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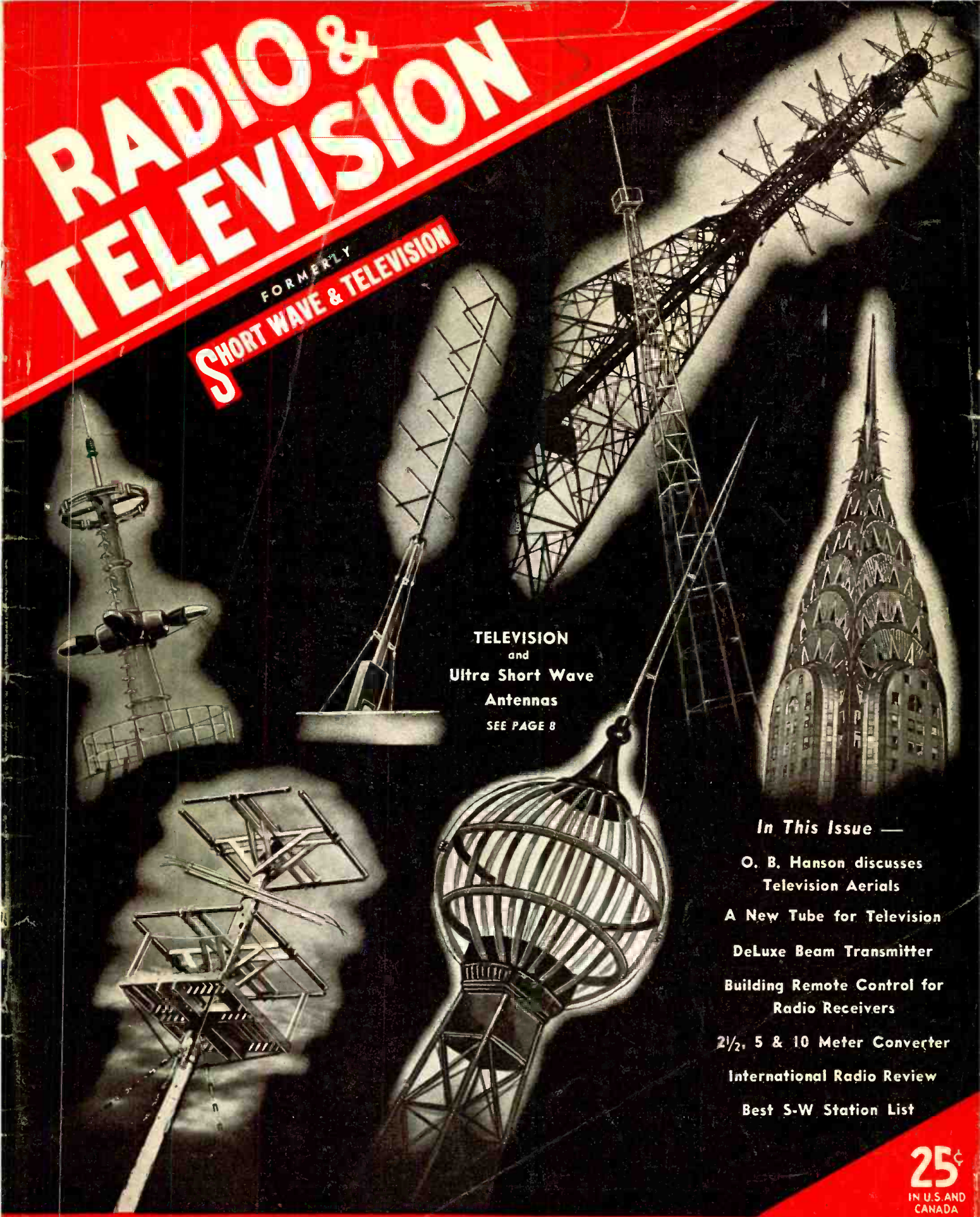

TELEVISION
and
Ultra Short Wave
Antennas
SEE PAGE 8

In This Issue —

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HUGO GERNSBACK
EDITOR

RADIO EXPERIMENTING
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MAY
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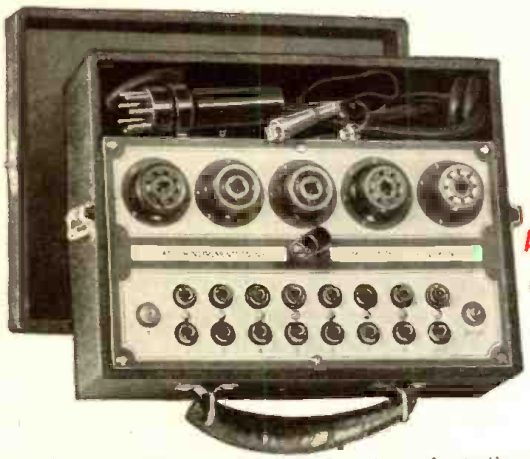

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RADIO & TELEVISION

The Popular Radio Magazine

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

MAY — 1939
Vol. X No. 1

TELEVISION SPECIAL!

June Number Tells ALL about this New Art

In This Issue

GENERAL FEATURES

CONSTRUCTION

CONDENSED FEATURES

INSTRUCTION

TELEVISION

MISCELLANEOUS

Cover composition by H. Gernsback and Thomas D. Pentz.
Television and Ultra Short Wave Antennas—See page 8.

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June "TELEVISION" *Issue*

Opportunities in Television—Dr. Alfred N. Goldsmith
How to Build a Television Receiver
Solving Problems in CBS Television—Dr. Peter C. Goldmark
De Luxe "Beam Power 3"—Part 2—Howard G. McEntee, W2FHP
Ultra Short Wave Receiver—Herman Yellin, W2AJL

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An Interview with F.C.C.'s Chief—Frank R. McNinch

Robert Eichberg

● WHEN Federal Communications Commission Chairman Frank R. McNinch came to New York to address some fifteen representatives of leading women's clubs, he granted the press an interview.

Mr. McNinch made it clear that he favors the Wheeler Bill and, indeed, had something to do with its framing. The bill, among other provisions, calls for a Federal Communications Commission with but three commissioners. The work of the Commission will be divided into three branches—common carriers (telephone and telegraph), broadcasting, and international affairs. Under the new bill, the Commission will vote on all necessary matters. There is also provision for the creation of a Bureau of Research and Information to keep the Commission abreast of developments.

In broadcasting (which includes television, amateur, and experimental work, etc.), this added department would not only keep the Commission informed as to engineering developments, but would gather data on public *likes*. The Commission now receives considerable mail describing what the public dislikes but listeners do not habitually send fan mail to the Commission. The Bureau will also take advantage of surveys now made by Crossley and similar services.

The Commission may soon be issuing licenses for extended periods—possibly up to three years, when the Havana treaty is ratified by Mexico. As ratification is not possible before next September, the Commission may even take action to issue longer licenses in advance of this date, if the Mexican Government puts the treaty into effect at an earlier time, as is expected.

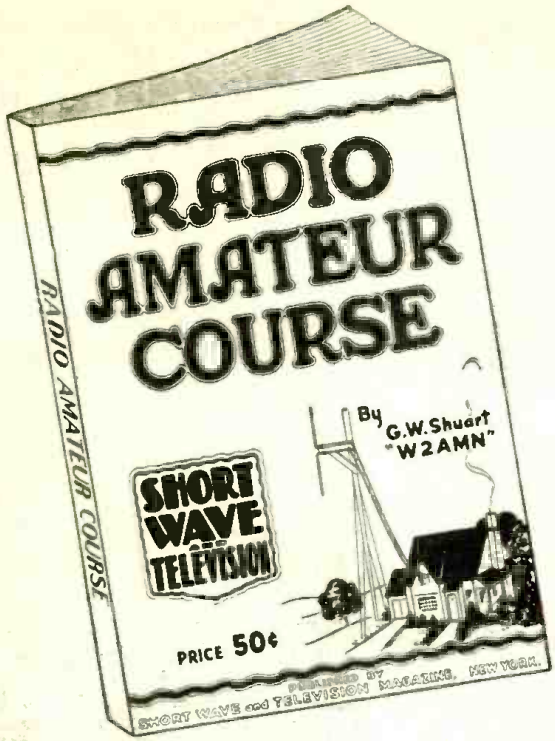
Commissioner McNinch explained that there will be frequency reallocations (though on a small scale) when the treaty goes through. For this reason, it would have been unwise to issue licenses for longer than a six months' period prior to such necessary changes. After the changes, longer licenses will be possible and will probably be preferable from the stations' viewpoint, saving executives much work in preparing applications for renewal licenses. Station owners also believe that it will help them to obtain more adequate financing.

Television: As to *television*, Commissioner McNinch stated that it is doubtful whether *commercial licenses* would soon be granted to television and facsimile broadcasting stations. The reason for this is that, in the opinion of the Commission, television is "still in the experimental stage" and not enough receivers have been distributed, although great progress has been made technically in the art.

No *police* applications for *television* stations have been received as yet. *Facsimile* is, of course, being used by the press of the nation, and it is said that one police station is in operation—at least experimentally.

The problem of *censorship* was next raised at the discussion, with Father Coughlin as the "jumping off" point. Commissioner McNinch said that some 4,000 cards and letters giving the *pro* and *con* of the controversy had been received relative to Father Coughlin. They were about evenly divided as to whether or not Father Coughlin should be forbidden the air and whether the stations which refused to broadcast his talks should have their licenses revoked. As far as the Commission is concerned, however, whether a station decides to put on any individual or not is the *station's own concern*, and as long as both sides of a controversy are fairly presented, the Commission is satisfied.

(Continued on page 47)



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RADIO & TELEVISION

HUGO GERNSBACK, EDITOR

H. WINFIELD SECOR, MANAGING EDITOR

Transoceanic

Radio Telephony on Short Waves

Frank B. Jewett,
President, Bell Telephone Laboratories

Dr. F. B. Jewett, President of the Bell Telephone Laboratories, New York. Transatlantic radio telephony, as it is known today, has been made possible largely through the vast researches carried out by the laboratories which he directs.

● IT is twelve years since the opening to public use on January 7, 1927 of the first long distance *radio telephone* circuit. This point-to-point channel across the Atlantic Ocean initially joined New York and London, but almost from the outset (and of course this was the intention) became a *trunk line* whereby any telephone in the United States and any telephone in the western part of Europe could be used for intercommunication.

Quickly following the inauguration of overseas telephony, a network of radio circuits has sprung into existence whereby nearly all the wire telephone systems of the world can be interconnected. This network is at once invisible and very substantial. A graphic view of the present-day status of overseas telephone facilities is given in the accompanying map. While a table listing all of the channels which the map portrays would far exceed the space allowed me, it is interesting to know that the total mileage of all of these channels adds up to nearly 125,000 miles. The circuits shown permit intercommunication of about 93 percent of the world's telephones and enable the United States telephone subscriber to reach seventy-three other countries.

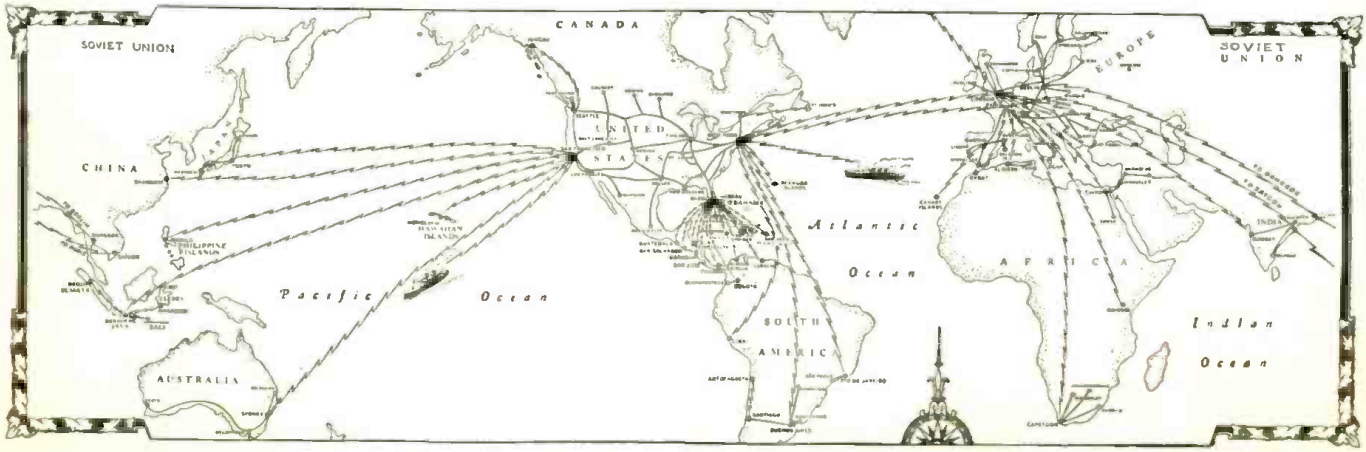
The technical achievements underlying this widespread commercial use fall roughly into three categories. The first covers those factors which made possible the beginning of commercial radio telephony. In the second are the things without which its rapid growth and wide expansion could not have occurred. In the third are several interesting and valuable technical features which are not readily classifiable, but without which the success we know today could not have been achieved.

At the outset radio telephony presented difficulties in addition to those existing in radio telegraphy. First and foremost, telephone communication has to be two-way,—and of course the system must be linked in with the wire telephone systems so as to be available to any instrument. Second, until the connection is actually established, the subscriber cannot deliver his message, so that delay due to unfavorable transmission conditions is less to be tolerated. Finally, the grade of transmission required to satisfy the average telephone user is higher than that permissible in telegraph reception by an experienced operator.

The realization that a relatively high degree of reliability was essential to success discouraged any attempt at commercial service until high power transmission on a practical basis was assured. For this reason the starting point of successful long distance radio telephony was the water-cooled

(Continued on page 37)

Twenty-seventh of a series of "Guest" Editorials



Map of the world showing the more important radio telephone channels.

TELEVISION
HOLDS THE SPOTLIGHT

Television is scheduled to make its bow to the American public this spring. Programs are promised in the following areas: New York, Schenectady, Philadelphia, Los Angeles, Milwaukee, Chicago and Kansas City.

Miss Thelma A. Prescott, television's first woman program director, who is now a member on the staff of the National Broadcasting Company. Miss Prescott will produce television fashion shows and other programs which appeal to women. Miss Prescott lived ten years in Paris.

The television image shown at the right is not a very clear one but it hopped 3400 miles from London, England to Riverhead, L. I.!

Right—Dewitt R. Goddard, a member of the RCAC engineering staff, is shown here using a motion picture camera to photograph television images broadcast from London, England, at RCAC's Riverhead, Long Island, N. Y., receiving station.

Above—This television image, although not very clear, is truly remarkable in that it represents the first image transmitted between England and America. The BBC television station has an average range of 50 to 100 miles, but this image broke all the rules of ultra short waves and hopped clear across the Atlantic, where it was picked up by the apparatus shown at the left. The British image was picked up on a rhombic antenna 800 feet long and 150 feet wide.

Above—Television in the rain!—note the powerful new type spotlights which resemble cathode-ray tubes—this picture was taken in Washington, D. C., during a recent N.B.C. demonstration, when people from all walks of life, from scientists to school girls, were asked to step in front of the camera and say a few words. Even the chairman of the F.C.C., Frank R. McNinch, appeared before the television camera.

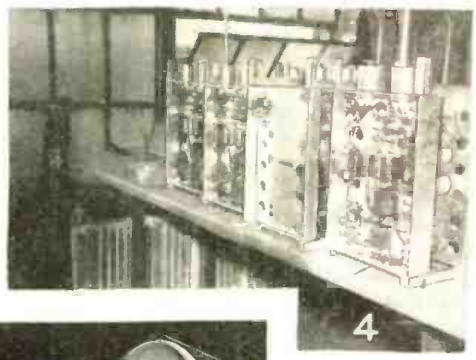
Above and left—The new Philco television apparatus. The 83 tube portable transmitter is shown at the left, and it was recently successfully demonstrated at Palm Beach, Fla., and also in New York. One of the new Philco receivers uses 22 tubes; it is shown above with dipole aerial. Albert F. Murray, Philco's chief television engineer, faces the reader in the photo above.

Who are these men on the television screen? Why, it's Amos 'n' Andy, who recently visited the New York World's Fair and gave a special television broadcast for the benefit of those in the New York area who possessed television receivers. Photo courtesy N.B.C.

Right—Gov. Herbert H. Lehman of New York was recently televised over the N.B.C. system, and the photo at the right gives some idea as to the excellent image observed on one of the receivers. Actually, the images are much clearer than they appear in these photos, as the images are moving and therefore difficult to photograph.

How a Television Receiver Is Born

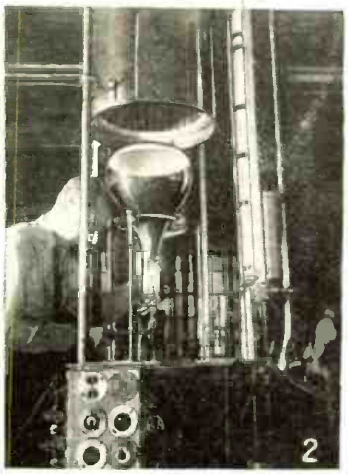
TO meet the immediate demand for television receivers in areas being served by experimental transmitters, and in anticipation of the greatly increased demand which will follow regular television programs this spring, the Allen B. Du Mont Labs., Inc., of Passaic, N. J., have gone into regular production on the 14-inch *teletron* or cathode-ray television tube.



5 Assembling a television receiver which will afford 8 x 10 inch screen images, with synchronized sound.

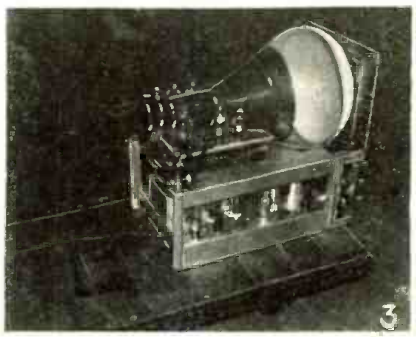
4 A few Du Mont sets about half completed, on the assembly line.

1 Trimming the chemical screen deposited on the inside of glass blank for cathode-ray tube.



2 Sealing off a television cathode-ray tube, following pumping and bombardment operations in the exhaust position.

3 Chassis of the 21-tube television and sound receiver.



Originally made in the laboratory by skilled mechanics and glassblowers, and exhausted in crude pumping positions, resulting in very high cost, the present 14-inch tubes are now fabricated by highly trained factory workers and exhausted in a battery of specially-built exhaust positions capable of hand-

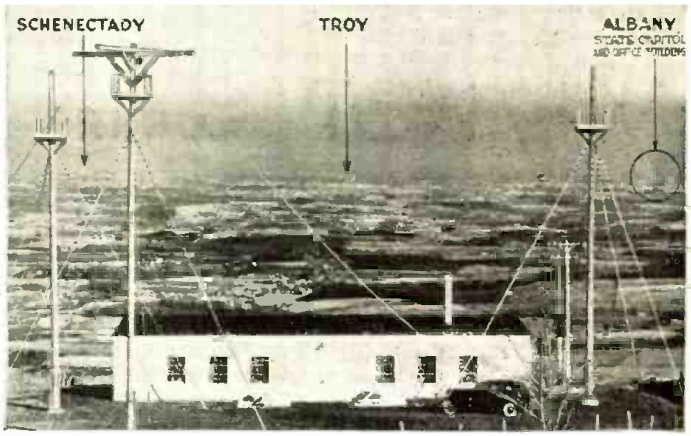
(Continued on page 64)

Most Powerful Transmitter for New Television Station

Top — G-E television camera. Small pilot lights glow when in use.

Middle — Front of television camera with cover removed. Focusing is done with knob at lower left.

Bottom — This tube, mounted in television pick-up, performs the same function as the film in an ordinary camera, but at the rate of 30 a minute.



The new 10 kw. G-E television transmitter station. The left tower will support the receiving antenna, picking up studio signals from Schenectady; the next will broadcast the televised pictures; the one at right will broadcast the sound. Small pole at right is part of the power line.

A 10 KW. television transmitter, more powerful than any now in use in this country and designed to broadcast pictures with much improved picture definition, will be put into operation before the end of April by General Electric at Indian Ladder in the Helderberg Hills, 12 miles from Schenectady, N. Y., according to Chester H. Lang, the company's manager of broadcasting.

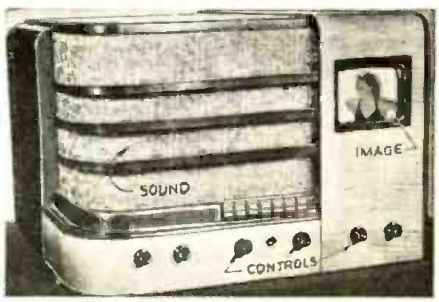
The television studio will be located in Schenectady, in quarters formerly occupied by WGY. At such times as studio programs are not available, motion picture film will be used much the same as electrical transcriptions now fill-in on broadcast programs.

From an ultra short-wave transmitter on top of the studio building, the images will be relayed over the 12-mile gap on a 1.4 meter band to the $155,000 main transmitter in the Helderbergs, where they will be broadcast for public reception on a wavelength in the 66-72 megacycle band or on about 4½ meters. The voice accompanying the picture will also be broadcast on the same band, on a frequency immediately adjoining the picture.

More than 250 vacuum tubes, many of

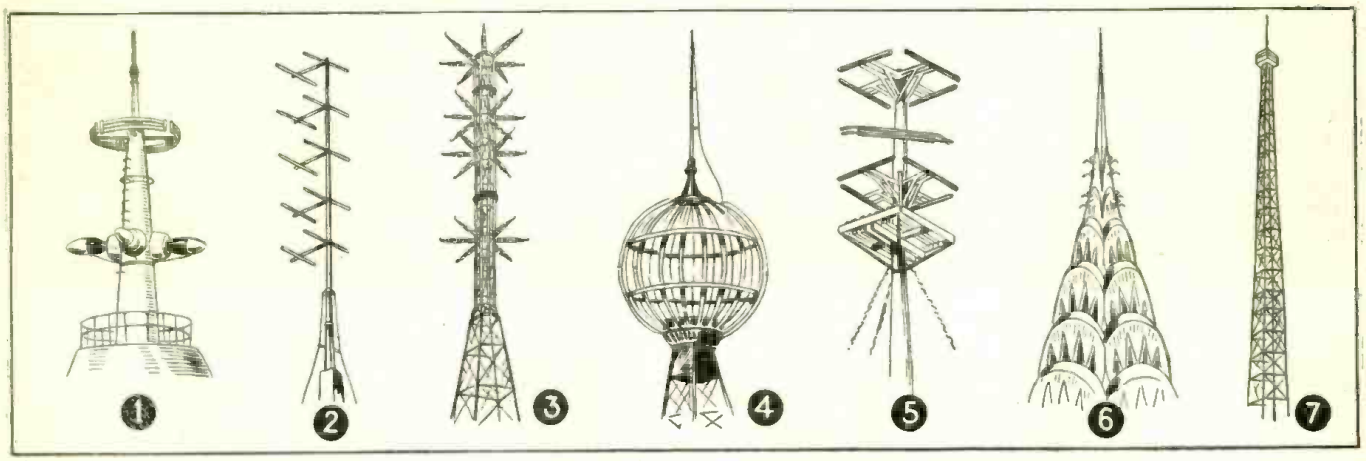
(Continued on page 64)

Table model G-E television receiver.



Television and Ultra Short Wave Antennas

(Front Cover Feature)



1—New NBC television aerial on the Empire State Building, New York City. 2—Aerial used on NBC mobile television truck. 3—Image and sound aerials used by BBC television station (London). 4—Ultra short wave antenna of station W8XWJ in Detroit. 5—New GE television antenna. 6—CBS television aerials atop the Chrysler Tower, New York City. 7—Ultra short wave aerial erected by station W9XUP.

● OUR front cover and the accompanying illustration show various types of television and ultra short wave antennas.

Fig. 1 shows the new NBC television image and sound transmitting antenna atop the 1300 foot Empire State Building in New York City. This antenna is especially designed and will operate on frequencies as high as thirty million cycles per second without peaking.

Fig. 2 shows the novel type of U.S.W. antenna devised by NBC experts for use with their mobile television transmitting truck. This antenna is demountable and it serves to relay television images picked up by the truck's camera to the nearest NBC receiving station.

Fig. 3 shows the image and sound aerials used at the BBC transmitting station in London. The dipoles are mounted vertically, as vertically polarized waves are employed there instead of the horizontally polarized waves used in this country.

Fig. 4 shows the ultra short wave (7.3 meter) antenna used at station W8XWJ (Detroit *News*), Detroit. It is employed for phone.

Fig. 5 illustrates the new G.E. 10 kw. television antenna to be used at the company's new television transmitting station at Indian Ladder, twelve miles from Schenectady. This antenna comprises eight hollow copper bars, each 4 inches in diameter and 7 feet long, or equivalent to one-half wave length. Powerful horizontally polarized waves will be radiated from the antenna, with both image and voice components, on a wave length of 4½ meters. It is located atop a 1500 foot hill and should therefore give a good account of itself.

Fig. 6 shows the new Columbia Broad-

(Continued on page 55)

Why NOT "Commercial" Television Licenses?

● **A vast new industry will give employment to thousands, and spread millions of dollars around the United States, when television becomes *commercial*. Knowing this to be true, RADIO & TELEVISION magazine has made a move to clarify the television situation. On this page there appears copy of a letter which was sent to Frank R. McNinch, Chairman of the Federal Communications Commission.**

In order to attract sponsors so that they will put on high quality programs, RADIO & TELEVISION believes that it will be necessary to permit such sponsors to advertise their products via television. It is to the end that this may be made possible that the letter printed on this page was sent. The reply from Commissioner McNinch appears on page 57 of this issue.

March 4th, 1939

Mr. Frank R. McNinch, Chairman
Federal Communication Commission
Washington, D. C.

My dear Mr. McNinch:

*We are sending, under separate cover, two copies of the February issue in which your guest editorial (**Emergency Uses of Radio**) appears.*

There is a very important problem occupying the minds of magazine writers as well as radio manufacturers today, on which we would greatly appreciate an opinion from you.

*1—How soon do you think **commercial licenses** may be issued to radio facsimile stations?*

2—What, in your opinion and that of your Commission, is the present status of television?

*It seems to us that if in the near future **commercial television broadcasting licenses** were granted, this would certainly help to start the television business rolling along and help, to a tremendous degree, to put the country's business back on its feet.*

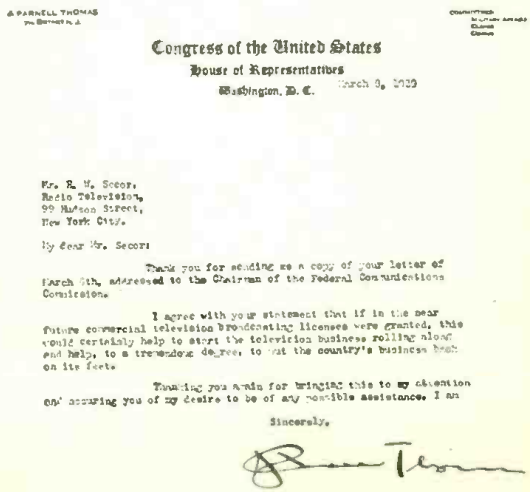
*We have interviewed a number of people in the radio industry and those who are thinking of taking a venture in television, and they all sing the same tune—**they are waiting for the F.C.C. to say the word so far as "commercial" licenses are concerned, so that they can proceed to solicit sponsored television programs.***

The writer has seen the present television images, as reproduced by several of the leading systems, and they are certainly very excellent.

*The writer would certainly appreciate learning, even though your opinion is to be a personal and strictly private one, why it is that the F.C.C. keeps deferring the issue of **commercial** television broadcast licenses. It would seem to the writer, judging by past experience in the radio broad-*

(Continued on page 57)

Congressman Approves



J. PARNELL THOMAS
7th District, N. J.

Congress of the United States
House of Representatives
Washington, D. C. March 8, 1939

Mr. R. H. Secor,
Radio Television,
99 Hudson Street,
New York City.

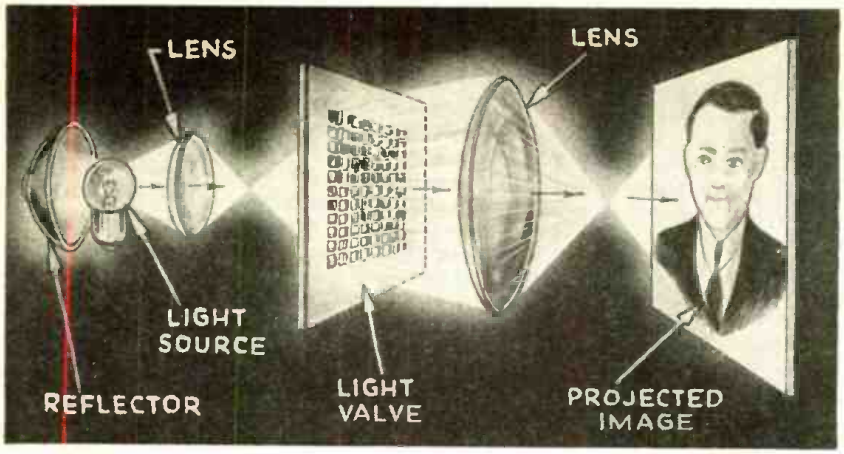
My dear Mr. Secor:

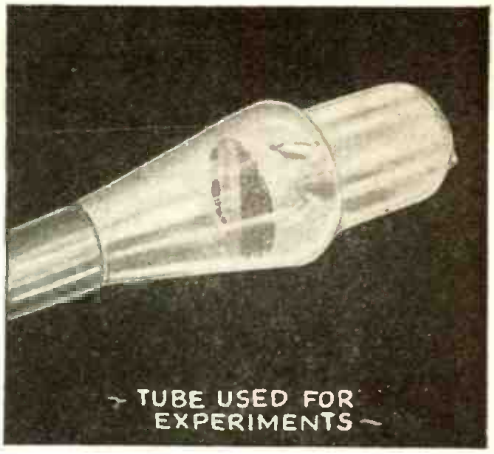
Thank you for sending me a copy of your letter of March 6th, addressed to the Chairman of the Federal Communications Commission.

I agree with your statement that if in the near future commercial television broadcasting licenses were granted, this would certainly help to start the television business rolling along and help, to a tremendous degree, to put the country's business back on its feet.

Thanking you again for bringing this to my attention and assuring you of my desire to be of any possible assistance, I am

Sincerely,





New Cathode-Ray Tube

Modulates Light Beam

For Brilliant Images

German Engineer replaces fluorescent screen with midget Kerr cell crystals, producing brilliant images capable of projection to large size on wall.

● ONE of the most intricate problems of television design pertains to the low intensity of illumination obtainable with cathode-ray tube screens. Practically all image reproducers of present design suffer from this defect.

The illumination of these image reproducer screens is so low that a terrific strain on the eye results after one or two hours of observation. The low-powered televisor screen as now used seems to be the finest device on the market to create permanent trouble in the family. This sounds strange, but let us remember that most of the present television receivers (those in the stage of development as well as those already on the market) must be operated in a more or less darkened room. The illumination in the room will be "less" rather than "more," and will make it impossible for some of the people in the room to read while others watch the program. In short, if television is to become the popular means of home entertainment we all dream about, engineers will have to increase the illumination of the televisor screen, and at the same time, lower cathode-ray tube prices.

von Ardenne Has New Invention

A young European scientist, Manfred von Ardenne, well-known for a great number of important discoveries in the field of electronics, has found an interesting method which bids fair to eradicate a considerable number of inherited faults of present television systems.

We all have read that present cathode-ray tube receivers operate on a principle whereby a cathode-ray beam is shot toward a chemically treated screen. The impact of the cathode-ray beam produces a peculiar effect on the screen which is known as *fluorescent light*.

If we consider that a cathode-ray beam has practically no weight, we will understand that a very minute amount of light can be obtained by this method. There are, however, means known to increase the power of impact, and thus to increase the intensity of illumination. (The large screen television receiver of the projection type is a typical example.) But this type of receiver is very expensive.

Since the present system of image reproduction by means of fluorescent screens has its physical limitations in regard to the power of illumination obtainable, other means will have to be employed. Such a means has now been proposed by von Ardenne.

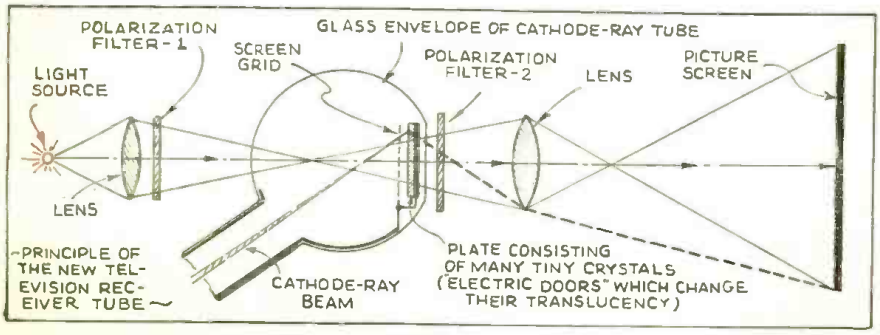
Screen Acts as Light Valve

He recommends a screen similar in shape and size to that used in present cathode-ray tubes. But, and this is of great importance, the impact of the cathode-ray beam *does not produce any fluorescent light on the screen*. In fact, *the new screen does not produce any light whatsoever*. But it does something else, and this is *absolutely new* (as far as the author could ascertain). It seems that the new principle may be of great importance in the future development of television, for the new screen changes its *translucency* under the impact of the cathode-ray beam.

In order to bring the principle of *varying translucency* home, let us use an analogy. Assume that instead of a television screen we have a large wall, and that there are many tiny doors installed in this wall. Further, assume that these are opened or closed by a cathode-ray beam, as shown at the top of this page.

When a strong source of light is arranged behind the wall, a beam of light will pass through the doors which are open. By varying the width of the door openings, a light pattern of specific shape and with varying degrees of illumination is produced.

In short, if we substitute the customary picture elements of television reception for the doors in this example, we have a television screen which is able to reproduce roughly sketched images. By increasing the number of doors, making each of them smaller, images of greater detail may be obtained.



Cathode Ray Serves as Relay

So far, we have only described the idea behind the proposed system of television image presentation, but have not emphasized its most important feature—the fact that the cathode-ray beam is *not* used to produce the light by its impact on the screen, but rather as a means to *control* the amount of light to be projected as the many picture points which constitute a television image.

That it is possible to obtain powerful illumination by this method is easy to grasp, since all that is required is a powerful electric bulb behind the screen.

(Continued on page 43)

Radiobeacon in Buoy

George Eaton, Superintendent of Lighthouses at Chelsea, Mass., has told the inside story of the radiobeacon buoy which is now in the North Channel of Boston Harbor. According to Superintendent Eaton, the buoy uses a low power battery-operated radiobeacon transmitter, in duplicate. This is located in one of the tank pockets which normally would contain the gas cylinders for operating a lighted

buoy. The other tank pocket contains a set of low-discharge type storage batteries mounted in a steel rack.

The photograph herewith shows the batteries being lowered into a tank pocket. The batteries furnish power for the transmitter which continually emits a characteristic signal of 5 dashes every 15 seconds on a frequency of 310 kilocycles.

"The antenna system," says Supt. Eaton. "consists of a fifteen-foot vertical radiator mounted on a ceramic insulator above the superstructure of the buoy. The radio frequency current is fed to the antenna by means of a co-axial cable which runs from the transmitter to a terminating unit at the base of the antenna."

While little is known of its actual range, it is expected that radio bearings will be obtained at a radius of about four miles.

First Facsimile Network

A preliminary experiment with the first facsimile network was made in mid-March when stations WGN in Chicago, WOR in Newark and WLW in Cincinnati went on the air. It is expected to extend the network if the tests prove successful.

A Television Network?

In a recent talk before the New York Advertising Club, John Black of the J. M. Mathes Advertising Agency stated that if television transmitters were installed in America's 96 largest population centers, 45% of the nation's population could be serviced with television programs even though the range of each station was no more than 50 miles.

That the country is well on its way to a good start in such service is indicated by a statement from the Philco Radio & Television Corporation. This company not only plans to produce a limited number of television receivers for the public, but may operate stations in New York, Philadelphia, Schenectady, Milwaukee and Los Angeles.

WORLD WIDE

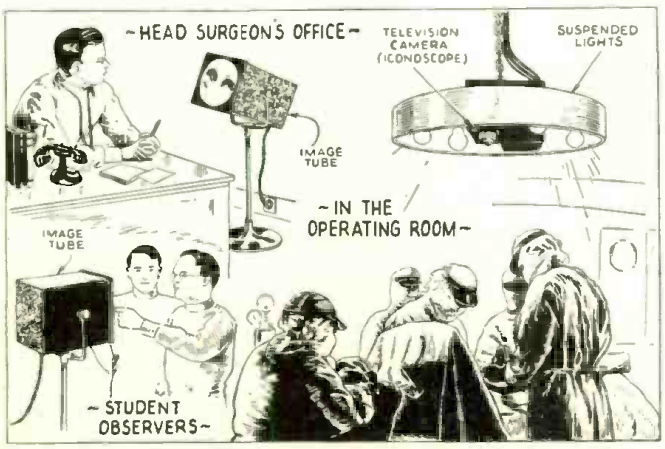
Airplane Static Suppressor

A static suppressor to insure normal reception of both directive beam and voice radio signals, irrespective of static conditions, has been developed by the Bendix Radio Corporation and United Air Lines. The device has been installed in the tails of United's entire fleet.

Now, when a pilot encounters static, he pressed a button which electrically releases a wire in the slip-stream. This wire extends to its full length behind the plane, permitting static, which formerly leaked off the plane, to discharge harmlessly.

Televise Operating Room

For many weeks there had been a lot of discussion about plans to televise a surgical operation in a Brooklyn, New York, hospital. The purpose of the experiment was to see whether or not television could be used as a means of giving medical students and internes a closer view of operating technique.



A local television company provided the equipment which the hospital used. Hospital authorities were enthusiastic as to the future applications of television in this field.

The problem of providing adequate illumination for television pick-up was solved by using filters to cut off the heat (infra-red) rays.

Mules and Radio

According to the Chapel Hill, N. C., *Weekly*, J. M. Yarborough, a Jonesboro farmer, has equipped his plow with a portable radio. As he follows his mules up and down the furrows, he listens to music, news broadcasts, plays, lectures and advertisements from all over the world. (The mules' reaction can only be guessed.)

Crowds Are Televised

More than 12,000 people visited the R.C.A. exhibit at the Frisco Fair on opening date. During the first two days more than 10,000 were televised—this being at the rate of 15 persons per minute for twelve hours.

Ears of the Army

Radio has been used for some time to keep the various ground units of an army in communication with one another. For almost as long, airplane radio has been used. Now the United States Army has adopted portable pack transmitter and receiver equipment to enable men on the ground to maintain communications with planes in the air.

As the accompanying picture shows, the equipment is no more than can be carried by a single man in a small back pack. The antenna, as shown, extends vertically above it.

In this particular set-up, two men are operating the equipment — the one who carries the pack and antenna, as an observer, while his companion can devote his full attention to operating the radio equipment.

Pants For "DX"

Short Wave Magazine, the British publication, reports that one SWL tried practically every means of getting rid of the effects of *body capacity*. As a final despairing gesture, he set up a chair, put a grounded metal plate on it, took off his pants, sat down and started tuning. Hand capacity was then considerably worse.

F.C.C. Releases Figures

According to a report from the Federal Communications Commission, there are now more than 51,000 licensed amateur radio operators in the United States. There are even more licensed amateur stations than there are operators, as several Hams own at least two stations—some, for example, have stations in their town and country homes, and not a few have portable rigs. Of these Hams, more than 1000 are *shut-ins*, whose chief contacts with the world are through radio. These include the blind, the crippled and the bed-ridden. Blind operators, estimated at more than 100, frequently take their license exams in Braille. Many of these Hams are affiliated with the Naval and Army Reserve Systems.

Instrument of Many Uses

A new type of highly sensitive seismograph has been designed by H. A. Chinn and V. N. James, CBS engineers. While the primary purpose is to show irregularities of current traveling through the network, it is so sensitive that it can pick up vibrations resulting from the movement of subway trains underneath the Chrysler Tower near the top of which it is located. It can even record the steps of a burglar entering a bank-vault!

Designed for testing radio lines, sound stages, etc., it permits engineers to perform in a single hour, work which previously took several weeks. Another of its many uses is to make tests for sound-proofing buildings. If the sound takes one-tenth of a second or more to fade out, the instrument will record it. Also, by means of its recordings in the study of acoustics, engineers can tell whether a studio is "live" or "dead."

Picture above shows James at the controls; Chinn's photo is inserted.

RADIO DIGEST

Medal Awarded David Sarnoff

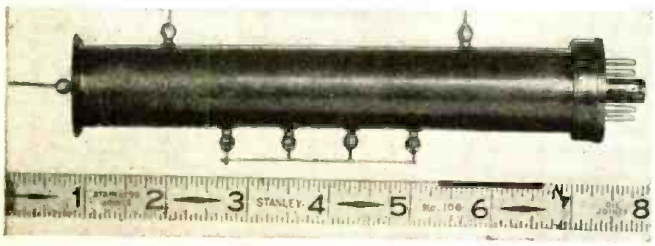
● AT the annual dinner of the Veteran Wireless Operators Association in New York, President William J. McGonigle announced that a new award had been inaugurated.

Mr. Sarnoff, a former wireless operator, was then presented the Marconi Memorial Medal for Achievement, as the outstanding radio executive of today who was formerly a wireless operator. The award and its acceptance were made over long distance telephone wires to Palm Beach, Fla., where Mr. Sarnoff was recovering from an illness.

New Tubes For Air Safety

A new type of radio tube developed by General Electric generates a radio wave which is even shorter than the tube itself. As seen in the illustration below, the tube measures 8 inches overall, but the wave it generates is only about 5½ inches (14 cm.) long. Radio beams of this length are highly directional and may be aimed like a searchlight, making it possible to measure distances by reflection.

Directed at the ground or any other obstacle from an airplane, the beam is reflected so that an altimeter can immediately record and translate the time required for the beam's reflection. With the equipment positioned beneath the plane, an indication of altitude can be had. With the instrument installed in the nose of the plane, it will signal approach to mountains, high buildings or other dangerous obstacles.



Meet Sifalala

Mr. Carlo Spatari, Director of the Spatari language foundation, has allotted to the Short Wave League the word "SIFALALA." This, in the Spatari language, means not only the name of the League, but also its address, by street, city, state and nation. The language, the syllables of which are based on the musical scale, was devised to facilitate international radio communications. One of the synthetic words may mean a complete message. For example, "LASIFARE" is a complete greeting, in *thirty-five words!*

Britain Calls All Radio Men to Register for Emergency

Although experts say that the tension in Europe has decreased, an indication that the war clouds are still lowering is seen in a recent issue of *Wireless World* which devotes two pages to the registration of all radio enthusiasts who might be of use to the Government in the event of a national emergency.

Reproduced at the right is one of the pages of the questionnaire inquiring as to the capabilities of the respondent. The reverse of this questionnaire carries a printed envelope addressed to the Navy.

Wireless World

NATIONAL WIRELESS REGISTER

THE MINISTRY OF LABOUR is issuing a booklet giving the details of various services which are essential for the defence of our country, and is asking members of the public to volunteer their services so that the whole efforts of the country may be rightly directed. Every individual can then be put to that task for which he is most fitted by previous training. A large percentage of readers of "THE WIRELESS WORLD" possess technical qualifications which in many cases have been acquired from years of training and practical experience. In the event of a state of emergency arising, the defence services of the country will have a great need of wireless operators, teleprinter operators, and technical personnel capable of caring for and repairing wireless and light electrical apparatus. During the Great War the needs of the Services for operators were largely met, especially during the early stages by the voluntary enlistment of trained Post Office operators, but as Morse is no longer used in the Post Office, this possible source of supply is rapidly dwindling. It is therefore imperative that all our readers who have at least a good working knowledge of Morse or have other qualifications such as ability to service and repair wireless and electrical apparatus, should apply to help fill the vacancies which now exist in the R.N.V.(W.)R., the Royal Corps of Signals, T.A., and the R.A.F.C.W.R.

Such applications will enable much valuable time to be saved and will facilitate volunteers being in their right position at the right moment if the necessity arises.

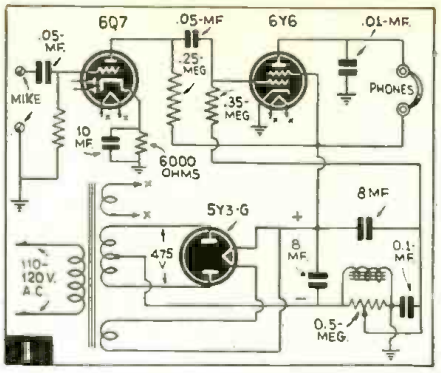
Readers who are not at present in a position to volunteer in the above-mentioned Services are asked to complete the Questionnaire which is reproduced below, and post it without delay. From the answers to this Questionnaire a register of wireless experts who are willing to serve their country should an emergency arise will be compiled in conjunction with the Wireless Telegraphy Board. This Register will be regarded as confidential and the information contained therein will only be made available to the Defence Services.

1. Name in full (in capitals) .....
2. Permanent address .....
3. Age .....
4. State whether British by
   (1) Birth .....
   (2) Naturalised .....
   (If naturalised, state former nationality and date of naturalisation.)
5. Give particulars of any technical degrees or other recognised qualifications .....
6. In which of the following categories would you place your qualifications :—
   (1) Research and design of wireless apparatus .....
   (2) Servicing and tracing faults .....
   (3) Construction of apparatus from blueprints and designs .....
   (4) Wireless operating. State number of words per minute .....
   (5) Teleprinter operator .....
7. Have you a sound knowledge of wireless theory and the ability to read circuit diagrams? .....
8. Have you had war experience, if so, give brief details .....
9. Are you already liable for service with any Force or Organisation? (If so, state particulars) .....
10. Have you any preference for service in either the Navy, Army or Air Force? .....
11. Are you physically fit? .....
12. Present occupation .....

Home-Made Deaf Aid

1 AN aid for the hard of hearing may be assembled out of three tubes, a microphone, a headphone and a few parts from the junk box, according to *Radio Revista* of the Argentine. A schematic diagram showing all values of components is given in Fig. 1. The iron core choke is any 30 h. filter choke. The microphone may be connected across the points marked "MIC" and the author recommends that a midget mike be used. This may be either crystal, dynamic or velocity and it is suggested that a crystal headphone be used as the mike.

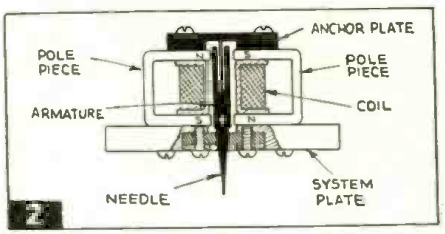
The diagram shows magnetic headphones being used for the output. If it is desired to replace these with crystal phones, a filter network must be employed to permit the B voltage to get to the plate without passing through the phones, which would be damaged.



1

New Magnetic Pick-Up

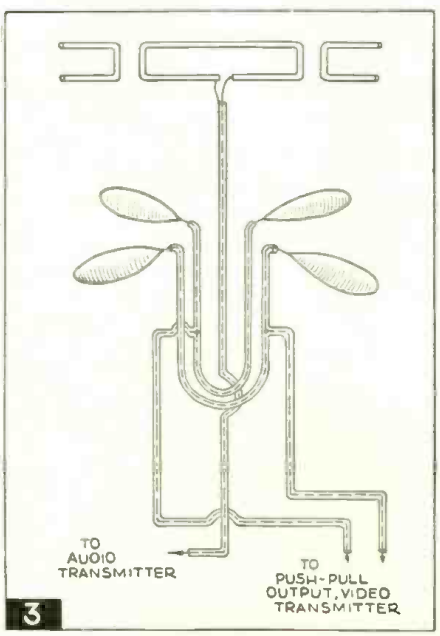
2 AN improved magnetic pick-up which uses *four* poles has been developed in Germany. This pick-up, which is described in *Bastelbriefe*, is shown schematically in Fig. 2. An ingenious means of cutting out material from the armature permits it to be pivoted at the exact center and provides adequate rigidity, as it actually forms an integral spring. The armature is also very easy to center, as the anchor plate forms the base of the entire system.



2

How the Television Torpedo Aerial Works

3 THE phantom drawing in Fig. 3 shows the connections which are utilized in the television sight and sound antenna which has been installed by the National Broadcasting Company atop the Empire State Building, New York City. Assigning arbitrary directions for the sake of clarity, you will notice that the North and West torpedoes are connected to one phase of the push-pull output of a video transmitter, while the East and South torpedoes are connected to the other phase of the video output.



3

The accompanying sound program is radiated from the antenna, positioned directly above the "torpedoes."

Co-axial cable is used for feeding all of these units. It is particularly interesting to notice that the point to which the video feed line is attached is so positioned that a quarter wave length "U" is formed, as shown on the diagram.

Dual Twin-Triode Transmitter

4 TWO twin triodes, such as the 6A6, form the basis of an ingenious exciter which was designed by Austin Forsyth, G6FO, editor of *The Short-Wave Magazine*, a British publication.

Keying can be handled in any of the jacks shown, but J3 is recommended. The 6A6's, according to the author, work very well up to 14 megacycles. The components specified are the same as in author's single tube transmitter, a description of which follows.

One point to remember is that the four R.F. chokes must be dissimilar in order to avoid self-oscillations. Use chokes of different make or of slightly different values.

