RADIO & TELEVISION

FORMERLY
SHORT WAVE & TELEVISION

MOVIES GLORIFY RADIO AMATEUR
SEE PAGE 263

In This Issue —

New! "Practical Radio Ideas" Section

Loktal 1-tube Preselector

How to Get Bigger Television Images

Variable I.F. Short Wave "Converter-Superhet"

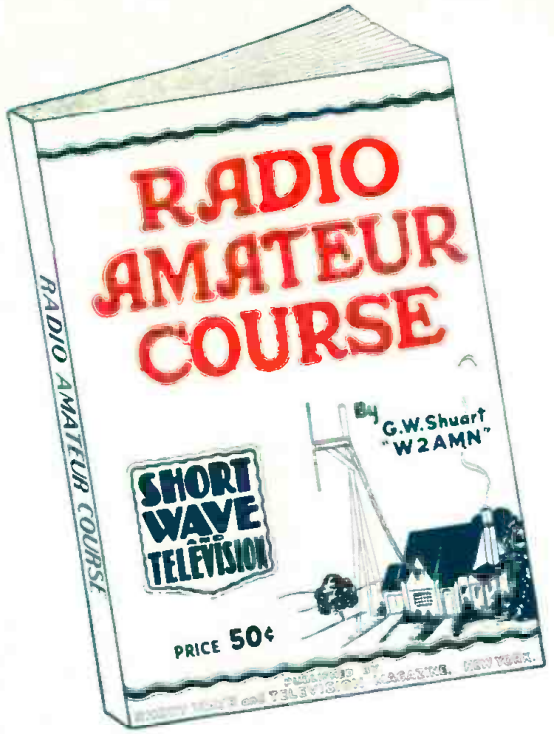
World Short-Wave Stations

25¢ IN U.S. AND CANADA

HUGO GERNSBACK
EDITOR

RADIO EXPERIMENTING
AMATEUR RADIO

SEPT. 1939



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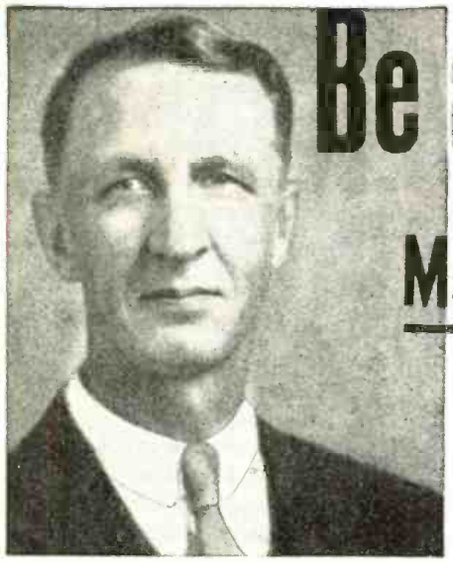
Many make $30 $40 $50 a week

I will train you at home for many Good Spare Time and Full Time Radio Jobs



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Established 25 years
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Radio broadcasting stations employ engineers, operators, station managers and pay well for trained men. Fixing Radio sets in spare time pays many $200 to $500 a year—full time jobs with Radio jobbers, manufacturers and dealers, as much as $30, $40, $50 a week. Many Radio Technicians open full or part time radio sales and repair businesses. Radio manufacturers and jobbers employ testers, inspectors, foremen, engineers, servicemen, in good-pay jobs with opportunities for advancement. Automobile, police, aviation, commercial Radio and loud speaker systems are newer fields offering good opportunities now and for the future. Television promises to open many good jobs soon. Men I trained have good jobs in these branches of Radio. Read how they got their jobs. Mail coupon.

Why Many Radio Technicians Make $30, $40, $50 a Week

Radio is young—yet it's one of our large industries. More than 28,000,000 homes have one or more Radios. There are more Radios than telephones. Every year millions of Radios get out of date and are replaced. Millions more need new tubes, repairs. Over $50,000,000 are spent every year for Radio repairs alone. Over 5,000,000 auto Radios are in use; more are being sold every day, offering more profit-making opportunities for Radio experts. And RADIO IS STILL YOUNG, GROWING, expanding into new fields. The few hundred $30, $40, $50 a week jobs of 20 years ago have grown to thousands. Yes, Radio offers opportunities—now and for the future!

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The day you enroll I start sending Extra Money Job Sheets; show you how to do Radio repair jobs. Throughout your training I send plans and directions that made good spare time money—$200 to $500—for hundreds, while learning. I send you special Radio equipment to conduct experiments and build circuits. This 50-50 method of training makes learning at home interesting, fascinating, practical.

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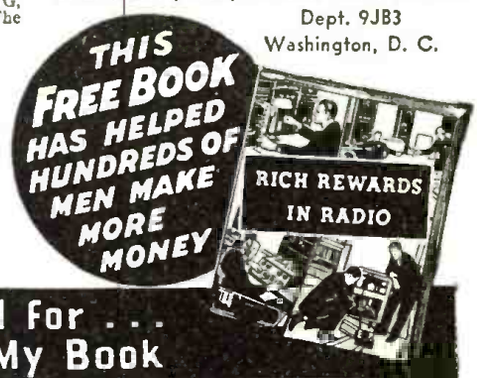

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RADIO & TELEVISION

The Popular Radio Magazine

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

Sept. — 1939
Vol. X No. 5

New! Practical Radio Ideas!

See Page 274

In This Issue

GENERAL FEATURES

CONSTRUCTION

CONDENSED FEATURES

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INSTRUCTION

●

TELEVISION

●

MISCELLANEOUS

Cover composition by H. Gernsback and E. A. Whitney. Two center photos from Radio Hams—an MGM picture; top and bottom photos from Grand Jury Secrets—a Paramount feature. See page 263.

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In the October Issue

An All-Band Ham Transmitter—Herman Yellin, W2AJL

Shooting Trouble on the Television Receiver

The Radio Beginner—Martin Clifford, W2CDV

Antennas for the Ham

Facsimile Receiver Built in Four Hours —Robert Eichberg

New Frequency-Wave Length Conversion Chart

An Economical 100-Watt Transmitter—W. J. Hoffert, W5HVB

Home Television Receiver

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This is the only magazine that renders such a service.

NEWEST RADIO APPARATUS

Stromberg-Carlson Television Receiver

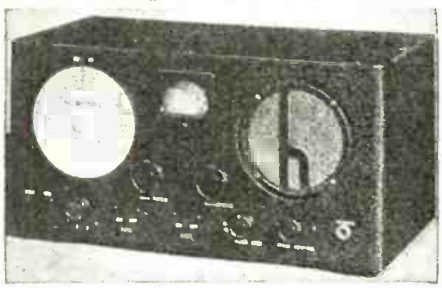
● MODEL 112 Radio and Television Receiver. Largest of the Stromberg-Carlson Television Receivers (32-tube console), includes a broadcast and *short-wave* labyrinth radio and employs a 12 inch picture tube, viewed indirectly on a mirror under the raised lid of the cabinet.

The same acoustical labyrinth and carpinchoe leather speaker are used for television sound as are used in the radio in this model. Their use in television results in excellent fidelity of sound reproduction. The labyrinth is even more important to television, because of the "boomy" size and shape of television cabinets, than it has already proven to be in true radio and phonograph reproduction.

Several other models are also in the television line, while the radio models are equipped to reproduce television sound as fed through a "sight only" television receiver.

New Economy Communications Receiver

● THE Hallicrafters, Inc., have announced a revised model of their "Sky Buddy" receiver, which boasts many of the features found in far more expensive sets, including a number which were not present in the original receiver of this name. Six tubes are employed in the new Model S-19-R, including the 6K8G as a combination



oscillator-mixer. It provides continuous coverage from 545 kc. to 44 megacycles, thus including the 10 meter amateur band and a good slice of the range occupied by the newest ultra high frequency services. This range is divided into four bands with selector switch. Easy tuning in all ranges is provided by the same electrical band-spread system found in the higher priced models of this line. Among the other features of this 110-120 Volt A.C. set are a self-contained dynamic speaker, a head-phone jack which cuts out the speaker when phones are plugged in, "send-receive" switch, beat frequency oscillator with pitch control and "on-off" switch, A.V.C. "on-off" switch, audio gain control, and antenna connections for both doublet and "L" type antenna.

Notes on 6SK7

● RADIO CORPORATION of America has issued application notes on the 6SK7 as an I.F. amplifier. This publication is known as Application Note No. 102. It tells how the design of an I.F. stage may be changed to use the 6SK7 in place of the 6K7 to obtain an increase in gain through the higher transconductance of the 6SK7. It may also enable the designer of an I.F. stage to improve selectivity or to reduce I.F. transformer cost.

A number of diagrams are included in the sheet to show the slight changes needed in circuit design to reduce feed-back for the increased stability necessary when the 6SK7 is used.

New Recorder

● TWO recording and instantaneous play-back instruments, one a de luxe console type which provides exceptional quality of reproduction while maintaining simplicity of operation, and the other a handy, low-cost portable, have been announced by RCA Victor.

Each instrument is a completely self-contained unit, with a reproducing pick-up, tone arm and loudspeaker in addition to a velocity microphone, recording head and amplifier. Of special importance is the newly-developed cutter head "Float Stabilizer" which counteracts "flutter" caused by microscopic variations in the texture of the lacquer coating on recording discs. This feature is standard equipment on the console recorder.

The console instrument is housed in an attractive cabinet of simple lines with a lid which completely covers all operating parts and controls. The portable instrument is in a sturdy carrying case, and weighs only 37½ pounds.

The former will record and reproduce as speeds of 78 or 33 1/3 r.p.m., using 10-, 12-, or 16-inch records, either outside-in or inside-out. It has a Visual Indicator Meter to insure proper recording level, high fidelity amplifier and loudspeaker, and volume and tone controls. A specially designed motor assembly for the turntable assures freedom from "wows" in recording and play-back.

The portable model records and reproduces 10- or 12-inch records at 78 r.p.m., using the outside-in method of recording. It is complete with amplifier, loudspeaker and visual indicator.

New Television Receiver

● THE new 9" Pilot Television Receiver, Model 4095, contains an 8-tube *all-wave* radio set in addition to a 21-tube television sight and sound receiver. The cathode-ray tube has a black and white screen and is actuated by a *magnetic* deflection system. On the front panel of the set are push buttons for five channels, one background control, contrast control, sound volume control, and oscillator vernier. On the back of the chassis are six additional "set-once" screw-driver controls. The receiver also features automatic background and raster control and a 12-inch speaker.

There are two other interesting models in the Pilot line. Model 4090 is the same as Model 4095, save that it does not have the all-wave radio receiver. Model 4125 is likewise the same, except that it uses a 12-inch cathode-ray tube and has a 12-tube all-wave receiver.

(Continued on page 295)

. . . . THESE OUTSTANDING SHORT WAVE BOOKS ARE *Now Available* AT YOUR DEALER!

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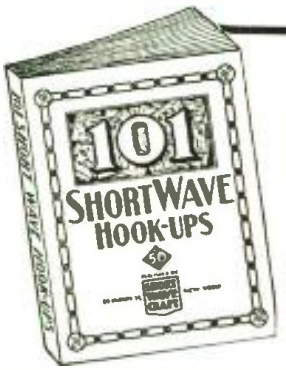

101 SHORT WAVE HOOK-UPS

Compiled by the Editors of RADIO & TELEVISION

Here is a worthwhile book that every short wave listener, every short wave fan, and every short wave amateur has wanted for a long time. It gives you the 101 best short wave hook-ups which have appeared heretofore.

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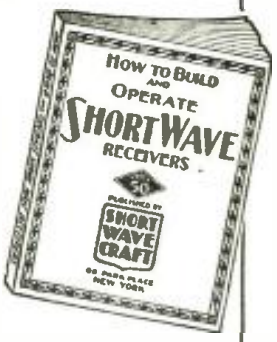

HOW TO BUILD AND OPERATE SHORT WAVE RECEIVERS

This is the best and most up-to-date book on the subject. It is edited and prepared by the editors of RADIO & TELEVISION and contains a wealth of material on the building and operation, not only of typical short wave receivers, but short wave converters as well.

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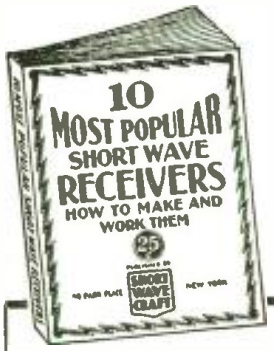

TEN MOST POPULAR SHORT WAVE RECEIVERS

HOW TO MAKE AND WORK THEM

The editors of RADIO & TELEVISION have selected ten outstanding short wave receivers and these are described in the new volume. Each receiver is fully illustrated with a complete layout, pictorial representation, photographs of the set complete, hook-up and all worthwhile specifications.

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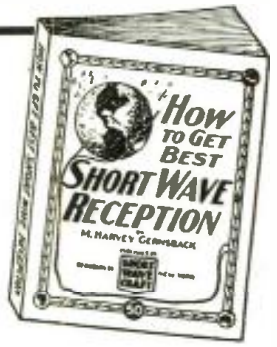

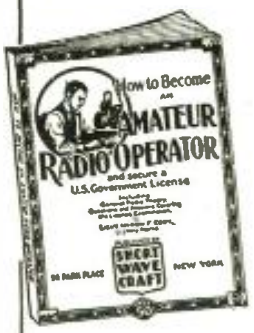

HOW TO BECOME AN AMATEUR RADIO OPERATOR

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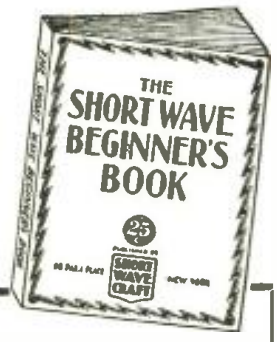

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Zack Radio Supply Co., Los Angeles
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Western Radio & Elec. Co., San Diego
Offenbach Electric Co., San Francisco
Technical Book Co., San Francisco
Zack Radio Supply Co., San Francisco
Radio Specialties Co., San Jose

COLORADO
Auto Equipment Co., Denver
Interstate Radio Supply, Denver

CONNECTICUT
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DELAWARE
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FLORIDA
Radio Accessories Co., Orlando

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BELGIUM
Emil Arens, Brussels

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

BRAZIL
Agencia Soave, Sao Paulo

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

CUBA
Diamond News Co., Havana

ENGLAND
Gorringe's Amer. News Agency, London

FRANCE
Toute La Radio, Paris

GERMANY
Rehr G.M.B.H. SW15, Berlin NW No. 7

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Radio Peeters, Amsterdam, Z.

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American Book Store, Mexico, D. F.
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Looking Ahead in Radio

J. R. Poppele,

Chief Engineer, Station WOR, Newark, N. J.

J. R. Poppele, WOR's chief engineer and secretary of its board of directors, became affiliated with the station on February 18, 1922. He was born in Newark, N. J., where he attended local schools, and operated his own ham station at 14. He studied electrical engineering at Newark Tech. and Penn State before the World War saw him turn to radio as a lifetime career. Originally the station's only engineer, Jack Poppele now heads a staff of sixty crack technical experts. In 1935 he served as technical consultant of the New Jersey Police Radio Commission, also aided in the establishment of the City of Newark Police radio system.

● IN all the long, unpredictable history of man there have been few things quite as unpredictable as the science of radio. Saying where it's headed or what surprise it's likely to pull out of the bag next is about as safe as going over Niagara Falls in a raincoat.

The history of radio has been built on surprises. Even today, as chief engineer of one of America's biggest broadcasting stations, I can still remember vividly my reactions when I first heard a "wireless" station transmitting music. It just couldn't be. I refused to believe it. And yet today at WOR-Mutual, only thirty years later, we broadcast almost twenty hours a day of music, talks and special programs, many of which are whisked to us from the farthest corners of the globe. There are more than 600 broadcasting stations on the air throughout the United States alone, one of the greatest stimuli to America's growth ever established.

There is no need to tell you how radio consistently has widened its sphere of influence, creeping steadily into a hundred fields, advancing technically with the speed of a "scientific wildfire." On the high seas, in the air, across continents and the highest mountains, radio becomes a vital force. Police radio cruisers patrol your city while you sleep. Radio guides and advises the sleek airliners upon which you span the nation. It brings you music and talks, news and a ringside seat at world events. When you pick up a telephone and ask for Melbourne, radio whisks your voice across a black, cold ocean. It keeps great steel ships at sea in constant touch with their home ports. And now radio enters a new era of facsimile and television.

There doesn't seem to be any bottom to its possibilities. We just about get settled with broadcasting and communication at what we think are their most advanced state, when along come frequency modulation, the baffling puzzles of the ultra-highs, the transmission of television and its fellow art, facsimile for the home. *What next?*

Looking ahead, it seems safe to venture a few hazy prophecies. However if radio lives true to form—and it always has—such pictures of the future will be greatly exceeded during the next ten or twenty years. Our engineers and great laboratories are hard at work on the matters I am about to outline. It is the things of which we haven't dreamt yet which are likely to alter again and again the whole horizon of the art.

Take for example the matter of *single sideband transmission*. Here is a practical notion for saving of frequencies in the already crowded bands, which is being attacked by research workers today. It would permit of a single carrier wave, modulated on one sideband by one type of service, on the opposite sideband by another. Thus a single station might perhaps transmit simultaneously regular broadcast programs and facsimile. The general effect would be that of doubling the available channels in any existing portion of the spectrum.

The possible introduction of *frequency modulation* opens amazing vistas, for it would obsolete all existing types of amplitude modulation equipment. Here the problem of service areas and inter-station interference would become a curiosity.

Police radio is only just hitting its stride. Interlocking work between communities, cooperation with state and federal law enforcement groups will continue to grow. The remarkable success of patrol cars in state and city use is one of the brilliant triumphs of radio. However, I feel that in the very near future facsimile is going to find a welcome place in the police set-up of operation for the transmission of fingerprints and other salient crime data.

Marine radio has also advanced by bounds, so that more and more private yacht owners will have small fool-proof transmitters for installation on board. Private aircraft are finding the use of radio phone as well as the radio compass and direction finder absolutely indispensable for cross-country flying. And we are likely to see considerable expansion along these lines, with tugboats, transcontinental trucking, newspaper correspondents all using radio for instant communication with their home offices.

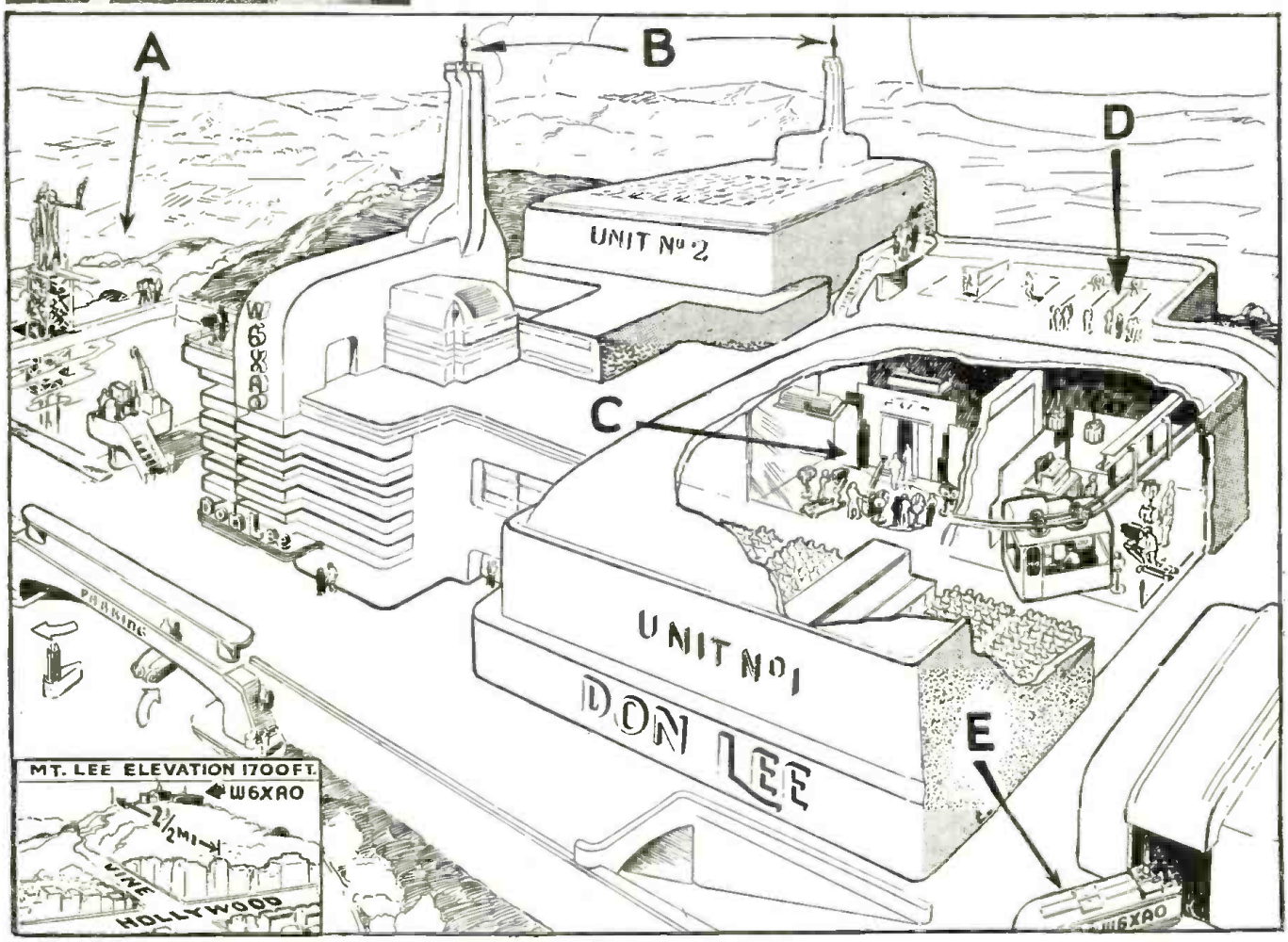
(Continued on page 317)

Thirty-first of a series of "Guest" Editorials

Television » » East and West

IF YOU had been a guest at the NBC New York television studios during a recent broadcast of the Gilbert and Sullivan operetta, *The Pirates of Penzance*, this is what you would have seen. Above, left—the lights flooding the cast before the painted backdrop and property rock, while the mike picked up their voices and the Iconoscope registered their actions. The cameraman wears a tropical helmet because of the lights' heat. Above, right—the control room, with the production man on a raised platform to watch the images. Left—another view of the control room. Images of the scene in progress appear on the large tubes in the wall rack: those of the next scene appear on the smaller tubes.

SOON the Hollywood (Calif.) area will be served by a new Don Lee television station, to be built atop Mt. Lee. The artist's drawing, below, explains what is planned. *A*—Two cameras at the swimming pool for close-ups and long shots. *B*—Audio and video antennas, invented by Harry R. Lubcke; upper radiator is for pictures, lower one for sound. *C*—Indoor television studio, with studio audience; note movable control room slung from overhead track. *D*—Outdoor studio. *E*—Mobile unit for spot telecasts.



MOVIES Glorify *Radio Amateur*

(Cover Feature)

Photos at left show various exciting episodes in the motion picture, "Radio Hams."

● PETE SMITH, who vies with Dave Elman as America's foremost discoverer of hobbies, gives the inside dope on radio amateurs in a new M-G-M specialty called "Radio Hams."

The picture opens with a view of a fourteen-year-old kid who has made his own haywire outfit out of funnels, egg-beaters and "sich." The youngster dreams of emulating the New Zealand Ham who saved the life of Clyde DeVinna, M-G-M cameraman, in Alaska. Overcome by fumes from his stove while holding a "rag-chew" with the New Zealander, DeVinna would have died except that his contact radioed another Ham and got help to the cameraman's cabin.

The youngster, who is the protagonist of the film, is snapped from his dream by hearing what he believes to be China on his little one-lung set. However, it is the voice of a Chinese Ham a couple of blocks away that gives him his ephemeral taste of glory.

Some scenes from the picture, which should be of interest to all SWL's and Hams, are shown on this page.

The 50,000 or more Hams and 500,000 SWL's in the United States will be interested to learn that short-wave radio as exemplified in their own work has at last come into its own in motion pictures, and that Eugene Kearney, one of the best-known Hams, helped in making a hit picture. "Ham" radio plays a vital part in motivating the plot of the thrilling new Paramount drama, "Grand Jury Secrets," with John Howard and Gail Patrick in the featured roles.

Here's how *short-waves* figure in the picture. John Howard, cast as a newspaperman and enthusiastic "Ham," is anxious to find out just what a special Grand Jury, called by his brother, an assistant district attorney, is probing. He is unable to get the information until a friend sends him a compact short-wave transmitter.

Howard sets up the transmitter in the Grand Jury room, and so is able to listen in on a receiving set installed in his car. Later, bawled out by his brother for this unethical method of getting news, Howard promises to be good, but goes right on using the transmitter to get additional information. His private probings finally serve to get him into serious trouble, from which he is only extricated by means of short-wave radio.

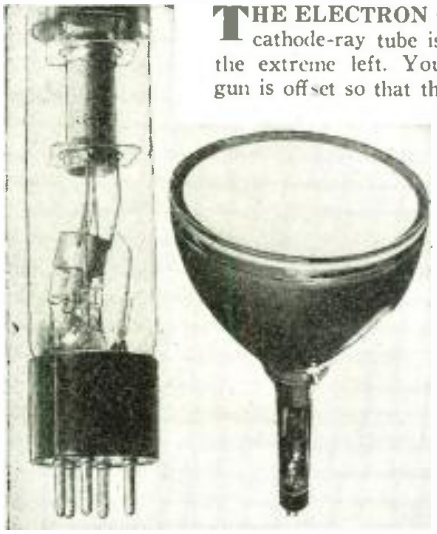
"Hams" will recognize the authenticity of

(Continued on page 317)

The new movie thriller—"Grand Jury Secrets" also features the Radio Amateur.

WORLD WIDE

ROD ANTENNAS, each 10 feet long, will be super-imposed on KDKA's 718-foot vertical antenna at the new station. This will be used for sending out *noise-free* experimental programs. There will also be two additional short-wave rhombic antennas—one for Europe and another for South America.



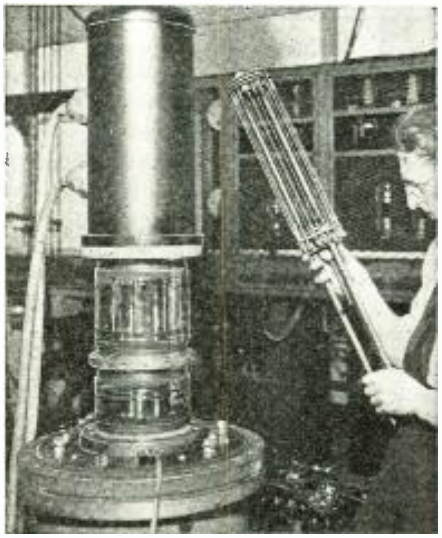
THE ELECTRON GUN in the new Philco cathode-ray tube is shown in close-up at the extreme left. You will notice that the gun is offset so that the ions which normally cause *ionization blemish* on C-R screens pass harmlessly to one side. The electron stream itself is magnetically deflected in the usual way.

The other accompanying illustration shows the Philco tube with the *flat screen*. The glass end of this tube is approximately ⅛ of an inch thick.

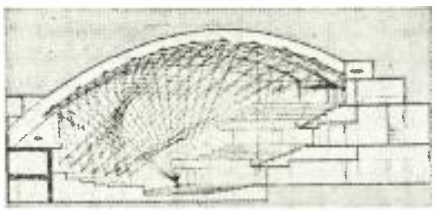
A NEW TYPE 100-kilowatt radio tube, shown below, in which the filament can be replaced, the first of its kind in this country, has been developed by engineers of the General Electric Company. Two of the tubes will be used in the new 100-kilowatt transmitter being completed for the G-E short-wave station, W2XAF, which has operated on 40 kilowatts.

They are the largest tubes of their kind yet to be built in this country and, when used with the new Alexanderson panel antenna, are expected to produce an effective directional power output of more than 600,000 watts.

This is still another of America's answers in the international short wave war being waged.



AN ARCHITECT'S sketch of the interior of the concert hall in the new Danish broadcasting station, located in Copenhagen is shown at the right. This will be one of the most modern buildings of its kind in the world. The radiating lines show how the roof has been designed to distribute sound from a number of sources equally over the auditorium.



A RESTAURANT in lower New York does not need to drive nails in the wall in order to hang up pots and pans. But two people are required to lift a small iron pot off the stove. The reason is that a giant dynamo in a shop next door has a stray magnetic field leaking into the restaurant. Customers are warned to check their watches when they enter.

FRENCH, GERMAN AND ITALIAN news broadcasts have been added to the schedule of W2XE's foreign programs. The station has hitherto sent out daily news service in Spanish and Portuguese to the Latin American republics, and English broadcasts to Europe and South America.

RADIOTYPE—a typewriter which sends printed messages through the air to appear on a large screen—is being exhibited by the International Business Machines Corp. at the New York World's Fair.

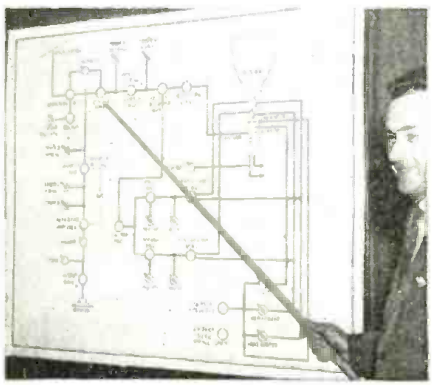
The picture below shows Walter S. Lemmon, radio engineer and Manager of the corporation's Radiotype Division, with A. C. Holt, Field Engineer, watching bulletins as they are received from a New York office building eight miles away. The mechanism automatically prints over the air at a speed of 100 words a minute on a transparent roll which is fed through projection apparatus that throws images of the letters on a large screen.

THE IRONY OF LIFE was manifest when the Crosley Corporation used carrier pigeons to transport pictures of a ball game to a facsimile studio. In this studio the films were developed, and twenty minutes after being taken, the pictures were on the air via facsimile. Many who saw the man at the field releasing the carrier pigeons wondered why it would not be practical to erect a portable facsimile transmitter at the field in order to speed the pictures out over the air with greater rapidity. The birds took approximately three minutes to travel the 4½ miles from the ball field to the studio. Radio waves would cover this distance in about 1/41333 of a second.

THREE SERIES of audio frequencies for use by servicemen, amateurs and experimenters are being transmitted over KFI, Los Angeles, at the close of each Saturday's broadcasting. The oscillator, which has an accuracy of 2%, will transmit the following:—1000 cycles transmitted and levels set at the studio and transmitter; 40 cycles transmitted, level set and equalizer adjusted; 8000 cycles transmitted, level set and equalizer adjusted.

RADIO DIGEST

TELEVISION TRAINING for radio service men is being offered by the Andrea Radio Corporation. Here Harold J. Heindel, Chief Engineer of the company, is photographed during the first television servicing meeting which the company conducted. As more than 800 servicemen and experimenters applied for tickets, it was necessary to repeat the program. Mr. Heindel says, "In six sessions I can give a serviceman the answers to 95% of all the practical problems he will meet in installing and maintaining television receivers." Fortunately, most television troubles are of a minor nature.



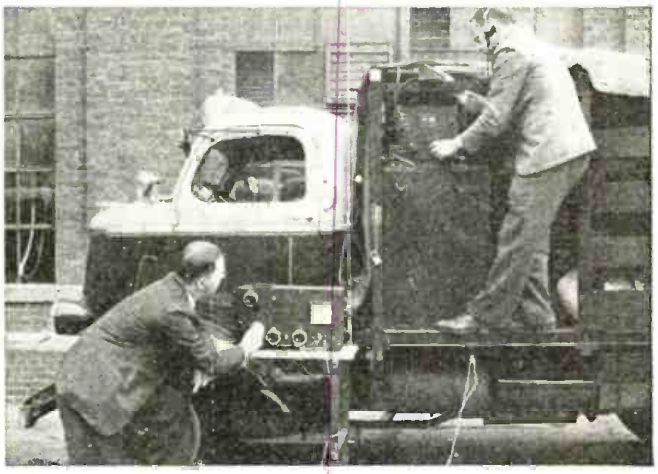
THE GERMANS may be far advanced scientifically but they don't go in very heavily for air-conditioning, according to the Press-Service of "The German Short-Wave Station". According to information from this source, temperatures in the station's studios are always high, but in July studio temperature reaches 104 degrees! Pheeeeew!! Virtually all major studios in the United States are air conditioned to comfortable temperatures. Maybe there's some good in "decadent democracies" after all.

AL FRESCO transmitting is accomplished by means of the gasoline driven generator shown at the right. The model illustrated weighs 90 lbs., runs at 1800 r.p.m. and is powered with a ⅝ hp. motor. Bolted directly to it is a four pole, laminated pole generator. It will produce either 300 watts AC at 110 volts, or 200 watts DC at 6 volts. Hams who wish to work apparatus normally operated from AC, when remote from power lines, may find units of this sort a solution to their problem. The manufacturer, Kato, claims good voltage regulation and "absolutely flickerless" operation. The generating system permits high power transmitters to be set up at any place a man with a pack can penetrate.

NO MARTYR captive of savages, dragged behind wild horses, ever took the beating handed to the Western Electric "eight-ball" mike shown below when, accidentally trailing from its cord behind a sound truck, it banged against miles of hard concrete highway.

Imagine the driver's state of mind when he discovered it! On its way to a big job, as part of a delicately calibrated sound measuring equipment, it appeared to be utterly ruined. Then picture the driver's amazement, and that of the engineer, when, on test, they found that it would work—and continue to work—perfectly!

FOUR MOBILE UNITS will be used in the Lawrence Thaw trans-Asiatic expedition. In order to maintain contact with each other, they have been equipped with G-E apparatus with a 200-mile communications radius. Below, engineers are seen

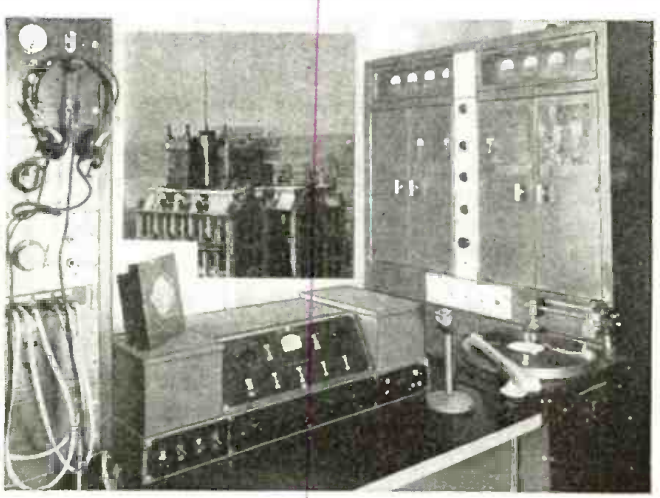


testing the radio equipment on one of the trucks which the expedition includes. A trailer and a cruising sedan will also be employed. The system, powered by standard car batteries, is similar to that used by many police departments. Antennas, ranging from the standard fishpole type to a 128-foot flat-top, are being provided.

BROADCAST SERVICE to South America, Asia, and the Antipodes from General Electric's West Coast short-wave station W6XBE, located at the Golden Gate International Exposition on Treasure Island, San Francisco Bay, has been practically doubled. The new schedule calls for an increase to twelve and three-quarter hours of programs daily.

The company's short-wave station, W2XAF, at Schenectady has added 10 additional hours to the existing weekly schedule of programs for the Spanish-speaking listeners in Central America and the western half of South America. W2XAF operates on 9.53 mc., or 31.48 meters.

W2XBF, FACSIMILE transmitter, using the Finch system, is now located in a building just north of New York's *Times Square* area. The large picture below shows the control room of the transmitter. Inset is a picture of the roof, with antenna.



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 240; a good score is 180; below 80 is poor.

This month's Radio Test-Quiz was prepared with the co-operation of the Press and Engineering Departments of the Mutual Broadcasting System.

1. How many filament amperes does a 35 kw. water cooled vacuum tube draw at rated filament voltage of 20.0 volts?

(a.) 200 *(c.) 70*
(b.) 150 *(d.) 25*

2. What is the frequency band required for the transmission of facsimile signals where the number of lines per inch is 125, and the length of the stroke is 8¼ inches?

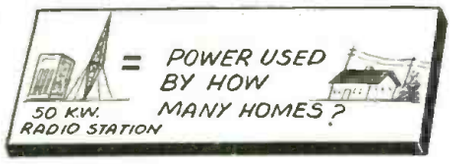
(a.) 10 kc. *(c.) 7 mc.*
(b.) 100 kc. *(d.) 10 mc.*

3. Atmospheric interference with radio reception in the Southern Hemisphere is greater in:

(a.) June *(c.) August*
(b.) January *(d.) October*

4. How many programs per day does the average broadcasting station offer the public during a daily operating schedule of 20 hours?

(a.) 150 *(c.) 40*
(b.) 60 *(d.) 25*



5. The amount of power required every year by a 50 kw. broadcasting station is sufficient to supply the electrical power requirements of which number of average homes for a year?

(a.) 500 *(c.) 5000*
(b.) 1500 *(d.) 10,000*

6. WOR's tiny hand Relay Transmitter, a complete self-contained radio transmitter, is rated at a power output of:

(a.) .02 watt *(c.) 2.0 watts*
(b.) .2 watt *(d.) 20. watts*

7. The spray pond usually found in connection with a 50 kw. transmitter site is used:

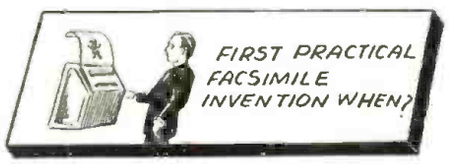
(a.) as a water reservoir
(b.) to enhance the appearance of the landscape
(c.) to dissipate the heat generated by the anodes of high power vacuum tubes

8. Which system of sound recording is the more apt to have an absolute minimum of surface noise?

(a.) vertical disk recording
(b.) photo-electric tape recording
(c.) lateral disk recording

9. What is the maximum frequency deviation allowed by the Federal Communications Commission for broadcasting stations?

(a.) 5 cycles *(c.) 500 cycles*
(b.) 50 cycles *(d.) 5000 cycles*



10. The first practical facsimile system was developed in the year:

(a.) 1842 *(c.) 1925*
(b.) 1901 *(d.) 1936*

11. WOR's contribution in hours of transmission per week to the new art of facsimile broadcasting is:

(a.) 5 *(c.) 25*
(b.) 15 *(d.) 50*

12. The gain obtained from the best of directional antennae at short wave broadcasting stations is the equivalent of raising the transmitter's power by:

(a.) 10 *(c.) 1000*
(b.) 100 *(d.) 10,000*

13. The impedance of a parallel circuit at the resonant frequency is:

(a.) low *(c.) zero*
(b.) high *(d.) infinity*

14. What is the present-day rate of broadcast facsimile transmission in the number of feet per hour?

(a.) 1 *(c.) 3*
(b.) 2 *(d.) 4*

15. The amount of power required to heat the filament of a vacuum tube affects the over-all power conversion efficiency more favorably in a:

(a.) low power tube
(b.) medium power tube
(c.) high power (water cooled) tube

16. Television channels are adjacent to:

(a.) 0.5 mc. *(c.) 50 mc.*
(b.) 5 mc. *(d.) 500 mc.*

In the Next Issue

JOHN L. REINARTZ

tells you all about the

Naval Communications Reserve

Don't Miss It!

17. The radio receiver used in conjunction with the reception of broadcast facsimile material is:

(a.) of special design
(b.) an ordinary radio set

18. What is the average delay introduced by wire lines per 100 miles?

(a.) .007 second *(c.) .7 second*
(b.) .07 second *(d.) 7 seconds*

19. A greater area of terrain may be covered with broadcast facsimile signals by the use of:

(a.) ultra-high frequencies
(b.) standard broadcast frequencies

20. The requirements for a facsimile network consist of:

(a.) stations connected only with special frequency-characteristic wire lines
(b.) stations connected only with ordinary program wire lines

21. The important use of a vertical antenna in conjunction with a broadcast-band transmitter is:

(a.) less space is required
(b.) beacons for aircraft
(c.) extends primary service area

22. To adequately cover a range of up to 20 miles, a Relay Broadcast Transmitter's output power should be:

(a.) 3 watts *(c.) 300 watts*
(b.) 30 watts *(d.) 3000 watts*

23. Repeating amplifiers on program wire lines are required every:

(a.) 15 miles *(c.) 60 miles*
(b.) 30 miles *(d.) 120 miles*

24. In accordance with International radio law, a ship's station call consists of how many letters?

(a.) 3 *(c.) 5*
(b.) 4 *(d.) 2*

Answers

1. c	13. b
2. a	14. c
3. b	15. c
4. b	16. c
5. c	17. b
6. b	18. a
7. c	19. b
8. b	20. b
9. b	21. c
10. a	22. b
11. c	23. a
12. b	24. b

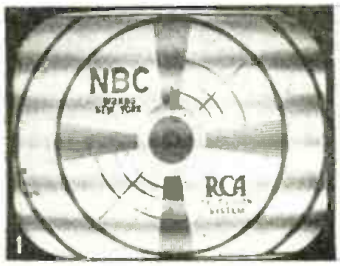


Fig. 1. Sound modulation in picture.

Fig. 2. Picture tube incorrectly oriented.

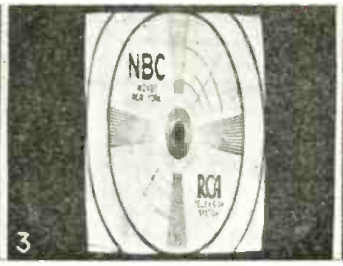


Fig. 3. Horizontal width control incorrectly set.

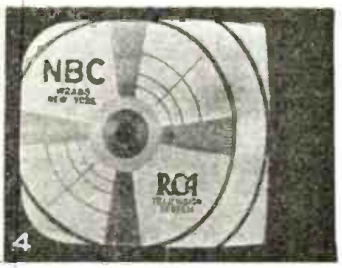
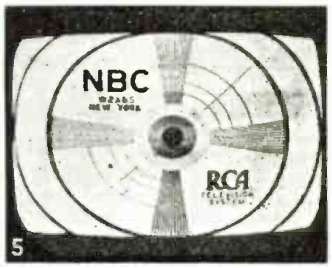


Fig. 4. Horizontal centering control incorrectly set.

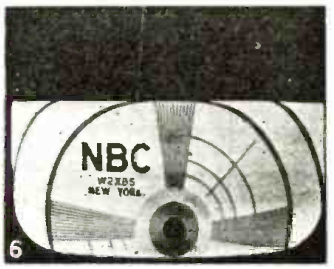
Fig. 5. Vertical height control incorrectly set.



When That Television Image Is Distorted!

Here are some reasons why

Fig. 6. Vertical centering control incorrectly set.



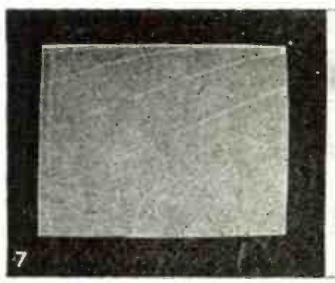


Fig. 7. Scanning raster correctly oriented.

Fig. 8. Action of blanking on picture size.

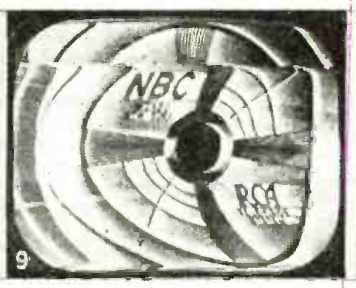


Fig. 9. Effect of too strong a signal.

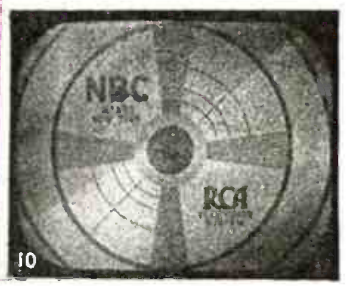


Fig. 10. Effect of too weak a signal.

