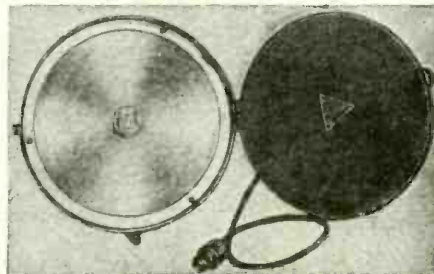
The resulting accessory will be found to be sturdy and steady enough to support cameras up to four or five pounds, in any position desired.

Plugs Right into Your House Socket....



This large 10 1/2" diameter Spot or Flood-lamp is ideal for amateurs and professionals.

These lamps were originally purchased by the Government for the Signal Corps at over \$25.00 each. Heavy construction. QUALITY throughout.



U.S. Signal Lamp complete with 100 watt Westinghouse bulb..... **\$3.35**
(Weight packed 6 lbs.) F.O.B. New York

Army Tripod with screw on bronze plate to fit lamp. **\$2.00**
Tripod made of solid wood with bronze fittings.....
(Weight packed 6 lbs.) F.O.B. New York

When remitting, add for postage, East of Chicago, complete 60c, West of Chicago, \$1.20.

GOLD SHIELD PRODUCTS 350 Greenwich St., Dept. RTF-140, New York, N. Y.

Questions & Answers

WHERE TO BUY

Will it be possible for you to mention places where one can buy the things specified in various articles when such objects are not obtainable in ordinary local camera stores? Also, can gelatin filters be used to make separation filters, as I do not wish to purchase regular ones?—Dorothy Cameron, Zillah, Wash.

We do not believe it would be fair to merchants who might also be handling specified apparatus if we were to mention only one or two of the larger outlets. When there is only a single source of supply, the name will be given. Regarding your second question, the answer is Yes. We suggest that you write to any of the larger photographic mail order houses, whose advertisements you will see in these pages from time to time, to obtain them.

ENLARGING PROBLEM

Please tell me if it is possible to use the focusing arrangement on a miniature camera with telescopic lens barrel for focusing an enlarger?—Armand Maddalina, Trenton, N. J.

Yes, it is possible—but you will probably find that the telescopic lens barrel will give you insufficient extension for making large prints on the easel. You may be able to correct this by using an extension tube, or by (and this is sometimes more satisfactory) employing a portrait attachment in conjunction with the lens.

NEGATIVES FROM TRANSPARENCIES

I have a lot of Kodachrome prints (828 and 135) and want to make negatives. Can I make contact prints with a printing frame, and if so, what light should be used, and what exposure given? Is there any process I can use to make Kodachrome prints in color on paper? How can I make color separations on Kodachrome of subjects such as children when it is impossible to take three pictures of the same pose?—George B. Cornelius, Wheeling, W. Va.

You can make contact prints with a printing frame. We suggest putting a piece of opal glass in the frame to give greater diffusion of light. The exposure will of course vary with the type of film used. The Question Box Editor has had best results when using either a fine grain film or a process film. The light had best be a 25-watt inside-frosted bulb, about a foot from the printing frame and flashed on for about a quarter second or less. Try one film at a time and change the exposure as the results indicate.

There is a process whereby one can make paper prints in color from transparencies. This is rather a lengthy task, and unless you have considerable skill in the darkroom, you might find it difficult. Any well-stocked photographic supply house can supply a kit for this purpose.

Color separations are best made by means of a three-color camera. However, you might take your picture on Kodachrome in the usual way and then use color filters to make separation negatives from it. We suggest your communicating with the manufacturer of this film for more detailed information than it is possible for us to give in this limited space.

WATCH COMING ISSUES

I have made photography my hobby for almost a year, and would like to know more about trick photography and table-top photography with which to occupy myself during the winter months. Will you please feature these in your magazine?—Norton Star, Bronx, N. Y.

An article on table-top photography appears in the Dec. issue of this magazine. Several articles on photographic tricks have appeared in previous issues of this magazine and another is scheduled for an early issue.

BUILDING COLOR CAMERA

I am building a "one-shot" color camera and have come to the most critical stage, the two mirrors. From advertisements and descriptions of two cameras of this type which are on the market, the Lerochrome and the Devin, I understand that the mirrors or pellicles, by reason of their amount of silvering and angle, are made to transmit and reflect intensities of light proportionate to the factors of the filter through which three light beams must pass. Is it true that the same film must always be used in the camera, and that the camera is only good for one type of light (daylight, tungsten, etc.) without the use of correcting filters? Also, can you tell me if there is any place in New York where I can buy these pellicles?—Thomas Hazapis, New York, N. Y.

We suggest that you contact the manufacturers of the cameras you mention and attempt to purchase the mirrors from them. As few persons attempt such an exacting task as building a color separation camera, mirrors of this sort are not available on the general market.