Single Twin-Triode Transmitter

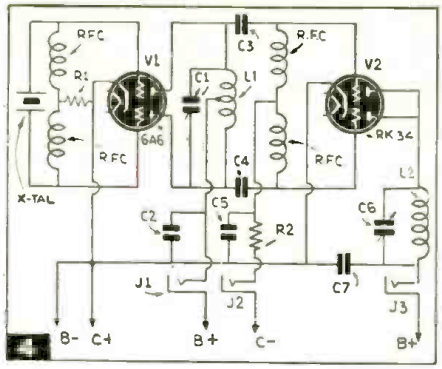
5 VALUES used in the one-tube CO-PA unit are as follows: R2—10,000 ohm, 3 watt resistor; RFC—standard transmitting R.F. choke; C3—.0001 mf. for all bands between 3.5 and 14 mc.; C3—.0003 mf. for 1.7 mc.; C1 and C4—.0001 mf. for higher frequency bands or .00016 for 1.7 mc.; C2, C6 and C7—.005 mf.; R1—25,000 ohms. Coils L1 and L2 should be electrically well separated and are standard coils for the frequencies to be employed. C5 is a neutralizing condenser; C4—.0001 mf. double-spaced condenser. Tank coil L2 is a standard 10 watt in mount and must be center-tapped. Plate voltages are 400 maximum with a 6A6 or 250 if a 6E6 is used.

Cathode-Ray Microscope

6 AN excellent explanation of a cathode-ray microscope, as shown in Fig. 6, appears in *Wireless World*, of Britain. The diagram is virtually self-explanatory, as the optical analogy at the right explains

the cathode-ray system shown at the left. It is found that magnification up to 100,000 diameters is obtainable with this apparatus. The electron beam is produced by a cold cathode in a low vacuum tube at the top.

The object to be inspected is placed on a revolving plate and examined with the optical microscope at the right and then rotated into the electron beam. Its image is produced at moderate magnification on the upper screen so that it may be focused. This screen is then raised and the projection coil below it gives greatly increased enlargement on the final screen at the bottom of the microscope.



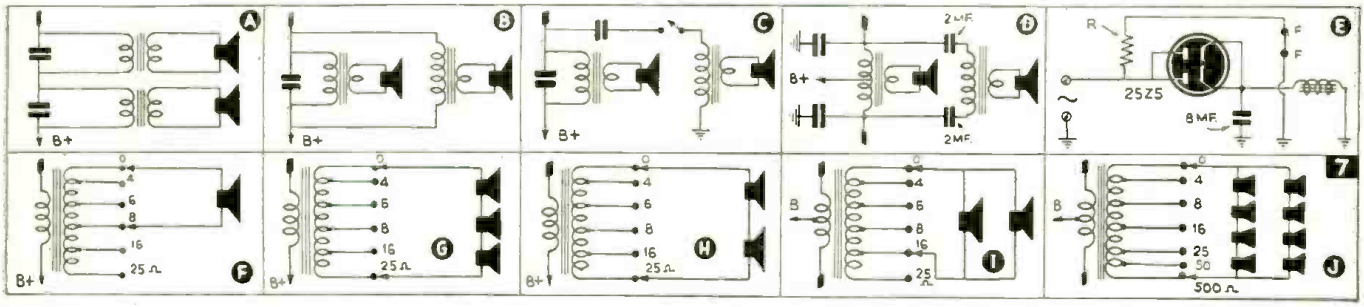
speakers in parallel to this transformer.

Fig. 7J indicates the connection of eight speakers in series-parallel.

The impedances of the speaker voice coils are: Fig. F—8 ohms; Fig. G—8 ohms; Fig. H—12 ohms; Fig. 1—32 ohms; and Fig. J—25 ohms.

New Marconi Aerials

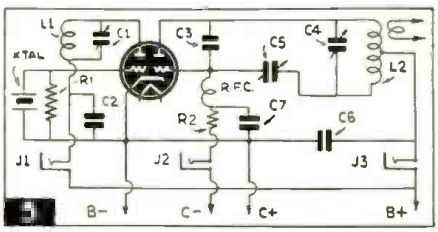
8 FIG. 8A illustrates a tapered artificial line to match impedance and to secure maximum energy transfer and optimum tuning when a receiver is connected to a remote aerial. The line consists of a series of progressively changing units of induct-



Connecting Additional Speakers

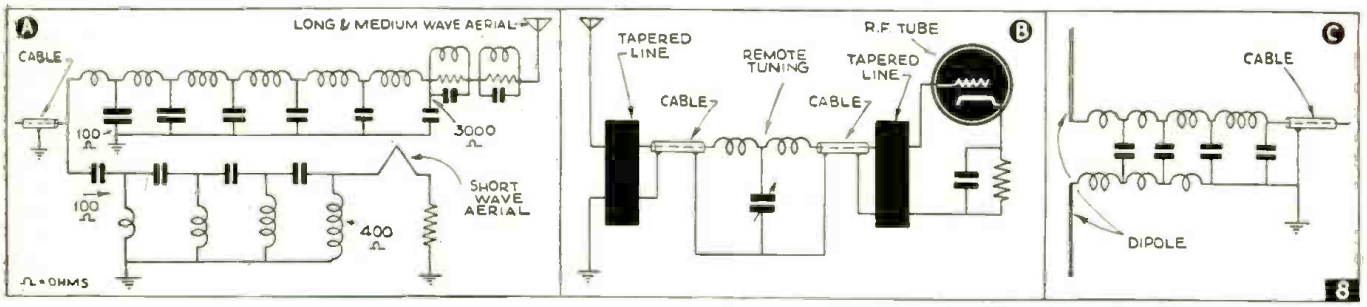
7 FIG. 7A shows a method by which a supplementary loudspeaker is used in conjunction with the loudspeaker of a set. This series connection affords a plate impedance which is the sum of the primary impedance of both speaker transformers.

Fig. 7B shows parallel connection of the speakers in which the impedance is decreased, the formula being the usual one



ance-capacity. The figure shows two aerials of different characteristics connected to the same cable.

The line going to the long and medium wave aerial has an impedance of about 3000 ohms at the aerial, decreasing to 100 ohms at the cable. The short wave antenna's line has an impedance of from 400 ohms at the aerial, decreasing to 100 ohms at the cable. Each line offers high impedance to



for impedances in parallel.

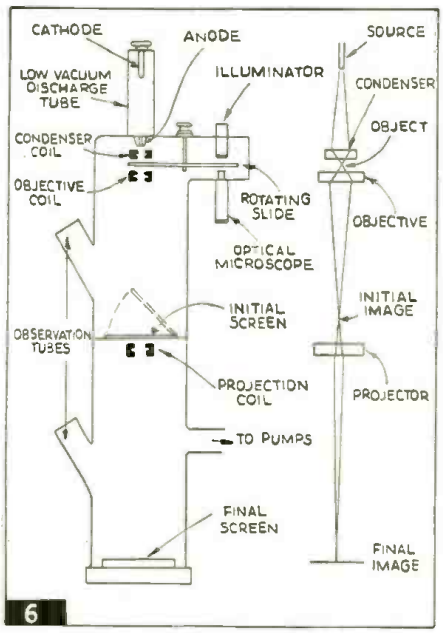
Fig. 7C shows connections for one speaker connected directly in the plate circuit, to reproduce the bass end of the spectrum, while the second speaker, connected through a condenser, will reproduce high frequencies.

Fig. 7D shows connection of an additional loudspeaker *which does not have a center-tapped primary* to a push-pull output stage.

Fig. 7E shows a method of affording excitation for a speaker field. The tube is a 25Z5. The resistance is 300 ohms at 300 ma., for 115 volt A.C., the condenser is 8 mf. and the speaker field may vary between 1500 and 4000 ohms.

Fig. 7E simply shows a means of using a variable impedance secondary transformer to match a speaker to an output stage.

Fig. 7G shows how three speakers in series would be connected to such a transformer, and Fig. 7H shows how two speakers in series would be so connected, while Fig. 7I indicates the connection of two



the frequencies on the other aerial.

A remote control unit may be previously calibrated and inserted in the cable at any point, as shown in Fig. 8B.

Fig. 8C shows the adaptation of the circuit to a dipole antenna.

Curing Key Clicks

9 A KEY may be inserted in the screen-grid lead of an oscillator, in the high voltage lead, or in the high voltage plate lead of the power amplifier. Even if the key is inserted in the first mentioned place, which is the best, sparking is apt to result at the key's contact. This causes interference.

The simplest filter to eliminate this trouble is seen in Fig. 9A, where a 2 mf. condenser and a 1000 ohm resistor are in series across the key. If the current in the key's circuit exceeds 10 ma., additional components are necessary. This is the circuit, as shown in Fig. 9B, where a high inductance choke in parallel with a 100,000 ohm variable resistor is connected in series

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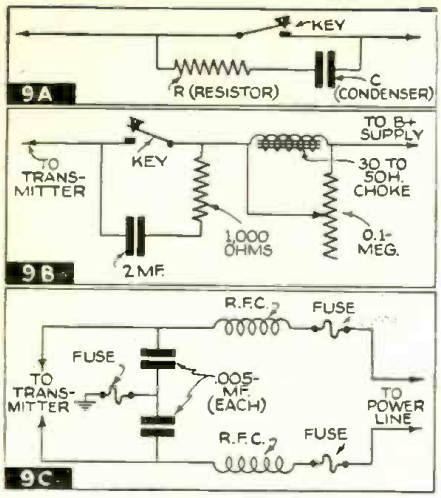
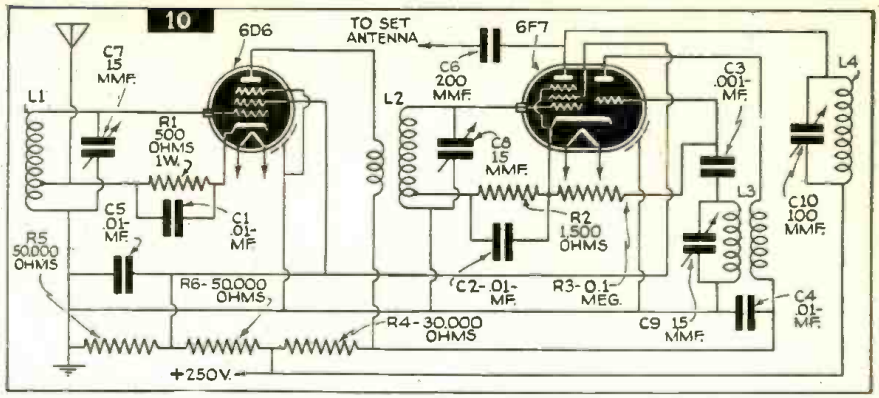




INTERNATIONAL

(Continued from preceding page)

with the key. If interference from keying still feeds into the line, an R.F. filter may be inserted in the A.C. power leads, as shown in Fig. 9C. This will prevent interference with broadcast reception.

2-Tube 3-Meter Adapter

10 AN extremely simple converter can be made at a maximum cost of about $7.50, as described in *Short Wave Magazine* of England. All the coils are wound on one-inch corks and are permanently mounted on their associated condensers. The radio receiver, with which this converter is used, is tuned to approximately 1500 kc., the coil L4 consisting of 150 turns. Both tubes must be shielded as are the three tuned circuits.

To operate, tune the oscillator until a hissing sound is heard, then tune for a signal with the antenna connected to the cathode tap of the detector stage. When a signal is tuned in in this way, shift the antenna to its correct position and balance the R.F. stage.

Specifications for the coils and other components are: R.F. stage, L1, 6 turns spaced to cover 1-in. Cathode tap ¾-turn from ground end; 1st det., L2, ditto, with 3-turn coupling coil close to ground end; osc. coils, L3, 5 turns each, wound continuously to cover 2 ins. With both coils wound in the same direction, the connections, starting from either end, should be: 1 plate, 2 B, 3 grid condenser, 4 ground.

List of parts and values: C1, C, C4, C5—.01 mf.; C3—.001 mf.; C6—.0002 mf.; C7, C8, C9—15 mmf.; C10—.0001 mf.; R1—500 ohms, 1 watt; R2—1500 ohms, 1 watt; R3—100,000 ohms, 1 watt; R4—30,000 ohms. 1 watt; R5, R6—50,000 ohms, 1 watt; filament transformer, 6.3 v., 1 amp.; 6D6 and 6F7 tubes.

Home Recording Hints

11 A SIMPLE circuit for home recording is given in Fig. 11A, from *Practical and Amateur Wireless* of England. Two double-pole, double-throw switches are used to permit either the microphone or pick-up to be connected to the input of an amplifier which, incidentally, may be the audio channel of a radio receiver. Either the microphone or a pick-up may be connected to the input, permitting play-back through the loud speaker or recording on the cutting-head connected with the output.

If the radio frequency and detector stages of a receiver are connected to the input, broadcast programs may either be played through the speaker or recorded by the cutting head.

Fig. 11B shows a simple mixer for recording from a microphone and pick-up, permitting any degree of fading of either unit.

Fig. 11C shows a constant impedance volume control for the input circuit. In this way, the input may be regulated without getting the circuit out of balance and thereby destroying its frequency characteristics.

When playing back, surface noise (particularly manifest in home recording) may be eliminated by means of a simple scratch filter, as shown in Fig. 11D. This consists of a fixed condenser and a variable resistor in series. Many circuits use a fixed resistor, which is cheaper, but the variable resistor is preferable as it permits the passage of a maximum range of highs while allowing the scratch to be taken out.

Making an "S" Meter

12 AN "S" meter to measure signal strength may be used to replace the magic eye often incorporated in communications receivers. The advantage is that an "S" meter gives a definite reading, while the magic eye merely indicates an approximate signal strength.

The basic principle of the "S" meter, as described by J. F. S. Carpenter, G8JQ, in *The T. & R. Bulletin* of Great Britain, is merely a Wheatstone Bridge as shown in Fig. 12A. The ratio of the resistances, when no current flows, is expressed by the ratio R4/R1 = R2/R3.

Fig. 12B shows how a tube is substituted for R4. Its internal resistance must remain constant so that no current flows through the meter when the bridge is balanced. This balance is achieved by installing a variable resistance of the correct value in series with the tube.

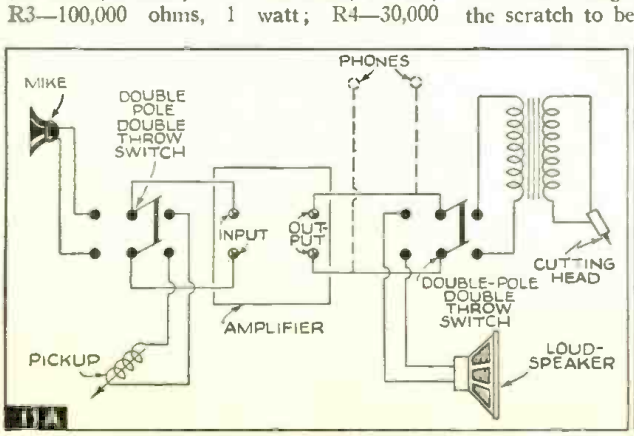
Practical application of this circuit is shown in Fig. 12C. In this figure, resistances 1, 2 and 3 correspond to those similarly numbered in 12D. In the writer's case, R1 was 2000 ohms; R2, 100,000 ohms; R3, 24,000 ohms. A 0-1 ma. meter was employed.

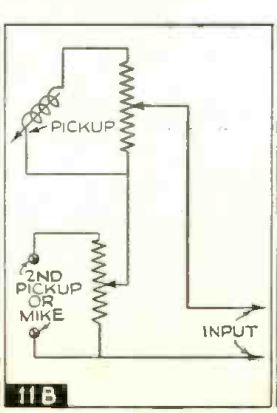
If, in actual use, the meter tends to go off scale, a shunt can be used to increase its range.

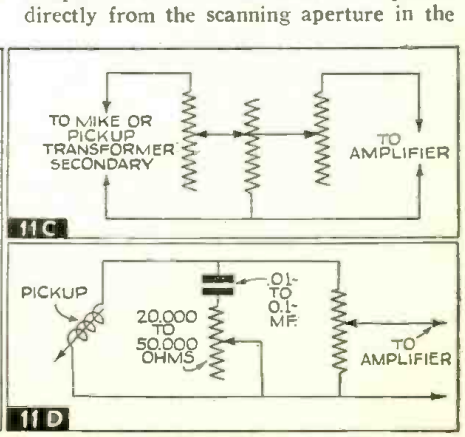
New Television Tube

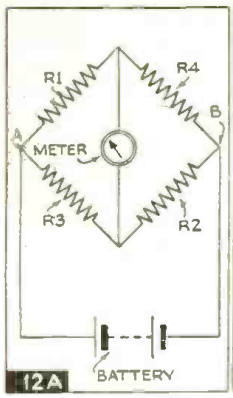
13 T. C. BUTTALL and Baird Television, Ltd., have applied for a patent on a new type of television tube, which has been described in *Wireless World*, a British publication.

In this system, the picture signals developed in an electron camera are passed directly from the scanning aperture in the

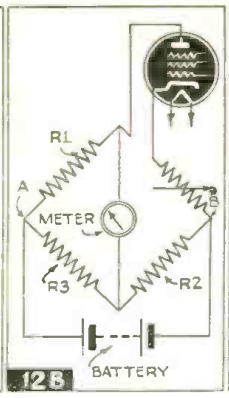




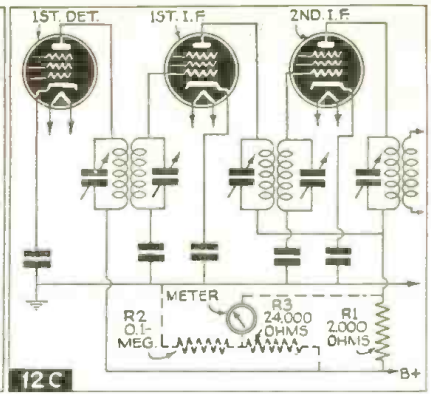




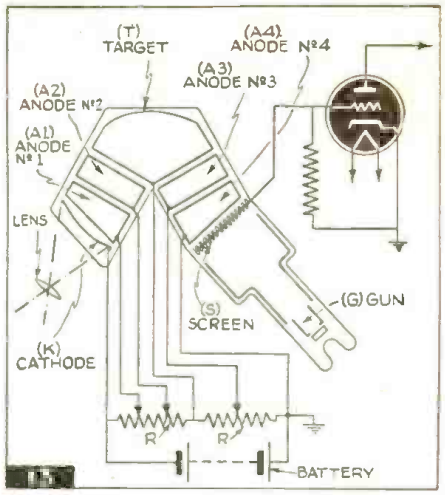
12A



12B



12C



13

RADIO REVIEW

anode on to the first of a series of target electrodes arranged in a projecting part of the same tube, where they are subjected to intensive amplification by secondary emission.

According to the invention, the signals are modulated, as they pass through the tube, by applying a carrier-wave frequency directly to one or more of the target electrodes in the electron multiplier. Preferably a periodic blocking potential is also applied to the electron multiplier, in order to cut off the output during the flyback period.

Simplified Variable Selectivity

14 HIGH selectivity is an advantage in a radio receiver when one wishes to separate the signals of stations on adjacent bands, but a lesser degree of selectivity is preferable in order to get high fidelity reproduction when extra sharp tuning is not needed.

A method suggested by a British writer, R. E. Spencer, in *Wireless World*, is shown in Fig. 14. This consists of adding two windings to a coupling transformer and having a single-pole, double-throw switch with an "OFF" position connected to them. The insert in Fig. 14 shows how these coils are added, while the schematic shows their place in the circuit. When the switch is in the middle position, with neither coil "shorted," medium selectivity is obtained. This selectivity may be increased by placing the switch in one position, and the tuning broadened by placing it in the other position.

Interference in Television

15 ONE trouble that British television viewers are experiencing, according to *Wireless World*, is due to interference from the heterodynes of various stations which impinge on the video band. The use of a reflector can do much to overcome this difficulty.

In normal use the reflector is positioned directly in back of the receiving antenna in a straight line with the video transmitter to be received. If the interfering station is located as shown in Fig. 15A, its signals will reach the antenna and cause distortion of the image. Fig. 15B shows how a simple change in the position of the reflector will block the wave from the interfering station. In this case, however, there will be some decrease in the strength of the signal received from the vision transmitter. Therefore, the editors of RADIO & TELEVISION suggest that instead of changing the position of the reflector, as the British magazine recommends, an additional reflector be installed so that two are in use—one as shown in Fig. 15A and the other as shown in Fig. 15B.

Operation of Automatic Bias

16 THE basic circuit in which cathode bias is used is shown in Fig. 16A. The direction of the plate current which flows from the cathode to the plate inside the tube is shown by the arrows. Flowing through resistor R3, it creates a voltage drop which is equal to IR3, I being the current in amps., and R3 the resistance in ohms, thus making the cathode positive with respect to the negative B lead, to which the grid is returned through R1. In normal operation, no grid current flows, so that the grid is at the same potential as negative B, making the cathode positive with respect to the grid. When a signal is applied across R1, the grid becomes alternately positive and negative, with respect to negative B.

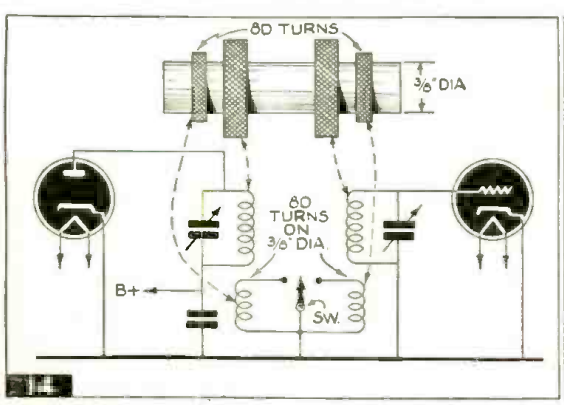
When the grid swings positive, the grid potential is less negative than before with respect to the cathode, so that the plate current increases. The voltage drops across R2 and R3, therefore, increase as well. With respect to negative B, the plate is less positive than formerly, and the cathode is more positive.

When the grid swings negatively, exactly the reverse happens, the plate current falls and the voltage drops across R2 and R3 are decreased. Consequently, the plate becomes more positive, and the cathode less positive relative to negative B.

It is therefore clear that when a signal is applied, both plate and cathode potentials fluctuate, and that the change of plate potential is in the opposite direction, and the change of cathode potential is in the same direction as the grid voltage change. All potentials are reckoned with respect to negative B. The output voltage at the cathode is thus in the same phase as the input, and the output voltage at the plate is in the opposite phase.

One difficulty sometimes experienced with automatic bias is the possibility of feedback. This, however, can be suppressed by using a large capacity by-pass condenser C, as shown in Fig. 16B. In this way, although the plate current fluctuates and follows a change of grid voltage, the current through R3 does not change, for the condenser absorbs the difference.

The values of C are: 25 to 50 mf. in A.F. amplifiers; .1 mf. in broadcast I.F. and R.F. amplifiers; or .1 mf. or smaller for short wave work.



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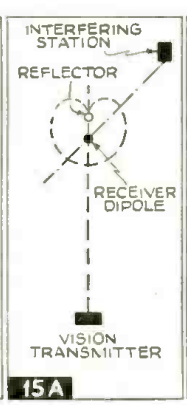
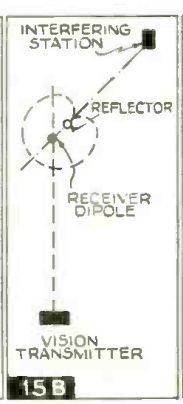
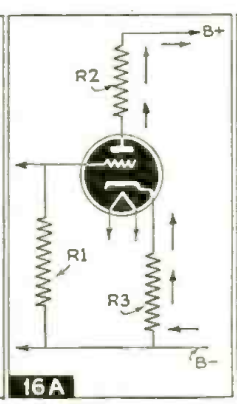


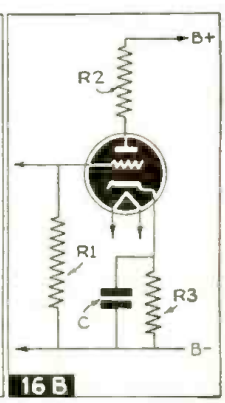
15A



15B



16A

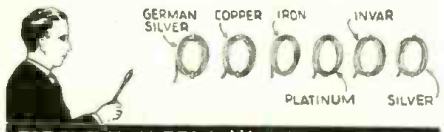


16B

Robert Eichberg's Radio Test-Quiz

For each question answered fully, count 10 points; half right, 5 points; etc. A perfect score is 170, a good score is 110; below 60 is poor.

Hugo Gernsback, Editor of "R & T," scored 130 points in 19½ minutes. What is your score?



FOR MINIMUM RESISTANCE WHICH WIRE TO USE?

1. When you want to wire up a circuit with the least possible D.C. resistance, which of the following would you use to keep resistance at a minimum?

a. Copper wire *d. Iron wire*
b. Silver wire *e. German silver wire*
c. Platinum wire *f. Invar wire*

—

2. Manfred von Ardenne, noted German physicist, has recently received much publicity for his work on

a. a new type of submarine detector.
b. a new type of "death ray".
c. a new type of cathode ray tube.
d. a means for creating interference with enemy broadcasts.

—

3. Here are the names of three noted radio engineers and three well-known companies. Can you tell which engineer is with which company?

a. Ed Cohan *A. NBC*
b. Charlie Horn *B. MBS*
c. Jack Poppele *C. CBS*

—

4. No matter what your opinion of them may be, the most popular programs in the rural districts are

a. Lum & Abner *d. Charlie McCarthy*
b. Major Bowes *e. Information Please*
c. Kate Smith *f. Benny Goodman*

—

5. When Guglielmo Marconi, Italian inventor, died, his yacht, the *Elettra*, was

a. seized by Mussolini for his personal use.
b. sunk with the body of its owner aboard.
c. turned into a floating radio museum.
d. put into the Italian National Museum of Science.

WHICH IS NEAREST AND FARTHEST--?

6. A radio listener in Denver tunes in a number of s-w broadcasts. Of the following cities where these broadcasts might have originated, which is farthest from, and which nearest to, the listener?

a. Tokyo *d. Moscow*
b. Caracas *e. Berlin*
c. Paris *f. Rome*

7. Certain motion picture executives have decided that their stars should cease broadcasting because

a. the programs were so bad they hurt the stars' prestige.
b. the programs were so good that people stayed home to listen to them instead of going to the movies.
c. the public got so much free entertainment from the stars that they were unwilling to pay to see their pictures.
d. the stars got swelled heads and wanted more money.

—

8. Instructions for mounting certain radio parts call for the use of 6/32 screws, which means that

a. one should use six screws of the No. 32 size.
b. the screws are size No. 6 in diameter and have 32 threads to the inch.
c. the screws are 6/32" in diameter.
d. the ratio of the diameter to the length of the screw is 6:32.

—

9. When Sunday sermon broadcasts were commenced nearly 20 years ago, a number of ministers condemned them as

a. attempts to win converts from one religion to another.
b. giving a false impression of a church service.
c. another reason for the public to stay away from church.
d. too strong a drive for new church members, and therefore undignified.

—

10. At the end of February, 1939, the number of licensed amateurs (Hams) in the United States was

a. less than 25,000
b. between 25,000 and 35,000
c. between 35,000 and 45,000
d. between 45,000 and 55,000
e. more than 55,000

ACHIEVED AT WHICH DATE--?

11. (A) Thomas Edison discovered that a heated filament emits electrons. (B) J. A. Fleming discovered that a positive plate would attract these electrons, and (C) Lee de Forest controlled the flow by means of an interposed grid. From the following table, choose the date of each man's achievement.

a. 1869 *d. 1888* *g. 1905*
b. 1876 *e. 1896* *h. 1907*
c. 1883 *f. 1899* *i. 1909*

—

12. In scanning an image, the cathode ray in a kinescope must swing back to the beginning of each line. The relation between the time it takes for the back-swing and the time taken for the image swing may be expressed by the ratio

a. 10:1 *d. 1:5*
b. 5:1 *e. 1:10*
c. 1:1 *f. 1:11½*

—

13. A famous broadcaster was recently granted a Ham license. The "air name" of this person is

a. Gracie Allen
b. Amos, of Amos 'n' Andy
c. Andy, of Amos 'n' Andy
d. Lum, of Lum & Abner
e. Abner, of Lum & Abner
f. Fibber McGee

—

14. The screens of some cathode ray tubes show a green image, while others show a white image, the difference being caused by

a. the electron emitting material on the cathode.
b. the fluorescent material on the screen.
c. the voltage applied to the tube.
d. the war in China.

—

15. In New York City, the title of the man in charge of the police department radio system is

a. Radio Supervisor
b. Chief of Communications
c. Director of Broadcast Division
d. Superintendent of Telegraph Bureau

—

16. A "hard" tube, as used in radio, is

a. any metal tube.
b. a highly evacuated tube.
c. a tube containing a large percentage of gas.
d. any tube suitable for use in high frequency work.

—

17. In the following list, can you pick out one artist who has never sung over the air?

a. Lily Pons *c. Paul Chabas*
b. Lawrence Tibbett *d. Enrico Caruso*

(Answers appear on page 64)

What About THAT *Television* Antenna?

An interview with O. B. Hanson, chief engineer of N.B.C., discloses many interesting things we did not know before concerning receiving aerials for television.

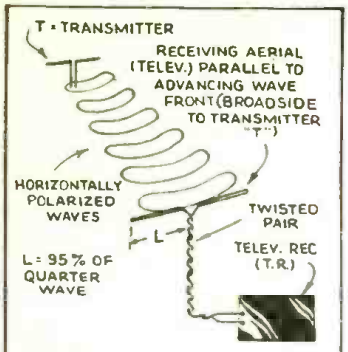


FIG. 1-A

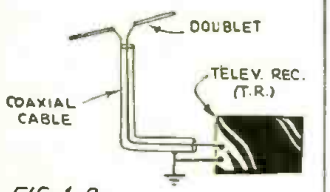


FIG. 1-B

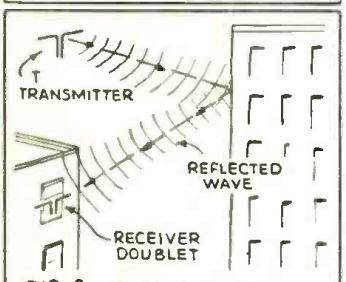


FIG. 2 — SIMPLE REFLECTION —

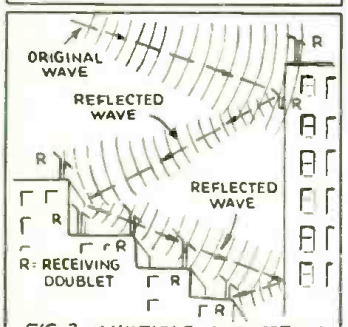


FIG. 3 — MULTIPLE REFLECTION —

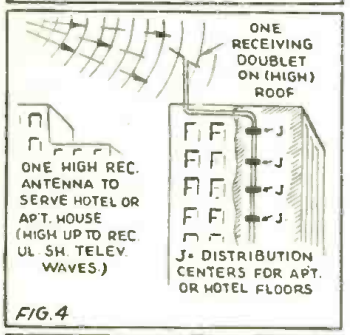


FIG. 4

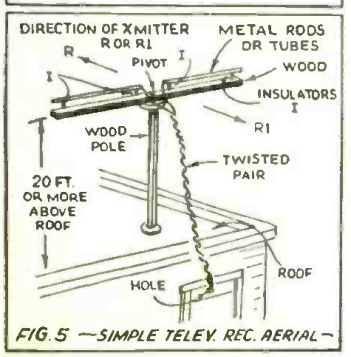


FIG. 5 — SIMPLE TELEV. REC. AERIAL —

● FOR receiving television images transmitted on waves in the 6-meter region, a horizontal doublet is generally advocated. The accompanying pictures show various locations in which the doublet may be placed. It is interesting to note for those who read the English television articles, that their doublets are shown in a vertical position, the waves being vertically polarized over there. In this country, *horizontally* polarized waves are used for television, and the doublet should be placed *horizontally* also, as shown in the accompanying sketches.

Fig. 1 shows how the doublet, each leg of which measures one-quarter wave length, may be connected to the television receiver by means of a twisted pair. The twisted pair comprises two rubber covered wires which are twisted together, similar to lamp cord; the better the insulation, the more reliable the reception, especially in wet weather when leakage may occur, if the wires are poorly insulated.

Fig. 1B shows the use of co-axial cable between the antenna and the television receiver itself. The principal thing to remember in connection with a television aerial or doublet is that it should be elevated to the *highest* position possible, at least twenty to thirty feet above the roof, so as to be free from interfering electric light or telephone circuits, and capacity or inductive effects from any nearby metal or other masses.

In a recent article in the *New York Sun*, Mr. O. B. Hanson, vice-president and chief engineer of N.B.C., revealed some interesting conditions that will undoubtedly occur in television reception in large cities. With buildings of various heights, all sorts of wave reflections are bound to occur and our television experimenters will often find conditions similar to those illustrated in Figs. 2, 3, etc.

As Mr. Hanson pointed out (see Fig. 2), the receiver doublet or aerial may pick up a very good signal on a wave *reflected* from the wall of a building.

Fig. 3 shows a double and even a triple reflected wave, and many of our television experimenters in the near future may find that by moving the doublet up or down, a point of maximum signal with minimum multiple path reception will be found for their particular location. Of course, the waves will spread out a great deal more than is apparent from the simple diagrams here shown, and in each case the point where the maximum strength of signal (especially on a reflected wave) is to be found, will have to be determined by experiment (rotation of the antenna while viewing received image). Sometimes much better reception will be found by moving a doublet closer to or farther from the wall of the building. Even moving the doublet a few feet may spell the difference between success and failure.

Mr. Hanson brought out the fact that while absorption of energy from the television wave, due to metal structures in close proximity to the receiving aerial, is to be considered, National Broadcasting Company engineers have found this

(Continued on page 44)

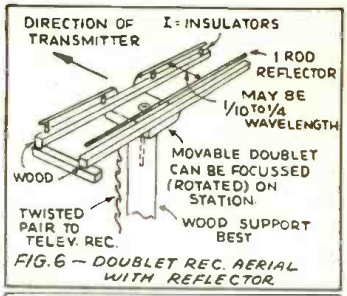


FIG. 6 — DOUBLET REC. AERIAL WITH REFLECTOR

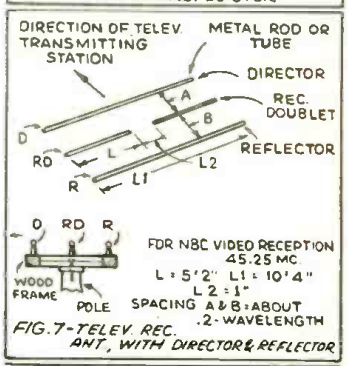


FIG. 7 — TELEV. REC. ANT. WITH DIRECTOR & REFLECTOR

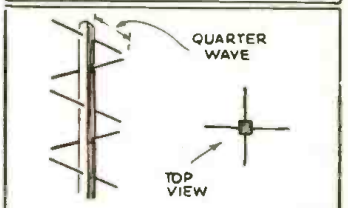


FIG. 8 — TURNSTILE ANTENNA FOR 360° COVERAGE

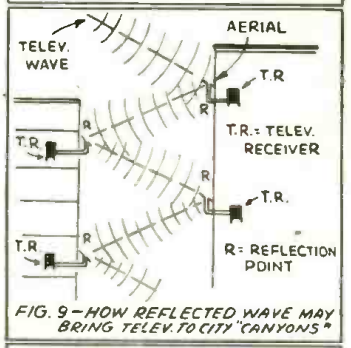


FIG. 9 — HOW REFLECTED WAVE MAY BRING TELEV. TO CITY "CANYONS"

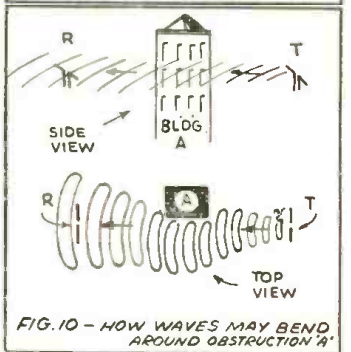


FIG. 10 — HOW WAVES MAY BEND AROUND OBSTRUCTION 'A'

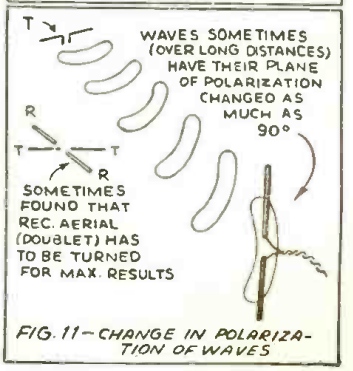


FIG. 11 — CHANGE IN POLARIZATION OF WAVES

Radio Kinks

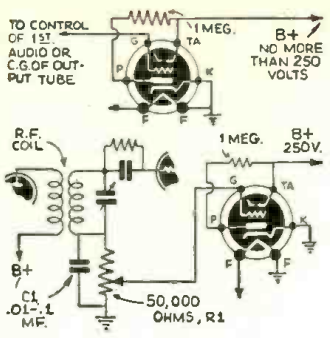
Each month the Editor will award a 2 years' subscription for the best kink submitted. All other kinks published will be awarded eight months' subscriptions to RADIO & TELEVISION. Read these kinks; they will be of real use to you, besides indicating what is wanted. Send a typewritten or ink description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

First Prize Winner

Regeneration Indicator

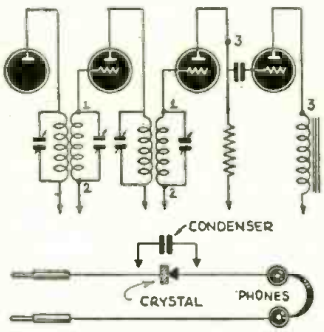
One of the "magic eye" or electron ray tubes, such as the 6G5, 2E5, etc., can be used to indicate when a set is regenerating or when it has "plopped out".

The circuit shown may be used on broadcast T.R.F. as well as on regenerative sets. Points to remember are that the filament of the magic eye need not be grounded if the filament supply in the power pack is. Also that it may be necessary to experiment with values of C1 and R1 to get the best results. —*Michael Schmitz.*



Locating Distortion

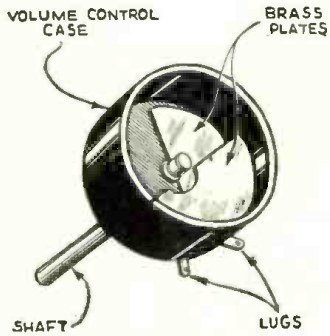
A quick way to locate distortion or dead stages in a radio is to connect a fixed crystal detector in series with a pair of phones and, with the set tuned to a strong broadcasting station or coupled to a modulated signal generator, connect the phones across the secondaries of the R.F. and I.F. transformers, starting with the R.F. and going toward the output. When you reach the audio stages, substitute a .1 mf. 600



volt condenser for the crystal and connect directly from plate to chassis. Sometimes this will locate a faulty stage when nothing else will. Use crystal when testing between points 1 and 2, and condenser between 3 and 4. —*William H. Perkins.*

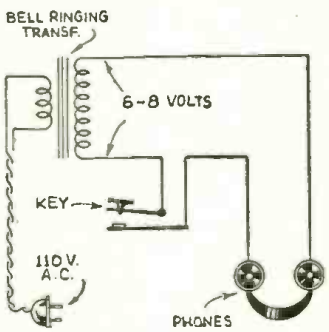
Making Variable Condenser

A midget variable condenser can be made from an old burned out volume control and a little sheet brass. First the volume control components, such as the resistance, contact, etc., must be taken out. The plates are then cut to size and shape from the sheet brass; the rotor is fastened to the shaft either by tapping the shaft and securing the plate with a screw, or by soldering, or swaging. The stator plate or plates can be secured either by bolting or by affixing with a household cement. A two or three plate condenser is most easily made, but with a little practice, multi-plate condensers can be made in this way. —*Tony R. Smolar.*



Code Practice Oscillator

The cheapest efficient code-practice oscillator can be made out of an old bell-ringing transformer, a key and a headset. The primary of the bell-ringing transformer is connected across

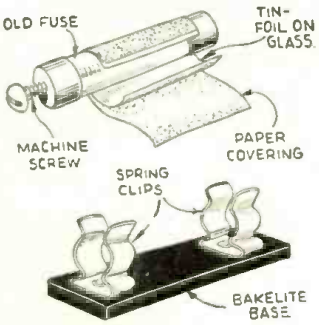


the 110 volt line, while the secondary is connected in series with the key and phones, as shown. This, of course, can be used only on A.C.

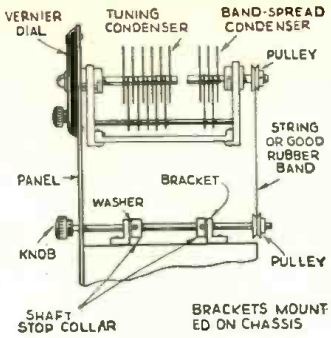
Some experimenters prefer using a glass of water with a pair of leads submerged in it as a resistance, instead of a transformer. Although this is considerably cheaper, it is quite dangerous should the user be wearing a pair of grounded phones and accidentally come across a ground or touch a metal part of the key.—*Jerome Mulberg.*

Plug-In Condensers from Old Auto Fuses

I have found that burnt-out fuses of the small auto and radio type make fine antenna trimmer condensers. The idea is simply this—a small hole is drilled in one of the end caps, just large enough to admit the thread of a machine screw, which forms one plate of the condenser. (Better, the hole in the cap may be threaded for the



screw, or a nut soldered to it, if no tap is at hand. A lock nut may also be provided.) The other plate is formed of tinfoil glued on the outside of the glass tube and underneath the other end cap. Ordinary paper is then glued over the fragile foil to protect it. I use standard fuse clips for mounting. Being simple and cheap to construct, I find it best to have one for every coil and just clip them in, instead of adjusting every time I change coils.—*Ivan Walker.*

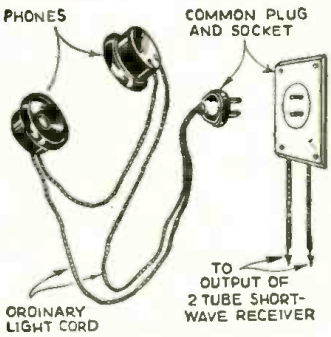


Band-Spread Tuning

Many condensers which are equipped with band-spread sections have no means of tuning the band-spread from the front of the panel. In order to obtain such control, I am using the system illustrated herewith. The sizes of the pulleys will determine the ratio of vernier control for the bandspread. The drive may be a piece of strong string or fish line, or even a strong rubber band. It saves a great deal of trouble as one does not have to reach behind the panel to tune the band-spread condenser.—*Richard J. Blackburn.*

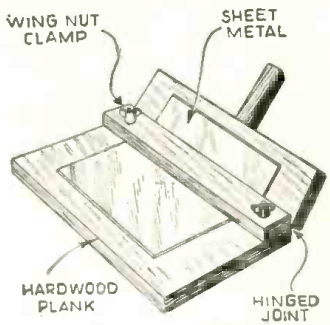
Heavy Duty Phone Cord

As my phones are used a great deal and subject to hard use, I found that standard phone cords did not last very well. In order to make a heavy duty cord that would stand almost unlimited abuse, I used the system shown herewith. The cord is ordinary electric light wire; the plug is a standard electric light plug; and the jack is a standard electric outlet.—*Andres Enongelis*

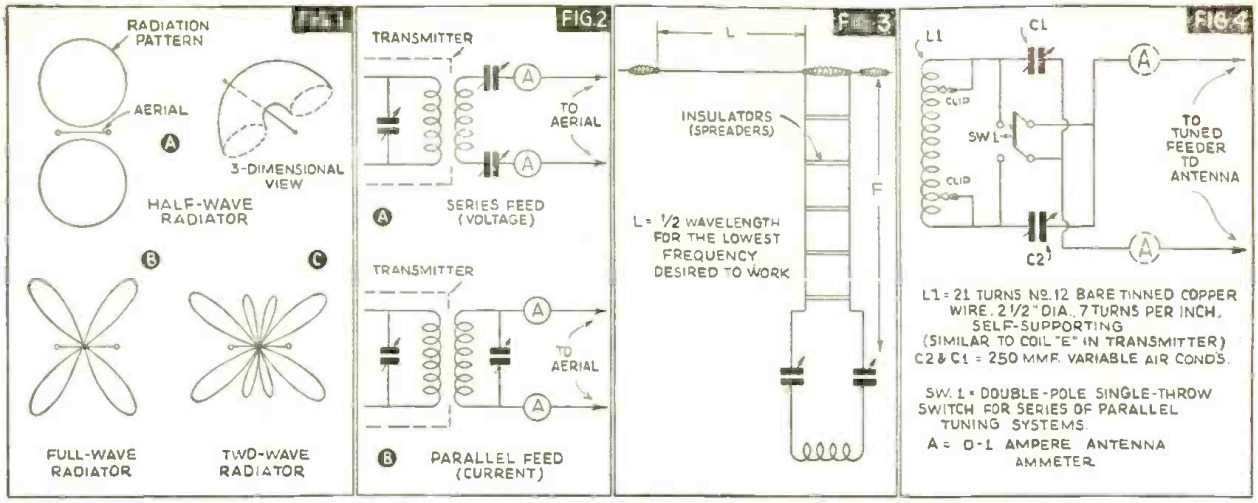


Bending Jig

With this easily built jig, sheet metal for radio cabinets or chassis may be quickly and evenly bent to any desired angle up to 90 degrees. Two boards are hinged together, with a wooden clamp to hold the metal in position while one of the hinged portions is being raised. Use hard-



wood throughout, especially if you plan to bend sheet steel. The large board is secured to the top of the bench, while the smaller board, which is hinged to it, is provided with a long hardwood or iron pipe handle. —*Bill Smith.*



Various connections for the amateur transmitting antenna and feeder system are here shown, with special regard to the transmitter described in the March number.

Getting Started in Amateur Radio

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

Third of a New Series

● PERHAPS no part of amateur radio has changed more rapidly in the past few years as much as the *aerial* or antenna. Especially in ultra-high frequency transmissions, the changes have come so rapidly that the ham who always wants to try the "latest" has difficulty in keeping up with developments.

On the lower frequencies used for amateur communication, the changes have been somewhat slower and set rules can be given for the design and construction of dependable radiating aerials.

First, there are two general types—the "Marconi" and the "Hertz"—named for the men who first applied them to radio transmission. The Marconi type which may consist of a single wire either vertical or horizontal or a combination of both, is connected to "ground" through a coupling and tuning arrangement. The Hertz antenna is a single wire suspended above the earth and the "ground" plays no direct part in the means of radiation, though it does of course have a very important effect on its performance.

Since the Hertz antenna is used almost exclusively in amateur transmission, the description which follows will apply directly to this type. The natural wavelength to which a Hertz antenna resonates is approximately twice the length of the wire, and is affected to some extent by the proximity of surrounding objects which tend to raise the natural wavelength. A rule of the thumb for figuring antenna length is to multiply the desired wavelength in meters by 1.56 and the result is the *length in feet* required.

This length is for a *half-wave* radiator and it must be understood that an antenna can be any multiple of half-wavelengths and still operate efficiently as a transmitting radiator. Thus an aerial twice the length figured above will have two half waves on it. This fact makes it possible to use the same antenna for several "ham" bands since a full-wave (2 half-wave lengths) antenna for one band will be a half-wave antenna on another band. It will be remembered that the ham bands are approximately in harmonic relation—that is, one band is twice the frequency of the next lower in frequency. Conversely the full-wave antenna will be two wavelengths long for the next higher frequency band, etc.

The direction or directions in which a Hertz antenna will radiate when not obstructed by surrounding objects is shown graphically in Fig. 1. This illustration does not show the true shape, as, for example, the half-wave antenna pattern is in reality in the shape of half of a cruller, set upright on the surface of the earth—that of the full-wave aerial is in the form of two half-cones set in similar fashion, etc.

An important characteristic of a transmitting aerial is its *radiation resistance*. This varies with the length of the wire and is greater for longer wires than for short ones. However, there is another factor which must be considered which offsets this to some extent. The radiation resistance of a half-wave radiator is about 70 ohms. That of a four-wave radiator is considerably higher and even though the power in the major lobe of the four-wave antenna is about twice that in the major lobe of the half-wave radiator, the antenna current fed from the transmitter to the radiator will be reduced by an increase in radiation resistance. Thus, though the efficiency of the four-wave antenna is greater, the advantage is offset by the smaller amount of power supplied by the transmitter. In actual practice, the longer aerial shows some gain over smaller aerials.

Feeding Current to the Aerial

In Part 2 (see March issue) we constructed a c.w. transmitter to the point of coupling it to the aerial. We can now complete the X-mitter by actually putting up an aerial and coupling the unit to it.

There are two methods of feeding the aerial: *current* and *voltage* feed. This simply means that the current from the transmitter is introduced into the antenna at either a point at which current is maximum or a point at which voltage is at its peak.

Figure 2 shows the difference between *voltage* and *current* feeds. For voltage feed a coil and condenser or two condensers are connected in series with the antenna. When coupling by the voltage feed method it is necessary to feed the power to the antenna at a high R.F. voltage (and corresponding low current) and for this purpose the coil and condenser are connected as shown in Fig. 2A. A balanced antenna is shown, in the latter case, but if desired, one of the half-wave radiators could be omitted.

Transmission lines feeding an antenna from a transmitter may be either tuned or untuned. The untuned type must be matched very carefully in impedance with the impedance of the aerial and are usually limited to transmission on one frequency. The tuned type on the other hand is readily

(Continued on page 56)

Another "SWL Punk" Speaks Up!

Editor,

I just finished reading Austin Wardman's letter on "SWL punks" in the January issue of RADIO & TELEVISION. Well, Austin, OB, you were pretty good, but not good enough, so I'm going to throw my 2 cents' worth in.

First of all, I'll say a few words about QSL cards. Some of these amateurs will send you their cards as soon as they receive yours, but others won't send you one for love or money and these amateurs ought to get out of the game.

In the past six months I've logged 135 amateur stations and I've sent them all my SWL card; and how many of these guys answered? Only 40! Pretty good out of 135. Some of these I sent International Reply Coupons and they didn't even reply!

So far, there have been only two amateurs that I think are worth their weight in gold. Of course there are many more but these two head the list. One is HH2B, Eric Bleo in Haiti—he's really one swell guy! He answers all SWL's right away—he doesn't wait a month or two! The other is W3LE. Judging from his letter in "R.&T." for October, he's really a swell guy and I would sure like to know him. These two hams are "hams what am!"