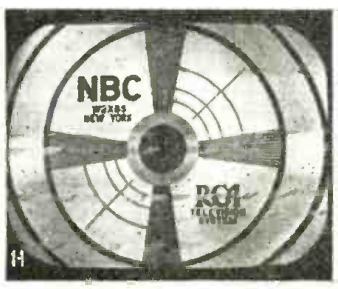


Fig. 11. Excessive auto ignition interference.

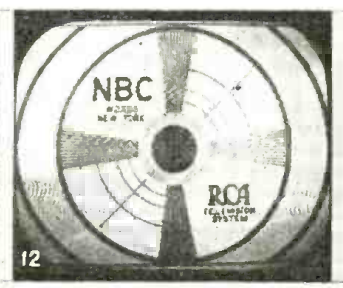


Fig. 12. Excessive diathermy interference.

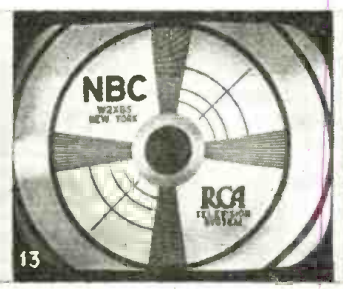


Fig. 13. Beat frequency interference.

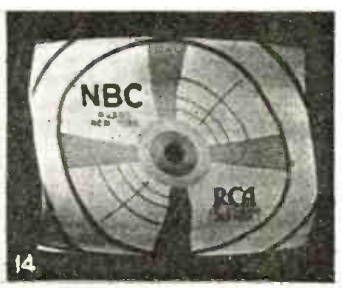


Fig. 14. Excessive ripple in horizontal deflection.

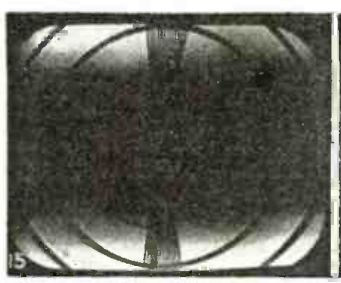


Fig. 15. Excessive ripple in video amplifier.

Fig. 16. Same as Fig. 15, except opposite phase.

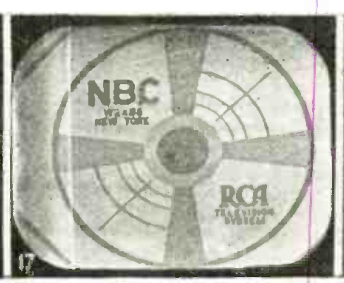
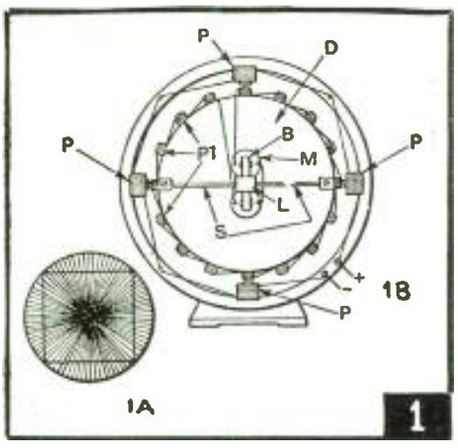
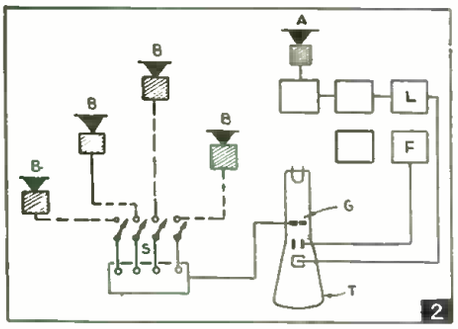


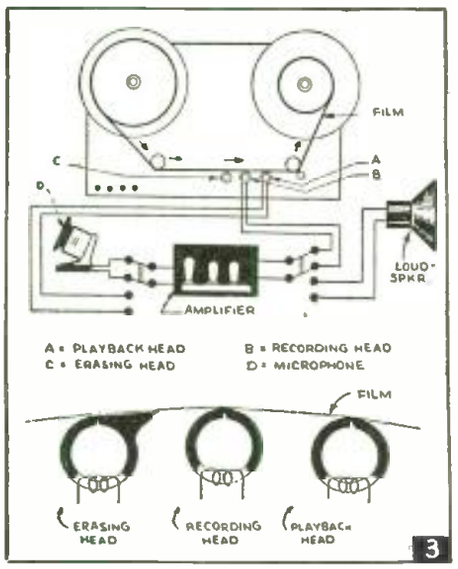
Fig. 17. Effect of damping tube failure.

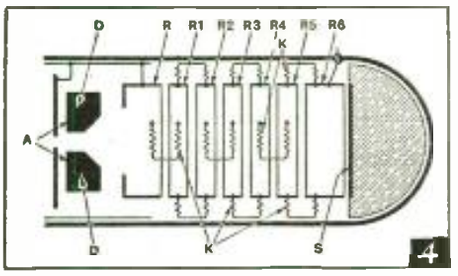
Fig. 18. Effect of open H.V. filter condensers.

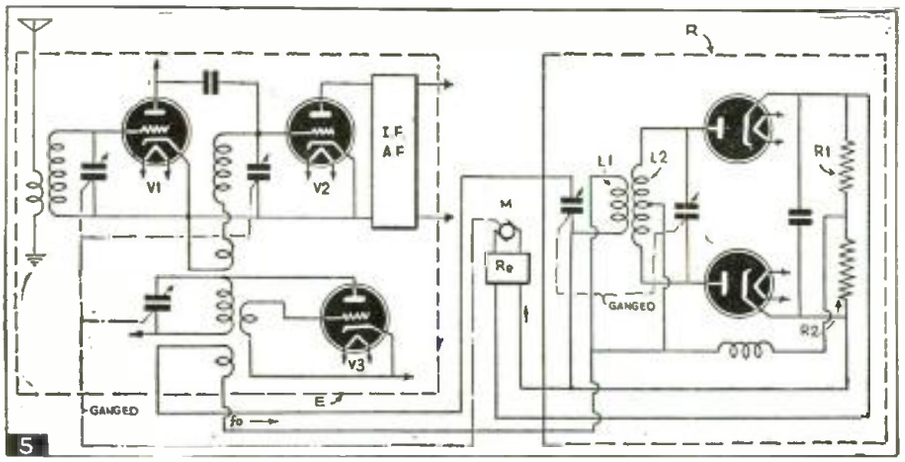
● ONE thing that makes it comparatively easy to locate troubles in complicated television circuits is that each set is virtually its own oscillograph. An inspection of the raster or the image on the C-R tube will often disclose in which circuit the trouble lies. As will be noted, most of the troubles can be corrected by adjusting knobs or moving antenna.











Diametric Scanning

1 A RADICALLY different type of television scanning system, described in *Wireless World* of Britain, is shown in Fig. 1A. In this mechanical system, the picture is scanned diametrically instead of transversely, so that the spot of light swings constantly to and fro through the center of the picture, its direction being slightly changed at each stroke until the whole area has been covered. The rotation is steadily progressive, so that no break or *flyback* movement is required, each picture being completed once per revolution.

In the apparatus, shown in Fig. 1B, a metal strip, S, mounted on a disc, D, is fitted with a small center cross-bar, B, which is attracted (say, 5,000 times per second) by a magnet, M, fed with A.C. A small mirror L, mounted at the center of the strip thus throws the scanning spot of light across the picture. Meanwhile, the disc, D, rotates bodily (say at 25 revolutions per second), this movement also serving, through the pole-pieces, P and P1, to generate the 5,000-cycle current required for the magnet.

Airplane Detector

2 A BEAM of ultra short waves is directed at invisible airplanes and is reflected back from them to a system of grouped antennas in a new airplane detector, described in *Wireless World*.

The cathode-ray tube, T, in Fig. 2, is fed with framing impulses from a time base, F, and with line impulses from an associated oscillator, L. The latter are superimposed on longer impulses, which are radiated by transmitting aerial, A.

A number of receiving aerials, B, are distributed at various points and are coupled at S to the control grid, G, of the cathode-ray tube. Under normal conditions these aerials will produce a raster on the screen of the cathode-ray tube showing one vertical black bar. If an airplane flies through the radiation field, it will intercept and reflect some of the waves, which will reach the aerials at a slightly different time, producing another "bar" image. By switching aerials, the plane's direction can be learned.

Tape Recorder

3 AN ingenious system of recording on metal tape is described in *FTM* of Germany. The diagram in Fig. 3 shows the complete system. When the microphone is connected to the amplifier, this, in turn, feeds into the recording head and the sound waves, converted into magnetic impulses, are impressed upon the tape by means of the recording head. With the switches in reverse position, the playback head connects to the input of the amplifier, and the speaker to its output. A third circuit, not shown for the sake of simplicity, passes current through the erasing head so that the tape may be wiped clean for a new recording.

Projected Television

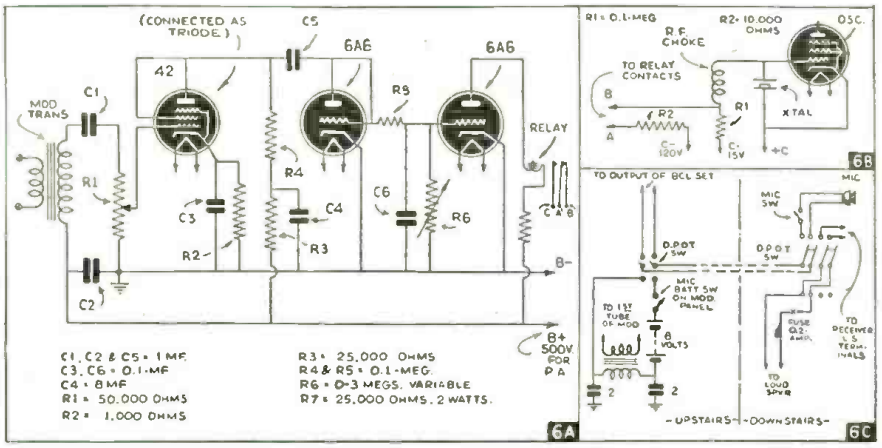
4 AN interesting television projection tube, shown in Fig. 4, was recently described in *Wireless World*. The illustration shows an electrode arrangement used for the final acceleration of the electron stream. The tube produces on the 4 cm. square screen, S, an image in which each picture point, 1/10 mm. in diameter, has an intensity of about 10 candle-power. (1 cm. = .4 in.; 1 mm. = about 1/25 in.)

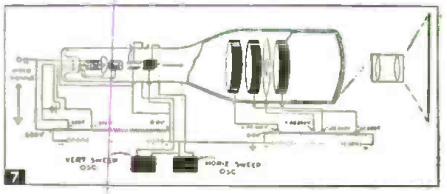
The electron stream, after it has passed through the anode, A, and deflecting plates, D, is accelerated by progressively increasing voltages applied to a series of ring electrodes R, R1, R2, etc., the voltage on the last ring, R6, being of the order of 15,000. The biasing voltages are derived from a series of potentiometer resistances K.

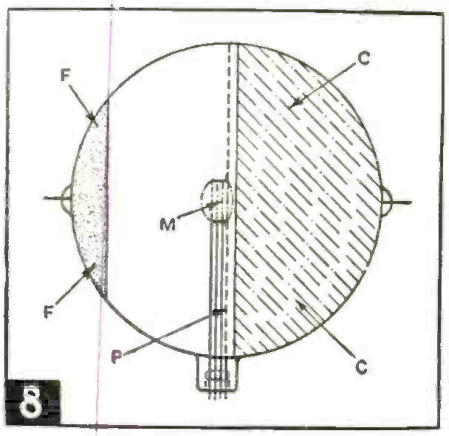
Stabilized Oscillator

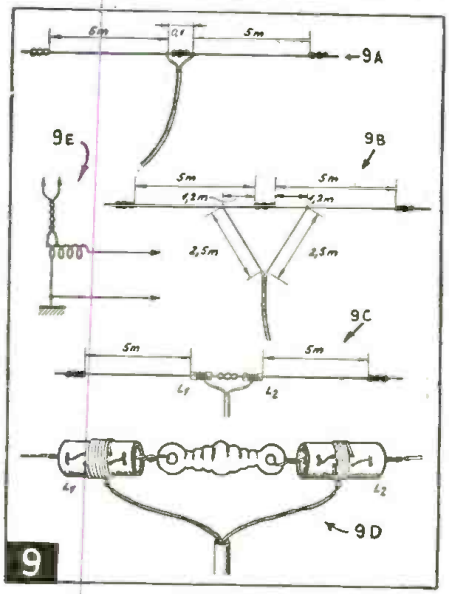
5 A CIRCUIT for stabilizing the oscillator of a superheterodyne is shown in Fig. 5, taken from *Wireless World* of Britain. In this circuit, the receiver is indicated by *E*, and the control circuits by *R*. Thus, V1 is an R.F. stage, V2 a mixing stage, and V3, the oscillator. From V3, the oscillator frequency, f_o, is taken to L1 by inductive coupling.

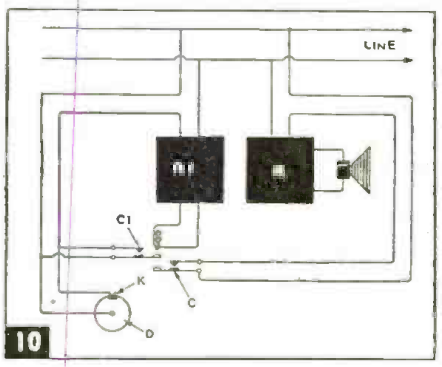
As shown in Fig. 5, the discriminator has two tuned circuits, L1 and L2, coupled together and connected so that opposing D.C. potentials occur at the output resist-











ances, R1 and R2. When f_0 is identical with the natural frequency of the circuits, L1 and L2, the two potentials at R1 and R2 are equal and opposite and, therefore, neutralize each other. When a deviation from the required frequency exists, however, a control potential is produced which operates a motor, M (or a tube working as a variable reactance), through a change-over relay, Re, or through an amplifier.

Voice-Operated Remote Control

6 A SYSTEM developed by J. C. Egerton (G8MU) writing for *The T. & R. Bulletin* (England), enables him to operate his transmitter and receiver merely by speaking to them. As Fig. 6 shows, speech potentials are tapped off the modulation transformer and applied to the 42, the output from which is passed to one half of a 6A6. The resulting rectified negative bias is applied to the second half of the 6A6, in parallel with which is C6, shunted by a 3-meg. variable grid-leak, R6, for controlling the delay. Without modulation, current flows through the relay, holding the contacts together, and applying –120 volts to the grid of the crystal oscillator, thus stopping it from oscillating. When speech occurs, plate current drops to zero, and the contacts A and B open. When speech ceases, the contacts close, and –120 volts is applied to the C.O. (see Fig. 6B) which switches off the transmitter. Fig. 6C illustrates the switching system used.

New C-R Tube

7 A UNITED STATES patent has recently been granted on a new projection tube. This tube, shown in Fig. 7, has a "primary" section in which the electrons travel at low velocity, and another section in which they travel at a relatively high velocity.

In the low-velocity section of the tube, a beam of electrons creates a relatively small electron image. The image so created is in effect a virtual cathode with respect to the high-velocity section of the tube and is employed as such. Purely by electron focusing and acceleration, a second electron image, which is a reproduction of the first electron image, is produced at a fluorescent screen in the high-velocity section of the tube, with the electrons traveling at relatively high velocities to produce a brilliant image for projection by an optical lens system onto a large, external screen.

Regenerative Photocell

8 AN ingenious method of boosting the output of a photo-electric cell recently appeared in *Wireless World*.

Fig. 8 shows a cell containing a photo-electric cathode, C, opposite a fluorescent screen, F, with an electron-multiplier, M, midway between the two and in line with a transparent screening partition, P. Light falling on C liberates primary electrons, which are attracted by the positive voltage on the first electrode and pass from it through a series of "permeable" target-electrodes, each biased more positively than the last.

The emerging stream, amplified by secondary emission, produces a more intense light than usual on the fluorescent screen, F. This light "reacts" back on the sensitive cathode, C, to liberate more electrons, and so build up the current strength still further until it is taken off from the last or output electrode.

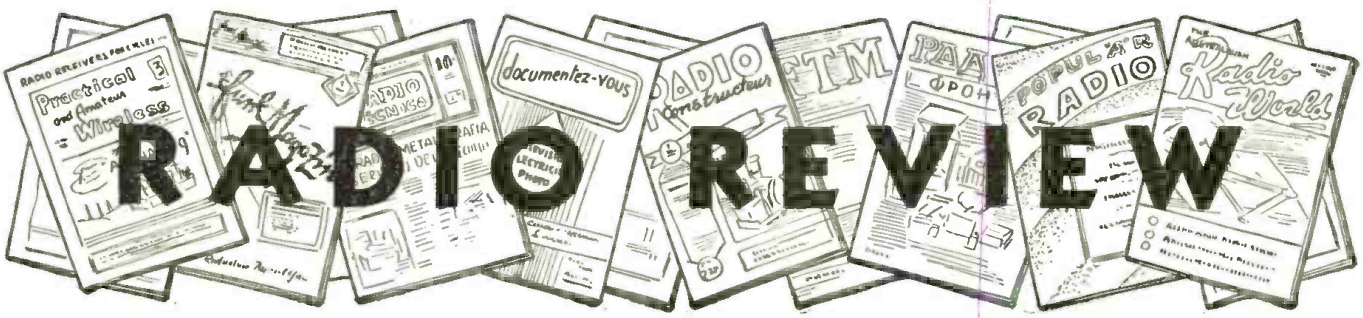
German Doublets

9 FIGURE 9A, from *Radio Fortschritt*, of Germany, shows a simple dipole. Fig. 9B shows how this is easily modified to make a double dipole out of this system. Note how the lead-in is tapped 1.2 meters from the inner ends of the antenna and how the "V" where the lead-in joins is kept at a 60 degree angle. Fig. 9C shows a method of loading the antenna, while Fig. 9D shows the detail. You will notice how the antenna may be tuned by connecting the lead-in to various taps on the small loading coils. Fig. 9E shows the coupling from the lead-in to the receiver.

Dictated Reception

10 A SIMPLE master control for radio receivers, in which announcements can be interpolated in a program irrespective of to what station the set is tuned,

(Continued on page 307)



The Radio Beginner

Lesson No. 9

What happens in a Half-Wave Rectifier circuit? In a Full-Wave rectifier? What is a "choke input" filter? Condenser input filter? What is the purpose of a Voltage Divider?

Martin Clifford, W2CDV

● FROM our discussion of the operation of vacuum tubes, we recall the necessity for maintaining a *positive* plate potential. In order to keep the plate circuits of tubes at their proper operating conditions, there must be supplied a steady, unidirectional, non-pulsating direct current. Early types of radio receivers used blocks of "B" batteries hooked in series to achieve this purpose. A step forward in the complete electrification of receivers was made with the introduction of "B" eliminators. It was the function of the eliminator to take the standard alternating house current, and change it to such a form that it could be used in a radio set. It is with this problem that we now concern ourselves—that of making alternating current suitable for use on the plate of a vacuum tube.

We can conveniently divide the operation of power supplies into a number of steps. Since vacuum tubes usually operate at potentials higher than 110 volts, the first procedure is to raise the voltage to a higher value. Having achieved this, it is next necessary to *rectify* the current, so that instead of being *alternating* it becomes a *direct* current. The current is next fed into a *filter* which smoothes out any variations.

Half-Wave Rectifier: We have already learned that we can secure a voltage step-up or step-down by means of a transformer. In Fig. 1 we see such a transformer connected in a rectifier circuit. There are two separate secondary windings on the transformer: one, having a smaller number of turns than the primary, supplies the filament voltage to the rectifier tube; the other winding, with many more turns than the primary, supplies the rectifier plate potential. When the filament becomes heated, electrons are discharged from it. Since the potential on the plate is alternating, current will flow through the rectifier during only that half of the A.C. cycle in which the plate becomes positive. No current will flow during the other half of the cycle, since the plate of the rectifier would then be negative with respect to the filament. The type of rectifier shown in the diagram is known as a *half-wave rectifier*. It should be remembered that we are placing an alternating current on the plate of this tube, hence the tube operates during only the *positive* half of the alternating current cycle. The disadvantage of such rectification lies in the intermittent operation of the tube, resulting in a current that is not continuous. Fig. 2 shows an alternating current as it appears across the secondary of a transformer, and then as it looks when it comes from the half-wave rectifier. In the latter, the period during which current flows is indicated by (a); that when no current flows, by (b).

Full-Wave Rectifier: In order to overcome the disadvantages of half-wave rectification, we can put another plate in our rectifier tube, as shown in Fig. 3. Each end of the transformer secondary becomes alternately "plus" and "minus." During one half of the cycle one plate becomes positive and the other negative. During the second half of the cycle, the situation is reversed, the plate that was negative becoming positive. Actually, we have two half-wave rectifiers so operated that at any given instant either one plate or the other is positive. Current in such a rectifier, known as a *full-wave rectifier*, flows continuously. Examine Fig. 4; graphs there show the type of current output of such a rectifier. If we compare the graph of the output of a half-wave rectifier we can see that for half the time there is no output current at all, while the output of the full wave rectifier does not cease, to all practical purposes, although it fluctuates.

●

Diagrams at right show simple rectifier hook-ups, also action of half-wave and full-wave rectifiers. Fig. 5 shows "condenser" and "choke" input filter circuits. Fig. 6 illustrates full-wave rectifier circuit, with graphs of current before and after rectifying.

●

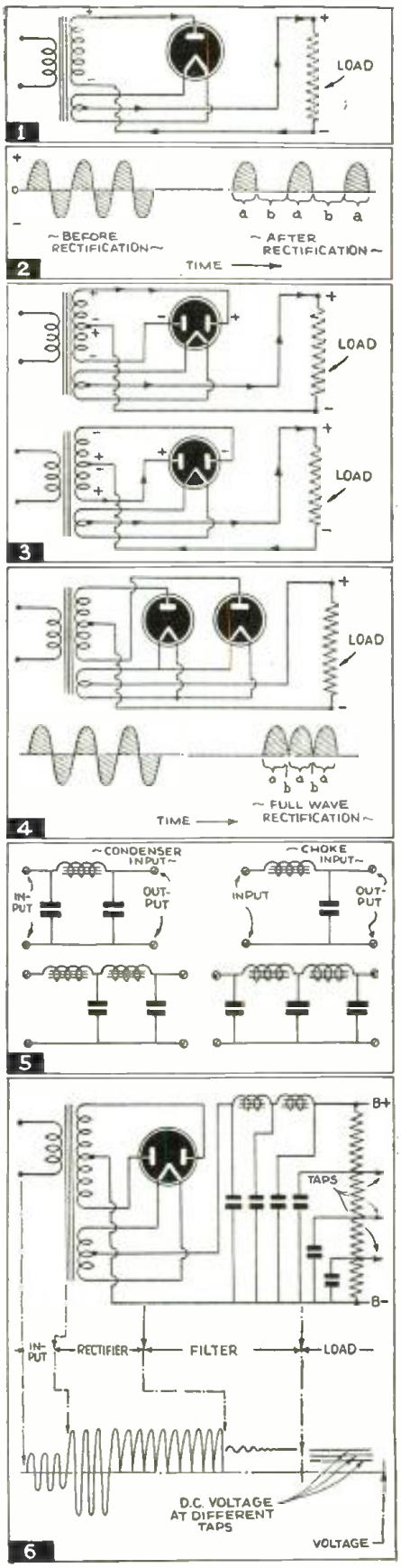
A full wave rectifier may have both plates inside a single tube, or if the reader so desires, he can use two half-wave rectifier tubes (that is, tubes each containing but a single plate) in place of a single full wave rectifier. See Fig. 4. The advantage of using two half-wave rectifier tubes in combination is that they can handle much higher voltages than a single tube. Such a circuit ordinarily finds its greatest application when used for transmitters.

Different Types of Rectifier Tubes

At present there are, in popular use, two types of tubes for purpose of rectification. The first is one in which a very high degree of vacuum has been obtained, the only source of electron supply being the hot filament. The second kind is known as a *mercury vapor rectifier* due to the presence of a small amount of mercury vapor in the tube. When the filament of such a tube gets hot, the electrons emitted collide with the atoms of mercury. The resultant effect is known as *ionization*, since the atoms break down into *electrons* (negative) and *ions* (positive). Since we now have both the electrons from the filament and from the mercury, we have a larger flow of current. In such a tube the voltage loss is generally considerably smaller than that of a highly evacuated rectifier.

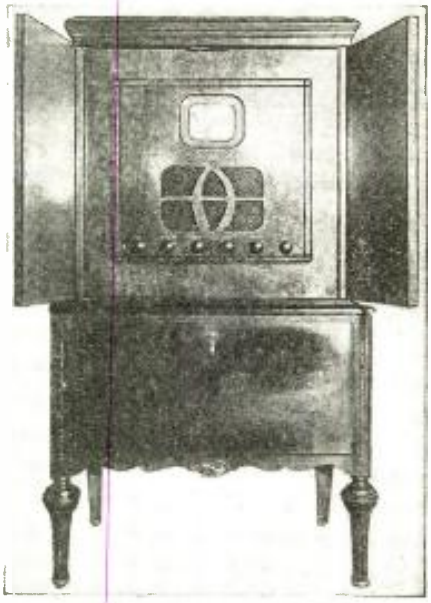
If we examine the *output* of a rectifier

(Continued on page 308)



How to Get Bigger and Better Television Images

Robert Eichberg



Andrea Kit installed in Console.

● AS no cabinet is provided for the kit model Andrea television set, the writer got in touch with a distributor of merchandise whose ad in RADIO & TELEVISION showed an old Kolster cabinet of approximately correct dimensions.

While this cabinet is not quite as deep as the assembled kit, a hole may be cut in the back to accommodate the C-R tube and bracket. A removable panel takes care of the chassis depth.

In the cabinet, as it is supplied, there is an old Kolster R.F. unit and a loud speaker baffle. These were removed. A piece of walnut veneer plywood was used to fill the panel space in the cabinet, which was considerably larger than the panel supplied in the Andrea kit. Centering this panel on the plywood necessitated raising the chassis some three inches from the bottom of the cabinet compartment. This was done by means of a small platform built out of boards —the very boards with which the cabinet was secured in its packing case.

There is another compartment, originally for batteries, below the compartment now housing the television unit. The writer uses this as a highly convenient compartment for "soft drinks."

The legs on the cabinet are cross-braced, but as it was a little too high for comfortable viewing when the observer was seated, these legs were sawed off just above the brace, lowering the cabinet about four inches.

Incidentally, this cabinet has a lid which may be tilted so that a mirror may be attached to it for mirror viewing of the C-R tube. When this is done, it is necessary to reverse the picture from left to right. This is very simple to handle, as it is only necessary to interchange the green and the green-and-white leads to the C-R tube socket. However, the writer finds it more pleasant to look directly at the end of the tube, as it is normally mounted in the Andrea kit.

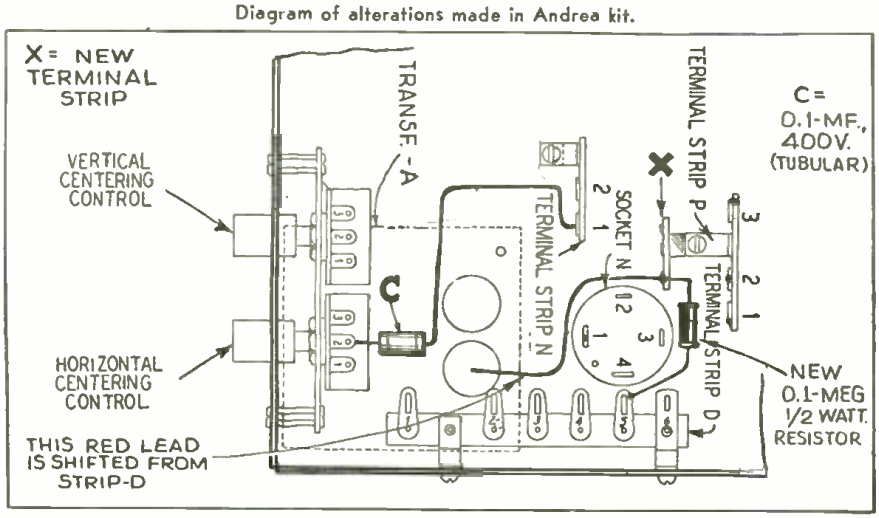
Due to excessively high voltage, the image could not be expanded to fill the en-

(Continued on page 307)

CHART INDICATING TUBE FAILURES

Tube and Function	*Picture* *Raster, no picture*	*Sound*	*Miscellaneous*
1852 Modulator	Picture		Tube is microphonic; gray bars appear when cabinet is tapped, or when loud audio signals are heard.
6J5 Oscillator	Distorted picture No picture	No sound	
1852 1st Video I.F.	No picture	Sound O.K.	
1852 2nd Video I.F.	No picture	Sound O.K.	
6H6 Video Detector and Clipper	No picture Picture, but sync. slipping	Sound O.K.	
6V6G Video Output	No picture	Sound O.K.	
1852 Sync. Separator	Picture, but sync. slipping	Sound O.K.	
6N7 Vertical Oscillator	Insufficient height		
	Out of frame		Picture syncs. slightly down from top or up from bottom.
6F8G Vertical Deflection Amp.	Insufficient height		Picture may appear as merely a horizontal line.
6N7 Horizontal Oscillator	Insufficient width		Picture may appear as a vertical line.
6F8G Horizontal Deflection Amp.	Insufficient width		Picture may appear as a vertical line.
879 or 2Y2 High Voltage Rectifier	No picture	Sound O.K.	Centering controls have no effect.
5V4G Low Voltage Rectifier	No picture	No sound	
1805—P4 Picture Tube	Momentary		Momentary picture, screen blooms, picture disappears.
	Spot		Yellow spot: burn, due to operation at excessive brightness.
	Dull		Dull picture due to long use of picture tube.
	Odd Size	Note: if faulty picture size cannot be corrected by size or hold controls, look for open connection from cable to picture tube socket.	
1852 Sound I.F.	Picture O.K.	No sound	
6SQ7 Detector and 1st Audio	Picture O.K.	Microphonic howl	
	Picture O.K.	No sound	
	Picture O.K.	Distortion	
	Picture O.K.	Noise in speaker	
6V6G Audio Output	Picture O.K.	No sound	
	Picture O.K.	Weak, distorted	

Diagram of alterations made in Andrea kit.



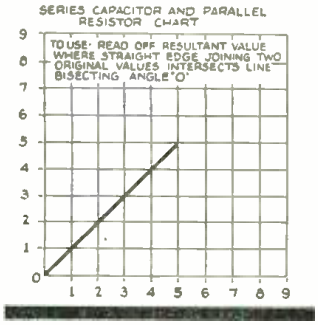
Radio Kinks

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

First Prize Winner

Calculating Kink

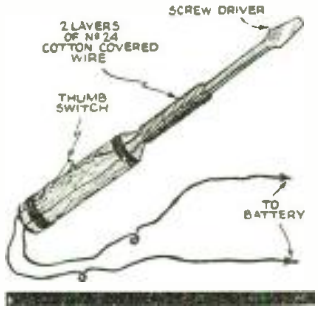
Below is a chart suitable for finding series capacitors or parallel resistors. To use, merely locate the two values on the ordinate and abscissa (vertical and horizontal lines) and join these two points. Where the straight edge intersects the line bisecting the angle 0 (heavy line) is the



resulting value. I don't find this chart in any of the books, manuals, or magazines I have, so I suppose it is original.—*J. B. Jackson, Jr.*

Electro-Magnetic Screw Driver

A highly useful electro-magnetic screw driver can be made out of any standard screw driver. All that is necessary is to wind about 50 turns of No. 24 d.c.c. wire over the shank of the tool, as illustrated. The ends of this coil are connected across two ordinary No. 6 dry cells. As a further refinement, a switch, as shown in the drawing, is used in the circuit. In this way the magnet is energized only when the screw driver is being used to

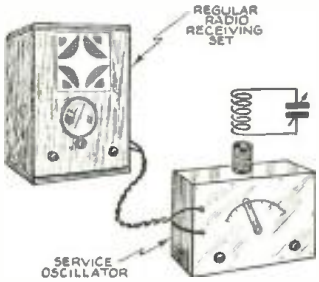


hold a bolt or a screw for insertion in an out-of-the-way corner. Of course, the tool will not operate with brass screws.—*Steve S. Boychuh.*

Matching R.F. Coils

To the radio experimenters who use service oscillators employing plug-in coils, I would like to pass on my method of matching R.F. coils. Proceed as follows:

Tune your radio receiver and test oscillator to the highest frequency to be covered by the coils that are to be matched. Now connect the variable condenser, which is to be used in the same circuit with the coils, as shown in the diagram. With the coil placed so that it is magnetically coupled to the oscillator coil, the condenser is tuned until a plop is heard in the receiver. In my case resonance is indicated by a change in the audio frequency note and a decrease in volume. The coil will have the correct number of turns when the circuit resonates with the variable condenser set at minimum capacity. This same process



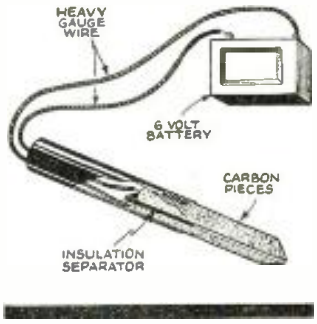
can be used in matching I.F. coils, by tuning the radio to a strong harmonic of the oscillator frequency.—*Frederick F. Slack.*

Handy Wiring Tool

A simple idea struck me when I dropped my pen on the floor and snapped the point of the nib off. It was a cheap ordinary wooden school pen which most of us have around. The handle is quite long, making it useful for prodding in awkward places for loose connections, etc., without getting a shock. It can be used for pushing the ends of the windings down into the pins of a coil form. The bottom piece holding the nib is steel, making it handy for continuity tests, or shorting to ground while testing. The longer and thinner the penholder, the more useful it is.—*Jack Neil.*

Six-Volt Soldering Iron

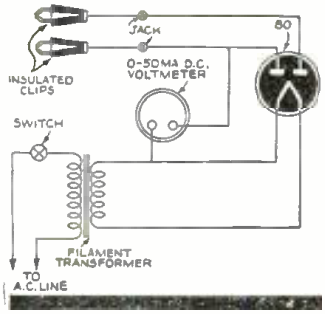
Here is a novel soldering iron for those remote from the power lines who have 6-volt batteries



at their disposal. To make this useful soldering iron, take a carbon stick found in cells of discarded "B" batteries and file a point on one end, then cut it lengthwise down the center with a coping saw or other means. A thin sheet of insulating material, such as bakelite, is placed between the two halves. The holder is an old fountain pen case in which a hole has been drilled in the closed end to admit two insulated wires. The insulation is removed from the ends of the wires which are placed on the side of each carbon so they will make good contacts when placed in the holder. I find it very useful for soldering small jobs, such as found around radios.—*Sam Garner.*

Inexpensive Output Meter

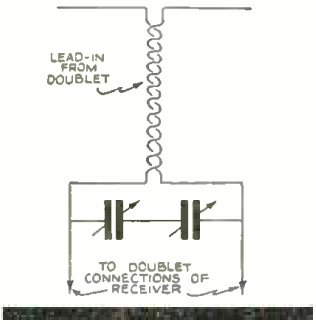
The only parts needed, in addition to a D.C. voltmeter provided with a 0-50 scale, are a filament transformer, a 4-prong socket, an 80 tube, and a pair of test leads. As shown in the diagram, the filament transformer is connected to supply the requisite voltage to the socket of the 80 tube. The output of the set is led to the two plates of the 80, and the voltmeter is connected between one of these



plates and the filament of the tube. In this way, the A.C. output is rectified so that it can be read on the meter. The greater the sensitivity of the meter, the better the results.—*Ralph Scott.*

Electrical Bandspread

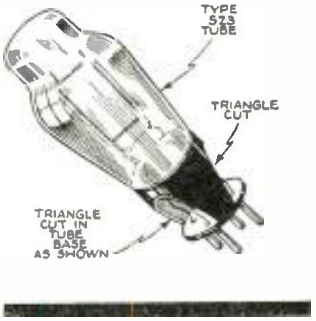
When the pulley rope on my mechanical bandspread broke, I used the following arrangement for electrical bandspread. I found that on the high frequencies to about 25 meters, the signal strength was boosted. Noise was taken out to a great degree and the quality of the tone improved. It also works exceptionally well with receivers with built-in electrical bandspreads. The total spread affects very few kilocycles, thereby pulling a station out from under QRM caused by signals close by, and serves to get a station in perfect resonance. Two condensers should be used to minimize the effects of body capacitance. The circuit is very simple. If pos-



sible, the condensers should be of the same capacity.—*M. Malsky.*

Cutting Tube Base

Every now and then the 5Z3 rectifier in the power pack of my transmitter flashed in the base, blowing the fuse in my set. I



determined to see exactly where this arcing was, so cut the base of the tube, as shown in the sketch—that is, a triangular portion was removed on each side. I watched and waited but no further arcing occurred, although I used the tube steadily for nine months. A few days ago, I had to replace it, and about ten minutes after I inserted the new tube in the socket, the fuse blew again. I immediately cut this tube as I had the other one, and experienced no further trouble with it. My theory is that there must be some sort of a vacuum at the base, and when it is cut, the air admitted increases the resistance.—*Oscar H. Bonter, W8RHV.*

The very efficient radio amateur station, W3GNU, owned and operated by Wm. E. "Doc" Wilbur, Hightstown, N. J.

NEW!
MODERN PLAQUE REPLACES OLD HAM TROPHY AWARD

This is the final award of the Ham Trophy illustrated below. From now until further notice, the award will be a modern plaque, 5 by 7 inches in size, and handsomely finished in color and satin-aluminum. This new plaque is of the latest design and is far more handsome than the older trophy which it replaces. Send your entries in NOW; all entries received hereafter will be considered for the new R. & T. Plaque—the Award of Honor—which will be illustrated in next month's issue of Radio & Television.

15th Silver Trophy AWARD

For Best HAM Station of the Month

Awarded to

William E. Wilbur, W3GNU

156 Stockton St., Hightstown, N. J.

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.

This month's prize winner—William E. Wilbur, W3GNU, Hightstown, N. J.

● SINCE receiving my "ticket" some three years ago I have worked as "portable" more than half that time at Lafayette College, Easton, Pa., and at the University of Miami, Coral Gables, Fla. A past member of the Lafayette College Radio Club, the Easton Radio Club and the Miami Radio Club, I am now Vice-President of the Delaware Valley Radio Association, Trenton, N. J., and general chairman of its third annual outing and Hamfest.

The layout of the shack (from left to right) is as follows: National 101X receiver, Model DD-104 Astatic microphone, commercial Lafayette 5B40W transmitter, and a home-built transmitter.

The commercial rig has a 6C5 crystal oscillator, a 6L6 buffer-multiplier, and a T40 final, with about 70 watts input. The modulator consists of a 6J7 high-gain high-impedance input, a 6N7 low-gain high-impedance input and mixer stage, a 6N7 phase inverter, a pair of 6L6G's in push-pull, and a built-in 913 oscillograph tube. The antenna panel for this "rig" has components which include two condensers and a coil, with provision for switching the condensers into sundry circuit combinations. There are plug-in coils for all bands including 5 meters, and all bands may be worked by utilizing only two crystals.

The larger rig at the right of the picture is home-built and consists of a 47 crystal oscillator, a T40 buffer, and a pair of T125's connected in push-pull in the final.

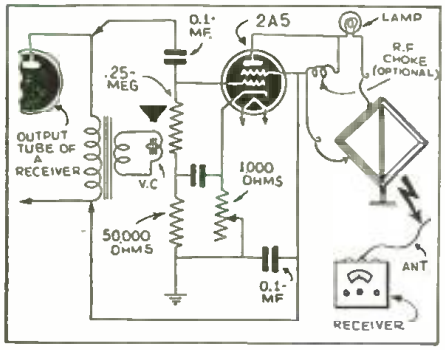
The speech and modulator consists of a 6J6 pentode, resistance-coupled into a 6C6 triode, impedance coupled into a pair of 76's in push-pull, transformer coupled to a pair of 42's in Class AB, driving a pair of 838's in Class B. The antenna panel, with its thermo-coupled ammeters, has a switching arrangement for either series or parallel tuning. The rig uses plug-

(Continued on page 307)

Practical

The editors introduce a new department this month and hope that readers will find it a practical and useful one. This is YOUR department and you can help to make it a very "live" one by sending your favorite radio "idea" to the editors. Photos are welcome, but pencil or pen and ink sketches will do—our draftsmen will remake all drawings. Just write a simple description of the idea and keep it within 500 words.

Experiment in Radiation



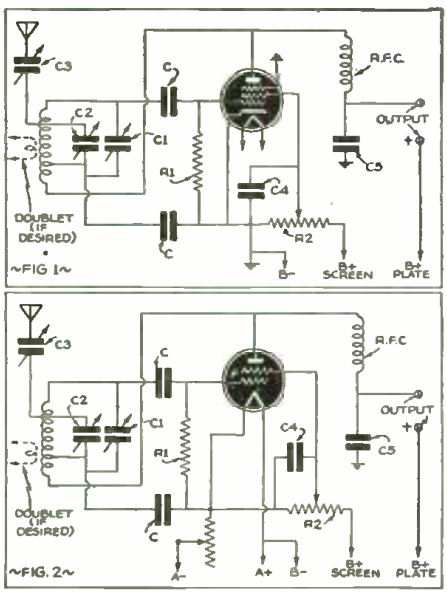
Audio frequency transmission with a loop antenna.

● THE object of the experiment is to prove that audio frequency signals can be re-broadcast without the use of a local oscillator. This is accomplished by using an extra resistance-coupled audio amplifier, connected to the output of a receiver, as shown in the diagram.

If a broadcast loop antenna is made of bare copper wire, leads with clips attached to the ends can be used to tap the loop easily to change the inductance of the plate circuit. The lead from the plate should be connected to the inside end of the loop and the B plus lead to about the second or third turn from the inside. Note that a two-cell flashlight bulb is connected in the plate lead as close as possible to the clip on the loop, so that it is possible to tell when the loop is

(Continued on page 300)

2 Detector Hook-ups



Two detector circuits worth trying.

● THE accompanying diagrams of a detector circuit are a result of a recent experiment. No exact or extreme claims are made for the circuit. However, selectivity seems to be improved over that of the conventionally accepted *feed-back* circuit, and the sensitivity is all that can be expected, under the conditions of such circuits. *Band-spreading* is accomplished by means of a

(Continued on page 300)

Have Fun With Transmitter

The parlor radio transmitter will provide barrels of fun.

This low-cost, easily-built miniature radio transmitter will provide lots of fun. It may also prove useful in many radio experiments in the home laboratory. It is of such low power that it can be operated without danger of interfering with neighborhood reception.

● WE seem to be passing through a cycle of miniature transmitting device attachments for use with the family broadcast receiver. First we had the phono oscillator, then the famed "Mystery Control," and now an enterprising manufacturer has come out with a line-power operated gadget that may be used for playing records or for talking, to be used at a distance from the conventional broadcast receiver. Of course, these devices all have a *limited range*, so that they cannot be classed as broadcast transmitters and do not come under FCC license requirements.

While it is naturally impossible to build a record player in a size small enough to hold in one's hand, it is quite possible to produce a voice-operated attachment of such dimensions, and it is the purpose of this article to describe one or two such units.

Local announcements by a member of the family will surprise your guests and friends very much if the sound comes a-popping out of your radio set during a regular program.

Thanks to the portable short-distance radio transmitter, here illustrated, which can be built at low cost, barrels of fun can be obtained.

Here we have a peek at the "innards" of the miniature radio transmitter built into a talcum powder can. It is self-contained, operates from batteries, and so may be carried about freely.

Radio Ideas

All articles accepted by this department will be paid for at regular space rates. Each month, beginning with the next issue, the editors will select the best article and it will receive a special prize —double the usual space rates.

