SHORT WAVE & TELEVISION

The Popular Radio Magazine

„SHORT WAVES„
"Spot the News"
SEE PAGE 74

25¢ IN U.S. AND CANADA

HUGO GERNSBACK
EDITOR

BEST SHORT-WAVE STATION LIST
HOW TO GET OVERSEAS STATIONS
NEWEST RADIO EXPERIMENTS
RADIO QUESTIONS AND ANSWERS

JUNE 1938

THE NEW 1938 ULTRA STRATOSPHERE "10"
2½ to 4000 METER TRANS-RECEIVER (RECEIVES 2½ to 4000 METERS TRANSMITS 2½ and 5 METERS)

*Ten tubes.
1—6K7 Regenerative Tuned R.F. Amplifier.
1—6J7 Regenerative Detector.
1—6J5G Super Regenerative Detector & Transmitting Osc.
2—6C5 P.P. 1st Audio Stage.
2—25L6 P.P. Beam power output stage & modulators.
2—25Z6 Parallel Rectifiers.
1—6G5 Electronic tuning indicator & R meter.
*Receives from 2½ to 4000 meters.
*Transmits on 2½ & 5 meters.
*8" Dynamic Speaker.
*Calibrated R.F. Gain Control.
*A.F. Gain Control.
*Size—17½" x 19½"—16 gauge metal.
*Tone control.
*R.F. Resonator control.
*Separate electrical bandspread.
*Vernier planetary drives on tuning Cond.
*Large 8" tuning dials.
*May be used for I.C.W. and phone transmission and as a code practice oscillator. Only a key required.
*Standby switch.
*Automatic Phone jack.
*Built-in A.C. & D.C. Power supply.

Complete kit of parts, including 8" Dynamic Speaker, unwired, less tubes and accessories $18.95

1 Kit of 10 matched Sylvania tubes	$6.95
Set of 4 coils—2½ to 15 meters	.30
Set of 8 coils—15 to 550 meters	2.20
Set of 4 coils—550 to 4000 meters	2.00
American S. B. Handmike	2.95
Wired and tested extra	4.50

Price complete, less mike $34.90

Shipping weight 36 lbs.

SENSATIONAL ULTRA A. C. + D. C. 2-TUBE TRANS-RECEIVER 2½ to 4000 Meters

TRULY A SENSATION

Uses the new 6J5G super triode tube which is the equivalent of acorn types

Never before was a unit of this type available at any price. This compact and self-contained unit will receive from 2½ to 4000 meters with a high degree of excellence. Will receive foreign stations, amateurs, police calls, broadcast, press, airplane and weather reports, time signals, and all ultra high frequency stations. As a 2½ and 5 meter transmitter surprising results will be obtained when calling friends from afar.

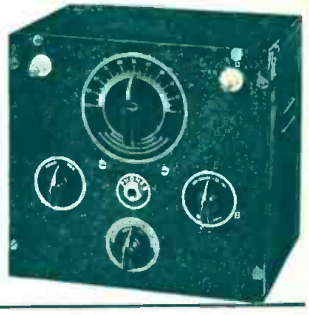
FEATURES

- Transmits from 2½ to 5 meters
- Receives from 2½ to 4000 meters (12 bands)
- Separate electrical and mechanical bandspread
- Loud speaker volume
- Automatic super-regeneration, 2½ to 15 meters
- House to house communication
- Plate modulation
- Built in A.C. & D.C. power supply (any cycle)

Complete kit unwired less tubes, coil, cabinet, microphone $7.15

Cabinet	$ .95	Set of 4 coils (15 to 200 meters)	.95
Matched set of tubes (12A7-6J5G)	1.65	Set of 5 coils (200 to 4000 meters)	1.75
Wired and tested	2.00	American SB Handmike	2.95
Set of 4 coils (2½ to 15 meters)	.30	5" Magnetic Speaker	1.25

Battery model same price.



SPECIAL HEAVY DUTY POWER SUPPLY

OUTSTANDING FEATURES

- 6.3 volts at 6 amps.
- 400 volts D.C. at 250 mils.
- Encased in handsome black crackle metal finish cabinet 12¾"x7⅞"x3⅜" overall dimensions.
- Tapped extremely heavy duty power transformer allows operation on any line voltage from 95 to 250 volts, 25 or 60 cycles.
- Ideal for medium powered transmitter or P.P. 6L6 amplifier or modulator.

Complete, wired and tested with Sylvania 523 rectifier tube and cabinet **$4.95**

ULTRA DUPLEX 6 TUBE MOBILE OR A.C.

2½ to 5 Meters (56 to 120 M.C.)

This unit uses six of the latest 6 volt tubes in a circuit which may be operated from a 6 volt automobile battery or by substituting power supplies from 110 volts A.C. Receiver uses 1-6J5G as a super-regenerative detector, 1-6C5 1st A.F. stage, 1-6F6 output stage. Transmitter consists of 1-6E6 oscillator, 1-6C5 speech amplifier, 1-6L6 class A modulator. Power output of transmitter is 10 watts 100% plate modulator. Separate antennas are used for peak efficiency of both units regardless of frequency settings. Changeover from 6 volt to A.C. operation is extremely simple. All that is necessary is to remove the built in genemotor and insert the A.C. power supply.
Supplied complete with all coils including coil for 10 meter reception.

- 6J5G—6C5—6F6—6E6—6C5—6L6
- Built in 350 volt 150 mil filtered genemotor
- Built in dynamic speaker
- 10 watts power output
- 100% plate modulation
- Absolutely independent receiver and transmitter
- Negligible receiver radiation
- Automatic phone jack

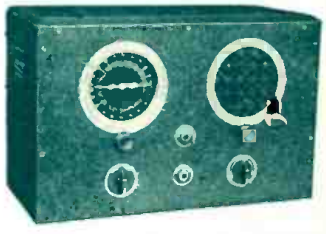
Ultra 6 Tube Duplex complete with built in dynamic speaker, and A.C. power supply, wired and tested, with cabinet, less tubes, mike and antenna **$28.90**

Ultra Duplex complete with built in dynamic speaker, and 150 mil genemotor, wired and tested, with cabinet, less tubes, mike and antenna $38.45

Set of 6 Sylvania tubes	5.35
American SB hand mike	2.95
Adjustable 8 ft. antenna	1.60

Ultra 4A-4-Tube A.C. Operated Transceiver

(2½ to 5 Meters)



In the design of the Ultra 4A, A.C. operated transceiver, every tradition of radio value has been incorporated. Built-in dynamic speaker, self contained power supply. Class A 100% modulation are only a few of the outstanding features of this "Ultra High Frequency" product. The new all metal tubes are used as follows: 6F6, Class A modulator—Power amplifier. 6C5, high gain speech amplifier—1st A.F. amplifier. 5Z4, rectifier. 6A6, Oscillator-detector. The Ultra 4A is completely filtered at both R.F. and A.F. Levels. Automatic phone jack silences speaker. Tuning range 2½ to 5 meters with 5 watts output. Supplied complete with all coils, including coil for 10 meter reception.

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Sylvania 6A6, 6C5, 6F6, 5Z4 matched set of 4 tubes	3.40
American SB Hand Mike	2.95

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Radio broadcasting stations pay engineers, operators, station managers up to $5,000 a year. Share time Radio set servicing pays as much as $200 to $500 a year—full time servicing pays as much as $30, $50, $75 a week. Many Radio Experts operate their own business. Manufacturers and jobbers employ testers, inspectors, foremen, engineers, servicemen, paying up to $6,000 a year. Automobile, police aviation, commercial Radio, and loud speaker systems are newer fields offering good opportunities now and for the future. Television promises many good jobs soon. Men I trained have good jobs in these branches of Radio.

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SHORT WAVE & TELEVISION
The Popular Radio Magazine

JUNE — 1938

Vol. IX No. 2

HUGO GERNSBACK, Editor
H. WINFIELD SECOR, Manag. Editor
M. HARVEY GERNSBACK, Assoc. Editor

In This Issue

FEATURES

S-W STATIONS—HOW TO FIND THEM

TELEVISION

CONSTRUCTOR

MISCELLANEOUS

Cover photo composition by H. Gernsback and Arthur MacLean. Spot-news beer-mug transmitter photo courtesy of NBC. Fire scene courtesy Times Wide-World Photos. WEAF tower photo courtesy of NBC.

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In the July Issue

Talking on a Light Beam!

Cold Waves and Short Waves, Prof. J. Merino y Coronado, T12JM.

Compact 5-Meter Receiver, Art Gregor.

Using the National SW3 as a Pre-Selector.

W8KPX Beginner's Transmitter, H. D. Hooton.

A. F. Amplifier—for Use with The Average S-W Tuning Unit, H. Yellin, W2AJL.

Self-Powered 4-Tube A.C. Receiver, Harry D. Hooton.

A Rotating Aerial for Your Attic.

●

Two machines used for recording programs at the German short-wave station in Berlin. The records are broadcast later.

●

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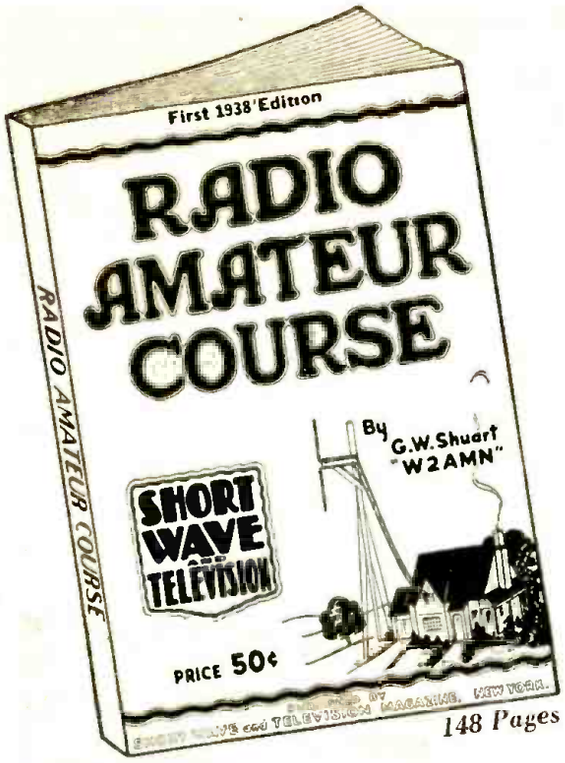

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HUGO GERNSBACK, EDITOR

H. WINFIELD SECOR, MANAGING EDITOR

RADIO in JAPAN

— Shigeru Okamoto,
of the International Telecommunications Company, Ltd., of Japan

● IN Japan, or Nippon, as we call it, most radio activities are under government control. All broadcasting activity is handled by the Nippon Hoso Kyokai, or the Broadcasting Corporation of Japan. This is a privately owned monopoly under governmental supervision.

Oversea radio communications were, until recently, the domain of two different companies. The telegraph services were operated by the Japan Wireless Telegraph Company and the short-wave radio phone services were operated by the Kokusai-Denwa Kaisha, Ltd. In March of this year a consolidation was effected so that now these two companies are known as the International Telecommunications Company. The activities of this company are widespread. Direct radiophone service is operated by short-waves from Tokyo to San Francisco; Bandoeng, Java; Manila, P. I.; Saigon, Indo-China; Bangkok, Siam; Shanghai, China; Hsinking, Manchukuo; Berlin, Germany; London, England; Cape Town; Buenos Aires via London; and ship-to-shore telephone service is maintained to two ships, the Chichibu Maru traveling from Yokahama to San Francisco and the Yasukuni Maru traveling between Yokahama and London.

Transmission to the ships and to foreign countries is carried out from the transmitting plant at Nazaki, Japan. Here a large group of short-wave transmitters are located together with directional aerial systems.

Overseas Short-Wave Broadcasting

Short-wave broadcasts for listeners abroad are now sent out daily by cooperation of our company and the Broadcasting Corporation of Japan. Programs originate in the Tokyo studios of the Broadcasting Corporation and are sent out from our short-wave transmitters at Nazaki. At the present time there are several 20 kw. transmitters and one 50 kw. unit at Nazaki. The 50 kw. station was designed for the express purpose of sending short-wave broadcast programs abroad. It is usually operated on JZJ, 11.8 mc. The other channels used for short-wave broadcasting employ any one of the 20 kw. transmitters normally used for radio telephone work.

These short-wave broadcasts are sent out at various hours during the day, using directive antenna systems to insure proper reception in various parts of the world.

Short-Wave Listening Forbidden

Interesting to Americans no doubt is the fact that *short-wave* listening is forbidden in Japan except by a few hundred licensed amateurs. To get a license from the Ministry of Communications is not so difficult, but amateur activities are not so extensive as in this country. The ordinary listener is not allowed to operate receiving equipment which will tune in *short-waves;* in other words, he must use only *single-band* receivers. However, I believe that this law will be modified in the near future to permit Japanese people to listen to *short-wave* stations as there is considerable interest in this popular hobby.

Television

Television experiments have been going on in Japan for about ten years. Several organizations have done considerable research in this field, the most notable being Waseda University at Tokyo, the Hamamatsu Higher Technical School, the Electrotechnical Laboratory of the Ministry of Communications, Tokyo Electric Company and The Broadcasting Corporation of Japan. The Hamamatsu school was formerly most active in this field.

At present, the Broadcasting Corporation of Japan is doing most of the television experimentation and it is expected that television broadcasting will be put on a public scale in 1940 at the time of the next Olympic games in Tokyo. Television development has followed a pattern similar to that in other countries in that the first work was done with mechanical scanning systems. We now make use of cathode ray systems for transmission and reception; the iconoscope is used for picking up images. At the present time the Japanese Broadcasting Corporation has a small experimental transmitter in operation for use in conducting private field tests. A mobile television station has also been constructed in anticipation of the Olympic games.

The mobile system consists of four trucks, one containing the picture transmitting equipment, another the camera and the other two containing voice transmission equipment and voice reception equipment. The camera employs an iconoscope while the transmission system operates on a band 3 mc. wide at a frequency of 58 mc. 441-line definition is achieved with 25 frames per second. In the receiving set a Braun cathode ray tube is used for reproducing images, giving a blue-white picture. The screen of this tube has a diameter of about 12 inches.

Mr. Okamoto, a member of the I.R.E. and an engineering representative of the International Telecommunications Company of Japan, is spending several years in the United States doing research work.

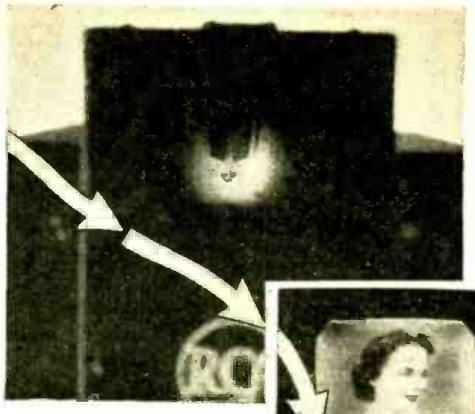
Ultra Short-Waves

The Ministry of Communications, which controls all telephone lines in Japan, operates several ultra-short wave radiophone circuits to bridge water gaps between the numerous islands which make up Japan. These systems are automatic in operation, supplementing submarine cables, and in some cases are the *only* means of com-

(Continued on page 128)

Eighteenth of a Series of "Guest" Editorials

A



A view in the television control room at the National Broadcasting Co., in Radio City, New York, is shown below. Usually there are three men in the control room; one monitors the sound, the second is the program director and the third checks the image.

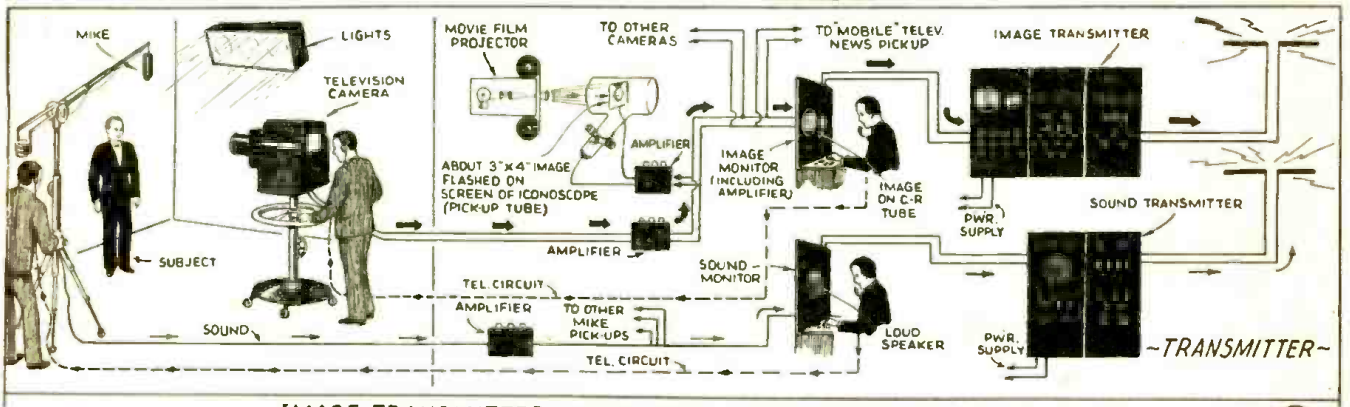
B

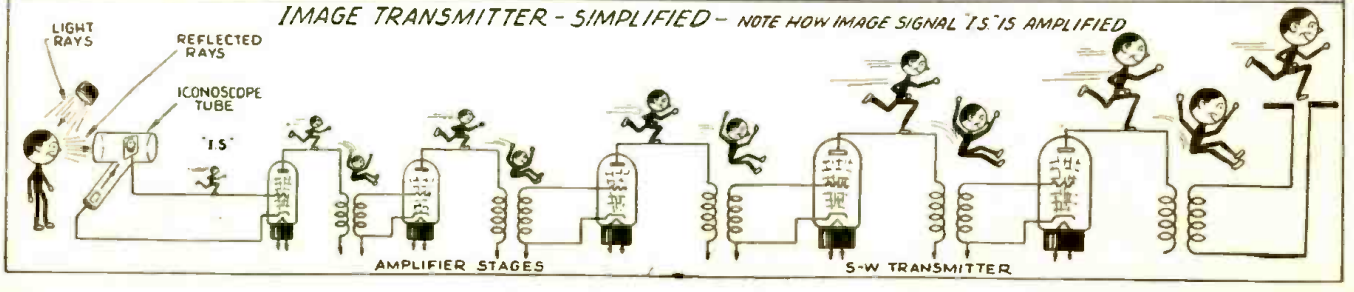
Above, we see the rear of a television studio camera and the reversed image on the ground glass, just as the television camera operator sees it. The small picture shows the television image as it appears before the control room operator (right). The wave-like image alongside of the girl's face is the television signal as shown on a cathode ray oscillograph, part of the checking system followed by the control room experts.

C

The photos above and to the right show three ways in which the television image may be picked up. A—studio pick-up with television cameras; B—movie film pick-up (above); C—spot news pick-up from mobile television truck.

A B C



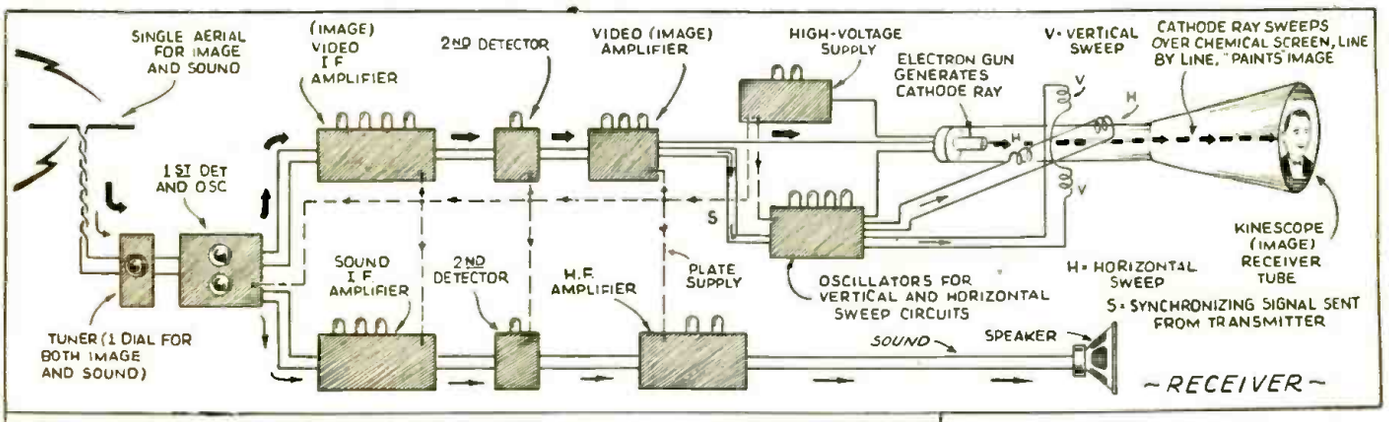


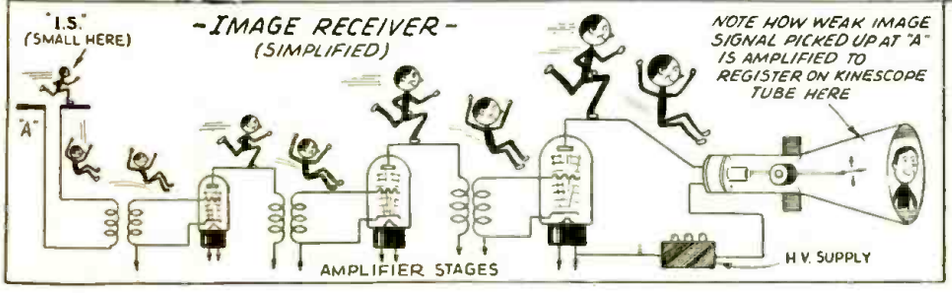
By following the large arrows across the series of pictures, the path of the television image is easily traced. Below, we see the image and sound signals passing through the transmitters located in the Empire State Building. The image is "piped" from the NBC studio in Radio City through a coaxial cable to the Empire State Tower.

Above—Top picture shows actual photo of modern 441 line television image, while the photos immediately above and to the left show front and rear views of an experimental RCA television receiver. Photos courtesy Nat'l Broadcasting Co.

TELEVISION IS STILL IN THE EXPERIMENTAL STAGE. THIS ARTICLE GIVES THE LATEST TECHNICAL INFORMATION ON THE SUBJECT. HOME TELEVISION WILL NOT BE REALIZED FOR SOME TIME TO COME.

# of TELEVISION

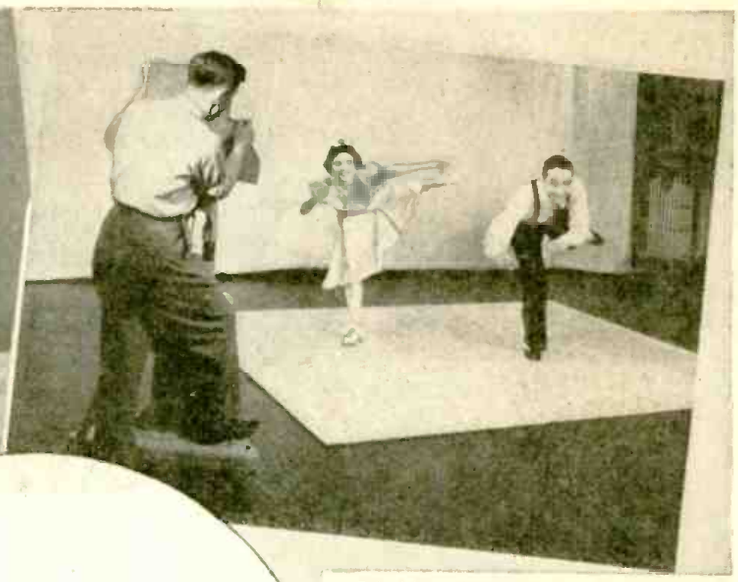




The process of picking up, transmitting and receiving the television image, as well as the sound is shown in the diagrams above and to the left. The lower diagram is presented for the general reader who may find it difficult to follow the more technical diagram above. Note how the image, as well as the sound currents, is continuously amplified.

Short Wave FOTO NEWS

A combination ultra-high frequency, ultra-violet ray machine for medical therapy. UHF currents excite mercury vapor in a quartz tube, causing radiation.
Courtesy of Lepel High Frequency Labs.



Television rehearsal in London. Tap dancing before the BBC television camera.

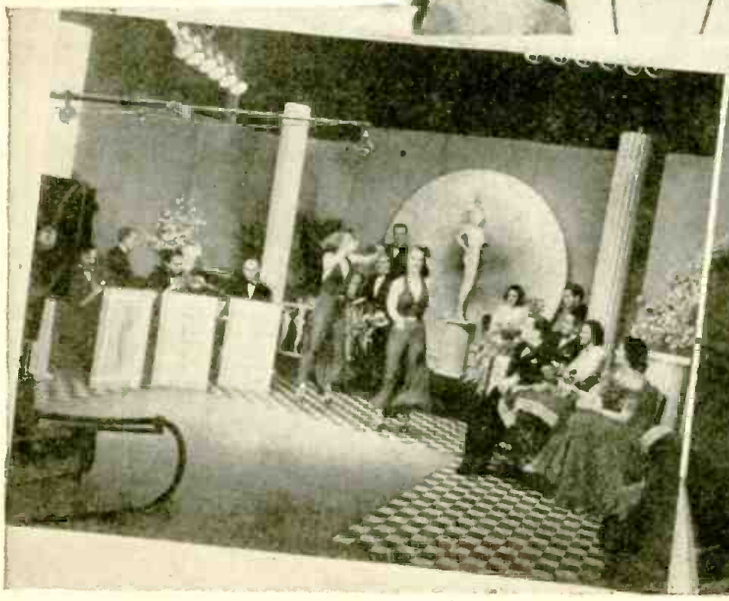
Below—part of the power-control panel of the new CBS television transmitter, N. Y. C.

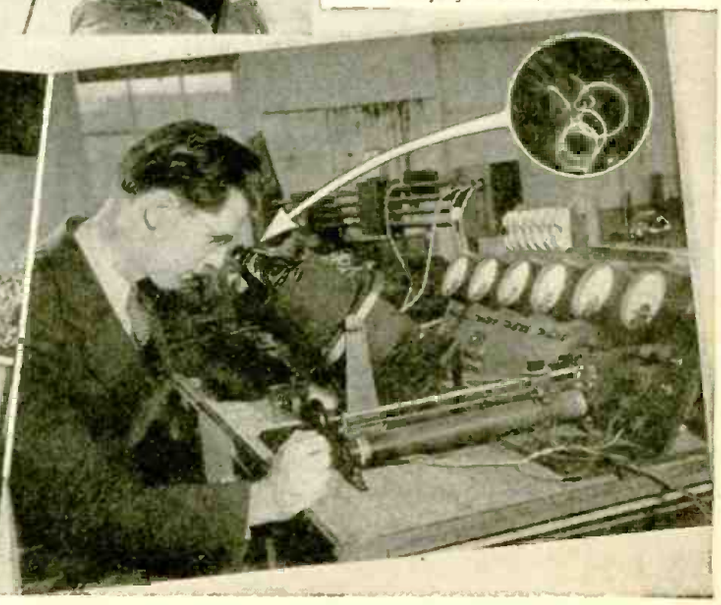
This new U.H.F. tube uses a glass cup as base to which copper terminals are fused.
Courtesy of Westinghouse Elec. Mfg. Co.

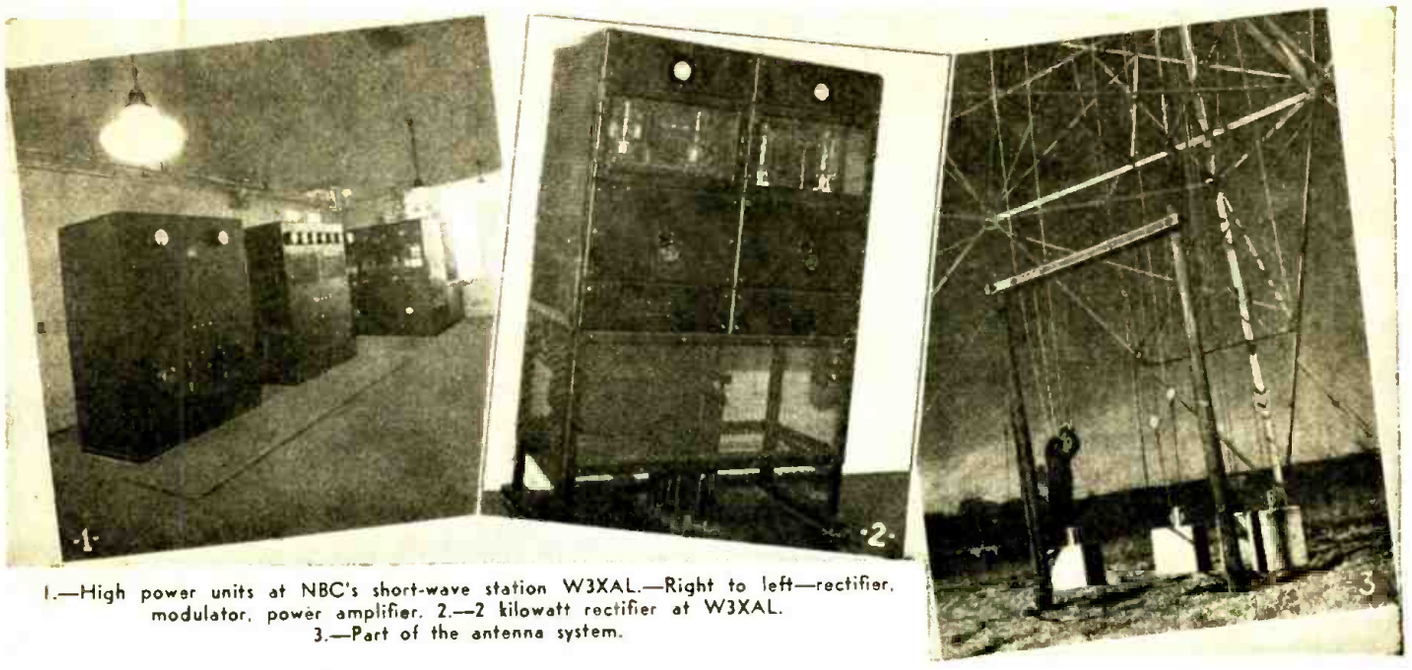
Below—NBC televises the Big Apple. A scene from a television production.

Left—portable radiophone equipment used by the Loyalist troops in the Spanish War.
© International News Photo

Below—a machine devised by RCA for studying electrons in motion.







1.—High power units at NBC's short-wave station W3XAL.—Right to left—rectifier, modulator, power amplifier. 2.—2 kilowatt rectifier at W3XAL. 3.—Part of the antenna system.

W3XAL's Short-Wave Voice Reaches Every Clime

Thanks to foreign language announcers on W3XAL's staff, the whole world now listens to American short-wave programs. American jazz is as popular in Timbuctoo as it is in New York.

● SOMEWHERE in the wilds of Africa, in the Belgian Congo region, a small party of men trudges out of the forest into a clearing. While porters busy themselves at the task of setting up camp, the white leader, an official of the Colony, drops to the bank of a brook and quenches his thirst. Beads of perspiration drop from his forehead and disturb the smooth surface of the water.

Behind him, in the center of the native village, a tall black unstraps a pack from his back. He sets a small, oblong box on the ground. Two sticks are rammed into the soft earth, and wires are strung. The white leader steps forward and turns a knob on the front of the box, then another, all the while listening intently. Residents of the village stand off at a short distance, awe-struck.

Suddenly, from the box comes a voice! It is French! The white man smiles appreciatively; the blacks roll their eyes in amazement and something akin to fear. The voice from the box says, in French:

"This is Station W3XAL. National Broadcasting Company, a service of the Radio Corporation of America. You are about to hear . . ."

The white man relaxes as he listens to news highlights from all over the world.

No longer is he in a remote section of wild Africa. Through the magic of radio, he has come into immediate contact with the important events of the world and his feeling of loneliness is broken. Later, music pours forth from the box on the ground and the faces of the natives light up with pleasure and their bodies sway in rhythm with the tune.

* * *

Weeks later, a secretary in the NBC International Division, Radio City, New York, takes up a letter from a large assortment of mail. The letter is postmarked "Maluku, Belgian Congo." It reads, in part:

"This day, the 6th of December, I have got reception of your broadcast in the Belgian Congo on the short-wave band . . . you are heard very clearly and the broadcast in French is understood perfectly. You have a very good announcer.

"I am an official in the Colony and am located in the wilds at about 100 kilometers to the North-East of Leopoldville, the capital of the Belgian Congo. I get reception on an American radio set, with 6-volt battery. I shift places every week and the set is carried on the back of a man. Upon arrival of the caravan in a village two policemen put up the antenna on two sticks and in ten minutes the set is operating . . .

"On February 14, 1938, I shall be at 300 kms. (180 miles) from Leopoldville, right in the heart of the equatorial forest, and I shall hear your broadcast at 9:00 o'clock in the evening Central European Time."

* * *

The Belgian Congo official's letter, like hundreds of others, came from a land far-distant from the skyscrapers of Manhattan. During the last six months of 1937, a total of 2,697 letters from seventy-five different countries and possessions was received by W3XAL. They bore postmarks of countries in Europe, Africa, Asia, the Indian Ocean, the South Seas, Australia, and

(Continued on page 107)

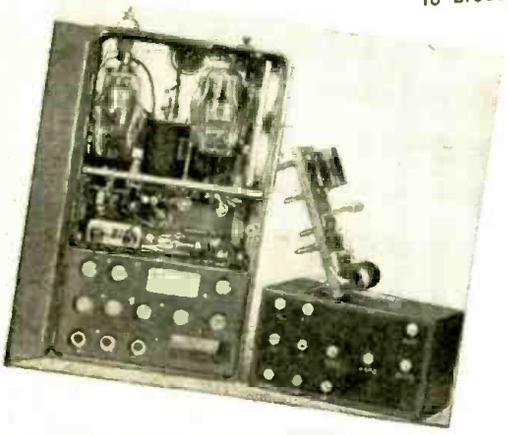
Above—The so-called beer-mug transmitter being used to broadcast a description by a flood survivor.

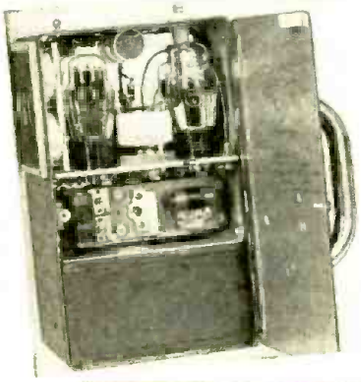
Close-up of the beer-mug transmitter.

BROADCASTING

Spot News

With the Beer-Mug Transmitter





Above — Beer-mug transmitter, self-powered by the battery fitting in the bottom of the case.

Left—The opposite side of the transmitter, showing the mike at the left of the instrument.

● AS one of the accompanying photos shows, the *beer-mug* transmitter as perfected by the engineers of NBC is a most useful instrument. Weighing less than eight pounds, its tiny case contains a battery-powered transmitter which enables the *spot news* radio reporter to relay his voice to some nearby pick-up station. The range of this miniature transmitter is about one-half mile, and in some cases it has been used over even greater distances. The *beer-mug* transmitter was so named because of its general resemblance in size and shape to the well-known container for the famous beverage, and it is one of the pets of the NBC laboratory engineers.

●

→ Spot news-caster in full swing with the 5-meter transmitter. News event is picked up by a relay station and finally broadcast over the NBC network.

●

← Left — Diagram of tiny transmitter recently perfected by the engineers of NBC, through whose courtesy these photos and descriptions were made available.

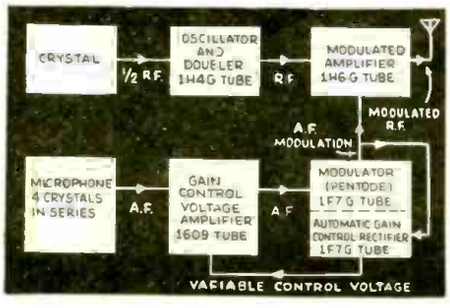


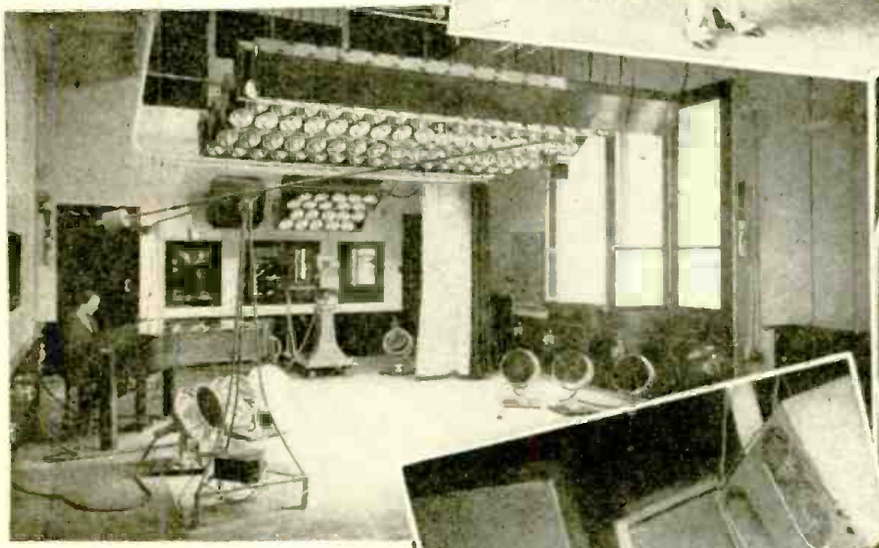
Diagram J. L. Hathaway, NBC Staff.

How the FRENCH Televise

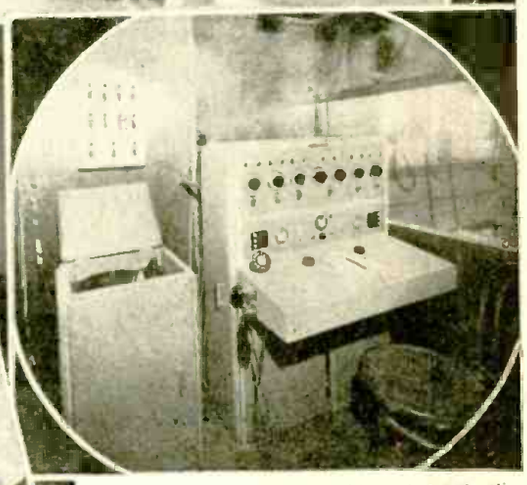
TELEVISION IS STILL IN THE EXPERIMENTAL STAGE. THIS ARTICLE GIVES THE LATEST TECHNICAL INFORMATION ON THE SUBJECT. HOME TELEVISION WILL NOT BE REALIZED FOR SOMETIME TO COME.

Above—Front of the television pavilion in Paris Exposition where television was demonstrated to the public.

Right—A view in one of the television studios where an iconoscope picks up the image. Note the mike suspended above the speaker.



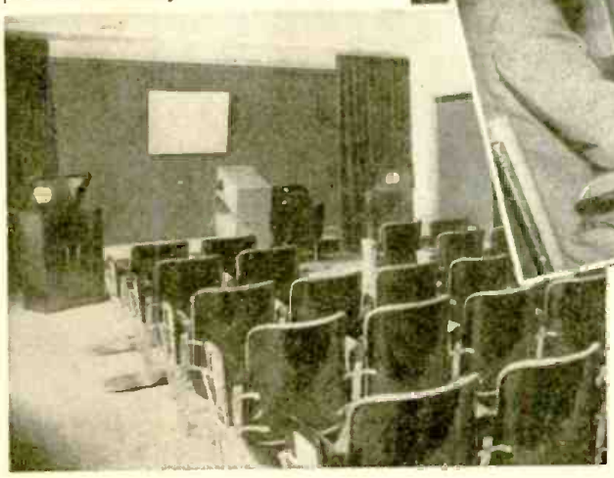
Above—A peek into the television broadcasting studio at Mount Rouge. Note the banks of powerful lights.



Above—Control switchboard for both image and sound.

Below—A corner of the television control room, showing meters, etc., including film transmitter and its transmitter tube mounted in the oblong box at the left.

Below—Public television demonstration room with large projection tube, which produces an image about 3 ft. square.



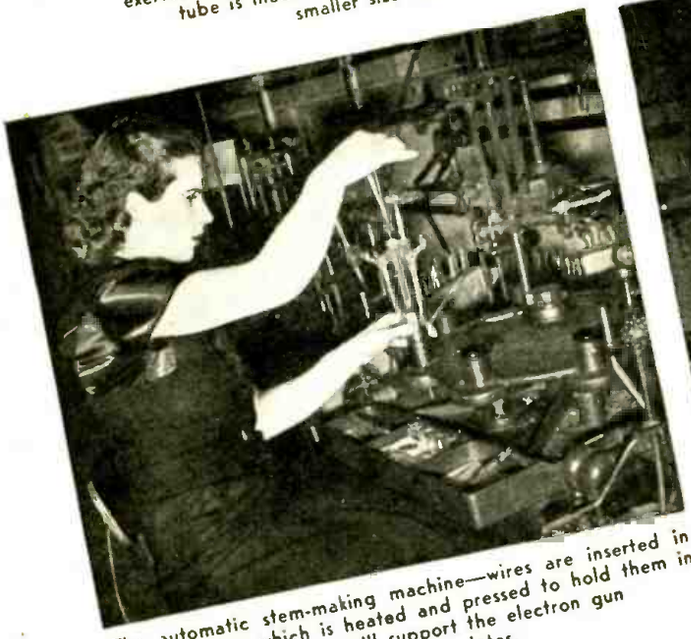
Above—Interior of one of the television booths. Projector lens is just visible in the opening at the right. Above it we see photo-electric cells. Through the window at the left the image of the person spoken to is visible.

The Birth of a Cathode Ray Tube

These pictures show various stages in the manufacture of a modern cathode ray tube, such as is used for television. These pictures were taken in an American factory.

TELEVISION IS STILL IN THE EXPERIMENTAL STAGE. THIS ARTICLE GIVES THE LATEST TECHNICAL INFORMATION ON THE SUBJECT. HOME TELEVISION WILL NOT BE REALIZED FOR SOME TIME TO COME.

The "Big Bertha" of cathode ray tubes—it measures 13½-inches in diameter. Due to the great pressure exerted by the atmosphere, the head of such a big tube is made rounder than in the case of smaller size tubes.



The automatic stem-making machine—wires are inserted in a glass collar, which is heated and pressed to hold them in place. This unit will support the electron gun and deflection plates.

Examining the C-R tube with a polariscope to detect strains in the glass. Various hues indicate stress or strain in the glass and tell whether a tube should be rejected.

Above—Induction coils heat the C-R tube elements to drive off gases, etc. Right—A skilled workman trims the screen of a tube with apparent ease, but it requires a practiced eye and a sure hand.

Photos courtesy Allen B. Du Mont Labs.

Wedge-Crystal Gives High-Fidelity Tone— *plus* Sharp Tuning

W. E. Schrage

French invention broadens reception band of radio receivers without sacrificing selectivity.

● IT'S happened to all of us sometime or other. We've tried to "slice" a specific broadcast station from an overcrowded part of the short-wave or broadcast range, and received an awful mixture consisting of the programs of several adjacent stations. In such a case there are generally two ways open to the unlucky short-wave listener. Either to give up at once or, when fishing for a precious and extremely rare station for veri-ing purposes, "to cut the crystal in." But don't ask about the result. One would receive something which might be termed—in the accommodating language of the fisherman—*a fish without head or tail!* Expressed in radio terms — the crystal would, of course, eliminate the interference from adjacent stations, but another trouble would occur. The high and low tones would be cut off, and thus music and speech would sound terrible.

Nevertheless, there are a few in the vast guild of the SWL's who can decipher what's what from such an awful mess, and land a handsome verification card from Timquaquica, or somewhere else. However, the majority of us, not gifted with a miraculous ear, will give up and wait for better "weather" in the hope of obtaining the desired veri-card at some later time.

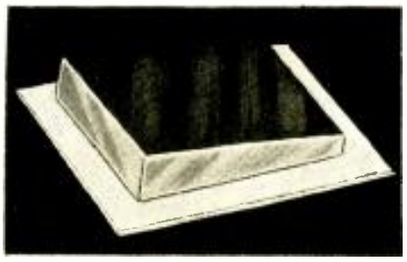
So much for the veri-card hunter. The complete loser is the straightforward broadcast or short-wave listener. His main interest centers around the program and its instantaneous entertainment value, because very few programs are repeated. Thanks to a French invention interference of this type will probably be a forgotten trouble in a few years. We shall be able to "slice" from an overcrowded wave-band just the station desired, and interference by adjacent stations will be rejected with ease.

This invention has, like other great inventions, a very human reason for its very existence. The Paris engineer, Alexis Guerbilsky, was very much upset by the fact that a considerable percentage of all radio control crystals produced had to be discarded. A few of them could be sold as second or third choice, but as a whole business was not as good as it should have been. The thrifty Monsieur Guerbilsky thought the matter over, then he experimented for a few years, and finally perfected what may indeed become a million dollar invention, which proves again that thrift when combined with ingenuity is still the most desirable prerequisite to becoming a successful inventor.

Guerbilsky tried first to find out why tuning circuits equipped with crystals of not exactly parallel sides could not be made to behave as desired, i.e., to oscillate at one specific frequency. He found no solution for this problem but this ingenious

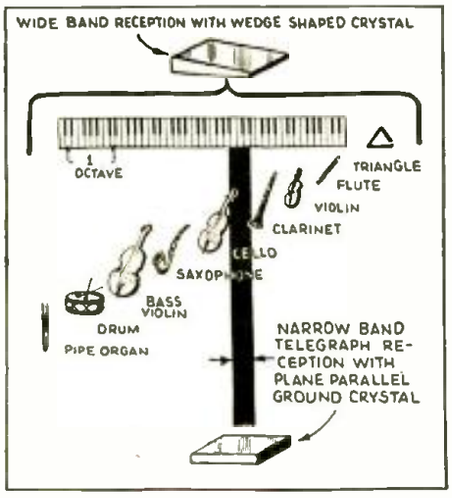
(Continued on page 113)

(Fig. 6) Alexis Guerbilsky, of the Paris University Ecole, who invented the wedge-shaped crystal.



