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How Giant Television Image Tubes are Made

Mechanical Scanning for Television —William H. Priess

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What Are Your Chances of Getting a Job in Television?

Let's Be Frank

WHEN I started training men for Radio 25 years ago, Radio was regarded only as means of long-distance communication. Since then, I have seen Radio expand in many different directions—into broadcasting, aviation, police, transatlantic telephone service, direction-finding, loudspeaker systems, automobile Radio, industrial electronic devices, and now Television is Radio's newest development.

Many sensational claims have been made for Television—so many that I feel a frank discussion of Television and how to get ready for the opportunities it offers, is advisable.

Are There Opportunities in Television Today?

Yes! There are opportunities in the large manufacturing plants which make television transmitters and other video equipment. There are opportunities in some stations planning to broadcast Television programs. There are opportunities in companies now making or planning to make Television receivers. There are opportunities installing and servicing Television receivers in New York and a few other cities where Television programs are now being broadcast. But there are *not many of these opportunities today* and they are going to men with long technical training and experience. However, this DOES NOT MEAN THAT TELEVISION IS NOT CREATING OPPORTUNITIES EVEN NOW. It is—for trained men qualified to take over the Radio jobs formerly held by the men who have gone and are going into Television.

When Will Television Offer More Opportunities?

Very soon, most informed persons believe. Just as soon as Television transmissions start in any city—opportunities will come in that city. There will be opportunities in the Television transmitting Stations — opportunities for installing, servicing, repairing and adjusting Television receivers. These opportunities will continue to grow but nobody knows how far or how fast Television will develop. It's almost a certainty, however, that it will eventually reach tremendous proportions.

Who Will Benefit from These Television Opportunities?

Only men with good, sound Radio Training and experience. Many of the men who will get the early good jobs in Television will be men now in Radio. Others will be men who have Radio Training and experience—plus special training in Television. It is safe to say that a MAN WHO DOES NOT KNOW RADIO will not get into Television. Television after all is a DEVELOPMENT OF RADIO, far more complicated and far more technical than Radio, but still a DEVELOPMENT of it. When men now in Radio shift into Television, that will MAKE OPPORTUNITIES IN RADIO—opportunities which may later lead to opportunities in Television.

What Can You Do NOW to Get Ready for Television?

First—you must Train for Radio. You'll need a working knowledge of fundamental Radio principles to understand Television. Second you'll need SPECIALIZED TRAINING IN TELEVISION, over and above your knowledge of Radio to grasp Television's opportunities. To prepare for Television—the sensible thing to do is to START TRAINING FOR RADIO NOW.

I have been training men for Radio for twenty-five years. I am proud of the records being made by N. R. I. graduates. They are in every major branch of Radio. I am prepared to train men for Television, so I believe my discussion on this page should interest every man who is considering getting into Radio's newest branch—Television.

J. E. SMITH, Pres.
National Radio Institute

How I Train You for Radio and Television

For more than 25 years I've been training men for Radio. Men I trained have enjoyed success and good pay in practically every branch of Radio—in nearly every country in the world. The N. R. I. Course has included training in Television principles FOR MORE THAN FIVE YEARS. Yes, for more than five years I have been preparing men for Television insofar as technical information available at the time would permit.

My Course Contains Up-to-Date Television Information

My training gives you the fundamentals of Radio you must have to get into either Radio or Television. These fundamentals are treated specially for Television in every instance. My text on superheterodynes has contained information about the wider frequency circuits needed for Television reception for many years now—and my training in sweep circuits, synchronizing, cathode ray tubes is just as complete. My texts have just been revised to include *up-to-date information* on today's Television developments, as well as developments in *ALL BRANCHES OF RADIO.*

Many Men I Trained Make $30, $50 and More a Week in Radio Now

My Training covers all you need to know to get a good job in Radio RIGHT NOW—the type of position which can LEAD RIGHT INTO TELEVISION when Television develops further. Best of all, you DO NOT HAVE TO WAIT for Television TO MAKE MONEY through my Training. Broadcasting Stations, Radio Repair Work, Radio factories, automobile Radio, commercial, aviation, police Radio, Loudspeaker systems ALL OFFER OPPORTUNITIES TO WELL TRAINED MEN—opportunities for good jobs—opportunities which may soon lead you into Television.

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J. E. SMITH, President
National Radio Institute, Dept. 9GB3
Washington, D. C.

J. E. SMITH, President, National Radio Institute.
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Without obligating me, please send sample Television lesson "Essential Circuits in a Television Receiver" and your 64-page book which points out the spare time and full time opportunities in Radio and those coming in Television, and explains your method of training at home for them. (Please write plainly.)

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RADIO & TELEVISION

The Popular Radio Magazine

HUGO GERNSBACK, Editor
H. WINFIELD SECOR, Manag. Editor
ROBERT EICHBERG, Assoc. Editor

July — 1939
Vol. X No. 3

TELEVISION at the NEW YORK WORLD'S FAIR

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CONSTRUCTION

CONDENSED FEATURES

INSTRUCTION

TELEVISION

MISCELLANEOUS

Cover composition by H. Gernsback and Thomas D. Pentz. Three photos with figures, courtesy Allen B. Du Mont Labs.; two C-R tubes, top center, National Union Radio Corp.; large image projector tube, at center, RCA.

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Published by Popular Book Corporation. Publication Office—29 Worthington St., Springfield, Mass. Editorial and Executive Offices—99 Hudson St., New York, N.Y. HUGO GERNSBACK, President; H. W. SECOR, Vice-President; EMIL GROSSMAN, Director of Advertising. European Agents: Atlas Publishing and Distributing Co., Ltd., 18 Bride Lane, Fleet St., London, England; Brentano's—London and Paris. Australian Agents: McGill's Agency, 179 Elizabeth St., Melbourne.

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In the August Issue

Portable 2-Band Receiver — Covers "broadcast" and "short wave"—C. W. Palmer, E.E.

1-Tube Television Sound Converter—Herman Yellin, W2AJL

"Ham" Antennas

How to Make Your Own "Mike" for Ham and "P.A." Work

Audio Frequency Amplifiers—Martin Clifford, W2CDV

How To Build A 2-Inch Oscilloscope

A Transmitter-Receiver for the "Ham" Beginner—D. L. Warner, W9IBC

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as of February 1, 1939 (Revised to date)

FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON, D. C.

Licenses and Location	*Call Letters*	*Frequency (mc.) or Group*	*Power Visual*	*Aural*
National Broadcasting Co., Inc.	W2XBS	42 to 56 mc.	12 kw	15 kw
New York, N. Y.		60 to 86 mc.		
(Tues., Thur.:—11 a.m.-4 p.m.; Wed., Fri. & Sat.:—4 p.m.-9:30 p.m.)				
National Broadcasting Co., Inc.	W2XBT	92 and	400 w	100 w
Portable (Camden, N. J., and		175 to 180 mc.		
New York, N. Y.)				
Columbia Broadcasting System, Inc.	W2XAX	42 to 56 mc.	50 w	
New York, N. Y.		60 to 86 mc.	C.P. 7½ kw	7½ kw
Radio Pictures, Inc.	W2XDR	42 to 56 mc.	1 kw	500 w
Long Island City, N. Y.		60 to 86 mc.		
Don Lee Broadcasting System	W6XAO	42 to 56 mc.	1 kw	150 w
Los Angeles, California		60 to 86 mc.		
Farnsworth Television	W3XPF	42 to 56 mc.	250 w	1 kw
Incorporated of Pennsylvania		60 to 86 mc.		
Springfield, Penna.				
Philco Radio and Television Corp.	W3XE	42 to 56 mc.	10 kw	10 kw
Philadelphia, Penna.		60 to 86 mc.		
(Irregular)				
Philco Radio & Television Corp.	W3XP	204 to 210 mc.	15 w	
Philadelphia, Penna.				
Allen B. Du Mont Laboratories, Inc.	W2XVT	42 to 56 mc.	50 w	50 w
Passaic, New Jersey				
(Irregular; 12 mid.-3 a.m.; 8-10 a.m.)				
General Television Corporation	W1XG	42 to 56 mc.	500 w	
Boston, Mass.		60 to 86 mc.		
RCA Manufacturing Co., Inc.	W3XAD	124 to 130 mc.	500 w	500 w
Portable (Camden, N. J.)				
RCA Manufacturing Co., Inc.	W3XEP	42 to 56 mc.	30 kw	30 kw
Camden, N. J.		60 to 86 mc.		
RCA Manufacturing Co., Inc.	W1OXX	42 to 56 mc.	50 w	50 w
Portable-Mobile		60 to 80 mc.		
Camden, N. J.				
General Electric Company	W1XA	60 to 86 mc.	10 kw	3 kw
Bridgeport, Conn.				
General Electric Company	W2XB	60 to 86 mc.	10 kw	3 kw
Albany, N. Y.				
General Electric Company	W2XD	156 to 162 mc.	40 w	
Schenectady, N. Y.				
General Electric Company	W2XH	42 to 56 mc.	40 w	
Schenectady, N. Y.				
First National Television, Inc.	W9XAL	42 to 56 mc.	300 w	150 w
Kansas City, Mo.		60 to 86 mc.		
University of Iowa	W9XUI	42 to 56 mc.	100 w	
Iowa City, Iowa		60 to 86 mc.		
Zenith Radio Corporation	W9XZV	42 to 56 mc.	1 kw	1 kw
Chicago, Ill.		60 to 86 mc.		
(Irregular)				
Kansas State College of				
Agriculture and Applied Science	W9XAK	2 to 2.1 mc.	125 w	125 w
Manhattan, Kansas				
(60-line images now; expect change to high definition in autumn)				
Purdue University	W9XG	2 to 2.1 mc.	1½ kw	
West Lafayette, Ind.				
University of Iowa	W9XK	2 to 2.1 mc.	100 w	
Iowa City, Iowa				

Seldes Discloses CBS Television Plans

● **RECENTLY** returned from a trip to England, Gilbert Seldes, Television Program Director of the Columbia Broadcasting System, has many ideas for air presentations. The CBS transmissions, which are now scheduled to start "sometime in mid-summer", will probably use many of the ideas that have proven popular in England. Among these are: "Tonight In Town", a theater pick-up; sports events from the outside; and interviews with visiting celebrities.

Although the British programs are presented approximately two to three hours daily and Sundays, no such schedule is planned as yet for the CBS broadcasts. These will probably go on sporadically at first and be increased as techniques develop.

Mr. Seldes disclosed that he has already discussed the possibility of televising Broadway shows with various theater managers, and that they seemed enthusiastic. He thinks they will be glad to make such material available without charge to the broadcasters; for the experience of the British managers has been that televising their shows has resulted in increased attendance.

The problem of financing television programs is, of course, a major one. Although the F.C.C. does not yet permit sponsorship of television broadcasts, Mr. Seldes says, "I think the Government should make some funds available for this purpose—possibly through the Reconstruction Finance Corporation. After all, the Government has spent many millions of dollars in aiding the railroads, and I believe that they would do well to encourage this new and growing industry."

Technically, the RCA equipment with which CBS engineers are working is providing good results, but Mr. Seldes would like to see the sensitivity of the iconoscope increased. This will permit using a smaller diaphragm opening in the lens of the pick-up and thus increase the focal depth. At present, using a 16.5 cm., f:2.7 lens, the portion of the stage which is within focus is only about 5 feet deep. This limits action, and Mr. Seldes feels that a focal depth of 10 feet is necessary for adequate flexibility of action. He is convinced that the engineers of RCA and CBS are making excellent progress and that the iconoscope will continue to be improved until it reaches and passes this point.

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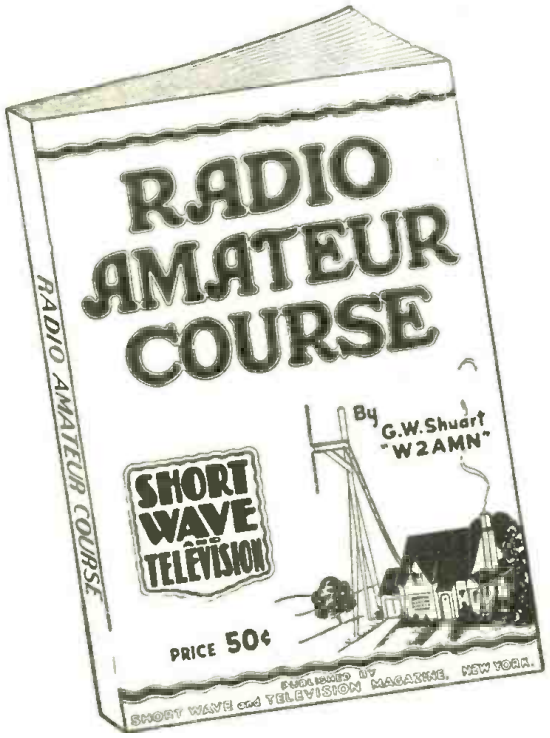

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RADIO & TELEVISION

HUGO GERNSBACK, EDITOR H WINFIELD SECOR, MANAGING EDITOR

Planning Programs for TELEVISION

By Thomas H. Hutchinson

Manager, Television Program Division, The National Broadcasting Company

● THE air is full of cheers for the new scientific miracle of television. The moment the National Broadcasting Company flashed its first air picture of President Roosevelt opening the New York World's Fair of 1939, a tumultuous welcome of *"Television Is Here!"* arose from the press of the nation.

It certainly is true that television is here. The engineers have brought the science to an amazing degree of perfection in the decade or more they have been working on it. None can deny that the steady, brilliant raster is a major engineering achievement. But that still leaves unsolved the perplexing problems facing the *program director.* We directors have to fill that frame with interesting program material.

The television staff of the National Broadcasting Company has been tussling with the new art's basic problem for three years. We have learned and unlearned. What apparently was clearly established in one show, was frequently just as decisively disproved in the next. Nevertheless we have much to show for our three years of research and experiment. We know that some program material does not readily lend itself to television, that other material does. We know the reaction of the iconoscope to different colors and fabrics, we know something about the construction and design of sets and we are acutely aware of the problems of lighting and camera technique. All these things are tremendously valuable. Anyone who goes into television programming will have to acquire similar experience in exactly the same way we did at NBC.

This experience, however, has not supplied the answer to television's fundamental program problem. Briefly stated, this problem is to get the right material and present it in the right way. By the "right material" I mean program subject matter that will hold the interest of a man and his family gathered in front of a home receiver. That program may be dramatic, slapstick comedy, a musical number, an educational program. More exactly, the viewer may want "Sherlock Holmes," a fashion show, Jane Froman or Marcy Wescott or Helen Morgan. He may demand Fred Waring and His Pennsylvanians, "Fats" Waller, Sheila Barrett or Gertrude Lawrence. Perhaps a program revealing the microscopic jungle in a drop of water, one bringing ordinary Americans on the screen to tell of their attitudes on various problems, or "special event" coverage of outside news happenings will be the most popular item on the program schedule. All these people and things, and many more, have been televised by NBC. They may partially answer the problem of the "right material." It is up to us to find out.

Thomas H. Hutchinson, the Ziegfeld of NBC television, who plans the programs for "lookers-in."

The obvious thing to do is to take proven acts and personalities from the stage and motion pictures and place them before the Iconoscope camera. We have done a lot of that at Radio City. Success in any already established medium, however, is no guarantee of even the slightest success in television. Time and again we have brought in sure-fire material from the stage and vaudeville only to watch it die miserably on the television screen. Personalities who carried their audiences along by continuous and violent expression of seemingly limitless energy have fared particularly badly in television. At the other extreme, acts and personalities relying almost entirely on technical perfection have scored no tremendous hits with the NBC audience. Were I to hazard a guess, I should say that a happy mean here is the thing to strive for. One of our early successes was a girl violinist, whose ingenuous youthful charm immediately captivated all who saw her in the television screen. This one quality—*personality*—expressed in a smooth, easy manner, is at present one of the most important elements in television success, as far as the performer is concerned.

News, news while it is still happening, is one of the "musts" of television. However limited we may have been in televising the President at the New York World's Fair, it was a tremendous success. So will many other similar events be successful in the future. The problem here is to fit camera technique to situations over which we have no control. We cannot ask the President to accommodate himself to the demands of the Iconoscope to the disadvantage of newsreel cameras, microphones and the present visible audience. We have to fit our cameras into the general scheme of things, supply them with lenses that will pick up *close-ups* and *long shots* of the event. We will have to deploy a battery of Iconoscope cameras to get different angles of the televised subject. When our mobile unit goes to cover football and baseball games, tennis matches, races, military manoeuvres and other outdoor events these will be the requirements of the job.

At their best, outdoor light conditions are ideal for television. The "catch" is that light seldom remains stable for any length of time on most days when we want to televise outdoor events. Those who witnessed NBC's inaugural telecast were certainly aware of the handicaps a fickle sun can lay on television. To offset this, of course, we may have in the near future new Iconoscopes of far greater sensitivity than any we have yet used.

(Continued on page 167)

Twenty-ninth of a series of "Guest" Editorials

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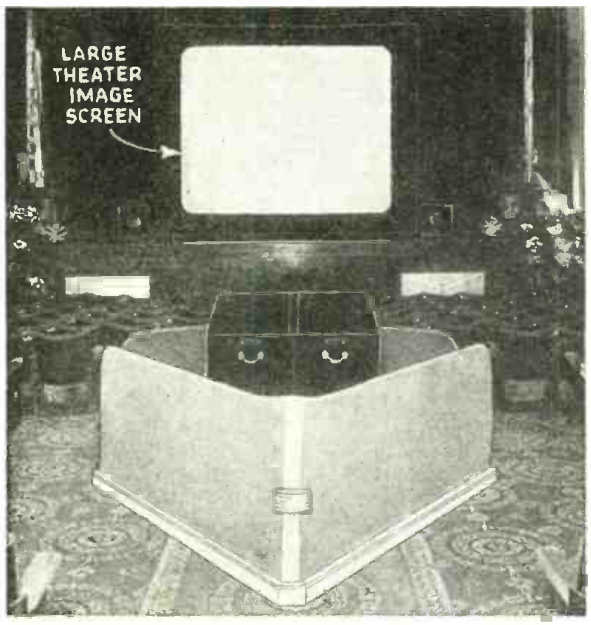
THEATER TELEVISION



Left—Large image projector and screen, as installed by the Baird Company in a London theater. High intensity cathode-ray tubes are used.

Right—Front view of the Baird television projector in a London theater.

Below—Interior view of the theater television projector, showing the control switchboard and the high voltage cathode-ray tubes. (One is a spare.)

● ACCORDING to reports, a number of theaters in England are being fitted with giant image television apparatus, whereby sporting events and "spot news" can be flashed on the theater screen. The latest advice from London is to the effect that the Gaumont-British New Victoria Theater in London has been equipped with the world's largest television screen, measuring 15 by 20 feet. The previous theater installations employed a screen 12 by 15 feet.

The television apparatus itself is built in dual fashion, as the accompanying photo shows, one of the cathode-ray tubes being a spare. As will be seen, the Baird projector is placed in the center of the main floor, some of the seats being removed to provide space for the apparatus. Loud-speakers for the television sound are placed on either side of the stage.

Engineers of the English Baird Company are now in New York to demonstrate large size television images. How soon American theaters may adopt large television screens can only be answered when we really have more television transmitters installed and in regular daily operation in such cities as Chicago, Philadelphia, etc.

The success of the Baird television projector is based on the production of an intensely brilliant image on the end of a 16-inch cathode-ray tube, the image being built up on a fluorescent screen measuring 4.4 by 5.5 inches. This screen is mounted inside the C-R tube in such a manner that its front face is scanned obliquely by the electron beam, and any distortion is compensated for electrically.

(Continued on page 180)

TELEVISION SHOWS FASHIONS THROUGHOUT STORE

Scene in television studio of New York Department Store, showing model on rolling platform. After announcer's description of hat, model steps off platform, puts on another bonnet and mounts other end of platform. The American Television Corp. equipped the studio with camera, lights and microphones.

● A LARGE New York department store (Bloomingdale Bros.) recently had the distinction of presenting the first television fashion show in a store. The complete television installation was made by the American Television Corporation, including a studio with television camera, lights and sound pick-up. In this way, the models, wearing the latest style hats, moved before the television camera, and the customers in various parts of the store could see these styles projected on special cathode-ray tube receivers known as "kinets."

Tomorrow television may find a tremendous field for application in stores, hospitals and other similar institutions where it is desirable to project images at various locations throughout a building or plant.

A customer purchasing, let us say, a pair of shoes, may watch the latest millinery styles on one of these television projectors installed in the shoe department, and before she leaves the store, she may buy a new

(Continued on page 180)

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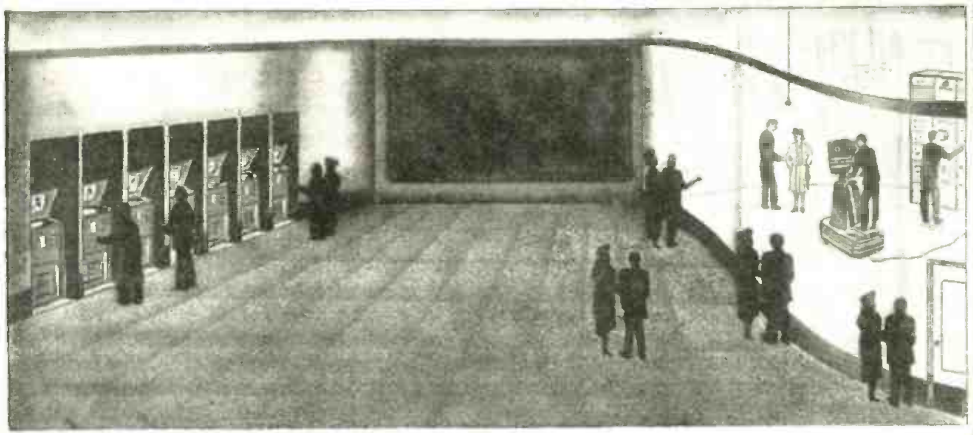
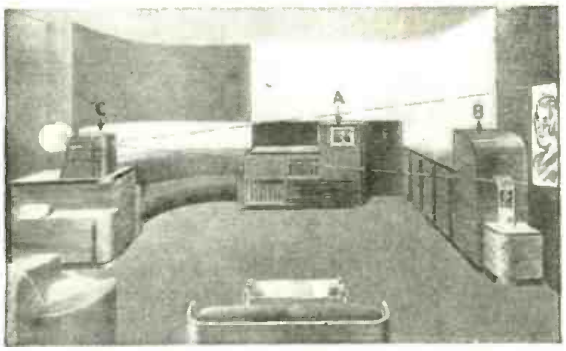
TELEVISION at the New York World's Fair

The G.E. Co.'s television exhibit at the New York World's Fair. Photo at right shows William Mulvey interviewing a Fair visitor in the television studio. The public gets a big kick out of these demonstrations, as they see the images of their friends on the screens of the television receivers shown at the left of the picture below. The television amplifiers appear in the small picture below at right.





Above—Radio equipment in the Living Room of Tomorrow at the New York World's Fair. This was designed by John Vassos for the RCA exhibit. "A" is the Television and "broadcast" sound receiver; "C" is the home movie projector which flashes pictures on the opposite wall; "B" is the facsimile receiver.

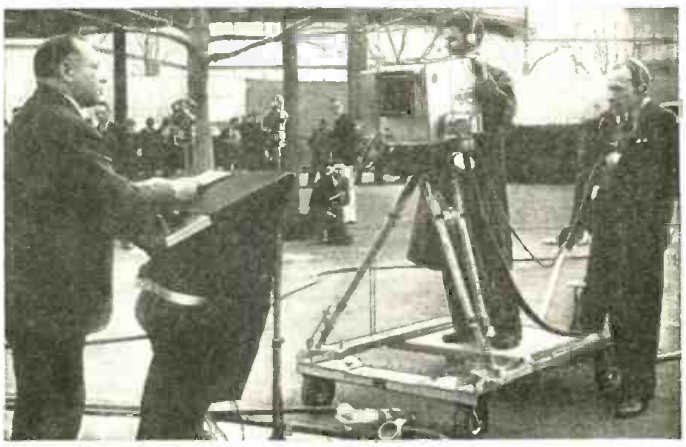
● SO popular are the television exhibits at the New York World's Fair that extra guards frequently have to be called to handle the crowds. The popularity of television is due apparently to the fact that the public is surprised at the greatly improved images seen with the modern television system. In all television exhibits at the Fair, including those staged by RCA, General Electric and Westinghouse, the studio transmitter is connected by means of a wire or cable to several receivers. In the G.E. demonstration, the person being interviewed before the television camera may be seen by the public through a glass partition, and the televised image can be viewed on the battery of receivers at the opposite side of the room, as the pictures herewith show.

Great interest is manifested by the public as to where they can purchase television receivers, the cost of the different size receivers, what programs are on the air and when, etc.

Above—Transparent RCA television receiver at the World's Fair. Set has 12-inch tube.

← Left — Television image of David Sarnoff, President of RCA, as seen on receivers in Radio City, New York, after being flashed from the television antenna at the N. Y. World's Fair.

→ Right — Mr. Sarnoff being televised by the portable RCA television camera at the RCA Building at the Fair. Images picked up by the mobile truck are flashed 8-miles, from the Fair to New York City.



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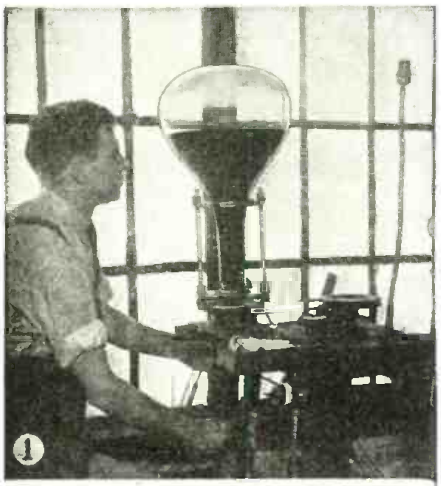
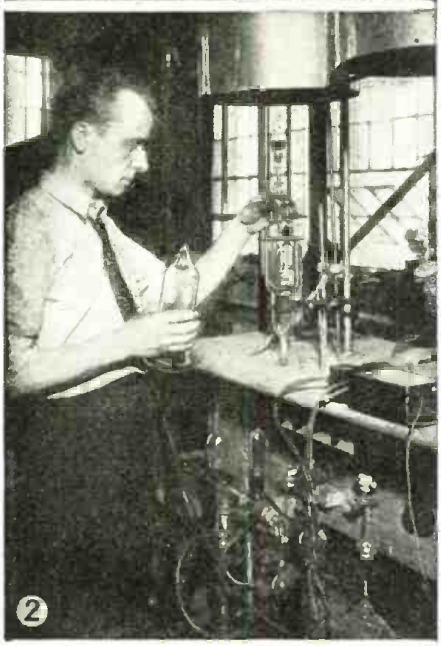
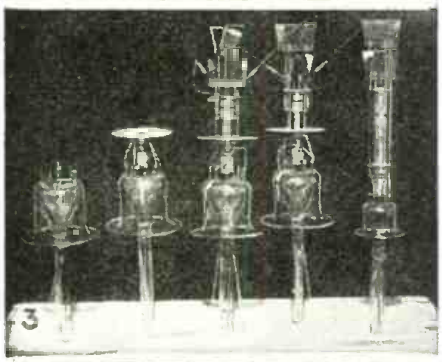
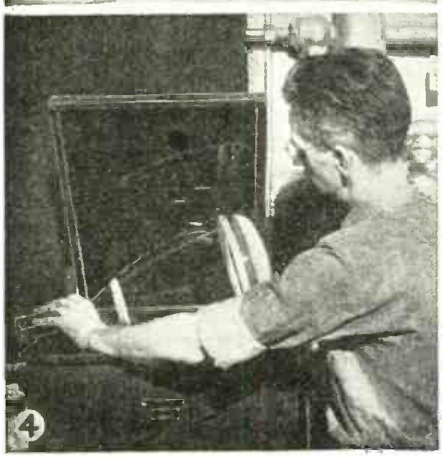








HOW GIANT

Image Tubes

H. Winfield

Are the large cathode-ray tubes hand blown? How is the screen coating put on? What plate voltage is used on a 14-inch tube? These and other questions are answered in this article.

● RECENTLY the writer had a very interesting visit at the Du Mont Television Laboratories, Palisades Park, N. J., where he witnessed excellent reception of the NBC television broadcast at 11:00 a. m.

Even though the Du Mont Laboratories are located 10 miles from the NBC transmitter atop the Empire State Building in New York City, the images—picked up on the new Du Mont console receiver, equipped with a 14" cathode-ray tube—were clear and steady. This particular model was also fitted with an all-wave broadcast receiver.

Photos at left show—1, Trimming the coating inside 14" image tube. 2, Mounting electron "gun" unit in tube end-section. 3, Successive stages in making "gun" and ray deflectors. 4, Polarized light shows strains in glass tube.

The Du Mont plant is very busy producing television receivers and, at present, has orders far in advance of production. They are concentrating on the large 14" tube television receivers but expect later to build models with smaller size cathode-ray tubes. An 8" x 10" image is obtained with this 14" tube, and the sound reproduction is of excellent quality.

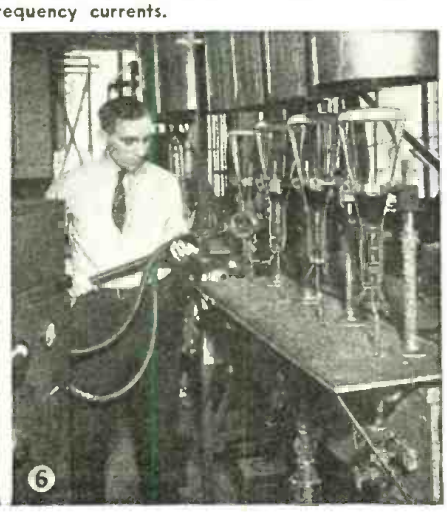
While watching the image on the 14" tube receiver, it was interesting to note that no frequent readjustment of any of the sweep or tuning controls was necessary, and the image remained very steady on the face of the tube. The image and sound were picked up on horizontal doublet aerials placed on the roof of the factory, the doublets being about 20 feet above the roof of the three-story building. There is plenty of rolling country in between the receiving and transmitting antennas, but it is possible to see the top of the Empire State Building on a clear day. However reception is reported in locations behind hills.

The manufacture of the large cathode-ray tube proved very interesting. A surprising fact is that all the metal parts, such as the deflecting plates, electron gun, electrodes, etc., are made of pure nickel (due to its high ductility, etc.), the only other metal being the Dumet alloy wires passing through the glass wall. On such large cathode-ray tubes, the atmospheric force reaches the astonishing figure of 5 tons.

A heavy plate glass window is placed in front of the C-R tubes in the receiver to protect the televiewers in the event that a tube should happen to collapse, but so far none have. The wall in these 14" tubes is about ¼" thick and is made of pyrex glass.

One of the first manufacturing steps is to thoroughly clean the hand-blown glass bulb, both inside and out. Next, the fluorescent chemical coating is placed inside the tube by a spraying process; and the tube is then baked. A coat of aquadag (graphite) is placed on the inner wall of the cone-

Fig. 5 shows glass expert fusing electron "gun" unit into position. 6—Heating internal metal units with high frequency currents.



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TELEVISION

Are Made

Secor

Among other novel ideas devised by Du Mont engineers are a new system of interlaced scanning and a method of transmitting the *sweep* pulses with the *image* signal — all on the same wave.

shaped section; this is later used as a grounded electrode. In another section of the tube assembly department, experts mount all of the nickel deflecting plates, electron gun, etc., in the glass stem, which is later to be welded to the small end of the pear-shaped glass bulb. All of the electrodes in the stem have to be mounted accurately in line by means of jigs. An expert glass worker next takes one of the completed stems with its nickel electrode assembly (which also include the cathode heater) and proceeds to fuse this glass stem or base onto the smaller end of the large 14" C-R tube, with the aid of several extremely hot gas flames. It takes about three hours to put one of these giant image tubes through its manufacturing stages, including the exhausting process.

The assembly of metal and glass parts is mounted on a glass envelope which is generally funnel shaped, and sealed in place. A glass tube, giving access to the inside of the glass bulb, serves for pumping the air out of the glass envelope. While the pumping operation is being conducted, the glass envelope is subjected part of the time to baking in an oven which is part of the exhaust equipment, at a temperature of approximately 750° F. This baking drives off moisture which might otherwise remain inside the tube. An interesting point in passing is that while the tube is being exhausted, an image from a laboratory transmitter is flashed on the chemical (fluorescent) screen of the tube, so that if there is any defect in the tube, it can be detected at this stage, instead of having to waste further manufacturing time on a defective tube.

The illustration at the right shows progressive steps in the manufacture of a 14" Television image tube. ➤

While the tube is passing through the exhausting stage, any occluded gases (gas trapped in between molecules) in the metal electrodes, or in the surface of the glass, are driven off by heating and carried out through the exhaust pump. The metal parts within the tube are heated by high frequency induction coils, placed on either side of the neck of the tube.

The metal parts attain temperatures up to 1850° F. during bombardment. The bombardment serves to free metal parts of gases. The construction and assembly of the cathode-ray tube calls for exceptional accuracy. The parts must be very accurately positioned and spaced, since such details affect the quality of finished tubes. Also, the metal parts must be imbedded in the glass, which again calls for great skill on the part of workers familiar with glass working. The cathode-ray tube plant must have skilled glass applicators to take care

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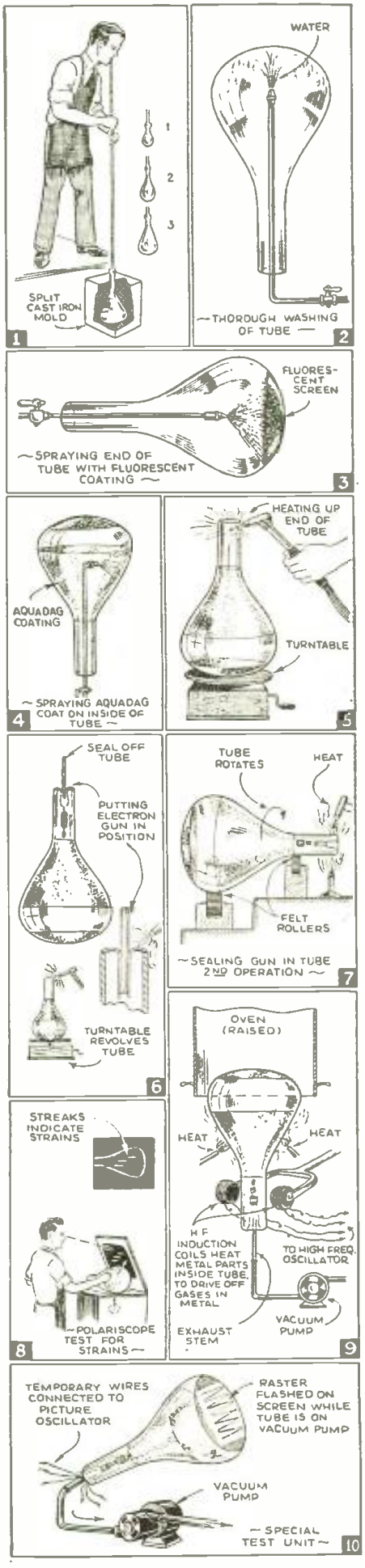
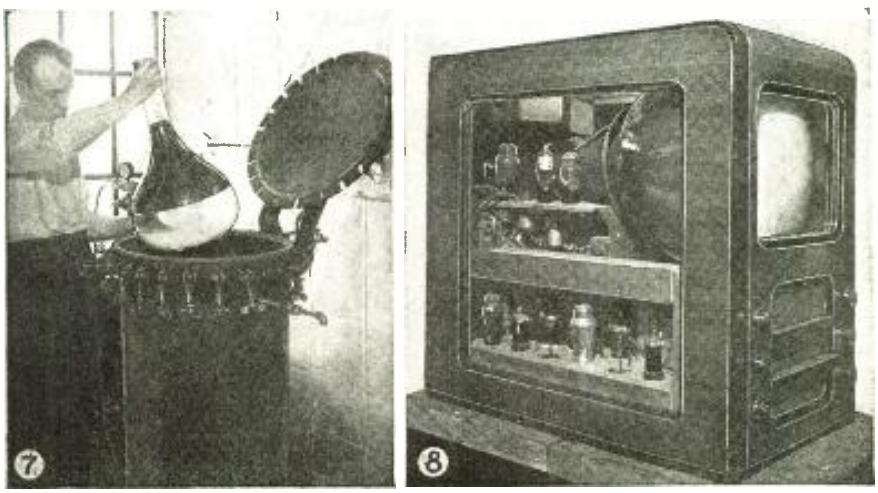


Fig. 7—The Du Mont television tubes are tested at high pressure in compressed air tanks. 8—The finished 14" cathode ray image tube in a receiver.

Photos courtesy Du Mont and Int. Nickel Co.



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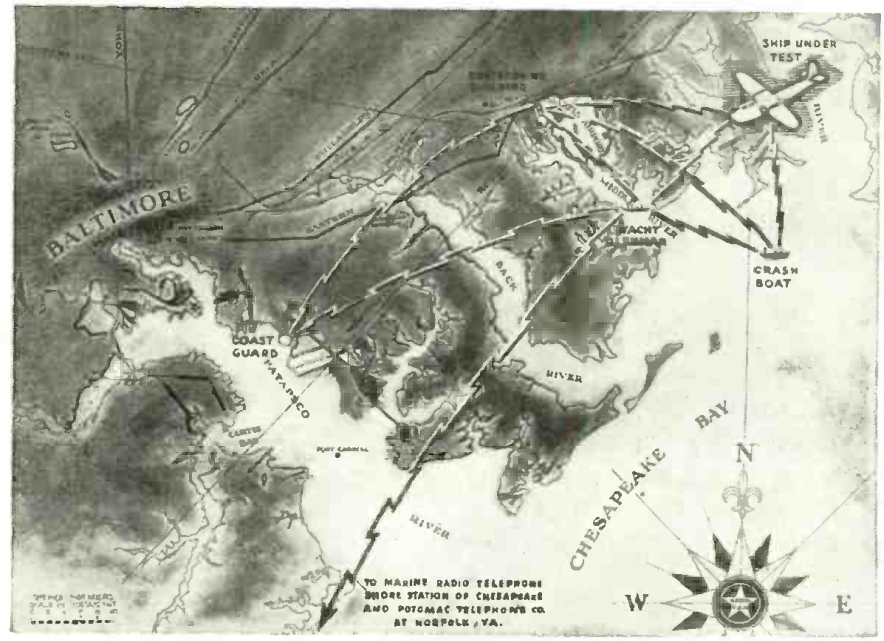
WORLD WIDE RADIO DIGEST

"STEREOSCOPIC television is a problem comparatively easy of solution," says Arthur R. Coussens, writing in *World-Radio*. Mr. Coussens believes that it will not be necessary to have two receivers, or even two pick-ups. He feels that a split image at the pick-up and dual projection on a single tube, super-imposed but of complementary colors, such as red and green, could be used. Similarly colored spectacles used by the viewer would solve the problem quite simply, he believes. The publication, however, points out that it would be necessary to use two separate channels to transmit the images. *R. & T.*, on the other hand, feels that separate channels might not be necessary, for each picture could well contain half the usual number of picture elements.

Another means of achieving stereoscopic television is through the use of two 1-inch cathode ray tubes, mounted in a pair of oversize spectacles, so that each eye views the image projected for it.



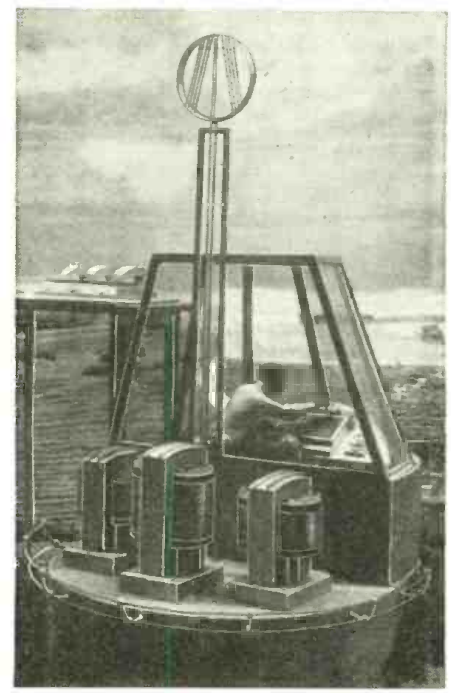
AVIATION RADIO: The map reproduced above tells the story of a radio telephone system recently installed by Western Electric Co. for the Glenn L. Martin Company to enable pilots and aeronautical engineers to converse while giant Martin flying boats soar above Chesapeake Bay during test flights. The miniature inter-communicating system, the most comprehensive of its type ever built, simultaneously links the Martin plant with the aircraft, two surface vessels, the U. S. Coast Guard, and telephone systems on land. It is intended primarily to increase the safety of the men testing the planes.

WILSON E. BURGESS, W1VBS, of Westerly, R. I., is smiling, and no wonder! He was selected as the winner of the annual William S. Paley amateur radio award for 1939 (insert, left) because of the heroic work he performed during the great New England hurricane of 1938.

Burgess, who works for Montgomery Ward in Westerly, assembled all available batteries and took them to his home when he foresaw that an emergency might arise. When the power lines went out, he established the only communication between his city and the outside world. For 46 hours, with trees and houses falling about him, he kept his transmitter working to handle rescue messages for the Red Cross. The award, shown in the insert, is a small replica of the silver trophy.

RADIO FARM: According to the exhibit of the United States Steel Corporation at the New York World's Fair, radio beams will direct every activity from sowing to shipping on the farm of the future.

Walter Dorwin Teague designed the exhibit to illustrate how steel might function in future farming. The heart of this conception is the radio control tower (shown below) from which the futuristic farmer sends wireless impulses to the machines which sow, cultivate, irrigate, reap, can or freeze, pack and ship the products of his broad, shining acres.



TWO YEARS in jail is the penalty for repeating to others any information gathered from foreign broadcasts considered harmful to the welfare of the Nazi party, if you live in Germany. Five years may be the penalty if, instead of whispering such information to one friend, you circulate it publicly. But if a group of people gets together and listens to a broadcast from Moscow—ah! that is high treason and the headsman's gleaming axe awaits you. All this is on the authority of *Deutsche Justiz*, the official German organ, which certainly should know!

WHAT PERCENTAGE of the public reads the radio gossip and programs in the daily newspapers? That is the question which *Fortune Magazine* asked a representative group of American newspaper readers. According to the survey, reproduced with the magazine's permission, 31.7% are habitual readers, 33.5% are occasional readers, and 34.8% do not read such material. Of those who habitually read the radio columns of the papers, 53% find them helpful in choosing their programs, 25.9% find them helpful only occasionally, and 21.2% do not find them useful.

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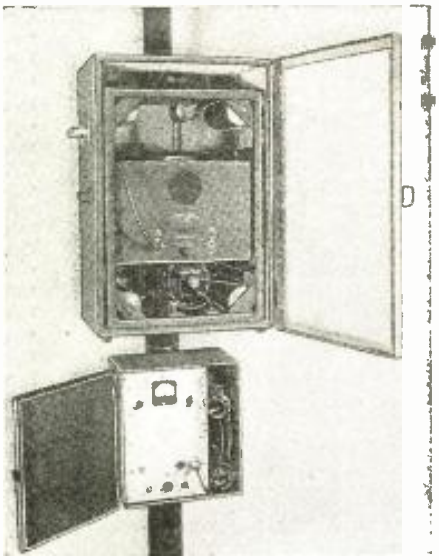
WORLD WIDE RADIO DIGEST

THE BELGIAN National Broadcasting Institute has a new home with 21 studios. Adjacent to all studios are the necessary control rooms, and the whole building is protected from cellar to roof with a Faraday cage.

MAGIC EYE is the name given to a new device to help airplane pilots pierce the fog. Developed by John Logie Baird, noted television pioneer, this apparatus will enable planes to see from 50 to 100 miles in any direction. It picks up the image of the terrain and projects it onto a ground glass screeo io the control panel. Although it has been tried out extensively over London, the secret of its operation is being closely guarded because of its potential value in time of war. It has also been tried out on boats and has been found capable of penetrating fog—a characteristic of great value in and around London.

CINCINNATI has already been tested as a location for television transmission. The Crosley Corporation has installed its experimental television broadcasting apparatus in the Carew Tower, 574 feet tall, and demonstrated a pick-up to the press. Although there have been no programs as yet, Crosley engineers using telephoto lenses have televised buildings and landscapes in Ohio and Kentucky. The Corporation has announced that although a number of television receivers have been constructed in its laboratory, no definite plans for production, marketing or pricing are as yet ready. These plans will depend upon the general public's acceptance of television.

MANY British receivers are now being made with loud speaker jacks to permit the installation of remote loud speakers —ao idea that American manufacturers might well copy.



ROBOT RADIO COP: Last month RADIO & TELEVISION made mention of a new radio highway safety device. This apparatus is shown in the photograph above. It incorporates a magnetic tape sound recorder, amplifier and loud speaker, which can shout a traffic bulletin or safety message to pedestrians or motorists. In addition, there is a miniature low-powered transmitter to be operated on an unoccupied frequency at the lower end of the broadcast band. This will feed its signals into a waveguide cable, laid in or next to the highway, to transmit messages to be picked up on the auto radios of passing cars. Attention of motorists will be called to these transmissions by means of highly visible signs.

A telephone line may link the units to a control headquarters. This will enable an operator to change the message recorded on the steel tape by reiiote control.

(Continued on next page)

RADIO ENGINEERS of the Norsk Riksringkasting, Norwegian State Broadcasting of Oslo, Norway, made a tour of the United States to record the folk life of our Norwegian citizens, using Fairchild sound recording equipment. They prepared transcriptions which will be broadcast over radio stations in Norway some time io the future. The purpose of the series will be to build a better understanding between the two nations.

The apparatus used has a 16-pound turntable driven by an 1800 r.p.m. synchronous motor geared down to 33 1/3 r.p.m., with a shift for 78 r.p.m. The amplifier is an 8-tube 12-watt Hi-Fi job with a flat frequency response of 40 to 10,000 cycles. Its efficiency is said to be extremely high.

Io the photograph above, E. W. Petersen, of the Norwegian group, is shown operating the recorders.

CO-AXIAL CABLE will be used to transmit television programs from the London Coliseum to Alexandra Palace, according to *Television and Short-Wave World*. This indicates that the cable is satisfactory for carrying the high frequency video signals, even though it has not as yet been used for extreme distances, says the magazine.

Television pick-ups have been installed at the side of the orchestra, about half-way back in the Coliseum, to give comprehensive long shots. The use of telephoto lenses will provide close-ups of all actors on the stage when desirable.

(In the United States, both the NBC and the CBS plan to televise theater stages.)

There is also a new 150-foot television receiving aerial erected at Swain's Lane, Highgate, 400 feet above sea level. This runs next to the cable linking Alexandra Palace and Broadcasting House. *World-Radio* states that this new receiver will be used for nearly all outside broadcasts requiring a radio link.

TRANS-ATLANTIC CLIPPER: Shown at the right, through the courtesy of Pan American Airways, is the radio room of Yankee Clipper No. 17, from which the Columbia Broadcasting System plans to transmit during an ocean flight. The transmitter to be used in this history-making event is WCBN, a 100-watt job, with a frequency range from 1600 kc. to 23 mc. It has been licensed to use eight special frequencies within that band.

This transmitter weighs less than 1000 pounds.

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(Continued from preceding page)

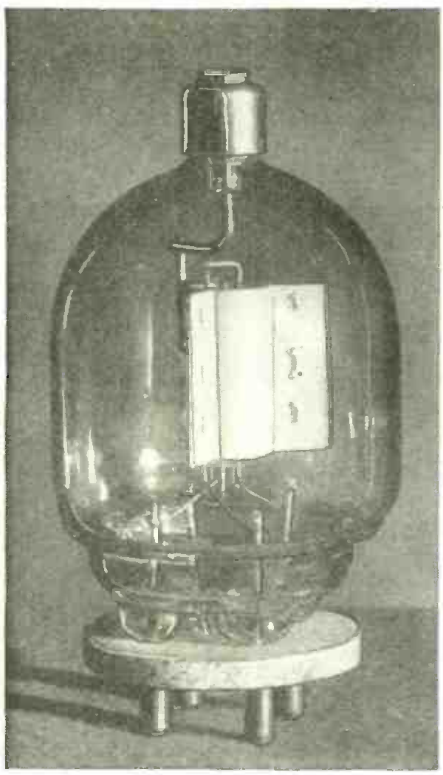
Television Truck

SO popular is television in England that a leading service engineer has equipped his truck especially for television servicing, as shown in the picture above. On the roof of the car is an extension ladder to which is affixed an antenna for making quick tests of new installations. In the interior of the truck is all the necessary equipment for demonstrating television images and for checking the receivers. With this mobile unit, the television installation man is ready to climb the roof of any ordinary dwelling in perfect safety to erect the antenna necessary for securing satisfactory reception. All tools are contained in compartments within the truck's body.

U.H.F. Tube

A NEW vacuum tube, described in the *Bell Laboratories Record*, is for use in the ultra high frequency range of 30 to 300 mc. Recently developed by the Laboratories, it has a plate dissipation of 50 watts; as an oscillator it will deliver as much as 75 watts. It may be used in a standard 4-terminal socket, as its terminals are brought out through a lavite plate with standard prongs.

It is interesting to note that one of the prongs is a center-tap on the filament. The fifth terminal is a cap on top of the molded glass envelope of the tube.



World Wide Radio Digest

Television Transmitted on Telephone Lines

THE greatest advance in television technique to be made in recent years was the transmission of the Six-Day Bicycle race from Madison Square Garden by RCA and NBC.

Heretofore, costly co-axial cable or expensive radio relay stations have been necessary to link a remote point with a transmitter. Now, through the efforts of Bell Telephone engineers working with those of the manufacturing and broadcasting company, there has been devised a way of making the hook-up by means of inexpensive telephone circuits.

Alfred H. Morton, NBC Vice-President in Charge of Television, says, "This first test is of tremendous significance. Essentially, it means that New York City will be turned into one vast outdoor theatre for television pick-ups."

Even more important is the possibility of intercity telephone line linkage for television. Although the circuit, which employed new amplifiers and equalizers, was only approximately 1 1/3 miles long, it may be possible to increase this distance greatly. If this were done, television networks, similar to present radio networks, may soon span the United States, bringing television to persons in both town and country.

Awards of Honor

THE Lawrence Sperry award for 1938 was given to Russell C. Newhouse, Western Electric Engineer, by the Institute of Aeronautical Sciences. The award was made for Mr. Newhouse's development of the *terrain clearance indicator*, described in a previous issue of RADIO & TELEVISION.

The Sylvanus Albert Reed award was presented to Professor A. V. de Forest of M.I.T., for his development of a method for magnetically testing airplane structural materials.

Dowd Wins

OWEN J. DOWD, W2JHB, Brooklyn, N. Y., is the winner of the Hiram Percy Maxim Award for outstanding activity in the amateur field for 1938. The award, pictured at the right, is a miniature replica of the "Wouff-Hong," revered emblem of the radio amateurs. Dowd, a red-headed youth of 21, is a teletype operator for the Union Pacific Railroad and uses home-made radio equipment almost exclusively. Dowd is not married, but he has a YL and she's learning the code.