Address all articles, photos and diagrams to the Editor, Practical Radio Ideas, c/o Radio & Television, *99 Hudson Street, New York, N. Y.*

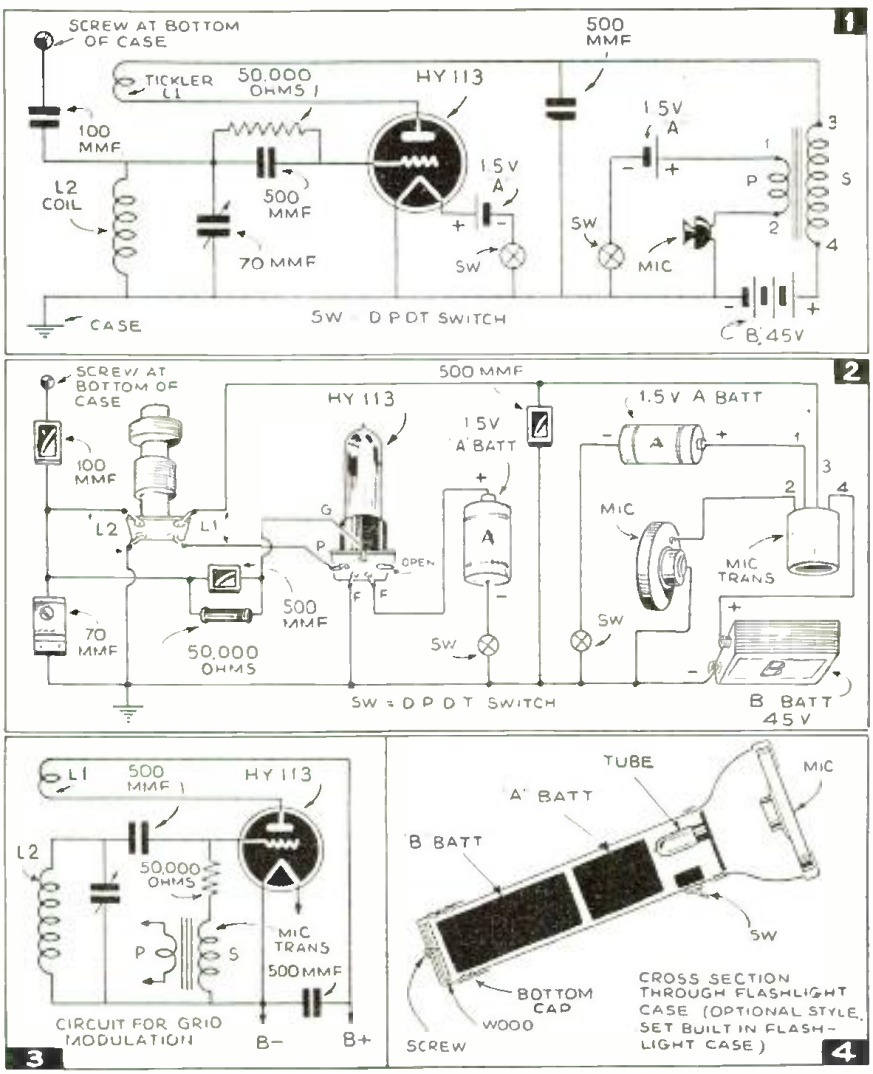
This Parlor Radio

—H. G. McEntee, W2FHP

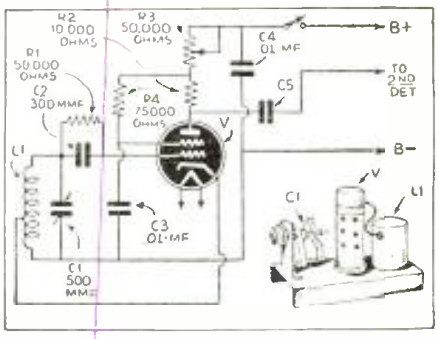
As the photos show, this particular portable low-power transmitter was built into a talcum powder can, fitted with a coffee pot handle. The individual radio parts are mounted on a piece of wood, the batteries being held in place by paper tape. The other parts, including the bracket to hold the tiny radio tube, are secured to the wood by means of small screws, and a hole is bored through one side of the wooden baseboard to admit the voice waves to the microphone. The antenna wire from the oscillator coil is carried out through a tip jack mounted on a bit of wood placed in the opening at the top of the talcum can. The mike is held

(*Continued on page* 300)

The diagrams below give the necessary details for constructing the parlor radio transmitter.



Beat Frequency Oscillator



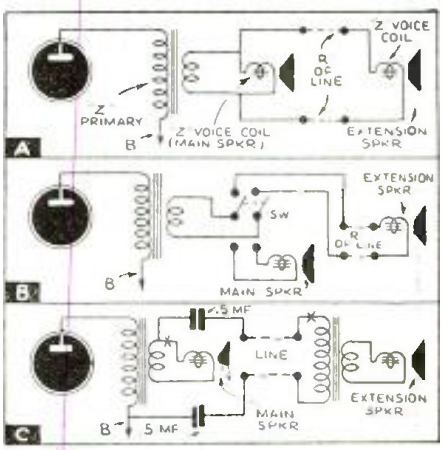
Circuit diagram for a simple and very useful beat-frequency oscillator, which will make it easy to locate those elusive DX stations.

● SHORT wave fans in particular frequently have use for a beat frequency oscillator—it will help locate those hard-to-find DX stations.

Most any 4-element tube may be used, depending on what you may have available. This oscillator is intended for use with the average modern receiver having an I.F. frequency of between 450 and 470 kc., and the oscillator coil, L1, is adjusted to the desired beat frequency by means of the trimmer condenser, C1, placed inside the shield can. An ordinary screen grid tube,

(*Continued on page* 301)

How To Install Extra Speaker



The diagrams show three methods of connecting an extension loud speaker.

● EVERY now and then the radio fan will have occasion to install an extra loudspeaker.

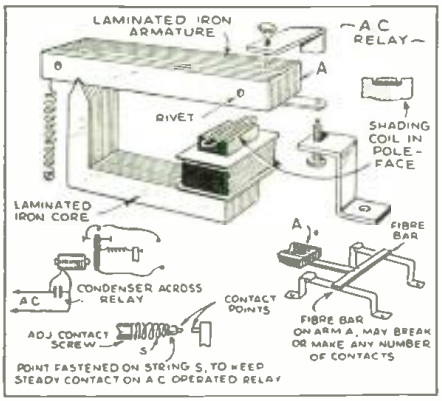
Fig. A shows one of the simplest ways of installing an extension speaker. For average home levels, this method is satisfactory, the extension speaker voice coil being connected in parallel with the main loud speaker voice coil. The length of the line is limited, due to the resistance R.

Fig. B shows how a double-throw switch can be arranged so that the main or the extension loudspeaker may be put into operation as desired. Here also the length of the line is limited by its resistance, R.

Fig. C shows how a high impedance line may be used to couple an extension speaker through two capacities of .5 mf. each.

The accompanying diagrams show three suggested methods, as recently described in the *Australasian Radio World*.

A. C. Relay Hints



How to improve A.C. Relays.

● RELAYS for operation on A.C., with low or high voltage, need to have their iron core laminated or built up in sheets. The average experimenter can readily build a serviceable relay from an old audio transformer.

One of the drawings shows how to improve the operation of an A.C. relay by cutting a slot in the iron pole face of the magnet in which there is embedded a piece of heavy copper wire forming a closed circuit. This will serve to prevent the relay from chattering or vibrating.

Another method which will help to stabilize the operation of relays on A.C. is to connect a condenser across the relay terminals; still another trick is to use a *floating* contact, the contact being mounted on a spiral spring, as the illustration shows. In this way, if the armature should vibrate due to the A.C., the contact will be maintained steadily, by the spring supporting the contact point. Note the simple construction of the armature support illustrated, which is suitable for the average relay where extra fine adjustments are not called for.

More Ideas for the

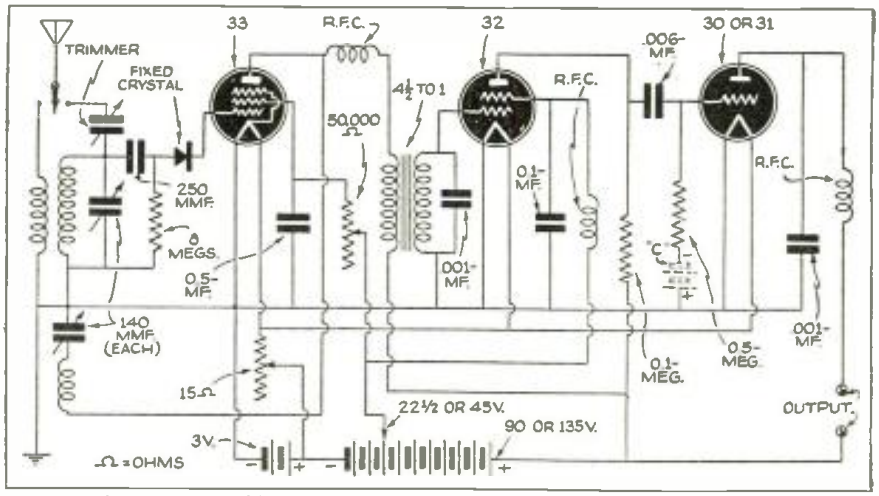
A Good 3-Tube "Portable"

● THE accompanying diagram shows the hookup for a 3-tube portable receiver which has worked particularly well on the broadcast band. It was built by Neil Eplin of the U. S. Bureau of Public Roads, Belton, Mont. He states that this little set outperformed several commercial battery type receivers, including two 5-tube battery superhets.

A study of the diagram shows that a crystal detector is used in the *megadyne* hookup, originated by Hugo Gernsback. Mr. Eplin writes that tests on the set were made in mountainous regions and that his outfit was located in the midst of the highest mountains in Glacier National Park. The nearest "local" broadcast station is CFCN, Calgary, Alberta, about 200 miles distant. Good loudspeaker volume was obtained with this set, equal to that of larger commercial sets, and this loudspeaker reception was obtained during daylight hours. At night, he says, the Pacific Coast stations "rolled in," strong enough to *overload* the 30 type tube in the output stage.

"I tried space-charging the 33 detector but the one I am using is highly microphonic when connected in that manner, and as just as much gain seems to be realized using the regular connections, I have given up following the megadyne circuit in that

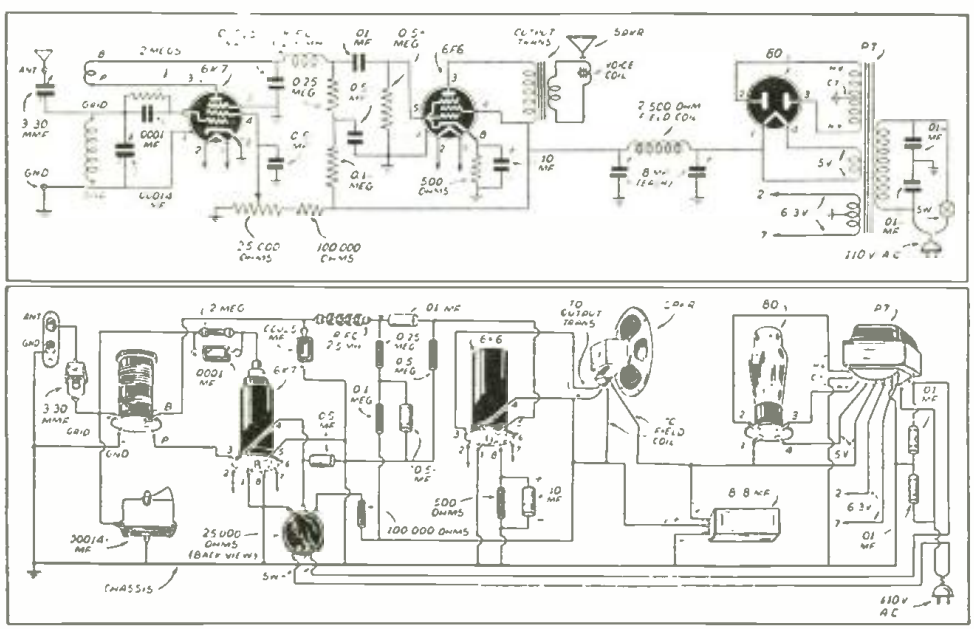
(Continued on page 301)



A 3-tube portable battery receiver using Megadyne crystal hook-up.

Three Tube A.C. Short Wave Receiver

● THE short wave fan often desires a 3-tube A.C. receiver which will cover all bands and provide, at reasonable cost, reception of world-wide short wave stations. The accompanying diagram shows such a 3-tube receiver, using standard parts, and which the average experimenter can easily put together and wire in a short time. Many of the parts may be available in the experimenter's "spare parts" cabinet, and even if all the parts have to be purchased, the cost of the complete set is well within the limits of the average pocketbook. A standard set of short wave plug-in coils is used to cover the principal broadcast bands, the coils being tuned by the usual .00014 mf. condenser. A 6K7 tube is employed for the detector, and a 6F6 tube for the audio amplifier, while an 80 serves as a full-wave rectifier.



List of Parts

1—Set 4-prong S.W. coils
1—.00014 mf. condenser
1—25,000 ohm regen. control and switch
2—.5 mf. condensers
3—.01 mf. condensers
1—10 mf. condenser
1—.0001 mf. mica
1—.00025 mf. mica
1—Dual 8 mf. condenser
1—3-30 mmf. trimmer condenser
1—Power transformer
2—Octal sockets
2—4-prong sockets
1—7" x 10" aluminum panel
1—Chassis
1—Knob
1—Dial, vernier type
1—Ant.-gnd. binding post strip
1—A.C. line cord and plug
2—100,000 ohm, 1 watt resistors
1—250,000 ohm, ½ watt resistor
1—500,000 ohm, ½ watt resistor
1—2 meg., ½ watt resistor
1—500 ohm, 2 watt resistor
1—Grid cap for met. tube
1—Speaker, 2500 ohm, with output transformer
1—Pair "broadcast" coverage coils
3—6K7, 6F6, 80 tubes (1 each)

This data supplied through the courtesy of Radio Wire Television, Inc.

Radio Experimenter

How to Build A. C.-D. C. Capacity Relay

● FOR protecting jewelry, silverware, etc., in stores or in the home, and for conducting many amateur experiments—and to provide fun at parties, the *capacity-operated* relay shown here will prove to be an asset to every experimenter.

If a person brings his hand near the coil, shown in the picture, the balance of the circuit will be disturbed and the relay will operate, closing the circuit of an alarm bell.

A clever adaptation of this capacity relay is that where a coin is put inside a frame and someone is challenged to get the coin without ringing the alarm. When the hand is brought near the coin or other object, the body capacity acts to trip off the relay and the alarm (bell or light) sounds.

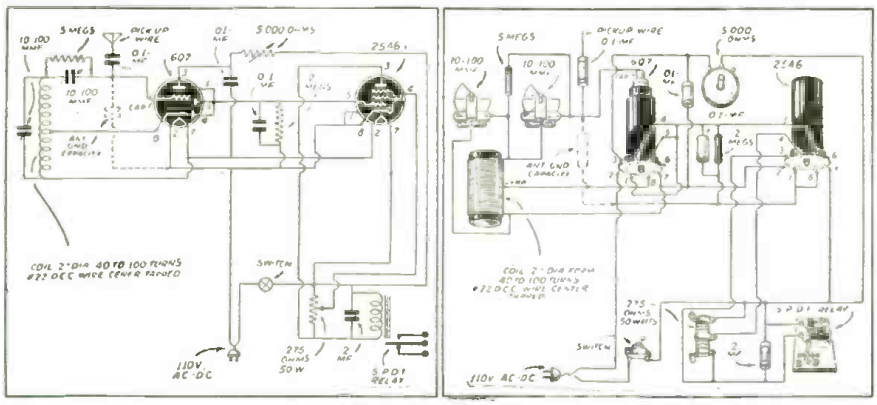
A 6Q7 and 25A6 tube serve to operate this capacity relay circuit and all the parts required are standard ones.

This circuit is published through the courtesy of Radio Wire Television, Inc.

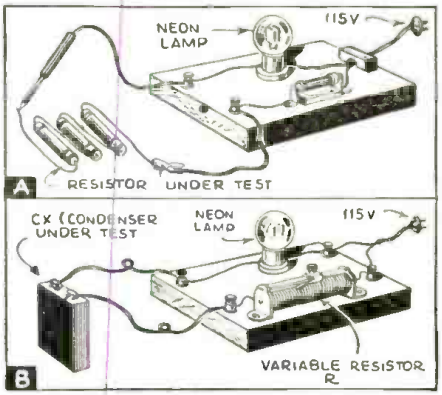
The list of parts required for building this capacity relay are:

2—Octal sockets
1—5 meg. resistor
1—2 meg. resistor
1—5,000 ohm pot.
2—100 mmf. condensers
1—.01 mf. condenser
1—2 mf. condenser
2—.1 mf. condensers
1—Resistor, adjusted for 275 ohms
1—Clip for above, for tap
1—Relay S.P.D.T. for 100 watts non-inductive load
1—Power line cord. 1—Switch
1—6Q7 tube; 1—25A6 tube

The diagrams show in schematic and picture form how to build an efficient capacity operated relay.



Useful Neon Lamp Tester



Top—Useful continuity testing device for the experimenter. Below—Simple tester for condensers.

● SMALL neon lamps are available at most radio supply stores nowadays, and they provide a simple and very effective tester for checking the continuity of circuits. One of these lamps may also be used for testing condensers, as shown in one of the diagrams herewith.

To construct the simple series continuity tester shown in Fig. A, a ½ watt, 100,000 ohm resistor, R, is arranged in series with the neon lamp. A test clip and test prod will provide very effective terminals for the two free lead wires, and all sorts of continuity tests can readily be made through coils, motor and speaker windings, switches, etc.

Fig. B shows a simple series circuit with neon lamp for testing condensers. Resistance R is variable and the condenser under test is indicated at CX. The strength of the glow of the lamp will indicate roughly the relative capacity of the condenser under test. Neon lamps used in both tests are rated at ¼ watt.

The Famous 1-Tube "Oscillodyne" Up-To-Date!

● PROBABLY no other one-tube receiver ever made so many friends among short-wave fans as did the famous "Oscillodyne." The editors have been deluged with requests for the "Oscillodyne" circuit, redesigned to use one of the new tubes. Herewith is the diagram and other data for constructing the Oscillodyne short-wave receiver, using the new 1N5-G tube.

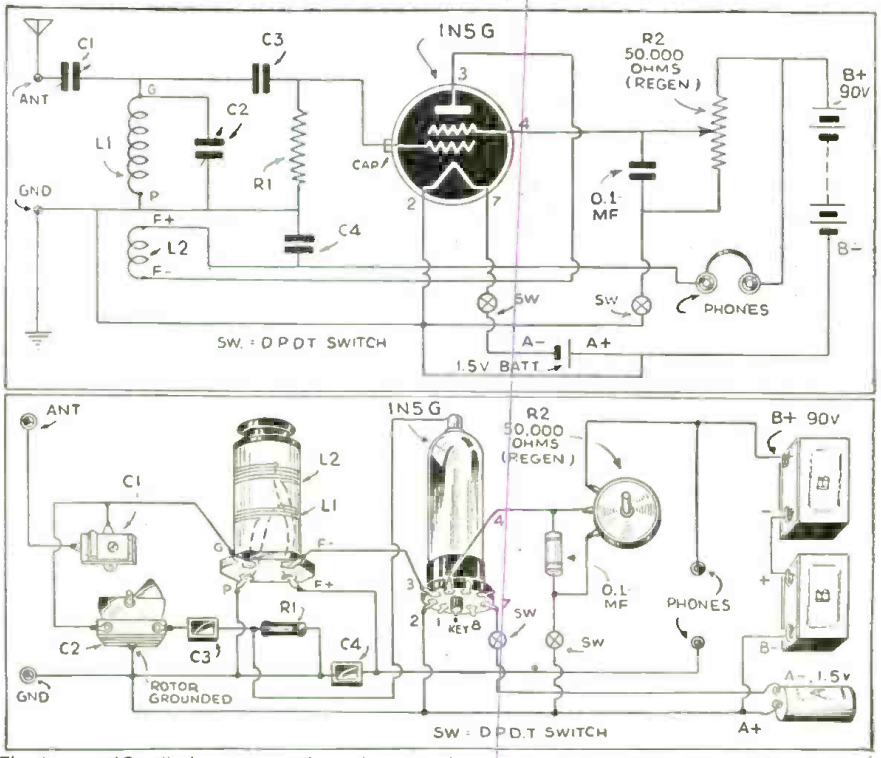
Coil Data

Approximate Wavelength (meters)	*Sec.*	*Tickler*
14-25	4	6
23-41	7	9
40-85	14	12
83-125	23	23
120-200	36	36

About ⅛" separation between windings. It will obviously be necessary to extend the tube base forms if coils for the "broadcast band" are used. However, grid and plate windings of about 67 turns will tune from 200-360 meters and 105 turn windings will tune from 350-550 meters with the above condenser.

Parts List for "Oscillodyne"

1—Aluminum panel, 4½" x 6" x 1/16"
1—Bakelite subpanel, 4½" x 5½" x 3/32"
1—50,000 ohm variable resistor, R2
1—Set of 4 pin plug-in coils wound on Hammarlund Isolantite forms, 1½" dia. wound, per specifications given in article
1—Series antenna condenser, C1, about 25 mmf. maximum
1—Tuning condenser, C2, .0001 mf.
1—Grid condenser, C3, 100 mmf., or 50 mmf.
1—Fixed resistor, R1, 3 megohms
1—Fixed condenser, C4, .0005 mf., mica
1—3" vernier dial



The famous "Oscillodyne" circuit brought up to date—using the new 1.4 volt tube, Type 1N5-G.

World Short Wave Stations

Revised Monthly

Complete List of SW Broadcast Stations

Reports on station changes are appreciated.

Mc.	Call	
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., 9.494 m. 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, 9.494 m., 11.30 am.-1.30 pm. Ex. Sat.-Sun.
26.550	W7XGU	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. 1-4 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 12 n. 6 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, 11.56 m., 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.-4 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 am.-12 n.
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	PHI3	HUIZEN, HOLLAND, 13.96 m. Addr. N. V. Philips, Hilversum. Irregular, 6.10-9.35 am.
21.470	GSH	DAVENTRY, ENG., 13.97 m. (See 21.550 mc.), 5.45 am.-12 noon. To Africa.
21.460	WIXAL	BOSTON, MASS., 13.98 m. Addr. University Club. Sun. 9-11.30 am., Tues. 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	DJH	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, 16.83 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.) 5-8.45 am., 6-9 pm.
17.810	GSV	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., 12.25-1.35, 1.40-4 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	FZEB	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. Daily 8-9 pm.
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.

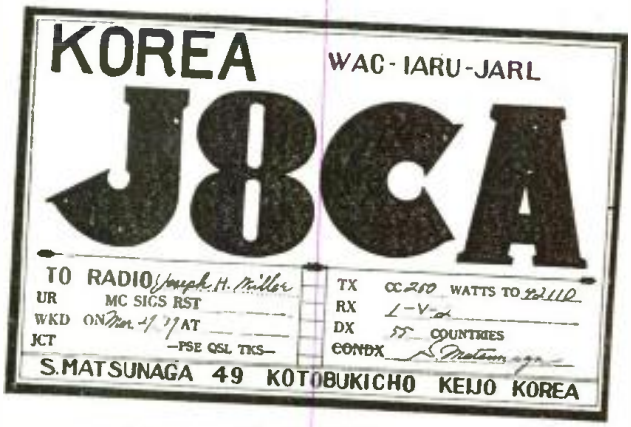
19 Met. Broadcast Band

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., 6.30-11.15 pm. to So. America.
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.) 12.25-4, 4.20-6, 6.20-9.15 pm.
15.300	YDB	SOERABAJA, JAVA, N. E. I. 19.61 m. Addr. NIROM. 10.30 pm.-2 am., Sat. 7.30 pm.-2 am.
15.300	XEBM	MAZATLAN, SIN., MEX., 19.61 m., Addr. Box 78, "El Pregonero del Pacifico." Irregularly 9-10 am., 1-2, 8-10 pm.
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. 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. 12.25-1.45, 9.40-11.30 pm.
15.250	WIXAL	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. Blvd. Haussmann. "Paris Mondial" 5-10 am. to Asia.
15.240	2RO	ROME, ITALY, 19.68 m. Irregular 3-9 pm.
15.240	CR7BD	LOURENCO MARQUES, MOZAMBIQUE. 19.68 m. Testing 1-4 pm. Irreg.

(Continued on page 280)

All Schedules Eastern Standard Time

Radio-Guadeloupe: Better known as FG8AH, this station at last sent cards with a red and blue stripe diagonally through card.



J8CA—Korea. A handsome QSL with red letters and blue edging.

Let's *Listen In* with Joe Miller

"DX" Editor

Note: All Times are EST

● LET'S look over the DX:

NEW CALEDONIA

FK8AA, on 6.122 mc., at Noumea, is reported by R. Murphy of Auckland, New Zealand, who already has a veri giving above frequency, with power of 50 watts, but with a change of sked, now operating daily, except Sun. and Mon., from 2:30-3:30 a.m., E.S.T., opening and closing with *La Marseillaise*. OM Gus Gallagher of San Francisco also reports an FK8AA veri, really nice going from the U. S. A., for this weak DX catch! Glad to hear you're better, Gus. Best o' luck to you out thar!

CHINA

XGOX, 15.195 mc., Chungking, QSLs with a letter from Mr. T. Y. Woo, Director-General of the Central Broadcasting Administration, enclosing the latest program of skeds. Also noted is the data that XRVG, on 11.38 mc., approx., left the air on Feb. 19, 1939, with only XGOX-XGOY, and XPSA, 6.97 mc., remaining as Gov't broadcasters. No mention is made of XOJD, 6.88 mc., but we'll continue listing it till definite notice is obtained.

XGOY, 11.90 mc., Chungking, is on the air 2-6:20 p.m., 5:30-11:30 a.m. XGOX, 17.80 mc., 9-10:30 p.m., latter program an hour less than listed.

XGM, 17.65 mc., Shanghai, reported by Gus Gallagher at 12:30 a.m., a nice fone catch!

MADAGASCAR

FB8AB, our ol' friend F. Paul Bour, located in Tananarive, had a sad tale to relate in his last interesting letter. Paul was persuaded to accompany an expedition to the island of St. Paul-Amsterdam, far south in the Indian Ocean, near the Antarctic regions, and to bring his xmtr and receiver along to supply communications with Madagascar during the voyage.

It was Paul's FB work with his xmtr that saved the 48 lives on the ship, but due to hardships and accidents experienced, his equipment was so damaged that it is now useless and 'twill be a long time till Paul can again call a "CQ DX." This FB OM has helped many DXers acquire their first veri from Madagascar (quite a thrill, that first veri), and has always treated hams and SWL's most courteously, being very well known throughout the amateur DX world.

We are going to try our very best to acquire all the radio parts we can, and perhaps dun some good-hearted manufacturer of receivers for one of his pet products. And so we turn to you OM's, hams and SWL's both, to help our ol' DX friend FB8AB to get back on the air, as he's lost without his rig, and the lads who ran the expedition didn't give him a sou, according to reports.

Any radio parts for a xmtr will be welcomed and will earn Paul's and our sincere gratitude. A list of those donating, though not mentioning items given, will be published later, as the least we can do to repay your kindnesses.

In order to avoid duplication of apparatus, will any of you who have something you wish to donate to Paul please send a *list* of such apparatus to me, in care of RADIO & TELEVISION, 99 Hudson Street, New York, N. Y. I'll drop you a card, telling you what part of the equipment to send and where to send it. *But please don't send any apparatus to the magazine or to me.* It might get lost in the shuffle.

(Continued on page 299)

SPECIAL NOTICE

The I.D.A. Ama-touring Editor, OM Roger Legge, has arranged a FB DX special transmission with YL2CD, Latvia. All SWL's hearing this station's transmissions to U. S. will earn a handsome QSL from a rarely heard country; so go to it! Schedule: 14,040 kc., phone, 12 midnight-12:10 a.m. on Sept. 10, 17, 24. On 28,080 kc., 10-10:10 a.m., on Nov. 12, 19. Don't miss this! Many thanks, Roger!

I Cover the Pacific Coast

By Lyle M. Nelson

● PACIFIC COAST short wave fans were given a real treat recently when Japanese authorities announced that the popular "Overseas Program" over JZK (15.16 mcs.) would be extended one-half hour and after July 1 would be heard from 9 to 10:30 instead of 9:30 to 10:30. The added half an hour has made possible a greater variety of entertainment, including several interesting talks in English. Reception is excellent during the entire program but is best from 9 to 9:30. News in English is now heard at 9:05.

Also reported here on the Coast with excellent volume has been the new Swiss station "Radio Schwarzenburg." According to announcement the station is testing on 17.78, 15.30, 11.86 and 9.63 mcs. All frequencies excepting the 17.78 megacycle one have been reported by listeners here. Mr. Jack McCliment of Portland reports hearing the station on 11.86 mc. as late as 7 p. m. He also reports the 9.63 mc. station with good volume on the regular North American program near 5 p. m.

Excellent reception from Holland's "Happy Station," PCJ (9.59 mc.), has been reported by several Pacific Coast listeners on Tuesdays from 6 to 7:15 p. m. PCJ comes on the air at 4, but is not audible here until almost 6 o'clock. The schedule for other days according to announcement from the station is as follows. Sundays from 5:35 to 6:35 p. m., Wednesday from 5:25 to 5:40 p. m. (C. F. Burns of Vancouver, Wash., reports them as late as 6:20), and Friday from 5 to 6 p. m.

On the 15.22 megacycle frequency PCJ is heard here with a night broadcast each Wednesday from 6:30 to 8:30 and in the mornings daily from 4:10 to 5:30 a.m. Several listeners have reported a station believed to be PCJ near 11 p. m. irregularly.

Mr. John Cavanaugh of Oregon City reports a new Oriental station announcing as JIE2 on 9.67 mcs. The schedule is irregular, but JIE2 is usually heard here from 6 to 7:20 a. m., Mr. Cavanaugh says. According to announcement the station is located in Tyureki, Taiwan. Typical Oriental music and war news feature the broadcast.

Several listeners have asked the schedules of Hawaii's powerful relay stations KKH on 7.52 and KQH on 14.92 mc. These stations do not operate on regular schedule, but merely relay programs from Hawaii to the mainland. At present both stations seem to be on the air on Saturdays from 6:30 to 7 p. m., on Fridays from 10:00 to 10:30 a. m. and on Sundays from 2 to 2:30 and 5 to 5:30 p. m.

Kendall Walker, ardent DX'er of Yamhill, Oregon, writes with the information that a new Italian station, 2RO13, is now broadcasting on 11.9 mcs. daily from 7 to 8 a. m. Reception is fair, but the station rapidly fades out after 8 o'clock. Mr. Walker reports. He also reports good reception from 2RO4 on 11.81 during the North American program from 3:30 to 6 p. m.

ROUND 'N' ABOUT—JDY of Dairen, Manchukuo, heard here daily on 9.92 mc. near 5 a. m. . . . . JUW3 of Tokyo on the air from 2 to 2:30 . . . . Code interference blots out Saturday "North American" program from Sweden over SBP on 11.73 mc. at 5 p. m. . . . New Japanese station announcing as JLU3 heard on 15.135 mc. giving schedule as from 5 to 6:30 p. m. . . . HAS3 of Budapest heard with fair volume on Sunday mornings near 6 a. m. . . . News in English over 2RO4 (11.81 mc.) is heard here daily at 4:30 p. m. Reception is good. . . . Mr. Charles Yoshii, announcer on Pacific Coast "Overseas Hour" from Japan, is a graduate of the University of Oregon which explains his good English. . . . "Radio Schwarzenburg" heard in the mornings near 6 a. m. on 15.30 mcs. Address is: Schweizerische Rundspruch-Gesellschaft, Neuengasse 30, Berne. . . . XGOY is now heard on 11.90 mc. from 6 to 8:30 a. m. Reception is excellent for about an hour after the station signs on the air. Woman announcer gives call letters in English. . . . TAQ of Ankara, Turkey, weakly audible on 15.19 mc. near 4 a. m. . . . XEFT Vera Cruz, Mexico is no longer on the air. . . . RAN (9.60 mc.) good from 6 to 7 p. m. daily. Some listeners claim call is RAL. . . . Marimba band concerts from Guatemala's TGWA on 9.68 mcs. are well received here daily except Wednesday and Friday from 8 to 9 p. m. . . . COCQ continues to hold forth on 8.83 mc. until 10 p. m. . . . HCIJB of Quito, Ecuador, is wandering around. Heard at present near 14.43 mc. . . . South African amateurs heard on 20 meter band during late evenings. . . . LRX of Buenos Aires, Arg., continues to reach here from 6:15 to 7 p. m.

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., 6.55-10.20 pm.
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	DJB	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, 6.25-9.20 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, 6.20-9.15 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. 2.30-5.30, 9-10 pm. ex. Wed., Sat., Sun. 2.30-3 pm.
15.120	SP19	WARSAW, POLAND, 19.84 m., 6-9 pm.
15.120	HVJ	VATICAN CITY, 19.84 m., 10.30-10.45 am., Tues., Suns. 1-1.30 pm.
15.120	CSW4	LISBON, PORTUGAL, 19.84 m., 6-8 am., irreg.
15.110	DJL	BERLIN, GERMANY, 19.85 m., Addr. (See 15.280 mc.) 12.10-2, 8-9 am., 10.40 am.-4.25 pm.
15.100	CB1510	VALPARAISO, CHILE. 19.87 m. Testing near 7.30 am.
15.100	2RO12	ROME, ITALY. 19.87 m. Testing irreg.
15.080	RKI	MOSCOW, U.S.S.R., 19.95 m. Works Tashkent near 7 am. Broadcasts Sun. 12.15-2.30 pm. Daily 7-9.15 pm.

End of Broadcast Band

14.960	RZZ	MOSCOW, U.S.S.R., 20.05 m., Thurs. 6 pm. Dutch program.
14.930	PSE	RIO DE JANEIRO, BRAZIL. 20.09 m. Broadcasts 6-7 pm., Wed. 4-4.10 pm., Thurs. 3-3.30 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 Irr. after midnight.
14.535	HBJ	GENEVA, SWITZERLAND, 20.64 m. Addr. Radio Nations. Broadcasts Sun. 10.45-11.30 am., Mon. 4-4.15 am., 6.45-8.15 pm.
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	HC2JB	QUITO, ECUADOR, 24.08 m. Daily exc. Mon. 7-8.15, 11.30 am.-2.30, 4.45-10.15 pm.
12.310	VOFB	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, 24.59 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. 11-11.45 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.
11.870	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.) Irregular.
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, 25.35 m., Addr. Czech Shortwave Sta., Praha XII, Fochova 16. Daily 6.45-9 pm.
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. 6 10.30 pm.
11.826	XEBR	HERMOSILLA, SON., MEX., 25.37 m., Addr. Box 68. Relays XE8H. 9.30-11 am., 1-4 pm., 9 pm.-12 m.
11.810	2RO4	ROME, ITALY, 25.4 m., Addr. E.I.A.R., Via Montello 5. Daily 4.30-8.45 am., 10 am.-2.30 pm., 6-9 pm.
11.805	OZG	SKAMLEBAK, DENMARK, 25.41 m. Addr. Statsradiofonien. Irreg.
11.801	DJZ	BERLIN, GERMANY, 25.42 m. Addr. See 15.280 mc. Irreg.
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. Addr. (See 15.280 mc.) Irreg.
11.790	WIXAL	BOSTON, MASS., 25.45 m., Addr. (See 15.250 mc.) 2.30-5.30 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, 6.20-9.15, 9.40-11.30 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.
11.725	JVW3	TOKYO, JAPAN, 25.57 m. Now on regular schedule from 1.15 am. daily on, and irregular from 4-7.30 am.
11.720	CJRX	WINNIPEG, CANADA, 25.6 m., Addr. James Richardson & Sons, Ltd. Daily 6 pm.-12 m., Sat. 6 pm.-Sun. 4 am.
11.720	ZP14	VILLARICA, PARAGUAY, 25.60 m. 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, 25.62 m., Addr. (See 7.894 mc.) 1-2.30 pm.
11.710	—	SAIGON, FRENCH INDO-CHINA. 25.62 m., Addr. Boy-Landry, 17 Place A Foray. 7.30-9.15 am.
11.705	SBP	MOTALA, SWEDEN, 25.63 m., 1-4.15 pm. Sun. 3 am.-4.15 pm. Wed and Sat. 8-9 pm.
11.700	HP5A	PANAMA CITY, PAN., 25.64 m. Addr. Radio Teatro, Apartado 954. 10 am.-1 pm., 5-10 pm. Sun. 6-10 pm. 7-8.30 am.

(Continued on page 282)

All Schedules Eastern Standard Time

The Short Wave League

DX on the Ham Bands

(with the "Listening Post" Observers)

Edited by Elmer R. Fuller

W. C. Post, observer for Minnesota.

TEN BEST DX'ERS LAST MONTH

Name	Call	Freq.	R	S	Distance
Ruiz	LU4PB	14.15	5	6	12,400 miles
Ruiz	CP5PK	14.3	5	4	12,300 miles
Ruiz	CE3CO	14.15	5	8	12,200 miles
Wells	PK4KS	14.03	3	6	12,200 miles
Scott	PK1AF	14.1	5	8	12,100 miles
Hegler	PK4KS	14.35	5	8-9	11,700 miles
Fleming	VS2AL	14.01	4	5-6	11,700 miles
Lendzioszek	KA1ME	14.23	5	7	11,600 miles
Wells	PK3WI	14.05	5	7	11,600 miles
Lendzioszek	VK7AB	13.995	3	6	11,500 miles

● WELL, here we are with our DX again, and this marks the beginning of our second year. In the past year, several changes have been made, and according to our readers, these changes have been for the betterment of our department. It is our desire to extend our many thanks to those who have been of service to us during this first year.

The appointments for next year, beginning with the first of August, have been made, and are now ready for publication. In making these appointments, we have carefully studied the records of the past year, and based our judgments on these written proofs of the accomplishments of our observers. A few of the observers for last year, were not reappointed for the coming year. These cases were caused by the observers themselves, by the reports they have sent in, or by the reports which they were expected to send in, and didn't. In order to keep this department going, it is necessary for us to have reports from every observer, every month. It is not possible for yours truly to put out the best of columns if several observers do not send in their reports as they are expected to do.

The following observers have been appointed for next year. In a few states, we have not been able to make an appointment as yet. All states which do not appear in this list have no observer, and applications will be welcomed. Only one observer has been named for each state. By doing this, it will be possible for us to use every report sent to us by an official observer.

Alabama	Jack Wells
Arizona	Lester Fuller
Arkansas	Bill Henderson
California	Richard A. Rush
Colorado	Dan T. Wallen
Connecticut	Howard G. Kemp
Florida	Major Lester
Georgia	Roy W. Lovelace, Jr.
Illinois	Austin and Helen Rheiner
Indiana	James Kavanough
Iowa	Dick Mannheimer
Kansas	Burns E. Hegler
Kentucky	Robert Taglauer
Louisiana	John R. Fasnacht
Maryland	Cecil A. Wilkes
Massachusetts	Edward Lendzioszek
Michigan	Vernon Gabriel
Minnesota	W. C. Post
Missouri	R. B. Fleming
Nebraska	William Dean Noyes
New Hampshire	Richard E. Mathes
New Jersey	John Fitzpatrick
New Mexico	J. P. Snow
New York	Charles H. Fuller
North Carolina	Roger Poole
Ohio	Paul E. Byrns
Oklahoma	Kenneth Walker
Oregon	Elwood C. Trueman
Pennsylvania	Tom Jordan
Rhode Island	G. Holmes Wilson
South Carolina	Ray Halliday
South Dakota	W. Walker
Tennessee	William Scott
Texas	Edward C. Slaughter
Utah	Robert Parker
Virginia	Everett Worrell, Jr.
Washington	Ernest W. Lang
West Virginia	W. O. Deem
Wisconsin	Jesse Dana Wheaton

FOREIGN OBSERVERS

B. C. (Canada)	Frank A. Surina
Nova Scotia (Canada)	George A. Poulain
Ontario (Canada)	Meredith M. Stroh
Quebec (Canada)	Stanley Clarke
England	Kenneth Spencer
	Leonard Gear
France	Charles LeRasle
South Africa	Morris Wasserzug
	Oscar Westman
	Jack Starup
New Zealand	J. C. Sibbin
	H. Vernon Wheatley
India	Masud Akhtar
Philippine Islands	Jose M. Ruiz
West Australia	F. Roy Matthews
South Australia	M. N. Wicks
Cuba	Evelio T. Torres

From Tom Jordan, Observer for Pennsylvania, we learn that the power now being used by EK1AF, formerly CN1AF, is five hundred watts. The QSL card used by this station shows a picture of the city.

PK6XX has irregular schedules with W5DEW and W4DLH in the early morning, usually around six to eight o'clock, E.S.T.

From several sources, we learn more about ZX4M and ZX9AM, which have been reported by several of our observers for the past few months. These two stations are the same, and are located on board the oil tanker S. S. *California*. It left Port Arthur, Texas, on December 10th of last year for a four or five months whaling expedition to the Antarctic. They use about fifteen watts, and Rhea Johnson, W9AM, is the operator.

We have two reports on five meter reception, from John Fitzpatrick and Todd Storz, of New Jersey and Nebraska, respectively.

Fitzpatrick reports hearing W3HOH, W9ARN, W9CPJ, and W9ZHB. Storz reports the following:

Call	R	S	Call	R	S
W1KKT	4	3	W2KLZ	5	9
W1KWI	5	6	W2AMJ	5	5
W1KLJ	5	7	W2MO	5	8
W1KJT	5	9	W2CMF	5	4
W2CUZ	5	9	W2GPO	5	9

Call	R	S	Call	R	S	Call	R	S
W3HDQ	5	6-8	W3GQS	5	9	W8JHW	5	7
W3BZJ	5	7	W3RL	5	9	W8QDU	5	9
W3HJQ	5	8	W3AIR	5	6	W8NYD	5	8
W3HI	5	5	W3DBC	4	3-4	W8CGJ	5	8
W3DYE	5	9	W8RV	5	9	W8CIR	5	9
W3EZM	5	9	W8NOR	5	9			
W3EZN	5	5	W8SFF	5	8			

Among our observers for the other amateur bands, we have reports from the following places:

Alabama	Jack Wells
Arizona	Lester Fuller
California	Richard A. Rush
Connecticut	Howard G. Kemp
Florida	Major Lester
Iowa	Dick Mannheimer
Kansas	Burns E. Hegler
Massachusetts	Edward Lendzioszek
Missouri	Robert Fleming
New Jersey	John Fitzpatrick
New York	Charles H. Fuller
Oregon	Elwood C. Trueman
Pennsylvania	Tom Jordan
South Carolina	Ray Halliday
South Dakota	Robert Hutchinson
Tennessee	William Scott
Texas	Edward C. Slaughter
Washington	Ernest W. Lang
Quebec (Canada)	Stanley Clarke
England	Kenneth Spencer
New Zealand	H. Vernon Wheatley

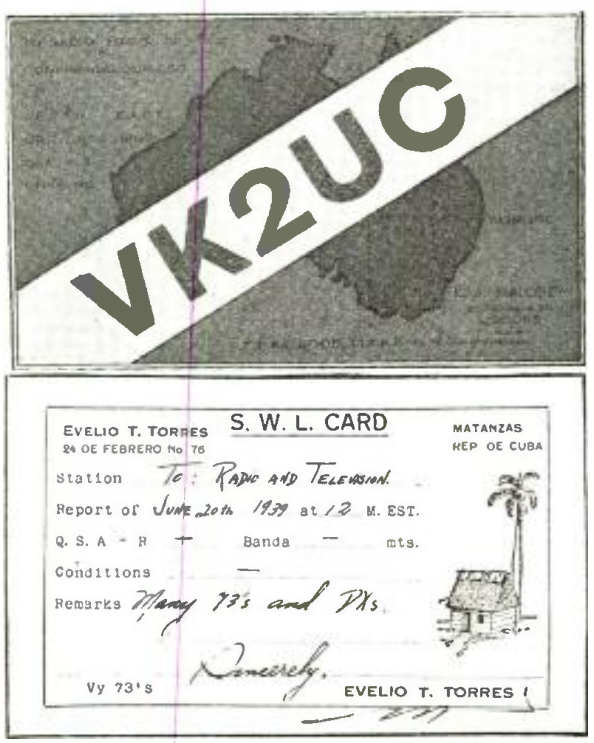
Now then, getting down to the reports for the month, we have only a very few of the Asiatics heard last month. These few were the following:—

J4CT	14.1	5	6	Tex.
J7CB	14.09	3	6	Wash.
VS2AL	14.1	4-5	5-6	Wash., Mo.
XU5TH	14.01	2	3	Wash.
XU8RB	14.1	4	5-7	Kan.