It is best to use the same film in the camera at all times because some films have greater sensitivity to various portions of the spectrum (i.e. colors) than others. It is also necessary to use filters in order to get faithful rendition of color values unless you wish to take pictures of objects under artificial light as they will look under artificial light—if you want them to appear as under daylight, the filter is needed.

MAKING FLASH SYNCHRONIZER

I have a Rolleiord F:3.5 with a Compur shutter. In this camera, the setting lever and shutter release are combined in one. I cannot figure out how to attach the synchronizer to this lever. Any suggestion or diagram showing how this could be done will be greatly appreciated.—Theodore J. Kane, M.D., Malden, Mass.

The particular synchronizer about which you ask was not designed for use with shutters of the type you are using. We hope to publish instructions for building synchronizers to fit cameras like yours in a forthcoming issue. One which is particularly suited to the Graflex appears in this issue; with a few changes, it might be adapted to your outfit. It would be necessary only to mount the switch so that contact is made through pressure of your single lever just at the instant the shutter starts to open.

Save Money!

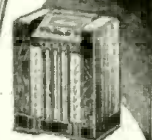
With the

RADOLEK RADIO PROFIT GUIDE!



EVERYTHING IN RADIO AT LOWEST PRICES!

In the Radolek catalog you will find the MOST for your money! Lowest Prices! Best Quality! Biggest Values! Most Complete Stock! Fastest Service! Send for your FREE copy NOW!



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The world's most complete stock of radio repair parts and exact duplicate replacements. All leading brands at lowest prices!



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All types, RCA, Sylvania, Raytheon, Philco, etc. Includes Kellogg, special Majestic and transmitting tubes. Complete selection.



NEWEST TEST INSTRUMENTS

The most complete line ever displayed in any catalog. All leading makes. Includes latest improved 1940 models at lowest prices.



GREATEST RADIO VALUES

A huge selection of money-saving set bargains! New Phono-Radio combinations. Automatic tuning sets. Beautiful cabinets. New "Ham" receivers and equipment.



EVERYTHING FOR AUTO RADIO

Complete new auto radio section. Includes vibrator replacement guide, new auto aerials, custom panel control plates for all autos.



COMPLETE P. A. SELECTION

New 1940 public address amplifiers from 5 to 100 watts. Complete P. A. Systems for permanent, mobile and portable use.



NEW ELECTRICAL APPLIANCES

Extra profits for you! Standard Brand Electric Irons, Stoves, Heaters, Perculators, Waste Irons, Vacuum Cleaners, Trains, Clocks, Mixers, etc., at lowest prices!



The RADOLEK Co.

601 W. Randolph, Chicago, Dept. T-37

Send the 1940 Radolek Radio Profit Guide FREE.

Name

Address

Service man? Dealer? Experimenter?

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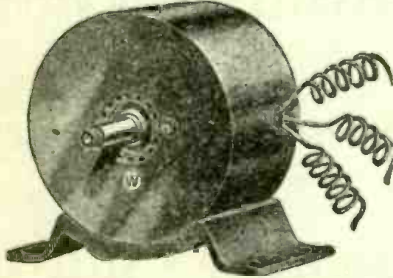
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Westinghouse Power Generator

Manufactured for U. S. Signal Corps
200 Watt. 110 V. AC



A. C. ELECTRICAL POWER

from a Windmill, from available Waterpower, from your Automobile, from your Motorcycle, from your Bicycle, Foot-pedal or Handcrank (for transportable Radio Transmitters, Strong Floodlights, Advertising Signs); do you want to operate AC Radio sets from 32 V. DC farm light systems; operate two generators in series to get 200 V. AC; obtain two phase and three phase AC, etc., etc.

There Are Over 25 Applications
Some of which are:

A.C. Dynamo Lighting from eight to ten 20 Watt 110 Volt lamps. Short Wave Transmitter supplying 110 Volts AC for operating "Ham" transmitter. Operating 110 V. AC 60 Cycle Radio Receiver in DC districts. Motor Generator, Public Address Systems, Electric Signs on motor boats, yachts, etc. Camp Lighting. Short Wave artificial "fever" apparatus. Television. Pelton Waterwheel for lighting or other purposes. Airplane: for lighting strong searchlights or electric signs. Laboratory work, etc., etc. $\frac{1}{2}$ to $\frac{1}{4}$ H.P. needed to run generator.

BLUE-PRINT 22 x 28 in. and Four-Page
8 1/2 x 12 in. INSTRUCTION SHEETS
FREE with Generator.

Generator, as described, including Blue-print and instructions

Send \$2.00 deposit, balance C.O.D.
Shipping weight 18 lbs.

MONEY-BACK GUARANTEE

WELLWORTH TRADING COMPANY
1915 S. State Street, Dept. RT-140, Chicago, Ill.