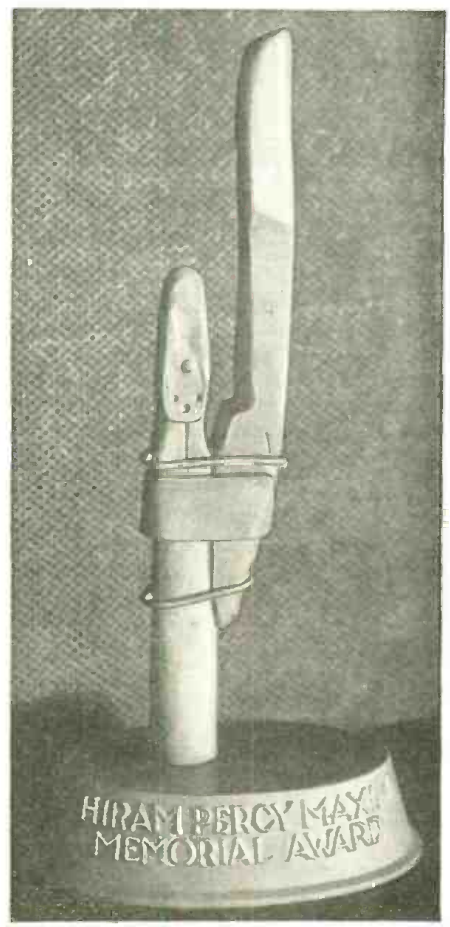
He was selected by his fellow Hams as the 1938 winner for many reasons, among them his volunteer work in helping the "QSL Bureau" at Helmetta, N. J., distribute veri cards. He is also known for his interest in helping SWL's learn the code, secure their licenses, build their equipment and install their antennas.

In addition to the trophy, each year's winner of the award, who incidentally must be under 21 years old, receives $100 cash prize.

Pilotless Airplanes

THE United States will be by no means behind in the air if we do have a war. Inventor W. L. Maxson has devised a means for radio-control of airplanes, and two experimental models are being built by the Brewster Aeronautical Corporation, according to the *New York Times*.

Military experts see the possibility of using such planes in flying mass formation for bombing attacks, without risking the lives of pilots.



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Mechanical Scanning—It's Done With Mirrors

William H. Priess

The author, William H. Priess, well-known radio engineer and exponent of mechanical scanning. He promises "large image" home televisors at lower cost.

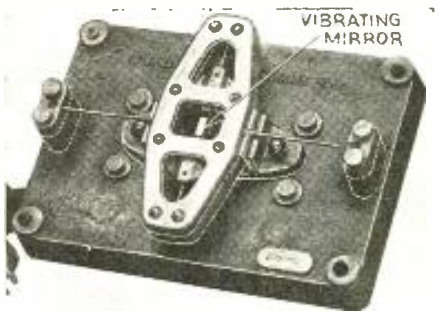
Electronic scanning is being widely used today—but proponents of mechanical scanning (by mirror or similar optical systems) believe they will be able to provide larger images at less cost. A novel system of scanning by means of an oscillating mirror is here explained by its inventor.

● H. I. PHILIPS in his column in the *New York Sun* frequently sums his solution of a complex problem with the terse remark, *"It's done with mirrors."* And yet that seriously may be the answer to many of the technical headaches of television.

A mirror is an extremely simple device. It can control a multiplicity of beams of light simultaneously without introducing interference of one beam with another. It doubles the angle of motion of a beam of light. If it is moved at the same time in two directions, it will produce a projected area of light that can cover a screen of any desired dimension. It operates equally well on low and high light intensities. It does not separate out light with frequency discrimination as does a lens. Its efficiency is high and fairly flat with respect to light frequency. It can be shaped to suit a desired focus; it is cheap and it is durable. These are but a few of its properties.

Basically, television is concerned with an *accurate and repeated high speed motion of a beam of light.* At the studio, the beam is usually reflected point by point from the subject matter. At the receiver the image is recreated by a modulated moving beam of light.

It does therefore seem that the mirror has a place in the television art, for its properties make it ideal as an element for efficiently effecting the motion of one or more beams of light. Modulation at both the transmitter and the receiver is a comparatively simple problem and therefore can be dropped for a moment in this discussion. This then reduces our analysis to the mechanics of the moving mirror, and the additional prime condition that the solution shall provide for an exact synchrony



One model of Mr. Priess' oscillating mirror scanner. The magnet poles are just behind the mirror.

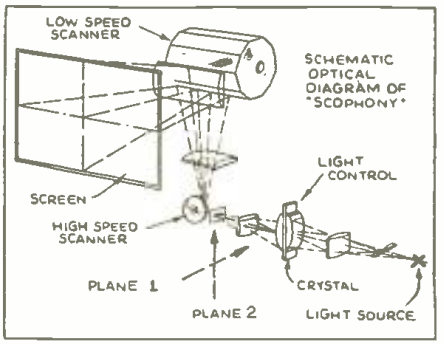
in phase as well as frequency, of the motions of the respective beams of light at the studio and at the receiver.

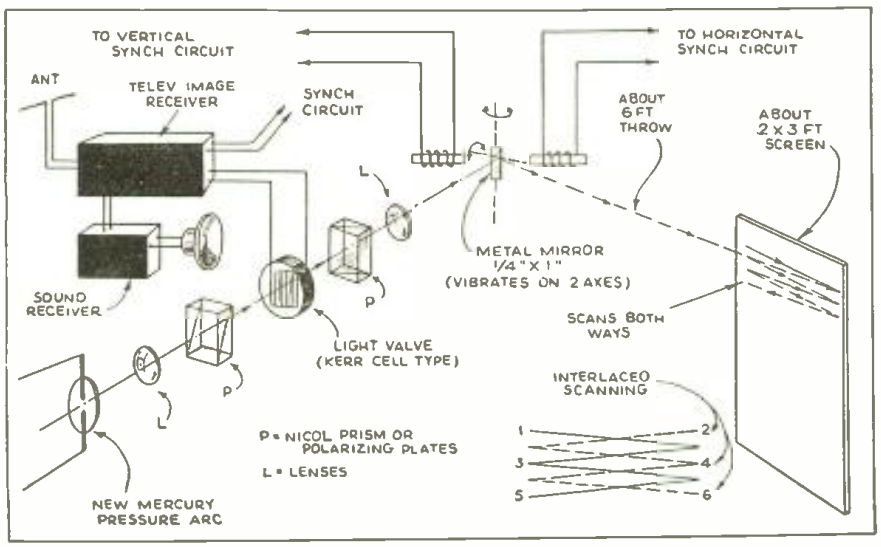
Possibly it is well to examine the systems of television using one or more mirrors as the essential scanning elements, by analyzing the most modern of the equipment using this principle. Roughly, the mirror art divides into the *rotary* and the *vibratory* schools. The former goes back to Nipkow's scanner of 1884, the latter to the early oscilloscope, for their basic conception.

ROTARY MIRROR SCANNER:

The most highly developed *rotary scanner* design is that produced by the British Scophony Co. In this design two mirror drums are employed. The drums are arranged with their axes of rotation at right-angles to one another. One multi-mirrored drum rotates at **30,375 revolutions per minute** and scans the line. The second drum mounts twelve long mirrors and scans the frame. It rotates at 250 revolutions per minute. The standard design reproduces a picture comprising 405 lines per frame, and 50 frames per second. The set employs 39 tubes, including the sound (six tubes), and the rectifiers. Its source of light is a 300 watt pressure mercury lamp modulated by a special oscillating crystal device. The size of the received picture is

The Scophony mechanical "mirror" scanning system. Here the rotating mirror principle is employed, with a light valve to modulate the beam, as shown below.





Schematic diagram of the Priess mechanical scanning system, in which a metal mirror is vibrated by magnets. The light beam is modulated by a Kerr cell type of light valve.

twenty by twenty-four inches, or many times the size of any home television picture produced by the cathode-ray principle. Unfortunately the cost of this home receiver has been $1,100, and this very materially restricts its market.

The Scophony design is an experienced compromise aimed at an attempt to balance

(Continued on page 168)

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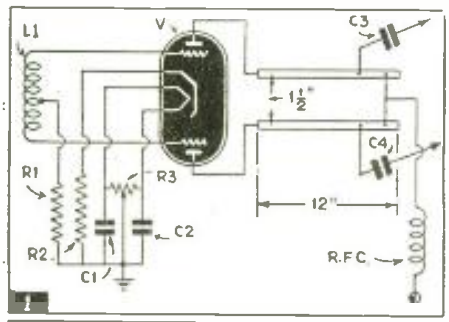

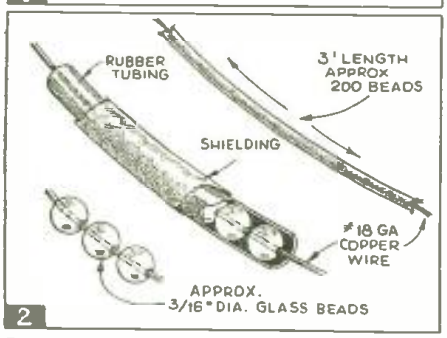

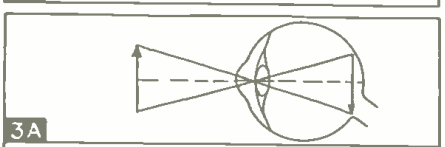

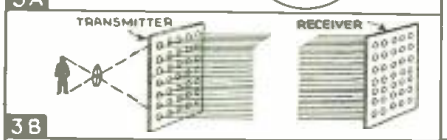

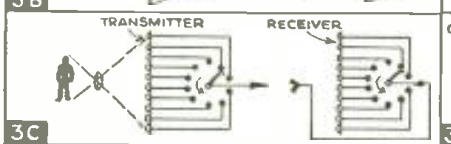

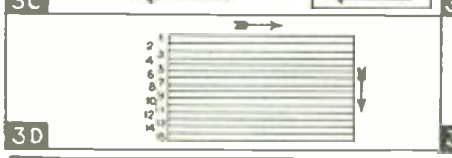

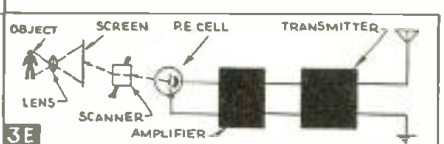

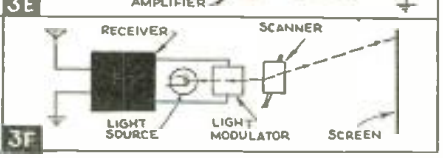

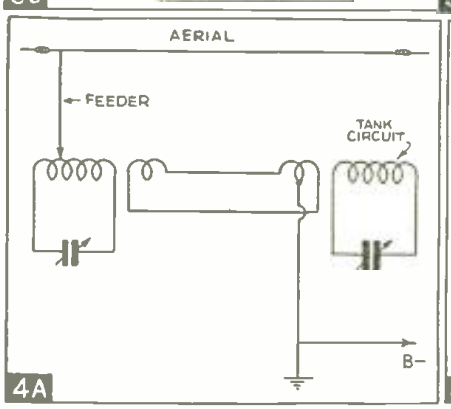

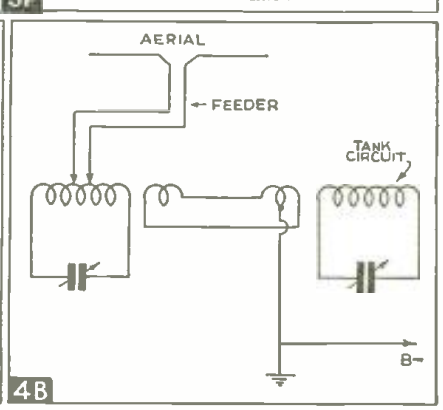

Twin-Triode 2½ Meter Xmitter

1 USING a twin-triode oscillator of low impedance, 10 to 15 watts of carrier power may be used from 112 mc. with the simplest equipment, according to *Television and Short-Wave World* (London). The apparatus described in that publication makes use of a wooden baseboard 16" long by 3" wide. There are two .001 mf. fixed condensers, C1 and C2 on the diagram, and two .0005 mf. fixed condensers, C3 and C4. The copper tubes used are 12" long and ¼"-½" in diameter, spaced 1½" apart (centers) and supported on stand-off insulators. The resistances are a 15,000 ohm 4-watt resistor at R-1, a 200-ohm 8-watt resistor at R-2, and the usual humbucking resistor at R-3.

The tube employed was a Mullard TV03-10, the characteristics of which are: heater voltage, 6.3; heater current, .8 amp.; amplification factor, 13; maximum plate dissipation, 10 watts; maximum d.c. plate current, 80 ma.; maximum d.c. grid current, 25 ma. However, if the transmitter is correctly constructed, the input can be raised to 25 watts with only 300 volts "B".

The constructor suggests the tube be mounted horizontally to keep the grid leads short. In this way, also, the plates can feed directly into the two copper tubes. A semi-fixed shorting bar tunes the tubes. The grid coil L1 is wound with No. 16 tinned copper wire and consists of 7 turns, ½" in diameter, spaced to cover a distance of 1¼". With these specifications, the job should tune to 112 mc. The positions for attaching condensers C3 and C4 to the rods are found by experiment, different points being tried until maximum output is obtained.

Home-Made Co-axial Cable

2 R. L. FELLOWS, writing in *Practical and Amateur Wireless* (English), suggests a simple and easily made co-axial cable for home use. Mr. Fellows needed three feet of such cable, so he got a couple of hundred glass beads. He strung these on No. 18 wire and forced a piece of rubber tubing over them. This he slipped inside of a piece of braided copper shielding. Drops of solder on the wire prevented it from shifting through the beads, and tape over the end of the braided shielding prevented fraying. The shape of the beads permitted considerable bending of the co-axial cable.

Television Explanation

3 A SIMPLIFIED course in television is currently being written by E. Aisberg in *Television*, a French publication.

In Fig. 3A, the French writer shows how the lens in the human eye projects an image of an object (the arrow at left) to the retina. In Fig. 3B, he shows how an image may be projected by a lens onto the screen of a mosaic tube. His illustration indicates that if connection were made from this transmitting tube to a receiving tube, the various picture elements would reproduce the image. In Fig. 3C, he shows how, instead of a large number of connecting wires, one wire might be used, synchronized switches keeping the picture elements of the transmitter in step with those of the receiver. This is virtually what is done in television, the moving switch, however, being replaced by a moving beam of electrons, and the modulated carrier wave replacing the connecting wire. Fig. 3D gives a rough idea of how scanning is accomplished. Fig. 3E shows a more detailed illustration of what occurs in a simplified transmitter, and Fig. 3F shows the simplified receiver, using a mechanical system.

Overcoming Harmonic Radiation

4 MEANS of overcoming harmonic radiation are described by A. G. Chambers, G5NO, in *Wireless World* (English). In Fig. 4A, the author illustrates a simple Windom or end-fed aerial system using a single-wire feeder. In Fig. 4B, he shows a Zepp feeder. The matching impedance section in the former system may be of a variety of couplers. He suggests that it be coupled into the PA by a low impedance line of the order of 80 ohms. This link may consist of standard twisted pair with coupling coils of one or two turns. Grounding the mid-point of the link at the PA side will form a Faraday screen that will not affect the output of the transmitter but will aid in the suppression of harmonics. A similar grounding system is also shown in Fig. 4B. The author suggests the use of current-fed aerials to decrease the radiation of even harmonics. He also lists three "don'ts": Don't use tubes in parallel, use them in push-pull; don't use a doubler for the final; don't use any more bias or excitation than necessary for efficiency.

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Airplane Antennas

5 A PAPER read by N. F. S. Hecht at the Institution of Electrical Engineers of Britain, was reported in *Practical and Amateur Wireless* (English). In this paper, Mr. Hecht brought out a number of interesting antenna systems for airplanes. Fig. 5A represents a wingtip-to-tail aerial; 5B, a fore-and-aft single wire; 5C, the broad arrow type; 5D, the "Y" type; and 5E, a recent type which can be used on medium waves by connecting the dipoles as the two legs of a "T" antenna, the feeders then acting as parallel vertical radiators.

Fig. 5F shows an early form of aerial using a weighted end. Frequently a snapping motion of the antenna broke it, thus reducing its efficiency. Subsequently, instead of using one heavy weight, a number of lighter units were used to distribute the weight and thereby decrease the chances of breaking the wire. This is shown in 5D. In America, however, the system in 5H has long been in use and has proven satisfactory.

Vacuum Tube Voltmeter

6 A SIMPLE vacuum tube voltmeter is described in *Populaer Radio* of Denmark. It is interesting to note that the apparatus gives voltage indications *without the use of any meter whatsoever.* It uses a magic eye tube, whose voltage is controlled by the variable resistance R8 and by the input voltage. R8 is calibrated and its setting indicates the input voltage. The rest of the required parts are as follows: Resistors, R1—10 meg.; R2—2 meg.; R3—1 meg.; R4—5 meg.; R5—0.1 meg.; R6—50,000 ohm; R7—1 meg.; R8—50,000 ohm; R9—2 meg. Choke D. 30 henries. Condensers: C1—50 mf.; C2—8 mf.; C3—100 mmf.; C4—100 mmf.; C5—0.1 mf.; C6—25 mf.; C7—8 mf.; C8—8 mf. The tubes used in this circuit were made by Philips and were: V1—EBC-3, V2—EM1; V3—EB-4.

Britain's "Wired Wireless"

7 A "WIRED wireless" system for wartime use in Britain is described in that nation's *Wireless World.* As shown in Fig. 7, the apparatus will employ the 172, 216, 252.5 and 280 kc. channels.

The purpose is primarily to avoid interference from hostile stations when information must be sent throughout the country.

Simple Inductance Meter

8 THE circuit shown in Fig. 8, taken from *Practical and Amateur Wireless* (English), shows a simple and inexpensive inductance calculator. While not highly accurate, it will at least show whether an unmarked iron core choke is 20 or 40 henries. The parts used are: A step-down transformer, a low-reading milliammeter, a pair of potentiometers, and a single-pole double-throw switch. Potentiometer R1 is 2000 ohms and adjusts the A.C. supply to the unit under test at X. R2 is 25,000 ohms for inductances up to 100 henries. The transformer should supply approximately 40 volts on its secondary and is most easily wound at home. Taps should be taken every 10 volts from the secondary winding, which may be wound with No. 30 enameled wire. To operate, R1 is connected to the lowest volt tap on the transformer and is set at a minimum, then adjusted until 1 ma. flows, as shown on the meter. Other taps are used if insufficient current flows. Then, with R2 at a maximum, the switch is thrown over to bring it into the circuit, and R2 is adjusted until 1 ma. flows again. The resistance of R2 is then measured with a voltmeter by the application of Ohm's Law. The inductance is found from the formula $Z=2\pi fL$ where Z is the reactance of the component in ohms, f is the frequency of the A.C. supply and L the inductance in henries. Assuming the current supply to be 50 cycles, a reference to the following formulas will make the operation clear.

Suppose the voltage measured across R2 with 1 milliampere flowing was 12.5 volts. Thus the resistance:

$$\frac{E \times 1000}{\text{milliamps}} = \frac{12.5 \times 1000}{1} = 12500$$

From the above the inductance is calculated:

$$Z = 2\pi fL = 12500 = 2\pi \times 50 \times L$$

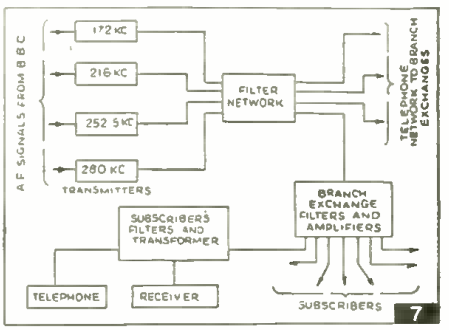
Therefore inductance

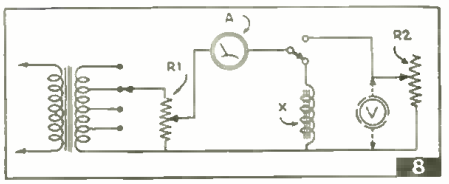
$$L = \frac{12500}{2\pi \times 50} = \frac{12500}{314} = 40H$$

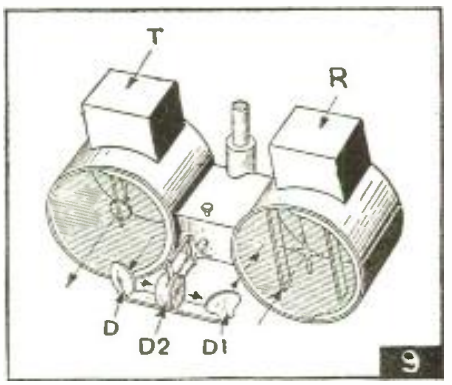
Radio Speed Indicator

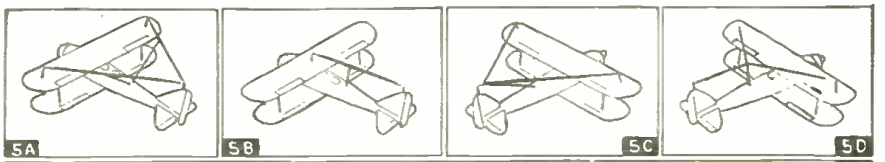
9 THE principle which states that if a source of waves moves relatively to an observer an apparent change of frequency

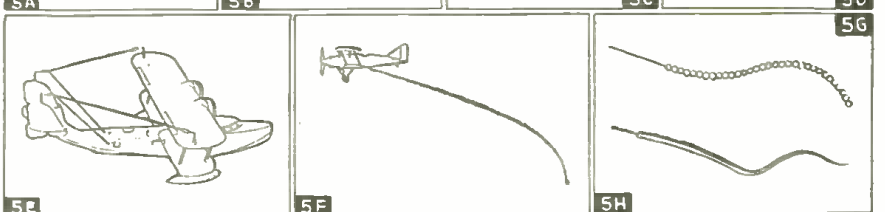
(Continued on page 168)

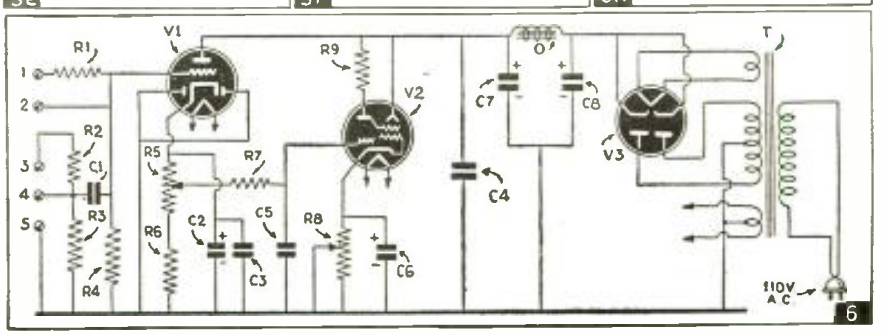












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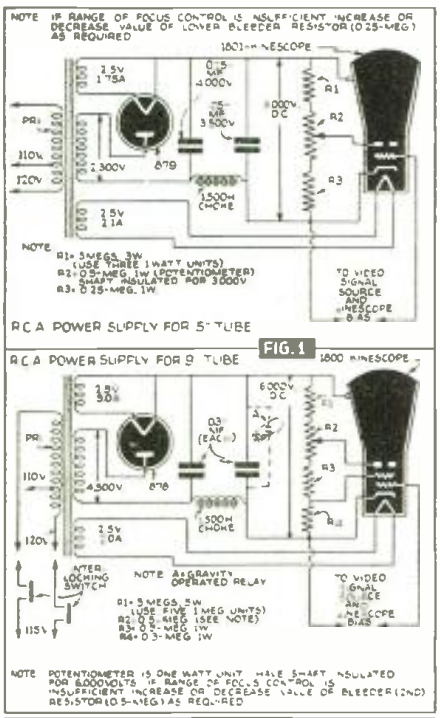
Electronic Television Course

Television Power Supplies, R.F. and Video Stages.

Lesson 5

Henry Townsend



IN the previous chapter of this course we have discussed several types of sweep circuits that can be used in modern television receivers, together with a synchronizing impulse separator. Fig. 1 of this chapter shows two types of power supplies—one for the *five inch*, the other for the *nine inch* electro-magnetic deflection tubes.

Every article written about high voltage supplies for cathode ray tubes has always stressed the great danger from possible contact of the human body with this high voltage source. Too much emphasis cannot be brought to bear upon this subject and consequently we must again bring this point to the reader's mind. In modern television receivers, several interlocking switches are usually placed in the primary circuits of the high voltage transformer, together with some method of short-circuiting the charge in the condensers in the filter circuit, such as a gravity operated mercury tube, in the event that adjustments or servicing becomes necessary. The entire power supply should be completely enclosed (but properly ventilated) so that it becomes impossible for a person to come in contact with high voltages. It might be well to state that in some high-voltage power supplies, the positive end is *grounded* and consequently high voltages would appear (with respect to ground) in places which would ordinarily be at ground potential. The leads connecting the cathode ray tube with the power-supply should be insulated for at least three times the maximum voltage used, and bare terminals on the tube should be protected with some insulating material such as caps, etc.

Fig. 1—Power Supplies for 5 and 9 inch television cathode ray tubes. Fig. 2—Block diagrams of 16-, 18- and 32-tube television sets.

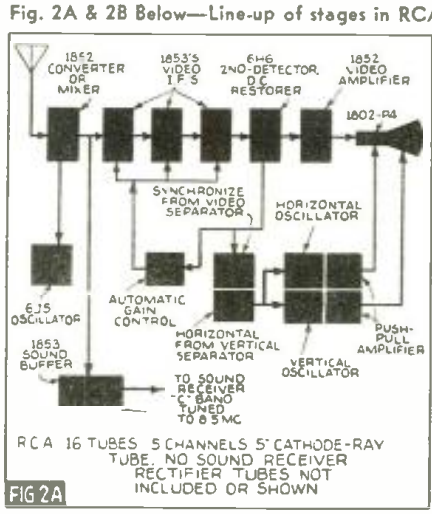
Radio Frequency Stages

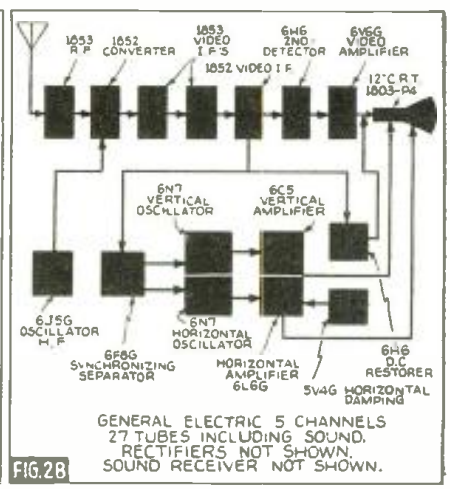
Fig. 2, 2A & 2B show, in block diagram, the *radio frequency* portions of several well-known makes of television receivers now on the market or about to be placed on the market. In the first types it will be noticed that the signal from the antenna circuit is brought directly to a *broadly resonant* grid circuit of a converter or mixer tube, followed by three or four video (picture) I. F. stages, a second detector video amplifier and *synch-separator* circuits. The last, in 2B, uses a stage of radio frequency amplification prior to the converter or mixer tube.

A typical stage of R.F. is shown in Fig. 3 together with the converter. The R.F. stage must be *broad* enough to pass a band width of 4.5 megacycles (4,500,000 cycles) and therefore the tuned circuits are heavily loaded with parallel resistances. The reason for this is that this stage must receive and amplify the picture signal carrier, plus the sound carrier (the latter being 4.5 mc. from the picture carrier), as explained in Chapter 3, May issue. The amplification that can be expected at this high frequency is from 3 to 4 per stage. The oscillator is tuned to 58.25 mc. (for the 44 to 50 mc. television channel) which produces two intermediate frequencies (one 13 mc. and the other 8.5 mc.) in the plate of the mixer tube, the 13 mc. being the I.F. for the *video* (picture) section and the 8.5 mc. for the *sound* section. A buffer tube is usually interposed between the video mixer and the sound receiver. This tube serves a dual purpose, preventing the sound receiver oscillator from interacting with the picture I.F. and also straightening out a valley in

(Continued on page 178)

Fig. 2A & 2B Below—Line-up of stages in RCA 16-tube and G.E. 27-tube television receivers.





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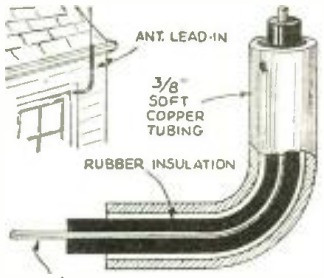
Radio Kinks

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

Home-Made Co-Axial

Recently when I changed my QRA, I found that the only practical place at which to fasten the end of my antenna was on



the corner of the house about two feet from the window of my shack. I was immediately puzzled as to how to feed the antenna. Zepp feeders were obviously impractical because of the short length and the fact that they would have to make a sharp bend to go through the window. I could easily have made it end fed, with a single wire feeder, but I wanted a non-radiating feeder, so the answer was concentric cable. But boy, how that stuff costs! When I did finally buy the cable, all went well until I tried to bend it, then it cracked. Now comes the kink. The answer to my problem was ⅜" copper soft-drawn tubing with No. 14 insulated wire running through it. It is quite flexible, very cheap, and very effective. I located a Pi-tuning network under the eaves, and coupled the cable to the final tank by means of 2 turns around the cold end of the tank. This cable has an impedance of about 176 ohms with the tubing grounded.—*W8GCD.*

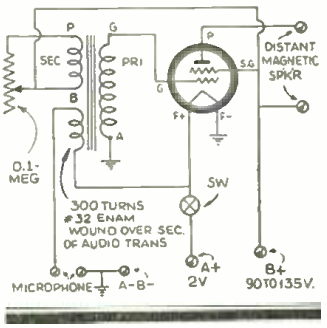
Pilot Lights for Tuned Circuits

Unless properly tuned, the buffer or amplifier stages of the transmitter will draw excessive current and damage the tube, unless battery bias is used. As my rig has cheap meters which can't be used in the circuit while the transmitter is in operation, I had to devise another system.

I bought a number of pilot light sockets with panel jewels and mounted them on the panel. I connected one in the crystal circuit of the oscillator and placed a 60 ma. bulb in the socket. Another one was connected in the positive B lead to the final stage and a Christmas tree bulb put into the socket. When the amplifier is correctly tuned, this bulb hardly glows, but if excitation fails or if the tank is detuned the bulb glows brightly, calling immediate attention to the trouble. By putting a bulb in every stage, tuning may be done with complete satisfaction. Christmas tree bulbs work best for tubes such as 10's, 801's or their equivalents. I have been using this method successfully for some time.—*Operator, Station W8QKA.*

Inter-Office Communicator

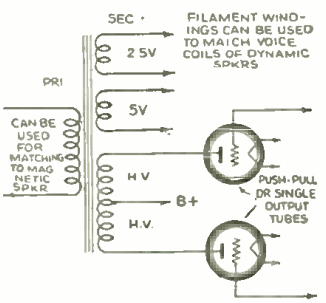
A simple one-tube inter-office communicator can be made using only a 33 pentode tube at each



station. The accompanying illustration shows the circuit. The transformer can be purchased, or may be made by winding about 250 to 300 turns of No. 32 enameled copper wire over the secondary of an ordinary audio transformer. The metal chassis is used as a common ground. Plenty of volume and good clear output are secured with 90 to 135 volts of "B" battery. The microphone is of the single-button carbon type.—*Paul F. Hatten.*

Emergency Output Transformer

An old power transformer can be used as an output transformer in case of emergency. It will



match dynamic speaker voice coils or magnetic speaker windings to push-pull outputs. The various windings are shown in the accompanying sketch.—*H. H. Bloom.*

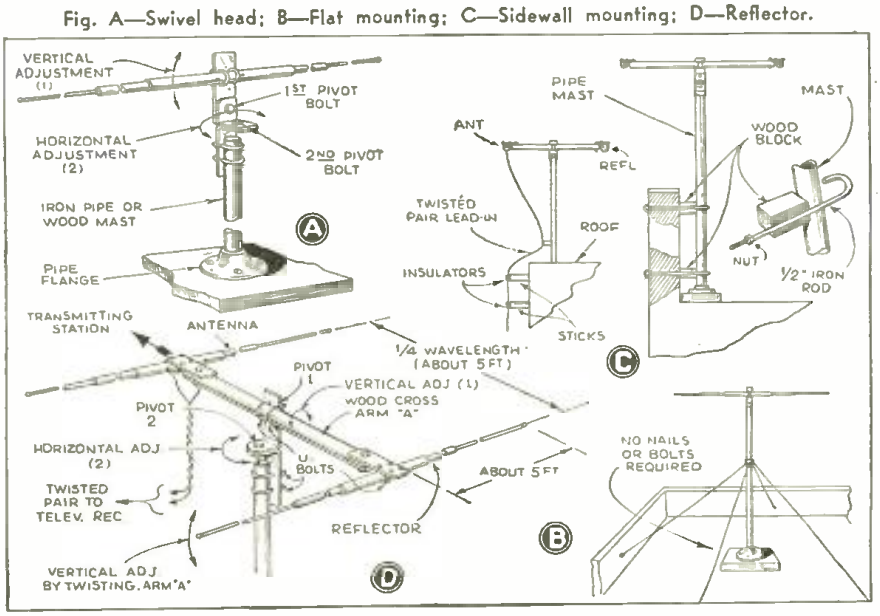
NEW TELEVISION ANTENNA VERY FLEXIBLE

● ONE of the newest television receiver antennas of the doublet type, shown in the accompanying drawings, was designed by the engineers of Taco. As will be seen, it is very flexible, and the doublet can be moved to any desired angle, either horizontally or vertically. This is a very desirable feature for television receiving antennas, especially where they are to be erected in badly congested districts, such as in cities, where reflected waves may cause peculiar reception conditions. The aerial, in many cases, may have to be tilted to a certain angle in order to receive the best television signal.

A twisted pair transmission line or a co-axial cable may be used to connect the doublet with the television receiver. One of the drawings shows the clever double-swivel arrangement provided for the flexible support of doublet antenna and also the reflector. The reflector is mounted one-one-quarter wave length behind the antenna on a wooden cross-arm. A piece of iron pipe may be used to support the antenna array 15 to 20 feet above the roof or—better—a wooden pole may be employed for the purpose.

It is best to treat any wooden antenna parts with creosote or tar paint so that they will withstand changing climatic conditions. If a twisted pair of rubber covered wires is used to connect the antenna to the television receiver, the wires should be kept away from any grounded metal pipes, metal building structures, roofs, etc. The twisted pair should be supported with small sticks or insulators wherever necessary.

Fig. A—Swivel head; B—Flat mounting; C—Sidewall mounting; D—Reflector.



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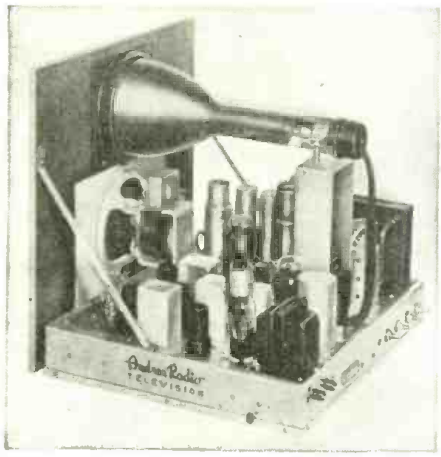
TELEVISION

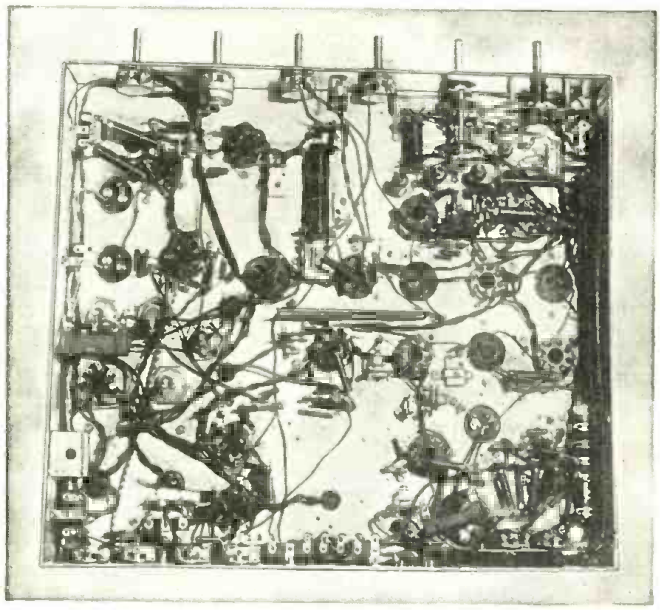
Writer Tells How He Assembled

Part 2

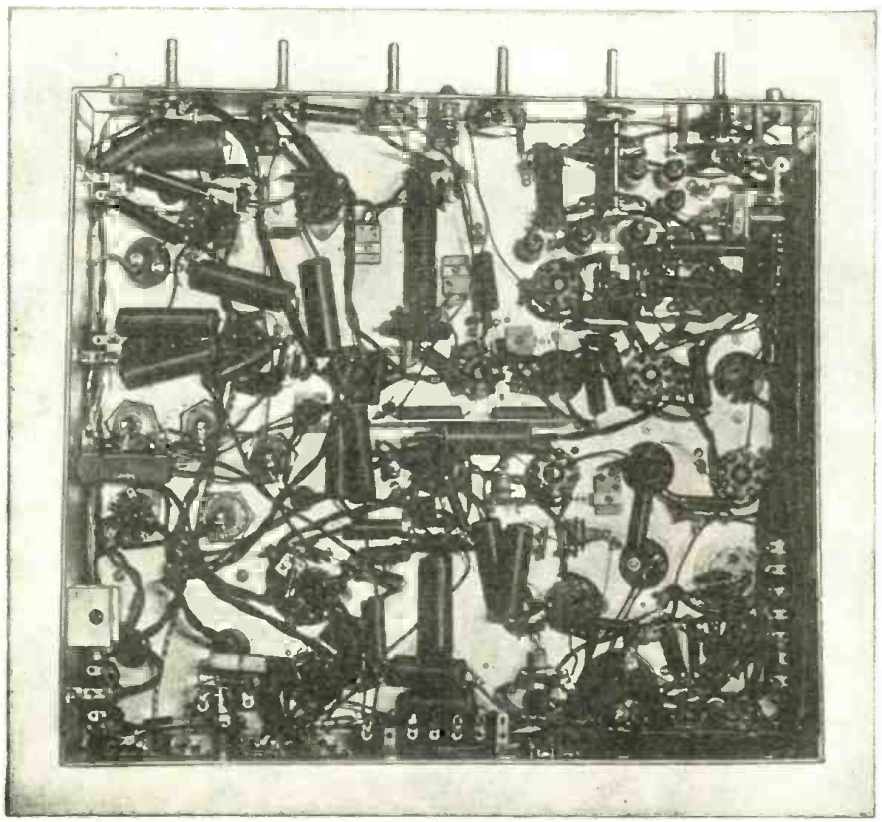


Completed receiver, showing position of tubes, speaker and brackets.

Assembly Stage 4 is finished; all resistors are connected.



All the wiring has been done when the condensers are in, as shown below in the view of Stage 5.



● IN last month's RADIO & TELEVISION, the writer told his experiences in wiring up the first three stages of assembly of the Andrea KT-5-E television receiver kit. (For sight and sound—using 5 inch cathode ray tube for 3 x 4 inch image.)

In this article, the wiring of the final two assembly stages, alignment and antenna installation, and a few hints to builders, will be given.

Perhaps the simplest part of the job was Stage No. 4 and, oddly enough, it took far longer than any other part of the work.

There are some 70-odd resistors to be mounted in this stage, and one or two wires to be connected. The simplest way to do the work is first to sort the resistors, for the instructions are coded. For example, the sheet says, "Connect Resistor A to 6 of Socket B to 1 on Terminal strip I." The chart at the left-hand side of the instruction sheet tells you that there are two resistors of the "A" type. These are ¼ watt resistors, the color coding of which is brown, black, green. It is very convenient to have all the resistors of the same wattage and of the same resistance value together, so that they may be picked out easily while you are working. Otherwise the job was handled in the same manner as the three preceding stages.

One instruction required a resistor to be connected from the mid-tap of the Horizontal Centering Control to an adjacent terminal strip, and stated that varnished tubing be placed over this resistor's leads to insulate it from the Picture Width Control. As the Picture Width Control is on the opposite side of the chassis, it was assumed that the insulation was to keep the leads away from the case of the Horizontal Centering Control. This assumption was correct.

In connecting a batch of resistors to a socket for a 6F8G (socket "G" on the instruction sheet), the writer found that by changing the order of the assembly, it was much easier to get at the socket terminals.

After completing the wiring of this stage, he made two checks. First, to see that all resistors were connected between the correct points and, second, to see that all were of the correct value. He found that he had made two errors in wiring and rectified them before proceeding to Stage No. 5.

Incidentally, while Stage 4 was one of the simplest jobs in constructing the receiver, it took 6½ hours to select the resistors, wire them up, double-check the circuit, and correct errors.

The fifth stage consisted of putting in the tubular condensers. This went like clock-work and required only 3 hours, 15 minutes. This time includes not only the wiring and double-checking of connections, polarity and values, but also includes mounting the panel supports and tube bracket on the chassis, and mounting the speaker and tube mask on the panel, attaching the panel to the chassis, and putting control knobs on. Finally the writer and a friend took two hours off and re-checked the entire chassis. When this was finished, the writer inserted the National Union tubes in their sockets, took two 5-foot lengths of bell wire and connected them directly to the antenna post of the receiver and grounded it at the proper post.

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IN 24 HOURS

a 16-Tube "Sight-and-Sound" Kit

It Works— and HOW!

Robert Eichberg

We See Our First Image!

Then, with a little fear and trembling, the receiver was plugged into the light socket and the switch turned on. It was the writer's good fortune that there was a test transmission on the air at the time. What he saw looked like a jittery design for a snake-skin rug. He then adjusted the controls and trimmers, as suggested in the final instruction sheet supplied with the kit. The design took form—with the NBC-RCA test pattern clearly visible. A few more turns of the controls and it assumed its proper proportions (the circles were round), but it could not be expanded to more than 2 x 3" without going out of synchronization. Later it was found that this was due entirely to the extremely sour antenna being used at the time. *When the writer put the Andrea Teleceptor on the roof of the house and dropped 150 ft. of their special lead-in cable down to the set, the image could be enlarged to greater than the area within the mask.*

At first he was able to get nothing but a rather unpleasant 60 cycle hum on the sound channel.

What to do?

Ah! He grabbed an insulated screw-driver and went to town on the audio trimmers. No results. Then he remembered—he was the bright boy who had given a spin to the Sound Separator Control when he first unpacked the set. He took the insulated screw-driver and fiddled around with this little trimmer for a few moments. Sound was heard, and a little more adjustment of the audio trimmers brought in the sound with clarity unequalled by any radio receiver he had ever owned before.

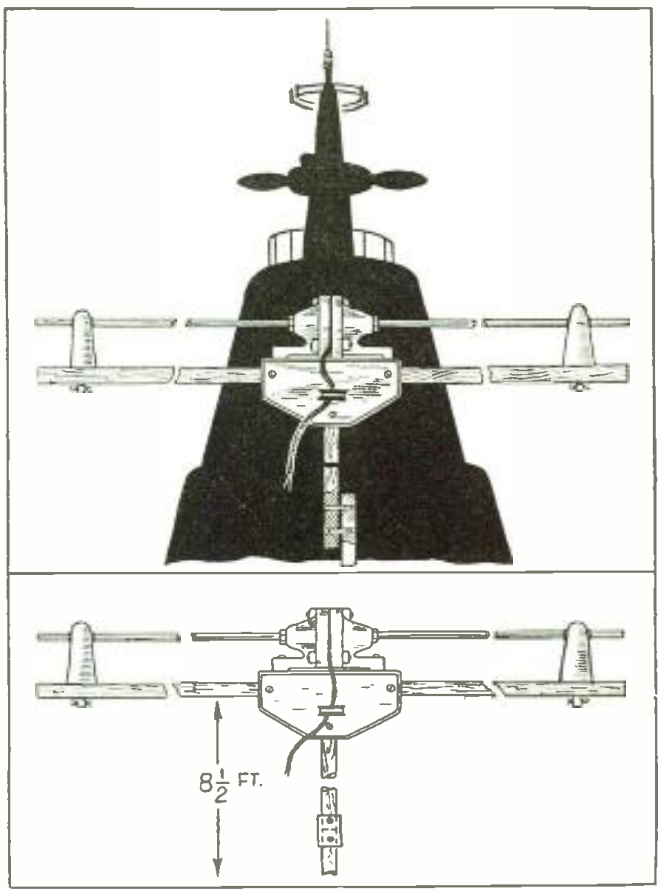
Still, with all that, results were slightly less than perfect. He had not yet learned to balance the contrast, brightness and focus controls against each other. He found out that by going up on the roof and turning the antenna, he was able to improve the picture at least 100%. There was an iron support for a water tank some distance from the antenna, and this apparently was setting up a reflection which caused ghosts in the images. However, when the antenna was correctly set in position, these disappeared.

Correct setting and operation of the panel controls, as well as those on the back of the chassis, is extremely important. It is possible to get a highly distorted image by misuse of the height and width controls, or to get a drifting image by improperly adjusting the vertical or horizontal hold controls. The writer deliberately made some experiments with these, as well as with the centering controls, to learn just what to avoid in setting up the apparatus for most efficient reception. *It is imperative that the image be well centered in the mask.* While the mask will be filled if the image, off center, is expanded to greater than normal size, such an image will not give faithful reproduction of what is taking place in the studio.

The writer found it desirable to set the height and width controls for an image considerably smaller than the opening in the mask and to center it accurately, before expanding it to the correct size. It is necessary to readjust the hold controls after changing the image size, but when satisfactory adjustment has been made, these do not need to be reset. In this way, perfect centering was assured.

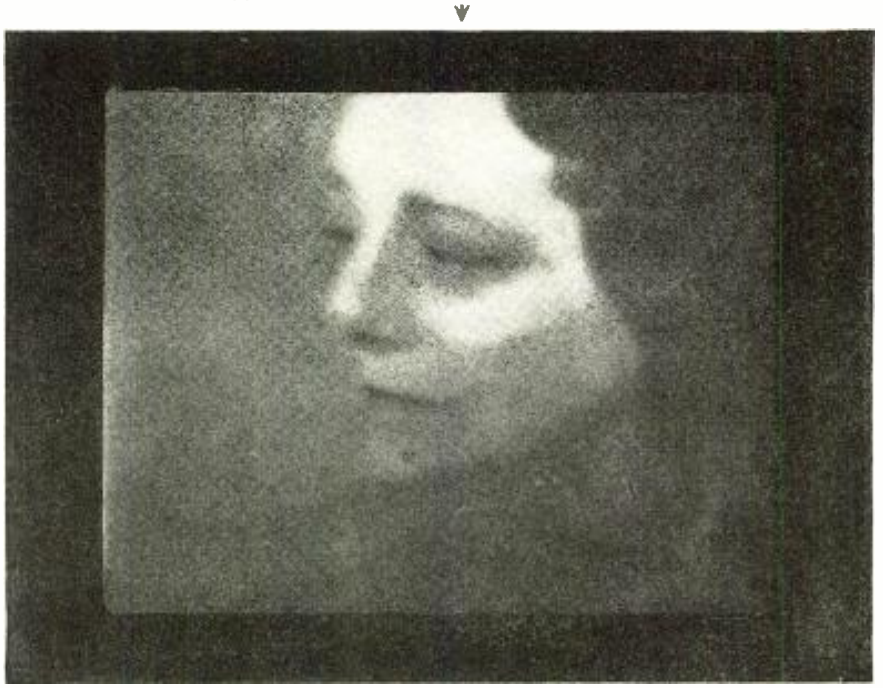
As to the front panel controls, there is always a tendency to build up contrast to

(Continued on page 167)



Above, top, the antenna is erected perpendicular to the beam from the transmitter. Detail of antenna construction appears in the panel.

Below is an actual-size unretouched photograph of an image received with the assembled kit, taken by the author on "vest pocket" film.



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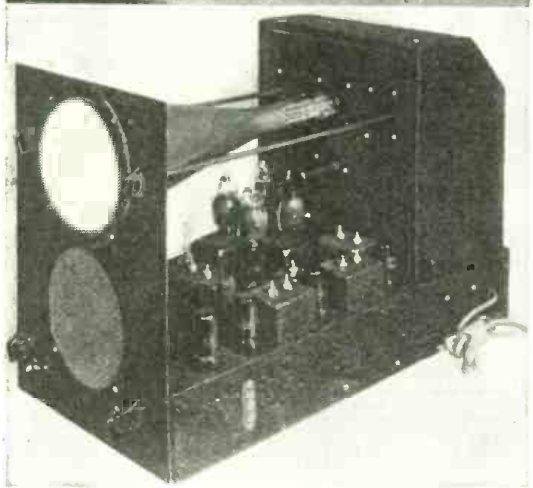


Two views of Meissner Kit 17-tube Receiver.

For the Home Set-Builder

A 17-Tube Television Kit

If you like to "wire your own," here's a Television Sight and Sound Receiver using a 5-inch C-R tube.

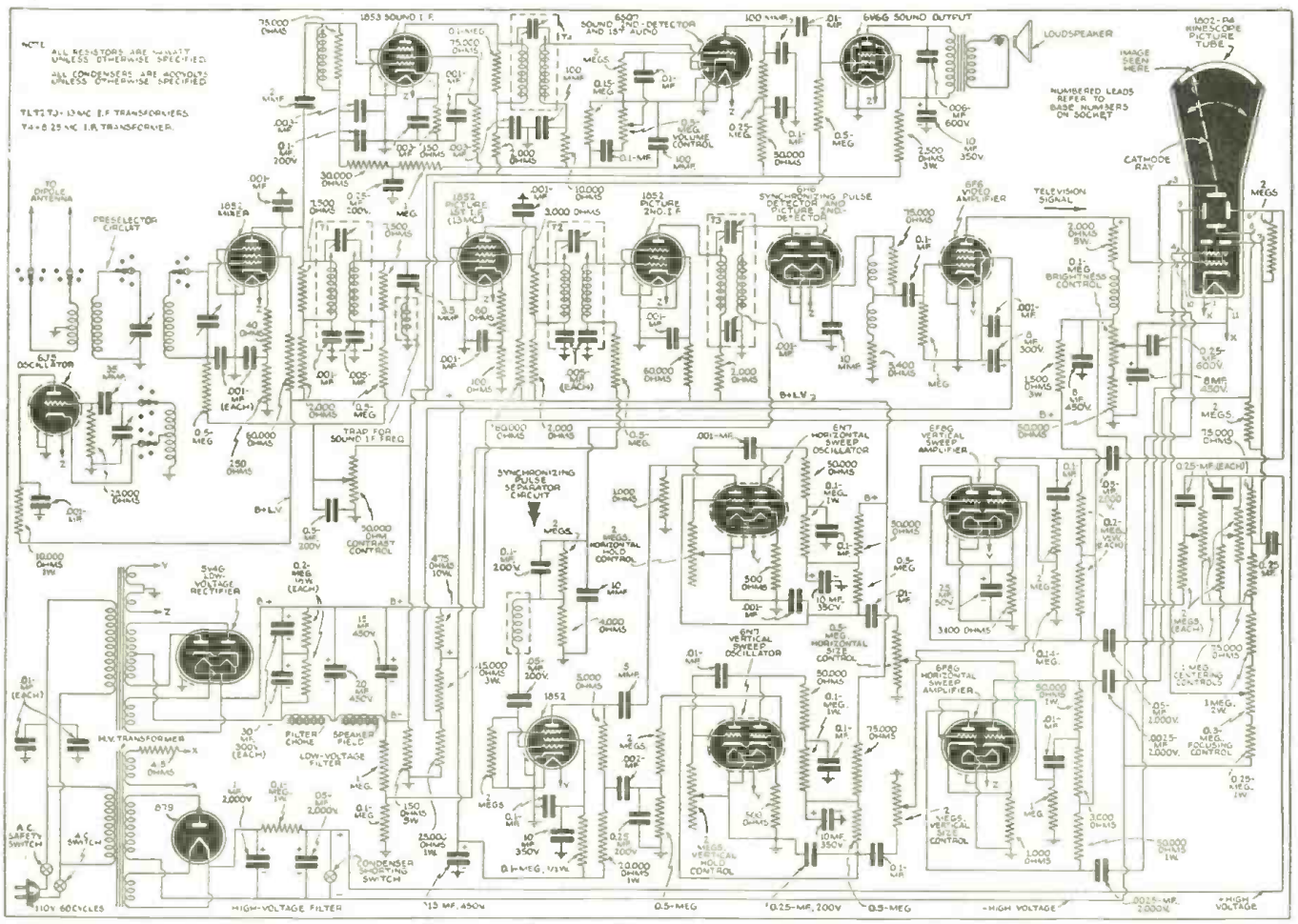
● FOR the television enthusiast, a new kit has recently been made available, and the appearance of the completed television receiver is illustrated herewith. It provides a 3" by 4" image on a 5" cathode-ray tube.