Left—(Fig. 5) Close-up of new wedge-shaped crystal.

Fig. 1, below, shows great band-width passed by wedge-crystal and how ordinary crystal excludes many desirable notes.



Below (Fig. 8)—How first I.F. transformer of ordinary receiver is modified to take wedge-shaped crystal, effecting a five-fold increase in selectivity.

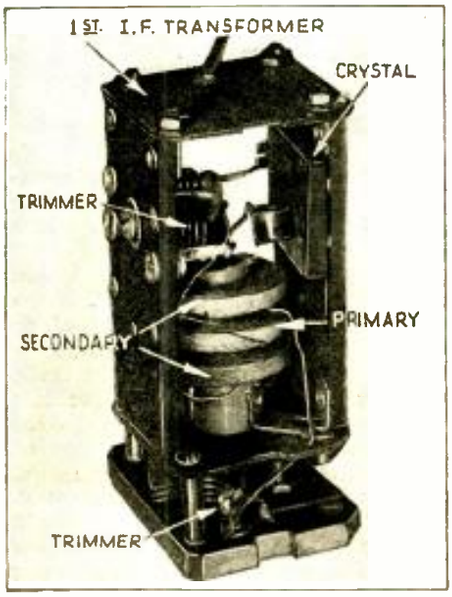


Fig. 7, below—Chassis of standard American 7-tube superhet, fitted with wedge-crystal. Wedge-shaped crystals when available can be installed at slight cost, with great boost in tone quality and selectivity.

France and U.S. Combat S-W Propagasters

Recent interesting developments in the field of short-wave propaganda broadcasts. For a more complete discussion of this subject, refer to the article on page 666 of the April issue.

Above—The receiving equipment in the French station at Bicetre which eavesdrops on broadcasts of European stations. Receivers are operated by remote control from Paris.

Right—Aerials at the Bicetre receiving station. This building is an old fortification which has been converted into a receiving station.

Linguistic stenographers transcribing broadcasts picked up at Bicetre. Stenographic notes of all political broadcasts are taken. Phonograph records are made of important speeches.

● THE French government has erected a receiving station near Paris for the purpose of checking on the propaganda broadcasts sent out by foreign countries. The photographs at the top of this page show several views of the plant. A number of specially designed receivers pick up the signals of the principal European broadcast stations. A corps of special stenographers on twenty-four-hour duty transcribes all broadcasts of a political nature for future reference. This special staff, of course, must understand the numerous languages used in broadcasting in Europe. Important political speeches are generally recorded as a future check.

It is interesting to note that sometimes the versions of speeches by European leaders, as given out to the foreign press by the government censors, are considerably milder in tone than the actual speeches were. The French receiving station has provided a check several times in this connection. A speech broadcast in a foreign country contained remarks which were slurring to France. Although the version of the speech released to the press omitted these remarks, a record of the speech made at the time of the broadcast contained indisputable proof that the remarks had actually been made. As a result of this record, protests were lodged with the government in question. Copies of all transcriptions of this nature are turned over to the French foreign office for investigation.

The coverage obtained with the new South American beams of W2XAF-W2XAD. The German station's beam is also shown.

U. S. Expands Pan-American Broadcasting

As a result of the increasing short-wave propaganda programs directed at South America by Germany and Italy, the F.C.C. recently made a temporary allocation of four short-wave channels which had previously been reserved for the use of a projected Pan American broadcasting station to be operated by the United States government.

Two of the channels (15.13 and 11.73 mc.) were loaned to station WIXAL at Boston, which as you may know, is operated by the World-Wide Broadcasting Foundation. The other two frequencies (9.55 and 21.5 mc.) were assigned to the General Electric station, W2XAD, at Schenectady, New York. The use of these channels was granted on condition that *commercial broadcasts* of any type were not to be made. W2XAD has now been put into service with a special beam directed at Brazil and the eastern part of South America and presents special programs in the Portuguese language from 7:30 p.m.-12 m., on 9.55 mc. W2XAF on 9.53 mc. has a new beam which is directed at Argentina

(Continued on page 128)

New Silver Trophy

to be

AWARDED MONTHLY

for the

Best HAM Station Photo

Hams everywhere are eligible in this monthly contest and the photos will be judged by the simple rules given

This beautiful silver trophy stands 11¾" high and is to be awarded monthly by SHORT WAVE & 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. The photos for this contest must be as large and clear as possible and the degree of workmanship and the quality of the apparatus in the station will be judged, as well as the clearness of the picture. Come on boys, let's see some good Ham station photos!

● WOULD you like to win one of these beautiful silver trophies? It is very easy to do so—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 these handsome silver trophies with your name engraved on it.

The winner of the first trophy award will be announced in the July issue, and the closing date for the first contest is May 10. The deadline thereafter will be the first of the month.

The judges of the contest will be the Editors of *Short Wave & Television*. In the event of a tie, duplicate prizes shall be awarded to the contestants so tying.

Note these important rules!

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

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

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

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

The Editors will not be responsible for photos lost in transit. Do not send small, foggy-looking photos because they cannot be reproduced properly in the magazine. If the picture you have or may take of your station is not thoroughly sharp and clear and at least 5" x 7", it would be best to have a commercial photographer take a picture of your station.

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

First Ham to Talk with Pitcairn Island

Ham station W8CNA first to contact Pitcairn Island.

● RADIO amateur Ferris W. Wolfinger of Binghamton, N. Y., and a house guest, Joseph Phennicie, of Waterloo, Iowa, recently experienced the "thrill of a lifetime."

Mr. Wolfinger, sitting quietly in his home with his friend, Mr. Phennicie, was twirling the dials on his short-wave set; just another "ham"—next minute he became the first person in the outside world to contact the isolated island of Pitcairn in the southern Pacific, by radio.

Pitcairn Island, known only as the little paradise where the mutinous men under the leadership of Fletcher Christian and Edward Young settled with their Polynesian wives in 1790. They found this island after they had set Captain Bligh afloat in a boat and had taken command of the H.M.S. Bounty.

Out of the speaker in Mr. Wolfinger's receiving set a voice suddenly came through repeating the call letters "VR6A—VR6A." Mr. Wolfinger, never having heard this call letter before, immediately consulted his log book. Not finding the station corresponding with these letters, he very quickly responded with his

(Continued on page 124)

What Do You Think?

Charles Stephens, Randolph, Mass., this month's winner of prize—one year's subscription to S. W. & T. for best "Listening Post" photo.

Wants More Constructive Articles

Editor,

Since I sent the photo of my SWL corner I have received the following cards: SABC, So. Africa, which comes in just as loud as the *locals*. Amateur ZS2N; HC2RL, YV1RA, COCD, also PCJ, and last but not least—EAR, card which had been opened and censored by the Spanish officials. The photo directly over the S-W Converter on the wall is my Commercial Radiophone License.

I have just made the Power-Supply and the Two-in-One receiver which was described in the May 1936 issue of *Short Wave Craft*. I have read many other magazines and with due respect to them, I can not find any to be compared with *Short Wave & Television*. My only fault to find is: leave out all this baloney about hearing Mars, as I think Dr. Tesla had a nightmare.

Put in more constructive articles and put Doerle back to work. Your best department is run by Joe Miller. *New Experiments with Radio Apparatus* is very good; *Short Wave Kinks* are also very good. Your *What Do You Think Dept.* is just *about the Nerts*. I must close now as it's time to put on the "feed-bag."

CHARLES STEPHENS,
Ex-Amateur U1CFJ,
40 meter CW.1925 to 1927.

(Thanks for your suggestions, Charles, and we will endeavor to publish as many construction articles as possible.—Ed.)

He Likes Television Articles

Editor,

May I offer a few suggestions for the improvement of your F.B. magazine.

I experienced keen disappointment in your March 1938 issue when viewing the listing in the Short Wave Station List. It is difficult to distinguish between the *broadcasters* and the *commercials* due to irregularity in the boldness of the type. The former method of listing was much better.

Since so many of the DX'ers have dials on their receivers calibrated from 0-100, why couldn't you leave space in a separate column next to the frequency listing in the Station List for us to put the number in which that station appears on our dial. It would facilitate logging immensely. I wish you would consider the above very seriously because there are many who think the same as I.

And now for a few bouquets. Your articles on one, two, and three tubers are sure

Short-Wave Listening post of Otto A. Weiss, 536 State St., Brooklyn, N. Y.

appreciated. I am particularly referring to *"The Switch-Band 2"* in the February issue. This little radio is "tops" in my estimation and beats those larger sets to pieces.

Keep on printing pictures of the foreign short-wave stations and their antenna systems. By all means, *don't slight the Television side of your magazine*. We always read those articles regarding new developments in television. We always read Joe Miller's department and derive a lot of good from it.

Your *new cover* certainly shows up the mag, and sure is fine. Keep up the good work and we won't miss an issue.

PAUL E. TRUED,
Tribune, Kansas.

Mr. Fiege Answers

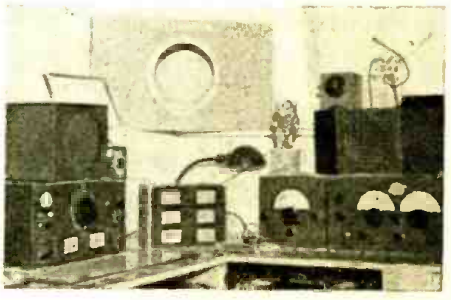
Editor,

Well my SWL friends? Here is the old Ogre of the "Ham" bands back to gobble up a few more smart (?) young squirts. Too bad we are not back in the good old days when the "Hams" used the *Wouff-Hong* on the smart squirts, and boiled short-wave *bootleggers* in transformer oil! But those days and practices are gone forever and QSL-ing is in the same antiquated category. (Speaking of both the Amateur exchanging of QSLs and the SWL-QSL.) In the *spark* days it often took a postal card to complete a *contact*. But now with radio, the most modern means of communication, we can easily obtain more information direct than the other fellow could possibly send on a card. And still, with this modern means of communication at hand, we revert to the most primitive means of communication, a postal card.—We don't talk to Chicago or London on the phone, and then send a post card along to convince the other fellow that we actually talked to him. We don't follow up a telegram with a card. But that is just what we do in Amateur Radio. There are a few occasions where a QSL card is justified, and one of the reasons will not be the mere desire of some SWL QSL card collector seeing how many cards he can gather. The only real use for a QSL card is in confirming a REAL DX contact.

Now for this Irish soldier with the medals, Mr. J. Daugharty. Just what mental process do you use in arriving at the asinine conclusion that my statement re SWL-QSL cards is "keeping many a well-meaning lad from going after a ticket"? Does the SWL, upon applying for a license, exhibit a handful of QSL cards to the Radio Inspector and thereby obtain ten or twenty free points on his license exam? Does the collecting of cards from PHONE stations teach the embryo "Ham" the fundamentals of radio? Does it teach him the code? It is about time that someone wised you up, Mr. Daugharty.

There are only two things necessary to obtain a license. You must be able to copy code at thirteen and a half words per minute. (Code, Mr. Daugharty, is those funny little dots and dashes that annoy you so much when you are looking for *phone* stations to send cards to.) And you must know elementary radio theory. Well, Irish,

(Continued on page 106)



Here's a swell "listening post"—all fitted up with A-1 receiving apparatus. Note the HRO receiver at the left. Owned and operated by N. R. Thornton, Somerville, Ohio.

One Year's Subscription to
SHORT WAVE & TELEVISION
FREE
for Best "Listening Post" Photo

Closing date for each contest—75 days preceding date of issue; May 15 for Aug. issue, etc. The editors will act as judges and their opinions will be final. In the event of a tie a subscription will be given to each contestant so tying.

The Listener Asks

Questions asked by not-so-technically inclined listeners are answered in this department.

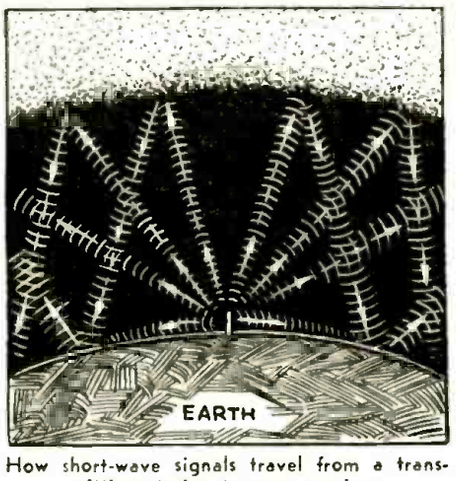
HOW SHORT WAVES TRAVEL

Q. *I've noticed in listening to short-wave stations that reception is much more erratic than from broadcast stations. This I am told is quite normal, but I'm curious to know why the short-waves should act in this way. Just how are short-waves supposed to travel from a radio station to a receiver?*

A. Radio waves ordinarily follow two routes from the transmitting aerial of a S-W broadcast station. A reference to the illustration will make this clear. One type of radiation is known as the *ground* wave radiation. As its name implies, it is a radiation along the surface of the ground from the transmitting station. This ground wave does not travel any great distance from the station and is absorbed by the surrounding terrain. The actual distance which a ground wave will travel depends upon the operating frequency of the station. The higher the frequency (shorter wavelength) the smaller will be the distance it travels before disappearing. Thus the ground wave is only good for reception within a very short distance from the transmitter.

The second type of radiation is known as the *sky wave*. As reference to the sketch again will show, the sky wave travels up from the aerial of the station until it reaches a radio-wave reflecting layer a good many miles above the earth's surface. This reflecting layer is made up of electrically charged particles which have the peculiar property of reflecting radio waves much as mirrors reflect light. Actually there are several of these layers at different heights above the earth's surface and waves of different lengths are reflected by different layers.

After the waves are reflected by this layer they return to the earth's surface once more and are reflected from the earth back to the reflecting layer again. This bouncing from the earth's surface to the reflecting layers is the way in which waves travel great distances. As the sketch shows, the radiations from the transmitting aerial strike the reflecting layer at many different points, causing a multitude of reflected waves to return to the earth at different points. The reflecting layers sometimes become quite unsteady and move up and down a considerable distance, frequently with great rapidity. When this occurs, the waves reflected to the earth become unsteady, and fading and fluttering of distant signals is the result. At other times, magnetic disturbances will cause the reflecting layers to lose their reflecting power completely and the waves will pass off into space instead of being reflected back to the earth's surface. When this occurs, long distance reception becomes impossible.



How short-wave signals travel from a transmitting station to your receiver.

TYPES OF RECEIVING AERIALS

Q. *I have heard many opinions expressed concerning the relative merits of different types of aerials for use with short-wave receivers. Everyone seems to have a different opinion. Could you set me right on the advantages and disadvantages, if any, of the commonly used short-wave receiving aerials?*

A. There are several basic types of aerials in general use for short-wave reception by the general public today. First, there is the Marconi type, which has long been used for reception of ordinary broadcasting stations. This generally takes the form of a flat top aerial consisting of a single wire from the end of which another single wire called the lead-in goes to the receiver. The receiver is also connected to a good ground connection. This type of aerial is simple to erect and is only slightly directional as reference to the drawing on this page will show, and is not critical as to length.

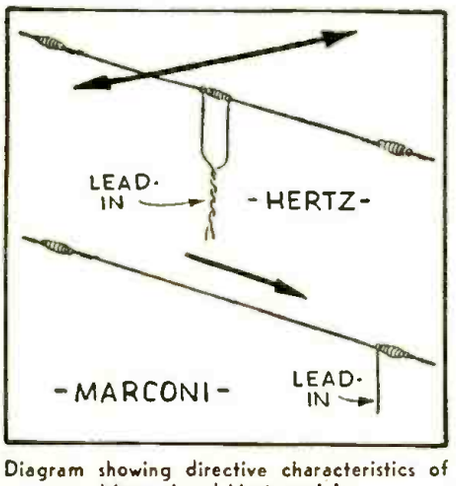


Diagram showing directive characteristics of Marconi and Hertz aerials.

The lead-in, as well as the flat-top, picks up signal with this type of aerial. So, if there is any electrical interference generated close to the receiver, although it may not be picked up by the flat-top of the aerial, it will undoubtedly be picked up by the lead-in.

To overcome this difficulty, use is frequently made of a lead-in system whose only function is to conduct the signal from the aerial to the receiver. A lead-in of this type will not pick-up any signals by itself. A lead-in of this type may take the form of a twisted pair of wires or two wires running parallel to each other, but separated several inches by means of spreaders and periodically transposed with respect to each other. With this arrangement there is no grounding of one end of the system. This type of antenna system is known as the Hertz.

There are a large number of variants of the Hertzian type, but the most commonly used for short-wave broadcast reception is the half-wave doublet. This type system is highly efficient at one particular frequency and only moderately efficient at all other frequencies. The frequency at which it has its highest efficiency is dependent on the length of the two wires making up the flat-top of this antenna. A doublet antenna is ordinarily made up of a length of wire broken in the exact center by an insulator. Each side of the doublet should have a length of ¼ of the wavelength of the signal to be received at maximum efficiency.

For example, if you are interested in receiving a station operating on 31 meters, the length of each half of the doublet should be ¼ of 31 meters or about 7¾ meters (25½ ft.). This aerial will be efficient for picking up signals of 31 meters wavelength. It will also give good reception of signals at half this wavelength. At all other wavelengths its efficiency will not be very great and, in fact, will be considerably less than the Marconi type.

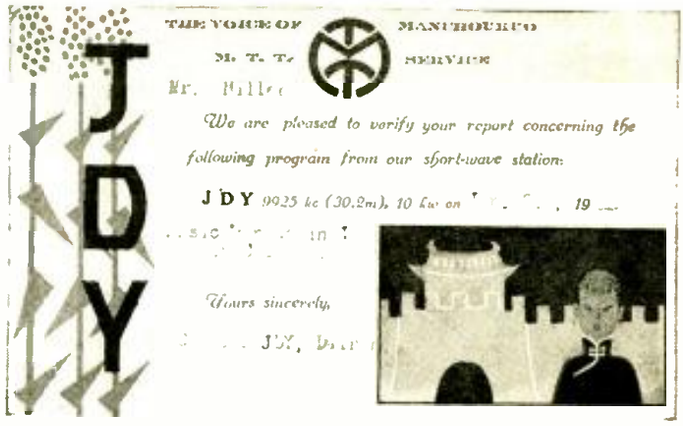
The two wire lead-in system is connected to the center of the doublet as shown in the drawing. The main advantage of this aerial is that the lead-in does not pick up electrical interference. The doublet is also quite directional and by erecting it in a certain position reception from any desired point can be improved.

Let's Listen In with

Joe Miller

"DX" Editor

JDY—Manchukuo. A very striking card comes from this Oriental in four different colors.



XU3FK—An interesting snapshot of this amateur in China.

● HERE we are in mid-April, with DX conditions getting better all the time, this mostly on the amateur 10 and 20 meter bands, where, what with the recent Amateur A.R.R.L. DX Contest, most of our attention has been centered, as with all other DXers interested in improving their VAC and VIC ratings.

A number of new countries have been logged on 20 meters, also some on 10 meters, and the bands, especially 20 meters, being FB for good long distance reception, some really fine DX catches have been heard during the Amateur Contest.

We have quite some time yet to look for good DX reception, as the Javanese and other Asiatic amateurs will be heard still more consistently than in the last month for the duration of April and most of May. This Asiatic reception, of course, for the hours between 6-8 a.m. with a peak around 6:30-7 a.m. E.S.T. From the latter part of May, Asiatic DX will not be heard quite as well, coming through only on certain days, these conditions continuing until the approach of September.

The inroads of approaching summer conditions in the form of increased QRN on the lower frequencies have made DX on these frequencies unprofitable, continuing thus throughout the summer. This "noisy" range extends, on the S.W., from about 3-8 mc.

Asiatic reception on SW-BC and commercial 'phone bands has improved lately, with signals that really "pound in" from a number of Oriental countries. Reception of the Javanese SW-BC stations from PLP and PMN down to YDC have improved a good deal, and all should take the opportunity of logging these "easy" Asiatics and earning some of those hard-to-get Asiatic QSL's.

Say, fellows! How many of you really tried for CR7BH, as per our tip of last month? We are wondering, as we have received practically no reports on this fine catch, which is still "pounding" in nicely afternoons.

It would seem that some of the tips published in these columns are thought of as too difficult for many fans to hear, and that special DX receivers and beam antennas are necessary to *log* such stations.

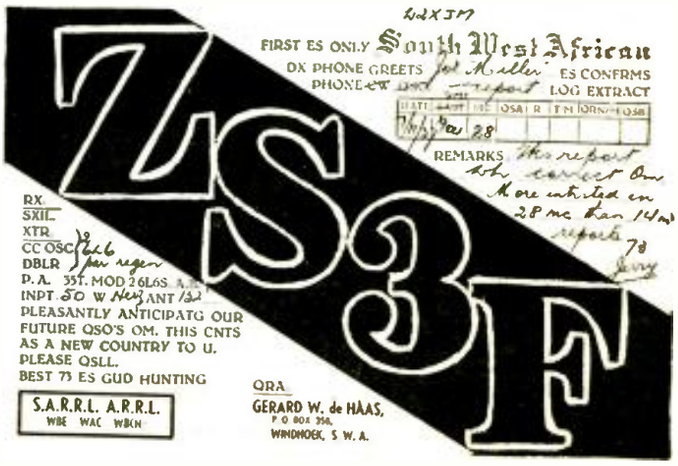
This may be the case with some rarely heard stations, but very few, and certainly not with CR7BH! Quite a number of our friends have tuned in CR7BH with only ordinary receivers, and a length of wire on the roof, so well does this signal penetrate the East Coast.

So take a tip from us, OM's, and do try, and try *hard*, for the stations mentioned monthly in our columns, as most can be heard with a little patience, and the effort will certainly be well worthwhile when a nice QSL arrives in your mail a few months later.

Too much is the trend toward the amateurs, in DXing today, often leaving such FB DX as CR7BH going begging a few mc. away, while ye DXer keeps combing 20 meters.

We can't particularly blame the new DXer for his undivided attention to the "hams," as he couldn't begin to identify the other DX stations to be heard by the hundreds most of the day, but

ZS3F—South West Africa. This is a QSL all should have! Extremely striking, with deep blue letters on orange band.



everyone who has been in the game for some time should pass over 10 and 20 meters once in a while, just to see what he's missing! As it is, though, most all of our reports received here monthly are exclusively *amateur DX*.

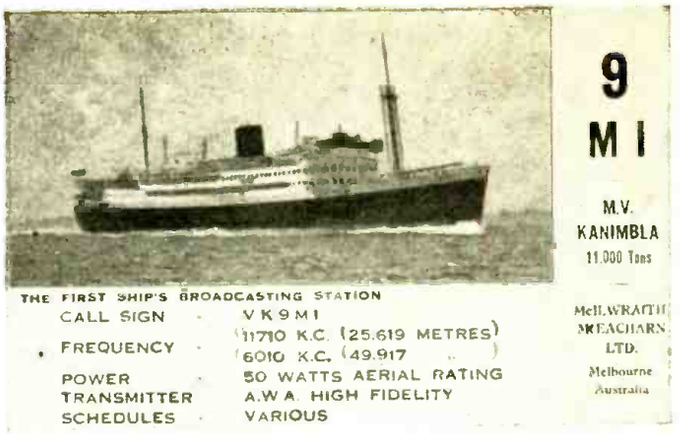
It is no small wonder then, that many *amateurs* whose "sigs" are well heard throughout the world, are forced to ignore the hundreds, and often thousands, of reports received upon their transmissions, as it seems that everyone listens to 10 and 20 meters only, when they DX. And these DX amateurs, were they to answer all reports as soon as they could, would have to devote much, if not most of their spare time to just sending out cards, instead of being on the air. One notable example, VQ4CRO, Fred Gilfillan, of Kenya Colony, told us that he was forced to stay off 20 meter phone, due to his being "swamped" with reports, whenever he was on the air! And ZT6Y of South Africa sends us a plea to inform SWL's that if they *must* send him reports, to send him good ones, not of the "*I heard you QS, R9, psc QSL*" variety.

Hugh (ZT6Y) outlines his idea of a good, useful report as follows: "Give exact time of report, and date, freq. heard, correct rept. of sigs. (RST), details of *contact* heard, type of receiver and antenna used, and most important, enclose a reply coupon, and an addressed envelope." Hugh suggests that a gummed label with address of listener be enclosed with report, if not an envelope, simplifying the amateur's reply considerably. It must be borne

ES5D—Esthonia. A handsome QSL from this FB OM, red letters on light buff card.

in mind that most amateurs have little time to spend answering reports, as ZT6Y, whose station was one of many well heard from South Africa this Fall and Winter, alone received 536 reports from all the world, with 355 from the United States, besides working 1212 DX stations, 890 of them W's. There are 1748 cards to mail, right there! And ZT6Y is only one amateur of many who also faced the task of answering a thousand or more reports and QSO's with their QSL's!

So, DXers, please try to be fair to the amateur, they're all FB OMs, and do their best, but very often do not receive the just consideration due them when reports are mailed to them.



9MI—Australian ship, "S.S. Kanimbla." A floating DX catch!

As mentioned before, the Golden Rule certainly applies here, as much as in any other instance. And now for DX:

CEYLON

VPB, now on 6.11 mc., at Colombo, has been heard, but poorly, several mornings lately. This is a rare DX catch, to be heard only on the best of mornings, and has yet to be reported in the East in '38. Daily sked is 7-9:30 a.m. and on Sundays 6:30-9:30 a.m. QRA is: Radio Club of Ceylon and South India, P.O. Box 282, Colombo, Ceylon.

JAVA

PLQ, 10.68 mc., Bandoeng, is being heard quite frequently of late, usually near 7 a.m., with a really good signal. This station can be easily spotted as they are just to the H.F. side of JVN, 10.66 mc. The usual fare is inverted speech, and when PLQ is on, one may also hear other East Indian islands, such as YBG, PNI, YCP, YBB, etc. YDC, 15.15 mc., PLP, 11.00 mc., and PMX, 10.26 mc., are all being heard well lately and seem to be improving all the time, as summer permits these Orientals to be heard with their best signal strength.

JAPAN

Latest authentic data on the daily broadcasts from Japan, as heard over the air by Harry Honda, our Pacific Coast Japanese correspondent, are as follows:

Trans. 1—Europe: JZJ, 11.8 mc. and JZ1, 9.535 mc., 2:30-4 p.m.
Trans. 2—So. America: JZJ, 11.80 mc., and JZ1, 4.30-5.30 p.m.
Trans. 3—No. America: JZJ, 6-6:30 p.m.
Trans. 4—No. America (West Coast) and Hawaii, JZJ, 12:30-1:30 a.m.
Trans. 5—North America—JZJ, 7-7:30 a.m.
Trans. 6—Asia, Australia—JZJ, 8-9:30 a.m.

JVO, 10.37 mc., Nazaki, heard daily 'phoning TDE, 10.065 mc., Manchukuo, as early as 3:50 a.m., up to 8 a.m., during past month, though never in clear speech.

(Continued on page 125)

Can You Answer These Radio Questions?

1. Is short-wave listening permitted in Japan? See page 69.
2. How does the operator in charge of a television pick-up camera in the studio, know whether he has the image properly framed and focused? See page 70.
3. Why would a French explorer in the heart of the Belgian Congo be interested in listening to the American short-wave station, W3XAL? See page 73.
4. What is the "beer-mug" transmitter and how did it get its name? See page 74.
5. How are strains in the glass of a cathode ray tube easily detected? See page 76.
6. What method is being used by France and the U. S. to combat short-wave propaganda? See page 78.
7. Can you explain how a single quartz crystal can be made to respond to a number of different frequencies? See page 77.
8. What was the outstanding short-wave DX catch last month? See page 82.
9. Can you describe a simple method for recording the facsimile pictures now being broadcast? See page 89.
10. How can one tube be made to perform dual purposes in a receiver? See page 93.
11. What means are used to change the frequency of the scanning for the "S.W.&T." cathode ray television receiver? See page 98.
12. How may one milliammeter be used to measure the plate current in several tubes of a transmitter? See page 100.

World Short Wave Stations

Revised Monthly

Broadcasters' Calls in bold type
Phones' in light type

Reports on station changes are appreciated.

Mc.	Call	
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 m.
31.600	W3XKA	PHILADELPHIA, PA., 9.494 m., Addr. NBC. Delays KYW 11 am.-9 pm.
31.600	W5XAU	OKLAHOMA CITY, 9.494 m., Sun 12 n-1 pm., 6-7 pm. Irregular other times.
31.600	W4XCA	MEMPHIS, TENN., 9.494 m. Addr. Memphis Commercial Appeal. Relays WMC.
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 6-12.30 am., Sun. 8 am-12 m.
31.600	W9XPD	ST. LOUIS, MO., 9.494 m., Addr. Pulitzer Pub. Co. Relays KSD.
26.400	W9XAZ	MILWAUKEE, WIS., 11.36 m., Addr. The Journal Co. Relays WTMJ from 1 pm.
26.100	W9XJL	SUPERIOR, WIS., 11.49 m. Relays WEBC daily.
26.100	GSK	DAVENTRY, ENG., 11.49 m., Addr. B.B.C., London. Operates irregularly.
25.950	W6XKG	LOS ANGELES, CAL., 11.56 m., Addr. B. S. McGlashan, Wash. Blvd. at Oak St. Relays KGFJ 24 hours daily.
21.550	GST	DAVENTRY, ENG., 13.92 m., Addr. (See 26.100 mc.) Irregular at present.
21.540	W8XK	PITTSBURGH, PA., 13.93 m., Addr. Grant Bldg. Relays KDKA 6.45-9 am. Exc. Sun.
21.530	GSJ	DAVENTRY, ENG., 13.93 m., Addr. (See 26.100 mc.) 5.45 am.-12 n.
21.520	W2XE	NEW YORK CITY, 13.94 m., Addr. Col. Broad. Syst., 485 Madison Ave. 6.30-9 am., Sat. and Sun. 7 am.-12 m.
21.500	W2XAD	SCHENECTADY, N. Y., 13.95 m., General Electric Co., 8 am.-12 n.
21.470	GSH	DAVENTRY, ENG., 13.97 m. (See 26.100 mc.), 5.45 am.-12 n.
21.450	DJS	BERLIN, GERMANY, 13.99 m., Addr., Broadcasting House. 12.05-11 am.
21.420	WKK	LAWRENCEVILLE, N. J., 14.01 m., Addr. Amer. Tel. & Tel. Co. Calls S. Amer. 7 am.-7 pm.
21.080	PSA	RIO DE JANEIRO, BRAZ., 14.23 m., Calls WKK daytime.
21.060	WKA	LAWRENCEVILLE, N. J., 14.25 m. Addr. (See 21.420 mc.) Calls England morning and afternoon.
21.020	LSN6	BUENOS AIRES, ARG., 14.27 m., Addr. Cia. Internacional de Radio. Works N.Y.C. 7 am.-7 pm.
20.860	EHY-EDM	MADRID, SPAIN, 14.38 m., Addr. Cia Tel. Nacional de Espana. Works S. Amer. mornings.
20.700	LSY	BUENOS AIRES, ARG., 14.49 m., Addr. Transradio Internatl. Tests irregularly.
20.380	GAA	RUGBY, ENG., 14.72 m. Calls Arg., Brazil mornings.
20.040	OPL	LEOPOLDVILLE, BELGIAN CONGO, 14.97 m. Works ORG morn.
20.020	DHO	NAUEN, GERMANY, 14.99 m., Addr. Reichspostzenstralamt. Works S. Am. mornings.
19.900	LSG	BUENOS AIRES, ARG., 15.08 m., Addr. (See 20.700 mc.) Tests irregularly.
19.820	WKN	LAWRENCEVILLE, N. J., 15.14 m., Addr. A. T. & T. Co. Calls England daytime.
19.680	CEC	SANTIAGO, CHILE, 15.24 m., Addr. Cia. Internacional de Radio. Calls Col. and Arg. daytime.
19.650	LSN5	BUENOS AIRES, ARG., 15.27 m., Addr. (See 21.020 mc.) Calls Europe daytime.
19.620	VQG4	NAIROBI, KENYA, 15.28 m., Addr. Cable and Wireless. Ltd. Calls London 7-8.30 am.
19.600	LSF	BUENOS AIRES, ARG., 15.31 m., Addr. (See 20.700 mc.) Tests irregularly.
19.480	GAD	RUGBY, ENG., 15.4 m. Calls VQG4 7.30-8 am.
19.355	FTM	ST. ASSISE, FRANCE, 15.5 m. Calls S. America mornings.
19.345	PMA	BANDOENG, JAVA, 15.51 m. Works Holland 5.30-11 am.
19.260	PPU	RIO DE JANEIRO, BRAZ., 15.58 m., Addr. Cia. Radiotel. Brasileira. Works France mornings.
19.220	WKF	LAWRENCEVILLE, N. J., 15.6 m., Addr. A.T.&T. Co. Calls London and Paris daytime.
19.200	ORG	RUYSSELEDE, BELGIUM, 15.62 m. Calls OPL mornings.
19.160	GAP	RUGBY, ENG., 15.66 m. Calls Australia 1-8 am.
19.020	HS8PJ	BANGKOK, SIAM, 15.77 m. Mondays 8-10 am.
18.970	GAQ	RUGBY, ENG., 15.81 m. Calls S. Africa mornings.
18.890	ZSS	KLIPHEUVEL, S. AFRICA, 15.88 m., Addr. Overseas Comm. of S. Africa. Ltd. Calls GAU 6.30-7 am.
18.830	PLE	BANDOENG, JAVA, 15.93 m. Calls Holland 6-11 am.
18.680	OCI	LIMA, PERU, 16.06 m. Tests with Bogota, Col.
18.620	GAU	RUGBY, ENG., 16.11 m. Calls N. Y. daytime. Calls ZSS 6.30-7 am.
18.480	HBH	GENEVA, SWITZERLAND, 16.26 m., Addr. Radio Nations. Sun., 10.45-11.30 am.
18.345	FZS	SAIGON, INDO-CHINA, 16.35 m. Works Paris early morning.
18.340	WLA	LAWRENCEVILLE, N. J., 16.36 m., Addr. A.T.&T. Co. Calls England daytime.
18.310	GAS	RUGBY, ENG., 16.38 m. Calls N.Y. daytime.
18.299	YVR	MARACAY, VENEZ., 16.39 m. Works Germany mornings.
18.250	FTO	ST. ASSISE, FRANCE, 16.43 m. Works S. America daytime.
18.200	GAW	RUGBY, ENG., 16.48 m. Works N.Y.C. daytime.
18.135	PMC	BANDOENG, JAVA, 16.54 m. Works Holland mornings.
18.115	LSY3	BUENOS AIRES, ARG., 16.56 m. Addr. (See 20,700 mc.) Tests irregularly. Broadcasts 5-6 pm. Friday.
18.040	GAB	RUGBY, ENG., 16.83 m. Works Canada morning and afternoon.
17.810	PCV	KOOTWIJK, HOLLAND, 16.84 m. Works Java 6-8 am.

16 Met. Broadcast Band

17.800	TGWA	GUATEMALA CITY, GUAT., 16.84 m., Addr. Ministre De Fomento. Irregular.
17.790	GSG	DAVENTRY, ENG., 16.86 m., Addr. B.B.C., London. 12 m.-2.15 am., 5.45 am.-12 n., 12.20-4 pm.
17.785	JZL	TOKYO, JAPAN, 16.87 m. Tests irregularly.
17.780	W3XAL	BOUND BROOK, N. J., 16.87 m., Addr. Natl. Broad. Co. 8 am.-8 pm.
17.770	PHI	HUIZEN, HOLLAND, 16.88 m., Addr. (See PHI, 11.730 mc.) Daily except Wednesday, 7.25-9.30 am., Sun. 6.25-9.30 am.
17.765	TPB3	PARIS, FRANCE, 16.88m. Addr. (See 15.245 mc.) 8.30-10 am.
17.760	DJE	BERLIN, GERMANY, 16.89 m., Addr. Broadcasting House. 12.05-10 am.; also Sun. 11.10 am-12.25 pm.
17.760	W2XE	NEW YORK, N. Y., 16.89 m., Addr. Col. Broad. System, 485 Madison Ave. Irregular.
17.755	Z8WS	HONGKONG, CHINA, 16.9 m., Addr. P.O. Box 200. 4-10 am. Irregular.

End of Broadcast Band

17.741	HSP	BANGKOK, SIAM, 16.91 m. Works Germany 6-7 am., 8-9 pm. Works JVE 11 pm.-6 am.
17.650	XGM	SHANGHAI, CHINA, 17 m. Works London 7-9 am.
17.520	DFB	NAUEN, GERMANY, 17.12 m. Works S. America, near 9.15 am. Works Siam 6-7 am., 8-9 pm.
17.480	VWY2	KIRKEE, INDIA, 17.16 m. Works London 7.30-8.30 am.
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.
17.120	WOO	OCEAN GATE, N. J., 17.52 m., Addr. A.T.&T.Co. Works ships irregularly.
17.080	GBC	RUGBY, ENG., 17.56 m. Works ships irregularly.
16.835	ITK	MOGADISCIO, ITAL. SOMALILAND, 18.32 m. Calls IAC around 9.30 am.
16.270	WLK	LAWRENCEVILLE, N. J., 18.44 m., Addr. A.T.&T. Co. Works S. Amer. daytime.
16.270	WOG	OCEAN GATE, N. J., 18.44 m., Addr. A.T.&T. Co. Works England late afternoon.
16.240	KTO	MANILA, P. I., 18.47 m., Addr. RCA Comm. Works Japan and U. S. 5-9 pm. and early am. irreg.
16.233	FZR3	SAIGON, INDO-CHINA, 18.48 m. Calls FTK 6-9 am.
16.030	KKP	KAHUKU, HAWAII, 18.71 m., Addr. RCA Comm. Works Dixon 3-10 pm.
15.880	FTK	ST. ASSISE, FRANCE, 18.9 m. Works Saigon 6-9 am.
15.865	CEC	SANTIAGO, CHILE, 18.91 m. Calls Peru daytime irregular.
15.810	LSL	BUENOS AIRES, ARG., 18.98 m., Addr. (See 21,020 mc.) Works London mornings and Paris afternoons.
15.660	JVE	NAZAKI, JAPAN, 19.16 m. Works Java and Siam early am.
15.620	JVF	NAZAKI, JAPAN, 19.2 m. Works Cal. near 5 am. and 8 pm.
15.550	CO9XX	TUINICU, ORIENTE, CUBA, 19.29 m., Addr. Frank Jones, Central Tuinicu, Tuinicu, Santa Clara. Broadcasts irregularly evenings.
15.440	XEBM	MAZATLAN, SIN., MEX., 19.43 m., Addr. Flores 103 Alto. "El Pregonero del Pacifico." Irregularly 7 am.-10 pm.
15.450	IUG	ADDIS ABABA, ETHIOPIA, 19.44 m. Works Rome 9-10.30 am.
15.415	KWO	DIXON, CAL., 19.46 m., Addr. A. T. & T. Co. Works Hawaii 2-7 pm.
15.370	HAS3	BUDAPEST, HUNGARY, 19.52 m., Addr. Radiolabor, Gyali Ut 22. Sun. 9-10 am.
15.360	DZG	ZEESEN, GERMANY, 19.53 m., Addr. Reichspostzenstralamt. Tests irregularly.

(Continued on page 86)

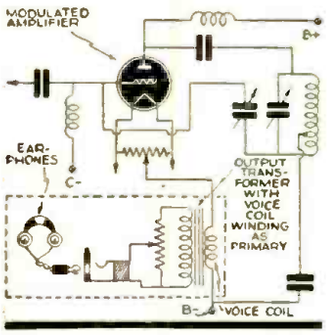
All Schedules Eastern Standard Time

Short Wave Kinks

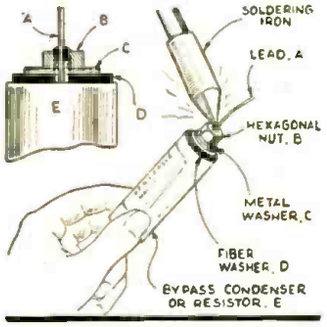
Each month the Editor will award a 2 year subscription for the best short-wave kink submitted. All other kinks published will be awarded eight months' subscription to SHORT WAVE & TELEVISION. Look over these kinks; they will give you some idea of what is wanted. Send a typewritten or ink description, with sketch, of your favorite to the "Kink" Editor.

PHONE MONITOR
1st PRIZE

A simplified phone monitor can be made from an old loudspeaker output transformer. The voice coil winding of this transformer is connected in series with the center-tapped filament of the modulated amplifier. A pair of headphones is connected to the secondary of this transformer with a 5,000 ohm potentiometer shunted across the secondary for controlling volume. The arrangement will detect carrier hum, distortion and improper neutralization.—*Carl Ornehaug, W8CDK.*



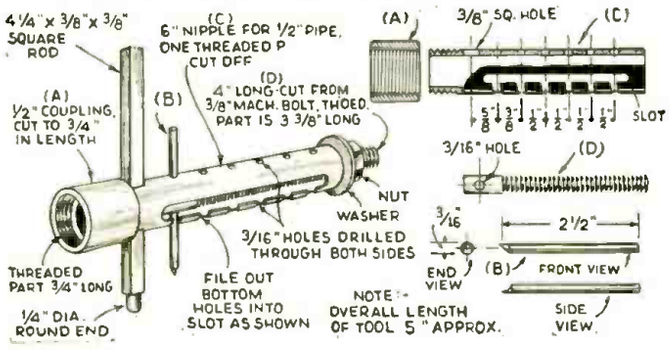
PROTECTING CONDENSERS



How many experimenters have found that after using a pigtail tubular condenser in several circuits the pigtail leads break off flush with the side of the condenser?

As illustrated, a fibre washer, a metal washer and a hexagonal nut are slipped over each end of the pigtail condenser. The nut is then soldered to the pigtail lead. After the condenser has been used a few times the pigtail lead will break off as usual. However, it is now possible to unsolder the hexagon nut and remove the washers, exposing an unused length of lead.—*A. J. Dembiec, W8PJK.*

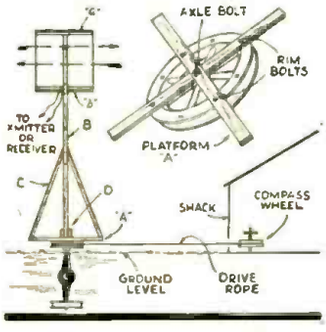
AN ADJUSTABLE HOLE CUTTER



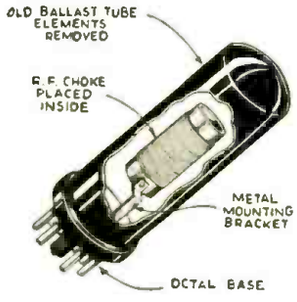
A very useful adjunct to any workbench is this cutting tool for cutting holes of various sizes in metal chassis. It is an improvement over the tool described in the August 1936 issue of *Short Wave Craft.* To adjust the radius of the cutting circle of this tool loosen the nut, pull the cutting tool (B) down through the hole and move it along to the desired position, then insert in the hole at that point and retighten the nut. A drill rod should be used for the cutting tool. The construction of the cutter is clearly shown in the layout above.—*Mitchell Wozniak.*

DIRECTIVE ANTENNA

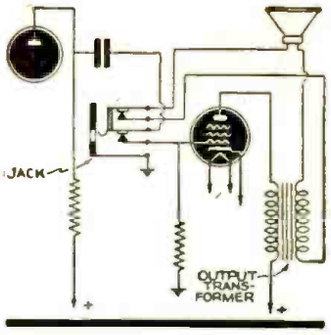
A rotatable antenna mast suitable for ultra-high frequency use in the 5 and 10 meter bands may be constructed from an automobile rear end assembly picked up in a junk yard. The assembly is buried vertically in the ground as shown, with one wheel protruding above the ground level. This wheel should be of the wooden spoke type with detachable rim. The rim should be removed and bolts long enough to firmly secure the platform to the wheel should be substituted for the original bolts. The mast may be of any convenient length. The type of aerial array is left up to the constructor. By mounting a wheel on the floor of the transmitting shack and attaching it by means of a driving rope to the rim of the wheel on the mast, it is possible to turn the array without going out of the shack.—*Charles Culley, W5DOK.*



SHIELDED CHOKE



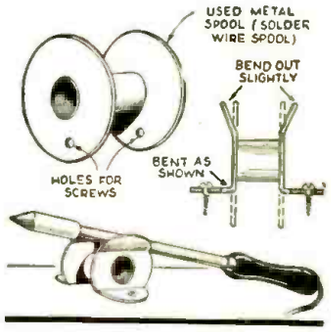
A new use for burnt out metal ballast tubes is to use the metal shield and base as a mounting for a plug-in shielded R.F. choke. Any R.F. choke of small diameter may be mounted within the ballast tube shield after all the burnt out elements have been removed. The leads from the choke are connected to any convenient pins on the base of the tube and the metal shield should be connected to one of the pins for grounding purposes. One precaution should be observed in using a choke in this housing. If the choke diameter is large, so that the windings are less than ¼-inch away from the metal shell, the choking action will be seriously affected and the choke's action may be completely canceled. The metal ballast tube shells can also be used for housing electrolytic condensers.—*John Ferral.*



HEADPHONE JACK

When using the ordinary headphone jack on a short-wave receiver a considerable hum is sometimes heard from the loudspeaker when headphones are connected. This hum can be disturbing to the listener, or anyone else in the room. By employing a double circuit jack as shown in the sketch, the voice coil of the loudspeaker is opened thus disconnecting the speaker from the receiver and preventing hum from being heard.—*L. F. Schneider.*

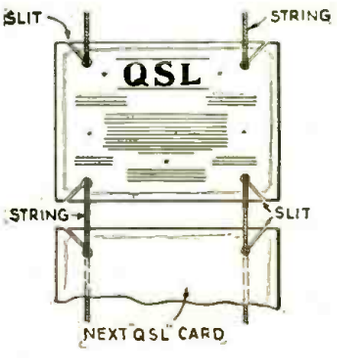
IRON HOLDER



Our old friend, the soldering iron holder, comes under a new guise this month. This holder is made from an empty solder spool. As the illustration shows, the holder may be secured to the work-bench by wood screws.—*Bill Knipe.*

CARD MOUNT

A neat way of mounting QSL cards on a wall is sketched. Two parallel pieces of string are run down the wall from the picture moulding to the floorboard. The space between the two strings must be less than the width of the cards. To mount a card, punch four holes in it and cut out four slots as shown.—*W. T. Murray.*



Mc.	Call	
15.355	KWU	DIXON, CALIF., 19.53 m., Addr. A.T.&T. Co. Phones Pacific Isles and Japan.