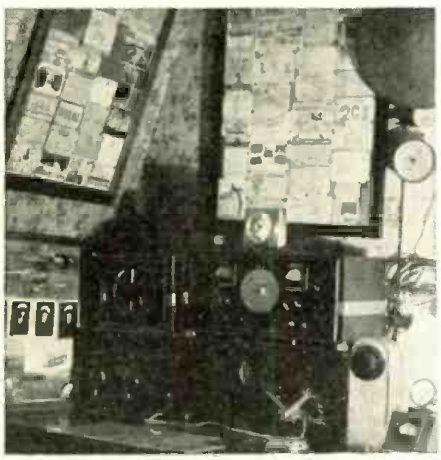
This business of putting R9 reports on cards is a lot of hooey! I never give an R9 report unless they deserve it.

My suggestion to amateurs who are too cheap to QSL is:—at the end of every contact say, "I don't QSL to SWL's" or "I don't QSL to SWL's unless they send a 2c or 3c stamp."

Well, that's all boys, but I'll be back with more; in the meantime I'm open for all criticisms—or praise!

GEORGE MATHEWS,
854 Wrightwood Ave.,
Chicago, Ill.
Member Short Wave League.

What Do YOU Think?



This photo shows the business-like short-wave "listening shack" maintained by Capt. Paul B. Silver and his son at Woodbridge, N. J. One of the principal receivers used in this post is the Hallicrafter, shown in the photo. Captain Silver has hundreds of veri cards, a special veri letter and photos of the crew of the ***China Clipper,*** visible in the frame at the left of the photo.

Found Our Circuits OK!

Editor,

Have read RADIO & TELEVISION for a long time and can say "it is the berries" for any one interested in radio and television receiver construction. I have built and tested many of the circuits shown in your magazine and have sure had lots of luck with them.

WALTER BURDINE,
Waynesville, Ohio.

U.H.F. Listening Neglected? Aussie Hears Calif.!

Editor,

A phase of S.W. listening which I feel is greatly neglected is the Ultra-High Frequency stations on 11, 9 and 7 meters.

Although these U.H.F. stations are primarily intended for "local" reception, you may be interested to know I have already received verifications from 14 of them and have reports away to 6 others. Included in my veris are four from Californian Police radios on 30.1 mc. Most of these veris were for the first reports received from Australia.

In my general short-wave listening, I have received verifications from stations in 104 different countries.

R. SIMPSON,
80 Wilga Street,
Concord West, N.S.W.,
Australia.

An English S-W Listener

Editor,

I have been reading RADIO & TELEVISION for about ten months and thought it a very F.B. magazine, but lately it has changed—I think it is better!

If the shack photos you publish are an example of the majority of American SWL's, you guys certainly "go places!" I have been S-W listening for about 18 months; I started on a 1-tube adapter; now I have a 5-tube all-wave set. In a month or so, I am going to buy an American S-W receiver and have some SWL cards printed. I have very little time for listening, but I have managed to hear all continents and 37 countries, also 23 states of the U. S. Compared with some of your SWL's—this is "chickenfeed." I would like a correspondent in the U. S. who is interested in S-W listening. I will answer all letters and will send an English television catalog to all who write. (Please note these are limited.)

Well, I will say 73s to you, and wish the magazine long life.

S. BURRAGE,
25 Grosvenor Road,
Forest Gate,
London, E.7, England.

Here's an "Aussie Contact," Fellows!

Editor,

I am a constant reader of RADIO & TELEVISION and thoroughly satisfied with my 25 cents worth, and how!

I think Joe Miller's (Let's Listen In) corner to be the best reading, and tips on the DX and QSL cards, etc. This corner apparently is a popular page for many other readers, judging by the correspondence you receive.

I am using a 5-tube superhet. dual-wave commercial receiver and a 38-ft. single-wire center-fed aerial, running N-S, and this seems to be the one most satisfactory and up-to-date. I suffer terribly from automobile QRM which makes SWL impossible at times, and I quite agree with Franklin Jarvis' letter in the September, 1938, issue. When the car is being registered, the police should make the owner install an ignition *suppressor* of some kind!

I have 30 countries in my "log," including s.w. Commercials and Amateurs, but lately have been only listening on 14 mc. as I find the Amateurs far more interesting to listen to and to "log."

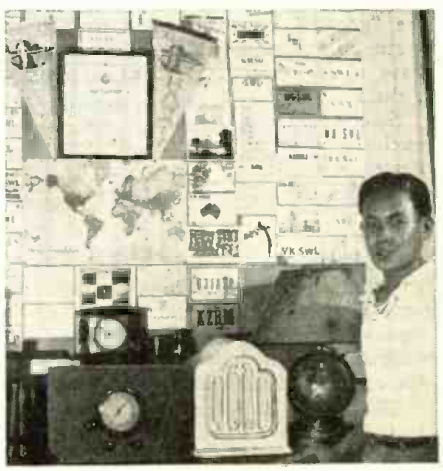
SWL cards out here are very expensive to have printed—about 200 cost $4.00—that is for one color only. Wow!

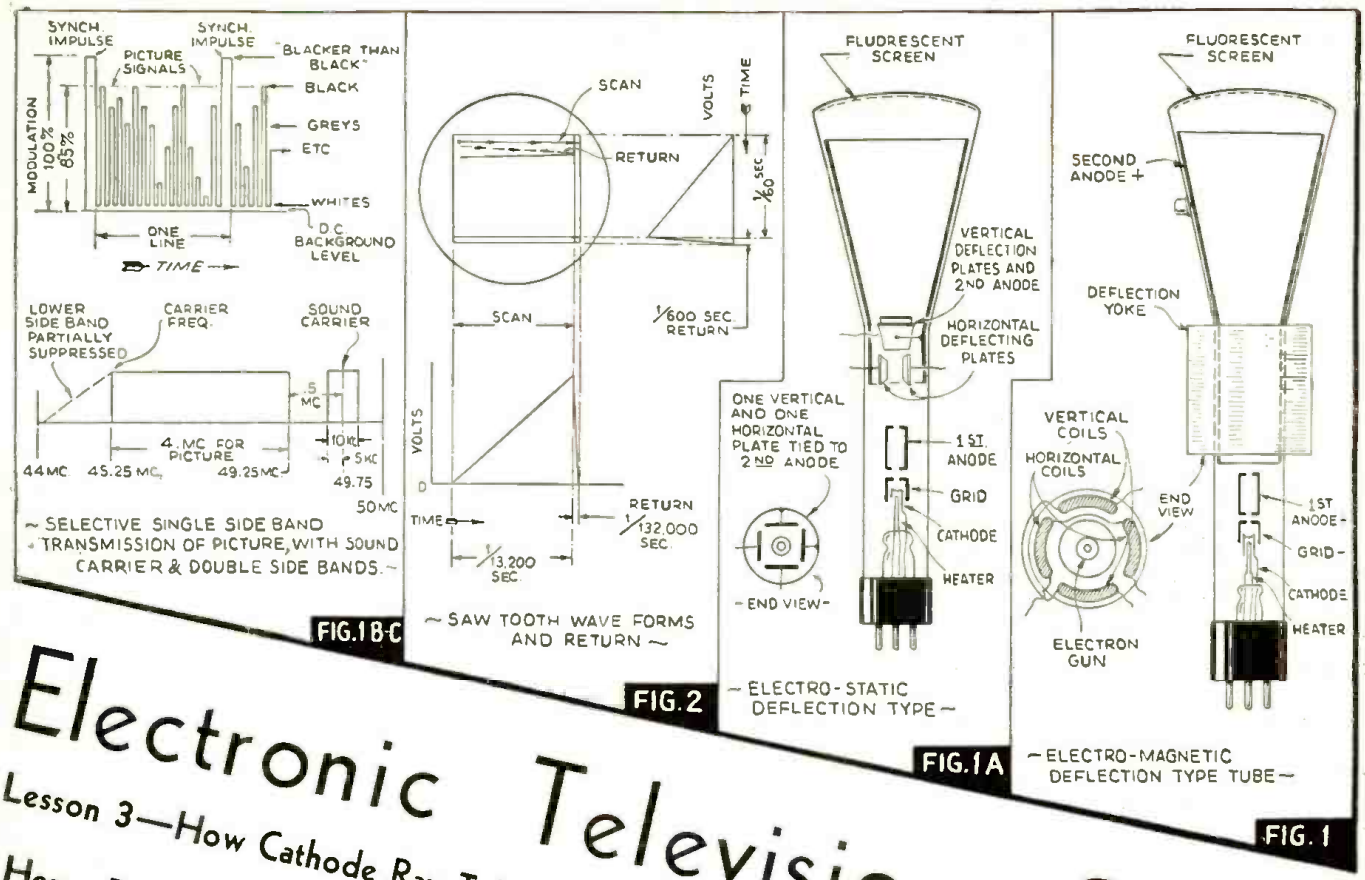
I would like very much to hear from any of you chappies in the States or any other part of the world and will reply to all letters, also if any would like a call-book of the VK's and ZL's, I will gladly exchange or send one along. I would like some U.S.A. stamps from any correspondent (1c) and I will forward some "Aussie" stamps in return.

IAN B. PORTER,
201 Tooronga Road,
East Hawthorn E3,
Melbourne, Victoria, Australia.

Voice from Honolulu

Photo below shows the short-wave listening post of Ricardo Murakami, 1014 Gulick Ave., Honolulu, Hawaii. He uses several receivers covering all of the important short-wave bands, and is a member of the ***Short Wave League,*** certificate of which is seen on the wall.





Electronic Television Course

Lesson 3—How Cathode Ray Tube Works

Henry Townsend

● AT the present time, the Federal Communications Commission has allotted three channels to the transmission of television pictures and the accompanying sound. The channels are: 44-50 mc., 50-56 mc., 66-72 mc. If double-side band transmission is used, the carrier would be modulated 2.5 mc. on each side (in the 44-50 mc. channel). The carrier would be 46.5 mc., with the upper side band extending to 49 mc. and the lower side band to 44 mc. The sound accompanying the picture is spaced 3.25 mc. from the picture carrier and this separation remains the same for all channels.

Recently the Radio Manufacturer's Association has recommended that selective single side bands transmission should be adopted. The following recommendations were tentatively adopted as a standard. The audio carrier remains at 49.75 mc. (in the 44-50 mc. channel). The video carrier is 4.5 mc. lower in frequency, at 45.25 mc., and only the upper side band is transmitted totally, giving a video side band channel of 4 mc. (See Fig. 1-B.) This extremely wide band of frequencies must be preserved in both transmission and reception of the television signal in order to convey to the eye the maximum detail available on 441 lines, 30 picture per second with an aspect ratio of 3-4.

When we consider the extremely high carrier frequencies and the tremendously wide side bands employed in the transmission and reception of television images, we can realize some of the engineering difficulties that had to be overcome before television arrived at its present state of perfection. But they have been solved!

Beam of Electrons "Paints" Image

In the reception of electronic television images, the transducer is a cathode ray tube. This tube is similar in construction to the picture tubes already described in previous chapters on this course. The cathode beam of electrons originating in an electron gun is passed through a series of negatively and positively charged electrodes and caused to impinge upon a fluorescent screen where it is transformed into *visible light*. In the *electro-statically* deflected tubes, this beam is caused to pass between two vertical and two horizontal plates or electrodes which deflect it across the fluorescent screen when voltage is applied to the set plates. In the *electro-magnetic* deflection types of cathode ray tubes, the beam of electrons is caused to pass through a vertical and horizontal magnetic field generated by two electro-magnetic coils surrounding the neck of the cathode ray tube. In Fig. 1, the negatively charged cylinder surrounding the electron gun is usually termed "the grid" and this electrode or grid acts in an identical manner to the grid of a common 3 or 4 element radio tube with which we are familiar. This element, in present day tubes, is usually biased at minus 50 volts. This bias exerts a sufficient repelling force on the electron beam that no electrons reach the fluorescent screen and consequently the screen is dark. This effect is called the *current cut-off*.

When the signal from the television receiver partially or completely overcomes this bias, more and more electrons reach the fluorescent screen making it fluoresce to a greater or lesser degree, representing the *whites* and *greys* of the picture. A grid signal-swing voltage of approximately 25 volts modulates this cathode beam completely for optimum contrast in present type tubes.

How Beam "Scans" Screen

Since a picture is scanned from left to right and top to bottom, as previously explained, the cathode beam at the receiver must begin at the upper left hand corner, move across the screen in synchronism with the transmitter, return in one-tenth of the time to a point representing the third line and repeat this cycle 220½ times, at which time the beam must return again to a point between the first and third lines and scan the even lines (namely 2, 4, 6, 8, etc.) to complete one frame of the picture. In order to do this (in the electro-static deflection type tubes) the *voltage* applied to the deflection plates must rise gradually and fall sharply, as shown in Figure 2. This wave shape assumes the form of a saw-tooth and consequently is termed a "saw-tooth". In the electro-magnetic de-

(Continued on page 40)

World Short Wave Stations

Revised Monthly

Complete List of SW Broadcast Stations

Reports on station changes are appreciated.

Mc.	Call	
31.600	W1XKA	BOSTON, MASS., 9.494 m., Addr. Westinghouse Co. Daily 6 am.-1 am., Sun. 8 am.-1 am. Relays WBZ.
31.600	W1XKB	SPRINGFIELD, MASS., 9.494 m. Addr. Westinghouse Co. Daily 6 am.-1 am., Sun. 8 am.-1 am. Relays WBZ.
31.600	W3XEY	BALTIMORE, MD., 9.494 m., Relays WFBR 4 pm-12 m.
31.600	W2XDV	NEW YORK CITY, 9.494 m., Addr. Col. Broad. System, 485 Madison Ave. Daily 6-11 pm.; Sat. and Sun. 1.30-6, 7-10 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. Relays KYW 9 am.-10 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.
26.550	W2XGU	NEW YORK CITY, 11.3 m. Relays WMCA.
26.450	W9XA	KANSAS CITY, MO., 11.33 m., Addr. Commercial Radio Eqpt. Co. Testing
26.400	W9XAZ	MILWAUKEE, WIS., 11.36 m., Addr. The Journal Co. Relays WTMJ from 1 pm.
26.300	W2XJI	NEW YORK, N. Y., 11.4 m., Addr. Bamberger Broad. Service, 1440 Broadway. Relays WOR 12 n.-6 pm.
26.100	W9XJL	SUPERIOR, WIS., 11.49 m. Relays WEBC daily.
26.050	W9XTC	MINNEAPOLIS, MINN., 11.51 m. Relays WCTN 9 am.-1 pm., 7 pm.-12 m.
26.050	W9XH	SOUTH BEND, IND., 11.51 m. Addr. South Bend Tribune. Relays WSBT-WFAM 2.30-6.30 pm., exc. Sat. and Sun.
25.950	W6XKG	LOS ANGELES, CAL., 11.56 m., Addr. B. S. McGlashan, Wash. Blvd. at Oak St. Relays KGFJ 24 hours daily. DX tips Mon., Wed. and Fri. 2:15 pm.
25.950	W9XUP	ST. PAUL, MINNESOTA. 11.56 m. Relays KSTP evenings.
21.640	GRZ	DAVENTRY, ENG., 13.86 m. Addr. B.B.C., London. Unused at present.
21.630	W3XAL	BOUND BROOK, N. J., 13.8 m. Addr. N.B.C., N. Y. C. 9 am.-4 pm.
21.570	W2XE	NEW YORK CITY, 13.91 m. (Addr. CBS, 485 Madison Ave., N. Y. C. Daily 7.30-10 am. Sat. 8 am.-12 n. Sun. 8-11.30 am.
21.565	DJJ	BERLIN, GERMANY, 13.92 m., Addr. Broadcasting House. Irreg.
21.550	GST	DAVENTRY, ENG., 13.92 m., Addr. (B.B.C., London) Irregular at present.
21.540	W8XK	PITTSBURGH, PA., 13.93 m., Addr. Grant Bldg. Relays KDKA 6.45-9 am. Also Sunday. 6 pm.
21.530	GSJ	DAVENTRY, ENG., 13.93 m., Addr. (See 21.550 mc.) 5.45-10.30 am.
21.520	W3XAU	PHILA., PA., 13.94 m., Addr. Col. Broad. Syst., 485 Madison Ave., N. Y. C. Daily 1.30-2.30 pm., Sat. & Sun. 1-2.30 pm.
21.500	W2XAD	SCHENECTADY, N. Y., 13.95 m., General Electric Co., 8-10.15 am.
21.480	PCJ	HUIZEN, HOLLAND, 13.96 m. Addr. N. V. Philips, Hilversun. Irregular.
21.470	GSH	DAVENTRY, ENG., 13.97 m. (See 21.550 mc.), 5:45-8:50, 9 am.-noon.
21.460	W1XAL	BOSTON, MASS., 13.98 m. Addr. University Club. Tues., Thurs., Sat., 11 am.-12 n.
21.450	DJS	BERLIN, GERMANY, 13.99 m., Addr., Broadcasting House. 12.05-7.50 am.
19.020	HS6PJ	BANGKOK, SIAM, 15.77 m. Mondays 8-10 am. See 15.23 mc.
18.480	HBH	GENEVA, SWITZERLAND, 16.23 m., Addr. Radio Nations. Sun., 10.45-11.30 am.

16 Met. Broadcast Band

17.850	TPB3	PARIS, FRANCE, 16.8 m. Addr. (See 15.245 mc.) 5.30-10 am.
17.850	HVJ	VATICAN CITY, 16.8 m. Heard 12 n. on Wednesday.
17.845	DJG	BERLIN, GERMANY, 16.81 m., 12.05-11 am.
17.840	—	MOYDRUM, ATHLONE, EIRE, 16.82 m. Addr. Radio Eireann. Daily 10 am.-5.30 pm.
17.820	2RO8	ROME, ITALY. 16.84 m., Addr. (See 2RO, 11.81 mc.) 4.30-8.45 am.
17.810	GSV	DAVENTRY, ENGLAND, 16.84 m., 5.45-8.50 am.
17.800	OIH	LAHTI, FINLAND, 16.85 meters, 4-9 am.
17.790	GSG	DAVENTRY, ENG., 16.86 m., Addr. B.B.C., London. 5.45-8.50, 9 am.-12 n., 12.20-4 pm.
17.780	W3XL	BOUND BROOK, N. J., 16.87 m., Addr. Natl. Broad. Co., 9 am.-5 pm. to Europe, 5-11 pm. to So. Amer.
17.770	PHI2	HUIZEN, HOLLAND, 16.88 m., Addr. (See PHI, 11.730 mc.) Daily 7:40-9:10 am. Mon & Thurs. 7:40-9 am. Sun. 6:25-9:45 am.
17.760	DJE	BERLIN, GERMANY, 16.89 m., Addr. Broadcasting House. 12.05-11 am., 4.50-9 pm. Also Sun. 11.10 am.-12.25 pm.
17.755	ZBW5	HONGKONG, CHINA, 16.9 m., Addr. P.O. Box 200. Dly. 11.30 pm.-1.15 am., 5-10 am., Sun. 9 pm. (Sat.)-1.30 am., 5-9.30 am. Operates irreg.

End of Broadcast Band

17.310	W2XGB	HICKSVILLE, L. I., N. Y., 17.33 m., Addr. Press Wireless, Box 296. Tests 9.30-11.30 am. except Sat. and Sun.
17.280	FZE8	DJIBOUTI, FRENCH SOMALILAND, 17.36 m. Test XMSN 1st Thurs. each month 8-8.30 am. Next B.C. April 6.
15.550	CO9XX	TUINICU, ORIENTE, CUBA, 19.29 m., Addr. Frank Jones, Central Tuinicu, Tuinicu, Santa Clara. Broadcasts irregularly evenings.
15.510	XOZ	CHENGTU, CHINA, 19.34 m. Daily 9.45-10.30 am.
15.370	HAS3	BUDAPEST, HUNGARY, 19.52 m., Addr. Radiolabor, Gyali Ut 22. Sun. 9-10 am.
15.360	DZG	ZEESEN, GERMANY, 19.53 m., Addr. Reichspostzenstralamt. Tests irregularly.
15.360	—	BERNE, SWITZERLAND. 19.53 m. Irreg. 6.45-7.45 pm.

19 Met. Broadcast Band

15.340	DJR	BERLIN, GERMANY, 19.56 m., Addr. Br'dcast'g House, 4.50-10.50 pm.
15.330	W2XAD	SCHENECTADY, N. Y., 19.56 m., Addr. General Electric Co. Relays WGY, 10.30 am.-6 pm.
15.330	W6XBE	SAN FRANCISCO, CALIF., 19.56 m. Addr. General Electric Co., 7-10 am., 6.30-10 pm.
15.320	OLR5B	PRAGUE, BOHEMIA. 19.58 m. Addr. (See 11.840 mc.) Irreg.
15.320	OZH	SKAMLEBAK, DENMARK, 19.58 m., Sun. 8 am.-1:30 pm.
15.310	GSP	DAVENTRY, ENG., 19.6 m., Addr. (See 17.79 mc.) 4.20-6 pm., 12.20-1.15 pm.
15.300	YDB	SOERABAJA, JAVA, N. E. I. 19.61 m. Addr. NIROM. 10 pm.-2 am.
15.300	XEBM	MAZATLAN, SIN., MEX., 19.61 m., Addr. Box 78, "El Pregonero del Pacifico." Irregularly 9-10 am., 1-2, 8-10 pm.
15.300	2RO6	ROME, ITALY. 19.61 m., Addr. (See 2RO, 11.81 mc.) 10 am.-12.04 pm., 3-5.30, 6-9 pm.
15.290	VUD3	DELHI, INDIA, 19.62 m. Addr. All India Radio. 9.30-11.30 pm., 1.30-3.15 am.
15.290	LRU	BUENOS AIRES, ARG., 19.62 m., Addr. El Mundo. Relays LRI, 8-10 am.
15.280	DJQ	BERLIN, GERMANY, 19.63 m., Addr. Broadcasting House. 12.05-11 am., 4.50-10.50 pm.
15.270	HI3X	CIUDAD TRUJILLO, D. R., 19.65 m. Relays HIX Sun. 7.40-10.40 am. Tues. and Fri. 8.10-10.10 pm.
15.270	W3XAU	PHILA., PA., 19.65 m. (Addr. See 21.52 mc.) 3-7 pm.
15.270	W2XE	NEW YORK CITY, 19.65 m., Addr. (See 21.570 mc.) 1-3 pm., Sat. 12.30-2.30 pm., Sun. 12 n.-2.30 pm.
15.260	GSI	DAVENTRY, ENG., 19.66 m., Addr. (See 17.79 mc.) 1.30-3.50 am.
15.250	W1XAL	BOSTON, MASS., 19.67 m., Addr. University Club. 2-3:30, or 4 pm., ex. Sat. and Sun.
15.245	TPA2	PARIS, FRANCE, 19.68 m., Addr. 98 Bis. Blvd. Haussmann. "Paris Mondial" 5-10 am.
15.230	HS6PJ	BANGKOK, SIAM, 19.7 m. Irregularly Mon. 8-10 am.
15.230	OLR9A	PRAGUE, BOHEMIA. 19.7 m. Addr. (See OLR4A, 11.84) Daily 4.55-8.15 am.
15.220	PCJ2	HUIZEN, HOLLAND, 19.71 m., Addr. N. V. Philips' Radio Hilversum. 3-4:30 am. Tues., 9:30-11:30 am. Weds. Daily 7.25-8.25 am.
15.210	W8XK	PITTSBURGH, PA., 19.72 m., Addr. (See 21.540 mc.) 9 am.-1 pm.
15.200	DJB	BERLIN, GERMANY, 19.74 m., Addr. (See 15.280 mc.) 12.05-11 am., 4.50-10.50 pm. Also Sun. 11.10 am.-12.25 pm.
15.195	TAQ	ANKARA, TURKEY, 19.74 m., 5.30-7 am., 9.30-11 am., Relays 2RO irregularly Afts.
15.190	OIE	LAHTI, FINLAND. 19.75 m. Addr. (See OFD, 9.5 mc). 1:05-4 am, 9 am.-5 pm.
15.190	—	CHUNGKING, CHINA, 19.75 m. Irreg. 8-9.30 pm.
15.190	ZBW4	HONGKONG, CHINA, 19.75 m., Addr. P. O. Box 200. Irregular. 11.30 pm. to 1.15 am., 3-10 am.
15.180	GSO	DAVENTRY, ENG., 19.76 m., Addr. (See 17.79 mc.) 4.15-6 pm., 1.30-3.50 am., 9-11 am.

(Continued on page 24)

All Schedules Eastern Standard Time

YL2CD—Latvia. An unusual, neat QSL in red print from this "hard-to-get" country.

Let's Listen In with

Joe Miller

"DX" Editor

● IT is mid-March as this is written, and conditions up to this time have not been as promising as expected. However, in the last few days DX reception is looking up, and the "band" should really "open up" shortly.

If you OM's want to "clean up," get going now, as April is one of the best months to get the DX, especially Asiatics on 20, when these much-sought-after signals will be heard up to as late as 10 a.m. on East Coast. Also, Asiatic SW BC and commercial phones are at one of their highest signal peaks during April and, QRN permitting, one may go after a number of the rare 'uns with some assurance of success.

There has been considerable delay in answering mail from readers, and we would like to make our apologies to those of our readers who have written, and not received a reply within a reasonable time. Delays were due to pressure of business.

Our endeavor will be to answer all letters same week as received, in the future, but we must require a stamped self-addressed envelope for all requested replies.

And now for DX:

AFGHANISTAN

YAA, 4.195 mc., Kaboul, and YAH, 5.17 mc., Herat, heard here last March, were confirmed in a letter from Mr. M. Said, the Director of International Comm.

We had written reports of these fine DX catches last year, when heard, but received a reply from Mr. Said, informing us we had our frequencies reversed, for each station, and not in any way mentioning whether we had heard these stations or not! This "refusal" was registered, as was the veri; nice service!

Not in the least discouraged, again we wrote, giving each call its correct frequency, and back came one of our most prized veris, and were we happy!

These stations often keep a schedule at 8:30 a.m., when we heard them, and the veri states aerial input is only 250 watts.

QRA (address) is, briefly: Mr. Said, Ministere des P. T. T., Kaboul, Afghanistan.

STRAITS SETTLEMENTS

ZHP, 9.69 mc., at Singapore, is coming in very nicely these mornings, and all you fellers should go get this nice DX catch, and (for most) new country, verified right away, while ZHP is still so FB. This station sends a handsome QSL card, too. The morning skeds are daily: 4:40-9:40 a.m. and Suns.: 5:40-9:40 a.m. On the East Coast, ZHP should be easiest to log around 6-6:30 a.m. in April, but even 5:30 a.m. will be OK, with perhaps less QRN. Let's see how many of you DXers can verify this easy ace!

QRA: Radio ZHP, Broadcasting House, Thomson Road, Singapore, Straits Settlements.

CHINA

XGOX, 15.185 mc., Chungking, has been heard several evenings during their irregular transmissions from 9-11 p.m. Also, occasionally reported as beginning program at 8 p.m. Though this station is not very well heard, at this rather difficult time for Asiatics, it is certainly worth a try, and will be heard still better in April, as the higher frequencies stay "open" longer into the evening, benefiting from the increasing length of day in the Northern Hemisphere. This station is also known as XGRV.

Then, XGRV on 11.42 mc., also at Chungking, is continuing daily BCs, as given in last issue, but during other times in a.m. Outside sked is used for communication work, and heard here using inverted speech, with a FB signal at 7:10 a.m., then later during their regular broadcast. H. C. Rufner and Max P. Fisher, W6, report XGOX, 15.185 mc.

Though no QRA is available, it is believed reports sent to Chinese Radio Administration, Chungking, China, will be verified.

JAVA

YBF, 9.93 mc., Medan, Sumatra, a rarely heard station, was heard recently at 6 a.m. after vainly being called by what must have been a new Javanese commercial phone, just to the L.F. side of VK3ME, or about 9.48 mc. This latter station had called "allo Medan" at 5:55 a.m. and repeatedly thereafter, but, after trying for YBG, and finding no carrier on, we tried 9.93 mc., and were agreeably surprised to find YBF's carrier. However, the only reply YBF made was to put on a weak recording of native Javanese music, though, as we did not hold YBF, they may have answered later. YBF had a FB R8 carrier signal. All these Javanese phones contact one another, usually between 5:30-6:30 a.m.

PLE, 18.825 mc., Bandoeng, heard by G. C. Gallagher working KWE, Dixon, at 10:30 p.m.

PMC, 18.135, and PLE broadcast on Feb. 25, 7-8 p.m. via KQG, in a special program dedicating the Java Pavilion at the Golden Gate Exposition, and were heard R7-9 by Max Fisher and Mr. Gallagher, W6.

JAPAN

OM G. C. Gallagher sends in a fine list of ol' reliable Japanese phones, which now QSL in 2 months, and should be "cleaned up" by all of you OM's, they're so easy.

JVE, 15.66 mc., midnight; JVD, 15.86 mc., 10 p.m.; JVG, 14.91 mc., 8 p.m.; JVH, 14.60 mc., broadcasting all hours irreg., noon-9 p.m.; JVW3, 11.725 mc., broadcasting once 1:30-2:30 a.m.; an unknown on 15.12 mc., once hrd. BCing at 6 p.m. Also JIB, 10.53 mc., Taiwan (Formosa), a separate country, at 7 a.m., this one heard very often 4-8 a.m., as are others mentioned. JIB also verified by Jap phone QRA. Thanks for data, OM!

SIAM

HSP, 17.74 mc., Bangkok, heard by G. C. Gallagher at unusual time of 11:30 p.m. phoning. HSP sometimes, but rarely, heard on East Coast near 7-8 a.m.

HS4PJ, 6.11 mc., the call of the unidentified Siamese phone previously reported on 6 mc., was verified by OM Gallagher, and letter stated that this station was operated by staff of HS8PJ, and intended for local reception only. Power was 2.5 kw. HS4PJ is no longer being used. FB DX, OM!

MORE FROM ASIA

MANCHUKUO

MTCY, 6.00 mc., believed in this Japanese-dominated state, reported around 5 a.m. by C. D. Platner, W6.

FRENCH INDO-CHINA

Boy-Landry, Inc., at Saigon, in a recent veri of their 9.76 mc. transmissions, lists 3 transmitters on schedule, including one on 6.18 mc., but this transmission is heard on 6.21 mc.

Radio Saigon, 6.16 mc., a new station heard BCing a test program at 7 a.m. recently by Mr. Platner. The schedule is stated to be 6:30-7:10 a.m. and the QRA that of the Indo-Chinese commercial phones, P. O. Box 238, Saigon.

●

VS2AS—Malay. A plain but much valued card—red call letters. OM John sent this air mail all the way via the "China Clipper"!

JAPAN

JVW3, or JLG3, 11.71 mc., in test broadcasts, 12:30-1:30 a.m. irregular, by OM Gallagher.

CHINA

XMXA, 11.94 mc., Shanghai, reported by C. D. Platner, signing off at 11 a.m. We wonder if this station is connected with XMHA, 12.23 mc., which is reported by I.D.A. as relaying the BCB XMHA from 4-7 a.m. XMHA has an interval chime signal, and every half-hour gives announcements. QRA for XMHA is "The Call of the Orient," 445 Race Course Road, Shanghai.

INDIA

VUD4, 15.29 mc., Delhi, has now replaced VUD3, 15.16 mc., on the nightly transmissions, 9:30-11:30 p.m., and also being heard 1:30-3:45 and 7:30 a.m.-12:30 p.m. VUB2, 9.55 mc., Bombay, is being well heard 9:30-10:30 p.m. daily, though with complaints of QRM from XEFT. VUB2 is better heard with less QRM, from midnight-3:30 a.m., also being on 4:30-7 a.m., and up to 12:30 p.m. OM Gallagher reports VUB2 at 9 p.m.

The 4.8-4.9 mc. VU BCers have passed away till another Winter DX season makes possible reception on such low frequencies.

OTHER DX

In a veri of EA9BJ, 7.10 mc., Radio Alcarar-quivir, Spanish Morocco, a list of Spanish Moroccan broadcasters are given, a valuable list.

EA9AH, 14.004 mc., Tetuan, listed at 8 p.m., broadcasting; EA9AH, 7.002 mc., EA9ME, 7.14 mc., De Villa Sanjurjo; EA9AI, 7.138 mc., De Melilla; F.E.T.-11, 7.135, Tetuan; and F.E.T.-8, Melilla, on 7.255 mc.

These are all war stations, and broadcast, or contact other Spanish stations, at all hours. Most are very well heard in evenings and early mornings.

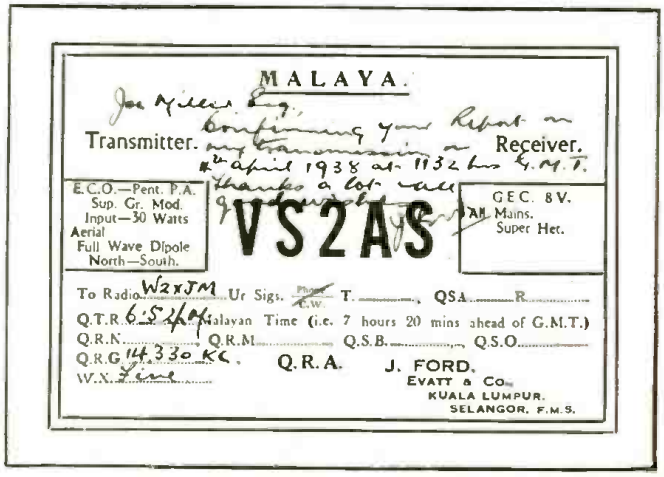
ALBANIA

Radio Tirana, 6.085 mc., heard by Ian Jamieson, England, at 2:15 p.m. testing, with a woman announcing in perfect English, and a man announcing in French, Italian and other languages. Reports to be sent to Radio Tirana, Tirana, Albania.

NORWAY

From the West Coast where Europe is real DX, OM Gallagher reports LKQ, 11.72 mc., at 8 p.m., veri received; LLG, 9.61 mc., and another on 10.753 mc., broadcasting simultaneously, 11-12 p.m., and LKV, 15.17 mc., at 1 p.m.

(Continued on page 54)



Mc.	Call	
15.175	RV96	MOSCOW, U.S.S.R., 19.76 m. Mon., Tues., Fri., Sat. 2.30-3.30 pm. Daily 3-4 am. Mon., Wed., Thurs. 7-9.15 pm.
15.170	TGWA	GUATEMALA CITY, GUAT., 19.77 m., Addr. Ministre de Fomento. Daily 12.45-1.45 pm.; Sun. 12.45-5.15 pm.
15.166	LKC	OSLO, NORWAY, 19.78 m. Reported Suns. 10.30 am. on.
15.160	XEWW	MEXICO CITY, MEXICO, 19.79 m., 12 n.-12 m., irregular.
15.155	SM5SX	STOCKHOLM, SWEDEN, 19.79 m., Daily 11 am.-5 pm., Sun. 9 am.-5 pm.
15.150	YDC	BANDOENG, JAVA, 19.8 m., Addr. N. I. R. O. M. 6-7.30 pm., 10.30 pm.-2 am., Sat. 7.30 pm.-2 am., daily 4.30-10.30 am.
15.140	GSF	DAVENTRY, ENG., 19.82 m., Addr. (See 17.79 mc.) 1.30-3.50 am., 5.45-8.50 am., 9 am.-noon, 4.20-6 pm.
15.130	TPB6	PARIS, FRANCE. 19.83 m., Addr. "Paris Mondial," 98 Bis Blvd. Haussmann, 1-4 am.
15.130	WIXAL	BOSTON, MASS., 19.83 m., Addr. World-Wide B'cast'g. Foundation. University Club. Sun. 10 am.-12.30 pm.
15.120	SP19	WARSAW, POLAND, 19.84 m., 6-9 pm.
15.120	HVJ	VATICAN CITY, 19.83 m., 10.30-10.45 am., Tues., Suns. 1-1.30 pm.
15.110	DJL	BERLIN, GERMANY, 19.85 m., Addr. (See 15.280 mc.) 12.05-2, 9-9 am., 10.40 am.-4.25 pm.
15.080	RKI	MOSCOW, U.S.S.R., 19.87 m. Works Teshkent near 7 am. Broadcasts Sun. 12.15-2.30 pm. Daily 7-9.15 pm.
		End of Broadcast Band
14.960	—	MOSCOW U.S.S.R., 20.25 m., 1st of month, 6 pm. Dutch program.
14.940	PSE	RIO DE JANEIRO, BRAZIL. 20.08 m., Broadcasts Wed. 3.45-4.15 pm.
14.920	KQH	KAHUKU, HAWAII, 20.11 m. Sats. 1-1.30 am., 11-11.30 pm.
14.600	JVH	NAZAKI, JAPAN, 20.55 m. Broadcasts irregularly 5-11.30 pm. Works Europe 4-8 am.
14.535	HBJ	GENEVA, SWITZERLAND, 20.64 m., Addr. Radio Nations. Broadcasts Sun. 10.45-11.30 am., Mon. 4-4.15 am.
14.440	—	RADIO MALAGA, SPAIN, 20.78 m. Relays Salamanca 5.40-8.40 am. Sometimes 2-4 pm.
14.430	HCIJB	QUITO, ECUADOR, 20.79 m. 10-10.30 pm. except Mon. 9-9.30 pm. and irreg.
14.166	PIIJ	DORDRECHT, HOLLAND, 21.15 m., Addr. (See 7.088 mc.) Sat. 12 n.-12.30 pm.
13.997	EA9AH	TETUAN, SPANISH MOROCCO, 21.43 m. Apartado 124. 5.15-6.15 pm., 6.30-7.30 pm., 9-10 pm. Relays Salamanca from 5:40 pm.
13.635	SPW	WARSAW, POLAND, 22 m. Daily 6-8 pm. Sat. & Sun. 6-9 pm.
12.862	W9XDH	ELGIN, ILL., 23.32 m. Press Wireless, Tests 2-5 pm.
12.486	HIN	TRUJILLO CITY, DOM. REP., 24.03 m. 7.10-10.10 pm.
12.460	HC2J8	QUITO, ECUADOR, 24.08 m. Daily exc. Mon. 8-10.30 pm.
12.235	TFJ	REYKJAVIK, ICELAND, 24.52 m. Works Europe mornings. Broadcasts Sun. 1.40-2.30 pm.
12.200	——	TRUJILLO, PERU, 25. m., "Rancho Grande." Address Hacienda Chiclin. Irregular.
12.000	RNE	MOSCOW, U.S.S.R., 24.88 m. Daily 6-7 am., 12 n.-2 pm., 3-6, 10.15-11 pm., also Tues., Thurs. 8.30-9 pm., also Sun. 6-10.30 am., 12 n.-5 pm., 6-6.30, 8.30-9, 10.15-11 pm.
11.990	CB1180	SANTIAGO, CHILE, 25.02 m. 7-11 pm.
11.970	HI2X	CIUDAD TRUJILLO, D. R., 25.07 m., Addr. La Voz de Hispaniola. Relays HIX Tue. and Fri. 8.10-10.10 pm.

25 Mc. Broadcast Band

11.935	T12XD	SAN JOSE, COSTA RICA, 25.12 m. La Voz del Pilot. Apartado 1729. 10 am.-n., 4-10 pm.
11.910	CD1190	VALDIVIA, CHILE, 25.2 m., P. O. Box 642. Relays CB69 10 am.-1 pm., 7-10 pm.
11.900	—	HANOI, FRENCH INDO-CHINA. 25.21 m. "Radio Hanoi", Addr. Radio Club de l'Indochine. 3.45-4.15 am., 7-9.30 am., 150 watts.
11.900	XEWI	MEXICO CITY, MEXICO, 25.21 m., Addr. P. O. Box 2874. Mon., Wed., Fri. 3-4 pm., 9 pm.-12 m. Tues. and Thur. 7.30 pm.-12 m., Sat. 9 pm.-12 m., Sun. 12.30-2 pm.
11.895	2RO	ROME, ITALY. 25.23 m. Irregular 6-9 pm.
11.885	TPA3	PARIS, FRANCE, 25.24 m., Addr. (See 15.245 mc.) 1-4 am., 10.15 pm.-5 pm.
11.885	TPB7	PARIS, FRANCE, 25.24 m. (See 15.245 mc.) 6-8.15, 8.30-11 pm., 12.15-2 am. Irregular.
11.880	VLR3	MELBOURNE, AUST., 25.25 m., 3.30-7.15 pm., 9 pm.-3 am. weekdays. Suns. mid.-3 am.
11.870	W8XK	PITTSBURGH, PA., 25.26 m., Addr. (See 21.540 mc.) 1-11 pm.
11.865	——	BERNE, SWITZERLAND. 25.28 m. Irreg. 8-9 pm. to No. Amer.
11.860	GSE	DAVENTRY, ENG., 25.30 m., Addr. (See 11.75 mc.) 5.45 am.-12 n., 12.25-3, 6.20-8.30 pm. (Sun. 6-8.30 pm.)
11.855	DJP	BERLIN, GERMANY, 25.31 m., Addr. (See 15.280 mc.) Irregular.
11.850	CB1185	SANTIAGO, CHILE, 25.32 m. Sat. 6-11 pm. and irreg.
11.850	OAX2A	TRUJILLO, PERU, 25.32 m. Testing on this freq. (See 12.200).
11.840	KZRM	MANILA, P. I., 25.35 m. Addr. Erlanger & Gallinger, Box 283. 9 pm.-10 am. Irregular.
11.840	CSW	LISBON, PORT., 25.35 m. Nat'l Broad. Station. 11.30 am.-1.30 pm. Irregular.
11.840	OLR4A	PRAGUE, BOHEMIA, 25.34 m., Addr. Czech Shortwave Sta., Praha XII, Fochova 16. Daily 12.45-6.30, 7.55-11.20 pm. Sun. Also 8.25-10.05 am.
11.830	W9XAA	CHICAGO, ILL., 25.36 m., Addr. Chicago Federation of Labor. Irregular 7 am.-6 pm.
11.830	W2XE	NEW YORK CITY, 25.36 m., Addr. Col. Broad. System, 485 Madison Av., N.Y.C. Mon.-Fri. 3.30-6, 6.30-10 pm. Sat., Sun. 3-6, 6.30-11 pm.
11.826	XEBR	HERMOSILLA, SON., MEX., 25.37 m., Addr. Box 68. Relays XEBH. 9.30-11 am., 1-4 pm., 9 pm.-12 m.
11.820	GSN	DAVENTRY, ENG., 25.38 m., Addr. (See 11.75 mc.) Irregular.
11.810	2RO4	ROME, ITALY, 25.4 m., Addr. E.I.A.R., Via Montello 5. Daily 4.30-8.45 am., 10 am.-2.30 pm., 6-9 pm.
11.805	OZG	SKAMLEBAK, DENMARK, 25.41 m. Addr. Statsradiofonien. Irreg.
11.801	DJZ	BERLIN, GERMANY, 25.42 m. 4.50-10.50 pm.
11.800	COGF	MATANZAS, CUBA, 25.42 m. Addr. Gen. Betancourt 51. Relays CMGF. 2-3, 4-5, 6 pm.-Mid.
11.800	JZJ	TOKYO, JAPAN, 25.42 m., Addr. Broadcasting Co. of Japan, Overseas Division. 7-7.30, 8-9.30 am., 2.30-4, 4.30-5.30 pm., 12.30-1.30 am.
11.795	DJO	BERLIN, GERMANY, 25.42 m. 4.50-, Addr. (See 15.280 mc.) Irreg.
11.790	WIXAL	BOSTON, MASS., 25.45 m., Addr. (See 15.250 mc.) Daily 3.15-6.30 pm., Sat. 1.30-6 pm., Sun. 1-6.30 pm.
11.780	HP5G	PANAMA CITY, PAN., 25.47 m., Addr. Box 1121. 6-10 pm.
11.780	OFE	LAHTI, FINLAND. 25.47 m. Addr. (See OFD, 9.5 mc.) 1.05-3 am., 5-6.20, 10 am.-12.30 pm.
11.770	DJD	BERLIN, GERMANY, 25.49 m., Addr. (See 15.280 mc.) 11.30 am.-4.25 pm., 4.50-11 pm.
11.760	TGWA	GUATEMALA CITY, GUAT., 25.51 m. (See 17.8 mc.) Irregular 10-11.30 pm. Sun. 6-11.30 pm., irregular.
11.760	XETA	MONTEREY, MEX. 25.51 m., Addr. Box 203. Relays XET, n.-3.30 pm. and evenings.
11.760	OLR48	PRAGUE, BOHEMIA, 25.51 m. Addr. (See 11.840 mc.) Daily exc. Sun. 8.25-10.05 am.
11.750	GSD	DAVENTRY, ENG., 25.53 m., Addr. B.B.C., London, 1.30-3.50 am., 10.45 am.-noon. 12.25-6 pm., 6.20-8.30 pm., 9.20-11.30 pm.
11.740	SP25	WARSAW, POLAND, 25.55 m., 6-9 pm.
11.740	COCX	HAVANA, CUBA. 25.55 m. P. O. Box 32. Daily 8 am.-1 am. Sun. 8 am.-12 m. Relays CMX.
11.740	HVJ	VATICAN CITY, 25.55 m. Testing irregular. Wed. 8.30-9 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. Daily exc. Sat. and Sun. 9.15-11.30 pm.
11.730	LKQ	OSLO, NORWAY, 25.58 m. 4.30-9 am., Suns. 2.30-9 am.
11.720	CJRX	WINNIPEG, CANADA, 25.6 m., Addr. James Richardson & Sons, Ltd. Daily 6 pm.-12 m., Sat. 6 pm.-Sun. 4 am.
11.720	ZP14	VILLARICA, PARAGUAY, 25.60 m. 7.07-9.07 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. to No. America.
11.710	YSM	SAN SALVADOR, EL SALVADOR, 25.63 m., Addr. (See 7.894 mc.) 1-2.30 pm.
11.710	—	SAIGON, FRENCH INDO-CHINA. 25.62 m., Addr. Boy-Landry, 17 Place A Foray. 7.30-9.15 am.
11.705	JLG3	TOKYO, JAPAN, 25.63 m. 2.30-4 pm.
11.705	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. Wed. and Sat. 8-9 pm.
11.700	HP5A	PANAMA CITY, PAN., 25.65 m. Addr. Radio Teatro, Apartado 954. 10 am.-1 pm., 5-10 pm. Sun. 6-10 pm.
11.700	CB1170	SANTIAGO, CHILE, 25.65 m. Addr. P.O. Box 706. Relays CB89 10 am.-2 pm., 3.30-11 pm.
		End of Broadcast Band
11.676	IQY	ROME, ITALY. 25.7 m. News in Russian 5-5.15 am. ex. Sun., Daily 3-3.35 pm.
11.535	SPD	WARSAW, POLAND, 26.01 m., Addr. 5 Mazowiecka St. 6-9 pm.
11.402	HBO	GENEVA, SWITZERLAND, 26.31 m., Addr. Radio Nations. Sun. 7-7.45 pm., Mon. 1-1.15 am., 7-8.30 pm.
11.400	—	CHUNGKING, CHINA. 26.31 m. 8-8.30 am., 8-9.30 pm.
11.040	CSW2	LISBON, PORTUGAL, 27.17 m., Addr. Nat. Broad. Sta. 9.30 am.-Noon. 2-5.30 pm.
11.000	PLP	BANDOENG, JAVA, 27.27 m. Relays YDB. 6-7.30 pm., 10.30 pm.-2 am., 4.30-10.30 or 11 am. Sat. until 11.30 am.
10.950	——	TANANARIVE, MADAGASCAR, 27.40 m., Addr. (See 9.38 mc.) 12.30-45, 10-11 am., 2.30-4 am., exc. Sun.
10.670	CEC	SANTIAGO, CHILE, 28.12 m. Irregular.
10.660	JVN	NAZAKI, JAPAN, 28.14 m. Broadcasts daily 1.50-7.40 am. Works Europe irregularly at other times.
10.600	ZIK2	BELIZE, BRIT. HONDURAS, 28.30 m., Tue., Thurs., Sat. 1.30-2, 8.30-9 pm.
10.535	JIB	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.
10.400	YSP	SAN SALVADOR, EL SALVADOR, 28.85 m., 1-3, 6.30-11 pm.
10.350	LSX	BUENOS AIRES, ARG., 28.98 m., Addr. Transradio International. Tests irregularly.
10.330	ORK	RUYSSELEDE, BELGIUM, 29.04 m. Broadcasts 12.30-2 pm. Works OPM 1-3 am., 3-5 pm.
10.290	TIEMT	SAN JOSE, COSTA RICA, 29.15 m., 4.30-8 pm.
10.290	DZC	ZEESEN, GERMANY, 29.16 m., Addr. (See 15.360 mc.) Irregular.

(Continued on page 26)

All Schedules Eastern Standard Time

George P. Huntley, Hollywood movie star, finds time to operate this swell "ham" station. His call letters are W6LIP (ex-W2GIU). Many famous movie stars have visited and talked over Mr. Huntley's station.

11th SILVER TROPHY Award

For Best HAM Station Photo of the Month

Awarded to *George P. Huntley*, W6LIP
Beverly Hills, Calif.

Editor:

Here are the technical details of my station. W6LIP (ex-W2GIU of N. Y. City).

Transmitter:—6L6, Xtal osc.; RK49 1st doubler; 807 2nd doubler.

Push-pull HK54's final amplifier; 240 watts input.

Receiver:— RME 69 Monitor, Freq. Meter, VI. and card index file of all names of stations worked, with "handles."

W6LIP Speech equipment:—Thordarson universal amplifier 500 ohm line to TZ40, Class B modulators.

All equipment here built by myself. 32 Xmtrs. built in last two years. Three element rotary beams on 10 and 20 meters. End-fed ant. for 75 m. and 40 m. (CW.) 75, 40, 20, 10 m. worked, on fone and CW. Worked all continents fone and CW, worked all states.

Operate mainly on 10 meters. Contemplate going to 2½ meters. Hold skeds with New Zealand chiefly.

Never run over ½ kw. Most W.A.C. done with 25 watts input. Hi! Operated in N.Y.C. 40 cw. under call W2GIU. Listen or operate approx. 16 hours daily, unless working on picture. Handle lots of traffic, like "rag chewing," or anything pertaining to radio. QSL 100% to all stations sending cards or to SWL's. Appreciate SWL reports from near or far. Air handle is "Tim." Always glad to contact any Hams who may want checks on their Xmtrs. or antennas.

Like your magazine very much, although not a subscriber at the minute, and I find valuable information when I do read it.

ARRL member and also support the West Coast, Hi!

73 to you and hope you like the photos.

Geo. P. Huntley,
602 No. Maple Drive,
Beverly Hills, Calif.