A single dipole antenna feeds the *image* and *sound* signals into a common mixer tube. The tuning is greatly simplified as a common oscillator (6J5) is also supplied, so that the sound and television signals are tuned in all in one operation. The stations are selected by means of a switch, and the tuning inductances are pre-set by means of trimmer condensers.

After the image and sound signals leave the 1852 mixer tube, the sound component is shunted off into a *sound* amplifier, as the diagram shows. The image signal is filtered through a specially tuned output transformer and passes into the first picture I.F. amplifier employing an 1852 tube. The image signal is then passed through a second I.F. stage using another 1852 tube. Next the picture signal passes into the second detector, a 6H6, from which point part of the image signal passes into a 6F6 video amplifier, and then

(Continued on page 175)

Complete wiring diagram of 17-tube Television "Sight-and-Sound" receiver. It provides images 3x4 inches.



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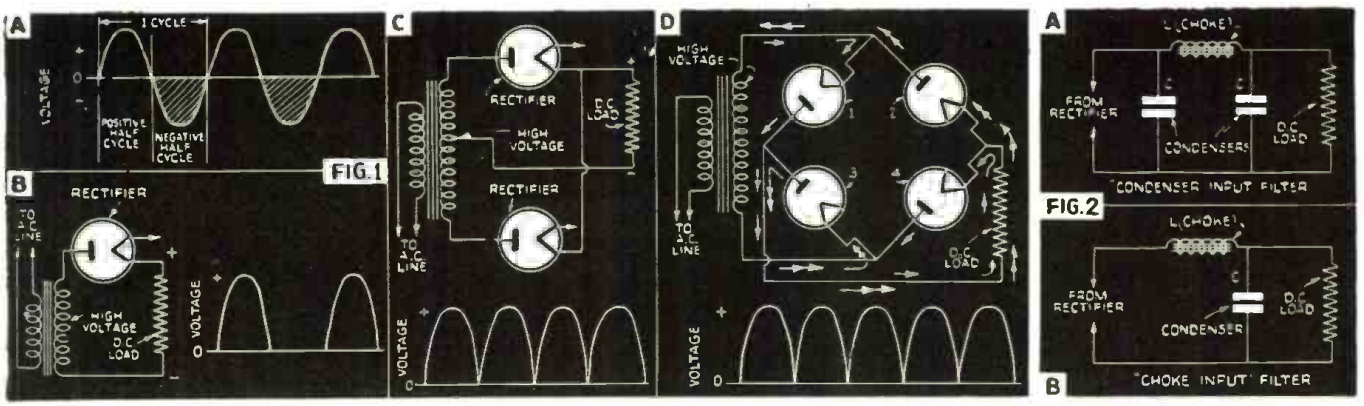


Above is illustrated the difference between half, full wave and bridge type rectifiers, and at the right—two different types of filters.

Getting Started in

Amateur Radio

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

Fourth Article

Do you know the difference between half wave, full wave and bridge rectifiers? The difference between condenser and choke input filters? What the action of a swinging choke is? These questions and others on Power Supplies are answered in this article.

● IN Part 2 of this series, details for the construction of a good beginner's ham radio station were given, including the crystal-controlled oscillator, and the power amplifier to operate on four of the amateur frequency bands. This constructional article also included a suitable power supply unit for the filaments and plates of the tubes.

This power supply unit was very similar in design and appearance to the units used in radio receivers and requires no detailed description in this series on amateur radio. However, in X-mitters of a larger size than our beginner's unit, where higher voltages and larger currents are required, the power supply design and construction are not so simple. It is for this reason that some consideration of the power requirements of modern Ham units is given here.

At this time, we might digress for a moment from the power supply question and think once again about the code test that must be passed before any radio transmitter can be "put on the air". It must be remembered that it requires constant attention to increase the keying speed and especially the copying speed to the required 13-a-minute. Lagging interest after a few months has caused many a would-be Ham to flunk the code test or even to give up the idea of owning an amateur station.

A renewed interest in copying either from a code machine, a helpful amateur with time to spare, or the slow transmissions on the air, at this time will cut down the "learning" time considerably and put your rig on the air that much sooner. Go to it, fellows!

Rectifier Action

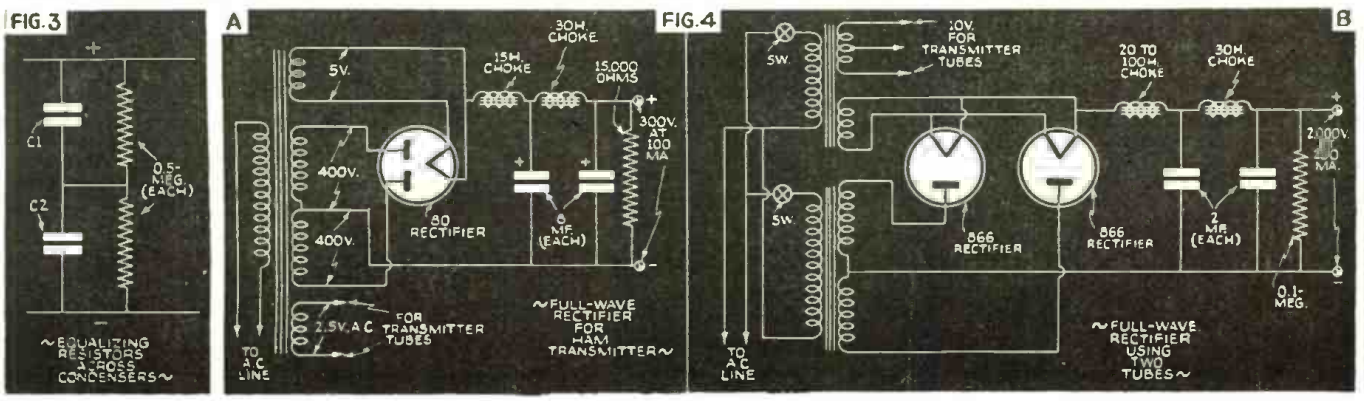
And now to return to *power supply* equipment. Practically all amateur transmitting equipment, with the exception of portable stations and some ultra-high frequency equipment which uses batteries, depends on the A.C. electric light lines for the source of power.

Vacuum tube rectifiers of either the *hard* or mercury-vapor types are used to convert this alternating current to direct current for the plate supply.

Just how this conversion takes place can be understood from a study of the sketches in Fig. 1. At A is a visual representation of the A.C. wave form as it would be seen on an oscillograph. It will he seen that the polarity of the voltage goes through continuous reversals—first *positive*, then *negative*. The object of rectification is to transform this into a current which does not reverse but flows in only one direction. At B we see the secondary winding of a power transformer connected to a rectifier, the rectifier in this case being a vacuum tube containing a filament and a plate. This type of tube will pass current *in one direction*—from the filament to the plate—but will not carry current in the opposite direction. At the right of Fig. B we see the result of connecting this rectifier to the transformer. When current flows in the transformer in one direction, it can pass through the rectifier, but when it flows in the *reverse* direction, the rectifier prevents its flow. Since only half the pulses of current shown in A are used, this type of rectifier is called

(Continued on page 182)

Below—Use of resistors across condensers to equalize the load on each (Fig. 3); Fig. 4 shows two types of full wave power supply units.



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World Short Wave Stations

Revised Monthly

Complete List of SW Broadcast Stations

Reports on station changes are appreciated.

Mc.	Call	
33.600	W3XEF	BALTIMORE, MD., 8.93 m. Operates Daytime. No schedule known. Poss. connected with W3XEY.
31.600	W1XKA	BOSTON, MASS., 9.494 m., Addr. Westinghouse Co. Daily 6 am.-1 am., Sun. 8 am.-1 am. Relays WBZ.
31.600	W1XKB	SPRINGFIELD, MASS., 9.494 m., Addr. Westinghouse Co. Daily 5 am.-12 m., Sun. 7 am.-12 m. Relays WBZ.
31.600	W3XEY	BALTIMORE, MD., 9.494 m., Relays WFBR 4 pm-12 m.
31.600	W2XDV	NEW YORK CITY, 9.494 m., Addr. Col. Broad. System, 485 Madison Ave. Daily 5-10 pm.; Sat and Sun. 12.30-5, 6-9 pm.
31.600	W9XHW	MINNEAPOLIS, MINN., 9.494 m. Relays WCCO 9 am.-12:30 am.
31.600	W3XKA	PHILADELPHIA, PA., 9.494 m., Addr. NBC. Relays KYW 8 am.-9 pm.
31.600	W5XAU	OKLAHOMA CITY, 9.494 m., Sun. 12 n-1 pm. 6-7 pm. Irregular other times.
31.600	W9XUY	OMAHA, NEBR. No sked. known.
31.600	W4XCA	MEMPHIS, TENN., 9.494 m. Addr. Memphis Commercial Appeal. Relays WMC. 10 am.-6 pm.
31.600	W8XAI	ROCHESTER, N. Y., 9.494 m., Addr. Stromberg Carlson Co. Relays WHAM 7.30-12.05 am.
31.600	W8XWJ	DETROIT, MICH., 9.494 m., Addr Evening News Ass'n. Relays WWJ 5 am.-11.30 pm. Sun. 7 am.-11 pm.
31.600	W9XPD	ST. LOUIS, MO., 9.494 m., Addr. Pulitzer Pub. Co. Relays KSD.
31.600	W5XD	DALLAS, TEXAS. 11.30 am.-1.30 pm. Ex. Sat.-Su.
26.550	W2XGU	NEW YORK CITY, 11.3 m. Relays WMCA.
26.550	W2XQO	NEW YORK CITY, N. Y. 11.3 m. Noon-9 pm
26.500	W9XTA	HARRISBURG, ILL., 11.32 m. 2-4 pm.
26.450	W9XA	KANSAS CITY, MO., 11.33 m., Addr. Commercial Radio Eqpt. Co. 10 am.-1 pm., 3-7 pm.
26.400	W9XAZ	MILWAUKEE, WIS., 11.36 m., Addr. The Journal Co. Relays WTMJ from 1 pm. to midnite.
26.300	W2XJI	NEW YORK, N. Y., 11.4 m., Addr. Bamberger Broad. Service, 1440 Broadway. Relays WOR 11 am.-5 pm.
26.150	W9XUP	ST. PAUL, MINN. 11.47 m. Rel. KSTP 8 am.-1 am.
26.100	W9XJL	SUPERIOR, WIS., 11.49 m. Relays WEBC daily. 10 am.-8 pm.
26.050	W9XTC	MINNEAPOLIS, MINN., 11.51 m. Relays WCTN 10 am.-9 pm.
26.050	W9XH	SOUTH BEND, IND., 11.51 m. Addr. South Bend Tribune. Relays WSBT-WFAM 2.30-6.30 pm. exc. Sat. and Sun.
25.950	W6XKG	LOS ANGELES, CAL., 11.56 m., Addr. B. S. McGlashan, Wash. Blvd. at Oak St. Relays KGFJ 24 hours daily. DX tips Mon., Wed. and Fri. 2:15 pm.
25.950	W8XNU	CINCINNATI, OHIO. 7 am.-1 am. Sun. 8 am.-1 am.
21.640	GRZ	DAVENTRY, ENG., 13.86 m. Addr B.B.C., London. Unused at present.
21.630	W3XAL	BOUND BROOK, N. J., 13.8 m. Addr. N.B.C., N. Y. C. 8 am.-5 pm.
21.570	W2XE	NEW YORK CITY, 13.91 m. Addr. CBS, 485 Madison Ave. Irregular.
21.565	DJJ	BERLIN, GERMANY, 13.92 m. Addr. Broadcasting House. Irreg.
21.550	GST	DAVENTRY, ENG., 13.92 m., Addr. (B.B.C., London) Irregular at present.
21.540	W8XK	PITTSBURGH, PA., 13.93 m., Addr. Grant Bldg. Relays KDKA 5:30-8 am.
21.530	GSJ	DAVENTRY, ENG., 13.93 m., Addr. (See 21.550 mc.) 5.45-8.50-9-10.30 am.
21.520	W3XAU	PHILA., PA., 13.94 m., Addr. Col. Broad. Syst., 485 Madison Ave., N. Y. C. Irregular.
21.500	W2XAD	SCHENECTADY, N. Y., 13.95 m., General Electric Co., 7-10 am.
21.480	PCJ	HUIZEN, HOLLAND, 13.96 m. Addr. N. V. Philips, Hilversum. Irregular.
21.470	GSH	DAVENTRY, ENG., 13.97 m. (See 21.550 mc.), 5:45-8:50, 9 am.-noon. To Africa.
21.460	W1XAL	BOSTON, MASS., 13.98 m. Addr. University Club. Tues., Thurs., Sat., 10-11 am.
21.450	DJS	BERLIN, GERMANY, 13.99 m., Addr., Broadcasting House. 12.05-7.50 am.
19.020	HS6PJ	BANGKOK, SIAM, 15.77 m. Mondays 8-10 am. See 15.23 mc.
18.480	HBH	GENEVA, SWITZERLAND, 16.23 m., Addr. Radio Nations. Sun., 10.45-11.30 am.

16 Met. Broadcast Band

17.850	TPB3	PARIS, FRANCE, 16.8 m. Addr. (See 15.245 mc.) 5:30-10 am.
17.845	DJG	BERLIN, GERMANY, 16.81 m., 12.05-7.50, 8-9, 9:15-11 am.
17.840	HVJ	VATICAN CITY, 16.82 m. Heard 12 n. on Wednesday.
17.840	—	MOYDRUM, ATHLONE, EIRE, 16.82 m. Addr. Radio Eireann. 8.30-10 am. 12.30-4.30 pm. irreg.
17.830	W2XE	NEW YORK CITY, 16.81 m. (Addr. CBS, 485 Madison Ave., N. Y. C. Daily 6.30-9 am., 12 n.-5 pm. Sat. Sun. 7-11 am., 11.30 am.-5 pm.
17.820	2RO8	ROME, ITALY. 16.84 m., Addr. (See 2RO, 11.81 mc.) 4.30-8.45 am. Sun. 10 am.-7.25 pm.
17.810	G5V	DAVENTRY, ENGLAND, 16.84 m., 5.45-11 am. to Far East.
17.800	OIH	LAHTI, FINLAND, 16.85 meters, 4-9 am.
17.800	XGOX	CHUNGKING CHINA, 16.85 m., 9.30-11.30 pm. Mar. 21-Sept. 21 to No. America.
17.790	GSG	DAVENTRY, ENG., 16.86 m., Addr. B.B.C., London. 5.45 am.-12 n., 12.20-4 pm.
17.785	JZL	TOKYO, JAPAN, 16.86 m., 4.30-5.30 pm. to S.A., 8-8.30 pm. to Eastern U. S.
17.780	W3XL	BOUND BROOK, N. J., 16.87 m., Addr. Natl. Broad. Co., 8 am.-5 pm. to Europe, 5-9 pm. to So. Amer.
17.770	PHI2	HUIZEN, HOLLAND, 16.88 m., Addr. (See PHI, 11.730 mc.) Daily 7.10-8.15 am. Mon. & Thurs. 7.10-8.30 am. Sun. 6.10-9.35 am.
17.760	DJE	BERLIN, GERMANY, 16.89 m., Addr. Broadcasting House. 12.05-11 am., 4.50-9 pm. Also Sun. 11.10 am.-12.25 pm.
17.755	ZBW5	HONGKONG, CHINA, 16.9 m., Addr. P.O. Box 200. Dly. 11.30 pm.-1.15 am., 5-10 am. Sat. 9 pm.-1.30 am., Sun. 5-9.30 am. Operates irreg.

End of Broadcast Band

Mc.	Call	
17.310	W2XGB	HICKSVILLE, L. I., N. Y., 17.33 m., Addr. Press Wireless, Box 296. Tests 9.30-11.30 am, except Sat. and Sun.
17.280	FZE8	DJIBOUTI, FRENCH SOMALILAND, 17.36 m. Test XMSN 1st Thurs. each month 8-8.30 am. Next B.C.S. May 4 & June 1.
15.550	CO9XX	TUINICU, ORIENTE, CUBA, 19.29 m., Addr. Frank Jones, Central Tuinicu, Tuinicu, Santa Clara. Broadcasts irregularly evenings.
15.510	XOZ	CHENGTU, CHINA, 19.34 m. Daily 9.45-10.30 am.
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. Reichspostzenstralamt. Tests irregularly.
15.360	—	BERNE, SWITZERLAND. 19.53 m. Irreg. 6.45-7.45 pm.

19 Met. Broadcast Band

15.340	DJR	BERLIN, GERMANY, 19.56 m., Addr. Br'dcast'g House, 4.50-10.50 pm. to C.A.
15.330	W2XAD	SCHENECTADY, N. Y., 19.56 m., Addr. General Electric Co. Relays WGY, 10.15 am.-5 pm.
15.330	W6XBE	SAN FRANCISCO, CALIF., 19.56 m. Addr. General Electric Co., 6.30-10 pm. to So. Amer., 7-10 am. to Orient. Radiates 20 kw. on each program. Golden Gate Exposition Station.
15.320	OZH	SKAMLEBAK, DENMARK, 19.58 m., Sun. 8 am.-1:30 pm.
15.310	GSP	DAVENTRY, ENG., 19.6 m., Addr. (See 17.79 mc.) 4.20-6, 6.20-8.30 pm., 12.25-4 pm.
15.300	YDB	SOERABAJA, JAVA, N. E. I. 19.61 m. Addr. NIROM. 10 pm.-2 am.
15.300	XEBM	MAZATLAN, SIN., MEX., 19.61 m., Addr. Box 7B, "El Pregonero del Pacifico." Irregularly 9-10 am., 1-2, 8-10 pm.
15.300	2RO6	ROME, ITALY. 19.61 m., Addr. (See 2RO, 11.81 mc.) 4.15-4.55, 10 am.-12.04 pm., 3-5.30, 6-9 pm.
15.290	VUD3	DELHI, INDIA, 19.62 m. Addr. All India Radio. 9.30-11.30 pm., 1.30-3.30 am., 7.30 am.-12.30 pm.
15.290	LRU	BUENOS AIRES, ARG., 19.62 m., Addr. El Mundo. Relays LRI, 7-9 am.
15.280	DJQ	BERLIN, GERMANY, 19.63 m., Addr. Broadcasting House. 12.05-11 am., 4.50-10.50 pm.
15.270	HI3X	CIUDAD TRUJILLO, D. R., 19.65 m. Relays HIX Sun. 7.40-9.40 am. Tues. and Fri. 8.10-10.10 pm.
15.270	W3XAU	PHILA., PA., 19.65 m. (Addr. See 21.52 mc.) Dly. 10.45-11.45 am. 12.30-5.15 pm. Sat. 10.45-11.45 am. Noon-5.15 pm. Sun. Noon-5 pm.
15.270	W2XE	NEW YORK CITY, 19.65 m., Addr. (See 21.570 mc.) 5.30-7.30 pm.
15.260	GSI	DAVENTRY, ENG., 19.66 m., Addr. (See 17.79 mc.) Mid. to 2.15 am. to Oceania. 12.25-1.30 pm.
15.250	W1XAL	BOSTON, MASS., 19.67 m., Addr. University Club. 2-3:30, or 4 pm., ex. Sat. and Sun.
15.245	TPA2	PARIS, FRANCE, 19.68 m., Addr. 98 Bis. Elvd. Haussmann. "Paris Mondial" 5-10 am. to Asia.
15.240	CR7BB	LOURENCO MARQUES, MOZAMBIQUE. 19.68 m. Testing 1-4 pm. Irreg.

(Continued on page 152)

All Schedules Eastern Standard Time

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Let's Listen In With Joe Miller

"DX" Editor

● HERE goes for DX:

CHINA

XPSA, 7.01 mc., Kweiyang, has QSL'd to Gail T. Beyer, Chicago, with a form letter from a Mr. Tung, which states sked is 5:30-11 a.m., freq. is 6.97 mc., slightly off their actual reading, and 10 kw. power is used. Mr. Tung desires reports, the more detailed, the better. QRA (address) is simply: XPSA, Kweiyang, Kweichow Province, China.

XGOX, 17.80 mc., and XGOY, 11.90 mc., are now on from Chungking, these being the summer freqs. XGOX is on 9-11:30 p.m., and XGOY from 7-10:30 a.m. On XGOY, woman announces in English on the quarter hour. This data from printed sked sent here from Chungking. Power used by these Xmtrs is 35 kw. Reported by G. C. Gallagher, W6, Murray and Jack Buitekant, Ralph Gozen and "Y. T."

TURKEY

TAP-TAQ, the Ankara broadcasters, have sent full data to Fred W. Alfred, VE2, concerning their station. These stations relay the local 120 kw. TAR, and each uses 20 kw. Daily skeds, which don't seem to be adhered to strictly, are: TAQ, 15.195 mc., 5:30-7 a.m., and TAP, 9.465 mc., 11.30 a.m.-5 p.m.

Reports should be sent to Correspondence Dept., Radio Ankara, Ankara, Turkey, and it is requested all reports be made out in G.M.T. We've heard that Ankara has already sent out some QSL's, so it may explain why none of us has heard from them as yet, when it is also reported that they have just lately arranged for the reply of the thousands of reports rec'd.

IRAQ

HNF, 9.70 mc., Baghdad, has been heard, though not too well, and to us it seems that this station will afford quite a number of DXers their best chance of "cleaning up" this rare country. Also reported by Jack and Murray Buitekant, W2. However, we've heard that this station has yet to honor a report with confirmation.

ALBANIA

ZAA, 7.85 mc., Tirana, has been reported heard at 7:30 a.m. recently by Murray Buitekant, W2, and his brother Jack, so perhaps it is still permitted to operate regularly, as we certainly hope. Its schedule was 6:30-7:30 a.m. daily, 6:30-8:30 a.m. Sundays.

ANGOLA

CR6RC, 11.74 mc., at Luanda, on a schedule of Tues., Thurs. and Sat., 2-3:30 p.m., has been reported by Ralph Gozen, W2, near latter time. Reports may be sent to Radio Club of Angola at Luanda. A nice catch, and easily the best opportunity to add Angola to one's list of countries. Go to it!

MOZAMBIQUE

CR7BB, 15.24 mc., Lourenco Marques, is going to help quite a few tuners to add this real DX country to their list this summer, as their schedule is 1-4 p.m. on this fine frequency for good reception, even from Mozambique. The QRA is Caixa Postal 594, this being the same as for CR7AA, CR7BH, possibly the very same transmitter on new frequency.

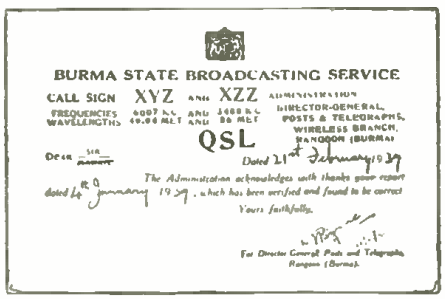
JAPAN

JLG3, 11.705 mc., and JZK, 15.16 mc., are listed in May Japanese schedule as on from 2:30-4 p.m. JZL, 17.785 mc., and JLT2, 9.645 mc., from 4:30-5:30 p.m. JZL will also be on 8-8:30 p.m. for Eastern U. S., as will JZK, 15.16 mc., from 7-7:30 p.m. A new one is JLU3, 15.135 mc., 8-9:30 a.m. One can earn some Asiatic veries easily by "cleaning up" these powerful stations, which promptly QSL with attractive photo cards, when reports are sent to: Broadcasting Corp. of Japan, at Tokyo, Japan.

G. C. Gallagher, W6, reports JIB, 10.53 mc., Formosa, at 10 a.m., phoning, and JVE, at 9 p.m., ditto.

BURMA and INDIA

VVS, 12.87 mc., Mingaladon, has been heard phoning VVN recently, with the latter at Fort Madras, India, being on 13.26 mc., and the usual contact time around 7 a.m. These are nice


BURMA STATE BROADCASTING SERVICE

CALL SIGN XYZ AND XZZ

QSL

Veri card received from Burma S-W station.

DX catches, especially VVS, Burma being a rare country to verify, but VVS can't be missed when heard, usually R6 or better, ditto VVN, and both will QSL all reports promptly.

VWY2, 17.48 mc., at Poona, using inverted speech also, as do VVN-S, phoned England at 8 a.m. once, with a powerful R8 signal here.

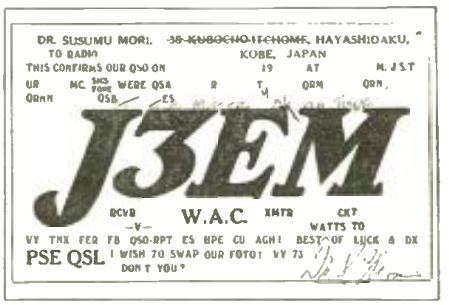
BRIEFS

COKG, 8.96 mc., Santiago, Cuba, offers Cuban cigars for reports, so we're certainly going to send at least a coupla good 'uns, as we sure do go for the better "ropes" in a big way, as our friends will regretfully testify, hi! Schedule is 5-6, 9:30-10:30 p.m. So— have a cigar!

K7GSC, Juneau, Alaska, sends us his request that we notify all U. S. DXers *not* to send him reply coupons, a 3c stamp being OK, as these U. S. coupons cannot be redeemed by him, Alaska being part of the U. S., and *not* a foreign country. Glad to oblige, Jerry.

From the Postmaster-General's office at Berbera, British Somaliland, we have received word that there are no *radiophone* stations in existence, neither commercial nor amateur, but only the government "wireless" service. Surprising, when one remembers that French and Italian Somaliland long have had gov't radiophone stations in operation, and heard all over the world.

VU2EU, Bill Metcalfe, India, a FB OB, asks that we notify SWL's that he can't possibly *swap* QSL's and photos, as has recently been mistakenly published. Bill got some 120 letters in *one mail alone*, and, being a radio officer, has very little time of his own, so cannot possibly handle such mail. Thanks for everything, Bill, you've been mighty swell!


DR. SUSUMU MORI, 38 KUBOCHO-TCHOME, HAYASHIDAKU, KOBE, JAPAN

J3EM

W.A.C.

PSE QSL

The author received this card from J3EM.

HAM STARDUST

Some DX has been reported, but as yet it has not been up to expectations, due to the unusual weather and other conditions prevailing.

BELGIAN CONGO—OQ5ZZ, 14350, heard with fair signal at 4:25 p.m. here, also reported by Jack Buitekant, W2.

INDIA—VU2LL, 14370; VU2JK, 14030; VU2CA, 14254; VU2FQ, 14078, all heard, with Murray Buitekant reporting 2 CA.

JAVA—PK1VY, 14100; PK2DF, 14040; PK2JN, 14320; PK1SK, 14070; PK1VX, 14070, all in Java, and PK4VR, 14375; PK4JD, 14100, in Sumatra, heard during early a.m.

JAPAN—J2MK, 14080; J2KI, 14250, in Japan, and J8CA, 14260; J8CG, 14400 approximate, heard during early a.m., 3-4 a.m. best. Gail Beyer, W9, reports a FB QSL from J8CG. Very nice to get one of these, as J8 is Korea, now Chosen.

CHINA—XU3AA, 14075; XU8HW, 14080; XU8JR, 14130; XU8ET, 14060; XU6TL, 14050; XU8MT, 14030, all in early a.m.

Also VS1AF, 14060; VS1AB, 14250, in Straits Settlements. VS2AR, 14310, in Fed. Malay States. VS5AC, 14370, reported from Sarawak, a rare catch.

VS6AF, 14300, Hong Kong. VS7RF, 14336;

(Continued on page 189)

I COVER THE PACIFIC COAST

By Lyle M. Nelson

(All times are P.S.T.)

● ONE of the strongest European short wave signals ever heard here was reported this spring when the powerful Moscow transmitter RAI, came on the air. RAL has been reported by many listeners as testing on 15.18 mc. irregularly from 4 to 6 p.m. Several listeners have also reported the station in the early afternoon and morning.

Another station on the "coming-in-fine" list for the past month has been ZRK on 9.606 mc. The signals from Cape Town, South Africa, over this station have been very well received from 8:45 to 9:45 each night. T. C. Turlay of Portland reports good reception from ZRK from 6 to 8:45 a.m.

The correct schedule for the Norwegian short wave stations, according to information on their QSL card received by Bert Wolfe of Oakland, California, is as follows: LKJ (9.61 mc.) from noon to 11 p.m. LKQ (11.73 mc.) from 11 p.m. to 3:40 a.m. and from 7 a.m. to noon. LKU (15.17 mc.) from 3:40 to 7 a.m., and LKJ2 (6.13 mc.) from 8 to 11 p.m.

A new Chinese station announcing as XMHA has been reported with fair volume here. XMHA broadcasts on 11.94 mc. from 6 to 8 a.m. according to John Cavanagh of Oregon City. Announcements indicate that the station is run by the Japanese. The QRA is given as: 445 Racecourse Road, Shanghai.

A new station in Papua, British Guinea, has been heard here on 7.31 mc. The station is very weak near 5 a.m.

JZK, on 15.16 mc. in Tokyo, continues to carry the popular "overseas program" for the Pacific Coast from 9:30 to 10:30 each night. Reception is very good during the entire program. JVH on 14.60 mc. has been heard on several occasions broadcasting the Japanese baseball games on Saturday night.

According to recent announcements from Finland, OFE on 11.79 mc., and OIE on 15.19 mc., are now operating from 10 p.m. to 8 a.m. daily. Both stations are received here from 10 to 12 p.m. Frequent announcements are given in English.

Also heard with good volume during the late evenings have been VUM2 on 11.87 mc. and VUC2 on 9.53 mc. VUM2 is located in Madras, India, and comes on the air at 12:30 a.m., signing off at 1 a.m. VUC2 of Calcutta sends programs consisting of native music with announcements in English during the same time.

The new Treasure Island short wave stations are now operating regular schedules on 15.33 and 9.53 mcs. Programs for South America are broadcast on 15.33 mc. from 4 to 7 p.m. and programs for Asia and the Far East are sent out from 4 to 7 a.m. on 9.53 mc.

Despite reports that the station is off the air, Z11P, on 9.69 in Singapore, continues to reach here daily from 1:40 to 6:40 a.m. Best reception is around 6 a.m., with the station gradually fading out after that time.

Round 'n' About—VUD4 on 15.29 mc. in Delhi is now heard nightly from 6:30 to 8:30 . . . . Bert Wolfe says call of Norway station on 10.71 mc. is LCN . . . . Radio Tirana on 6.085 mc. is a new station in Albania . . . . SBP of Motala, Sweden, is received with fair volume on 11.71 mc. Wednesday and Saturday from 5 to 6 p.m. Station no longer verifies reports . . . . "Radio Leopoldville" in Belgian Congo is on the air from 4 to 5:30 a.m. daily . . . . XGOY is on 11.90 mc. daily from 2 to 8 a.m. . . . . New Taikoku station on 9.69 mc. relays JFAK in early mornings . . . . A new powerful short wave transmitter is being constructed in Bucharest, Rumania. Will have 50,000 watts power . . . . VPD2 on 9.54 in Suva, Fiji, is excellent during early morning hours. New address for VLR and VLR3 is P.O. Box 1686, Melbourne.

www.americanradiohistory.com

Mc.	Call	
15.230	HS6PJ	BANGKOK, SIAM, 19.7 m. Irregularly Mon. 8-10 am.
15.230	OLR5A	PRAGUE, BOHEMIA. 19.7 m. Addr. (See OLR4A, 11.84) Daily 4.55-8.15 am.
15.220	PCJ2	HUIZEN, HOLLAND, 19.71 m. Addr. N. V. Philips' Radio Hilversum. Wed. 9.30-11.30 am. Sun. 6.10-9.35 am. Daily 7.10-8.15 am. Mon., Thurs. 7.10-8.30 am.
15.210	W8XK	PITTSBURGH, PA., 19.72 m., Addr. (See 21.540 mc.) 8 am-1 pm.
15.200	DJ8	BERLIN, GERMANY, 19.74 m., Addr. (See 15.280 mc.) 12.05-11 am., 4.50-10.50 pm. Also Sun. 11.10 am.-12.25 pm.
15.195	TAQ	ANKARA, TURKEY, 19.74 m., 5.30-7 am.
15.190	OIE	LAHTI, FINLAND. 19.75 m. Addr. (See OFD, 9.5 mc). 1:05-4 am, 9 am.-5 pm.
15.190	ZBW4	HONGKONG, CHINA, 19.75 m. Addr. P. O. Box 200. Irregular. 11.30 pm. to 1.15 am., 3-10 am.
15.180	GSO	DAVENTRY, ENG., 19.76 m., Addr. (See 17.79 mc.) 4.20-6, 6.20-8.45 pm.
15.180	RW96	MOSCOW, U.S.S.R., 19.76 m., Daily 1-2, 3-4 am. Mon., Wed., Thurs. 7-9.15 pm.
15.170	TGWA	GUATEMALA CITY, GUAT., 19.77 m., Addr. Ministre de Fomento. Daily 12.45-1.45 pm.; Sun. 12.45-5.15 pm.
15.166	LKV	OSLO, NORWAY, 19.78 m. 6.40-10 am.
15.160	JZK	TOKYO, JAPAN, 19.79 m. 12.30-1.30 am. to Canada & Hawaii, and Pacific U.S. 7-7.30 am. to Eastern U.S. 8-9.30 am. to China and 2.30-4 pm. to Europe.
15.160	XEWW	MEXICO CITY, MEXICO, 19.79 m., 12 n.-12 m., irregular.
15.155	SM5SX	STOCKHOLM, SWEDEN, 19.79 m., Daily 11 am.-5 pm., Sun. 9 am.-5 pm.
15.150	YDC	BANDOENG, JAVA, 19.8 m., Addr. N. I. R. O. M. 6-7.30 pm., 10.30 pm.-2 am., Sat. 7.30 pm.-2 am., daily 4.30-10.30 am.
15.140	GSF	DAVENTRY, ENG., 19.82 m., Addr. (See 17.79 mc.) 5.45 am.-12 n. 4.20-6 pm.
15.135	JLU3	TOKYO, JAPAN, 19.82 m., 8-9.30 am. to China.
15.130	TPB6	PARIS, FRANCE. 19.83 m., Addr. "Paris Mondial," 98 Bis Blvd. Haussmann, 1-4 am.
15.130	WIXAR	BOSTON, MASS., 19.83 m., Addr. World-Wide B'cast'g Foundation. University Club. Sun. 11 am.-12.30 pm. Wkdys. 3.30-6 pm.
15.120	SP19	WARSAW, POLAND, 19.84 m., 6-9 pm.
15.120	HVJ	VATICAN CITY, 19.83 m., 10.30-10.45 am., Tues., Suns. 1-1.30 pm.
15.120	CSW4	LISBON, PORTUGAL, 19.83 m., 6-8 am., irreg.
15.110	DJL	BERLIN, GERMANY, 19.85 m., Addr. (See 15.280 mc.) 12.05-2, 8-9 am., 10.40 am.-4.25 pm.
15.100	CB1510	VALPARAISO, CHILE. 19.87 m. Testing near 7.30 am.
15.100	2RO12	ROME, ITALY. 19.87 m. Testing irreg.
15.083	RKI	MOSCOW, U.S.S.R., 19.89 m. Works Tashkent near 7 am. Broadcasts Sun. 12.15-2.30 pm. Daily 7-9.15 pm.

End of Broadcast Band

14.960	—	MOSCOW U.S.S.R., 20.25 m., 1st of month, 6 pm. Dutch program.
14.930	PSE	RIO DE JANEIRO, BRAZIL. 20.09 m. Broadcasts 6-7 pm.
14.920	KQH	KAHUKU, HAWAII, 20.11 m. Sats. 1-1.30 am., 11-11.30 pm. Fri. 9-10 pm.
14.795	IQA	ROME, ITALY, 20.28 m. 4.30-5 am. In Arabic.
14.600	JVH	NAZAKI, JAPAN, 20.55 m. Works Europe 4-8 am. Rel. JOAK 10-10.30 pm.
14.535	HBJ	GENEVA, SWITZERLAND, 20.64 m. Addr. Radio Nations. Broadcasts Sun. 10.45-11.30 am., Mon. 4-4.15 am.
14.440	—	RADIO MALAGA, SPAIN, 20.78 m. Relays Salamanca 5.45-7.30 pm. Sometimes 2-4 pm.
14.420	HCIJB	QUITO, ECUADOR, 20.80 m. 7-8.15, 11.30 am.-2.30, 4.45 pm.-10.15 pm. Exc. Mon.
14.166	PIIJ	DORDRECHT, HOLLAND, 21.15 m., Addr. (See 7.088 mc.) Sat. 12 n.-12.30 pm.
13.997	EA9AH	TETUAN, SPANISH MOROCCO, 21.43 m. Apartado 124. 5.15-6.15 pm., 6.30-7.30 pm., 9-10 pm. Relays Salamanca from 5.40 pm.
13.635	SPW	WARSAW, POLAND, 22 m. Daily 6-8 pm. Sat. & Sun. 6-9 pm.
12.862	W9XDH	ELGIN, ILL., 23.32 m. Press Wireless, Tests 2-5 pm.
12.486	HIIN	TRUJILLO CITY, DOM. REP., 24.03 m. 6.40-10.40 am., 5.10-10.10 pm.
12.460	HC2J8	QUITO, ECUADOR, 24.08 m. Daily exc. Mon. 7-8.15, 11.30 am.-2.30, 4.45-10.15 pm.
12.310	VOF8	ST. JOHNS, NEWFOUNDLAND. 24.37 m. 5.30-7.30 pm.
12.235	TFJ	REYKJAVIK, ICELAND, 24.52 m. Works Europe mornings. Broadcasts Sun. 1.40-2.30 pm.
12.230	COCE	HAVANA, CUBA, 24.53 m.-8 am.-11.30 pm. Sun. noon-11.30 pm.
12.200	——	TRUJILLO, PERU, 25. m., "Rancho Grande." Address Hacienda Chiclin. Irregular.
12.000	RNE	MOSCOW, U.S.S.R., 25 m. 6-6.30, 10-10.30 am., 1-1.30, 3-5.30, 8.30-10 pm., Sun. 6-10 am., 1-6, 9-10 pm.
11.970	CB1180	SANTIAGO, CHILE, 25.06 m. 7-11 pm.
11.970	HI2X	CIUDAD TRUJILLO, D. R., 25.07 m., Addr. La Voz de Hispaniola. Relays HIX Tue. and Fri. 8.10-10.10 pm. Sun. 7.40-9.40 am.

25 Met. Broadcast Band

11.940	TI2XD	SAN JOSE, COSTA RICA, 25.13 m. La Voz del Pilot. Apartado 1729. 7.30 am.-noon, 4-10 pm.
11.940	XMHA	SHANGHAI, CHINA. 25.13 m. 5-11 am.
11.910	CD1190	VALDIVIA, CHILE, 25.19 m., P. O. Box 642. Relays CB69 10 am.-1 pm., 3-6, 7-10 pm.
11.910	—	HANOI, FRENCH INDO-CHINA. 25.19 m. "Radio Hanoi", Addr. Radio Club de l'Indochine. 3.45-4.15 am., 7-9.30 am., 150 watts.
11.900	XEWI	MEXICO CITY, MEXICO, 25.21 m., Addr. P. O. Box 2874. Mon., Wed., Fri. 3-4 pm., 9 pm.-12 m. Tues. and Thur. 7.30 pm.-12 m., Sat. 9 pm.-12 m., Sun. 12.30-2 pm.
11.900	XGOY	CHUNGKING, CHINA, 25.21 m., 5.30-7.10 am. to North Asia, 7.15-7.55 am. to Japan. 8-10.30 am. to South Asia. 11-11.30 am. to U.S.S.R. 4-6.30 pm. to Europe. Mar. 21-Sept. 21—35 kw.
11.895	2RO13	ROME, ITALY. 25.23 m. Irregular 6-9 pm.
11.885	TPA3	PARIS, FRANCE, 25.24 m., 10.15 am.-5 pm. 1-4 am.
11.885	TPB7	PARIS, FRANCE, 25.24 m. (See 15.245 mc.) 6-8.15, 8.30-11 pm.
11.880	VLR3	MELBOURNE, AUST., 25.25 m., 3.30-7.15 pm., 9 pm.-3 am. weekdays. Suns. mid.-3 am.
11.870	W8XK	PITTSBURGH, PA., 25.26 m., Addr. (See 21.540 mc.) 1-10 pm.
11.870	VUM2	MADRAS, INDIA, 25.26 m. M.W.F. 3.30-4 am. Irregular.
11.865	——	BERNE, SWITZERLAND. 25.28 m. Irreg. 8-9 pm. to No. Amer.
11.860	GSE	DAVENTRY, ENG., 25.30 m., Addr. (See 11.75 mc.) 5.45 am.-12 n., 6.20-8.30 pm.
11.855	DJP	BERLIN, GERMANY, 25.31 m., Addr. (See 15.280 mc.) Irregular.
11.850	CB1185	SANTIAGO, CHILE, 25.32 m. Sat. 6-11 pm. and irreg.
11.850	OAX2A	TRUJILLO, PERU, 25.32 m. Testing on this freq. (See 12.200).
11.840	KZRM	MANILA, P. I., 25.35 m. Addr. Erlanger & Gallinger, Box 283. 9 pm.-10 am. Irregular.
11.840	CSW	LISBON, PORT., 25.35 m. Nat'l Broad. Station. 11.30 am.-1.30 pm. Irregular.
11.840	OLR4A	PRAGUE, BOHEMIA, 25.34 m., Addr. Czech Shortwave Sta., Praha XII, Fochova 16. Daily 12.45-6.30, 7.55-11.20 pm. Sun. Also 8.25-10.05 am.
11.830	W9XAA	CHICAGO, ILL., 25.36 m., Addr. Chicago Federation of Labor. Irregular 7 am.-6 pm.
11.830	W2XE	NEW YORK CITY, 25.36 m., Addr. Col. Broad. System, 485 Madison Av., N.Y.C. 8-10.30 pm.
11.826	XEBR	HERMOSILLA, SON., MEX., 25.37 m., Addr. Box 68. Relays XEBH. 9.30-11 am., 1-4 pm., 9 pm.-12 m.
11.810	2RO4	ROME, ITALY, 25.4 m., Addr. E.I.A.R., Via Montello 5. Daily 4.30-8.45 am., 10 am.-2.30 pm., 6-9 pm.
11.805	OZG	SKAMLEBAK, DENMARK, 25.41 m. Addr. Statsradiofonien. Irreg.
11.801	DJZ	BERLIN, GERMANY, 25.42 m. 4.50-10.50 pm. to N. A.
11.800	COGF	MATANZAS, CUBA, 25.42 m., Addr. Gen. Betancourt 51. Relays CMGF. 2-3, 4-5, 6 pm.-Mid.
11.800	JZJ	TOKYO, JAPAN, 25.42 m., Addr. Broadcasting Co. of Japan, Overseas Division 7-7.30, 8-9.30 am. Irreg.
11.795	DJO	BERLIN, GERMANY, 25.42 m. 4.50-Addr. (See 15.280 mc.) Irreg.
11.790	WIXAL	BOSTON, MASS., 25.45 m., Addr. (See 15.250 mc.) 3.30-6.30 pm. Sat., 2-6.30 pm.
11.780	HP5G	PANAMA CITY, PAN., 25.47 m., Addr. Box 1121. Noon-1 pm., 6-10 pm.
11.780	OFE	LAHTI, FINLAND. 25.47 m. Addr. (See OFD, 9.5 mc.) 1.05-3 am., 5-6.20, 10 am.-12.30 pm.
11.770	DJD	BERLIN, GERMANY, 25.49 m., Addr. (See 15.280 mc.) 11.30 am.-4.25 pm., 4.50-10.50 pm.
11.760	TGWA	GUATEMALA CITY, GUAT., 25.51 m. (See 17.8 mc.) Irregular 10-11.30 pm. Sun. 6-11.30 pm., irregular.
11.760	XETA	MONTEREY, MEX. 25.51 m., Addr. Box 203. Relays XET, n.-3.30 pm. and evenings.
11.760	OLR4B	PRAGUE, BOHEMIA, 25.51 m. Addr. (See 11.840 mc.) Daily exc. Sun. 8.25-10.05 am.
11.750	GSD	DAVENTRY, ENG., 25.53 m., Addr. B.B.C., London, 12-2.15 am., 12.25-4, 4.20-6, 6.20-8.30, 9.20-11.30 pm.
11.740	SP25	WARSAW, POLAND, 25.55 m., 6-9 pm.
11.740	HVJ	VATICAN CITY, 25.55 m. Tues. 8.30-9 am.
11.740	CR6RC	LOANDA, ANGOLA, 25.55 m., Tues., Thurs., Sat. 2-3.30 pm.
11.735	COCX	HAVANA, CUBA. 25.57 m. P. O. Box 32. Daily 8 am.-1 am. Sun. 8 am.-1 am. Relays CMX.
11.735	LKQ	OSLO, NORWAY, 25.57 m. 2-6.40, 10 am.-3 pm.
11.730	PHI	HUIZEN, HOLLAND, 25.57 m., Addr. N. V. Philips' Radio.
11.730	WIXAR	BOSTON, MASS., 25.58 m., Addr. World-Wide B'cast'g Foundation, University Club. Daily 7 or 7.30-9, 9.15-11 pm. Sat.-Sun. 2.30-5 pm.
11.720	CJRX	WINNIPEG, CANADA, 25.6 m., Addr. James Richardson & Sons, Ltd. Daily 6 pm.-12 m., Sat. 6 pm.-Sun. 4 am.
11.720	ZP14	VILLARICA, PARAGUAY, 25.60 m. 5.30-7.55 pm. irreg.
11.718	CR7BH	LAURENCO MARQUES, PORTUGUESE E. AFRICA, 25.6 m. Daily 12.05-1, 4.30-6.30, 9.30-11 am., 12.05-4 pm., Sun. 5-7 am., 10 am.-2 pm.
11.715	TPA4	PARIS, FRANCE, 25.61 m., (See 15.245 mc.) 6-8.15, 8.30-11 pm. to No. America.
11.710	YSM	SAN SALVADOR, EL SALVADOR, 25.63 m., Addr. (See 7.894 mc.) 1-2.30 pm.
11.710	—	SAIGON, FRENCH INDO-CHINA. 25.62 m., Addr. Boy-Landry, 17 Place A Foray. 7.30-9.15 am.
11.705	JLG3	TOKYO, JAPAN, 25.63 m. 2.30-4 pm.—Irreg. 4.30-5.30 pm.
11.705	SBP	MOTALA, SWEDEN, 25.63 m., 1-4.15 pm. Sun. 3 am.-4.15 pm. Wed and Sat. 8-9 pm.

(Continued on page 154)

All Schedules Eastern Standard Time

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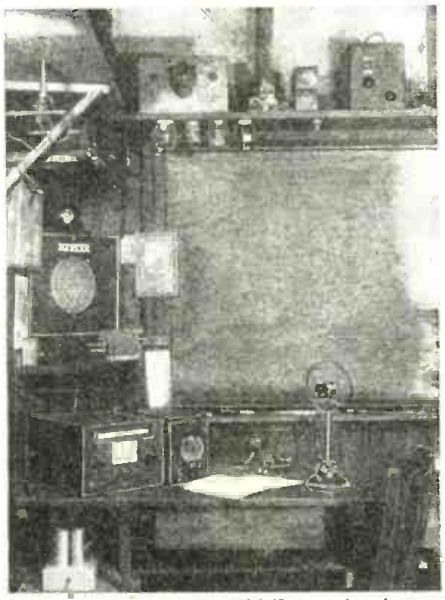
13th Silver Trophy Award

For Best HAM Station Photo of the Month

Awarded to *William Schofield* ("Skipper"—VK6WS)

Peppermint Grove Western Australia



Operating desk of Station VK6WS, owned and operated by William Schofield of Peppermint Grove, Western Australia; known affectionately to his friends on the air as "Skipper."

This beautiful silver trophy stands 11¾" high and one is awarded monthly by RADIO & TELEVISION magazine for the best photo of a Ham station. The silver statue stands on a handsome bakelite base on which is a silver plate. The name of the winner will be engraved on this plate before the trophy is sent to him.

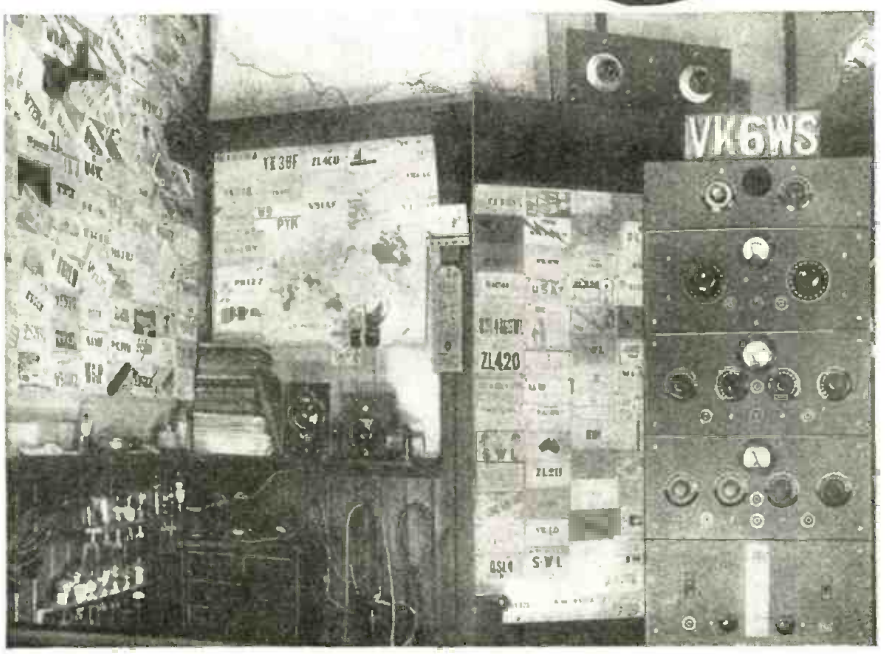
Well, boys, here's "Skipper"—otherwise William Schofield, VK6WS, of Western Australia.