There were a few more Africans reported, but not many.

CT2BP	14.12	5	7-9	Quebec, Tenn.
EK1AF	14.1	5	6	Quebec, Penn.
SU1MW	14.025	4	7	Mass.
SU1JM	14.13	4	7-8	Mass.

(Continued on page 305)



Top—QSL card received from VK2UC by Jack Wells, observer for Alabama.

Bottom—Veri card sent out by Evelio T. Torres, Matanzas, Cuba.

Mc.	Call	
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. 6.45-8.15 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., Mon. 8-8.30 pm., Fri. 7-7.30 pm.
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. Reichspostzentralamt. 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 JOAK daily 7-8 am. Works Tokyo occasionally in early am.
9.892	CPI	SUCRE, BOLIVIA, 30.33 m., 11 am.-n., 7-9 pm.
9.855	EAQ	MADRID, SPAIN, 30.45 m., Addr. P. O. Box 951. 7.30-8, 8.40-9 pm. 3.45-4.05, 4.45-5.05 am., also.
9.830	IRF	ROME, ITALY, 30.52 m. Works Egypt afternoons. Relays 2RO, 12-12.25 pm. Thurs. Daily 12.40-1, 1.37-3.35, 6-9 pm.
9.815	COCM	HAVANA, CUBA, 30.57 m. Addr. Transradio Columbia, P. O. Box 33. 8-1 am. Relays CMCM.
9.785	HH3W	PORT-AU-PRINCE, HAITI, 30.66 m. Addr. P. O. Box A117. 1-2, 7-9.15 pm.
9.753	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

Mc.	Call	
9.705	——	FORT DE FRANCE, MARTINIQUE, 30.92 m., Addr. P. O. Box 136. 6-8.10 pm. Irr. to 9.30 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, 30.96 m., Addr. Amando C. Marin, Apartado 40. Sun. 7-8 am., Tues., Thurs., Sat. 9-10 pm.
9.690	LRA1	BUENOS AIRES, ARG., 30.96 m., 6-9 pm. Mon-Thur., 4-9 pm, Fri., 7-9 pm. Sat.
9.690	—	TANANARIVE, MADAGASCAR, 30.96 m., 12.30-12.45, 3.30-4.30, 10-11 am., Sun 2.30-4 am.
9.690	ZHP	SINGAPORE, MALAYA, 30.96 m. Sun. 5.40-9.40 am., Wed. 12.40-1.40 am., Mon.-Fri. 4.40-9.40 am., Sat. 12.25-1.40 am., 4.40-9.40 am., 10.40 pm.-1.10 am. (Sun.)
9.690	GRX	DAVENTRY, ENGLAND, 30.96 m., Addr. See GSC, 9.58 mc., 5.45 am.-12 n., 12.25-6 pm.
9.685	TGWA	GUATEMALA CITY, GUAT., 30.96 m. Daily 10-11.30 pm.; Sun. 7-10.45 pm.
9.680	JFO	TAIHOKU, TAIWAN, 30.99 m. Relays JFAK irreg. 4-10.30 am.
9.675	DJX	BERLIN, GERMANY, 31.01 m., Addr. (DJD, 11.77 mc.) 11.30 am.-4.25 pm. To Africa.
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., 6-6.30 pm.
9.660	LRX	BUENOS AIRES, ARG., 31.06 m., Addr. El Mundo. Relays LRI, 6-6.45 am.-9.15 am.-10 pm.
9.660	HVJ	VATICAN CITY, 31.06 m. Sun. 5-5.30 am.
9.650	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	CXAB	COLONIA, URUGUAY, 31.12 m., Addr. Belgrano 1841, Buenos Aires, Argentina. Relays LR3. Buenos Aires 5 am.-10.45 pm. Sat. to 1 am.
9.635	2RO3	ROME, ITALY, 31.13 m., Addr. (See 11.810 mc.) 12.07-3 pm., 5.30-9 pm., also Mon. 3.50-4.05 pm., Fri. and Sat. 4-4.20 pm.
9.620	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	RAN	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, 6.25-9.20 pm.
9.580	VLR	MELBOURNE, AUSTRALIA, 31.32 m. Addr. Box 1686, G. P. O. Daily exc. Sat. 3.30-7.15 pm., Sat. 5-10.30 pm. Daily exc. Fri., Sat. 9 pm.-8.30 am., Fri. 9 pm.-9 am. (Sat.), Sat. 12 m.-7.30 am. (Sun.).
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, 31.37 m., 7-8, 11.30 am.-1.30 pm.
9.560	XGAP	PEKING, CHINA, 31.38 m. Addr. S. Yoshimura, Dir. Peking Central Sta., Hsi-chan-an-chieh, Peking. 4-9 am.
9.560	DJA	BERLIN, GERMANY, 31.38 m., Addr. Broadcasting House. 6.30-10.50 pm.
9.550	HVJ	VATICAN CITY, 31.41 m., Sun. 5-5.30 am., Wed. 2.30-3 pm.
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.) 12.05-2.30, 9.30-11 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., 31.48 m., Addr. Gen. Elec. Co., 12 m.-3 am., 7 am.-12 n. to Asia.
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., 7 pm.-midnight.
9.526	ZBW3	HONGKONG, CHINA, 31.49 m., Addr. P. O. Box 200. 5-10 am., 11.30 pm.-1.15 am. Sun 5-9.30 am.
9.525	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, Heiberasqade 7, Copenhagen, 8-9.30, 9.30-11 pm. to No. Amer.

(Continued on page 284)

All Schedules Eastern Standard Time

What Do YOU Think?

He's After a VAC Certificate

Editor:

I have been an ardent reader of RADIO & TELEVISION (previously *Short Wave & Television*) for four years and find it very interesting and helpful. I have been an S.W.L. for about two years and have been helped a great deal by Joe Miller's column and the Station Lists. I find "What Do YOU Think?" to be very interesting.

At present I am using a 6 tube Philco. With this I have heard five continents, but up-to-date have only three verified. By this time next year, I expect to have all continents and all states represented. I am trying for a VAC certificate.

Let's hear from some of you SWL's.

HAROLD C. CHAPMAN,
106 Mill St.,
Lodi, Ohio.

A Word from a Greek!

Editor:

Herewith is a photo of my radio den. The receiver is a 1939 Super Skyrider, model SX-16. Also on the side is a 5 meter set built from some of the circuits that have appeared in your magazines. On the roof I have three antennas, cut to resonate on different bands: one of them is a double-doublet from your Educational Library booklet entitled *All About Aerials*. So far I have heard nearly all continents and most of them have been verified.

I have been an enthusiastic reader of RADIO & TELEVISION for only about a year, but I could hardly do without it now as I think it is the finest magazine of its kind. I find your new series, "Getting Started in Amateur Radio," by C. W. Palmer, of much value as I am studying for a "Ham" ticket. Also I am very proud to be a member of the SWL realm and one of Mr. Fuller's Listening Post Observers.

I am corresponding with quite a number of members in different parts of the world and I will gladly exchange SWL cards and answer all letters received from English and Greek-speaking listeners.

I have just finished reading George Mathew's letter on "SWL punks" in the May issue; and I think he is terrific. COLOSSAL!! Well George, OB, as a rule, "A Greek always has a word for it!" This time though, I take my hat off to you and I say congratulations, George, they got what was coming to them. Let's have some more!

Wishing RADIO & TELEVISION the best of luck.

NICK S. KAPPIRIS,
Odos Rannis,
Chios. Greece.

From Chios, Greece, comes this interesting short-wave "listening post" photo sent by Nick S. Kappiris.

He's Read R. & T. for Years

Editor:

Just a few lines to let you know how much I enjoy RADIO & TELEVISION. I have been a reader for years, and find it to be *tops* for the Amateur as well as the Service Man. I started in radio some 20 years ago and have operated a repair business since 1922.

I was an amateur radio operator some years ago and at present am constructing a new 5 and 10 meter transmitter which I will have on the air the last of the month.

Now here's an idea— Why not publish one month's issue on 5 meter receivers, transmitters and aerials? Another month's issue on 10 meters, then each month continue with the next amateur band, until each one has been thoroughly covered? At present I am much interested in 5 meter. Last summer I received some 300 stations during "skips" on 5 meters.

I believe this band will soon open up as the 10 meter has done and many of the new as well as the old amateurs will go to the higher frequencies.

Your friend and reader,

W. J. WEIGHTMAN,
132 N. 5th St.,
Middletown, Ind.

A Voice from New Zealand

From half way round the world comes this interesting photo of a short-wave Ham shack —ZL2BW, owned and operated by Bob J. Wright of Box 33, Martinborough, New Zealand.

Success with "Home-built" Superhet.

Editor:

I have been a constant reader of your FB magazine for over five years and I think it is the best magazine dealing with short waves.

I have made quite a few sets from articles printed in your magazine, and at the present am using a 57 electron-coupled detector and 56 audio stage for 10 meter listening on earphones, and also a "home-built" superhet using 6J7, 6K7, 6K7, 6F6, 6F6 and 80 for speaker reception. On the ten meter Ham band I have heard VP3GB, XE2XE, and all U. S. districts, and on the superhet I have heard W1XAL, W2XAD, W3XAU, W4XB, DJD, GSD, ZTJ, HH3W, TGWA, OLR5, 2RO, TPA2, XEWW, CJRX, COCH, EAQ, and Hams too numerous to mention. Hi!

I would like to swap photos and cards with any SWL or Ham in any part of the world.

Wishing your magazine the best of success SK ES 73's.

VICTOR SMID,
1836 So. May St.,
Chicago, Ill.

Ireland Salutes Us!

T. P. Magill of County Donegal, Ireland.

Editor:

Here is a photo of my listening post located in the north west of Ireland. The book in my hand is radio's best magazine—RADIO & TELEVISION. I have logged 65 countries but so far have only received QSL's from 30—all on 20 meters. The following are the stations I have received QSL's from: K6OQE, XZ2DY, CT1ZA, YGZCD, TIIAF, SUIAM, ES5D, ES6D, HC2CC, CN8BA, PK2AY, PK1RI, VK4JP, VK2AGU, VK2OQ, VE4SS, VE4VC, VE2MC, CFCN, CBR, CGA4, ZS6DY, ZS6DK, ZS6H, SPW, EI5J, W8ERJ, W4DIS, W2AZ, PI1J, ON4PJ, VO2N, VSJGJ, W3FZA, F8UE, G5OV, HB9AT, G8IK, ON4DJ, HB9AY, OLR, LA7K, LA8C, SM5WZ, W2IXY, TRADE-UNION MOSCOW, DAZZH, F8XT.

Congratulating you on your radio magazine, without which it would be impossible to get the pleasure we do in radio.

T. P. MAGILL,
Marine View,
Bundoran, Donegal, Ireland.

Our Diagram Works Swell!

Editor:

I have recently constructed a short-wave receiver, the diagram of which I secured from the January edition of RADIO & TELEVISION. It is a battery-operated regenerative set using a 1A4 as a T.R.F. tube, a 19 as a detector and first audio, and a 1F4 as a driver. So that I can operate a speaker, I am using a pair of 89's as final amplifiers which give ample speaker drive. It works very well—thanks to RADIO & TELEVISION.

E. M. HUMPHRIES,
804 Burlison Ave.,
Mart, Texas.

Built Lots of "R. & T." Sets— Results O.K.!

Editor:

I am a newsstand reader of your very fine magazine. I have been building *short-wave* sets from your magazine for the past five years. I have built 1 tube sets to 14 tube ones. My 8-tube superhet communications receiver was built by the writer and it sure works FB. I like your magazine very much—so keep up the good work.

STANLEY GARNER,
29 West Chestnut St.,
Norristown, Pa.

Mc.	Call	
9.520	YSH	SAN SALVADOR, EL SALVADOR 31.51 m., Addr. (See 7.894 mc.) Irregular 6-10 am.
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.-2.15 am., 6.20-9.15, 9.40-11.30 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., 6-9.05 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 CMBX 8 am.-11.30 pm.
9.188	HC2AB	ECUADOR, 32.65 m., nightly to 10 pm.
9.170	HCIGQ	QUITO, ECUADOR, 32.72 m., Mon. Wed., Sat. 9-9.55 pm.
9.125	HAT4	BUDAPEST, HUNGARY, 32.88 m., Addr. "Radiolabor," Gyali-ut, 22. Daily 7-8 pm., Sat., 6-7 pm.
9.124	HC2CW	GUAYAQUIL, ECUADOR, 32.88 m., 11 am.-1, 7-11 pm.
9.100	COCA	HAVANA, CUBA, 32.61 m. Addr. Galiano No. 102. Relays CMCA Noon-1.15 am. Irreg. to 3 am.
9.091	PJCI	CURACAO, D. W. INDIES, 33 m., 6.36-8.36 pm., Sun. 10.36 am.-12.36 pm.
9.030	COBZ	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.
8.968	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. 11.30 am.-12.30 pm., 3.30-6, 8-9 pm.
8.665	W2XGB	HICKSVILLE, N. Y., 34.64 m., Addr. Press Wireless, Mon. to Fri. News at 9 am. and 5 pm.
8.652	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. 2.30-4.30 pm. Also 7.177 mc.
7.520	KKH	KAHUKU, HAWAII, 39.89 m., Fri. 9-10 pm., Sat. 1-1.30 am., 9.30-10 pm.
7.490	EAJ43	TENERIFE, CANARY ISL., 40.05 m., 8-9.30 pm. and Irreg.
7.450	TI2RS	SAN JOSE, COSTA RICA. 40.27 m. "Radioemisora Athena". 7-11 pm.
7.440	FG8AH	POINT-A-PITRE GUADELOUPE, F.W.I., 40.32 m., 6-7.10 pm., also 9-10.30 pm. Irreg. P. O. Box 125.
7.410	HCJB4	QUITO, ECUADOR, 40.46 m., 7-9.30 pm. irregularly.
7.380	XECR	MEXICO CITY, MEX., 40.65 m., Addr. Foreign Office. Sun. 6-7 pm.
7.310	VIG	PORT MORESBY, PAPUA, 41.01 m., June 10 & 24, 3-5 am.
7.280	TPB12	PARIS, FRANCE, 41.21 m., 10.15 am.-5.15 pm., 8.30-11 pm.
7.260	CSW8	LISBON, PORTUGAL, 41.32 m., addr. Emissora Nacional de Radiodifusao, rua do Quelhas. Tue., Thur., Sat. 4.05-5 pm.
7.250	YDA	TANDJONGPRIOK, JAVA, 41.38 m., Addr. N.I.R.O.M., Batavia, 10.30 pm.-2 am.; Sat. 7.30 pm.-2 am.
7.220	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.
6.990	XEME	MERIDA, YUCATAN, 42.89 m., Addr. Calle 59, No. 517, "La Voz de Yucatan desde Merida," Irregular.
6.977	XBA	TACUBAYA, D. F., MEX., 43 m. 9.30 am.-1 pm., 7-8.30 pm.
6.970	XPSA	KWEIYANG, CHINA, 43.05 m., 5.30, or 6-11 am.
6.960	2ZB	WELLINGTON, N. Z., 43.10 m., Mid.-7 am.
6.880	XOJD	HANKOW, CHINA, 43.60 m., 6-8.30 am.
6.805	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	PARAMIRABO, 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, 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	XBC	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.
6.540	YNIGG	MANAGUA, NICARAGUA, 45.87 m., Addr. "La Voz de las Lagos." 1-2.30, 8-10 pm. Except Sundays.
6.490	TGWB	GUATEMALA CITY, GUAT., 46.2 m. La Voz de Guatemala. Daily 7.45-9 am. 12.45-3.45 pm., 7.30 pm.-12.15 am. Sun. 10.30 am.-5.15 pm., 7 pm.-12 m.
6.480	HIIL	SANTIAGO DE LOS CABALLEROS, D. R., 46.28 m., Addr. Box 356. 9.40-11.40 am., 7.40-9.40 pm.
6.470	YNLAT	GRANADA, NICARAGUA, 46.36 m., Addr. Leonidas Tenoria, "La Voz del Mombacho." Irregular.
6.455	HI4V	SAN FRANCISCO DE MACORIS, D. R., 46.44 m., 11.40 am.-1.40 pm., 5.10-9.40 pm.
6.420	HIIS	SANTIAGO, D. R., 46.73 m., 5.40-7.35 pm. Ex. 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., 46.95 m., Mon. 6-6.45, 8-8.45 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.

(Continued on page 318)

All Schedules Eastern Standard Time

High Voltage Power Supplies for *Television Receivers*

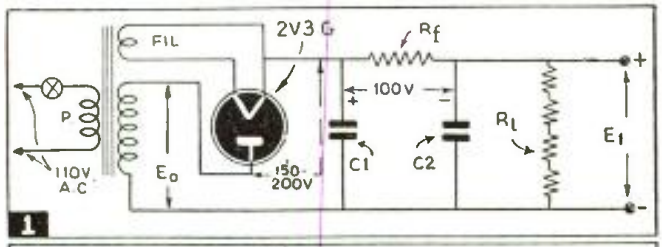
F. L. Sprayberry

● IN determining the specifications for parts to be used in the construction of high voltage power-supply units for television receivers you will be guided by the characteristics of the cathode ray tube to be used. The supply rarely has any function other than this. For satisfactory television operation, cathode ray tubes require from 2,000 to 10,000 volts maximum but, fortunately, very little current is drawn. This fact greatly simplifies the construction of the power transformer, the rectifier system, and the filter.

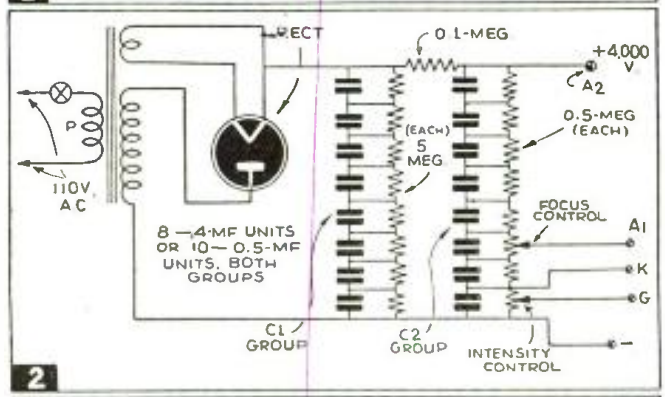
The first thing to determine is the voltage at which you intend to operate the second, or highest voltage, anode of the cathode ray tube. If several voltages are recommended for the tube, one of the highest would be best to assure good results. Let us say that we have chosen a cathode ray tube of the double anode type, which requires 4,000 volts for its second anode voltage and 1,000 volts for its first anode. It is not likely that the total cathode current of the cathode ray tube will amount to .25 ma. of current. Usually it will be far below this figure. You will be perfectly justified in basing your power-supply design on a cathode ray tube total current of .25 ma.

Half-Wave Rectifier Satisfactory

In any rectifier system, when the current drawn is very small, a *half-wave* rectifier arrangement is completely satisfactory because



1



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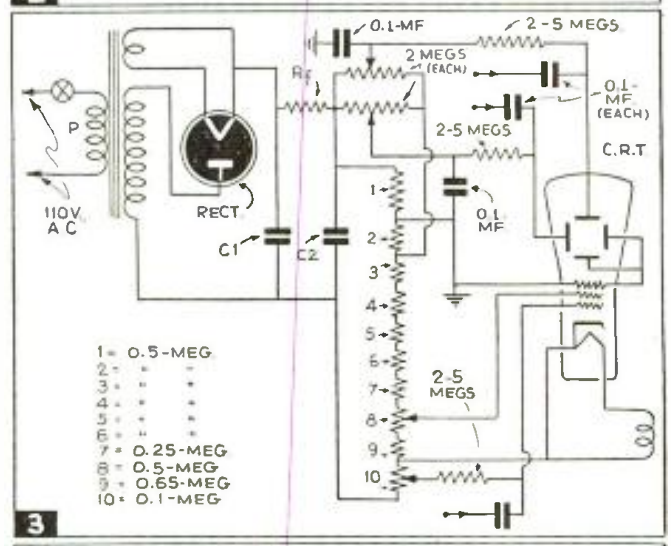

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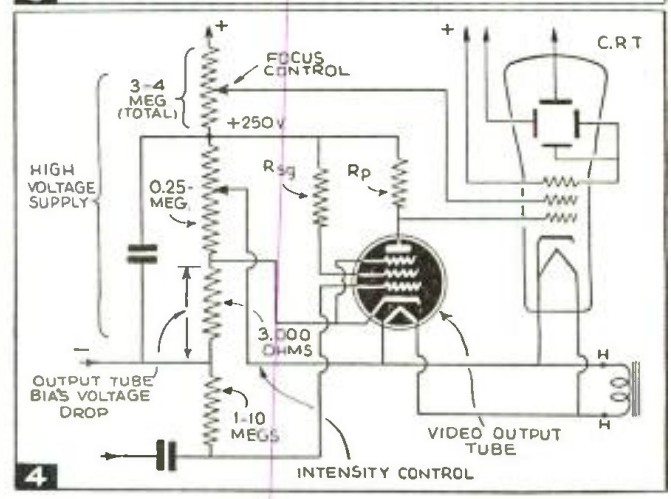

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Fig. 1. Typical half-wave rectifier circuit for television receivers.

Fig. 2. Use of a number of low-voltage condensers in series in high voltage filter, with equalizing resistances.

Fig. 3. High voltage power-supply with potentiometers for "centering" control.

Fig. 4. Here the video output amplifier tube is also fed from the high voltage supply.

of the additional simplicity afforded in the entire power-supply.

Into the consideration of the r.m.s. A.C. voltage at which the high voltage winding of the transformer should be rated must come the rectifier tube drop and the filter resistor drop. We will return to the filter later to show why a *resistance* is used in preference to a choke coil. However, we must know that a filter resistor is used for the purpose of selecting the correct transformer voltage.

For the type of rectifier we must use, we can anticipate an internal tube drop from plate to heater or cathode of 150 to 200 volts or more on the peak of the useful half cycle. This drop is indicated in the elementary circuit in Fig. 1. In this same circuit we may also anticipate a drop across the filter resistor Rf of around 100 volts or more. With the sum of these two added to 4,000 volts, so that we may get a full 4,000 volts at E_1 across the load resistance RL, we must have a transformer winding which can deliver an average of 4,300 volts, that is, 4,000 + 200 + 100 so that by losing 300 volts in the rectifier and filter we will still have 4,000 volts available.

A further consideration is that the entire load on this power-supply will drop this average voltage only 5 to 8% below the A.C. peak voltage at E_o. Because of the small load on the rectifier, the output D.C. will be within this percentage of the A.C. peak value. If we are conservative, we will increase 4,300 by 8%, obtaining a peak of 4,300 × 1.08 = 4,650 volts (approximately). Now if this is the peak voltage, we must have a winding rated at 4,650 × .707 = 3,290 volts r.m.s. Obviously a 3,300 volt winding would be satisfactory, or if you cannot purchase a transformer of this rating, a value within 10% of this may be used and the higher or lower total output voltage will probably be satisfactory. A 3,000 volt winding is a fairly common value and would enable you to get an output voltage at E_o of perhaps 3,700

(Continued on page 314)

"FLEXIBLE 3"— A Combination Converter-

This simple receiving unit will appeal to every radio experimenter. It provides a combination all-wave converter which may be used as a superhet if desired. Converter range: 5 to 200 meters; superhet tuning range: 5 to 600 meters. Uses 3 tubes, changeable plug-in I.F. transformers, and may be powered from your present receiver.

● ONE of the the reasons why your average low-cost short-wave *superhet* or *converter* performs rather inefficiently at very high frequencies is that it must necessarily feature a compromise value of I.F. providing for optimum gain, signal selectivity, and image rejectivity—which is to say the best possible balance between the three—over the tuning range most used. A value selected, say, to give ample amplification and sharpness of tuning on the 20, 40, 80 and 160 meter bands with one intermediate stage, and with the image problem adequately solved in the bargain, would not (nor could it be conveniently made to) afford equally good results at 28 mc. and higher.

Of course you could select some other than the conventional 456 kc. intermediate frequency. You might use the new and increasingly popular 1600 or 1500, now really practical with self-excited transmitters off the air and the average U.H.F. signal almost as easy to hold as those of longer wavelength. Or you could add tuned R.F. stages, calculated to give the receiver the necessary image discrimination right at its "front end." But in the one case you would be simply substituting one compromise I.F. favoring standard short and medium wave reception for another compromise value favoring U.H.F. reception; and in the other case you would be increasing the cost of construction and complicating both circuit and tuning considerably.

Well, what are we going to do about it? Clear enough! We're going to do the one logical thing that suggests itself—give the I.F. stage *flexibility*—design it so that it will work at *any intermediate* frequency providing for optimum over-all receiver performance at *any signal* frequency. We're going to use *plug-in* I.F. coils!

An Exemplary Design—the Flexible Three

The little set we're going to talk about was built as something of an experimental job, largely to prove or disprove the practicality of two ideas: This I.F. plug-in coil one; and the *combination of a superhet and converter* in one small unit. It turned out to be such a downright good performer and it so conclusively demonstrated the value of both ideas in application that we're presenting it here as a finished laboratory model for duplication in exact detail by any reader who wants to build an effective and certainly inexpensive assembly which will:

1. Work as a converter with any broadcast band receiver. (Frequency range "5 and under" to 200 meters.)

2. Work as a variable I.F. converter with any all-wave receiver and primarily to effect U.H.F. reception beyond the tuning range of that receiver.

3. Work as a variable I.F. superhet with tuning range of from "5 and under" to 600 meters or higher.

Three tubes are employed. "Front end" coils are plug-in and individually designed to provide for maximum R.F. efficiency at related frequencies and in the given tuned circuit. I.F. coils are similarly *plug-in* for convenient change and are

Left—Illustrations show complete converter-superhet unit in operation; center, top view with one of the interchangeable plug-in i.f. transformers; lower photo, bottom view of the unit.

Raymond P. Adams

Superhet

three in number: one 456 kc., one 1500 kc., one 3000 kc. (with a 175 kc. item a possible addition for use with long wave inputs above 500 meters). These individual transformers are mounted on six-prong laminated plugs, and the leads are terminated in such a way that with any coil in place its primary will be connected into the high frequency mixer's plate circuit and its secondary into the second detector's grid circuit. The second detector works, of course, at I.F. frequency but no I.F. tube is employed. Thus but one coil change is necessary when one shifts from one intermediate value to another.

The 6-prong plugs are related to a 6-prong socket, two terminals of which do not connect to any of the I.F. transformer's leads, but lead out for external connection. Three special output coils, each continuously tunable over a wide range, are used for *converter* operation (one with range of 250-560 meters, one 135-270 meters, one 66-150 meters), only one of these coils being used at any one time. The converter output items are 6-prong and replace the I.F. transformer in the 6-prong socket. The low impedance output windings terminate within the coil forms so that the winding leads (with coil plug-in) make connection not into the second detector grid circuit but to the two socket prongs to which are tied the shielded wires for link coupling the converter to the main receiver.

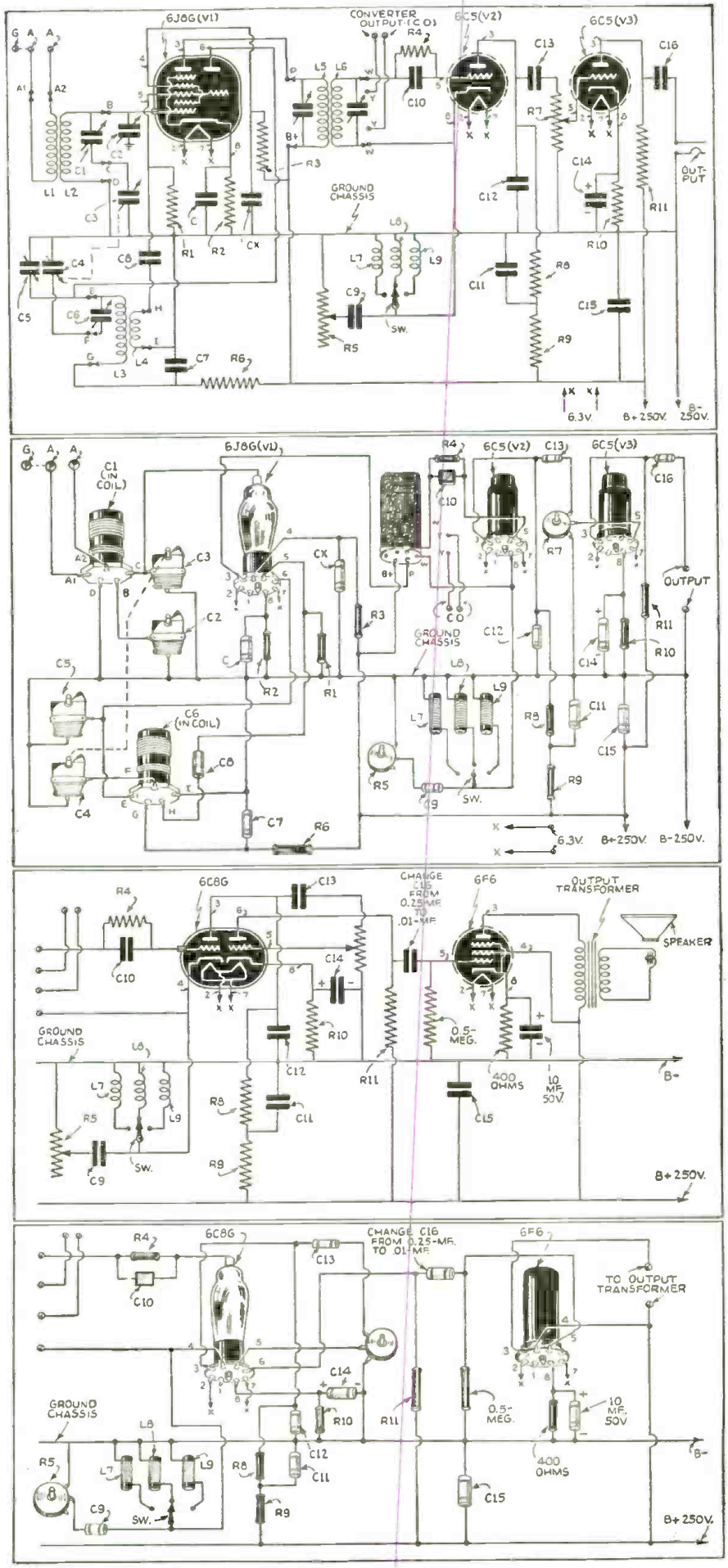


Fig. 1, top diagrams, show schematic and picture circuits of the unit wired for use as a short-wave converter. Lower two diagrams, Fig. 2, schematic and physical hook-ups, providing for the addition of a power pentode output tube.

The receiver can is really very compact and small. The unit is complete except for power supply, may be powered (maximum 25 ma.—250 volts "B" and .9 amps—6.3 volts "A") by an external A.C. pack or by any receiver with reserve power capacity, and is designed for headphone operation when used as a super, though a pentode may be substituted for the A.F. triode if the necessary circuit changes are made and if speaker output is desired.

The Circuit

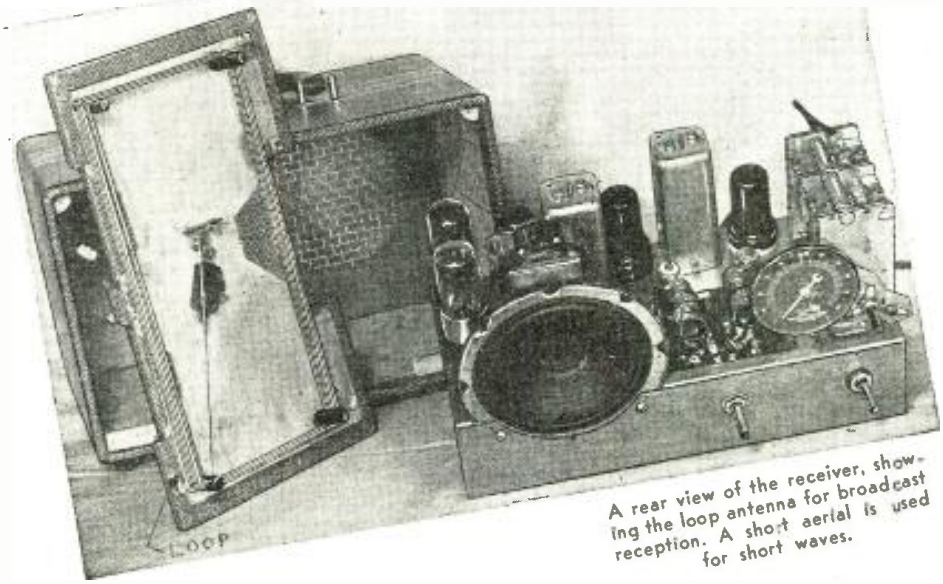
The circuit is really very simple. See Fig. 1. A 6J8G is used in a very efficient self-excited mixer circuit, the H.F.O. portion being plate instead of grid tuned (coils are wound like conventional items but have the windings "in reverse" in circuit position)

(Continued on page 309)

You Can Build This Modern 5-Tube

John Crouch

A truly up-to-date 5-tube portable receiver, which will operate on A.C. or D.C. is here presented.



A rear view of the receiver, showing the loop antenna for broadcast reception. A short aerial is used for short waves.

● REQUIRED: A set which was easily transportable for vacationing, and yet did not sacrifice any of the efficiency of *high gain* tubes available for use in electrically-operated sets. The set should work on *short waves* as well as broadcast and while communication receiver performance is not expected, it should be able to pull in strong stations clearly.

The result: An A.C.-D.C. job using the new 12 and 35 volt heater tubes of the highly efficient single-ended metal type, together with 2 bantam type glass tubes. The receiver is a *two band-job* covering the broadcast band and short waves from 18.5 to about 6 mc. On the broadcast band reception is by means of a self-contained loop. On the short waves an aerial is necessary. It was originally intended to use the loop on short waves, too, but tests showed that while pick-up with a loop on the short waves was remarkably good it was impossible to get the antenna and oscillator tuning condensers (which are ganged) to "track" together. If the builder is prepared to sacrifice single dial tuning he can experiment with a loop on the short waves. One or two turns of No. 18 wire on the same frame as the broadcast band loop will do the trick.

Copper Oxide 2nd Detector

A novel feature of the set is the use of a *Westector*, type WX, as second detector. This is a copper oxide half-wave diode made especially for use as a *diode* detector. It is British-made, and its use affords slightly more audio volume than if a combination diode-pentode tube is used as 2nd det.-1st A.F. amp. Using the Westector as 2nd det. and A.V.C., a separate tube, 12SJ7, is used as 1st A.F. stage. For those who don't want to bother with the Westector an alternate circuit for 2nd det. and 1st A.F. is shown using a 12C8 duo-diode-pentode tube.

Reverse Feedback Used in Audio

Another feature is the use of *reverse feedback* over the two audio stages. This reduces distortion considerably at the expense of some loss of audio gain. However, the audio system was purposely made with extra gain to take care of this. When the wave change switch is in the S-W position the reverse feedback is automatically cut out, leaving full audio gain available as it is more apt to be needed on the short waves. The *feedback* is from the speaker output transformer to the cathode of the 12SJ7 tube.

New Tubes Used

The use of the 12 and 35 volt, .15 amp. heater tubes means that the series dropping resistor in the heater circuit can be of very low value and low wattage. This means that no line cord resistor or ballast tube is required. As a result there is much less heat dissipation from the set than was the case with old tubes. The total line consumption of the set is only about 27 watts.

The mixer stage is a 12SA7 single-ended metal pentagrid tube of unusual design. Reference to the circuit shows that the oscillator feedback coil is in series with the cathode and that there is no oscillator anode grid in this tube. The cathode feedback arrangement results in good frequency stability on the short waves. The mixing efficiency of the tube is high compared to most pentagrid converters.

The single I.F. stage uses a 12SK7 single-ended metal tube. This is an improvement on the 6K7 tube and results in about 30% more gain. The 1st A.F. is the 12SJ7, a similar improvement on the 6J7. The output tube is a 35L6GT, a bantam glass beam power tube, similar to a 25L6 except for its 35 volt heater. The rectifier is a 35Z4GT bantam glass half-wave rectifier.

Variable Inductance I.F. Transformers

The permanence of alignment of the I.F. stage is assured by the use of iron core transformers, provided with adjustable cores instead of adjustable trimmer condensers. This type of trans-

2-Band "Portable"

Uses Up-to-Date Tubes and Circuits

This AC-DC Portable Receiver uses five modern tubes and covers the short-wave (6 to 18.5 mc.) and broadcast bands. It has a loop antenna, copper oxide second detector and features reverse feed-back in the audio amplifier.

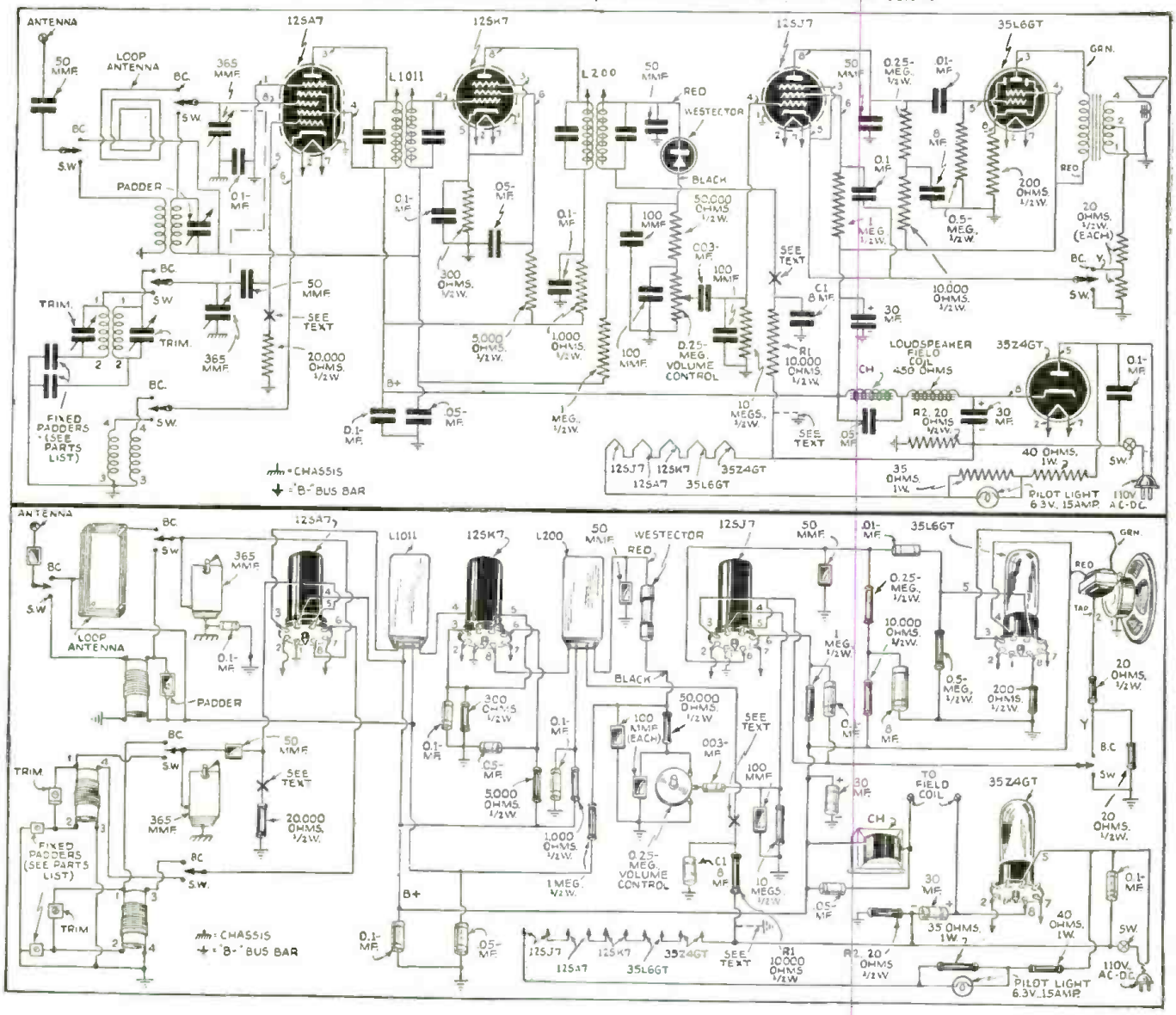
former is also very compact. The I.F. employed is 456 kc.

Construction

There are no special points about the assembly of the set. Mount the sockets and I.F. transformers first and complete the wiring of the heater circuits as far as possible at once. Note particularly that the chassis is *not* connected to the circuit, except through a .1 mf. condenser and to the rotor of the tuning condenser. The oscillator coils are mounted on the wave-change switch so that they are *above* the deck of the chassis. The S.W. antenna coil is mounted on the switch so that it is *below* the chassis deck level. It is necessary to alter the two oscillator coils. This is done after the receiver has been assembled and checked. A 0-1 ma. milliammeter is connected in series with grid No. 1 of the 12SA7 at point X on the diagram. The number of turns on the tickler or feedback winding of the oscillator coil (the winding in the cathode circuit of the 12SA7) will have to be adjusted as follows: On the *broadcast* band turns should be removed, one by one, until the meter shows a reading of 0.5 ma. with the tuning condenser at mid-scale. On the S.W. coil the tickler should be adjusted so that with the tuning condenser *fully closed*, the current reading is from 0.2 to 0.25 ma. With this coil it may be necessary to rewind the tickler with No. 28 D.C.C. wire as the number of turns already on it may be insufficient. However, first try removing turns, one

(Continued on page 303)

Complete wiring diagram for building the portable A.C.-D.C. receiver is shown below.



The EMQ 2½ Meter Transceiver—

It Talks Both Ways

Mr. McQuade obtained fine results on 2½ meter phone with this transceiver. It uses two tubes and can be built for batteries or A.C. operation.

Edward McQuade W1EOG

● A FRONT view of the transceiver with W1EOG (the author) at the controls is shown in the photograph with a top and bottom view to give the builder an idea of how the transceiver was constructed.

The carrying case for the transceiver is made of ¼" plywood and measures 19" x 12" x 10". The case is made a little large to provide room for "B" batteries, vibrator pack, etc. The sub-panel is constructed of 20 gauge sheet metal. After all the holes are drilled for mounting parts, the sub-panel is bolted to the front 10½" from the bottom of the case. The front panel and the sub-panel are arranged to unscrew from the front of the case to make it easier for repairs or wiring.

Facing the transceiver the layout is as follows: The tuning control is on the right, the volume control is on the left and the "Receive—Transmit" switch is in the center with the loudspeaker just above the tuning and volume controls. The plug for the microphone is mounted in back on the sub-panel. The knobs and dial scales were made from old Atwater Kent dials; a jigsaw was used to cut the knobs out and the scales were filed down, drilled out and mounted with screws. The pointers on the knobs were cut from a piece of metal left over from the sub-panel. These were soldered to the coupling shaft in the knob with the pointed section sticking out.

The transceiver uses glass tubes, V1 is a 76 and V2 a 42. Other tubes that were tried and found suitable for V1 (det. tube) were 6C5, 37, 76, or 56 and for the audio (V2) 6F6, 41, 42, or 2A5. If the 2A5 and 56 tube are used, make sure the filament voltage is 2½ volts. The fixed resistors may be of the ½ watt or 1 watt type, with the exception of R6, which is rated at 10 watts or more at 25,000 ohms.

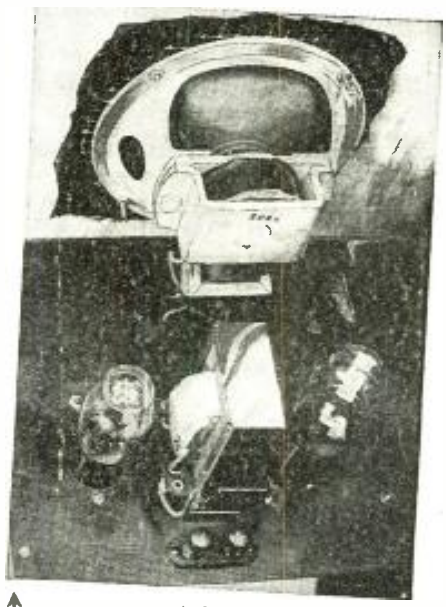
Wafer sockets may be used if care is taken while soldering. Of course, if the junk box has an isolantite socket, it should be used for the detector V1.