● **GEORGE P. HUNTLEY is on the air an average of two hours a day, generally in the evening, holding long conversations with amateurs in South Africa, Manila, Singapore, Greenland, South America, New Zealand, and other far-away countries.**

Most frequent users of Huntley's transmitter, next to Huntley himself, are members of Hollywood's large English colony. Many of them, including Patricia Morison, E. E. Clive, and Melville Cooper, have made trips to Huntley's microphone to talk to friends and relatives in England.

Most of the amateurs with whom Huntley talks, regardless of whether they reside in the United States or on a South Sea atoll, want to know about movies and ask his advice on which pictures to see.

"And, of course, when they ask which pictures are good and bad, I'm obliged to tell them the pictures I appear in are always good," says Huntley.

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

Silver Trophy Award

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.

State briefly the number of continents worked, the total number of stations logged or contacted, and any other features regarding the station which

(Continued on page 45)

Mc.	Call	
10.260	PMN	BANDOENG, JAVA, 29.24 m. Relays YDB 6-7.30 pm., 10.30 pm.-2 am., 4.30-10.30 or 11 am., Sat. to 11.30 am.
10.220	PSH	RIO DE JANEIRO, BRAZIL, 29.35 m., Addr. Box 709. Broadcasts 6-7 pm., Mon. 8-8.30 pm.
10.100	——	DEUTSCHE FREIHEITS SENDER, 29.70 m., loc. in Germany, undercover. 4-5 pm.
10.042	DZB	ZEESEN, GERMANY, 29.87 m., Addr. Reichspostzentralamt. Irregular.
9.995	COBC	HAVANA, CUBA, 30.02 m., Addr. P. O. Box 132. Relays CMBC 6.55 am.-1 am.
9.920	JDY	DAIREN, MANCHUKUO, 30.24 m. Relays JQAK daily 7-8 am. Works Tokyo occasionally in early am.
9.892	CPI	SUCRE, BOLIVIA, 30.33 m., 11 am.-n., 7-9 pm.
9.860	EAQ	MADRID, SPAIN, 30.43 m., Addr. Post Office Box 951. 7.30-8, 8.40-9 pm.
9.830	IRF	ROME, ITALY, 30.52 m. Works Egypt afternoons. Relays 2RO, 12-12.25 pm. Thurs. Daily 12.40-1, 1.37-3.35 pm.
9.805	COCM	HAVANA, CUBA, 30.60 m. Addr. Transradio Columbia, P. O. Box 33. 8-1 am. Relays CMCM.
9.760	——	SAIGON, INDO-CHINA, 30.72 m., Addr. 17, Place A. Foray. "Radio Boy-Landry." Heard 6-9.15 am.
9.753	ZRO	DURBAN, SOUTH AFRICA, 30.75 m. Addr. S. A. Broadcasting Corp., P. O. Box 4559, Johannesburg. Daily exc. Sat. 11.45 pm.-12.50 am. Daily exc. Sun. 3.30-7.30, 9-11.45 am., Sun. 5.30-7, 9-11.30 am., also 4-5 am. on 3rd Sun. of month.
9.735	CSW7	LISBON, PORTUGAL, 30.82 m. Addr. Nat. Broad. Sta. n.-2 pm., 6-9 pm. for No. Amer.
9.708	COCQ	HAVANA, CUBA, 30.90 m. Addr. 25 No. 445, Vedado, Havana, 7-1 am. Sun. 6.55 am.-1 am.

31 Met. Broadcast Band

9.705	——	FORT DE FRANCE, MARTINIQUE, 30.92 m., Addr. P. O. Box 136.
9.690	TI4NRH	HEREDIA, COSTA RICA, 30.94 m., Addr. Amando C. Marin, Apartado 40. Sun. 7-9 am., Tues., Thurs., Sat. 9-10 pm.
9.690	LRA	BUENOS AIRES, ARG., 30.94 m., 6-9 pm. Mon-Thur., 4-9 pm. Fri., 7-9 pm. Sat.
9.685	TGWA	GUATEMALA CITY, GUAT., 30.96 m. Daily 10-11.30 pm.; Sun. 7-10.45 pm.
9.680	ZHP	SINGAPORE, MALAYA, 30.98 m. Sun. 5.40-9.40 am., Wed. 12.40-1.40 am., Mon.-Fri. 4.40-9.40 am., Sat. 12.25-1.40 am., 4.40-9.40 am., 10.40 pm.-1.10 am. (Sun.)
9.675	DJX	BERLIN, GERMANY, 31.01 m., Addr. (DJD, 11.77 mc.) 10.40 am.-4.25 pm.
9.670	W3XAL	BOUND BROOK, N. J., 31.03 m. Addr. NBC, N. Y. C. 5 pm.-1 am.
9.665	2RO9	ROME, ITALY, 31.04 m. 12.40-1, 1.37-5.30 pm.
9.660	LRX	BUENOS AIRES, ARG., 31.06 m., Addr. El Mundo. Relays LRI, 7-7.45 am., 10.15 am.-11.05 pm.
9.660	HVJ	VATICAN CITY, 31.06 m. Irreg.
9.650	W2XE	NEW YORK CITY, 31.09 m. (See 21.570 mc. for addr.) 10.30-11.30 pm. exc. Sat. and Sun.
9.650	CS2WA	LISBON, PORTUGAL, 31.09 m., Addr. Radio Colonial. Tues., Thurs. and Sat. 4-7 pm.
9.645	HH3W	PORT-AU-PRINCE, HAITI, 31.1 m., Addr. P. O. Box A117. 1-2, 7-9 pm.
9.640	CXA8	COLONIA, URUGUAY, 31.12 m., Addr. Belgrano 1841, Buenos Aires, Argentina. Relays LR3. Buenos Aires 7 am.-m., Sat. to 2.15 am.
9.636	JFO	TAIHOKU, TAIWAN, 31.13 m. Relays JFAK irreg. 4-10.30 am.
9.635	2RO3	ROME, ITALY, 31.13 m., Addr. (See 11.810 mc.) 1-3 pm., 5.30-9 pm., also Mon. 3.50-4.05 pm., Fri. and Sat. 4-4.20 pm.
9.630	HJ7ABD	BUCARAMANGA, COL., 31.14 m. 5.45-6.30, 11.30 am.-1 pm., 6-11 pm.
9.618	HJ1ABP	CARTAGENA, COL., 31.20 m., Addr. P. O. Box 37. Daily 9 am.-1.30 pm., 4.30-10.15 pm., Sun. 4.30-9 pm.
9.615	ZRL	KLIPHEUVAL, SOUTH AFRICA, 31.2 m., Addr. P. O. Box 4559, Johannesburg. Daily, exc. Sat. 11.45 pm.-12.50 am. Daily exc. Sun. 3.20-7.20, 9-11.45 am., Sun. 3.30-4.30 or 4-5, 5.30-7, 9-11.45 am.
9.607	HP5J	PANAMA CITY, PANAMA, 31.23 m. Addr. Apartado 867. 12 n. to 1.30 pm., 6-10.30 pm.
9.600	RAN	MOSCOW, U.S.S.R., 31.25 m. Daily exc. Sun. 6-10 pm. Sun. 6-7, 9.15-10 pm.
9.595	—	MOYDRUM, ATHLONE, EIRE, 31.27 m., Radio Eireann. Irregular.
9.595	HBL	GENEVA, SWITZERLAND, 31.27 m., Addr. Radio Nations. Irregular.
9.590	VUD2	DELHI, INDIA, 31.28 m. Addr. All India Radio, 1.30-3.30 am., 7.30 am.-12.30 pm., 8.30-10.30 pm.
9.590	PCJ	HUIZEN, HOLLAND, 31.28 m., Addr. (See 15.220 mc.) Sun. 2-3, 7-9.25 pm. Tues. 1.45-3.40, 7.15-8.45, 9-10.30 pm., Wed. 7.15-8.30 pm., Fri. 8-9 pm.
9.590	VK6ME	PERTH, W. AUSTRALIA, 31.28 m., Addr. Amalgamated Wireless of Australasia, Ltd. 6-9 am. exc. Sun.
9.590	VK2ME	SYDNEY, AUSTRALIA, 31.28 m., Addr. Amalgamated Wireless of Australasia, Ltd., 47 York St., Sun. 1-3 am.; 5-11 am.
9.590	W3XAU	PHILADELPHIA, PA., 31.28 m. (Addr. See 21.52 mc.) Mon. and Thurs. 7.30-11.30 pm. Sat. 7.30-10.45 pm.
9.580	GSC	DAVENTRY, ENGLAND, 31.32 m., Addr. B. B. C., Portland Pl., London, W. 1., 12.20-4, 4.20-6, 9.20-11.30 pm.
9.580	VLR	MELBOURNE, AUSTRALIA, 31.32 m. Addr. Box 1686, G. P. O. Daily 3.30-8.30 am. (Sat. till 9 am.) Sun. 12.01-7.30 am. Also daily exc. Sat. 9.25 pm.-2 or 2.15 am. Sat. 5-10.30 pm.
9.570	KZRM	MANILA, P. I., 31.35 m., Addr. Erlanger & Galinger, Box 283. Sun. 3-10 am. Daily exc. Sat. 4.30-7 pm., 11.15 pm.-12.15 am. Daily exc. Sun. 4-10 am.
9.570	WIXK	BOSTON, MASS., 31.35 m., Addr. Westinghouse Electric & Mfg. Co. 7 am.-1 am. Sun. 8 am.-1 am.
9.560	XGAP	PEKING, CHINA, 31.38 m., 9 am.-2 pm.
9.560	DJA	BERLIN, GERMANY, 31.38 m., Addr. Broadcasting House. 6.30-10.50 pm.
9.550	HVJ	VATICAN CITY, 31.41 m., Sun. 5-5.30 am., Wed. 2.30-3 pm.
9.550	TPBII	PARIS, FRANCE, 31.41 m. Addr. (See 15.245 mc.) Irregular.
9.550	W2XAD	SCHENECTADY, N. Y., 31.41 m., General Electric Co., 6.15-9 pm. to So. Amer.
9.550	OLR3A	PRAGUE, BOHEMIA, 31.41 m. (See 11.840 mc.) Irreg. 4.40-5.10 pm.
9.550	XEFT	VERA CRUZ, MEX., 31.41 m. 10.30 am.-4.30 pm., 10.30 pm.-12.30 am.
9.550	YDB	SOERABAJA, JAVA, 31.41 m., Addr. N.I.R.O.M. Daily exc. Sat. 6-7.30 pm., 4.30-10.30 am. Sat. 4.30-11.30 am.
9.550	VUB2	BOMBAY, INDIA, 31.41 m., Addr. All India Radio. 9.30-10.30 pm., 1-3.30 am.
9.540	DJN	BERLIN, GERMANY, 31.45 m., Addr. (See 9.560 mc.) 12.05-11 am. 4.50-10.50 pm. to So. Amer.
9.540	HJ5ABD	CALI, COLOMBIA, 31.45 m., Addr. La Voz de Valle. 12 n.-1.30 pm., 5.10-9.40 pm.
9.538	VPD2	SUVA, FIJI ISLANDS, 31.46 m., Addr. Amalgamated Wireless of Australasia, Ltd. 5.30-7 am., exc. Sun.
9.535	JZI	TOKYO, JAPAN, 31.46 m., Addr. (See 11.800, JZJ) 2.30-4, 4.30-5.30 pm. 8-9.30 am.
9.535	—	BERNE, SWITZERLAND, 31.46 m., 1-2 pm. exc. Mon. and Tues.
9.530	W2XAF	SCHENECTADY, N. Y., 31.48 m., Addr. General Electric Co. 4 pm.-12 m. Sat. 1 pm.-12 m.
9.530	VUC2	CALCUTTA, INDIA, 31.48 m. Addr. All India Radio. 2.06-4.06 am.
9.526	XEDQ	GUADALAJARA, GAL., MEXICO, 31.49 m., n.-4.30 pm., 8-11.30 pm.
9.526	ZBW3	HONGKONG, CHINA, 31.49 m., Addr. P. O. Box 200. 11.30 pm.-1 am., 3-10 am.
9.525	LKC	JELOY, NORWAY, 31.49 m., 4.30-10.30 am., Sun. 2.30-10.30 am.
9.523	ZRG	ROBERTS HEIGHTS, S. AFRICA, 31.5 m., Addr. (See ZRK, 9.606 mc.) Daily exc. Sun. 5-7.30 am.; Sun. 5.30-7 am.
9.520	XGOY	CHUNGKING, CHINA, 31.51 m. 3-5 pm.
9.520	OZF	SKAMLEBOAEK, DENMARK, 31.51 m., Addr. Statsradiofonien, Heibergsgade 7, Copenhagen, 8-9.30, 9.30-11 pm. to No. Amer.
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) 1.30-3.50 am. 3-4, 4.20-6, 6.20-8.30, 9.20-11.30 pm.
9.510	HJU	BUENAVENTURA, COLOMBIA, 31.55 m., Addr. National Railways. Mon., Wed. and Fri. 8-11 pm.
9.510	HS6PJ	BANGKOK, SIAM, 31.55 m. Thursday, 8-10 am.
9.510	—	HANOI, FRENCH INDO-CHINA, 31.55 m. "Radio Hanoi", Addr. Radio Club de L'Indochine. 12 m.-2 am., 6-10 am. 15 watts.
9.503	KZIB	MANILA, PHIL. ISL., 31.57 m., 7-9.05 am.
9.503	XEWW	MEXICO CITY, MEX., 31.57 m. Addr. Apart. 2516. Relays XEW. 9 am.-12.30 am.
9.500	VK3ME	MELBOURNE, AUSTRALIA, 31.58 m., Addr. Amalgamated Wireless of Australasia, 167 Queen St. Daily except Sun. 4-7 am.
9.500	OFD	LAHTI, FINLAND, 31.58 m., Addr. Finnish Brcst. Co., Helsinki. 12.15-5 pm.
9.490	OAX5C	ICA, PERU, 31.61 m., Radio Universal, 8-11.30 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

9.465	TAP	ANKARA, TURKEY, 31.70 m., 1.20-5 pm. Irreg.
9.445	HCODA	GUAYAQUIL, ECUADOR, 31.77 m., 8.15-10.15 pm., exc. Sun.
9.437	COCH	HAVANA, CUBA, 31.8 m., Addr. 2 B St., Vedado. 8 am.-9.30 pm. Sun. 8 am.-12 m.
9.380	—	TANANARIVE, MADAGASCAR, 31.96 m. Addr. Le Directeur des PTT, Radio Tananarive, Administration PTT. 12.30-12.45, 10-11 am., 2.30-4 am., exc. Sun.
9.370	XOY	CHENGTU, CHINA, 32.02 m., 9.45-10.30 am.
9.355	HCIETC	QUITO, ECUADOR, 32.05 m., Addr. Teatro Bolivar, Thurs. until 9.30 pm. 8-11 pm. Sats.
9.350	COCD	HAVANA, CUBA, 32.08 m., Addr. Box 2294. Relays CMCD 10 a.m.-11.30 pm. Sun. 10 am.-9 pm.
9.345	HBL	GENEVA, SWITZERLAND, 32.11 m., Addr. Radio Nations. Sun. 8-8.45 am., Mon. 6.45-8.30 pm.
9.340	OAX4J	LIMA, PERU, 32.12 m., Addr. Box 1166, "Radio Universal." 12 n.-3 pm., 5 pm.-1 am.
9.300	XGX	SHANGHAI, CHINA, 32.26 m., 8-9.05 am. Varies between 9.180-9.300.
9.300	HIG	CIUDAD TRUJILLO, D. R., 32.28 m. 7.10-9.40 am., 11.40 am.-2.10 pm., 3.40-9.40 pm.
9.200	COBX	HAVANA, CUBA, 32.59 m. Addr. San Miguel 194, Altos. Relays CMBX 7 am.-12 m.
9.165	HC2CW	GUAYAQUIL, ECUADOR, 32.74 m., 7-11.30 pm., Sun. 3.30-6 pm.
9.125	HAT4	BUDAPEST, HUNGARY, 32.88 m., Addr. "Radiolabor," Gyali-ut, 22. Daily 7-8 pm., Sat., 6-7 pm.

(Continued on page 28)

All Schedules Eastern Standard Time

The Short Wave League

On the Ham Bands

(with the "Listening Post" Observers)

Edited by Elmer R. Fuller

● CONDITIONS during the past month improved several fold over the previous months, according to the reports which have been sent to me. At times, during February, the twenty-meter band provided better results than any other time this winter. The VK's are again being heard, and several were reported not only on the twenty-meter band, but also on the forty-meter band. Another new call to make its appearance during February was the EA's. These have been heard to some extent in the past, but now they are operating in large numbers. Instead of operating as commercial stations and giving news of war, they are now amateurs and are running their stations as such.

Many, many thanks for the help which you have shown in sending information on certain rare calls, for which I have advertised in several issues. From Roger Legge of Binghamton, New York; Ernest W. Lang, Observer for Washington; and Raymond Fehr, W6QVY, the correct QRA (address) of CR7AY has been learned. It is: *Mario De C. Pereira, P. O. Box 264, Lourenco Marques, Mozambique, Africa.* Ray Fehr says that he will answer all SWL and QSL cards. Mr. Fehr also tells me that V1RKTB will QSL 100%.

Reports were received from twenty-eight observers for the month of February, and they were certainly FB reports. However, several observers have been appointed who are not sending in regular reports, and this is going to count against them when it comes time for reappointment. After some deliberation, it has been decided that our year will start on the first of September, since this is about the beginning of the DX season. Therefore, all observers will be subject to reappointment at that time. The names of the observers for the coming year will be published in a following issue, and new certificates will be issued to them. Records are kept of the reports and activities of the several observers, and these records will be the main basis for reappointment. It will not be necessary for any observer to apply for reappointment, as all observers for this year will automatically be considered for next year.

For February reports were received from observers representing the following locations:—

Alabama	Wells, Jack
Arkansas	Henderson, Bill
Colorado	Wallen, Dan T.
Connecticut	Kemp, Howard G.
England	Spencer, Kenneth
Florida	Lester, Major
Illinois	Carling, Len M.
Kansas	Hegler, Burns E.
Kentucky	Taglauer, Bob
Maine	Barker, Elwyn L.
Maryland	Wilkes, Cecil A.
Massachusetts	Lendzioszek, Edward
Missouri	Fleming, R. B.
Nebraska	Noyes, William Dean
New Hampshire	Montgomery, Alex
New Jersey	Fitzpatrick, John
New York	Fuller, Charles H.
	Herzog, W. F.
New Zealand	Sibbin, J. C.
Ontario	Clarke, Stanley
Oregon	Trueman, Elwood C.
Pennsylvania	Jordan, Tom
South Africa	Westman, Oscar
South Carolina	Halliday, Ray
South Dakota	Hutchinson, Robert
Texas	Slaughter, Edward C.
Utah	Parker, Robert
Washington	Lang, Ernest W.

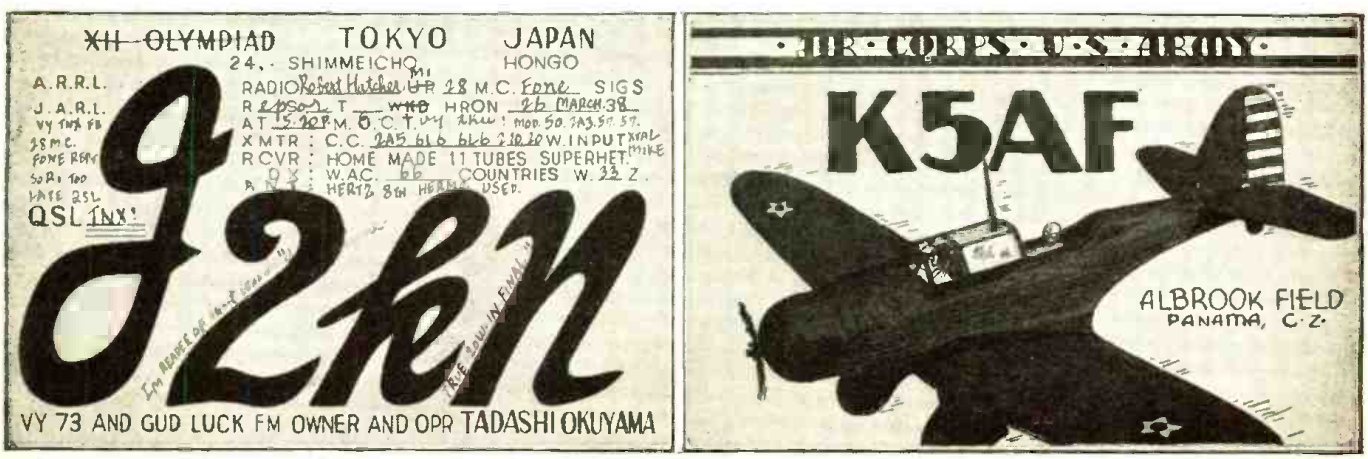
Asiatics seem to be coming in much better than they have before this season. Several were reported for February.

Call	*Freq.*	*R*	*S*	*Where Heard*
J2KG	14.	4	7	New Zealand
J2CS	14.	4	6-7	New Zealand
J2MI	14.	3-4	6	New Zealand
J3FJ	29.9	4	6	New Hampshire
J7CB	14.	5	5	Ore.
J7CD	14.063	4	6	Utah
VU2BG	14.25	4	7	Fla.
VU2EG	14.	5	8	South Africa
VU2FU	14.	5	7	South Africa
VU2CQ	14.3	5	5	N. Y.
XZ2DX	14.06	4	6	Wash.
XZ2DY	14.3	5	6	N. Y.
YI2YL	14.28	5	6	N. Y.
CN8BA	14.06	4	7	N. J.
	28.11	4	6	Neb.
CN8AV	14.065	4	7	N. J.
	28.06	4	7	N. J.
CN8MI	14.03	4-5	7	Ontario, Conn.
CN8MB	14.045	5	7	N. J.
CN8MY	14.07	4	7	N. J.
CN8AW	14.115	4	6	Mass.
EA8AS	7.27	5	7	Ala.
EA9AH	7.0	5	9	Ala.
EA9BJ	7.12	5	9	Ala.
SU1MW	28.367	4-5	7	Neb., N. J.
SU1CH	28.38	5	7-8	Ky.
SU1AM	14.	5	7	South Africa
VQ2PL	14.1	4	5	Tex.
VQ8AE	14.	5	7	South Africa
ZE1JN	14.252	4	7	Ill.
ZE1JX	14.021	4	7	Ill.
ZE6EC	14.	4	7	South Africa
ZS1BV	14.017	3	6	Neb., Conn.
ZS1AX	14.07	4	5	Conn.
ZS1BL	14.2	5	6	N. Y.
ZS2N	14.008	4-5	6-8	Ill., Kan.
ZS2X	14.03	4-5	5-8	Tex., Neb., Kan., Ill., Ark., Conn.
ZS2AZ	14.07	4-5	5-8	Ill., Tex., N. Y., Neb., England, Kan., Ontario, Ore., Ark.
ZS4H	14.06	4-5	5-9	N. Y., Colo., Ill., Neb., Kan., Conn.
ZS5BE	14.047	3	6	Ill.
ZS5CO	14.3	5	6	N. Y.
ZS5AS	14.347	5	9	Fla.
ZS5J	14.055	4	5-7	Conn., Ill.
ZS5T	14.05	5	7	Ark.
	28.035	4	7	Neb.
ZS5CJ	14.13	5	5-7	Kan.
ZS5AW	28.197	5	7	Neb.
ZS5CL	14.1	5	6-9	Tex., Pa., Ark., Ill., Conn.
ZS6DW	14.09	3-4	5-7	Col., Kan., Ill., Mo.
ZS6S	14.11	5	5-9	Col., Kan., N. J., Fla., Ore., N. Y., Ark., Ill.
ZS6AJ	14.12	4-5	5-9	Tex., Neb., Ore., Ill.
ZS6CN	14.035	4-5	5-8	Neb., Conn.
ZS6CT	28.176	3	5	Neb.
ZS6W	28.24	4	6	Neb.
ZS6BB	14.09	3-4	4-5	Wash., Conn., Ill.
ZS6BR	14.035	5	6-7	Kan., N. Y., Ill.
ZS6EF	14.11	4	7	Kan., N. J.
ZS6DY	14.11	5	6-7	Kan., Ontario, Ark., Ill.
	28.2	5	8	Ontario
ZS6DL	14.064	5	5-7	Ore., Ill.
ZS6BW	28.105	5	9	Ky.
ZS6Q	28.24	5	7	Ky.
ZS6CK	14.03	3	4-5	Conn.
ZS6AK	14.2	5	6	N. Y.
ZS6BY	14.1	5	6	N. Y.

From our observers in other countries we have the following United States hams, and several other North American amateurs being heard locally.

CO2GL	14.055	4	8	Utah
CO2AM	14.066	4	7	Utah
CO2MA	14.1	5	6	Col., Wash.
CO2RR	14.09	5	7	Col., Wash.
CO2JJ	14.13	5	7	Col.
CO2SH	14.09	5	6	Col.
CO2SV	14.09	4-5	6-7	Col., Ore., S. D.
CO2WM	14.15	5	7-8	Col., Wash., England
	28.045	5	7	N. J.
CO2LY	14.1	5	8	Col., Wash.
CO2RG	14.13	5	5	Col.
CO2GY	14.12	5	8	Col., Wash., N. Y.
CO2LL	14.025	5	7	Wash.
CO2OY	14.08	5	7	Wash.
CO2CR	28.1	5	8	N. J.
CO2OK	14.45	5	8	Fla.
CO2HY	14.32	5	9	Fla.
CO2RD	14.07	5	2	N. Y.
CO2BD	14.065	4	4	N. Y.
CO2VG	14.072	2-5	3-5	N. Y., S. D.
CO2JJ	14.11	5	6	England
CO2WW	14.01	3	5	S. D.
CO2WL	14.24	3	6	S. D.
CO2SE	14.22	4	7	S. D.
CO7CX	14.04	5	6	Col.
CO8RC	14.061	5	8	Utah
HH2B	14.00	5	8-9	Me., N. J., Conn., England, N. Y.
HH2PB	14.35	5	8	N. Y.
HH5PA	14.05	5	9	Me., N. J., N. Y.

(Continued on page 60)



Left—Interesting QSL card sent Robert Hatcher, Richmond, Va. from J2KN, Tokyo, Japan. Right—Veri card from Army amateur station K5AF, Canal Zone.

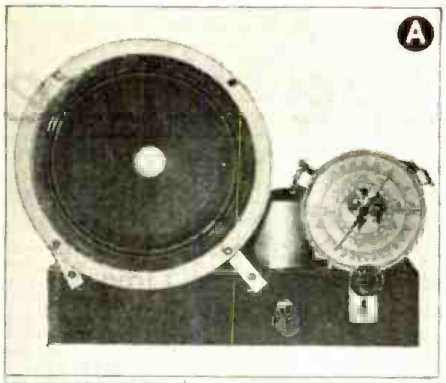
Mc.	Call	
9.100	COCA	HAVANA, CUBA, 32.95 m., Addr. Galiano No. 102. Relays CMCA 9 am.-12 m.
9.091	PJC2	CURACAO, D. W. INDIES, 33 m., 6.36-8.36 pm., Sun. 10.36 am.-12.36 pm.
9.030	COBZ	HAVANA, CUBA, 33.32 m., Radio Salas Addr. P. O. Box 866. 7.45 am.-1.15 am. Sun. 7.45 am.-12 m. Relays CMBZ.
8.965	COKG	SANTIAGO, CUBA, 33.44 m. Addr. Box 137. 9-10 am., 11.30 am.-1.30 pm., 3-4.30, 5-6, 10-11 pm., 12 m.-2 am.
8.841	HCJB	QUITO, ECUADOR, 33.5 m. 7-8.30 am., 11.45 am.-2.30 pm., 5-10 pm., except Mon. Sun. 12 n.-1.30 pm., 5.30-10 pm.
8.700	HKV	BOGOTA, COLOMBIA, 34.46 m. Tues. and Fri. 7-7.20 pm.
8.665	COJK	CAMAGUEY, CUBA, 34.64 m., Addr. Finlay No. 3 Altos. 5.30-6.30, 8-11 pm., daily except Sat. and Sun.
8.665	W2XGB	HICKSVILLE, N. Y., 34.64 m., Addr. Press Wireless, Mon. to Fri. News at 9 am. and 5 pm.
8.580	YNPR	MANAGUA, NICARAGUA, 34.92 m. Radiodifusora Pilot.
8.090	YDX	MEDAN, SUMATRA, N. E. I., 37.08 m. Daily exc. Sat., 10.30 pm.-2 am. Sat. 7.30 pm.-1.30 am.
7.894	YSD	SAN SALVADOR, EL SALVADOR, 37.99 m., Addr. Dir. Genl. Tel. & Tel. 7-10.30 pm.
7.870	HCIRB	QUITO, ECUADOR, 38.1 m. La Voz de Quito. 8.30-11.30 pm.
7.854	HC2JSB	GUAYAQUIL, ECUADOR, 38.2 m. Evenings to 11 pm.
7.797	HBP	GENEVA, SWITZERLAND, 38.48 m., Addr. Radio-Nations.
7.614	CR6AA	LOBITO, ANGOLA, 39.39 m., Mon., Wed., Sats. 2.45-4.30 pm. Also 7.177.
7.510	JVP	NAZAKI, JAPAN, 39.95 m., 8-9.30 am.
7.450	TI2R3	SAN JOSE, COSTA RICA, 40.27 m. "Radioemisora Athena". 9.30-11 pm., exc. Sun.
7.410	HCJB4	QUITO, ECUADOR, 40.46 m., 7-9.30 pm. irregularly.
7.410	YDA	TANDJONGPRIOK, JAVA, 40.46 m., Addr. N.I.R.O.M., Batavia, 10.30 pm.-2 am.; Sat. 7.30 pm.-2 am.
7.380	XECR	MEXICO CITY, MEX., 40.65 m., Addr. Foreign Office. Sun. 7-8 pm.
7.220	HKE	BOGOTA, COL., S. A., 41.55 m. Tues. and Sat. 8-9 pm. Mon. and Thurs. 6.30-7 pm.
7.200	YNAM	MANAGUA, NICARAGUA, 41.67 m. Irregular at 9 pm.
7.177	CR6AA	LOBITA, ANGOLA, PORT. WEST AFRICA. 41.75 m., Mon., Wed., and Sats. 2.45-4.30 pm. Also see 7.614 mc.
7.100	FO8AA	PAPEETE, TAHITI, 42.25 m., Addr. Radio Club Oceanien. Tues. and Fri. 11 pm.-12.30 am.
7.088	PIIJ	DORDRECHT, HOLLAND, 42.3 m., Addr. Dr. M. Hellingman, Technical College. Sat. 11.10-11.50 am.
7.050	FG8AA	POINT-A-PITRE GUADELOUPE, F.W.I., 42.55 m., 6-7 pm., also 9-10.30 pm. Irregular. P.O. Box 125.
6.990	XEME	MERIDA, YUCATAN, 42.89 m., Addr. Calle 59, No. 517, "La Voz de Yucatan desde Merida." Irregular.
6.977	XBA	TACUBAYA, D. F., MEX., 43 m. 9.30 am.-1 pm., 7-8.30 pm.
6.805	HI7P	CIUDAD TRUJILLO, DOM. REP., 44.06 m., Addr. Emisoria Diaria de Commercio. Daily exc. Sat. and Sun. 12.40-1.40, 6.40-8.40 pm. Sat. 12.40-1.40 pm. Sun. 10.40 am.-11.40 am.
6.790	PZH	PARAMIRABO, SURINAM, 44.16 m., Addr. P. O. Box 18. 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.
6.750	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 N.I.R.O.M. programs. 4.30-11 or 11.30 am. Also Sat. 9.30 pm.-1.30 am.
6.690	TIEP	SAN JOSE, COSTA RICA, 44.82 m., Addr. Apartado 257, La Voz del Tropico. Daily 7-11 pm.
6.675	HBQ	GENEVA, SWITZERLAND, 44.94 m. Addr. Radio-Nations. Off the air at present.
6.672	—	—— 44.74 m., relays Salamanca, Spain, 7-9.45 pm.
6.672	YVQ	MARACAY, VENEZUELA, 44.95 m. Irregular.
6.635	HC2RL	GUAYAQUIL, ECUADOR, S. A., 45.18 m., Addr. P. O. Box 759. Sun. 5.45-7.45 pm., Tues. 9.15-11.15 pm.
6.630	HIT	CIUDAD TRUJILLO, D. R., 45.25 m., Addr. "La Voz de la RCA Victor," Apartado 1105. Daily exc. Sun. 12.10-1.40 pm., 5.40-8.40 pm.; also Sat. 10.40 pm.-12.40 am.
6.625	PRADO	RIOBAMBA, ECUADOR, 45.28 m. Thurs. 9-11.45 pm.
6.610	YNLG	MANAGUA, NICARAGUA, 45.39 m. Emisora Ruben Dario. 1.30-2.30, 6-10.15 pm.
6.558	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 las Lagos." 1-2.20, 8-10 pm. Except Sundays.
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	TGWB	GUATEMALA CITY, GUAT., 46.2 m. La Voz de Guatemala. Daily 7.45-9 am. 12.45-3.45 pm., 7.30 pm.-12.15 am. Sun. 10.30 am.-5.15 pm., 7 pm.-12 m.
6.480	HIIL	SANTIAGO DE LOS CABALLEROS, D. R., 46.28 m., Addr. Box 356. 9.40-11.40 am., 7.40-9.40 pm.
6.470	YNLAT	GRANADA, NICARAGUA, 46.36 m., Addr. Leonidas Tenoria, "La Voz del Mombacho." Irregular.
6.465	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.
6.400	TGQA	QUEZALTENANGO, GUATEMALA, 46.88 m., Mon.-Fri. 9-11 pm. Sat. 10 pm.-1 am. Sun. 1-3 pm.
6.384	ZIZ	BASSETERRE, ST. KITTS, W. INDIES, 46.99 m. 4-4.45 pm. Wed. 7-7.30 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	OAX1A	ICA, PERU, 47.33 m., Addr. La Voz de Chiclayo, Casilla No. 9. 8-11 pm.
6.324	COCW	HAVANA, CUBA, 47.4 m., Addr. La Voz del Radio Philco, P. O. Box 130. 6.55 am.-12 m. Sun. 9.55 am.-10 pm.
6.310	HIZ	CIUDAD TRUJILLO, D. R., 47.52 m. Daily except Sat. and Sun. 11.10 am.-2.25 pm., 5.10-8.40 pm. Sat. 5.10-11.10 pm. Sun. 11.40 am.-1.40 pm.
6.300	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.
6.280	HIG	TRUJILLO CITY, D. R., 47.77 m. 7.10-9.40 am., 11.40 am.-2.10 pm., 3.40-9.40 pm.
6.270	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. 5.30-8 pm.
6.243	HIN	CIUDAD TRUJILLO, D. R., 48 m., Addr. "La Voz del Partido Dominicano." 12 n.-2 pm., 6-10 pm.
6.235	HRD	LA CEIBA, HONDURAS, 48.12 m., Addr. "La Voz de Atlantida." 8-11 pm.; Sat. 8 pm.-1 am.; Sun. 4-6 pm.
6.225	YVIRG	VALERA, VENEZUELA, 48.15 m. 6-9.30 pm.
6.210	——	SAIGON, INDO-CHINA, 48.28 m., Addr. Radio Boy-Landry, 17 Place A. Foray. 4.30 or 5.30-9.15 am.
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.
6.190	HVJ	VATICAN CITY, 48.47 m., Mon., Wed., Thur., Sat. 2-3.30 pm., Tues., Fri. 2-3 pm. Thur. also 3-3.30 pm.
6.190	TG2	GUATEMALA CITY, GUAT., 48.4 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.
6.185	HIIA	SANTIAGO, D. R., 48.5 m., Addr. P. O. Box 423. 7 am.-5 pm.

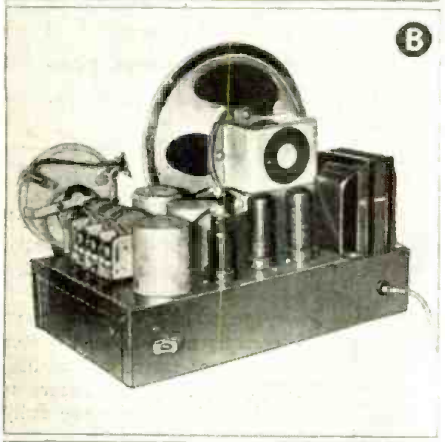
49 Met. Broadcast Band

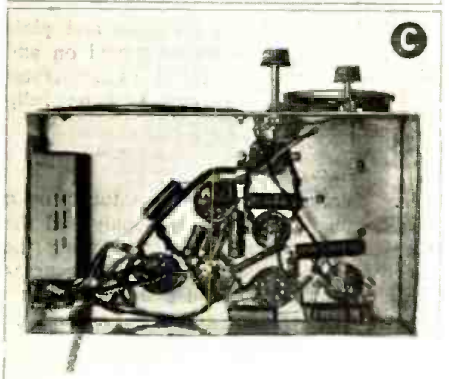
6.170	W2XE	NEW YORK CITY, 48.62 m., Addr. Col. B'cast System, 485 Madison Ave. Mon.-Fri. 12 m.-1 am., Sat. & Sun. 11.30 pm.-1 am.
6.156	YV5RD	CARACAS, VENEZUELA, 48.71 m. 11 am.-2 pm., 4-10.40 pm.
6.153	HI5N	MOCA CITY, D. R., 48.75 m. 6.40-9.10 pm.
6.150	VPB	COLOMBO, CEYLON, 48.78 m., 7-11 am.
6.150	CJRO	WINNIPEG, MAN., CANADA, 48.78 m., Addr. (See 11.720 mc.) Daily 6 pm.-12 m., Sun. 5-10 pm.
6.150	ZPI4	VILLARRICA, PARAGUAY, 48.78 m. 4-6 pm.
6.147	ZEB	BULAWAYO, RHODESIA, S. AFRICA, 48.8 m. Mon., Wed., and Fri. 1.15-3.15 pm.; Tues. 11 am.-12 n.; Thurs. 10 am.-12 n. Sun. 3.30-5 am.
6.145	HJ4ABG	MEDELLIN, COL., 48.79 m. 11 am.-12 n., 6-10.30 pm.
6.140	W8XK	PITTSBURGH, PA., 48.83 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.
6.133	XEXA	MEXICO CITY, MEX., 48.93 m., Addr. Dept of Education. Daily 8-11 am., 2.30-4 pm., 7.30 pm.-12.45 am. Sun. 1.30 pm.-12.45 am.
6.130	VP3BG	GEORGETOWN, BRIT. GUIANA, 48.94 m. 9-10 am., 2.15-6.30 pm., Sun. 5.30-11.30 am., 3-5 pm.
6.130	TIEM	SAN JOSE, COSTA RICA, 48.94 m. "El Mundo", Apartado 1049. 11 am.-11 pm., Sun. 10 am.-6 pm.
6.130	CHNX	HALIFAX, N. S., CAN., 48.94 m., Addr. P. O. Box 998. 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. 8 am.-Noon. 2-10 pm.
6.122	HJ3ABX	BOGOTA, COL., 49. m., Addr. La Voz de Col., Apartado 26-65. 12 n.-2 pm., 5.30-11 pm.; Sun. 6-11 pm.
6.122	HP5H	PANAMA CITY, PAN., 49 m., Addr. Box 1045. 10 am.-1 pm., 5-11 pm.
6.122	FK8AA	NOUMEA, NEW CALEDONIA, 49.00 m., Radio Noumea, Addr. Charles Gaveau, 44 Rue de l'Alma., Wed. & Sats. 2.30-3.30 am.
6.117	XEUZ	MEXICO CITY, MEX., 49.03 m., Addr. 5 de Mayo 21. Relays XEFO 9 am.-1 pm., 7 pm.-2 am.
6.115	OLR2C	PRAGUE, BOHEMIA, 49.05 m. (See 11.40 mc.)

(Continued on page 58)

All Schedules Eastern Standard Time







The "Bauer" T-R-F Four

Francis J. Bauer, Jr., W6FPO

A four tube T.R.F. receiver performing as well as many a small super-het. A novel circuit is employed, combining "link" and "capacity" coupling in a tuned plate circuit for the r.f. amplifier.

● ANYONE who has used or built the conventional four tube T.R.F. receiver is familiar with the limitations of such equipment. The selectivity is usually none too good and in addition there is regeneration that supposedly gives greater sensitivity but actually reduces the amplification because the receiver breaks into oscillation before the full gain of the R.F. tube can be realized. Another common defect in this type of receiver is a characteristic drop in *gain* toward the low frequency end of the broadcast band.

These obvious deficiencies are remedied to a surprising extent in the simple receiver described in this article. In the writer's opinion, the performance of the High Efficiency Four compares very favorably with that of many a small super-het, with the added advantage of lower noise-level and no oscillator hiss.

New Coupling System Used

An examination of the wiring diagram will reveal a circuit that is standard in every respect except for the unique coupling system between the R.F. and detector tubes. This, together with the tuned plate circuit in the R.F. stage, is the heart of the receiver and accounts for the tremendous gain *with stability* that this receiver is capable of.

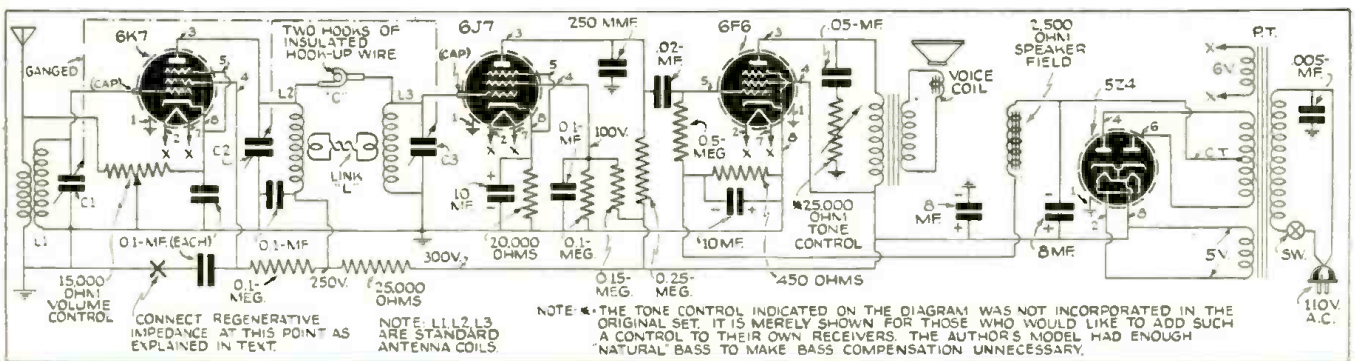
A combination of link and capacity coupling is used so as to provide uniform gain throughout the tuning range. At high frequencies condenser "c" is the most effective coupling medium. As the frequency is lowered "c" becomes less and less effective because of its increase in reactance but the link circuit, on the other hand, becomes more efficient. In other words, "c" works best at high frequencies and the link circuit works best at low frequencies, provided both "c" and the link circuit are properly phased as explained later on in the text.

Set Easy to Build

The construction of this receiver presents no unusual difficulties as long as the chassis layout is adhered to, particularly in the R.F.

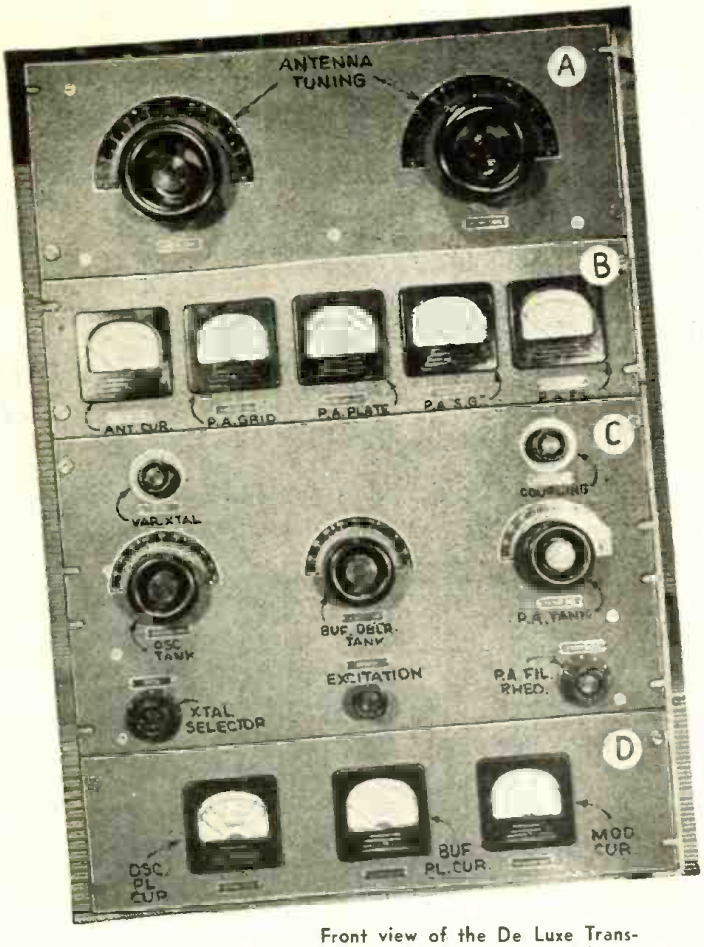
(Continued on page 51)

Left—Photos of the T.R.F. Four. Below—Wiring diagram. The improved tuning is due to the "link" circuit connecting the R.F. and detector tubes.



De Luxe

This is the first of a series of articles describing a swell transmitter. The "radio frequency" section is explained in this part. This unit employs three beam power tubes. The power output on both phone and CW is about 200 watts. Remote control is provided for, as are both over- and underload protection. Bands—80, 40, 20 and 10 meters.



Front view of the De Luxe Transmitter using beam power tubes—a handsome smooth-working "rig."

The R.F. Unit

● THE R.F. section of this transmitter is composed of three beam power tubes, hence the name. In addition to the usual 6V6 and 807 beam tubes, the power amplifier is one of the new 813 tubes, which is one of the most efficient types ever designed. The power output on both phone and CW is around 200 watts, which will do respectable work even on the present overcrowded bands.

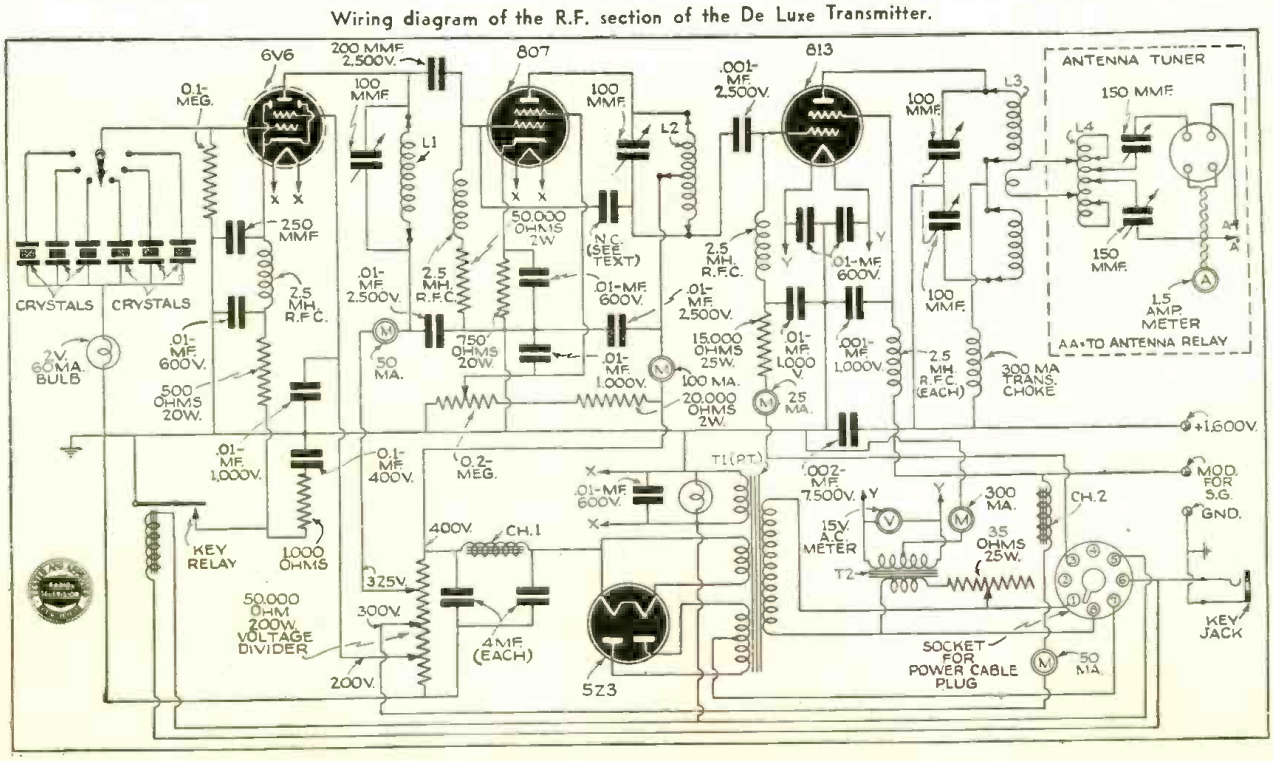
Besides the new 813, several other recent developments have been incorporated. One of these is the recently announced 40-meter variable crystal. Provision is made for two of them, and adjustment of both is made from the front panel. Another feature is the kit-type speech amplifier which will be described more fully in a subsequent article.

Remote control is provided for, and the filaments and plate power as well as the exciter alone may each be turned on and off from a remote position. This control system also incorporates complete over- and underload protection, and will be fully described in the next article.