"Skipper's" station certainly steps out. Look at the beautiful array of QSL cards in the photo below.

Editor,

Herewith photos of my "Ham" station VK6WS and one of myself. In business I am an estate (real estate) agent and obtained my amateur ticket (license) four years ago when I was 61 years of age.

I have made all my "gear" at home except my receiver. My shack is only 6 feet by 6 feet, 6 inches—there is, therefore, no waste space. The photo of the cards and part of the transmitter was taken through the window with two exposures and the prints joined together.



The transmitter is mounted on casters; it comprises an 8-stage rack and panel. Stages Nos. 1, 2 and 3—for power packs and grid bias; No. 4—modulator for phone, music and C.W., 2—37's, and a 250; No. 5—80-meter C.C. transmitting unit (tri-tet) 59 and 46; No. 6—40-, 20- and 10-meter transmitting unit (Jones) 3—6A6's; No. 7—final amplifier T-20; No. 8—aerial tuning panel. Meters Ferranti and Triplett. Power, 45 watts input to final; plate modulation and Ericcson carbon mike. Receiver—National FBXA, with pre-selector and Jensen speaker. Aerials—(1) 20 meter (2 half waves in phase) with reflectors, directional USA; (2) ½ wave, 40 ft. single wire fed Hertz (all receiving is done on this as well as transmitting); (3) 45 ft. lattice tower erected for W8JK beam—not yet completed. Other gear is a wave-

(Continued on page 183)

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Mc.	Call	
11.700	HP5A	PANAMA CITY, PAN., 25.64 m. Addr. Radio Teatro, Apartado 954. 10 am.-1 pm., 5-10 pm. Sun. 6-10 pm. 7-8.30 am.
11.700	CB1170	SANTIAGO, CHILE, 25.65 m. Addr. P.O. Box 706. Relays CB89 10 am.-2 pm., 3.30-11 pm.

End of Broadcast Band

11.676	IQY	ROME, ITALY. 25.7 m. 5.20-5.40 am. ex. Sun., Daily 12.07-12.56, 1.50-2.30 pm.
11.535	SPD	WARSAW, POLAND, 26.01 m., Addr. 5 Mazowiecka St. 6-9 pm.
11.402	HBO	GENEVA, SWITZERLAND, 26.31 m., Addr. Radio Nations. Sun. 7-7.45, 8-8.45 pm. 1.45-2.30 pm. Mon. 3.30-3.45 am.
11.380	XTS	CHUNGKING, CHINA. 26.36 m. 1-1.30, 8-8.35 am., 6.45-7.30 pm.
11.040	CSW5	LISBON, PORTUGAL, 27.17 m., Addr. Nat. Broad Sta. 11 am.-4.30 pm. Sun. 10 am.-4.30 pm.
11.000	PLP	BANDOENG, JAVA, 27.27 m. Relays YDB. 6-7.30 pm., 10.30 pm.-2 am., 4.30-10.30 or 11 am. Sat. until 11.30 am.
10.950	——	TANANARIVE, MADAGASCAR, 27.40 m., Addr. (See 9.38 mc.) 12.30-45, 10-11 am., 2.30-4 am.,
10.670	CEC	SANTIAGO, CHILE, 28.12 m. Irregular.
10.660	JVN	NAZAKI, JAPAN, 28.14 m. Broadcasts daily 1.50-7.40 am. Works Europe irregularly at other times.
10.535	JIB	TAIHOKU, TAIWAN, 28.48 m. Works Japan around 6.25 am. Broadcasts, relaying JFAK 9-9.55 am., 1-2.30 am. Sun. to 10.15 am.
10.400	YSP	SAN SALVADOR, EL SALVADOR, 28.85 m., 1-3, 6.30-11 pm.
10.360	EAJ43	TENERIFE, CANARY ISL., 28.96 m., 3-4.30, 5-7, 7.45-8.45, 9-10 pm.
10.350	LSX	BUENOS AIRES, ARG., 28.98 m., Addr. Transradio International. Tests irregularly.
10.330	ORK	RUYSSELEDE, BELGIUM, 29.04 m. Broadcasts 12.30-2 pm. Works OPM 1-3 am., 3-5 pm.
10.260	PMN	BANDOENG, JAVA, 29.24 m. Relays YDB 6-7.30 pm., 10.30 pm.-2 am., 4.30-10.30 or 11 am., Sat. to 11.30 am.
10.220	PSH	RIO DE JANEIRO, BRAZIL, 29.35 m., Addr. Box 709. Broadcasts 6-7 pm., Irreg.
10.100	——	DEUTSCHE FREIHEITS SENDER, 29.70 m., loc. in Germany, undercover. 4-5 pm.
10.050	TIEMT	SAN JOSE, COSTA RICA, 29.85 m., 4.30-8 pm.
10.050	DZC	ZEESEN, GERMANY, 29.16 m., Addr. (See 15.360 mc.) Irregular.
10.042	DZB	ZEESEN, GERMANY, 29.87 m., Addr. Reichspostzenstralamt. Irregular.
9.995	COBC	HAVANA, CUBA, 30.02 m., Addr. P. O. Box 132. Relays CMBC 6.55 am.-1 am.
9.920	JDY	DAIREN, MANCHUKUO, 30.24 m. Relays JQAK daily 7-8 am. Works Tokyo occasionally in early am.
9.892	CPI	SUCRE, BOLIVIA, 30.33 m., 11 am.-n., 7-9 pm.
9.855	EAQ	MADRID, SPAIN, 30.45 m., Addr. P. O. Box 951. 7.30-8, 8.40-9 pm. 3.45-4.05, 4.45-5.05 am., also.
9.830	IRF	ROME, ITALY, 30.52 m. Works Egypt afternoons. Relays 2RO. 12-12.25 pm. Thurs. Daily 12.40-1, 1.37-3.35, 6-9 pm.
9.805	COCM	HAVANA, CUBA, 30.60 m. Addr. Transradio Columbia, P. O. Box 33. 8-1 am. Relays CMCM.
9.770	HH3W	PORT-AU-PRINCE, HAITI, 30.71 m., Addr. P. O. Box A117. 1-2, 7-9.15 pm.
9.753	ZRO	DURBAN, SOUTH AFRICA, 30.75 m. Addr. S. A. Broadcasting Corp., P. O. Box 4559, Johannesburg. Daily exc. Sat. 11.45 pm.-12.50 am. Daily exc. Sun. 3.30-7.30, 9 am.-12.30 pm., Sun. 5.30-7, 9 am.-12.30 pm., also 4-5 am. on 3rd Sun. of month.
9.735	CSW7	LISBON, PORTUGAL, 30.82 m. Addr. Nat. Broad. Sta. n.-2 pm., 6-9 pm. for No. Amer.
9.730	CB970	VALPARAISO, CHILE, 30.83 m., 6.30-11.30 pm., or mid.
9.708	COCQ	HAVANA, CUBA, 30.90 m. Addr. 25 No. 445, Vedado, Havana, 7-1 am. Sun. 6.55 am.-1 am.

31 Met. Broadcast Band

9.705	——	FORT DE FRANCE, MARTINIQUE, 30.92 m., Addr. P. O. Box 136. 6-8.10 pm.
9.700	——	SAIGON, INDO-CHINA, 30.93 m., Addr. 17, Place A. Foray, "Radio Boy-Landry." 7.30-9.45 am. Irreg.
9.700	HNF	BAGHDAD, IRAQ, 30.93 m., 10 am.-3 pm. S.O. before or after 3 pm.
9.690	TI4NRH	HEREDIA, COSTA RICA, 30.94 m., Addr. Amando C. Marin, Apartado 40. Sun. 7-8 am., Tues., Thurs., Sat. 9-10 pm.
9.690	LRA1	BUENOS AIRES, ARG., 30.94 m., 6-9 pm. Mon-Thur., 4-9 pm. Fri., 7-9 pm. Sat.
9.690	—	TANANARIVE, MADAGASCAR, 30.96 m., 10-11 am.
9.690	ZHP	SINGAPORE, MALAYA, 30.96 m. Sun. 5.40-9.40 am., Wed. 12.40-1.40 am., Mon.-Fri. 4.40-9.40 am., Sat. 12.25-1.40 am., 4.40-9.40 am., 10.40 pm.-1.10 am. (Sun.)
9.690	GRX	DAVENTRY, ENGLAND, 30.96 m., Addr. See GSC, 9.58 mc., 5.45 am.-12 n., 12.25-4, 4.45-6 pm.
9.685	TGWA	GUATEMALA CITY, GUAT., 30.96 m. Daily 10-11.30 pm.; Sun. 7-10.45 pm.
9.675	DJX	BERLIN, GERMANY, 31.01 m., Addr. (DJD, 11.77 mc.) 10.40 am.-4.25 pm.
9.670	W3XAL	BOUND BROOK, N. J., 31.03 m. Addr. NBC, N. Y. C. 5 pm.-12 m.
9.665	2RO9	ROME, ITALY, 31.04 m. 12.40-1, 1.37-5.30 pm. Irreg. 6-9 pm.
9.660	LRX	BUENOS AIRES, ARG., 31.06 m., Addr. El Mundo. Relays LR1, 6-6.45 am.-9.15 am.-10 pm.
9.660	HVJ	VATICAN CITY, 31.06 m. Sun. 5-5.30 am.
9.650	W2XE	NEW YORK CITY, 31.09 m. (See 21.570 mc. for addr.) Irregular.
9.650	CS2WA	LISBON, PORTUGAL, 31.09 m., Addr. Radio Colonial. Tues., Thurs. and Sat. 4-7 pm.
9.650	IABA	ADDIS ABABA, ETHIOPIA, 31.09 m., 3.55-4.05, 4.15-4.45, 11 am.-noon, 1-3 pm. Suns. 3.30-3.55 am.
9.645	JLT2	TOKYO, JAPAN, 31.10 m., 2.30-4 pm. to Europe.
9.640	CXA8	COLONIA, URUGUAY, 31.12 m., Addr. Belgrano 1841, Buenos Aires, Argentina. Relays LR3 Buenos Aires 5 am.-10.45 pm. Sat. to 1 am.
9.636	JFO	TAIHOKU, TAIWAN, 31.13 m. Relays JFAK irreg. 4-10.30 am.
9.635	2RO3	ROME, ITALY, 31.13 m., Addr. (See 11.810 mc.) 12.07-3 pm., 5.30-9 pm., also Mon. 3.50-4.05 pm., Fri. and Sat. 4-4.20 pm.
9.620	CXA6	MONTEVIDEO, URUGUAY, 31.19 m., Rel. CX 6 to 9 pm.
9.618	HJ1ABP	CARTAGENA, COL., 31.20 m., Addr. P. O. Box 37. Daily 9 am.-1.30 pm., 7-10.15 pm., Sun. 4.30-9 pm.
9.610	LLG	OSLO, NORWAY, 31.22 m., 3-6, 8-9, 11 pm.-mid.
9.606	ZRL	KLIPHEUVAL, SOUTH AFRICA, 31.23 m., Addr. P. O. Box 4559, Johannesburg. Daily, exc. Sat. 11.45 pm.-12.50 am. Daily exc. Sun. 3.20-7.20, 9-11.45 am., Sun. 3.30-4.30 or 4-5, 5.30-7, 9-11.45 am.
9.600	RAL	MOSCOW, U.S.S.R., 31.25 m. Daily exc. Sun. 6-10 pm. Sun. 6-7, 9.15-10 pm.
9.600	CB960	SANTIAGO, CHILE, 31.25 m., 8-11.30 pm.
9.600	GRY	DAVENTRY, ENG., 31.25 m., Addr. See GSC, 9.58 mc., Irreg. 12.25-6 pm.
9.595	—	MOYDRUM, ATHLONE, EIRE, 31.27 m., Radio Eireann. 12.30-4.30 pm. Irreg.
9.595	HBL	GENEVA, SWITZERLAND, 31.27 m., Addr. Radio Nations. Irregular.
9.590	HP5J	PANAMA CITY, PANAMA, 31.28 m. Addr. Apartado 867. 12 n. to 1.30 pm., 6-10.30 pm.
9.590	VUD2	DELHI, INDIA, 31.28 m. Addr. All India Radio, 1.30-3.30 am., 7.30 am.-12.30 pm., 8.30-10.30 pm.
9.590	PCJ	HUIZEN, HOLLAND, 31.28 m., Addr. (See 15.220 mc.) Sun. 2-3, 7.15-9.25 pm. Tues. 1.45-3.30, 7-8.30, 8.45-10.15 pm., Wed. 7.15-8.40 pm., Fri. 8-9 pm.
9.590	VK6ME	PERTH, W. AUSTRALIA, 31.28 m., Addr. Amalgamated Wireless of Australasia, Ltd. 6-8 am. exc. Sun.
9.590	VK2ME	SYDNEY, AUSTRALIA, 31.28 m., Addr. Amalgamated Wireless of Australasia, Ltd., 47 York St., Sun. 1-3 am.; 5-9, 10.30 am.-12.30 pm.
9.590	W3XAU	PHILADELPHIA, PA., 31.28 m. (Addr. See 21.52 mc.) Mon. & Thurs. 5.30-6.15, 6.30-10.30 pm., 11 pm.-Mid. Sat. 5.30-6, 6.30-10.30 pm.
9.580	GSC	DAVENTRY, ENGLAND, 31.32 m., Addr. B. B. C., Portland Pl., London, W. 1., 12.25-4, 4.20-6, 9.20-11.30 pm.
9.580	VLR	MELBOURNE, AUSTRALIA, 31.32 m., Addr. Box 1686, G. P. O. Daily 3.30-8.30 am. (Sat. till 9 am.) Sun. 12.01-7.30 am. Also daily exc. Sat. 9.25 pm.-2 or 2.15 am. Sat. 5-10.30 pm.
9.570	KZRM	MANILA, P. I., 31.35 m., Addr. Erlanger & Galinger, Box 283. Wkdys. 4.30-6 pm. m. tof. 5-9 am., Sat. 5-10 am., Sun. 4-10 am.
9.570	W1XK	BOSTON, MASS., 31.35 m., Addr. Westinghouse Electric & Mfg. Co. 6 am.-12 m. Sun. 7 am.-12 m.
9.566	OAX4T	LIMA, PERU, 31.38 m., 7-8, 11.30 am.-1.30 pm.
9.560	XGAP	PEKING, CHINA, 31.38 m., 4-9 am.
9.560	DJA	BERLIN, GERMANY, 31.38 m., Addr. Broadcasting House. 6.30-10.50 pm.
9.550	HVJ	VATICAN CITY, 31.41 m., Sun. 5-5.30 am., Wed. 2.30-3 pm.
9.550	TPB11	PARIS, FRANCE, 31.41 m. Addr. (See 15.245 mc.) 11.15 am.-7 pm., 9.30 pm.-mid. Irreg.
9.550	W2XAD	SCHENECTADY, N. Y., 31.41 m., General Electric Co., 5.15-8.15 pm. to So. Amer.
9.550	OLR3A	PRAGUE, BOHEMIA. 31.41 m. (See 11.840 mc.) Irreg. 4.40-5.10 pm.
9.550	XEFT	VERA CRUZ, MEX., 31.41 m. 10.30 am.-4.30 pm., 10.30 pm.-12.30 am.
9.550	YDB	SOERABAJA, JAVA, 31.41 m., Addr. N.I.R.O.M. Daily exc. Sat. 6-7.30 pm., 10.30 pm.-2 am.-4.30-10.30 am. Sat. 7 pm.-2 am.
9.550	VUB2	BOMBAY, INDIA. 31.41 m., Addr. All India Radio. 9.30-10.30 pm., 1-3.30 am. 5-6 am. also.
9.540	DJN	BERLIN, GERMANY, 31.45 m., Addr. (See 9.560 mc.) 12.05-11 am. 4.50-10.50 pm. to So. Amer.
9.538	VPD2	SUVA, FIJI ISLANDS, 31.46 m., Addr. Amalgamated Wireless of Australasia, Ltd. 5.30-7 am., exc. Sun.
9.535	—	SCHWARZENBURG, SWITZERLAND, 31.46 m., 1-2 pm. 6.45-7.45, 8-9 pm.
9.530	W6XBE	SAN FRANCISCO, CAL., 31.41 m., Addr. Gen. Elec. Co., 7-10 am.
9.530	W2XAF	SCHENECTADY, N. Y., 31.48 m., Addr. General Electric Co. 3-11 pm.
9.530	VUC2	CALCUTTA, INDIA. 31.48 m. Addr. All India Radio. 2.06-4.06 am. 10 pm.-2 am.
9.526	XEDQ	GUADALAJARA, GAL., MEXICO, 31.49 m., n.-4.30 pm., 8-11.30 pm.
9.526	ZBW3	HONGKONG, CHINA, 31.49 m., Addr. P. O. Box 200. 5-10 am., 11.30 pm.-1.15 am. Sun 5-9.30 am.
9.525	LKC	JELOY, NORWAY, 31.49 m., 4.30-10.30 am., Sun. 2.30-10.30 am.
9.523	ZRG	ROBERTS HEIGHTS, S. AFRICA. 31.5 m., Addr. (See ZRK, 9.606 mc.) Daily exc. Sun. 5-7.30 am.; Sun. 5.30-7 am.
9.520	OZF	SKAMLEBOAEK, DENMARK, 31.51 m., Addr. Statsradiofonien, Heibergsgade 7, Copenhagen, 8-9.30, 9.30-11 pm. to No. Amer.

(Continued on page 156)

All Schedules Eastern Standard Time

www.americanradiohistory.com

The Short Wave League

DX on the Ham Bands

(with the "Listening Post" Observers)

Edited by Elmer R. Fuller

HONORARY MEMBERS

Dr. Lee de Forest — Manfred von Ardenne
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Hugo Gernsback, Executive Secretary

● FN1C will give a special broadcast for DX purposes on June 29th and July 2nd on a frequency of 14.084 mc. The time will be 1400 to 1410 and 1800 to 1810 GMT. on both days. One hundred watts power will be used, and all reports will be verified if correct. A special quotation will be broadcast, and this will act as the check for verification. Send your report to FN1C, D. Patterson, Gongalpara, Chandenagore, Bengal. French India, and inclose a postal reply coupon.

W6USA, the voice of the Golden Gate Exposition at San Francisco, has been reported on the air. The frequency used is said to be about 14.18. The power is not known.

Vernon Gabriel, Observer for Michigan, reports hearing Experimental Car Number 37, of the Mexican Border Patrol. The frequency used was 14.14, and was heard R5 and S8.

Another unknown ZX station has been reported by Observer Gabriel. This month it is ZX4M on 14.07 megacycles. If anyone knows the QRA of this station or of ZX9AM, which was reported last month, please let us have it.

UK3AH is a new station on the air, and is located in Moscow, according to the report of Kenneth Spencer, Observer for England. His exact QRA was not given.

We wish to extend our congratulations to the amateurs who helped in relaying the messages in regard to the landing of the Moscow to New York airship in the Gulf of St. Lawrence. The skip distance on twenty meters was very long that night, and it was impossible for the two Canadian amateurs to get in touch with any Americans in the eastern part of the country, so the message was sent to every listener's friend, HH2B in Port-au-Prince, Haiti. Gertrude and Eric Bleo, the operators, sent it back to W2IXY, and from there it was telephoned to WOR. The two Canadian amateurs taking part were VE1BB and VE1SQ. This information was reported by Charles H. Fuller, Observer for New York.

Some of our newer listeners seem to have difficulty with the system now used by American and other hams for reporting readability and signal strength. The readability table is as follows:—

R-1 Unreadable
R-2 Barely readable
R-3 Readable with considerable difficulty
R-4 Readable with little difficulty
R-5 Perfectly readable

The S or signal strength is indicated by the following numbers:—

S-1 Very faint, barely perceptible
S-2 Very weak signals
S-3 Weak signals
S-4 Fair signals
S-5 Fairly good signals
S-6 Good signals
S-7 Moderately strong signals
S-8 Strong signals
S-9 Extremely strong signals

The T or tone report is not used except for CW notes.

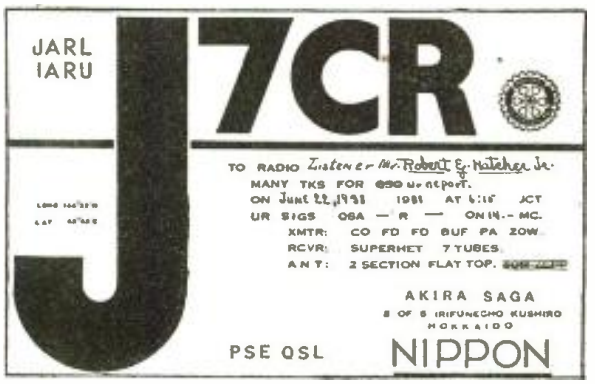
Starting with the August issue, our style of giving reports will be changed. It is intended to use the ten best DX stations heard by each observer. These will be listed in the usual manner, as in the past. At the top of our page, there will be a special box containing the ten best DX stations reported by our observers. DX will be based on the distance from the observer to the station heard, the strength of the signal, and the popularity of the call, or prefix.

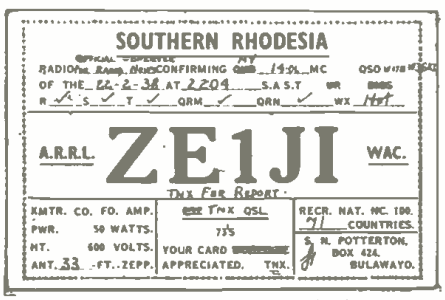
This may limit the reports to 10 and 20 meter amateurs, but it has been some time since anyone has reported any good DX on 80 or 160 meters.

During the past month, much difficulty has been encountered due to the *northern lights*. They have been very active, and have had a decided effect upon the short wave bands. Ten meters has been experiencing a short skip effect, and this has greatly reduced the DX on this band. However, there are times when ten meters still produces some very good results.

Five meters is the same as it has been for several months, but it is expected to open up soon. Last summer some very fb DX was heard and it is hoped that this season will be even better.

A nice Veri card received by Robt. E. Hatcher, Richmond, Va., from a Japanese Ham.

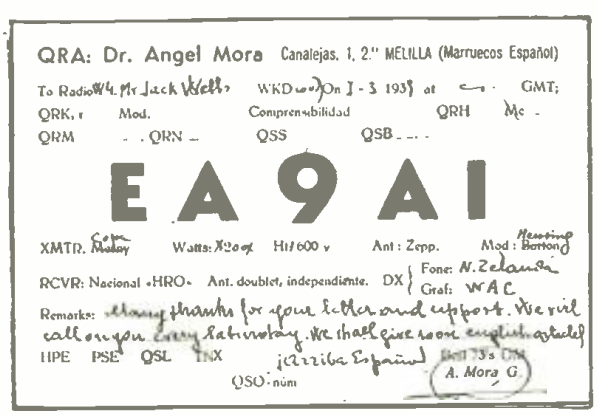




Veri from Bulawayo, Southern Rhodesia, sent to Robt. Hatcher.

For April reports were received from the following observers:

Alabama	Wells, Jack
Arizona	Fuller, Lester
Arkansas	Henderson, Bill
California	Rush, Richard A.
Colorado	Wallen, Dan T.
Connecticut	Kemp, Howard G.
England	Spencer, Kenneth
Florida	Lester, Major
Iowa	Mannheimer, Dick
Kansas	Hegler, Burns E.
Kentucky	Taglauer, Bob
Massachusetts	Lendizioszek, Ed.
Michigan	Gabriel, Vernon
Missouri	Fleming, R. B.
Nebraska	Noyes, W. Deen
New Jersey	Fitzpatrick, John
New York	Fuller, Chas. H.
Oregon	Trueman, El. C.
Pennsylvania	Hartzell, Clar.
	Jordan, Tom
Philippines	Ruiz, J. M.
So. Carolina	Halliday, Ray
So. Dakota	Hutchinson, R.
Texas	Slaughter, Ed. C.
Utah	Parker, Robert
W. Virginia	Deem, W. O.



Interesting Veri sent Jack Wells by EA9AI, Spain.

The Asiatics have all but disappeared from the eastern part of North America, and are being heard only rarely in the West. The following were reported being heard last month, April.

Call	*Freq.*	*R*	*S*	*Where Heard*
J2MI	14.1	5	6	Ore.
J2KN	28.0	4	6	Calif.
J3EI		3	5	Utah
J5CE		3	4	Utah
VS2AL	14.08	4	6	Wash.
VS7RA	14.18	5	6-8	W. Va., England
VU2CQ	14.3	3	4	W. Va.
XU8AM	14.14	5	6-7	W. Va., Tex.
AFRICANS				
CN8DW	14.105	4	7	Mich.
CN8MI	14.31	5	6	W. Va., Que.
CN8AU	14.015	3	5	Mass.
CN8MB	14.105	4	5-6	Mass.
CT2BP	14.2	5	7	N. J.
EA8AC	14.155	4	7	Mass.
EA9AH	14.0	5	9	Ia.
EK1AS	14.1	5	9	Mich.
EK1AF	14.1	3-5	4-8	Ia., Que., W. Va., Mass., N. J., Tex.
SU1CH	28.38	4	5	W. Va., Mass.
SU1AM	14.095	5	7-8	Mass.
SU1AX	14.25	4	7	Mass.
SU1WM	14.205	3	4	Mass.
VQ2CM	14.2	5	8	England
ZE1JX	14.0	4	6	Kans.
ZS1BW	14.21	5	6-7	Fla., Ore.
ZS1RA		4	6	Utah
ZS2AD	14.1	4	7	Ariz.
ZS2AZ	14.035	4-5	4-9	Phil. Is., Utah, Ia., Tex.
ZS2SY		4	6	Utah
ZS2AK	14.035	4	5	Ia.
ZS2AV	14.07	5	6-7	W. Va., Kans., Tex.
ZS2X	14.325	3-5	4-7	Ore., Mass.
ZS2AF	14.1	5	6	Kans.
ZS2AQ	14.05	4	5	Kans.
ZS2BZ	14.04	5	8	Kans.
ZS4M	14.115	3	5	Mich.
ZS4H	14.11	2-5	5-8	Utah, Kans., Mass.
ZS5Q	14.05	3-5	5-8	Tex., Mich., Ia., Calif., W. Va., Kans.
ZS5AW	14.08	5	9	So. Dak., Kans.
ZS5QQ	14.2	4	5	W. Va.
ZS5BZ	14.0	4	6-7	Kans.
ZS6DV	14.06	5	8	Ariz.
ZS6DW	14.025	5	5-6	Utah, Ia., Tex., Ore., Kans.
ZS6AD	14.075	5	7	Ia.
ZS6CY	14.16	5	6	Ia.
ZS6W	28.3	5	7	Kans.
ZS6BW	28.15	2	5	Mass.
NORTH AMERICA				
CO2AG	14.065	5	7	Colo.
CO2LY	14.09	5	8	Colo.
CO2WN	14.121	5	8	S. D., Wash.
CO2RH	14.158	5	9	S. D.
CO2JJ	14.1	5	6-7	Wash., England
CO2GY	14.105	4	6	Wash.
CO5EQ	14.0	5	8	Colo.
CO7AB	14.08	2-3	5	S. D.
CO7CX	14.05	5	8	England
HI3N	14.1	5	9	England
HR5C	14.1	5	8	Quebec

(Continued on page 185)

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Mc.	Call	
9.520	YSH	SAN SALVADOR, EL SALVADOR 31.51 m., Addr. (See 7.894 mc.) Irregular 6-10 pm.
9.520	RV96	MOSCOW, U.S.S.R. 31.51 m., 1-3, 4-7 pm. and irr.
9.510	GSB	DAVENTRY, ENGLAND, 31.55 m., Addr. (See 9.580 mc.—GSC) 12 m.-2.30 am., 6.20-8.45, 9.20-11.30 pm.
9.510	HJU	BUENAVENTURA, COLOMBIA, 31.55 m., Addr. National Railways. Mon., Wed. and Fri. 8-11 pm.
9.510	—	TANANARIVE, MADAGASCAR, 31.55 m. Addr. Le Directeur des PTT, Radio Tananarive, Administration PTT. 12.30-12.45, 10-11 am., 2.30-4 am.
9.510	HS8PJ	BANGKOK, SIAM, 31.55 m. Thursday, 8-10 am.
9.510	—	HANOI, FRENCH INDO-CHINA. 31.55 m. "Radio Hanoi", Addr. Radio Club de L'Indochine. 12 m.-2 am., 6-10 am. 15 watts.
9.503	XEWW	MEXICO CITY, MEX., 31.57 m. Addr. Apart. 2516. Relays XEW. 7:45 am.-12.30 am.
9.501	PRF5	RIO DE JANEIRO, BRAZIL, 31.58 m., 4.45-5.55 pm. Ex. Suns.
9.500	VK3ME	MELBOURNE, AUSTRALIA, 31.58 m., Addr. Amalgamated Wireless of Australasia, 167 Queen St. Daily except Sun. 4-7 am.
9.500	OFD	LAHTI, FINLAND, 31.58 m., Addr. Finnish Brcst. Co., Helsinki. 12.15-5 pm.
9.497	KZIB	MANILA PHIL. ISL., 31.59 m., 7-9.05 am.
9.488	EAR	MADRID, SPAIN, 31.6 m., Addr. (See 9.860 mc.) Irreg.
		End of Broadcast Band
9.465	TAP	ANKARA, TURKEY, 31.70 m., 11.30 am.-5 pm.
9.445	HCODA	GUAYAQUIL, ECUADOR, 31.77 m., 8.15-10.15 pm., exc. Sun.
9.437	COCH	HAVANA, CUBA, 31.8 m., Addr. 2 B St., Vedado. 8 am.-9.30 pm. Sun. 8 am.-12 m.
9.390	OAX5C	ICA, PERU, 31.95 m., Radio Universal, 7-11.30 pm.
9.370	XOY	CHENGTU, CHINA, 32.02 m., 9.45-10.30 am.
9.355	HCIETC	QUITO, ECUADOR, 32.05 m., Addr. Teatro Bolivar, Thurs. until 9.30 pm. 8-11 pm. Sats.
9.350	COCD	HAVANA, CUBA, 32.08 m., Addr. Box 2294. Relays CMCD 10 a.m.-11.30 pm. Sun. 10 am.-9 pm.
9.345	HBL	GENEVA, SWITZERLAND, 32.11 m., Addr. Radio Nations. Sun. 7-7.45, 8-8.45 pm. Mon. 6.50-8.15 pm.
9.340	OAX4J	LIMA, PERU, 32.12 m., Addr. Box 1166, "Radio Universal." 12 n.-3 pm., 5 pm.-1 am.
9.295	HI2G	CIUDAD TRUJILLO, D. R., 32.28 m. 6.40-8.40 am., 11.40 am.-2.10 pm., 3.40-4.40 pm.
9.280	LYR	KAUNAS, LITHUANIA, 32.33 m., 11 am.-1.25 pm. and Irreg.
9.200	ZMEF	SUNDAY ISLAND, 32.61 m., Conts. ZIL5, N.Z. 1.45-2.15 am. Irreg.
9.200	COBX	HAVANA, CUBA, 32.61 m. Addr. San Miguel 194, Altos. Relays CM8X 8 am.-11.30 pm.
9.188	HC2AB	ECUADOR, 32.65 m., nightly to 10 pm.
9.170	HCIGQ	QUITO, ECUADOR, 32.72 m., Mon., Wed., Sat. 9-9.55 pm.
9.135	HC2CW	GUAYAQUIL, ECUADOR, 32.84 m., 11 am.-1, 7-11 pm.
9.125	HAT4	BUDAPEST, HUNGARY, 32.88 m., Addr. "Radiolabor," Gyali-ut, 22. Daily 7-8 pm., Sat., 6-7 pm.
9.100	COCA	HAVANA, CUBA, 32.61 m. Addr. Galiano No. 102. Relays CMCA Noon-12.15 am. Irreg. to 3 am.
9.091	PJCI	CURACAO, D. W. INDIES, 33 m., 6.36-8.36 pm., Sun. 10.36 am.-12.36 pm.
9.030	COBZ	HAVANA, CUBA, 33.32 m., Radio Salas Addr. P. O. Box 866. 7.45 am.-1.15 am. Sun. 7.45 am.-12 m. Relays CMBZ.
8.965	COKG	SANTIAGO, CUBA, 33.44 m. Addr. Box 137. 9-10 am., 11.30 am.-1.30 pm., 3-4.30, 5-6, 10-11 pm., 12 m.-2 am.
8.841	HCJB	QUITO, ECUADOR, 33.5 m. 7-8.30 am., 11.45 am.-2.30 pm., 5-10 pm., except Mon. Sun. 12 n.-1.30 pm., 5.30-10 pm.
8.830	COCQ	HAVANA, CUBA, 33.98 m., 6.55 am-1 am.
8.700	HKV	BOGOTA, COLOMBIA, 34.46 m. Tues. and Fri. 7-7.20 pm.
8.665	COJK	CAMAGUEY, CUBA, 34.64 m., Addr. Finlay No. 3 Altos. 5.30-6.30, 8-11 pm., daily except Sat. and Sun.
8.665	W2XGB	HICKSVILLE, N. Y., 34.64 m., Addr. Press Wireless, Mon. to Fri. News at 9 am. and 5 pm.
8.652	HJ4DAU	MEDELLIN, COLOMBIA, 34.67 m., Wkdys. 7-10 pm.
8.580	YNPR	MANAGUA, NICARAGUA, 34.92 m. Radiodifusora Pilot. 12.45-2.15, 6.45-10.15 pm.
8.572	—	BUCHAREST, ROUMANIA, 35.02 m., 8.15-10.30 am., 4-7 pm.
7.894	YSD	SAN SALVADOR, EL SALVADOR, 37.99 m., Addr. Dir. Genl. Tel. & Tel. 7-10.30 pm.
7.870	HCIRB	QUITO, ECUADOR, 38.1 m. La Voz de Quito. 8.30-11.30 pm.
7.854	HC2JSB	GUAYAQUIL, ECUADOR, 38.2 m. 11 am.-2, 4-11 pm.
7.797	HBP	GENEVA, SWITZERLAND, 38.48 m., Addr. Radio-Nations.
7.614	CR6AA	LOBITO, ANGOLA, 39.39 m., Mon., Wed., Sats. 2.45-4.30 pm. Also 7.177.
7.520	KKH	KAHUKU, HAWAII, Fri. 9-10 pm., Sat. 1-1.30 am., 9.30-10 pm.
7.490	EAJ43	TENERIFE, CANARY ISL., 40.05 m., 8-9.30 pm. and Irreg.
7.450	TI2RS	SAN JOSE, COSTA RICA. 40.27 m. "Radioemisora Athena". 7-11 pm.
7.440	FG8AH	POINT-A-PITRE GUADELOUPE, F.W.I., 40.32 m., 6-7.10 pm., also 9-10.30 pm. Irreg. P. O. Box 125.
7.410	HCJB4	QUITO, ECUADOR, 40.46 m., 7-9.30 pm. irregularly.
7.410	YDA	TANDJONGPRIOK, JAVA, 40.46 m., Addr. N.I.R.O.M., Batavia. 10.30 pm.-2 am.; Sat. 7.30 pm.-2 am.
7.380	XECR	MEXICO CITY, MEX., 40.65 m., Addr. Foreign Office. Sun. 6-7 pm.
7.310	VIG	PORT MORESBY, PAPUA, 41.01 m., June 10 & 24, 3-5 am.
7.280	TPB12	PARIS, FRANCE, 41.21 m., 10.15 am.-5.15 pm.
7.220	HKE	BOGOTA, COL., S. A., 41.55 m. Tues. and Sat. 8-9 pm. Mon. and Thurs. 6.30-7 pm.
7.220	YDX	MEDAN, SUMATRA, N. E. I., 41.55 m. Daily exc. Sat., 10.30 pm.-2 am. Sat. 7.30 pm.-1.30 am. Irreg. to 9 am.
7.200	YI5KG	BAGHDAD, IRAQ, 41.67 m., 7.30 am.-4 pm.
7.200	YNAM	MANAGUA, NICARAGUA, 41.67 m. Irregular at 9 pm.
7.177	CR6AA	LOBITA, ANGOLA, PORT. WEST AFRICA. 41.75 m., Mon., Wed., and Sats. 2.45-4.30 pm. Also see 7.614 mc.
7.128	YN3DG	LEON, NICARAGUA, 42.09 m., 2-2.30, 8.30-9.30 pm. ex. Suns.
7.100	FO8AA	PAPEETE, TAHITI, 42.25 m., Addr. Radio Club Oceanien. Tues. and Fri. 11 pm.-12.30 am.
7.088	PIIJ	DORDRECHT, HOLLAND, 42.3 m., Addr. Dr. M. Hellingman, Technical College. Sat. 11.10-11.50 am.
7.010	XGSA	KWEIYANG, CHINA, 42.80 m., 5.30, or 6-11 am.
6.990	XEME	MERIDA, YUCATAN, 42.89 m., Addr. Calle 59, No. 517, "La Voz de Yucatan desde Merida." Irregular.
6.977	XBA	TACUBAYA, D. F., MEX., 43 m. 9.30 am.-1 pm., 7-8.30 pm.
6.960	2ZB	WELLINGTON, N. Z., 43.10 m., Mid.-7 am.
6.880	XOJD	HANKOW, CHINA, 43.60 m., 6-8.30 am.
6.805	HI7P	CIUDAD TRUJILLO, DOM. REP., 44.06 m., Addr. Emisoria Diaria de Commercio. Daily exc. Sat. and Sun. 12.40-1.40, 6.40-8.40 pm. Sat. 12.40-1.40 pm. Sun. 10.40 am.-11.40 am.
6.790	PZH	PARAMIRA80, SURINAM. 44.16 m., Addr. P. O. Box 18. Sun. 8.40-10.40 am. Tues. & Fri. 5.40-8.40 pm. 1st & 3rd Thurs. monthly 6.40-8.40 pm.
6.775	HIH	SAN PEDRO DE MACORIS, DOM. REP., 44.26 m. 7-9.40 pm. Sun. 5.20-6.40 pm.
6.730	HI3C	LA ROMANA, DOM. REP., 44.58 m., Addr. "La Voz de la Feria." 12.30-2 pm., 5-6 pm.
6.720	PMH	BANDOENG, JAVA, 44.64 m. Relays N.I.R.O.M. programs. 4.30-11 or 11.30 am. Also Sat. 9.30 pm.-1.30 am.
6.690	TIEP	SAN JOSE, COSTA RICA, 44.82 m., Addr. Apartado 257, La Voz del Tropico. Daily 7-11 pm.
6.675	HBQ	GENEVA, SWITZERLAND, 44.94 m. Addr. Radio-Nations. Sun. 1.45-2.45 pm.
6.660	HI5G	TRUJILLO CITY, D. R., 45.05 m., to 8.40 pm.
6.635	HC2RL	GUAYAQUIL, ECUADOR, S. A., 45.18 m., Addr. P. O. Box 759. Sun. 5.45-7.45 pm., Tues. 9.15-11.15 pm.
6.630	HIT	CIUDAD TRUJILLO, D. R., 45.25 m., Addr. "La Voz de la RCA Victor." Apartado 1105. Daily exc. Sun. 12.10-1.40 pm., 5.40-8.40 pm.; also Sat. 10.40 pm.-12.40 am.
6.625	PRADO	RIOBAMBA, ECUADOR, 45.28 m. Thurs. 9-11.45 pm.
6.610	YNLG	MANAGUA, NICARAGUA. 45.39 m. Emisora Ruben Dario. 1.30-2.30, 6-10.15 pm.
6.600	HI6H	TRUJILLO CITY, D. R., 45.45 m., 7.40-8.40 pm.
6.565	HI5P	PUERTO PLATA, D. R., 45.70 m., 5.40-7.40, 9.40-11.40 pm.
6.558	HI4D	CIUDAD TRUJILLO, D. R., 45.74 m. Addr. Apartado 623. 12.30-2, 6-8 or 9 pm. Except Suns.
6.550	X8C	VERA CRUZ, MEX., 45.8 m. 8.15-9 am.
6.550	TIRCC	SAN JOSE, COSTA RICA, 45.8 m., Addr. Radioemisora Catolica Costarricense. Sun. 11 am.-2 pm., 6-7, 8-9 pm. Daily 12 n.-2 pm., 6-7 pm., Thurs. 6-11 pm.
6.516	YNIGG	MANAGUA, NICARAGUA, 46.02 m., Addr. "La Voz de las Lagos." 1-2.20, 8-10 pm. Except Sundays.
6.490	TGWB	GUATEMALA CITY, GUAT., 46.2 m. La Voz de Guatemala. Daily 7.45-9 am. 12.45-3.45 pm., 7.30 pm.-12.15 am. Sun. 10.30 am.-5.15 pm., 7 pm.-12 m.
6.480	HIIL	SANTIAGO DE LOS CABALLEROS, D. R., 46.28 m., Addr. Box 356. 9.40-11.40 am., 7.40-9.40 pm.
6.470	YNLAT	GRANADA, NICARAGUA, 46.36 m., Addr. Leonidas Tenoria, "La Voz del Mombacho." Irregular.
6.455	HI4V	SAN FRANCISCO DE MACORIS, D. R., 46.44 m., 11.40 am.-1.40 pm., 5.10-9.40 pm.
6.420	HIIS	SANTIAGO, D. R., 46.73 m., 5.40-7.35 pm. Ex. Suns.
6.400	TGQA	QUEZALTENANGO, GUATEMALA, 46.88 m., Mon.-Fri. 9-11 pm. Sat. 10 pm.-1 am. Sun. 1-3 pm.
6.388	HI9B	SANTIAGO, D. R., 46.8 m., Mon. & Fri. 8.10-8.40 pm.
6.384	ZIZ	BASSETERRE, ST. KITTS, W. INDIES, 46.99 m. 4-4.45 pm., Wed. 7-7.30 pm.
6.357	HRPI	SAN PEDRO SULA, HONDURAS, 47.20 m., 6-7.30 am., 2-4 pm. & Irreg. to 10 pm.
6.340	HIIX	CIUDAD TRUJILLO, D. R., 47.32 m. Sun. 7.40-10.40 am., daily 12.10-1.10 pm., Tues. and Fri. 8.10-10.10 pm.
6.335	OAXIA	ICA, PERU, 47.33 m., Addr. La Voz de Chiclayo, Casilla No. 9. 8-11 pm.
6.324	COCW	HAVANA, CUBA, 47.4 m., Addr. La Voz del Radio Philco, P. O. Box 130. 6.55 am.-12 m. Sun. 9.55 am.-10 pm.
6.310	HIZ	CIUDAD TRUJILLO, D. R., 47.52 m. Daily except Sat. and Sun. 11.10 am.-2.25 pm., 5.10-8.40 pm. Sat. 5.10-11.10 pm. Sun. 11.40 am.-1.40 pm.
6.298	OAX4G	LIMA, PERU, 47.63 m., Addr. Apartado 1242. Daily 7-10.30 pm.

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All Schedules Eastern Standard Time

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What Do YOU Think?

A Shout from New Zealand

Editor,

First of all, let me tell you of my "outfit" here. The rig is built up from circuits published in *Short Wave Craft* and RADIO & TELEVISION. The Xmitter is the H.F.35 and I will say it has and still is doing its job well. The receiver is your "Band Switch 2" plus an R.F. and A.F. stage, and built-in power supply. Everything is in metal cabinets with crackle enamel finish.

I hear W's on 80 meter band, my latest being W7FP calling C.Q. Honolulu Q5 and R6 on speaker.

If there are any of the boys "over there" who feel inclined to drop me a line—O.K., shoot it along. About this matter of QSL-SWL; well, I always do answer 100%, for the reason that I was once a DXer and got a big kick out of receiving the cards. Usually a SWL honestly thinks his report covers what a station wants but just let me pass on a hint: When reporting, always give percentage of modulation and quality details.

Yours till the rig blows up,

R. E. McGRATH, ZL3KE,
183 Richmond Terrace,
New Brighton,
Christ Church,
New Zealand.

He Wants More 3, 4 & 5 Tube Sets

Editor,

I'll second the motion that you should print more articles on construction of three-, four-, and five-tube sets and not the larger sets that have appeared in the past, as cash to be spent on radio is not any too plentiful around here. I am a high school student and the only time I have to get extra money is after school, when I like to work with the set, or sets.

FRED C. STUCKERT,
6021 N. Kent Ave.,
Milwaukee, Wis.

A Lisbon Short Wave DXer

Editor,

The accompanying photo shows my modest "Listening Post" in action.

S-W Listening Post of Fernando Pereira, Lisbon, Portugal.

I am very much interested in *short wave* work, and I thoroughly enjoy RADIO & TELEVISION each month.

My receiver is a "Philips."

I am a member of the *Short Wave League*, Liga dos Radio Escutas Portugueses, and Rede dos Emissores Portugueses of Lisbon.

I have recorded foreign stations very, very well and have verifications from: Portugal, Poland, Germany, Spain, Australia, China, U. S. A., Canada, Mexico, Colombia, Peru, Brazil, Argentina, Java, England, Belgium, Chile, Kenya, Siam, S. Africa, Venezuela, France, Fr. Somaliland, Hawaii, Japan, Holland, Guatemala, Costa Rica, Panama, Italy, Switzerland, Salvador, Nicaragua, Honduras, Iceland, Morocco, Burma, U. S. S. R., Bulgaria, Sweden, Czechoslovakia, Cuba, India, Republica Dominicana, Egypt, New Zealand, Fiji, Ecuador, Vatican City, Paraguay, Hungary, Uruguay, Tahiti, etc., etc.

I have been reading your magazine for a long time and think it is just about "tops."

FERNANDO PEREIRA,
Ave. Visconde Valmor, 26-2°,
Lisbon, Portugal.

The Finest!

Editor,

As a regular reader of your magazine for three years, I would like to express my congratulations. It is the finest magazine in radio.

I have built many sets from RADIO & TELEVISION and all were excellent. I am now building the 4 metal tube beginner's superhet. from plans given in the May, 1938, issue.

I like all the departments of your magazine, but would like to see more constructional articles on low-power transmitters and superhet. receivers.

In my opinion, those silent Hams who do not send QSL cards are forgetting one important thing. The amateur is licensed to conduct conversations with his fellow Hams. The SWL is in reality an amateur without a license or transmitter. He cannot come right back with a radio call, so when he is inspired with an amateur's QSO, he must resort to the mail and his SWL card to say "nice going, OM," or vice versa.

Of course, one should be reasonable with the Hams. When the cost of the "rig," receiver and other instruments are added, it often knocks the QSL cards out of the pocketbook.

However, there are a few Hams who QSL. I would like to take this opportunity to thank the few Hams who answered my SWL card.

I would like to exchange SWL cards and chatter with any foreign SWL's.

Wishing best of luck to RADIO & TELEVISION.

GERALD B. CAPE,
P.O. Box 163,
Desloge, Mo.

Dan Hightower, of St. Petersburg, Florida, takes the prize for best S-W Listening Post photo this month—1 year's subscription to RADIO & TELEVISION.

Watch Out! He's After Your "Veri"

Editor,

Enclosed please find a photo of myself and listening post for your contest (prize-subscription to your fb magazine).

The equipment consists of a Hallicrafter SX16 and a National NC-100. The antennas are a 40 ft. long, 20 ft. high inverted "L" and a 20 ft. long, 10 ft. high antenna of the same type.

I am just now concentrating on the occupation of "veri" soliciting.

DAN H. HIGHTOWER,
2000 28th Ave., N.,
St. Petersburg, Fla.

Our "Advs" Pull!

Editor,

Very many thanks for printing my ad in the January issue of RADIO & TELEVISION. The number of replies already received gives some idea of how large the circulation of your admirable magazine must be. I am still willing to swap my SWL card with any ham or SWL in your country or in any other part of the world. I am definitely 100% QSL as many of my friends in America will assure you if you ask them! If any YL's or hams would like to correspond with me, I will be only too willing to do so.

Since starting listening on the amateur bands about 10 months ago, no less than 91 countries have been logged and veris have been received from 41. Receivers used are a ten tube all-wave superhet, an 0-v-2 for the short waves and a 5-tube superhet for the broadcast bands.

DENYS CRAMPTON,
35 York Road,
Southport, England.

100% Interesting

Editor,

Being a reader of your magazine, I must congratulate you for the way it is put together. It is 100% interesting. There is nothing in England to touch it, and the pity is I am always two months behind in issue—but do I digest it when I get it.

May I pass a few words on the contents? The following are top hole—*Short Wave Kinks, What Do YOU Think?, S. W. League, Let's Listen in with Joe Miller,* and *World S. W. Stations.*

I would be delighted to exchange cards or

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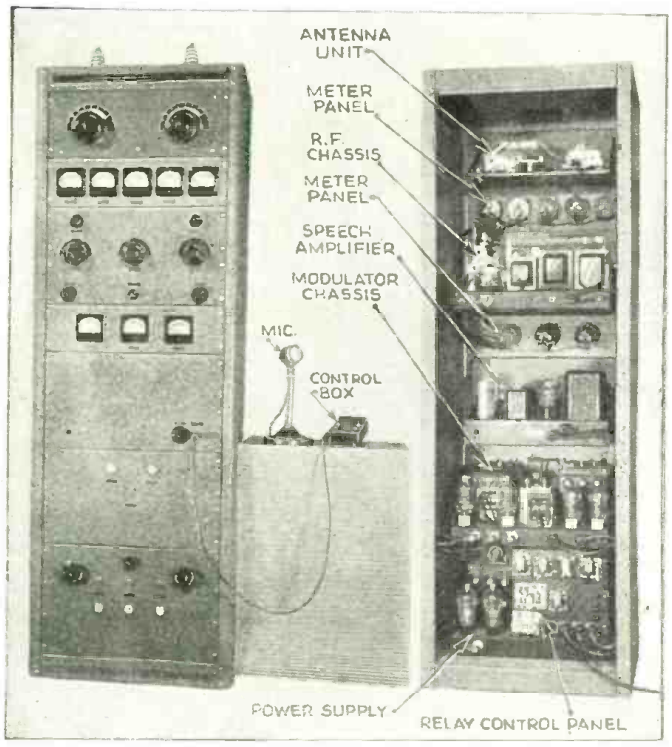


Front and rear views of complete De Luxe Transmitter.

This third and final article covers the construction of the Speech Amplifier and Modulator. The instructions include a simple method for testing the speech amplifier and a means of testing the complete transmitter with a "dummy load" before putting it on the air.

Part 3—Conclusion

Howard G. McEntee, W2FHP

De Luxe

● THIS third and final section will describe the complete speech equipment for use with the "Beam Power 3". There are two units, the speech amplifier with driver stage, and the modulator unit itself.