A 10 mmf. variable condenser with an insulated shaft coupled to it is used for tuning any suitable midget condenser cut down to one plate on the rotor and ne on the stator, for tuning. Good band-spread can be maintained by bending the rotor a little from the stator after the transceiver has been calibrated. The transceiver can be

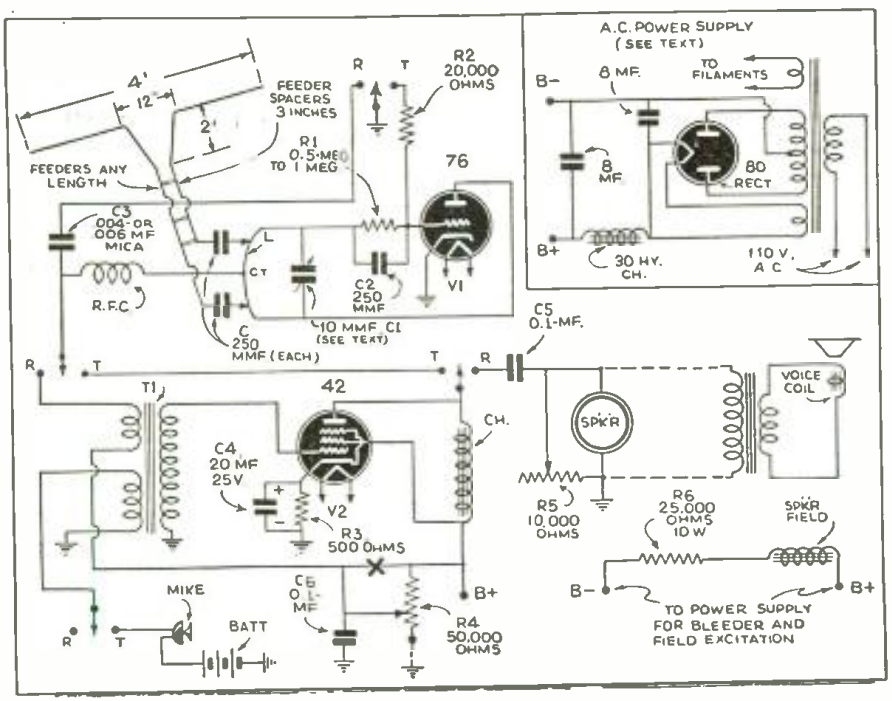
(Continued on page 306)

The portable 2½ meter transceiver—it carries 2-way phone.

Bottom view of transceiver—the parts are few and the construction simple.



Top-rear view—Choke on right; mod. tube on right; det. tube left; A.F. transformer between tubes.



Left—Wiring diagram of 2½ meter Transceiver.

Build This

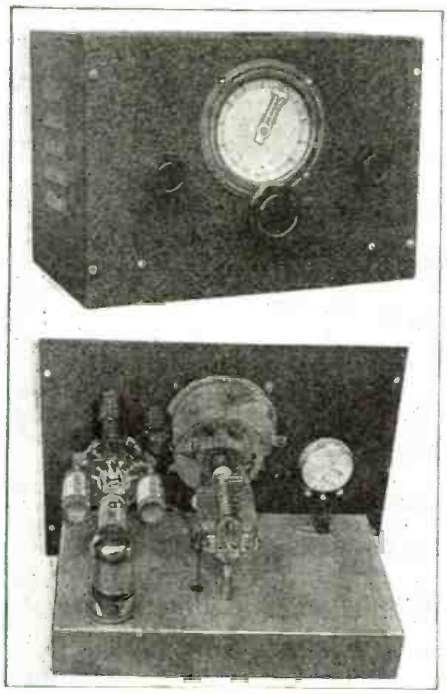
LOKTAL *1-Tube* PRESELECTOR

Harry D. Hooton, W8KPX

This preselector may be used as a simple one-tube receiver to cover all bands. Used as a single tube regenerative preselector ahead of the average superhet, it will greatly improve the signal strength and the selectivity. For general short-wave coverage or Ham bands.

Here is the one-tube preselector in actual use, connected ahead of a superhet receiver.

● THE congestion in the amateur and short-wave broadcast bands makes the use of a superheterodyne receiver almost a necessity for wading through the mass of clamoring signals from every corner of the globe. The use of a super, however (and this is especially true of the inexpensive types placed on the market by some manufacturers), does have its drawbacks. In the first place, unless a stage of R.F. (radio frequency) amplification is used ahead of the mixer, many of the weaker signals will be heard only as a lot of noise and image frequency interference is almost certain to be present.



Front and rear views of the preselector described by Mr. Hooton are reproduced above.

The single-tube regenerative preselector to be described here is designed especially for use with the small, low-cost type of communications receiver, although the additional gain and selectivity will improve the performance of any set. As shown in Fig. 1, the circuit consists of a 7B7 "high gain" loktal tube in a simple regenerative R.F. booster arrangement. *Band-switching* is employed, as indicated in Fig. 2. The five most popular amateur bands are covered with the strictly Ham model; the general coverage model is identical with the unit shown in the photographs, except that a 160 mmf. tuning condenser is employed instead of the 50 mmf. type specified here. The frequency range of the general coverage preselector is from 45 megacycles to 1.8 megacycles in five positions of the band switch. In either case the coils, if the constructor does not care to wind his own, may be obtained commercially already wound and mounted on the band switch with a calibrated precision dial to match. The cost of the complete preselector unit, if all the parts are bought at prevailing amateur net prices, will be only slightly over ten dollars.

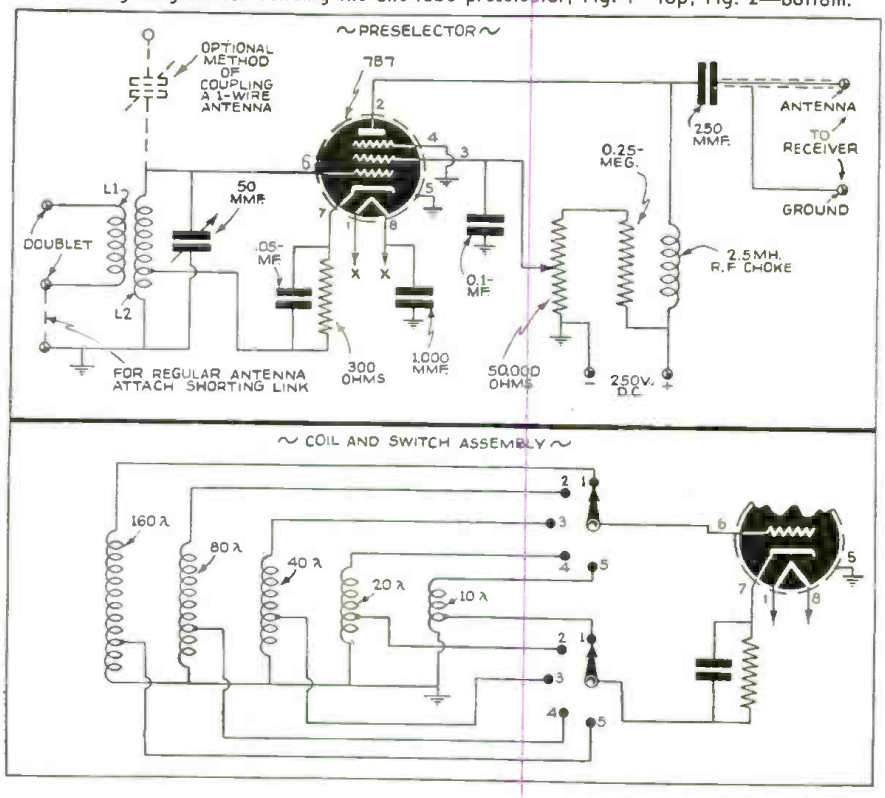
The actual construction of the preselector is not at all difficult and almost anyone should easily build and have it in operation inside of two or three hours at the most.

If the coils are to be home-made, wind these according to the data given in the coil table and mount them directly on the switch as shown in the photograph. Keep the leads short and direct and solder each connection carefully with rosin core (radio) solder. Do not permit the solder or the rosin to run over, or between, the insulation or the contacts of the switch. This particular type of switch has been designed to *short-circuit* all the unused coils in the circuit, so if reasonable care is used during construction, the losses due to absorption and leakage will be negligible and the results obtained with the more convenient band switching arrangement will compare very favorably with plug-in coils. It is not necessary to shield the loktal tube as it is already shielded internally.

The connection of the preselector to the receiver and its operation is simplicity itself: Merely attach the shielded wire or

(Continued on page 304)

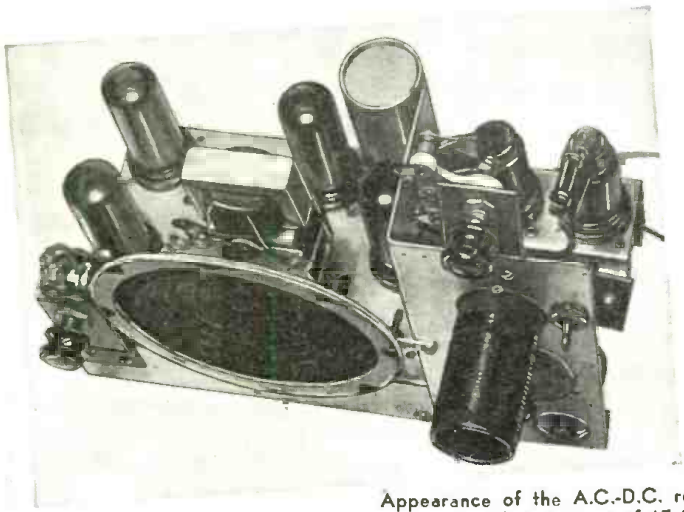
The wiring diagram for building the one-tube preselector; Fig. 1—top; Fig. 2—bottom.



All-Wave *Space Explorer* Six

H. G. Cisin, M. E.

A simple A.C.-D.C. receiver for the short wave "Fan"—Has dual beam power output—provision for extra speakers—17 to 2000 meter range—no ballast tube or line resistance cord needed.



Appearance of the A.C.-D.C. receiver which has a range of 17 to 2000 meters.

● THIS powerful, compact, six tube all-wave receiver contains many interesting and novel features. It is designed to give complete coverage of the *short wave, broadcast* and *long wave* bands through the use of overlapping plug-in coils. *Bandspread* is available on all bands by means of a low capacity variable condenser shunted across the main tuning condenser.

The circuit incorporates a refinement of the well-known tuned regenerative detector. When properly designed as to its constants, this is one of the most sensitive circuits ever devised. It has the ability to pick up weak distant signals from stations eight to ten thousand miles away. Therefore, there is no necessity for the addition of more radio frequency stages. In this set, the regenerative detector is the metal tube 6J7.

Regeneration Control

Regeneration is controlled by varying the 6J7 screen and plate voltages simultaneously with a potentiometer. This gives gradual, smooth control, making it possible to build up a weak signal readily, without fear of losing it through over-regeneration.

The rectified R.F. signal is fed through a resistance coupling into a first audio stage employing a 6C5 tube. The voltage gain attained by this tube is approximately fourteen-fold. The second audio (or power output) stage is resistance coupled to the first stage. The output stage uses two 25L6 beam power tubes in a parallel arrangement. These tubes provide high power output at the relatively low plate and screen voltages available without the use of a transformer. Moreover, this high power output

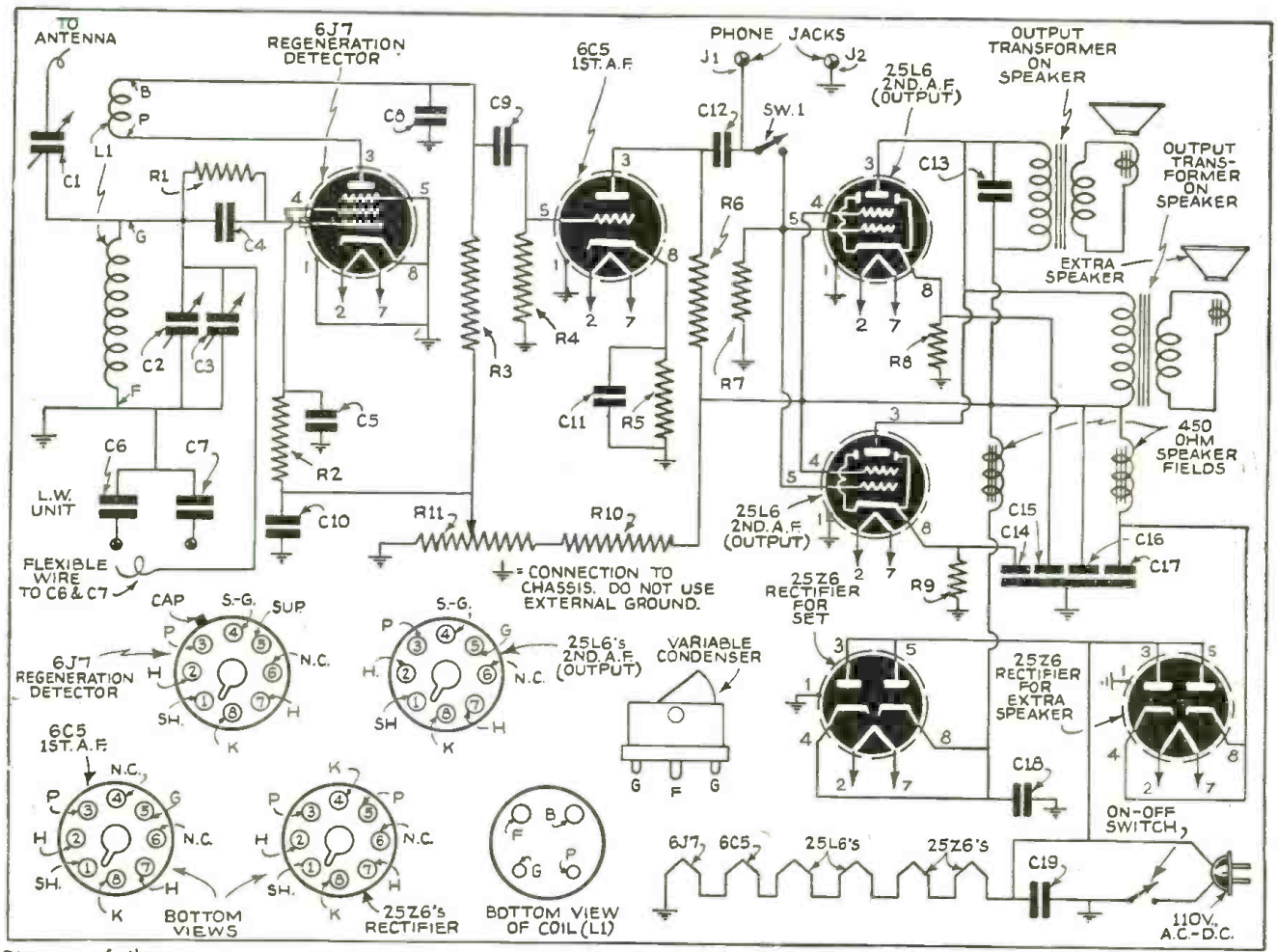


Diagram of the receiver—its simple design makes it easy to build and tune.

is obtained with high sensitivity and high efficiency. The power output at all levels has low third and negligible higher order harmonic distortion. Each beam power tube has an output of over two watts. The great advantages of beam power operation are attainable because of the effective suppressor action given by the space charge and also of the low screen current of the beam power tube.

Two Rectifiers Used

Two separate 25Z6 rectifiers are used; one provides rectified current for the receiver speaker field and the various plates and screens of the functioning tubes. The second rectifier makes available rectified current for one or more additional speakers. Each of the 25Z6 tubes is employed as a half-wave rectifier. Since each tube is able to furnish a maximum D.C. output of 85 milliamperes per plate, this gives a measure of the rectified current made available by the second rectifier for additional speakers.

The power supply is the standard A.C.-D.C. circuit described in the author's patent No. 2,086,256. However, a new feature, covered in claim 3 of this patent, has been introduced for the first time in this receiver; namely, the elimination of the ballast or limiting resistor in the filament circuit. This permits all current to be usefully employed, thus doing away with needless dissipation of energy in a ballast tube or line cord.

The Space Explorer is provided with a convenient switch, whereby the speakers may be cut out of the circuit and earphones cut in at the first audio stage. This permits foreign stations to be tuned in to maximum volume on sensitive earphones and then brought forth with full speaker volume at the flip of the switch. Obviously, this switch is also of great value when it is desired to use the receiver late at night without disturbing the neighbors.

The receiver "ON-OFF" switch is combined with the regeneration control potentiometer, mounted on a bracket at the left front of the set. The antenna control trimmer condenser is mounted at the rear. All other controls, such as station selector, band-spread, "SPEAKER-PHONE" switch and insulated phone jacks, are mounted on the compact metal front panel. The plug-in coils are also inserted from the front of the set into a coil socket mounted on this panel. The panel serves to shield the coil from the operating components of the receiver. A shield is also provided in back of the metal panel and at right-angles to it. It is clearly shown in the illustration.

The .01 mf. cartridge condenser, between the plates of the rectifier tubes and ground, provides an efficient filter, shutting off tunable 60 cycle hum. The filter system for the rectified current consists of the 450 ohm speaker field, by-passed at either end by electrolytic condensers. It has been found that 8 to 16 mf. at the input and 16 to 32 mf. at the output provide ample filtering under most conditions. The operation of the set is practically humless.

Set Is Simple to Wire

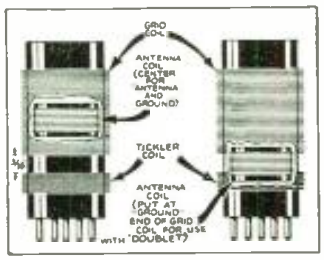
As will be seen from the diagram, this circuit is notably easy to wire. The metal chassis serves in all cases as the common *negative* return. There is no possibility of getting a shock when inserting earphones in the phone tip jacks, as one jack is grounded to the chassis and the other jack is blocked from the high voltage by a .01 mf. blocking condenser.

It is possible to bring in radio beacons, ship-to-shore code messages and other long wave signals from airports, etc., between 560 and 2000 meters, by means of a special

(Continued on page 299)

Question Box

How to Wind Antenna Coil



Arrangement of Aerial Coil. No. 1192.

? *On a plug-in coil, where should I wind the antenna coil when it is to be used (a) for doublets and (b) for connection to the regular antenna and ground? — L. B. Johnson, Rochester, N. Y.*

A. The accompanying drawing shows one method of winding and mounting the antenna coil; if it is to be used with a regular antenna and ground, the aerial coil may be placed at the center of the grid coil with the tickler wound at the end of the coil. If the antenna coil is to be used for connection to a doublet aerial, it is preferable to place it at the lower end of the grid coil, as shown at the right of the picture. Some constructors simply wind a few turns of insulated wire around the grid coil and use this for the antenna coil. In some cases where improved selectivity is necessary or desirable, the antenna coil is mounted on an insulated rod or arm, so that it can be moved toward or away from the grid coil, and thus vary the coupling between the coils.

Eliminating Interference

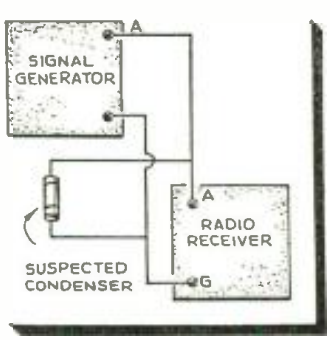
? *A friend of mine and I have transmitting stations which are located so close that the transmitting antennas almost cross each other. It is practically impossible for either of us to receive while the other is operating. Can you make any suggestions as to the elimination of this interference? John Dvoran, Topeka, Kan.*

A. There is practically no method of eliminating the interference caused by your receivers and transmitters due to the fact that they are so very close to each other. The only logical thing to do would be to separate the two transmitting antennas as far as possible and improve the selectivity of both receivers.

Wants Good Antenna

? *I have looked through many magazines but failed to find an antenna which I felt would be suitable for use on the U.H.F. for television. I would like to know if you could provide some information on the subject. L. K. Porosky, Brooklyn, N. Y.*

A. Antennas for use in the reception of television signals have been discussed frequently in Radio & Television. However, for best results it is advisable to install a special antenna that is expressly designed for the ultra high frequencies. Such antennas are made by L. S. Brach Co., Crosley Co., RCA and others. One of these was shown in the June "Question Box."



Hook-up for Testing Condensers. No. 1193.

Test for Noisy Condensers

? *Describe a simple test for noisy and "intermittent open" condensers. — Thomas Rentz, Far Rockaway, N. Y.*

A. If you have a signal generator handy, the diagram shows how to rig up a simple test for suspected noisy condensers—this test having been recommended by the Sprague Products Company. The oscillator is switched on and set for some frequency in the broadcast band, using an unmodulated R.F. signal. The radio receiver is tuned to the oscillator frequency, and the receiver volume control is turned up while the operator listens for a frying or crackling noise. Condensers which are continuously noisy will show up by this test.

By snapping the fingers against the condenser or "rolling" it slightly on its leads between the fingers, if a crackling noise is heard, the condenser almost certainly has intermittent or unstable internal contacts. This method is useful in testing all types of condensers—mica, paper, oil and electrolytic types, and no polarizing voltage is necessary to test electrolytic types by this method.

Filament in Television Tube

? *In a cathode-ray tube as used in television receivers, does the filament burn out the same as in ordinary vacuum tubes as used in radio receivers?—Paul Lasky, Newark, N. J.*

A. Yes. There is a filament (heater) in the cathode-ray tube and it will burn out if overloaded. However, the heater should last as long as those in ordinary tubes. These tubes are said to have a life of 2000 to 3000 hours, according to some manufacturers.

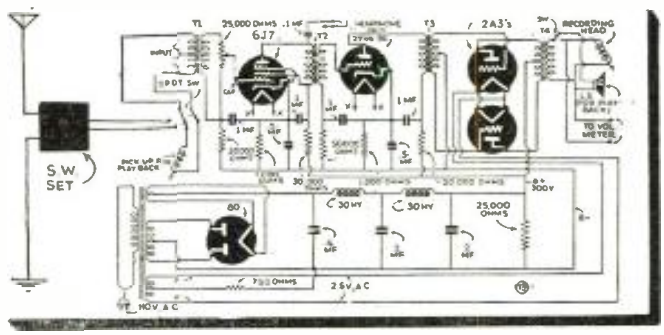
Dipole Antennas

? *Are dipole antennas necessary for television reception and can they be purchased?—Leon Copeland, Bronx, N. Y.*

A. Dipoles are the proper type of antenna to use for television reception. Several manufacturers make them and they are for sale at most any radio service store. By all means make use of a dipole if you expect the best efficiency on television signals.

Recording Programs

? *Please show diagram for using a 6J5, a 56 and a push-pull output stage with 2A3's, for recording and reproducing programs on phonograph records.—L. H. Wing, Johannesburg, S. Africa.*



Amplifier circuit for recording and reproducing programs. No. 1194.

Diagram is given herewith for connecting the amplifier stages you outline, together with an 80 type rectifier.

Testing Instruments

? *What instruments are needed to align and check multitube receivers?—Paul Weingert, Rochester, N. Y.*

A. Only a very small number of instruments are necessary to check and align any type of multitube receiver. The most important of these testing units being the modulated oscillator and D.C. and A.C. voltmeters. The meters are essential in checking the applied voltage at each circuit point from the power-supply. If the A.C. voltmeter is of the oxide-rectifier type, it can be used in addition as an output meter when connected across the receiver output when tuning to a modulated signal. If the signal is a steady tone such as from a test oscillator, the output meter will indicate the value of the detected signal. In this manner line up adjustments may visually be noted on the meter rather than by increase or decrease of sound intensity as detected by ear.

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

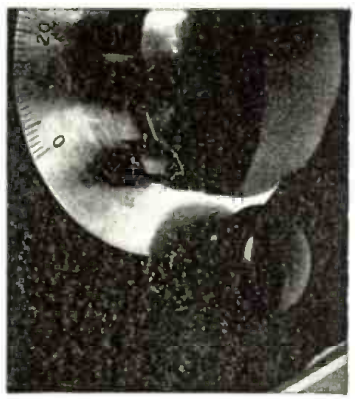
Newest Radio Apparatus

(Continued from page 259)

New National Parts

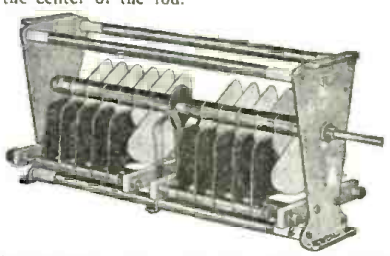
The new R-100U choke is similar to the R-100 type electrically, but is designed to mount directly on the chassis like a stand-off insulator. Its specifications are: inductance 2½ mh.; distributed capacity, 1 mmf.; D.C. resistance 50 ohms; current rating, 125 ma. National Co. makes these.

Various other bushings, terminal jacks, and the like are shown, but of particular interest to those who now have sets using National type O dials, there is a *friction vernier drive* for fine adjustment. This is mounted by means of one additional hole in the panel.



Transmitting Condensers

A complete new line of variable transmitting condensers, known as the "Giant" series, has been announced by Bud Radio, Inc. These condensers have a plate diameter of approximately 6" and are intended for high power amateur transmitters. Air gap spacings are from 0.250" to 1.000". They are available in single and dual units, with tie rods insulated with ceramic to eliminate any closed loops in condenser frame; rotor contact is made at the center of the rod.

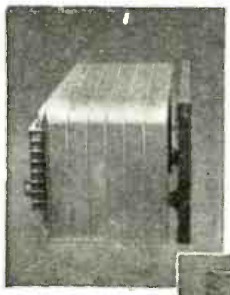


Bud also has a new series of oscillator and buffer coils that plug into standard 5-prong sockets. A complete new line of "Streamline" sheet-metal housings for receivers, amplifiers, and transmitters has also been introduced.

New Carrier Coupling Capacitor

Cornell-Dubilier engineers announce the new larger type CA Carrier Current Coupling Capacitor. This unit has fog type petticoats, giving a large creepage distance between terminals. The capacitors are constructed with galvanized malleable iron mounting flanges so that they may be stacked for series, high voltage connection. The base and top are sealed so as to afford leakproof service. The capacitor sections are designed for low resistance at high frequencies, and very low 60 cycle stress. Individual units are now made up to 46 kv., but may be stacked to operate at any desired voltage.

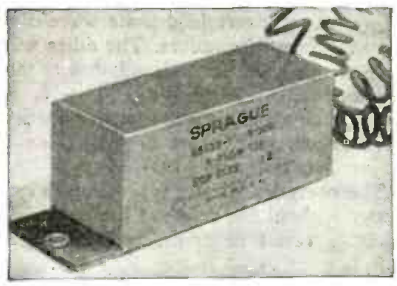
New Loop Antenna



A new self-contained loop antenna, the "Antenna-Scope," has just been announced by Consolidated Wire & Associated Corps. It attaches to any broadcast receiver with the two double vacuum cups provided, and may be matched to the inductance requirements of any TRF or super-het receiver by screw-driver adjustment of the iron core, permeability tuned, tracking coil.

The "Antenna-Scope" is claimed to reduce noise-to-signal ratio, eliminate static, and prevent noise-induction through a high Q circuit. No lead-in or ground wires are needed. The unit is 6½" wide, 11¾" long and ½" thick.

Solving the Duplicate Condenser Replacement Problem



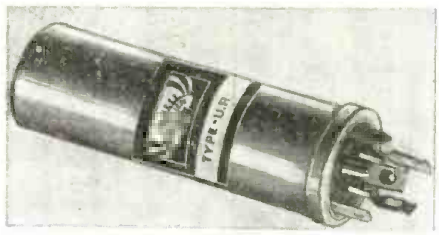
The problem of duplicate condenser replacements receives full attention in the new Sprague Condenser Catalog.

In addition to including a larger list of the more popular exact duplicate replacements, Sprague offers five types of Universal Replacement units in hard-to-get dual and triple capacities.

Besides the long list of exact duplicate replacements included in the catalog, the manufacturer will supply any duplicate replacement promptly. To obtain the proper unit it is only necessary to give the set manufacturer's name, part number on the original condenser, the capacity, voltage, dimensions and state whether it is a can or cardboard type.

New Type Electrolytics

The experience gained in designing and manufacturing electrolytics for more than 10 years has been incorporated into the design of the new Cornell-Dubilier Type UP etched foil dry electrolytic series. These capacitors are hermetically sealed in small cylindrical aluminum containers with terminals extruded for subpanel mounting. Special mounting prongs permit simplified and more economical installation.



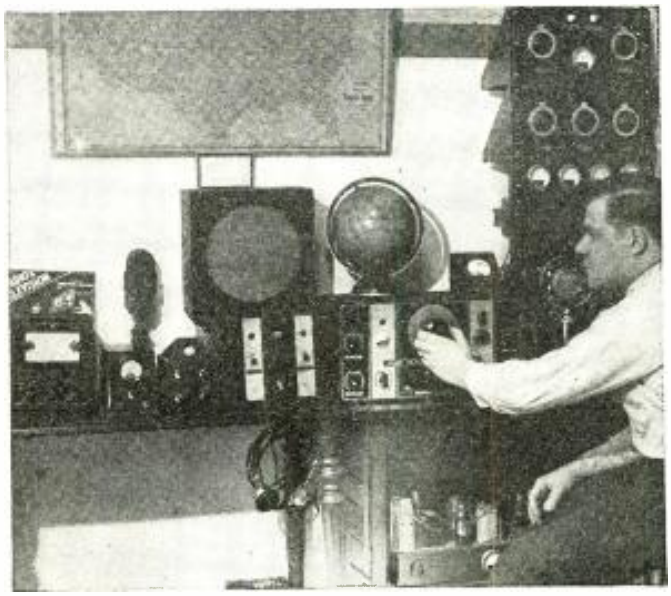
A special ventilating system allows internal gases to escape, but prevents air from entering, and a bakelite terminal base is used that completely eliminates leakage. Internal construction is all aluminum and electrolyte cannot come into contact with any corrosive metal.

(Continued on page 297)

Getting Started in *Amateur Radio*

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

In this lesson Mr. Palmer gives pointers on learning the code, and how to obtain an amateur radio operator's license.



Edward Trybus, W9WPZ, of Chicago, Ill., is the type of Ham all beginners try to emulate. Incidentally, his equipment includes a globe, a National receiver and—"R.&T."

Hints on Obtaining Operator's and Station Licenses

● NO one can give the details on just how to obtain the licenses necessary to operate an amateur radio transmitter, any more than anyone can tell a person just what to do to obtain an automobile driver's license. The person has to learn enough about the subject to be able to pass the license requirements regardless of how the details are varied by the examiners.

For this reason, the reader must not expect to find this an "open sesame" to getting those coveted slips of paper. However, diligent application in learning the code, learning to "copy," and in study of the principles of radio communication as outlined later will go a long way toward assuring the *ham-to-be* of getting his license.

As in passing an auto driver's examination and obtaining the driver's and owner's licenses, certain requirements must be met to satisfy the examiners. We have already told where application for the tests is to be made in different parts of the U. S. An informative leaflet can be obtained by addressing an inquiry to the nearest district examiner—the list will be found on Page 631 of the February, 1939, issue.

A few excerpts from the requirements needed to pass the government regulations follow:

A license is required to operate a *transmitter of any description on any wavelength.* However, only certain definite wavelengths are available to amateurs. The other wavelengths are used for other forms of communication, broadcasting and television. The wavelengths open to amateur operators were shown in a chart in Part I of this series. See February, 1939, issue.

The operation of any type of radio transmitter without the required licenses will invariably result in arrest and fine or imprisonment.

Amateur License Is Free

Amateur licenses are free but are issued only to citizens of the United States (this applies to the operator's ticket which allows the person to take charge of an amateur transmitter) with the additional requirement for the station license that the apparatus is not to be located on premises controlled by an alien.

An amateur license can be issued to any person filling the above-mentioned requirement, regardless of age, or physical condition—provided he successfully passes the examination. There are several blind amateurs who are well-known in ham circles, and there are many bedridden hams who find their hobby a priceless aid to happiness. There are hams of both sexes between the ages of nine and eighty, and all share equal rights.

It is not necessary to own a station or have a station license to operate an amateur station. A ham can have an operator's ticket and use the equipment and station license of a friend, but no one can take out a *station* license without first having an operator's ticket.

The "Communications Act" and additions and changes to this act are too lengthy for publication here. However, the complete regulations with all modifications and changes can be obtained from the Federal Communications Commission.

As we have stressed from time to time in these lessons, one of the lengthiest and most common stumbling blocks to expectant amateur operators is the requirement that a *code test* must be passed before a license can be obtained, even though the person never intends to use a "code" transmitter. The code is a necessary evil to amateur radio and every amateur has had to pass through the same long months of preparation before he obtained his "ticket." For this reason, most hams will be found very cooperative in helping the new operator pass his test. It is not unusual to find an old-timer spending many hours pounding the key of a code practice set for a new operator, to teach him how to copy the code. A number of excellent code practice tables are given in the book, *"How to Become an Amateur Radio Operator,"* by Lt. Myron F. Eddy. This book also includes many questions and answers of the type asked in the examinations for amateur license.

In addition to such cooperation, there are a number of amateur stations operating on regular schedules which send messages at various speeds especially calculated to help beginners learn the code. Some of these stations use code alone, while others use a combination of code and "phone" in sending the messages. Words and sentences are sent at different speeds and repeated by voice or corrected by mail for correctness. These "code teachers" will be found on all the

(Continued on page 302)

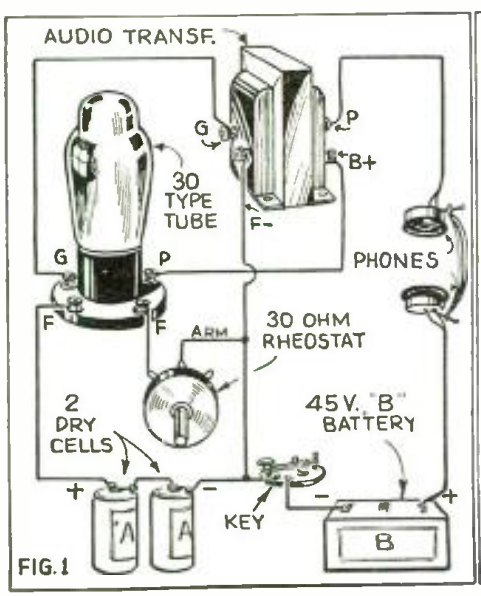
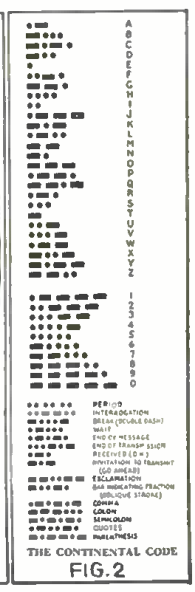


FIG. 1



THE CONTINENTAL CODE

FIG. 2

Simple Circuit for code-practice set, also copy of the radio code.

Newest Radio Apparatus

(Continued from page 295)

Dual-Section Midget Metal-Can Electrolytics

The Aerovox Corporation has added several dual-section numbers to its "Dandee" line. These are the 8-8 and 8-16 mf. 450 v.; 8-8, 8-16 and 16-16 mf. 200 v.; and the 20-20 mf. 150 v.; and 10-10 25 volt. The 10-10 mf. 50 volt unit, previously included in the line, rounds out the dual-section numbers.

"Featherweight" Portable

The Pilot Radio Corporation is offering its "Featherweight" Portable. This set introduces the *economizer*, an ingenious device which can be turned off or on at will. Through its use, the listener can cut the consumption of battery current about fifty per cent when maximum power is not required.

The snap-on cover is detachable and snaps on the back of the case when the set is in use.

Electrostatic and Electromagnetic Television Cathode Ray Tubes

Cath-Ray Electronics Corporation is offering a complete line of precision and high sensitivity electrostatic and electromagnetic television cathode ray tubes, producing a brilliant white picture, which is said to be exceptionally free from distortion, and to afford clear pattern, fine line and high sensitivity. Tubes are available in 5" to 12" sizes.

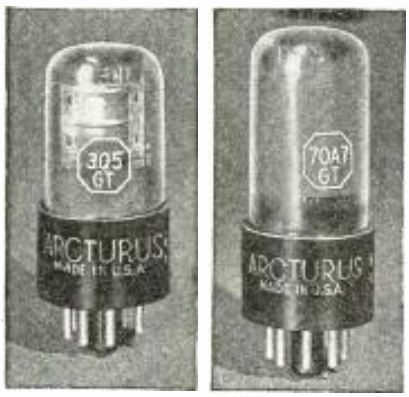
Lightweight Portable

The new battery-operated Majestic receiver weighs slightly more than three pounds complete with batteries and built-in aerial ready to play. The radio measures only 6¾ inches high, 5½ inches wide and 3½ inches deep. It tunes standard American broadcasts and is extremely sensitive. The cabinet is furnished with handle, and provision is made for attaching shoulder carrying strap.

Two New Arcturus Tubes

Designed primarily for the dual function of output and half-wave rectifier service in A.C.-D.C. receivers, the new Arcturus 70A7GT Midget Tube also has the rectifier heater tapped so that a .150 ampere pilot lamp may be connected between pins No. 6 and No. 7, thus making it suitable for triple duty use in combination portable, battery-operated A.C.-D.C. receivers, and in straight A.C.-D.C. sets.

The heater voltage of this tube is 70 volts. Heater current is 0.15 ampere. Plate and screen grid voltages of the power amplifier section are 110 volts; power output is 1.5 watts; A.C. plate voltage of the rectifier section is 125 volts maximum and the D.C. output current 60 ma. As the D.C. output current flows through the pilot lamp section of the heater, the tube is intended only for circuits where a pilot lamp is required.



Arcturus' new beam power amplifier, type 3Q5GT, is a filament type beam output unit having a center point connection to filament, which makes possible either a series or parallel arrangement of the two halves. Filament voltage is 2.8 volts for series filament operation and 1.4 volts for parallel filament operation. Filament current is 0.05 ampere for series and 0.10 ampere for parallel filament operation.

New Heavy Duty R.F. Relay

An R.F. relay, which handles up to 1 kw. with ease through its ⅜-inch self-cleaning silver contacts, has been announced by the Gordon Specialties Company. A ½-inch spacing of contacts is provided so that high potentials may be handled with ease, and the magnet is amply strong to close them, for it has a 4-lb. pull in its closed

position. The relay, which is of the double-pole, double-throw type, is practically free from hum and has absolutely no chatter or bounce in the contact arm, according to the manufacturer's statement. Among its uses are antenna change-over, multi-band tank switching, and 60 cycle power switching. Uses but 5 watts on 110-volt, 60 cycle A.C.

New Television Fuse

What the manufacturers believe to be the lowest range fuse ever made by man is the 1/1000 ampere vacuum enclosed "Video" Littel-fuse, now going into production.

There are six sizes available between 1/1000 and 1/16 ampere.

These fuses perform a two-fold function in television: To protect the equipment itself against damage due to loss of bias, insulation break-down, shorts, etc. And (probably most important) protection against shock to persons working on the equipment. In some cases as low as 10 milliamperes is dangerous; and a 1/500 ampere fuse is ample protection.

Because of the vacuum enclosed feature, these new fuses break unusually high voltages—20,000 volts peak being the maximum.

The physical size is only 1¼" x 9/32" diameter.

Power Rheostats

The unique construction of the 50-Watt All Metal Rheostats IRC Type PR-50, just introduced by the International Resistance Company, results in a reduction of operating temperatures to almost half those obtained with rheostats of conventional design and of the same size. Operation of the rheostat at full load in any portion of the resistance winding down to 25% of full rotation is made possible without exceeding the normal temperature rise by more than 30 degrees C. The 50 watt rating is based on a hottest spot temperature rise of 140 degrees C. when unit is mounted on a metal panel and power dissipated over the entire unit. Thus, this rating applies under the same mounting conditions for as low as 25% of full rotation with a temperature rise of only 170 degrees C.

The rapid heat dissipating properties of aluminum are utilized in the housing of the rheostat and in the core on which the resistance wire is wound. Through proper use of best grade mica and special asbestos, the insulation properties are ample to meet all ordinary requirements.

IRC Type PR-50 Rheostat is only 2⅛" in diameter. Depth behind panel is 1⅛". It is available in a full range of values from 0.5 ohm to 10,000 ohms. 25 watt models are also available.

New Radio Catalogs

Volume Control Replacement Guide

● FULLY revised to date and based on a complete line of controls including the new "midgets" and the low range wire wound units, Edition No. 2 of the IRC Guide covers both standard and special replacement controls.

Although special controls in exact duplicate replacement form have long been available, many short-cuts are now made possible with the new universal plug-in shafts. In many cases, a less costly standard control can now be used for "special" jobs merely by cutting the shaft, grounding a terminal or adding grid bias. Full details are included in the Guide.

The new Type D Midget Controls afford a complete range of units with suitable shafts, guide "funnels," etc., for all automobile radio replacements. The wire-wound controls cover all low range control and rheostat requirements up to 10,000 ohms. Higher ranges are supplied in the metallized type controls.

A.T.R. Catalog

American Television & Radio Catalog No. 139. Eight pages, size 8½" x 11". This new catalog covers a complete line of vibrator-operated and rectifier power supplies, including shaverpacks, low power inverters, radio inverters, industrial inverters, vibrapacks, polarity changers, "A" battery eliminators, battery chargers, rectifier packs, special supplies, "A-B" power units, and inverter vibrators. Specifications and list prices of all units are given.

A.P.C. Bulletin

Allied Products Company two-color catalog. Recorders and many of the special features of the Allied line have been reproduced with large illustrations so that the reader may easily see the salient features of the instruments. The manufacturer will mail a copy of this catalog free on request to engineers, sound studios, broadcasting studios, schools and similar organizations interested in recorders, turntables, scopes, cutting heads, recording blanks, complete systems, and other Allied products.

Two New Jefferson Catalogs

● TELEVISION components, power transformers, filter chokes, tube deflecting yokes, oscillation and output transformers—all are described and illustrated along with nine new radio parts items in the 16-page catalog 391-R recently published for distribution by the makers, the Jefferson Electric Company.

The other new Jefferson catalog is a 32-page replacement transformer guide, which includes data on virtually all radio receivers marketed during the past ten years. The book shows what replacement power, audio (input and output) transformers, and chokes are needed for the various sets. (Bulletin No. 391-RG.)

New Oxford-Tartak Booklet

● UNDER the name "Speaker Encyclopedia," Oxford-Tartak has issued another catalog, listing its junior series, its Permag, electrodynamic and magnetic replacement speakers, and speakers for public address systems, both of the Permag and electrodynamic types. This catalog gives pictures, prices and descriptions, and includes a very interesting chart which shows what power loss obtains due to mismatching between speaker and output of set.

Also issued by the same company is Vol. 1, No. 2 of Techni-Talks. This sheet deals with the matching of speakers to public address installations, and tells the effects of mismatching speakers to amplifier outputs.

Burstein-Applebee Catalog

● A 96-page catalog, known as "Hot Shot No. 3," has just been issued as a supplement to Burstein-Applebee's general catalog No. 55. In this new catalog, sections are devoted to radio sets, P.A. sound, new Ham gear, tubes, batteries and test instruments.

New Cornell-Dubilier Catalogs

● THREE new C-D catalogs have just been issued. No. 165-A gives prices, pictures and specifications of the well-known Cornell-Dubilier dry electrolytic capacitors, wet electrolytics, tubular paper condensers, Dykanol transmitter and filter condensers, mica transmitting and receiving condensers, paper condensers for various purposes (cased and uncased), auto generator and vibrator condensers, radio interference filters, paper and electrolytic replacement condensers, and describes a book on electrolytic capacitors by Paul McK. Deeley.

Catalog No. 166-A describes and lists in detail the entire C-D line of "Quietone" radio interference filters, of which there are several models. The catalog also contains numerous photographic illustrations and diagrams.

The same company's catalog No. 167-A shows in word and picture the C-D capacitor analyzer, the capacitor bridge, and various capacitor decades.

S.W. Time Chart

Dressed in colors, larger, and folded in a new way is the latest edition of the International Chart of the Air. One new feature is the employment of two special clock dials, the inner one being rotated to show the time in any of the world's twenty-four time zones.

It is published by the Radio Listeners' Guild. Comprehensive listings of short wave stations in various groups by meter bands are among its features.