Clickless Keying

The R.F. unit is complete, except for the antenna tuner, on a single chassis. This includes low voltage power supply and the keying relay. *Clickless keying* is accomplished by breaking the cathode circuit of the 6V6 oscillator. A small amount of regeneration in the oscillator circuit lowers crystal and plate current and allows rapid keying even with rather poor crystals. Self-bias on

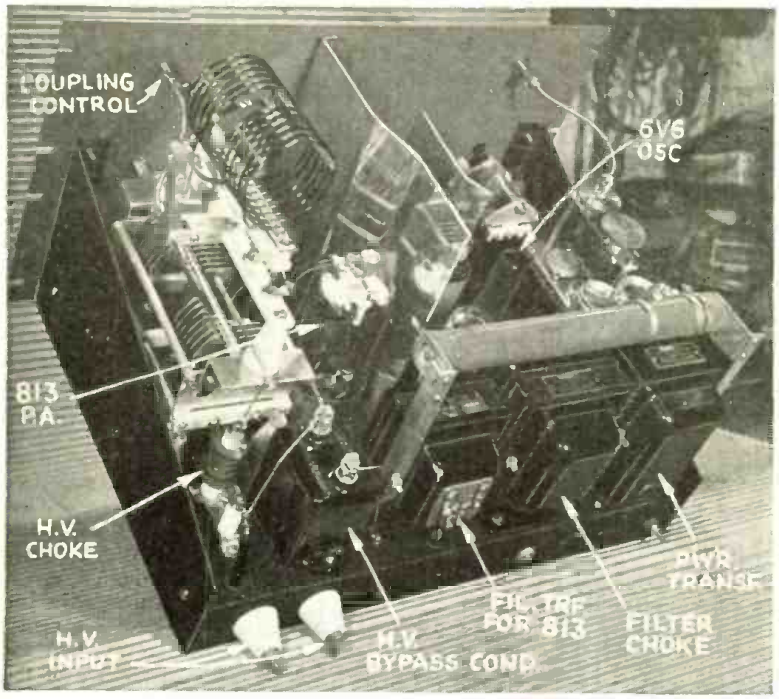
Wiring diagram of the R.F. section of the De Luxe Transmitter.



"Beam Power 3"

PART I

Howard G. McEntee, W2FHP



A close-up rear view of the transmitter's R.F. unit.

the 807 and partial fixed-bias on the 813 make this type of keying practical. A single 45-volt battery holds the latter tube down when excitation stops, and is the simplest possible bias means. A single battery will last practically as long as its shelf life in this circuit, since the grid current is only about 10 ma. or so.

The fact that such low excitation is required by the 813 allows us to run all the components at relatively low ratings, so that life of all parts is very long, and everything runs cool and without strain.

The 6V6 always runs on fundamental frequency, while the 807 can be run on fundamental, or double, or quadruple, as required. The transmitter was designed primarily for 40, 20 and 10 meters, which is the reason for the selection of the 40-meter crystals. However 80-meter operation is entirely feasible and may be accomplished with an 80-meter crystal. Either 80- or 40-meter crystals will cover three bands, doubling or quadrupling in the 807 as required, with plenty of drive to the 813. The drive is so high in most cases that it is best to reduce it, as it is quite easy to overdrive the 813. For this purpose a variable screen grid resistor for the 807 acts as excitation control and reduces the drive smoothly and without detuning effects.

807 Is Neutralized

It was found advisable to neutralize the 807, so that *straight-through* or *fundamental* operation could be accomplished without fear of self-oscillation. If the neutralization is not used, considerable extra shielding is required. Of course, complete stability is had when the 807 is doubling.

The neutralizing capacity required is very small, and the condenser may be seen on the underside view. It consists of pieces of No. 10 tinned copper wire run about ⅜" apart for 1". The wires are held rigidly spaced by clamping between two "butt-in" insulators which are about ½" in diameter. The spacing of the wires is varied until stable operation is secured when either 40- or 80-meter coils are used at both L1 and L2.

The output of L2 is taken off at the opposite end of the coil from the plate end, giving a more balanced arrangement and less of a capacity load on L1, since the plate to filament capacity of the 807 and the grid to filament of the 813 are both rather high.

813 Plate Circuit Unusual

The 813 plate circuit is rather unusual, but the arrangement used lessens the effect of the high output capacity on the tuned circuit, and at the same time permits the use of a ready-made variable link unit. The latter permits variation of coupling from the front of the panel which is a decided convenience, especially with some types of antennas. This transmitter is used with an 8JK beam, which is quite susceptible to changes in weather such as rain or heavy fog. It is a great convenience to be able to vary coupling from the front panel.

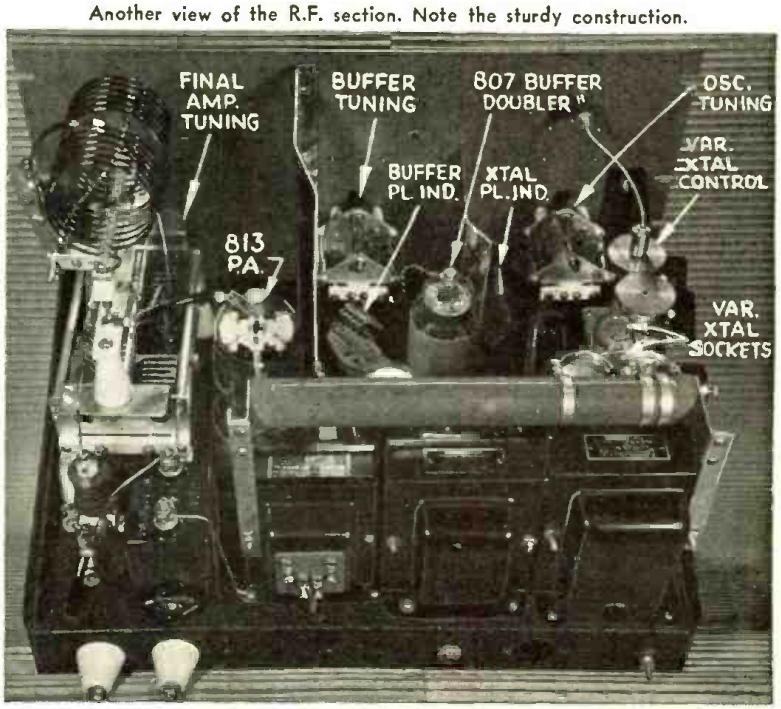
The two variable crystals plug in on a shelf above the chassis, and this shelf is supported by the side brace: brass pillars are run from the two free corners to the base to form a solid mounting. The crystal variation control is operated by a flexible shaft from the front panel. A strip of aluminum ½"x⅛" mounted above the crystal shelf on pillars supports the two shafts which are geared together. The gears are standard 1½" diameter units with ¼" shaft holes. Clips to slip over the knobs on the crystal holders are soldered on the lower ends of the gear shafts. When changing these crystals, the gears and shafts may be raised to permit removal. Ordinary ¼" shaft bushings serve as bearings for the shafts.

Sockets for four other crystals are mounted in the side bracket, so that the crystals project outward. They keep cooler in this position and such mounting reduces crowding on the chassis.

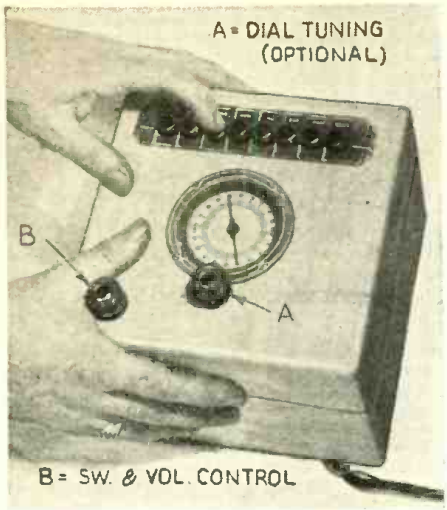
The crystal selector switch is mounted under the chassis, with a large hole over it for the leads to pass through. A 60 ma., 2 V. pilot lamp is mounted in series with the common lead from the crystal holders. It is only needed during preliminary adjust-

(Continued on page 41)

Another view of the R.F. section. Note the sturdy construction.



REMOTE CONTROL Selects Stations Spot—*Just*



This "Remote Control" box will tune any broadcast receiver automatically to seven different stations.

New! Exclusive!

This easily built Remote Control box, plugged into any electric light outlet in your home, permits any one of seven stations to be "tuned in" by simply pushing a button! It also controls volume and provides "remote" dial tuning of your broadcast receiver. Four tubes are used, together with standard parts.

● THERE is an old saying that *"necessity is the mother of invention,"* but even more true, perhaps, would be one reading—*"laziness is the reason for many inventions."* And being inclined to laziness—especially with spring weather here—the thoughts of a "gadget" which would permit tuning from one station to another and, if desired, changing the volume of the programs, without leaving that comfortable easy chair, sounded awfully interesting.

So with an effort the easy chair was relinquished for a few evenings while an *armchair remote control unit* was designed and constructed.

And with the thought that there might be other lazy folk who might resent leaving their easy chairs to tune in the radio entertainment they want to hear, the details of this unit, which is no more difficult to construct and no more costly than a small A.C.-D.C. midget superhet, are here given. It can be used with any broadcast receiver without making any changes in the receiver *or connecting any wires to it.*

How "Remote Control" Unit Works

The principle of operation is quite simple. The remote tuner contains the first-detector, oscillator and two I.F. amplifier stages of a superheterodyne receiver, plus a radiating coil which re-transmits the programs received on the remote tuner to the regular radio receiver where they are amplified again, detected and heard through the loudspeaker.

In other words, the remote tuner is a tiny radio *transmitter* which changes the frequency of the broadcast stations to a frequency of 1560 kc. The broadcast receiver is tuned to this frequency and not touched further. All stations within the broadcast band are picked up by the remote tuner and changed to this same frequency.

The remote tuner is contained in a small box about 7½ inches square and 5½ inches high. The photos on this page show its convenient size as well as the general layout of parts and construction.

Circuit Is Simple

The circuit is less complicated than most broadcast sets. The 6K8 tube is the first detector and oscillator. A two-gang condenser tunes the aerial and oscillator circuits. A 6K7 tube is the first I.F. amplifier stage, which is tuned to a frequency of 1560 kc. The 6B8 is used as second I.F. stage and as A.V.C. diode. The coil in the plate lead of this 6B8 tube is 3 inches in diameter and is not shielded like the other coils in the set. This coil is a *loop aerial* which sends the signals to the regular receiver.

Incidentally, it was found that by coupling the aerial wire to this coil loosely (the aerial wire is twisted around the A.C. line cord and the two are wrapped *once around* this 3-inch coil) the remote tuner could be removed about 100 feet from the receiver and still provide complete control over the station selection and volume of the radio set.

Plate Supply "Built-In"

The filament and plate voltages for the tuner are obtained in conventional A.C.-D.C. manner by means of a 25Z6 tube and a series connection of the filaments. Two 40 mf. electrolytic condensers and a wire-wound resistor provide adequate filtering of the plate voltage supply.

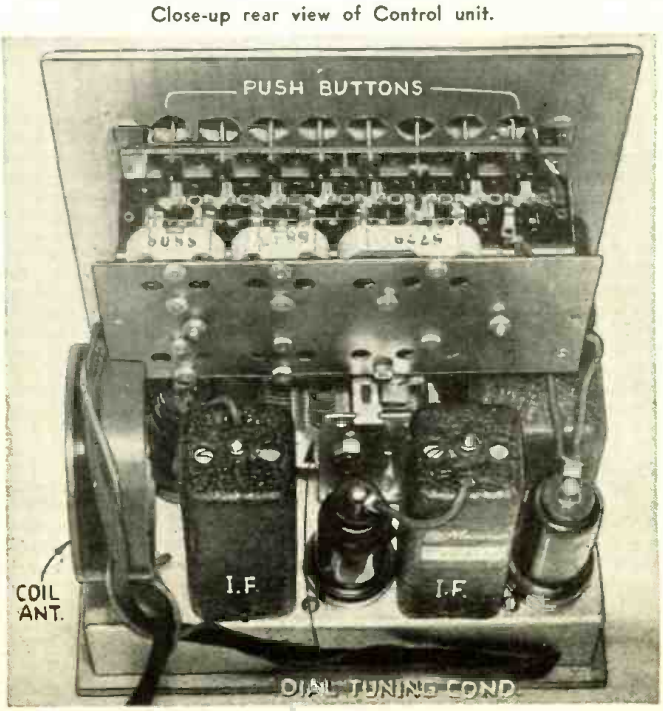
Actual layout of the parts can be seen in the photos and accompanying drawings. The aerial coil and the two I.F. coils are Meissner coils which are readily obtained. The oscillator coil is a Meissner type 14-7560 adjustable oscillator coil which is doctored up as follows. The plate winding is completely unwound and 35 turns are removed from the grid or tuned winding. The plate winding is then rewound, as a straight solenoid directly over the grid winding, after having replaced the layer of varnished cloth which was originally between the two coils. Wind 30 turns for the plate coil and connect the ends back to the terminals on the coil base. Then replace the shield and the powdered iron core.

The radiating coil consists of 28 turns of No. 30 enamelled wire on a 3-inch bakelite form. This coil must be *close-wound*. The position of this coil in the tuner can be seen in the photos.

Image Trap Coil

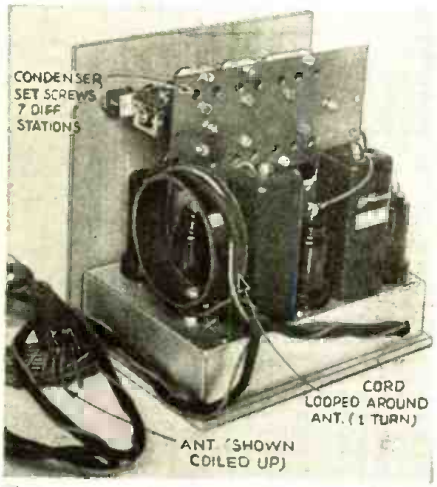
One other coil is shown in dotted line. This coil was not required in the original set. It is an *image trap coil* and is tuned to the I.F. of 1560 kc. to prevent signals tuned to 1560 kc. from being heard through the I.F. channel. It consists of a coil and condenser connected in series and tuned to 1560 kc. A small broadcast coil and a 225 mmf.

Close-up rear view of Control unit.



BOX from any *push button!*

C. W. Palmer, E.E.



This view shows coil antenna used on Remote Control unit.

mica trimmer condenser will serve nicely. If no I.F. or image interference is encountered, this coil and condenser can be omitted.

Adjustments

The adjustments of the I.F., oscillator and the push-button tuner, which permits stations to be tuned by simply pushing buttons on the remote tuner, are quite easy.

First, tune your *broadcast* receiver accurately to 1560 kc., preferably by means of a calibrated service oscillator. Remove the aerial wire from the aerial binding post of

See Diagram on page 47

the set and replace this with a wire about 5 to 10 feet long, laid on the floor.

Place the remote tuner near the receiver, with the aerial wire (a 30 ft. length of insulated flexible wire) placed conveniently under a rug or around the edge of the room. Plug in the tuner and turn the radio set on. Set the volume controls on both units on *high*. Adjust the I.F. of the tuner to 1560 kc. with a signal generator, picking up the signal in the receiver and using a tuning meter in the set or the "sound" as indicating means. Next, with the "manual-tuning" button of the Meissner 10-7554 tuner pushed in, adjust the trimmers on the condensers at a frequency of about 1400 kc., again using the service oscillator. Follow this with an adjustment of the padder condenser in the oscillator of the tuner unit at a frequency of 550 kc.

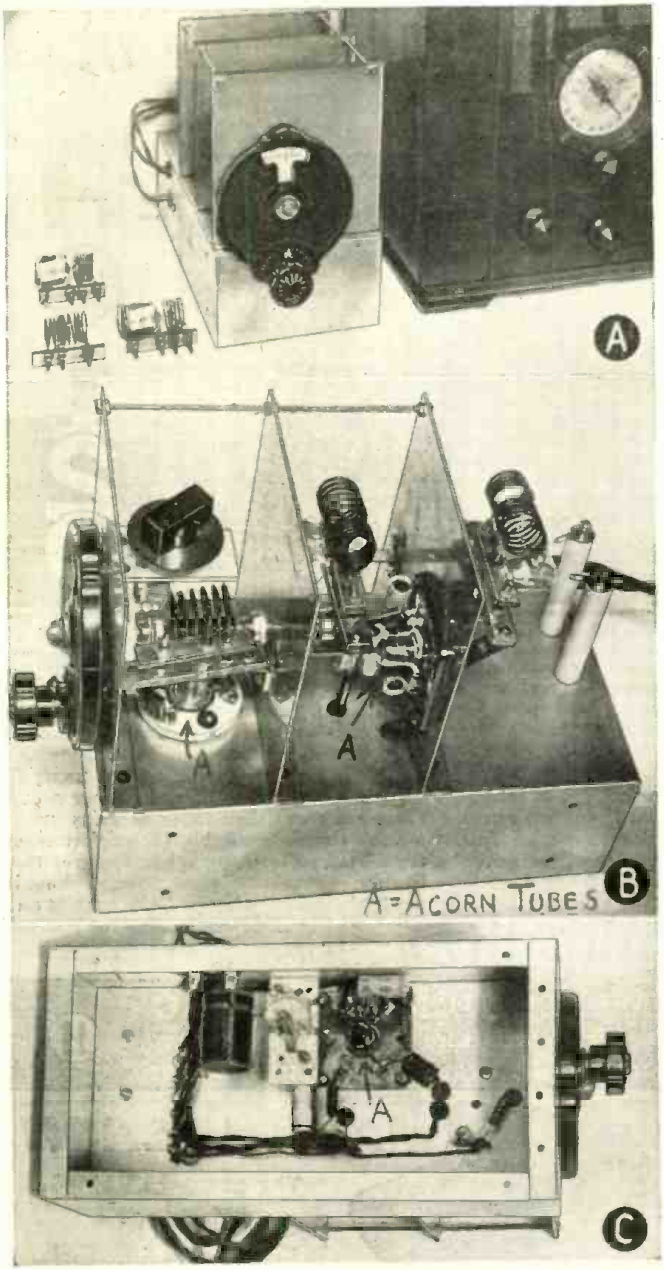
After the tuning dial of the set has been "tracked," the tuning buttons can be set-up by pushing the buttons one at a time and

(Continued on page 46)

Tune In TELEVISION SOUND

Converter for 2½, 5 and

Herman Yellin, W2AJL



Top—Converter with all-wave superhet (must tune to 3400 kc. or 88 meters). Center—Close-up side view. Bottom—a peek at the underside. One shield tie-rod removed for photo.

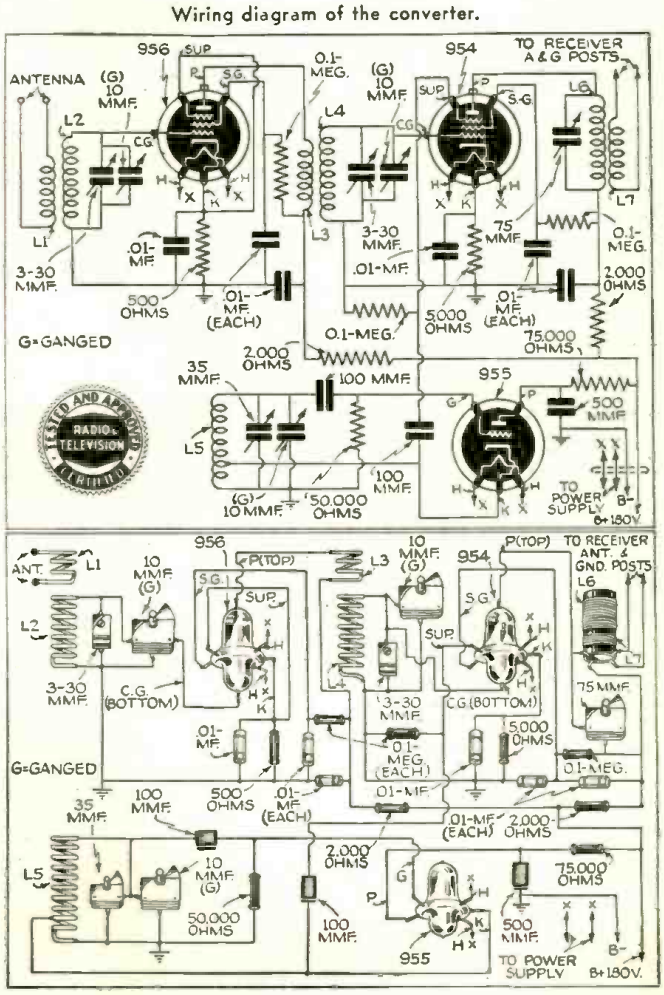
● THE recent forced use of stable *five meter* transmitters has made entirely practicable the use of superheterodyne receivers on this high frequency. Not only have they become practical, but as many of the old possessors of wobbulated transmitters are returning to the fold with *crystal-controlled* rigs, the use of a *highly selective* receiver will soon become a necessity. The appearance of stable transmitters and receivers has already resulted in a number of stations using cw transmissions on 5 meters.

For many amateurs, the construction of a separate five meter receiver offers a serious financial problem. However, it is possible to build a small converter at a comparatively low cost and couple this to the *regular* station receiver, using this receiver as the *intermediate frequency* amplifier. If the receiver is a superhet we will have a super with a double I.F. and it will give much better selectivity than a super using but a single I.F. Thus, strange as it may seem, a simple converter added to a good receiver will furnish us with a much better receiving system than an ordinary complete superhet. For best results the regular station super should have an R.F. stage with plenty of "soup."

All Tuning Done with "Converter"

In the converter whose description follows, the I.F. of 3400 kc. is one at which practically all short-wave receivers have plenty of *gain*. Unlike the lower frequency supers, the oscillator is operated at a *lower* frequency than the detector in order to increase oscillator stability. In use the converter is adjusted so that the frequency difference between the oscillator and detector is 3400 kc. (88 meters) and the regular s-w receiver tuned to this frequency. *Subsequent tuning is done only with the converter.* By means of plug-in coils, reception is also possible on the 2½- and 10-meter bands. On 2½ meters it will be rather difficult to receive

Wiring diagram of the converter.



On This *10 Meters*

signals from modulated oscillator transmitters, but since more and more hams are using their 5-meter crystal-controlled rigs on 2½ meters there will be plenty of stations to listen to. Too, one might as well start off on 2½ with a good receiver.

Because of the desirability of using the converter on 2½ meters, acorn tubes were employed, a 956 for the R.F. stage, a 954 for the first detector and a 955 for the high frequency oscillator. The sensitivity on 2½ as well as on the other two bands was much greater than with receivers using ordinary

Highly sensitive acorn tube converter, capable of exceptional selectivity when used with a superhet tuning to 88 meters. Particularly useful for intercepting Television Sound channels.

tubes. Also, the use of the small acorn tubes resulted in a much more compact layout with extremely *short* leads. At the ultra-high frequencies, R.F. leads should be conspicuous by their absence, with wires concentrated in the coils.

Tuning Condensers Ganged

As the photos show, the converter is mounted on a standard 5 x 10 x 3 inch chassis to which are bolted three aluminum interstage shields. On these shields are mounted the three ganged tuning condensers. Figures 1 a, b, c and d show the necessary holes which should be drilled quite accurately in order for the different units to fit together.

The shield closest to the tuning dial mounts the oscillator tuning condenser and immediately above this condenser is the oscillator padding condenser, which is of the *air-dielectric* type since its capacity must be quite constant in order for the converter to hold its calibration. The tuning condensers have a capacity of 15 mmf. which must be changed to 10 mmf. This can be done by moving the rear stator plate so that the distance between the two stator plates is *doubled*. The 955 socket, of isolantite, is mounted about ⅛" off the chassis. Holes are drilled through the chassis under the filament, cathode and plate terminals for connecting leads to these terminals. Also a small hole (¼") should be drilled through the chassis under the center of the socket to allow the small projection of the 955 tube to protrude through the chassis. The oscillator coil jack bar is mounted at an angle in order to keep the leads as short as possible. All the coil mounting strips and receptacles were made from sheet *victron*. The writer used 3/16" sheet for the bars holding the coil jacks and ⅛" sheet for the coil strips. Miniature banana plugs and jacks were used for the contacts. The constructor should make up a metal drilling template for drilling the jack bars and coil strips so that the coil plugs will line up with the jacks. Attempts at forcing the plugs into the jacks when they don't line up will result in a broken coil strip.

On the center shield is mounted the detector tuning condenser, while the detector coil (L_3, L_4) is supported between this shield and the rear shield with metal brackets. The 954 tube socket is mounted underneath the chassis, so that when the tube is inserted into its socket, the end of the tube containing the grid terminal will be above

(Continued on page 49)

Coil Data

	10 meter band	5 meter band (and Television Sound Chan.)	2½ meter band
L_1	6 turns No. 18 enameled ¾" dia. wound at end of L_2	4 turns No. 14 enameled ⅝" dia.	3 turns No. 12 ½" dia.
L_2	11 turns No. 18 enameled ¾" dia.	6 turns No. 14 enameled ⅝" dia. ¾" long	4 turns No. 12 ½" dia. ⅝" long
L_5	8 turns No. 18 wound at end of L_1	5 turns No. 14	3 turns No. 12
L_6	12 turns No. 18 ¾" dia. 1" long tapped at 3rd turn from ground	4 turns No. 14 enameled ⅝" dia. 11/16" long Tap 2 T. from G	4 turns No. 12 ½" dia. 9/16" long Tap 1½ T. from G
L_6	46 turns No. 24 enameled, close wound on 1" dia. form		
L_7	8 turns No. 24 enameled, wound at end of L_6 (number of turns can be varied for optimum output). T=Turns; G=Ground.		

PARTS LIST

NATIONAL CO.
3—15 mmfd. tuning condensers, type STHS-15E (altered)
1—35 mmfd. condenser, type UM-35
1—75 mmfd. condenser, type UM-75
2—Metal acorn sockets, type XMA
1—Isolantite acorn socket, type XCA
1—Flexible shaft coupling, type TX-9
1—Can victron coil dope and ⅛" and 3/16" sheet victron
1—XR-2 coil form for L_6, L_7
6—3-30 mmf. mica trimmers, type M-30
2—Stand-off insulators, type GS-2
1—Type "B" vernier dial
1—HRO dial "0-10"

RCA MFG. CO.
1—954; 1—955; 1—956 (Acorn tubes)

I.R.C.
1—500 ohms; 2—2000 ohms; 1—5000 ohms; 1—50,000 ohms; 1—75,000 ohms; 3—100,000 ohms; all ½ watt, type BT½

SOLAR MFG. CORP.
6—.01 mfd. 400 volt paper tubulars, type SO219
2—.0001 mf. mica, type MO1416
1—.0005 mf. mica, type MT1322

PAR-METAL
1—5" x 10" x 3" Cadmium plated chassis, type C-4508

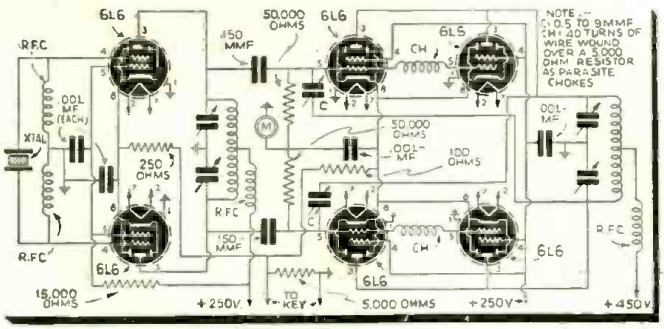
AMERICAN RADIO HARDWARE CO.
11—No. 394 midget jacks
33—No. 392 midget plugs

Question Box

Simple C.W. Transmitter Rig

Please show diagram for a C.W. rig using six 6L6's for an output of about 100 watts.

A. The diagram you request is given herewith, and a member of the Galveston (Tex.) Amateur Radio Club built this transmitter (designed by Louis Huffert), at a total cost of $20.00, which included crystal, tubes, chassis, three low-priced meters



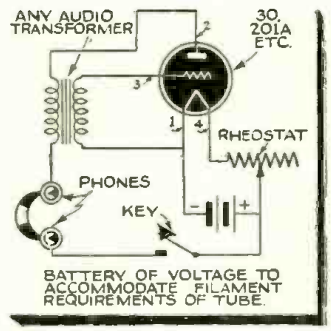
Hook-up for C.W. Ham transmitter using six 6L6's. No. 1177.

and hardware. The set is easily constructed and requires but little space; it can be operated from two low-priced power packs. The original model, in fact, operated satisfactorily with an old Majestic receiver powerpack for the final stage, and an R.C.A. receiver pack for the oscillator.

Size of Grid Resistor

Please publish the correct value of the grid resistor for an 809 tube when used as a class C, plate modulated R.F. amplifier. —Melvin Roppelt, Baltimore, Md. (W3HRY).

A. According to the tube booklet, a 5000 ohm grid resistor should be employed when this type tube is used as a Class C R.F. amplifier.



A very simple code practice oscillator. No. 1178.

Oscillator for Code Practice

I read your recent article entitled, "How to Learn the International Radio Code" and I wish to obtain more data showing how to build a good code-practice oscillator. — Joe McNulty, Hillsboro, Ill.

A. The diagram requested is given herewith. The filament battery must be suited to the filament voltage requirements of the particular tube used, which may be a 201A, a 30, etc. A rheostat in series with the filament is needed only when the battery voltage is higher than the filament rating of the tube. The audio transformer may be any one available, and if the circuit does not oscillate at the first try, reverse the connections to one of the transformer windings.

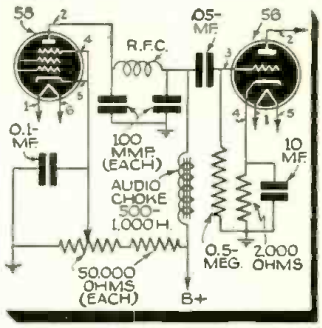
Television Query

A. In answer to numerous queries we wish to point out that with television about to break, there is no simple attachment which can be added to your present broadcast or all-wave receiver for picking up the images. The sound channel may be intercepted in this way, however, and converters for tuning in waves of 6 to 7 meters will be available on the market; some all-wave receivers tune to this channel as they stand and, in that case of course, no other attachment for receiving the sound is necessary. For picking up the image, a special wide-bandpass receiver will be required and a small dipole aerial, with its broad-side facing toward the television transmitter, should be used.

Adding Amplifier Stage

Please show how to add a 56 audio stage to a 58 detector. —Frank D'Arcy, Saskatoon, Sask., Can.

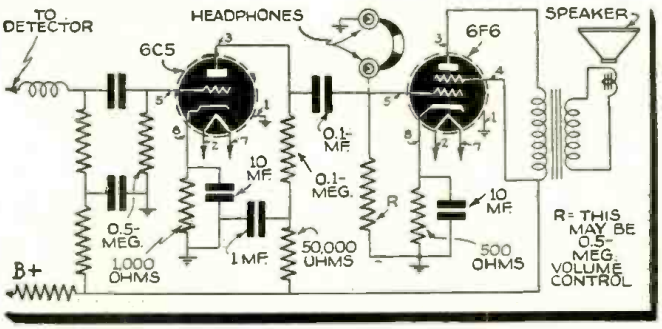
A. Diagram herewith shows how to connect a 56 audio stage, as you request. The use of an iron core audio choke for coupling results in a much better impedance match and allows a greater effective plate voltage to be applied to the plate of the 58 tube.



How to add an audio amplifier stage to a 58 detector. No. 1179.

Improving a 3-Tube A.C. Receiver

On page 480 of your December issue, there is described a 3-tube A.C. receiver, by J. R. Wilcox. Show in diagram how to add one stage of audio frequency amplification so as to increase the strength of signal on the loud speaker, and also indicate the best place to plug in a pair of headphones.—A. Robert Levett, New Haven, Conn.



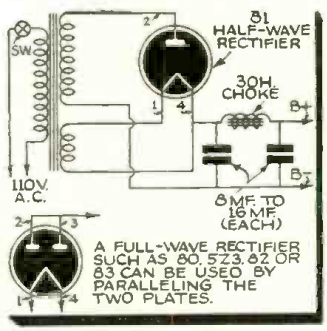
How to connect an amplifier stage to the 3-tube receiver described in the December issue, with the connection of headphones indicated. No. 1180.

A. The best method for adding an audio amplifier stage to the 3-tube receiver is shown herewith—note that a new tube, a 6C5, is placed between the 6K7 and the 6F6 in the old hook-up. The connection for headphones is also indicated.

Half-Wave Rectifier

Please diagram the connections for a half-wave rectifier for use with a transformer which does not have a center-tapped secondary. — Horace Hill, Stevens Point, Wisc.

A. Here is the diagram you want. A full-wave rectifier tube, such as an 80, 5Z3, 83 or 82, can be used by connecting the two plate terminals of the tube in parallel. This is a popular circuit and uses standard components.



How to hook up a half-wave rectifier; with a full-wave tube the two plates are joined together. No. 1181.

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.

Transoceanic Radio Telephony on Short Waves

FRANK B. JEWETT

(Continued from page 5)

tube; and its advent, as is well known, came with the invention of a method of making vacuum tight seals between metal and glass envelopes.

In searching for the most efficient way of applying the power made available by water-cooled tubes, telephone engineers were led to the employment of a method which had already been used successfully in high-frequency wire telephony. This method, now well known to radio engineers, is called *single side-band suppressed-carrier transmission*. As compared with the ordinary modulated carrier transmission, it increases the effectiveness of a radio telephone system by about *ten-to-one* in power. This accrues partly because none of the power capacity of the transmitter is used up in sending the non-communication bearing carrier frequency and partly because the narrower band width permits greater selectivity and noise exclusion at the receiver.

A final element, and a very important one, was then necessary to permit the effective utilization in a combined wire and radio system of the potential power capacity provided by water-cooled transmitters employing the single side-band principle. The difficulty that remained to be overcome was that of *singing*. By associating and electrically interlocking several of the voice-current operated switching devices which had already been developed for suppressing echoes on long wire lines, an arrangement now commonly known as a "vodas" was perfected. When the subscriber talks, his own speech currents, acting on the vodas, cause it to connect the radio transmitter to the wire line and at the same time to disconnect the radio receiver. When the subscriber listens, the connection automatically switches back to the receiver. No singing path ever exists. The amounts of amplification in the two oppositely directed paths can be adjusted substantially independently of each other, and constant full load output from the radio transmitters is permitted. With this device it became possible to connect almost any telephone line to a radio system and to adjust amplification so that a weak talker over a long wire line could operate the radio transmitter as effectively as a strong local talker.

Although the first long distance radio telephone circuit operated, and still operates, between the United States and England on a long wave-length of about 5,000 meters we did not then, and we do not today, know how any considerable amount of intercontinental radio telephony could be accomplished using such low frequencies. The discovery that *short waves* can be transmitted to the greatest terrestrial distances and can be satisfactorily received in the tropics came, therefore, at a most opportune time. In addition to removing physical barriers, short waves further encouraged the growth of radio telephony by making it possible to construct directive antennas of moderate size, as is now well known. These increased the effectiveness of transmission many times, thereby reducing the transmitter power required for a given reliability of communication.

In view of the limitations of our knowledge, or perhaps the limitations with which Nature has circumscribed radio transmission, short waves are the indispensable element without which substantial growth of overseas radio telephony could not have occurred. Other contributions, now to be briefly mentioned, have played a significant part in this development.

A well-nigh fundamental requirement of telephony is *privacy*—and radio telephone communication would have been severely hampered if means had not been invented to prevent eavesdropping. The first method developed, and applicable to systems in which the carrier wave is transmitted, was the simple inverter. Single side-band transmission presented a more difficult problem, but one which has of course been solved.

Another item of great aid in promoting growth was the development of methods of accurate stabilization of transmitted frequencies. The first effect of this was to eliminate the extreme distortion which characterized early short-wave telephone transmission and which was found to be due to parasitic phase or frequency modulation effects in the transmitters. As the number of radio communication facilities, both telegraph and telephone, grew, accurate stabilization of frequency became a necessity in order to permit effective utilization of the available frequency space without mutual interference between stations.

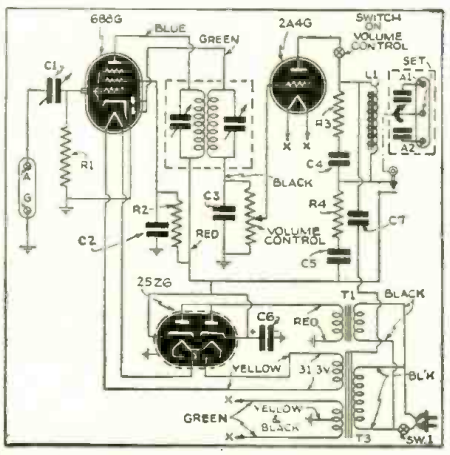
While space will not permit mention of all the methods and devices which have been introduced to facilitate or to lessen the cost of radio telephony, I should like to close with a few words regarding the *musa*. This new type of antenna utilizes the fact that in long distance short-wave transmission, the received waves come at any one instant slanting down to the receiver from different angles of elevation. In continuous-wave sending the energy reaches the receiver in distinct streams from different vertical angles which remain comparatively stable. As might be expected, the component coming at a low angle has taken less time in its trip from the transmitter than a high-angle component. The ordinary directive antenna is blunt enough in its vertical receiving characteristic to receive all these components and merge them together. Because of phase differences which tend to vary from moment to moment, the result is greater or less destructive interference, which shows up as selective fading or distortion.

The musa, by providing extremely sharp selectivity in a vertical plane, enables the phase differences between the various vertical components to be equalized and thus removes the root of the trouble. The system of antennas can be aimed or steered electrically, so as to pick out separately the individual radio beams. Having accomplished this, its second function is to correct phase differences between the beams so that they may be combined smoothly into a replica of the original signal. Fortunately, it is found that the directive selection and the delay compensation adjustments correct for one frequency are satisfactory for a considerable band of frequencies adjacent thereto. This permits receiving a number of grouped channels through one system.

Improved McMurdo Silver Diversity Coupler

Irvin L. Glarum

Two views of the improved diversity coupler and diagram below.



● A METHOD of dual diversity reception recently disclosed by McMurdo Silver retains the advantages of the multiple receiver diversity systems and eliminates the extra cost, noise and bulk due to shielding usually associated with this type of receiver. This new method may be reduced in practice to a simple unit which will operate with any receiver of the superheterodyne type having an I.F. of 450 to 480 kc., either with or without A.V.C. Such a unit need not be discarded with receiver changes, and insures the advantages of dual diversity reception with any receivers now in use, and any which may be designed in the future.

Working from the hypothesis that a fading signal does not always fade equally on two different antennae and that usually the signal can be found on one of two antennae in the same plane if they are a wavelength apart, or on one of two antennae when one is in a vertical plane and one in a horizontal plane, a method was developed of automatically switching from one to the other, this change following the signal phase shift or fading.

In the initial experimental unit a single-pole, double-throw switch operated by the fading signal was used. This proved not wholly satisfactory inasmuch as the phase shift was not always exactly 180 degrees, but usually fractions of this amount, although the shift did usually complete a 360 degree cycle. However, this direct antennae switching system worked and indicated the soundness of the fundamental concept.

A means of antenna switching capable of combining in varying degree the voltages from the two antennae, as well as simply selecting either of them, was obtained by the use of a differential variable condenser having two stator sections and a common rotor. The rotor section was connected to the receiver antenna terminals, a horizontal antenna connected to one stator and a vertical antenna to the other stator section.

Further developments indicated that the same relay operated successfully in conjunction with a 2A4G tube used in the early direct switching system, together with suitable amplifier system. A relay having a rotating shaft, which was connected by means of bakelite gears to the condenser shaft, the relay action being transmitted to the shafts by means of a ratchet, was selected as the simplest means of accomplishing the desired antenna selecting action. This ratchet having eight teeth, permitted simulation of the condition of five distinct antenna angles, the eight-tooth ratchet giving 45 degrees of rotation for each relay impulse.

Sometimes one antenna will have a better signal-to-noise ratio than the other, when the coupler will locate on the antenna having the best signal-to-noise ratio. This is because the noise impulses, being of short duration, do not create sufficient voltage at the grid of the coupler amplifier tube to control the 2A4G. The antenna selecting condenser will then continue to rotate until sufficient control voltage is obtained at the grid of the 2A4G from one antenna or the other to temporarily "lock" it.

As the rotation of the antenna selecting condenser is dependent upon the ratchet for positioning it can readily be understood that, as the signal fades, the relay being actuated by the 2A4G which in turn is controlled by its amplifier and signal voltage from the receiver, the condenser will rotate until it automatically finds a signal sufficiently strong to prevent the 2A4G from ionizing and operating the relay.

In receivers with no A.V.C. systems, a small amount of the I.F. signal voltage is taken from the receiver's I.F. amplifier at the plate of the last I.F. tube, through a small variable coupling condenser located in the diversity coupler, and impressed on the grid of a 6B8 pentode-duo-diode tube. An intermediate frequency transformer is used to couple the plate of this tube to its diodes. The amplified voltage developed across the diode load resistor is then used to control the 2A4G grid. The diversity coupler amplifier having a voltage gain of one hundred times the minimum voltage required to prevent the 2A4G from ionizing being nine volts, it is only necessary to supply the grid of the 6B8 tube with less than one tenth of a volt for control. If the voltage at the grid of the 2A4G tube drops below nine volts the tube ionizes, increasing its plate current suddenly sufficiently to actuate the relay.

In order to get smooth control of this grid voltage a potentiometer having a reverse "audio volume control" taper and a resistance of ½ megohm is used as the diode load resistor. This allows a very critical set-up adjustment so that extremely small decreases in signal level below a level determined by the setting of this potentiometer cause the coupler to function.

When used with receiver having six or more tuned circuits (2 I.F. stages) the 6B8 grid coupling capacity is adjusted to about ten mmf. while for receivers having less than six tuned circuits (1 I.F. stage) the capacity is set to approximately twenty mmf.

The I.F. transformer of the coupler unit is tuned to the I.F. of the receiver.

In operation it is merely necessary to tune the receiver to the desired signal and adjust the potentiometer of the coupler so that the unit begins to function when the signal starts to fade. The coupler should be so adjusted so that it operates only when the downward signal level fade is greater than can be taken care of by the A.V.C. system in the receiver.—Photos and diagram courtesy E. I. Guthman & Co.

Parts for Diversity Coupler

GUTHMAN
1—No. N89 Chassis; 1 No. M90 Chassis Cover; 1 No. M91 Chassis; Bottom Plate
1—Antenna selecting Condenser, S76 Shield and R5 relay
1—6 ft. Cord and Plug
1—2-screw terminal strip, A-G
1—No. 905 Pure Gum Grommet
T1..1—No. 5428 Transformer, plate
T3..1—No. 5427 Transformer, fil.
T1 (I.F. Transf.)..1—No. 3388—OUT I.F. Transformer
C1..1—No. C45 Trimmer Condenser
MTG. 1, 2, 3, 4, 5 5—No. B145—2-lug mounting strips

CORNELL-DUBILIER
C5..1—½ mf. 200 volt condenser
C2..1—1/10 mf. 200 volt condenser
C7..1—1/10 mf. 400 volt condenser
C3..1—500 mmf. mica condenser

I.R.C.
R3. R4..2—BT½ resistors, 150 ohm
R1..1—BT½ resistors, 1 megohm
R2..1—BT½ resistors, 100,000 ohm

CROWE
1—No. 561 Sensitivity Plate

MALLORY
C6..1—No. BB42, 10 mfd. 300 volt condenser
C4..1—No. BB35, 20 mmf. 250 volt condenser

CENTRALAB
P1..1—½ meg. Volume Control with switch and lock washer

AMPHENOL
3—S8 sockets with No. 6 ring
7—UN800 grommets

ARROW
SW1..1—H. & H. Toggle Switch No. 20994 N.P. with ON-OFF plate

KURZ-KASCH
1—8292-1L black knob.
Hardware.

NEWEST RADIO APPARATUS

Toy Kits by RCA

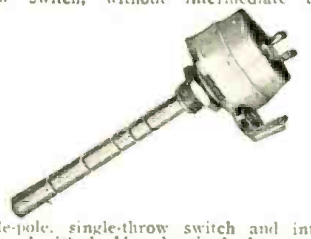
● THE RCA Manufacturing Company is now producing two kits of toys, the first of which—a radio *sound-effects* laboratory for the youngsters

to play with—is pictured here. It will be sold not only through regular radio stores handling other items in the line, but also through mail order houses and toy shops. The sound effects include surf breaking on the beach, train collision, the NBC chime tones, siren whistle, rain effect, cow moo, etc. The entire outfit is affixed to a sturdy table with removable legs, so it can be set up for play in a few moments. The kit includes two complete program scripts which call for a wide range of different sound effects. There is also available an auxiliary microphone outfit to be used with the kit. The mike connects to the radio receiver by means of a simple oscillator packed with it.

The RCA *electronic* kit, not shown, contains complete parts and instructions for building a telegraph code practice set, a public address system, a capacity relay for automatic control of electrical mechanisms, and a small radio receiver. There are condensers, inductance coils, resistors, a radio tube, a microphone, an earphone, a relay, and soldering equipment. The instruction booklet explains the nature and function of each part and contains diagrams for wiring the devices.

New Line of Volume & Tone Controls

● FILLING the requirements for 90% of replacements, a new line of volume and tone controls has been announced by Consolidated Wire & Associated Corps. The line includes resistances from 5,000 to 1,000,000 ohms in 5 types—without switch or intermediate tap; without switch, but with intermediate tap; with single-pole, single-throw switch, without intermediate tap; with



single-pole, single-throw switch and intermediate tap; and with double-pole, single-throw switch without intermediate tap. The unit illustrated is Model VTC—with S.P., S.T. switch, without intermediate tap.

Handy Kits of Midget Dry Electrolytics

● HANDY kits containing six or twelve midget dry electrolytics have recently been introduced by the Sprague Products Company as a quick and highly economical solution to countless condenser replacement problems.

Because these "Atoms" are available in all capacities and voltages, including a complete line-up of dual combinations, a comparatively small stock of these condensers will equip the serviceman for almost any job.

In addition to being exceedingly small dry electrolytics, Atoms are self-supporting and can be mounted in exactly the same manner as paper tubular condensers.

Bud's New Devices

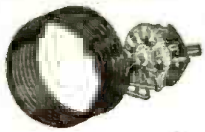
● ANNOUNCING a new 500 watt radio-frequency amplifier kit, Bud Radio, Inc., introduces many other interesting devices. Among these are an Auto Link Control which provides electrical control of the link circuit in five definite steps and eliminates the necessity of mechanically controlled link coils.

There is also a new line of Tiny-mite tuning condensers in sizes ranging from 6 to 140 mmf. maximum capacity. All models are adapted to single hole panel mount, insulated panel mount and insulated base mount, without need for extra fittings, and require but 1½" x 1¼" panel mounting space.

Also shown is a line of sloping panel cabinets which may be used for housing frequency meters, modulator indicators, field strength meters, etc. The entire front panel is removable.

Similar to these but without the removable panel are the sloping panel meter cases which are furnished with two ceramic feed-through insulators.

A removable-top chassis is also featured in the line, as is a transmitter rack dolly for moving heavy transmitters.



1.

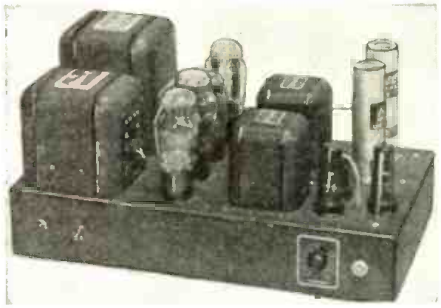
3.

2.

1—New auto link control. 2—Tiny-mite tuning condensers. 3—Sloping panel meter case.

Amateur Speech Amplifier

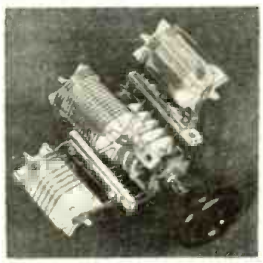
● A FOUNDATION kit for the construction of a modern amateur speech amplifier with over-modulation control is designed to meet the specialized and exacting requirements of the amateur and commercial transmitter. An outstanding feature is the improved automatic over-modulation control circuit. Push-pull 2A3's are used with a



choice of either a 500 ohm output transformer for remote control operation or one of the new Multi-Match or Universal driver transformers for use where this new Thordarson amplifier is closely adjacent to the modulator. The output is sufficient for driving any class B stage up to 500 watts output.

Band-Switch

● A NEW turret band-switch has been developed for amateur transmitter applications. It utilizes a five-gang three-position switch equipped with mounting bars to accommodate any three Coto "Pee-Wee" inductors. This permits the choice of any three bands without removing coils. Two or more band-switches may be coupled for unit control.



The inductors are wound on threaded Alsimag 196 forms and are available for all bands with end link, center link, and center tapped without link. Mounting bases may be had for regular plug-in operation where band-switching is not desired. The inductors and switch are rated at 50 watts capacity.

Names and addresses of manufacturers supplied upon request.

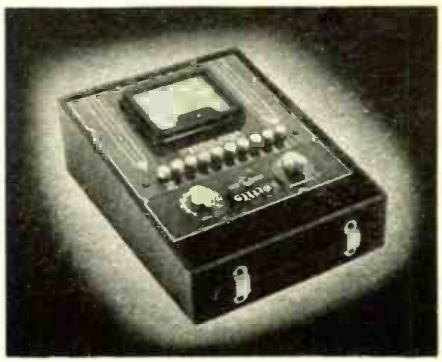
New Filter Unit

● ADDITIONS to the "Quietone" filter line have been announced by the Cornell-Dubilier Electric Corp. These new units have a wide range of application. The Type IF-8 All Wave Quietone Filter, replacing the old CD Type IF-1, can successfully be used between the radio receiver and power line, to prevent line noises from entering set. A metal case effectively shields unit which is equipped with binding post for ground connection. For use on 110 V. A.C. or D.C., 5 amp., maximum capacity.

New Line Noise Filter.

New V T Voltmeter

● A NEW vacuum tube voltmeter has been announced by Million Radio & Television. It features a push-button range from 3 to 3,000 volts on A.C. or D.C., and as it has an input impedance of 24 megohms, it will not disturb the circuit under test. The instrument, which uses co-axial cable, is A.C. operated. It needs but one adjustment for all ranges, making it simple to use. The range of frequencies covered is from 30 cycles to 40 megacycles.



NEWEST CATALOG

Thordarson Catalog

Thordarson Complete Transformer Catalog No. 400-CX. Twenty-three pages, size 8½" x 11".

The Spring and Summer edition of this manufacturer's new catalog includes several new transformers particularly adapted for use by the serviceman, public address engineer, amateur and experimenter. Extremely interesting is the section devoted to the instructions as to what type of transformer is best suited for use with specific tubes in various circuits.