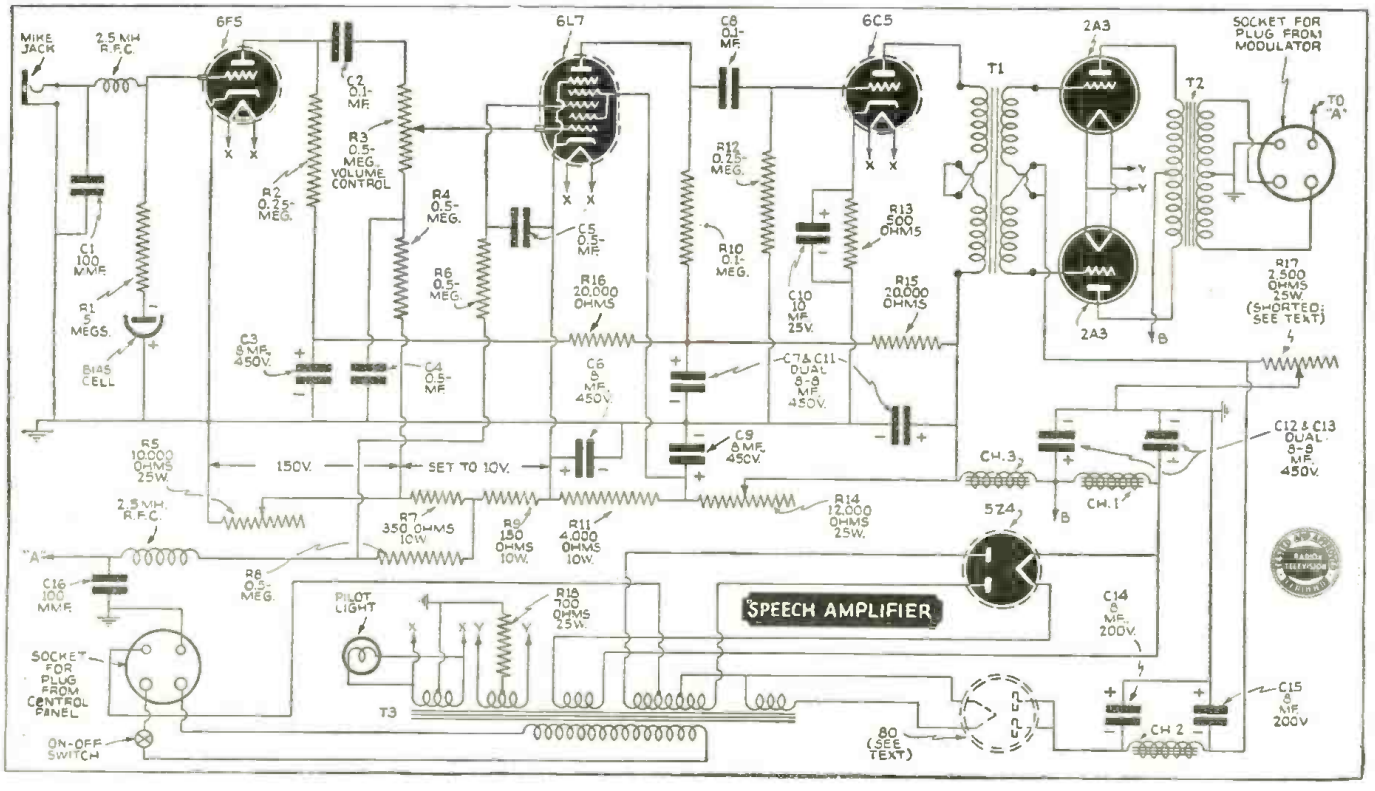
The speech amplifier is commercially available in *kit* form, and a completely punched chassis may be had. It is highly advisable to get the foundation kit for the unit, as it has been very carefully engineered and produces excellent results.

The Speech Amplifier

Complete directions are given in the *speech amplifier* foundation kit and they should be followed explicitly. As furnished, the amplifier uses a fixed bias output stage, the bias voltage coming from an 80 rectifier and a separate filter system. When this transmitter was originally laid out, a slightly different amplifier was drawn up in which the output stage was self-biased. The relay control system was made to accommodate a single circuit from the speech amplifier which was to open the center-tap for stand-by periods. This is not possible with the speech amplifier as shown, since the 80 still carries the load through the bias tap when the center tap of T3 is open. Rather than re-design the whole control circuit and install a new relay to open the bias circuit, the driver stage is simply run with self-bias. Resistor R17 is shorted by means of the sliding tap. The 80 rectifier is removed and a 700 ohm resistor is placed between the center tap of filament winding Y-Y on T3 and ground. These alterations change the driver to self-bias, with no noticeable difference in output quality, at least for voice work. The power output is more than will ever be needed for driving the Class B stage.

It is recommended, however, that the speech amplifier be made exactly as specified in the directions which come with it. The

Wiring diagram of the Speech Amplifier and Power Supply.



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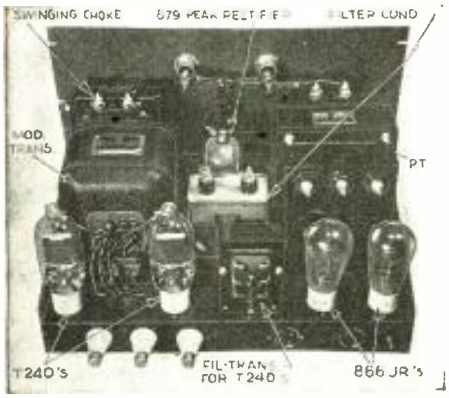
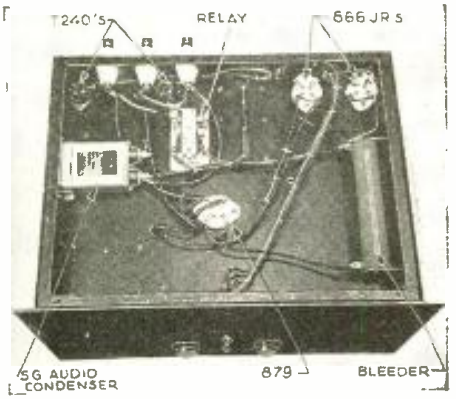


Top view of modulator.



Modulator as seen from the bottom.

"Beam Power 3" HAM Transmitter

slight changes mentioned above then enable its use in this transmitter; but if higher output with less harmonic content is ever needed, the circuit may be changed to fixed bias with very little trouble.

The R.F. filters shown in mike input and in the lead from the peak rectifier were considered good insurance, although it is quite possible they will not be required for every installation.

All connections to the speech amplifier chassis are made by means of two 4-prong plugs, one of which connects with the control panel, and the other with the modulator chassis.

It is a good idea to get the amplifier going correctly before starting on the modulator. The direction sheet gives quite explicit details for this and should be followed, omitting, of course, the setting of R17. It was found that the resistor R5 should be set for about 150 V., after which R14 is adjusted to give 10 V. across R7 and R9. The former is about 9 to 10 per cent of the Class C voltage and was found to give more sure control of overmodulation, particularly on speech work. A pure sine-wave could be held down quite well with only 5 per cent, but we are naturally interested only in *speech* work in this particular case.

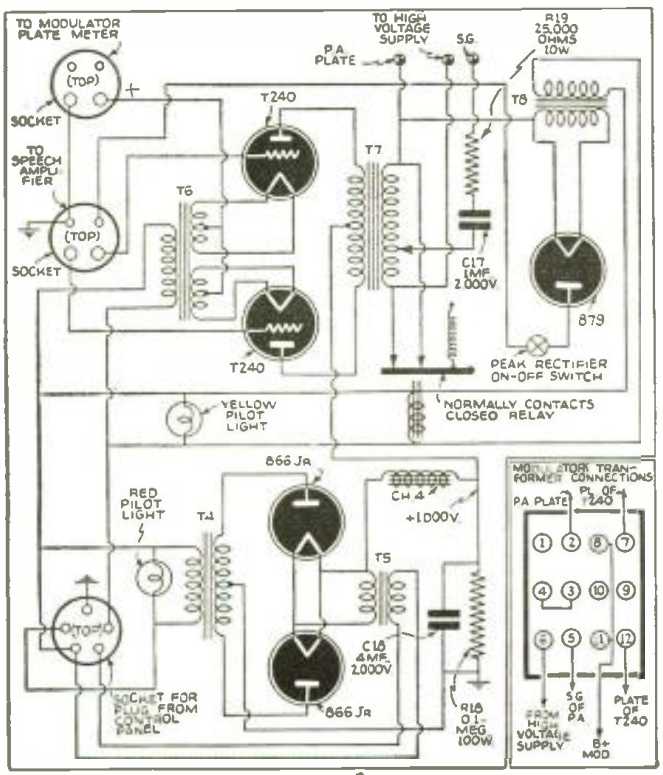
A test of the speech amplifier may be made with a 50 W. wire-wound resistor of from 10,000 to 20,000 ohms or so connected to the output transformer, with a pair of headphones connected across a very small section of the resistor. This will not give any indication of the power output, but if the speech output sounds clean and voltages are correct, you may be reasonably sure that the amplifier will work when properly matched to the Class B tubes. The output transformer should be connected on the 4 to 1 taps.

Modulator Simple to Build

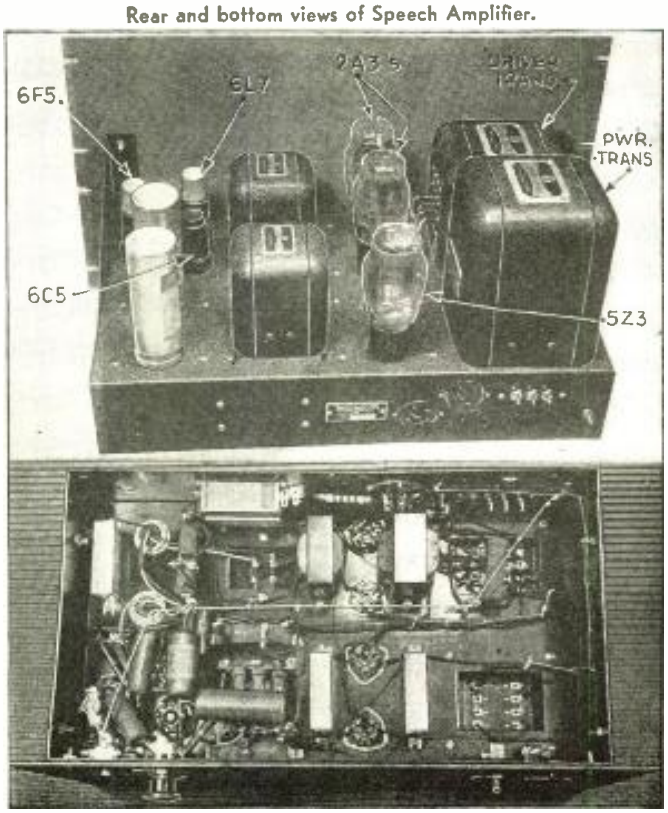
The *modulator* is a simple task after the relatively complicated *speech amplifier*. Besides the modulator stage and its power supply, the peak rectifier tube, with its filament transformer, is placed on this chassis. An "on-off" switch is provided for the A.M.C. circuit, but is practically unnecessary after preliminary testing has been completed. It does serve, however, to give a very convincing demonstration to skeptical visiting hams who sometimes

(Continued on page 176)

Hook-up of the Modulator, with Power Supply and Peak Rectifier.



Rear and bottom views of Speech Amplifier.



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Hams—Build This

W8KPX 70-Watt MODULATOR

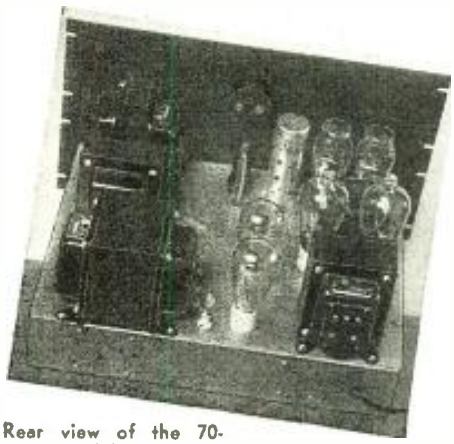
Harry D. Hooton, W8KPX

The completed modulator in actual service.

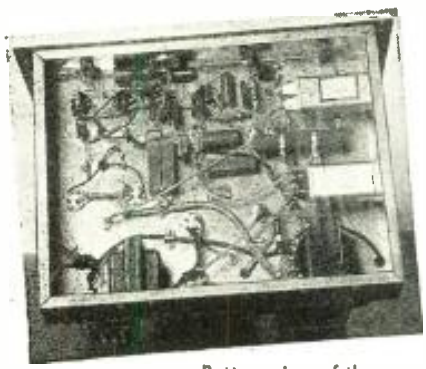
A high-quality, inexpensive audio unit which will 100 per cent modulate any final amplifier of 250 watts or less input.

● SINCE the publication of the 6L6, 15-watt modulator article in the October 1938 issue of RADIO & TELEVISION, the author has received a number of requests for constructional data on a more powerful model. In the majority of instances, the power input to the final R.F. amplifier ranged from 150 to 250 watts. In designing the 70-watt modulator to be described, we have endeavored to supply a good but not expensive audio unit which will 100% modulate any final amplifier running 250 watts or less input. The construction is standard throughout, the modulator and power supply being built on a 17 x 3 x 13 inch removable top chassis and a 19 x 10½ inch black crackle finished steel panel. Incidentally, arrangements have been made for the modulator to be supplied in kit form with the panel and chassis already punched and drilled. This will eliminate most of the hard labor involved and simplify the construction of the unit considerably.

The circuit, as Fig. 1 shows, is more or less conventional, consisting of a 6J7 input from the crystal microphone resistance-capacity coupled to a 6C8G second audio amplifier-phase inverter. The output of the 6C8G is, in turn, fed to the grids of the 6B4 driver tubes which operate in push-pull class A. The class B modulator uses a pair of Taylor TZ-20s which require only 1.8 watts driving power for the full 70 watts output. The rectifiers are a pair of 866 Jrs., which are very satisfactory for our purpose. The modulation transformer is of the universal type designed to match the TZ-20s to any R.F. load.

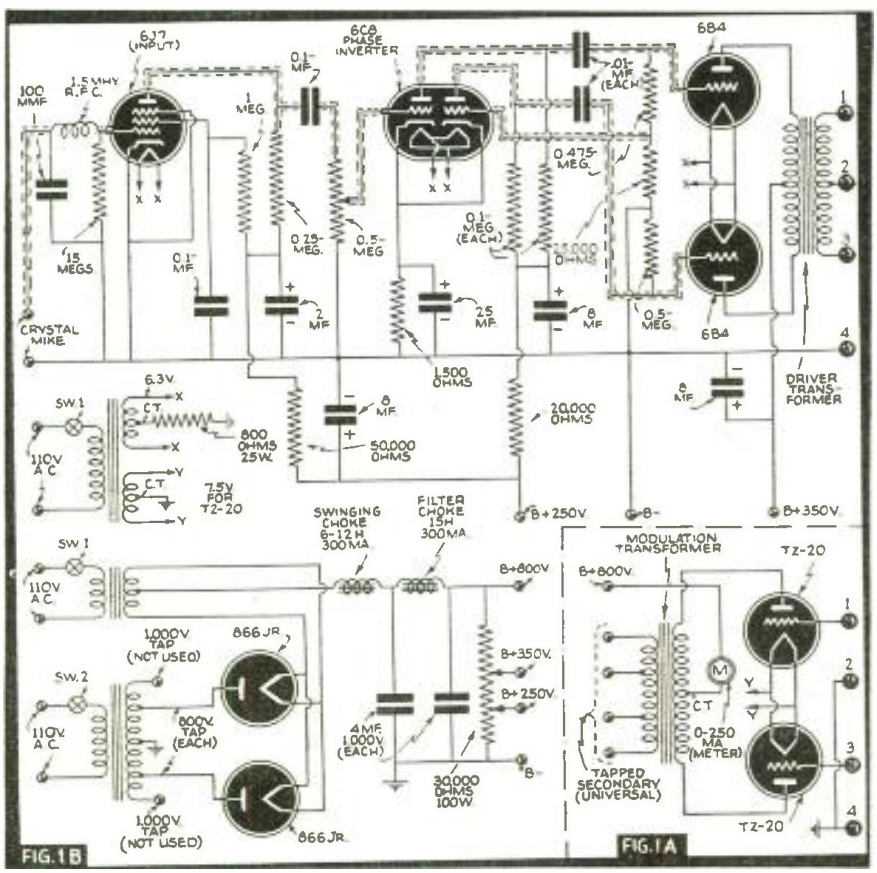


Rear view of the 70-watt modulator — note the neat yet well-spaced line-up of parts.



Bottom view of the completed modulator.

Fig. 1—Schematic diagram of the W8KPX 70-watt modulator. Note shielding on leads of 6J7, 6C8, and 6B4s.



The 6J7 input circuit is very interesting in that no grid biasing arrangements are provided. The grid leak is of the unusually high value of 15 *megohms* and the tube receives its bias through the voltage drop across this resistor which occurs from the minute grid current in the tube. Experiments with this arrangement have shown that distortion is decreased and there is a greater uniformity of performance, regardless of tube changes, than when using the conventional method of supplying bias

(Continued on page 179)

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Radio Test-Quiz

Edited by Robert Eichberg

For each question answered fully, and correctly, credit yourself with 10 points; half right, 5 points; etc. A perfect score is 180; a good score is 120; below 60 is poor.

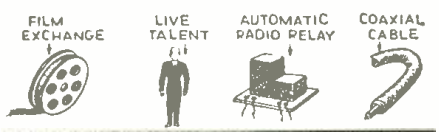
This month's Radio Test-Quiz was prepared with the cooperation of the Press Department of the National Broadcasting Company.

1. How far in the future can short-wave reception conditions, on the average, be accurately forecast?
   a. One day *c. Two weeks*
   b. Three days *d. One month*

2. Forecasts are based on
   a. weather
   b. sunspot activity
   c. state of the earth's magnetic field
   d. daylight-darkness distribution over the circuit path
   e. geographic location of the path

3. With what average degree of accuracy (approximate)?
   a. 5% *c. 50%*
   b. 25% *d. 75%*

4. What is the greatest distance a picture has ever been transmitted by modern high-definition electronic television?
   a. 50 miles
   b. 100 miles
   c. Around the world
   d. Transatlantic



WHAT FORMS A TELEVISION NETWORK ?

5. A television network might be formed by
   a. film exchange
   b. live talent touring groups
   c. automatic radio relay
   d. coaxial cable

6. What is the width of the channel assigned by the Federal Communications Commission for television stations?
   a. 10 kilocycles *c. 1 megacycle*
   b. 20 kilocycles *d. 6 megacycles*

7. Spacing between the audio and video carriers, according to the RMA proposed standards, is
   a. 10 kc. *d. 3.5 mc.*
   b. 500 kc. *e. 4.5 mc.*
   c. 1 mc.

8. NBC's Beer Mug is the smallest practical, complete relay transmitter. Its approximate weight is
   a. 2 pounds *d. 9 pounds*
   b. 5 pounds *e. 13 pounds*
   c. 7 pounds *f. 24 pounds*

9. What is the *new* word for the partially suppressed sideband in television broadcasting?
   a. single sideband *c. rudimentary*
   b. vestigial *d. atrophied*

10. Which country has established the greatest frame frequency in television broadcasting?
    a. Great Britain *c. Germany*
    b. France *d. United States*

11. NBC's first television program (electronic television) was transmitted
    a. April 30, 1939
    b. February 10, 1938
    c. July 7, 1936
    d. January 1, 1937

12. The picture sent on that date was in
    a. 240 lines *d. 441*
    b. 180 *e. 500*
    c. 343

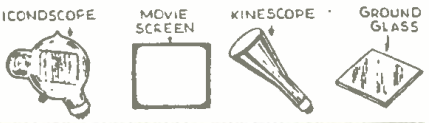
13. What great American television inventor was a student under one of the following early experimenters?
    a. Berzelius
    b. Dr. Paul Nipkow
    c. Campbell-Swinton
    d. Boris Rosing
    e. Denes von Mihaly

14. The final R.F. stage in American broadcasting transmitters uses what type of modulation?
    a. amplitude *c. phase*
    b. frequency *d. 110 per cent*

15. In crystal control oscillators what type of crystal provides the most accurate frequency control?
    a. tournaline *c. Y-cut crystal*
    b. x-cut quartz *d. AT-cut crystal*

16. What is the single most irritating source of interference with the television signal?
    a. heat
    b. lightning
    c. automobile ignition systems
    d. diathermy apparatus
    e. power sub-stations

17. What kind of waves can be transmitted through pipes?
    a. centimeter waves
    b. ultra-short
    c. standard broadcast waves
    d. long waves



IN HOME TELEVISION REC. THE PICTURE APPEARS-?

18. In electronic television (home receiver) the picture appears in or on
    a. Iconoscope
    b. Motion picture screen
    c. Kinescope
    d. A ground glass

Answers

1. c
2. b, c, d, & e
3. d
4. d
5. a, b, c & d—if you can call b a "net-work"
6. d
7. e
8. c
9. b
10. d (30 per second)
11. c
12. c
13. d (Dr. V. K. Zworykin was the)
14. a
15. d
16. d
17. a
18. c

BIG RESULTS AT LITTLE COST with RCA 809's

W3BES WINS 9th A.R.R.L. SWEEPSTAKES . . . TOTALS 84,001 POINTS

Jerry Mathis of Philadelphia's Frankford Radio Club *knows* tubes—and he knows they don't have to be costly to bring real results.

For his 100-watt entry in the 1938 A.R.R.L. Sweepstakes, Jerry chose a pair of RCA 809's for the final amplifier stage and drove them with a third 809. These tubes had already seen two years of hard use. They had brought him second place in the 1937 Sweepstakes. At another time, during the DX Contests, he blushingly admits to having built them up temporarily to 500 watts input instead of their rated 150 watts input. Yet these hard-working old 809's continued to come through in their own big way.

Jerry's W3BES won first place in the 1938 Sweepstakes by working 502 stations, an average of more than 12.5 an hour. His total score was 84,001.25—a record that tells its own story of honest-to-goodness results from inexpensive equipment in the hands of an expert operator.

WIN, PLACE and SHOW with RCA'S

Here Is the W3BES Sweepstakes Record

1936—Ran 3rd using RCA-852's with 1,000 watts.

1937—Ran 2nd using RCA-809's with 100 watts.

1938—First place—with the same 809's!

RCA Radio Tubes

First in Metal, Foremost in Glass, Finest in Performance

RCA Manufacturing Co., Inc., Camden, N. J.
A Service of the Radio Corporation of America

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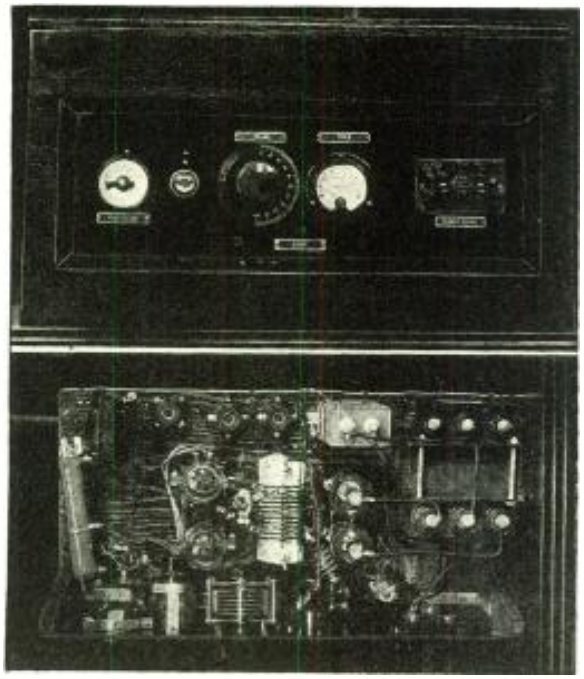


Front and top views of short wave diathermy apparatus.

How to Make
Dollars from Diathermy

C. C. Long

Details for Building 275 Watt Output Unit

● SHORT wave diathermy is finding more and more duties to perform in the field of modern medicine. Almost all hospitals and physicians' offices boast of some form of therapy using radio waves.

Primarily the use of the short wave diathermy at present is in the creation of artificial fever. Nature, of course, has used heat therapy for assisting the body in fighting off the ravages of disease since the creation of man. Until recently almost everyone, including physicians, regarded fever as a sort of "evil spirit" which aided the disease which caused it, in finishing off the unfortunate victim in a short time. However, modern physicians realize that fever is the process nature provides us with to *fight off* the disease. As considerable danger is involved in giving a treatment using a natural fever-producing disease, the use of radio waves has become widespread. In this way the patient can be given the fever either locally or generally in a pleasant and harmless manner. Fevers ranging from 103 degrees to 106 degrees can be produced in a few minutes and will disappear a few minutes after treatment is stopped.

As short wave diathermy machines are nothing more nor less than radio frequency generators, there is no reason why the radio set constructor cannot derive some benefit from the sale and maintenance of these machines. However, the radio technician's activity should cease with the sale and maintenance of the machine; the application should be left to an experienced physician. Although indicated in a large number of conditions the careless use of the machine may result in disaster.

Other than the creation of artificial fever, short wave diathermy is also used for minor surgery such as cutting, coagulation, etc.

CONSTRUCTION: Diathermy machines are used in many different conditions, consequently there are a number of sizes used. Power output may range from slightly above 100 watts to 1000 watts. However,

(Continued on page 169)

New "Noise Reduction" Circuits

Louis Mouroux

In this article the writer reviews the newest ideas and systems developed for the reduction of natural and man-made static noises interfering with radio reception.

● THE problem of noise reduction has been somewhat neglected by most radio technicians who are convinced that it is either too difficult or too complicated, if not entirely a waste of time and effort.

However, when one considers the improvements needed for better radio reception, the suppression of noise gives great satisfaction to the listener.

During the last few years several methods have been employed with more or less success, some having distinct advantages. They are, in order of relative effectiveness:

A—Noise reduction antennas.

B—Shielded loops and balanced loop circuits.

C—Noise-to-noise bucking, or neutralization circuits.

D—Limiter circuits.

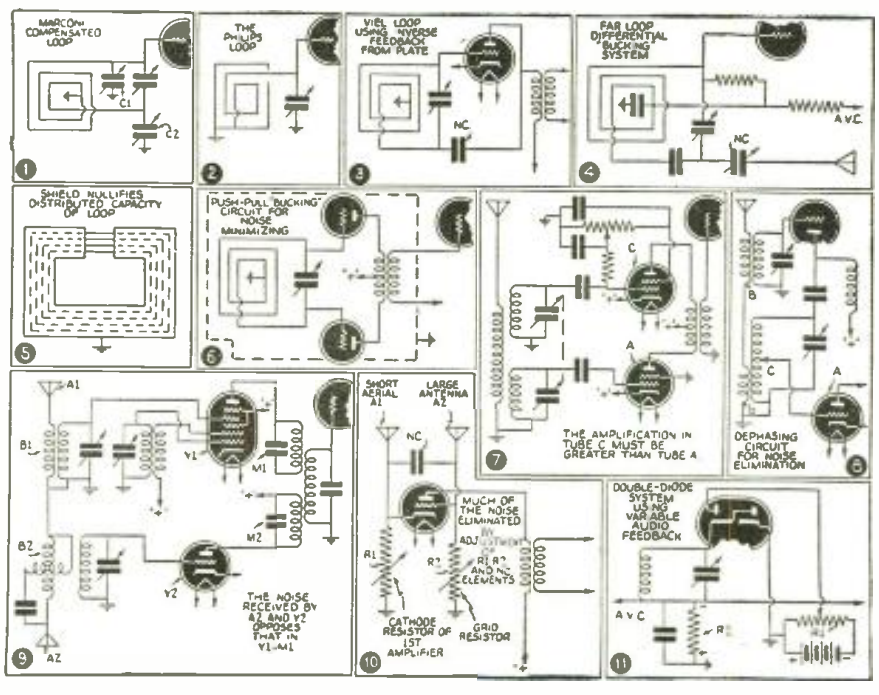
A—Noise reduction antennas, now commonly used, are well known and need not be discussed here.

B—The balanced and shielded loop circuits are probably the most efficient and the least complicated of all the systems ever designed. They have the advantage of having directional properties; they are easy to shield and balance; and they are not sensitive to the damped waves of natural or man-made static.

Moreover, they are not affected by the currents induced in ordinary antennas by changes in the earth's magnetic field or the ground noise currents usually intense in metal frame buildings, such as hotels, apart-

(Continued on page 184)

An interesting group of "Noise-Reduction" Receiver Circuits.



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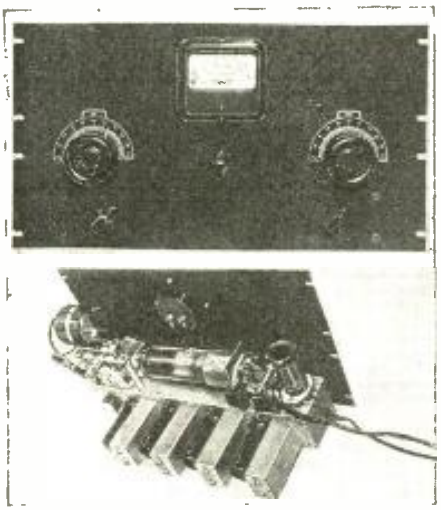
100 Watt Transmitter with Band-Switching Exciter Unit

● NEAT, compact transmitters are becoming more popular every day. The 100 watt transmitter with four stage band switching exciter, described here, operates on all bands from 80 to 10 meters, inclusive, and embodies the latest principle of construction and design. The exciter portion is built around a boxlike chassis measuring 17" long x 2¾" high x 3½" deep. The four 6L6 tubes, as well as the four fixed tuned exciter tanks, are built along the rear edge rather than on the top, as is the usual practice. The top of the chassis is used for the final amplifier. The entire transmitter, including everything but the power supplies, measures 17" long by 8" deep by 9¼" high and requires a 19" x 10½" panel for rack or cabinet mounting. Band switching in the exciter portion is accomplished in a very simple manner. The switch breaks the cathode circuits of the stages not being used, and at the same time connects the link output circuit to the proper doubler stage. No high potential R.F. exists in the switch and all circuits remain in perfect alignment.



Front and rear views of Band-Switching Exciter. Designed and built by Hammarlund.

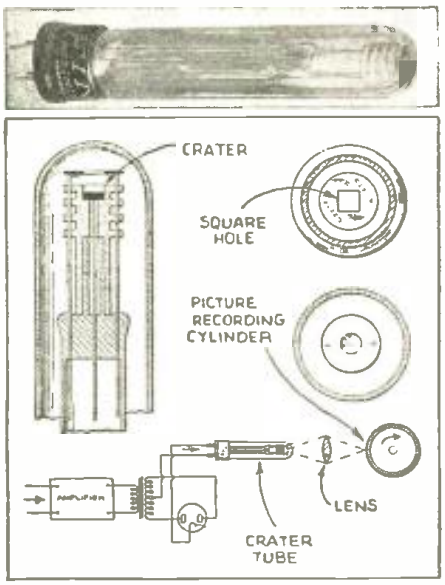
Meter switching is accomplished by connecting 100 ohm resistors in the circuits to be metered. The meter is connected across these resistors by means of a single four-point rotary switch for the exciter and a three-point dual switch for the 100 watt final amplifier.

The exciter plate coils are ready wound Hammarlund units about the size of an ordinary I.F. transformer. The coils in the final amplifier are of the plug-in variety, in order to maintain simplicity.

When the transmitter is completed, there are only two tuning controls to operate. All other adjustments are made when the transmitter is put into operation and then require no further attention. With the use of efficient beam type antennas having a power gain of three or four, a transmitter of this type will compete with the high power boys and still take up no more space than the average ham receiver.

Facsimile Recording Tube

● W. G. H. FINCH, former Ass't Chief Engineer of the F.C.C. and now president of the Finch Telecommunications Laboratories, Inc., in New York City, has been awarded U. S. patent 2,123,721 on a new simplified and inexpensive gaseous type of facsimile recording tube.



Top—Photograph of the Finch tube. Below—Sectional view of tube, and diagram showing its use.

Although the new tube was developed primarily for facsimile reproducing systems, it is also useful for sound recording and television. Earlier gas-filled tubes, says Mr. Finch, were not satisfactory for high quality facsimile reproduction work, due to the intensity of the cross-section of the resultant spot of light focused upon the record sheet, which resulted in "fringes" between the successive scanning lines, causing the line-by-line construction to be noticeable.

The new type of recording tube produces a beam of light with a predetermined shape and uniform cross-sectional intensity, maintaining a *square* beam for recording. By means of a lens system, this beam, varying in intensity in accordance with the picture signals, is sharply focused upon the film mounted upon the drum of the facsimile unit.

The tube produces this uniform glow across the square aperture so that the lens system may be focused directly upon the aperture in order that the image of the light is produced directly upon the film.

The electrodes consist of a flat plate anode containing the square aperture located directly above a cylindrical cathode. This cathode is set into supporting insulation material which is mounted upon the extension tube from the glass stem. The insulation member contains projecting fins used for cooling the electrode.

RUGGED—COMPACT—INEXPENSIVE—SINGLE OR DOUBLE FEED

- Insulated with ALSIMAG 196
- Rated at 1 KW, AF or RF, at 28 MC
- Maximum contact capacity in Minimum space
- Guardian Built

Utilizing the highly efficient insulating qualities of ALSIMAG 196, the A-100 Antenna Relay affords greater flexibility for amateur transmission use, giving maximum contact capacity in minimum space and permitting economical construction of the most elaborate control circuits.
The A-100-C makes an excellent antenna relay for any transmitter up to, and including 1 KW. A single A-100-C is recommended for use in single wire fed antenna installations or two, in two wire open line systems. When used in pairs, they may be placed at any desired spacing to accommodate width of line used, avoiding possible mismatch caused by distorting the feed system to provide for relay installation.
R-100 series relays are designed for use in AF and RF circuits of kilowatt phone or CW transmitter operating on frequencies up to and including 28 megacycles and provide a simple, efficient method of remotely controlling receivers and transmitters; of band switching, crystal switching, high voltage keying and break-in.

MODEL	LIST PRICE
A-100 Double pole—double throw	$5.95
A-100-C Single pole—double throw	3.30
R-100 Single pole—single throw, Norm. open	2.75
R-100-B Single pole—single throw, Norm. closed	2.75
R-100-C Single pole—double throw	3.30
R-100-G Double pole—double throw—Triplex insulated	5.00

Normally operates on 110V-60C. For coils operating on other than 110V-60C-AC add 10% to the above list prices.

Get complete details from your dealer or write direct for free bulletins and circuit diagrams.

GUARDIAN ELECTRIC
1628 W. WALNUT STREET CHICAGO

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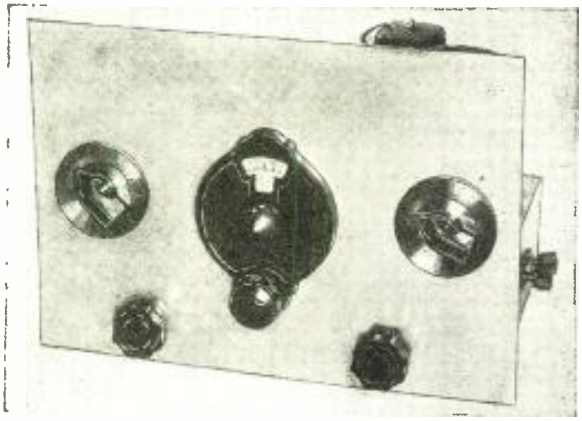


Above—New 4-tube receiver; below—diagram of the receiver and its power-supply. ▲

New 4-Tube Receiver

Has Range of 8 to 550 Meters

G. C. Crose

● THE new improved model of the Knight Super-Gainer kit incorporates new features and offers higher efficiency without sacrificing any of the advantages of the original circuit. When properly constructed and operated, this four-tube receiver will give you the kind of performance ordinarily expected of seven- or eight-tube sets, say its sponsors.

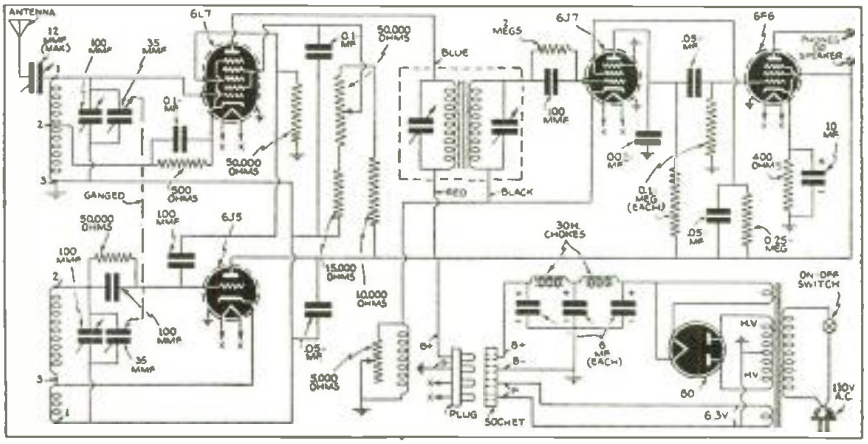
In examining the circuit you will find that a regenerative 6L7 tube is used as the first detector with a type 6J5 tube serving as a separate oscillator. Volume level and regeneration are controlled by means of a voltage divider network, which varies the screen grid potential on the 6L7 tube. The regeneration action gives extremely sharp selectivity and sensitivity. Nevertheless, the set is very easily controlled and sharp-tuning bandspread is also provided.

A 456 kc. iron-core I.F. transformer couples the first stage to the regenerative second detector which employs a 6J7 tube. Additional regeneration is accomplished by inserting an R.F. coil of special design in the cathode circuit; the degree of regeneration is controlled by means of a shunting potentiometer.

A power output tube is used to supply plenty of kick to headphones or speaker. The operator may use phones or speaker at will; in either case excellent quality will be obtained.

The complete Super-Gainer may be operated from "B" batteries and

(Continued on page 177)



A crystal-control combination "Send - 'Ceiver" which can be expanded whenever desired to make it a M.O.P.A.

Beginner's Xmitter-Receiver

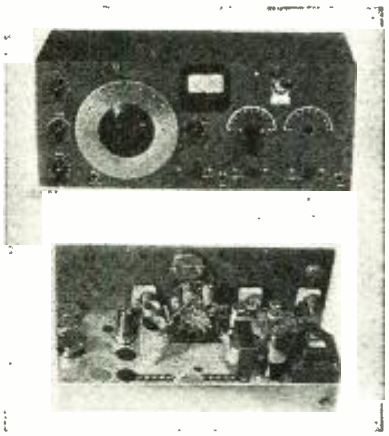
Makes an Ideal PORTABLE

McMurdo Silver

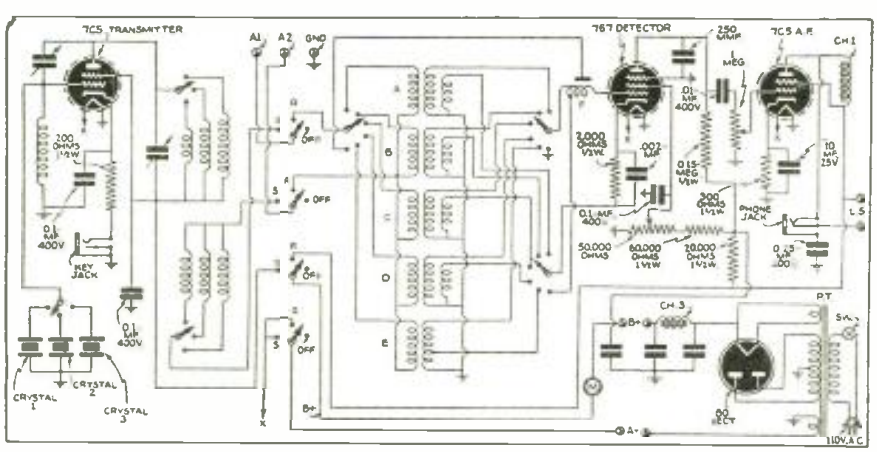
● IN the "Send-'Ceiver" the transmitter is a simple, fool-proof crystal-controlled 10–15 watt affair, so arranged that it can be added to as desired and, starting as a simple one-tube crystal oscillator, can grow to a two-tube, 15 watt m.o.—p.a. rig—to which can be added 1 or 2 tubes to convert it into a telephone transmitter—phone as well as c.w. telegraph transmission can be enjoyed as the beginner advances to such stages. It can be used as an "exciter" for much more powerful amplifiers, if, as the beginner grows up, he joins the "kilowatt parade."

The front panel carries all receiver controls at left and all transmitter controls at right. The small knob at the upper left is the receiver tuning condenser, or band-setting knob. In operation, it is set to the edge of any amateur band from 5 through 160 meters (or is used to tune regular and short-wave broadcast bands which the receiver also covers), after which stations in the desired band are tuned in on the large 5½" "vernier" band-spread dial, for easy tuning, even as low as 5 meters. The lower left knob is the master *on-off* switch and receiver volume-regeneration control. Set up to just below oscillation, as evidenced by a hiss in the head-phones (with stations heard as a squeal), it provides for selective long-distance voice and broadcast reception. Set just above this point, or just beyond critical regeneration, c.w. telegraph stations the world over can be tuned in—with, actually, more effective selectivity than is

(Continued on page 173)



Above—Two views of the Transmitter-Receiver, and at left—the hook-up, showing the "change-over" switch. ▲



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Planning Programs for Television

Thomas H. Hutchinson

(Continued from page 133)

In the studio, the necessity for mobility—mobility of cameras and lighting units—and the obvious requirement of continuous action lie at the bottom of most of our problems. We do have the advantage of controlled light conditions and three camera chains. But the light is still inferior to sunlight in brilliance, and considerably hotter. Our engineers, however, have recently perfected a lighting system of such efficiency and flexibility that I believe it will revolutionize all studio lighting. Ceiling lighting units, six lamps to each unit, are so arranged that each may be swung through nearly a complete circle and the units themselves tilted through a considerable angle. Each unit is remotely controlled so that the lighting set-up may be changed to follow studio action without interfering with camera movement.

As far as sets are concerned, our problem is to make them embody the impression we want to make on the viewer and yet keep set dimensions small enough for our studios. We have had as many as seven sets in one play; four or five are usually used. I must confess that sometimes a good deal of ingenuity is required in arranging these about the studio floor.

We are still up against the limitations imposed by cameras with lenses of long focal length. This has made us confine our dramatic action within rather narrow limits. This condition, however, is of temporary duration. New Iconoscopes in the process of development will permit us to use lenses of short focal length and gain a greater depth of focus in our images.

These are some of the limitations the program director faces today in presenting a television show. Some we shall overcome with greater experience. Solution to other problems awaits on the ingenuity of our friends in the RCA laboratories. Nevertheless, our immediate job is to build programs of such interest that the man who sees them will want to buy a receiver for his home. Regardless of the present limitations of television, the program director must somehow manage to please the viewer, the ultimate judge of its success or failure.

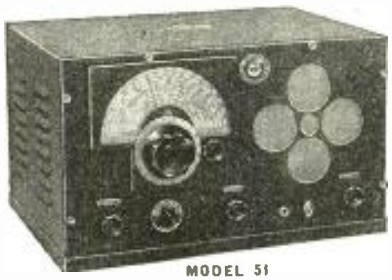
Television in 24 Hours

(Continued from page 147)

too great an extent, especially when one wishes to photograph the image. A moderate degree of contrast, with the brilliance brought up to a point at which the image is bright enough to be comfortable but somewhat less than maximum, will be found to give most faithful reproduction of half-tone values. The too-contrasty image gives a sort of poster effect with large patches of blacks and whites and no intermediate shades of gray.

With these two controls well balanced, the focus control should be brought into use. It is possible to set this control so that horizontal black lines appear and, of course, this gives the greatest degree of detail. The writer, however, finds it pleasanter to look at a picture with somewhat less detail but with an absence of all the lines which have heretofore been considered characteristic of television images. Therefore, he adjusts the focus controls for a slightly larger scanning spot and succeeds in entirely eliminating these lines, as the photograph of the image illustrating this article shows.

MARINE and COMMERCIAL-TYPE RECEIVERS



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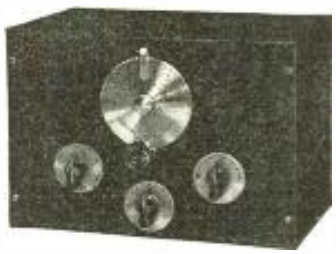

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NC80X & NC81X	99.00	19.80	6.99
SX-23	115.50	23.10	8.15
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Mechanical Scanning

(Continued from page 141)

factors to produce a minimum cost, and at the same time to achieve a satisfactory degree of reliability. Essentially it is a multi-mirrored design. A reduction in the number of its mirrors can only be attained by increasing the rotary speed of one or both motors. For example, doubling the speed of both motors would cut the total number of mirrors in half, but it is rather apparent that 30,375 revolutions per minute represents the upper limit of practicability for the design, and therefore little can be hoped for by increasing the speed of the line frequency motor.

OSCILLATING MIRROR:

The *oscillating mirror* system of television replaces the multi-mirrored Nipkow rotary system with a *single* mirror, and it retains its single mirror, irrespective of the degree of detail that the art now requires or will require in the future. This principle is most encouraging. Like many such apparent short-cuts, it soon became evident that the power required to oscillate a mirror of appreciable size at speeds of say 10,000 swings a second over a sufficiently wide angle to produce a large picture, runs into values far above practical limits.

The answer to this problem was found in the use of *mechanical resonance*. This dropped the driving power by four orders of magnitude. However, reducing the power to a low value was of itself not a complete solution. The design had to be of such a nature that its exact duplication would be inexpensive, and its characteristics stable in the field, otherwise the vital rigid condition of exact synchrony in frequency and phase could not be attained. The photograph shows the scanner developed by the International Television Radio Corporation. Its frequency is constant over a large temperature range, due to a special design feature. In its zero position the device is in a state of zero strain. There is an entire absence of parasitic vibration in its operation. The cost is low and the design is stable and contains no wearing parts whatever.

Naturally there is a slight difference in natural period between the various scanners, but since all are driven by a component of the radio wave, they all are forced into, and maintained in exact step with one another. The only difference between them is their varying amplitudes of swing, which is adjusted by framing controls at the receiver. These controls adjust the amplitudes of the swings of the mirror by varying the input powers into the two sets of driving magnet coils.

Employing resonance, there is no practical upper limit to the detail that can be scanned with a single vibrating mirror.

HARMONIC SCANNING PATTERN:

The patterns can be interlaced as in other systems. However, the scanning pattern is harmonic. Furthermore, the scanning spot is never interrupted, but, on the contrary, is continuously on the screen.

It has been suggested that because of this harmonic motion, the light would be piled up at the edges of the picture. Experience does not support this view, for to the eye, a screen scanned with unmodulated white light appears uniform except for a frame one dot wide about the entire picture. This framing dot is cut off by a diaphragm and therefore does not appear. If a non-uniform distribution of light did occur it could be compensated for at the transmitter.

Synchrony for such a system is elementary in its simplicity. The shape of the transmitted pulse can be of *any desired form*, for the increment of energy imparted to the vibrating element by each pulse is but a very small percentage of its stored energy. Man-made static therefore does not affect the scanning or the proper arrangement of the picture elements. The synchronizing pulses occupy an extremely narrow portion of the channel.

The resonant vibratory mirror system can produce a home picture two to three feet on a side, and the indications are that television receiving sets *may* be made to retail at about $200.

July, 1939 RADIO-CRAFT

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Correction Notice

● DUE to an editorial oversight, credit was omitted on the article, "Rotating Beam Loop," in the April issue. This article was written by W. F. Holford, G5NG, and appeared in the *T & R Bulletin* of England. The editors of RADIO & TELEVISION regret this omission and wish to give both the author and the original publisher full credit.

● ON page 36 of the May issue in the "Question Box," we incorrectly gave credit for the "Simple C.W. Transmitter Rig" to Louis Huffert. Credit should have been given to W. J. Hoffert, Port Arthur, Texas, who designed the apparatus.

Radio Speed Indicator

(Continued from page 143)

occurs, is used in a new radio airplane speed indicator recently patented by The British Thomson-Houston Co., Ltd., and reported in *Wireless World* (London).

According to the invention, the plane carries a short-wave transmitter, T, and a short-wave receiver, R, mounted side by side in separate parabolic reflectors, as shown in Fig. 9. The transmitter radiates to the ground a clear-cut beam of energy which is reflected back, at least in part, toward the receiver, where it produces apparent change in frequency. The change is proportional to the speed of the machine relative to the point of reflection, and is measured by the beat-note produced by combining the returning wave with a fraction of the outgoing wave. A small ray is diverted directly from the transmitter into the receiver by a pair of small disc reflectors D, D1, placed just in front of the outgoing beam. An iris diaphragm, D2, serves to regulate the strength of the diverted ray.

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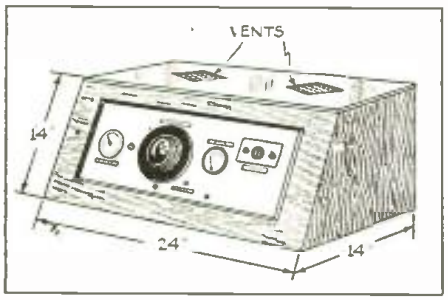
How to Make Dollars from Diathermy

(Continued from page 164)

the most popular range is between 200 and 500 watts. A machine having an output of 250 watts is generally satisfactory for office use. (The present design has.) In construction the experimenter should bear in mind that due to the varying load and the abuse received by the machine it should be made substantially, and under no condition should quality of parts be sacrificed for low cost.

In order to have a radio frequency circuit capable of producing under adverse



Assembled Diathermy Apparatus.

conditions, the component parts must be heavy enough to withstand a heavy overload without injury to themselves. Circuit design must be considered also, as stable operation must be maintained.

Diathermy machines are capable of producing much interference, so proper shielding and line filters must be used. In some cases it has been necessary to use the machine in a screened enclosure large enough to permit the treating table, the attendant, the patient and the machine, all to be enclosed. This is in extreme cases, however, and should not be necessary if the machine is properly constructed.

It should be remembered that the person using the apparatus seldom has any knowledge of the technical operation of equipment of this type and the machine should be so constructed that it will be foolproof and safe, even though the operator does not know what is inside.

Referring to the circuit diagram, it will be seen that in the power input circuit there is ample filtering action to prevent the R.F. from going into the power line. Ch. 1 and Ch. 2 are ordinary R.F. chokes, built to stand the necessary load. C1 and C2 are condensers, preferably of the mica type, to further aid in preventing R.F. from entering the power line. These precautions, as well as the shielding of the interior of the cabinet with copper wire screen should eliminate all possibility of interference.

As the mercury vapor 866 tubes are easily damaged by applying the plate voltage before the filaments are heated, it should be arranged so that there is the usual delay of 15 seconds between the time the filament transformers are switched on and the time the plate transformer is switched on. The ideal way, of course, is by using a time delay switch. In the circuit, however, it is noted that a common *tuning eye* tube is used, to indicate when the plate voltage may be applied, for the sake of economy. This will easily remind the operator to wait for the interval before turning the plate voltage on and will also add "eye appeal" to the machine. S1 controls the filament; the plate voltage is applied by the switch in the timer. The duration of the treatment may be timed and after the end of the treatment the plate voltage is automatically shut off. The Mark Time switch incorporated in the circuit may also be set in a "HOLD" position so as to not limit the time but to permit the machine to operate.

In the oscillator circuit several tubes were tried and the best results were obtained with the Gammatron 254. This tube has the following characteristics:

HK254

Maximum plate dissipation	100 watts
Filament volts	5.1 volts
Filament current	7.5 amps
Maximum plate volts	3000 volts
Maximum plate current	200 ma.
Maximum D.C. grid current	40 ma.