19 Met. Broadcast Band

15,340	DJR	BERLIN, GERMANY, 19.56 m., Addr. Br'dcast'g House, 8-9 am., 4.50-10.45 pm.
15,330	W2XAD	SCHENECTADY, N. Y., 19.56 m., Addr. General Electric Co. Relays WGY 12.30-7 pm.
15.320	OLR5B	PRAGUE, CZECHOSLOVAKIA, 19.58 m. Addr. (See 11.840 mc.) Daily exc. Sun. 6.30-7.30, 9.10-9.50 am., Sun. 6.15-7.45 am.
15.310	GSP	DAVENTRY, ENG., 19.6 m., Addr. (See 26.100 mc.) 12.15-1.15, 4.15-6, 6.20-8.30 pm.
15.290	LRU	BUENOS AIRES, ARG., 19.62 m., Addr. El Mundo. Relays LRI, 7-9 am.
15.280	HI3X	CIUDAD TRUJILLO, D. R., 19.63 m. Relays HIX Sun. 7.40-10.40 am. Weekdays 12.10-1.10 pm.
15.280	DJQ	BERLIN, GERMANY, 19.63 m., Addr. Broadcasting House. 12.05-10 am., 4.50-10.45 pm. Also Sun. 11.10 am-12.25 pm.
15.270	W2XE	NEW YORK CITY, 19.65 m., Addr. (See 21.520 mc.) Daily except Sat. and Sun., 12 n-5 pm., Sat. & Sun. 1.30-5 pm.
15.260	GSI	DAVENTRY, ENG., 19.66 m., Addr. (See 26.100 mc.) 9.20-11.20 pm.
15.252	RIM	TASHKENT, U.S.S.R., 19.67 m. Works RKI near 7 am.
15.250	WIXAL	BOSTON, MASS., 19.67 m., Addr. University Club. Daily 12.30-2 pm., Sun. 10.15 am.-12 n.
15.245	TPA2	PARIS, FRANCE, 19.68 m., Addr. 98 bis. Blvd. Haussmann. "Paris Mondial" 5-10 am.
15.230	HS8PJ	BANGKOK, SIAM, 19.7 m. Irregularly Mon. 8-10 am.
15.230	OLR5A	PRAGUE, CZECHOSLOVAKIA, 19.7 m. Daily exc. Sun. 6.30-7.30, 9.10-9.50 am., Sun. 6.15-7.45 am.
15.220	PCJ	HUIZEN, HOLLAND, 19.71 m., Addr. N. V. Philips' Radio Hilversum. Tues. 2-3.30 am., Wed. 9.30-11 am.
15.210	W8XK	PITTSBURGH, PA., 19.72 m., Addr. (See 21.540 mc.) 9 am.-7 pm.
15.200	DJB	BERLIN, GERMANY, 19.74 m., Addr. (See 15.280 mc.) 12.05-11 am., 4.50-10.45 pm. Also Sun. 11.10 am.-12.15 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 26.100 mc.) 12 m.-2.15, 5.45-10 am., 4.15-6, 6.20-8.30 pm.
15.170	TGWA	GUATEMALA CITY, GUAT., 19.77 m., Addr. (See 17.8 mc.) Irregular 11.30 am.-2 pm.
15.160	XEWW	MEXICO CITY, MEXICO, 19.79 m., 12 n.-12 m., irregular.
15.160	JZK	TOKYO, JAPAN, 19.79 m. Irreg.
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 5.30-10.30 am.
15.140	GSF	DAVENTRY, ENG., 19.82 m., Addr. (See 26.100 mc.) 12 m.-2.15, 5.45 am.-12 n., 4.15-6, 6.20-8.30.
15.130	TPB6	PARIS, FRANCE, 19.83 m., Addr. "Paris Mondial" 98 Bis Blvd. Haussmann. 6-8.15 pm.
15.130	WIXAL	BOSTON, MASS., 19.83 m., Addr. World-Wide B'cast'g. Foundation. University Club. 10-11 am., Mon.-Fri.
15.120	HVJ	VATICAN CITY, 19.83 m., 10.30-10.45 am., except Sun., Sat. 10-10.45 am.
15.110	DJL	BERLIN, GERMANY, 19.85 m., Addr. (See 15.280 mc.) 12 m.-2, 8-9 am., 10.40 am. to 4.30 pm. Sun. also 6-8 am.
15.080	RKI	MOSCOW, U.S.S.R., 19.87 m. Works Tashkent near 7 am. Broadcasts Sun. 12.15-2.30 pm. Daily 7-9.15 pm.

End of Broadcast Band

Mc.	Call	
15.055	WNC	HIALEAH, FLORIDA, 19.92 m., Addr. A.T.&T. Co. Calls Central America daytime.
14.980	KAY	MANILA, P. I., 20.03 m., Addr. RCA Comm. Works Pacific Is. Mornings.
14.960	PSF	RIO DE JANEIRO, BRAZIL, 20.05 m., Works with Buenos Aires daytime.
14.950	HJB	BOGOTA, COL., 20.07 m. Calls WNC daytime.
14.940	HII	CIUDAD TRUJILLO, D. R., 20.08 m. Phones WNC daytime.
14.940	HJA3	BARRANQUILLA, COL., 20.08 m. Works WNC daytime.
14.920	LZA	SOPHIA, BULGARIA, 20.10 m., Addr. Radio Garata. Mon., Tues., Thurs., Fri. 11.30 am.-2.45 pm., Wed. 11.30 am.-4.45 pm., Sat. 11.30 am.-5 pm., Sun. 2 am.-5 pm. Daily except Sun. 5-6.30 am.
14.845	OCJ2	LIMA, PERU, 20.21 m. Works South America stations daytime.
14.790	ROU	OMSK, SIBERIA, U.S.S.R., 20.28 m. Works Moscow irregularly 7-9 am.
14.730	IQA	ROME, ITALY, 20.37 m. Broadcasts 6-9 pm. irregular.
14.653	GBL	RUGBY, ITALY, 20.47 m. Works JVH 1-7 am.
14.640	TYF	PARIS, FRANCE, 20.49 m. Works Saigon and Cairo 3-7 am, 12 n.-2.30 pm.
14.600	JVH	NAZAKI, JAPAN, 20.55 m. Broadcasts irregularly 5-11.30 pm. Works Europe 4-8 am.
14.590	WMN	LAWRENCEVILLE, N. J., 20.56 m., Addr. A.T.&T. Co. Works England morning and afternoon.
14.535	HBJ	GENEVA, SWITZERLAND, 20.64 m., Addr. Radio Nations. Broadcasts Sun. 1.45-2.30 pm., Mon. 1.30-1.45 am.
14.530	LSN	BUENOS AIRES, ARG., 20.65 m. Addr. (See 20.020 mc.) Works N. Y. C. afternoons.
14.500	LSM2	BUENOS AIRES, ARG., 20.69 m., Addr. (See 21.020 mc.) Works Rio and Europe daytime.
14.485	TIR	CARTAGO, COSTA RICA, 20.71 m. Works Central America and U. S. A. daytime.
14.485	YSL	SAN SALVADOR, SALVADOR, 20.71 m. Irregular.
14.485	HPF	PANAMA CITY, PANAMA, 20.71 m. Works WNC daytime.
14.485	TGF	GUATEMALA CITY, GUATEMALA, 20.71 m. Works WNC daytime.
14.485	YNA	MANAGUA, NICARAGUA, 20.71 m. Works WNC daytime.
14.485	HRL5	NACAOME, HONDURAS, 20.71 m. Works WNC daytime.
14.485	HRF	TEGUCIGALPA, HONDURAS, 20.71 m. Works WNC daytime.
14.48	IBS	ROME, ITALY, 20.7 m. Works Eritrea and Addis Ababa 6.30-7.30 am.
14.470	WMF	LAWRENCEVILLE, N. J., 20.73 m., Addr. A.T.&T. Co. Works London and Paris daytime.
14.460	DZH	ZEESEN, GERMANY, 20.75 m., Addr. (See 15.360 mc.) Irregular.
14.440	—	RADIO MALAGA, SPAIN, 20.78 m. Relays Salamanca. Irreg. afternoons.
14.440	GBW	RUGBY, ENG., 20.78 m. Works U.S.A. afternoons.
14.166	PIIJ	DORDRECHT, HOLLAND, 21.15 m., Addr. (See 7.088 mc.) Sat. 12 n.-12.30 pm.
14.004	EA9AH	TETUAN, SPANISH MOROCCO, 21.4 m. Daily except Sun. 2.15-5, 7 and 9 pm.
13.990	GBA	RUGBY, ENG., 21.44 m. Works Buenos Aires late afternoon.
13.820	SUZ	ABOU ZABAL, EGYPT, 21.71 m. Works with Europe 11 am.-2 pm. Works GBB daily at 11 am.
13.690	KKZ	BOLINAS, CALIF., 21.91 m., Addr. RCA Comm, Irregularly.
13.635	SPW	WARSAW, POLAND, 22 m. Daily 6-8 pm. Sat. & Sun. 6-9 pm.
13.63	ZGB	KUALA LUMPUR, F.M.S., 22 m. Works Java and VVS, VVN and Siam, 6.30-8 am.
13.585	GBB	RUGBY, ENG., 22.08 m. Works Canada afternoons. Works SUZ at 11 am.

Mc.	Call	
13.415	GCJ	RUGBY, ENG., 22.36 m. Works Japan and China early morning.
13.410	YSJ	SAN SALVADOR, SALVADOR, 22.37 m. Works WNC daytime.
13.390	WMA	LAWRENCEVILLE, N. J., 22.4 m., Addr. A.T.&T. Co. Works England morning and afternoon.
13.380	IDU	ASMARA, ERITREA, AFRICA, 22.42 m. Works Rome daytime.
13.350	VVN	FT. ST. GEORGE, MADRAS, INDIA, 22.46 m. Works VVS, Burma, near 7 am.
13.345	YVQ	MARACAY, VENEZUELA, 22.48 m. Works WNC daytime.
13.285	CGA3	DRUMMONDVILLE, QUE., CAN., 22.58 m. Works London and ships afternoons.
13.330	IRJ	ROME, ITALY, 22.69 m. Works Tokyo 5-9 am., irregularly.
12.882	W9XDH	ELGIN, ILL., 23.25 m. Press Wireless, Tests 2-5 pm.
12.870	VVS	MINGALADON, BURMA, 23.30 m. Works ZGB, VVN, and Siam, 6.30-7.30 am.
12.840	WOO	OCEAN GATE, N. J., 23.36 m., Addr. A.T.&T. Co. Works with ships irregularly.
12.830	CNR	RABAT, MOROCCO, 23.38 m., Addr. Director General Tele. & Teleg. Stations. Works TYA, Paris 6-7 am., 2.30-4 pm.
12.800	IAC	PISA, ITALY, 23.45 m. Works Italian ships mornings.
12.780	GBC	RUGBY, ENG., 23.47. Works ships irregularly.
12.325	DAF	NORDDEICH, GERMANY, 24.34 m. Works German ships daytime.
12.290	GBU	RUGBY, ENG., 24.41 m. Works N. Y. C. evenings.
12.250	TYB	PARIS, FRANCE, 24.49 m. Irregular.
12.235	TFJ	REYKJAVIK, ICELAND, 24.52 m. Works Europe mornings. Broadcasts Sun. 1.40-2.30 pm.
12.215	TYA	PARIS, FRANCE, 24.56 m. Works French ships in morning and afternoon.
12.150	GBS	RUGBY, ENG., 24.69 m. Works N. Y. C. evenings.
12.130	DZE	ZEESEN, GERMANY, 24.73 m., Addr. (See 15.360 mc.) Tests irregular.
12.120	TPZ	ALGERS, ALGIERS, 24.75 m. Calls Paris near 6 am., and 2.30-4 pm.
12.060	PDV	KOOTWIJK, HOLLAND, 24.88 m. Tests irregularly.
12.060	RNE	MOSCOW, U.S.S.R., 24.88 m. Daily 6-7 am., 12.15-1 pm., 8-9.15, 10-11 pm., also Sun. 6 am.-1 pm.
11.991	FZS4	SAIGON, INDO-CHINA, 25.02 m. Phones Paris irregular.
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.
11.955	IUC	ADDIS ABABA, ETHIOPIA, 25.09 m. Works IAC around 12 m.
11.950	KKQ	BOLINAS, CALIF., 25.1 m. Tests irregularly evenings.
11.940	FTA	STE. ASSISE, FRANCE, 25.13 m. Works Morocco mornings and Argentina late afternoon.

25 Met. Broadcast Band

11.910	CD1190	VALDIVA, CHILE, 25.2 m., P. O. Box 642. Relays CB69 10 am.-1 pm., 3-6 pm., 7-10 pm.
11.900	TPA3	PARIS, FRANCE, 25.21 m., Addr. (See 15.245 mc.) 1-4 am., 10.15 am.-5 pm.
11.900	XEW1	MEXICO CITY, MEXICO, 25.21 m., Addr. P. O. Box 2B74. Tues. and Thurs. 7.30 pm.-12 m., Fri. 9 pm.-12 m. Sun. 12.30-2 pm.
11.895	HP5I	AGUADULCE, PANAMA, 25.22 m. Addr. La Voz del Interior. 7.30-9.30 pm.
11.885	TPB7	PARIS, FRANCE, 25.24 m. (See 15.245 mc.) 8.30-11 pm.
11.870	W8XK	PITTSBURGH, PA., 25.26 m., Addr. (See 21.540 mc.) 7-11 pm.
11.860	YDB	SOERABAJA, JAVA, 25.29 m., Addr. N. I. R. O. M. Sat. 7.30 pm. to 2.30 am., daily 10.30 pm. to 2 am.

(Continued on page 88)

All Schedules Eastern Standard Time

Short Wave League

HONORARY MEMBERS

Dr. Lee de Forest — Manfred von Ardenne
D. E. Replogle — E. T. Somerset
John L. Reinartz — Hollis Baird
Hugo Gernsback, Executive Secretary

When to Listen In

M. Harvey Gernsback

All schedules in Eastern Standard Time

A special certificate sent to SWLs sending a reception report to TI4NRH during May. This one was sent to the executive secretary of the League.

DAYLIGHT SAVING TIME . . . During April, daylight saving time went into effect in many cities in the United States and Canada and in the whole of France and England. In this country, the schedules of many stations were advanced one hour because of this. Most Canadian stations were also similarly affected. The English station at Daventry sticks to a fixed schedule all year around, however. The French station made a wholesale revision of its schedule as noted in the item below. Listeners residing in zones where daylight saving time is not used should expect to hear most U.S. and Canadian short-wave stations one hour earlier than before, while listeners observing daylight time will find these stations on the same schedule as they have been, but all other stations of the world will be heard one hour later. All station schedules published in *Short Wave & Television* are in Eastern Standard Time throughout the year. Therefore, listeners must make any necessary corrections if they use Daylight time. This is done by adding one hour to the time shown in the schedules.

BOSTON . . . The revised schedule of W1XAL, Boston, is, Monday to Friday: 15.13 mc.—10 to 11 a.m.; 15.25 mc.—12:30-2 p.m.; 11:70 mc.—3:15 to 5:30 p.m.; 6.04 mc.—6 to 7:45 p.m.; 11.73 mc.—8 to 10 p.m. On Monday, the 6.04 mc. schedule is 6 to 8 p.m., and the 11.73 mc. schedule 8:30 to 10:30 p.m. Saturday the station operates only from 5-5:30 p.m. on 11.79 mc. On Sundays on 15.25 mc. from 10 to 11 a.m., and on 11.79 mc. from 12 n. to 5:30 p.m.

PARIS . . . The new French short-wave station has gone into regular operation and there has been a complete upheaval in its schedules, call letters, name and frequency. *It is no longer known as Radio Colonial.* The new name for the station is Paris Mondial and the following frequencies, call letters and schedules are now in effect. TPB3 on 17.765 mc. operates from 8:30-10 a.m., directed to Asia. TPA2, 15.243 mc., operates from 5-10 a.m., also for Asia. TPB6, 15.13 mc., and TPA4, 11.715 mc., operate from 6 to 8:15 p.m., for South America. TPA3, 11.9 mc., and TPB11, 9.57 mc., operate from 1-4 a.m., and from 10:15 a.m.-5 p.m., from Africa. TPA4 11.715 mc., and TPB7, 11.885 mc., operate from 8:30-11 p.m. for North and Central America.

The TPB stations are the new 50 kw. station at Essarts, France, while the TPA stations are the old transmitters.

SWITZERLAND . . . Radio Nations at Geneva is now on a spring schedule. Sunday programs for North America are sent out on HBO, 11.402 mc., from 7-7:45 p.m., and for India from 10:45-11:30 a.m., on HBH, 18.48 mc. A program for South Africa is heard from 1:45-2:30 p.m., on HBJ, 14.535 mc., and HBQ, 6.675 mc. Finally a program for Australians and New Zealand is broadcast on Monday from 1-1:15 a.m., on HBO and from 1:30-1:45 a.m., on HBJ.

Amando Cespedes Marin, founder and director of NRH.

ROME . . . A new station is heard relaying 2RO until 6 p.m., on about 17.81 mc. 2RO now operates on 11.81 mc. for practically all of its transmissions.

TI4NRH's Tenth Birthday . . . One of the real old-timers among short-wave broadcasting stations is celebrating its tenth birthday during the month of May. TI4NRH, *The Voice of Costa Rica*, Heredia, is operated by our old friend, Amando Céspedes Marin. During the month of May he is having a gala celebration on the station with thirty-one special programs dedicated to various short-wave organizations of the world and to various individuals in the short-wave fraternity. These programs will be broadcast from 9-10 p.m. each night during the month on 9.67 mc. On May 12, the program is to be dedicated to the *Short Wave League*, and to Hugo Gernsback, the Editor of *Short Wave & Television*.

To all listeners reporting and commenting upon these special broadcasts a beautiful three-colored lithographed diploma 14" x 12" will be sent. We have reproduced this diploma at the top of this page. A special medal will be awarded to those who participate in a special contest, details

(Continued on page 121)

Mc.	Call	
11.860	GSE	DAVENTRY, ENG., 25.29 m., Addr. (See 26.100 mc.) Irregular.
11.855	DJP	BERLIN, GERMANY, 25.31 m., Addr. (See 15.280 mc.) Irregular 11.35 am.-4, 7-10.45 pm.
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, CZECHOSLOVAKIA, 25.35 m., Addr. Czech Shortwave Sta., Praha XII, Fochova 16. Sun. 6.15-8.55 pm., Mon., Tues., Thur., Fri. 8-10.35 p.m. Daily exc. Sun. 9.55-10.50 am.
11.830	W9XAA	CHICAGO, ILL., 25.36 m., Addr. Chicago Federation of Labor. Irregular 7 am.-6 pm.
11.830	W2XE	NEW YORK CITY, 25.36 m., Addr. Col. Broad. System, 485 Madison Av., N.Y.C. 5.30-10 pm.
11.826	XEBR	HERMOSILLA, SON., MEX., 25.37 m., Addr. Box 68. Relays XE8H. 2-4 pm., 9 pm.-12 m.
11.820	GSN	DAVENTRY, ENG., 25.38 m., Addr. (See 26.100 mc.) Irregular.
11.810	2RO	ROME, ITALY, 25.4 m., Addr. E.I.A.R., Via Montello 5. Daily 5-8.30 am., 10.30 am.-9 pm.
11.805	COGF	MATANZAS, CUBA, 25.41 m., Addr. Gen. Betancourt 51. Relays CMGF. 2-3, 4-5, 6-11 pm.
11.805	OZG	SKAMLEBOAEK, DENMARK, 25.41 m. Addr. Statsradiofonien. Irreg.
11.800	JZJ	TOKYO, JAPAN, 25.42 m., Addr. Broadcasting Co. of Japan, Overseas Division. 12.30-1.30, 7-7.30, 8-9.30 am., 2.30-4, 4.30-5.30, 6-6.30 pm.
11.795	DJO	BERLIN, GERMANY, 25.43 m., Addr. (See 15.280 mc.) Irregular. 7-11 pm.
11.790	OER3	VIENNA, AUSTRIA, 25.45 m. Daily 10 am.-5 pm. Sat. until 5.30 pm.
11.790	WIXAL	BOSTON, MASS., 25.45 m., Addr. (See 15.250 mc.) Daily 3.15-5.30 pm., Sat. 5-5.30 pm., Sun. 12 n.-5.30 pm.
11.770	DJD	BERLIN, GERMANY, 25.49 m., Addr. (See 15.280 mc.) 10.40 am.-4.30 pm., 4.50-11 pm.
11.760	TGWA	GUATEMALA CITY, GUAT., 25.51 m. (See 17.8 mc.) Sun., Tues. and Thurs. 8 pm.-12 m.
11.760	OLR4B	PRAGUE, CZECHOSLOVAKIA, 25.51 m., Addr. (See 11.840 mc.) Irregular.
11.750	GSD	DAVENTRY, ENG., 25.53 m., Addr. B.B.C., London. 12 m.-2.15 am., 12.20-6.00 pm., 6.20-8.30, 9.20-11.20 pm.
11.740	HVJ	VATICAN CITY, 25.55 m. Testing irregular.
11.730	——	SAIGON, INDO CHINA, 25.57 m., Addr. Radio Philco. 11 pm.-1 am., 5.30-9.30 am.
11.730	PHI	HUIZEN, HOLLAND, 25.57 m., Addr. N. V. Philips' Radio.
11.730	WIXAL	BOSTON, MASS., 25.57 m., Addr. World-Wide B'cast'g. Foundation, University Club. 8.30-10.30 pm. Mon., 8-10 pm. Tues.-Fri.
11.720	CJRX	WINNIPEG, CANADA, 25.6 m., Addr. James Richardson & Sons, Ltd. Daily 6 pm.-12 m., Sun. 5-10 pm.
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 pm., 8.30-11 pm.
11.710	SBP	MOTALA, SWEDEN, 25.63 m., 1.20-2.05, 6-9 am., 11 am.-1 pm., Sat. 1.20-2 am., 6 am.-1.30 pm., Sun. 3 am.-1.30 pm.
11.710	YSM	SAN SALVADOR, EL SALVADOR, 25.63 m., Addr. (See 7.894 mc.) Irregular 1.30-2.30 pm.
11.700	HP5A	PANAMA CITY, PAN., 25.65 m. Addr. Radio Teatro, Apartado 954. 10 am.-10 pm.
11.700	CB1170	SANTIAGO, CHILE, 25.65 m. Relays CB89 6 pm.-12 m.

End of Broadcast Band

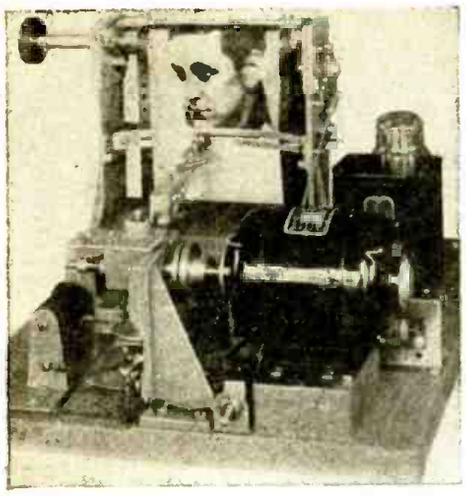
Mc.	Call	
11.680	KIO	KAHUKU, HAWAII, 25.68 m., Addr. RCA Comm. Irregularly.
11.595	VRR4	STONY HILL, JAMAICA, B. W. I., 25.87 m. Works WNC daytime.
11.560	VIZ3	FISKDALE, AUSTRALIA, 25.95 m., Addr. Amalgamated Wireless of Australasia Ltd. Tests irregularly.
11.530	SPD	WARSAW, POLAND, 26 m., Addr. 5 Mazowiecka St. 6-8 pm., Sat. & Sun. 6-9 pm.
11.500	XAM	MERIDA, YUCATAN, 26.09 m. Irregular 1-7.30 pm.
11.500	PMK	BANDOENG, JAVA, 26.09 m. Tests irregularly.
11.420	COCX	HAVANA, CUBA, 26.25 m. P. O. Box 32. 6.55 am.-1 am. Sun. till 12 m. Relays CMX.
11.413	CJA4	DRUMMONDVILLE, QUE., CAN., 26.28 m. Tests irregularly.
11.402	HBO	GENEVA, SWITZERLAND, 26.31 m., Addr. Radio Nations. Sun. 7-7.45 pm., Mon. 1-1.15 am.
11.050	ZLT4	WELLINGTON, NEW ZEALAND, 27.15 m. Works Australia and England early morning.
11.040	CSW	LISBON, PORTUGAL, 27.17 m., Addr. Nat. Broad. Sta. 1.30-5 pm.
11.000	PLP	BANDOENG, JAVA, 27.27 m. Relays YDB. 6-7.30 p.m., 5.30-10.30 or 11 am. Sat. until 11.30 am.
10.970	OCI	LIMA, PERU, 27.35 m. Works Bogota, Col. evenings.
10.960	——	TANANARIVE, MADAGASCAR, 27.36 m., Addr. (See 9.53 mc.) 12.30-45, 3.30-4.30, 10-11 am.
10.910	KTR	MANILA, P. I. 27.41 m. Phones ships 6-10 am.
10.840	KWV	DIXON, CALIF., 27.68 m., Addr. A.T.&T. Co. Works with Hawaii evenings.
10.770	GBP	RUGBY, ENGLAND, 27.85 m. Works Australia early morning.
10.740	JVM	NAZAKI, JAPAN, 27.93 m. Works U.S.A. 2-7 am.
10.680	PLQ	BANDOENG, JAVA. 28.09 m. Works Javanese Isles and other Asiatic phones 6-8.30 am.
10.675	WNB	LAWRENCEVILLE, N. J., 28.1 m. Addr. A.T.&T. Co. Works with Bermuda irregularly.
10.670	CEC	SANTIAGO, CHILE, 28.12 m. Irregular.
10.660	JVN	NAZAKI, JAPAN, 28.14 m. Broadcasts daily 2-8 am. Works Europe irregularly at other times.
10.600	ZIK2	BELIZE, BRIT. HONDURAS, 28.25 m., Tues., Thurs., Sat. 7.30-7.45 pm.
10.550	WOK	LAWRENCEVILLE, N. J., 28.44 m. Addr. A.T.&T. Co. Works S. A. nights.
10.535	JI8	TAIHOKU, TAIWAN, 28.48 m. Works Japan around 6.25 am. Broadcasts, relaying JFAK 9.05-10 am., 1-2.30 am. Sun. to 10.15 am.
10.520	VLK	SYDNEY, AUSTRALIA, 28.51 m., Addr. Amalgamated Wireless of Australasia Ltd. Works England 1-6 am.
10.430	YBG	MEDAN, SUMATRA, 28.76 m. Calls Java 5.30-6.30 am.
10.410	PDK	KOOTWIJK, HOLLAND, 28.8 m. Works Java 7.30-9.40 am.
10.410	KES	BOLINAS, CALIF., 28.8 m., Addr. RCA Communications. Irregular.
10.370	JVO	NAZAKI, JAPAN, 28.93 m. Works TDE 3-8 am.
10.370	EAJ43	TENERIFFE, CANARY ISLANDS, 28.93 m. Relays Salamanca, Spain, 2.15-3.15, 6.15-10 pm.
10.350	LSX	BUENOS AIRES, ARG., 28.98 m., Addr. Transradio International. Tests irregularly.
10.330	ORK	RUYSSELEDE, BELGIUM, 29.04 m. Broadcasts 1.30-3 pm. Works OPM 1-3 am., 3-5 pm.
10.300	LSL2	BUENOS AIRES, ARG., 29.13 m., Addr. Cia. Internacional de Radio. Works Europe evenings.
10.290	DZC	ZEESEN, GERMANY, 29.16 m., Addr. (See 15.360 mc.) Irregular.
10.260	PMN	BANDOENG, JAVA, 29.24 m. Relays YDB 5.30-10.30 or 11 am., Sat to 11.30 am.
10.250	LSK3	BUENOS AIRES, ARG., 29.27 m., Addr. (See 10.310 mc.) Works Europe and U.S.A. afternoons and evenings.
10.230	CED	ANTOFAGASTAN, CHILE, 29.33 m. Tests 7-9.30 pm.

Mc.	Call	
10.220	PSH	RIO DE JANIERO, BRAZIL, 29.35 m., Addr. Box 709. Broadcasts 6-9 pm.
10.160	RIO	BAKOU, U.S.S.R., 29.5 m. Works Moscow 10 pm.-7.30 am.
10.140	OPM	LEOPOLDVILLE, BELGIAN CONGO, 29.59 m. Works Belgium 1-3 am. and 3-5 pm.
10.080	RIR	TIFLIS, U.S.S.R., 29.76 m. Works Moscow 12 m.-8 am.
10.065	TDE	SHINKYO, MANCHUKUO, 29.81 m. Works JVO 3-8 am.
10.055	ZFB	HAMILTON, BERMUDA, 29.84 m. Works N.Y.C. irregular.
10.055	SUV	ABOU ZABAL, EGYPT, 29.84 m. Works Europe 1-6 pm.
10.042	DZB	ZEESEN, GERMANY, 29.87 m., Addr. Reichspostzenstralamt, Irregular.
9.990	KAZ	MANILA, P. I., 30.03 m., Addr. RCA Communications. Works Java early morning.
9.980	COBC	HAVANA, CUBA, 30.04 m., Addr. P. O. Box 132. Relays CM8C 6.55 a.m.-12:30 a.m.
9.950	GCU	RUGBY, ENGLAND, 30.15 m. Works N.Y.C. night time.
9.940	CSW	LISBON, PORTUGAL, 30.18 m. Addr. Nat. Broad. Sta. 5-7 pm.
9.940	JDY	DAIREN, MANCHUKUO, 30.18 m. Relays JQAK daily 7-8 am. Works Tokyo occasionally in early am.
9.930	HK3	BOGOTA, COL., 30.21 m. Works Rio evenings.
9.890	LSN	BUENOS AIRES, ARG., 30.33 m., Addr. (See 10.300 mc.) Works N.Y.C. evenings.
9.870	WON	LAWRENCEVILLE, N. J., 30.4 m., Addr. A.T.&T. Co. Works England nights.
9.865	COCM	HAVANA, CUBA, 30.41 m., Addr. Transradio Columbia, P. O. Box 33. 7 am.-12 m. Relays CMCM.
9.860	EAQ	MADRID, SPAIN, 30.43 m., Addr. Post Office Box 951. Irregular.
9.830	IRF	ROME, ITALY, 30.52 m. Works Egypt afternoons. Relays 2RO. 6-9 pm.
9.800	LSI	BUENOS AIRES, ARG., 30.61 m., Addr. (See 10.350 mc.) Tests irregularly.
9.790	GCW	RUGBY, ENGLAND, 30.64 m., Works N.Y.C. evenings.
9.760	VLZ-VLK	SYDNEY, AUSTRALIA, 30.74 m., Addr. Amalgamated Wireless of Australasia Ltd. Works Java and New Zealand early morning.
9.750	WOF	LAWRENCEVILLE, N. J., 30.77 m., Addr. A.T.&T. Co. Works London and Paris night time.
9.745	COCQ	HAVANA, CUBA, 30.78 m. Addr. 25 No. 445, Vedado, Havana. 6.55 am.-1 am. Sun. till 12 m.
9.710	GCA	RUGBY, ENGLAND, 30.9 m. Works S. A. evenings.
9.698	TI4NRH	HEREDIA, COSTA RICA, 30.91 m., Addr. Amando C. Marin, Apartado 40. Sun. 7-8.30 am. Daily 9-10 pm.
9.685	TGWA	GUATEMALA CITY, GUAT., 30.96 m. Irregular.
9.680	FZF6	FORT DE FRANCE, MARTINIQUE, 30.97 m., Addr. P. O. Box 136. 11.30 am.-12.30 pm., 6.15-7.50 pm.
9.675	DZA	ZEESEN, GERMANY, 31.01 m., Addr. (See 10.042 mc.) Irregular.
9.660	LRX	BUENOS AIRES, ARG., 31.06 m., Addr. El Mundo. Relays LR1, 9.30 am.-11.30 pm.
9.650	CS2WA	LISBON, PORTUGAL, 31.09 m., Addr. Radio Colonial. Tues., Thurs. and Sat. 4.30-7 pm.
9.650	DGU	NAUEN, GERMANY, 31.09 m., Addr. (See 20.020 mc.) Works Egypt afternoons.
9.645	HH3W	PORT-AU-PRINCE, HAITI, 31.1 m., Addr. P. O. Box A117. 1-2, 7-8 pm.
9.640	CXAB	COLONIA, URUGUAY, 31.12 m., Addr. Belgrano 1841, Buenos Aires, Argentina. Relays LR3, Buenos Aires 7 am.-12 m.
9.635	2RO	ROME, ITALY, 31.13 m., Addr. (See 11.810 mc.) Daily 12.30-9 pm.
9.630	HJ7ABD	BUCARAMANGA, COL., 31.14 m. 10 am.-12 n., 4-11 pm.
9.625	JFO	TAIHOKU, TAIWAN, 31.16 m. Relays JFAK irreg. 4-10 am.

(Continued on page 90)

All Schedules Eastern Standard Time

HINTS for the FACSIMILE Experimenter



Finch home-type facsimile receiver. The motor causes the stylus arm to sweep across the paper, line by line, and record the image. After each sweep the paper moves up a line automatically.

● FACSIMILE pictures are being broadcast between midnight and six a.m. in various sections of the country by some of our leading broadcast stations. While the receiving apparatus for reconstructing the facsimile pictures is not being sold to the public just yet, many experimenters no doubt would like to try their skill at picking up some of these images.

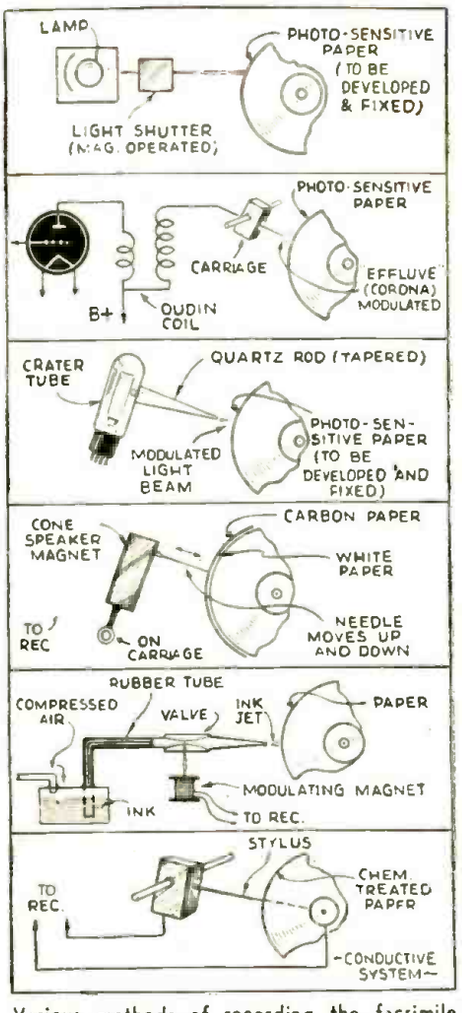
The accompanying pictures and explanations will help the experimenter who possesses a little ingenuity of his own and who may have a phonograph or other apparatus which can be pressed into service for the purpose.

As explained in the last issue, in the article on facsimile, the Finch system of recording the image utilizes a dry chemically-treated paper, through which an electric current is passed to cause a line to be registered. As the various lights and shadows are traversed by the photo-electric cell at the transmitter line by line, the modulated current in the Finch receiver causes the recorded line to vary in width. With 100 lines to the inch it is easy to see that a very excellent facsimile reproduction of a drawing or photo can thus be reproduced. One of the older methods of causing fluctuations in the voltage of the recording current was to use a moist chemically-treated paper such as litmus. The trouble with the moist paper method is that the lines tend to spread and merge into one another and the sharpness of the image is thus spoiled.

One of the simplest modern methods of recording the facsimile message is that used in the RCA system; here the vibrating stylus needle is caused to press with more or less strength against a piece of paper backed up with a carbon sheet. When the signal is strong a darker impression is left from the carbon paper and when the signal is weaker, only a slight impression is left on the paper.

One of the accompanying drawings shows several methods which have been tried and which may whet the appetite of the experimenter to the extent that he may like to try some of them.

The A.T.&T.Co. system of recording facsimile images utilizes a piece of photo-sensitive paper. A delicate magnetically-operated light shutter or "light valve," is placed in the path of a light beam from an ordinary projection lamp. As the fluctuating facsimile current is received, the light shutter opens and closes and causes a line of fluctuating width to be recorded on the photo-sensitive paper. Either the cylinder on which the photo paper is wrapped, or else the light shutter and its projection lamp element may be moved so that as many as 100 lines to the inch are traversed. In any event, the speed of the revolving cylinder or moving paper strip must be kept in perfect step with that at the transmitter.

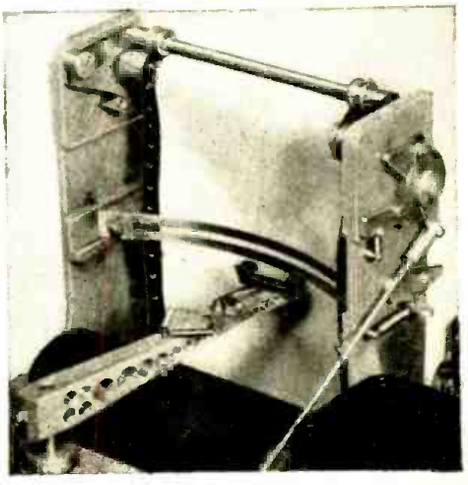


Various methods of recording the facsimile image are illustrated above. The final one, the conductive system, is employed by Finch. RCA uses the carbon-paper method.

About ten years ago there were several thousand facsimile machines built and interesting demonstrations given of a picture transmission system in which the image was recorded on photo-sensitive paper by modulating a high frequency corona (spark) discharge. One of the diagrams herewith shows how fluctuations in the grid and plate currents of the last stage of a radio receiver caused the high frequency discharge from an Oudin coil to be modulated. The apparatus was adjusted so that the effluvia or corona glow discharge from the end of a needle on the moving carriage, caused a line of varying width to be recorded on the rotating photo-print paper. The travelling carriage with its corona electrode (which was spaced a short distance above the surface of the photo paper) was placed in a small light-proof box. The beauty of this system lies in the fact that the Oudin coil discharge is unipolar in character and proceeds to discharge from the single wire as the diagram shows. No return circuit is required and the experimenter does not have to worry about moist paper and blurred images. The new dry processed (chemically-treated) paper such as used in the Finch system, is not yet available to the public. With this paper a regular conductive system such as shown in one of the accompanying dia-

(Continued on page 111)

Close-up of the Finch recording head. Note the curved guide over which the stylus arm sweeps. The stylus holder is shown turned sidewise. The paper rests against a curved backplate.



Mc.	Call	
9.617	HJIABP	CARTAGENA, COL., 31.20 m., Addr. P. O. Box 37. 11 am.-1 pm., 5-11 pm., Sun. 10 am.-1 pm., 3-6 pm.
9.615	ZRK	KLIPHEUVAL, SOUTH AFRICA, 31.2 m., Addr. P. O. Box 4559, Johannesburg. Daily, exc. Sat. 11.45 pm.-12.40 am. Daily exc. Sun. 3.20-7.20, 9-11.40 am., Sun. 4-5.30, 8-11.40 am.
9.607	HP5J	PANAMA CITY, PANAMA, 31.23 m. Addr. Apartado 867. 12 n. to 1.30 pm., 6-10.30 pm.

31 Met. Broadcast Band

9.600	RAN	MOSCOW, U.S.S.R., 31.25 m. Daily 7-9.15 pm.
9.595	H8L	GENEVA, SWITZERLAND, 31.27 m., Addr. Radio Nations. Irregular.
9.590	VUD2	DELHI, INDIA, 31.28 m. Addr. All-India Radio. 8.30-10.30 pm., 1.30-3.30 am.
9.590	PCJ	HUIZEN, HOLLAND, 31.28 m., Addr. (See 15.220 mc.) Sun. 2-3, 7.15-9.25 pm., Mon. 8.15-9.45 pm., Tues. 1.45-2.40, 7-10.15 pm., Wed. 7.15-8.15 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, 9.30-11.30 am.
9.590	W3XAU	PHILADELPHIA, PA., 31.28 m. Relays WCAU 11 am.-7 pm., 10-11 pm.
9.580	GSC	DAVENTRY, ENGLAND, 31.32 m., Addr. B. B. C., Portland Pl., London, W. 1, 9.20-11.20 pm.
9.580	VLR	MELBOURNE, AUSTRALIA, 31.32 m., Addr. Box 1686, G. P. O. Daily 3.30-8.30 am. (Sat. till 9 am.) Sun. 3-7.30 am. Daily exc. Sat. 9.35 pm.-2.15 am.
9.580	OAX5C	ICA, PERU, 31.32 m. Radio Universal 6-10 pm.
9.570	KZRM	MANILA, P. I., 31.35 m., Addr. Erlanger & Galinger, Box 283. 4.30-6 pm., 5-9 am., Sun 4-10 am.
9.570	WIXK	SPRINGFIELD, MASS., 31.35 m., Addr. Westinghouse Electric & Mfg. Co. Relays WBZ 6 am. to 12 m. Sun. 7 am.-12 m.
9.570	TPBII	PARIS, FRANCE, 31.35 m. Addr. (See 15.245 mc.) 1-3 am., 10.15 am.-5 pm.
9.560	DJA	BERLIN, GERMANY, 31.38 m., Addr. Broadcasting House. 12.05-11 am., 4.50-10.45 pm.
9.550	W2XAD	SCHENECTADY, N. Y., 31.41 m., General Electric Co., 7.30 pm.-12 m.
9.550	OLR3A	PRAGUE, CZECHOSLOVAKIA, 31.41 m. (See 11.840 mc.) 12.55-4.40 pm.
9.550	XEFT	VERA CRUZ, MEX., 31.41 m. 11.30 am.-4 pm., 7 pm.-12 m.
9.550	YDB	SOERABAJA, JAVA, 31.41 m., Addr. N.I.R.O.M. Daily exc. Sat. 6-7.30 pm., 5.30 to 10 am. Sat. 5.30-11.30 am.
9.540	DJN	BERLIN, GERMANY, 31.45 m., Addr. (See 9.560 mc.) 12.05-10 am., 4.50-10.45 pm.
9,540	VPD2	SUVA, FIJI ISLANDS, 31.45 m., Addr. Amalgamated Wireless of Australasia, Ltd. 5.30-7 am.
9.535	JZI	TOKYO, JAPAN, 31.46 m., Addr. (See 11.800, JZJ) 12.30-1.30 am., 2.30-4, 4.30-5.30 pm.
9.535	HB9D	ZURICH, SWITZERLAND, 31.46 m., Addr. Radio Club of Zurich, Post Box Zurich 2. Sun. 9-11 am., Thur. 1-3 pm.
9.530	W2XAF	SCHENECTADY, N. Y., 31.48 m., Addr. General Electric Co. 4 pm.-12 m.
9.526	XEDQ	GUADALAJARA, GAL., MEXICO, 31.49 m. Irregular 7.30 pm. to 12.30 am.
9.525	ZBW3	HONGKONG, CHINA, 31.49 m., Addr. P. O. Box 200. 11.30 pm. to 1 am., 3-10 am.
9.525	LKJI	JELOY, NORWAY, 31.49 m. 5-8 am.
9.523	ZRH	ROBERTS HEIGHTS, S. AFRICA. 31.5 m., Addr. (See ZRK, 9.606 mc.) Daily exc. Sat. 11.45 pm.-12.45 am.; Daily exc. Sun. 5-7.30 am.; Sun. 3 or 3.30 to 4.30 or 5 am.
9.520	HJ6ABH	ARMENIA, COLOMBIA, 31.51 m. 8-11 am., 6-10 pm.
9.520	OZF	SKAMLEBOAEK, DENMARK, 31.51 m., Addr. Statsradiofonien, Copenhagen., 2-6.40 pm.
9.520	YSH	SAN SALVADOR, EL SALVADOR 31.51 m., Addr. (See 7.894 mc.) Irregular 6-10 pm.
9.510	GSB	DAVENTRY, ENGLAND, 31.55 m., Addr. (See 9.580 mc.—GSC) 12 m.-2.15 am., 12.20-6 pm., 9.20-11.20 pm.
9.510	HJU	BUENAVENTURA, COLOMBIA, 31.55 m., Addr. National Railways. Mon., Wed. and Fri. 8-11 pm.
9.500	VK3ME	MELBOURNE, AUSTRALIA, 31.58 m., Addr. Amalgamated Wireless of Australasia, 167 Queen St. Daily except Sun. 4-7 am.
9.500	XEWW	MEXICO CITY, MEX., 31.58 m. Addr. Apart. 2516. Relays XEW. 6 pm.-12 m.
9.500	HS8PJ	BANGKOK, SIAM, 31.58 m. Thursday, 8-10 am.
9.500	PRF5	RIO DE JANEIRO, BRAZ., 31.58 m. Irregularly 4.45 to 5.45 pm.
9.488	EAR	MADRID, SPAIN, 31.6 m., Addr. (See 9.860 mc.) 7.30-8.30 pm. Mon., Tues., Thur., Sat. at 9.30 pm. also.