New Superheterodyne Victrola

RCA Victor has just announced a low priced 5-tube superheterodyne radio-phonograph combination. Designated as Victrola Model U-8, this small, compact instrument is designed for use with a television attachment, in addition to providing high quality record reproduction and broadcast reception.

Television Receiving Tubes Available

Nine television receiving tubes, including four Kinescope picture tubes, three amplifier pentodes, and two half-wave, high-vacuum rectifiers, have been made available by the RCA Manufacturing Company to tube distributors and dealers for renewal sale in areas where television service has been or will be inaugurated.

Television Parts for Experimenters

To assist amateur television enthusiasts and experimenters in furthering television development, RCA has made available a number of parts used in modern deflecting circuits in television receivers employing Kinescopes.

Power transformers, and vertical and horizontal oscillation (feedback) transformers are now being offered the experimenter for use with 5-inch, 9-inch and 12-inch Kinescopes. For the two larger tubes a yoke, a filter capacitor, and a vertical and a horizontal output transformer are listed.

For the 5-inch tube alone the following parts are listed: two-section filter capacitor, low voltage reactor, three-section filter capacitor, high voltage rectifier socket, horizontal coupling capacitor, and a vertical coupling capacitor.

Typical deflection and power supply circuit diagrams for all three tubes are available from RCA parts distributors, through whom the parts may be obtained.

New Broadcast Catalog

● A NEW 16-page catalog, No. 500-D, on Broadcast Units was recently issued by Thordarson Electric Manufacturing Co. It contains information on Thordarson transformers for all types of broadcast application, including the new Automatic Voltage Regulators which automatically maintain constant voltage supply for plate, filament, or power transformers.

Also listed and illustrated are the well-known Thordarson Tru-Fidelity transformers in three new groups, the "Major," "Bantam" and "Incher" series, available in high permeability chromium-plated drawn cases. Up to 85 db. hum reduction is possible for most types. The "Incher" series with a flat frequency response within ± 1 db. from 40 to 12,000 c.p.s. are only 1¼" high (including lugs) and 15/16" in diameter.

Free copies of catalogs mentioned on this page may be had by writing to Service Dept., RADIO & TELEVISION, 99 Hudson St., New York City.

All-Wave Space Explorer Six

(Continued from page 293)

long wave coil used in conjunction with a long wave unit consisting of two .0001 mf. fixed mica condensers. When employing the long wave coil, the flexible grid wire is connected either to one or both of the .0001 mf. condensers. This permits the .00014 mf. (140 mmf.) tuning condenser to cover the long wave range. Of course, the range is increased by the addition of the second .0001 mf. condenser.

The chassis size is 9½" long by 4½" deep by 1½" high. The metal front panel is 3" by 8".

PARTS FOR SPACE EXPLORER SIX

HAMMARLUND (Condensers, Coils and Sockets)

1—3 plate 20 mmf. Band Spread Variable Condenser, type MC-20-S (C3)
1—19 plate 140 mmf. Variable Tuning Condenser, type MC-140-S (C2)
1—Antenna Trimmer, 3 to 30 mmf. type MEX-30 (C1)
1—Set Short Wave Plug-in Coils 17 to 270 Meters, type SWK-4 (L1)
1—Broadcast Coil, 250 to 560 meters, type BCC-4 (L1)
1—4-Prong Isolantite Coil Socket, type S-4
6—8 Prong (Octal) Isolantite Tube Sockets, type S-8

CORNELL-DUBILIER (Condensers)

3—Mica Condensers, .0001 mf. (C4, C6, C7) Type 5W-5T1
1—Mica Condenser, .0005 mf. (C8) Type 5W-5T5
3—Tubular Paper Condensers. 0.1 mf. 400 volts (C5, C10, C11) Type DT-4P1
4—Tubular Paper Condensers. 0.01 mf. 400 volts (C9, C12, C13, C19) Type DT-4S1
1—Four Section Dry Electrolytic Condenser
C14—10 mf. 25 volts (Cat. No. UM-101)
C15—10 mf. 25 volts
C16—16 mf. 250 volts
C17— 8 mf. 250 volts
1—Midget Dry Electrolytic Condenser, 16 mf., 250 volts (C18)

I.R.C. (Resistors)

2—Fixed Resistors, 1 meg., ½ watt (R1, R2)
2—Fixed Resistors, 200,000 ohms, ⅛ watt (R3, R6)
2—Fixed Resistors, 330 ohms, ½ watt (R4, R7)
1—Fixed Resistor, 1250 ohms, ½ watt (R5)
1—Fixed Resistor, 20,000 ohms, ¼ watt (R10)
2—Fixed Resistors, 150 ohms, 1 watt (R8, R9)
1—75,000 ohm Potentiometer with Switch (R11, Sw2)

HYGRADE-SYLVANIA (Tubes)

1—6J7
1—6C5
2—25L6
2—25Z6

MISCELLANEOUS

2—Insulated Pin Jacks (J1, J2)
1—Speaker-Phone Switch (SW1)
1—Metal Chassis, 9½" x 4½" x 1⅓"
1—Metal Front Panel, 3" x 8"
1—Line Cord with Plug
3—Knobs
1—Dial
1—Small Screen Grid Clip
1—Roll Hook-up Wire
1 or More Dynamic Speakers with 450 ohm Fields and Output Transformers for 25L6 Tube
1—Special Find-All Long-wave Coil, 560 to 2000 meters.

COIL DATA FOR 1½" DIAMETER COILS

Range Meters	Grid Turns	Tickler	Spacing*
200–500	126T. No. 28	28T. No. 34	
135–270	82T. No. 28	16T. No. 30	1⅞"
66–150	38T. No. 26	11T. No. 30	1⅝"
33–75	18T. No. 24	6T. No. 30	1½"
17–41	9T. No. 16	5T. No. 30	1¼"
9–20	3½T. No. 14	3T. No. 30	1"

*Spacing is length of winding. All coils wound on 1½" diameter ribbed forms. Space between grid coil and tickler ¼". All ticklers wound with No. 30 D.S.C. wire (except 200-500 meter coil).

Let's Listen In With Joe Miller

(Continued from page 279)

ROUMANIA

A station on 12.16 mc., at Bucharest, has been reported operating at 1 p.m. and announcing in English, "This is the short-wave of the Polytechnic School in Bucharest, Roumania," then requesting reports, signing off with the National Anthem. Look for this irregular transmitter in early afternoons, as with the deplorable lack of courtesy of the YR hams in QSLing we must depend upon a broadcaster (S.W.M.) to help us verify Roumania.

ETHIOPIA

IABA, 9.65 mc., Addis Ababa, I. E. A. (Italian East Africa) now QSLs reports through the Ministero della Marina, Rome, or, if a direct QSL is desired, write the E. I. A. R. at Addis Ababa. Full schedule in station list. IABA will be an easy fall DX catch, in the early a.m. and near 3 p.m. Jack Buitekant, W2, reports IABA.

JAPAN

JVG, 14.91 mc., Nazaki phone, heard at 7 p.m., and JVA, 18.91 mc., heard often near 7 p.m., both by Gus Gallagher, W6. JZK, 15.16 mc., Tokyo, has added a half hour to the Overseas Program, now on 12 midnight-1:30 a.m. Jack Buitekant reports QSLs from JLT2 and JVW3, while brother Murray got these QSL's: JLU3, JLG3 and JLT2, FB going!

New frequencies and calls soon to replace the ol' reliable JVH, JVN transmitters are intended for broadcasting to Manchukuo; they are: JVW, 7.257 mc.; JVW2, 9.675 mc.; JVW3, 11.725 mc.; JVW4, 15.235 mc.; JVW5, 17.825 mc. JLG3, 11.70 mc., is off the air.

MOZAMBIQUE

A letter to Murray Buitekant gives a full list of the CR7 transmitters now on regular schedules, these being CR7AA, 6.137 mc.; CR7AB, 3.49 mc.; CR7BH, 11.718 mc.; and CR7BD, erroneously listed as CR7BB, 15.24 mc., the latter testing irregularly from 1-4 p.m. These stations are best heard in late Fall and Winter, and send very handsome cards.

JAVA

With a veri of YBF, 9.93 mc., at Nedan, Sumatra, from our old friend, P. C. Arends, Java's engineer-in-charge, come some valuable and exclusive data which will be printed as received.

PLE, 18.83 mc., Bandoeng, and PMC, 18.135 mc., ditto, often heard near 1 a.m. by Gus Gallagher, W6. Already from the fone list, Jack Buitekant reports PLU, 9.85 mc., near 6 a.m., nice going! Jack also reports YBF, as per our tip to tune near 5:30 a.m. Murray Buitekant already has cashed in on YBF, getting the QSL lately, along with YBG. That's cleaning up Sumatra, OB!

DX NOTES

VLR, 11.88 mc., Melbourne, Australia, is off the air, per Gus Gallagher. From OM Murphy at Auckland, N. Z., we learn that a VLR6 is in construction, no frequency known.

A Syrian SWL in Bloomington, Ill., William Shadid, reports hearing a Syrian station on 6.50 mc., daily 7:30-8:30 p.m., when it is quite possible for a station (if there is one) in Syria to be heard here.

"Scoop" List from Japanese Govn't

Call	Kc.	Meters	Kw.	Workdays on air in GMT.
YDC	15150	19.80	1.5	2300-0030 0330-0700 0930-1530
YDB	9550	31.41	1	idem (ditto)
	15310	19.61	1	idem
YDA	3040	98.68	10	idem
	7250	41.38	10	idem
YDX	7220	41.55	0.5	0230-0600 1230-1430
	5175	57.97	0.5	idem
PLP	11000	27.27	1.5	2300-0030 0330-0700 0930-1530
PMN	10260	29.24	1.5	idem
YBF	9930	30.21	1	
YBG	10425	28.77	3	These stations are
YCX	7530	39.84	1.5	in use for telephony
YBB	7870	38.12	1.5	and telegraphy at
PNI	8775	34.19	2	different times;
YCP	9125	32.88	2	most of them from
PMA	19345	15.51	80	2230 till 1100 GMT.
PMC	18135	16.54	80	
PMH	6720	44.64	3	
PLV	10060	29.82	3	
PMG	7465	40.19	3	
PLE	18830	15.93	80	
PLG	10680	28.09	80	
PLV	9415	31.86	80	
PLF	17855	16.80	10	

(Continued on page 317)

Practical Radio Ideas

Experiment in Radiation

(Continued from page 274)

working by adjusting the clips so that the bulb glows dimly.

A small 4-tube A.C.-D.C. set is converted to pick up the signals by connecting a six-foot length of wire to the detector control grid. No other changes are made in the set. The set works best with the volume set at low volume and with the tuning condenser plates all out (set at lowest capacity).

Various effects are obtained by changing the C bias on the tube and by changing the inductance in the plate circuit. Also by using a small R.F. choke in parallel with the loop, it is possible to control the frequencies radiated.

It was found that several small sets could be operated by remote control, using this circuit. As the light bulb varies in brilliance, depending on the signals present, it is possible to use this set-up to transmit sound over a light beam.—J. A. RIFFEL.

2 Detector Hook-ups

(Continued from page 274)

separate band-spread condenser, and is usually accepted as entirely satisfactory.

At present the circuit is being tested on the 20- and 40-meter bands, and data for these two coils is included herein as a guide to those who wish to try the circuit on these and other frequencies. The more important points to observe are:—

(1) The tuning condensers should be efficiently insulated from ground both for R.F. potential and D.C. current, particularly the former.

(2) A by-pass condenser should not be used between the plate-end of the R.F. choke and ground. A condenser at this point, if functioning properly, would prevent regeneration completely, or in some cases make it extremely difficult to control.

(3) All wiring carrying R.F. currents should be as short as possible. The use of *good parts* also cannot be stressed too strongly.

(4) If the "band-spread and antenna" tap does not seem to be working correctly, adjust it for the antenna and let the band-spread fall as it may. Condenser C3 should be able to compensate for any antenna inequality, so no trouble is likely to ensue that cannot be instantly corrected. If a doublet antenna is decided upon, the antenna tap is not used. In this case affix the tap for reasonable hand-spread. C1 is the *band-setting* condenser; C2 is the *band-spreading* condenser.

(5) With carefully planned construction and very short R.F. leads, this circuit should operate down to and including five meters; if 5 meter operation is contemplated, smaller tuning condensers should be substituted for the values shown and these should be wired across the entire coil instead of just across the grid section as here depicted. Removing the grid-resistance from its shown position and re-wiring it across the grid blocking condenser should also aid in high-frequency operation. The ohmic value of the grid resistance, R1, should in all cases be determined by experiment. With the circuit in Figs. 1 and 2, a value of three megohms will be about correct for ordinary regeneration. For super-regeneration, 5 megohms or higher should be used.

(6) Although this circuit will give good operation with triodes, we recommend the multi-grid tubes for superior output and ease of operation. Variation of screen grid voltage offers by far the most desirable method of feed-back control. Battery operation gives about the same result as with A.C. power. For those interested, Fig. 2 gives the details.

It will be fully apreciated if those trying this circuit and finding it satisfactory or otherwise will let the editors know through letters to RADIO & TELEVISION.—F. H. TOOKER.

Coil Data

Meters	Turns	Cathode Tap	B.S. and Ant. Tap
40	12	5	4
20	7	3	2.5

(All coils wound on standard ribbed forms.)

Parts Index

C1—140 mmf.
C —.00025 mf.
C2—25 mmf.
C3—35 mmf.
C4—0.1 mf.
C5—.002 mf.
R1—See text
R2—500.000 ohm pot.
RFC—5 mh.

Have Fun With This Parlor Radio Transmitter

(Continued from page 275)

to the baseboard by means of three small clips, bent from a strip of brass.

While the entire transmitter shown measures only 2" x 2¼" x 7¼", it could be compressed into a smaller space, if absolutely necessary. Likewise, and considering that you might use a transformer and some other parts, such as a standard battery tube, it could be built within a space measuring probably no more than 3" x 3" x 9", which would still make the transmitter one of the world's smallest.

Your home radio receiver is tuned to the frequency at which the miniature transmitter operates, and if you are not certain of what this frequency is, you can readily find it by having someone talk into the microphone of the transmitter, which should be placed, at first, near to the receiver, and then slowly turn the receiver dial until you pick up the voice through the transmitter.

An alternative model, not illustrated, was also built. For this a standard 3-cell focusing flashlight was selected as a suitable case (see Fig. 3) into which all components were fitted, including the power supply. This necessitated a surgical operation on the standard "C" batteries which are employed in this unit as "B" batteries, but all other parts were used as they came. (Or a 45-volt special compact type "B" battery, now available on the market, may be used.)

Should you wish to make the flashlight model, three 7½ volt "C" batteries, each of which contains 5 cells, are used as the "B" battery. Only 12 of these cells are required, re-arranged so as to slide into the battery compartment of the case. The batteries are dismantled and all screw terminals and excess sealing compound removed. The compound should be chipped off to the level of the brass electrode caps. Then one cell is clipped off each series and the four remaining cells folded together, using heavy wax paper between them and leaving the original cell connections intact. Flexible leads are used to connect the three sets of four cells and the whole assembly is wrapped in heavy paper. It may be dipped in melted wax if desired. The final voltage should be 18 volts.

The regular flashlight switch is removed and an ordinary small toggle switch substituted. The original bulb socket and holder are, of course, removed.

The socket for the tiny HY113 triode tube is held by a single bracket soldered to the case. The tiny mike transformer and the coil are similarly fastened.

The smallest condensers and ½ watt resistors are used. The connections are not difficult since the circuit is very simple. The tuning condenser is mounted by its lugs directly on the terminals of the inductance coil; the latter is an oscillator coil designed for 175 kc. work. It will tune only to the high frequency end of the broadcast band with the 70 mmf. condenser shown, but larger capacities may be used if so desired.

The "antenna lead" runs down through the case and out the bottom, where it is fastened to an insulated screw. The case itself is grounded to the "B" minus. Thus, when the case is held in the hand, it is in effect *grounded*. A foot or so of wire may be fastened to the antenna post and will give plenty of radiation. This antenna may be brought near the receiver antenna lead-in, or even to lamp cords in the house, which will act as an antenna.

The HY113 is plate-modulated by means of the mike transformer in the "B+" lead. This transformer, the smallest made, incidentally, is of the 200-ohm to grid type, and is designed for a single button mike. For those who want more sensitivity, the mike transformer may be connected as shown in Fig. 2, which will give *grid modulation*. Much lower input to the mike is needed with this connection, but the speech quality as received is rather poor, due to frequency modulation. The plate-modulation system gives very fair quality.

The mike is mounted in a small piece of plywood. Flexible leads connect it to the rest of the circuit so that the cap may be removed for adjustments. A hole in the plywood piece allows access to the adjustment screw of the tuning condenser.

Be sure to hold the unit so that the microphone is in a vertical plane when transmitting. Do not expect to get any DX with this unit! The plate power input is only 0.009 watt and with the very poor antenna used, an operating distance of a few feet or yards is considered excellent.

List of Parts

2—Medium size, 1½ volt flashlight cells; Eveready
1—Universal Model W microphone
1—UTC 0-14 mike transformer
1—Meissner coil, No. 14-3732
1—C-D 500 mmf. condenser
1—I.R.C. 50,000 ohm, ½ watt resistor
1—C-D 100 mmf. condenser
1—70 mmf. padding condenser
1—Toggle switch, S.P.S.T.
1—Burgess V3OBP battery (45 volts)
1—Pen lite cell

Beat Frequency Oscillator

(Continued from page 275)

either battery or other type, works very well.

The plate of the oscillator tube is coupled to the plate of the second detector diode (or the grid of the second detector triode or tetrode, if used) through a very small capacity C5, having a value of 3 to 5 mmf. This capacity may be formed by winding a few turns of insulated wire around the diode plate lead. R3 is adjusted for stable oscillation and then left at that setting. L1 may be 170 turns of No. 36 d.s.c. wire wound on a 1" diameter form, the cathode tap being taken at 55 turns from the ground end. A .00035 mf. condenser is required across the coil to tune it to 465 kc. (a preset condenser of .0005 mf. has been used).

This B.F.O. was recently described in *Wireless World*, London.

A Good 3-Tube "Portable"

(Continued from page 276)

portion," writes Mr. Eplin. "The crystal works best only in one direction, as everyone who has tried a megadyne will know. Although I intended to use the hookup as an all-wave job, I have trouble with the detector blocking, and no value of grid-leak or condenser and leak combination seems to help. If the tickler turns are of exactly the right number, the set works fairly well on high frequencies but now I'm using it exclusively as a BCL job. As such, it is very stable, with no tricks or streaks of temperament.

"Plug-in coils are used with an extra primary winding inside the BCL coils. Small condensers make for good selectivity on even the broadcast band, so I haven't changed the set to use a larger tuning condenser and a single broadcast coil. The combination of a variable resistor and small throttle condenser makes for very smooth regeneration control, although good control can be had with the condenser alone. The .001 mf. condenser across the secondary of the audio transformer helps to suppress the noise caused by a 32-volt light plant used in camp.

"The 32 first A.F. gives much more gain than the usual 30. I prefer a combination transformer and resistance coupled A.F. channel using a 32 and a 30 or 31 to the more usual transformer coupled 30 and 33. All the 33 tubes I have used are bad about fringe howls, and a fixed resistor across the transformer secondaries cut down volume. Some 32 tubes are microphonic, used as A.F. amplifiers, but no RCA tubes I have had are noisy or microphonic in this position. The R.F. choke and condenser in the output cuts down hand capacity and keeps the set from breaking into regeneration of a violent nature when running near the oscillation point. It is an old and very good idea gleaned from your magazine. The set works very well on 90 volts of "B" and makes a good *portable* because of its sensitivity and low current consumption. Midget plate batteries last a long time."

Engineering Bulletin E-7

A DUAL FREQUENCY CRYSTAL CALIBRATOR, published by Bliley Electric Co., Erie, Pa., size 6¼" x 9½".

Although the publisher makes no charge for this 8-page illustrated booklet, it is worth real money to any amateur or service man, for it gives a complete wiring diagram and instructions for use of a crystal calibrator. The book is clearly written, well illustrated, neatly printed, and appears to be authoritative on the subject which it covers. It gives the lie to the old saying that anything which is free is worth just what it costs. This free book is really valuable!

Getting Started in Amateur Radio

(Continued from page 296)

popular ham bands during the fall and winter months and some even operate during the summer. They can be heard on any suitable all-wave or short-wave receiver.

For those who have facilities for using a code-practice set, the diagram of a simple one is shown in Fig. 1. It consists of a type 30 tube, an audio transformer, a rheostat and batteries, with the requisite key and phones (commonly called "cans" by amateurs).

The parts are connected as shown in the circuit. They can be mounted on a small board, with the parts fastened down by means of woodscrews. When the key is pressed, a tone will be heard in the cans. By pressing the key, an experienced person can simulate the high-pitched whistles of C.W. (continuous wave) code signals. Of course, such a code practice set is of use in learning to copy only if an amateur or other person having experience in sending code is available for the practice periods. Otherwise, a code practice machine or the volunteer code practice stations mentioned above should be used.

So much for the code—all that is needed is plenty of patience and some spare time, and the required speed of 10 words a minute will eventually be achieved.

For practical experience in passing the written test, a knowledge of the regulations covering amateur radio is needed and this can be obtained from the leaflet obtainable through the district radio inspector.

In addition to this, questions are asked involving *basic transmitter theory*, and a general knowledge of the subject is necessary. Some of the data in the first four lessons of this course will be valuable in this respect. As an adjunct, a text-book on *transmitters* should be studied, to combine practical and theoretical knowledge. A list of several books of particular usefulness from this standpoint appears at the end of this lesson. While it is not requisite that the student obtain one of these volumes, much data which will be invaluable in passing the operator's test will be gained by carefully studying those parts of one of these volumes dealing with transmission theory. The books have been chosen to be understandable to a beginner in the subject. There are other books which delve more deeply into the subject and which can be added to the library when time and the purse permit.

The *station license*, which is needed before an amateur transmitter can be put on the air, is the permit authorizing the licensed amateur to use a rig of certain stated type and description on one or more of the regular amateur bands. To obtain this ticket with its sought-after call letters, the licensed amateur must fill in a printed form obtained from the district radio inspector, thus complying with the government regulations. This form is mainly to give a record in the district inspector's office of all the ham transmitters in his district and to indicate to the inspector that all the regulations of the Communications Act have been met with regard to the type of equipment used.

Finally, the applicant for amateur license is required to swear before a notary to maintain secrecy regarding all and any communications picked up. This may be done when the applicant has passed his written and code tests at the district inspector's office.

COLLATERAL READING

RADIO AMATEUR COURSE, *by G. W. Shuart*, W2AMN.

MANUAL OF RADIO TELEGRAPHY AND TELEPHONY, *by Admiral S. S. Robinson, U. S. N.* Published by the U. S. Naval Institute.

PRINCIPLES OF RADIO, *by Keith Henny.* Published by McGraw-Hill Book Co.

PRACTICAL RADIO COMMUNICATION, *by A. R. Nilson and J. L. Hornung.* Published by McGraw-Hill Book Co.

The Radio Amateur's Handbook. Published by the American Radio Relay League; 1939 edition.

Television Data

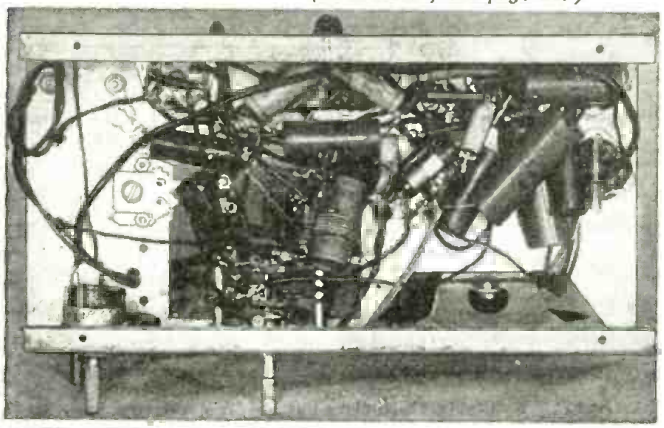
PRACTICAL TELEVISION, compiled by the Service Division of the RCA Manufacturing Co., Inc., Camden, N. J. This book contains 39 pages, size 8½" x 11" and is illustrated.

Any one owning or operating (or engaged in the servicing of) television receivers will find *Practical Television* an invaluable aid in his work. An introduction gives a brief description of television transmission and reception, after which there are explanations and diagrams of typical television receivers, with an analysis of the circuits used. There is a section dealing with the general problems of installation and the erection of an antenna. Numerous pictures of test patterns on the end of the C-R tube give a key to the faults from which a television receiver is likely to suffer and the remedies for them. A definition of television terms is given on the final page.

This book will save many hours of arduous labor for any one who must install or "hunt bugs" in a television receiver. Book is supplied at a nominal price.

Modern 5-Tube "Portable"

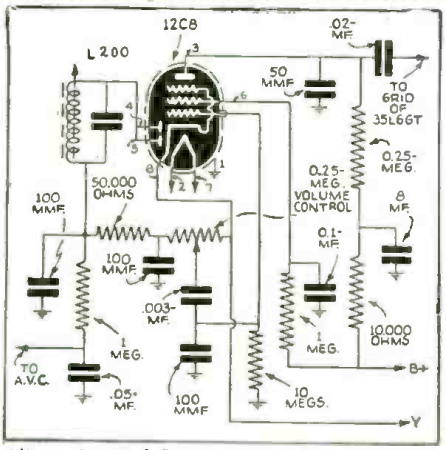
(Continued from page 289)



Bottom View of Receiver.

by one, until the proper current reading is obtained. Generally 1½ to 2½ turns are proper for the S.W. coil. One last point — if no current reading at all is obtained at the start, make sure that the tickler is connected properly. Try *reversing* connections to it.

If the Westector is used, note that a negative bias of 1.5 volts has been applied to it. This is necessary to eliminate distortion on weak signals.



Alternative 2nd Detector-First A.F. stage, using 12C8 tube instead of Westector and 12SJ7.

The Loop Aerial

The loop antenna used on the *broadcast* band is wound around four wooden dowels mounted on the inside of the back cover of the carrying case. The dowels are spaced to form a rectangle 10 x 5 inches. These are the loop's dimensions. The loop consists of about 21 turns of No. 28 D.C.C. wire wound so that the ground end of the winding (end nearest the antenna tap at 1½ turns) is close to the surface of the back cover of the case.

Aligning the Set

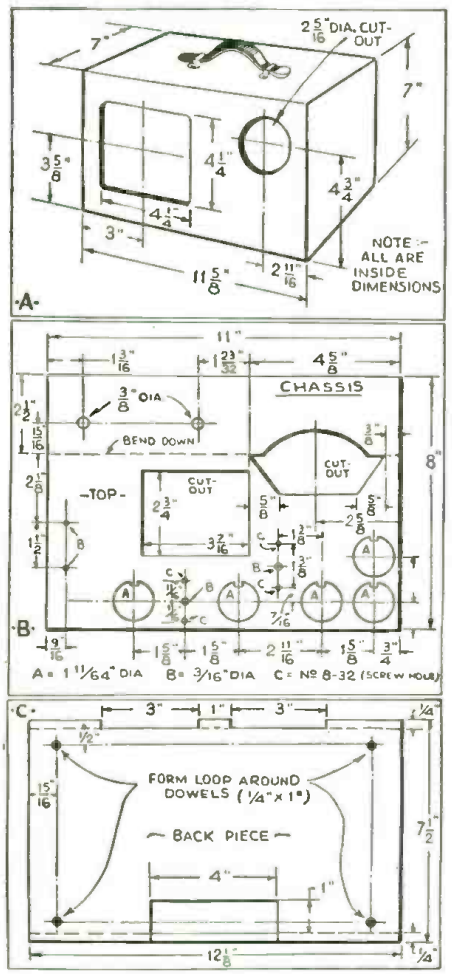
In aligning the set the I.F. transformers should be aligned first, preferably with the aid of an oscillator. Next the antenna trimmer condenser mounted on the top of the tuning condenser should be tightened as far as it will go and then backed off one turn. With the set on the *broadcast* band the oscillator padder should be adjusted so that with the tuning dial set 10 degrees away from minimum capacity, 1500 kc. will be tuned in. Similarly the series oscillator trimmer mounted on the chassis should be adjusted so that the set will tune to 530 kc. with the tuning condenser set at maximum capacity. When this has been ascertained, the set should be tuned to a station near 600 kc. and the antenna trimmer condenser adjusted for maximum signal.

All these steps should be performed after the padder mounted on the broadcast oscillator coil has been adjusted to about its mid-point. During these adjustments the loop should be placed in the *exact position* with respect to the chassis that it will occupy when the set and loop are mounted in the cabinet.

Adjustment of the S.W. trimmers should be exclusively on the trimmers mounted on the S.W. antenna and oscillator coils. Generally it is only necessary to check the S.W. tracking at the high-frequency end of the band (where the tuning condenser is nearly wide open).

External Aerial

Although an aerial is required for S.W. use only as mentioned before, provision has been made for using it on the *broadcast* band in case the set is located a long distance from a broadcast station, or if the user is interested in DX on the *broadcast band*. With an aerial the set will really go out and get 'em, even on the *broadcast* band.



Parts List

SOLAR (Condensers)

5—.1 mf. paper type SO238
3—.05 mf. paper type SO228
1—.01 mf. paper type SO221
1—.003 mf. paper type SO213

(Continued on following page)

4—50 mmf. mica type MO1410
3—100 mmf. mica type MO1416
2—30 mf. 150 v. electrolytic type M230
1—8 mf. 100 v. electrolytic type M108
1—8 mf. 250 v. electrolytic type M258

I.R.C. (Resistors)

½ watt type BT
1—20,000 ohms
1—300 ohms
1—5000 ohms
2—1 meg.
1—1000 ohms
1—50,000 ohms
2—10,000 ohms
1—10 meg.
1—250,000 ohms
1—500,000 ohms
1—200 ohms

½ watt type BW
1—20 ohms
1 watt type BW
1—35 ohms
1—20 ohms
Volume control
1—250,000 ohm midget type D with power S.W.

ALADDIN (I.F. Transformers)
1—L200
1—L1011

AMPHENOL (SOCKETS)
4—Octal type S8
1—Octal steatite type SS8

MALLORY-YAXLEY (Wave Change Sw.)
1—Type 1223L, 6 circuit, 3 position

MEISSNER (Coils)
1—14-7670
1—14-7674
1—14-7682
(Trimmers)
1—22-8037
1—22-5134

(Tuning Condenser)
1—2 gang 365 mmf. condenser type 21-5221
(Knobs)
1—Dial knob type 25-8220
2—Bar knobs type 25-8221
(Tie Points)
2—25-6716 (4 terminals)
1—25-6715 (3 terminals)

OXFORD-TARTAK (Loud Speaker)
1—5" electrodynamic speaker with universal output transformer and 450 ohm field; type U55

CROWE (Tuning Dial)
1—Dial type No. 124 for ⅜ inch shaft

RCA (Tubes)
1—12SA7
1—12SK7
1—12SJ7
1—35L6GT
1—35Z4GT

CORWICO (Wire)
1—Spool No. 28 D.C.C. wire
1—Roll "hook up" wire
1—Line cord

KORROL (Chassis)
1—Special chassis drilled and cut to specification as per drawing

CUSTOM AUTO TRUNK (Case)
1—Airplane luggage type carrying case, special design (see drawing)

CHOKE
1—2-10 henry midget filter choke, resistance as low as possible

MISCELLANEOUS
1—Insulated pilot light bracket (American Radio Hardware Co.)
1—Aerial terminal strip

Loktal 1-Tube Preselector

(Continued from page 291)

concentric line from the output of the preselector to the *antenna* and *ground* terminals of the receiver as shown in Fig. 1. If the receiver has twin posts for the connection to a doublet antenna, short one terminal to ground with a short length of copper wire and proceed as shown. It will be necessary to make a connection to the *receiver power-supply* in order to obtain the 6.3 A.C. and the 250 D.C. voltage required for proper operation of the loktal tube. Attach the antenna and ground wires to the input terminals of the R.F. unit. Tune in a signal on the receiver, rotate the preselector dial until it is in resonance with the receiver and the signal and adjust the regeneration control for maximum sensitivity.

Can Be Used as a 1-Tube Receiver

Although the *preselector* unit was designed especially for use with a communications superheterodyne, this little R.F. booster is ideal for use ahead of a simple two- or three-tube TRF or regenerative receiver in order to raise the *sensitivity* and *selectivity*. Or, by simply placing a 100 mmf. mica condenser and a 3 megohm grid-leak resistor in series with the lead from the fixed plates of the tuning condenser to the 7B7 grid, the unit may be used as a *simple single-tube, all-band short wave receiver*. In this case, the 250 mmf. coupling condenser indicated in Fig. 1, would be connected directly to ground and the A.F. output taken off "B-plus" end of the R.F. choke.

PARTS LIST—Preselector

HAMMARLUND
1—50 mmf. double-spaced tuning condenser, *or*
1—140 mmf. single-spaced tuning condenser. (See text.)
1—Midget R.F. choke, 2.5 mh.

IRC (Resistors)
1—300 ohm metallized fixed resistor, 1 watt
1—250,000 ohm metalized fixed resistor, 1 watt
1—Volume control potentiometer, 50,000 ohms

BUD
1—7 x 10 x 6 steel cabinet, black crackle finish
1—7 x 10 steel panel, black crackle finish
1—1½ x 5 x 8 steel chassis, bright metal

SIGMON RADIO SUPPLY
1—Coil-switch assembly
1—Special calibrated scale for tuning dial

P. R. MALLORY
1—Special "shorting type" preselector coil switch

CROWE
1—Special calibrated precision vernier dial
2—"Professional" type knobs

NATIONAL UNION
1—Type 7B7 "loktal" tube

MISCELLANEOUS
1—"Loktal" type socket for 7B7 tube

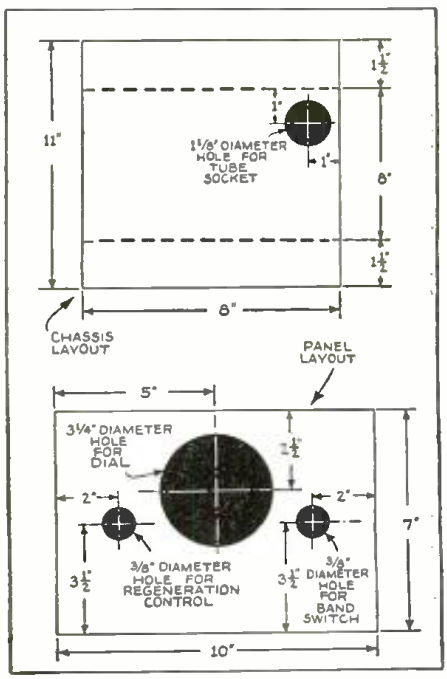
COIL DATA

Band	*Turns*	*Tap*	*Spacing*	*Wire*
160	115	9	Close	34 E.
80	45	4	Close	28 E.
40	16	2½	⅞"	22 E.
20*	9	2	13/16"	16 E.
10*	5	1¾	1"	14 E.

The coils for the 160, 80 and 40 meter bands are wound on ¾-inch diameter, 1¼-inch long forms. The 20 and 10 meter coils are air-wound and self-supporting.

*These coils may be stretched or compressed to bring the bands to the center of the dial scale.

Detail of panel and chassis.



DX on the "Ham" Bands

(Continued from page 281)

VQ4KTB	14.1	3	6	Mass.
ZS1BY	14.21	4	7	Fla.
ZS2AV	14.07	4	5-6	Kan.
ZS5T	14.	4	8	New Zealand
ZS5Q	14.006	5	8-9	Penna., Mo., Tex., Ia.
ZS6AD	14.14	4	4	Ala.
SZ6DW	14.03	5	6-8	Ariz., Mo.
CO2OK	14.02	5	8	Ore.
HH2B	14.28	3	4	India
K4FAY	14.15	4-5	6-8	India, S. Dak.
NY2AE	14.32	3	5	S. Dak.
NY2ME	14.211	4	9	S. Dak.
TG5JG	14.121	5	7	S. Dak.
VE1DR	14.1	5	9	England
VE1HI	14.122	5	8	England
VE1BB	14.11	5	9	England
VE1CR	14.24	5	7	England
VE3WI	14.106	5	8	England
VE4IF	14.076	5	8	England
VE5DT	14.124	5	8	England
VE5OT	14.	5	9	New Zealand
VE5EF	14.	5	8	New Zealand
VE5BF	14.	5	9	New Zealand
VP1BA	14.1	5	7	Quebec
VP2LC	14.125	5	8	Tenn.
VP5IS	14.1	5	7	Cal.
VP6TR	14.2	5	9	S. C.
VP7FS	14.1	5	9	S. Dak.
W1HS	14.14	5	6	P. I.
W1JFG	14.17	5	9	England
W1HKK	14.218	5	8	England
W1DQ	14.17	5	9	England
W1WE	14.175	5	7	England
W1BIC	14.154	5	8	England
W1AW	14.22	5	8	England
W1IGU	14.19	5	7	England
W1IVU	14.14	5	8	England
W1HX	14.154	5	8	England
W2AZ	14.	5	8	New Zealand
W2GVZ	14.26	5	6	P. I.
W3RR	14.	4	5	New Zealand
W3AMM	14.2	5	7	P. I.
W4EEV	14.	5	8	New Zealand
W5FBA	14.	4	7	New Zealand
	28.	5	9	New Zealand
W5HDK	14.	4	7	New Zealand
W5AXU	14.23	5	6	P. I.
W5QR	14.25	5	6	P. I.
W5YS	14.23	5	6	P. I.
W5YF	14.22	5	7	P. I.
W6BKY	14.	5	9	New Zealand
W6EJC	14.	4	8	New Zealand
W6USA	14.21	5	6-9	New Zealand, P. I.
W6KR	14.	3	5	New Zealand
W6ISH	14.	4	8	New Zealand
W6LLQ	14.	5	7	New Zealand
W6OLQ	14.	4	6	New Zealand
W6KNI	14.	5	9	New Zealand
W6OJI	14.	4	8	New Zealand
W6BMA	14.	5	8	New Zealand
W6LYM	14.	5	7	New Zealand
W6LLY	14.	4	8	New Zealand
W6UFA	14.2	5	6	P. I.
W6JP	14.25	5	5	P. I.
W6LYP	14.25	4	4	P. I.
W6CHV	14.21	5	6	P. I.
W6NHB	14.26	5	7	P. I.
W6DSA	14.28	5	6	P. I.
W6IDY	14.2	5	7	P. I.
W6PMX	14.29	4	4	P. I.
W6LYY	14.23	4	4	P. I.
W6NCS	14.24	5	6	P. I.
W6PKY	14.23	5	5	P. I.
W6OM	14.25	5	5	P. I.
W6NNR	14.3	5	7	P. I.
W6BDV	14.25	5	6	P. I.
W6PNX	14.26	5	6	P. I.
W6DCQ	14.23	5	7	P. I.
W6GHD	14.26	5	7	P. I.
W6MYO	14.23	5	8	P. I.
W6OSY	14.27	5	7	P. I.
W6KSE	14.27	5	7	P. I.
W6EW	14.2	5	7	P. I.
W6ELC	14.2	5	6	P. I.
W6KUW	14.22	5	7	P. I.
W6MLG	14.25	5	8	P. I.
W6MEK	14.29	5	6	P. I.
W6TT	14.2	5	7	P. I.
W6AII	14.21	5	7	P. I.
W7DX	14.27	3-5	5-7	New Zealand, P. I.
W7GAE	14.	5	9	New Zealand
W7DC	14.3	4-5	6-8	P. I., England
W7BMZ	14.25	5	7	P. I.
W7ACD	14.21	5	7	P. I.
W7FP	14.22	5	8	P. I.
W7BUH	14.23	5	7	P. I.
W8JOE	14.16	5	8-9	New Zealand
W8BTI	14.	4	7	New Zealand
W8GK	14.	4	7	New Zealand
W9ZYD	14.	4	6	New Zealand
W9ARA	14.23	4-5	7-8	New Zealand, P. I.
W9AKI	14.	4	6	New Zealand
W9UOP	14.	3	7	New Zealand
W9UWL	14.	4	7	New Zealand
W9DSG	14.	4	6	New Zealand
W9REF	14.29	5	4	P. I.
W9PTY	14.22	5	8	P. I.

Too many of our own U. S. Hams to list were reported by our observer for England. These were 10 W1s, 17 W2s, 2 W3s, 8 W4s, 2 W5s, 6 W6s, 4 W7s, 12 W8s and 4 W9s.

SOUTH AMERICA

CE1AH	14.12	3-5	3-6	P. I., N. Y., India
CE2BP	14.132	5	8	Penna.
CE3AA	14.08	5	7	P. I.
CE3CO	14.15	5	8	P. I.
CE3EE	14.18	5	6	P. I.
CE3DW	14.05	5	7	Quebec
CE3BK	14.06	3	3	India
CP5PK	14.3	5	4	P. I.
CX2CO	14.1	4	8	N. J.
HK1AE	14.14	2	3	India
HK3CG	14.1	5	8	Ore.
LU1PA	14.13	5	5	P. I.
LU1JC	14.3	5	4	P. I.
LU3AH	14.25	5	5	P. I.
LU4PB	14.15	5	6	P. I.
LU6KE	14.09	5	5	P. I.
LU7AZ	14.095	4	7	N. J.
LU8AB	14.1	5	8	India
LU8DR	14.115	5	9	N. J.
OA4VA	14.075	4	7	Tenn.
PY4EJ	14.13	4	4	India
VP3CO	14.065	5	8	Quebec
YV4AE	14.05	5	8	Ore.

EUROPE

CT1PK	14.1	5	8	Kan.
CT1QA	14.07	5	8	N. J.
EI2L	14.1	5	7	India
ES5D	14.055	4	6	Wash.
F3OX	14.09	5	7	Penna.
F3MN	14.255	5	6	Penna.
F8NT	14.06	4-5	6 9	New Zealand, Ore., Wash., Kan., Penna.
F2XT	14.	4	7	New Zealand
F8TU	14.	4	7	New Zealand
F8VP	14.02	4-5	7-8	Quebec, Kan.
F8BK	14.116	5	6	Penna.
F8AF	14.125	5	7	Tenn.
G2PU	14.06	4-5	6-9	New Zealand, Ore., Fla.
G2AV	14.065	3	7	Wash.
G2XV	14.1	4	7	Fla.
G5BJ	14.47	4	8	Fla.
G6JL	14.0	5	8	Fla.
G6LK	14.	4	9	New Zealand
G6JB	14.095	5	7	Quebec
G6MB	14.045	5	4	N. Y.
I8SY	14.	4	6	New Zealand
GI5ZY	14.06	5	8	Quebec
GI5NJ	14.2	4	7	Fla.
GM2UU	14.05	4-5	6-8	New Zealand, Ore., Wash.
GM6OT	14.	3	5-7	New Zealand
GM8MW	14.05	5	7	Penna.
GW3JI	14.04	5	7	Quebec
GW5PH	14.017	4	8	Fla.
HA1K	14.07	5	7	Tenn.
I1LL	14.035	3	6	N. J.
ON4VK	14.06	5	6-7	Calif., Kan., Tenn.
ON4HS	13.097	5	6	Penna.
ON4HT	14.085	4	7	N. J.
PA0EO	14.02	3	5	Tenn.
SM5WZ	14.11	3	6	Mass.
SM7MU	14.12	4-5	6	New Zealand, India
SV1CA	14.081	4	6	Mass.
ZB2B	14.01	3	4	Tenn.

OCEANIA

K6KGA	14.15	5	8	Penna.
K6NYD	14.	5	4	N. Y.
K6PCF	14.25	5	9	S. C.
K6BAZ	14.2	5	8	S. C.
K6OQE	14.26	3	4	India
K6OJI	14.152	5	8	Mass.
K6KGN	14.472	5	9	S. Dak.
K6OGF	14.496	5	9	S. Dak.
K6OJR	14.496	5	9	S. Dak.
K6OTH	14.21	4	8	S. Dak.
KA1HS	14.24	5	7-8	Ore., England
KA1AF	14.1	5	6	Ala.
KA1AP	14.14	5	6	Ala.
KA1CS	14.15	4-5	4-7	Ala., Mo.
KA1ER	14.26	5	6	Ala.
KA1LB	14.26	5	6	Ala.
KA1PI	14.14	5	5	Ala.
KA1ZL	14.27	5	7	Ala.
KA1FH	14.138	5	9	England
KA1ME	14.23	5	7	Mass.
KA3KK	14.298	5	9	England
KA7EF	14.13	4-5	8-9	Ariz., Mo.
KA7EH	14.12	5	8	Kan.
PK6XX	14.01	4-5	6-9	Ore., Quebec, Mo., S. Dak., Wash., Mass., Ariz.
	28.04	5	9	Calif.
PK1AF	14.1	5	8	Tenn.
PK2LZ	14.05	2	6	Wash.
PK3WI	14.1	5	7	Ore., Ala.
PK4KS	14.35	3-5	6-9	Kan., Ala.
PK4AY	14.04	5	9	Ariz.