In order to have a ripple-free current a 1 mf., 3000 volt (C3) condenser is used in the high voltage input. The tuning condenser C4 is a split stator, 35 mmf. per section, rated at 5000 volts. Condensers C5 and C6 are used to isolate the patient's circuit in order to prevent shocks. C7 is used for reduced power in conjunction with outlet P1. The terminals P1 and P2 give full current for fever treatments and the terminals P1 and P3 are used for coagulation, dessication, cautery, etc. The strength of the special application outlets may be

(Continued on following page)

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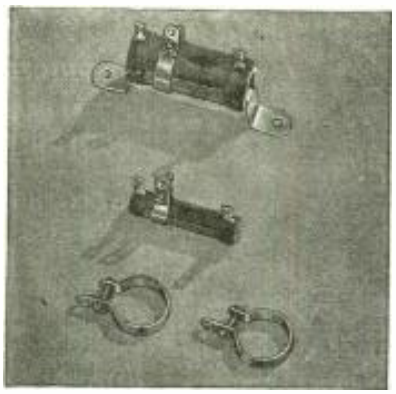

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changed by varying the value of C7. *(Note that in the photo the condenser shown is not of the split stator type. This conventional type condenser does not perform as well as the split stator type and is more dangerous to use because of possible shock as well. For this reason the author thought it wise to specify the split stator type. The test model was changed after the photo was made.)* Condensers C8 and C9 should be of sufficiently high rating to prevent possible breakdown. R.F. current output is indicated by the meter in the patient's circuit. Since pads and surgical applicators cannot satisfactorily be made, it is suggested that they be purchased from a surgical supply house.

The plate tank circuit consists of 12 turns of No. 10 copper wire on a 2¾-inch diameter form. The machine should tune at about 16 meters. Care should be exercised when buying the pads to be sure they will resonate at the frequency used.

In addition to the use of outputs P1 and P3 for attenuation of the output, a High-Low switch is employed in the grid bias

BUD RADIO

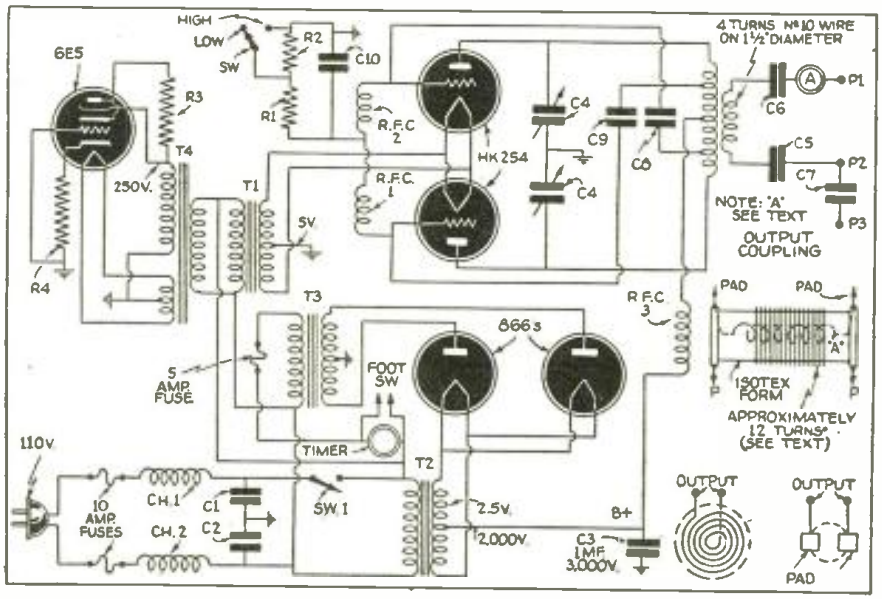
1—C4 No. 1581 35 mmf. per section dual condenser
4—No. 226 transmitting sockets
1—Tuning eye assembly
1—Heavy duty switch
1—Isotex transmitter tank form
1—No. 568 transmitting choke R.F. 2.2 m.h., 1000 ma.
2—No. 876 transmitting chokes, R.F. 2.5 m.h., 250 ma.
1—Pilot light assembly
3—Insulated jacks for pads

I. R. C.

1—R1 3500 ohm, 50 watt resistor
1—R2 5000 ohm, 50 watt resistor
1—R3 1 megohm, 1 watt resistor
1—R4 5000 ohm, 1 watt resistor

SANGAMO

2—Transmitting mica condensers, C5, C6. .002-mf., 5000 volts
1—Transmitting mica condenser, C7, .005-mf., 5000 volts
2—Transmitting mica condensers, C8, C9. .0001-mf., 5000 volts
1—Transmitting mica condenser, C10. .006-mf., 5000 volts



Hook-up of Short-Wave Diathermy Apparatus.

circuit, R1. A tuned grid circuit may be used if desired but it was found that the circuit shown did not go out of oscillation on overload as much as the tuned grid circuit.

The cabinet should be well ventilated and rigidly built. For added safety the panel should be of bakelite. Cabinet design will depend largely upon individual taste, but of the materials available, wood will be found cheapest and safest.

Approximate operating conditions for the Heintz and Kaufman 254 tubes in the oscillator circuit are as follows for a pair:

Plate voltage—2000 volts.
Plate current—200 M.A. loaded.
120 M.A. idle.
Grid current—80 M.A. maximum.
Power output—275 watts approximately.

This tube is capable of greater output when used as a straight radio frequency Class C amplifier, but when used in diathermy it would not be wise to exceed the above approximate ratings, due to the varied load conditions.

List of Parts for S-W Diathermy Machine

SPRAGUE

1—C1 .006 mf. 600 volt condenser
1—C2 .006 mf. 600 volt condenser
1—C3 oil condenser, CR13, 1 mf., 3000 volts

HEINTZ & KAUFMAN

2—HK 254 transmitting tubes

RAYTHEON

2—866 rectifier tubes (half-wave)
1—6E5 cathode-ray tube

HOYT

1—0-3 ampere hot wire ammeter

OHMITE

2—A.C. line chokes Ch.1 and Ch.2 (Z22)

STANCOR

1—Plate transformer, No. P6154 (T3) D.C. Vts, after filter—2,000; 300 ma.
1—Filament transformer, No. P3025 (T2)
1—Filament transformer, No. P4086 (T1)
1—Filament and plate transformer, No. P5058 (T4)—550 V. C.T.; 50 ma.; 6.3 V. C.T. and 2.5 amp.; 5 V. C.T. and 2 amp.

MISCELLANEOUS

1—Mark Time timer and switch assembly
2—10 ampere line fuses
1—5 ampere line fuse
3—Fuse holders
1—Outlet receptacle for foot control
1—Bakelite panel to fit cabinet
1—Cabinet constructed as suggested in text
1—Pickup coil (see diagram)

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NEWEST RADIO APPARATUS

New Skyrider 23

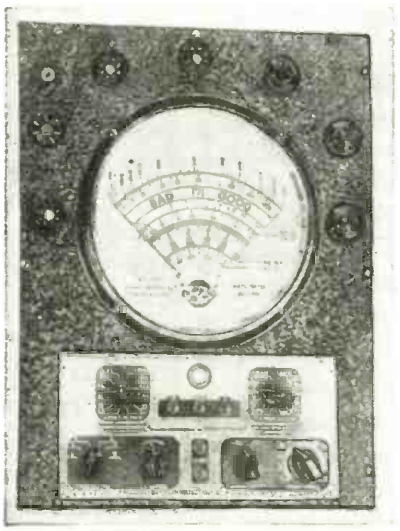
● HALLICRAFTERS have brought out a new 11-tube model, known as the Skyrider 23, which has a number of highly desirable features. For example, to secure greater frequency stability, con-

densers and coils are constructed of materials with temperature co-efficients causing frequency changes that compensate for each other. Thus, when a coil producing a positive frequency change with an increase in temperature is used in conjunction with a condenser that has a negative frequency change for the same temperature variation, a zero frequency change results.

The tuning dial is made of metal, indirectly lighted, and the four general coverage dials are accurately calibrated in megacycles, while the bandspread dial is calibrated with an arbitrary scale for easy logging of stations. The "S" meter dial is calibrated in "S" units and "db." units. The band indicator has eight positions which provide continuous coverage from 8.8 to 556 meters (34 mc. to 540 kc.) and bandspread coverage over the full 330 degree dial of the 10, 20, 40 and 80 meter bands. It also includes an automatic noise limiter to minimize noise level on the higher frequencies. The switch of this unit is mounted directly adjacent to its tube, and is mechanically linked with the switch on the operating panel. Other features are a crystal filter, automatic noise limiter, amplified AVC, wide band-spread, variable selectivity, and separate speaker in matching cabinet.

Tube & Set Tester

● THE Approved Technical Apparatus Company has announced its model 2000-C Portable combination *Tube Tester and Set Analyzer*. It has many features, among which are a 9" round



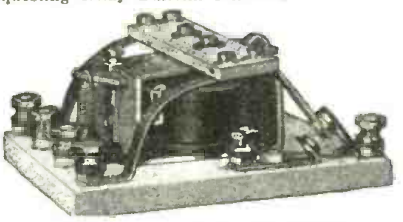
D'Arsonval type 1 ma. meter with 1000 ohms per volt sensitivity and 2% accuracy. It tests all tubes including the new OZ4, and other cold cathode rectifiers, as well as all metal, MG, spray shield and glass tubes. Among the tests it gives are hot interelement short and leakage between all individual elements, hot cathode leakage, and individual tests of each section of full-wave rectifiers, duo diodes and all multi-purpose tubes. Its D.C. voltage ranges are 0-10-50-500-1000; its A.C. voltages are 0-10-50-500-1000; while its current scales are: D.C. ma. 0-1-10-100-1000 and D.C. amp. 0-10. It also provides an ohm meter with ranges of 0 to 500 to 5000 ohms and 1 to 10 megohms. Its decibel ranges are −8+15, −15+29, −29+49, −32+55. It also gives inductance readings from 1 to 700 henries; wattages from .006 to 600, and four ranges of outputs. It may be used for making condenser leakage measurements, as well as for all other obvious tests. The unit comes complete with test leads and book of instructions, in a portable leatherette case.

New Transmitter Relay

● THE new Type 400 Transmitter Relay of Advance Electric Co., employing Isolantite for the base and armature cross-arm, has exceptional sturdiness and high insulation throughout. The contact combination is DPDT, using ¼" pure silver contacts, on which perfect "wiping" action is always present.

The unit permits quiet, chatter-free operation on A.C. as well as D.C., no "hum" to contend with, and without any loss of power or snap action.

Available for operation on all A.C. and D.C. voltages, the coils may be placed in continuous service without danger of overheating. For further details write Service Dept., RADIO & TELEVISION, requesting Relay Bulletin No. 400.



New Recording Blanks

● JUST announced by the David Bogen Company, Inc., is a new type *recording blank*. More durable than acetate, flexible and noninflammable, it does not develop hard or dry spots, will not dehydrate. It is absolutely uniform in thickness, impervious to temperature, and is manufactured by the lamination process, with no dipping or spraying. Literature available upon request by writing to this magazine.

Condenser Insulators

● THE Sprague Products Company, North Adams, Mass., has developed "Lifeguard" Protective Caps as a new and exclusive feature of their transmitting condensers.

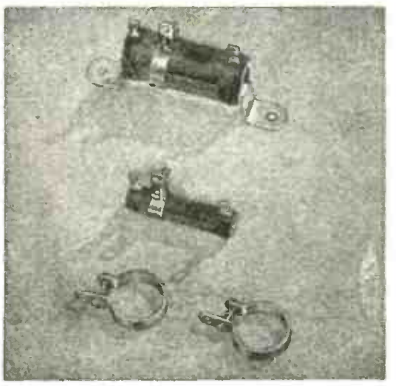
These hard rubber caps, which fit snugly over the condenser terminals, insulating them completely, are supplied free of charge with this company's High Voltage Transmitting Condensers in either the round or rectangular types, or may be had separately for use on old condensers at a nominal price.

As a further protective measure, all Sprague Transmitting Condensers are both filled and impregnated with Spracol, a highly noninflammable oil having a flash point protection of 500 degrees F., and terminals are insulated from cans for at least twice the working voltages of the condensers.

New Resistors

● A NEW line of wire-wound resistors has just been announced by Consolidated Wire & Associated Corps. Four sizes of adjustable resistors are offered—10-watt, 25-watt, 50-watt and 75-watt—of which the 10- and 25-watt sizes are shown with extra adjustable bands. There are also four sizes of wire-wound fixed resistors—5-, 10-, 20- and 50-watt.

Two mounting brackets are supplied on all but the 10-watt size in the adjustable resistors. All four have two tab terminals. All sizes of fixed resistance units have solder lugs and all but the 5-watt size have tinned copper leads as well.



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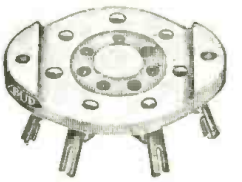

Circuits requiring very low loss construction will find this line of Glazed White Ceramic Sockets the Perfect receptacles for tubes and plug-in coils. The contact springs are of a special design that assures a positive contact indefinitely on a large area of the pins, and these springs have heavy soldering terminals. Priced only 24c to 33c net at your BUD jobbers.

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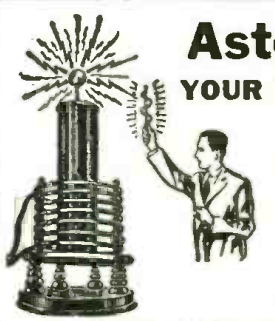

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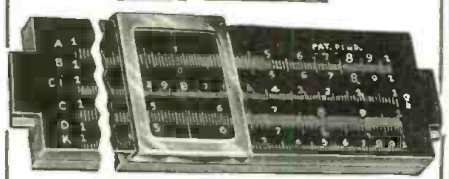

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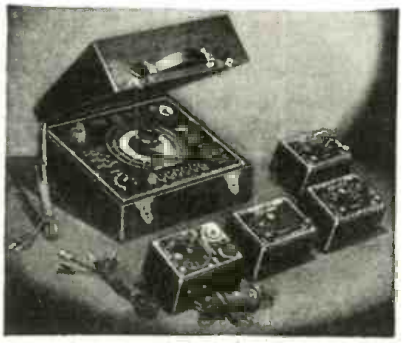
Capacitor Test Equipment Line

● ENGINEERS at the Cornell-Dubilier Electric Corporation have released their new Capacitor Test Equipment Line. The first of these instruments will be the Capacitor Analyzer, Capacitor Bridge and complete line of Capacitor Decade Boxes. The Model BF 500 Capacitor Analyzer with



easy reading linear scales and push-button controls, will measure all the important characteristics of paper, mica, oil, wet and dry electrolytic and motor starting capacitors. It consists essentially of a Wien Bridge connected to a single stage of amplification which operates a "visual eye" detector. A built-in power supply provides adjustable 450 V. D.C. for leakage and insulation resistance measurements. A 12A7 tube is used as a rectifier and amplifier, while a 6E5 is used for bridge detector and leakage indicator.

The C-D Midget Capacitor Bridge will measure all types of capacitors between .00001 and 50 mf. It also employs a Wien Bridge circuit for all measurements, and contains a 12A7 as rectifier and a 6AF6-G for bridge detector. The Capacitor Bridge is completely self-contained, requires no headphones or other accessories.

The C-D Capacitor Analyzer, Capacitor Bridge and Capacitor Decade Boxes are described and detailed in Catalog No. 167A.

New Television Capacitors

● A NEW series of capacitors has been developed by Cornell-Dubilier engineers, which have been incorporated into the design of *television* receivers, engineered by several of the leading manufacturers. These new capacitors are furnished to required specifications. The type PC capacitors are impregnated and filled with Dykanol, the chlorinated-diphenyl impregnant of high dielectric characteristics, which is non-inflammable and non-explosive. Hermetically sealed in cylindrical containers the Type PC units are produced with Bakelite double-cone type insulators. The capacitor is mounted in an inverted position, with the terminals clearing the chassis. Ample protection against possible electrical shock, and flash-over

between terminals caused by dust, is afforded by an insulating container. This capacitor series is available in single, dual and multiple capacities at voltages between 2,000 and 10,000 volts D.C.

DyKanol Capacitors

● A COMPLETE line of DyKanol capacitors has been announced by the laboratories of the Cornell-Dubilier Electric Corporation. These new capacitors are designed specifically for oscillator and filter circuits in television transmitters and receivers. Company engineers state that DyKanol capacitors will remain extremely constant under all temperature and climatic conditions, and that the wide safety range of these units will enable them to take the heavy transient surge voltages that obtain in television circuits.

C-D DyKanol television capacitors are supplied with inverted mounting features and heavily insulated terminal structure.

This series will be available in tubular, cylindrical and rectangular shapes and sizes. Special designs will also be offered. Ratings will be from 1,000 to 10,000 volts D.C.

Several important additions have been made to the C-D capacitor line. These include exact duplicate capacitors for motor starting for refrigerators.

Also available are electrolytic capacitors for both new equipment and replacement applications—standard shapes and sizes in a complete capacity range at voltages up to 220 V. A.C.

Catalog No. 162A contains complete information.

Line-Voltage Regulator

● A COMPACT line-voltage regulator which permits maintaining the A.C. voltage supply constant within plus or minus 2 per cent of the normal required voltage even though the line voltage may drop to 95 or rise as high as 135 volts; or which may be used to boost or reduce normal line voltages in 5-volt steps when desired, has been introduced by the Lafayette Radio Corporation division of Wholesale Radio Service Co., Inc.

This Line-Voltage "Jogger" finds useful applications in providing constant operating voltage supply to calibrated oscillators, vacuum-tube voltmeters and other precision apparatus; to communications receivers in which the tuning calibration would otherwise vary with variations in line

voltage; to the exciter sections of "ham" transmitters which do not employ crystal oscillators; and to various types of equipment employed in photographic and other work.

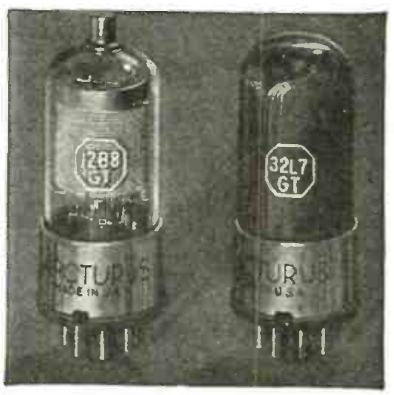
The unit, rated to handle loads up to 240 watts and inclosed in a steel case only 5" x 4" x 3" in size, includes a direct reading 0-150 volt A.C. voltmeter in its output circuit which reads the voltage supplied to any device plugged into its receptacle. It is only necessary to adjust the transformer tap switch on the top of the case until the meter shows the desired value.

The "Jogger" is available in kit form with the case drilled, ready for mounting the parts, or in the form of a complete unit, wired and ready for use.

New "2-in-1" Tubes

● TWO new "2-in-1" midget tubes, just pioneered by the engineering laboratory of the Arcturus Radio Tube Company, make possible the smallest and lowest priced sets for truly practical reception ever made.

According to the engineers who designed them, each of the two new tubes serves as two tubes in one. Both have been designed primarily for A.C.-D.C. receivers wherein very limited space is



available. Tube Type 32L7GT, for instance, may be used in conventional half-wave high-vacuum rectifier and beam power amplifier circuits. Type 12B8GT has both a pentode and triode section, the former being used as a conventional R.F. or I.F. amplifier and the latter as a biased or grid-leak detector. Neither tube is any larger in size than the conventional GT Midget tubes.

www.americanradiohistory.com

A Universal Preselector

Range 5 to 185 Meters with Electrical Band-Spread

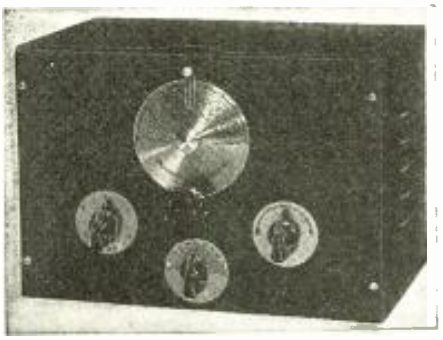
By GENE TURNEY, W2APT

● THE number of communication receivers which employ little or no preselection before the converter tube makes it particularly desirable to have some type of preselector which will give a high image rejection ratio, increased gain, and a lowering of the noise level available for use ahead of such receivers.

After careful consideration, about the most reasonable thing was to construct a good preselector, but what kind of a preselector was it going to be?

In designing the complete preselector, it is advisable to start with tuned circuits which have a high Q, and the apparatus and tubes must all have good stability.

In looking over the available tubes, it would appear that the 1852 possessed very desirable characteristics inasmuch as the transconductance was 6000 or more; and a little experimental work with a regenerative circuit showed that, with screen control regeneration, the tube was extremely stable even when the control was adjusted very close to the oscillation point. A few more calculations concerning gain with this apparatus showed that, if it was assumed that the impedance of the antenna input system of the receiver to which the preselector was to be connected had about 400 ohms, the 1852 alone would give a gain of two or more; that with regeneration on the tuned circuit, gains of 1000 or more in this circuit could be obtained. Thus the overall gain of a single regenerative stage would be several thousand.



Universal Preselector.

The circuit finally evolved a 5-band coil switch to cover all bands from 5 to 185 meters. Generous overlap was available between bands as it was not difficult to cover the range of frequencies with as small a tuning condenser as 200 mmf., and an electrical band-spread condenser of 25 mmf.

In order to facilitate tuning, an antenna throw-over switch was incorporated so that the receiver could first be tuned to the signal whereupon the antenna throw-over switch can be operated placing the preselector between the antenna input system and the receiver.

The Browning preselector is easy to construct. The 5 to 185 meter Tuner available for this type of preselector is completely wired at the laboratory and it is only necessary to make three connections between the chassis and this Tuner. A laboratory type, vernier drive dial is available, which has an approximate frequency calibration for each of the bands, and is provided with an 0 to 100 scale on the outer rim for accurate frequency logging.

Amateurs and experimenters alike who are interested in DX reception, as well as those who are bothered with electrical images, will find the regenerative preselector to be an extremely welcome addition—especially those operators who live in metropolitan areas where the noise level is at all times a problem.

Beginner's Xmitter-Receiver

(Continued from page 166)

possible to any but a regenerative super-het, or one having a crystal filter. Like the regenerative super-het, this receiver gives "in between" selectivity so badly needed in amateur phone bands. At the upper left is the audio volume control. To the lower left of the dial is the head-phone jack, with loudspeaker terminals on the rear. At the top center is a hole for a milliammeter for the transmitter, when it can be afforded. This hole is ordinarily covered by a neat disc. Directly below is the six-band wave-change switch knob, and below and toward the left, the sending key jack and *send-receive* switch which shifts power from receiver to transmitter, and shifts antenna connections, too.

The microphone jack is at the extreme lower right, not used in the one-tube transmitter illustrated, but included for appearance.

To its left is the 3-position oscillator crystal circuit wave-change switch, with, to its upper left, the plate tuning condenser knob and dial scale. Each plate circuit switch position covers two out of six amateur bands, shifts from one to the other being accomplished simply by rotating the oscillator plate condenser knob. Just to the right is a blank dial scale (covered by a blank plate until the builder desires to expand the transmitter to two tube m.o.—p.a.), and below it the 3-position plate circuit switch (the crystal switch will also switch oscillator plate coils when the transmitter grows to two tubes, the right dial and switch then controlling both crystal and oscillator plate circuits). Any one of three crystals set in 10, 20, 40, 80 and 160 meter amateur bands can be instantly selected at will. In the one tube form, with three crystals plugged into their sockets, instant choice of three-band operation is had, while two additional bands can be covered simply by swapping crystals. In 2-tube form, when the amplifier may also double the crystal frequency, six bands can be instantly covered by using one each 160, 40 and 10 meter crystals.

The receiver uses two of the newest tubes. The new 6SJ7 (single-ended 6J7) sharp-cut-off R.F. pentode functions as a high-sensitivity regenerative (autodyne) detector, followed by one of the new Loktal 7C5 (new version of 6V6 beam power tubes).

A three section, low-loss wave-change switch carries six individual coils mounted directly on its contacts. Coming as a complete factory-assembled and wired coil and switch system, it achieves connections as short and direct as with plug-in coils, plus the lower losses possible due to the better quality of insulation of the individual coil forms and wave-change switch. Each coil, consisting of antenna primary and separate secondary, is short-circuited to prevent absorption losses except for the one coil selected for reception. These coils are tuned by a new positive-single-bearing "band-set" tuning condenser of 165 mf. capacity, with "band-spread" provided by an identical but smaller 15 mmf. condenser. The six bands so provided tune from well above 600 meters for ship and distress calls right on down through the 5 meter amateur band.

For battery operation, use a 6-volt storage or "hot-shot" battery for tube filaments (more properly, heaters), with 90 to 250 volts of B battery connected, negative to chassis ground and positive to the wire marked "B+".

At the bottom of the diagram is the A.C. power supply unit for both transmitter and receiver. The filament or heater circuit of all tubes is also controlled by the *send-receive* switch, so that whether power be A.C. or batteries, control of either is complete at the front panel.

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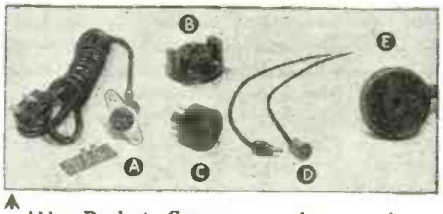
NEW TELEVISION PARTS

Arcturus has tubes for television applications. These include types 2Y2, 5X3, 6AD5G and 6R6G. The 2Y2 tube is a half-wave high-vacuum rectifier, with an A.C. plate voltage of 4400 max., RMS. The 5X3 is a full-wave high-vacuum rectifier, the A.C. voltage per plate being 1275 max., RMS. The 6AD5G is a high-mu triode, and the 6R6G is a remote cut-off pentode amplifier.

Du Mont is producing two new ideas in C-R tubes. First is the egg-shaped envelope shown in the illustration, which is planed to provide much greater structural strength than previous straight-sided types. The other innovation is an *intensifier* type tube, which has one or two gold rings deposited on the inside wall adjacent to the screen. This is designed to provide an intensifier electrode to accelerate the electrons after deflection. According to Du Mont engineers, this affords a 60% increase in deflection sensitivity, thus potentially lowering the cost of television sets of given image size.



Alden Products Company now has several specially designed connectors for use with television tubes heavy duty tube caps (C), plugs and connectors (D) for interlocks, sockets for high voltage rectifiers (B) and for C-R tubes (E). A line connector is seen at A.

Review of Bulletin T-1 Solar Television Capacitors

This 6-page catalog contains specifications and descriptions of Solar's new condensers, designed specifically for television work. The catalog tells why special condensers are needed for television reception, gives general specifications of the line, and details on the tubular paper and oil-impregnated, oil-filled models. The rating of the condensers is two times the rated D.C. voltage plus 1000 volts from terminal to terminal or high voltage terminal to container, and the corona voltages will be greater than the working voltage plus 30% or plus 1000 volts D.C., whichever is higher.

The oil-filled capacitors come in several operating voltages from 1000 to 7500 volts, while the tubular capacitors may be had from 1500 to 3000 volts. They are made in the popular chassis mounting style, a ring being provided to hold the condenser fast in the round can models. Mounting brackets are provided for the tubular paper condensers which are oil-impregnated and oil-filled.

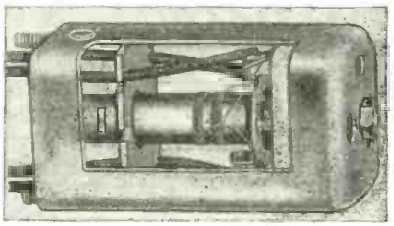
Novel Crosley Set Features

● TWO novel developments are featured in certain new Crosley models. One is the newly discovered sound diffusion principle developed by Crosley engineers in Crosley laboratories, and the other is the Magnetune electric tuning system.

The *Acoustical Tone Director*, the mounting of the speaker and the baffle gives a new and more uniform diffusing effect which reduces directional tone and creates a feeling of higher fidelity in reproduction. The speaker is mounted face down on a panel at the top of the sounding board, which is curved like the bell of a horn.

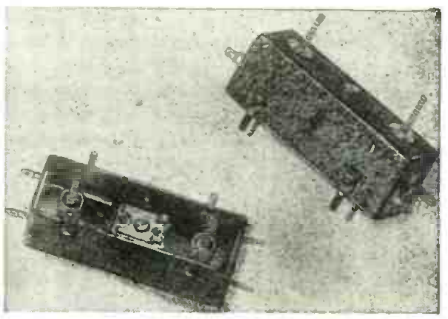
The *Magnetune electric tuning system* utilizes solenoid operated push-buttons, which at the slightest touch actuate a powerful electro-magnet that automatically turns the knob and dial pointer to the wanted station. In construction, it is the utmost in simplicity, and the adjustment screw, which is readily accessible by flipping back the key, tunes the station and permanently sets it simultaneously.

The J. W. Miller Company, manufacturers of radio products, have a new 13.5 mc. television I.F. transformer, model No. 612-N. It is for use



with 3-stage I.F., using type 1851, 1852 or 1231 tubes. The primary circuit is tuned, while the secondary is to be shunted with a 1500 ohm resistor. The primary and secondary are both wound on a single iron core with No. 36 *glass insulated* enameled copper wire. The tuning condenser, adjustable from the top of the shield, is of the mica compression type.

The F. W. Sickles Company has also developed a new line of I.F. transformers especially designed for sight and sound. These are of the perm-trimmed



type with trap circuits to eliminate sound carrier interference from the picture channel. The unit may be mounted under the chassis but tuned from above the chassis.

Special items for television being produced by American Phenolic Corp. include C-R tube sockets, high voltage rectifier sockets, high voltage grid caps, ultra low loss bushings and insulating materials, and co-axial cables. The Amphenol Co-Axial Cable has a surge impedance of 72 ohms, and special cables with capacities as low as 5 mmf. per foot are available. The standard type, for receiver lead-in use, consists of No. 12 solid copper wire strung with low-loss insulating beads, shielded with tinned copper braid and covered with two cotton braids, heavily lacquered to prevent the entrance of moisture.

Television Books in National Radio Institute Course

● IN line with its recognized policy of maintaining a complete and up-to-date course, the National Radio Institute announces that a new series of text books concerning Television theory and practice has been added to its course in radio and television.

The following titles of these text books give a general idea of the subjects covered: Requirements of a Television System; The Theory of Light; Geometric and Electronic Optics; Uses for Optics in Electronics and Television; Practical Electronic Control Equipment; Essential Circuits in a Television Receiver; Cathode-Ray Tubes for Television Receivers; Antennas, Preselectors, Frequency Converters and Sound Channels for Television Receivers; Video I.F. Amplifiers; Video Detectors and Automatic Gain Controls; Video Frequency Amplifiers and D.C. Restoring Circuits; Impulse Separators, Sweep Circuits and Power Supplies for Television Receivers; Servicing of Television Receivers; How Television Signals Are Produced at the Transmitter; Picture and R.F. Circuits in Television Transmitters.

Therefore, all students of the school now receive training in *both* radio and television.

Correction Notice

In the article, "Television in 24 Hours," which appeared in the June issue of R. & T., a quotation from the Andrea instruction sheet was given as calling for the use of "ground" wire. This should have been *brown* wire. In the same article, reference was made to the *pre-tuned* R.F. *unit* in the sub-chassis views. This unit appears in the *lower* right-hand corner of the two small views, and in the *lower left-hand* corner of the large picture.

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17-Tube Television Kit

(Continued from page 148)

into the control grid of the kinescope picture tube.

Part of the image signal is split off at the 6H6 second detector and passes into a special filter known as the synchronizing pulse signal separator. This circuit also employs an 1852 tube, and the amplified synchronizing pulses are then passed into the grids of the horizontal and vertical sweep oscillators. The synchronizing pulses, as they arrive from the transmitting station at the end of every scanning line, serve to lock the sweep oscillators in step with the transmitter. The vertical and horizontal sweep oscillators have amplifier tubes, 6F8G type, to boost the sweep pulses.

Two rectifier tubes and power transformers are used, one (5V4G) for the low voltage plate supply of all the amplifiers and detector tubes, etc.; and the other rectifier, an 879, to supply the extra high voltage D.C. for the cathode-ray tube.

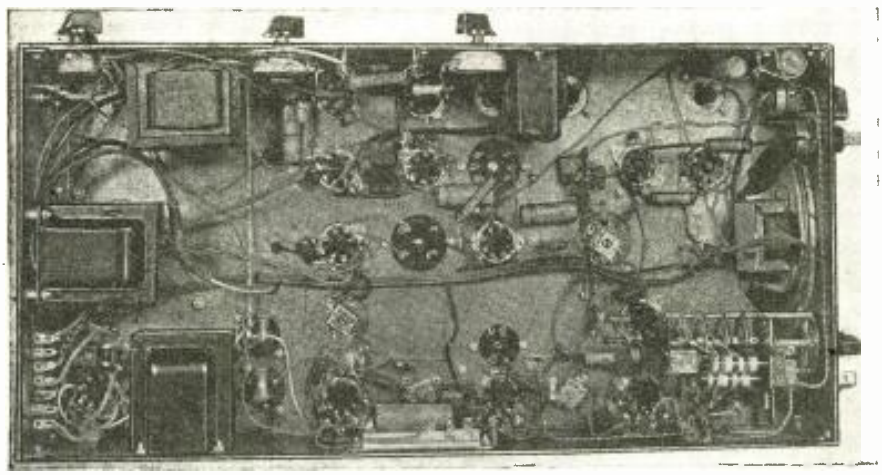
The picture intermediate frequency used is 13 mc. and the I.F. frequency used in the sound channel is 8.25 mc. The sound amplifier sound channel uses 3 tubes, an 1853 I.F., a 6SQ7 second detector, and a 6V6G sound output amplifier.

The kinescope tube socket is mounted in a manner that permits a few degrees rotation about its long axis so that the edges of the picture may be made truly vertical and horizontal. Provision is also made at the tube socket to accommodate the commercial variation in the overall length of the tubes.

Synchronizing Pulse Clipper: Returning to the 6H6, the synchronizing circuit begins with the other diode plate, the cathode of which is connected to a resistance-capacity network.

Synchronizing Separator Circuit: Synchronizing pulses are separated from each other in the synchronizing circuit of the 1852 separator tube. Horizontal synchronizing pulses are taken off through the 5 mmf. condenser while vertical synchronizing pulses are taken off at the tap point between the 5,000 and 20,000 ohm plate circuit resistors.

Sweep Circuits: The sweep circuits are easily adjusted for sweep amplitude and frequency. The separated synchronizing pulses are applied to the control grids of the



Bottom View of Completed Meissner Television Receiver.

High Frequency Coil Assembly: The radio frequency and oscillator coil assembly consists of a rotary 4 channel switch assembly, upon which is mounted a four-section coil for each of the two low frequency television channels. Each of these four-section coils consists of an antenna primary, a preselector, the detector input, and oscillator. This arrangement permits the coupling between windings to be adjusted to optimum conditions for each television band.

Picture I.F. Amplifier: The picture I.F. amplifier makes use of capacitative coupling to facilitate adjustment of band width. Small movable iron cores tune the coils. A trap for the 8.25 megacycle sound I.F. is connected to the grid of the first I.F. tube.

Second Detector: The second detector consists of one diode—a 6H6.

Video Amplifier: The video amplifier consists of a 6F6 tube in a circuit which is a combination of series and shunt compensation to give a flat frequency response up to 3 mc.

6N7's through suitable coupling condensers. The sweep pulses are amplified through 6F8G tubes as shown.

Sound Channel: The sound channel consists of an 1853 I.F. amplifier, a 6SQ7 second detector, first audio and A.V.C., a 6V6G output tube, and a 6-inch electro-dynamic speaker, the field of which is a part of the low voltage filter. The same type of tuning and capacity coupling system used in the picture I.F. transformers is employed, although, of course, the pass band of this stage is far sharper and the amplification higher than in a picture I.F. stage. The sound I.F. should, however, be broad enough so that some adjustment of the oscillator frequency may be made (for best picture) without noticeably affecting the sound reproduction. The frequency to which the sound I.F. is tuned is 8.25 mc.

Opening the safety compartment operates a switch which disconnects all primary windings from the 110-volt supply and shorts the high voltage filter condensers after the power has been disconnected by the interlock switch, which is recessed to prevent its being accidentally operated.

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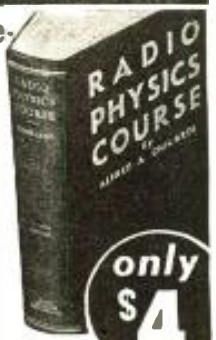

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"De Luxe Beam Power 3"

(Continued from page 159)

doubt that A.M.C. really works! Incidentally, an 879 seems to work better than an 866 as a peak rectifier, although the latter will do in a pinch.

The only other unusual item on this chassis is the relay which automatically shorts the modulation transformer secondary when C.W. is to be used. This relay has to be altered so that the contacts open when the relay operates. This is not much of a job and was considered preferable to having a special type made, as the unit specified is a standard item.

The leads from the 866 Jr. plates to the power transformer should be connected to the "Low" terminals, which will give a D.C. voltage of about 1000 on the plates of the TZ40's.

The plug connections should be self-explanatory. It will be seen that the 5-prong plug connects the modulator to the control panel, the 4-prong plug goes to the speech amplifier, and the plug labeled "meter" is connected in circuit to the modulator plate milliammeter.

The screen grid lead from the R.F. chassis runs to the modulation transformer through a high voltage condenser and a resistor. After the transmitter was finished, and the output was being checked with an oscilloscope and sine wave input, it was found that practically the same modulation could be had when the screen was fed no audio whatsoever. The percentage of modulation seemed about the same as with the connections shown. If this had been suspected when the transmitter was started, it is probable that no provision would have been made to modulate the screen, as the difference is hard to detect, either on the 'scope or on the air.

The connections to the modulation transformer are made by means of small plugs, the *insert* on the modulator diagram showing the actual arrangement. The numbers in the circles correspond to those found on the modulation transformer.

In the interests of safety, a new wrinkle has been used in the connections of the high voltage leads between chassis. The terminals are the usual feed-through insulators and the actual connecting links are of auto high tension cable. This latter material has also been used for all wiring carrying 1500 V. or more within the chassis. The real safety feature is in the use of the new insulated plate caps which are now available for the 9/16" cap size. Sections of 9/16" brass rod are cut to a length of about ⅜" and drilled and threaded to fit the rods in the feed-through insulators. These threaded sections are then screwed in place and the insulated caps snap over them, effectively covering all the ordinarily exposed high voltage terminals.

It is recommended that the insulated caps also be used in the positions they were intended for; that is, on the tube plate caps, although they had not been installed at the time the photos were taken.

The final touch for this transmitter is had in the De Luxe style case in which it is housed. The pictures really fail to convey the fine appearance afforded by the enclosed rack. A hinged back door is supplied with the rack, but was removed for photographing. Use of this door will be a big help in keeping the ever-present dust out of the works.

A copper strip ⅜" wide runs from the antenna tuning unit to the power supply chassis and is connected to every chassis between them. This affords a positive low impedance ground for the whole transmitter, and a good heavy connection should be run from this strip to the best possible ground at the working location. The strip, which runs past the rear right corner of each chassis, was removed when the picture was taken.

The builder is urged to test this *transmitter* out thoroughly with a *dummy load* before trying it "on the air." A fair load may be made of a pair of 100 W. lamps in series connected directly to the swinging link. These bulbs should light at practically full brilliancy on 20 meters with a P.A. plate meter indication of around 180 ma. It must be borne in mind that this meter reads the total of plate, screen, and grid current, but the last two combined are always about 25 ma. under proper operating conditions.

C.W. operation is, of course, possible at 2000 V. and a plate meter total reading of about 210 ma. For this use, the leads on the P.A. power transformer may be connected to "high". This amount of input should never be used on *phone*, however.

List of Parts

CORNELL-DUBILIER (Fixed Condensers)

2—100 mmf. mica condensers, No. 5W5T1, C1, C16
2—.1 mf. paper condensers, No. DT4P1, C2, C8
3—8 mf. 450 V. electrolytic condensers, No. JR508, C3, C6, C9
2—Dual 8 mf. 450 V. electrolytic condensers, No. EB8800, C7-C11, C12-C13
2—8 mf. 200 V. electrolytic condensers, No. JR208, C14, C15
1—10 mf. 25 V. electrolytic condenser, No. ED2100, C10
1—.5 mf. 200 V. paper condenser, DT4P5, C4
1—.5 mf. 400 V. paper condenser, DT4P5, C5
1—1mf. 2,000 V. paper condenser, TJU20010, C17
1—4 mf. 2,000 V. paper condenser, TJU20040, C18

INTERNATIONAL RESISTANCE COMPANY (Resistors)

1—5 meg., ½ W. resistor, Type BT½, R1
2—.25 meg., 1 W. resistors, Type BT1, R2, R12
3—.5 meg., 1 W. resistor, Type BT1, R4, R6, R8
1—.1 meg., 1 W. resistor, Type BT1, R10
1—500 ohm, 1 W. resistor, Type BT1, R13
2—20,000 ohm, 1 W. resistors, Type BT1, R15, R16
1—350 ohm, 10 W. resistor, Type AB, R7
1—150 ohm, 10 W. resistor, Type AB, R9
1—4,000 ohm, 10 W. resistor, Type AB, R11
1—10,000 ohm, 25 W. resistor, Type DHA, R5
1—12,000 ohm, 25 W. resistor, Type DHA, R14
1—2500 ohm, 25 W. resistor, Type DHA, R17
1—.5 meg. variable resistor, Type 13,133, R3
1—100,000 ohm, 100 W. resistor, Type HA, R18
1—25,000 ohm, 20 W. resistor, Type DG, R19

NATIONAL

2—R100 R.F. chokes
3—Feed-through insulators
8—Insulated plate caps

THORDARSON (Transformers)

1—A.F. transformer, No. T15A74, T1
1—Output transformer, No. T15D79, T2
1—Power transformer, No. T15R05, T3
1—Power transformer, No. T19P59, T4
1—Filament transformer, No. T19F88, T5
1—Filament transformer, No. T54F66, T6
1—Modulation transformer, No. T11M76, T7
1—Filament transformer, No. T19F90, T8
1—Choke, No. T15C54, CH1
1—Choke, No. T75C49, CH2
1—Choke, No. T74C30, CH3
1—Choke, No. T63C15, CH4
1—Speech amplifier foundation unit

R.C.A. (Tubes)

1—879 tube
1—6F5 tube
1—6L7 tube
1—6C5 tube
2—2A3 tubes
1—5Z3 tube
1—80 tube

PAR-METAL

1 Gray finished DeLuxe Relay Rack, No. ER215
1—Gray finished 10½" steel panel, No. G3605
1—Gray finished 12¼" steel panel, No. G3606
1—Chassis, 13" x 17" x 2", No. 15212
1—Set of brackets, No. SB713
1—Set of brackets, No. SB78

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WARD LEONARD
1—Relay, No. 507-533

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6—4-prong sockets—Molded type
3—Octal sockets—Clip type
3—Steatite 4-prong sockets
1—5-prong molded socket
4—4-prong plugs
1—5-prong plug

DRAKE MANUFACTURING COMPANY
1—Red pilot light (110 V.)
1—Yellow pilot light (110 V.)
1—Small size red pilot light (6 V.)

YAXLEY
1—Grid bias cell and holder
1—Shielded single circuit plug
1—Midget single circuit jack

ASTATIC
1—Model T3 microphone with E1 stand

GORDON
1—1½" pointer knob
1—doz. ½" grommets
7—Name plates

TAYLOR (Tubes)
2—TZ40 tubes
2—866 Jr. tubes

MISCELLANEOUS
2—Johnson 3" stand-off insulators
2—Single pole toggle switches
6 feet ⅜" copper strip
Connection cable and wire
Hardware, etc.

New 4-Tube Receiver

(Continued from page 166)

any source of 6-volt filament supply. Or, again, the set may be operated from 110 volts A.C. with the power-supply for which a separate diagram is included.

Assembling the set is a simple process, yet the finished receiver has a neat, professional appearance. The front panel and chassis base are supplied completely drilled and punched to match the requirements of this set. Layout of parts should be based on the pictorial diagram furnished with the outfit, but the wiring should follow the plan indicated in the schematic diagram.

For CW reception, set the non-critical I.F. regenera ion knob controlling the 5,000 ohm potentiometer just below the point of oscillation. The other control (for volume and R.F. regeneration) should be set just above the point of oscillation. For phone reception, R.F. oscillation should be avoided, and the volume control should be set at the desired point.

Usually, the two larger condensers are tuned to about the same point on the band desired, and actual tuning is accomplished through the vernier dial which controls the *bandspread* condenser. The coils have sufficient overlap to offer complete coverage from 8 to 550 meters. As you change from band to band, replace the coils with the set that covers the desired frequencies.

The bandspread feature affords much more accurate tuning than is possible by any other method. Even in very crowded portions of any band you can usually pick out exactly the signal you want by means of the separate bandspread vernier dial. The technique of tuning, first with the larger condensers and then with the *bandspread* condenser, is easily learned.

The set-builder who lives in an area where 110 volts A.C. is available will find it advisable to construct the power-supply unit, thus eliminating the need for batteries.

All in all, the Super-Gainer has been designed to meet the needs of the Amateur or Short Wave Listener who wants an efficient, single-signal receiver at very low cost. It is well suited for keeping up DX contacts even where ordinary sets are bogged down in a maze of local QRM.

(This article has been prepared from data supplied by the Allied Radio Corporation.)

Parts List of the Super Gainer Kit

(All parts numbers are Knight catalog numbers)

KNIGHT
1—Drilled panel, N2232
1—Drilled chassis base, N2214
1—"S" shield, N2215
2—Dial plates, E5741
2—Bar knobs, E6171
2—Knobs, E5480
1—Antenna trimmer condenser, E2949
1—Condenser coupling, E4149
4—Octal sockets, E4031
1—4-prong socket, E4524
2—Grid clips, E6335

NATIONAL
1—Dial, E1528

HAMMARLUND
1—Dual 35 mmf. variable condenser, E5321
2—100 mmf. variable condensers, E5331

EBY
2—4-prong Isolantite sockets, E4015
1—Twin binding post assembly, E4059

YAXLEY
1—Tip jack, red, E6364
1—Tip jack, black, E6365
1—Variable resistor 50,000 ohms "R," E8625
1—Variable resistor 5,000 ohms, E8606

MEISSNER
1—Iron-core I.F. transformer 456 kc., E5801

CONDENSERS
2—Condensers .0001 mf. mica, E7830
3—Condensers .1 mf. 200 volt paper, E7910
1—Condenser .002 mf. 600 volt paper, E7932
3—Condensers .05 mf. 600 volt paper, E7941
1—Condenser 10 mf. 35 volt electrolytic, E3791

RESISTORS
1—Resistor 50,000 ohm ¼ watt, E4888
1—Resistor 500 ohm 1 watt, E5058
1—Resistor 400 ohm 1 watt, E5056
2—Resistors 100,000 ohm ½ watt, E4991
1—Resistor 2 meg. ¼ watt, E4903
1—Resistor 50,000 ohm ¼ watt, E4888
1—10,000 ohm 2-watt resistor R-2, E5179
1—15,000 ohm 1-watt resistor R-1, E5081
1—250,000 ohm 1-watt resistor, E5094

MISCELLANEOUS
1—Roll of hook-up wire, E3560
1—Set of 2 coils, 49-80 meters, N1155
1—I.F. regeneration coil, N1156
1—1" piece of ¼" fibre rod, E4584
1—Hardware kit, consisting of: 4 ¼" 6/32 machine screws; 12 5/16" 6/32 machine screws; 16 hexagon nuts; 6 soldering lugs; 3 rubber grommets; 4⅜" brass bushings, N1601

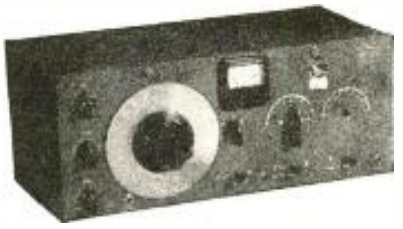
ACCESSORIES

KNIGHT (Coils)
1—Set of coils 160, 40, 20 and 10 meters, E9835
1—Set of coils 200 to 550 meters, E9836

TUBES
1—Type 6J5 tube
1—Type 6J7 tube
1—Type 6F6 tube
1—Type 6L7 tube

POWER SUPPLY KIT

KNIGHT
1—Drilled chassis 7" x 4" x 2", N2213
1—Power transformer, E6060
1—Condenser block 8-8-8 mf. 550 volts, E3834
2—Chokes, 30 henry, 50 ma., E12952
1—A.C. switch, E5450
1—A.C. line cord and plug, E3498
1—4-prong bakelite socket, E4524
1—4-prong wafer socket, E4026
1—3-foot 4-wire cable, E3502
1—4-prong plug, E1800
1—Hardware kit, N1302, consisting of 3 rubber grommets; 6 5/16 6/32 machine screws; 6 6/32 nuts.



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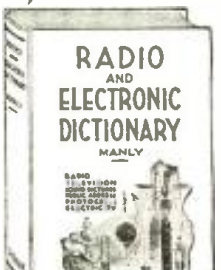

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(Continued from page 144)

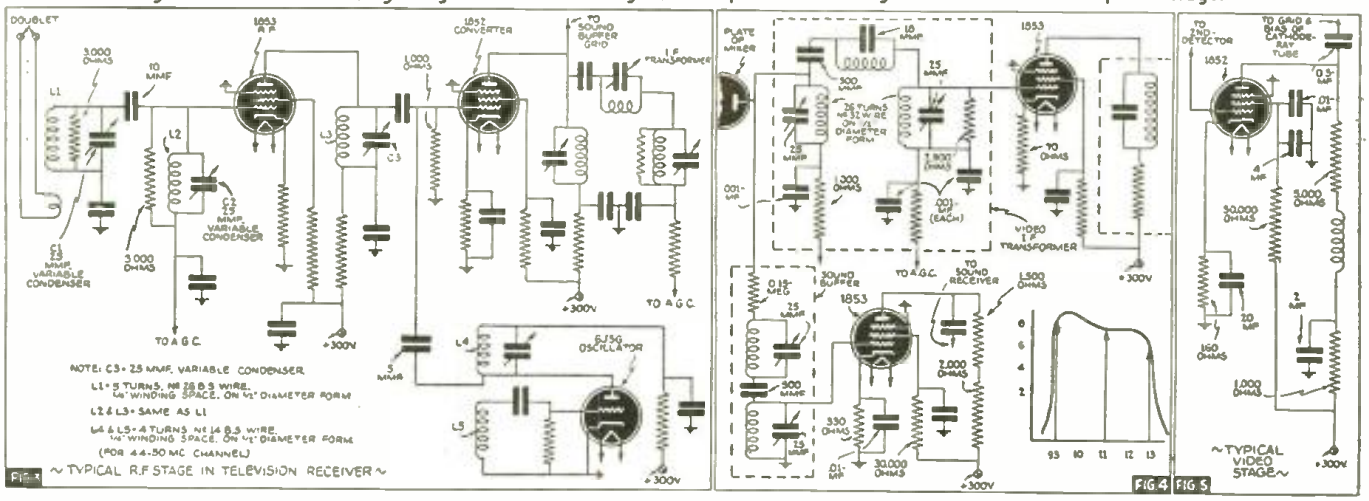
the response curve of the I.F. transformers of the video I.F. section. Since the carriers for the picture and sound are spaced the same for *all* television channels, the sound receiver will always be tuned to 8.5 mc. and, once adjusted to this frequency, need not be changed when tuning from one picture channel to the other.

Electronic Television Course

ideal response curve for the stage. The circuits illustrated were developed by the RCA Laboratory. The sound detector is usually a 6H6, of which only one section is used as the detector, in order to keep the capacity across the tuned circuit low. The second

The detector stage is followed by a video stage where a gain of 15 may be expected, while still maintaining the wide frequency response necessary. Fig. 5 illustrates a video frequency stage commonly used in present-day receivers. The plate circuit of this tube has an inductance in series with the plate resistor, which raises the high frequency response but still keeps the phase change

Fig. 3—Television R.F. stage. Fig. 4—Video I.F. stage and response curve. Fig. 5—Common V.F. amplifier stage.