End of Broadcast Band

9.460	ICK	TRIPOLI, N. AFRICA, 31.71 m. Works Rome, 5.30-7 am.
9.445	HCODA	GUAYAQUIL, ECUADOR, 31.77 m. Irregularly till 10.40 pm.
9.428	COCH	HAVANA, CUBA, 31.8 m., Addr. 2 B St., Vedado. 7 am.-1 am.
9.415	PLV	BANDOENG, JAVA, 31.87 m. Works Holland 5.30-9 am.
9.380	—	TANANARIVE, MADAGASCAR, 31.48 m., Addr. Le Directeur des PTT, Radio Tananarive, Administration PTT. 12.30-12.45, 3.30-4.30, 10.11 am.
9.355	HCIETC	QUITO, ECUADOR, 32.05 m., Addr. Teatro Bolivar, Thurs. until 9:30 p.m.
9.345	HBL	GENEVA, SWITZERLAND, 32.08 m., Addr. Radio Nations Fri. 7:15-8:30 p.m., 6:45-8 p.m.
9.330	CGA4	DRUMMONDVILLE, CANADA, 32.15 m. Works England irreg.
9.330	OAX4J	LIMA, PERU, 32.15 m., Addr. Box 1166, "Radio Universal." 12 n.-3 pm., 5 pm.-1 am.
9.290	HIG	CIUDAD TRUJILLO, D. R., 32.29 m. 7.10-8.40 am., 11.40 am.-2.10 pm., 3.40-8.40 pm.
9.280	HC2CW	GUAYAQUIL, ECUADOR, 32.31 m., 11.30 am.-12.30 p.m., 8-11 pm.
9.280	GCB	RUGBY, ENGLAND, 32.33 m. Works Canada and Egypt evenings and afternoons.
9.200	COBX	HAVANA, CUBA, 32.59 m. Addr. San Miguel 194, Altos. Relays CMBX 7 am.-12 m.
9.180	ZSR	KLIPHEUVEL, SOUTH AFRICA, 32.66 m. Phones London late afternoon.
9.170	WNA	LAWRENCEVILLE, N. J., 32.72 m. Works England evenings.
9.150	YVR	MARACAY, VENEZUELA, 32.79 m. Works with Europe afternoons.
9.125	HAT4	BUDAPEST, HUNGARY, 32.88 m., Addr. "Radiolabor," Gyali-ut 22. Sun. and Wed. 7-8 pm., Sat. 6-7 pm.
9.120	YCP	BALIKPAPAN, DUTCH BORNEO. 32.88 m. Phones Bandoeng 5.30-7.30 am.
9.100	COCA	HAVANA, CUBA, 32.95 m., Addr. Galiano No. 102. Relays CMCA 9 am.-12 m.
9.060	TFK	REYKJAVIK, ICELAND, 33.11 m. Works London afternoons.
9.030	TYA2	PARIS, FRANCE. 33.2 m. Works TPZ2 near 2 am. and 4-5 pm.
9.020	COBZ	HAVANA, CUBA, 33.26 m., Radio Salas Addr. P. O. Box 866, 7:45 am.-12.10 am. Irreg. 12.30-2 am. Relays CMBZ.
9.020	GCS	RUGBY, ENG., 33.26 m. Works N. Y. C. evenings.
9.010	KEJ	BOLINAS, CAL., 33.3 m. Relays NBC and CBS programs in evening irregularly.
8.967	VWY	KIRKEE, INDIA, 33.43 m. Works with England 1.30-3 am.
8.965	COKG	SANTIAGO, CUBA, 33.44 m. Addr. Box 137. 9-10 am., 11.30 am.-1.30 pm., 3-4.30, 5-6, 10-11 pm., 12 m.-2 am.
8.960	TPZ2	ALGIERS, ALGERIA, 33.48 m. Works TYA2, near 2 am. and 4-5 pm.
8.841	HCJB	QUITO, ECUADOR, 33.5 m. 7-8.30 am., 11.45 am.-2.30 pm., 5-10 pm., except Mon. Sun. 12 n.-1.30 pm., 5.30-10 pm.
8.840	ZM8J	S.S. AWATEA, 33.92 m. Steamer out of New Zealand. Saturday at 11 pm. Phones Australia early am. irregularly.
8.775	PNI	MAKASSER, CELEBES, N.E.I., 34.19 m. Works Java around 4 am.
8.765	DAF	NORDDEICH, GERMANY, 34.23 m. Works German ships irregularly.
8.760	GCQ	RUGBY, ENG., 34.25 m. Works Africa afternoons.
8.730	GCI	RUGBY, ENG., 34.36 m. Works India 8 am.
8.700	HKV	BOGOTA, COLOMBIA, 34.46 m. Tues. and Fri. 7-7.20 pm.
8.860	GBC	RUGBY, ENG., 34.56 m. Works ships irregularly.
8.665	COJK	CAMAGUEY, CUBA, 34.64 m., Addr. Finlay No. 3 Altos. 5.30-6.30, 8-11 pm., daily except Sat. and Sun.
8.665	W2XGB	HICKSVILLE, N. Y., 34.64 m., Addr. Press Wireless, Mon. to Fri. News at 9 am. and 5 pm.
8.580	YNPR	MANAGUA, NICARAGUA, 34.92 m. Radiodifusora Pilot.
8.560	WOO	OCEAN GATE, N. J., 35.05 m. Works ships irregularly.
8.380	IAC	PISA, ITALY, 35.8 m. Works Italian ships irregularly.
8.185	PSK	RIO DE JANEIRO, BRAZIL, 36.65 m. Irregularly.
8.036	CNR	RABAT, MOROCCO, 37.33 m. Works Paris irreg. in afternoons.
7.901	LSL	BUENOS AIRES, ARGENTINA, 37.97 m. Works Brazil at night.
7.894	YSD	SAN SALVADOR, EL SALVADOR, 37.99 m., Addr. Dir. Genl. Tel. & Tel. 7-11 pm.
7.870	HCIRB	QUITO, ECUADOR, 38.1 m. La Voz de Quito. 9-11 pm.
7.860	SUX	ABOU ZABAL, EGYPT, 38.17 m. Works with Europe, 4-6 pm.
7.854	HC2JSB	GUAYAQUIL, ECUADOR, 38.2 m. Evenings to 11 pm.
7.797	HBP	GENEVA, SWITZERLAND, 38.48 m., Addr. Radio-Nations. Sat. 5.30-6.30 pm.
7.780	PSZ	RIO DE JANEIRO, BRAZIL. 38.54 m. Phones 6-11 pm. irregularly.
7.715	KEE	BOLINAS, CAL., 38.89 m. Relays NBC and CBS programs in evening irregularly.
7.680	YBZ	MENADO, CELEBES, N.E.I. 39.04 m. Phones PNI and Bandoeng, 5.30-7 am.
7.626	RIM	TACHKENT, U.S.S.R., 39.34 m. Works with Moscow in early morning.
7.610	KWX	DIXON, CAL., 39.42 m. Works with Hawaii, Philippines, Java and Japan, nights.
7.560	FZE9	DJIBOUTI, FRENCH SOMALILAND. 39.66 m. Phones Paris early am.
7.540	RKI	MOSCOW, U.S.S.R., 39.76 m. Relays RAN 7-9.15 pm. Works RIM early am.
7.520	KKH	KAHUKU, HAWAII, 39.87 m. Works with Dixon and broadcasts irregularly nights.
7.510	JVP	NAZAKI, JAPAN, 39.95 m. Irreg.
7.410	HCJB4	QUITO, ECUADOR, 40.46 m., 7-9.30 pm. irregularly.
7.390	ZLT2	WELLINGTON, N. Z., 40.6 m. Works with VLZ near 4 am.
7.380	XECR	MEXICO CITY, MEX., 40.65 m., Addr. Foreign Office. Sun. 6-7 pm.
7.220	HKE	BOGOTA, COL., S. A., 41.55 m. Tues. and Sat. 8-9 pm. Mon. and Thurs. 6.30-7 pm.

(Continued on page 92)

All Schedules Eastern Standard Time

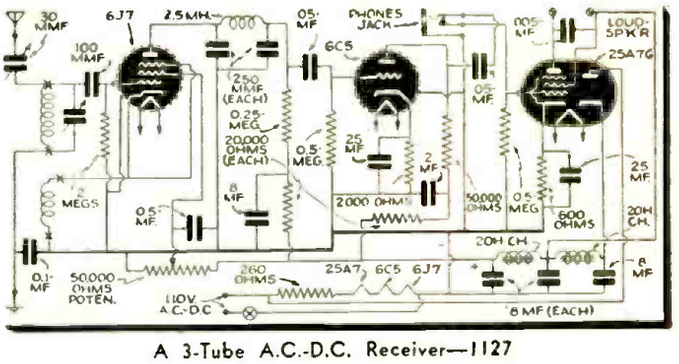
Question Box

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

A.C.-D.C. RECEIVER

I wish to build a 3-tube A.C.-D.C. receiver which will tune from 10 to 550 meters, using 4-prong plug-in coils. Please publish a suitable diagram for this receiver.—C. Norman, Montreal, Can.

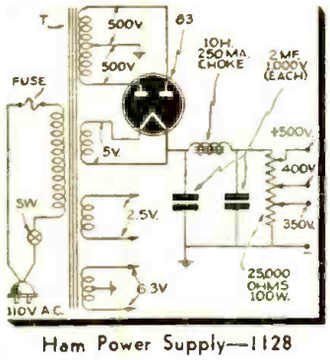
A. A receiver employing a regenerative detector, two stages of audio and a power rectifier should meet your requirements. We have illustrated such a circuit employing a 6J7 as regenerative detector, a 6C5 as first audio and a 25A7G as second audio and rectifier. Regeneration is by means of electron coupling through feedback in the cathode circuit of the detector. A headphone jack is also provided in the output of the first A.F. stage. The impedance of the output transformer for the loudspeaker should be 4500 ohms to properly match to the 25A7G tube.



A 3-Tube A.C.-D.C. Receiver—1127

POWER-SUPPLY FOR HAM TRANSMITTER

I would like to build a power supply for my transmitter, capable of delivering about 500 volts at a drain of 250 ma. Taps should also be available for taking off 400 and 350 volts. There should be separate filament windings of 2.5 and 6.3 volts.—Douglas Hawthorne, Chicago, Ill.



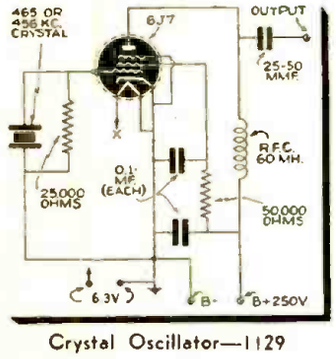
Ham Power Supply—1128

A. The circuit of a suitable power supply is shown using an 83 as a rectifier tube, a single heavy duty choke and two oil-filled paper condensers in the filter. The 25,000 ohm bleeder is equipped with sliders so that the required voltages may be obtained by suitable adjustment with a voltmeter. It is important that the power transformer and choke be capable of handling the desired output current.

RK-42 SET

Will you please publish a diagram of a 1-tube receiver using an RK42 tube?—Katherine York, Kansas City, Mo.

A. We have sketched the circuit you require. Note that the RK42 requires only 1½ volt filament potential with a drain of 60 ma. Ordinary 4-prong plug-in coils may be used with this set. The plate voltage may be anywhere from 45 to 90 volts. The filament supply is a 1½ volt dry cell. The rheostat is necessary to protect the tube's filament when using a new dry cell.



Crystal Oscillator—1129

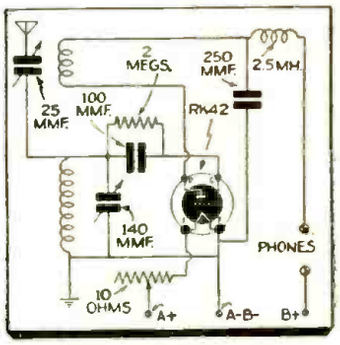
OSCILLATOR

Will you please publish the circuit for a simple R.F. oscillator for aligning the I.F. stages of a superheterodyne receiver. The receiver employs a single signal quartz crystal filter so the oscillator must be quite precise.—Thomas Pickard, Cleveland, Ohio.

A. The diagram of a suitable aligning oscillator is shown. Note it is of the simplest type imaginable as no tuned circuits are employed. The quartz crystal from the receiver is used, insuring the generation of a precise I.F. frequency. There are no tuning adjustments necessary when using the oscillator. Simply install the quartz crystal from the receiver, turn the unit on and it will automatically oscillate at whatever frequency the crystal is ground for. The output is then connected to the grid of the first detector of the receiver and the alignment is carried out by means of an output meter, magic eye tube or R meter built into the set.

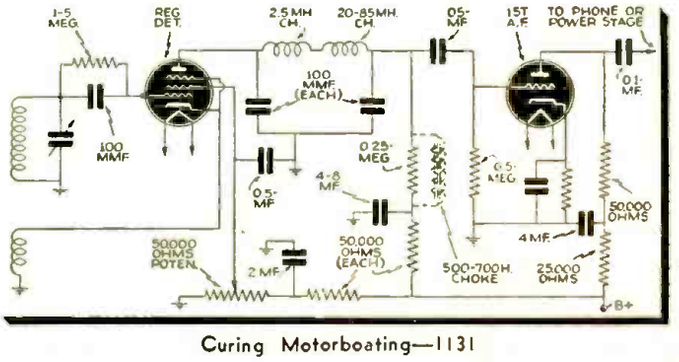
CURING INSTABILITY

In operating my regenerative short-wave receiver, several troubles are apparent. First of all the receiver frequently motorboats, and secondly when I bring the detector up to the regeneration point a severe howling is heard. What can I do about this?—Aaron O'Brien, New York.



1 Tube RK42 Set—1130

A. We have prepared a special diagram showing some of the steps which may be taken to eliminate trouble of this kind. Motor-boating is generally caused by insufficient decoupling in the plate circuits of the audio and detector stages of a receiver. The use of a decoupling resistance and a by-pass condenser of suitable size will almost invariably cure motor-boating. Note that in the plate of the detector and A.F. stage decoupling resistances and by-pass condensers are shown. In the case of the detector, decoupling may be a 50,000 ohm resistor and a 4-8 mf. by-pass condenser. In the first A.F. stage the decoupling resistor shown has a value of 25,000 ohms and the by-pass condenser a value of 4 mf. Different values of condensers and resistors should be experimented with at these points. The resistance values may range from 5,000 to 75,000 ohms and the by-pass values may range from .5 mf. to 8 mf. Note that the voltage supplied to the screen grid of the detector tube through the 50,000 ohm potentiometer also has a decoupling circuit. This will be found very helpful in reducing the howling tendency when attempting to bring the detector to the oscillation point. The other point to be noted is the use of two different R.F. chokes in the plate of the detector. These should be connected in series. The plate load for the detector may be either a resistor of .25 meg. as shown, or preferably a 700 henry choke as shown by the dotted lines, shunted by the .25 meg. resistor.



Curing Motorboating—1131

Mc.	Call	
7.200	YNAM	MANAGUA, NICARAGUA, 41.67 m. Irregular at 9 pm.
7.177	CR6AA	LOBITA, ANGOLA, PORT. WEST AFRICA. 41.75 m., Wednesday and Saturday 2.45-4.30 pm.
7.100	FO8AA	PAPEETE, TAHITI, 42.25 m., Addr. Radio Club Oceanien. Tues. and Fri. 11 pm.-12.30 am.
7.100	—	GUADALAJARA, JALISCO, MEX., 42.25 m., Addr. Madero 210, La Radiodifusora del Pueblo. 9-11 pm.
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.
6.980	KZGG	CEBU ISLAND, P. I. 42.95 m. Phones Manila near 4 am.
6.977	XBA	TACUBAYA, D. F., MEX., 43 m. 9.30 am.-1 pm., 7-8.30 pm.
6.905	GDS	RUGBY, ENG., 43.45 m. Works N.Y.C. evenings irregularly.
6.860	KEL	BOLINAS, CALIF., 43.70 m. Tests irregularly, 11 am.12 n., 6-9 pm.
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, DUTCH GUIANA, 44.16 m., Addr. P. O. Box 18. Daily 6.06-8.36 am., Sun. 9.36-11.36 am. Daily 5.36-8.36 pm.
6.775	HIH	SAN PEDRO DE MACORIS, DOM. REP., 44.26 m. 12.10-1.40 pm., 7:30-9 pm. Sun. 3-4 am., 4.15-6 pm., 4.40-7.40 pm.
6.755	WOA	LAWRENCEVILLE, N. J., 44.41 m., Addr. A.T.&T. Co. Works Eng. evenings.
6.750	JVT	NAZAKI, JAPAN, 44.44 m., Addr. Kokusai-Denwa Kaisha, Ltd., Tokyo. Irregular.
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 NIROM programs. 5.30-9 am.
6.690	TIEP	SAN JOSE, COSTA RICA, 44.82 m., Addr. Apartado 257, La Voz del Tropico. Daily 7-10 pm.
6.672	—	—— 44.94 m., relays Salamanca, Spain, evenings.
6.672	YVQ	MARACAY, VENEZUELA, 44.95 m. Irregular.
6.650	IAC	PISA, ITALY, 45.11 m. Works ships irregularly.
6.635	HC2RL	GUAYAQUIL, ECUADOR, S. A., 45.18 m., Addr. P. O. Box 759. Sun. 5.45-7.45 pm., Tues. 9.15-11.15 pm.
6.630	HIT	CIUDAD TRUJILLO, D. R., 45.25 m., Addr. "La Voz de la RCA Victor," Apartado 1105. Daily exc. Sun. 12.10-1.40 pm., 5.40-8.40 pm.; also Sat. 10.40 pm.-12.40 am.
6.625	PRADO	RIOBAMBA, ECUADOR, 45.28 m. Thurs. 9-11.45 pm.
6.558	HI4D	CIUDAD TRUJILLO, D. R., 45.74 m. Except Sun. 11.55 am.-1.40 pm.
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.
6.545	YV6RB	BOLIVAR, VENEZUELA, 45.84 m., Addr. "Ecos de Orinoco." 6-10.30 pm.
6.520	YV4RB	VALENCIA, VENEZUELA, 45.98 m. 11 am.-2 pm., 5-10 pm.
6.516	YNIGG	MANAGUA, NICARAGUA, 46.02 m., Addr. "La Voz de los Lagos." 8-9 pm.
6.500	HIL	CIUDAD TRUJILLO, D. R., 46.13 m. Addr. Apartado 623. 12.10-1.40 pm., 5.40-7.40 pm.
6.490	HIIL	SANTIAGO DE LOS CABALLEROS, D. R., 46.2 m., Addr. Pres., Trujillo 97, Altos., 5.40-7 pm.
6.470	YNLAT	GRANADA, NICARAGUA, 46.36 m., Addr. Leonidas Tenoria, "La Voz del Mombacho." Irregular.
6.465	YV3RD	BARQUISIMETO, VENEZUELA, 46.37 m. Radio Barquisimeto, irregular.
6.450	HI4V	SAN FRANCISCO DE MACORIS, D. R., 46.48 m. 11.40 am.-1.40 pm., 5.10-9.40 pm.
6.440	TGQA	QUEZALTENANGO, GUATEMALA, 46.56 m. Mon.-Fri. 9-11 pm., Sat. 9 pm.-1 am., Sun. 1-3 pm.
6.420	HIIS	SANTIAGO, D. R., 46.73 m. 11.40 am.-1.40 pm., 5.40-7.40, 9.40-11.40 pm.
6.416	YV6RC	BOLIVAR, VENEZUELA, 46.73 m. Radio Bolivar.
6.410	TIPG	SAN JOSE, COSTA RICA, 46.8 m., Addr. Apartado 225, "La Voz de la Victor." 12 n.-2 pm., 6-11.30 pm.
6.400	YVSRH	CARACAS, VENEZUELA, 46.88 m. 7-11 pm.
6.388	HI8J	LAS VEGAS, D. R., 46.92 m., Irreg.
6.384	VP2LO	STE. KITTS, B.W.I. 46.96 m. ICA Service Labs, Box 88, Daily 4-4.45 pm., Sun 10-10.45 am. and irreg. at other times.
6.380	YVSRF	CARACAS, VENEZUELA, 46.92 m., Addr. Box 983. 6-10.30 pm.
6.370	TI8WS	PUNTARENAS, COSTA RICA, 47.07 m., Addr. "Ecos Del Pacifico", P. O. Box 75. 6 pm.-12 m.
6.365	YVIRH	MARACAIBO, VENEZUELA, 47.18 m., Addr. "Ondas Del Lago," Apartado de Correos 261. 6-7.30 am., 11 am.-2 pm., 5-11 pm.
6.360	HRPI	SAN PEDRO SULA, HONDURAS, 47.19 m. 7.30-9.30 pm.
6.350	JZG	NAZAKI, JAPAN, 47.22 m. Relays Tokyo 5-7.30 am. irreg. Phones ships early am.
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 de las Antillas, P. O. Box 130. 6.55 am.-1 am. Sun. 10 am.-10 pm.
6.310	HIZ	CIUDAD TRUJILLO, D. R., 47.52 m. Daily except Sat. and Sun. 11.10 am.-2.25 pm., 5.10-8.40 pm. Sat. 5.10-11.10 pm. Sun. 11.40 am.-1.40 pm.
6.300	YV4RD	MARACAY, VENEZUELA, 47.62 m. 6.30-9.30 pm. exc. Sun.
6.295	OAX4G	LIMA, PERU, 47.63 m., Addr. Apartado 1242. Daily 7-10.30 pm.
6.290	HIG	TRUJILLO CITY, D. R., 47.67 m. 7.10-8.40 am., 11.40 am.-2.10 pm., 3.40-8.40 pm.
6.280	COH8	SANCTI SPIRITUS, CUBA, 47.77 m., Addr. P. O. Box 85. 9-11.30 am., 12.30-1.30, 4-7, 8-11 pm.
6.270	YV5RP	CARACAS, VENEZUELA, 47.79 m., Addr. "La Voz de la Philco." Daily to 10.30 pm.
6.255	YV5RJ	CARACAS, VENEZUELA, 47.18 m.
6.243	HIN	CIUDAD TRUJILLO, D. R., 48 m., Addr. "La Voz del Partido Dominicano." 12 n.-2 pm., 6-10 pm.
6.235	HRD	LA CEIBA, HONDURAS, 48.12 m., Addr. "La Voz de Atlantida." 8-11 pm.; Sat. 8 pm.-1 am.; Sun. 4-6 pm.
6.225	YVIRG	VALERA, VENEZUELA, 48.15 m. 6-9.30 pm.
6.220	——	SAIGON, INDO-CHINA, 48.2 m., Addr. Radio Philco. 4.30 or 5.30-9.30 am.
6.210	TG2	GUATEMALA CITY, GUAT., 48.28 m., Addr. Dir. Genl. of Electr. Commun. Relays TGI Mon.-Fri. 6-11 pm., Sat. 6 pm.-1 am. Sun. 7-11 am., 3-8 pm.
6.205	YV5RI	CORO, VENEZUELA, 48.32 m., Addr. Roger Leyba, care A. Urbina y Cia. Irregular.
6.200	HI8Q	CIUDAD TRUJILLO, D. R., 48.36 m. Irregular.
6.200	ZGE	KUALA LUMPUR, FED. MALAY ST., 48.36 m. Sun., Tue. and Fri. 6.40-8.40 am.
6.185	HIIA	SANTIAGO, D. R., 48.5 m., Addr. P. O. Box 423, 7 am.-5 pm.
6.171	XEXA	MEXICO CITY, MEX., 48.61 m., Addr. Dept. of Education. 7-11 pm.
6.156	YV5RD	CARACAS, VENEZUELA, 48.71 m. 11 am.-2 pm., 4-10.40 pm.
6.153	HI5N	MOCA CITY, D. R., 48.75 m. 6.40-9.10 pm.

49 Met. Broadcast Band

Mc.	Call	
6.150	ZRD	DURBAN, SOUTH AFRICA, 48.78 m., Addr. (See ZRK, 9.606 mc.) Daily exc. Sat. 11.45 pm.-12.45 am.; Daily exc. Sun. 3.30-7.30 am., 9 am.-3.45 pm.; Sun. 8-11.30 am., 12 n.-3.20 pm.
6.150	CJRO	WINNIPEG, MAN., CANADA, 48.78 m., Addr. (See 11.720 mc.) Daily 6 pm.-12 m., Sun. 5-10 pm.
6.150	ZPI4	VILLARRICA, PARAGUAY, 48.75 m. 5-6 pm.
6.147	ZE8	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.
6.145	HJ4ABE	MEDELLIN, COL., 48.79 m. 11 am.-12 n., 6-10.30 pm.
6.140	W8XK	PITTSBURGH, PA., 48.86 m., Addr. Westinghouse Electric & Mfg. Co. Relays KDKA 11 pm.-12 m.
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.
6.130	VP3BG	GEORGETOWN, BRIT. GUIANA. 48.94 m. From 5 pm. on.
6.130	COCD	HAVANA, CUBA, 48.94 m., Addr. Box 2294. Relays CMCD 7 am.-1 am.
6.130	VE9HX	HALIFAX, N. S., CAN., 48.94 m., Addr. P. O. Box 998. Mon.-Fri. 7 am.-11.15 pm., Sat. 11 am.-11 pm., Sun. 12 n.-11.15 pm. Relays CHNS.
6.130	LKL	JELOY, NORWAY, 48.94 m. 11 am.-6 pm.
6.125	CXA4	MONTEVIDEO, URUGUAY, 48.98 m., Addr. Radio Electrico de Montevideo., Mercedes 823. 10 am.-12 n., 2-8 pm.
6.122	HP5H	PANAMA CITY, PAN., 49 m., Addr. Box 58. 12 n.-1 pm., 8-10 pm.
6.120	W2XE	NEW YORK CITY, 49.02 m., Addr. Col. B'cast. System, 485 Madison Ave. 10-11 pm.
6.117	XEUZ	MEXICO CITY, MEX., 49.03 m., Addr. 5 de Mayo 21. Relays XEFO 1-3 am.
6.115	HJ3A8X	BOGOTA, COL., 49.05 m., Addr. La Voz de Col., Apartado 2665. 12 n.-2 pm., 5.30-11 pm.; Sun. 6-11 pm.
6.115	OLR2C	PRAGUE, CZECHOSLOVAKIA, 49.05 m. (See 11.740 mc.)
6.110	XEPW	MEXICO CITY, MEX., 49.1 m., Addr. La Voz de Aguila Azteca desde Mex., Apartado 8403. Relays XEJW 11 pm.-1 am.
6.110	VUC	CALCUTTA, INDIA, 49.1 m. Daily 2.06-4.36 am., 7.06 am.-12.06 pm., Sat. 10.06 pm.-2.06 am., Sun. 7.06 am.-12:36 pm.
6.110	VP8	COLOMBO, CEYLON, 49.1 m. Daily 7-9.30 am; Sun. 6.30-9.30 am.
6.108	HJ6A88	MANIZALES, COL., 49.14 m., Addr. P. O. Box 175. Mon.-Fri. 12.15-1 pm.; Tue. and Fri. 7.30-10 pm.; Sun. 2.30-5 pm.
6.100	YUA	BELGRADE, JUGOSLAVIA, 49.18 m. 12.45-2.30, 4-8 am., 1-6 pm.
6.100	W3XAL	BOUND BROOK, N. J., 49.18 m., Addr. Natl. Broad. Co. 8.25 pm.-12 m.
6.100	W9XF	CHICAGO, ILL., 49.18 m., Addr. N.B.C. 4-6.50 pm., 1.05-2 am. Sun. 1-5.50 pm.
6.097	ZRK	KLIPHEUVEL, S. AFRICA, 49.2 m., Daily 12 n.-4 pm., Sun. 12 n.-3.20 pm.
6.097	ZRJ	JOHANNESBURG, S. AFRICA, 49.2 m., Addr. African Broad. Co. Daily exc. Sat. 11.45 pm.-12.40 am.; Daily exc. Sun. 3.15-7.30, 9-11.30 am.
6.095	JZH	TOKYO, JAPAN, 49.22 m., Addr. (See 11.800 mc., JZJ.) Irregular.
6.090	CRCX	TORONTO, CAN., 49.26 m., Addr. Can. Broadcasting Corp. Daily 7.45 am.-5 pm., Sun. 10.30 am.-12 n.
6.090	ZBW2	HONGKONG, CHINA, 49.26 m., Addr. P. O. Box 200. Irregular.
6.085	HJ5ABD	CALI, COLOMBIA, 49.3 m., Addr. La Voz de Valle. 12 n.-1.30 pm., 5.10-9.40 pm.

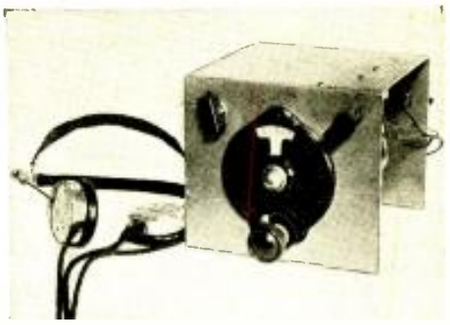
(Continued on page 123)

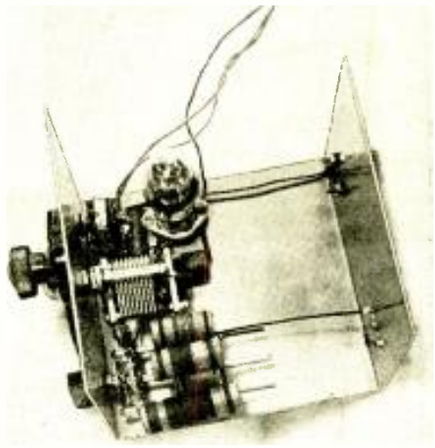
All Schedules Eastern Standard Time

1-Tube Duplex—

A Sure-fire Beginner's Receiver

One tube acts as detector and audio amplifier in this set. Band-switch and dry cell operation are features.





Front and rear of unique 1-tuber.

● SHORT-WAVE receivers for the beginner have generally used plug-in coils rather than a system of coil-switching. The reasons for this were twofold: it was simpler to wire up only a coil socket and where several coils are close together, only one of which is in use, *dead-spots* caused by absorption appear on the tuning control. The latter is the more important. Recently, however, a special coil-shorting switch has been made available to the home constructor. This switch *shorts out* the unused lower frequency coils. When the lowest frequency coil is being used none of the other coils are shorted out. As higher frequency bands are switched in, the lower frequency coils are successively *shorted*, thus reducing absorption effects caused by the lower frequency coils. Around this switch has been built a rather novel one-tube receiver.

1 Tube Does 2 Things

Only one tube is used, but this is a 1E7G, one of the newer 2 volt tubes. This tube is a dual pentode type. One section is used as a *regenerative detector* and the other section as a stage of resistance-coupled *audio amplification*. The detector is the old stand-by. Regeneration is controlled by a 50,000 ohm potentiometer, giving very smooth control.

In order to make construction as simple as possible, the front panel, rear panel and top was made of a single piece of aluminum. This was bent to form a "U" shape as shown in the drawing.

The heart of the receiver is the special band-switch. A three-gang switch was used, switching one side each of the antenna coil, the grid coil and the tickler coil. The three windings of each band are all wound on one form. Three bands are used, giving a wavelength range of 180 meters to 25 meters. Although only one side of each coil is being switched, it is necessary to bring the common or unswitched terminal of each coil back to the switch. A separate terminal is provided on each deck for this connection, enabling the unused lower frequency coils to be *shorted out*. The adjustable stop on the switch should be set for only three positions. All three coils are wound on three-quarter inch bakelite tubing with number 30 d.s.c. wire. With one exception all coils are close wound. The highest frequency grid coil is space-wound to occupy ⅝ inch. The tickler coils are spaced ⅛ inch from the grid coils. The antenna coils are spaced 3/16 inch from the grid coil. Coil sizes and connections are given in Fig. 3. All coils should be wound in the *same* direction.

Three pieces of No. 12 bus-bar were bent in a semi-circular shape and each fastened between the common shorting terminal of each deck and an unused terminal on the deck. The coils are then placed on these buses and the common connections soldered to the bus, drawing these leads taut; the other ends of the coils are soldered to the switch terminals. Perhaps a better method would be to rivet tiny eyelets to the coil form, fastening the coil ends thereto and using small lengths of bus-bar as rigid connectors between the coil and switch.

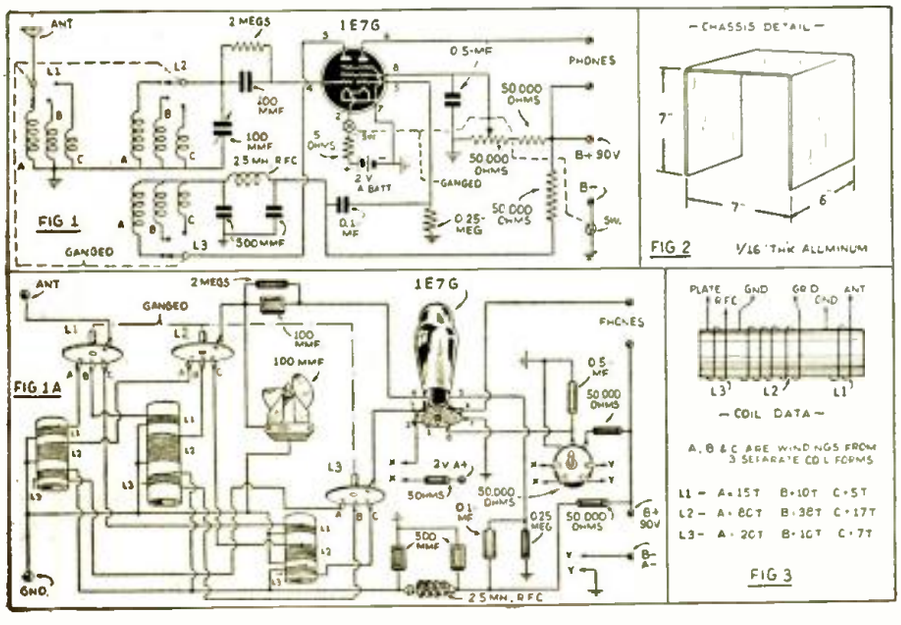
For all-around work, a single-wire antenna about 100 feet long will give the best results. A number of *foreign* broadcasting stations were received with good volume, besides numerous amateur CW-telegraph and phone stations. Careful handling and skill, acquired with just a little practice, should enable anyone to get the same results. Tuning is comparatively simple, there being only one tuning control. The regeneration control in the upper right hand corner has a double-pole switch incorporated in it, thus allowing both "A" and "B" batteries to be disconnected when the receiver is not in use. The regeneration control is advanced in a clockwise direction until a faint plop is heard in the phones. This indicates that the receiver is oscillating. As the tuning control is varied, squeals will be heard, indicating that a station is being tuned in. Turn the regeneration control counter-clockwise slightly so that the detector stops oscillating and the station, if phone, will be heard clearly. If the station is a CW-telegraph station, the detector must be kept oscillating.

Connections to the batteries are by means of flexible leads. There is sufficient space at the back of the receiver to house the "A" and "B" batteries, thus making the receiver quite portable. For optimum results 90 volts of "B" battery should be used, although 45 volts can be used with a little loss in volume.

Although no regular band-spread has been incorporated, the excellent vernier dial provides ease in tuning. As a protection

(Continued on page 112)

Hook-up for 1-tube receiver.



Presenting Herman Yellin in person at the controls of his de luxe superhet receiver. Actual tests have shown that this set delivers the goods, not only for high selectivity and comfortable band-spread, but also for fine DX!

Herman Yellin, W2AJL

The 2AJL

Flexible Design

● IN recent years the amateur bands have become so crowded that it is hopeless to attempt to consistently pull in distant stations with the ordinary type of short-wave receiver. The necessity for a more efficient and effective receiver has given birth to the communications type of receiver. Many such receivers have been described in magazines and numerous others have been offered to the public by radio companies specializing in this field. Lately the writer decided that a new receiver was a necessity, if it was desired to continue amateur operation. Because it was considered more in keeping with amateur traditions to construct one than to buy one ready made, plans were at once started for a communications receiver that would gibe with our own ideas on the subject.

Features of the Receiver

Our model would have a stage of R.F. with provision for using either a doublet antenna or a single wire antenna. The high frequency oscillator would be a 6J7 as an electron coupled oscillator injected into the No. 3 grid of a 6L7 first detector tube. A quartz crystal filter would of necessity be used in the I.F. stage. This then calls for the use of two stages of I.F. and since more gain than is ordinarily available was desired, it was decided to use one iron core transformer, the others being regular air core units. All iron core units would undoubtedly have given enough gain to make the I.F. amplifier too critical. The transformers would be air tuned for greater stability of course. Another *must* is a noise limiter and this was to be of the new simplified type using a single 6H6 tube as second detector, AVC and noise limiter; all in one small envelope. Besides a separate beat frequency oscillator using a 6J7, and a 6C5 first audio, it was decided to use a 6N6 second audio stage. This allows loudspeaker operation on even the weakest signals. Provision was to be made for using either a magnetic speaker or a dynamic speaker. An "R" meter was also incorporated. This operates through the AVC, recording the strength of signals and facilitating the tuning in of phone signals. The receiver was to be mounted on a standard metal chassis 17" x 11" x 3" with a grey rack panel 8¾" high.

As to results, well, it completely came up to our expectations. In the recent ARRL DX contest, despite the terrific interference from American stations, numerous foreign stations were heard and could be easily copied. This is due to the receiver's extreme selectivity and sensitivity. Although no quantitative measurements were made, in the opinion of a number of visitors to the shack, the receiver was the equal, if not the superior of many commercially built communications receivers.

3 Plug-in Coils Handled as a Unit

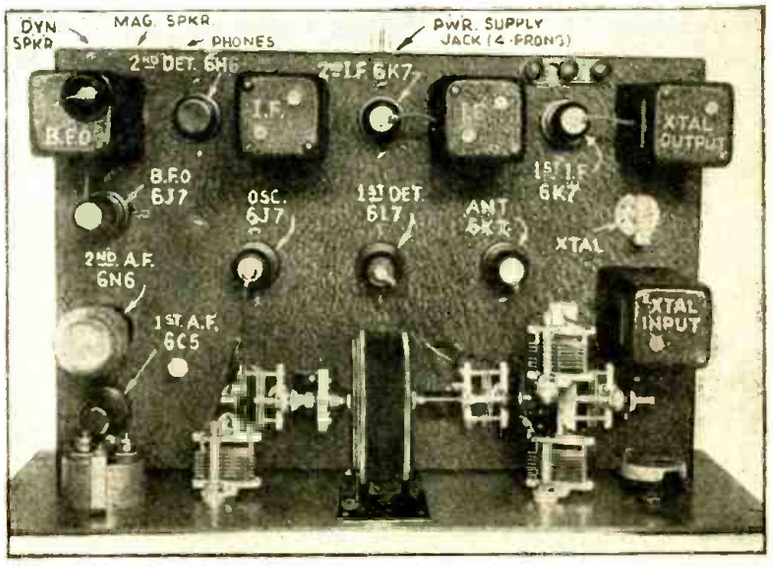
Unquestionably plug-in coils are more efficient than any type of coil switching available to the home constructor. This fact and the remembrance of the length of time necessary to change three coils and replace their shields when changing from one band to another determined the type of coil changing. This was to have the coils plug-in from the front panel and the three coils ganged together so that they could be handled as a unit. A description of this system will be found later on in this article.

The method of band-spreading is not new, having been used many times before. It consists of 100 mmf. band-setting condensers (C2, C8, C32) across each tuning coil and 35 mmf. tuning condensers (C1, C7, C31) across a part of each coil. This provides excellent band spread, the 14 mc. band covering 70 percent of the condenser rotation. The three tuning condensers are ganged and controlled by one vernier dial. The oscillator band-setting condenser is controlled from the panel, while the Detector and R.F. stage band-setting condensers are ganged together. In practice, the oscillator band setter is set so that the desired frequency range can be handled by the main tuning condenser after the R.F. and detector ganged band-setting condensers are brought into resonance with the oscillator control. This is indicated by maximum signal or a maximum rushing noise in the output. A little practice and experience will soon make one quite adept. If the constructor is interested only in the amateur bands and is indifferent to the intervening frequencies, air padding condensers can be placed in each coil. These condensers will replace the band-setting condensers on the panel. They should be set so that each band occupies the center portion of the tuning dial scale with a little extra dial scale at each end of the band. This makes band-changing quite simple and very rapid, besides simplifying construction.

Crystal Filter Optional

Incidentally, if one does not care for a quartz crystal I.F. filter, it can be omitted, at the same time omitting one of the I.F. stages. In this case, it will be well to use all iron core I.F. transformers. For the strictly phone man or the SWL, the receiver

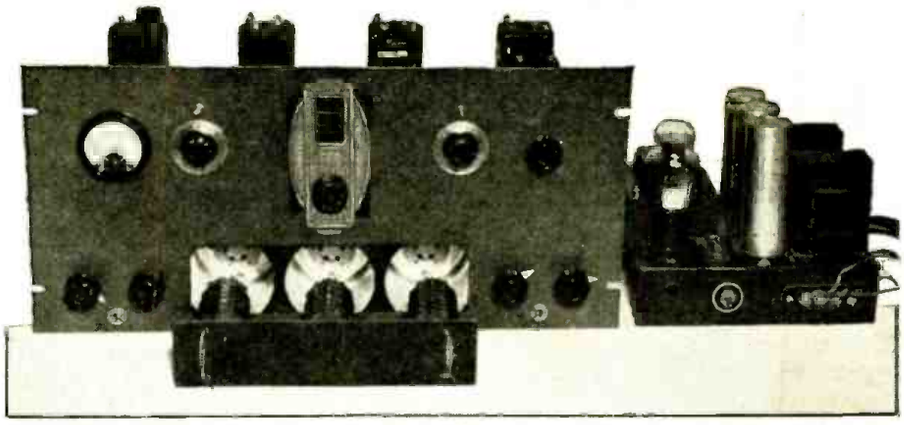
Top view of the superhet receiver with beat frequency oscillator built in.



Fans and Hams alike will be pleased with this very flexible superhet design. It may be built with as low as seven tubes if the beat oscillator and crystal filter are dispensed with.

Superhet Receiver

Permits Building Set with 7 to 9 Tubes



Mr. Yellin's superhet viewed from the front. "R" meter at left and main tuning dial at top center. Ganged plug-in coil is shown about to be placed in position. Power-supply unit appears at extreme right.

could do without the heat-frequency oscillator, although its inclusion will facilitate locating distant stations. More than sufficient volume is available with only the 6C5 audio stage, so if loudspeaker volume is not required the 6N6 can be omitted, too. In fact, most stations can be heard on a small loudspeaker connected in the 6C5 plate circuit. After reading these generalities, the reader will probably be interested in the constructional details.

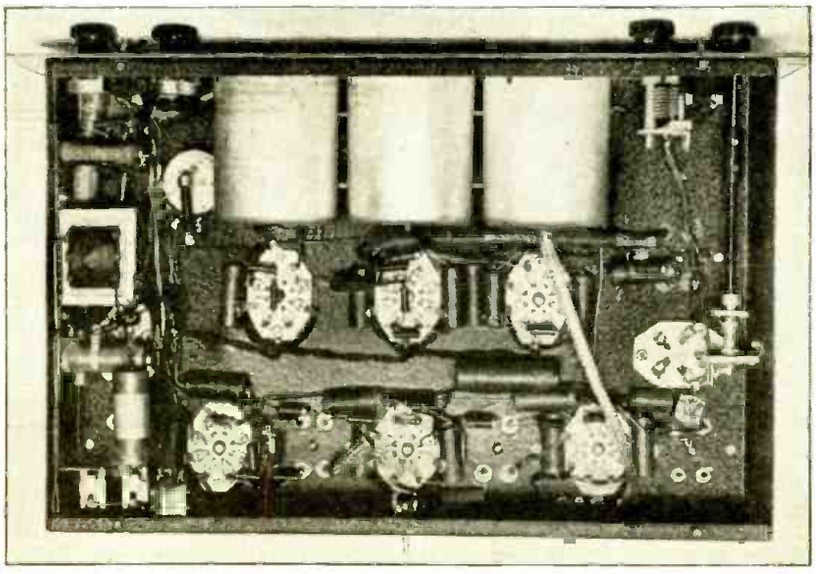
Coil Assembly

To start with, the most important, and probably the most interesting, section is the coil assembly unit. As mentioned before, the R.F. detector and oscillator coils for each frequency range are plugged in simultaneously from the front of the panel. As can be seen in the photos, there are three coil shields, 3¾" high by 3" in diameter, mounted inside the chassis, with their openings at the front of the chassis. On the front of the chassis there are three 2½" holes, behind which these coil shields are mounted. The three shields are bolted together with one-quarter inch spacers between them and the three shield unit mounted on the chassis. This makes a very rigid assembly. A five-prong isolantite socket is mounted inside each shield. Use the 9/16" brass spacers that come with the sockets. The leads from these sockets are passed through small holes drilled in the shields. Use either very small grommets or protect the wire insulation with pieces of spaghetti where it passes through the holes. In order for the coils to be plugged into the coil sockets, it will be necessary to cut a rectangular hole in the panel. This opening should be 2 5/16" by 9". This is not very difficult. First mark out the 9" x 2 5/16" opening, placing it in the lower center of the panel, coinciding, of course, with the 2½" holes in the chassis. Now drill a series of small holes inside the opening so that there is about 1/16" clearance between the holes and the future opening. Using a cold chisel or fine saw cut out this opening along the holes. The final step consists of filing out the surplus metal so that the rectangular opening is of the required size.