New RCA Tube Book

Characteristic Chart and Socket Connections of RCA Receiving Tubes. Sixteen pages, size 8½" x 5½". More than 200 types of receiving tubes are covered in this new booklet, which is an absolute necessity for every one who is interested in radio. While not as complete as RCA receiving tube manual No. RC-13, which contains 192 pages, this 16-page booklet does give the fundamental information, such as type number, designation, dimensions, socket connections, cathode type and rating, use, plate voltage, plate bias, screen voltage, screen current, plate current, A-C plate resistance, transconductance, amplification factor, load for stated power output and power output in watts.

Wholesale Radio Service Co., Catalog No. 76

The first 152 pages of this new catalog are devoted to radio equipment, while cameras and photographic supplies fill the pages from 157 to 184, those lying between being devoted to an index, instructions, etc.

Among the new items offered is a battery-powered portable Lafayette receiver in a variety of price ranges. Also in the line is a 5-tube "three-in-one" superhet., which will operate on 6 volt battery or on 110 volts, A.C. or D.C.

Prices of sets shown in the catalog range from $2.75 for a one-tube battery-operated model to $199.50 for the 16-tube radio-phonograph.

As always, the catalog contains a wide variety of P.A. equipment, record players, microphones, set components, test instruments, communications receivers produced by various leading manufacturers, build-your-own kits, tools, and everything else that the SWL, Ham or Experimenter might desire. The new catalog is bigger and better than ever before.

Hammarlund Catalog

The Hammarlund Manufacturing Company, Inc., has published a 20-page 1939 second edition catalog, containing many items which have been added recently to the line. Foremost among these are variable condensers of improved design, transmitting foundation units, and many other new and interesting short wave components for both transmitting and receiving. Complete technical details, mechanical as well as electrical, are given for the various parts. There are over 75 illustrations.

More *"Newly Licensed Hams"*—names and address in Next Issue.

Electronic Television Course

(Continued from page 21)

flection type tubes the *current* through the deflection yoke must be of this shape in order to deflect the beam of electrons both in the vertical and horizontal directions.

How Synchronism Is Maintained

In the previous chapter of this course, it was stated that the synchronizing pulses transmitted at the end of each line and frame represented the highest modulation percentage capabilities of the television transmitter. These synchronizing impulses (see Fig. 1-C) are used to "trigger off" the saw-tooth oscillators at the proper time and consequently keep the picture synchronized with that of the transmitter. At the receiver, these impulses are first separated from the picture signals, and finally the line frequency impulses (13,200 cycles) are separated from the frame frequency impulses (60 cycles) and "fed" or injected into the grid circuit of the low frequency and high frequency saw-tooth oscillators. These oscillators are adjusted slightly lower in frequency and the synchronizing impulses trigger them at their respective scanning frequencies (13,200 cycles horizontal line frequency and 60 cycles vertical frame frequency).

D.C. Background Level

In addition to the picture and synchronizing signals, as described in the preceding paragraphs, there is another component transmitted of which no mention has been made as yet. This is the D.C. or background *pedestal level.* (See Fig. 1-C.) This pedestal establishes the *relative intensity* of the received picture. Where direct coupling is employed from the second detector to the grid of the cathode ray tube, this D.C. component would automatically regulate the pedestal or background level. However, in some circuits, direct coupling between the grid of the cathode ray tube and the detector would be impractical and, therefore, the pedestal or background level must be established by a manual control unless some means is found to couple the grid of the cathode ray tube to the detector by a direct current path. This we will take up in detail in a subsequent chapter on *receiving circuits.*

De Luxe Beam Power Xmitter

(Continued from page 31)

ments and only rarely even then, but is good insurance.

The shield for the 813 is cut down from a larger size, as it need be only 2" high. The stubby construction of the 813 certainly permits short leads and compact design, one of the reasons, no doubt, for its fine operation on 10 meters.

The keying relay is mounted just in front of the filter choke and next to the filter condensers. It is fastened to a piece of ½" thick sponge rubber to afford quiet operation.

Meters Have Panels of Their Own

The meters are all mounted on separate panels and the connections to the R.F. chassis are made by means of plugs and sockets. The latter are fastened to the panel side brace under the final tank condenser. An eleven prong socket is used for the upper meter panel and a six prong for the lower, with two leads in each case carrying 6.3 V. for the meter lamps.

The variable link unit is removed from the mounting plate supplied with it, and fastened on aluminum brackets to the final plate tuning condenser.

Although the final amplifier coils are used as they come, the exciter coils L1 and L2 must have a few turns removed from each to hit the required bands. About 20 per cent of the turns are removed, and it is best to do this a few at a time until the tuning condenser reaches resonance about 1/3 of full capacity. The turns on L2 must be removed evenly from each end so that the center tap will not be upset.

Preliminary tune up follows the usual procedure. The 813 should not be placed in its socket until the exciter section is working properly. This ma be checked by temporarily connecting a 25 watt lamp in series with a 50 mmf. variable condenser from grid of the 813 socket to ground. Next insert the 813 and leave off plate and screen voltage. If between 10 and 15 ma. grid current can be obtained on all bands, the exciter may be considered satisfactory.

The antenna coupling unit follows standard practice, and by use of clips on L4 practically any circuit or band may be used. The antenna relay is on this section for convenience. The relay is not shown in the schematic, as connections to its coil come from the control circuit to be described next month.

List of Parts

THORDARSON

1—Power Transformer No. T92R21 (T1)
1—Choke No. T64C09 (CH1)
1—Choke No. T43C92 (CH2)
1—Filament Transformer. 10 V. at 5 A. No. T64F14 (T2)

BLILEY

2—40 M. variable crystals. Type VF1

R.C.A.

1—6V6. V1
1—807. V2
1—813. V3
1—5Z3. V4
1—No. UT 104 socket

TRIPLETT

1—1.5 A R.F. meter. Model 347A
1—25 ma. meter. Model 327A
2—50 ma. meter. Model 327A
1—100 ma. meter. Model 327A
1—300 ma. meter. Model 327A
1—15V A.C. meter. Model 337A
All with rear illumination

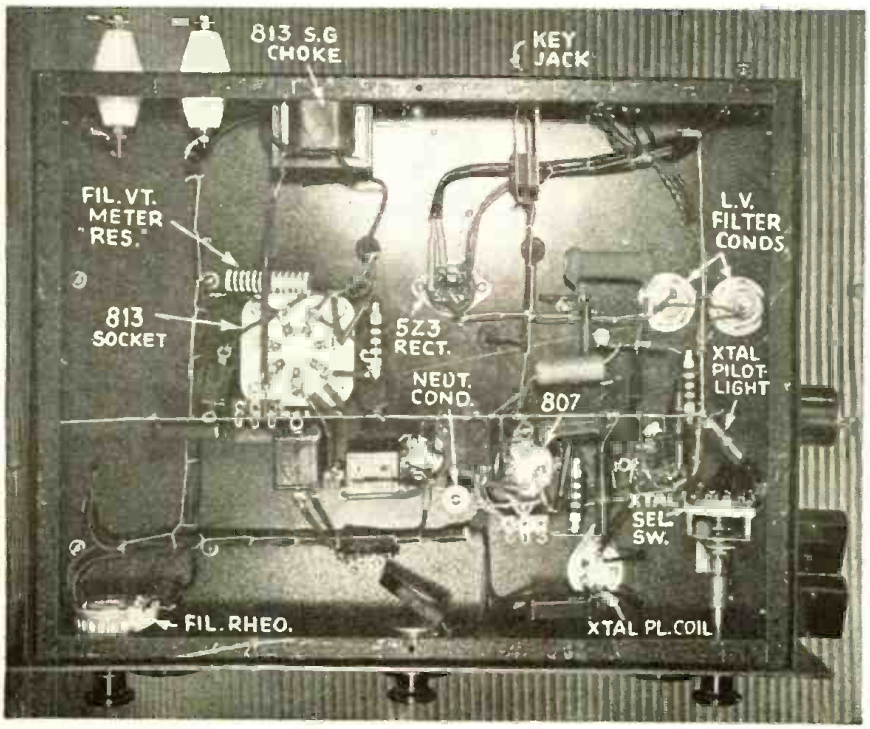
PAR-METAL

1—No. 15212 chassis 17 x 13 x 2"
1—No. SB713 brackets (pair)
1—MG33 panel 19 x 5¼"
1—MG53 panel 19 x 5¼"
1—G3603 panel 19 x 7"
1—G3605 panel 19 x 10½"

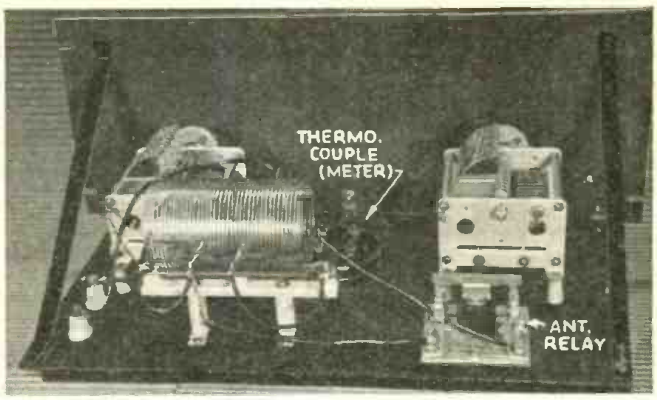
NATIONAL

1—TMC 100 D split stator condenser
2—TMS 100 condensers (driver)

(Continued on following page)



Bottom View of Transmitter.



Rear view of Antenna Tuning Panel.

NATIONAL (Cont'd.)
2—TMC 150 condensers. (antenna)
4—CHS crystal holders
4—R-100 chokes
1—R-154 choke
2—TX13 flexible couplings
2—XS-1 feed through insulators
4—GS-5 insulators
14—GS-10 insulators
2—TX-9 couplings
1—TX-1 coupling
6—SB panel bushings
1—J-30 shield
1—B-30 shield

I. R. C.
1—20.000 ohm BT2
1—100.000 ohm BT2
1—50.000 ohm BT2
1—1.000 ohm BT1
1—750 ohm Type DG
1—500 ohm Type DG
1—15.000 ohm Type DG
1—50.000 ohm Type HOA (3 bands)
1—.2 meg. variable No. 11-129
1—Rheostat 35 ohm No. PR25

CORNELL DUBILIER
1—250 mmf. midget mica
1—.1 mf. 400 V. paper
6—.01 600 V. mica
1—200 mmf. 2500 V. mica
1—.001 mf. 2500 V. mica
1—.001 mf. 1000 V. mica
3—.01 mf. 1000 V. mica
1—.002 mf. 7000 V. mica
2—4 mf. 600 V. paper

AMPHENOL
1—Super MIP octal socket
9—5 prong steatite sockets
1—MIP4 socket 4 prong
1—MIP6 socket 6 prong
1—MIP8 socket 8 prong
1—MIP11 socket 11 prong
1—Plug 6 prong
1—Plug 8 prong
1—Plug 11 prong

BARKER AND WILLIAMSON
1—80 TVL coil. L3
1—40 TVL coil. L3
1—20 TVL coil. L3
1—10 TVL coil. L3
1—TV base
1—TA antenna coil (6 clips), L4
1—80 M coil. L1
1—40 M coil. L1
1—80 MC coil. L2
1—40 MC coil. L2
1—20 MC coil. L2
1—10 MC coil. L2

GORDON
3—No. 301 dials
2—No. 300 dials
5—No. 314 knobs
12—½" grommets
18—Name plates (standard size)
2—No. 262 dial plates

CENTRALAB
1—6 point isolantite switch

WARD LEONARD
1—Keying relay No. 507-507
1—Antenna relay No. 507-531

MISCELLANEOUS
1—60 ma. pilot lamp and socket
Aluminum for shields
2—Brass gears 1½" diameter

I Cover the Pacific Coast!

LYLE M. NELSON

Reports of reception will be greatly appreciated. Address them to the author in care of RADIO & TELEVISION, 99 Hudson St., New York, N. Y.

● AS the long days of summer begin to approach, reception on the 49 meter band during the late evenings is gradually fading out and listeners on the Pacific Coast are turning to early morning 31 meter stations in the Far East and to daytime European broadcasters.

Surprising reception from China's XGOY on 9.50 mc. has been reported during the past few weeks. XGOY is now reaching here with tremendous volume from 4 to 4:30 and 6 to 7:50 a.m. daily. It can easily be picked up just on the low frequency side of Tokyo's JZI, which is on the air at the same time. XGOY is also well received on 15.19 mc. from 6:30 to 8:30 p.m.

As this column is being written, the new Irish short wave station is testing on 17.84 mc. As yet all broadcasts are irregular, but the station can usually be picked up in the afternoons with fair volume. Mr. Kendall Walker of Yamhill, Oregon, reports that this station is heard during the afternoons on 6.19, 9.595, 11.74, 15.12 and 17.74 mcs. announcing as "Radio Eireann." The station is located near Athlone.

A new station announcing as "Radio Noumea" in Noumea, New Caledonia, has been reported on 6.12 mc. from 11:30 to 1 a.m. Tuesdays to Fridays. The call letters are given as FK8AA.

As predicted in this column last month the new Soviet stations on 6.00, 6.03 and 9.52 mcs. were not RV15 as many have believed. Recent word received from Moscow authorities by T. S. Hite of Los Angeles brings the information that these stations are RV96 (6.03 and 9.25) and RV59 (6.00). According to this report all three stations are now broadcasting an English program from 7 to 8 a.m. daily.

Hawaii's popular transmitters continue to reach here with the volume of local stations. KHE on 17.8 mc. and KQH on 14.9 mc. are on the air from 5:30 to 6:30 p.m. Saturdays and Sundays.

Reception of the North American hour from Italy has greatly improved and the Rome stations are now coming through with excellent strength on 9.64, 9.83 and 11.81 mcs. from 4:30 to 6 p.m. Best reception is usually from the 9.83 mc. station, but occasionally 2RO4 on 11.81 mc. is the loudest.

Amateur station PK6XX in Hollandia, New Guinea, has been reported by several listeners. This station can be heard on the 20 meter amateur band (approximately 14.02 mc.) during the early morning hours.

The new Oslo station on 9.60 mc. is well received here during test transmissions from 8 to 9 p.m. daily. Mr. G. Goehring, Jr., of Fresno, states that the station may also be heard on 11.72 mc. in the early a.m. and on 15.19 mc. during the afternoon until sign off at 4:10 p.m.

Round 'n' About—from listeners' reports—TPA, new station in Turkey, heard on 9.46 mc. from 7 to 9 a.m. Station is very weak . . . . Address of New Zealand station on 6.95 is Station ZL2ZB, Hope Gibbons Building, Dixon Street, Wellington, C1 . . . . JDY on 9.92 mc. in Dairen, is heard giving Japanese side of news daily at 4:50 a.m. . . . . W6XBE, new Golden Gate exposition station on 15.33 mc., is testing from 4 to 8 p.m. irregularly . . . . ZRD of Durban on 9.72 is heard between 7 and 8 a.m. . . . . YL2CB of Latvia is sending weak signal through on 28.81 mc. from 6:30 to 7:15 . . . . ZRK is very well received on 9.61 mc. from 8:45 to 9:45 p.m. and 6 to 7:30 a.m.

New Cathode-Ray Tube

(Continued from page 9)

This sounds simple, but there still remain two problems to be explained. First, how does a screen operate with as many "doors" as one required to produce a television image full of detail? Second, how are these doors to be open or closed?

If we keep in mind that an unbelievably large number of doors is required to produce a really good television image, it may seem that the new system is "not so hot," and that it belongs in that class generally termed as "theoretical dreams." This is not the case, according to German technical magazines.

How Translucence Is Changed

There is an interesting physical phenomenon which is obtainable with certain crystals and liquids. They act like variable doors as far as the passage of light is concerned. The variation of their translucence varies with the voltage which is applied to them in a suitable manner.

This possibility of varying translucence by means of an electric current is known as the *Kerr effect*. It is obtained by placing a crystal between the plates of a condenser, into the terminals of which a high voltage is fed. There are a number of variations of design. Liquids may be used instead of crystals, and coils instead of the condenser plates, and so on.

Although this system may seem brand new, the fundamental principle is already used in certain television systems, and also in some facsimile transmission devices. But all present systems operates with *one single* "electric door" only. That is the reason for certain limitations of contemporary television systems of this design.

New Crystal Screen Used

Von Ardenne applies the Kerr effect in a *completely different* manner. How he does it is explained in detail in the schematic diagram. Instead of the customary fluorescent screen (a fundamental part of every present cathode-ray tube), he uses a cathode-ray tube equipped with a screen consisting of many tiny crystals. After all that has been said above, it is not necessary to stress that each of these crystals acts as an "electric door"—or, to say it more precisely, as a *light valve*.

The cathode-ray beam, playing over the screen consisting of many tiny crystals, varies the translucence of the crystals, an application of the Kerr effect already described. Thus the light of the lamp (shown to the left of the crystal screen) may pass either uninterrupted or partly reduced, or is perhaps blocked out entirely.

Large Image Obtainable

In short, the crystal screen takes the place of a lantern slide, or rather that of a movie film. By placing a projection lens in front of the crystal screen, the images obtained may be reproduced in large size on a wall.

But that is not the only advantage of this system of television reception. In fluorescent screen receivers, the dots of light which constitute the television image fade away shortly after the beam has generated the dot of fluorescent light, thus causing, among other phenomena, the flicker effect. The new crystal screen of von Ardenne's operates practically without flicker, because of a so-called storage effect, the German publications state. The openings of the tiny crystal doors *do not change* until the beam returns for a second adjustment.

What About That Television Antenna?

(Continued from page 17)

effect to be of less importance than *multiple path* transmission. He recommends, therefore, that the television experimenter move the aerial closer to, as well as farther from, the building wall in order to ascertain the exact point where the *best signal* is to be obtained. The *best* signal, in this case, may not be the strongest, but it will be the one which is sufficiently strong, and the one which is free of multiple image effects from adjacent steel structures. It must also be free of the veritable "hash" of signals received in various portions of the building occupied by the receiver and transmitted along the framework to the immediate vicinity of the receiving antenna. This composite may cause the very slightly displaced multiple images that result in blurred reproduction. This problem is distinct from that resulting in direct reflection of the signal from the portion of the steel framework of the building immediately behind the receiving antenna.

Fig. 4 shows another point brought out by Mr. Hanson—the use of a single receiving aerial for television on an apartment house or hotel. The various apartments throughout the building will be able to receive television signals through a central amplifying and distributing system, as shown in the diagram. An alternative method for hotels would be for an expert operator to tune in a television signal on a good set, and then distribute the amplified video signal over co-axial lines to the various rooms.

Fig. 5 shows a simple television receiving aerial, and it is best to erect this on a wooden pole if possible. The arrow shows the direction of maximum reception, the doublet in each case being placed broadside to the transmitting station.

In Fig. 6, a television receiving doublet with a *reflector* is shown, the space between the legs of the doublet and the *reflector* being one-quarter wavelength.

A more elaborate receiving antenna is shown in Fig. 7, and here the aerial is provided with a *director* as well as a *reflector*. The arrow indicates the direction of the transmitting station.

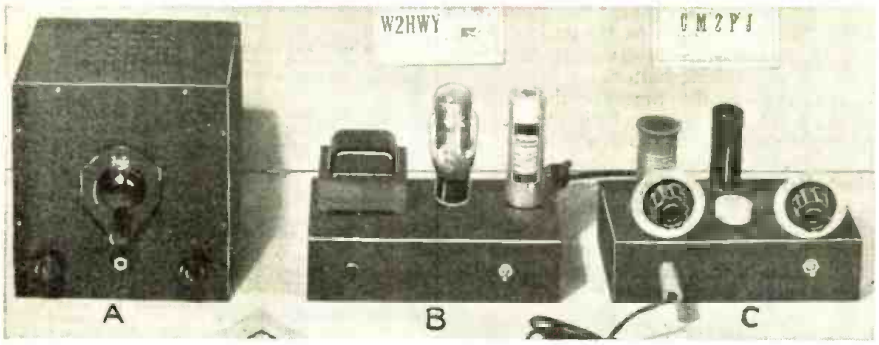
By means of the so-called *turnstile* antenna, 360 degree coverage may be obtained and Fig. 8 shows how the two doublets are arranged in this case.

Fig. 9 shows how the ultra short television waves may be reflected back and forth many times between tall buildings, before they finally reach the receiving aerials of some of the television receivers. In one case, cited by Mr. Hanson, television reception was successful where the space between the transmitting and receiving aerials was not entirely clear, but was obstructed by a building, as shown in Fig. 10. In such a case, the received waves undoubtedly reflected from some other building or object off the line of direct transmission.

Fig. 11 shows how waves may be changed in their polarization plane so that the receiving aerial may have to be tilted at some angle, different than that of the transmitting antenna, in order to ensure maximum signal strength.

In one case, mentioned in an English report several years ago, a change in the polarization as great as 90 degrees was noted; i.e., where the transmitting double was *vertical*, the horizontal doublet had to be placed *horizontal* for maximum received signal strength.

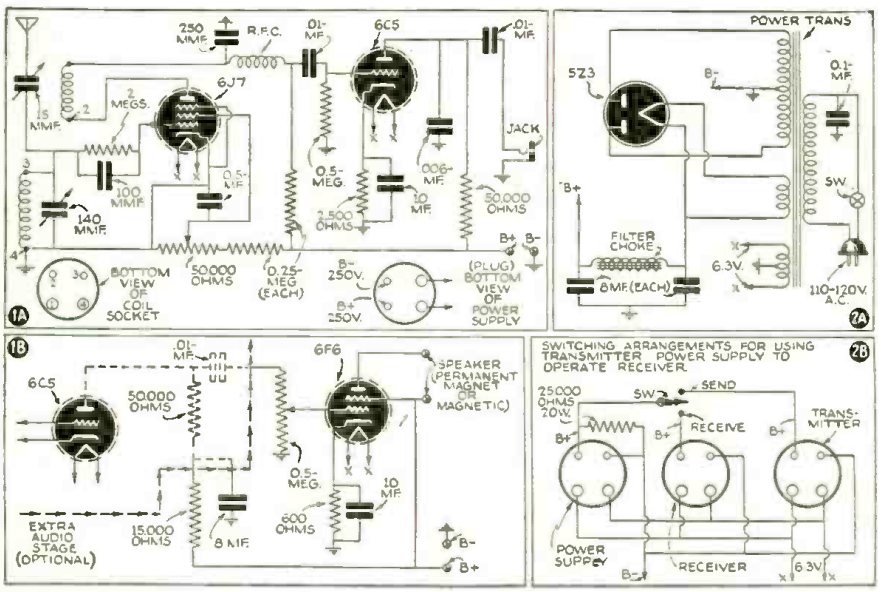
New S-W Receiver



R-9 Receiver at A; power supply at B; transmitter at C.

● A NEW receiver, designed to operate on the amateur and foreign broadcast bands, has been designed by the engineers of the Eagle Radio Company. Known as the R-9, the receiver is efficient, compact and easy to construct. In its basic form it consists of a regenerative detector, and a single stage audio employing a 6J7 and a 6C5, respectively. An extra audio stage using a 6F6 is available, if loud speaker reception is desired.

The receiver proper is shown in Fig. 1A; the additional audio stage in Fig. 1B. Also available is a simple power supply, which may be used alternatively on either the receiver or the 25 watt transmitter which was described in the December, 1938, issue of RADIO & TELEVISION. The power supply is shown in Fig. 2A and its method of connection in Fig. 2B. A single-pole, double-throw switch permits power to be fed into either the *send* or the *receive* circuit, the switch being placed in the positive B lead in the supply chassis. The transmitter filaments are connected in parallel and remain "on" at all times, only the "B" being transferred. The "B" negative of all three units is common and a 20 watt, 25,000 ohm bleeder resistor is connected from "B" positive to "B" negative of the power supply. A 5Z3 is used as the rectifier.



Hook-up of receiver, power-supply and additional stage of audio for loud-speaker operation.

Silver Trophy Award

(Continued from page 25)

you think will be of general interest to the reader. Mention the type of aerial system used, especially any unique or new features about it, and which type of aerial you use for transmitting and receiving; also what type of break-in relay system, if any, is used.

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

Note that you do not have to be a reader of RADIO & TELEVISION in order to enter the contest. Pack all photographs carefully and the description had best be mailed in the same package with the photos. The Editors will not be responsible for photos lost in transit.

Do not send small, foggy-looking photos because they cannot be reproduced properly in the magazine. If the picture you have or may take of your station is not thoroughly sharp and clear and at least 5" x 7", it would be best to have a commercial photographer take a picture of your station. If you cannot do this, you most probably have a friend who owns a good camera and who can arrange to take the photograph. You are not limited to one picture, but may submit as many different views as you like.

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

Don't miss the June **"Television" Issue!**

Remote Control Selects Stations

(Continued from page 33)

adjusting the trimmers on the button unit for best signal strength on the desired local stations. Seven stations can thus be tuned in simply by pushing buttons!

Next, remove the tuner to the desired remote point and try out both the manual and button tuning, making any slight readjustments for correct tuning. It will be found that the volume control on the radio receiver can be set at a point to give the desired maximum signal strength and then the correct strength of the music can be set by means of the remote control tuner. See diagram on opposite page.

LIST OF PARTS

MEISSNER
1—Type 10-7554 push-button tuner
1—Type 14-1496 antenna coil, L1
1—Type 14-7560 oscillator coil, L2 (modified)
1—Type 16-8091 1500 kc. I.F. coil, L3
1—Type 16-8095 1500 kc. I.F. coil, L4
1—Type 18248 dial
1—Type 21-5214 2-section 365 mmf. condenser, C1, C2
2—Type 22-7028 mica semi-var. cond. 80-225 mmf. C3, C14

CORNELL-DUBILIER
1—Mica cond. 50 mmf. C4
1—Mica cond. 250 mmf. C5
5—Paper cond. .05 mf. 300 V., C6, C7, C8, C9, C10
1—Mica cond. 50 mmf. C11
2—Electrolytic conds. 40 mf. 200 V. C12, C13

RCA
1—Type 6K8 tube. V1
1—Type 6K7 tube. V2
1—Type 6B8 tube. V3
1—Type 25Z6 tube, V4

PAR-METAL PRODUCTS
1—Chassis 5" x 7" x 1½" deep

I.R.C.
1—Resistor. 50,000 ohms, ½ W., R1
1—Resistor 200 ohms, 1 W., R2
1—Resistor 1250 ohms, 1 W., R3
1—Resistor 3000 ohms, 1 W., R5
2—Resistors .25 meg., ½ W., R6, R7
1—Type AB resistor, 1000 ohms, R8

CENTRALAB
1—Volume control with switch, 500,000 ohms, R4

OHMITE
1—225 ohm resistor line cord, R8

EBY
4—Wafer octal sockets

MISCELLANEOUS
3/16" wood for cabinet, screws, nuts, washers, grid caps, and wire for connections and aerial.

The following average socket voltages made with a 1,000 ohm/volt meter on the control unit—volume control full on—will indicate whether all tubes are receiving correct voltages when trying out the new unit.

Tube	Cathode V.	Osc. Plate V.	Screen V.	Plate V.
V1	2½	112	112	112
V2	8	—	112	112
V3	10	—	112	112

A variation of 10 to 15% is permissible from the above figures without indicating a defect.

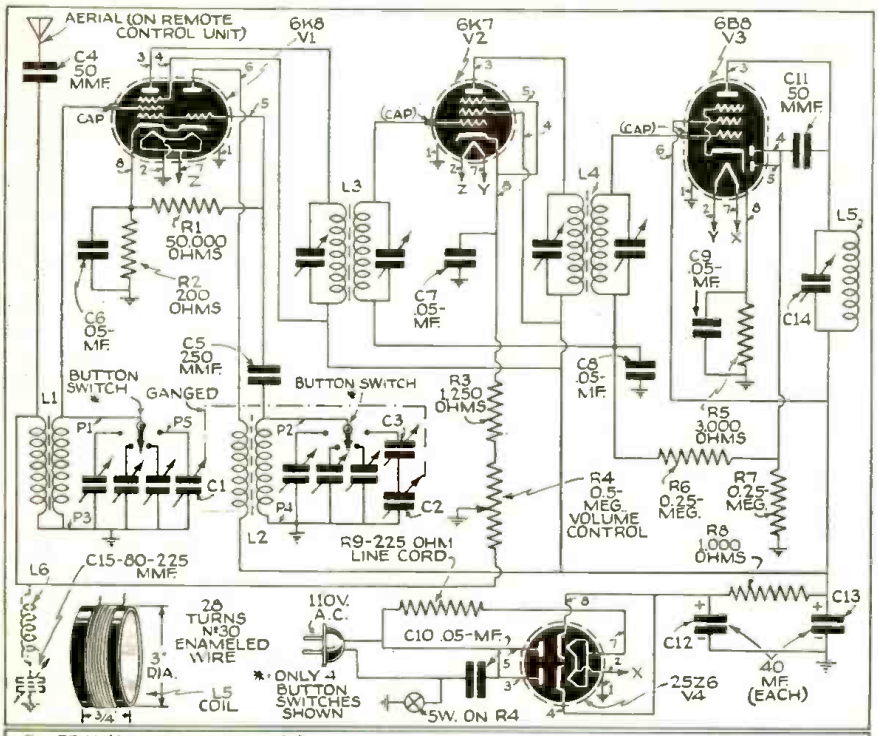
BOOK REVIEW

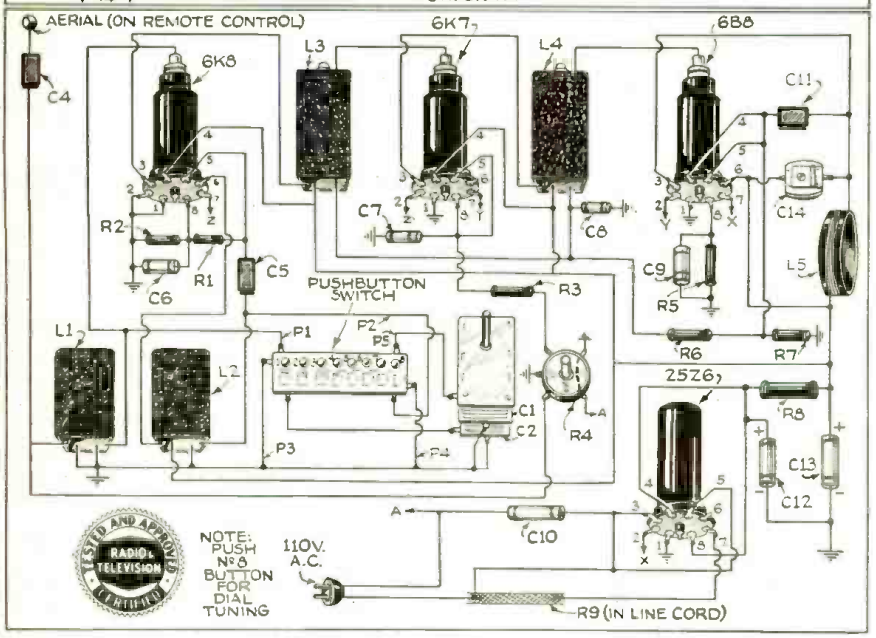
SPRAYBERRY DICTIONARY OF RADIO. 94 pages, size 5½" x 8".

A very complete glossary of radio items is offered in this neatly printed book. The first 81 pages are devoted to a table of contents and definitions on everything from **A1 Emission to Z Signals.** The balance of the book is given over to explanations of abbreviations; of the Greek letter Pi as used in radio; conversion tables; Greek symbols used in Radio; a chart of standard symbols (which is printed through the courtesy of Gernsback Publications); an International Morse Code chart (printed through the courtesy of the same organization); a parallel resistance chart; analyses of radio set troubles, a resistor chart, and a decibel level chart.

The book will be useful to anyone engaged in the study, hobby or business of radio.

Hook-up of Remote Control Unit





An Interview with F.C.C.'s Chief

(Continued from page 3)

Commissioner McNinch then pointed out one flaw in the present radio law which holds that if a candidate for any office in a major political party is given time on the air, his opposing candidates must be given equal facilities. However, the law does not state anything about *friends or advocates* of the various candidates, and it would be possible for a station to put on ten men who urge that you vote for Senator Blank, and refuse to put on those who insist that Senator Dash would make the better legislator.

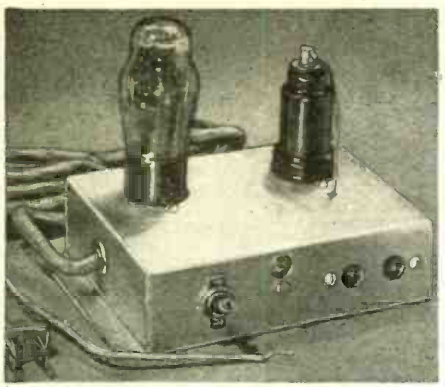
Summing up, Mr. McNinch said that he was in favor of a smaller F.C.C. because a group of fewer men would be subject to less political pressure than would a larger body, and because a smaller body could act more quickly and with greater harmony than a larger group. He added that if applications for *commercial television* stations do go through, he will give them full consideration, although it is not probable that there will be much demand for such licenses at the present time.

Next Issue!

How To Build a

TELEVISION RECEIVER

"Wireless" Oscillator for Phono and Mike



The "wireless" oscillator here described is very easy to build. It enables one to play phonograph records on a regular radio receiver, without direct connection to the set itself. It can also be used with a "mike."

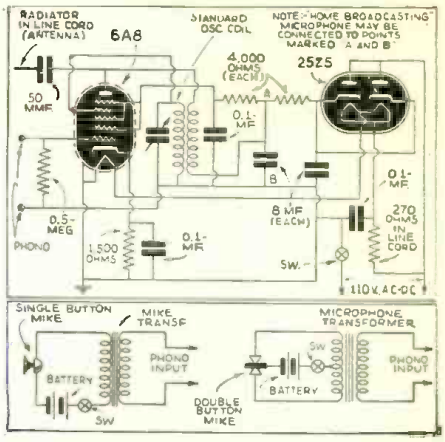
● THE use of a small modulated oscillator will permit you to carry on remote point phono and mike transmission at any distance up to 25 feet, and without direct connection to the radio receiver.

The general theory of *wireless* type phono oscillators has been covered by several articles, but it is well to review briefly the operation of such units. The oscillator is designed to produce oscillations in the broadcast band. Usually the carrier signal is adjustable over 100 or 200 kc. to permit the reception of the oscillator's signal at a point where no broadcast station is present. The carrier is modulated by the electric impulses generated by the phono pickup. While a separate modulator type tube can be used, because the input audio signal is of sufficiently high intensity and for simplicity, a single tube is utilized for a dual purpose and electron-modulation is employed, in the apparatus described here.

Notice in the circuit diagram the connections leading to the 6A8 tube. Considering for the moment the function of this tube with the control grid G-1 remaining at a small negative constant potential, we see the equivalent autodyne tetrode in a modified oscillator.

This circuit is not standard, for while the grid coil tuning condenser is sometimes omitted and the plate coil tuned circuit is used for frequency adjustment, this procedure normally is not reversed, for the variation only of the grid coil condenser has but little effect on the oscillating frequency. This arrangement has the advantage of offering better vernier adjustment and keeping the carrier frequency constant for any one setting.

The control grid G-1 is in the electron path and will modulate the resulting plate current with the audio signal produced by the phono pickup. The antenna radiator is capacity coupled (through a 50 mmf. condenser) to the plate of the tube. The antenna wire is incorporated in the line cord, but usually an additional length of wire will have to be connected if the oscillator is at a considerable distance from the associated radio receiver.



The "oscillator"—really a miniature transmitter—uses but 2 tubes, a 6A8 and a 25Z5. Connections for single- and double-button mikes are shown. The radiator may be separate from the line cord.

For the power supply, a 25Z5 tube in a half-wave rectifier circuit is used. The needed filtering is obtained with a dual 8 mf. electrolytic condenser and a 4,000 ohm resistor. The second 4,000 ohm resistor serves to reduce the voltage to supply the

(Continued on page 50)

2½, 5 and 10 Meter Converter

(Continued from page 35)

the chassis and very near to the tuning condenser. On the rear shield is mounted the R.F. stage tuning condenser and R.F. coil (L_1, L_2) jack bar. Also mounted on this shield is the 956 tube socket which is mounted on the side of the shield nearest the center shield so that when the 956 is inserted in its socket, its grid terminal will protrude through the shield and be very close to the stator terminal of the R.F. stage tuning condenser.

New Type "Acorn" Tube Sockets Used

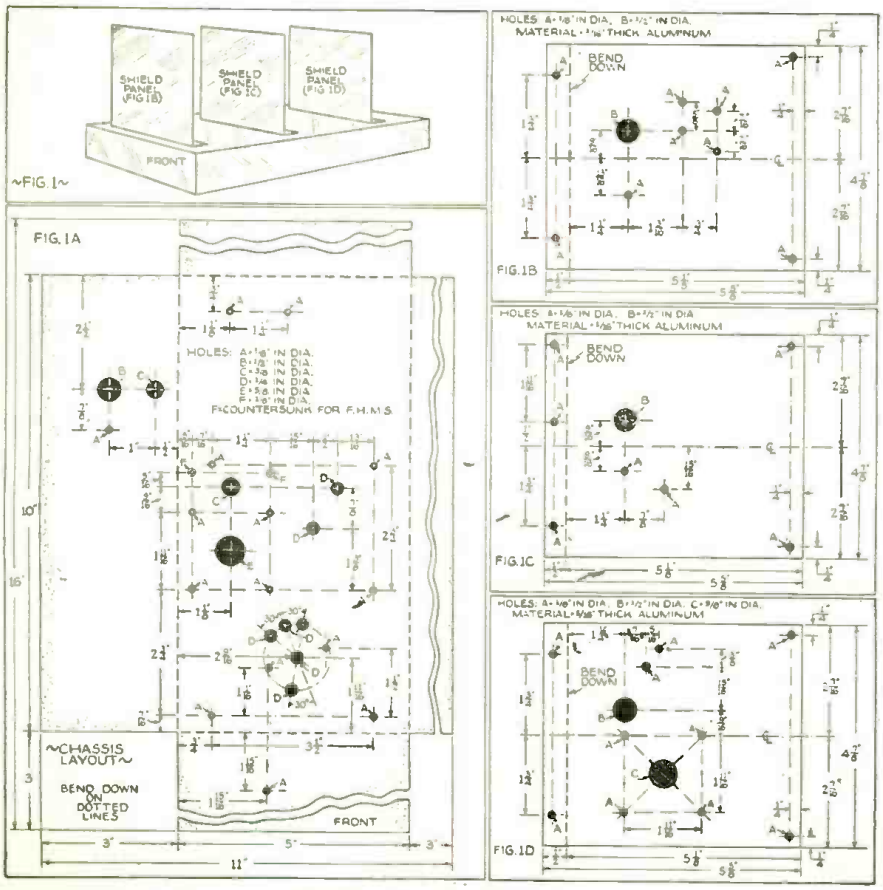
A few words concerning the R.F. and detector tube sockets might not be amiss. These are special National acorn tube sockets made of sheet copper, with the tube contacts mounted on but *insulated* from this plate by a sheet of mica. The socket is *insulated from the chassis* by a sheet of mica also. This type of assembly results in a capacity between each contact and base of about 40 mmf. and between base and chassis of 500 mmf. When the cathodes of the 954 and 956 are connected to the socket plate, quite effective by-passing is had right at the socket terminals. At very high frequencies, this is all the by-passing needed, but at 5 and 10 meters a little more is necessary so .01 mf. condensers were added. Incidentally, care should be exercised not to allow the socket contacts other than the cathode to short to the socket plate.

The detector plate coil (L_6) and its *air-trimmer* condenser are mounted beneath the chassis next to the 954 tube socket. The shaft of this condenser is slotted and projects above the chassis so that it can be readily adjusted. Make certain that the shaft doesn't short to the chassis.

As the photo shows, a pair of threaded 6/32 rods bolted at the upper corners of the three shields make the assembly extremely rigid.

Since air trimmers were not necessary across the R.F. and detector coils, mica compression trimmers were used, thereby enabling us to use individual trimmers for each coil. They are mounted on each one of the R.F. and detector coils with short lengths of heavy wire and adjusted for each band, so that when changing to another band, it is only necessary to readjust the oscillator padding condenser besides changing the coils.

With the converter all wired up, the output from the pickup coil L_7 is connected through a pair of twisted wires to the antenna and ground terminals of the regular *short wave* receiver, which should be tuned to approximately 3400 kc. (88 meters) and its gain control placed at maximum. The converter detector plate trimmer condenser should now be adjusted to a position where the noise level heard in the receiver peaks up. Now with an antenna connected to the converter and the tuning condensers at their half capacity setting and mica trimmers at their minimum capacity, adjust the oscillator padding condenser until signals in the desired band are heard. Remember the oscillator frequency will be 3400 kc. *lower* than the detector frequency. The detector and R.F. coil trimmers are then successively adjusted for maximum signal in the receiver. If the receiver has an "R" meter, adjustments will be greatly facilitated. An output meter can also be used. By the proper set-



Details of Chassis and Shields.

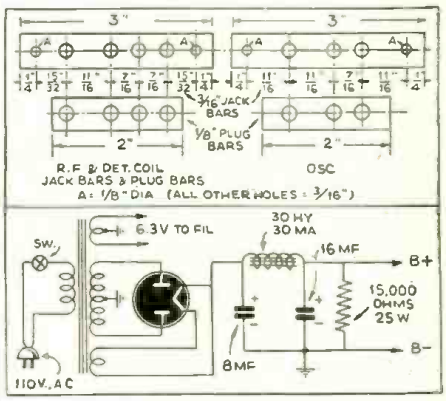
ting of the oscillator padder, the entire band can be tuned in with the tuning condensers with adequate band spread.

Picking Up Television "Sound" Channel

Using the 5 meter coils, the television audio signals can be tuned-in by adjusting the padding condensers to a somewhat higher capacity than is needed for the 5 meter amateur band. Incidentally, the R.F. and detector coils should have the same inductance. Any necessary changes can be made by varying the turn spacing.

Power-Supply

No *power-supply* was built into the converter as power can usually be obtained from the main receiver. Besides, in the next issue there will be described an addition to the converter which will make the converter a *complete receiver* in itself. This will consist of an I.F. amplifier, second detector, audio amplifier and power-supply, all mounted in a single cabinet. The only change necessary in the present converter will be to omit the detector plate coil (L_6, L_7) and its trimmer condenser. However, if only the converter is to be built and a self-contained power-supply is desired, the one shown in Figure 2b can be constructed. This may be built up on the converter chassis.



Power-supply hook-up and detail of coil supports.

"Wireless" Oscillator for Phono and Mike

(Continued from page 48)

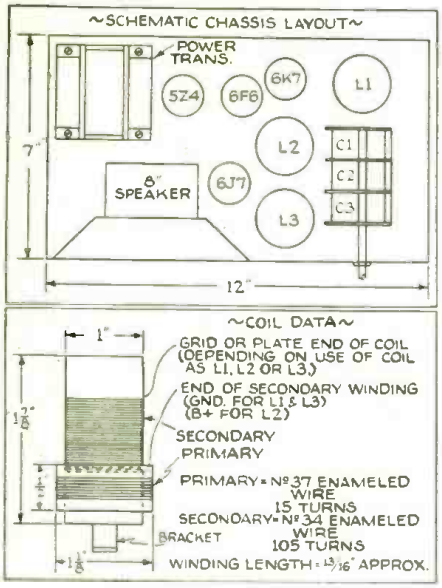
screen grid and anode grid which are tied together.

The complete unit can be easily assembled on a small chassis base. It is important, of course, to place the padding condenser in a position to permit easy adjustment. The placement of the remaining parts is not important; the photograph will serve as a suggestion.

Any single or double-button carbon microphone may be used for "home broadcasting." A suitable microphone transformer and a 4½ volt battery are employed in a standard circuit and the secondary of the transformer is connected to the phono input terminals. In case you wish to use a "home-broadcasting" type microphone requiring a high potential, a different method of connection is needed. The unit is simply connected between the points marked A and B; i.e., across the high voltage plate supply. Since this microphone acts as a variable resistor it will modulate the plate voltage at the audio frequencies of sounds reaching the microphone.—Photos, diagram, and design data courtesy of Allied Radio Corporation.

The "Bauer" T-R-F Four

(Continued from page 29)



end. Several layouts were tried and the one shown was finally adopted since the R.F. amplifier did not oscillate and the circuits tracked perfectly. It is important that good shielded coils be employed in order to realize full performance from this circuit. Regeneration, *when properly controlled*, can be used to advantage on weak signals as explained later, but regeneration caused by poor parts or sloppy wiring is nothing but a detriment and a nuisance marring the performance of an otherwise good receiver.

The usual common-sense rules of wiring apply to this receiver as they do to any other. Keep the R.F. leads short and install the various by-pass condensers and resistors as close as possible to their respective points in the circuit. The photograph of the underside of the chassis gives the general idea to be followed. It does not result in a very pretty appearing job, perhaps, but it is efficient—and *efficiency* is what we want after all. Confine all of your artistic ability to the top of the chassis. For instance, the author sprayed his chassis with lacquer after cutting and drilling it and placed the necessary wire holes for condenser and speaker leads so that they would be as unobtrusive as possible. The dark green chassis produced a very pleasing contrast with the aluminum coil shields and black metal tubes.

Getting back to the circuit once more, it will be noticed that a separate bleeder is used for the screen voltage supply of the detector tube. There are two important reasons for this. Since this is not a production model radio, we can afford to spend an extra dime for two carbon resistors and another dime for an extra by-pass condenser, resulting in constant screen voltage on the detector when the volume control is operated.

The 25,000 ohm resistor in the plate circuit of the R.F. tube was inserted because the D.C. voltage of the author's power supply was higher than was deemed safe for the R.F. tube. If the voltage output of your power transformer speaker system is no more than 250 V., this resistor can be omitted.

Adjusting the "Link" Circuit

After the receiver has been completely assembled, wired, and checked, it is ready for adjustment. Leave one side of the "link" circuit open and make sure that the antenna primaries on L_2 and L_3 that make up the link circuit are as far from L_2 and L_3 as possible. Condenser "c" should be left permanently wired in since there is no need to experiment with the value of "c." It was found that the very small value of "c" as indicated on the diagram was adequate.

Now turn on the receiver and let the tubes warm up. It would be a good idea to check the voltage at this point. If the suggestions outlined in this article have been closely followed, the receiver will play immediately upon connecting an antenna to it. Tune in a local station and make a rough adjustment on the tuning condenser trimmers.

Now tune the receiver to the high frequency end of the band and pick out a fairly weak station. Readjust the condenser trimmers carefully and test the receiver over the whole band.

If any powerful *locals* on the dial appear as "double spots," it is an indication that the capacity of "c" must be reduced by cutting the wire loops shorter. Make sure that you followed the directions on the diagram properly when you made "c."

With the correct value of "c" in the circuit—and not until then—you may now proceed to adjust the link circuit properly. This is the most important adjustment of all. Upon it depends the successful operation of the "High Efficiency Four." Too much emphasis cannot be placed upon it.

Tune in a fairly weak station at the high frequency end of the dial with the link circuit *open*. Now close the link, retune with the dial if necessary, and note if the volume is increased or decreased. If the volume is decreased, solder the link circuit permanently. If the volume is increased, or there is no noticeable change in volume, it indicates that the link coupling is in phase with the capacitive coupling of "c" and the leads to *one* of the link coils must be *reversed*.

It is very important that the link circuit be *out of phase* with the coupling condenser "c." If it isn't, serious audio distortion will result, together with *double-spot* tuning, in spite of the loose coupling and the gain will not be uniform throughout the tuning range. When the circuit is properly adjusted, opening the link should result in weaker signals at the low frequency end of the band and at the high frequency end there should be little or no difference in volume. There will be a difference in fidelity, however.

The circuit developed in this article is really what is known as a "band-pass" amplifier. However, in this receiver the coupling is purposely adjusted below the critical value. If more than one stage of R.F. is used, the coupling may be tightened and the result is a remarkable high gain, high fidelity band-pass amplifier either for P.A. work or for use in the home of the discriminating listener. Such a unit, complete with a volume expander in the audio system, will be described by the author in the near future, if the Editor is satisfied there is sufficient reader interest. If you want this article, tell the Editor.

Coil Data

The coils illustrated are for the broadcast band and are designed for use with a standard .000365 mf. tuning condenser. All three coils (L, L2 and L3) in this receiver are *exactly* alike: as a matter of fact, three standard commercial antenna coils can be used in place of this home-constructed design, provided the coupling to the primary is adjustable.

When this coil is used as L (in the diagram): PRI=antenna coil; SEC=R.F. grid coil.

(Continued on page 53)

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HOW TO BUILD THE "MONO-COIL 2". No more "plug in" coils. This set eliminates bothersome coils and is made to cover short-wave bands. Works with either batteries or A.C. power pack.....No. 50

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The "Bauer" T-R-F Four

(Continued from page 51)

When this coil is used as L2 (in the diagram): PR1=link coil; SEC=R.F. plate coil.

When this coil is used as L3 (in the diagram): PR1=link coil; SEC=detector grid coil.

The amount of coupling indicated on the drawing is approximately correct for the *link* circuit. Antenna coils usually have closer coupling, so when using commercial antenna coils in this receiver, the primary coupling will have to be reduced on those coils used as L2 and L3, as already explained in the text.

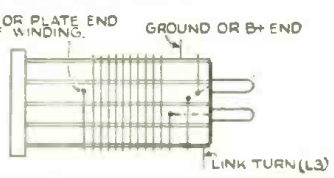
The reason that this reduction in coupling is necessary is because in L2 and L3 we no longer are coupling an aperiodic (antenna) circuit to a tuned circuit, but are actually coupling two tuned circuits (i.e., L2 and L3).