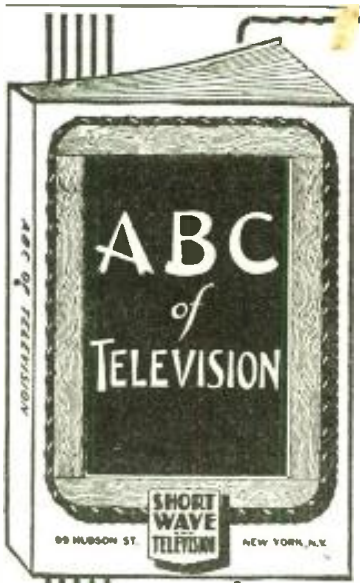
Intermediate Frequency Stages

The mixer tube is then followed by three or four I.F. stages where a gain of six to eight per stage may be expected with high transconductance tubes, such as the 1852 and 1853. A typical I.F. stage is schematically illustrated in Fig. 4 together with an

section is sometimes used either as a D.C. restorer or a bias tube on the cathode ray tube grid, biasing the grid high enough to keep the spot off the screen while the *sweep circuit* tubes are warming up, thus preventing a stationary spot from burning the fluorescent screen.

down to negligible proportions. Where a separate D.C. *restorer* is used, the plate of this video stage may be capacitively coupled to the grid of the cathode ray tube, but the preferable method is to couple it directly to the grid and provide for the proper bias

(Continued on page 192)



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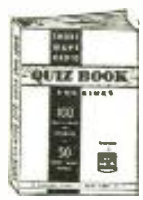

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Build This W8KPX Modulator

(Continued from page 160)

to the tube. In addition, the circuit is simplified by the omission of a cathode biasing-resistor and a by-pass condenser which, in spite of every precaution, sometimes permit hum and noise to enter the speech amplifier circuits. The tube life remains about the same as when the conventional method is used. The 2.5 millihenry R.F. choke and the .0001 mf. mica condenser form a filter to keep the R.F. currents from reaching the 6J7 grid. Although the Brush "HL" type of crystal microphone has a high internal impedance, the small mica condenser does not have any appreciable effect on the frequency response because of the characteristics of the microphone. Sometimes, if R.F. is still present, it is necessary to connect another .0001 mf. condenser from the grid of the second stage to ground in order to get rid of the trouble.

Construction Simple

The actual construction of the modulator is quite simple and should present no difficulties to even a beginner. Mount the various parts on the chassis as shown in the photograph, making certain that the transformers and chokes are placed in the positions as indicated in Fig. 2B. Unless these precautions are observed, A.C. hum might be induced in the speech amplifier, due to intercoupling between the transformers and chokes. The filament transformers for the 866 Jrs., the TZ-20s and the 6.3 volt tubes are placed underneath the chassis and their leads enclosed in woven copper shielding which is suitably grounded to the chassis at several points. The by-pass condensers, both paper and electrolytic, and the fixed resistors are placed as close as possible to their particular circuits and are fastened securely to the chassis either by their own mounting lugs or by means of insulated mounting strips. All wiring which carries the high voltage should be covered with spaghetti in order to prevent any possible breakdown of the insulation. The 800 volt leads are placed on small porcelain stand-off insulators as an added precaution against breakdowns and short-circuits. The wiring indicated by the dotted lines must be shielded; use the usual braided copper tubing and ground it to the chassis at points not over two or three inches apart. Otherwise R.F. voltages may build up, especially when using the modulator in connection with a 28 or 56 megacycle R.F. amplifier, and get into the grids of the speech amplifier tubes through capacity effects from the shielding. Always have the modulator attached to a good ground when operating the transmitter on the higher frequencies.

The power transformer is designed to supply both 800 volts and 1,000 volts, after the filter, simultaneously. In this particular design the 1,000 volt taps are not used. However, sufficient space for the additional two 866 Jrs. has been left in case the constructor desires the use of the higher voltage. The 1,000 volt supply would be suitable for the operation of some final R.F. amplifier, such as the T-55 or RK-51, running 150-200 watts input. A transmitter of this type can be conveniently placed in a small two-panel size table-model cabinet, resulting in an unusually compact medium-powered phone rig.

It is hardly necessary to point out that extreme care must be exercised in adjusting the various voltages and in operating the modulator. *Be careful not to come in contact with the secondary terminals of the high voltage transformer or the 800 volts on the plates of the TZ-20s. The D.C. voltage will give a painful shock and is plenty high enough to be fatal.* Never attempt to operate the modulator without the proper load on the secondary of the modulation transformer; if no secondary load is presented, the excess energy generated in the primary may cause it to burn out, or the insulation to break down.

If the instructions and diagrams have been carefully followed, no difficulty should be experienced. Should additional information or advice be required, however, the author will be glad to advise readers who enclose a 3-cent stamp for return postage. All letters should be sent to the author in care of RADIO & TELEVISION.

Parts List, 50-70 Watt Modulator

CORNELL-DUBILIER (Condensers)

2—Paper dielectric condensers, 0.1 mf., 600 D.C. volts. DT-6P1
2—Paper dielectric condensers, 0.01 mf., 600 D.C. volts. DT-6S1
1—Cardboard case dry electrolytic, 8.0 mf., 450 w.v., JR-508
1—Tubular case dry electrolytic, 2.0 mf., 450 w.v., EDJ-9020
1—Cardboard case dry electrolytic, dual 8-8 mf., 450 w.v., JR-588
1—Tubular case dry electrolytic, 25 mf., 50 w.v., EDJ-3250
2 Oil impregnated transmitting condensers, 4 mf., 1,000 v., TJU-10040

I.R.C. (Resistors)

1—Fixed resistor, ½ watt, 15 *megohms*
1—Fixed resistor, 1 watt, 1 megohm
1—Fixed resistor, 1 watt, ¼-megohm
1—Fixed resistor, ½ watt, 0.475 megohm (see text)
1—Fixed resistor, ½ watt, 0.5 megohm
1—Fixed resistor, 1 watt, 50,000 ohms
1—Fixed resistor, 2 watts, 1,500 ohms
2—Fixed resistors, 1 watt, 100,000 ohms
1—Fixed resistor, ½ watt, 25,000 ohms
1—Fixed resistor, 1 watt, 20,000 ohms
1—Wire-wound resistor, 25 watts, 800 ohms
1—Wire-wound resistor, 100 watts, 30,000 ohms
1—Volume ("gain") control, 500,000 ohms

BUD

1—Removable top chassis, 17" x 13" x 3". Plain.
1—Steel panel, 19" x 10½". Black crackle finish.
2 —Supporting brackets (see text)

TRIPLETT

1 —D.C. milliammeter, 0-250 ma. Square type

BRUSH

1—"HL" type crystal microphone. See text.

AMPHENOL (Sockets)

4 —Spring mounting bakelite sockets, 8-prong octal type
4—Isolantite sockets, 4 prongs (for TZ-20s and 866 Jrs.)

STANCOR (Transformers)

1—Driver transformer, 6B4 plates to TZ-20 grids. *Type A-4212*
1 —Modulation transformer, TZ-20 plates to universal R.F. load. *Type A-2908*
1—Plate supply transformer, 1,000 and 750 volts after filter at 250 ma. *Type P-4030*
1—Filament transformer, 2.5 volts, center-tapped. *Type P-4083*
1—Filament transformer, 6.3 volts at 3 amperes and 7.5 volts at 4 amperes, center-tapped. *Type P-4090*
1—Swinging choke, 300 milliamperes. *Type C-1403*
1—Filter choke, 300 milliamperes. *Type C-1413*

(Continued on following page)

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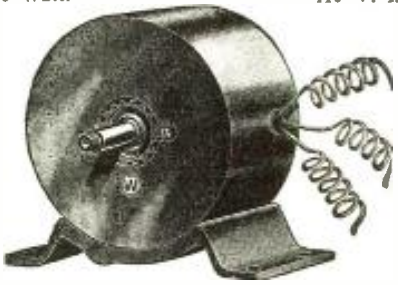

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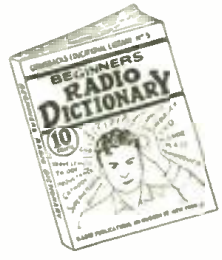

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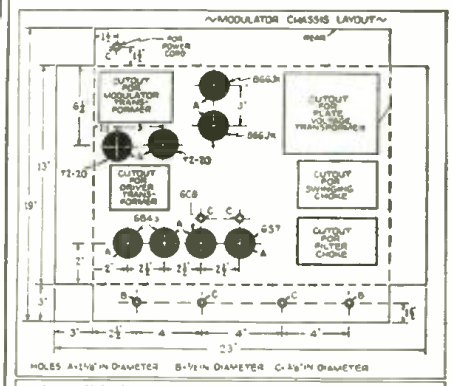

Chassis Details

Theater Television

(Continued from page 134)

The C-R tubes are kept running continuously, so that the image can be projected from the spare tube if the first one should break down. The television image signals are picked up by an antenna on the roof of the theater, and passed through a suitable receiver and amplifier to the high power C-R tubes. These special tubes are operated at a voltage between 40,000 and 45,000, while the beam current varies from 300 to 400 microamperes. The power consumed by the television projector is about 2 kw.

The apparatus here described is that used for projecting a 12 x 15 foot image.

Television Shows Fashions Throughout Store

(Continued from page 134)

hat. And so it goes!

The store's millinery show presented twenty-one new and exclusive models. Special illumination and make-up were used to facilitate clear projection of images. The manikins applied a sun-tan make-up; eyes and lips were painted a deep blue. The Bloomingdale models were chosen by Russell Patterson, noted illustrator, for their "telegeneric qualities."

The applications of television to all such commercial enterprises is almost infinite. A style "film" may be made up in advance and arranged to show continuously through the store's television system, interspersed with "spot news" and other features.

What Do YOU Think?

(Continued from page 157)

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How Giant Television Tubes Are Made

(Continued from page 137)

of the more intricate details of glass working. Were it not for the availability of pure nickel and certain nickel alloys, the cathode-ray tube would not be a practical reality today. The metals used in such devices must possess a number of mechanical, electrical and chemical characteristics. The metal must be amenable to production processes which involve a wide variety of fabricating operations. Even in the softest temper, it must be sufficiently strong to avoid deformation during normal handling and use. It must also remain strong at high temperatures in order to preserve tube characteristics through evacuation and bombardment, and must permit strong spot welds while being rustproof and resistant to corrosion. It must resist warpage and distortion regardless of high temperatures during manufacture and use. (The position and clearance of the various parts are vital factors in maintaining the proper tube operation.) The metal must have the required electrical properties, especially proper electron emission characteristics, must be low in contained gas, and be readily de-gassified at moderate temperatures. Approximately 8 times as much nickel is used for the cathode-ray tube as for the conventional radio tube.

The exhaustion in one of these tubes is carried out to a very high degree—in fact, to 10^{-6} millimeters (almost a perfect vacuum) of mercury. Special annealing appliances have been constructed to maintain any desired degree of heat on the tubes over a considerable period of time, so that they can be cooled slowly and thus avoid any undue strain in the glass. Interesting, too, is the fact that each tube is checked with a *polariscope*, which shows up any strain in the glass by variation in the light pattern on the screen.

The large 14" tube television receivers, designed and built at the Du Mont plant, use 5,500 volts on the anode, and as a safety feature, interlocking switches are mounted within the cabinet so that if any one opens the rear panel, the high voltage transformer is cut out of the circuit. Electrostatic scanning is employed on this large image receiver, thus marking a departure from the usual practice of using electromagnetic scanning on tubes larger than 5" diameter. Twenty-two tubes are used in the television receiver for the 8" x 10" image. This includes the *sound* channel receiver.

For the large console receiver shown here with 14" C-R tube, and fitted with an all-wave broadcast receiver, 32 tubes are used.

DU MONT SENDS SWEEP-PULSES WITH IMAGE SIGNAL

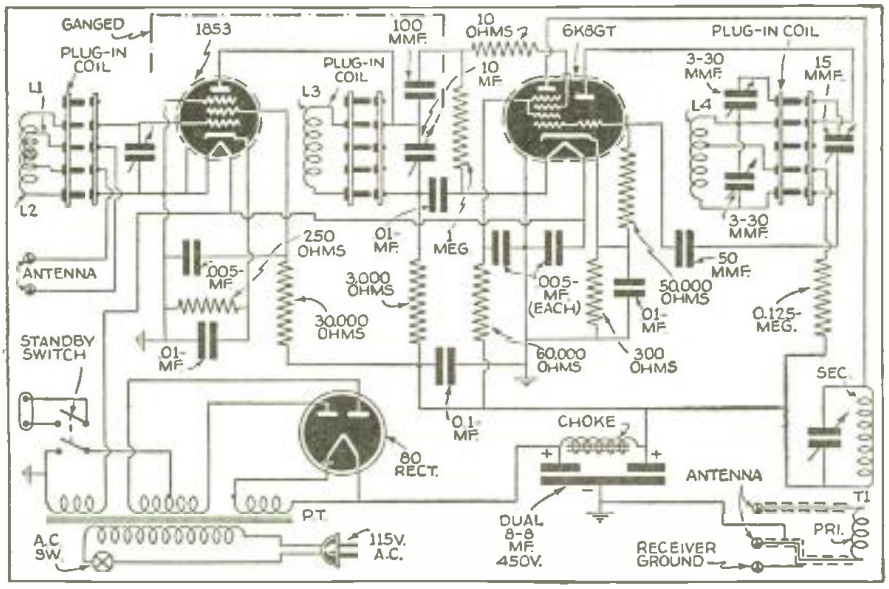
At the Du Mont plant, two television transmitters are installed, together with a studio. One of the transmitters sends out television image signals of the R. M. A. (Radio Manufacturers Association) type, such as is used by the NBC and other stations—while the second transmitter sends either sound or television signals based on the Du Mont invention, whereby all of the sweep signals are sent from the transmitter.

It is a very simple matter to build the television receiver so that it can pick up either the R. M. A. standard image signal, or the special composite Du Mont type signal which incorporates the vertical and horizontal sweep signals with television signal.

NEW INTERLACED SCANNING SYSTEM

Another interesting demonstration was a new method of scanning by *quadruple* interlacing, which was demonstrated on an oscillograph, in comparison with the present *double* interlacing method. By this method, Dr. Goldsmith claimed that it would be possible to cut the present television image channel in half. In other words, instead of requiring six megacycles for the television channel, only three megacycles would be necessary and, at the same time, an improved quality of the image would result, Dr. Goldsmith said. Simply explained, the quadruple scanning would work out as follows: The first scan would be 1, 5, 9, etc.; second scan, 2, 6, 10, etc.; third scan, 3, 7, 11, etc.; fourth scan, 4, 8, 12, etc. Dr. Goldsmith stated that the average life of one of these C-R tubes is 2,000 to 3,000 hours.

Correct Diagram for 5 & 10 Meter Converter



Those interested in the 5 & 10 meter converter described on page 102 of the last issue will find the correct diagram above.

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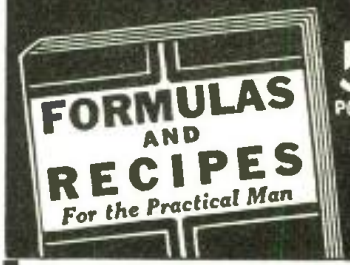

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Getting Started in Amateur Radio

(Continued from page 149)

a *half-wave* rectifier by radio engineers.

Full Wave Rectifiers

As a means of using all the pulses of the alternating wave, two methods have been devised. The first of these shown at C is called a *full wave* rectifier. This really consists of two half-wave rectifiers connected in such a way that one rectifier operates on one set of current pulses and the second rectifier uses the second set. Since current can flow through the rectifier tube in only one direction, only one of the two rectifiers is working at any given time. In some cases —such as the rectifier used in the C.W. transmitter described in Part 2 of this series, two rectifiers are combined in one vacuum tube. In this way only one tube is needed for *full wave* rectifying. This combining of two tubes is not done in larger, higher voltage units, two separate tubes being needed.

The second method of using all of the alternating wave for the D.C. high-voltage supply is called the "bridge rectifier". This is shown in Fig. 1D, and it can be seen that four rectifiers are needed. The secondary winding of the power transformer does not have to be center-tapped as in the case of the full wave circuit.

Bridge Rectifier

The operation of the bridge rectifier is as follows: When the top end of the winding is positive, current flows through section 1 but cannot flow through sections 2 and 3 because it can pass only from cathode to plate in the tubes. It then passes through the load and then through section 4 to the lower end of the transformer winding. When the lower end of the winding is positive, current flows through section 3, then through the load and finally through section 2.

Filtering

Although the output of any of the above types of filters is *direct current* in the sense that it always flows in one direction, it is not uniform in voltage, but varies continually as we can see in the wave-forms in Figs. 1B, C and D. To be useful for the plates of the tubes in a transmitter, it must be continuous and entirely unvarying. It is the function of the filter to smooth out the variations from the rectifier.

Filters are made up of combinations of inductance and capacity connected in such a way that they store energy to fill the points at which the voltage from the rectifier drops.

Two types of filters are shown in Fig. 2. The first (A) is called the condenser-input or "brute-force" filter. The characteristics of this type of filter are high voltage and high rectifier peak voltage. The latter means that the rectifier tube is subjected to unusually high voltages under certain circuit conditions; this must be considered in the selection of a rectifier tube when designing a power supply unit.

In addition, the "regulation" of this type of filter is comparatively poor. This means that the voltage varies as the amount of current drawn by the transmitter varies; this is a condition to be avoided if possible.

The second type of filter, shown at 2B, is the "choke-input" type, and differs from the first in that the choke follows directly after the rectifier. This type of filter has good regulation, a low rectifier tube peak voltage and a lower output voltage for a given rectifier voltage than the condenser input type. The first two characteristics are desirable and the last can be compensated for by proper selection of the transformer.

In spite of the above characteristics, it is common to find the brute-force filter in ham transmitters. This is perhaps due to the fact that this type of filter was the first to be used extensively in power-operated amateur stations.

Choke coils used in filter work are of two general types—*smoothing* chokes and *swinging* chokes. Smoothing chokes are made with a view to maintaining a high inductance (storing capacity) with a relatively low resistance. *Swinging* chokes are designed to vary in inductance as the load imposed by the transmitter varies, so that an optimum value of inductance is maintained in the filter, whether the key is depressed or open. Both types of chokes are available in suitable sizes for small and large size stations.

The Bleeder

To maintain the output voltage of the power supply at a constant value, it is necessary to have some load on the power unit always. If this were not done, the filter condensers will be charged to the peak value of the rectified A.C. wave (this is 1.4 times the rated transformer voltage) and may break down.

To supply a constant load, a "bleeder" or resistance is usually connected across the output of the power supply unit. This resistor is ordinarily sized so that about 10% of the output is fed through it. A resistor of about 15,000 to 30,000 ohms is customary for low voltage supplies, higher values being used for higher voltage units.

In making filter units for high voltage supplies, condensers having lower voltage ratings than the output voltage of the power supply can be used by connecting them in series. The condensers should have equal capacities and if two condensers are thus connected, the resulting filtering capacity will be half that of one condenser. As a precaution against one condenser taking more than half the applied voltage, resistors of about 500,000 ohms (1 or 2 watts) should be connected across the condensers, as shown in Fig. 3.

Typical Power Units

In Fig. 4 are shown two representative power supply units for X-mitter use. The first, at A, supplies 300 volts with a cur-

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rent of about 100 milliamperes. This unit uses a single transformer to supply both filament and plate voltages. A single *full wave* rectifier tube converts the high voltage to pulsating D.C. A two-section choke input filter smooths the D.C. voltage and a bleeder of 15,000 ohms applies a load to the unit. A separate 2.5 volt filament winding heats the filaments of the transmitter tubes.

The second circuit, given at 4B, shows a 2000-volt, 200 milliampere supply unit. This unit is also a *full wave* type using two half-wave tubes of the "66" type. Two transformers are used, one for the plate supply and the second for the filaments of the rectifiers, plus a winding for the transmitter tube filaments. This filament transformer must be carefully insulated, as the full voltage of the plate supply appears between the two filament windings.

The filter is a *choke-input* type of two sections. The input choke is a swinging type varying between 20 and 100 henries at no load and full load. The second section uses a 30 henry smoothing choke, rated at the full 200 milliamperes. Two 2 mf. high voltage condensers complete the filter. A 100,000-ohm bleeder applies the continuous load across the 2000-volt output.

A word of caution regarding power supply units will be desirable in closing this Part IV of the series. The power supply unit of even a low-powered transmitter is a potential lethal machine and as such *should be handled with the greatest caution.* A number of amateurs have been killed during the past few years and many more have been injured by the high voltages used —let a word to the wise be sufficient! *Be certain that all power is off and all condensers discharged before touching any part of the power unit.*

In Part V, next month, this series will be continued with hints on obtaining amateur licenses.

Silver Trophy Award

(Continued from page 153)

meter, a 1-tube 5-meter transceiver, and a 3-tube 5-meter combined transmitter and receiver (not completed).

When seated at the operating table, the transmitter is just at my left hand. I have worked five continents, 41 of the 48 United States and about 600 stations.

I have a 34 ft. seagoing motor-boat and my radio friends and I have had many happy week-ends with 5-, 20- and 40-meter transmitting gear on board. At times a *kite aerial* is used with success.

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Photos of Ham stations must be sharp and clear, preferably not less than 5 x 7 inches. Accompany your station's photo with a picture of yourself and a description (not more than 300 words) of your station, including general line-up of apparatus, make if not home built, number and types of tubes, watts in antenna, type of antenna, etc. State number of continents worked, stations contacted and any other features of general interest.

Contest for October, 1939, issue ends on August 1. If two or more entries tie, duplicate prizes will be awarded.

New Radio Manufacturer

● JAMES MILLEN, well known in the radio field and particularly to the Ham fraternity, recently organized his own company, which will devote its activities to the design and manufacture of new type radio communication products, including component parts, receivers and transmitters. The name of the new company is the James Millen Manufacturing Co., Inc., 6 Pleasant Street, Malden, Mass.

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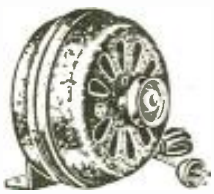

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Noise Reduction Circuits

(Continued from page 164)

ment houses, etc. When a loop is made, and particularly a shielded balanced circuit loop, static noises can be reduced to a minimum when the loop ceases to act as an antenna—that is, when it receives signals mostly through induction and least through capacity.

Fig. 1 shows the Marconi compensated loop, which has its capacity neutralized by C-1 and C-2, leaving only its inductance effective. It is claimed that this system gives good results.

Fig. 2 shows the Philips loop, a simplified form of the Marconi loop, where the distributed capacities of the two open end loops neutralize each other.

Fig. 3 illustrates the Viel loop, which uses inverse feed-back from the plate into the control grid through a neutralizing condenser (NC).

Fig. 4 shows the F.A.R. loop, in which the noise picked up by a short antenna is bucked against the noise impulses in the loop through condenser NC.

Fig. 5 represents a shielded loop, where the shield nullifies the distributed capacity of the loop. Signals are received through the unshielded portion of the loop. In this case, as little energy is received, the sensitivity of the receiver must be correspondingly higher.

In Fig. 6 the signal received by the loop is applied on both branches of a push-pull circuit, whereby the bucking of the noise in the plate circuits is greater than the bucking of the signal.

The antenna circuit in Fig. 7 has a primary coupled to two circuits operating in phase and tuned to resonance. One channel amplifies both the noise and the signal. The other channel is over-biased and amplifies only strong noise impulses, which are cancelled by the bucking fields in the plate primaries. The amplification of tube C must be much higher than that of tube A.

Noise elimination through de-phasing. In Fig. 8, a part of the amplified output voltages of tube D is applied to a tuned circuit coupled to the antenna 180 degrees out of phase. The coupling condenser or taps on the coil may be adjusted for minimum noise.

Noise elimination through frequency changing. In Fig. 9, channel Y-1 is an ordinary superheterodyne mixer circuit, receiving signals and noises from antenna A-1. In channel Y-2, the frequency is not changed. The noise received by antenna A-2 is amplified and opposes the noise impulses in M-1. The designer of this circuit claims to have obtained excellent results with this combination.

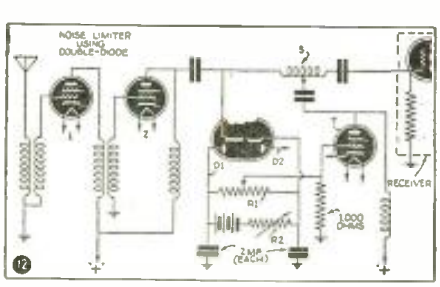
An aperiodic circuit, as in Fig. 10, is interesting on account of its simplicity. A-1 is a short antenna receiving maximum noise and connected to the cathode-resistor of the first amplifier stage. This resistor must not be by-passed and is shown as R-1. A longer antenna goes directly to the control grid at the grid resistor R-2.

By adjusting the values of R-1 and R-2 and the coupling neutralizing condenser (NC), a great deal of noise can be eliminated while the selectivity of the receiver is also improved. *(Note: This circuit was designed independently by the translator over two years ago, and is recommended for its efficiency and ease of neutralization.)*

In Fig. 11, the double-diode limiter circuit needs at least two stages of R.F. or I.F. amplification to operate the diodes. The diodes are biased by the potentials in R-1 and R-2. The system is simple and acts to neutralize any voltage higher than the average carrier wave intensity, provided that A.V.C. is used. When the diodes operate, the noise currents above carrier intensity are theoretically maximum in R-1. They are amplified separately by T and opposed in coil S through the dephasing action of T-2, thus suppressing another portion of the noise.

In Fig. 12, the double diode limiter uses the variable audio feed-back idea, where the upper diode section is negatively biased through R-1. When voltages are received exceeding the value of this bias, the diode draws current which flows in an opposite direction in the A.F. drop resistor, R-2, and thus cancels the excessive amplitudes.

—L. MOUROUX. *(Translated by H. F. Dalpayrat.)*



Double diode noise-reduction circuit.

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(Continued from page 155)

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K5AN	28.51	5	8	Ky.
K5AM	28.995	3	5	Mass.
K7EST		4	6	Utah
K7GSC	14.185	5	9	Utah, Ia.
K7BLC	14.205	5	6	Ia.
K7AU	14.275	2	6	Mass.
NY1AA	14.272	4-5	3-5	Colo., N. Y.
NY2AE	14.32	3	5	S. D.
NY2ME	14.211	3-4	7	S. D.
TG5JG	14.04	5	8-9	Colo., N. J., Mich., Ore., Wash.
TG9AA	14.075	5	7-8	Colo., Ore.
TG9BA	14.265	5	6-9	Colo., Conn., N. J., Mich.
TI2RH	14.12	4	5	Colo.
TI2AV	14.095	4	7	Conn.
TI2RC	14.055	5	5-9	N. Y., Mich., Ore.
TI2AB	14.115	5	9	Penna.
TI5JJ	14.277	5	7-8	Penna., Quebec
VE1EJ				Scotland
VE1BK	14.14	5	8	Scotland, England
VE1CR	14.28	5	9	Scotland, England
VE1AW				Scotland
VE1DC	14.1	5	7	England
VE1EL	14.09	5	8	England
VE1GH	14.11	5	9	England
VE1DQ	14.1	5	7	England
VE2HS	14.1	5	9	England
VE2CP	14.11	5	8	England
VE3XQ	14.108	5	8	England
VE3FQ	14.11	5	6	England
VE4ACP	14.085	5	6	England
VE4FH	14.11	4	5-6	England
VO1Y	14.11	5	9	England
VO1D	14.09	5	5-7	England
VP1BA	14.115	5	5-9	Colo., Penna., N. J., Conn., Mich.
	28.19	5	8	Penna.
VP1WB	14.07	5	6-7	Colo., Mich., Wash., Penna.
	28.17	5	7	Ky.
VP2LC	14.115	3-5	6-9	Conn., Mich., Quebec
VP2MY	14.11	5	8	Quebec
VP5BR	14.125	4	7	Conn.
VP5GM	14.12	5	9	Penna.
VP6YB	14.1	5	9	W. Va.
	28.12	4-5	8-9	Penna., N. J., Ky.
VP6FO	14.5	5	7	Ore.
VP6MY	14.135	4	7	N. J.
VP7NU	14.065	5	5-7	Colo., Ore.
VP7NS	14.1	4-5	7-8	Conn., Ky.
VP7NC	14.19	5	8	Fla.
VP9X	14.085	5	9	Quebec
W1AXA	14.1	–	–	Scotland
W1ADM	14.14	5	9	Scotland
W1AVK	14.22	5	8	Scotland, England
W1BQM	14.19	5	6	Scotland, England
W1CND	14.	–	–	Scotland
W1DQ	14.	–	–	Scotland
W1FMP	14.	–	–	Scotland
W1HKK	14.	–	–	Scotland
W1TS	14.	–	–	Scotland
W1HAZ	14.23	5	9	England
W1IFG	14.19	5	9	England
W1FUY	14.19	5	8	England
W1JCX	14.21	5	9	England
W1ME	14.18	5	9	England
W1MW	14.3	5	9	England
W2AY		–	–	Scotland
W2AZ		–	–	Scotland
W2BYM		–	–	Scotland
W2FDB		–	–	Scotland
W2JKV		–	–	Scotland
W2HEM		–	–	Scotland
W2HCD		–	–	Scotland
W2GRG		–	–	Scotland
W2UK		–	–	Scotland
W2JT		–	–	Scotland
W2KFH		–	–	Scotland
W2CDV		–	–	Scotland
W2GIZ	14.27	5	9	England
W2IKY	14.15	5	8	England
W2BLV	14.2	5	9	England
W2BYP	14.2	5	9	England
W2AEB	14.2	5	9	England
W3BNC		–	–	Scotland
W3FQP		–	–	Scotland
W3PC		–	–	Scotland
W3CZY	14.2	5	8	England
W3ELM	14.21	4	8	England
W3BRX	14.21	5	9	England
W4DSY	14.15	5	9	Scotland, England
W4BMR		–	–	Scotland
W4DRZ	14.28	5	8	Scotland, England
W4TJ	14.15	5	7-8	England
W6GJL		–	–	Scotland
W8LIV	14.19	5	8-9	England
W8NIK	14.2	5	9	England
W8ACY	14.19	5	8	England
W8DMF	14.17	5	8	England
W8LFE	14.2	5	9	England
W8DTJ	14.21	3	6	England
W8KLM	14.2	5	9	England
W9CIH	14.16	5	8-9	England
W9OOY	14.26	3	9	England
YN1IP	14.01	4-5	6-7	Mich., Utah, Penna.

SOUTH AMERICA

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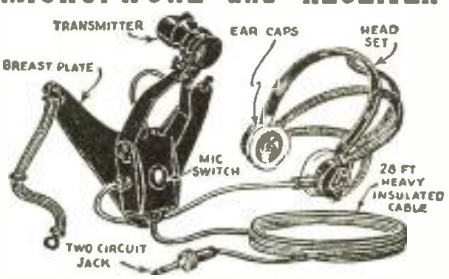

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HAVE 60 WATT EXCITER USING 6J5-6L6 to pr. 6L6s, final, will swap for some transmitting equipment. Mainly interested in power supplies or tubes, variable condensers. Steve Vargo Jr., 2368 Riverview Ave., Dayton, Ohio.

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(Continued on following page)

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CE3AT	14.	5	6	P. I.
CX1CO	14.075	4-5	6-7	Conn., Mass.
CX1AA	28.6	5	8	Ark.
CX2CO	14.1	4	5-8	Conn., N. J., Quebec, Penna.
CX2UO	14.08	5	7	Mich.
HC1JB	14.42	5	5-9	Penna., Ia.
HC1FG	14.248	5	7	Conn.
HC1PZ	14.083	4	6-8	S. D., Ia., Wash.
HC2CC	14.24	4	6	Mich.

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LU's were reported being heard by observers in Penna., Conn., Mich., Ia., Colo., Wash., England, Fla., Ark., Quebec and Ore.

OA4C	14.27	5	8-9	Penna., Mich., Ia.
OA4AI	14.945	5	6	Ia.
OA4R	14.09	5	7	Ia.

PY's were reported being heard by observers in Colo., Ia., Conn., Ky., Penna., Quebec, Mass., and England.

VP3AA	14.08	5	6	Colo.
CP3CO	14.07	4-5	6-9	Conn., England, Ia., N. J., Quebec
VP3LF	14.07	5	7	Mich., Ia.

YV's were reported being heard in S. C., Colo., England, Conn., Penna., Ia., N. J., England, Mich., Fla., Wash., N. Y., and Quebec.

EUROPE

CP1BA	14.07	4	4	Ia.
CT1ZA	28.5	5	9	Penna.
CT1PK	14.3	5	7	P. I., Que.
CT1QA	14.105	5	7	Que.
CT1AY	14.135	4	8	Mass.
EA7BA	14.07	5	8	Conn.
EI2L	14.05	4	6-7	Conn., Tex.
EI3J	14.05	5	9	Mich.
EI9J	28.2	4	7	Mass.
F3KH	14.2	3	5	P. I.
F3OF	14.153	3	6	Mass.
F3HM	28.0	4	8	Mass.
F8LX	14.035	4-5	6-9	Conn., Mich.
F8NT	14.065	4-5	5-7	Conn., Ala., Mich., Que.
F8TU	14.02	3-5	4-7	Ala., P. I.
F8SI	14.09	5	6	Ala.
F8RV	14.13	5	7-8	Ala., Que.
F8UE	14.04	5	6	Ala.
F8VP	14.25	4	6	P. I.
F8JO	14.3	5	6	P. I.
F8QD	14.095	5	8	Tex., Mass.
F8AI	28.16	5	9	Mass.

G's were reported being heard by observers in Penna., Conn., S. C., Ala., Mich., Fla., Nebr., Ia., W. Va., Calif., N. J., Ky., Tex., and Quebec.

GM's were reported from Conn., Ala., Mich., Ia., W. Va., N. J., and Tex.

GW3KY	14.09	4-5	7-8	Conn., Ala., W. Va.
GW5PH	14.017	4-5	5-8	Fla., W. Va., Que.
HA1K	14.255	3-5	4-7	Fla., W. Va.
HB9GA	14.0	5	7-8	Mass.
HB9BL	14.255	5	7-8	Mass.
I1TKM	14.056	3	7	Mass.
I1KN	28.215	4	8	Mass.
OH2QM	14.05	5	7	Tex.
OK4OA	14.355	5	9	Mass.
ON4UC	14.05	4	7	Fla.
ON4TO	14.06	4	7	Fla.
ON4RI	14.16	5	8	W. Va.
ON4HS	14.07	5	8	Tex.
ON4DJ	14.005	3-4	6-8	Mass.
ON4VP	28.16	4	7	Mass.
PA0WF	14.142	4	6	Conn.
PA0EH	14.075	4	5	Conn., Ark.
PA0ZN	14.075	4	7	Conn.
PA0MZ	14.005	4	8	Mass.
PA0OBE	28.215	3	7-8	Mass.
SM5SI	28.015	3	7-8	Mass.
UK3AH	14.08	5	7	England

OCEANIA

KA1AP	14.145	5	9	Ariz., Tex.
KA1JM	14.265	5	6-8	Ariz., Utah, W. Va., Wash.
KA1ME	14.26	5	8	Ariz., Utah, Kans., Que.
KA1ER	14.12	4-5	7-8	Utah, Wash.
KA1CS	14.13	5	7-8	Utah, Wash.
KA1CW	14.14	5	8	Wash.
KA1F	14.2	4	8	Mass.
KA2OV	14.27	5	8	Ariz., Wash.
KA3KK	14.3	5	8	Wash.
KA4LH	14.135	3-4	5-7	Ariz., Ia.
KA7EF	14.13	5	7-8	Ariz., Kans., Utah, Tex., Ore., Wash.
PK1AF	14.105	4	6	Conn.
PK1RI	14.04	4-5	6-7	Utah, Wash.
PK2WI	——	4	7	Utah
PK2AY	14.05	4-5	5-9	Utah, W. Va., Kans.
PK2JK	——	5	7	Utah
PK4AY	14.05	5	8	Ariz.
PK4KS	14.04	4-5	6-7	Utah, Tex., Ark., Kans., Ia., W. Va., Wash.
PK6XX	14.04	3-5	4-8	Penna., Conn., Ia., Wash., Mich., Tex., Kans., Ark., W. Va., Mass.
	28.99	5	7-9	Calif., Ore.

(Continued on page 189)

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World S-W Stations

(Continued from page 156)

Mc.	Call	
6.280	HIG	TRUJILLO CITY, D. R., 47.77 m. 7.10-9.40 am., 11.40 am.-2.10 pm., 3.40-9.40 pm.
6.243	HIN	CIUDAD TRUJILLO, D. R., 48 m., Addr. "La Voz del Partido Dominicano." 12 n.-2 pm., 6-10 pm.
6.235	HRD	LA CEIBA, HONDURAS, 48.12 m., Addr. "La Voz de Atlantida." 8-11 pm.; Sat. 8 pm.-1 am.; Sun. 4-6 pm.
6.210	——	SAIGON, INDO-CHINA, 48.28 m., Addr. Radio Boy-Landry, 17 Place A. Foray. 4.30 or 5.30-9.15 am. 11.45 pm.-1 am.
6.200	HI8Q	CIUDAD TRUJILLO, D. R., 48.36 m. Irregular.
6.190	JLK	TOKYO, JAPAN, 48.47 m. 8-9.30 am.
6.190	HVJ	VATICAN CITY, 48.47 m., Mon., Wed., Thur., Sat. 2-3.30 pm., Tues., Fri. 2-3 pm. Thur. also 3-3.30 pm.
6.190	TG2	GUATEMALA CITY, GUAT., 48.47 m., Addr. Dir. Genl. of Electr. Commun. Relays TGI Mon.-Fri. 6-11 pm., Sat. 6 pm.-3 am. Suns. 7-11 am., 3-8 pm.
6.185	HI1A	SANTIAGO, D. R., 48.5 m., Addr. P. O. Box 423. 7 am.-5 pm.

49 Met. Broadcast Band

6.170	W2XE	NEW YORK CITY, 48.62 m., Addr. Col. B'cast System, 485 Madison Ave., 11 pm.-12 m. Sat. & Sun.-10.30 pm.- Mid.
6.153	HI5N	MOCA CITY, D. R., 48.75 m. 6.40-9.10 pm.
6.150	HJ4DAE	MEDELLIN, COLOMBIA, 48.78 m., 9.30 am.-1 pm., 5-11.30 pm.
6.150	VP8	COLOMBO, CEYLON, 48.78 m., 7-11 am.
6.150	CJRO	WINNIPEG, MAN., CANADA, 48.78 m., Addr. (See 11.720 mc.) Daily 6 pm.-12 m., Sun. 5-10 pm.
6.150	ZPI4	VILLARRICA, PARAGUAY, 48.78 m. 4-6 pm.
6.148	ZTD	DURBAN, SOUTH AFRICA, 48.8 m., Addr. (See ZRO, 9.753 mc.) Daily 12.40-3.45 pm., Sat. till 4 pm., Sun. till 3.20 pm.
6.147	ZEB	BULAWAYO, RHODESIA, S. AFRICA, 48.8 m. Mon., Wed., and Fri. 1.15-3.15 pm.; Tues. 11 am.-12 n.; Thurs. 10 am.-12 n. Sun. 3.30-5 am.
6.140	W8XK	PITTSBURGH, PA., 48.83 m., Addr. Westinghouse Electric & Mfg. Co. Relays KDKA 10 pm.-12 m.
6.140	SP48	WARSAW, POLAND, 48.83 m., 3-5.30 pm.
6.137	CR7AA	LAURENCO MARQUES, PORT. E. AFRICA, 48.87 m. Daily 12.05-1, 4 30-6.30, 9.30-11 am., 12.05-4 pm., Sun. 5-7 am., 10 am.-2 pm.
6.133	XEXA	MEXICO CITY, MEX., 48.93 m., Addr. Dept of Education. Daily 8-11 am., 2.30-4 pm., 7.30 pm.-12.45 am. Sun. 1.30 pm.-12.45 am.
6.130	VP3BG	GEORGETOWN, BRIT. GUIANA. 48.94 m. 9-10 am., 2.15-6.30 pm., Sun. 5.30-11.30 am., 3-5 pm.
6.130	TIEM	SAN JOSE, COSTA RICA. 48.94 m. "El Mundo", Apartado 1049. 11 am.-11 pm., Sun. 10 am.-6 pm.
6.130	CHNX	HALIFAX, N. S., CAN., 48.94 m., Addr. P. O. Box 998. 7 am.-11.15 pm. Sat. 8 am.-11.30 pm. Sun., Noon-11.15 pm. Relays CHNS.
6.130	LKJ	JELOY, NORWAY, 48.94 m. Noon-6 pm.
6.125	CXA4	MONTEVIDEO, URUGUAY, 48.98 m., Addr. Radio Electrico de Montevideo, Mercedes 823. 8 am.-Noon. 2-10 pm.
6.122	HP5H	PANAMA CITY, PAN., 49 m., Addr. Box 1045. 10 am.-1 pm., 5-11 pm.
6.122	FK8AA	NOUMEA, NEW CALEDONIA, 49.00 m., Radio Noumea, Addr. Charles Gaveau, 44 Rue de l'Alma., Wed. & Sats. 2.30-3.30 am.
6.120	W2XE	NEW YORK CITY, 49.01 m., Addr. See 6.170 mc., 11 pm.-12 m., Sat. & Sun. 10.30 pm.-12 m.

(Continued on following page)

BARTER and EXCHANGE FREE ADS (continued)

FOR 4-8 PRONG FREE POINTANALYZER with adapters I'll give 33 Birnbach 4" Feederspreaders, 12 tube clips, 5-tube, coil-cond.-chassis-cab. BGTRF kit. Want S.W. portable for? J. Mueller, 1883 So. Blvd., Bronx, N.Y.

HAVE RADIO NEWS, QST, RADIO parts, used tubes, dynamic speakers, headphones, auto B. eliminator, etc. Newell Kelly, 208 Congress St., East McKeesport, Pa.

WANTED—A SKY BUDDY RECEIVER for which I will exchange a Keystone 16MM movie projector and two rolls of 50 ft. film in first class condition. Receiver must be in first class condition. Romney Miller, 43½ Elm Street, Newport, R. I.

WANTED: 16M MOVIE FILMS AND projector. Have to trade velocity mike, crystal mike, Weston meters, RCA test oscillator, 7 tube amateur set, xmitting parts, etc. For big swap list write to S. J. Nicewicz, 79 Church St., Broad Brook, Conn.

HAVE ALL TYPES BATTERY, A.C., A.C.-D.C. tubes. W.E., Baldwin phones, stamps, airmail covers, many radio parts. Want B.C. portable radio, ultra-high converter. Will answer all letters. Harry Gursh, 161 Sutter Ave., Brooklyn, N. Y.

DO YOU WANT A SURPRISE? I want to swap photos, S.W.L. post card views, and correspondence. All letters answered. QRA: Evelio T. Torres, 24 de Febrero No. 76 Matanzas, Cuba.

WANTED—LARGE COMPRESSOR as used in soda fountains (with motor). Have radios, rifles and shotguns, also Butter-Kist popcorn machine. Paul D. Ratliff, Berrien Springs, Michigan.

TRADE: SW3, 20, 80, 160 COILS, power supply; Argus with filter, exposure meter, cable release; 11 tube 1 band Kadette; 15 jewel Waltham. For Howard, Hallicrafters, National communications receiver. Hue Diament, Perkiomen School, Pennsburg, Pa.

WANT DETROLA, U. H. F. CONverter. What can you use? What's wanted? Please write. QRA, J. Naky, Jr., 9610 Kennedy Ave., Cleveland, Ohio.

SWAP $10.00 GUITAR (NEW) AND home study course for a 40 meter crystal, or what have you? Oxide Lee, 220 Adams St., Alpena, Mich.

HAVE SHORTWAVE CONVERTER, 4-band superhet kit, two power supply kits, P.P. trans, music stand, speaker cabinet and cash for service manuals, testers or? Wm. Covey dueck, Box 842, St. John's, Newfoundland.

HAVE SKY CHAMPION IN A-1 condition, for what have you. All mail answered. W9KRR, Seneca, Mo.

WANTED—HALLICRAFTER SKY Champion or similar receiver. Have F/2.5 Poth Derby camera, eveready case, Instoscope exposure meter with case, Optochrom filter, sunshade, and cable release; also have 12" dynamic speaker. Louis Kelsey, Wilmington, Ohio.

HAVE 10 INCH POLYPHASE DUplex slide rule with instruction book. This is a $10.00 rule never used. Will swap for books or course on Radio or Television. What's your trade offer? Dan Chapman, Mars, Pa.

WANTED: 19TH CENTURY U.S.A. stamps, old pennies, good ham TRF receiver. Have: Foreign stamps, foreign coins, receiver power supply, tubes, etc. W8SNA, 305 Grant St., Greensburg, Penna.

HAVE ARGUS CAMERA WITH ACcessory lenses, Handee grinder with 20 wheels, $10.00 Electric Engravrite, Schick Shaver, 100 National Geographics, 80 Popular Mechanics, Original cartoons by famous cartoonists. Want drawing books. Trapkus, 349 Tenth St., Moline, Ill.

WILL TRADE AN UNDERWOOD Standard No. 5 typewriter for a communication receiver or used radios. Peter A. Kay, 4 Plymouth Ave., Toronto, Ont., Canada

HAVE TUBE TESTER, TESTS 4, 5, 6, 7 and octal tubes, contains built in volt-ohm-milliammeter. Will swap for S.W. receiver or radio parts. I QSL 100%. Clarence Wilhelm, 3911 W. Schubert Ave., Chicago, Ill.

SWAP "TARBELLE MAGIC Course" 56 lessons and 32 copies "Linking Ring" official organ International Brotherhood of Magicians. Want any kind S.W. receiver or transmitter parts. H. M. Waggoner, 143½ Crescent St., Goshen, Ind.

WANTED: VOLS. I AND II SHORT Wave Craft; also other radio mags before 1930. Could use an Ellen 7C-AB or similar set. Send for my big swap list. It's free! Don R. Yocom, Bettsville, Ohio.

HAVE NATIONAL AGS RECEIVER complete, power pack, coils, 100A R.C.A. speaker in A-1 condition. Want 8 power binoculars, camera, fishing equipment or what have you? Royal Pollitt, 3131 Sands Place, Bronx, N.Y.C.

TRADE: MILLER SHORT WAVE preselector kit # 302 with chassis and gang condenser. Parts not wired. Used. W9TME, 2901 N. Kilbourn Ave., Chicago, Ill.

HAVE CONDENSERS, TRANSformers, S.W. coils, etc. Want good camera. Will send list. Write make you have. H. Seligson, 2547 Aqueduct Ave., Bronx, N. Y. C.

I WILL TRADE A TWO TUBE Philmore battery radio with tubes and in good condition for a crystal microphone. Richard Kershaw, 846 University St., Springfield, Mo.

WANTED 1938 ULTRA STRATosphere "10" trans-receiver. Have commercial, 2 tube short wave receiver and what have you. Write for list and trade details. Henry F. Heckert, 910 Coolbaugh St., Red Oak, Iowa.

WANTED—GOOD DXING RECEIVer that goes to 10-200 mtrs. Sky Buddy, Sky Rider or Hallicrafters. Trade anything radio course, parts, plans. Radio's 1, 2, 3, 4, tubes. QSL 100%. George Locher, 8038 Logan Ave., Detroit, Mich.

HAVE TABLE ATWATER-KENT radio and speaker about 28 or 30, midget 4 tube needs alignment. Majestic power pack, parts, etc. Want photographers or radio test equip. John Neiss, 317 W. King St., Lancaster, Penn.

WANT TABLE MODEL RADIO. Have 1,000 postmarks, stamps, toy mold, courses, floor lamp, peanut vending machine and other articles. Your list for mine. A Dupuis, 3 Cypress, Ludlow, Mass.

WANT: BLILEY BC3 OR B5 1kM crystal, 1851, 1852 tubes, 8 power binoculars. Will give radio parts, cash, 49, 76, License Manual, set Rad plug in coils. Leonard Makela, 1129-16th Ave. East, Hibbing, Minn.

FACTORY BUILT HAM COMMUNIcations receiver—6K7, 6K7, 6J7G 25A6, 25Z5 in excellent condition for one Bliley VF1 or 20 meter B5, or three BC3, or two LD2. Jim Moulton, 4912 Quebec Street, N.W., Washington, D. C.

WANTED FIVE METER TRANSreiver, two if possible. Will swap a complete NRI course in radio servicing, or what you need. Phillip B. Clark, Box 111, Princeton, Maine.

HAVE COMPLETE TATTOOING outfit, value $7.00, radios, mikes, radio parts. Want typewriter, printing press. Lavoyd Kuney, Fayette, Ohio.

HAVE AN ULTRA STRATOSPHERE "10" complete with tubes and coils. Used very little. Will exchange for 5 meter parts or 8mm projector or film subjects. Or what have you? S. Ordet, 3008 Fontain St., Phila., Pa.

WANTED 2—100 MMF. VARIABLE condensers, 2 4-prong ribbed coil forms, 1 set of short wave coils, 4 prong. Daisy air rifle, no single shot. John H. Walker, 97-34 Alstyne Ave., Corona, L. I., N. Y.

HAVE ONE AND TWO TUBE BATtery radios and parts. Want Currier & Ives prints, old books, chicken dishes, old penny banks. John Haynes, Doe Run, Missouri.

HAVE APPROXIMATELY 15,000 stamps. Want short wave set in good running order. Please state no. of tub. and make of set. J. Seco, 53 Pine St., Bergenfield, N. J.

1—15 WATT, 5 TUBE AMPLIFIER, A-1 shape, tubes, horn, mike. Easily converted into 30 watt transmitter, complete. Preamplifier transformer, choke condensers, phono pickup. John Arnold, Bluffs, Ill.

WILL EXCHANGE POST CARDS with anyone, U. S. or foreign. Have new album 300 diff. stamps. What's offered in trade? W. G. Conley, Ozark, Arkansas, U.S.A.

WANT ULTRA SKY ROVER, AC-DC trans-receiver, Candler Junior code course. Have radio books, magazines, parts, tubes and stamps. John Modral, 85 Gardner Ave., So. Attleboro, Mass.

WANTED — TEST EQUIPMENT, Riders Manuals, No. 1 to No. 9. Will swap radio parts, B eliminators, all kinds of mechanics and science magazines or pay cash. Send your list for mine. S. J. Battory, 35 Potter Pl., No. Adams, Mass.

WILL EXCHANGE A $12.50 ARGUS model A-F candid camera with $4.50 Ever Ready case for a typewriter or what have you? John R. Stinner, 122 East Street, Williamstown, Pa.

WANTED RIDER OR GERNSBACK Manuals Vol. 1; also Radio News prior to 1923. Will trade radio parts or cash. R. C. Hanselman, 1753 W. Congress St., Chicago, Ill.

SPRAY GUN AND COMPRESSOR—2-4 mfd. 1500 V.—2-1 mfd. 600 V.—30 Mh. 200 m.a. choke—7000 V. Rud 50 mfd. Variable Condenser. Need two TZ40 or? Jimmy Gwinn, 935 W. 21. Anderson, Ind.

EXCHANGE UNDERWOOD TYPEwriter, alto saxophone, Vibroplex. Want tenor saxophone or what have you? E. H. Van Parton, Avoca, N. Y.