The method of fastening the coils to the coil-holder is both simple and effective. Procure some round wooden plugs, 1½" in diameter and about ¾" long. Place one in each completed coil form so that the top of this plug is flush with the top of the coil form. Three small wood screws are used to hold the plug firmly in the coil form. The set of 3 coils is then placed in the coil sockets. The rectangular coil-holder, 9" x 2 5/16", when placed in the panel opening, will just touch the top of the coil plugs. It previously should have been determined approximately where the plugs will touch the coil-holder and then, opposite each coil plug, 3 small holes are drilled in the coil-holder. Now, with the coils in their sockets and the holder placed over the panel opening, small guide holes are drilled in the coil plugs and the coil-holder fastened down to the plugs with small No. 4 wood screws. Either special handles or small round drawer pulls should be placed at each end of the coil-holder. Figure 2 gives the dimensions for the handles used by us. If desired, a small graph chart can be placed on each coil-holder to carry the coil calibration. This gives the receiver quite a professional look.

As can be seen in the photos, the R.F., Detector and high frequency Oscillator tube sockets are mounted right in back of the three coil shields. This makes the coil leads very short, a necessity for successful ten-meter operation. The tuning condensers are ganged together and mounted on the chassis above the coil shields. The shafts

Bottom view of the receiver showing the three coil shields.

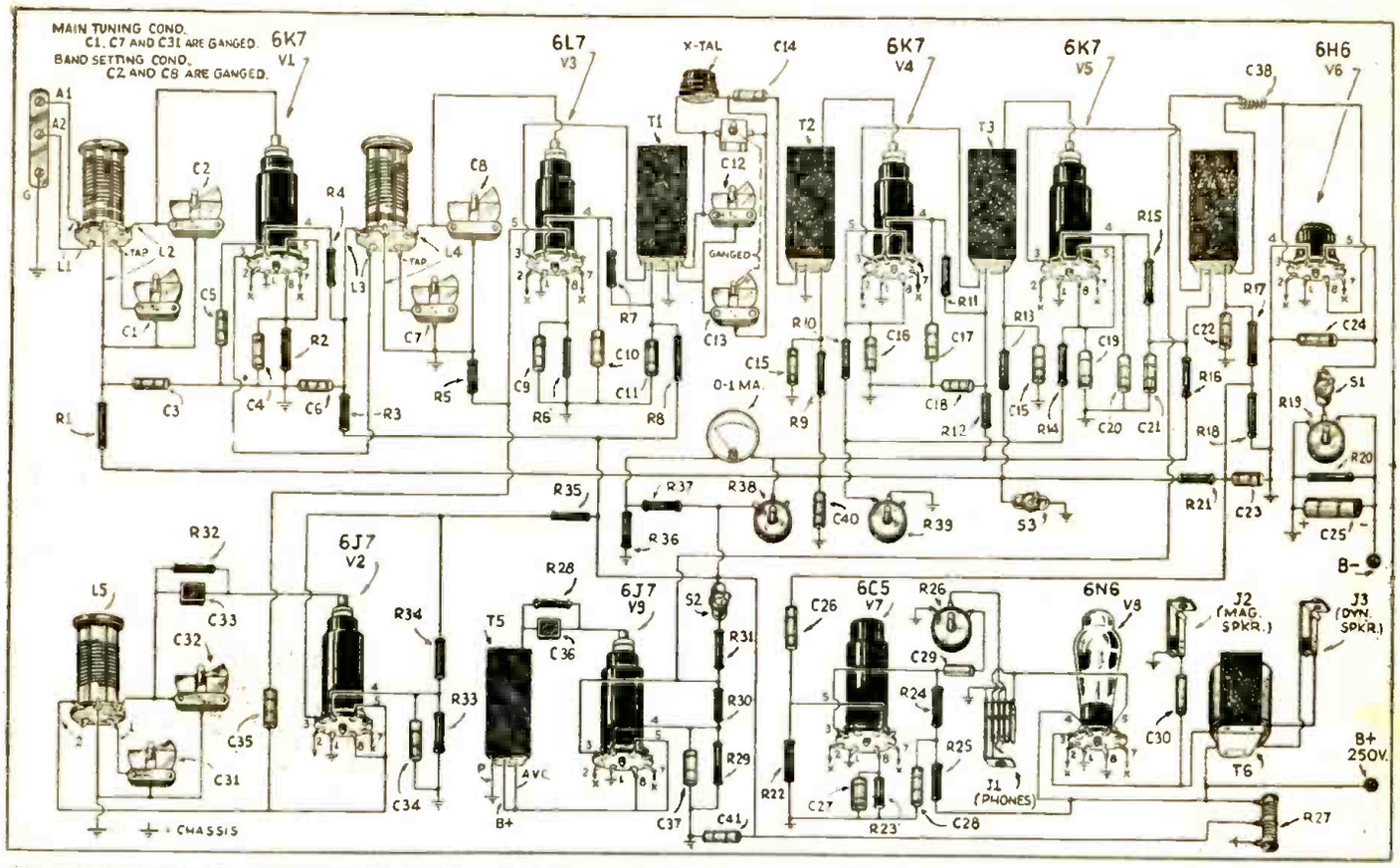


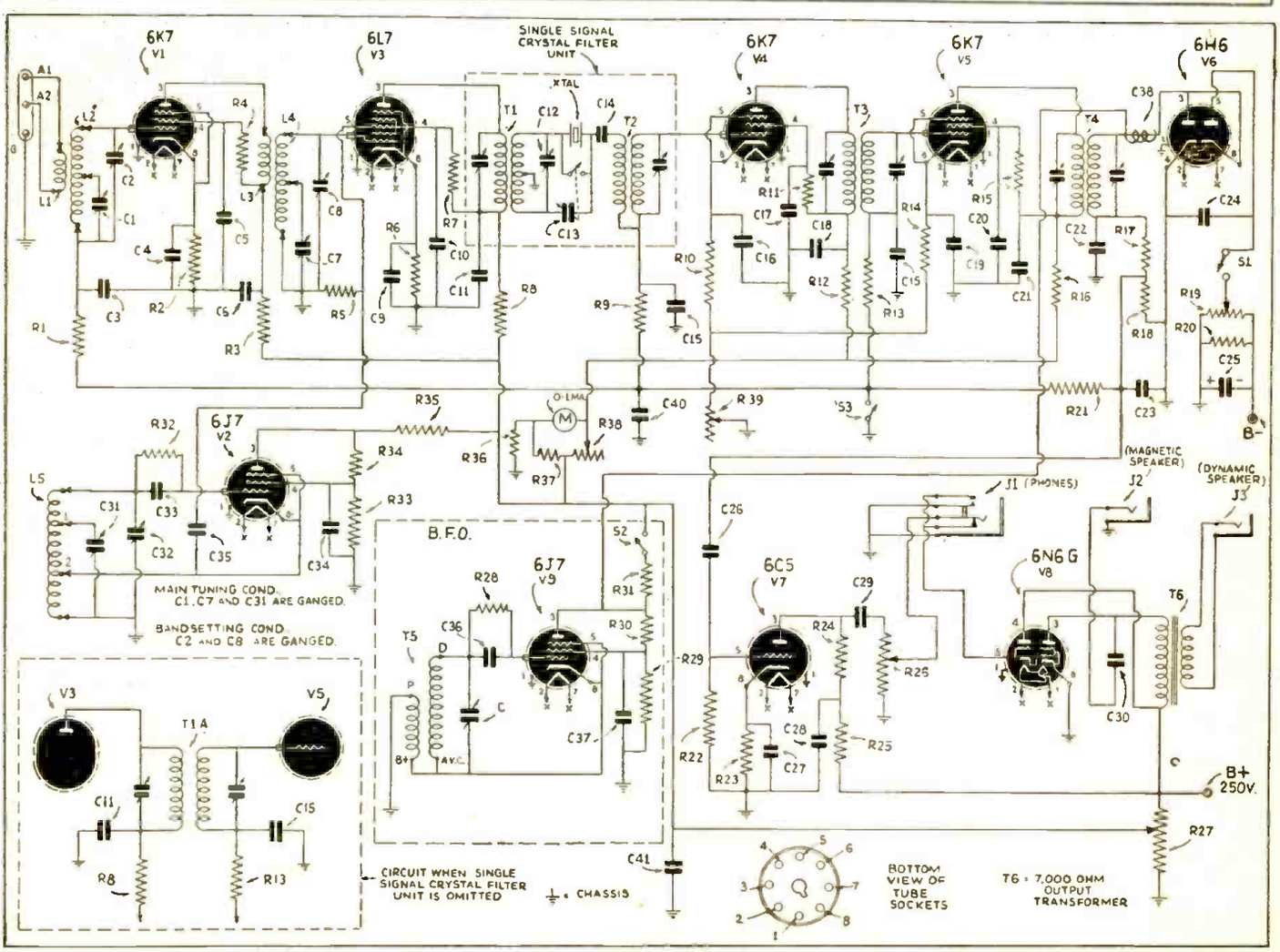
Turn Page for Wiring Diagram

of the condensers are parallel to the panel. Each condenser is mounted on a bracket 2" wide by 2¼" high which also serves as a shield between the condensers.

(*Continued on page* 117)

Wiring Diagram for the 2AJL Superhet Receiver





"Seeing" with Electrons

Television Stepping-Stones

Eric W. Leaver

● SEVERAL years ago, De Broglie published a theory which stated that matter is fundamentally wave-like in nature. The wave-like nature of the electron is now an established fact due to the researches of Davisson, Germer, G. P. Thomson and others. It has been found that electrons can be reflected, refracted, and diffracted just as light can, although their wavelengths are many times smaller than that of light. In fact, the wavelength of an electron which has been accelerated by a potential of 150 volts is one hundred millionth of a centimeter or about one thousandth that of visible light. The wavelength of an electron decreases enormously as its velocity increases. For example, the wavelength of the electrons in a high voltage cathode-ray tube may be one ten thousandth that of visible light.

How Electrons Are Refracted

Just as light is refracted when it passes through a region having a high refractive index, so electrons are refracted when they pass through a region of varying electrostatic or magnetic fields. In fact, electrode systems can be easily constructed which diverge or converge beams of electrons just as lenses diverge or converge beams of light. The exact action of an electrode system depends upon its arrangement and upon the potentials that are applied to its various components. For example, if a beam of electrons passes through a small aperture in a large disc, it will be converged if the electrostatic field on the emergent side of the aperture is more positive than the electrostatic field on the incident side, while the beam will be diverged if the field is less intense or negative. Systems of rings or cylinders or a magnetic field such as that formed by a coil carrying direct current which is placed about the beam, act as converging lenses always, irrespective of the potentials applied or, in the case of the magnetic field, the direction of current flow.

Just as optical lenses form optical images of a source of light, so electron optical lenses form electron images of a source of electrons. This electron image can be converted into an optical image by placing a fluorescent screen in the image plane. The electron optical images may be many times smaller or many times larger than the source of electrons. Magnifications have been obtained by Ruska, which are as large as 12,000 times, while a magnification of 250 is quite easy to realize.

Distortion in Electron Optical Systems

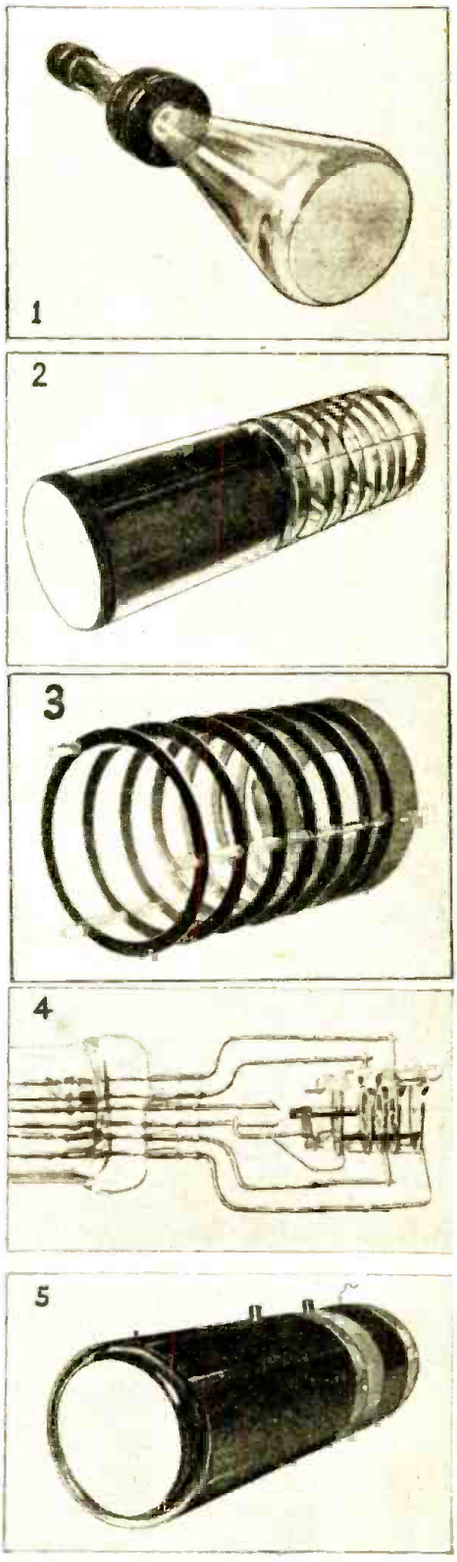
The parallel between the two systems can be still further extended. The various aberrations such as spherical aberration, coma, astigmatism and distortion have exact counterparts in electron optical systems. Up to the present time, however, we have not become as adept at compensating for these aberrations in electron optical systems as in the conventional optical device. Like the designer of optical equipment, the designer of electron optical systems tries to minimize the aberrations as much as possible and then uses a stop or diaphragm to limit the aperture of the lens. Our present knowledge only allows the design of electron lenses with comparatively small usable portions.

There is one aberration, however, which occurs in electron optical systems which has no counterpart in optics. Rays of light act independently of one another, but electrons are negatively charged, and so mutually repel each other. The aberration due to space charge or an accumulation of electrons increases with the number of electrons and their closeness to one another. For this reason, electron lenses are usually of the accelerating type, so that the electrons are removed as fast as possible and space charge density is kept low.

In spite of the present day limitations of electron optical systems, they possess fundamental advantages, great advantages that far outweigh the limitations and which encourage earnest and untiring development. One of the most obvious of these advantages is that due to the almost infinitesimal wavelength of the electron. As you may know, the resolving power of an optical system is inversely proportional to the wavelength of the radiation which it uses. Thus, theoretically at least, an electron optical system is capable of distinguishing the separate nature of two objects one thousand times closer together than if an ordinary optical system were used. Already these new systems have demonstrated a resolving power many times that of any conventional system. Thus, the structure of metals can be examined to a degree impossible by any other means. The metal can be caused to emit electrons or reflect electrons which can then be refracted by an electron lens and an optical image formed on the fluorescent screen.

Probably the greatest advantage possessed by an electron optical system is the fact that the electron intensity or image brightness can be amplified. The utilization of *secondary emission multiplication* allows the amplification of a weak optical image into a brilliant one, which may or may not be of the same size. This property obviates the fundamental necessity of a light amplifier. Not only this, however, it can act as a *frequency converter* as well. For example, if a photo-electrically sensitive surface is used as the source of the electron image, then either infra-red visible, or ultra-violet light can be used to cause the emission. The color or the light emitted at the fluorescent screen depends upon the screen material and so can be

(Continued on page 109)



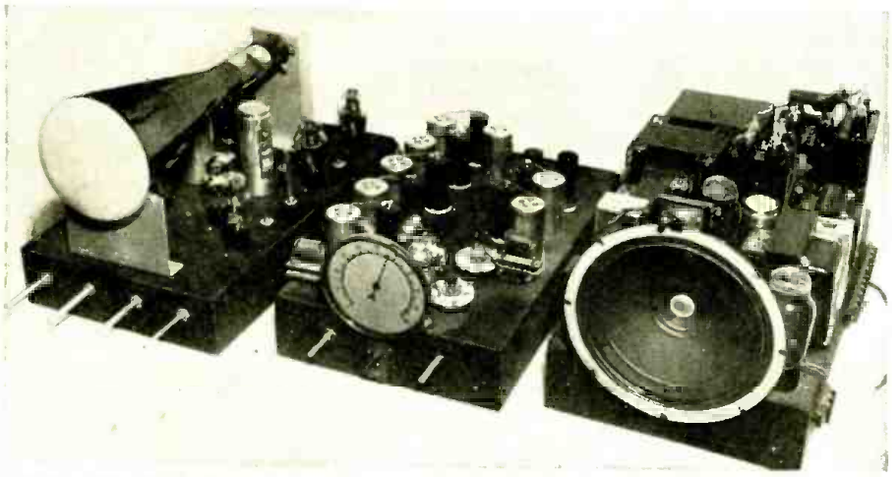
Beginning with top photo—television cathode ray tube using magnetic focusing; experimental electron image tube; electrode system of electro-statically focused image tube; condensing electron lens system; experimental electron gun for use with magnetic focusing.

S.W. & T. 441-Line Television

C. W. Palmer, E.E.

TELEVISION IS STILL IN THE EXPERIMENTAL STAGE. THIS ARTICLE GIVES THE LATEST TECHNICAL INFORMATION ON THE SUBJECT. HOME TELEVISION WILL NOT BE REALIZED FOR SOME TIME TO COME.

Details of



Left to right—Cathode-ray tube and sweep circuit chassis—Sound and Image receiver unit—Power-supply and loud-speaker chassis.

● THE construction of our television receiver has up to now consisted of the two radio receivers of special design which pick up, amplify and rectify the *image* and *sound* impulses transmitted by the several television broadcast stations now in operation, and the rather complex power-supply which feeds the receivers, the scanning or sweep oscillators and amplifiers, and the cathode-ray television tube.

In this part the most complex part of the receiver will be described. This is the chassis which might be called the "video" chassis. It contains the vertical and horizontal sweep oscillators with their push-pull amplifiers which sweep the fluorescent spot back and forth across the end of the cathode-ray tube at a rate of some 13,200 times per second moving it at a constant rate of speed across and then *snapping* it back instantly to its starting point. This horizontal action is supplemented by the vertical motion, which is down at a constant rate and then *snapping* back some 60 times a second, for the 441 line interlaced scanning that is standard at the present time.

In addition to the scanners or *sweep circuits*, this chassis contains the means of *synchronizing* the motion of the cathode-ray beam with the scanning at the transmitter, and the 5 inch cathode-ray tube which actually reproduces the visual programs.

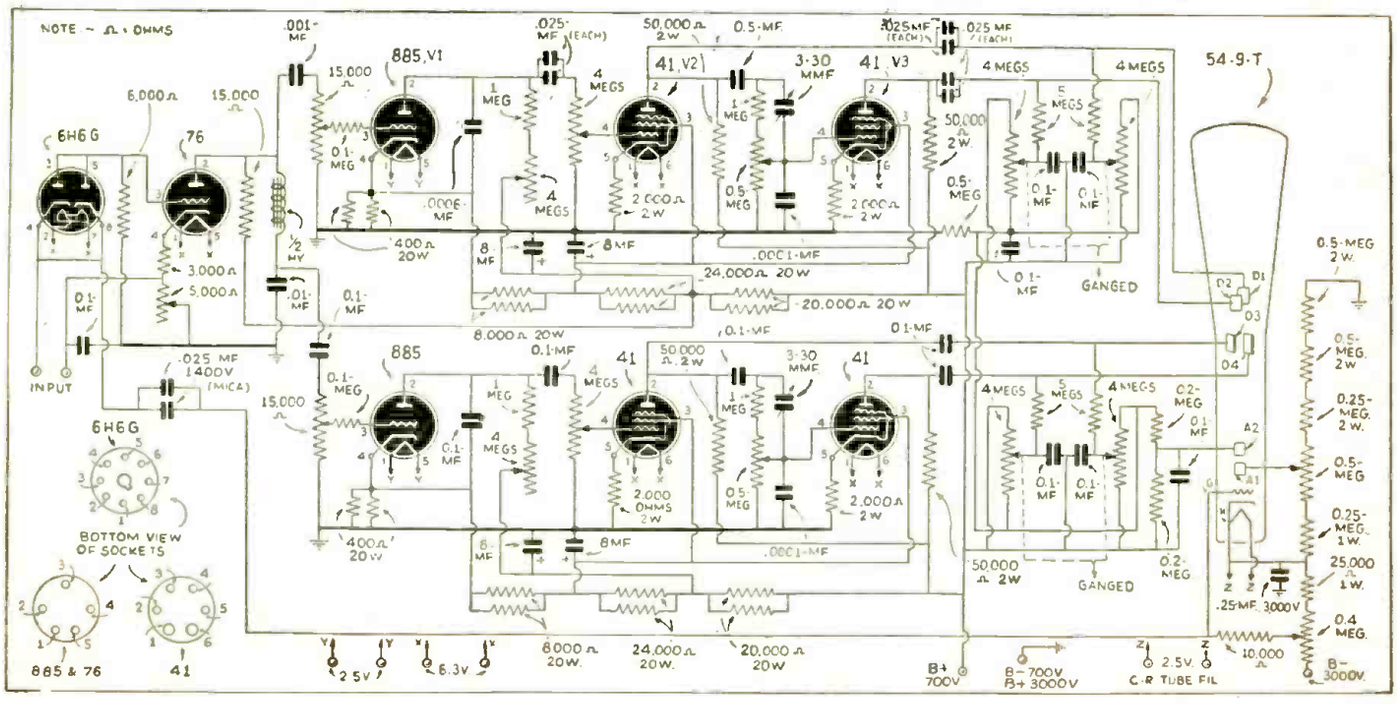
Electrostatic Scanning Used

Let us consider for a while the means whereby these actions are achieved. The Du Mont 54-9-T television tube, around which the receiver is designed, utilizes *electrostatic* scanning plates because of the greater simplicity and stability of equipment required to produce linear scanning (in other words, a straight-edged raster).

The saw-tooth oscillators are of the gas-discharge type and linearity has been preserved by using only a small portion of the charging characteristic of the condenser which controls the sweep frequency. This is practically linear as the bias on the gas discharge tube is small. The limited output of this tube is then fed through a push-pull amplifier which builds up the output to the required voltage for carrying the spot all the way across the end of the tube.

The push-pull amplifier used is of rather odd design as an examination of Fig. 1 will indicate. This push-pull amplifier—and in

Diagram showing vertical and horizontal sweep circuits and amplifiers, with connections to cathode-ray tube.



Part IV

Receiver

Sweep Circuits

fact the entire basic *video* chassis was designed by Mr. G. R. Mezger of the Du Mont Laboratories, Inc. Certain fundamental changes have been made to adapt this circuit to the particular tube which we are using and the video receiver which we have ready for use.

The vertical and horizontal sweep oscillators and amplifiers are almost identical, except for the values of certain condensers, and thus it will be necessary to describe the action of only one. The use of push-pull amplification will permit twice the deflecting voltage obtainable from a single-ended amplifier for a given plate voltage, and in addition, both deflecting plates of the C.R. tube will vary reciprocally in potential keeping the average potential of both plates constant. This is a distinct advantage over the single-ended amplifier which causes one plate to vary above and below the other plate which is tied to ground.

The output of the gas discharge type 885 tube is fed to the grid of V2 through a resistance-capacity network which provides voltage control for V1 and input control to V2. The output of V2 is fed to one of a pair of deflecting plates of the C.R. tube. A portion of the output voltage of this tube is also fed through a resistance-capacity voltage divider, which provides the 180 degree phase shift necessary for push-pull action. This odd phase shifter also reduces the output signal of V2 by a proportion 1/mu to feed a signal of opposite phase and equal voltage to tube V3. The output of V3 is then fed to the second of the pair of deflecting plates mentioned. By varying the capacity and resistance of the phase shifter, the proper proportion of high and low frequency voltages can be obtained.

A balanced centering arrangement is used to permit the fluorescent spot to be shifted and to center the "raster" on the screen of the C.R. tube. This balanced circuit provides a double action, similar to the push-pull action of the sweep amplifier.

Synchronizing Circuit

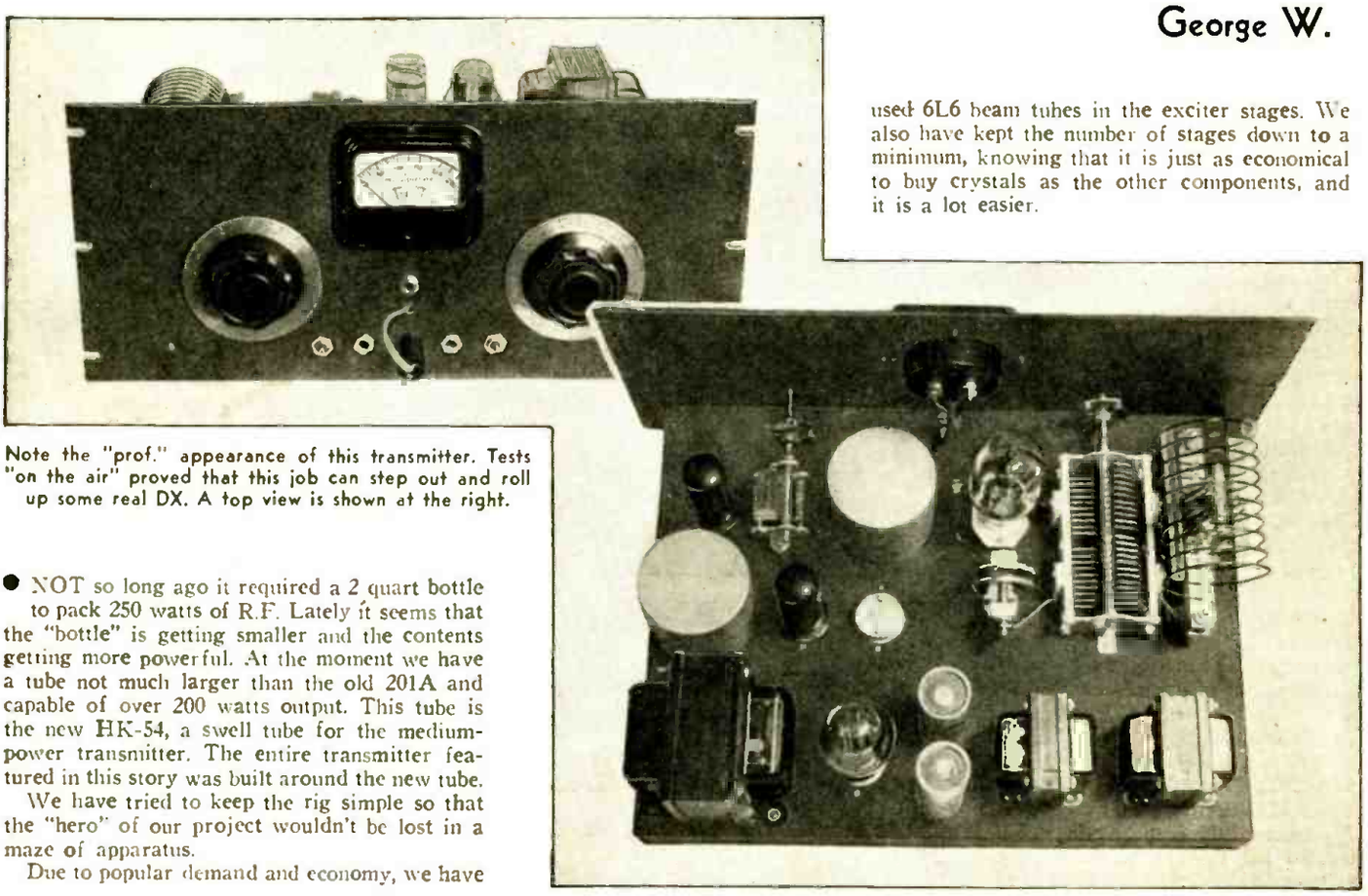
The *synchronizing circuit* consists of a diode tube which is biased to operate only on the synchronizing peaks of the transmitted signal and a triode (76) to reverse the phase of the peaks for positive signal synchronization or discharge of the thyratron oscillators.

In order that this synchronizer may be used with any phase of synchronizing impulse which may be transmitted, the input to the synchronizer is taken from the same signal that is fed to the grid of the cathode-ray tube. Since in all systems in use to date, the synchronizing signal must be negative at the grid of the C.R. tube in order to blank out the return trace, a signal of this phase

(Continued on page 115)

The HK-54 200 Watt

George W.



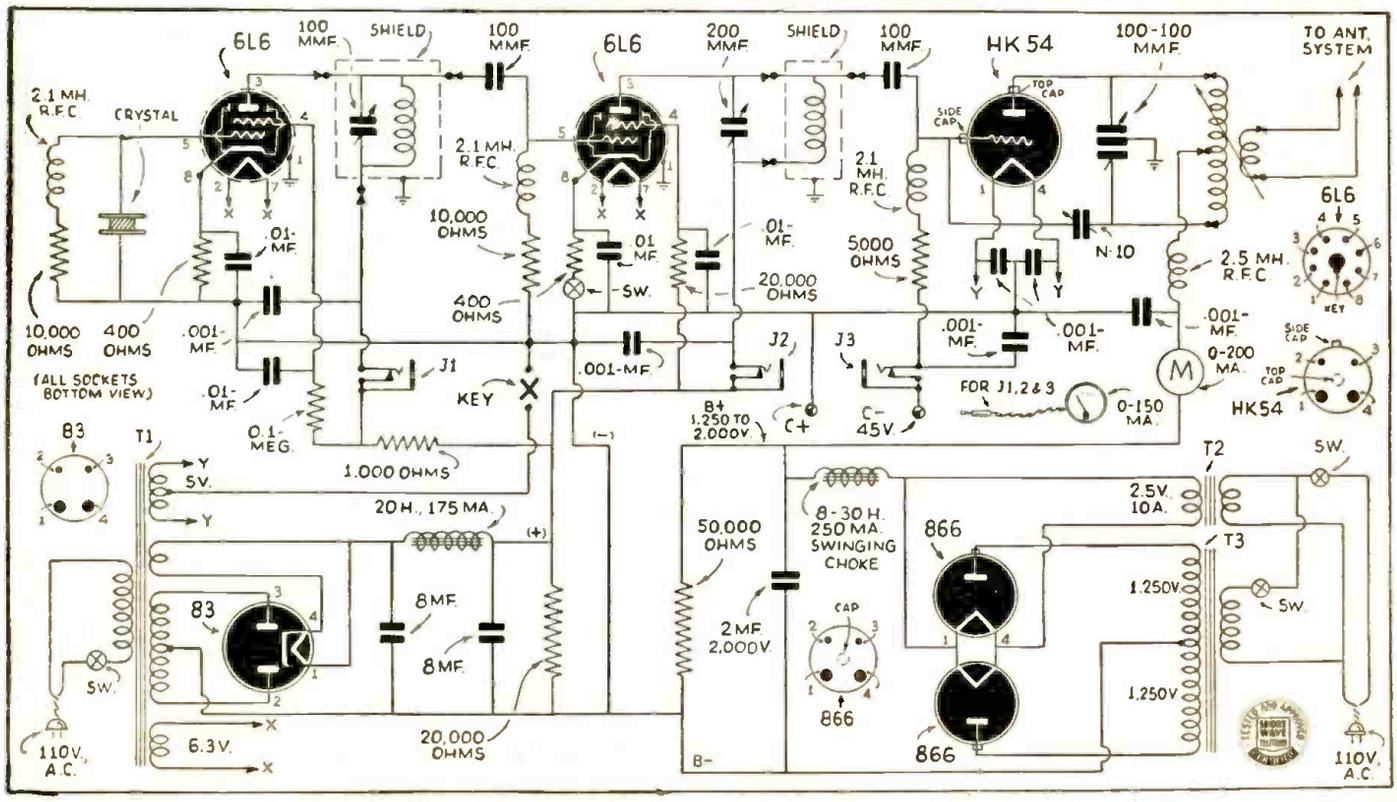
Note the "prof." appearance of this transmitter. Tests "on the air" proved that this job can step out and roll up some real DX. A top view is shown at the right.

● NOT so long ago it required a 2 quart bottle to pack 250 watts of R.F. Lately it seems that the "bottle" is getting smaller and the contents getting more powerful. At the moment we have a tube not much larger than the old 201A and capable of over 200 watts output. This tube is the new HK-54, a swell tube for the medium-power transmitter. The entire transmitter featured in this story was built around the new tube.

We have tried to keep the rig simple so that the "hero" of our project wouldn't be lost in a maze of apparatus.

Due to popular demand and economy, we have used 6L6 beam tubes in the exciter stages. We also have kept the number of stages down to a minimum, knowing that it is just as economical to buy crystals as the other components, and it is a lot easier.

The hook-up for the 200 watt transmitter, using the HK-54 in the final amplifier, is shown below and can be followed by any Ham.



Transmitter

Shuart, W2AMN

This snappy transmitter should prove a delight to the Ham looking for a reasonably priced rig that can really step out. It uses an HK-54 tube in the final amplifier and a 6L6 crystal control exciter. Power-supply data is included.

Straight Tetrode Crystal Oscillator

Starting with the diagram we find a straight tetrode crystal oscillator with no "fixings." This is followed by another beam tetrode buffer-multiplier, which drives the HK-54 final amplifier, and we mean "drive it." There is more than sufficient power to drive the final, not so much because of the great power output of the driver, but because of the really modest driving requirements of the 54.

Back to the oscillator—the plate circuit is tuned with a plug-in, tuned tank circuit. This consists of a 4-prong coil form and a small padder mounted inside, both are thoroughly shielded as can be seen in the photo. There is a complete tuned tank circuit for each crystal used.

The buffer-doubler plate coil is also shielded but the tuning condenser is mounted outside with a panel control. This is done so that two bands can be covered with a single coil. The condenser is large enough (200-mmf.) so that it is only necessary to swing it from near maximum to near minimum capacity to effect the change.

In order to further simplify construction we have employed capacity coupling between the driver and the final.

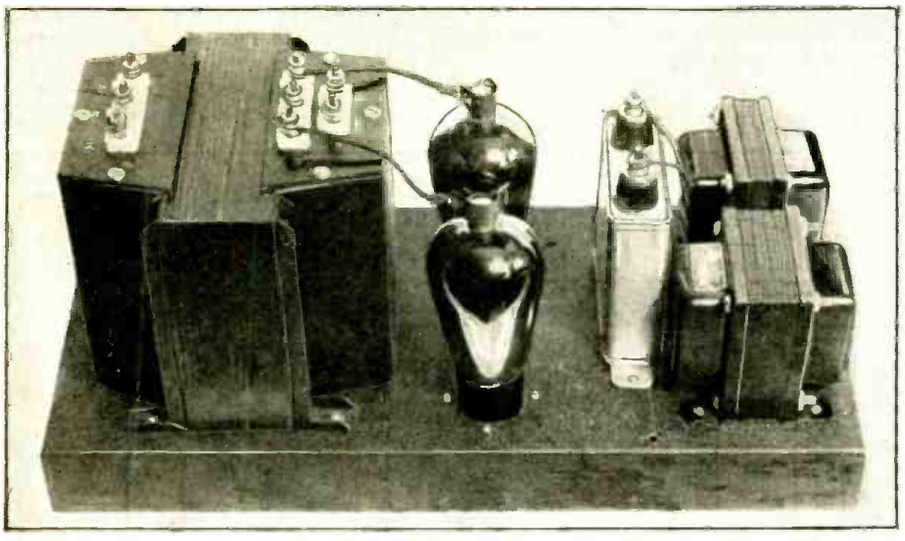
While some may disapprove of this method, it serves the purpose with no hitches. The final is conventional; it employs a split-stator condenser and a center tapped plug-in coil. For convenience and simplicity manufactured air-wound plate inductors are used. These are of excellent design and have a built-in variable link of just the right proportions. To vary the coupling it is only necessary to "probe" the link around to the proper position.

Chassis Layout Includes Power-Supply

In order to keep the size of the rig within the demands of a small shack we have included the low-voltage power-supply and the filament transformer of the 54 on the same chassis with the entire R.F. portion. The chassis is 17 x 13 x 2 inches and just the right size. Laying out the parts requires care; proper placement results in good stability. The power-supply components are, of course, along the rear edge of the chassis. Then in the "center aisle" we have, from left to right, the crystal, the oscillator tube and last, the oscillator plug-in tank unit. Along the front we have, right to left, the buffer 6L6, buffer tuning condenser, the shielded buffer coil and the rest is the final which is clearly shown in the photo.

The low-voltage power-supply delivers around 400 volts to the two 6L6 plates. This voltage is lowered in the case of the oscillator because the oscillator is capable of many times the required power output necessary to drive the second 6L6. Even with the 1000 ohm voltage-dropping re-

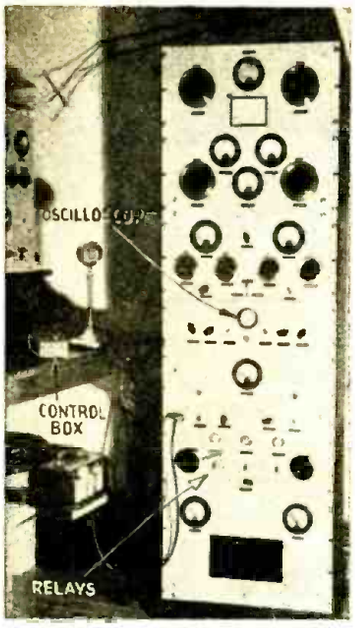
(Continued on page 108)



The high voltage power-supply unit is illustrated above. It utilizes 2—866 rectifier tubes.

Push-Control for

Every Ham dreams of building a remote control for his transmitter. Here is an effective one using a few push-buttons and relays. Incidentally it protects the rectifier tubes until they are warmed up.



Complete transmitter at station W2FHP, fitted with remote push-button control.

● THIS concluding article will describe construction of a complete remote control system and an oscilloscope for use with the medium power transmitter.

The control system uses the same control panel that was shown in the last article. However, many additions must be made. The relays are all mounted on a bakelite panel 6½ in. x 16 in. which is held to the steel front panel by means of strips of aluminum. The two are separated seven inches.

Before proceeding with construction details, it will doubtless be best to describe the function of the various parts of the control unit. Neglecting, for the moment, the remote control box, let us see what takes place in the circuit. The first switch to be operated is that marked "FIL" which of course lights all filaments in the transmitter. The yellow lamp comes on at the same time. Until this switch is operated no current can flow in any part of the transmitter. Along with the filaments, the heater element of "TU" which is the thermal delay unit, warms up. It is still impossible to operate any of the power transformers, even if the switches are closed. However, after an interval of 30 seconds or so, which gives the mercury rectifiers time to heat up, "TU" closes its contacts which in turn operate relays 1 and 2. The heater of "TU" immediately cools off so that should the power circuit be opened for any reason, high voltage cannot be applied until the heating cycle is repeated. This gives complete protection to the rectifiers.

As soon as 1 and 2 have closed, the transmitter is ready for immediate operation. Closing of the "HV" switch puts the rig on the air as both the high and low voltage transformers are energized when relay 3 operates. The red pilot light indicates this condition.

Wiring diagram of push-button control applied to medium-power transmitter described in the March issue.

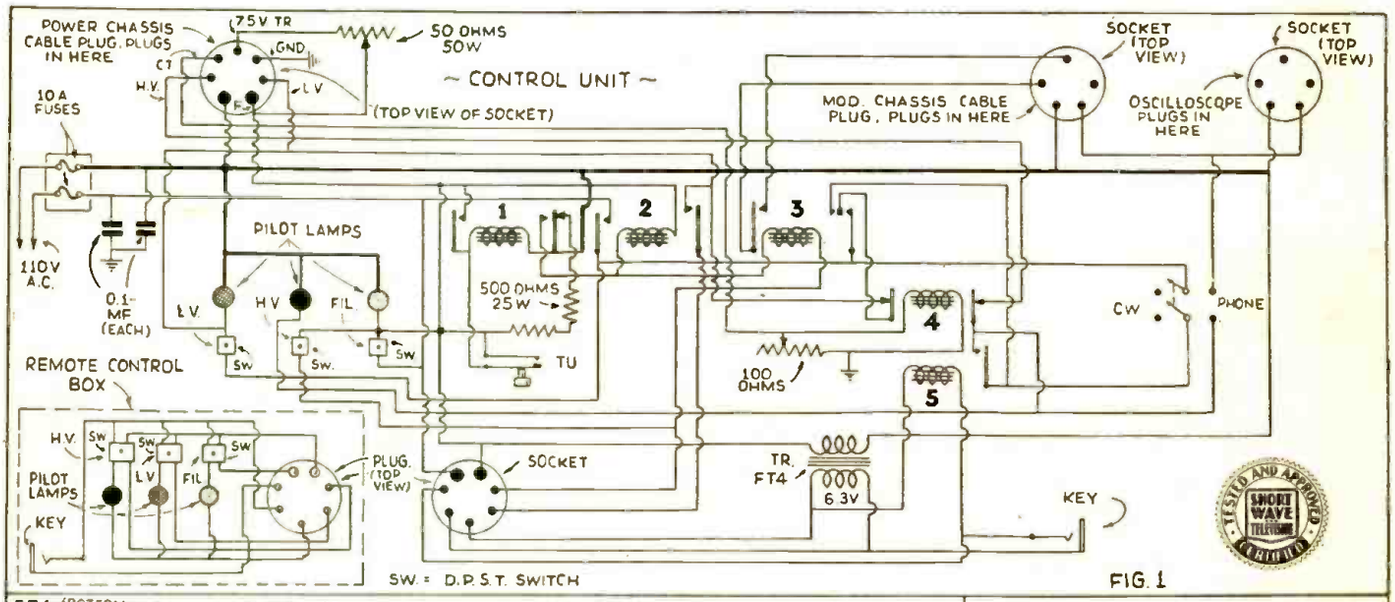


FIG. 1

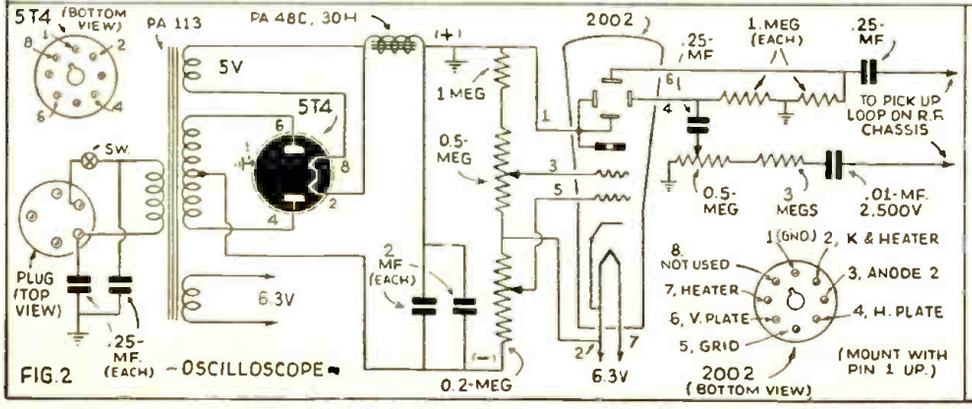


FIG. 2

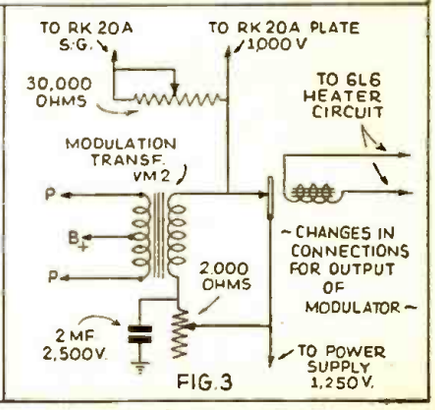
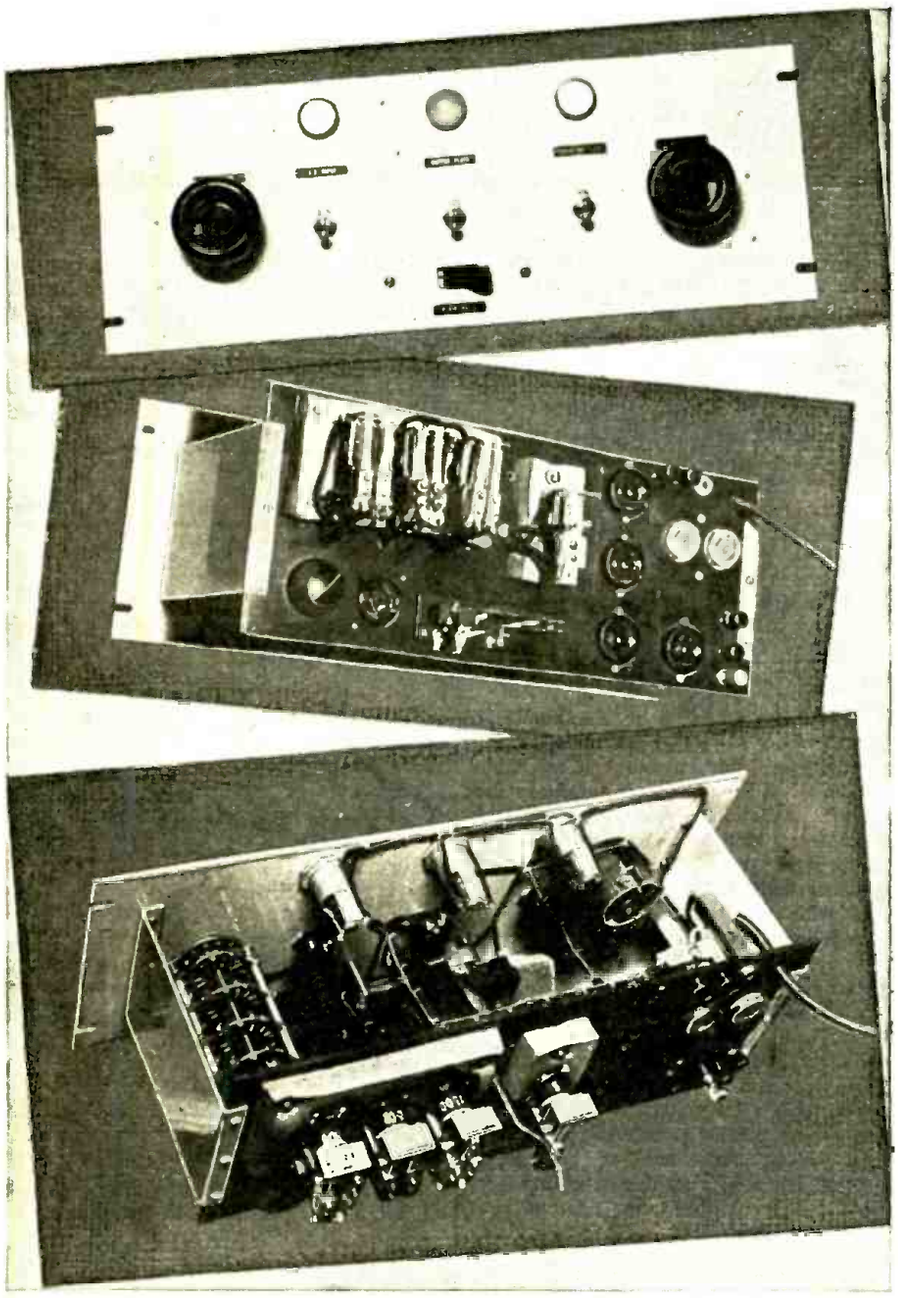


FIG. 3

Button Transmitter

Part III

H. G. McEntee, W2FHP



Above—Front and rear views of relay rack unit built by the author. The diagram is given on the opposite page.