576

Low-Angle View-Finder

(Continued from page 568)

tures with your camera held vertically or horizontally. Next make cutouts as noted and fold on dotted lines. Now take the screw cap and the spring washer off the waist-level finder. Slip the threaded portion into the round hole in the back of the adapter, slip on the spring washer and then screw the threaded cap on. This cap will tighten the whole assembly just enough so as to allow the view-finder to be turned $\frac{1}{4}$ turn in the adapter. The spring washer will act as a friction clutch and hold the finder in any position you may wish to turn it. To use this finder, slip the adapter over the back portion of the folding view-finder so that the round window in the waist-level finder is centrally located over the small rear window of the view-finder.

Legend of Dimensions

"A"—Total thickness of rear part of view-finder.
"B"—"A" plus "Q".
"C"—Height of front glass in view-finder.
"D"—Same as height of view-finder.
"E"—Width of front glass in view-finder.
"F"—Total width of back section of view-finder.
"G"—Diameter over threads on waist-level finder.
"H"—Mirror in waist-level finder.
"I"—Top viewing glass in waist-level finder.
"J"—Retaining cap.
"K"—Front lens of waist-level finder.
"L"—Waist-level view-finder body.
"M"—Spring tension washer.
"N"—Retaining cover for top glass in waist-level finder.
"O"—Slot to receive ear which limits the angle of turn on the view-finder.
"P"—Distance from bottom of view-finder to the center of rear window.
"Q"—Distance the waist-level finder protrudes through back of adapter.

What's New

J-M-P Spot Photometer

• **FOTOCRAFTSMEN** who do their own enlarging can save much time, paper, and temper by using some type of photometer such as that being produced by the J-M-P Manufacturing Co. This unit, designed on the well-known "spot" principle, makes it possible to produce accurately exposed enlargements with a minimum of effort. The device has been made to operate from self-contained batteries, thus making it not only highly convenient but also free from fluctuations of voltage in the light source. Operating as it does from batteries, it is free from heat, and the light bulb has a long life. The dial is calibrated from $1\frac{1}{4}$ to 160 seconds, and the same scale is used for negative density range readings. No mathematics need be used to secure perfect results with this meter, according to the manufacturer's claim. Battery life is said to be adequate for 600 readings of two minutes each.

"Ready Rest" Film Case

• **IN** this new case for the Film 141 16 mm. camera, the camera is screwed to a tongue which is permanently attached to the case. When the camera is placed in use the body of the case forms a camera rest against the chest for greater steadiness in movie making. All the camera controls remain visible throughout use, and loading of the magazine is accomplished without having to detach any part of the case from the camera.

Speedgun for Agfa Memo Camera

• **THE** Agfa Memo Speedgun, especially designed and fitted for use with the Memo Camera, provides accurate synchronization of flashbulb exposures at all camera speeds and with all types of flash lamps. Provision is made for extension wiring to additional flash lamps, for a safety catch to prevent accidental exposures and for adjustment of both reflector position and synchronizing control for different sizes and makes of flash lamps.

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READY TO GO

Equipped with the advanced noise limiter circuit described in October *QST*, the NC-101XA is ready to hang up new records. All the fine features, all of the outstanding performance of the older models have been retained, but to them have been added a noise limiter of truly remarkable effectiveness. The NC-101XA is master of adverse operating conditions. Combined with the NTE Exciter-Speech Amplifier, it forms the heart of a superb station.

NATIONAL COMPANY, INC., MALDEN, MASS.

They might have been the "FORTY-EIGHTERS"



Gold was discovered in January, 1848 in the tail race of Sutter's Sawmill in Eldorado County, California. Because of poor communications, word spread slowly and not until 1849 did the ensuing "gold rush" reach its height.



HOW THE FAMILY OF RCA WOULD SPEED UP THE GOLD RUSH

Hardly before the echoes of the first shout of "gold" died out along Sutter's Creek, NBC engineers and announcers would be on the spot with portable broadcasting equipment developed in RCA Laboratories and built by the RCA Manufacturing Company. Out over the two great NBC networks, which provide the broadcasting service of the Radio Corporation of America, would flash the discovery news in a thrilling program featuring a personal interview with James Wilson Marshall, the finder of the first nugget.

Both in America and abroad listeners would turn the volume a little higher on their RCA Victor receivers so that not one precious word would escape them.

Then as the rush started for Eldorado County, police in cities and towns throughout the nation would direct the flow of traffic with 2-way RCA Police Radio Systems. And songs improvised by the gay "Forty-Eighters" to make the going more pleasant would, of course, be recorded on Victor and Bluebird Records and reproduced everywhere by RCA Victrolas.

In lieu of any present discovery of gold, RCA stands ready to serve you in every respect in every field of radio.

• • •

Trademarks "RCA Victor" and "Victor" Reg. U. S. Pat. Off. by RCA Mfg. Co., Inc.



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