HAVE THREE TUBE S.W. RECeiver, chemistry set and electric train. Would swap for typewriter or what have you? Cliff Bennett, 94 Westfield Rd., Holyoke, Mass.

WANT CODE MACHINE AND tapes. Have Meissner 3 tube midget (battery) with tubes and all coils to trade or what have you in radio. Konnie Hightower, 2801 Scott, Fort Worth, Texas.

HAVE 101 DETECTIVE MYSTERY, etc., magazines (1934-1938) in fair condition. Cost $10.75 when bought. Want radio magazines, etc. Also want Tesla or Oudin used high-frequency coil, etc. Verlyn Hein, Hortonville, Wisc.

HAVE 16 MM $25 DEAVY PROjector, assorted aviation magazines. Popular Science from October, '32, to present, .22 rifle. Want transmitter, good S.W. receiver, P.A. system, Master Teleplex, Instructograph, or? Victor Osterby, Grant, Mich.

HAVE OVER 40 RADIO MAGAzines that I want to trade for old firearms catalogs. Also have 35 American Rifleman magazines. Cartridges for collectors for guns. Frank Wheeler, Osborne, Kansas.

WANT PHONE TRANSMITTER, tube tester, mike, pick-up, phonomotor, audio trans, amplifier, converters. Have plate camera, etc., meters, old radio, Radio Amateur Hand Book, variable condenser. Write John Grier Burford, Ontario, Canada

WANTED WINDCHARGER AND SWL cards printed. I am willing to pay a reasonable price for them. Readers, what have you? All mail answered. Norman Borchers, R.R. No. 1, Vandalia, Ohio.

SHORT WAVE SET, THREE TUBES A.C. 60—41—80. Tubes and parts Also 40-year old papers and mags. Want Maytag, Briggs Stratton motor, doughnut tires. 100% QSL. Roy Harding, 926 Neosho St., Burlington, Kansas.

HAVE AMPERITE VELOCITY MIKE with stand for dynamic or crystal mike or? Also have two Western Electric French style telephones (swell for portable use) with cradle Ray E. Murphy, 7311 Georgetown Road, Bethesda, Md.

HAVE DANDY 2½ METER XMITter C.W. and phone, complete with tubes and power supply for Sky Buddy or Sky Champion, in good condition. S. E. Probst, 26½A North Ave., Sanford, Me.

ALL AMATEUR RADIO OPS! Would like to swap QSO's with you on 40 and 80 mtr C.W. You will find me on high freq. part of these bands, so watsa? W9SEF, Renwick, Iowa.

SWAP 50 WATT OUTPUT 6L6 MODulator, variable tap modulation transformer. Relay rack panel-meter and power supply. What have you? H. G. Gwinn, Anderson, Ind.

WANTED RADIO SERVICE MANuals as issued by radio mfgs., Atwater Kent, RCA, Colonial, Sparton. Must be in A-1 condition. All letters answered. Owen B. Olive, 7 Howard St., Cranston R. I.

HAVE SET OF RHODE ISLAND Centennial half dollars, mint, for photo-electric meter. Also have set 4 mint China Clipper stamps. Trade SWL cards. B. Packscher, 208 East 237 St., Bronx, N. Y.

WANTED—SKY BUDDY OR ANY other small short wave receiver in good condition. State full price and full particulars in first letter. Must be reasonable. All letters answered. Clarence Ginther, Box 197, Oatman, Arizona.

WILL TRADE CANDLER CODE and Typing Course for high power transmitter gear or UHF transmitter. W6RFB, San Pedro, California.

WILL SWAP CHEMICAL EQUIPment, value $25, for Sky Buddy, or low power transmitter or what? W. R. Graham, 38 Wardman Road, Kenmore, N. Y.

HAVE 2V. STORAGE BATTERY, radio magazine, parts, B supply, 1 tube 32V. receiver, tubes 15, 31, etc., 0-50 voltmeters, radio course, etc. Will trade for 6 tube receiver. Burdett B. Trine Sheridan, Oregon.

LIN-O-WRITER TYPEWRITER wanted. Will either trade Underwood or pay cash. Will also trade radio parts for photo-engraving equipment. Lawrence Bakewell, Oak Street, East Natick, Mass.

WILL BUY OR TRADE COMPLETE phone transmitter, about fifty watts. Correspondence wanted with young people from all over world who write English language. Answer all letters. Kenneth Brv. Mancel, North Dakota.

SWAP: 53 SYLVANIA TUBE (NEW) old radio fundamental course, books, 100 valuable formulas, U. S. Signal Corps, radio book "Safe Council," "Tricks with Coins," "Regaining Health." SWL cards appreciated. Wm. Schroeder, 803 Wisconsin, Peoria, Ill.

(Continued on following page)

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BARTER and EXCHANGE FREE ADS (continued)

WILL SWAP 16MM PROJECTOR, film, Hawaiian guitar, case, lesson books, sheet music and small camera for wireless equipment. Gerald Engleka, Box 262, Grant Town, W. Va.

WANTED: ONE 50 WATT PHONE transmitter that operates off a battery power supply. Pay cash. Floyd Howard, Quitman, La.

SWAP COLLECTION OF 2,800 stamps in album, including U. S. mint blocks, 222 different countries. Catalog value $60.00. Also 2,315 doubles. Want candid camera, radio parts. Joseph Malsky, 3101 Ave. I, Brooklyn, N. Y.

WOULD LIKE CORRESPONDENCE with stamp collectors, interested in trading stamp duplicates. I have a Lionel train set, camera, old radio, transformer, to trade for what have you. Walter Monk, 51 Vineyard St., Providence, R. I.

WANTED — USED AIRPLANE model motors. Will pay cash or trade for radio parts. I also want small washing machine or other similar motors. D. Carlson, 217-02 38 Ave., Bayside, N. Y.

SWAP FOR MIMEOGRAPH, MOtorcycle motor (must run), phono pick-up or? Your list for mine. James E. Windsor, Jr., Burlington, Kans.

OLD PHONOGRAPH RECORDS wanted. Will trade or buy. Have Bessie Smith's, Mound City Blue Blowers, many others. Send list. E. B. Rubin, 1329 E. 53rd St., Chicago, Ill.

WANTED: SHORT WAVE TRANSceiver set with hand-mike, dry-cell batteries and headphones. Have copies of National Geographic, microscope, etc. Julius Hughes, 12 North Main, Green, S. C.

SWAP—REM. .22 REPEATER, SKY Buddy, new and used tubes, and cash. Want—Sig.-Gen. Riders. Nos. 1, 3, 4, 5, motorcycle 45 or 37 cu. in. A. C. Chick, 264 Oakland Ave., Manchester, N. H.

SWAP: BOOKS, MAGS., MOTORS, A.C. radios, meters, speakers, radio parts. Wanted: Test equipment, typewriter, candid camera, electric shaver, jigsaw or what have you? Your list for mine. Wm. Wallenbecker, 28 Washington, LaGrange, Ill.

HAVE EILEN BS-5, EILEN 7C tubes, airplane dials, speakers and parts. Want photographic equipment or ham equipment. Will exchange SWL cards. Gerald Samkofsky, 213 So. 3rd St., Brooklyn, N. Y.

WANTED TELEPLEX OR SIMILAR instruments in good shape; also two 19 tubes. Will trade small Remington .22 rifle, shoots shorts, longs, longrifle shells, or cash. Good condition. Eugene Wright, P.O. Box 1794, Vernon, Texas.

FISHING EQUIPMENT, HIGH quality, flies, plugs, lures, lines, reels, etc., for portable radio sets, good sleeping bag, binoculars, .22 rifle. Waltz, 1211 Transverse, Carrick, Pittsburgh, Pa.

WILL SWAP ACCORDION; THREE pair earphones, or typewriter and brand new Lionel remote control whistle train set. Also four 26 type tubes. Donald Nelson, 138 Johnson Ave., Dumont, N. J.

WILL SWAP AN 8½-IN. UTAH A.C. dynamic speaker for a 2 tube short wave receiver that operates on 110 volts A.C. Urban Fischer, North Mill St., Jasper, Ind.

HAVE ALL KINDS OF HAM equipment, 30 issues of QST, 50 issues of other radio magazines, 30-X telescope, ¼ H.P. motor, swap for 8mm movie equipment, or what have you? Clarence George, Palmerton, Pa.

WANTED RIDER'S MANUALS, ANY or all volumes. Will pay cash. Also want all wave signal generator. Must be in good condition. Paul K. Ortt, 551 River St., Newcomerstown, Ohio.

WANTED: 160 AND 10 METER coils for an F.B.7, Jensen 10" P.M. speaker, crystal mike. Have several articles to trade or pay cash if reasonable. H. S. Lair, Vineyard Haven, Mass.

SWAP LEEDS AND NORTHRUP Wheatstone bridge (worth over $100.00) for a 16mm motion picture camera and projector, or short wave and television equipment or what have you? William M. Dailey, 7332 Florence St., Swissvale, Pa.

HAVE NINE TUBE PHILCO chassis, speakers, RCA tubes in sealed cartons, key, transformers, DeForest electrical engineering course, pick-ups. Trade for heavy duty phono motor or what have you? Jay Berger, 1001 Avenue H., Brooklyn, N. Y.

WANTED—LOW POWER C.W. OR fone transmitter, also 3- to 8-tube ham receiver with broadcast. Both must be able to operate from 6V. battery. Send details and price wanted. Arch. Bursey, Burlington, Nfld.

SWAP KIT GRADE A PARTS TO build 5-tube regenerative superhet, with B.F.O. for microscope, chemical or electrical apparatus or most anything. State trade in first letter. J. A. Czarnecki, 33 Akron St., Meriden, Conn.

I HAVE A LATE MODEL A.C. SW-3, complete with tubes and five sets of coils. New condition. Will trade. What have you? W9NOO, Oglesby, Ill.

TRADE: COMPLETE N.R.I. RADIO & Television course, cost $110. Want A.C. SW3 or what have you? All letters answered. John J. Oskay, R.F.D. 1, Box 179, New Brunswick, N. J.

WANTED: ONE SHORT WAVE RECeiver as Howard 430 or Sky Buddy. Will swap 211Es. Riders Manuals, Jewell ohmmeter or what you want. Want 5 meter transceiver. Answer all letters. Phillip Clark, W1BKN, Box 111, Princeton, Me.

SWAP 5 METER REC. WITH TUBES and speaker, Sargent compression doorstops, small furnace blower with G.E. motor, photo cells. Want small xmitter or what have you? L. W. Morris, Williamstown, Pa.

WANT HAMMARLUND "HQ-120-X" receiver, Savage .22 auto. rifle, Savage 410 single shotgun, Smith Kit-gun, Ithaca 16 pump shotgun, Remington 38/40 or 44/40 rifle. R. Welker, 406 No. Harvey, Oak Park, Ill.

WANTED 20 OR 40 METER CRYStal, 7.175 or 14.350. What do you need? SWL's. I swap cards 100%. All cards will be answered. Victor Samardza, 1044 Longfellow Ave., Bronx, N. Y., U.S.A.

WANTED: LOOSE COUPLER OR double slide tuning coil and 45 volt B eliminator. Have 12" dynamic speaker, two 24-A and one 245 tube and telephone microphone. Billy Price, Route 1, Box 99A, Kannapolis, North Carolina.

WANTED—MOTORCYCLE, MOTOR scoot, midget auto racer. Have Dayrad tube tester No. 381 (worth $30), coyote skin (worth $15), bear skin (worth $7), both mounted. What do you want? I QSY 100%. Bob Bailey, Lewiston Orchards, Idaho.

SWAP: TUBES, MOSTLY METAL RCA, ¼ HP motor, Singer sewing machine motor, flatiron all 32V, Silver Beauty battery charger, Corbin motorcycle speedometer, 0-5 Weston D.C. voltmeter. Want: Handbook, Callbook, Sky Buddy, Howard 430, xtals Walter Blumer, Jefferson, Wis.

WILL SWAP M & M GAS MODEL motor, Super Clipper receiver, regulation boxing gloves, or new 20 gauge shotgun for portable typewriter, .22 pump repeating rifle. Ray Cecil, Winters Lane, Cold Spring, Ky.

SWAP: HAMMARLUND SUPER Pro, xtal, 15-550 model complete. A1 condition. Want HRO or RME 69 and DB 20. Wm. Quigley, 102 Avenue "S," Brooklyn, N. Y.

BRAND NEW GILBERT A.C. ELECtric drill, air cooled motor, takes up to ¼ drills, value $15.00. Want good short wave receiver, 10 meter phone transmitter or? Sam Schlecker, 326 E. 46th St., Brooklyn, N. Y.

WANTED USED MARCO 4" DIAL or National "B" vernier. Will trade used Premier 5" magnetic speaker in good condition. John W. Creamer, 423 Third St., Chillicothe, Missouri.

SWAP COMPLETE PHONE RIG 15 watts, complete with tubes, xtal, mike, etc., using 57, 6L6, 6L6, 80 for what have you? W2HAP, 804 Langt Ave., Far Rockaway, L. I., N. Y.

WANT TO BUY A GOOD 2½ TO 10 meter converter, pair phones. Exchange view post cards for World's Fair views. Have 1 tube set, back issues radio mags. Charles Holstein, 246 E. 148 St., Bronx, N. Y.

TRADE—SUPER SKYRIDER AND radio parts for small metal turning lathe or what have you? S. Schultz, 1149 W. Chicago Ave., Chicago, Ill.

HAVE MICROSCOPE TURRET TYPE with 4 lenses 200 to 1000 power in case, little used. Want Teleplex master SW super or what have you? John Taylor, Box 8, Sparks, Nevada.

WILL SWAP JEWELL 3½" AMmeter 20-0-20 D.C., like new, for receiver or microphone. What have you? Jos. Haquin, Gillespie, Ill.

SWAP—6.3 VOLT FIL TRANS., slightly used. Potentiometer, antennae trimmers, sockets, resistors. 2—6J5G's, 1—80 (Sylvania) almost new. (List.) Want—8- or 4-tube, 2-volt battery receiver, good cond. QRA: C. Ducy, 514 N. 7th Street, Philadelphia, Pa.

TRADE THREE TUBE A.C.-D.C. S.W. receiver (coils, phones) and 6-tube table "Automatic" and cash if needed for used Sky Buddy or Howard 430. More details furnished. George Sadro, 52 Ridge, Manchester, Conn.

WANTED — MORSE AND CONtinental Morse code tapes for Instructograph, also Vibroplex bug, and 6 volt battery radio. Will pay cash for above articles. E. G. Semenchuk, 255 Valparaiso St. S., Valparaiso, Indiana.

WANTED IN GOOD CONDITION: Set of 3 Aero short wave receiving coils (on market about 12 years ago) catalogue No. L.W.T. 125. Also standard broadcast coil. Norman Lehde, Gardenville, N. Y.

WANTED: A.C. GENERATOR, 6 or 32 volt Genemotor, trans. tubes, parts, xtals, transformers, will trade stamps, 1400 all different, or will buy. Wilmer H. Deck, Hoskins, Nebr.

REGISTERED SCOTTIE FEMALE pup, many champions in two generations. Trade for meters, radio xmitter parts or? W5HVX, Box 936, Wink, Texas.

TRADE TRIPLETT SIGNAL GENerator model 1232, 110 volt, 60 cycle, A.C., for model 1231 battery operation. Write to John F. Sullivan, 99 Aldrich St., Roslindale, Mass.

HAVE ICE SKATES, SIZE 9, phones (perfect), box of old radio parts including condensers, resistors, tube-sockets, chassis, twenty-six good tubes. Want good S.W. set, Argus camera. H. Birkdale, 44 E. 208 St., Bronx, N. Y.

WILL TRADE GARDINER LEVERing automatic sender for a McElroy key (de luxe model) or a Vibroplex key. Robert Sachtleben, W2LHX, Clifton, N. J.

SWAP NATIONAL A.C.—SW3 AND 4 sets coils 13 to 76 and 115 to 200 meters, all first class condition. Want Argus speed camera, Model C2. James A. Dalin, Sr., 141 S. Lynwood Avenue, Glenside, Pa.

HAVE RACO SUPER CLIPPER radio, radio parts, magazines to trade. Want auto radio, Argus candid camera model C, radio books. Jeff Rice, Jr., 706 West Central Avenue, Bentonville, Arkansas.

WANTED: A GOOD USED 807. Must be in perfect condition. What do you want for it? Write Elmer R. Fuller, Listening Post Editor, 32 Madison Street, Cortland, New York.

WANTED: LONG DISTANCE SUPER sensitive crystal set, Czech and U. S. stamps, coins, obsolete auto radiator name plates. Have auto radio, spotlight, coffee grinder, etc. Exchange lists. Rudolph Zak, 2509 East 89th, Cleveland, Ohio.

WILL SWAP 125 COPIES 1934 through 1938 issues of Short Wave & Television, Radio Index, All Wave Radio and Radio News for a Phonograph pick-up or what have you. Robert Seaward, 4516 Polaris St., Jacksonville, Florida.

HAVE 1-TUBE BATTERY RADIO. Tunes amateurs, police calls, short wave, broadcast bands, etc. Wanted, radio magazines or what have you? W. A. Ogle, R.F.D. 2, Green City, Missouri.

WILL SWAP 35MM CANDID CAMera with carrying case and cable release. Would like a S.W. recvr., or what have you? Will also swap SWL cards. QRA—Victor Charis, 14 Union Street, Methuen, Mass.

WANT TO BUY—A USED LOW power phone transmitter—160 meters. Keith A. Boss, 796 Middle St., Portsmouth, N. H.

WESTON NO. 537 SET ANALYZER, will exchange for a sedan in good condition or a set of Riders or Gernsback's Servicing Manuals, or candid, reflex and motion picture cameras and projectors. Write only. Harry Perkins, 403 Christopher Ave., Brooklyn, N. Y.

SWAP ALL-STAR JR. RECEIVER complete except speaker, coils 13 to 465 meters. Was used as station equipment by several Cleveland hams, for movie camera and projector, binoculars. Elwood Brooks, 1636 East 36th St., Cleveland, O.

INSTRUCTOGRAPH OR TELEPLEX code practice machine wanted. Must be cheap. Will pay cash. Please give full description and price. Martin Gasperik, 618 Sixth Avenue, Lyndhurst, N. J.

WANTED: OSCILLOSCOPE, FREquency modulator, Solar condenser analyzer, 8- or 9-inch v.o.m. meter, Perfex camera. Will swap radio parts, magazines, books, stamps, etc. Write to T. Wojciechowski, 2880 Fulton St., Brooklyn, N. Y.

HAVE RIDERS 4—5—6 MANUAL, Riders Servicing by Resistance, Modern & Field Servicing by Ghirardi, 2 B eliminators, 3 pair earphones. Want Hallicrafters receiver, Jensen, 211 East 200 St., Bronx, N. Y.

HAVE 100 ASSORTED CUNNING ham tubes, brand new in unsealed cartons, 56s, 57s, 58s, 82s, large stock used audio transformers, parts, etc. Swap, what have you, no junk. Geo. Olson, Carrington, N. Dak.

HAVE TWO TUBE 110 V. A.C.-D.C. all-wave set with four plug-in coils with pair Western Electric headphones. Swap for emission tube tester with good and bad meter. Marcel Lachance, 26 Howard, Lewiston, Maine.

WANT GOOD PHONO PICKUP, motor, turntable. Swap for Atwater Kent 40 with tubes, new tuning condensers, vernier dials, powerpacks, RCA 32 and 44, dynamic speakers, some 6 V. D.C. Gifford N. Hartwell, 38 Charlemont St., Newton Highlands, Mass.

(Continued on opposite page)

Mc.	Call	
6.117	XEUZ	MEXICO CITY, MEX., 49.09 m., Addr. 5 de Mayo 21. Relays XEFO 9 am.-1 pm., 7 pm.-2 am.
6.116	—	SAIGON, FR. INDO-CHINA, 49.05 m., 6 or 7 to 9.30 am., 11-11.30 pm.
6.115	OLR2C	PRAGUE, BOHEMIA, 49.05 m. (See 11.40 mc.)
6.110	XEGW	MEXICO CITY, MEX., 49.1 m., Addr. La Voz de Aguila Azteca desde Mex., Apartado 8403. Relays XEJW 11 pm.-1 am.
6.105	HJ6FAB	MANIZALES, COL., 49.14 m., Addr. P. O. Box 175. Dly. 5.30-10 pm. Sat. to 11 pm. Sun. 2.30-5 pm.
6.100	YUA	BELGRADE, JUGOSLAVIA, 49.18 m. 1-3, 6.30-8.30 am., Noon-6.30 pm.
6.100	W9XF	CHICAGO, ILL., 49.18 m., 4-6.50 pm. (Sat. to 5.30 pm.) 1-2 am.
6.100	W3XL	BOUND BROOK, N. J., 49.18 m., Addr. Natl. Broad. Co. 9 pm.-12 m.
6.097	ZRK	KLIPHEUVEL, S. AFRICA, 49.2 m., Addr. S. African Broad. Co., Johannesburg. Daily 12 n.-4 pm., Sun. 12 n.-3.20 pm.
6.097	ZRJ	JOHANNESBURG, S. AFRICA, 49.2 m. Addr. S. African Broad. Co. Daily exc. Sat. 11.45 pm.-12.50 am.; Daily exc. Sun. 3.15-7.30, 9-11.30 am. (Sat. 8.30-11.30 am.) Sun. 3.30-4.30 or 4-5 am., 5.30-7, 9-11.30 am.
6.095	JZH	TOKYO, JAPAN, 49.22 m., Addr. (See 11.800 mc., JZJ.) Irregular.
6.090	ZNS	NASSAU, BAHAMAS, 49.26 m., Addr. Dir. of Tel. East St., Nassau. 1.30-2, 8-9 pm.
6.090	CRCX	TORONTO, CAN., 49.26 m., Addr. Can. Broadcasting Corp. Daily 6.45 am.-4 pm., Sun. 9.30 am.-11 pm.
6.090	ZBW2	HONGKONG, CHINA, 49.26 m., Addr. P. O. Box 200. Irregular.
6.083	VQ7LO	NAIROBI, KENYA, AFRICA, 49.31 m., Addr. Cable and Wireless, Ltd. Mon., Fri. 5.30-6 am., 11.15 am.-2.15 pm., also Tues. and Thurs, 8.15-9.15 am.; Sat. 11.15 am.-3.15 pm.; Sun. 10.45 am.-1.45 pm.
6.080	W9XAA	CHICAGO, ILL., 49.34 m., Addr. Chicago Fed. of Labor. Relays WCFL irregular.
6.080	CRY9	MACAO, MACAO, 49.34 m., Mons. 8.30-10 am.
6.080	HP5F	COLON, PAN., 49.34 m., Addr. Carlton Hotel. 7-9 pm.
6.079	DJM	BERLIN, GERMANY, 49.34 m., Addr., Broadcasting House. Irregular.
6.077	OAX4Z	LIMA, PERU, 49.35 m. Radio National 7 pm.-1.30 am. Except Sun.
6.075	VP3MR	GEORGETOWN, BRI. GUIANA, 49.35 m. Sun. 7.45-10.15 am.; Daily 4.45-8.45 pm.
6.070	CFRX	TORONTO, CAN., 49.42 m. Relays CFRB 6.30 am.-11 pm., Sun. 9 am.-11 pm.
6.070	VE9CS	VANCOUVER, B. C., CAN., 49.42 m. Sun. 1.45-9 pm., 10.30 pm.-1 am.; Tues. 6-7.30 pm., 11.30 pm.-1.30 am. Daily 6-7.30 pm.
6.069	——	TANANARIVE, MADAGASCAR, 49.42 m., Addr. (See 9.53 mc.) 12.30-12.45, 3.30-4.30, 10-11 am., Sun 2.30-4.30 am.
6.065	SBO	MOTALA, SWEDEN, 49.46 m. Relays Stockholm 4.15-5 pm.
6.060	—	TANANARIVE, MADAGASCAR, 49.5 m., 12.30-12.45, 3.30-4.30, 10-11 am.
6.060	YDD	BANDOENG, JAVA, 49.5 m., 5.30 am. on.
6.060	W8XAL	CINCINNATI, OHIO, 49.5 m., Addr. Crosley Radio Corp. Relays WLW Sun. 7 am.-6.30 pm., Mon., Tues., Thur. 5.45-11 pm., Sat. to 10 pm. Other days to 10.30 pm.
6.060	W3XAU	PHILADELPHIA, PA., 49.5 m. Tues., Wed., Fri. 5.30-6.15, 6.30-11 pm. Sat. 11 pm.-1 am. Sun. 6.30-11 pm.
6.057	ZHJ	PENANG, FED. MALAY STATES, 49.53 m. 6.40-8.40 am., except Sun., also Sat. 11 pm.-1 am.
6.050	GSA	DAVENTRY, ENGLAND, 49.59 m., 12.25-4, 4.20-6 pm.
6.045	XETW	TAMPICO, MEXICO, 49.6 m. Irregular 7-11 pm.
6.040	W4XB	MIAMI BEACH, FLA., 49.65 m. 1-3 pm., 9 pm.-2 am., Sun. 4-6 pm. Relays WIOD.

www.americanradiohistory.com

Mc.	Call	
6.040	WIXAL	BOSTON, MASS., 49.65 m., Addr. University Club. 7-9 pm. exc. Sat. & Sun. Sun. 2.30-6 pm.
6.033	HP5B	PANAMA CITY, PAN., 49.75 m., Addr. P. O. Box 910. 10.30 am.-2, 6-10 pm.
6.030	CFVP	CALGARY, ALTA, CAN., 49.75 m. Thur. 9 am.-1 am.; Sun. 12 n.-12 m.
6.030	RW96	MOSCOW, U.S.S.R., 49.75 m. 1-3, 4-7 pm.
6.030	OLR2B	PRAGUE, BOHEMIA, 49.75 m. (See 11.875 mc.) Off the air at present.
6.023	XEUW	VERA CRUZ, MEX., 49.82 m., Addr. Av., Independencia 98. 10 pm.-1 am.
6.020	DJC	BERLIN, GERMANY, 49.83 m., Addr. (See 6.079 mc.) 11.30 am.-4.30 pm.
6.020	HJ3CAX	BOGOTA, COL., 49.83 m., Addr. Apartado 26-65. 12 n-2 pm., 5.30-11 pm., Sun. 6-11 pm.
6.017	HI3U	SANTIAGO DE LOS CABALLEROS D. R., 49.84 m. 7.30-9 am., 12 n.-2 pm., 5-7 pm., 8-9.30 pm.; Sun. 12.30-2, 5-6 pm.
6.015	PRA8	PERNAMBUCO, BRAZIL, 49.85 m., Radio Club of Pernambuco, 4-9 pm.
6.010	OLR2A	PRAGUE, BOHEMIA, 49.92 m. Addr. (See OLR, 11.84 mc.) Irreg.
6.010	COCO	HAVANA, CUBA, 49.92 m., Addr. P. O. Box 98. Daily 7.55 am.-12 m., Sun. until 11 pm.
6.010	VK9MI	S. S. KANIMBLA, 49.92 m. (Travels between Australia and New Zealand). Sun., Wed., Thurs. 6.30-7.30 am.
6.010	CJCX	SYDNEY, NOVA SCOTIA, 49.92 m. Relays CJCB 7 am., 1.30, 4-8.30 pm.
6.007	XYZ	RANGOON, BURMA, 49.94 m., 6.30-10 am., 9-11 pm., Sat. 9.30-11 pm.
6.007	ZRH	ROBERTS HEIGHTS, S. AFRICA, 49.94 m., Addr. (See ZRK, 9.606 mc.) Daily exc. Sun. 9.30 am.-3.30 pm.; Sun. 9 am.-12 n., 12.15-3.15 pm. Daily exc. Sat. 11.45 pm.-12.50 am.
6.005	HP5K	COLON, PAN., 49.96 m., Addr. Box 33, La Voz de la Victor. 7-9 am., 10.30 am.-1 pm., 5-11 pm.
6.005	CFCX	MONTREAL, CAN., 49.96 m., Can. Marconi Co. Relays CFCF 6.45 am.-12 m.; Sun. 8 am.-10.15 pm.
6.005	VE9DN	DRUMMONDVILLE, QUE., CAN., 49.96 m., Addr. Canadian Marconi Co.
6.002	CXA2	MONTEVIDEO, URUGUAY, 49.98 m. Addr. Rio Negro 1631. Relays LS2, Radio Prieto, Buenos Aires. 5.30-10.30 pm.
6.000	XE8T	MEXICO CITY, MEX., 50 m., Addr. P. O. Box 79.44. 10 am.-1.45 am.
5.990	ZEA	SALISBURY, RHODESIA, S. AFRICA, 50.08 m. (See 6.147 mc., ZEB.) Also Sun. 3.30 5 am.

End of Broadcast Band

5.977	CS2WD	LISBON, PORTUGAL, 50.15 m., Addr. Rua Capelo 5. 3.30-6 pm.
5.975	OAX4P	HUANCAYO, PERU, 50.16 m. La Voz del Centro del Peru. 9-11 pm.
5.968	HVJ	VATICAN CITY, 50.27 m. Off the air at present.
5,950	HH2S	PORT-AU-PRINCE, HAITI, 50.37 m., Addr. P. O. Box A103. 7-9.45 pm.
5.940	OAX2A	TRUJILLO, PERU, 50.51 m., Tue., Thu., Sat., Sun. 7-10 pm.
5,900	ZNB	MAFEKING, BRI. BECHUANALAND S. AFRICA, 50.84 m. Addr. The Govt. Engineer, P. O. Box 106. 6-7 am. 1-2.30 pm. Ex. Suns.
5.900	TiLS	SAN JOSE, COSTA RICA, 50.85 m. 6-10 pm.
5.885	HI9B	SANTIAGO, D. R., 50.95 m. Irregular 6-11 pm.
5.875	HRN	TEGUCIGALPA, HONDURAS, 51.06 m. 1.15-2.16, 8.30-10 pm.; Sun. 3.30-5.30, 8.30-9.30 pm.
5.855	HI1J	SAN PEDRO DE MACORIS, D. R., 51.25 m., Addr. Box 204. 11:40 am.-1.40 pm., 6.10-8.40 pm.
5.825	TIGPH	SAN JOSE, COSTA RICA, 51.5 m., Addr. Alma Tica, Apartado 800. 11 am.-1 pm., 6-10 pm. Relays TIX 9-10 pm.
5.813	TIGPH2	SAN JOSE, COSTA RICA, 51.59 m., Addr. Senor Gonzalo Pinto, H.

(Continued on page 191)

BARTER and EXCHANGE FREE ADS (continued)

TRADE A UTAH 80 WATT TRANSmitter complete except 1 meter for an amateur receiver. Howard Goodside, 2510 Lincoln St., Saginaw, S.S., Mich.

SWAP FOR 3 OR 4 A.C. S.W. recvr., a Weston model 674 tube checker and/or model B-40 G.E. auto recvr. 807 East Van Buren Street, Columbia City, Ind.

HAVE 12,000 VOLT INDUCTION coil, G.E. tungar charger, 6 volt generator, 5-inch dynamic speaker, to trade for gas motor, radio or parts, camera, or? Ralph Saber, 107 S. Albion Ave., Atlantic City, N. J.

HAVE A NEW RCA FREQUENCY modulator in factory sealed carton. Would like to trade for good shotgun. Nick Denaro, 8148 102 Ave., Ozone Park, N. Y.

WANTED SKY BUDDY, SW3 National electrified late model, exchange for Airline 6-tube pushbutton thirty-nine and two-tube reGenerator, Harry Pearsall, Room No. 218, St. Francis Sanatorium, Colorado Springs, Colo.

WANT RADIO PARTS, TRANSformer delivering 400 to 600 volts each side of CT. or? Have rifle, books, banjo, stamps, etc. Robert E. Lloyd, Box 94, Portsmouth, Ohio.

HAVE SHORT WAVE EQUIPMENT, stamps, tools, books and number of other things. Am willing to swap for any kind of phonograph equipment. Want good pickup. A. M. Bird, Jr., 119 Broad St., Glassboro, N. J.

HAVE ALL KINDS OF MAGAzines, including radio, science fiction, photography and all kinds of pulps to trade for any transmitting equipment, tubes, meters, condensers, coils, etc. William Craggs, 1023 Washington Blvd., Venice, Calif.

HAVE DB AND TRANSFORMER; Thordarson mod. transformer 200 ohm line to plate and screen of pr. 807's; Pre. amp 6F5-6C5; Haynes Rig checker; 03A; other items. What have you? W8OIG, Woodsfield, O.

SWAP 2 RCA 955 ACORN TUBES, brand new, boxed, also two transmitting condensers, television tuners, trimmers, etc., for good analyzer, meters, microphone, or what? Bill Osborne, 213 Davis St., Sarnia, Ontario, Canada.

SWL EXCHANGE

UNITED STATES

LEWIS NEUMAN, P.O. Box 8363, Pittsburgh (18), Pa.
NOBLE SHEATSLEY, JR., Walkerton, Ind.
MILES H. MOTT, 61 Grace Street, Cranston, Rhode Island.
W. E. TIETZ, 615 7th Street, Watertown, Wis.
PAUL FRANUSICH, Route 1, Box 120, Florin, Calif.
FRANK VON PUTZ, 8612 55 Road, Elmhurst, Long Island, N. Y.
MEYER SUSSMAN, P.O. Box 2182, Paterson, New Jersey.
MIKE HOYCHUK, 5547 Saxon Dr., Garfield Hts., Ohio.
MAURICE WYNNE, 210 Hector Avenue, New Orleans, La.
N. E. BROOKS, 1344 W. 41st Street, Baltimore, Md.
JAMES NELSON, 1838 N. Erie St., Toledo, Ohio.
ROBERT J. ELLIS, 3539 17th St., San Francisco, Calif.
LUTHER SCHNAKE, 1608 Campbell Ave., Des Plaines, Ill.
CHARLES COLMARK, 1426 24th Ave., Moline, Illinois.
GEORGE CRYDER, R.D. No. 3, Delaware, Ohio.
E. F. DIEHL, JR., 309 So. 17th St., Camp Hill, Pa.
JOSEPH COHEE, General Delivery, Frankfort, Ind.
WM. ANDERSON, 9142 Fairview Ave., Brookfield, Illinois.
STEVE MECSERI, 34 St. John Place, Stamford, Conn.
BOB FORMAN, Box 127, Monmouth, Illinois.
A. E. PERRY, Eddyville, Iowa.
JOHN L. BALLIN, 40 East 66 St., New York, N. Y.
GLENN WEHRMANN, 1289 Keeney Avenue, Des Plaines, Ill.
NORM WHITON, Green St., Greenwood, Mass.
PAUL BAHR, Marion, Indiana.
CARL ANDERSON, 5024 W. Ohio St., Chicago, Ill.
MIGUEL ANGELO, W2BWL, 247 East 62nd St., New York City.
WILLIAM C. BREWER, 852 East 169 St., Bronx, N. Y. C., N. Y.
TOM SCHRECKENGOST, 6020 Grafton St., Pittsburgh, Pa.
A. H. JONES, 4017 Cold Spring La., Baltimore, Md.
VERNON LOCKETT, 229 S. Bonner Ave., Tyler, Texas.
HENSLEY MOREHEN, 66 Curtis Street, San Francisco, Calif.
JIMMY WRATIL, 1147 White St., Des Plaines, Ill.
STANLEY PAWLIKOWSHI, Jr., 11 Clinton St., Easthampton, Mass.
LOYALL MUMBY, 36 Burr Ave., Middletown, Conn.
DONALD CHARLES JOHNS, 1342 Campbell Ave., Des Plaines, Ill.
JAMES COLLINS, Hilltop Rd., Catons, Maryland.
P. WYNNE, 210 Hector, New Orleans, La.
ED. J. BRAUN, 111 Maltby Street, Rochester, N. Y.
WILLIAM E. SIMMONS, 3430 Dickens Ave., Chicago, Illinois.
G. F. BARRON, 1517 Ruan St., Phd., Philadelphia, Pa.

AUSTRALIA

F. DUBBO, City Road, Beenleigh, Queensland.
VIVIAN HAMPSON, "Brookville" 146 Jellicoe St., Toowoomba, Queensland.
ERNEST JONES, McKellar St., Tenerife, N.1, Brisbane, Queensland.

CANADA

GEORGE FERGUSON, 70 Cameron Ave., Hamilton, Ontario.
HOWARD F. DIXON, 23 Guelph St., Stratford, Ontario.
STAN CLARKE, 468 Bourgeois St., Montreal.

ENGLAND

ANDREW ROBERTSON, 5, York Road, Southport, Lancashire.
DENYS CRAMPTON, 5, York Road, Southport, Lancashire.
A. F. JACKMAN, 32 North, Denes Road, Gt. Yarmouth, Norfolk.
JIM BALL, 3 Waterworks Cottages, Southworth Road, Newton-Le-Willows, Lancs.
GEORGE MILLS, 13 Critchley St., Ilkeston, Derbyshire.

HAWAII

TOKIO MUJAZONO, 2838 Church Lane, Honolulu.

SOUTH AFRICA

BASIL GREEN, % 5 Pallinghurst Road, Parktown West, Johannesburg.
MURRAY B. GUNN, "Farm Rome," Somerset West, Cape Province.

SWITZERLAND

R. R. LONGYEAR, Genthod, Geneva.

Let's Listen In With Joe Miller

(Continued from page 151)

VS7JW, 14350, Ceylon.

KA3BW, 14176; KA7EF, 14120; KA1JM, 14280, in Philippines.

MX2B, 14310; MX2C, 14280, both in Manchukuo.

TF3C, 14110, Iceland, at 9 a.m.

FI8AG, 28000, French Indo-China, is a rare catch which Jack Buitekant, W2, heard at 10:20 a.m. some time ago. Real DX!

FA3JY, 14070; FA8CF, 14060; in Algeria, heard FB, also SV1CA, 14010, Greece, also CT2BC, CT2BP, HB9CE, HB9DO, in Azores and Switzerland, respectively.

FN1C—FRENCH INDIA

Dave Patterson, FN1C, has kindly consented to honor the I.D.A. with a Special Broadcast, doing so on June 29 and July 2, at 9 a.m. and 1 p.m. E.S.T., each day, calling for 10 minutes on 14084 kc., phone.

Dave will insert a "reference clause" in his call, and all correctly reporting his words will earn a handsome QSL from a rare DX country. I.R.C.'s must be sent with reports.

Dave has a FB transmitter using 100 watts phone into a close-spaced 2 element rotary beam, one of the finest transmitters in all Asia. Gail T. Beyer, W9, arranged this broadcast. It's very nice of Dave to make this broadcast but the time will make it almost hopeless for "East Coast" DXers, although will be OK for W9s and W6s. Good luck, anyway, boys! Dave also tells us that he is building a 35 watt phone rig for AC4YN in Tibet, to be ready late in July, which will be really FB, as some lucky DXers may then log AC4YN! Vy 73. Joe.

Review of Hammarlund HQ-120

This is a fine set, for ours, or any one else's money. That's the opinion of all the DXers who've heard the HQ-120 at our DX shack. We could have no other belief after the FB results obtained, in a side-by-side test with several other receivers.

The HQ-120 will "bring in" any stations any other set will; is very sensitive on all bands, including "10"; calibrates in true Hammarlund precision, and, of interest to all Hams and amateur DXers, has a band-spread for all the amateur bands with accurately calibrated scales (in MC.) which permits direct reading of frequencies right off the band-spread dial, something all the boys wanted. And each band is spread over the whole dial, making tuning a pleasure.

A fine feature is the antenna compensating control, with which one can adjust circuit peak when changing bands, so effective that very often, when just tuning *inside one amateur band* (10 or 20 M.), a slight turn will very noticeably improve the signal received.

The HQ-120 Noise Limiter proved itself of considerable value in diminishing the usual QRM evident on the higher frequencies, often being the difference as to whether or not we got some weaker station's call.

The crystal circuit is a fine one, and we usually preferred to keep the crystal in, in its first position, meeting various QRM conditions by readjustment of the indispensable phasing control.

We could go on and on, but will QRT with these words, to cover everything—Hammarlund really built class into the HQ-120. 73

JOE MILLER.

DX on the "Ham" Bands

(Continued from page 186)

The season for the VK's is certainly here, with several hundred reported. One observer alone reported that he had heard over seventy-five of them during April. The Aussies were heard in Colo., P. I., Ala., Mich., Nebr., S. D., Utah, Ariz., Conn., Ia., W. Va., Calif., Ore., Wash., Kan., Penna., and England.

Call	*Freq.*	*R*	*S*	*Where Heard*
ZK2BE	28.42	5	8	Calif.
ZL1HY	28.15	5	9	Ariz.
ZL1GZ	28.38	5	8-9	Ariz., Calif.
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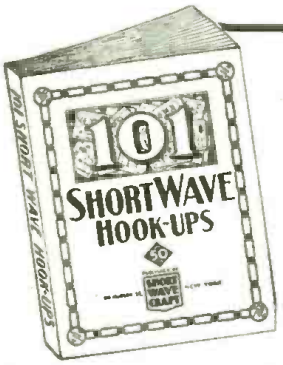

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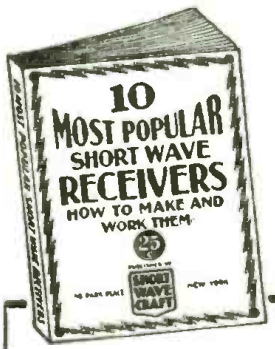

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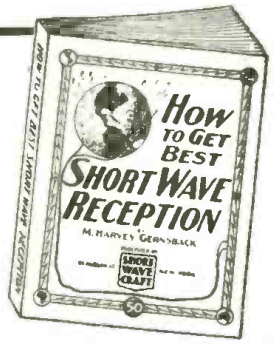

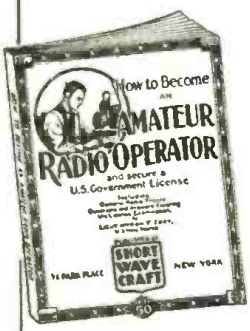

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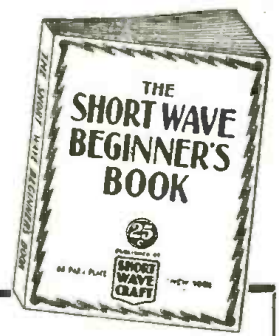

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5.300	ZIK3	BELIZE, BRIT. HONDURAS, 56.6 m., Tue., Thurs., Sat. 1.30-2, 8.30-9 pm.
5.145	OKIMPT	PRAGUE, BOHEMIA, 58.31 m., Addr. (See OLR, 11.84 mc.) Irregular.
5.145	PMY	BANDOENG, JAVA, 58.31 m. 5.30-11 am.
5.040	YV5RN	CARACAS, VENEZUELA, 59.52 m., 4-11.30 pm., Sun. 8.30-11.30 am., 3.30-10 pm.
5.020	YV4RQ	PUERTO CABELLO, VENEZ., 59.76 m., testing nightly. Off 9.20 pm.
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4.920	YV5RU	CARACAS, VENEZ., 60.98 m., 6.30-7.30, 10.30 am.-1, 3.30-10 pm.
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4.910	YVIRY	CORO, VENEZ., 61.10 m., 6.30-9.30 pm., ex. Sundays.
4.905	HJIABG	BARRANQUILLA, COLOM., 61.16 m., 11 am.-11 pm., Sun. 11 am.-8 pm.
4.900	YV6RT	BOLIVAR, VENEZ., 61.22 m., Signs-off at 9.30 pm.
4.900	HJ3CAH	BOGOTA, COLOM., 61.22 m., 11.30 am.-2, 6-11 pm.
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BOOK REVIEWS

HELLO AMERICA! Cesar Saerchinger. Size 5⅝" 8⅝", 393 pages, illustrated. Published by Houghton Mifflin Co., Boston, Mass.

In a light, fascinating style, this famous European-contact man of the Columbia Broadcasting System tells of the growth of broadcasting from abroad, enlivening his work with many amusing and thrilling anecdotes. He gives, for example, the inside story of Mr. Windsor's abdication for the love of Bessie Wallace Warfield Spencer Simpson. He tells of Shaw's first broadcast, putting the Pope on the air, an interview with Ghandi, and many other topics of interest, in 25 chapters which are illustrated with 20 pages of photographs. There is a detailed index which enables the reader to find any subject covered in the book.

SOUND, Arthur Taber Jones. Size 5⅝" x 8¼", 450 pages, illustrated. Published by D. Van Nostrand Co., Inc., New York City.

In this book, which emphasizes both the fundamental principles and the more important phenomena of sound, the author—who is Professor of Physics at Smith College—is careful to include the more recent discoveries and points of view. In graphic manner, he shows the progress of acoustic science, and details how a large part of the new knowledge can be mastered and acquired. He presents the rather abstruse ideas in language which is not only clear, but even fascinating. His 12 chapters deal with: Preliminary Ideas; The Production of Various Noises; Vibratory Motion; Simple Tones and Combinations of Tones; Musical Scales; Transmission of Sound; Free Vibration; Forced Vibration and Maintained Vibration; Hearing; Musical Instruments; Speech and Sound; and Technical Applications. There are 7 appendices and an index. The book is thoroughly documented, nearly 2 pages being devoted to a partial bibliography covering but three of the innumerable points by the erudite author.

THE RADIO NOISE REDUCTION HANDBOOK, size 6" x 9", 44 pages, paper covers, illustrated. Published by Radio, Ltd., Los Angeles, Calif.

This is a handbook which really gives the experimenter, who wishes to conduct research into "noise suppression," some real usable information. The noise limiters described in one chapter range all the way from the simple neon bulb connected across the speaker to the Dickerts system which, though fairly complex, has long been a favorite of workers in this field. Other chapters deal with the suppression of noise at the source, means of analyzing the causes of noise, balancing systems, new circuits, etc. This book is a "must" for every radio enthusiast who finds the QRN over-riding the signals.

THE FUNDAMENTALS OF WIRELESS AND TELEGRAPHY FOR BEGINNERS, size 5⅜" x 7⅜", 32 pages, paper cover, illustrated. Published by Signal Electric Mfg. Co., Menominee, Mich.

This booklet explains in simple terms the functions of telegraph keys, sounders, relays and batteries, giving some simple circuits for two-way communication. It also gives the code and a series of lessons to enable the aspiring operator to practice in the most effective way. A few pages at the back of the book are devoted to advertising.

Electronic Television Course

(Continued from page 178)

of the video and cathode ray tubes by means of the power supplies. It will be noticed that the cathode of the cathode ray tube is not at or near ground potential *but several hundred volts above*, as explained in the second paragraphs of this chapter.

Another method of restoring the D.C. *background level* is of course a manual one, in which a resistance changes the bias of the cathode ray tube grid. When this method is used it will be necessary to change the bias with the pedestal level as it changes with the transmitted scene, thus necessitating frequent adjustment of the background control.

Circuits covering *electrostatic deflection* type tubes will be described in the following chapter. These tubes are less expensive than electro-magnetic deflection types but usually suffer somewhat in the detail obtainable. Circuits of the antennas as well as the R.F. type of receiver will also be described for the reception of television pictures, where the receiving point is located within fairly close proximity to the transmitter.

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A set of free booklets describing the NC-100XA and other National receivers will be mailed free on request. Though primarily instruction booklets, they contain a wealth of general information on receiver design and operation that will be of real value to anyone interested in fine instruments. Just ask for "Receiver Group Booklets." They will be mailed promptly, postpaid.

National builds a complete line of communication receivers, ranging from the Type HRO, in which cost is a secondary consideration, to the Type NC-44, designed for the lowest price which good performance permits.

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SET BUILDERS, STUDENTS, EXPERIMENTERS and SERVICE MEN

The Andrea Television Kit gives you factory-built performance at rock-bottom cost—plus the fun and satisfaction of building your own. Already, set builders are reporting enthusiastically about results from their assembled KT-E-5 kits:

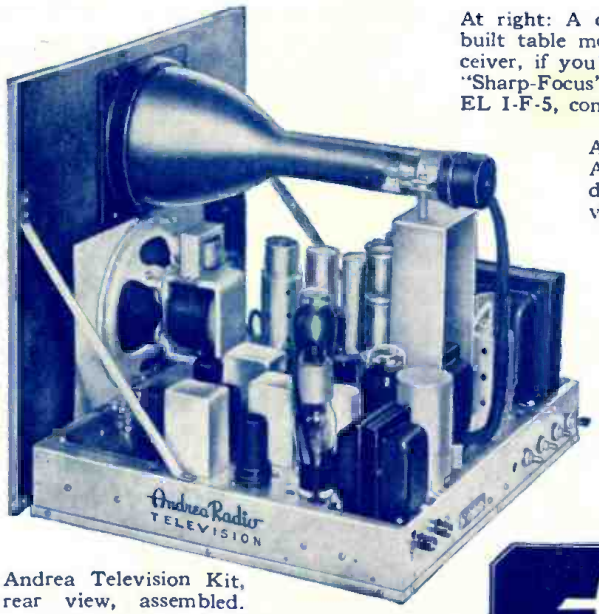
In the N. Y. Sun, April 15th, E. L. Bragdon, Radio Editor, said: "In the writer's opinion, gained through the actual assembly of the (Andrea) kit, the plan of instructions devised by the manufacturer sets a new high point in that field of radio.—The individual steps in the formation of this televisor have been so clearly outlined that the only excuse for failure is carelessness on the part of the builder."

FROM *TELEVISION HEADQUARTERS:* ANDREA RADIO CORP. is the only television manufacturer whose factory and laboratories are located right in New York City. Thus ANDREA engineers have not been limited to laboratory receiving tests from miniature, experimental transmitters. No, indeed! Every step in the perfection of ANDREA "Sharp-Focus" sets and kits has been checked on actual reception from the New York transmitters which are setting the standards of television technique in the U. S. A.

FINISHED, COMMERCIAL DESIGN: ANDREA is the only manufacturer of television receivers who is making a standard, commercial set available in construction kit form for experimenters, students, and service men. Because the ANDREA KT-E-5 kit is actually comprised of the parts of the factory-built model 1-F-5 receiver, the kit, when assembled in accordance with the instructions provided, will give you sight and sound reception equal to the factory-built set.

SUCCESS ASSURED: You need only a soldering iron, screwdriver, and pliers. No testing instruments are necessary, for the R.F. circuits are assembled, wired and precision pre-tuned to the 44-50 and 50-56 mc. channels. You'll be delighted to see how every last detail has been planned to assure your success.

BE THE FIRST IN YOUR NEIGHBORHOOD TO OWN AN ANDREA TELEVISION RECEIVER!



Andrea Television Kit, rear view, assembled.

$79.95 less tubes

At right: A complete, factory-built table model television receiver, if you prefer it. Andrea "Sharp-Focus" receiver MODEL I-F-5, complete with tubes. $189.50

Andrea Teleceptor Antenna specially designed for television reception $9.50

- Complete Wiring Diagrams and Step-by-Step Instructions supplied free with every Andrea KT-E-5 Kit.

  Or send $1 for diagrams and instructions alone—authoritative, detailed profusely illustrated.

- **DISTRIBUTORS:** A limited number of territories are still open. Write for full information.

IMMEDIATE DELIVERY: Leading dealers are now displaying and demonstrating Andrea sets and kits. Write for the Andrea Television literature and name of your nearest dealer.

Andrea Radio

"SHARP-FOCUS" TELEVISION

ANDREA RADIO CORP. • 48-35 48th Ave., Woodside, L. I., N. Y. • Telephone: Stillwell 4-4754

www.americanradiohistory.com