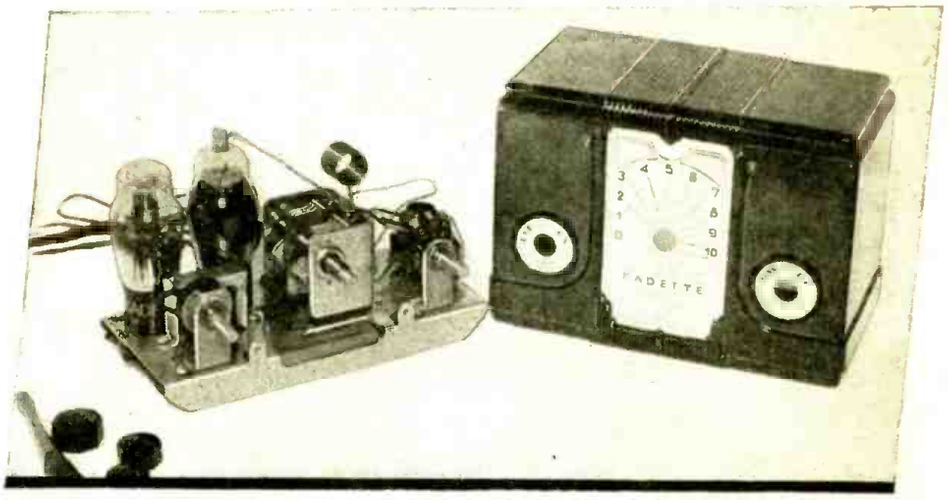
If it is desired to operate only the exciter, the "LV" switch is operated, which activates only the low voltage transformer. This condition is signaled by the green pilot lamp. This lamp, of course, is also lighted when the "HV" switch is turned on.

Although center tap keying was shown in the original article on this transmitter,

(Continued on page 119)

What's New in S-W Apparatus

A.C-D.C. Ultra-S.W. Converter



A view of the converter chassis beside its diminutive cabinet. (715)

● COMPACTNESS is the keynote of this new converter. Using but two tubes, a 6J8G triode—heptode frequency converter, and a 25Z5 rectifier, it will tune in the bands from about 5 to 8 meters. The 6J8G is a new tube which combines the functions of a pentagrid and a separate triode oscillator in one tube. The converter has three controls, an on-off power switch, main tuning dial which is of the reduction type, and a switch for transferring the aerial from the converter to the broadcast receiver to which the unit must be attached.

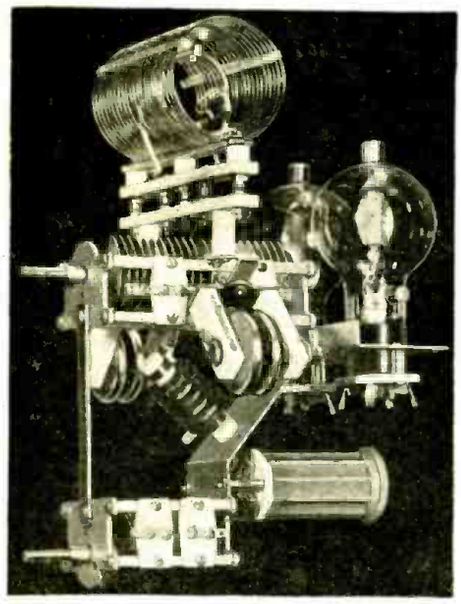
The converter is placed in operation by connecting the aerial lead of any broadcast receiver which will tune to 1520 kc. to the output lead of the converter. The grounding lead of the converter is connected to the ground on the receiver. The aerial is then connected to the aerial lead on the converter.

To operate the converter, the broadcast receiver is tuned to the above mentioned frequency, the converter turned on and the selector switch set to the short-wave position. All tuning is then done by the converter tuning dial. The receiver volume control is used to control volume.

The tuning of the unit is not particularly critical and on test in New York City broadcast programs from the two Radio City ultra short-wave transmitters of the National Broadcasting Co. were picked up with good volume. To listen to regular broadcast stations, the converter is turned off and the selector turned to the broadcast position which automatically connects the aerial to the receiver input. The receiver is then tuned in normal fashion.

The converter is housed in a molded case measuring 7½"x3¾"x5½".

Our information bureau will gladly supply manufacturers' names and addresses of any items mentioned in Short Wave & Television.



Appearance of new Hammarlund transmitter unit. (No. 716)

Ham Xmitter Built Easily with New Unit

● ALL amateurs do not have available the tools and machinery necessary to make the fancy brackets and oddly shaped pieces of metal necessary for modern type xmitters. All of these constructional difficulties have been eliminated in the unit shown, which is a push-pull radio-frequency power amplifier, designed to use any of the popular triode tubes having ratings of from 100 to 300 watts output per pair.

All parts associated with the amplifier proper are joined together with brackets of various shapes. This hardware is available in kit form and the only tools necessary for assembling and wiring are a screw-driver and soldering iron. When finished, it is a self-supporting unit which can be bolted to a panel with the mounting screws furnished with the variable condenser; no chassis is necessary.

Mounted on the two side bars of the large variable condenser, an MTCD-100-B, are two brackets which support the plug-in plate coil and the two N-10 neutralizing condensers. The lower condenser (MTCD-100-C), for tuning the grid circuit, is fastened to the large condenser with an angular shaped back plate. At the top of this plate we find another horizontal bracket which serves as the mounting for the two tubes. At the lower edge of the back plate is mounted the plug-in grid coil. This plate is also drilled for mounting the radio frequency choke (CH-500) and the two filament by-pass condensers, together with the grid biasing resistor. All brackets are completely drilled and machined and have a silver-like finish.

The entire arrangement is constructed to permit short, direct wiring leads. The tubes shown in the unit are RCA 808's. Other triodes may be used, depending entirely upon power output desired. The overall dimensions are 13" high, 8½" wide and 8" deep.

List of Parts

1—MTCD-100-B (Variable condenser)
1—MTCD-100-C (Variable condenser)
2—N-10 (Neutralizing condensers)
1—CH-500
2—S-4 (sockets)
1—S-5 (socket)
Plug-in plate coil
SWF coil forms for plug-in grid coils (5 prongs)
1—Complete set of hardware, including brackets and screws

This article has been prepared from data supplied by courtesy of Hammarlund Mfg. Co.

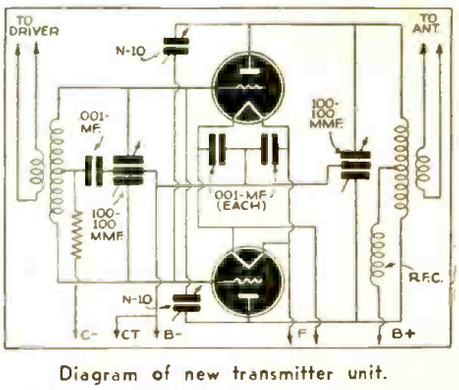


Diagram of new transmitter unit.

Names and addresses of manufacturers of apparatus furnished upon receipt of postcard request; mention No. of article.

NEW ELECTROLYTICS

● A TUBULAR dry electrolytic condenser of considerably smaller physical size than heretofore available has been introduced. These condensers are her-

metically sealed in metal cans with pig-tail leads and are available in 100, 350 and 450 volt ratings. (No. 708.)

This article has been prepared from data supplied by the courtesy of the Solar Mfg. Co.

PRECISION MICA CONDENSERS

● A NEW series of bakelite encased mica condensers, employing silver-plated mica, has been introduced. The new method of construction permits a capacity tolerance

within 3% and an extremely high Q. Condensers are available in sizes from 10 to 1100 mmf. (No. 705.)

This article has been prepared from data supplied by courtesy of Cornell-Dubilier.

BALLAST TUBE FOR A.C.-D.C. SETS

● A NEW series of helium filled, iron wire ballast tubes, which will serve as replacements for a multitude of older type ballast tubes, is now available. One of these new tubes can handle a wide variation in the number of tubes used in a receiver, because it functions as a true ballast device, whereas some of the older tubes were merely straight resistors. Four of these tubes will replace 90% of the older type tubes. (No. 702.)

This article has been prepared from data supplied by the courtesy of the Amperite Co.

EXPERIMENTAL TELEVISION AMPLIFIER PENTODE

● THE 1851, a new pentode with unusual characteristics, has been developed for use by the amateur and experimenter in experimental television receivers. It is especially designed for use in the R.F. and I.F. stages of a television receiver employing a high I.F. It may also be used in the first stages of a video amplifier, particularly noteworthy is the amplification factor of 6750 and the transconductance of 9000 micromhos. The 1851 is an octal based metal tube. As the photo shows, however, the grid cap is smaller than usual. See page 47, May issue, for technical data. (No. 696.)

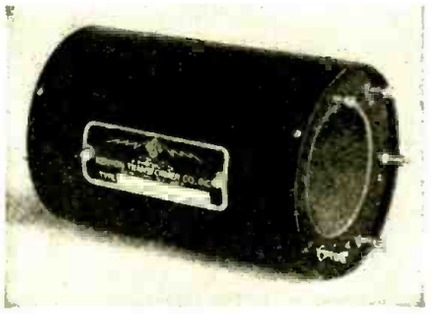
This article has been prepared from data supplied by courtesy of the RCA Mfg. Co.

NEW DEFLECTING YOKE AND TRANSFORMERS FOR TELEVISION

● THIS new deflecting yoke is designed for use with cathode ray tubes of the electromagnetic deflection type.

Special care is taken in the winding and placement of coils in the yoke to reduce to a minimum any distortion which may occur due to unbalanced magnetic flux or non-uniform fields. By means of proper construction, coupling between high and low frequency coils has been reduced to a negligible value. An internal shield is effective in reducing the effects of external fields on the image to be projected.

The low frequency coils are so constructed that a low impedance line may be run to them from the new output transformers. This helps to minimize pick-up and eliminate coupling condensers.



Television Magnetic Sweep Yoke.

More than ample deflection with negligible distortion is obtained from the yoke on nine-inch tubes at a plate voltage of 6000.

The new type high frequency sweep output transformer, also marketed by the same company, is wound with low capacity coils in order to effectively pass the higher harmonics of 13,200 cycles necessary for the production of a linear deflection. (No. 709.)

Our information bureau will gladly supply manufacturers' names and addresses of any items mentioned in SHORT WAVE & TELEVISION.

NEW CRYSTAL MICROPHONE

● A SMALL, lightweight, crystal microphone, with good response and high output has made its bow. It is semi-directional and free from feed-back. This unit has a wide range of applications, enhanced by the available accessories. The device is singular in that it is equipped with a plug at the microphone, thus making cable replacement a simple operation. It is chrome finished and comes complete with plug and 8 ft. cable. (No. 712.)

This article has been prepared from data supplied by the courtesy of the American Microphone Co., Inc.

100 VOLT A.C.—6 VOLT D.C. RECEIVER

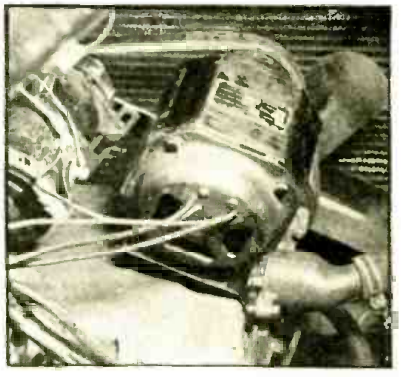
● AN all-wave receiver especially designed for rural communities where there is a possibility that electric power lines will be erected in the future, is now available. It is a 5-tube superhet table model, which may be operated from a 110 volt A.C. line or a 6 volt storage battery. Change-over from one current to another is automatic; the battery cord is disconnected and the electric plug placed in the power socket. Frequency coverage is 540-1720 kc., and 5.8 to 18 mc. (No. 699.)

This article has been prepared from data supplied by courtesy of the RCA Mfg. Co.

A MOBILE GENERATOR

● A NEW A.C. generator supplying 110 volts is available for operation from an auto engine for mobile "ham" applications. The generator bolts onto the engine block with two head bolts and is driven from the fan belt. The unit will deliver 110 volts regardless of the running speed of the engine, provided the current load is maintained constant. (No. 701.)

This article has been prepared from data supplied by courtesy of the Lejay Mfg. Co.



A 110 volt A.C. generator for mobile use.

What Do You Think?

(Continued from page 80)

you believe yourself capable of telling me the answers to the above, and how the suppressing of the SWL-QSL card nuisance keeps the SWL from getting a ticket? For the information of Mr. Daugharty and the rest of the SWLs the only things I have against the SWL are the foolish QSL card racket, and bootlegging on five meters. I have spent many an hour giving code practice and theory to SWLs, two of them have obtained their license some years ago—W2AON and W2IVR. At present I am teaching two more, one of them is ready for his exam right now, the other not so far advanced. Does that look as though I was trying to "Keep many a poor lad from getting his ticket", Mr. Daugharty?

This Carey W. Sullivan's letter isn't worth a comment. I gather from his attitude on Law Breaking that he is probably just another five meter bootlegger. Though I might reply to Sullivan that I am not 100% for S.W.&T. because of the magazine printing too many circuits of cheap five meter outfits which are an incentive to bootlegging.

To Mr. M. W. Soplop—I agree with you absolutely, and the fact that the Amateurs didn't reply, even though you sent postage, must surely prove to you that the cards were undesirable. So I will reiterate Send cards to the Short Wave *Broadcast* stations where they will be appreciated.

Norman W. Hastings, the boy with the high blood pressure and the receiver which brings in all signals R9, states that he hopes he has pleaded his case to an acquittal. My lad, you have convicted yourself and are found guilty of being very foolish. You emphasize the statement the call formation W2SWL, etc., is not a violation of the Radio Act of 1934. Mr. Hastings, you had better look up the regulations regarding call letters, before you make any such brash statements. And get the idea right out of your head that the FCC does not issue the calls W2SWL, etc., because you SWLs use them. Borrow a call book from some "Ham" and look up the call W9SWL, and then go dig a hole and crawl into it!

In my letter to the editor of this magazine I furnished proof, with a letter from the Federal Communications Commission, stating that there is no occasion for SWLs to print cards bearing the calls W2SWL, etc.

N2DDV, CHARLES FIEGE, JR.,
CRM, USNR.

A Bouquet

Editor,

Let me add my word of praise to your great magazine. Although a new subscriber, I was very much pleased by the information it contained in my first copy, particularly the article in the March issue entitled—"*Simple Laboratory Practices for Beginners*," by Jim Kirk, W6DEG.

I have gained much knowledge from this article and believe others have likewise. I think it would be a very good idea to publish it as a regular monthly feature in your magazine.

JOSEPH J. BARRY,
37 Camp St.,
Newark, N. J.

W3XAL's Short-Wave Voice

(Continued from page 73)

Central America—world-wide coverage!

Programs in French, German and Italian

Announcements and programs in French, German and Italian were started on W3XAL in July, 1937. For practically a year before this, the same service was being rendered in both Spanish and Portuguese. In the beginning, the special service of the NBC International Division was limited to South and Central America. Today, the Division operates from 9:00 a.m. to 1:00 a.m., EST, with an hour and a half of special programs for German-speaking listeners, two hours for the French, and one hour for the Italian. From 5:00 p.m. to 1:00 a.m., EST, programs in English, Spanish and Portuguese are broadcast, with one hour of Spanish especially for the Argentine and one hour in Portuguese especially for Brazil.

Reunion Enjoys American Music

In one instance, word came to NBC from a Prince on the Ile Reunion in the Indian Ocean by way of an amateur radio operator in Scranton, Penn. According to the Pennsylvanian, Prince Vinh San, who lives in the city of St. Denis, Ile Reunion, enjoys NBC's short-waved programs of popular American music. The Prince communicated this message by means of his own amateur broadcasting station.

Another communication, this one direct, came from a planter near Port Vila, New Hebrides, Oceania. *"I listen to your broadcasts right straight along, which are heard well-nigh every day with perfect clarity,"* he wrote. *"Your programs are very interesting . . ."*

Germans Like W3XAL

Each period of special broadcasts has brought its response. The German period has inspired letters from listeners in and close to the Fatherland and from Germans in the colonies of Africa. A writer in Oldenburg, Germany, said: *". . . your broadcasts are making friends and, speaking for myself, I derive great pleasure from your broadcasts and am particularly fond of American rhythm . . ."* A young man, writing from Wiesbaden, Germany, said that he not only had been improving his English by listening to W3XAL, but also was deriving great pleasure from *"your dance music, particularly the new dance, 'Big Apple.'"*

French Enjoy American Programs

The French also are voluble in their appreciation of the special programs broadcast to them in Europe and many out-of-the-way places of the world. A listener in Diego-Suarez, Madagascar, wrote: *"I hereby address you to convey the expression of my warmest congratulations upon the quality of your broadcasts, which are very clearly heard here."* He also pointed out that he had just been listening to the six-day bicycle races *"in which a crashing spill of the Dutch rider Conval has been mentioned."*

From Beirut, Syria, a Frenchman wrote that *"all in all your broadcast is perfect and I thank you therefor."* And from Rabat, Morocco, came a communication which read: *"I hasten to add that twice a day I listen in with real satisfaction and tenfold pleasure, since hearing is so distinct, something never believed by me heretofore."* Conakry, French Guinea, is the point from which another enthusiastic listener wrote: *"My friends who also have sets identical with mine are all in accord in finding your broadcasts to their liking and the pleasure is all the more enhanced by the fact that the language you use is impeccable, since it is always a pleasure for a Frenchman to hear his native tongue."* Letters along much the same lines have been received from Izmir, Turkey; Port Louis, Mauritius Island, Indian Ocean; Mexico City, Mexico; Campulung, Muscel, Rumania; Dakar, Senegal, French West Africa; St. Tome, Portuguese West Africa; Koulnuba, French Soudan, and Brazzaville, French Equatorial Africa.

Typical of letters from France, itself, is one addressed from Heris les Bains, in which the writer avers: *"It is hardly necessary to emphasize the pleasure derived in listening to a voice in French coming from 6,000 kilometers away and I am grateful to W3XAL for devoting two hours a day to broadcasts in our language."*

A listener in Para, Brazil, has written his appreciation of increased service to Latin America. He says: *"Now with the Brazil hour my interest has redoubled, since the scope of the program has been broadened, both in regard to news reports and in regard to cultural entertainment. The broadcasts of W3XAL are heard here very distinctly, and with a power greater than that of any other American station."*

Others of NBC's listeners in South and Central America write from the Republic of Panama, Cuba, the Cape Verde Islands, Porto Rico, Mexico, Ecuador, Chile, Paraguay, Argentine, Uruguay, and many more places. Portuguese in Portuguese West Africa and Spaniards in Spain also hear the broadcasts and write their commendations to NBC.

In addition to a radiator antenna, W3XAL operates two directional beam antennae, one for Europe and the other for South and Central America. The directional antennae concentrate the power behind the wave upon the region for which the broadcasts have been prepared. The best sustaining programs of both the NBC-Red and the NBC-Blue Networks in the United States, as well as specially prepared programs, are broadcast by the *short-wave* station.

The HK-54 200 Watt Xmitter

(Continued from page 101)

sistor we are over-driving the buffer-doubler. If desired a smaller tube such as the 6F6 or the 41 may be used in place of the 6L6 oscillator. Or the grid tap on the oscillator tank may be taken off at the lower end of the coil (nearer the B plus end) in order to reduce output.

Screen voltages are obtained with dropping resistors, 100,000 ohms for the oscillator and 20,000 for the buffer-doubler.

Bias Considerations

Bias for the first two stages is a combination of cathode and grid resistors. This combination is logical because there is less danger of damaging the tubes during tune-up; the plate current falls to a safe value when excitation is removed. In the final amplifier we have also used a combination bias arrangement. Fixed bias is supplied by the 45 volt battery and the automatic bias by the 5,000 ohm grid resistor. The 54 has high enough amplification factor to permit 45 volts to bring the plate current to a very low value when excitation is removed. If the buffer-doubler is keyed, instead of the final, the battery bias should be increased to the point of plate current cut-off.

Only one meter is used for all stages. Jacks are provided on the panel for each circuit that requires metering. If this system is followed be sure that the final plate jack is well insulated because it has full plate voltage on it and the panel is grounded. Also keep your fingers away from the jack, because you are only flirting with the angels if you touch it!

High voltage is obtained from a *separate* unit which can be placed in back of the R.F. chassis. Built on an 8 x 17 x 2 inch chassis this unit includes the plate transformer, the filter choke, filter condenser and the 866's, with their filament transformer. The high voltage transformer delivers 1250 volts at 250 mils. This is low voltage for the 54 but results in 150 watts output. Voltages up to 2000 may be safely applied to the 54 with a great increase in power output. It is a cinch to make this little 54 give up 210 watts with no sign of strain. If the higher voltage is employed we suggest all tuning-up be done at lower voltage. These little tubes will take it, but when a maladjustment is made if for only a moment, with 2000 volts on the plate, it is almost a certainty that the momentary input, which is nearly all dissipated by the plate, will run up to a half kw. and over. This is too much for even the largest tubes to stand, much less the little ones.

10 to 80 Meter Range

This transmitter will operate with good efficiency on all bands from 80 to 10 meters. The output, of course, depends on the plate voltage of the *final amplifier*. For four-band operation, three crystals are necessary —one for each of the three lowest frequency bands. This allows the choice of two frequencies in all but the highest frequency band.

As for antennas we suggest that the reader refer to past articles for there is not space enough for complete details. We might say though, that the *doublet* is about the best for general operation.

List of Parts

HAMMARLUND (Condensers, Chokes, etc.)

1—100 mmf. APC-100-for mounting in oscillator coil form

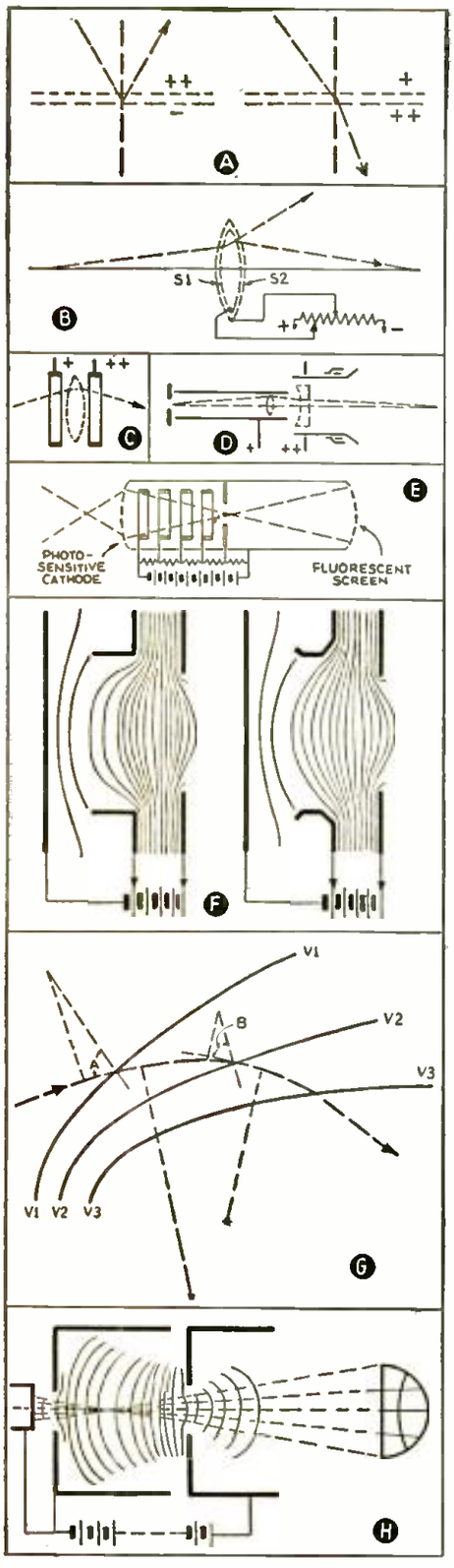
1—200-mmf. MC-200-M variable cond.

1—100-mmf. split-stator cond. MTC-100-B

(Continued on page 121)

"Seeing" with Electrons

(Continued from page 97)



A, reflection and refraction of electron beams by charged screens. B, wire screen electron lens; with S-1 positive, lens will converge ray, if S-1 is negative, ray is diverged. C, converging electron lens constructed of two ring electrodes. D, electron lens as used in oscilloscopes. E, electron image tube using electrostatic focusing. F, modification of electrodes in second electron lens and consequent change in field. G, how path of an electron through a series of equi-potential lines is plotted. H, electron image forming system.

varied over wide limits. If an infra-red image is used to illuminate the photo-sensitive surface, then a visible image corresponding in every way to the original one is formed at the screen. The ability of infra-red rays to penetrate fog and smoke is well known and so the applications of such an electron optical system will be obvious.

It has been known for many years that electrons will penetrate thin films of metal and, in fact, tubes have been constructed in which the electrons have been projected through a foil window into the outside air. It may be feasible to use such an arrangement in conjunction with an electron optical system, to examine materials which could not stand the low pressure within a vacuum tube. Due to the magnifying and resolving power of such a device, it seems reasonable to suppose that it would be of value in the study of small bodies, such as germs.

Modern Television Systems Use Electron Optics

Apart from these future developments, electron optical systems are of great value at the present time. Almost every modern television system uses electron optical devices at the transmitter and at the receiver. In the receiving tube, where a small but intense spot of light must be formed, electron lenses are used to form an image of an aperture illuminated with electrons emitted by a heated cathode. In one type of transmitting tube, an *electron image* of an optical image is formed. In the former device, electrostatic and magnetic lenses are both extensively used, while in the latter, a magnetic lens is preferred. The electron lenses in a receiver tube are designed to produce a spot at the screen as small as, if not smaller than, the object. In most practical cases it is the aberrations of the system rather than the refractive power of the lens which limits the size of the spot.

In an effort to reduce the aberrations of the systems, arrangements of electrodes are used so that electrostatic lines of force passing from one electrode to the next are nearly parallel to the axis of the system. Furthermore, these lines of force do not change their direction abruptly; but rather "flow" in gradual curves. In practice, it can be assumed that the electrons are refracted by a series of spherical surfaces. The index of refraction of the electron lens varies continuously along a considerable distance. The velocity of an electron is a function of the square root of the potential existing at any point in its path, and so the refractive index of an electron lens is proportional to the ratio of the square roots of the potentials applied to the electrodes of the system.

Before the properties of an electron lens can be computed, it is necessary to know the distribution of the electrostatic field. It is exceedingly difficult to derive an expression showing this distribution by theoretical means. Therefore, experimental methods are always used to obtain what is known as an equi-potential line plot of the system. An equi-potential line is one which joins all points in the lens space which have the same potential with respect to electrodes. Actually, of course, the distribution can be better expressed in the form of equi-potential surfaces, but as the systems are always symmetric, then a cross-section of the surface or equi-potential line is satisfactory. If an electron lens is to be

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completely determined, many hundreds of these lines must be found. The lines of force are at right-angles to the equi-potential lines, and so the electrons are accelerated at right-angles to the direction of the equi-potential lines. The force exerted by the field is proportional to the voltage, while centrifugal force will tend to prevent the deflection of the electrons by the field. The path of the electrons through the whole electron lens can be computed step by step in terms of the deflection at each equi-potential line. Other means, however, have been developed which are shorter and more convenient for the various types of systems, although of course, the more complex method must be resorted to in many cases.

In general, the design of electron optical systems is one of the most fascinating subjects that one can imagine. The art is a blend of the science and skill of the mathematician and physicist combined with the knowledge and dexterity of the experimentalist. Unlike many other branches of science, the end is just as interesting and absorbing as the means. The ways in which electron optical systems may eventually be used are almost unlimited.

In the preceding paragraphs we have mentioned that infra-red rays can pass easily through fog and smoke and also that these rays can be converted into electron images and amplified and then transformed into visible light. What a wonderful aid to navigation this device could be! Rock salt lenses could be used to focus an infra-red image on the photo-sensitive surface and the amplification could be so large that obstacles could be detected from considerable distances. Such a system might even be used in the art of communication, perhaps infra-red rays will be the eventual television carrier.

Future Opportunities for Electron Optics

The magnifying, amplifying and resolving power of electron optical instruments presage their wide-spread use in astronomical fields. Their ability to convert infra-red and ultra-violet light into visible light will be invaluable in the study of the stars. No longer need photographic plates be exposed for hours to detect far distant suns. Gone will be the practice of staring into eye pieces for a faintly luminous dot in a black sky.

In the field of microscopy, electron microscopes will open new worlds which are far beyond the reach of conventional instruments. Already a great deal has been learned about the structure of emitting surfaces, such as the cathodes employed in the construction of radio tubes. Information such as this can be obtained in no other way. The same methods can be applied to the study of the surface structure of various materials and the "electron pictures" of these surfaces are invaluable. It is only reasonable to suppose that the electron optical examination of materials will be still further extended and we can expect much from the knowledge so gained in the fields of metallurgy and physical chemistry. It would seem that modified electron microscopes can be invaluable to medicine. The magnification and resolving power of the instrument may be put to good account in the search for new drugs and medicines, and for the fundamental secrets of disease. Even the secrets of life itself may be revealed by the use of an instrument which is basically capable of probing the structure of the chromosomes and the genes.

The amplifying ability of the electron image tube may be turned to good uses in many fields. For instance, one of the tubes might be used in conjunction with a motion picture camera. The intense image formed by the tube would make the huge lights now used on motion picture sets unnecessary.

The uses of electron optical principles are by no means all in the future, however. We have already mentioned the fact that present-day television systems utilize electron optical devices. The application of these principles can be broadened still further. They can be used in the design of radio tubes, both amplifiers and oscillators. One of the more familiar of the former types is the well known beam power tube which ably demonstrates the advantages of such design. Tubes having negative resistance characteristics have been constructed and are remarkable for their efficiency and stability.

Courtesy American Television Institute, Inc.

Hints for the Facsimile Experimenter

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grams—can be readily used; the fluctuations in the plate voltage of an audio amplifier output tube in a receiver (50 to 200 volts) being sufficient to record satisfactorily.

Another system of interest to the facsimile experimenter employs a neon crater tube as one of the diagrams shows, this tube being modulated by the picture signal. The fluctuations in the light beam from the crater tube are passed through a tapered quartz rod. The tube and its stylus rod is moved along on a carriage so as to jet unit are mounted on a carriage propelled across the paper by a threaded rod or shaft driven by motor and gear. The paper is moved up the proper distance, about 1/60 to 1/100 of an inch per second, after each passage of the ink jet across it.

A wiring diagram is suggested herewith in which the corona type recorder is shown connected with a high-frequency oscillator. The synchronizing impulses which occur at the end of each line cause the sensitive relay to close the circuit to the release magnet and the cylinder starts rotating

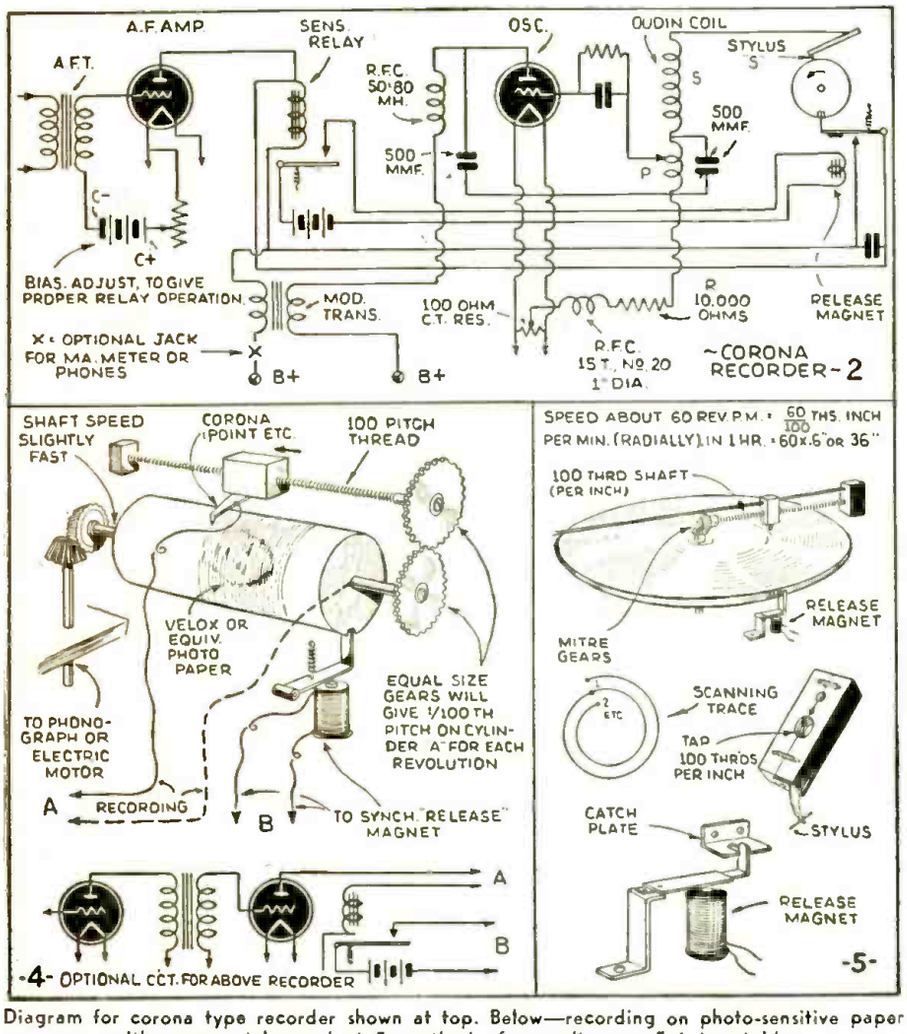

Diagram for corona type recorder shown at top. Below—recording on photo-sensitive paper with corona stylus and at 5, method of recording on flat turn-table.

give 60 to 100 lines per inch definition on a rotating cylinder covered with photo-sensitive paper such as Velox or Azo.

One of the systems developed by Captain Ranger is also shown and here a jet of vaporized ink is modulated by a magnetically operated valve as the drawing shows. In one of these systems, an ordinary paper is used and the ink jet causes a line of fluctuating width to be recorded on the moving paper. An ordinary throat spray atomizer might be improvised for this purpose by the experimenter, so as to spray a modulated ink vapor line on the moving paper. In one of the commercial types of recorders utilizing this system a piece of rubber tube connects the atomizer with the magnetic valve and ink jet. The valve and again. The speed of the recording cylinder has to be experimented with and an old phonograph is a good piece of apparatus to start you off, as the speed of these machines can be regulated quite accurately. In any event, the speed of the recording cylinder (or paper) should be *slightly faster* than the speed of the transmitter. In this way, the recording device is always ready to trace just before the transmitter and it is likewise then always ready for the synchronizing impulse, which pulls down the magnet armature and releases the cylinder. Looking at the diagram we see that the modulation current is caused to modulate the high frequency corona discharge coming from the Oudin coil, by means of a modula-

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Hints for the Facsimile Experimenter

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tion transformer connected in the plate circuit of the oscillator tube. The values of the R.F. chokes and the resistors shown in the diagrams of the oscillator tube can vary over a wide range, and they will vary also with the type of tube used. The Oudin coil may be an ordinary broadcast tuning inductance, or preferably one having more turns of secondary wire on it than the usual broadcast coil. The primary of the coil is tuned by a variable condenser to get maximum corona at the stylus point. (A phonograph needle will serve.)

When the armature is attracted it incidentally closes a circuit (including a condenser) across the winding of the sensitive relay in the audio output tube of the receiver (to absorb any inductive surge).

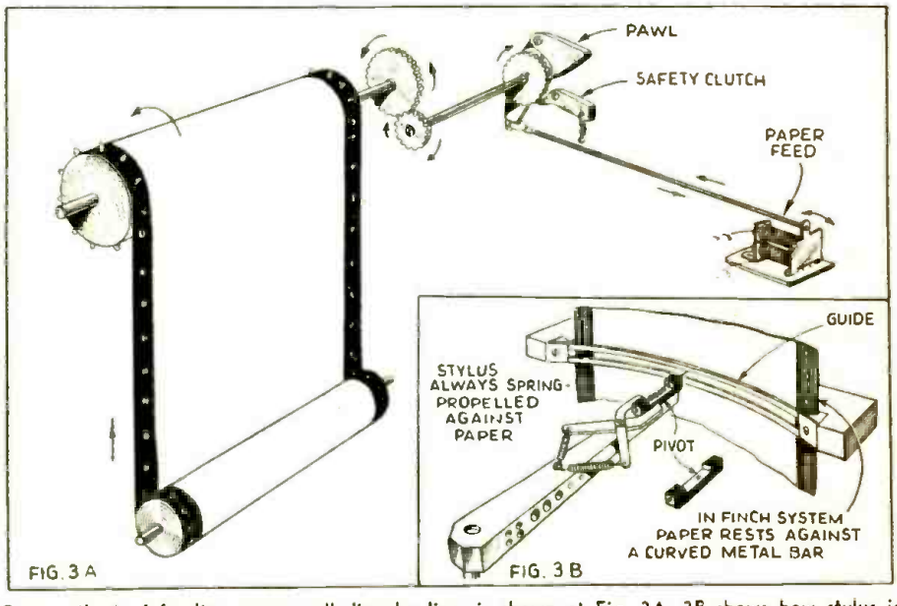
The facsimile images are now being sent out on the regular broadcast frequencies and an ordinary *broadcast type* receiver can be used for this purpose, the recording device being connected in the place of the loudspeaker. The facsimile signal sounds like a low frequency note of fluctuating pitch if listened to on a speaker or a pair of phones.

Some experimenters may want to try the recording of facsimile images with an ordinary disc-type phonograph, and one of the sketches shows an idea of how to rig such a set-up. The synchronizing impulses (using a primary sensitive type relay) cause the release magnet to release the turntable each time such a pulse is received from the transmitter. As mentioned before, the speed of the turntable is regulated to be slightly faster than the required speed, so that the turntable is always ready for the synchronizing signal and ready to start on its next revolution. The carriage carrying the stylus, or whatever type you determine to try, may be carried across the turntable by means of a 100 thread to the inch shaft, rotated by mitre gears as shown in the picture.

This threaded shaft could also be rotated by a small motor if desired. It is a good idea to slit the stylus block as shown, arranging a hinge at one end or else simply mounting springs on the split block, which will enable the operator to quickly release the block from the threaded shaft and slide it back to the starting position.

CORRECTION NOTICE

With regard to the article entitled—"A 3 for 5 Receiver," appearing on page 688 of the April issue, the condenser used for bypassing the R.F. choke in the power supply, "C-10," should have a value of about .002 to .001 mf.



One method of feeding paper roll, line by line, is shown at Fig. 3A. 3B shows how stylus is arranged in Finch recorder.

1-Tube Duplex

(Continued from page 93)

against moisture, the coils should be coated with coil dope.

Parts List

NATIONAL
1—100 mmf. tuning condenser, SE100
1—2½ mh. R.F. choke
1—Isolantite octal wafer socket
1—Velvet Vernier Dial type B
2—Small HRO dials

IRC (Resistors)
1—2 meg. ½ W. fixed resistor
2—50,000 ohm ½ W. fixed resistors
1—250,000 ohm ½ W. fixed resistor
1—50,000 ohm potentiometer with D.P.S.T. switch

CORNELL-DUBILIER (Condensers)
1—.5 mf. tubular condenser
1—1 mf. tubular condenser
1—.0001 mf. mica condenser
2—.0005 mf. mica condensers

MEISSNER
1—Coil-shorting rotary switch, type 19203

RAYTHEON
1—1E7G tube

BLAN
1—Chassis as per specifications in drawing

Wedge-Shaped Crystal

(Continued from page 77)

Frenchman discovered something else. He found that tuning circuits equipped with "cockeyed" crystals, or more precisely described, with crystals of wedge shape, retain their selective properties. The sides of their selectivity curve are as steep as customary, but instead of producing a very sharp and narrow pass-band, a remarkable broad pass-band results. Despite the extreme selectivity the lowest pipe of the organ as well as the highest soprano voice is reproduced by the radio receiver (see Fig. 1).

The whole trick consists of the discovery that *wedge-shaped* crystals do not resonate at a *single* sharply-defined frequency, but *in a band of a great many* closely related frequencies. See Fig. 2. Or said in other words; wedge-shaped crystals operate like a great number of separate crystals. Such a crystal resonates, as demonstrated in Fig. 2, on a great number of *inter-chained frequencies*, and as result a resonance-curve is obtained which is broad on its head (see Fig. 3), but has steep sides, which reject the most powerful station on an adjacent channel.

And now something else of interest. The width of this head—or more precisely described—of the pass-band obtained, depends on the thickness at both ends of the crystal. What this involves is demonstrated in Fig. 4. If the thickness of the crystal on side "A," is the determining factor for the oscillation-frequency F1, and the thickness of the crystal on side "B" is the determining factor for the frequency of oscillation F2, then the crystal oscillates at all frequencies between F1 and F2, as shown in detail in Fig. 2 (or in outline in Fig. 3). Thus by choice of suitable crystals of *wedge-shape* one can produce a pass-band of any width desired. In our case a bandwidth of 10 kc. (10,000 cycles) should be sufficient to satisfy the average demand for *faithful reproduction* of any short-wave or broadcast program received.

How such a crystal looks is shown in Fig. 5. This crystal is of exaggerated wedge-shape for demonstration. In actuality this wedge-shape is less pronounced, and is hardly visible at a superficial inspection.

Mr. Guerbilsky is seen holding a wedge-shaped crystal in Fig. 6; it is shown in a conventionally designed American superhet, in Fig. 7. How the installation of the crystal was executed is shown in detail in Fig. 8. The power of rejecting unwanted stations is increased 5-fold.

The alterations consist mainly of rewiring the first I.F. transformer, as shown in Fig. 9, into a circuit as presented in Fig. 10.

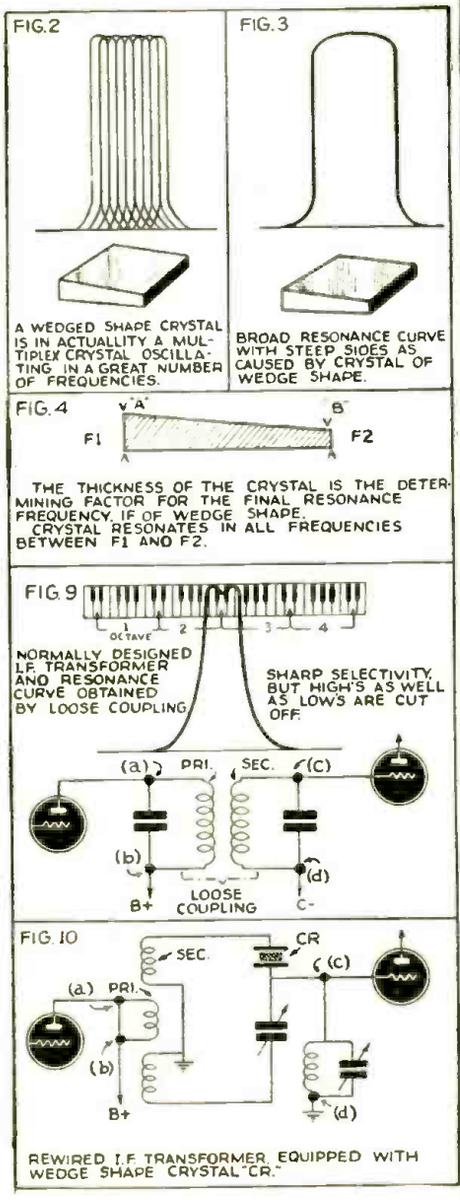


Fig. 2—How overlapping frequencies are selected as one band by wedge-crystal. 3—Broad resonance curve of wedge-shaped crystal. 4—Values of two extreme dimensions of crystal determines frequency band passed. 9—Resonance curve for average I.F. transformer—note sharpness which cuts off many desirable high and low frequency components of music. 10—New I.F. circuit with wedge-shaped crystal.