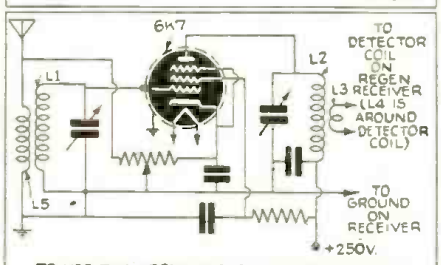
We are all familiar with the use of *link coupling* in transmitters. It so happens that properly adjusted link coupling in receivers is just as efficient, although physical examination of the coils makes one wonder how the diminutive link coil is capable of transferring the energy so completely. Well, the point is that it does and in some cases it may be necessary to decrease the coupling even more than indicated in the drawing. The experimenter can readily determine the proper amount of coupling. The disappearance of "double spots" on the dial, as explained in the text, is the best check.

SHORT-WAVE COIL DATA (TENTATIVE)

	L1 AND L2	L3 AND L4	L5
1,500KC-4,600KC	44 TURNS № 22 D.C.C.	3 TURN LINK	5T
3,800KC-11,600KC	15 TURNS № 22 D.C.C. SPACED DIA. OF WIRE	1 TURN LINK	3T
8,800KC-27,000KC	6 TURNS № 22 D.C.C. SPACED TO COVER 1"	1 TURN LINK	2T

THESE SPECIFICATIONS ARE FOR USE WITH STANDARD 365 MMF TUNING CONDENSER. COILS ARE WOUND ON 1¼" DIAMETER RIBBED FORMS, WITH THE WINDINGS ARRANGED AS SHOWN:





TO USE THE FRONT END OF THE RECEIVER AS A SUPER PRE-SELECTOR, MERELY CONNECT ONE SIDE OF L3 TO THE ANTENNA POST OF THE SUPER AND GROUND THE OTHER SIDE OF L3 TO THE CHASSIS OF THE SUPER.

THE ANTENNA PRIMARY OF THE SUPER THEN BECOMES A LINK COIL AND IT MAY BE NECESSARY TO REDUCE COUPLING FOR SATISFACTORY OPERATION.

Hook-up and coil data for use as S-W converter.

"The Radio Beginner"

will continue next month—SUBJECT:

"How the Superheterodyne Works"

Let's Listen In with Joe Miller

(Continued from page 23)

HAM STARDUST

Writing during middle of A.R.R.L. Contest, we are still awaiting the Spring "opening" of bands, but at present in vain. But much better things are in store, so let's see what *we can hear*, listed here, and then pray that a few of these luscious calls fall prey to our straining ears!

ASIA

This is the continent we all want to hear in particular, no guess work there!

We will mention DX reported for each country, then list others on 20 fone also operating in that particular land.

BURMA

XZ2EX, 14060, by Mario Bruscia, W2, FB DX OM, at 9:40 a.m.! Others on fone are XZ2DY, 14100, 210, 375; XZ2DX, 14040; XZ2PB, 14040; and 2DY also reported on 332, using 100 watts (I.D.A.-A.T.).

FRENCH INDIA

FN1C, Chandernagore, a district within the city of Calcutta, but under French rule, is reported on a number of frequencies, from 14075, 14150, 14210 and again to 14040! This would count a separate country.

JAVA

PK1RI, 14030; PK2AY, 14020; PK2WL, 14130; PK3WI, 14040, and PK4KS, 14320, all by Rog Legge, W8, I.D.A. Ama-touring Editor, who's doing a FB job on A.T., and DX, too. PK3WI and 4KS also here. Others are: PK1VY, 14270, 060, 100; PK1DB, 14300; PK1RL, 14030, 280; PK1BX, 14260; PK1ZZ, 14280, 320; PK1VM, 14100; PK1SK, 14070; PK2RN, 14320; PK2JN, 14320; PK2DF, 14040; PK3AA, 14300, 360. In Sumatra are: PK4JD, 14100, reported by Ian Jamieson, G; PK4VR, 14375.

CHINA

XU3AA, 14075, reported by Carl Weber, W2 (I.D.A.) at 10:45 a.m. XU8RB, soon to be on with 500-600 watts, has his license again. FB news for "Reg." and will be on 14084 and 14212 (I.D.A.). Other Chinese are XU6TL, 14050, 120; XU8MC, 14000, 090; XU8ET, 14050; XU8HW, 14080; XU9CS, 14280; XU2HL, 14035; XU8RL, 14310; XU8JR, 14130; XU8MT, 14030, 135.

JAPAN

J7CB, J8CB, J2MI are reported by Max Fisher, W6, but no frequencies. J8 is Korea, a new country, and now called Chosen by the Japanese. Heard by Max near midnight, E.S.T. Other Japs are: J2MK, 14080; J2LL, 14010; J2KJ, 14260; J2KN, 14400; J2QI, 14250; J2CR, 14035; J5CC, 14400, 280. And in Korea, J8CA, 14260; J8CG, near 14400.

PHILIPPINES

KA1FH, 14130, KA1PI, 14140, reported by Rog Legge. Other KA's heard here are KA1FH, KA1LB, KA1ME, KA1CS, all on low end of the American fone band, vicinity of 14150, and KA1ME, also around 14280. Other KA's are: KA1MG, 14280, 140; KA1JZ, 14300; KA1BH, 14140; KA1CW, 14270; KA1AP, 14300; KA3BW, 14176; KA7EF, 14120, 150, 290. Ian Jamieson reports KA1ME, KA1PI and KA1FH.

INDIA

VU2FU, 14200, by OM Ian. Others are: VU2BG, 14140; VU2CQ, 14140; VU2DR, 14120; VU2LL, 14370, 340; VU2FU, 14240; VU2JK, 14030; VU2FQ, 14060, 190. VU2FQ QSL'd to Murray Buitekant, W2, for reception at 3 p.m., on 14190, in midst of American fone band! How do you do it, Murr?

STRAITS SETTLEMENTS

VS1AB, 14250; VS1AF, 14070, are on fone in Singapore.

FED. MALAY STATES

VS2AE, 14100, 320, 370; VS2AR, 14040, 310, 370 are on fone.

HONG KONG

VS6AF, 14300; VS6AB, 14080, are on fone.

CEYLON

VS7GJ, 14060; VS7RF, 14336; VS7JW, 14350; VS7RP, 14255, are on fone.

PALESTINE

ZC6EC, 14300; ZC6AP, 14210; ZC6AC, 14250, are reported on fone, but unlicensed, under cover.

AFRICA
MOZAMBIQUE

CR7MD, 14400+, heard here at 12:25 a.m., but faded out suddenly.

MADEIRA

CT3AN, 7.09 mc., on 40-meter band, heard at 1:25 a.m., recently.

EGYPT

SU1MW, 14145; SU1CR, 14055, SU1RD, 14300; SU1RH, 14020, reported and heard here.

TANGIERS

EK1AF, 14020, 14135, new call prefix of CN1AF, heard by many.

MADAGASCAR

FB8AH, 14380, reported by many, with a usual R8-9 signal.

FRENCH MOROCCO

CN8MT, 14080; CN8AI, 14110; CN8AW, 14030; CN8MI, 14030; CN8MB, 14030; CN8MV, 14060, reported and heard here. CN8AC, 7.07 mc., here at 2:15 a.m.

South Africans still coming in, but dying off.

EUROPE
LITHUANIA

LY1S, 14020; LY1KK, 14080, heard and reported. LY1BF, 14140.

POLAND

SP1MR, 14015, 3:40 p.m. here

LUXEMBURG

LX1TW, 14050; LX1AY, 14060, 220; LX1GI, 14100, by Ian Jamieson.

JUGO-SLAVIA

YU7VX, 14020; YU7XU, 14150, by Ian.

SWITZERLAND

HB9DB, 14060; HB9S, 14170, 110, by Ian.

Others by Ian are: OH8NW, 14080, Finland; ZA1CC, 14135, Albania; TF3C, 14060, Iceland.

We regret leaving out 10-meter DX, but will have a space reserved for it next month. Europe and Africa come in FB now from 8 a.m.-2 p.m., and Oceania occasionally on Asiatic, heard near 6-7 p.m. on East Coast.

Good DX hunting to all!

Television and Ultra Short Wave Antennas

(Continued from page 8)

casting System's television aerials mounted on the spire of the Chrysler Tower, New York City. The video antenna is 937 feet above the street, and the audio or voice antenna 965 feet above the street. There are sixteen dipoles in the complete antenna system, and the television transmitter is mounted in the tower, directly beneath the antennas. The transmitter is connected by means of a co-axial cable with large television studios located nearby, at Grand Central Terminal.

Fig. 7 shows the U.S.W. antenna for 11.4 meter (26,150 kc. or 26.1 mc.) broadcasts erected by station W9XUP, owned by broadcast station KSTP, St. Paul and Minneapolis. (Power is 1000 watts.)

The antenna system shown in Fig. 7 is mounted on top of a 175 foot steel tower. A small platform, 4 feet by 4 feet, was constructed on top of the tower to be used in the installation of the antenna, for tuning the antenna, and for use in the contemplated research on high frequency antenna design. The antenna is of three inch steel seamless tubing ¾ wave length long, of which approximately ½ wave length is now being used as the actual radiator. It is mounted in a sleeve fastened to the steel tower so that the tube may be easily adjusted to any desired height of radiator up to ¾ wave length. The antenna is fed by means of a concentric line which is coupled to the antenna by means of the condenser-slant wire method in the manner of the shunt feed method used in some broadcast installations. This method was used due to its flexibility—it combines ease and accuracy

(Continued on page 57)

Getting Started in Amateur Radio

(Continued from page 19)

adapted to several frequencies and is easier to build and adjust. The feeder wires of the transmission line should be close to a multiple of a quarter wavelength. Differences in the exact length can be compensated for in the coupling and tuning arrangement. The two wires of the feed should be from 3 to 12 inches apart and be held at that spacing by means of insulators spaced every foot or two along the length of the transmission line.

The most popular type of Hertz antenna used by amateurs is the "Zepp" antenna, so-called because it was first used on Zeppelin airships. This antenna consists of a horizontal wire of any desired number of half-wavelengths, computed by the method given above and a tuned feeder, one wire of which is connected to the aerial and the other is left *floating*. The feeder is an odd number of quarter wavelengths long. Series tuning can be used with feeders having a length between ¼ and ⅜ of a wavelength. For feeders shorter or longer than these limits, parallel or current feed is desirable.

Since this type of aerial is particularly suited to the transmitter that was described in Part 2, some exact details will be given for making such an antenna and coupling arrangement.

Figure 3 shows the makeup of the antenna. The length L is figured from the method given at the beginning of this article. The length of the feeders and the method of tuning the coupling coil is given in the chart below, for the wavebands covered by the X-mitter described in Part 2.

Length of each wire F in feet	Waveband and Tuning Arrangement 1750 Kc.	3500 Kc.	7000 Kc.	14000 Kc.
120	Series	Parallel	Parallel	Parallel
90	Parallel	Series	Series	Parallel
60	Parallel	Series	Parallel	Parallel
30	Not recommended	Parallel	Series	Parallel

In tuning the Zepp antenna with series tuning, the condensers should be turned to the maximum capacity position, while with parallel tuning the condenser should be at minimum capacity. After the transmitter has been tuned to the desired frequency, following the methods given in Part 2, the antenna coupling coil should be placed near the output tank coil in the transmitter and the series condensers tuned simultaneously until the radio-frequency ammeter shows maximum current and the plate current milliammeter in the X-mitter shows normal current.

The procedure with parallel tuning is the same as above, except that the condenser is set at minimum capacity and is increased for maximum indication in the R.F. ammeter. Only one meter is needed as it can be shifted from one line to the other. The readings on both lines should be the same.

The coil for coupling the transmitter to the feeder line is made identical to the tank coil used in the plate circuit of the 46 tube. Two clips should be provided as shown in Fig. 4, to reduce the over-all inductance for the higher frequency bands. The coil and the two condensers with the R.F. ammeter should be mounted on a suitable chassis or panel to permit the coil to be coupled to the tank coil in the X-mitter.

In addition to the simple Marconi and Hertz antennas, of which the Zepp is a representative type, there are many other types. The feed can be connected to the center of the single wire span, making what is called a "doublet." Then the feeder line can be made in the form of heavy aluminum or copper rods tuned to ¼ wavelength and this becomes the "Q" antenna. Many other modifications have been made, each with some characteristic to fit an individual need.

To increase the radiation in a given direction, many hams have tried the various forms of directive arrays, such as the rotatable doublet with a reflector, and the "V" type or diamond type long wire directive systems. However, these are highly specialized types of transmitting antennas and do not lend themselves well to the beginner's needs. These special types of aerials can be studied later when the new ham has tried the more conventional types.

In the next part of this series, we will discuss the design of power-supply *units, with some references to the various types of rectifier and filter systems commonly used in amateur stations. This includes the brute-force, tuned and swinging types of filters, each of which has some application in supplying the high voltage to the elements of the tubes in a phone or C.W. transmitter.*

Television and Ultra Short Wave Antennas

(Continued from page 55)

of tuning with speed of tuning, which is very advantageous for any experiments on the antenna.

The program material for W9XUP up to the present time has been either the regular KSTP programs or the NBC Red Network programs. Special programs of interest primarily to the amateur have been contemplated for the near future in addition to special programs of common interest. The station is on the air from 7:00 A.M. to 12 o'clock midnight CST every day. Reports of reception will be acknowledged by card.

Why NOT "Commercial" Television?

(Continued from page 8)

casting field, that the earlier these licenses are issued, so that television can "get going," the sooner television will become a strong factor in helping to revitalize the country's business.

One radio manufacturer told the writer the other day that he has been getting inquiries daily from broadcasters all over the country, for prices and delivery dates on television transmitters; but in the same breath, many of them mentioned that they are still worried about the fact that they will be under a heavy expense so far as producing programs is concerned because they cannot solicit sponsors!

I am sure that the radio industry and the readers of RADIO & TELEVISION would highly appreciate an opinion from you as to how soon commercial television licenses may be issued.

Cordially yours,
RADIO & TELEVISION
(Signed) H. W. Secor
Managing Editor

Commissioner McNinch's Reply Follows

Federal Communications Commission
Washington, D. C.
March 16, 1939

Mr. H. W. Secor, Managing Editor,
RADIO & TELEVISION,
99 Hudson Street,
New York, N. Y.

Dear Mr. Secor:

After careful consideration of your request in your letter of March 4, I have reached the conclusion that it would not be advisable for me to respond to your invitation to venture expression of an opinion as to the present status of television, and as to how soon I think commercial licenses may be issued for radio facsimile stations.

For numerous reasons, which are to the Commission entirely satisfactory, the Commission has not deemed it advisable to grant commercial licenses for either facsimile or television, and because I could not forecast accurately the time or the character of future Commission action touching these subjects, it seems unwise for me to enter the dubious field of prophecy.

Sincerely yours,
FRANK R. McNINCH,
Chairman.

COMMERCIAL NOTICES 10¢ A WORD

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

AGENTS WANTED

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

CORRESPONDENCE COURSES

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

INSTRUCTION

RADIO ENGINEERING, BROADcasting, aviation and police radio, servicing, marine and Morse telegraphy taught thoroughly. All expenses low. Catalog free. Dodge's Institute, Colt St., Valparaiso, Ind.

COMPLETE RADIO CODE COURSE on Three Records. Dealer's Net Price $5. Poinsettia, Inc., Pitman, N. J.

MISCELLANEOUS

FOR SALE, 18" SHIP MODELS. Golob, East Harvey St., Ely, Minn.

7 MILLIAMMETER, HEAVY RUBber insulation, high voltage lacquered cable, suitable for transmitter. 2c per foot. Gold Shield Products, 350 Greenwich St., New York City.

PATENT ATTORNEYS

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

QSL—CARDS—SWL

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

QSL-SWL CARDS. 200 FOR $1. Quality Printing. Send stamp for Free Samples. Miller Printing Co., 399 Thirteenth Ave., Columbus, Ohio.

RADIO

STOP:—BEFORE YOU BUY A short wave receiver, send dime for our 24-page catalog containing circuit diagrams and information on over 25 Doerle short wave receivers and transmitters. See Dec. 1938 issue for page ad describing a few of our models. Oscar B. Kusterman, 297 DeKalb Ave., Brooklyn, N.Y.C.

PLANS 18 TESTED CRYSTAL sets. SW record 4250 miles, with "Radiobuilder"—year. 25c. Laboratories, 7700-A East 14th, Oakland, California.

3,000 MI. CRYSTAL-PLANS 10c. Kit $1.00. World-wide metal tube receiver $1.95. Information free. Caliradio, B.94ft. Saugus, Calif.

SHORT WAVE RECEIVERS

WE STILL HAVE A FEW USED Doerle receivers Models D-38, BS5 and 7C, reconditioned by factory, at 40% off. See Dec. 1938 Radio and Television for description. Oscar B. Kusterman, 297 DeKalb Ave., Brooklyn, N.Y.C.

SONG POEMS WANTED

WANTED ORIGINAL POEMS, songs for immediate consideration. Send poems to Columbian Music Publishers, Ltd., Dept. K49, Toronto, Can.

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. NATIONAL I-10 slightly used, complete with tubes, coils and power pack. No speaker. $35. Harold Mendel, 2474 Marion Ave., New York City.

MASTER TELEPLEX $25. HAM special $13. Instructograph complete $18. James Rush, 14 Madison Ave., Pleasantville, New York.

SKY BUDDY, $15.00. EDW. BIRD, 4340-6th N.E., Seattle, Wash.

50 WATT XMITTER COMPLETE $21.00. W5IJT, Russellville, Ark.

BEST CASH OFFER TAKES three tube T.R.F. receiver with separate power supply. Write for full particulars. Richard Briggs, 848 Belmont Street, Watertown, Mass.

811 ELEVEN TUBE SUPERSkyrider $49.00. ACR-136 $29.00. Silver 5C $24.00. Sky Buddy $15.00. W9ARA, Butler, Missouri.

RECONDITIONED RECEIVERS. Have several good, reconditioned communication receivers. Send stamp for list. W2AVA, 12 West Broadway, New York.

BARTER AND EXCHANGE — FREE!

NO ADVERTISEMENT TO EXCEED 35 WORDS, INCLUDING NAME AND ADDRESS

Space in this department is not sold. It is intended solely for the benefit of our readers, who wish to buy or exchange radios, parts, photographs, 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 one issue. All dealings MUST be above board. Remember you are using the U. S. mail in all these transactions and therefore you are bound by the U. S. Postal Laws. Describe anything you offer accurately and without exaggeration. Treat your fellow men the way you wish to be treated. We welcome suggestions that will help to make this department interesting and helpful to our readers.

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

HAVE NEW AMPERITE MIKE. Silver-Marshall 6 tube A.C. receiver complete, electric shaver, radioptican, field glasses, other items. Your list for mine. M. Epstein, 2953 Ruckle, Indianapolis, Ind.

TRADE INSTRUCTOGRAPH COMplete with ten tapes, with built-in Mac electric oscillator. Also Speed-X key. Jewell R.F. meters for what have you? Write W9IMJ, 616 N. Central, Chicago.

WANTED: LARGE STAMP COLlections (none too large to consider). Send full description and what you want. Swap: radio bugs, xtals. Stamp for swap list. R. D. Dawson, 130SF, The Dalles, Oregon.

WANTED: SUPREME 89 OR similar Supreme's, Rider's Manuals. Like to trade with person near. Have Allmeter, Triplett oscillator, Sky Buddy and other things. Have 125 radio magazines also. Bill Eslick, Norwich, Kans.

ALL WAVE 16 MIDWEST 175 TO 9 meters, fine shape, need PA with crystal or ribbon 2250 or what, also OCA. CR ose like new cost $33.00. A. Jonas, 1019 Wood, Flint, Mich.

HAVE MARINE HARDWARE AND parts, also have radio parts of every description, want rifles, shot guns, sporting goods. J. A. Bakutis, P. O. Box 51, Sta. A, New Haven, Conn.

WANT CORRESPONDENCE FROM all over the world. Will trade anything. I will answer all mail promptly. 73's. Bob Burch, 3135 Kedzie, Chicago, Ill., U.S.A.

RADIO MAGAZINES SINCE 1930, including SWC, Radio News, Radio-Craft, over 50 to trade for photographic enlarger, record changer, phono-motor. Will pay cash difference. William Chrusch, 152 Fifth St., Elizabeth, N. J.

WANTED — CORRESPONDENCE with fellows interested in aviation radio, photography or stamps in all parts of the world. Harry Jamieson, 94 Raglan Avenue, Toronto, Ontario, Canada.

HAVE BUTTERFLIES AND many other insects, old coins, bills, magazines. Wanted car radio, old stamps, antiques. Also have many fine covers. L. Signor, Dover, Fla.

HAVE 3 2½ METER RECEIVERS work fine, also set of coils for SW4, 1 low loss 40 meter coil banana plug type, 1 pr. Baldwin phones. WILDD, Roxbury, (19), Mass.

HAVE LARGE SELECTION OF HI class s.w. parts, last set was H.R.O. Want something not in electrical or radio line, or stamps or coins. John Dudarevich, 1808 Pitkin Ave., Brooklyn, New York.

SWAP—NATIONAL SW3, COMplete, good condition, 40, 160 meter coils, for candid camera, Argus preferred. Seymour Bogdonoff, Box 852, Bridgeport, Conn.

HAVE CHARLES ATLAS strength course, fine .22 rifle, A.C. power packs, Diesel Power magazines, radio parts, books, portable phonograph. Want modern radio parts, short ware receiver, testing equipment. Wallace Freeman, Box 466, Barre, Mass.

HAVE "HAM" COMMUNICATION receiver. Tunes all bands, 5 tubes. Speaker incorporated. Complete with tubes. To trade for J. Weiss, 547 E. 105 Street, Cleveland, Ohio.

BRITISH COLONIES AND FOReign airmail stamps duplicates, mixed wanted for same of old and new U.S. stamps or foreign in lots, also have radio parts, tubes, books, magazines. W2IAG, 2807 Claflin Ave., New York, N. Y.

TRADE KEYSTONE PROJECTOR, Eastman developing outfit 3½x5½ frame and 3½x5½ box camera for 250 volt genemotor 6 volt input. Want ½ H.P. air cooled gas engine. J. O. S. Hunter, Box 165, Kensington, P.E.I.

WANTED 16MM PROJECTOR OR camera. Have amplifier, telescope, chem. outfit. What have you to swap? Walter Carmichael, 135 Marcella St., Boston, Mass.

HAVE CORONA PORTABLE, RAdio Physics, Modern Radio, Belden double-doublet, York bar dumbbell course, mags., Diesel mags., U.S.N. photos. Want Piezo calib., pre-selector, Spider-web ant., head-phones, radio parts, John S. Praszynski, St. Martinville, La.

25 CAL. REPEATING RIFLE, new gauntlet fur mittens and vest, size 44, ladies medium size calf skin fur coat. Want car radio Leica camera, binoculars, outboard motor. Leo Hernenport, 3007 Jay Ave., Sioux City, Iowa.

WANTED STANDARD SHORT wave receiver. Have Victoreen superhet battery chassis, Sparton 11 tube chassis, refrigerator compressor, Crosley Dynacone speaker, radio parts. Trade for what have you? Ernst Albrecht, 1454 West 14th St., Davenport, Iowa.

WILL SWAP GILBERT ERECTOR sets Nos. 6 and 7½ complete with 2 motors AC and DC for meters and test equipment. Frank M. Masters, Jr., River Road RD No. 2, Harrisburg, Penna.

WHAT HAVE YOU TO SWAP FOR a 5 meter receiver or bicycle. Photo equip. pref. Hyman Baikien, 65 Weston St., Boston, Mass.

SWAP FOREIGN, U.S. STAMPS, books, large lenses from plate cameras, bellows, boxing gloves, Denkert punching bag, fresh water fishing pole, S&D mint pennies. Want cameras, enlargers, photographic equipment. E. Lorenzo, 356 Carpenter St., Prov., R. I.

TRADE—6 FT. SPLIT BAMBOO rod, heavy, large Pflenger reel, good condition, suitable for tuna, muskie fishing. Want Howard 430, Sky Buddy. Also 22 rifle, electric razor. Forrest F. Wilson, 107 E. North St., Marshalltown, Iowa.

WANTED ANSCO MEMO 35MM camera, good lens. What do you want in trade or cash? All letters answered. Harvey E. McDowell, Ft. Defiance, Arizona.

(Continued on opposite page)

World S-W Stations

(Continued from page 28)

Mc.	Call	
6.110	GSL	DAVENTRY, ENGLAND, 49.1 m.,
6.110	XEGW	MEXICO CITY, MEX., 49.1 m., Addr. La Voz de Aguila Azteca desde Mex., Apartado 8403. Relays XEJW 11 pm.-1 am.
6.108	HJ6ABB	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. 1-3, 6.30-8.30 am., Noon-6.30 pm.
6.100	W3XL	BOUND BROOK, N. J., 49.18 m., Addr. Natl. Broad. Co. 9 pm.-1 am.
6.097	ZRK	KLIPHEUVEL, S. AFRICA, 49.2 m., Addr. S. African Broad. Co., Johannesburg. Daily 12 n.-4 pm., Sun. 12 n.-3.20 pm.
6.097	ZRJ	JOHANNESBURG, S. AFRICA, 49.2 m. Addr. S. African Broad. Co. Daily exc. Sat. 11.45 pm.-12.50 am.; Daily exc. Sun. 3.15-7.30, 9-11.30 am. (Sat. 8.30-11.30 am.) Sun. 3.30-4.30 or 4-5 am., 5.30-7, 9-11.30 am.
6.095	JZH	TOKYO, JAPAN, 49.22 m., Addr. (See 11.800 mc., JZJ.) Irregular.
6.090	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.
6.083	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 pm.-1.30 am. Except Sun.
6.075	VP3MR	GEORGETOWN, BRI. GUIANA, 49.35 m. Sun. 7.45-10.15 am.; Daily 4.45-8.45 pm.
6.070	CFRX	TORONTO, CAN., 49.42 m. Relays CFRB 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 4.15-5 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 Tues., Fri., Sun. 5.45 am.-12 n., 11 pm.-2 am.; Wed. 5.45 am.-12 n., 9 pm.-2 am.; Mon., Thurs., Sat. 5.45 am.-2 am.
6.060	W3XAU	PHILADELPHIA, PA., 49.5 m. Relays W2XE Wed., Fri., Sun. 7.30-11 pm., 11.30 pm.-1 am., Mon. and Thur. 12 m.-1 am. Tues. 7.30-11 pm., 12 m.-1 am. Sat. 11 pm.-2 am.
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	GSA	DAVENTRY, ENGLAND, 49.59 m.,
6.050	HJ1ABG	BARRANQUILLA, COL., 49.65 m., Addr. Emisora Atlantico. 11 am.-11 pm.; Sun. 11 am.-8 pm.
6.050	HP5F	COLON, PAN., 49.59 m., Addr. Carlton Hotel. Irregular.
6.045	RV15	KHABAROVSK, U.S.S.R., 49.63 m. 2-11 am.
6.045	XETW	TAMPICO, MEXICO, 49.6 m. Irregular 7-11 pm.

Mc.	Call	
6.040	W4XB	MIAMI BEACH, FLA., 49.65 m. 1-3 pm., 9 pm.-12 m. Relays WIOD.
6.040	W1XAL	BOSTON, MASS., 49.65 m., Addr. University Club. 7-9 pm. exc. Sat. & Sun.
6.033	HP5B	PANAMA CITY, PAN., 49.75 m., Addr. P. O. Box 910. 10.30 am.-2, 6-10 pm.
6.030	VE9CA	CALGARY, ALTA, CAN., 49.75 m. Thur. 9 am.-1 am.; Sun. 12 n.-12 m.
6.030	RV59	MOSCOW, U.S.S.R., 49.75 m. 5-6, 10-11 pm. Irregular.
6.030	OLR2B	PRAGUE, BOHEMIA, 49.75 m. (See 11.875 mc.) Off the air at present.
6.025	XEUW	VERA CRUZ, MEX., 49.82 m., Addr. Av., Independencia 98. 10 pm.-1 am.
6.020	DJC	BERLIN, GERMANY, 49.83 m., Addr. (See 6.079 mc.) 11.30 am.-4.30 pm.
6.017	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, 4-9 pm.
6.010	OLR2A	PRAGUE, BOHEMIA, 49.92 m. Addr. (See OLR, 11.84 mc.) Irreg.
6.010	COCO	HAVANA, CUBA, 49.92 m., Addr. P. O. Box 98. Daily 7.55 am.-12 m., Sun. until 11 pm.
6.010	VK9MI	S. S. KANIMBLA, 49.92 m. (Travels between Australia and New Zealand). Sun., Wed., Thurs. 6.55-7.30 am.
6.010	CJCX	SYDNEY, NOVA SCOTIA, 49.92 m. Relays CJCB 7 am.-1 pm., 4-8 pm. 1.30 pm. 8.30 pm.
6.007	ZRH	ROBERTS HEIGHTS, S. AFRICA, 49.94 m., Addr. (See ZRK. 9.606 mc.) Daily exc. Sun. 10 am.-3.30 pm.; Sun. 9 am.-12 n., 12.15-3.15 pm. Daily exc. Sat. 11.45 pm.-12.50 am.
6.007	ZRJ	JOHANNESBURG, S. AFRICA. 49.94 m., Addr. S. African Broadcast. Co. Irregular.
6.006	HP5K	COLON, PAN., 49.96 m., Addr. Box 33. La Voz de la Victor. 7-9 am., 10.30 am.-1 pm., 5-11 pm.
6.000	CFCX	MONTREAL, CAN., 49.96 m., Can. Marconi Co. Relays CFCF 6.45 am.-12 m.; Sun. 8 am.-10.15 pm.
6.000	VE9DN	DRUMMONDVILLE, QUE., CAN., 49.96 m., Addr. Canadian Marconi Co.
6.000	CXA2	MONTEVIDEO, URUGUAY, 49.98 m. Addr. Rio Negro 1631. Relays LS2, Radio Prieto, Buenos Aires. 7.30-10.30 pm.
6.000	ZEA	SALISBURY, RHODESIA, S. AFRICA, 50 m. (See 6.147 mc., ZE8.) 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.
5.970	YV5RC	CARACAS, VEN., 50.26 m., Addr. Radio Caracas. Sun. 7 am.-10 pm. Daily 7-8 am., 1-1.45 pm., 4-9.30 or 10 pm.
5.968	HVJ	VATICAN CITY, 50.27 m. Off the air at present.
5.950	HH2S	PORT-AU-PRINCE, HAITI, 50.37 m., Addr. P. O. Box A103. 7-9.45 pm.
5.935	YV1RL	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.
5.920	YV4RH	VALENCIA, VEN., 50.68 m. 5-9.30 pm.
5.900	ZNB	MAFEKING, BRI. BECHUANALAND S. AFRICA, 50.84 m. Addr. The Govt. Engineer, P. O. Box 106. 6-7 am. 1-2.30 pm. Ex. Suns.
5.900	TIL5	SAN JOSE, COSTA RICA, 50.85 m. 6-10 pm.

(Continued on following page)

BARTER and EXCHANGE FREE ADS (continued)

WANTED—110 VOLT A.C. GASOline generator. or? Will trade Western Electric sound system and recording amplifiers, volume indicator, common battery P.B.X., analytical balances, standard weather bureau anemometer, pen recorder, etc. A. H. Dreesen, Mansfield Centre, Connecticut.

WILL TRADE ONE TRIPLETT Master four unit tester, Meissner 8 tube receiver (Traffic Scout) for Clough-Brengle 105 oscillograph 85A Unimeter, 81-A modulator. John F. Sullivan, 99 Aldrich St., Roslindale, Mass.

WANTED—USED RADIO SERVice equipment, such as tube tester, signal generator, V.T. voltmeter, etc. Will pay cash. Send description and price in first letter. Thank you. J. V. Katkus, 1122 Beaver Ave., Pittsburgh, 12, Penna.

TRADE—4 TUBE A.C.-D.C. RAdio in perfect condition for a s.w. receiver or portable typewriter. Will add cash or 15 jewel wristwatch if necessary. What say? R. Miner, Oakdale, Iowa.

WILL PAY CASH OR TRADE radio parts for any kind of radio service equipment. All inquiries will be answered. James C. Gates, 64 Hyatt St., Prov., R. I.

WILL TRADE C. F. MARTIN guitar and case style C-1. Purchase price $101.60 in April, 1936, in A1 condition, for good SW receiver 10-160M in 5 bands. John J. Clemens, 4406 2nd St., Ecorse, Mich.

SWAP 1 TRANSFORMER, 1500 or 3000 volts D.C. at 350 MA 3000 VAC. each side of center tap. 110 or 220V input. 1 pair WE211E's, one Cardwell XT210PD split-stator condenser. James Dolan, Box 655, Woonsocket, R. I.

I HAVE A SET OF CZECHOslovakian stamps, catalog value $15. I would like to trade these for a ½ watt resistor. John Krupa, 17 W. Ridge St., Nanticoke, Pa.

HAVE ELECTRICAL EXPERImental kit, contains two-way phone; hand driven (75-125 volts) generator; polarized bell ringer, etc. Want photographic materials or what have you? Send swap list. George Homer, 1305 Harrison St., Chicago, Ill.

WILL SWAP BOWLING BALL and shoes size 8½ with bag, three matched Hagen woods, five irons, golf bag, ice skates size 9, Packard electric razor. Want test equipment, etc. Leslie Merz, 132 Millbank St., Rochester, N. Y.

WANTED—RIDER MANUALS; from vol. three up to date. State price. C. E. Laier, Nezperce, Idaho.

WANTED: 35 AND 16MM MOVIE cameras also candid types. Have: SW3 National, meters, test equip., 22 automatic rifle, power transformers, gas engine. Gus W. Deuchler, No. 1 Florence Station, Omaha, Nebraska.

WANTED CARBON OR CRYSTAL mike, have radio parts, variable cond. power packs, also Balkite Trickle charger, operates on 110 volts, charges from 4 to 6 volts, etc. Albert Bellfuss, Jr., R.I. Box 94, Harris Rd., Glenview, Ill.

WANTED—PICKUP, SLIDE trombone, any type of trombone music and records, and complete orchestrations. Have radio and bike parts. Joseph Gerard, Jr., 3338 E. 132, Cleveland, Ohio.

FIRST DAY COVERS TO EXchange for U.S. commemoratives. Newspaper for ten commems. World War covers, gov't. postals, T.B. seals for coins. Ten unused purple stamps for old Duck stamps. Mervyn Reynolds, Jefferson, Maine.

WILL TRADE BUILDING INstructions, fuselage, wing spars, enough wood to finish Flying Flea airplane for printing press or what have you. H. Earl Tremain, 916 Park, Salina, Kansas.

WANTED: RADIO COURSE. Have stamps, tennis racket and roller skates. Want to exchange stamps with foreign correspondents; stamp for stamp. Donald C. Weber, Archbold, Ohio, U.S.A.

TRADE READRITE 0-60-300 D.C. voltmeter, net $2.65, 0-10 D.C. voltmeter, zero adjustment, 1938 Radio Handbook, for Radio Physics Course. Write, stating condition. Glenn Coffey, 703 Woodbury Road, Altadena, California.

HAVE CYLINDER EDISON phonograph, 37 records, stamps, 75 lbs. U.S. stamps on paper. Want long or short wave single battery receiver, good 32 or 110V generator or battery unit, tools, stamps, or? Frank Schmid, Washington, Vermont.

954-955-956 TUBES. WILL EXchange 4 tube, 2 band, receiver for any one of them. Or what have you? All letters answered. G. E. Boldman, 317-7th St., Rawlins, Wyo.

HAVE SW-3, HOME BUILT TRF and Parts. Want phonograph parts such as record changers, pickups, etc. Bill Sampson, Jr., 2208 Floyd Avenue, Richmond, Virginia.

WANTED, GOOD STAMP COLlection from someone who wants to get rid of entire collection. Have radio parts to trade for same or what? Write Elliott Layden, RFD No. 2, Box 21, Hertford, N. C.

WANTED: 20 METER CRYSTAL and bug. Have cash, 100 power microscope, radio mags. and parts. QRA: Al Hobling, 1725 Putnam Ave., Ridgewood Station, Brooklyn, New York City.

WANTED—AUTO RADIO, PICKup or? Have speaker, radio parts, stamps, etc. Send for list. Want to correspond with 18 year old YL'S or SWL'S. R. Hower, R.D. No. 3, Bloomsburg, Penna.

SWAP—NEW PORTABLE PHONO spring driven—small A.C. electric motor, 12" Majestic speaker in case, 25 novel books, for typewriter or what have you. All letters ans. Charles Bailey, Box 187, Draper, N. C.

SWAP SCHICK RAZOR USED, mechanical drawing set 906½, Keuffel & Esser a-1, cost $22.50, Eby eye, 3 inch PM spkr., other parts. Want scope, record changer, xmitter parts. Harold Cook, 307 So. Elm St., Shenandoah, Iowa.

SIGNAL GENERATOR WANTED type using batteries. Must be in A-1 condition and priced reasonable. Will pay cash. Please send full details in first letter. Elmo Brekhus, Dawson, Minnesota.

I HAVE SIX 4 MFD, 2000 VOLT oil filled condensers with insulated standoffs. Want ohmmeter, transmitting tubes, parts, manuals, etc. Write. Will consider any swap. W8OLM, Natrona, Pa.

HAVE GUITAR, NEW METAL glass tubes, many modern parts, transformers, midget speaker, cabinet, pickup, turntable, motor, spark coils. Want banjo, flyrod, N. Hansen, 826 S. 4th St., Aurora, Ill.

WANTED CRYSTALS MOUNTED or unmounted, or what have you. Have meters, new, slightly used transmitting tubes, RK20's, 809's, RK36's, mikes, other miscellaneous parts to swap. Radio W8OQI, Wellsville, N. Y.

WILL SWAP 6-350 DYNAMOTOR nearly new, a 6 tube Philco car radio and a Kodak, need a good SW receiver or what have you? W9FEL, Delphos, Kansas.

TRADE FOR RADIO EQUIPment, U. S. regulation bugle, and single shot Remington 22 rifle. Both in good condition. Trade for 6 volt broadcast receiver, 5 meter transceiver or car radio. Eugene Wright, Box 1794, Vernon, Texas.

SWAP GIANT OIL FILLED CONdenser, 15"x6"x6" rated 3500 volts will stand 5000. Want transmitting tubes or will consider any radio parts swap, can use anything. J. H. Ziglinski, 37 River Ave., Natrona, Pa.

SWAP 15 WATT PHONE RIG complete with mal. tubes, mike, power supply. Uses 80, 57, 6L6, 6L6. Works on 160M and 80M for what have you? W2HAP, 804 Lanet Ave., Far Rockaway, L. I., N. Y.

HAVE MOTOR EFFICIENCY guide, cartooning course, phones, practice of printing manual. Want instructograph, short wave parts, A.C.-D.C. code oscillator or what have you got. H. Patchen, 23 Grand Street, Sidney, N. Y.

WANTED RECORD-CHANGER, Rider's Manuals and oscilloscope. Have photo-enlarger, cameras, latest Victor and Bluebird dance records (new), back issues of Fortune and Esquire and cash. Write to Ray Kline, Box 273, Coraopolis, Pa.

HAVE WESTON SIGNAL GENerator, 8 inch milliammeter, condenser analyzer, Triplett lab, other equipment. My list for yours. Am interested in recording equipment. P. J. Wagner, 647 Seagirt St., Pittsburgh, Pa.

WILL SWAP OLD BOTTLES, FOSsils, Indian relics, for headphones for 1 tube radio, $ size silver coins, Rider Haggard books, E. Beam, Mt. Orale, O.

SWAP: 6 METAL TUBE SUPERGainer with 8" dynamic spkr. Also 4 tube 5 meter revr with 6" dynamic. Want FB7A or? All replies answered. W9OLD, 3848 N. Ridgeway Ave., Chicago, Ill.

HAVE ONE $150 ICS RADIO operating and servicing course; want good camera or small xmitter, or what have u. QRA John Ferris, Sussex, New Brunswick, Canada.

HAVE SAXOPHONE, VIOLIN, microscope, telescope, field glasses, movie camera, with projector, kodak camera, electric dry shaver, watch. Want coins, medals, old bonds, fine old U. S. stamps, covers, autographs, prints, relics. J. Settel, 24 Crosby Ave., Brooklyn, N. Y.

STAMP COLLECTORS: EXchange stamps with collectors in foreign countries, appreciate covers with commemorative stamps for my cover collection. All letters answered. Wilbur Myers, 317 Putman St., Sulphur Springs, Texas, U.S.A.

HAVE LATEST MODEL 27, SLIDE action Marlin repeater, caliber .25-20, perfect condition. Want high grade 8 power binoculars or? C. Moore, 211 East 108 Street, Los Angeles, Calif.

SWAP BRAND NEW MAC BUG for ham receiver in A-1 condition. Prefer one with electrical band spread but others considered. Frank Courtney, W4FDX, 616 Greene St., Augusta, Ga.

NEED CRYSTAL MICROPHONE, typewriter, Trade Thordarson 500, 7½ fil. Motor generator 110 AC, 500 DC, Jewell 15 VAC, 150 mil DC, one amp RF, Weston 50 and GE 500 mil DC. W6DXA, 209 S. F. Blvd., San Anselmo, Calif.

DX'ERS, YL'S, XYL'S, I'LL trade you stamp for stamp. Send one or more, I'll send equal number by return mail. Also a few Fada parts to trade for stamps. Arlene Horton, 16 Auburn Place, Athol, Mass.

HAVE SHORT WAVE CRAFT, S.W.&T., Radio News, Popular Science, Pop. Mechanics, Modern Mechanix, and Life Magazines for what have you. Will answer all mail. I exchange QSL's. Bill Rusins, 8611 S. Rockwell St., Chicago, Illinois.

HAVE—¾ HORSE B. & S. ENgine, '33 Willys sedan, Nickelodeon piano, C-2 Argus and all accessories. Want factory built rec. and trans. Rob Forman, Box 127, Monmouth, Illinois.

TRADE $14.95 SILVERTONE RECord player for a good used Sky Buddy receiver, also have many radio parts, have $2.00 worth of popular dance records. Want headfones. Write. Howard Perkins, 11814 Pepper Avenue, Cleveland, Ohio, U.S.A.

SWAP GOOD CONDITION WINchester 22 long rifle, leaver action, army type, wind gauge, front, back sights, arm straps, weight 10 lbs., 30 inch barrel, approx. value $45, for what have you. Milton Benson, So. Hadley Falls, Mass.

WILL TRADE ONE G.E. HI voltage sign transformer. Prim. 110-120 A.C. sec. 15,000 V. almost new, for a good S.W. receiver. M. F. Matteri, Del Norte, Colo.

HAVE COMBINATION TATTOOing machine, tattoo designs, inks, needles, secrets fire eating, glass walking, Hindu rope escape trick and many other secrets to trade for instructograph. E. E. Dye, 321 East State St., Kennett Square, Pa.

SWAP FISHING FLIES, PLUGS, lines, leaders, reels; handball gloves, Taylor barometer, Hodgman poncho, hunting knives, new briar pipes for sleeping bag, .22 rifle, binoculars, outdoor equipment. U. S. Stamps, Waltz, 1211 Transverse, Pittsburgh, Pa.

WILL SWAP A 4 TUBE BATTERY operated SW receiver with 40 and 80 meter coils for 10 meter transceiver or what have you? Harold Lantow (W9SEF), Renwick, Iowa.

WILL TRADE 1,000 DIFFERENT, unused postcard views of the U. S., $4.00 credit on used correspondence course, etc., for Sky Buddy or Howard 430. Joseph McGuire, 5022 So. 38th St., Omaha, Nebr.

TRADE MOTOR GLIDER SCOOTer, cost new $129.00, four cycle motor 1¼ h.p. for fast miniature camera, photo equipment, photographic supplies. Scooter worth at least half new price. Joseph Pietrowski, 1119 St. John St., Toledo, Ohio.

WIRGIN CAMERA F.3-5 REFLEX autofocusing also Oliver typewriter good condition and Hallicrafters Sky Chief, also $20. Would like Hallicrafters SX17 or what have you. Samuel Brodsky, 365 Grand St., New York City, New York.

WANTED—80 METER CRYSTAL with holder for 3860.5 meter crystal and cash to boot. Trade 20 volt transformer for Johnson dial es plate. Other parts. Write to Bob Louis, 112-4 Avenue East, Calgary, Alberta, Canada.

SWAP CHARLES ATLAS $35.00 (Dynamic Tension) course for a reasonably good SW receiver, radio courses, or what have you. J. Masiek, 515 Grand St., Trenton, N. J.

WOULD LIKE TO HEAR FROM stamp collectors in Canada and Newfoundland. Will exchange only good copies of Australian stamps, also 1st day covers. F. Ryan, 281 Bell St., West Coburg, N13, Victoria, Australia.

WANTED—TRIPLETT 0-300 AND 0-150 meters, test analyzer, osc., tube checker, 0-5 R.F. ammeter. Have Stewart Warner 301 converter, American F-1 mike, Stromberg Carlson Pickup, etc. Don Hutchins, Jr., 622 Blvd. E., Weehawken, N. J.

HAVE A CROSLEY 5 TUBE AUTO radio. Will swap for typewriter, short-wave receiver, or what? Will also swap S.W.L. cards. I QSL 100%. QRA—Victor Charls, 14 Union St., Methuen, Mass.

I HAVE 50 MAGAZINES S.W.&T., 1934-1938. Will swap for what have you. Have a 5 meter transceiver. Joe Ribinski, 219 Nepperhan Ave., Yonkers, N. Y.

(Continued on following page)

BARTER and EXCHANGE FREE ADS (continued)

HAVE 5 CELL FLASHLIGHT, Junior International album, 1937, 1500 foreign, U. S. stamps, transformer delivering 4.5 volts, copies Short Wave Craft, Radio & Television. Trade for complete N.R.I. course. Sol Friedman, 500 W. 182 St., New York, N. Y.

TRADE—150 VARIETIES U. S. stamps mounted in stock-book. No junk. Wanted—Musselman hub brake model M in good condition. Gale Passley, Jr., 1834 Monroe St., Chicago, Ill.

WANT OLD PHONO-RECORDS before 1920. Classical or jazz. Singers, orchestras. Must be fairly clear, not badly scratched. Send list. Will trade other records, cash. Jim Palmer, 4832 Caroline Street, Houston, Texas. Want for collection.

WILL PAY $2.00 FOR A 1,100-0-1,100 volt, 150 ma. power transformer, which was advertised for $1.69 in the bargain section of Wholesale Radio's catalog. Dean Cooper, 17 So. 17th St., Fort Dodge, Iowa.

TRADE LONGINES $100 WRIST watches, one man's, one lady's, 14k solid gold, brand new, never worn. John Elliott, 412 Seneca Ave., Oil City, Penna.

WANT TO TRADE OR WILL PAY some cash for barometers, or other weather instruments in good condition. Thad E. Gressley, 1819 Trinity Dr., Toledo, Ohio.

CASH FOR NATIONAL TYPE B drum dial, new or used, counter clockwise rotation. Also exchange 140 mmf dual condenser for 100 mmf singles. K. Johannes, Old Hickory, Tenn.

I HAVE 20 CANDY MACHINES and 4 peanut machines. Will trade for testing equipment, good receiver, such as National, Hallicrafter, etc. All letters answered. Whatsay? Jack Butler, 508 Whitley Ave., Joliet, Illinois.

WANTED: GOOD 16M PROJECtor, films. Also Jewell, Weston test equipment, meters. Trade: code machine, code course, velocity, mike, amateur sets, ham parts, radio books, course, etc. Write S. J. Nicewicz, 79 Church St., Broad Brook, Conn.

HAVE ONE TUBE RADIOS, crystal sets, parts, sign painter letter patterns. Want radio parts, books. John Haynes, Doe Run, Missouri.

OFFER—TELEPLEX SPRING wound model in good condition. Want meters or power supplies for xmitter. Write W3IYU, Albert Port, 165 W. 7 Ave., Conshohocken, Penna.

HAVE LIONEL O GAUGE ELECtric trains transformer, tracks in fair condition. Keystone postcard projector practically unused for good typewriter. Have good 33 tube for good 34. Arthur Waddicor, 29 Day Street, Fall River, Mass.

WANTED RIDER'S MANUALS OR tube tester, or what have you. Have radio parts, B-Eliminator, ice skates size 11, etc. S. J. Battory, 35 Potter Pl., No. Adams, Mass.

WANT A STRONG POWERFUL camera, phonograph oscillator, 1938 Ultra Stratosphere "10" or other similar sets. Have an old bayonet, Falcon camera and radio parts, interested in everything. Stanley Majewski, 165 Norman Ave., Brooklyn, N. Y.

WANT CAMERA, ENLARGER, etc. Have radio parts, ham equipment. Send your list for mine. Don W. Bottolfson, W9ZME, 260 Maria Ave., St. Paul, Minn.

HAVE PHONOGRAPH MOTOR, 8 inch dynamic speaker and U.S. and foreign stamps for short wave receiver, factory or home assembled, or what have you. Clare Seaman, 125 3 St., S. E., Rochester, Minn.

SWAP NEW WEBSTER UNAbridged Dictionary, two large volumes, latest edition. Jack Bannon, 412 Seneca Street, Oil City, Pa.

WANT OLD AND LATE RECORDings by Bing Crosby, must be in playable condition and not badly scratched. Will pay cash or trade if oke. Howard Hover, Box W, Lemon Grove, Cal.

CORRESPONDENCE WANTED with English speaking young man in Palestine. Leslie E. Collins, West Pine Street, Plaistow, New Hampshire, U.S.A.

WOULD LIKE A SW SET OR what have you. Have Windcharger, B-Eliminator, speaker, phono-pickup, etc. Edward Sherman, R.F.D. 2, Amanda, Ohio.

WILL SWAP OR TRADE ONE American Code Reader slightly used with two rolls of tape for what have you? Will consider a set of Riders Manuals. Eugene Cheney, Box 88, Rudd, Iowa.

WANT COM. RECEIVER, .54 TO 30 MC and V-O-M meter. Have Instructograph with ten tapes, Browning automatic 16 Ga. shotgun with two barrels, single barrel 20 ga. gun, cash. G. M. Bettis, Sweetwater, Texas.

POSTAL CARD COLLECTORS, I will exchange a card from my locality for one from yours. Please autograph face of card. Address to Leon F. Ostroski, 527 S. 15½ St., Reading, Pa., U.S.A.

HAVE BENJAMIN AIR PISTOL, single shot with safety catch and adjustable shooting force. Want D.C. volt-ohm-milliammeter or small signal generator. Arthur B. Hames, 2408 W. Oakdale St., Phila., Pa.