VK's were very numerous, and too many were reported to publish. They were reported by observers in Oregon, England, Iowa, Kansas, Washington, Arizona, Missouri, and Texas.

ZL1HY	28.2	5	7	Calif.
ZL1MR	28.42	5	9	Calif.
ZL1BP	28.44	5	8	Calif.
ZL2BE	28.42	5	9	Calif.
ZL4AO	28.05	4	3	Calif.

EMQ 2½ Meter Transceiver

(Continued from page 290)

calibrated from the harmonics of a 5 meter super regenerative receiver or transmitter. A little pruning or adding to coil L may be necessary during this operation.

Transformer T1 can be home-made by taking any good audio transformer that has enough room to wind 300 turns of No. 30 insulated wire layer-wound; any good commercial transformer will be satisfactory. If the transceiver is to be used at the *home* location, a 50,000 ohm variable resistor is coupled into the circuit at the point marked X. This tends to cut down on BCL interference and re-radiation. One side of the variable resistor is left open to prevent excessive drain when used for portable work with "B" batteries. However, if A.C. power is used, this may be grounded as shown by dotted lines. Any source of filtered D.C. current supply may be used and should be anything from 200 to 300 volts at 50 ma. or more.

The coil L shown in the bottom view of the photograph is wound with No. 12 wire and is 5½" long, then bent to "U" shape. This coil should start with one end of the "U" going to the grid and grid-leak and the other end going direct to the plate. Then two wires cut as short as possible are used to connect the variable condenser into the circuit. This tends to allow maximum induction which is needed on ultra-high frequencies for higher efficiency. When the transceiver is in *transmitting* position the condenser C3 is disconnected from the circuit, thus not affecting the audio frequencies from the modulator to the oscillator.

The volume control is used in a novel manner and is cut out of the circuit when the transceiver is in *transmitting* position thus giving high gain at all times with the microphone.

A dynamic speaker may be used by connecting as shown by *dotted lines* with R6 in series with the field coil to act as a bleeder for the power-supply and to excite the field coil of the speaker. The portable antenna used is shown in the photograph. Two stand-off insulators are mounted on the side of the case to hold a half-wave rod vertical. An adjustable curtain rod was used and was end-fed through a .00025 mf. mica condenser and coupled to a coil (L) on the plate side of the center tap. The antenna used with best results from the home location is a half-wave 2-wire fed matched impedance. The feeders connect on each side of the center tap through condensers C on coil L, and are moved toward the plate and grid, an equal distance each from the center tap, until it blocks out the receiver; then gradually draw them back equally until you have super-regeneration over the whole band. After you have found where the antenna "peaks up" in the band, mark this point on your dial and when transmitting always turn the transceiver back to transmitting position on the dial. The transmitting frequency is not exactly the same as the receiving frequency even though it utilizes the same tuned circuit. The change of plate or grid voltages when switching from "Receive" to "Transmit" changes the capacities which are in shunt with the tuned circuit, causing a frequency change.

These transceivers are being used at the present time by W1LSR, Randolph, Mass. He got a QSA 5R8 from W1SS in Arlington, Mass., 35 miles away.

Silver Trophy Award

(Continued from page 273)

in coils for 20, 40, 80 and 160 meters, and is capable of about 600 watts input on phone and 800 watts on CW. The Astatic crystal microphone is used with both rigs.

A Johnson "Q" antenna is used for 5 and 10 meters, a single wire end-fed Hertz for 40 meters, and a half-wave Hertz with a 250 foot flat-top and 67-foot Zepp feeders for 20, 80 and 160 meters.

WILLIAM E. "DOC" WILBUR, W3GNU,
156 Stockton Street, Hightstown, N. J.

Rules for Plaque Contestants

- SIMPLY send the Editors a good, clear photograph of your Ham station. If your station photo is selected as the best of those submitted each month, you will be awarded one of the new R. & T. 5 x 7 inch "Award of Honor" plaques with your name on it.

The winner of each month's award will be announced in the second succeeding issue, and the closing date for that contest is the end of the current month.

The judges of the contest will be the Editors of RADIO & TELEVISION. In the event of a tie, duplicate prizes shall be awarded to the contestants so tying.

Dictated Reception

(Continued from page 269)

is shown in Fig. 10, taken from *Wireless World*. In this system the broadcast receiver, R, can only get "juice" from the lines through a contact, C, which is, in turn, controlled by a small "watchdog" receiver, R1. The latter is either kept permanently in circuit with the power lines, or else is intermittently energized each time a small line-driven disc motor, D, closes a contact, K. The receipt of a signal by R1 closes C to bring the main receiver, R, into operation, and simultaneously closes a second contact, C1, to short-circuit the interrupter disc, D.

The arrangement as shown can only respond to one particular wavelength, to which the circuits must be pre-tuned. If, however, the rotating disc, D, is also arranged to insert different condensers, successively, into the tuning circuits of both the "watchdog" and main receiver, the listener can then pick up "authorized" programs sent out on one or other of several predetermined wavelengths.

Further relays may be added in order to make it possible for a distant transmitter to "take charge" of the set, so that it is compelled to receive an emergency message. To insure priority, the message is preceded by a special carrier-wave signal which is modulated at a definite frequency; this "locks" a similarly tuned circuit-closing relay for the duration of the message. At the end of the message a clearing signal, modulated at different frequency, operates a second relay to release the receiver.

Bigger and Better Images

(Continued from page 271)

tire mask on the cathode-ray tube. Engineers of the Andrea Company suggested putting a 100,000 ohm resistor in series with the (shielded cap) plate lead of the 2Y2 rectifier. This was done and the image could then be expanded to a size even larger than the mask opening. There was a little A.C. getting into the picture, however, manifested by a slight wave at the sides of the image. A 0.1 mf. 400 volt fixed condenser was connected from the center arm of the horizontal *hold control* to the juncture of the two half meg. resistors in the high voltage bleeder. This took care of the necessary filtering and the ripple disappeared.

As a further refinement, a push button switch was installed on the veneer panel so that the set is automatically turned on when the cabinet doors are opened.

This gave the writer the idea of making a few more changes. Even though the images received were good, they were improved when the two 6N7's were interchanged. Additional interchanging had no further results.

The Andrea Company is now publishing a sheet for service men who may be called upon to do work on television receivers. The sheet explains that 95% of the troubles experienced will be due either to faulty adjustment of the set's controls or to defective tubes. Some of the information from the sheet appears in this issue of R. & T. It is applicable to other makes of television receivers, with certain modifications.

SIGHT AND SOUND CHART

SYMPTOM	REMEDY
Picture will not hold vertical sync.	Adjust vertical hold control. Do this with contrast control as low as possible.
	Insufficient Signal: Antenna must be oriented, moved to more favorable location, or raised in height. Ratio of signal to noise may be too low. Increase height of antenna. If lead is over 100 ft. long, coaxial cable may be required. Note: May be due to losses introduced by antenna leads to other television receivers. Remove such leads.
	Interference: Ratio of signal to noise may be too low. See Insufficient Signal notes above.
Picture tears	Adjust horizontal hold control.
	Interference: Ignition interference may cause tearing in all or part of the picture area. See Insufficient Signal notes above.
Picture shows horizontal distortion	Adjust horizontal hold control.
	Interference: See Insufficient Signal notes above.
Picture is broken by angular pattern	Interference: See Insufficient Signal notes above.
Picture has white retrace lines	Brightness control too high, contrast control too low.
	Insufficient signal: If contrast control is at maximum see Insufficient Signal notes above.
	Transmitter adjustment is not correct.
Picture is distorted by sound	Adjust trimmers A and E for minimum signal at 14.25 mc.
Pictures without sound	Adjust trimmers B, C, and D for maximum audio output at 8.25 mc., and check adjustment of Sound Sensitivity trimmer at the side of the chassis.
Pictures and sound weak	As a last resort, after you have checked everything else, realign R.F. plunger condensers.

The Radio Beginner

(Continued from page 270)

system, we see that we have a current which starts at zero, rises to a maximum positive value, drops back to zero, and then repeats the procedure. Such a current is known as a *pulsating direct current* since it has a varying positive value. Because we must place an unchanging potential on the tubes of our receiver, we must smooth out the pulsating direct current so that it is always at one constant value. To do this requires the use of a filter, as shown in Fig. 5. The filter consists of a suitable combination of capacitance and reactance. Because of their capacitance and reactance, condensers and chokes have the property of being able to store energy. When the output from the rectifier tube varies from zero to maximum, the filter stores energy and releases it when the current drops back from a maximum to zero again. Thus, instead of having a current that changes in value, as shown by the rectifier output curves of the half and full wave rectifiers, we have a uniform *direct current*.

Condenser and Choke Input Filters

Condensers and chokes may be arranged in quite a number of ways, the most widely used being the *condenser input filter* and the *choke input filter*. We use the term condenser input if a condenser immediately follows the rectifier tube, and the term choke input if a choke is placed directly after the rectifier. Better *regulation* is obtained with the choke input filter, but the voltage across the output of the filter is less than the condenser input type. An adequate filter could consist of just one choke and a condenser, but in order to make sure of good, smooth D.C., additional condensers and chokes are used.

Voltage Divider: Across the output of the filter we have a potential that we can now place on the plate of a tube. However, since the different tubes in a receiver do not always get the same order of potential, it is necessary to make use of a *voltage divider*. This is simply a resistance, having taps, either fixed or sliding, placed across the output of the filter. In Fig. 6 we see a typical voltage divider (or *bleeder* as it is sometimes called) with taps to provide different voltages. The same figure shows a complete power supply circuit.

A problem that frequently concerns the amateur is that of *voltage regulation*. For example, a power supply may have a certain order of potential when not loaded, that is, when not connected to a transmitter or receiver. If, when connected to a transmitter, the potential should take a large drop, the power supply would be said to have *poor regulation*. A good power supply will not drop more than about ten percent in potential when connected to a load. Poor regulation may be due to a number of factors, an undersize power transformer, an incorrect or defective rectifier tube, a poorly designed filter, or using a power supply without a bleeder. Since the voltage divider or bleeder maintains a small though constant load on the power supply, the condensers are continually being discharged. The bleeder prevents the potential from building up to too high a value on the condensers.

It is important that the correct transformer input or line voltage be used, since a variation of just a few volts across the primary means a much larger variation across the secondary. If the line voltage is found to be higher than required, a resistance of suitable value and wattage rating can be inserted in the primary leg of the transformer.

"Flexible 3"—A Combination Converter-Superhet

(Continued from page 287)

to provide for maximum and it's noticeably good—oscillator stability down to and through frequencies as high as 60 mc. Ample input sensitivity is had without regeneration.

Oscillator and detector circuits are separately "tanked" by panel mounted .00014 mf. max. midget variables. *Bandspread* is effected by a two-gang condenser of approximately 35 mmf. per section, but the stators for this unit do not connect *directly* to the high end of R.F. coil tuned windings but *indirectly*—through series capacitors installed within the various coil forms and set to give just the amount of effective *bandspread* desired with any two coils in place.

Five-meter coils are air wound. 10 and 20 meter R.F. items are wound on Hammarlund CF-5-M 1⅛-inch isolantite forms. All other inductances for band coverage are wound on standard 1½-inch dimension forms and are provided with (except for the 160 meter item) A.P.C. bandspread-set trimmers. The 10 and 20 meter coils employ MEX type series condensers.

As we have previously explained, the mixer locks into one of the converter output or one of the intermediate transformers, depending on which is in place. With a converter unit in the 6-prong socket, the coil's low impedance winding connects out to the link line to the receiver and there is no coupling through to our second detector. With an I.F. transformer in use, there is no connection to the link, but the coupling is complete to the second detector and the whole unit is made operative.

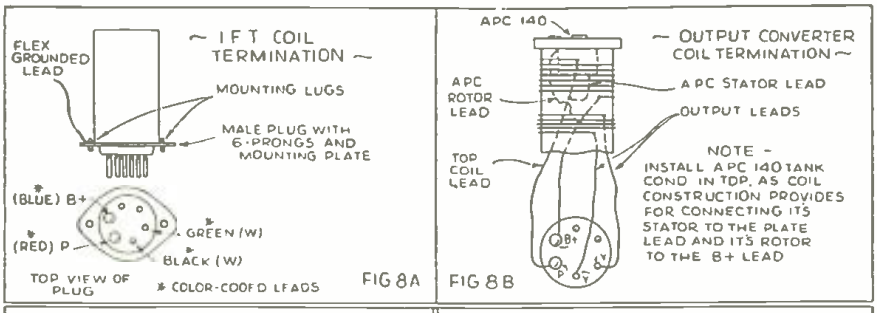
The *converter* output coils, by the way, are factory wound and provided with A.P.C. trimmers. The output frequency of any one of the three items may be set at any value within the related ranges as previously mentioned, so that with any given output coil in use there is every latitude in the selection of a frequency which will be within the main receiver's own tuning range and which will at the same time be well within the mixing scope of the converter's tuned front end.

The second detector is a 6C5 in a regenerative circuit, a 2.5 mh. R.F. *choke* being employed in the cathode lead to effect the feed-back. This value of small pie-wound choke worked out fairly well for all I.F. frequencies used in the laboratory model but might logically be replaced by perhaps two independent items—one, say, a 40- or 50-turn scramble-wound affair on a half-inch form, and one an ordinary broadcast band coil, switch selected from the rear chassis drop. The use of the two chokes, the first for 1500 and 3000 kc. and the second for 456, would afford much better control and so is recommended.

The detector is conveniently coupled to the 6C5 A.F. amplifier. The circuit here is familiar enough and needs little description. We might simply note that a .25 mf. condenser ties out from plate to headphones, which are isolated from D.C., and that the plate is parallel fed from B-plus through the 50,000 ohm resistor.

We might very well have employed a single 6C8G for detector-amplifier dual

(Continued on following page)



service, instead of the two metal triodes, and the builder may make the substitution if he so wishes. This would be in any event an advisable move if a pentode power output item, such as a 6F6 or 6V6 (see Fig. 2) is to go on the chassis, which is far too small to lend itself to a four-tube layout.

Power Pack

While, as we have said, the converter-super may be powered by a receiver having sufficient reserve A and B power, best practice is to build and use a separate pack. And as you may wish to add the pentode output amplifier (Fig. 2) either as an integral part of the *"flexible three"* or as an external accessory, it will be wise to more or less follow the circuit diagrammed in Fig. 3. This circuit is related to the particular pack which we built for use with the converter-super and will do the powering job splendidly.

A 60 ma. power transformer will handle the unit and an additional *outboard* amplifier. Two chokes—an 8 or 10 henry input item and a 50 henry, 1400 ohm smoothing type (or substituted speaker field of similar resistance)—will provide humless power when used with three 8 mf. 450 volt electrolytics; and a 25,000 or 30,000 ohm (adjustable) bleeder at the filter output will permit an adjustment for exactly 250 volts high potential under full load.

Receiver Layout

Above the chassis are the two-gang condenser for *bandspread*, with the high frequency oscillator coil socket to its left, and the detector coil socket to its right. Behind the oscillator coil socket is that for converter output coil or I.F. transformer. To the right of this last item are the second detector and A.F. triodes respectively.

Below the chassis are the tank capacitors, mounted on the front drop; the mixer tube, positioned on its side and so that leads to associated circuit points will be *short* and *direct;* the mixer sensitivity (receiver R.F. gain) control, between the tanks; the selectivity-regeneration — B.F.O. control, placed on the back drop because of front-of-chassis space limitations; and the various items in the general layout, all grouped as required for really *short, direct* leads.

Coil and Transformer Parts

Before attempting the construction of this receiver, which may be completed easily in an evening's work, acquire the various necessary and listed parts. It will not, by the way, be necessary to purchase *all* three I.F. transformers if the set is to be operated as a super on frequencies below about 14 mc. Nor will it be necessary to purchase all three converter output coils and the three A.P.C. trimmers to be installed within them —nor for that matter will this be practical if the *converter* is to be used only in conjunction with a broadcast band receiver. Perhaps the best move in any case is to acquire *one* I.F. transformer (preferably 456 kc.) and *one* output coil (preferably that tuning to the low frequency end of the standard broadcast band with 140 mmf. of A.P.C. trimmer). You can then add other transformers and coils at a later date.

Remember, 456 kc. will provide good all around I.F. service on 20, 40, 80, 160 and lower, and will at least *permit* reception with 10-meter tuning. 1500 kc., on the other hand, will be a fair enough compromise frequency with inputs from 5 meters to 80 or so. But plan to eventually acquire both the 456 and 1500 kc. items, plus one of 3000 kc. value, and to use 456 with 20, 40, 80, 160 and B.C.L. inputs, 1500 with 10 meter inputs and at 5 meters when signals are fairly stable, and 3000 when the R.F. tuning is down to 5 meters or lower and the

transmissions to be intercepted are really broad, such as U.H.F. *high fidelity* broadcasts or *television sound* signals.

As for *converter output* coils, remember that the one having a range from 250-560 meters will be the only item required if your main receiver is equipped for broadcast coverage only, though the 135-270 meter one might be a worthwhile second inductance to have on hand if you contemplate conversion to around 1500 kc. and your receiver will tune to this high a frequency. The 66-150 meter coil will be required only if your receiver itself tunes through this range of medium short wavelengths and you want to convert to a comparatively high frequency for optimum image attenuation with inputs of 5 meters or so.

Construction

To facilitate construction, we have provided layouts relating to the positioning of every part. Therefore, no detailed discussion on the business of building need be given. We shall simply offer one or two pointers which may be helpful.

Form.		Ant. Pri. (L1) none (use 3-30 trimmer)	Ant. Sec. (L2) 8 turns No. 14 half inch form	*Untuned* Osc. Grid (L4)	*Tuned* Osc. Plate (L3)
(air)	5 M.			Meissner type 7684	
CF5M	10 M.	4 turns, close wound No. 26	7½ turns, spaced to ¼ inch. No. 22 DSC	Same Meissner type 7684, with high C tanking	
CF5M	20 M.	6 turns, close wound No. 26	12¾ turns spaced to one inch, No. 22 DSC	6 turns interspaced No. 26 DSC	6¼ turns No. 22
1½M	40 M.	6 turns, close wound No. 26	20 turns spaced to 1 inch, No. 22	10 turns interspaced No. 26	10 turns interspaced No. 22
1½M	80 M.	10 turns, close wound No. 26	38 turns spaced to 1 inch, No. 24	12 turns No. 26 closewound	18 turns No. 24 close wound
1½M	160 M.	12 turns, close wound No. 26	75 turns, close wound No. 24	20 turns No. 26 close wound	30 turns No. 24 close wound

20 and 40 m. osc. plate windings spaced one inch. Grid windings interspaced with these plate windings.

Notes:

1—Above coils design to place amateur bands at low frequency end R.F. tank. Range of each coil will depend upon I.F. employed to some extent. 12 coils listed should in any event provide for full 5 to 200 meter coverage. Osc. tanking is comparatively high C for maximum stability.
2—5 meter ant. coil air wound. Osc. coil factory-made.
3—10 and 20 meter coils wound on Hammarlund CF5M isolantite forms. Except. 10 m. osc. coil, which should be 5 meter one with more tank.
4—All other coils wound on standard 1½ inch forms.
See coil wiring diagrams for proper construction, series condenser installation and lead termination.

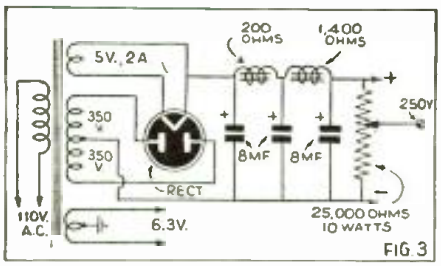
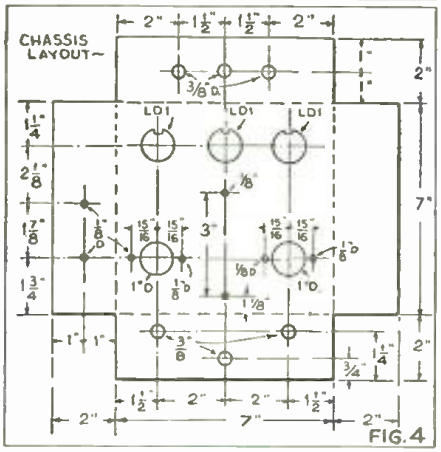


FIG. 3



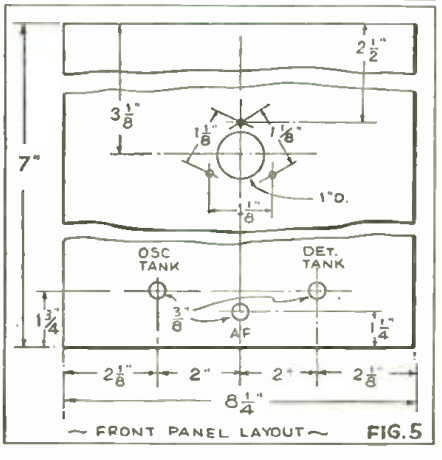


FIG. 5

1. Build the coils and terminate their leads precisely as indicated. The only work on the converter output coils will be the installation of the A.P.C. 140 trimmers within the forms (which are built for such trimmer installation) and the wiring of the condensers across the associated plate windings. And, before we forget it, the removal of the winding which is interspaced between tuned primary (heavy wire) turns. As for the I.F. coils, all you have to do is to wire their leads to the laminated 6-prong plugs and then fasten the plugs to the coil cans, which are provided with spade lugs spaced properly for direct plug mounting. Though not shown in our photographs, there should be a ground post on the chassis near the I.F. coil socket, and each I.F. can should be provided with a small flexible lead so that, after its installation, it may be conveniently grounded. (Otherwise the shield will be left floating.)

2. If you plan to use second detector regeneration, try the single 2.5 mh. pie-wound cathode choke as an all-frequency item, and if the circuit pops into oscillation too abruptly with the higher frequency I.F. transformers in place, try the better idea of using two or three separate chokes, switch selected, and consisting of a midget broadcast coil for 456 kc. a scramble (helter-skelter) wound 40- or 50-turn coil (½-inch diameter) for 1500 kc. and a smaller coil, "trial and error" built to give the desired result for 3000 kc. Remember that the return lead for the I.F. secondaries connect to the detector *cathode* and that the detector plate circuit must be grounded at I.F. frequency with a mica condenser of about .002 mf. value.

3. In wiring, check the circuit carefully so that particularly the R.F. tuning items—tanks, spreaders, and series condensers—are in proper continuity. Keep your R.F. leads *short* and *direct*—for that matter, do so with all leads throughout the converter-super. Of course, all circuits operate at different frequencies to minimize unwanted

(Continued on following page)

interstage coupling (this is one reason why we can use an unshielded output coil for converter operation), but the usual precautions should nevertheless be taken to wire the set according to the accepted dictates of standard short wave design practice.

R.F. coil data is separately given and need not be repeated here.

Operation

1. When using the set as a general service all-band S.W. converter with a standard broadcast range receiver, use the lowest frequency output coil, tuning it by means of the A.P.C. trimmer to a point somewhere around 500 kc. free from B.C. station interference. The receiver must, of course, be dial-set to this same point. When using it with a similar receiver as a S.W. and U.H.F. converter, use the next highest frequency range output coil, trimming it to around 1500 or 1600 kc. When using it as a 10- or 5-meter converter with an all-wave

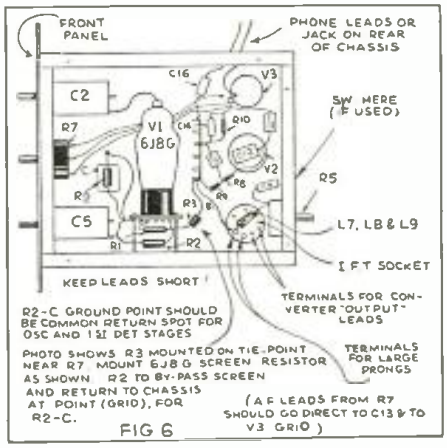


FIG 6

Bottom view, showing how 6J8G tube is mounted, also disposition of the other parts.

super, select the output coil which will tune to 4000 or 3000 kc. or thereabouts, and then band-switch and tune the super to the desired point.

2. When using the set as a superhet, use the 456 kc. I.F. transformer for general work with B.C., 160, 80, 40, and 20 meter inputs. 1500 kc., on the other hand, should be employed in 10-meter reception, 20-meter when image response is troublesome, and 5-meter when U.H.F. signals are stable and are not of the extreme high fidelity type. As for 3000 kc., this value of I.F. becomes most useful in listening to extremely broad transmissions such as the sound channel broadcasts accompanying *television* signals. The use of tanks of .00014 mf. maximum capacity gives us considerable leeway in the choice of I.F. with any two R.F. coils in place; proper settings of the oscillator tank with 20-meter R.F. coils in use, for instance, should provide for a suitable band spotting and spreader tracking with either the 456 or 1500 kc. I.F. transformer, or for that matter with any converter output coil adjusted to any desired frequency within its range.

Parts List

PAR-METAL PRODUCTS:
One HC-7108 cabinet
One B-4510 chassis

HAMMARLUND:
One HFD-30-X two gang micro condenser (C3-C4), 28.5 mmf. per sec. (½ Det-section plates removed)
Two HF-140 140 mmf. micro condensers (C2 and C5)
MEX trimmer for 5 meter antenna conn.
MEX trimmers, as required, for 10 and 20 meter coil C1 and C6 service
A.P.C. 25 trimmers (C1 and C6) for 40, 80 meter coils
A.P.C. 140 trimmers (C1 and C6) (two) for 160 meter coils

A.P.C. 140 trimmers for converter output coils
Two S-5 isolantite sockets
One S-8 socket
CF5-M coil forms for 10 (except oscillator) and 20 meter coils
SWF coil forms for 40, 80, and 160 meter coils
BCC-6 wound coil for converter output with B.C. band receiver (coil range with 140 A.P.C. trimmer—250-560 m.)
No. 64 wound coil for converter output at 1500 kc.
No. 63 wound coil for converter output at 3000-4000 kc.

MEISSNER:
One No. 7684 wound coil for 5 and 10 meter osc.
No. 16-5742 I.F. coil for 456 kc. I.F.
No. 16-8099 transformer for 1500 kc. I.F.
No. 16-6257 transformer for 3000 kc. I.F.

AMPHENOL:
One S6 socket for I.F.
Two S8 sockets for det. amp tubes
One PM 5 plug for cable termination
Two PM 5 plugs for 5 meter ant. and osc. coil assemblies
PM 6 plug, with mounting plate, for each I.F. transformer to be used

I.R.C.:
Half-watt resistors: R1—50,000 ohms; R2—300 ohms; R3—100,000 ohms; R4—5 megs.; R6—20,000; R7—500,000 ohms variable; R8—50,000 ohms; R9—20,000, R10—2,000; R11—50,000; R5—1,000

AEROVOX:
C—two type 1467-.006 mf. in parallel; Cx—type 284-.01 mf.; C8—type 1468-.0001 mf.; C7—.005 mf. mica; C9—type 284-.01 mf.; C10—.00025 mf. type 1468; C11—.1 mf. type 484; C12—type 1467-.002 mf.; C13—type 484-.01 mf.; C14—type PR25-10 mf.; C15—.25 mf. type 484; C16—.25 mf. type 484.

RAYTHEON:
One 6J8G converter
Two 6C5 (metal)

YAXLEY-MALLORY:
One (optional) type A-1 "infant" open ckt phone jack
One type 3215J switch (SW)
Note: L7, L8, and L9 are the feed back cathode coils providing for second detector regeneration (and oscillation for CW reception). That suitable for use with 456 kc. I.F. should be any *small* broadcast coil's secondary. A suitable item for 1500 kc. I.F. would have about 40 turns, scramble wound on half-inch form. One for 3000 kc. should have about 20 turns, scramble-wound (helter-skelter) on a similar form.

CROWE:
One type 27 osc. dial plate
One type 28 det. dial plate
One type 599 2 speed planetary
Two type 588 bar knobs
One type 280 large knob (2⅜" dia.) for ¼" shaft.

Radio Guide to New York World's Fair

● THE exhibits which are of special interest to the radio man at the New York World's Fair are those in the Communications Building, in the RCA Building, in the G.E. Building, in the A. T. & T. Building, and in the Westinghouse Building.

The Communications Building houses the official exhibit of the A.R.R.L., Amateur Radio Station W2USA.

Wire facsimile reproducing machines are in operation in the Western Union and Postal Telegraph booths in this building.

In the RCA Building, the main feature is more or less the continuous demonstration of television.

In the General Electric Building, the two most interesting things are the *House of Magic* demonstration and the demonstration of artificial lightning in Steinmetz Hall. The *House of Magic* demonstration includes a number of surprising stunts done by electronic means. The building also contains a number of television receivers on which visitors can view television programs.

In the A. & T. Building, the most popular feature of all seems to be the free long-distance telephone calls on which visitors in the building are allowed to eavesdrop. The Voder, which was described in RADIO & TELEVISION of March was also on demonstration.

Other buildings at the Fair where it is possible to see television receivers in operation are Westinghouse, Crosley and Ford.

See Pages 302 and 312
for Special Subscription Offers!

High Voltage Television Power Supplies

(Continued from page 285)

to 3,800 volts. The rectifier filament or heater winding is usually a part of this transformer, although not necessarily so. In either case, the insulation between the filament or heater winding and the high voltage one must be able to withstand the peak voltage of the high voltage winding which, in this case, is 4,650 volts.

None of the rectifiers ordinarily employed in receivers can be used because they are not designed for the large internal drop or for the proper *high voltage* insulation.

Capacity of Filter Condensers

The first filter condenser C, in Fig. 1, will quickly charge up to 4,100 volts (approximately), assuming our first figure of 200 volt tube drop and a 4,300 volt peak, and will never fall below 3,900 to 4,000 volts during operation. This means that the rectifier cathode also remains at this potential, and when the negative half-cycle makes the plate 4,650 volts negative with respect to the negative end of RL, there is a total of 4,000 + 4,650 or 8,650 volts from the rectifier plate to cathode with the plate, for this instant negative with respect to the cathode. For this reason the "inverse peak" rating for the rectifier must be 8,650 volts or anything in excess of this value. The 2V3G half-wave rectifier inverse peak rating is 16,500 volts and therefore it will handle this problem. On the other hand, the 879 tube cannot be used, because its *inverse peak* rating is only 7,500 volts. The *inverse peak* rating is the most important consideration in making the tube selection. In the determination of the capacity value of C, for the input filter condenser, we can base our design on the product of the capacity of C, and the resistance of the entire filter and load. This is the "time constant" of the filter, and for a 60 cycle supply the design is based on the factor .166; for 40 cycles, 0.25; and for 25 cycles it is 0.4.

It is based on the product of the capacity of C1 in mf. and the total load on the rectifier including the filter resistor, divider and cathode ray tube in megohms. Again going slightly ahead of our story to assume that the total load resistance as described is 4 megohms, the product of this and C1 must be .166 or greater for 60 cycles. We may, therefore, find C1 as follows:

$$C1 = \frac{.166}{R}$$

and if R is 4 megohms, then C1 = .0416 mf. approximately.

It must be realized that this is approximately the minimum satisfactory filter capacity for C1.

Unlike the ordinary filter in a common receiver power-supply, the capacity found in this way should not be exceeded. It is actually harmful to the rectifier if it carries excessive current when first turned on and, since the capacity of C1 is adequate for filtering, no excessively larger value should be used.

Essentially the identical conditions determine the capacity value of the output filter condenser C2, and it should have the same capacity value.

Voltage Rating of Condensers

The next consideration is that of the voltage rating of the condenser, which should be at least as high as the *peak voltage* of the transformer. For a peak of 4,650 volts the condenser must be rated at this value, or preferably 5,000 volts. Such voltage ratings have always been available for *transmitters* but the transmitting condenser is usually much too large and costly for television use. More and more new condensers are being developed for television and many are available now. However, there is an alternative to the use of a single high voltage condenser and that is to use many condensers, of lower voltage rating, in series. This procedure is, of course, more bulky but may be preferred where the home builder has a number of such items on hand. The arrangement for the use of eight 600 volt units in series would be as in Fig. 2, for both input and output filter condensers.

Electrolytic Condenser Considerations

Condensers in group C1 *cannot* be of the *electrolytic* types and those at C2 *should not* be of this type! The leakage current of the *electrolytic* types makes their use as *input filter* condensers impracticable. If each of these eight condensers at C1 is rated at 600 volts, their total rating will be 8 × 600 or 4,800 volts. Naturally, if all are of equal capacity, their total capacity will be equal to the capacity of one of the group divided by their number. Thus eight .4 mfd. units in series will have a total capacity of .4/8 or .05 mf. As a safety factor, it would be better to use ten .5 mf. values of 600 volts each, having a total voltage rating of 10 × 600 = 6,000 volts, and a capacity of .5/10 or .05 mf.

When two or more condensers are placed in series across a D.C. source, the voltage will not be distributed across them in proportion to their reactance as for A.C., but rather in proportion to their leakage resistance values. For good quality paper condensers, the leakage resistance values will be extremely high but not necessarily identical and by no means constant. In the course of time, the leakage resistance of any of these units may drop to as low as 100 or even 50 megohms. Ten times more voltage will be impressed across a condenser having a leakage resistance of 1,000 meg. than one having a leakage of only 100 meg.

Equalizing Leakage Resistance

This very probable difference in leakage resistance values is easily *equalized* by shunting each condenser with a high resistance (approximately 5 megohms for each condenser in the C1 group). This re-

sistance is so low as compared with the probable leakage resistance of a condenser, which tests *good*, that the voltage distribution among the condensers will remain equal to within a very few percent.

This must be done with the output group of filter condensers C2, Fig. 2 for the same reason.

Why Resistor in Place of Choke?

Now referring to either Fig. 1 or Fig. 2, which are electrically much the same, we note that a 100,000 ohm resistor is used in place of a choke coil for filtering. For the ordinary filter that we might find in the A.C. set we would have, for example, about 100 ma. of current flowing and we would use a choke coil of about 30 H. (henries) value. For equivalent filter conditions, a choke coil for the high voltage filter carrying only 1 ma. would need 100 times the inductance, or 3,000 H (henries).

Of course, the high voltage supply actually produces much less D.C. power, averaging something around 1/10 that of the ordinary supply, which means that we could get the same degree of filtering from the choke using only 300 H. Even this inductance value is quite high and, of course, much more expensive than a resistor.

Voltage Ripple: Since the total load and the value of C1 have been designed so that the voltage of C1 cannot fall more than 5% to 8% below peak voltage between positive peaks of the A.C. supply, the actual *voltage ripple* across C1 cannot exceed 200 to 300 volts. The load on the output condenser is substantially the same as for the input one and hence tends to maintain the same percentage of peak voltage as C1. The presence of C2 at the filter output reduces this ripple to some 10% less than half of that across C1. This brings the ripple voltage between 80 and 130 volts (approximately), which is only a 2½% ripple in the voltage divider.

Additional individual filters are used for the control grid, and the other electrodes which can actually reduce the ripple far below 1/10 of 1%, if desired.

Role of the Voltage Divider

We have seen in the foregoing that the total *cathode* current of most of the television cathode ray tubes is far below 1 ma. Hence, if we make the divider carry 1 ma. we will fulfill the conditions of having the divider carry a large portion of the total load current. To carry this current, the divider must have 1,000 ohms per volt for each volt impressed across it. Thus for 4,000 volts D.C. we would need 4 megohms total for the divider.

Fig. 2 shows such a divider serving also as a means of correctly distributing the voltage across the output filter condenser group C2. Inasmuch as many points on the divider must be by-passed, and many separate resistors must be used for the divider, this is not a bad arrangement. There are no resistors available at present having the desired wattage, the taps or the guaranteed values required in such a supply and available in separate units. It is much more justified at the output than at the input.

We must have a terminal for the cathode ray tube cathode from 60 to 100 volts above the negative end of the supply, and at least two additional points in the divider from which we may obtain variable voltages for operation of the *first anode* and for *biasing the grid*.

In addition to the group of .5 meg. resistors, each of which must be rated at a minimum of ½ watt, a 100,000 ohm potentiometer should be inserted in the negative end of the divider. Its most positive lead, when it connects with the divider, is attached to the cathode, and its slider to the

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

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ALGEBRA PROBLEMS SIMPLIFIED $1.30; Low Voltage Transformer Construction $0.60; Data on 500 to 20,000 Volt Step-up Transformer Construction $1.35 (Prepaid). H. Ackerson, Box 322-D, Ramsey, N. J.

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SWAP 6L6G TUBE FOR 76 TUBE, 100 mmf. midget receiving cond., 2.5 mh. R.F.C. receiving type, and 50,000 ohm 1 watt res. and 10,000 ohm 2 watt res. W9MIO, 919 W. 4th St., Mt. Carmel, Ill.

WANT RADIO AMATEUR'S HANDbook, latest Accountant's Handbook, also Financial Handbook, Hatcher's Textbook of Firearms Identification. Have books, magazines, rifles, ammunition, etc. R. Welker, 406 No. Harvey, Oak Park, Ill.

WANTED—PHONOGRAPH MOTOR, magnetic pickup, recordings, or small magnetic speaker. Will give tubes, books, magazines, power packs, transformers, audios, condensers, etc. State your wants. Mr. Angelo Pepe, 122 Cedar Ave., Exeter, Pittston, Pa.

SWAP TWO MICROPHONES—UNIversal $4.41 SB and Lafayette $4.95 DB for 20 or 40 meter crystals. DB in $1.88 stand. Exchange data first. James C. Moulton, 4912 Quebec Street, NW, Spring Valley, Washington, D.C.

SWAP NEW RADIO BUG, CODE BFO, revr. tubes, stamps, 160-80 meter crystals. Wanted: 40 meter crystals, NC800 condensers, 0-200, 0-500 ma meters 3½ inch. R. D. Dawson, 1308 F, The Dalles, Oregon.

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SWAP 20,000 OHM VOLUME CONtrol, W.E. 120B output transformer, 2 audio transformers 3-1 5-1, Sprague midget condenser 1500 volts, duplicate stamps, for what have you? Correspond. Martin R. Tyser, 2811 S. Kildare Ave., Chicago, Ill.

HAVE RADIO TUBES, RADIO parts, magazines, books, power supplies, chargers, eliminators, etc. Want good A.C. short wave receiver, meters or what have you? H. A. Dennis, 1923 Cullom Ave., Chicago, Ill. 6072

WANTED: GOOD 20 METER TRANSmitter, receiver complete. Not less than 50 watts. Pay cash or send list of swap items. Write stating price. John R. Turner, Jr., 265 Van Cott Avenue, Farmingdale, L. I., N. Y.

HAVE 100 COPIES LIFE MAG.; your needs in official airmail and first day covers for camera equipment, typewriter, radio equipment or what have you? A. Pearlman, 931 Gunnison, Chicago.

WANTED—LOW POWER TRANSmitter. Have steel casting rod, fishing tackle, Keystone projector, 3—25 ft. films, 1—100 ft. film, loud speaker. State full particulars first letter. Edwin Dolan, 2156 NW Northrup, Portland, Oregon.

WANT A USED ELECTRIC RADIO, at least 7 tubes, must be exceptionally clear, in first class condition, cheap for cash, or trade 7 tube console battery radio. Want correspondents also. Miss Dorothy Tanner, R.2, Douglas, Ga.

WANTED: ANY D.C. METERS. Have Burgess "A" and "B" batteries, used about 10 hours. Also have several 2 volt tubes. Write for details. A. C. Alatary, 8 Sylvan Ave., Metuchen, N. J.

TRADE 1—UNIVEX MINIATURE camera 1—Falcon Pressflash camera, 1—Keystone Radioptican, 1—three tube electric set. Would like to have good plate camera 5x7 size. Eugene Cheney, Box 88, Ruddle, Iowa.

HAVE 100 RADIO TUBES, ALL types, 200 radio parts, power packs, eliminators, etc. Want short wave receiver, A.C.-3 tubes or more, or what? George Roe, 5726 S Green St., Chicago, Ill.

TRADE 1929 MODEL "A" FORD sedan in good condition. Want factory built communications receiver or transmitter. W3GBO, 121 E. Pomfret St., Carlisle, Penna.

WHAT HAVE YOU IN EXCHANGE for a 250 watt phone-c.w. transmitter, with crystal mike, latest equipment? Write Arthur Smith, 1555 Seabury Pl., Bronx, N. Y.

HAVE (80) METER XTAL. 3832 KC. Would like a Vibroplex or other well known speed key. Crystal has holder. Will answer all inquiries. E. F. Horan, CCC Co. 2419, McRae, Ga.

TO TRADE: 50 OUTDOOR MAGAzines, 1934 to 1939. Good cond. I want anything in radio or chemical line. All inquiries answered by—Gerald B. Cape, Box 163, Desloge, Mo.

SWAP: PHILCO 623 B, OLD BOOKS, old pewter ware, 2 four poster beds, Colonial bill printed by B. Franklin 1760, want communications receiver. Tell me what you want. Frank Watson, Elsie, Mich.

WANTED MIDWEST RT-16 1934 model 16 tubes 5 wave band 9-2000 meter receiver, good or not. State your price. Cash will be paid. S. A. Forest, 83 Columbia St., Adams, Mass.

TRADE: WE625A MICROPHONE, Jewell 0-50 ma. meter, new Arcturus 6L6G, 26 copies S.W.C. as set of 6 prong 3-winding coils. Need xtals, xtal holders or anything else. W9OLD, 3848 N. Ridgeway Ave., Chicago, Ill.

SWAP NEW 203-A SYLVANIA xmitting tube, complete aviation course, for any code teaching machine. F. L. Saldana, Libertad 63, Texmelucan, Pue., Mexico.

WANTED—"NATIONAL SW-3" 2 volt battery model only. Have "Fairbanks Morse" 2 volt superhet. "Ellen 3R" 3 tube battery all-wave set and "Rocket Sportset" kit. Alexander Podstenny, 217 Pine St., Phila., Penna.

WILL TRADE '36 AND '37 SWC. Popular Science, "Ghirardi's Radio Physics Course," radio parts, small receiver, Power supply, for Argus camera or any photographic equipment. Jack Klein, 1983 Bryant Ave., Bronx, N. Y.

TRADE: $50.00 RADIO AND TEST equip. parts, meters, $100.00 assorted new radio tubes, for Sky Buddy, Howard, portable typewriter, F4.5 camera, microscope, power tools, saxophone or? S. Schultz, 1149 Chicago Ave., Chicago, Ill.

HAVE MANY NEW YORK CITY picture post card views. Would like to exchange them for views from other states. ORA: John E. Dehler, 692 Melrose Ave., Bronx, N. Y.

(Continued on opposite page)

grid through a 1 to 10 meg. resistor, depending upon what is recommended for that cathode ray tube. This should have no taper and must be of good quality. In this unit there is really no preference for either a wire wound unit or a carbon type. One should do about as well as the other.

"Focus Control" Voltage

The *first anode* voltage usually is between 20% and 30% of the total voltage or that supplied to anode 2. Thus a tube requiring 4,000 volts on its second anode would require between 800 and 1,200 volts on its first anode. Whatever figure is recommended for the second anode voltage, this should be the center position of the potentiometer used to control this voltage—*"the focus control."* Assuming for this case that it is 1,000 volts, this point would be up just 1 megohm from the negative end of the divider. The degree of focus control per volt will, of course, depend on the cathode ray tube design, but it is reasonably safe to use a ½ meg. or even a ¼ meg. potentiometer for focus control. If we are to use a ½ meg. unit, its center point will be ¼ meg. from its negative end and with this, together with the 100,000 ohm unit, must be added enough resistance to make up 1 megohm, so that this center point will have a potential of 1,000 volts. Between these two is, therefore, put a 650,000 ohm resistor.