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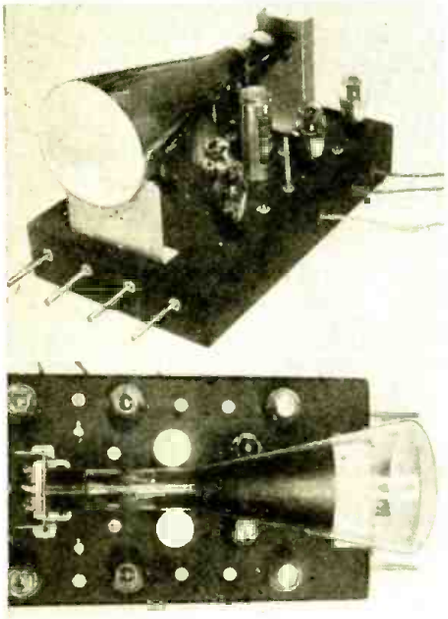
(Continued from page 99)

will always be available, regardless of the type of transmission which is received.

The synchronizing signal *separator* diode operates directly from the output of the diode detector of the receiver, in order to eliminate all coupling condensers in this circuit. It has been found that such condensers invariably assume a charge in proportion to the varying average image modulation. This in turn causes the vertical sides of the image to vary in shape as the transmitted signal varies.

The diode tube is biased by the voltage across the cathode resistor of the triode, which makes the plate of the diode negative so that no signal is passed until the cathode reaches the negative peak of the synchronizing signal. At this voltage, a signal is passed to the triode, changed in phase and then fed to a network which separates the high and low components of the synchronizing pulse. A small inductance blocks the high frequency impulses and a condenser in series with the inductance bypasses surges from the grid circuit. The high frequency



Front and top views of sweep circuit—cathode-ray tube chassis.

pulses are taken from the plate of the triode, while the low frequency pulses are taken from the remote side of the ½-hy. choke. Difficulty was encountered in obtaining a ½ hy. choke for the model and a 1 hy. unit had to be taken and half the core laminations removed to lower the inductance. The same procedure can be used by other builders.

It must be remembered that a voltage of some 3,000 is used on the cathode-ray tube and this voltage is **dangerous! Turn off the current before making any adjustments or changes.** Remember that the insulation at all points must be adequate to prevent breakdown with the full supply voltage. This is especially true of those portions of the circuit at or near the cathode of the C.R. tube.

Secondly, the input to the 885 tubes must of necessity be a high impedance circuit and all precautions must be taken to keep the capacity of wires and resistors in these input circuits at a minimum. It was found that if the metal front plates of the 15,000 ohm potentiometers were removed, this disconnected the metal covers from ground and greatly reduced the capacity of the resistance elements to the chassis. It is recommended that this change be made.

The layout of the parts can be seen in the photos. The input leads enter from the side, near the large end of the C.R. tube (the iront end of the chassis). The 6H6G diode synchronizing rectifier and the 76 triode phase inverter are located alongside of each other, directly opposite this input point. The output of the triode feeds to the two type 885 tubes, which are on the sides of the chassis at the front end. One side of the chassis running from front to back is the *high-frequency* sweep side, and the other is the *low-frequency* side.

After the 885 tubes are the two control resistors which control the plate voltages on the thyratron (885) and the input to the push-pull amplifier. Next comes the first type 41 tube and between this and the second 41 of the P.P. amplifier is the resistance-capacity network which reverses the phase and reduces the input to the second 41 to 1/mu of the plate signal of the first 41. On the inside, between the second type 41 tubes of the high and low sweep circuits, are the dual potentiometers of the balanced *centering* circuits.

Right in the center of the chassis with the socket mounted on a U-shaped strip of aluminum, is the cathode-ray television receiving tube—a type 54-9-T. The front end of this tube rests in a cradle having a 5 inch semi-circular cut-out and a tape strap to hold the tube in place.

Under the chassis are the various condensers and resistors and the ½ hy. choke. These may be seen in the photo.

The leads which carry high voltage, the positive side of the 700 volt supply and the negative side of the 2400 volt supply are passed through heavy rubber grommets which aid the insulation of the wire and prevent chafing where the wires pass through the metal.

This chassis (the video chassis) is made of *aluminum* instead of the sheet iron which was used for the other two chassis.

Controls Are Simple

The controls which appear on the iront of the chassis are the *bias control* of the type 6H6G synchronizing tube, the input potentiometers of the type 885 tubes and the 0.5 meg. *focussing* potentiometer of the voltage divider for the C.R. tube.

The .0000 mf. condenser and the 0.1 mf. condenser which are connected between the plate and cathode of the type 885 tubes control the *frequency* of the sweeps for high and low frequency scanning, respectively. These two condensers are correct for the standard 441 line images, 30 frames, interlaced, which are now being transmitted. If the receiver is to be used for other picture definitions or a different number of frames, these condensers will have to be changed accordingly.

Operation of the Set

Do *not* connect the input to the receiver, yet, and before turning on the current, set the sliders on all the control resistors to the center of their scales. Next, remove the two 885 tubes from their sockets and turn on the power. After a minute a greenish spot should appear on the end of the C.R. tube. Adjust this by means of the various controls on the front and top of the chassis to a small half-brilliant dot and center it by means of the centering controls.

(Continued on following page)

Next insert the 885 tubes, which should cause the dot of light to become an oblong of green on the end of the tube. Further adjust this until the length is about ¼ longer than the height: recenter the oblong and adjust the brilliance to about half its full value. **Do not make the raster too bright** as the tube may be burned and the images will not be well modulated.

Finally connect the input of the video chassis to the video receiver. A note at this point is necessary. Since the lower terminal on the video chassis input is not connected to the chassis, the video chassis must not be connected to the receiver chassis. These two chassis must be insulated from each other.

Do not become careless—use all precautions to avoid touching high voltage wires, terminals or units.

List of Parts

Du MONT LABS., INC.

1—Type 54-9-T tube
2—Type 885 tubes

RAYTHEON

1—Type 6H6G tube
1—Type 7o tube
4—Type 41 tubes

HAMMARLUND

3—5-prong Isolantite sockets
1—8-prong octal Isolantite socket
1—7-prong Isolantite socket
2—Type APC-50 3-50 mmf. midget variable condensers—screwdriver control
4—6-prong bakelite sockets

UNITED TRANSFORMER CORP.

1—1 henry choke, type PC-8

I.R.C. (Resistors)

1—Type CS potentiometer, 0.4 meg. screwdriver control
2—Type 14-118 potentiometers, 15,000 ohms (with front plate removed, per description)
2—Type CS potentiometers, 4 meg. screwdriver control
2—Type CS potentiometers, 4 meg. with shafts for knobs
2—Type CS potentiometers, 0.5 meg. screwdriver control
1—Type 11-133 potentiometer, 0.5 meg. with shaft for knob
1—Type 11-114 potentiometer 5,000 ohms screwdriver control
2—Type CD-CS dual potentiometers, 4 meg. screwdriver control
1—Resistor, 10,000 ohms, 1 watt
1—Resistor, 25,000 ohms, 1 watt
2—Resistors, 0.25 meg., 1 watt
2—Resistors, 0.1 meg., 1 watt
2—Resistors, 1 meg., 2 watts
4—Resistors, 50,000 ohms, 2 watts
2—Resistors, 1 meg., 1 watt
1—Resistor, 15,000 ohms, 1 watt
4—Resistors, 5 megs., 1 watt
2—Resistors, 0.2 meg., 1 watt
4—Resistors, 2,000 ohms, 2 watts
1—Resistor, 6,000 ohms, 1 watt
2—Resistors, 0.5 meg., 2 watts
1—Resistor, 3,000 ohms, 2 watts
4—Resistors, 400 ohms, 20 watts
4—Resistors, 8,000 ohms, 20 watts
4—Resistors, 24,000 ohms, 20 watts
4—Resistors, 20,000 ohms, 20 watts

SOLAR (Condensers)

1—Oil-filled condenser, .25 mf., 3000 volts, XI-30-025
13—Paper condensers, 0.1 mf., 600 V., S-0240
2—Dual 8-8 mf. electrolytic condensers, 500 V., D-820
2—Mica condensers, .0001 mf., 1000 V., XB-1-31
6—Mica condensers, .025 mf., 1000 V., XB-1-125
1—Mica condenser, .001 mf., 1000 V., XB-1-21
1—Mica condenser, .01 mf., 1000 V., XB-1-11
1—Paper condenser, .5 mf., 600 V., S-0265
1—Mica condenser, .0006 mf., 1000 V. (5% tolerance), XB-special

AEROVOX

2—.025 mf. mica condensers, 1400 V.

PAR-METAL

1—Aluminum chassis, crackle finish—10"x17"x3"

MISCELLANEOUS

25—¼" rubber grommets
1—Roll No. 20 heavy insulated hook-up wire
1—Roll No. 16 heavy insulated hook-up wire
Miscellaneous pieces of sheet aluminum, screws, bolts, nuts, lock washers, etc.

The 2AJL Superhet Receiver

(Continued from page 95)

The oscillator band-setting condenser is mounted directly on the panel near the oscillator tuning condenser. This condenser is controlled by the dial between the "R" meter and the main tuning dial in the photo. The R.F. and Detector band-setting condensers are ganged together by mounting both condensers on a piece of mycalex 4¼" x ⅝". The two shafts were coupled by a bakelite coupling. This effectively insulated their rotors from each other, since the R.F. stage condenser must be insulated due to the use of AVC. This 2-unit gang is mounted on the front panel with the detector condenser next to the panel. Its dial is just to the right of the tuning dial.

Beat Frequency Oscillator

In designing this receiver, it was decided against using a panel control for varying the beat note when using the BFO. Once set by the control on the BFO can, the beat note will remain the same indefinitely. Naturally, this requires an electron-coupled oscillator for extremely good frequency stability. The Meissner BFO unit will require a slight change for this purpose. As supplied by the manufacturer, the BFO unit has all its terminals brought out to the bottom. The grid-leak and condenser (C36, R28) are mounted inside the can. A quarter-inch hole is drilled about 2¾" up the side of the can. Through this hole is passed a piece of shielded wire, one end of which goes to a grid cap and the other end goes to the grid-leak and condenser. The other end of the grid-leak and condenser goes to the terminal marked "D" on the BFO transformer. The two terminals marked "AVC" and "B+" are connected together internally and only one terminal brought out; this goes to the cathode of the 6J7. The "P" terminal is *grounded*. The oscillator is coupled to the second detector by wrapping a lead (insulated wire) from the plate of the oscillator tube around the wire going to the plate of the 6H6. About 5 or 6 turns will be sufficient.

Crystal I.F. Filter

The crystal I.F. stage is quite standard. A special switch is used to cut out the crystal. This switch is mounted on the phasing condenser C13. It consists of a small piece of brass angle fastened to one of the empty holes in the isolantite end plate. When the plates are turned all the way in, the rotor touches the brass stop and thus shorts out the crystal. This type of switch introduces practically no additional capacity in the circuit. This phasing condenser is mounted on small brackets just over the crystal socket. An insulating shaft allows it to be varied from the front panel. The 100 mmf. band width condenser C11 is also insulated from ground.

Tuning up the receiver is not very difficult. Either use a calibrated oscillator, or better still, use the crystal in a special external oscillator. Place the phasing condenser so that the crystal is shorted out. The output of the oscillator is connected to the control grid of the first detector. Using an output meter, each I.F. transformer is aligned for maximum output. After disconnecting the external oscillator from the 1st detector the band-setting condensers are set for the frequency range desired and signals tuned in. The phasing condenser is kept in the mid-scale position. If a station interferes with the signal being received, vary the phasing condenser until the interfering station is eliminated or markedly reduced in intensity. The band width condenser can be varied so that the I.F. selectivity is varied from a few hundred cycles to about two thousand cycles.

The "R" meter is operated by the AVC. With the BFO turned off the R.F. gain control, R35, is turned for maximum volume, the "R" meter control, R36, which is mounted in back of the meter on the chassis is then varied until the meter reads zero with no signal input. Thereafter it is merely necessary to turn the BFO off by S2 and AVC on by S3 to determine the strength of the received signals. The meter is a special Triplett 2" 1 ma. milliammeter with a special "R" scale and movement.

Noise Limiter

The noise limiter action is controlled by switch S1 mounted on the back of R19. When R19 is turned clockwise S1 is turned on. R19 is varied until the signal rides over the noise level. The noise limiter will work only when the noise level is higher than the desired signal level. Both the BFO and AVC are controlled by SPST toggle switches on the front panel.

Coil Data

L1 and L2 are wound with 34 SCC wire at the bottom of the coil ⅛" from L2 or L3. All coils are wound with No. 18 enamel wire on 1½" Hammarlund forms, spaced to a length of 2" except for the 14 and 28 mc. coils which have a winding 1½" long.

	3.5 mc.	7 mc.	14 mc.	28 mc.
L1	6 turns	5 t.	5 t.	3 t.
L2	28½ t.	14.6 t.	6.5 t.	3.5 t.
Tap	none	at 9.5 t.	at 3.4 t.	at 2.4 t.
L3	20 t.	9 t.	5 t.	3 t.
L4	28.5 t.	14.6 t.	6.5 t.	3.5 t.
Tap	none	at 9.5 t.	at 3.4 t.	at 2.4 t.
L5	25.5 t.	13.5 t.	6.5 t.	3.5 t.
Tap 1	at 22 t.	at 8.1 t.	at 3.3 t.	at 3.4 t.
Tap 2	at 8.4 t.	at 4.4 t.	at 2.4 t.	at 1 t.

Parts List

HAMMARLUND

12—SWF5 coil forms
C1—C7—C31—35 mmf.—MC35S
C2—C8—C32—100 mmf. MC100M
C12—100 mmf. MC100S
C13—15 mmf. HF15
7—S8 isolantite octal sockets
1—S-5 isolantite socket

MEISSNER

T1, T2—matched crystal I.F. transformer units 465 kc. No. 7458
T3—iron core I.F. transformers 465 kc. No. 6123 Alignaire
T4—air core I.F. transformers 465 Alignaire No. 6644
T5—Alignaire BFO transformer No. 6779

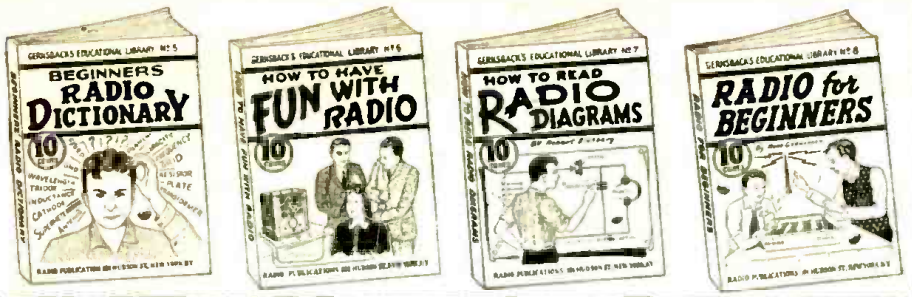
I.R.C. (Resistors)

R1, R9, R13—.25 meg. ½ watt fixed resistors
R4, R7, R11, R15, R17, R30, R29, R33, R34, R32, R5, R36—50,000 ohm ½ watt fixed resistors
R2, R10, R14—350 ohm ½ watt fixed resistors
R6—500 ohm ½ watt fixed resistor
R3, R8, R12, R16, R23—3000 ohm ½ watt fixed resistors
R37—1000 ohm ½ watt fixed resistor
R28, R24—100,000 ohm ½ watt fixed resistors
R31—10,000 ohm ½ watt fixed resistor
R21—1 meg. ½ watt fixed resistor
R18, R22—5 meg. ½ watt fixed resistors
R25—25,000 ohm ½ watt fixed resistor
R39—10,000 ohm potentiometer
R37—1000 ohm potentiometer
R20—350 ohm 20 watt wire wound resistor
R27—20,000 ohm 25 watt semi-variable wire wound resistor
R19—10,000 ohm potentiometer with switch
R26—.5 meg. potentiometer

CORNELL-DUBILIER (Condensers)

C4, C5, C6, C9, C10, C11, C16, C17, C18, C19, C20, C21, C24, C26, C29, C39, C34, C37—.1 mf. 400 V. paper condensers
C3, C15, C40—.01 mf. 400 V. paper condensers
C30—.5 mf. 400 V. paper condenser

(Continued on page 118)



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The 2AJL Superhet Receiver

(Continued from page 117)

C27, C25—5 mf. 50 Volt electrolytic condensers
C28, C41—1 mf. 450 V. electrolytic condensers
C35—.00005 mf. mica condenser
C33, C22, C23—.0001 mf. mica condensers
C36—.00025 mf. mica condenser
C38—see text

BUD

1—17" x 11" x 3" chassis
1—bottom plate
2—1¾" dials 0-100°

RAYTHEON (Tubes)

2—6J7
1—6L7
3—6K7
1—6H6
1—6C5
1—6X6G

PAR-METAL

1 panel 8¾" x 17" rack type grey mounting

BLILEY

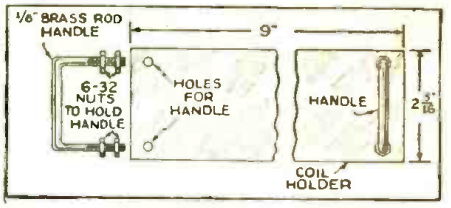
1—465 kc. crystal type CF1

TRIPLETT

1—2" special R meter, 1 ma.

MISCELLANEOUS

S2—S3—SPST toggle switches



Detail of "coil drawer."

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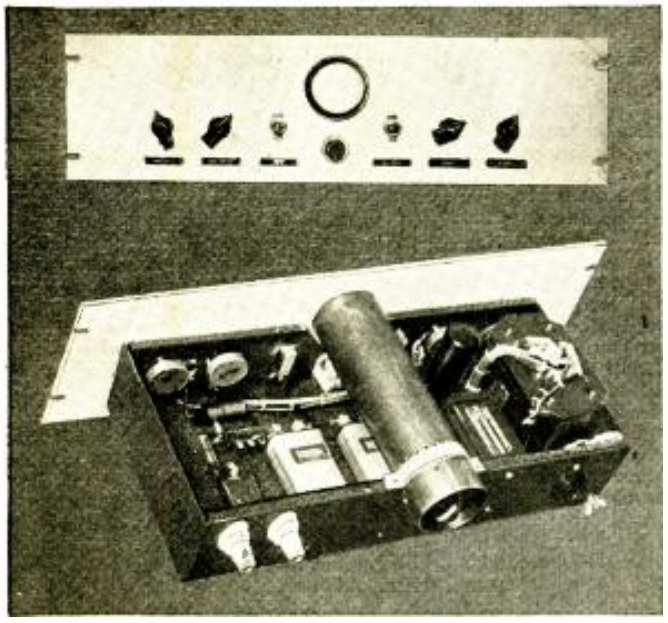
Push-Button Control for Transmitter

(Continued from page 103)



Front and top views of cathode ray oscillograph as built up for "rack" mounting by Mr. McEntee. It is very compact and forms a useful and handy adjunct to any complete Ham transmitter.

primary keying is now employed. With the use of this type of keying the final amplifier power supply does no work until the key is depressed, even though the "HV" switch has been closed. The keying relay (5) is operated on low voltage, about 6.5 V. to be exact, so that contact with the key or its leads will cause no inconvenience.

Remote Control Unit

The *remote control box* has three switches and lights which, in effect, duplicate those on the control panel, although the "LV" switch is connected slightly differently. The outlet for the key obviates the necessity for another control lead to the transmitter. A jack on the back of the control panel enables the operator to plug a key in if desired.

The only relay remaining on the control panel, No. 4, is an overload relay. It may be set to open at any desired current by means of the 100 ohm control connected across its coil. This relay is sensitive only to overload in the high voltage power supply, although when it opens both high and low voltage power supplies are rendered inoperative.

The overload relay was originally made for use on a fractional horsepower motor, which of course draws rather high current. The winding was removed, and the spool rewound with all the No. 34 enamelled wire it would hold. This winding in connection with the 100 ohm rheostat gives a range of operation from about 15 ma. upward. This relay naturally remains open, once it has operated, and must be manually reset, the lever at the lower center of the panel performing this service. Overload relays may be bought ready-made if so desired.

It will be seen from reference to the circuits published in the March issue, that considerable rewiring of the power-supply chassis cable is required to enable complete control of all functions from the expanded control panel described herein. No changes are required in the cable from power supply to exciter unit, but a few changes must be made in the high voltage to the final amplifier chassis. These are shown in the small detail drawing (Fig. 3) accompanying this article. It will be seen that the screen-grid gets its voltage from a different source than originally.

The socket marked "POWER" corresponds to that at the extreme lower right in the March issue. All 7 prongs are now used, however. That marked "CT" goes to the center tap of the high voltage transformer (T5). "GND" is ground and "7.5 V Tr." goes to one side of the primary of the filament transformer (T3) for the RK20A. This change puts the 50 ohm rheostat in series with T3's primary. It should be mentioned that sockets are used on all chassis all connecting cables having plugs on both ends.

The same switches and pilot lights (110 V. type) as shown in the March article are used, although the wiring must be completely revamped. The changes will be more readily understood if the circuits from both articles are compared.

The 50 ohm, 50 watt rheostat is in series with the lead to the transformer which lights the RK20A. This transformer, as mentioned in the last article, has 3 windings which when connected in series total 10 volts. The rheostat then allows the voltage to the RK20A to be set at exactly 7.5 V., no matter what the line voltage may be. Measurement should be made *at the socket* with an external meter. Then the A.C. voltmeter on the power panel can be set at the proper value to give 7.5 V. at the tube socket. This latter meter will probably read around 9 V., due to the potential drop in the cable leads.

Changing from Phone to C.W. Tubes

The only other control on the panel is for change from phone to C.W. Only two contact pairs are required, one for shorting the keying relay and the other which turns on the modulator power transformer. Thus as soon as this switch is turned to the phone side the modulator filaments are lighted. The center-tap of the power supply runs through contacts on relay No. 3 so that no high voltage flows in the modulator until this relay operates. As soon as the modulator power transformer is energized, a relay (6) in the modulator operates and removes a short on the modulation transformer secondary and a series resistor. This resistor is used to drop the plate voltage of the RK20A to 1,000 volts for phone use, from the higher value of 1250 V. used on C.W. The resistor should be adjusted so that at rated current the voltage to the RK20A is 1,000 V. The relay always oper-

(Continued on page 120)

Push-Button Control for Transmitter

(Continued from page 119)

ates as soon as the switch on the control panel is turned to the "phone" side.

The power-supply on the modulator as originally shown had no connection cable and socket. With the new control panel a 5 prong plug and socket connection is used, with the 110 V. A.C. leads connected to the socket terminals are usually employed for heater connections. The other two leads shown on this socket simply are connected in parallel with the modulator high voltage switch so that the modulator may be relay-controlled by relay No. 3 as described.

In this connection it should be noted that the screen-grid of the RK20A is fed its 300 V. through a 30,000 ohm resistor from the H.V. lead. Connections are shown on the drawing. This makes it possible to use a simple modulation circuit to get 100% modulation. The variable taps on the modulation transformer are connected for 3800 ohm plate to plate primary and 8200 ohm secondary load.

This completes the discussion of the control system except for the remote switch box. This simply has three D.P.S.T. switches, three pilot bulbs and a key jack. While the pilot lamps in the control panel are of 110 V. type, those in the control unit are of 6.3 V. size and are supplied by the small transformer in the control unit. A heavy weight should be put in the control box to keep it from sliding on the table.

Remarks Concerning Relays

The relays on the control unit are mounted on ½" thick sponge rubber to quiet them, and the keying relay is surrounded by a box lined with the same material.

Also mounted on the relay panel are all sockets for cables to all the other units. A double block holds two line fuses.

All the relays are used as received except No. 3 which must be slightly altered. As seen on the diagram, one side of this relay has three contacts, one of which moves with the armature, and two that are fixed. The extra contact can be removed from one of the other relays as all the contacts are not needed. If a relay was readily available with single-throw, triple-throw, it would do as well, but such a unit must usually be specially ordered, while those used here are all standard types. Still another set of contacts might be put on this same relay to cut out the receiver when transmitting.

The thermal unit is made from two thermal strips which are obtainable from scientific supply companies. They are mounted on a block of bakelite separated by about ⅜". One strip has a thin layer of asbestos or mica over which is wound resistance wire taken from a 110 V. type cigar lighter. An adjusting screw against the other strip enables change in the delay period which should be no less than 30 seconds.

Oscilloscope

The oscilloscope is of a simple type, and produces the trapezoid type of figure when used to measure modulation. A small one-turn loop at the ground end of the plate tank coil enables R.F. to be transferred to one set of plates in the oscilloscope, while audio is taken from the output transformer through a high voltage condenser. The A.F. voltage is controlled by the potentiometer on the oscilloscope panel, while the R.F. amplitude is varied by moving the pickup coil in relation to the final plate tank.

The oscilloscope chassis is inverted and the parts mounted inside for compactness. The tube itself is shielded in a steel tube 2⅛" inside diameter as protection from stray fields. Its socket is mounted inside the tubing by means of two angle brackets.

Room has been left in the chassis and space and controls provided on the panel for a built-in *sawtooth* sweep circuit, which may be added at any time. This type of sweep is not as convenient, however, as

to use the audio supply of the transmitter for this purpose.

A 2,000 V. D.C. meter was shown on the diagram of the power supply unit (2nd article: see March issue). This unit was made from an ordinary 15 ma. meter in series with fixed resistors, the latter not being shown on the diagram. There are five 25,000 ohm. one 15,000 ohm. and one 10,000 ohm units, all in series. The first six are of the fixed type, while the last is variable and serves to set the meter accurately. All are of the 10 watt wire-wound type, and are mounted on a small bakelite panel near the meter.

This completes the description of a transmitter well worth owning and using. Operation is smooth and rapid and it is certainly convenient to have all controls on the front panel. The remote control unit makes operating a pleasure and is well worth the extra expense and time needed for construction.

List of Parts—Relay Control Panel

GUARDIAN
3—DPDT 110 V. A.C. relays (1500 type coil)
2—SPST 6 V. A.C. relays

BUD
1—5" x 19" steel panel with rack section to match
1—Bakelite box with cover
1—Chassis 7" x 14" x 3" deep
4—DPST toggle switches
1—SPST toggle switch
2—Jacks
6—Jack type insulators
6—Name plates
2—Octal bakelite sockets
2—5-prong plugs
1—5" bakelite socket

TUBES
1—5T4 rectifier
1—2002 oscilloscope tube

U.T.C.
1—PA 913 power transformer
1—PA 48 C choke
1—FT4 filament transformer

CORNELL-DUBILIER
2—2 mf. 1000 V. condensers
4—.25 mf. 600 V. tubular condensers
1—.01 mf. 2500 V. mica condenser
1—2 mf. 2000 V. condenser
2—.1 mf. 600 V. tubular paper condensers

I.R.C.
1—500 ohm DHA resistor
1—30,000 ohm HAA resistor
1—1 meg. 2 W. resistor
2—1 meg. ½ W. resistors
1—3 meg. 1 W. resistor
2—.5 meg. variable resistors
1—.2 meg. variable resistor
1—2000 ohm HOA resistor

MISCELLANEOUS PARTS*
1—50 ohm 50 W. rheostat
2—Thermal strips
4—Pilot lamps (6.3 V.)
1—Overload relay (see text)
1—100 ohm rheostat
1—Double fuse block
1—DPST rotary switch
Knobs, hardware, etc.

*Most radio mail order houses can supply these items if properly identified as to title of article and issue (month and year) of SHORT WAVE & TELEVISION.

The HK-54 200 Watt Xmitter

(Continued from page 108)

1—N-10 neutralizing cond.
2—8-prong Isolantite sockets
5—4-prong Isolantite sockets
1—5-prong Isolantite socket
2—2.1 mh RF choke receiving type CHX
1—2.1 mh RF choke transmitting type CH-500
7—4-prong coil forms
2—coil shields type CS

CORNELL-DUBILIER (Condensers)
4—.01 tubular conds. 400 volt
2—.0001-mf. mica conds. 1000 V.
4—.001-mf. mica conds. 1000 V.
1—.001-mf. mica cond. 5000 V.
2—8 mf. electrolytic conds. 500 V.
1—2 mf. oil cond. 2000 V. for 1250 V. power supply

I.R.C. (Resistors)
2—10,000 ohm 10 Watt
1—100,000 ohm 10 Watt
2—400 ohm 10 Watt
1—1000 ohm 25 Watt
1—20,000 ohm 10 Watt
1—5000 ohm 25 Watt
1—20,000 ohm 35 Watt voltage divider
1—50,000 ohm 100 Watt bleeder

STANCOR (Transformers)
1—low voltage plate-filament trans. 400 V. (P-4081)
1—high voltage plate-filament transformer 1250 V. (P-5051)
1—filter choke (C-1402)
1—filter choke (C-1412)
1—5 V. fil. trans. for HK-54 (P-5000)
1—2.5 V. fil. trans. for 866's (P-3025)

PAR-METAL (Panel and Chassis)
1—8¾ x 19 panel
1—2 x 17 x 13 chassis
1—2 x 8 x 17 chassis

TRIPLETT (Meters)
1—0-250 ma. square meter

TUBES *See note above, center column.
1—HK-54
2—866's
2—6L6's
1—83

COTO-COIL
1—80 met. coil (CI-80BTVL)
1—40 met. coil (CI-40BTVL)
1—20 met. coil (CI-20BTVL)
1—10 met. coil (CI-10BTVL)
1—jack base for above (CI-6BTLM)

Coil Data

OSCILLATOR

Band			
80 m.	25 turns	No. 20	DCC
40 m.	12 turns	No. 20	DCC
20 m.	7 turns	No. 20	DCC

BUFFER-DOUBLER

Band			
80-40 m.	18 turns	No. 20	DCC
20- m.	7 turns	No. 20	DCC
10- m.	4 turns	No. 20	DCC

Coils wound on Hammarlund SWF coil forms, 1½" dia. spaced to length of 1½" long.

FINAL STAGE

Band			
80—34	turns	No. 14	DCC
40—22	turns	No. 14	DCC
20—10	turns	No. 14	DCC
10—6	turns	No. 14	DCC

Final coils 4" long—2¾" dia.

New Log Book

● BUD RADIO, INC., has published an *"Amateur Station Log and Data Book"* with 30 pages of log. The book also contains such data as Signal Reporting Systems, Information as to Keeping of a Station Log, Coil Winding Data, Inductance Calculations and Examples, Metric Equivalents, Winding Turns per Linear Inch, Useful Antenna Data, Frequency-Wavelength Conversion, Drill Chart, and International Q-Signals.

This article has been prepared from data supplied by courtesy of Bud Radio, Inc.

When to Listen In

(Continued from page 87)

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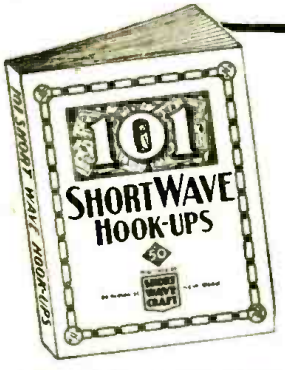

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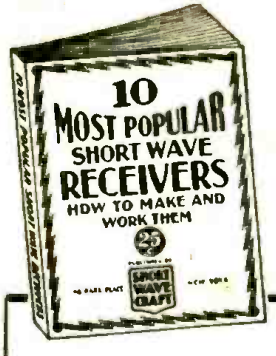

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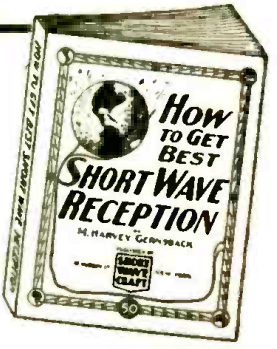

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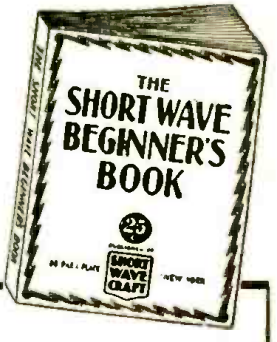

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World Short Wave Stations

(Continued from page 92)

Mc.	Call	
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.
6.081	YVIRD	MARACAIBO, VEN., 49.32 m. 6-11 pm.
6.080	W9XAA	CHICAGO, ILL., 49.34 m., Addr. Chicago Fed. of Labor. Relays WCFL irregular.
6.079	DJM	BERLIN, GERMANY, 49.34 m., Addr., Broadcasting House. Irregular.
6.077	OAX4Z	LIMA, PERU, 49.35 m. Radio National 7-11 pm.
6.075	VP3MR	GEORGETOWN, BRI. GUIANA, 49.35 m. Sun. 7.45-10.15 am.; Daily 4.45-8.45 pm.
6.073	HJ3ABF	BOGOTA, COL., 49.41 m. 7-11.15 pm.
6.070	CFRX	TORONTO, CAN., 49.42 m. Relays CFRB 7.30 am.-12 m., Sun. 10 am.-12 m.
6.070	VE9CS	VANCOUVER, B. C., CAN., 49.42 m. Sun. 1.45-9 pm., 10.30 pm.-1 am.; Tues. 6-7.30 pm., 11.30 pm.-1.30 am. Daily 6-7.30 pm.
6.069	——	TANANARIVE, MADAGASCAR, 49.42 m., Addr. (See 9.53 mc.) 12.30-12.45, 3.30-4.30, 10-11 am., Sun 2.30-4.30 am.
6.065	SBO	MOTALA, SWEDEN, 49.46 m. Relays Stockholm 1.30-5 pm.
6.060	—	TANANARIVE, MADAGASCAR. 49.5 m., 12.30-12.45, 3.30-4.30, 10-11 am.
6.060	W8XAL	CINCINNATI, OHIO, 49.5 m., Addr. Crosley Radio Corp. Relays WLW 5.45 am.-7 pm., 10 pm.-2 am.
6.060	W3XAU	PHILADELPHIA, PA., 49.5 m. Relays WCAU 7-10 pm.
6.057	ZHJ	PENANG, FED. MALAY STATES, 49.51 m. 6.40-8.40 am., except Sun., also Sat. 11 pm.-1 am.
6.054	HJ6ABA	PEREIRA, COL., 49.52 m. 9.30 am.-12 n., 6.30-10 pm.
6.050	HP5F	COLON, PAN., 49.59 m., Addr. Carlton Hotel. Irregular.
6.045	XETW	TAMPICO, MEXICO, 49.6 m. Irregular 7-11 pm.
6.042	HJ1A8G	BARRANQUILLA, COL., 49.65 m., Addr. Emisora Atlantico. 11 am.-11 pm.; Sun. 11 am.-8 pm.
6.040	W4XB	MIAMI BEACH, FLA., 49.65 m. Off the air temporarily.
6.040	W1XAL	BOSTON, MASS., 49.65 m., Addr. University Club. Exc. Sat. 6-7.45 pm.
6.040	YDA	TANDJONGPRIOK, JAVA, 49.65 m., Addr. N.I.R.O.M., Batavia, 10.30 pm.-2 am.; Sat. 7.30 pm.-2 am.
6.033	HP5B	PANAMA CITY, PAN., 49.75 m., Addr. P. O. Box 910. 12 n.-1 pm., 7-10.30 pm.
6.030	VE9CA	CALGARY, ALTA, CAN., 49.75 m. Thur. 9 am.-1 am.; Sun. 12 n.-12 m.
6.030	OLR2B	PRAGUE, CZECHOSLOVAKIA, 49.75 m. (See 11.875 mc.) 4.40-5 pm. Mon., Tues., Thur., Fri.
6.023	XEUW	VERA CRUZ, MEX., 49.82 m., Addr. Av. Independencia 98. 8 pm.-12.30 am.
6.020	DJC	BERLIN, GERMANY, 49.83 m., Addr. (See 6.079 mc.) 10.40 am.-4.30 pm.
6.017	HI3U	SANTIAGO DE LOS CABALLEROS D. R., 49.85 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, 49.84 m., Radio Club of Pernambuco, 6-9 pm.
6.010	OLR2A	PRAGUE, CZECHOSLOVAKIA, 49.92 m., Addr. (See OLR, 11.84 mc.) 4.40-5 pm. Mon., Tue., Thur., Fri.
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. 6.55-7.30 am.
6.010	CJCX	SYDNEY, NOVA SCOTIA, 49.92 m. Relays CJCB 7 am.-1 pm., 4-8 pm.
6.007	ZRH	ROBERTS HEIGHTS, S. AFRICA, 49.94 m., Addr. (See ZRK, 9.606 mc.) Daily exc. Sun. 10 am.-4 pm., Sat. till 4.45 pm.; Sun. 8 am.-12 n., 12.15-3.15 pm.
6.005	HP5K	COLON, PAN., 49.96 m., Addr. Box 33. 7-9 am., 11.30 am.-1 pm., 6-11 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.
6.004	RV59	MOSCOW, U.S.S.R., 49.97 m. Irregular. 3-6 pm.
6.002	CXA2	MONTEVIDEO, URUGUAY, 49.98 m. Addr. Rio Negro 1631. Relays LS2, Radio Prieto, Buenos Aires. 11.30 am.-11.30 pm.
6.000	ZEA	SALISBURY, RHODESIA, S. AFRICA, 50 m. (See 6.147 mc., ZEB.) Also Sun. 3.30-5 am.
6.000	XEBT	MEXICO CITY, MEX., 50 m., Addr. P. O. Box 79.44. 8 am.-1 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. 8 pm. on.
5.968	HVJ	VATICAN CITY, 50.27 m. 2-2.15 pm. daily; Sun. 5-5.30 am.
5.940	TG2X	GUATEMALA CITY, GUAT., 50.47 m. 4-6, 9-11 pm.; Sun. 2-5 am.
5.940	PJC1	CURACAO, DUTCH W. INDIES, 50.47 m., Mon., Wed., Fri. 6.36-8.36 pm., Sun. 10.36 am.-12.36 pm.
5.935	YVIRL	MARACAIBO, VEN., 50.52 m., Addr. Radio Popular, Jose A. Higuera M, P. O. Box 247. Daily 11.43 am.-1.43 pm., 5.13-10.13 pm.; Sun. 9.13 am.-3.13 pm.
5.913	YV4RP	VALENCIA, VEN., 50.71 m. Irreg.
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.
5.900	TILS	SAN JOSE, COSTA RICA, 50.85 m. 6-10 pm.
5.898	YV3RA	BARQUISIMETO, VEN., 50.86 m., Addr. La Voz de Lara. 12 n.-1 pm., 6-10 pm.
5.892	HH2S	PORT-AU-PRINCE, HAITI, 50.89 m. Addr. P. O. Box A103. 7-9.45 pm.
5.890	JIC	TAIHOKU FORMOSA, 50.9 m. Works Tokio 5-10 am. irregular.
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. 12 n.-2 pm., 6.30-9 pm.
5.853	WOB	LAWRENCEVILLE, N. J., 51.26 m., Addr. A.T.&T. Co. Works Bermuda nights.
5.845	YVIRB	MARACAIBO, VEN., 51.3 m., Addr. Apartado 214. 8.45-9.45 am., 11.15 am.-12.15 pm., 4.45-9.45 pm.; Sun. 11.45 am.-12.45 pm.
5.830	TDD	SHINKYO, MANCHUKUO, 51.46 m. Works Tokio 5-10 am., irreg.
5.825	TIGPH	SAN JOSE, COSTA RICA, 51.5 m., Addr. Alma Tica, Apartado 800. 11 am.-1 pm., 6-10 pm. Relays TIX 9-10 pm.
5.813	TIGPH2	SAN JOSE, COSTA RICA, 51.59 m., Addr. Senor Gonzalo Pinto, H.
5.800	YV5RC	CARACAS, VEN., 51.72 m., Addr. Radio Caracas. Sun. 8.30 am.-10.30 pm. Daily 7-8 am., 10.30 am.-1.45 pm., 3.45-9.30 pm.
5.790	JVU	NAZAKI, JAPAN, 51.81 m. Works JIC and TDD irregular.
5.758	YNOP	MANAGUA, NICARAGUA, 52.11 m. 8-9.30 pm.
5.740	YV2RA	SAN CRISTOBAL, VENEZUELA, 52.23 m., Addr. La Voz de Tachira. 11.30 am.-12 n., 5.30-9 pm., Sun. till 10 pm.
5.740	TGS	GUATEMALA CITY, GUAT., 52.23 m. Irregular.
5.735	HCIPM	QUITO, ECUADOR, 52.28 m. Irregular 10 pm.-12 m.

(Continued on page 124)

COMMERCIAL NOTICES 10¢ A WORD

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

AGENTS WANTED

500% PROFIT SELLING GOLD Leaf Letters for Store Windows. Free Samples. Metallic Co., 446 North Clark, Chicago.

CORRESPONDENCE COURSES

500,000 USED CORRESPONDENCE Courses and Educational Books. Sold, Rented, Exchanged. All subjects. Satisfaction guaranteed. Cash paid for used courses. Complete details and bargain catalog free. Send name. Nelson Company, 3279 Manhattan Building, Chicago.

MISCELLANEOUS

3½ INCH TR. 0-125 VT. A.C. Voltmeter, 0-10 A.C. Ammeter, $2.75 each, Weston D.C. 0-7 and 0-140 Voltmeter, 2¾" with 9 pt. D.P. Switch $2.75. Nat'l. MB27-4 Stg. T.R.F. chassis and Thord. 45 P.P. Pack. $7.50. 10" MUTER DYN. SPKR. $3.00 Victor 72" III-Fi Orthophonic Horn. Mag. and Acoustic Pick-ups, $10.00, plus express. $100.00 RCA battery Superhet—$25.00. Harry Ackerson, Ramsey, N. J.

WE ORIGINALLY HAD FIVE thousand Stoppani Compasses for which the U.S. Government paid over $30.00 each. We sold all but a very few. We cannot obtain more to sell at three times our present price. Send in your order before they are all sold at $4.50 each, postage paid. Gold Shield Products, 330 Greenwich St., New York City.

PATENT ATTORNEYS

INVENTORS, ALL PATENT AND trademark cases submitted given personal attention by members of the firm. Form "Evidence of Conception" and instructions free. Lancaster, Allwine & Rommel, 436 Bowen Building, Washington, D. C.

QSL—CARDS—SWL

100 NEAT SWL CARDS PRINTED with your name and address sent postpaid for $1. Bunch of samples and ItST Chart for five cents in stamps. W1BEF, 16 Stockbridge Ave., Lowell, Mass.

SPECIAL OFFER: 150 NEAT, ATtractive two color short wave listener's, amateurs. QSLs. $1.00, 200—$1.75. Samples (Stamps). W-8-E-S-N, 1827 Cone, Toledo, Ohio.

QSL, SWL CARDS, NEAT, ATtractive, reasonably priced, samples free. Miller, Printer, Ambler, Pa.

SONG POEMS WANTED

WANTED ORIGINAL POEMS, songs for immediate consideration. Send poems to Columbian Music Publishers, Ltd., Dept. K19, Toronto, Can.

TELEVISION

TELEVISION EQUIPMENT SINCE 1927. Arthur Pohl, 2123 Hubbard, Detroit, Mich.

FOR SALE (NON COMMERCIAL) 3¢ A WORD

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

FOR SALE: GROSS SHORT WAVE three tube metal cabinet battery receiver beerless cabinet speaker ready to operate; also Crosley metal cabinet four tube broadcast receiver less tubes and batteries; also about twenty five other valuable items all at a bargain. Send for complete list. Carl Jensen, 211 East 200 St., New York, N.Y.

AMPLIFIER, 6 TUBES, CASE, Mike, 50 feet cable, rebuilt for AC-DC. Used 2 months. $40.00 or swap for good AC-DC receiver. NC8OX or what have you? Dermoutz, 138 W. 62nd, New York.

FOR SALE: GUITAR, CAMERAS, string musical instruments, watches, chronometer or trade for 5 tube short wave receiver A.C. Gerhold, 113-18 Atlantic Ave., Richmond Hill, N.Y.

TRIPLETT 1210A TUBE TESTER $16.50; Tobe RF-2 line filter $1.50; Astatic S-8 pick-up $3.50; Meissner phonograph oscillator $5.00; very slightly used; all A-1. J. F. Close, 164 Ohio Ave., Wadsworth, O.

SELL CHEAP: MODERN RADIO course, three tube allwave electric receiver. Write for details. Rehbein, Larsen, Wis.

1937 MIDWEST EIGHTEEN TUBE Super Het. Complete with tubes and speaker. No cabinet. Guaranteed perfect condition thruout. Used six months. Phone jack. DX-23 countries. First $15 takes. Bill Ebeltoft, Frazee, Minnesota.

FOR SALE: SUPREME AAA1 Diagnometer, excellent condition, two Weston meters, A.C. Oscillator, tube checker and set analyzer. Weighs 26 lbs. Cost $160 sell for $25. J. Dubinsky, 9404 Astoria Blvd., Jackson Heights, Queens, N.Y.C.

BARTER AND EXCHANGE — FREE!

NO ADVERTISEMENT TO EXCEED 35 WORDS, INCLUDING NAME AND ADDRESS

Space in this department is not sold. It is intended solely for the benefit of our readers, who wish to buy or exchange radios, parts, phonographs, cameras, bicycles, sporting goods, books, magazines, etc. As we receive no money for these announcements, we cannot accept responsibility for any statements made by the readers. Use these columns freely. Only one advertisement can be accepted from any reader in any issue. All dealings MUST be above board. Remember you are using the U. S. mail in all these transactions and therefore you are bound by the U. S. Postal Laws. Describe anything you offer accurately and without exaggeration. Treat your fellow men the way you wish to be treated. We welcome suggestions that will help to make this department interesting and helpful to our readers.

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

I WANT TO TRADE AN FB7X complete with power supply, tubes and xtal for a good camera, enlarger or fine pair of binoculars. N. R. Thornton, Somerville, Ohio.

HAVE 4—210 TUBES GOOD used condition. Want transmitting parts. Have 30 back numbers Radio magazines, including old type QST —exchange for what have you. W. S. Crooks, W8LVG, Box 15, Stow, Ohio.

SWAP USED W.E.242A AND W.E.242B perfect condition; photo electric cell, new; National S.W.3 with National power supply and 8mm art photos (motion picture) for what have you? David Jashnoff, W2HAP, 1132 Forest Avenue, Far Rockaway, N.Y.

HAVE HUNDREDS OF U.S. AND foreign commemorative stamps to exchange for art photos, 8mm movies and radio parts. W.M. McDonald, 271 Pearl Street, Cambridge, Mass.

HAVE $32.50 MAJESTIC B POWer supply. Operates on 110 A.C., providing up to 200 D.C. Also hundreds of radio parts, cabinets, etc. Want small transceiver or what have you? Wallace Freeman, Box 466, Barre, Mass.

WILL SWAP S.W.L. CARDS with any SWL in foreign countries and will answer all correspondence. (QRA): George M. Fleming, 301 South Cherry Street, Cameron, Missouri, U.S.A.

AM INTERESTED IN JOINING American and foreign radio clubs, would like to join at least one in every continent. Would like to get your SWL and QSL card also. Bob Kelly, Box 98, Minoa, N. Y.

WILL TRADE McGRAW-HILL radio book, good condition. Back copies of Boy's Life, American Boy and Modern Mechanix magazines. Foreign stamps for one tube battery radio. Address Marion Deskin, Archer City, Texas.

WANTED: 2 TUBE TRANSCEIVER 2½-4000 meters ready to go on air or good superhet shortwave receiver. Have complete R.T.I. course and Frank Holten cornet. R. J. Racine, Box 274, Danielson, Conn.

TRADE—STOP WATCH; HAND Mike, with 4' cord; 8" Keuffel & Esser Slide Rule. All items excellent condition. Want small SW receiver, radio books or what have you. W. H. Coburn, Box 685, Keystone, W. Va.

WOULD LIKE TO EXCHANGE SWL cards with any SWL in U.S. or foreign countries. All cards received will be answered with my card. Charles Wall, 921 Lake Blvd., Albert Lea, Minn.

SWAP—REMINGTON MODEL 33 22 caliber rifle—excellent—250 cartridges. Ice skates size 11½. No. 3A pocket kodak like new. K. B. Dienst 8 power field glasses. What have you? W. MacMurray, 98 Hart St., Brooklyn, N.Y.

WOULD LIKE TO SWAP SWL cards with any other SWL. All mail will be answered promptly. George Chatfield, Box 93, Wolcott, N.Y.

WILL SWAP 22 CAL. REMINGton 16 shot autoloading automatic rifle, in good condition (peep sights), for good Remington or Underwood standard typewriter. If interested, correspond with Bradford Jamerson, 2205 Howard St., St. Louis, Missouri.

SHORT WAVE LISTENERS IN U.S.A. and especially foreign countries. Would like to exchange SWL cards and/or correspond with you. 100% answer guaranteed. Joe R. Cahall, Box No. 35, Georgetown, Ohio, U.S.A.

HAVE 14 INCH SPEAKER, ATwater Kent 5 tube battery radio, less speaker, batteries, Majestic 5 tube, 4700 ohms speaker, other parts. Swap for 110 volt SW receiver. Herb Kornowski, 418 Fifth St., Green Bay, Wis.

WILL TRADE OLD ISSUES OF Radio News in good condition, 48 copies from Jan. 1934 to December 1937, for all wave signal generator or tube tester. R. A. Martin, Jr., 1102 Chestnut St., Lampasas, Texas.

WILL TRADE — MAGNETIC pick-up, electric turntable and 1/100 h.p. A.C. motor for or on low power 40 or 80 meter xmitter, or what have you? Ralph Hitsman, 600 S. Boston St., Gallon, Ohio.

WANTED—USED BATTERY OPerated code machine, with or without tapes. Must be cheap, or at least not beyond repair. Send particulars to Thomas D. Grant, Lumby, B. C., Canada.

WILL TRADE GOOD 5 TUBE A.C.-D.C. Kadette rec., range 1520 to 17.5 megs, phone jacks and speaker, for good, accurate all-wave oscillator, complete. Jack Doherty, 1828 W. 11, Des Moines, Ia.

TRADE, 150 WATT, 110 VOLT Powerack auto generator complete, slightly used, also about 30 radio tubes; prefer late model auto radio. What have you? Deans Crumpler, 2511 Santee Ave., Columbia, S.C.

HAVE TWO "WILEY POST" stratosphere flight covers; one set German Olympic stamps affixed to official sheet Olympic stationery, canceled by P.O. in Berlin. Want: photographic equipment. M. Stark, Box 462, Waseo, California.

WANTED GOOD PRESELECTOR or Sky Buddy. Have typewriter, complete Ivory Mah Jongg set, cost $35, also Erector set with reversible motor. All letters answered. Daniel Platek, 225 Division Ave., Brooklyn, N.Y.

TRADE 50 BACK ISSUES OF S.W.C., other magazines, American and foreign stamps, radio parts, DX1 slightly used. Want American stamps or radio equipment. Fred Humphrey, Mohonk Ave., New Paltz, N.Y.

(Continued on following page)

World S-W Stations

(Continued from page 123)

Mc.	Call	
5.145	OKIMPT	PRAGUE, CZECHOSLOVAKIA, 58.31 m., Addr. (See OLR, 11.84 mc.) 5.15-5.30 pm. Wed. & Sat.
5.145	PMY	BANDOENG, JAVA, 58.31 m. 5.30-11 am.
5.077	WCN	LAWRENCEVILLE, N. J., 59.03 m. Addr. A.T.&T.Co. Works England late at night irregularly.
5.025	ZFA	HAMILTON, BERMUDA, 59.65 m. Works N.Y.C. irregularly at night.
5.000	TFL	REYKJAVIK, ICELAND, 60 m. Works Europe night time irreg.
4.975	GBC	RUGBY, ENG., 60.3 m. Works ships irregularly.
4.900	HJ3ABH	BOGOTA, COL., 61.19 m., Addr. Apartado 565. 12 n.-2 pm., 6-11 pm.; Sun. 12 n.-2 pm., 4-11 pm.
4.880	HJ4ABP	MEDELLIN, COL., 61.44 m. 6-11 pm.
4.842	HJ3ABD	BOGOTA, COL., 61.95 m., Addr. La Nueva Granada, Box 509. 12 n.-2 pm., 7-11 pm., Sun. 5-9 pm.
4.820	GDW	RUGBY, ENG., 62.24 m. Works N.Y.C. night time irregularly.
4.807	HJ1ABB	BARRANQUILLA, COL., 62.39 m., La Voz de Barranquilla, Addr. P. O. Box 715. 11.30 am. to 1 pm., 4.30-6 pm.
4.780	HJ1ABB	BARRANQUILLA, COL., 62.72 m. Addr. P. O. Box 715. 11.30 am.-1 pm., 4.30-10 pm.
4.772	HJ1ABJ	SANTA MARTA, COL., 62.85 m. 11.30 am.-2 pm., 5.30-10.30 pm. except Wed.
4.752	WOO	OCEAN GATE, N. J., 63.1 m. Addr. A. T. & T. Co. Works ships irregularly.
4.740	HJ6ABC	IBAGUE, COL., 63.25 m. 7 pm.-12 m.
4.272	WOO	OCEAN GATE, N. J., 70.22 m. Addr. A.T.&T. Co. Works ships irregularly.
4.250	RV15	KHABAROVSK SIBERIA, U.S.S.R., 70.42 m. 1-10 am.
4.107	HCJB	QUITO, ECUADOR, 72.99 m. 7-8.30 am., 11.45 am.-2.30 pm., except Monday. Sunday 12 noon-1.30 pm., 5.30-10 pm.

First Ham to Talk with Pitcairn Island

(Continued from page 79)

own call "W8CNA." The voice exclaimed, *"You are to be congratulated. You are the first person in the world to talk by radio with Pitcairn Island."*

Early Saturday morning March 5, 1938 at 1:30, the Binghamtonian and his guest held the invisible link with Pitcairn Island 6000 miles away and talked with the two Americans who had been sent there to set up this station.

The two Americans Lew Bellam and Lindley Granville of Providence, R. I., began the 6000 mile trip several weeks ago. No word had been heard from them until Mr. Bellam contacted the Binghamton operator. Mr. Bellam said, *"We arrived in a windstorm Tuesday. A New Zealand ship brought us within two miles of the island, from there the natives piloted us through treacherous rocks, and hoisted us and our 4 tons of equipment up a sheer cliff to the island."*

Mr. Wolfinger was asked by Mr. Bellam to relay a message to his mother in Providence, R. I. He did so immediately. He picked up the phone on his table and got Mrs. Bellam on the wire. Mrs. Bellam refused to believe that her son was actually talking with America until Mr. Wolfinger held the telephone receiver against the loud speaker and let her hear her son's voice telling her that he was safe and well.

The conversation started at 1:30 a.m. Saturday lasting until nearly 4:00 a.m. at this time the band began to fade.

Mr. Phennicie is also a "ham," W9ODQ Waterloo, Iowa.

Mr. Wolfinger has had many experiences with short wave but this Pitcairn Island incident tops them all.—*V. W. Brezee.*

Let's Listen In with Joe Miller

(Continued from page 83)

MANCHUKUO

JDY, now on 9.94 mc., QSLs our SW-BC report at last, though ignoring our 3 commercial 'phone reports. The QSL, as can be seen, is well worth getting, and a letter is also enclosed giving following data: Schedule daily 7-8 a.m., power 10 kw., broadcasts commencing July 16, 1937. JDY carries the programs of JQAK, the BCB station in Dairen. Letter is signed by Isao Sugiyama, director. QRA from letter: Dairen Broadcasting Station JDY, Shotokugai 3, Dairen, Kwantung, Manchukuo. JDY QSLs all reports in about 3 months.

NEW CALEDONIA

"Radio Noumea," 6.12 mc., a new DX catch to go after, is located in the South Pacific Ocean, and may be heard if one really tries hard for it. Operated by the French government, in New Caledonia, owned by France. QRA is: Radio Noumea, 44 Rue de L'Alma, New Caledonia, Pacific Islands. This station signs on and off with the Marseillaise. Schedule is Tuesdays and Saturdays, 3 to 4:30 a.m.

VATICAN CITY

HVJ, 15.12 mc., counted as a separate country apart from Italy, is being heard with a fine signal, and has a schedule of 10:30-10:45 a.m., but occasionally reported to 11 a.m. HVJ now has a new Xmtr, and should be easily heard by all. QRA: Stazione Radio HVJ, Citta del Vaticano, Vatican City, Italy. A beautiful postal card size view of some Vatican City scenery is the QSL card that verifies ones report.

ASIATIC REVIEW

VVS, 12.87 mc., Mingaladon, Burma, heard last at 6:35 a.m.

JVE, 15.66 mc., Nazaki, Japan, heard at 7:15 a.m., fine signal.

RV15, 4.27 mc., Khabarovsk, Siberia, reported by Harry Honda, W6, with a good signal, 8-9 a.m., West Coast.

INDIA

VUD2, 9.59 mc., New Delhi, India, is still well heard and reported by many. Chris D. Jaffe, Va., reports hearing Bombay, 9.565 mc., at 9:30 p.m. Any other reports on this one?

From Masud Akhtar of New Delhi, comes following data:

VUB, Bombay, operates on 9.55 mc., from 1-3:30 a.m. and on 3.305 mc. from 7 a.m. to 12:30 p.m.

VUD2, New Delhi, operates on 9.59 mc. from 8:30 p.m.-10:30 p.m., and 1:30-3:30 a.m. And on 4.905 mc. from 7:30 a.m.-12:30 p.m.

Revised schedule of VUC, Calcutta, as follows: 6.109 mc., weekdays, 2:06-4:36 a.m., and 7:06 a.m.-12:06 p.m. Sats., 10:06 p.m.-2:06 a.m., on Suns., 7:06 a.m.-12:36 p.m. Bombay and Delhi have 10 kw., while Calcutta still uses the old low-powered Xmtr. A new station for Calcutta is now under construction. Thank you, Mr. Akhtar!

Martin Garvey, W2, already has received a veri in the form of a letter, from VUD2. The QRA is correct as given in last issue, All-India Radio, New Delhi, India.

YBB, 7.87 mc., Palembang, Sumatra, has been verified by Roger Legge, W2, and

(Continued on page 126)

BARTER and EXCHANGE FREE ADS (continued)

WILL TRADE PRECISION MULtimeter series 830. It is new. For SW-3 receiver with coils. Must be for A.C. Howard Goodslde, 2510 Lincoln St., Saginaw S.S., Mich.

WILL SWAP 8 ISSUES OF MODern Mechanix and Inventions, in good condition for 6A6 tube. QTH: Warren Arnett, R1 Box 167, Jonesboro, Indiana.

TRADE 1938 HOWARD RADIO. Exide storage battery, radio tubes, signal generator, all new. Interested in television equipment, phone multter, crystal amplifier, and technical books. Clyde D. Kiebach, 1429 Moss, Reading, Penna.

WANTED—8"-10" ASTATIC (OR Plezo) Hi-Impedance crystal phonographic pickup in good condition. Buy or swap for excellent Gordon magnetic pickup with fine volume control. S. B. Zuckerman, 2230 Gr. Concourse, Bronx, New York City.

WANTED: SAMPLES OF QSL AND SWL cards from any printing; want to get different prices on cards. Luther Schnake, 1608 Campbell Ave., Des Plaines, Ill.

SWAP, CLASS "B" TRANSformers '46 or '59 to 5,000 or 10,000 ohm load. High quality DB carbon microphone. Waot HF bottle about 40 watts, candid camera. Arnold Schwemlin, 421—7th St., Clarkston, Wash.

I WOULD LIKE TO BUY A large number of radio magazines of various kinds to use as a reference library with an index in a small filing cabinet. (3"x5" cards.) Howard Chandler, R.R.1, Ravenna, O.

WILL SWAP GOOD UKULELE, folding camera, set of Hammarlund six prong plug in coils for a used 807, double button mike, 160 meter crystal, or what have you? Arthur Luntz, 609 Monona Street, Boone, Iowa.

WILL SWAP, EAR PHONES, small camera, radios and parts, .410 gauge shot gun. Am interested in motorcycle, rifle larger than .22 or what have you? Will exchange swap lists. Lawrence Miller, Healy, Kansas.

WILL SWAP EMERSON DYNAmotor output 180 volts at 40 Ma. from 6 volt battery at 2.6 amp. Never used. Will swap for S.W. radio parts or what have you. Jos. Hasquin, P.O. Box 116, Gillespie, Ill.

EXCHANGE: CANDLER HIGH Speed Code Course, complete 3x5 hand press, ship's wheel electric clocks, Conn E flat alto sax and case. Perfect condition. WIBZJ, Mendon, Massachusetts.

HAVE ONE AND TWO TUBE radios, crystal sets. Want radio parts. Send list. John Haynes, Doe Run, Missouri.

HAVE CRYSTAL RADIOS, ONE and two tube radios to trade for cameras, picture developing and printing outfit, hectograph, binoculars, high power microscope, Brush crystal headphones, or what have you? William Blecha, Pawnee City, Nebraska.

WILL TRADE A FINE MAHOGany steel guitar and case for a code machine with full line of tapes. Satisfaction or return on both ends. Must be in good condition. K. Summers, Port Burwell, Ont., Canada.

TRADE: 20 HAND MTD ORE RAdio crystals; 5 oz. unmtd unused tested galena, pure; 3 midget var. condensers; 300 V voltmeter; 2 unused skind. buttons; protected short wave coil invention. L. B. Johnson, Box 816, Spokane, Wash.

WANT SHORT WAVE RECEIVER in exchange for Kolster amplifier and power pack, pair pushpull transformers Pilot. Also code practice records. All letters answered. Wm. E. Speidel, Jr., 546 So. Broad St., Elizabeth, N. J.

WANTED—ALL VOLUMES RIDers Manuals, state price, condition. Swap rifles, telescope, text-books, N.R.I. Natrometer, code records, photo electric cell, new WE20D, Jewell 0-10 volt A.C. meter. John M. Thompson, 529 N. Main St., Canandaigua, N.Y.

HAVE GOOD USED 16 MM movie projector and used electric train; also radio parts for trade. What have you and what do you offer? Harry Wood, Route 1, Waverly, Washington.

WILL TRADE—ONE 30 POWER telescope, slightly worn. Also bunch of old phonograph records. Will send title list on request. Want set of SWK-4 or SWK-6 coils. Al. Comperda, 4808 S. Seeley Ave., Chicago, Illinois.

WANTED TO BUY: 1 OR 2 TUBE short wave receiver in fair condition and reasonable cost. Victor Delso, Jr., 422 High St., Monongahela, Penna.

HAVE PREHISTORIC STONE Age relics from the ruins of Arizona to trade for S.W. 2 tube electric receiver or what have you. Photo if interested. Geo. W. Parsons, 302 S. Granite St., Prescott, Arizona.

WILL TRADE 16 BACK ISSUES of SWC and SW&T; also other mags., for an Xtal on any amateur band. Chas. Ammerman, 355 Ridge St., Honesdale, Pa.

TRADE: KIT OF TRANSFORMERS and T pads for four channel mixer, pickup, meters, six P.A. trumpets, two button carbon mike. Want ribbon mike or what have you. C. Crandall, Fairfield, Iowa.

WILL SWAP PAN-AMERICAN silver plated, gold bell valve trombone, perfect playing condition, with case; for radio equipment, service manuals, or A.C. short wave receivers. Write, Roy B. Faulk, 210 Oak St., Crowley, La.

WANTED TO BUY AN INSTRUCtograph, Teleplex code machine or a Candler System. Robert Stellmaker, Aitkin, Minnesota.

WILL SWAP 28" BIKE, RCA CAR radio for short wave apparatus, camera or code help. J. B. Clooney, Jr., 310 Columbia St., Houston, Texas.

TRADE RCA VICTOR MODEL R93-A record player, Weaver model 320-S3 rifle telescope for 16-20 Ga. double barrel shotgun or radio. John Baierwick, Box 67, Simsbury, Conn.

WANTED TO BUY OR TRADE public address apparatus, sound motion picture apparatus and recording apparatus. Must be of nationally known makes. Danny Munroe, WIND, Gary, Ind.

WILL EXCHANGE 1 SET AUdel's Electric Library new condition value $15.00 for a well filled stamp album. H. Hawarth, 1144 Decatur St., Brooklyn, N.Y.

HAVE WINCHESTER 38-55, Knight transceiver, original 30 transceiver, DX-er receiver, many radio parts and large stamp collection. Want cheap code machine, 8 or 16mm movie camera and projector. W. F. Russell, Ashland, Maine.

SWAP MODEL 251 WESTON voltmeter (0-15-150 volts) in 9¾" case and two Western Electric 211E tubes (used). Need a good multitester. Rupert Lepie, 3026 S. St. Louis Ave., Chicago, Ill.

TRADE: $60 WORTH OF RADIO, science mags., $100 worth "hot" phonograph records. Six tube 1936 auto radio. Want good receiver, transmitter, and/or test equipment. T. E. McConnell, 2715 Lincoln Way, Ames, Iowa.

HERE'S YOUR CHANCE, WILL trade 160 different radio magazines, Radio News, Craft, etc., for Weston or Jewell meters, etc. Write H. Nelson, 60 West 75 Street, New York City.

HAVE CHROMIUM PLATED "Rug" practically new. What am I offered in exchange. All letters answered. Clyde A. Dalton, Det. Q.M. Corps, Mitchel Field, N.Y.

WANTED SWL's FROM ALL short wave listeners in the United States. All mail acknowledged. Lewis Neuman, Box 8363, Pittsburgh (18), Pa.

TRADE H. N. WHITE SLIDE trombone, cost $85. Virtuoso trombone course, cost $60. Also numerous instruction books, music, etc. Desire short wave set, equipment, etc. Best offer takes all. Lewis S. Parker, Middle River, Md.

WANT BROWNING "35", SKYBuddy, etc., have All-Star, Jr., complete with all coils 13-565 meters, metal cabinet (16x12x8) less speaker good condition. Will settle difference if any. Elwood Brooks, 1636 E. 36, Cleveland, O.

WOULD LIKE TO EXCHANGE some radio parts such as receivers, 5 meter trans., etc., for a 4.5 or 6.3 camera. Send for list of parts. Thomas Evans, 5226 Chester Ave., Philadelphia, Pa.

SWL's, WE SWAP SWL's, VIEWS, correspondence. You send your card—we'll send ours. All mail answered by return. B. W. T. Cockcroft, "Slegaby", Falkland Drive, Onchan, Isle of Man, British Isles.

HAVE 123 FICTION MAGAZINES (Western, Detective, etc.) to swap. Want typewriter, short wave receiver, radio magazines and books, radio parts, servicing instruments or? What am I offered. QRA: Harold Howard, R.F.D. No. 4, Wapakoneta, Ohio.

WANTED FBXA OR SIMILAR receiver; have good tenor banjo with sound board; 1936 Readrite signal generator; 1250 CT 500 mil transformer. Will buy or trade. Ray LaForce, Warren, Ohio.

WILL TRADE CAMERA, TENNIS racket and U.S. and foreign stamps. Other articles too numerous to mention. Want any kind of radio parts. Send for list of swaps. George P. Close, Joy, Ill.

WILL TRADE AN "EILEN 3B" three tube battery receiver, in good condition, for a 2-tube "Doerle" such as 1935 "Prof Doerle" or 12,500 mile "Doerle" battery receivers. Alexander Polstepny, 217 Pine St., Phila., Pa.

HAVE 5 TUBE EILEN RADIO complete with coils. Good condition. Will trade for battery set. Duane Sheller, RD1, Ashland, Ohio.

WANTED USED DOERLE D38 OR Super-Clipper 7 tubes offers must be reasonable. Carl M. Jensen, 211 East 200 St., Bronx, N.Y.

ABOUT 250 STAMPS, MANY countries, junior collections; trading also a few radio, etc., magazines—would like in trade an H. G. Cisin's Air Scout, Jr., receiver, or what have you? Geo. Seath, Leamington, Ontario.

WILL TRADE A WURLITZER violin, Stradivarius copy, in good condition for trumpet or clarinet—or what have you? Write—C. O. Nunnery, 557 Willowbrook Ave., Rock Hill, S. C.

TRADE FOR WHAT HAVE YOU —Readrite model 245A tester in fine condition. F. Vieweger, 1411 S. 17th St., Manitowoc, Wis.

SHORT WAVE LISTENERS IN all countries. Would like to exchange SWL cards with anyone. Will answer all SWL cards. QRA—Howard A. Schultz, 3519 East 104 Street, Cleveland, Ohio, U.S.A.

FOR TRADE RADIO PARTS ALL kinds meters and mikes, will trade for cameras, public address system. What have you? Would like to trade SWL cards. Lewis Johns, Lake St., Nicholasville, Ky.

SHORT WAVE LISTENERS IN 48 states and all foreign countries. I QSL 100%. Want to swap cards? QRA: Vincent C. Stasen, 5347 Priscilla St., Phila., Pa., U.S.A.

BUNDLE UP YOUR OLD OR new postcard views and send to me. For each one I'll forward one piece old Mexican money. (Not spendable now.) No two cards alike please. Harold Manliss, Coloradio, Texas.

WILL TRADE TUBE BASES 4-5-6-7s-8 prong, can be used for plug-in coil forms and many other things, for radio parts. Any offer accepted. Paul Bahr, Marion, Ind.

I HAVE AN INSTRUCTOGRAPH Junior Code Teaching set, five tapes, A1 condition, to trade for used 5"x7" or 8"x10" view camera or photographic apparatus. What have you? Hoyt Relschling, 818 North Alamo, San Antonio, Texas.

SWAP: NEW PHILCO ALL WAVE Antenna, list $5.00, for small short wave receiver worth same. Give details. Eugene Johnson, 698 Edmund St., St. Paul, Minnesota.

WANTED 10 AND 12 INCH RECordings, all kinds, will pay cash or swap, send want list with list of records, will pay for shipping charges. Alfred B. Shenton, Box 248, East Liverpool, Ohio.

ELECTRIC SHAVERS: FIRST person sending me $12.99 worth of merchandise will receive prepaid either a new Schick or a new Packard electric shaver. Address: J. S. Jackson, Jr., RD3, Box 76, Bowling Green, Kentucky.

WANTED—NATIONAL SW-3 complete power supply and coils, tubes. Have Hallicrafters Sky Buddy used two months. C. Whiter, 34 John Street, Ilion, N.Y.

WANT—HIGH QUALITY TELEscopic sights and click mounts, also 30-06 tool. Swap 1933 McMurdo super receiver, also CW and fone transmitter and parts. George Honold, 1218 Philippen Street, Manitowoc, Wisconsin.

WILL SWAP, ONE TRIPLETT model 1180 Tester used one year, one 8 watt ACA Amplifier new. $70 clarinet almost new. Popular Mechanics Magazines. Want Rider Manuals or what have you? Raymond Wensman, Cottonwood, Idaho.

WILL TRADE—SCALECRAFT Hudson type locomotive 0 gauge and 4 freight cars and 3 passenger cars worth $200, for Model G Leica camera or a good medical microscope. Max Haveluck, 939 Rockaway Ave., Brooklyn, N.Y.

WANTED: METERS AND TEST equipment, service manuals, microphones. Will buy or trade for. Send complete description, price and what you might want in exchange. Bill S. Byers, 416 Walnut St., Ironton, Ohio.

WANTED—USED IP501A OR similar type receiver. Would like to have second hand SW3. Both must be cheap. D. F. Stell, 508 Buchanan Rd., Durham, N. C.

WILL SWAP POWER TRANSformer with 110-120 V. pri., 700V. 70 ma. C.T., 5 V.2A., 2.5V. 3.75A, and 6.3V. 4A. secondaries for any radio parts. Ralph Freyberger, Fleetwood, No. 1, Penna.

TO TRADE, COMPLETE SET OF Hawkins Electrical Guide and other books on electricity and radio for candid camera, other books, radio parts or what have you? Rob Rice, Flandreau, S. Dak.

(Continued on page 126)

BARTER and EXCHANGE FREE ADS (continued)

WILL TRADE 50 WATT TRANSmitter complete with power supply, but less crystal for late NRI radio course complete with all text books and experimental equipment. James H. White, c/o Simpson & White, Coleman, Texas.

WANTED: LATE EDITION Radio Engineering books by Terman, Nilson and Hornung, Moyer and Wostrel, Ghirardi, Everitt, Henney, or others. Must be in fair condition and reasonable. Miss E. Burks, Route 5, West Tulsa, Okla.

WANTED: ONE FILTER CHOKE, 15 henries, 250 ma. power transformer, 600 volts each side c.t. and 7.5 and 5 volt windings. A reliable 40 meter crystal. Robert Alexander, 5 Arnold St., Richmond Hill, Ont., Can.

WILL BUY 2 NATIONAL 560-KC, air-tuned I.f. transformers, a National 500-kc. B.O. assembly, a National H. dial, and universal b.p. output transformer. Name price. Ray McIntosh, 87 E. Wyoming Ave., Melrose, Mass.

HAVE JEWELL 2 METER BATtery tube type tester, Triplett No. 1150 Oscillator in good shape, meters, speakers, P.P. trans., many other items from radio junk box. What have you. J. R. Reed, 2178 W. 3 Ave., Durango, Colo.

HAVE PIANOLIN (COMBINED violin and guitar) with music and instructions and over 800 different stamps. Will trade for radio parts, courses, books or magazines. Maurice Fowler, Blairsburg, Iowa.

WANTED—SHORT WAVE Receiver, no junk. Must be complete and compact. Also oscillator for code practice. All letters answered. Leo Blattner, Jr., 1105 Juniata St., N.S., Pittsburgh, Pa.

TRADE: COMPLETE MOTIOGRAPH 35 M.M. projector, 15,000 volt transformer and large variety of stamps. Want a good communication receiver, transceivers, transmitter able to work phone. Stanley Royek, 715 Windsor Terr., Schenectady, N. Y.

TRADE: NEW C.W. TRANSMITter and power supply, K&E Polyphase slide rule, K&E Manheim slide rule, 4 electric pants pressers. Want Peak Pre-selector and Argus camera. Fred A. Cook, Dutch Neck, N. J.

WANTED: NEW OR USED RECording mechanisms for home use, such as "Presto", "Universal", etc. Will pay cash. Send all particulars to R. F. Schell, 515 Grand St., Troy, New York.

SWAP—39 ISSUES NATIONAL Geographic Magazine, good condition, from Jan. 1935 to May 1938 except Oct. 1936, July 1937, for good 2 or 3 tube five meter receiver and 5 meter transmitter. Frank A. Scolaro, II, 6049 Huxley Ave., Bronx, N.Y.

HAVE BRONZE MOLDS: 4¾x1 plate camera; Generators; radio parts; radio and mechanical magazines. Want S.W. radio parts, typewriters, motors, lathe. R. Tracy, 611 So. 5th Ave., Mount Vernon, New York.

75 WATT TRANSMITTER COMplete power supplies, tubes, coils, 47 crystal, 46 buffer—2 10s in final. 6 meters. Have speech equipment to modulate it. Swap for P.A. system, 30 watts. L. B. Holtz, 553 Carrol St., Apt. 2, Akron, Ohio.

WHAT HAVE YOU TO OFFER for eight general coverage coils (2 sets) tuning from 16-200 meters, and eight bandspread coils for the amateur bands. Made by Meissner, all have five prongs. G. Black, 12 Lambert Rd., Belmont, Mass.

WANTED, USED CANDLER code course cheap for cash. Sean O'Neill, BRS 3163, Worcester College, Oxford University, Oxford, England.

SWL's WISHING TO EXCHANGE cards please mail yours and get mine in return. Wm. Basins, 7007 S. Maplewood, Chicago, Illinois, U.S.A.

TRADE: VAN HORN-FLEWELling (Using No. 506 Weston M.A.) and Sterling No. R-511 tube checkers; Grebe D.C., 3 tube, CR-18 Special S.W. Receiver. Wanted: Typewriter or girl's bicycle. L. G. Saunders, Bowling Green, Ohio.

WANTED: 6 VOLT SHORT WAVE equipment for use in car. State lowest price or what you will trade for. Louis B. Booth, 6 Longworth Ave., Middletown, Conn.

WANT: TO BUY OR RENT FOR a short time Candler Junior Course. will pay cash. Write: Louis Kronberg, 1905 Elgin, Houston, Texas.

WANT TO BUY FOR CASH: Used issues of Riders Manuals and mint U.S. stamps. Send condition of article and price you want. Reibstein, Larsen, Wis.

SWAP, EGERT VISUAL RESONance Oscilloscope, contains sweep circuit, amplifier, detector, and oscillator 100 kc. to 25 megacycles. Cost $150, excellent condition. For V.T. Voltmeter, Grid Dip Oscillator, etc. George Rohr, 67 Thorne St., Jersey City, N. J.

TRADE NATIONAL FB7A TYPE receiver complete, want Riders six, seven and eight, Solar condenser checker oscillograph, Weston 20,000 ohms analyzer, write for details. W9IAJ, W. L. Cornelius, Maquoketa, Iowa.

WILL TRADE 24 ISSUES OF S.W.C. mag. for used chemical apparatus. What have you got, OM? Please write to J. Grady, 165 Park Row Ave. North, Hamilton, Ontario, Canada.

"HAMS," SWLs, WOULD LIKE to receive letters from "Hams" or SWL's in Asia, Africa, South America, or Europe. Please write OM's. All letters answered. QRA—Romney Miller, 43½ Elm Street, Newport, R. I., U. S. A.

WANTED—KADETTE TWO-TUBE AC-DC compact radio. Uses 6F7, 12A7 Bakelite cabinet. Need not be in operating condition. State price. All quotations answered. Raymond Campbell, 311 East 2nd St., Monticello, Iowa.

SWAP: A CHROMIUM FINISHED B flat clarinet in excellent condition with case for a two tube R.F. Preselector in good condition. Write. Franklin McCutchen, 260 Julian Ave., E. St. Louis, Ill.

SWAP FOR GOOD S.W. SET: Radio equipment, 31 issues Radio News ('35 to '37), 5" auto dynamic. Cooke Electrical Engineering course, microphone, etc. What am I offered in swap? Robert Winslow, Box 172, Wykoff, Minn.

TRADE, MODEL 930 COLUMBIA Kolster amplifier and pickup, for transmitter and microphone or other short wave equipment. Write Charles Eisenberg, 832 Concord St., N.S., Pittsburgh, Pa.

Let's Listen In with Joe Miller

(Continued from page 125)

QRA for this DX catch is: Chief Engineer of the 4th Telegraph and Telephone District, Palembang, Sumatra, Neth. E. Indies.

DENMARK

OZF, at Copenhagen, is now reported on 15.165 mc., by Edward Petersen, W2. Reported on Sunday, may be operating daily at this time. QRA: Stats Radiofonen, Heibergsgade, Copenhagen, Denmark.

* * HAM STARDUST * *

The *Amateur Contest* certainly started the Amateur DX season for '38 with one big bang! Stations from every corner of the world were logged, and the impetus of the Contest has impelled many a CW ham to give 'phone more of his attention, as fine conditions through most of the contest made long distance QSOs a not too rare occurrence on 10 and 20 meter 'phone.

We have often tuned over the 20 meter band on week-ends, during the afternoon, and turned off our receiver with the expression, "Whew! What a mess!"

Right now, best reception from Europe is between 12:30-3 a.m., when these stations are heard with remarkable strength and but little QRM, with the VKs joining the parade as early as 1 a.m., continuing usually to 8 a.m. or so, without a break. Africa is also heard on 20 throughout the afternoons, and at same times as Europeans in early a.m.'s, of course. Europeans are heard every afternoon till around 7 p.m. and Asiatics being heard at 1 a.m., 3:30-4:30 a.m., and 7-8 a.m. Js and KAs are heard at 3:30-4:30 a.m. and an occasional J 'phone at 1 a.m. or so.

ASIA

The following are reported from the Orient: XZ2DY, 14120; XZ2DX, 14040; XZ2EZ, 14350, in Burma; XU8RB, 14080, China; F18AC, 14035, 14265, lately on 14265, French Indo-China; VU2LL, 14340, India; J2MI, 14080, 14300; J2NF, 14295; J2NG, 14300; J7CR, 14290; J7CB, 14310, Japan.

KA1HS, 14270; KA1BH, 14130; KA1MB, 14040; KA7EF, 14180; KA1AF, 14150; KA1MG, 14310; KA1ZL, 14255; KA1ME, 14265, in the Philippines. Also KA2OV, 14270.

HS1BJ, 14070, Siam; VS6AG, 14084, Hongkong; PG1GL, 14260; PK2WL, 14080; PK1PK, 14030; PK1VX, 14070; PK1GB, 14320; PK1RL, 14030; PK1ZZ, 14280; PK2JN, 14320; PK1DB, 14300; PK4DG, 14340; PK4AU, 14380; PK4JD, 14100, all in Java, with PK4s in Sumatra, reported.

AFRICA

Reported from Morocco: CN8AU, 14130; CN8AR, 14275; CN8MV, 14100; CN8AV, 14085; CN8AJ, 14100; CN8MB, 14145; CN8AM, 14090.

From So. Africa: ZS1B, 14080; ZS2AF, 14255; ZS2AH, 14400; ZS2AL, 14110; ZS1BL, 14350; ZS6CZ, 14350; ZS6CT, 14280; ZS6AJ, 14050; ZS3F, 14040, 14070.

From Egypt: SU1RD, 14070, 14100, 14340; SU1AM, 14270; SU1KG, 14090; SU1RK, 14330; SU1CH, 14390.

Algeria: FA8CC, 14120, 3 a.m.; FA3HC, 14280, 2 a.m.; FA8BG, 14300.

Kenya: VQ4KTB, 14145.

EUROPE

DX from Europe had its greatest season ever, with many FB DX hams heard from

nearly every country. Heard were:

Roumania: YR5AA, 14070, 14260; YR5KW, 14120; YR5CF, 14010, 14400.

Sweden: SM5SD, 14270; SM6WL, 14320; SM7YA, 14080; SM7UC, 14340.

Denmark: OZ3U, 14340; OZ5BW, 14400; OZ9Q, 14100; OZ9R, 14130; OZ5G, 14300.

Italy: I1KN, 14360; I1IT, 14000, 14040, 14350.

Switzerland: HB9BR, 14030; HB9J, 14350, 14110; HB9CL, 14025.

Norway: LA1F, 14260; LA3B, 14080; LA5H, 14100; LA8C, 14125; LA1G, 14150.

From Lithuania: LY1J, 14390; LY1HB, 14075.

Poland: SP1CC, 14340; SP1DC, 14360; SP2HH, 14025.

Esthonia: ES5D, 14300.

Greece: SV1KE, 14000, 14300.

Albania: ZA1CC, a new 'phone has been reported in American fone band, early a.m., working a G.

PITCAIRN ISLAND

VR6AY, 14346, formerly VR6A, operated by Andrew Young, a direct descendant of the world famous mutineers who settled on this lonely isle many years ago, is being heard with a very strong signal during early morning hours and occasionally reported as early as 8:30 p.m. Usually, VR6AY can be heard with best strength from 1:30 a.m. on.

Reports to VR6AY should be accompanied with reply coupons, and addressed to: Mr. Andrew Young, Station VR6AY, Pitcairn Island, South Pacific Ocean.

Regarding the "Special" from FR8VX, it was not heard on Sat. or Sun., but on Monday, March 21, FR8VX was logged by Romney Miller, W2.

The HS1BJ "Special" did not come through, much to our disappointment. However, it is very well heard on the West Coast, so if we really want to hear it, we'll have to move out West, hi!

10 METERS

Keep watch on 10 every morning and early afternoon, as you never can tell!

From Africa is reported: ZE1JR, 28.2, Southern Rhodesia; ZS6T, 28.2; ZS6AJ, 28.0; ZS6DW, 28.35; ZS6AJ, 28. mc., So. Africa.

A recent QSL from CN8MA, Morocco, for 10 meter reception informs us that 8MA was on 20 fone at the time, and that we heard his 10 meter harmonic! He's never been on 10!

From Asia: J2MI, 28.16 mc., J2KN, 28.32; J2NF, 28.29 mc. Japan, VU2CQ, 28.4, India.

New Zealand: ZL4AO, 28.; ZL3DJ, 28.2 mc.

SP2HH, 28.05 mc., Poland. OK1FF, 28.05 mc., Czecho-Slovakia. I1KN, I1IT, both 28. mc., Italy. ES5D, 28.1 mc., Esthonia. YR5AA, 28.0. Roumania.

Also reported: SU1CH, 28.8 mc., Egypt, and VK2GU, 28.16, Australia, also VK2IQ, 28.17; VK3YP, 28.19; VK2UC, 28.3 mc.

The Europeans and Africans are heard between 8 a.m.-5 p.m., peak around noon. VU2CQ in India has also been heard at 11 a.m. and 1 p.m.

Australians and Japs are heard between 4-7 p.m. on East Coast.

We wish to express our sincere gratitude to all those who reported their DX to us, and ask that all reports be mailed to reach us by the first of each month at 2559 E. 28th St., Brooklyn, New York.

(Continued on page 128)

This handsome certificate is presented FREE to all members of the SHORT WAVE LEAGUE. The full size is 7¼" x 9½". (See page 116)

Let's Listen In with Joe Miller

(Continued from page 127)

Those who contributed this month are: Ashley Walcott, Chris D. Jaffe, Murray Buitekant, Martin Garvey, Roy Myers, Warren Mayes, Mel Edwards, Cyrus Will, Harry Kentzel, Ralph Gozen, Roger Legge, Harry Honda, Romney Miller, Walter B. Roetter, Robt. Truhlar, Bert Wolfe, J. O. Faris, Jr., Leo Herz, Eli Powers, Pedro Rodriguez, David Styles, Max Fisher, Theodore Bottema, G. C. Gallagher, Jim Lonyon, Gail Beyer, Joe Hellmann.

Radio in Japan

SHIGERU OKAMOTO

(Continued from page 69)

munication between islands. Experiments with ultra-short wave two-way police radio have been conducted also, although there are not many radio-equipped police cars in Japan. The commercial aviation companies of Japan maintain two-way radio phone communications from planes to ground by short-waves as is the case in this country.

Facsimile

While wire facsimile has been in use for several years for transmitting news photos to various cities of the Empire, tests of radio facsimile were made to the United States last spring and this trans-Pacific service will probably be put into regular operation in a few years. Tests to several European countries also were made. No work has been done in the field of a home facsimile service for the general public, such as that now being evolved in the United States.

Receiving Equipment

The most popular type of radio in Japan is the T.R.F. receiver with a regenerative detector. Superheterodynes have never become very popular because the extreme selectivity of the superheterodyne is unnecessary where there are not a great many broadcast stations. Each of the principal cities of Japan has one or two broadcast stations. Four- or five-tube receivers for A.C. operation are most generally used. Alternating current electric lines are used exclusively in Japan, so there are no A.C.-D.C. receivers. Japanese receiving tubes are of the American type rather than the European type, but they are manufactured in Japan. The average four- or five-tube table model radio costs about $12 to $15. Very little set building is done by Japanese radio fans any more, although a few years ago most receivers were home-made.

France and U. S. Combat S-W Propagasters

(Continued from page 78)

and the western part of South America. This station broadcasts programs in Spanish. As a result of this change, South America is insured of superior reception of programs from this country. Strenuous efforts will be made to cultivate the good will of our southern neighbors via these broadcasts. It was emphasized that these allocations were conditional and the government might at some future time go into the field of short wave broadcasting to South America through a government-operated Pan American station. However, if W2XAD and W1XAL provide adequate service for South America, they will probably be granted unlimited use of these frequencies.

• 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.)

HRO

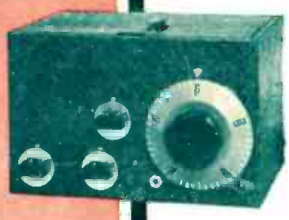
Designed with cost secondary to performance, with the one idea of obtaining the maximum of effectiveness in difficult communications work, the HRO Receiver has won a unique reputation for outstanding capability.

NC—101X

Somewhat lower in price than the HRO, and equipped with the added convenience of knob-controlled coil shifting, receivers of the NC-100 series have a consistently high performance that make them favorites in amateur stations throughout the world.

NC—81X

Offering the maximum of performance possible at a low price the NC-80 series are true Communication Receivers, capable, long-lived, and efficient. They provide extremely good performance-per-dollar value.



ONE—TEN

A special purpose receiver, the 1-10 Receiver covers the range from one to eleven meters, and is intended solely for work at ultra-high frequencies. It fills the need of the experimenter for an adequate receiver to cover this wide and increasingly valuable field.

A FINE RECEIVER FOR EVERY PURPOSE

NATIONAL COMPANY, INC., MALDEN, MASS.

Introducing

2 NEW Hallicrafters Receivers . .

the SKY BUDDY

ONLY AN ORGANIZATION with the facilities, experience and resources of the Hallicrafters could build a practical communications receiver to sell at this low price.

The 1938 SKY BUDDY covers everything on the air from 18.5 MC to 545 KC, including the 20, 40, 80 and 160 meter amateur bands, regular broadcast, police, aviation, foreign short wave, and government services. It's an amateur's and short wave listener's receiver in every respect—an AC set of conventional power transformer construction, and built of highest quality material and parts throughout. Sensitivity and selectivity are comparable only to receivers selling at many times its modest price. Any amateur or critical short wave listener will be delighted at its fine performance—it has all the painstaking, careful engineering of the better Hallicrafters receivers. See the New 1938 SKY BUDDY at your Hallicrafters dealer today.

- 5 Tubes
- 3 Bands
- Complete Coverage 18.5 MC to 545 KC
- Built-In Speaker
- Separate Band Spread Dial
- Easily adapted for battery operation
- All necessary controls

Amateur's Net Price (Including Speaker and Tubes) **29.50**

AT NO TIME PREVIOUSLY has the Amateur or Short Wave Listener with a limited purse been offered so much in a communications receiver for so little in price. The SKY CHAMPION is an 8-Tube, AC superheterodyne with Pre-Selection, complete coverage from 44 MC (6.8 meters) to the top of the broadcast band. Built-in Speaker, every essential control for amateur receptions and a Band Spread better than A.R.R.L. Handbook recommendations. In Sensitivity, Selectivity and all around performance, the SKY CHAMPION equals and betters receivers selling at double its price. It's a true Hallicrafters receiver—incorporating only the finest of parts, and the most careful and painstaking engineering and workmanship.

See the New Sky Champion at your Hallicrafters dealer today, or write for complete information.

and the SKY CHAMPION

- 8 Tubes
- Complete Coverage 44 MC to 545 KC
- For AC and Battery Operation
- 4 Bands
- Separate Band Spread Dial
- Built-In Speaker
- Individual Coils for each band
- Every essential control for efficient amateur reception

Amateur's Net Price Including Speaker and Tubes **49.50**

A champion endorses the SKY CHAMPION. Mr. T. E. McElroy, famous World's Champion Code Operator, says:

"Congratulations on the SKY CHAMPION. It's hot performance you can't get for twice the money elsewhere!"

ALL HALLICRAFTERS RECEIVERS AVAILABLE ON LIBERAL TIME PAYMENTS

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WORLD'S LARGEST BUILDERS OF AMATEUR COMMUNICATIONS RECEIVERS