Immediately above this focus control potentiometer are placed one ¼ meg. resistor and six ½ meg. resistors, as in Fig. 3, and shunted across the upper two are two 2 meg. potentiometers, for *electrostatic deflector* centering control. The complete divider now totals 4 megohms with these two centering control potentiometers. The deflectors, like the grid, draw no D.C., and the second anode and cathode draw so little current that connection to the divider will not normally change the voltages of the divider by more than 10% at the most.

Where it is desirable, and the cathode ray tube chosen will permit, two more potentiometers may be placed across those two shown for centering of the other two deflectors. This is needed only where the deflectors are fed by a balanced output circuit.

For cathode ray tubes using outside shielding, the shield must be at the same potential as the *first* anode. In this case, it is essential that the ground be placed near the *positive* end of the divider, or at the connection of A1 to the divider, as in Fig. 3. If the tube is shielded by an internal metallic coat, this is not essential.

Occasionally the high voltage supply will have other uses besides supplying the cathode ray tube. For example, a video amplifier output pentode may be directly coupled to the grid of the cathode ray tube, in which case the current drawn will be so small that it may be neglected. A typical circuit for this connection is shown in Fig. 4.

If the cathode ray tube to be used has three anodes, an additional supply terminal, usually of fixed value, will be needed. No provisions need be made for the current which this anode draws, because it will be negligible. This will be the first anode, and the second anode will require a variable supply for focussing as usual, while the *third* one will be at the fixed high voltage terminal.

The power-pack will be essentially the same for either the *electrostatic deflector* type of tube or the *magnetic deflector* type. Of course, if of the latter type, it will not need the deflector control potentiometers or the tap below the positive end of the voltage divider.

This article supplied through the courtesy of the Sprayberry Academy of Radio.

Looking Ahead in Radio

J. R. Poppele

(Continued from page 261)

A remarkable system has been devised which would permit the owner of a radio receiver to *vote his approbation* of any program on the air. By placing a certain surge in the line during the transmission of a favored program, the aggregate total of votes is recorded at the powerhouse and gives an accurate estimate in hundreds of the number of homes tuned in on certain broadcasts. The system is far superior to present house-to-house canvassing methods, and a tabulation may be taken instantly at any time. I think we shall soon see the day when all better-make receivers are thus equipped to participate in such "voting by radio."

The use of *facsimile* in the home looms nearest, I think, of any of the potentialities which radio offers today. It will bring printed matter, pictures, the latest in world events, cartoons and important commentaries directly into the homes of America, printing them in a tangible, permanent form. It is radio which has learned to write. Even today there is on the market a dual-purpose receiver which combines a facsimile printer and high-frequency receiver with the usual broadcast band and loudspeaker. A time-clock permits this facsimile equipment to be turned on and off at will, even when the owner is not at home or asleep. The normally useless hours of early morning, when the listening audience is at an absolute minimum, may thus be utilized for the transmission of facsimile which the "reader" will find waiting for him when he awakes.

With *facsimile* and *television* both at a highly developed stage, I sincerely feel that we are entering upon the greatest educational era in the history of the world. The audience may be transported to the scene of all world events, may receive instant and concise summaries of these affairs right in the quiet of its own living room. And, so long as American radio maintains the same unfettered status as it has enjoyed until now—the same freedom of expression and scope as the newspapers of America have always known—we may be sure that the progress of the art and its continued achievements in the name of education and toward the growth of an enlightened nation will be assured.

Movies Glorify Radio Amateur

(Continued from page 263)

all the short-wave equipment and procedure used in the picture, for W6PCV 10-Watter operated by Eugene Kearney, was selected by Director James Hogan to act as "technical adviser" on the picture. Kearney set up three outfits for the picture, two in houses, and one mobile unit. His call letters are used in the picture and he, along with several other "Hams," appears in several scenes.

Let's Listen In with Joe Miller

(Continued from page 299)

PLG	15950	18.81	80
PLJ	14630	20.51	3
PLK	14480	20.72	3
PLL	13600	22.06	7.5
PLN	11600	25.86	3
PLO	11440	26.22	7.5
PMB	20570	14.58	3.5
PMD	7995	27.52	7.5
PLU	9850	30.46	3
PLW	8125	36.92	6

BARTER and EXCHANGE FREE ADS (continued)

SWAP — COMPLETE FOUR UNIT Triplett Master test lab. in case, and heavy duty R.C.A. Phonomotor, also Waltham gold watch, for radio parts, watchmakers' tools or what? R. I. Gardner, 2689 L St., San Diego, Calif.

HAVE 1937 MODEL SUPER SKY-rider to swap for what have you? Sam Glass, 1126 N. Highland, Atlanta, Ga.

EXCHANGE R.C.A. MAGNETIC speaker, Tungar battery charger, trickle charger, Brown and Sharp 1" micrometer practically new, for testing instruments or power tools. Joseph Marsh, 111 Van Liew Ave., Milltown, N. J.

HAVE BLILEY HF2 CRYSTAL 14,106 kc. Will swap for a Bliley LD2 or B5 xtal between 7140-7200 kc. or for HF2 xtal 14, 280-14,400 kc. Andrew Barberelis, 11 Kimball St., Haverhill, Mass.

HAVE INSTRUCTOGRAPH WITH 11 tapes, built-in oscillator. Want candid camera; transmitter, or power supply equipment. Harold C. Kaley, 432 North 9th St., Lebanon, Penna.

WANTED I.P. 501A RECEIVER IN first class condition. R. G. Summers, 319 W. Utica, Buffalo, N. Y.

WANTED—20M FONE XTAL OR 1-tube fone xmitter for 20m. Will swap anything you want. Exchange SWL cards with anybody. QRA—A. Oglesby, 81, Stockton Lane, York, England.

WANT RECORDINGS BY ART Hickman, Ted Lewis, Carl Fenton, Prince's Orchestra, Trade Radio, Life magazines, stamps, anything of value. You send records, I'll send my letter of offer. T. Gemmill, Jr., Maple St., Red Lion, Penna.

HAVE ONE SUPER-GAINER, FOUR tubes, 6L7, 6J5, 6J7, and 6F6. Covers all the amateur bands. Also one Cleveland Cloudster gas model powered by a Phantom motor. What have you? Robert Ward, 83 Grove St., Augusta, Maine.

HAVE TYPEWRITERS, MUSICAL instruments, radio parts, rifle, etc. Want good S.W. radio, small lathe, camera, B. Tracy, 52, So. 3rd Avenue, Mount Vernon, N. Y.

SWAP HAMMARLUND SUPER-PRO crystal model SP110X 14-540 meters, complete for HRO Senior—RME69 and DB20. William Quigley, 102 Ave. S., Brooklyn, N. Y.

TRADE—CLOUGH BRENGLE SIGnal generator 1—Majestic, Crosley, Airline, Brunswick, 2—A.K.S. electric phono., chokes, condensers and some cash for tube tester, Rider manuals, Wobbulator, and oscillograph. For information write Jesse Correll, Yukon, Okla.

SWAP 50 IN. CLEVELAND GAS model with M&M motor never cracked, also meters and radio parts. Want good candid camera, portable typewriter or? Ray Cecil, Winters Lane, Cold Springs, Ky.

HAVE SEVEN TUBE ALL WAVE AC receiver. Has curable AC hum, otherwise fair condition. Want a later model Sky Buddy or a small Howard or Sargent receiver. Write first. Charles Baker, Jr., Franklin Grove, Ill.

WANTED—4 TUBE S.W. RECEIVER. Home made—optional. State all. Will swap 3 tube Meissner complete. Also 6.3 fil. trans., S.W. parts, tubes. (List.) 100% QSL QRA: C. Ducy, 514 No. 7th Street, Philadelphia, Pa.

WILL EXCHANGE TUBES, MIKE, radio parts, old pennies, white mice, volt-ammeter, records, odd parts. Want portable radio, radio books, used course or anything else you have. Alex Cambre, 176 Fourth Street, Leominster, Mass.

WANTED—2½ TO 10 METER PORtable transceiver. Have 5 tube 3 band receiver without speaker. Also 3 volt 1 tube kit. Will pay cash if reasonable. Jim Fahnestock, 1896 Grasmere Road, East Cleveland, Ohio.

HAVE PORTABLE TUBE TESTER A1 condition. Will trade for a crystal microphone. W. W. Slater, W8RBK, Box 212, Clarion, Pa.

HAVE POWER TRANSFORMERS, electrolytic condensers, tubes, radio mags., .00014 variable condensers, 5-meter RF chokes, 2½ m.h. RF chokes —4-5-6 prong plug-in coils. Want S.W. sets not in good condition. Shelton Radio Club, 215 S. 3rd St., Brooklyn, N. Y.

HAVE A THORDARSON CONdenser checker bridge and everything. Want some transmitter parts. Bud Carson, 1618 W. Second, Dayton, Ohio.

AM INTERESTED IN A GOOD Teleplex or such. Have 2 stage preselector. What have you? Steve Vargo, Jr., 2338 Riverview, Dayton, Ohio.

HAVE 7C AND BS5 MANUFACtured by Ellen. Also 5 and 10 meter receiver. Want mimeograph machine, typewriter, etc. G. Samkofsky, 213 S. 3rd St., Brooklyn, N. Y.

HAVE—32 VOLT DELCO GENerator, 2 amp. battery charger and other items to swap for electric motor and shop tools or? Ed. Caswell, North Adams, Michigan.

SWAP—VICTOR TEST OSCILLATOR Model 97-A, Pacent single button carbon mike, radio parts, mechanical magazines and stamps for S.W. receiver covering 20-160 meters. All letters answered. George Adams, Queen City, Texas.

HAVE SOLAR CAPACITY ANAlyzer type CB approximately 8 months old complete with tubes, test props and instructions. Would like a "Sky-Buddy" or similar receiver. James Walter, North Collins, New York.

HAVE A & B BATTERY ELIMinators, A-1 condition. Will trade for a good double button carbon mike, or what have you? Gordon C. Johnson, 2908 E. 6th St., Superior, Wis.

WANTED: GOOD 5 METER RECeiver—6J5G, 6C5 and 6F6 or like. Will swap instruction books on Commercial Art and Cartooning, drawing instruments and cash. Nick Mamula, Jr., 2825 Jane St., 2 Flr., Pittsburgh, Pa.

SWAP: DELUXE CHROME PLATED 3½" 150-0-150 ma. meter for service equipment or what? George Michaelis, 1200 Court Street, Charles City, Iowa.

WILL SWAP 2—25B's; 4—22?'s; 1—12A5, 2—235's, 2—245's and 1—43, used, but good. Want 2 crystals. Send frequency of xtals to James Dolan, Box 655, Woonsocket, R. I.

WANTED NATIONAL SCOTT, Hammarlund, etc., also testing instruments. Send your list for mine. C. Pollock, Chanute, Kansas.

SWAP—MIDGET COND., OUTPUT trans., 150 power microscope, 10-inch magnetic speaker, mounted condensers 4-10-10 mfds., 150 w.v., 4 mfd. 525 w.v. For: 5 tube S.W. receiver. J. Kennedy, 4416 Memphis, Cleveland, Ohio.

WANTED: SMALL PRINTING Press, mimeographic machine or printed or mimeographed goods. Also want short wave receiver. Have: radio books, courses, formulas, 53 tube or? SWLs appreciated. William R. Schroeder, 803 Wisconsin Ave., Peoria, Illinois.

WANTED—30 OR 23 TUBE SCOTT receiver, describe. Price. Swap Hallicrafters, RCA, phonograph oscillator, Universal output transformers, RCA M34 auto radio, DeForest radio course, Universal BR microphone new, Oliver Klein, 2235—N. 39 St., Milwaukee, Wis.

WANTED—6V. 300V. VIBRAPACK or genemotor, D.B. mike and transformer, modulating transformer for 6L6, telephone books, 160 and 40 xtal, Howard 430. Have cash, 80 xtal, meters, radio parts and books. W9RXY, Clitherall, Minn.

WANTED: TRIUMPH $30—3" Oscillograph and Wobbulator in perfect condition. Will give RCA 156A portable tube tester (little used) and $30.00 list RCA tubes. T. Wojciechowski, 2380 Fulton St., Brooklyn, N. Y.

WANTED TO BUY—USED "LINguaphone" course in French, German, Spanish or Italian; will accept best offer and will pay cash; outfit must be complete, in good condition. Martin Lewis, 54 Highland Avenue, Port Washington, N. Y.

WANTED—12A7 AND 6F7 TUBES 16mm lens, crystal mike, photo-meter, mini-camera and good signal key. Have Utah 6" speaker, headphones, Premo 9x12 cm f/8, radio mags. G. E. Chouinard, 4599 Papineau Avenue, Montreal, Canada.

HAVE RCA CODE MACHINE WITH tapes, 16mm Keystone movie projector, and 5 tube shortwave receiver with plug-in coils. Want typewriter or signal generator or what have you? Jerome Singer, 4529 N. Spaulding Ave., Chicago, Ill.

HAVE 852, 913, LD2 BLILEY 160 M. xtal, good condition for enlarger or other photographic equipment. All letters answered. P. C. Mangan, RD3, Warren, Penna.

HAVE NATIONAL SW5, COMPLETE coils, tubes, power pack, Hasnel model 28 heavy air pistol, 22 cal. repeater. list. Want 8mm camera and projector, hand grinder, what have you? W. J. Closson, 295 8th St., Troy, N. Y.

TRADE LOT OF S.W.&T. AND Radio & Tel. magazines, one Riders Servicing Superhets and a near new tube and set tester for a receiver. All letters answered. W9RAC, Richard Laplander, Box 149, Hubbell, Mich.

HAVE: C.W. TRANSMITTER: 6L6 xtal and 10 in final, uses plug-in coils. Complete with tubes, power pack and xtal, coils for 160 meters. Can be adapted for phone. Trade? W9TME, 2834 West Fullerton Ave., Chicago.

SWAP: RADIO BOOKS, SW MAGAzines, parts, test equipment, new '39 Crosley 5 AC-DC midget, National SW-3, 5 coils, stamps, Scott album, photography books, stamp for list. John J. Vilkas, 1515 South 49th Court, Cicero, Ill.

SWAP: RADIO PARTS (TUBES, condensers, transformers, speakers, etc.), new and used, for anything electrical, or what have you? E. W. Earps, 1316 E. Bobe, Pensacola, Fla.

WILL SWAP ADVANCED CANDLER Code Course, good condition, for AC-DC short-wave communications receiver or "bug." William M. Slusser, 2955 Clifton Ave., Baltimore, Md.

WILL TRADE—5 MET. TRANSceiver, two keys code oscillator new, two pr. transformers, 1000 V each, 852 RCA tube, good as new, for what have you? Eldon Wooster, Feesburg, Ohio.

WANTED: COMPLETE SKY BUDDY in good operating condition. State price, model, condition, etc. Have some radio parts and stamps. J. S. Shino, 300 Main St., Vancouver, B. C., Canada.

TRADE 3" MAGNETIC SPEAKER for National BM midget dial. Write first. List free. John Moskal, 85 Gardner Ave., So. Attleboro, Mass.

WANTED REFLECTA OR WIRGIN camera. Trade Argus camera Model A new, 2 tube transmitter less key, all electric, Philco short wave adapter kit 3 tube complete 110 volt for radio, parts. John Arnold, Bluffs, Illinois.

TRADE 25W. XMTR (47 XTAL) complete; Meissner Noise Silencer (4 tube) complete; Spring 1939 Amateur Call Book. Want U.S. stamps (used) or what? Vic C. Besancon, W6OLU, 406 West Ash St., San Diego, Calif.

SWAP VERY FINE MEDICAL microscope, Delta wood lathe with attachments, Univex movie camera, Browning 12 shotgun, for good communication receiver including 10 meters; crystals, or what have you? W5HVX, Box 936, Wink, Texas.

SWAP GENERATORS, MOTORS, two 1½ volt portable radios, one 6 volt radio and two 1-tube all wave loudspeaker radios, trade for what have you? W. A. Ogle, Route 2, Green City, Mo.

COLLECTORS: TRADE BRITISH Colony and other stamps catalog 5c each and over (or cash), for Rider manuals, data sheets from Radio News, Radio Craft, W. Bischer, 45-B Babbitt, Dayton, Ohio.

WILL EXCHANGE ONE-TUBE PORtable radio or one hundred fifty Saturday Evening Posts for small ham transmitter 1 to 2 volt tubes, or other radio parts or magazines. Eugene Makovec, Medford, Wisconsin.

TRADE—MODEL OCA (CLOUGH-Brengle signal generator 100 kc. to 30 mc. used very little, for super-het communications receiver, also National SW-5 and 2 complete radio courses for trade. Charles H. Hoover, 58 State St., Middletown, Penna.

SWAP COMPLETE $150 1939 radio course for radio parts, printing press or what have you? All inquiries will be acknowledged. M. W. Zmood, 3 Monadnock Bldg., Winnipeg, Man., Canada.

WILL SWAP A 5 TUBE 5 METER set, test meter, latest radio tubes and parts for what have you? James D'Amato, 703 Rogers Avenue, Brooklyn, N. Y.

HAVE FIRST DAY COVERS U.S. from 1936 to 1939. Want gas model engines and parts for radio controlled plane. Or what have you? J. E. Wilhelm, Box 693, Elkins, W. Va.

SWAP GILBERT A.C.-D.C. MOTOR, also Gilbert #18 reversible motor for radio parts. Also have speakers, P.M. and all types of radio tubes. SWL's exchanged. Daniel Platek, 225 Division Ave., Brooklyn, N. Y.

HAVE 35MM KODAK CAMERA, has f4.5 lens in perfect condition used only once, cost $29.50. Swap for Sky Buddy or Howard model 430 or wireless record player. Marcel Lachance, 26 Howard, Lewiston, Maine.

HAVE RCA INST. CODE MACHINE with 4 tapes, key and buzzer with battery complete for what have you? Tom Killeen, 567 Walnut St., Elizabeth, N. J.

WANTED LARGE STAMP ALBUM and stamps. Have all kinds of radio parts, tubes, etc. E. C. Tureman, Box 784, Bend, Oregon.

WANTED — "A" ELIMINATOR 5 volt for 10 tube set, good condition or can be repaired easily. State your needs in first letter. Schoonover, Oakland, N. J.

HAVE 15 JEWEL ELGIN WATCH 12 size just cleaned. One portable battery set with new tubes and coils less batteries. Need photo enlarger telescope, extension tubes for Excita camera. Raymond G. Smith, General Delivery, Reno, Nevada.

HAVE — EASTMAN CAMERA-120, Mac code oscillator, set of parts for P.A.—push pull 45s. Want—exposure meter, candid camera, tape for Instructograph, radio operating course. John E. Taylor, Box 8, Sparks, Nev.

SWAP SUPERIOR ALLMETER, Triplett tube 1210-A tester, 1200-A dual meter, Rider manuals 2-3 -5-6-7, 20 watt P.A. amplifier with two Rola G-12 dyn. spks. For? J. Bakutis, P.O. Box 51, Sta. A, New Haven, Conn.

(Continued on following page)

BARTER and EXCHANGE FREE ADS (continued)

FOUR BAND A.C.-D.C. SHORT wave receiver. Swap for automatic 4-jaw chuck for "AA"-brand lathe; or power tools and machines. Write for list of other radio stuff. A. Stuart, 1015 Wilson Ave., Teaneck, N. J.

SWL'S, CENTRAL AND SOUTH America. Wish correspond in English, exchange DX dope, swap stamps for QSLing (cheaper than IRC's). Use Sky Buddy here, es 6K7 preselector. Stan Keeley, 117 Lulworth Road, Hall/Green, Birmingham, 28, England.

HAVE 807 DBLR. BUFFER COMplete, 4 tube T.R.F. with dynamic speaker, a 112 mg long lines osc., 160 meter xtal. Want 7 mg low freq. xtals, a 809 or? Rudolf J. Ticky, 2009 Tate Ave., Cleveland, Ohio.

TRADE HALLICRAFTERS SX-18 8" P.M. Jensen spk. in Par-Metal cabinet. Shipped from factory Jan. 5th. Guaranteed perfect condition, for 430 Howard and cash difference. Whitney Anderson, 2120 Texas, Vernon, Tex.

WILL SWAP KIT OF GRADE A parts to build a 5 tube superhet with R.F.O. for a microscope or chemical equipment. State trade offer in first letter. J. A. Czarnecki, 33 Akron St., Meriden, Conn.

HAVE APPROXIMATELY $12 worth of chemicals and glassware; 120n foreign stamps. Want s.w. receiver; or used Superior test equipt., 0-1 ma. meter, parts, what have you? R. Hannon, 21 Whitcomb St., Webster, Mass.

HAVE: WINCHESTER MODEL 62 rifle, gold plated trumpet, radio magazines A-1 condition. Value $45. Want 6 volt short wave receiver and windcharger. Will consider any trade. Darrell Swift, Rural Route III, Washington, Iowa.

WILL BUY OR TRADE FOR CRYStal mike, genemotors, new radio tubes, ten, twenty, forty and eighty meter transmitting crystals, transmitting key, Candler course, send full description. William Blecha, W9DFQ, Pawnee City, Nebraska.

OFFER 60 WATT 6L6 BOOSTER amplifier, 30 watt high gain amplifier, 4 mikes, 6 aluminum baffles with Cinaudagraph units 0-50 Weston ammeter. Want oscilloscope, audio oscillator, frequency modulator. Edgar Rye, Blooming Prairie, Minn.

WANTED — GOOD MIKE AND speakers for P.A. system in exchange for receiving parts, radio books and magazines, Zeiss-Ikon camera, F-6.3, and tenor banjo. Luzon Gamboa, Block 7, Grace Park, Caloocan Rizal, Philippine Islands.

HAVE COMPLETE STAMP COLlection, includes: 1939 Scott stamp catalogue, 800 stamps in International album, and water mark detector, to trade for good A.C. short wave receiver. Robert Knox, 16 Bailey Avenue, Palchogue, New York.

HAVE LARGE NUMBER OF VARIous magazines to trade for radio parts. J. H. Hood, 37 Club Drive, Greenville, S. C.

SWAP: SINGLE SHOT 10 GA. 3" shell shotgun, gold-plated "Comet" cornet for what have you? Crystals, mikes or any radio parts. Charles J. Johnson, Kimball, S. Dak.

HAVE: PUP TENT, MODEL AIRplane kits, parts, miniature gasoline engines, stamps, magazines, printers type and equipment, etc. Want: Radio sets, books, N.R.I. course and radio equipment. B. Weinstein, 836 Faile Street, Bronx, N. Y.

WILL TRADE 2 A.C.-D.C. 4 TUBE radios, 2—7 jewel pocket watches, watchmaker's tools. Want A.C.-D.C. s.w. receiver, portable typewriter, old cuckoo clock or what have you? R. H. Miner, Oakdale, Iowa.

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

WANT 2—2¼ METER ACORN transceivers, complete. 35 valuable photographic processes, stunts, camera kinks, photo fads—swap for 10 copies of used piano music or what? George Homer, 1305 W. Harrison St., Chicago, Ill.

HAVE "BROWN-BILT" LADIES' fancy laced boots. Size 4½-A. Worn only a few times. Original heels and soles. Cost $8. Trade for Bliley crystal or on a crystal mike. Bettie Jane Johnson, Kimball, South Dakota.

HAVE A GOOD PHILCO 37-620 mantel model broadcast receiver. Also covers short wave. Will swap for short wave receiver or low power transmitter. Leonard Fuerst, Orland, Calif.

TRADE FOR STAMPS CBLOCKS OF U.S. or any foreign). Mac oscillator, deluxe key, new condition, latest ARRL Handbook, License Manual. Best stamp offer accepted. Carl L. Horton, 16 Auburn Place, Athol, Mass.

HAVE 2 TUBE PHILCO CONVERter 14-200 meters using 24 and 27 tubes. Would like signal generator (A.C.). John Garbowski, P.O. Box 255, Wilmerding, Pa.

WILL SWAP COMPLETE AMAteur station—6 tube 18 watt 160m. phone transmitter, tubes, crystal, mike, monitor, receiver, phones, handbook. Want camera, U.S. stamps. A Jaffray, 6304 E. Pleasant, Belvidere, Ill.

TRADE DELUXE DEVELOPING outfit — darkroom light, developer, frame, mask, roller, 3 acid-resisting trays, graduate, rod, ferrotype plate, half Gross Velox paper (2¼"x3¼") for Bliley crystal 1827—1849 kc. Box 286, Kimball, S. Dak.

COMPLETE CHEMICAL LABORAtory. Cabinets, chemicals, glassware, electrical equipment, balance, etc. Entire laboratory to one destination. Can furnish inventory. Will exchange for photographic or 10 meter equipment. T. C. Furnas, Jr., 315 South Eleventh, Independence, Kansas.

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SWL EXCHANGE

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JOHN L. BALLIN, W4OII56, 40 East 66 St., New York, N. Y.

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HAWAII

J. H. BROWN, 1711 Kilauea Ave., Hilo.

BOOK REVIEW

STANDARDS ON RADIO RECEIVERS 1938—STANDARDS ON ELECTRONICS 1938—STANDARDS ON ELECTROACOUSTICS 1938—STANDARDS ON TRANSMITTERS AND ANTENNAS 1938—each 6" x 9", and published by The Institute of Radio Engineers, Inc., New York City.

The volume on *radio receivers* contains 58 pages and is profusely illustrated with diagrams, graphs and symbols. The book includes all important definitions relative to the subject, grouped under appropriate headings. This part is followed by a section designating the schematic symbols commonly used, after which is a section on methods of testing broadcast receivers, the balance of the book being devoted to the explanation of methods of testing radio receivers. The index makes it possible for the user to refer to any section desired.

The book on *electronics* contains 59 pages, five of which are devoted to an index. Like the book previously described, it begins with a dictionary of appropriate terms and is followed by a chapter on letter and graphical symbols. Diagrams and graphs make clear the methods of testing vacuum tubes and the construction of test equipment, to which the balance of the book is devoted.

The volume dealing with *electroacoustics* contains 37 pages, of which three are the index. Like the others, it opens with a dictionary of appropriate terms and letter and graphical symbols. The remaining 20 pages of the book are devoted to diagrams illustrating means of testing loud speakers.

The fourth volume dealing with *transmitters and antennas* likewise begins with a dictionary of terms and a table of graphical symbols.

HISTORY OF RADIO TO 1926, by Gleason L. Archer. Size 9½" x 6"; 372 pages, plus appendix and index; illustrated. Published by The American Historical Society, Inc., New York City.

It is unfortunate that Mr. Archer saw fit to conclude this scholarly work with 1926, for radio has grown so largely since that time. However, his book traces the birth of communications from the fire beacons of ancient times through the invention of the electric telegraph, telephone and wireless telegraph up to the broadcast era. He has chapters dealing with the fight for control of broadcasting, litigation in the broadcast arena, and the struggle for network facilities.

TELEVISION by Frank Waldrop and Joseph Borkin. Size 8¼" x 5½"; 296 pages, plus appendices and index. Published by William Morrow & Co., New York City.

This volume, now particularly timely, tells of the birth of television and its growth throughout the world. Not highly technical, it discusses some of the technical problems which have kept television from the public, but, more important, tells about the fight to control television being waged by leading corporations in the United States.

With its comprehensive index and full bibliography, it is a most useful source book for anyone collecting a library on television.

RADIO FACSIMILE, Volume I, edited by Dr. Alfred N. Goldsmith, Arthur F. Van Dyck, Charles W. Horn, Robert M. Morris, Lee Galvin. 353 pages, illustrated, size 6" x 9", paper covers. Published by RCA Institutes Technical Press, New York City.

Perhaps the most startling feature of this book is the comparison of radio facsimile pictures sent from London to New York—one in 1924 and the other in 1938. The former looks as though it might have been done by one of the modernist artists with surrealist tendencies. The second resembles an ordinary newspaper half-tone, being surprisingly clear in detail.

The book is divided into four major sections, comprising the historical development of facsimile, status of facsimile in 1938, methods and equipment for such transmissions and, finally, facsimile broadcasting.

The volume includes papers by R. H. Ranger (whose facsimile system this reviewer used to transmit a copy of the "Evening World" from New York to the Radio Manufacturers' Convention at Atlantic City in 1929), V. K. Zworykin, A. N. Goldsmith, C. J. Young, and others of equal note.

The illustrations show not only facsimile equipment, diagrams and test patterns, but also numerous graphs which make the operation of the system easily understandable.

World S-W Stations

(Continued from page 284)

Mc.	Call	
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.
6.295	OAX4G	LIMA, PERU, 47.63 m., Addr. Apartado 1242. Daily 7-10.30 pm.
6.280	HIIG	TRUJILLO CITY, D. R., 47.77 m. 7.10-9.40 am., 11.40 am.-2.10 pm., 3.40-9.40 pm.
6.243	HIIN	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	HIOQ	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.
6.186	HIIA	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	VPB	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		LEOPOLDVILLE, BELGIAN CONGO, 48.83 m. Suns. 5.35-7 am.
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	LKJ2	JELOY, NORWAY, 48.94 m. Noon-6 pm.
6.125	CXA4	MONTEVIDEO, URUGUAY, 48.98 m., Addr. Radio Electrico de Montevideo, Mercedes 823. 8 am.-Noon. 2-10 pm.
6.122	HP5H	PANAMA CITY, PAN., 49 m., Addr. Box 1045. 10 am.-1 pm., 5-11 pm.
6.122	FK8AA	NOUMEA, NEW CALEDONIA, 49.00 m., Radio Noumea, Addr. Charles Gaveau, 44 Rue de l'Alma., Wed. & Sats. 2.30-3.30 am.

Mc.	Call	
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.
6.117	XBUZ	MEXICO CITY, MEX., 49.03 m., Addr. 5 de Mayo 21. Relays XEFO 9 am.-1 pm., 7 pm.-2 am.
6.116	—	SAIGON, FR. INDO-CHINA, 49.05 m., 6 or 7 to 9.30 am., 11-11.30 pm.
6.116	OLR3C	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	YDA	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	CRCK	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., Tues. 8.30-10 am.
6.080	HP5F	COLON, PAN., 49.34 m., Addr. Carlton Hotel. 7-9 pm.
6.079	DJM	BERLIN, GERMANY, 49.34 m., Addr., Broadcasting House. Irregular.
6.077	OAX4Z	LIMA, PERU, 49.35 m. Radio National 7 pm.-1.30 am. Except Sun.
6.075	VP3MR	GEORGETOWN, BRI. GUIANA, 49.35 m. Sun. 7.45-10.15 am.; Daily 4.45-8.45 pm.
6.070	CFRX	TORONTO, CAN., 49.42 m. Relays CFRB 6.30 am.-11 pm., Sun. 9 am.-11 pm.
6.070	VE9CS	VANCOUVER, B. C., CAN., 49.42 m. Sun. 1.45-9 pm., 10.30 pm.-1 am.; Tues. 6-7.30 pm., 11.30 pm.-1.30 am. Daily 6-7.30 pm.
6.069	——	TANANARIVE, MADAGASCAR, 49.42 m., Addr. (See 9.51 mc.) 12.30-12.45, 3.30-4.30, 10-11 am., Sun 2.30-4.30 am.
6.065	SBO	MOTALA, SWEDEN, 49.46 m. Relays Stockholm 4.15-5 pm.
6.060	—	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	WBXAL	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., 12.25-6 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.
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	XEBT	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	HIIJ	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.

(Continued on following page)

Mc.	Call	
5.813	TIGPH2	SAN JOSE, COSTA RICA, 51.59 m., Addr. Senor Gonzalo Pinto, H.
5.790	TGS	GUATEMALA CITY, GUAT., 51.75 m. Casa Preidencial, Senor J. M. Caballeroz. Irregular.
5.735	HC1PM	QUITO, ECUADOR, 52.28 m. Irregular 10 pm.-12 m.
5.460	YNOP	MANAGUA, NICARAGUA, 52.40 m., 8.30-9.30 pm. Sun. 2-3 pm.
5.300	ZIK3	BELIZE, BRIT. HONDURAS, 56.6 m., Tue., Thurs., Sat. 1.30-2, 8.30-9 pm.
5.145	OKIMPT	PRAGUE, BOHEMIA, 58.31 m., Addr. (See OLR, 11.84 mc.) Irregular.
5.145	PMY	BANDOENG, JAVA, 58.31 m. 5.30-11 am.
5.040	YV5RN	CARACAS, VENEZUELA, 59.52 m., 4-11.30 pm., Sun. 8.30-11.30 am., 3.30-10 pm.
5.020	YV4RQ	PUERTO CABELLO, VENEZ., 59.76 m., testing nightly. Off 9.20 pm.
5.010	YV5RM	CARACAS, VENEZ., 59.88 m., 3.30-10 pm., Sun. 8 am.-10.30 pm.
4.990	YV3RX	BARQUISIMETO, VENEZ., 60.12 m., 10 am.-11 pm.
4.970	YV1RJ	CORO, VENEZ., 60.36 m., Irreg.
4.960	VUD2	DELHI, INDIA, 60.48 m., Addr. All India Radio. 7.30 am.-12.35 pm.
4.960	YV5RS	CARACAS, VENEZ., 60.48 m., Irreg.
4.950	YV4RO	VALENCIA, VENEZ., 60.61 m., Noon-1, 6-10 pm.
4.940	YV5RO	CARACAS, VENEZ., 60.73 m.
4.930	YV4RP	VALENCIA, VENEZ., 60.85 m. Irreg.
4.920	YV5RU	CARACAS, VENEZ., 60.98 m., 6.30-7.30, 10.30 am.-1, 3.30-10 pm.
4.920	VUM2	MADRAS, INDIA. 60.98 m. Addr. All India Radio, 6.30 am.-12.10 pm.
4.910	YV1RY	CORO, VENEZ., 61.10 m., 6.30-9.30 pm., ex. Sundays.
4.905	HJ1ABG	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.
4.890	YV1RX	MARACAIBO, VENEZ., 61.35 m., 10.30 am.-1.30, 4.30-10.30 pm.
4.890	HJ7GAD	BUCARAMANGA, COL., 61.35 m., 5.45-6.30, 11.30 am.-1 pm., 6-11 pm.
4.885	HJ4DAP	MEDELLIN, COLOM., 61.42 m., 8 am.-2, 6-11 pm.
4.880	VUB2	BOMBAY, INDIA, 61.48 m. Addr. All India Radio, 7.30 am.-12.30 pm.
4.880	YV6RU	BOLIVAR, VENEZ., 61.48 m., 6.30-9.30 pm. except. Sundays.
4.875	HJ6FAH	ARMENIA, COLOM., 61.54 m., 8-11 am., 6-10 pm.
4.865	HJ2BAJ	SANTA MARTA, COLOM., 61.67 m., 5.30-10.30 pm.
4.860	YV1RL	MARACAIBO, VENEZ., 61.73 m., 11 am.-1 pm., 4.30-10.30 pm.
4.855	HJ3CAF	BOGOTA, COLOM., 61.80 m., 7 pm.-mid. ex. Sundays.
4.850	YV1RZ	VALERA, VENEZ., 61.88 m., 11.30 am.-1, 5.45-8.45 pm.
4.845	HJ3CAD	BOGOTA, COLOM., 61.92 m., 6-11.30 pm.
4.840	VUC2	CALCUTTA, INDIA, 61.98 m. Addr. All India Radio. 6.30 am.-12 n.
4.840	YV4RX	MARACAY, VENEZ., 61.98 m., 6-11 pm. ex. Sundays.
4.835	HJ1ABE	CARTAGENA, COLOM., 62.05 m., 7 am.-6, 7-11 pm.
4.830	YV5RH	CARACAS, VENEZ., 62.11 m., 5-9.30 pm. (Sun. to 10.30 pm.)
4.825	HJ5EAD	CALI, COLOM., 62.17 m., 7-11 pm, ex. Sundays.
4.820	YV3RN	BARQUISIMETO, VENEZ., 62.24 m., 11.30 am.-1.30, 5.30-9.30 pm.
4.815	HJ2BAC	CUCUTA, COLOMBIA, 62.31 m.
4.810	YV1RU	MARACAIBO, VENEZ., 62.38 m., 10.45 am.-12.45 pm., 4.30-10.30 pm.
4.800	YV1RV	MARACAIBO, VENEZ., 62.50 m., 10.45 am.-12.45 pm., 4.30-10.30 pm.
4.795	HJ6FAC	PEREIRA, COLOM., 62.57 m., 9 am.-noon, 6.30-10.30 pm. ex. Sun.
4.790	YV5RY	CARACAS, VENEZUELA, 62.63 m., 5.30-8 pm.
4.785	HJ1ABB	BARRANQUILLA, COLOM., 62.69 m., 4.30-10.30 pm. ex. Sundays.
4.772	HJ7GAB	BUCARAMANGA, COLOM., 62.87 m., Nightly to 10.45 or 11 pm.
4.560	HC2ET	GUAYAQUIL, ECUADOR, 65.79 m., Wed. & Sat. 8-10 pm.

Index to Advertisers

(While every precaution is taken to insure accuracy, we cannot guarantee against the possibility of an occasional change or omission in the preparation of this index.)

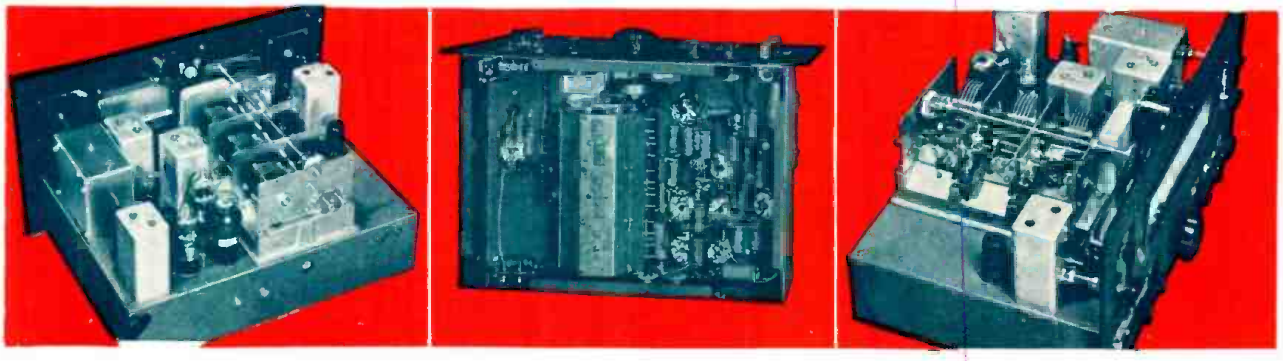
THE *New* NHU RECEIVER

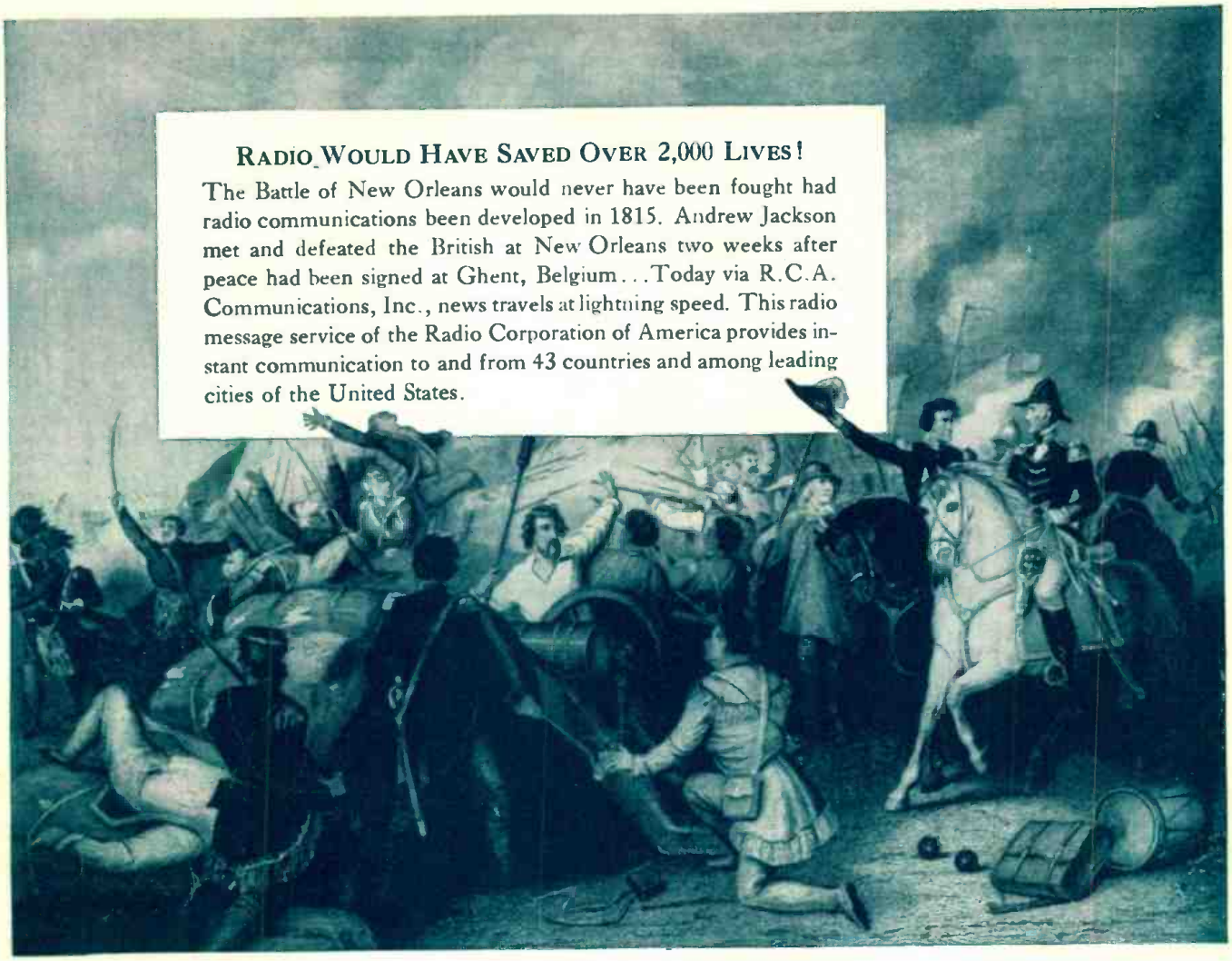
The new National NHU Communication Receiver brings outstanding performance to the range from 27 to 62 megacycles. All features commonly found in the finest communication receivers are provided in the NHU, including a wide range crystal filter.

Many details of the NHU are unique. The RF circuit and tubes are built completely inside the frame of the condenser, thus making a compact assembly with the shortest possible leads from coils to condensers to tubes. The coils are mounted radially in a cast aluminum turret which is easily rotated to position by a knob on the front panel. Inertia-type tuning is used, with a ratio of approximately 70 to 1. The dial pointer is positively driven by rack and pinion, and moves vertically when the coil range is changed, so that it always points to the right frequency.

A booklet describing this fine instrument will be mailed on request. Ask for the "Free NHU Booklet".

NATIONAL COMPANY, INC., MALDEN, MASS.





RCA Helps Make Radio a Welcome Guest in 27,500,000 Homes

IN RETURN for its welcome in the American home, radio provides millions of dollars worth of entertainment, education, and news which listeners receive free. In addition, radio renders services to the government, churches, universities, farms, ships, airplanes, and business which have an untold value.

How vital these services are is dramatically illustrated in contrasting pre-radio days with the present. For example... just imagine the cost and confusion that would be caused if news of the signing of a peace treaty should take two weeks to travel now from Europe to America as it did in 1815!

RCA's Role in Increasing the Services of Radio!

Research in RCA Laboratories is the basis of the ever expanding services of the Radio Corporation of America. Research made possible the development of NBC and its two networks, the Red and the Blue. Research creates the extra values offered in RCA Victor Radios, RCA Victor Television Receivers, RCA Victrolas, Victor and Bluebird Records, and all of the sound, radio, and motion picture equipment built by RCA Victor.

All of the activities of RCA are dramatized in the RCA exhibits at the New York World's Fair and at the San Francisco Exposition. We cordially invite you to visit these fascinating exhibits.

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Listen to the "Magic Key of RCA" every Monday, 8:30 to 9:30 P. M., E. D. S. T., on NBC Blue Network.

RADIO CORPORATION OF AMERICA

RADIO CITY, N. Y.

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Radiomarine Corporation of America
R.C.A. Communications, Inc.
National Broadcasting Company
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