SWAP HAM PARTS, ALL KINDS meters, transformers, chokes, tubes 212D, 203A, 807, 860, etc., 5 meter receiver, transmitter for all bands, many other parts. State your wants. W8JXV, 412 Seneca St., Oil City, Penna.

WANTED—TUBE TESTER, OSCilloscope or oscillator or any test instruments. I have superhet, radios, volt ohmmeter for testing instruments or something else. D. Carlson, 217-02 38th Ave., Bayside, L. I., N. Y.

TRADE: ARGUS-A, CAMERA, case, Don focusing mount, Maxim exposure meter and wrist loop, for Astatic D-104 mike, National CRM oscilloscope with tube, or? All letters answered. Chet Rataski, 272 E. Poplar, E. Plymouth, Penna.

SWAP—5, 10 METER EXCITERxmtr.; 10 meter mobile receiver; Carter 250 volt, 50 mils Genemotor; portable 10 meter c.w. rig; 10 meter mobile transmitter, mobile pwr. supply. W1JOM, 40 Wayland St., Boston, Mass.

WOULD LIKE TO BUY OR trade for books and information on how to become an Amateur and operating a transmitter. Billy Gyles, Hallesville, Okla.

WANTED 3 TUBE ALL ELECTRIC short wave receiver less tubes and coils. Have large 9 inch super dynamic speaker, also have 7 tube Majestic chassis less tubes, speaker and power pack. George Moeller, Finley Park, Ill.

WANT OLD COINS, CAMERA, lenses, photo equipment, drawing instruments, or? Have mechanics' tools, carpenters' tools, hobby or workshop equipment and fine table lamp. D. L. Snyder, 1140 Walnut St., Allentown, Pa.

WANTED ROLLEICORD OR ANY other reflex type camera in exchange for trumpet, miniature camera with 2.9 lens, enlarger, and other photographic equipment or cash. Address, John Baber, 802 So. Third Avenue, Maywood, Ill.

WANT CODE TEACHING MAchine. Have 600 volt power pack 7.5 fil. tan with tubes. Robert Cooke, Wes Fifth St., Marion, Indiana.

WANTED—2 CODE PRACTICE keys in good condition, also 6 volt storage battery "B" eliminators. Will answer all letters. Herbert McKay, Donalda, Alta., Canada.

WILL SWAP COMPLETE C-W transmitter, new receiver, 5 volt transformers, xmitting tubes, etc. Want phone transmitter less power supply. Will answer all correspondence. Send list. Maurice Twilley, Del. Road, Pittsville, Md.

TO TRADE: W&T HELLAGE comparator (Hydrogen ion apparatus) in perfect condition. Want 4-5-6 tube communication type revr., 10 to 550 meters. All inquiries answered. Write—G. Cape, P.O. Box 163, Desloge, Missouri.

SWAP—2 TUBE AC-DC SHORT wave set with 1 coil (others lost) with tubes. Want bicycle or portable battery set (1 to 5 tubes). Walter Graham, 6500a Olive St. Rd., St. Louis, Mo.

WANTED: USED CANDLER JUNior course. State lowest cash price in letter. Best offer accepted. Write:—Arthur Harris, 216 E. Madison St., Easton, Pa.

SWAP: ALL KINDS RADIO parts, test equipment, books on radio and photography, S.W. magazines, writers magazines, U.S. and foreign stamps. Want: Stop-watch, stapling machine, Hektograph machine. John J. Vilkas, 1317 So. 49th Court, Cicero, Ill.

WANTED: TO EXCHANGE CORrespondence with anyone, either sex, in England and U.S.A. I won't fail you. Ernest W. Meyer, R.1, Girard, Kans., U.S.A.

ENGLAND CALLING, I HAVE several duplicates in my stamp collection I should like to exchange. What have you and what do you want? No dealers please. George Blowers, 74 Commodore Road, Oulton Broad, Lowestoft, England.

CORRESPONDENCE WITH INteresting people desired. Want to exchange letters, photos, etc., with you whether you are in the U.S. or a foreign country. Write me, John Pawluk, 1085 Hazard Ave., Los Angeles, Calif.

WANTED: 5 METER TRANSceiver. Pay cash for best offer. State price and particulars. J. Bertolls, 510 W. Henrietta, Gillespie, Ill.

HAVE 1100 COPIES CHICAGO Fair songs. Very beautiful souvenirs. Battery radio and old fashioned high wheel bicycle, minus big wheel, for what have you? W. E. Shelton, 73 W. Cuyahoga Falls Ave., Akron, Ohio.

2 TUBE DC SET WITH AMPLIfier and speaker unit. Indian head cents, approval stamps, postmarks, sharp tuner dial, banjo-uke, auto safety lighter, headphones. Want mimeograph. R. Lewis, Griffithville, Ark.

SWAP $110 N.R.I. RADIO COURSE for superhet communications receiver or what. Norman Niemiller, 230 Parade St., St. Marys, Pa.

SWAP QST'S FOR PHOTOgraphic equipment:— May, June, Aug. 1925; Feb.-Dec. '26; Feb. '27-Jan. '29; June '29; Aug.-Nov. '29; Jan. '30-April '31; Nov., Dec. '31; Jan.-Oct. '32. Herman Yellin, 351 New Lots Ave., Brooklyn, N. Y.

USED HAWAIIAN GUITAR, CASE and lessons, cost $35.00 two years ago. Swap for high speed key, code course or what have you. Also have plate camera. Everett Schauf, Wellman, Iowa.

TRADE: LUDWIG ORCHESTRA snare drum which is practically new and in fine condition for SW3. A. M. Hinds, Jr., Box 1, Tye, Texas.

WANTED: 3 OR 4 BAND A.C. short wave, 5-, 6- or 7-tube receiver, working condition, with-without tubes. Trade 2—30-0-30, 2—0-60 Weston DC ammeters, never used for receiver. R. W. Dieter, R. 2, Box 109, Blue River, Wis.

WANTED: SUPERHET, AT LEAST 1 stage R.F. cover, 10 meters, code oscillator. Have E.C. 0-50-45 amp. 35 watt xmitter, 7T clipper, 750 volt xformer, 210 tube, A.C. motor, power supply for xmitter. Victor Samardzi, 1044 Longfellow Ave., Bronx, N. Y.

SWAP—TRANSMITTER, PARTS, radios, books. Wanted field glasses, movie camera or what have you in trade. Samuel Schleecker, 326 East 46th St., Brooklyn, N. Y.

WANTED: USED TEST EQUIPment in usable condition. Will trade radio parts or cash for same. Billy Diggs, 3000 Wilbarger St., Vernon, Texas.

TRADE FOR PHOTO SUPPLIES or? Triplett 1232 signal generator; 1200-A volt-ohm-milliammeter; 1220-A checker; 1295 modulation monitor, Clough-Brengle OMA frequency modulated signal generator. Guaranteed new. M. L. Potter, 233 East Ave., Park Ridge, Ill.

WANT BASEBALL CATCHER'S equipment, music and phonograph equipment, or? Have great variety of precanceled stamps, violin, magazines, Mah-Jongg game, etc. Victor Lurski, 15 Grove Terrace, Irvington, N. J.

HAVE EARPHONES, TONE ARM, fossils, minerals, guitar, mandolin, ukelele, banjo and taxidermy courses, old prints, records, list. Want midget radio, perennials, coins, Indian pottery, relics, vases, etc. Stanley Pytel, 5025 Ogden Ave., Cicero, Ill.

WANTED: SCIENCE FICTION story magazines. I have other magazines, papers, stamps, course in physical culture, etc. I will trade for them. Write H. A. Pitman, London, New Hampshire.

DETA WOOD LATHE, 36 INCH chuck, tool guides. Want communication receiver, gasoline power generators, meters, rifle, relays, camera, crystal microphone, or what? E. H. Lyle, Box 936, Wink, Texas.

WOULD LIKE TO EXCHANGE badges, pins, medals, etc., from other states and countries. Will send something for your hobby from here. I QSL 100%. Russell Fehr, 2018 South 7th East, Salt Lake City, Utah.

BREAKING UP MY LABORAtory. Tube tester, meters, outlets, switches, power trans, tubes, radio magazines, motors, generators, panel lights, condensers, resistors, radio cabinets and chassis. Russ Furman, 611 Franklin Ave., Hartford, Conn.

HAVE ALL KINDS OF RADIO parts. Am interested in trading for golf clubs. Give type of clubs and what you want in trade in first letter. Herman Buehrle, Jr., 722 Penn St., Gary, Indiana.

CANADIANS—HAVE NUMEROUS new and used radio parts to exchange for radio parts or test equipment. Inquiries appreciated and answered. Harvey Zellen, 441 Crawford St., Toronto, Ont., Canada.

HAVE 800 DIFFERENT STAMPS. Trade for R&T, double button mike, key, Isolantite sockets, plug-in coils, vernier dials, 140 mmf. variable condensers, 2½ MH. R.F. choke, power transformer. Thomas Silvaggio, 50 Steuben Street, Providence, Rhode Island.

WILL SWAP 3 TUBE AMPLIfier, complete with tubes, speaker amp. Any trade offers? Harry Campbell, Jr., 98 Cove St., Portland, Me.

CODE MACHINE INSTRUCTOgraph with oscillator, key, phones and tapes 1, 2, 3. Also Weston analyzer plug and adaptors. Will exchange for short wave parts or what have you. Andrew Dunn, 1462 W. Hubbard St., Chicago, Ill.

(Continued on opposite page)

Mc.	Call	
5.898	YV3RA	BARQUISIMETO, VEN., 50.86 m., Addr. La Voz de Lara, 12 n.-1 pm., 6-10 pm.
5.885	HI9B	SANTIAGO, D. R., 50.95 m. Irregular 6-11 pm.
5.875	HRN	TEGUCIGALPA, HONDURAS, 51.06 m. 1.15-2.15, 8.30-10 pm.; Sun. 3.30-5.30, 8.30-9.30 pm.
5.855	HI1J	SAN PEDRO DE MACORIS, D. R., 51.25 m., Addr. Box 204. 12 n.-2 pm., 6.30-9 pm.
5.845	YV1RB	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.
5.825	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.
5.790	TGS	GUATEMALA CITY, GUAT., 51.75 m. Casa Preidencial, Senor J. M. Caballeroz. 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.
5.735	HCIPM	QUITO, ECUADOR, 52.28 m. Irregular 10 pm.-12 m.
5.180	YDX	MEDAN, SUMATRA, N. E. I., 57.97 m. 8.30-11.30 am.
5.145	OKIMPT	PRAGUE, BOHEMIA, 58.31 m., Addr. (See OLR, 11.84 mc.) Irregular.
5.145	PMY	BANDOENG, JAVA, 58.31 m. 5.30-11 am.
4.960	VUD2	DELHI, INDIA, 60.48 m., Addr. All India Radio. 7.30 am.-12.35 pm.
4.920	VUM2	MADRAS, INDIA, 60.98 m. Addr. All India Radio, 6.30 am.-12.10 pm.
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.
4.830	VUB2	BOMBAY, INDIA, 61.8 m. Addr. All India Radio, 7.30 am.-12.30 pm.
4.880	HJ4ABP	MEDELLIN, COL., 61.44 m. 8-11 pm.
4.876	ZTD	DURBAN, SOUTH AFRICA, 61.5 m., Addr. (See ZRK, 9.606 mc.) Daily 12 m.-3.45 pm., Sat. till 4 pm., Sun. till 3.20 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.
4.840	VUC2	CALCUTTA, INDIA, 61.98 m. Addr. All India Radio. 6.30 am.-12 n.
4.800	HJ1ABE	CARTAGENA, COL., 62.46 m., La Voz de los Laboratorios Fuentes. Addr. Box 31. Daily 8.30 am.-11 pm., Sun. 10 am.-9 pm.
4.780	HJ1ABB	BARRANQUILLA, COL., 62.72 m. La Voz de Barranquilla. 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.
4.740	HJ6ABC	IBAGUE, COL., 63.25 m. 7 pm.-12 m.

On the "Ham" Bands

(Continued from page 27)

Call	*Freq.*	*R*	*S*	*Where Heard*
HI3N	14.21	5	9	N. J., South Africa
HI5X	14.165	5	9	N. J.
HI7G	14.2	5	9	N. J.
	28.25	4-5	7-9	Ontario, Me., N. J.
HI7I	14.035	5	2-8	Conn., N. Y.
HP1A	14.5	5	7	Fla.
HR2A	14.27	5	8	Kan.
HR5RG	14.05	5	5	Ore.
HR5C	14.115	5	8	Conn.
K4EEE	27.02	5	6	N. H.
K4EJF	14.115	5	4-9	N. H., N. J., N. Y., Fla.
K4FTC	28.125	4	8	N. J.
K4EZR	28.02	5	8	N. J.
K4EMG	14.11	5	8	N. J.
K4EJR	14.11	5	8	N. J.
K4FAY	14.219	3-5	6-8	N. J., Fla., S. D.
K5AF	29.38	5	6	Ky.
K5AN	28.8	5	8	Ontario
K7GSC	28.52	5	8	Ky.
K7GDP	28.62	5	7	Ky.
K7AOC	14.213	5	9	Utah
OX7ZL	14.04	5	7-8	Col., Kan.

Call	Freq.	R	S	Where Heard
TG9AA	14.095	4-5	6-9	Wash., N. J., Conn.
TG9BA	14.29	3-5	5-9	Col., Me., N. J., New Zealand
TI2AC	14.15	5	8-9	Me., N. J.
VE1ET	28.3	3	3	England
VE2BG	14.	5	8-9	England
VE2CP	14.15	5	8-9	England
VE2AA	14.15	5	7	England
VE3LL	14.19	5	8-9	England
VE5AHU	14.11	5	5	England
VO1B	14.25	4	7	Fla.
VO2N	14.02	3	4	Mo.
VO2Z	14.137	5	4	N. Y.
VO6B	14.28	5	7	Ontario
VP1BA	14.095	4-5	6-9	Col., Conn., Wash., Ill., Me., N. J.
VP1WB	14.09	4-5	6-9	Col., N. Y., Wash., Ore., Me.
VP2LC	14.13	4	8	N. J.
VP5TR	14.21	4	7	Me.
VP6FO	14.105	5	5-9	Ore., N. J., N. Y.
VP6LN	14.15	5	9	Me., N. Y.
VP6YB	14.1	5	9	N. J.
VP6MY	14.135	5	8	N. J.
VP6LO	14.075	4	7	Conn.
VP6MR	14.145	5	7	Conn., South Africa
VP7NS	14.11	5	6-8	Col., Me., N. J.
VP7NW	14.2	5	7	Me.
VP9L	14.06	4-5	6-9	Wash., Me., Conn., Ill.
VP9G	14.105	5	8-9	N. J., Conn., N. Y., Ill.
VP9R	14.165	4	8	N. J., N. Y.
VP9Z	14.34	3	5	N. Y.
VP9LS	14.12	2	2	S. D.
W1ATY	14.	4	6-7	New Zealand
W1ZI	14.	5	8	South Africa
W1KQM	28.4	5	7	England
W1KBL	28.42	5	3	England
W1HYZ	29.06	5	5	England
W1KEX	29.08	5	6	England
W1AUR	28.82	5	6	England
W1KDZ	29.0	5	6	England
W1FBX	28.86	5	4	England
W1JIS	28.62	5	4	England
W1BDS	28.6	5	5	England
W1IPV	28.	5	4	England
W1HON	28.	5	4	England
W1KTF	28.	5	5	England
W1HPQ	14.23	5	8	England
W1KKP	14.	5	9	England
W1BUZ	14.25	5	8	England
W1COI	14.23	5	7	England
W1IFD	4.4	2	5	S. D.
W1TNT	3.95	4	7	S. D.
W1DQA	4.0	3	7	S. D.
W2JOY	28.28	5	7	England
W2HTW	28.3	5	6	England
W2GIZ	28.33	5	4	England
W2IYX	28.32	5	6	England
W2BFN	29.4	5	3	England
W2GFH	28.	5	8	England
W2JWN	14.19	5	9	England
W2AQK	14.19	5	8	England
W2CXP	14.22	5	8	England
W2BRI	14.21	5	9	England
W2ELJ	4.12	4	8	S. D.
W3GKM	14.	5	8	South Africa
W3EOZ	14.28	5	7-8	South Africa, England
W3FIL	28.35	5	6	England
W3BDV	29.1	5	4	England
W3CLA	29.0	4	3	England
W3AST	28.	5	5	England
W3BBO	28.	5	6	England
W3IIKM	28.74	4	4	England
W3FRE	14.22	5	9	England
W3FJU	14.25	5	5	England
W3EWW	4.4	3	5	S. D.
W4OC	14.25	5	7-8	South Africa, England
W4EEV	14.	5	8	South Africa
W4EPX	28.62	5	4	England
W4EGN	29.6	5	5	England
W4ERX	28.6	5	4	England
W4ECZ	14.21	5	9	England
W4AMR	14.21	5	6	England
W5ZS	28.7	4	4	England
W6RKY	14.	5	8-9	New Zealand
W8DBC	14.	5	8	South Africa
W8AFQ	28.96	5	5	England
W8CIR	28.8	5	3	England
W8AHC	28.7	4	3	England
W8QWT	28.	5	6	England
W8QKS	14.22	5	8	England
W9ARA	14.	4	6-7	New Zealand
W9TIZ	14.	5	8	South Africa
W9RGH	14.	5	8	South Africa
W9MEL	14.	5	8	South Africa
W9OFL	28.65	5	5	England
W9WIP	28.	5	6	England
W9OLY	28.6	5	5	England
W9RUK	14.24	5	8	England
XE1AA	14.12	5	6	Wash.
XE1GE	28.45	5	7	Ontario
XE1CJ	14.1	5	7	Me.
XE2BJ	14.13	5	9	Wash.
XE2FA	14.05	5	8	Wash.
XE2GM	14.115	5	8	Wash.
XE3AX	14.3	5	8	Ontario
YN3BG	28.4	4	6	Me.
CE1YO	14.12	5	7	Wash.
CE1AO	14.1	4-5	6-8	Ore., Fla., Ill.
CE2BX	14.13	3-5	5-7	Col., Ill., Mass., S. D., Fla., New Zealand

(Continued on page 63)

BARTER and EXCHANGE FREE ADS (continued)

WANTED: USED INSTRUCTOgraph tapes; continental only, state number, price, and condition. Write: John R. Kane, 1718 Martha Washington Dr., Wauwatosa, Wis.

HAVE 6 INCH REFLECTING telescope, factory ground mirror, metal tube. Want oscilloscope or what have you. Claude Smith, Wink, Texas.

WANTED—"SKY BUDDY" SW receiver. Will give $11.00 in cash or Argus camera, filter and sunshade (retail value is $13.50) and $3.00 cash. B. Rosenbaum, 1606 North Shore Rd., Revere, Mass.

I HAVE 8 SETS REDUCTION gears suitable for rotary antennas. Need meters and dials, variable condensers. Send list and I will send full data. I will answer 100%. Martha E. White, Pittsville, Md.

CANADIANS, 65 POPULAR MEchanics, 50 Modern Mechanix and Invention. Trade for folding Kodak camera or 8 mm. movie camera. A. E. Martsch, Box 101, Madison, Sask., Canada.

SWAP NEEDHAM UPRIGHT concert grand piano, needs retuning and polishing, inside in perfect condition, never been used. Will deliver around Boston. Want transmitter or receiver. S. Swetzoff, 33 Wabon St., Roxbury, Mass.

WANTED: SMALL XMITTER, A.C. transceiver ei phono equip. Will trade test equip., meters, es rering parts. Write—Charles Steiner, 634 Delaware Street, Harrisburg, Pa.

WILL SWAP A SUNBEAM ELECtric razor A-1 condition. Also hand grinder brand new with 6 steel cutter 6 emery mounted wheels. For Hallicrafters, Sky Buddy or what? Marcel Lachance, 26 Howard St., Lewiston, Maine.

WILL SWAP 1 LIONEL TRAIN set, reversible engine, for short wave receiver. Will swap SWL cards. QRA. E. F. Diehl, Jr., 309 S. 15th St., Camp Hill, Pa., U.S.A.

I HAVE 120 COPIES OF SATURday Evening Post. Also Time, Forum, National Geographic and others. Want good radio parts, recvr., xmitter, or? QRA—Bob Davis, 363 Westland Ave., Berlev, Ohio. QSL 100%.

HAVE 4 VOLUME SET OF Audel's Plumbers' and Steamfitters' Guide, cost $6, good condition. Will swap for radio book or books of equal value. William H. Coburn, Box 177, Vivian, W. Va.

TO TRADE SUPERIOR ALL meter, Triplett tube tester, model 1210, and Triplett signal generator, model 1230, also Hammarlund coils S.W.K.-4 and S.W.K.-6 kit. R. I. Gardiner, 2689 L St., San Diego, California.

SWAP NEW EASTMAN ADJUSTable aluminum developer tank and radio parts for phono motor, pickup, equipment or what? Send list of swappage to Emmett Sullivan, 2329 N. Cramer St., Milwaukee, Wis.

HAVE 12 ISSUES RADIO NEWS Dec., '37 to Dec., '38, old Amateur Call Book, 2 or 3 SWL QRA lists. Want 10 meter converter, small battery radio or? Chas. A. Spileman, 413½ S. Barstow St., Eau Claire, Wis.

WANTED: UTAH KIT NO. 2 OR modulator. Must be in good condition. All letters answered. Burns E. Hegler, 310 N. "A" St., Arkansas City, Kans.

40 WATT—PHONE AND C.W. "Bi-Push" all band transmitter. Complete! Factory assembled. What have you to trade? H. G. Gwinn, 935 W. 21, Anderson, Ind.

SWAP DYNA PUSH EXCITER, complete with power supply, crystal and coils, for good used receiver or transmitting parts. Swap 2 stage postal preselector for Candler system or code machine. Steve Vargo, Jr., 2338 Riverview Ave., Dayton, Ohio.

TRADE BRENO VELOCITY MIKE A-1 with 10' cable, telegraph key and sounder, for crystal mike, pickup, turntable or what have you? I'll answer all inquiries. B. L. Fisher, 808 Farmer St., Petersburg, Va.

WANTED: GOOD 6 VOLT GENEmotor with about 200V output. Have A-1 condition Wollensak 15 power telescope to trade. All letters answered. Billy Sellman, R.R. 5, Greenville, Ohio.

WANTED: 2-4 TUBE AC-DC S.W. receiver, small printing press or Call Book. Have 2—30, 2—32, 1—22 tubes, 8" Utah speaker, phones. Homer Davidson, 322 E. 10th St. S., Newton, Iowa.

HAVE NEW MAC DE LUXE BUG key and late Candler Junior code course. 0-1 DC "Triplett" milliampere meter "new." Want good complete short wave receiver. Must be A-1 shape. John Strang, 332 N. Jefferson, Peoria, Ill.

SWAP CORONA PORTABLE WITH case, golf clubs, G.E. two-band superhet., books, tested tubes. Want phone rig, frequency meter, radio servicing instruments. Donald Watson, 17 Lake Street, Cooperstown, N. Y.

WILL TRADE MAGAZINES, TELescope, books and motor for small transmitter, 46 magazines in all. Motor in good condition. Also have many stamps, etc. Write for list. Warren Brown, 616½ Com'l Ave., Anacortes, Wn.

SWAP: ANALYZER, P.E. CELL unit, Motorola car set, vibrator power supply, 211-E transmitting tube. What have you? Jack E. Fry, Box 151, Denver, Colo.

WANTED: AUTOMATIC CODE machine or small multimeter, must test A.C. volts. Have Riders No. 3 and other radio equipment. Address: James H. Finney, 45 River Street, Cambridge, Mass.

SWAP 110 VOLTS UNIT D.C. 15 watts output name Racon, horn 3 feet long, brand new, converter D.C. to A.C., deliver 350 watts, for rifle, gauge 12 or 16, good condition. M. Bayona, 54 Henry St., N. Y. C.

HAVE TELEPLEX CODE MAchine, complete, built-in oscillator, phones, key and instructions, will trade for good preselector 10 to 160 meters, give particulars, or what have you? William Tietz, 1610 Mahan Ave., Bronx, N. Y. C.

TRADE "EILEN 3B" THREEtube, all-wave battery receiver, works magnetic speaker, very economical operation, in perfect working condition. Want a balloon tire bicycle in perfect working condition. Alexander Podstepny, 217 Pine St., Phila., Penna.

WANT 300 WATT FINAL AMPLIfier, modulator for same and power supplies, or parts. Have C Melody Sax, searchlight, power circular and jig saw, miscellaneous parts. Jimmy Gwinn, 935 W. 21st, Anderson, Indiana.

WANT TO BUY, USED FACTORY built short wave receiver and code machine. A. F. Jensen, 6939 Imlay St., Chicago, Ill. Nor. Pk.

WANTED: HAWAIIAN GUITAR, enlarger, stamp collections, 40 meter Rials, chassis, educational books, or? Have: 16 mm projector, films, radio parts, D.B. mike, QST, Radio, science magazines and charger, etc. Stan. 2748 Meade St., Detroit, Mich.

WANTED: SKY BUDDY, SIMILAR receiver, low power phone xmitter, meters, pickups, record changers. Have xmitter key, candid camera, radio course, records, high ratio tuning dial, phono oscillator. Bill Godden, Box 3, Emmetsburg, Iowa.

HAVE 5-TUBE S.W. RADIO, A.C.-D.C. model. Will trade for "U.H.F. Products Co." portable trans. recv., 2½ or lower, 4.000 M. or higher. Emery Toon, 300 Highland Ave., Johnson City, Tenn.

HAVE ARGUS CAMERA AND EXlarger, exposure meter, photo light, standard vertical enlarger complete, $75 course in photography, to trade for amateur radio and parts. Paul Rood, Hilton, N. Y.

HAVE BRAND NEW NATIONAL SW-3 with 20-, 40-, 160-meter bandspread coils, tubes and Frost headphones. It is the 2 volt model. Want photograph equipment. R. Rhett Byrd St., Raleigh, N. C.

HAVE: PRACTICAL WIRELESS Telegraph by E. Drew, and Radio Telephony for Amateurs by Ballantine. Want radios, parts, code machine or what have you? J. Kubik, 37 Pine St., Gt. Barrington, Mass.

WANTED: 6-TUBE SUPERHET., must have "R" meter. Have 360 feet 16 mm sports film in perfect shape, transmitting, receiving tubes and $3.00 in unused 3c stamps to boot. Dickson Witman, Red Bank, N. J.

HAVE LADY'S WHITE GOLD wrist watch, seventeen jewelled, Eastman 3A folding Kodak, National Geographics, Popular Mechanics, others; two tube Radette, Sky Buddy radio. Want larger radio, instruments, oscillator or what offered. C. Pollock, Chanute, Kans.

SWAP: SHORT WAVE SET builders' parts 2 volt tubes, 48 lesson N.R.I. course, value $20. Trade for field glasses, auto radio or .22 caliber automatic rifle. Oscar E. Nelson, Route 1, Oslo, Minn.

WANTED TO BUY—A CAMERA, prefer Argus, but will consider any kind. Price must be cheap. Have rifle, microscope, books and magazines to swap for what? All letters answered. Maylan Wilbur, Weld, Maine.

WANTED—RIDERS, GERNSBACK Manuals. Have three meter Readrite tester. L. M. Schlachter, Gettysburg, S. D.

SWAP ONE COMPLETE NRI radio course complete with code lessons for a Sky-Buddy or like receiver. John H. Schulken, 3 Warren St., Charleston, S. C.

HAVE 150 WATT A.C. GENERAtor. Cost $42.50 new. Power rack model A-1 shape. Trade for 5 meter transceiver or 2-tube loudspeaker set with batteries. Robert L. Smith, 33 Erwin St., Duquesne, Pa.

SWAP NEW ECLIPSE ELECTRIC outboard (cost $40), 1922 Harley motorcycle in A-1 condition, Candler code and typing course, N.P.I. Poultry course, for Graflex, Rolleicord or similar camera or good S.W. receiver. Richard Houghton, Littleton, Mass.

HAVE .32 CAL. RIFLE, WILL swap for guitar and rifle for 30/40 Krag. Have 11 shells to fit rifle. Radio parts, etc. What have you? Michael Fostar, R.D. No. 1, Salina, Pa.

WANTED: HALLICRAFTER, NC, or Howard short wave receiver. Will pay cash or trade, let's exchange lists. John C. Noonan, 620 8th Ave., Brooklinns, S. D.

HAVE LOTS OF RADIO PARTS, over 1,000 foreign and U. S. stamps, good guitar case, small turning lathe. Write for list. Want xmitter and ham equipment. Arnold Odden, Battle View, No. Dak.

SWL EXCHANGE

GREETINGS FROM THE SOUTHland. SWL's! Would like to swap cards with you, also newspapers and photos. Foreign readers, I QSL 100%, so come ahead with your cards. Edward Owens, Wellington, Ala.

SHORT WAVE LISTENERS IN U.S.A. and foreign countries. Would like to exchange SWL's. We QSL 100%. QRA: W. C. Parkinson, Box 864, Texas City, Texas, U.S.A.

I AM AN SWL. I WILL QSL 100% anywhere in the world. Ernest Sawyer, R.S.S.L., W3F84, 46 Highland St., West Medway, Mass.

SWL'S IN THE U.S.A. AND foreign countries, let's swap SWL cards. Send me your card and I will promptly send you mine. I QSL 100%. QRA: Vernon Lockett, 229 S. Bonner Ave., Tyler, Texas.

CQ SWL'S. WOULD LIKE TO swap QSL's with SWL's and hams. YL's included, in any part of the world. I QSL 100%. QRA: Arnold L. Berger, G75, 33 Warrender Park Road, Edinburgh, 9, Scotland.

SWL'S EVERYWHERE IN THE world, ur crd wud b appreciated. I QSL 100%. What say someone pse. Robert Guest, 359 N. Charlotte St., Pottstown, Penna.

ATTENTION SWL'S IN U.S.A. and foreign countries. I would like to swap my SWL card for one of yours. I QSL 100%. Ian M. Perkins, Tardale, Napier, New Zealand.

WOULD LIKE TO EXCHANGE cards with any ham, U.S. or foreign. I QSL 100%. Al Letcher, 528 E. Main St., Medford, Oregon, U.S.A.

CQ YL'S ES OM'S. WILL COME back fer anybody by return mail. Vy 73 es DX. QRA: "PY2OK," Ary Blausteln, 699 Alameda Yto, Sao Paulo, Brazil, South America, K pse.

SWL'S AND HAMS ANYWHERE. Anybody sending me one of their SWL's will get one of mine in return. I QSL 100%. Harold C. Chapman, 106 Mill St., Lodi, Ohio, U.S.A.

CQ K6 SWL'S. I WOULD LIKE very much to correspond with future K6 or other Oceania Hams. I will answer all mail. Millard Portner, Route No. 1, Box 80, Cereio, W. Va.

OM'S, YL'S, SWL'S, WOULD like to exchange correspondence with you, what say someone, please? QRA: R. C. Norton, Jr., R.R. 5, Hamilton, Ontario, Canada.

HELLO SWL'S ANYWHERE. Let's swap crds. 100% QSL ltr. Vy 73 es DX. QRA: "The Listener in the Rankes," M. N. Wicks, Bahannah, South Australia.

ATTENTION SWL'S ALL OVER the world. I will swap cards 100% with anyone. Also, I will swap stamps or correspondence. Harold L. Knauf, 34 Wilmington Street, Rochester, New York, U.S.A.

SHORT WAVE LISTENERS IN all countries. Would like to exchange SWL cards, postcards and photos and would like to correspond with anyone. I QSL 100%. Ed. Hoffman, 1744 Wilmot Avenue, Chicago, Illinois, U.S.A.

I WISH TO EXCHANGE SWL cards and correspond with anyone in the world. Come on, YL's and OM's. Lavoyd Kuney, Fayette, Ohio.

WOULD LIKE TO EXCHANGE postcard views and letters with foreign SWL's. Prefer ones interested in radio. If you like long letters, write—will answer all. Mrs. Lucy Jennings, R.F.D. No. 1, Gladys, Va., U.S.A.

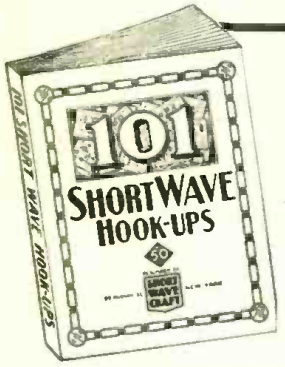
CALLING CQ. SWL XYL'S, YL'S and Hams, would like to swap SWL cards with you. QRA: Ray Davis, Co. 773 CCC, Drakesville, Ia.

SWAP SWL'S AROUND THE CORner or around the world, 100%. QRA: Bob Liggett, 824 Passmore St., Philadelphia, Penna.

ATTENTION YL'S ES OM'S. "The Voice of the Windy City" calling all SWL's throughout the world. Have new card. Will swap and correspond 100%. QRA: Chas. E. Baxa, 2678 N. Halsted St., Chicago, Ill., U.S.A.

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

YOU *buy* parts. tubes, kits, accessories from your local radio dealer—that's what countless thousands of short-wave fans do. Now through a nation-wide distribution service our numerous books are available at your favorite radio dealer—right where you buy other radio equipment. It's more convenient, saves time and you can inspect the books before you buy. *Ask your dealer to show you all the books advertised on this page—they're always in stock.*



101 SHORT WAVE HOOK-UPS

Compiled by the Editors of RADIO & TELEVISION

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

100 Illustrations
72 Pages

50c

HOW TO BUILD AND OPERATE SHORT WAVE RECEIVERS

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

150 Illustrations
72 Pages

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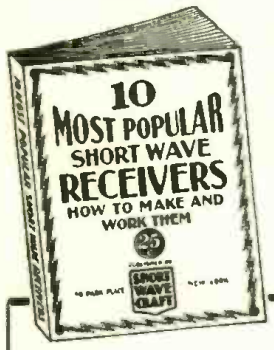

TEN MOST POPULAR SHORT WAVE RECEIVERS

HOW TO MAKE AND WORK THEM

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

75 Illustrations
40 Pages

25c

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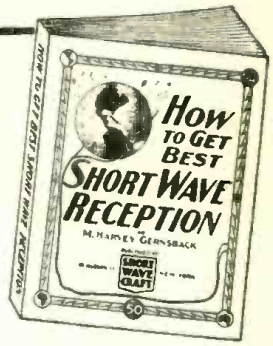
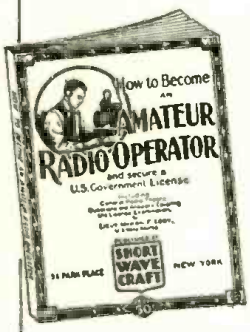
M. HARVEY GERNSBACK tells you everything you have ever wanted to know about short wave reception.

The author, a professional radio listener and radio fan for many years, gives you his long experience in radio reception and all that goes with it.

40 Illustrations
72 Pages

50c





HOW TO BECOME AN AMATEUR RADIO OPERATOR

By Lieut. Myron F. Eddy, whose experience in the amateur field has made him pre-eminent in this line.

If you intend to become a licensed code operator, if you wish to take up phone work eventually—this is the book you must get.

150 Illustrations
72 Pages

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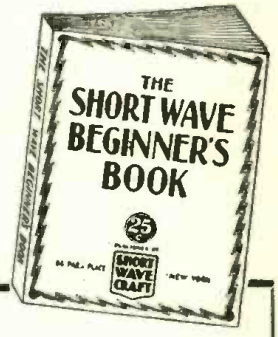

THE SHORT WAVE BEGINNER'S BOOK

Here is a book that solves your short wave problems—leading you in easy stages from the simplest fundamentals to the present stage of the art as it is known today. It is the only low-priced reference book on short waves for the beginner.

75 Illustrations
40 Pages

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Electric Supply Co., Oakland
Radio Supply Company, Los Angeles
Radio Television Supply Co., Los Angeles
Pacific Radio Exchange, Inc., Los Angeles
Western Auto Supply, Los Angeles
Zack Radio Supply Co., Los Angeles
Vroman's Book Store, Pasadena
Western Radio & Elec. Co., San Diego
Offenbach Electric Co., San Francisco
Technical Book Co., San Francisco
Zack Radio Supply Co., San Francisco
Radio Specialties Co., San Jose

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

CONNECTICUT
The Edward P. Judd Co., New Haven

DELAWARE
Wilmington Elec. Spec. Co., Inc., Wilmington

FLORIDA
Radio Accessories Co., Orlando

GEORGIA
Wholesale Radio Service Co., Inc., Atlanta

ILLINOIS
Allied Radio Corporation, Chicago
Walter C. Braun, Inc., Chicago
Chicago Radio Apparatus Co., Chicago
A. C. McClurg & Co., Chicago
Midwest Radio Mart, Chicago
Newark Electric Co., Chicago
Sears, Roebuck & Co., Chicago
Max Stein & Co., Chicago
Montgomery Ward & Co., Chicago
Wholesale Radio Service Co., Inc., Chicago

INDIANA
Van Sickle Radio, Indianapolis

MASSACHUSETTS
DeWolfe & Fiske Co., Boston
The Personal Book Shop, Boston
Wholesale Radio Service Co., Inc., Boston
Library Book House, Springfield
Tremont Elec. Supply Co., Boston

MICHIGAN
Rissi Brothers, Detroit

MINNESOTA
St. Paul Book & Stat. Co., St. Paul

MISSOURI
Burstein-Applebee Co., Kansas City
Radio Labs., Kansas City
Walter Ashe Radio Co., St. Louis
Van Sickle Radio Co., St. Louis

NEW JERSEY
Radio Apparatus Co., Newark
United Radio Co., Newark
Wholesale Radio Service Co., Inc., Newark

NEW YORK
Fort Orange Radio Dist. Co., Albany
Wholesale Radio Service Co., Inc., Bronx
Wholesale Radio Service Co., Inc., City
Harrison Radio Co., New York City
Jamaica, L. I.
American News Co., New York City
Baker & Taylor Co., New York City
Bian, the Radio Man, New York City
David Bogen & Co., New York City
Federated Purchaser, Inc., New York
Radio Circular Co., New York City
G. E. Stechert & Co., New York City
The Steiger Co., New York City
Sun Radio Co., New York City
Thor Radio Corp., New York City
Try-Mo Radio Co., New York City
Van Riemsdyck Book Stores, New York City
Wholesale Radio Service Co., Inc., New York City
H. W. Wilson Co., New York City
Radio Parts & Equipment Co., Rochester
M. Schwartz & Son, Schenectady

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OREGON
J. K. Gill Co., Portland

PENNSYLVANIA
Radio Electric Service Co., Philadelphia
Cameradio Co., Pittsburgh

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

WISCONSIN
Radio Parts Co., Milwaukee

ARGENTINA
Radio Revista, Buenos Aires

AUSTRALIA
McGill's Authorized Agency, Melbourne

BELGIUM
Emil Arens, Brussels

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

BRAZIL
Agencia Soave, Sao Paulo

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

CUBA
Diamond News Co., Havana

ENGLAND
Gorringe's Amer. News Agency, London

FRANCE
Toute La Radio, Paris

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

HOLLAND
Radio Peeters, Amsterdam, Z.

INDIA
Empire Book Mart, Bombay

MEXICO
American Book Store, Mexico, D. F.
Central De Publicaciones, S. A., Mexico, D. F.
Jaques Salvo, Mexico, D. F.

NEW ZEALAND
Johns, Ltd., Auckland
James Johnston, Ltd., Dunedin
Te Aro Book Depot, Ltd., Wellington

SOUTH AFRICA
Technical Book Co., Cape Town
Central News Agency, Johannesburg
International House, Johannesburg
South African Radio Publications, Johannesburg

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(Send remittance in form of check or money order. If letter contains cash or unused U. S. postage stamps, register it.)

POPULAR BOOK CORPORATION • *Publishers* • 99 HUDSON STREET • NEW YORK, N. Y.

On the "Ham" Bands

(Continued from page 61)

Call	Frcq.	R	S	Where Heard
CE3BM	14.04	4	5	Col.
CE3CG	14.11	5	6	Ark.
CE3AS	14.025	4	6	N. J.
CE4AC	14.09	4-5	6-7	Col., Ill.
CX2AK	14.034	5	7	Pa.
CX2CO	14.072	4	8	Ill.
CX3CL	14.01	4	7	N. J.
HC1FG	14.26	5	7	Wash.
HC2CC	14.1	4	5	Conn.
HC2HP	14.3	5	7	N. Y.
HJ1AG	14.02	4	3	Wash.
HK1AG	14.015	4-5	6-8	Md., Ore., N. J., Conn.
HK3CL	14.05	5	4-6	Col., Wash., N. J., N. Y.
HK3CC	14.25	4-5	6-7	Md., Ontario
HK3CO	14.2	5	5	Ore.
HK3CR	14.	5	7	Ore.
HK3CG	14.07	4-5	6-7	Conn., Ill.
HK3CZ	14.3	5	6	N. Y.
HK3CW	14.25	5	7	Ill.
HK4DF	14.025	3	7	Mass.
HK4DL	14.1	5	8	N. J.
HK4AS	14.18	5	7	N. J.
HK5EE	14.	4	6	New Zealand
LU1DA	14.07	4-5	4-8	Col., Pa., Me., Mass.
	28.1	5	9	Ark., S. C.
LU1DF	28.05	5	8	Ark.
LU1QA	28.215	4	8	Mass.
LU2VG	14.287	4	8	Fla.
LU4AH	14.08	4	5	N. Y.
LU4CZ	14.07	5	5-7	Col.
LU5CZ	14.09	5	5-7	Col., Me., Wash., Pa., Ark.
LU7BK	14.11	5	6-8	Wash., Me., N. J.
LU7BH	14.1	5	5	Ore.
LU7BR	14.065	5	6	Pa.
LU8EC	14.035	4-5	4-7	Wash., Ore., Ark.
OA4C	14.19	5	6	Ark.
OA4AW	14.137	4-5	2-8	New Zealand, N. Y., Ill.
PY2PP	14.175	5	7	Me.
PY2JC	14.1	4	6	Conn.
PY2FY	14.	5	7-8	New Zealand
PY2AK	14.25	5	8	N. Y.
PY4BI	14.21	5	6	England
PY5BF	14.	5	7	South Africa
PY7GA	14.	5	9	South Africa
VP3AA	14.1	4-5	7-9	N. J., Conn., N. Y., Ill.
VP4TK	14.125	4-5	4-9	N. J., N. Y.
YV's reported from Col., Md., Wash., N. J., England. Mass., Conn., Mo., New Zealand and Fla. Too many to publish.				
CT1AY	14.11	5	7-9	Md., Ky., N. J., Ontario. Conn.
CT1FU	7.24	5	8	Ala.
CT1ZA	14.12	5	9	Me., Conn.
CT1PK	14.095	4	8	Mass.
CT1QG	14.	3-4	5-7	New Zealand
EA7BA	14.29	4-5	6-9	Ontario, Conn.
EI9J	28.205	5	7-8	Neb., Mass.
EI2L	28.4	4-5	3-7	Ontario, N. Y.
F3 and F8 reported by N. H., Me., Mass., N. Y., Neb., Ark., Ky., Ontario and Conn.				
G2, G3, G5, G6 and G8 reported by Neb., Ark., S. C., Mass., Ontario, N. J., Me., Conn., Fla., N. Y., Md., Ky., Pa., and N. H.				
G12LW	28.06	5	8	Ark.
G15J	28.3	4	5	S. C.
GM2MB	14.085	3	6	Ill.
GM6RG	28.445	5	9	Neb., Ky., N. J., S. C.
GM6WD	14.095	5	9	Ark.
GM8MN	14.15	5	8	N. Y.
GW reported by Ontario, Ark., Me., Mass., N. Y., and Conn.				
H1T	28.04	5	7	Ky.
H1TKM	28.065	5	8	Neb.
ON4NO	28.115	5	9	Neb.
ON4BK	14.11	5	5	Wash.
ON4RI	14.16	5	8	Me.
ON4PA	28.16	5	8-9	Me., Mass.
ON4ZA	14.	5	8	South Africa
OZ2HN	14.15	3	4-5	Mass.
PA0AD	28.212	4	7	Neb.
PA0FB	28.005	4	6	Neb.
PA0MZ	14.075	5	7-8	Ontario, Ark., South Africa, Ill.
K6 reported by Utah, Kan., New Zealand, Col., Ill., South Africa, Ore., Ky., S. D., Pa., N. J., Wash., Mass., and S. C.				
KA reported by Utah, Wash., Kan., Neb., South Africa, New Zealand.				
PK1RL	14.	4	7	New Zealand
PK2AY	14.05	5	5	N. Y.
PK3WI	14.05	5	8	Wash.
PK4KS	14.315	3-5	6-7	Kan., Ontario, New Zealand
PK6XX	14.02	4-5	6-9	Wash., N. Y., Kan., Ontario, New Zealand
VK has made a comeback and about forty were reported by Neb., Ala., New Zealand, Wash., Kan., Me., Mo., N. Y., and South Africa.				
VR6AY	14.	4	6	South Africa
ZL3IF	28.45	3	4	Ontario
ZL2BE	28.5	5	8	Ark.

Well, that finishes the reports for this month, and it is hoped that they will be as good next month. If conditions remain as favorable as they have been for the last two weeks, some extra good DX should be heard.

FREE CATALOGS and INFORMATION

By carefully reading the advertising columns, you will find many offers to furnish literature containing valuable technical information that will help you in your work. Use this list freely.

Firm	Business	Offer	No.	Cost	Adv. Page
Allied Engineering Inst.	Kit Mfr.	Circulars		Free	38
Allied Radio Corp.	Mail Order	Spring Radio Catalog		Free	35
		Builder's Handbook		10c	
American Radio Institute	Radio School	Booklet		Free	46
Andrea Radio Corp.	Television Kit Mfr.	Information		Free	B.C.
Bliley Electric Co.	Parts Mfr.	Engineering Bulletin	E-6	10c	43
		Circular	A-6	Free	
Brush Development Co.	Parts Mfr.	Catalog		Free	43
Bud Radio, Inc.	Parts Mfr.	Folder	RT59	Free	41
		Station Log & Data Bk.		10c	
Burstein-Applebee Co.	Mail Order	Catalog		Free	55
Cameradio Co.	Mail Order	1939 Catalog		Free	53
Candler System Co.	Code Course	Book of Facts		Free	46
Cannon, C. F., Co.	Parts Mfr.	Folder	T-6	Free	44
Consolidated Wire & Associated Corporations	Parts Mfr.	Information		Free	55
Cornell-Dubilier Elec. Corp.	Parts Mfr.	Catalog	161	Free	51
Coyne Electrical School	Trade School	Electrical Catalog		Free	3
		Radio Catalog		Free	
Crosley Corporation, The	Set Mfr.	Literature		Free	41
Dodge's Institute	Radio School	Catalog		Free	46
Eagle Radio Co.	Kit Mfr.	S. W. Diagrams		Free	40
Eastern Mfg. Co.	Mfr.	Circular		Free	57
Gold Shield Products	Mail Order	Catalog		Free	53.55.57
Guthman, Edwin I., & Co.	Set & Parts Mfr.	Information		Free	49
Hammarlund Mfg. Co.	Set & Parts Mfr.	1939 Catalog		Free	33
		16 page Booklet		Free	
Harrison Radio Co.	Mail Order	Information		Free	44
Henry, Bob	Mail Order	Information		Free	49
Instructograph Company	Code Machine	Information		Free	46
International Resistance Co.	Parts Mfr.	Literature		Free	39
Korrol Radio Products Co.	Parts Mfr.	Catalog		Free	53
Lafayette Radio Corp.	Set Mfr.	Radio Catalog	76	Free	45
Levine, M. M.	Coil Machines	Information		Free	42
Martin Research & Mfg. Corp.	Radio Keys	Catalog		Free	33
Mass. Radio School	Radio School	60-page Catalog		Free	46
Midwest Radio Corp.	Set Mfr.	1939 Catalog		Free	51
National Company, Inc.	Set & Parts Mfr.	Catalog		Free	I.B.C.
National Plans Institute	Publisher	Book Catalog		Free	44
National Radio Institute	Radio School	64-page Book		Free	1
National Schools	Radio School	Radio & Television Bklt.		Free	46
Par-Metal Products Co.	Parts Mfr.	Catalog	39T	Free	44
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Supreme Publications	Publisher	Information		Free	57
Teleplex Co.	Code Machine	Booklet	S-5	Free	46
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Tri-State College	Radio School	Catalog		Free	46
Turner Co., The	Parts Mfr.	Bulletin	41-A	Free	45
United Radio Company	Mail Order	Spring Catalog		Free	44
Universal Microphone Co.,	Parts Mfr.	Information		Free	55
Universal System	Television School	Literature		Free	46
Wholesale Radio Service Co.	Mail Order	Radio Catalog	76	Free	45
X. L. Radio Laboratories	Parts Mfr.	Information		Free	51

How a Television Receiver Is Born

(Continued from page 7)

ling dozens of such tubes each working day. The cost is said to have been reduced to a level well within reach of the television enthusiast.

Finished tubes are thoroughly tested for deflection sensitivity, image brilliance, positioning and other characteristics, before being released for use in Du Mont television receivers or otherwise.

These tubes, the largest yet made available to American television workers and enthusiasts, will provide, it is claimed, a full 8 x 10 inch screen image, with all the brilliancy, sharpness and flickerless characteristics of home movies, when properly operated.

Most Powerful Television Transmitter

(Continued from page 7)

new design, will be utilized in the complete television transmission equipment, which is five times as many as now used for voice broadcasting. The antenna will resemble a cube of wires as strung from the three 100-foot poles.

Images transmitted will conform to the usual United States standard of 441 lines per frame, 30 frames (60 fields) per second, with an aspect ratio of 4:3.

In addition to the Indian Ladder transmitter, G-E is said to have a license for another 10 kw. transmitter to be erected at Bridgeport, Conn., at an estimated cost of $195,000.

Last year General Electric sent radio engineers abroad to investigate and study television in England, Germany and Holland, so that this station might incorporate the very latest known to the art.

C. A. Priest, engineer in charge of radio for G-E, announced: "We will *not* use the new coaxial cable between our studio and the station but an ultra high-frequency sharp directional transmitter, feeling this will also produce better results because the cable cannot carry the 3-4-million cycle frequencies which will be used in television."

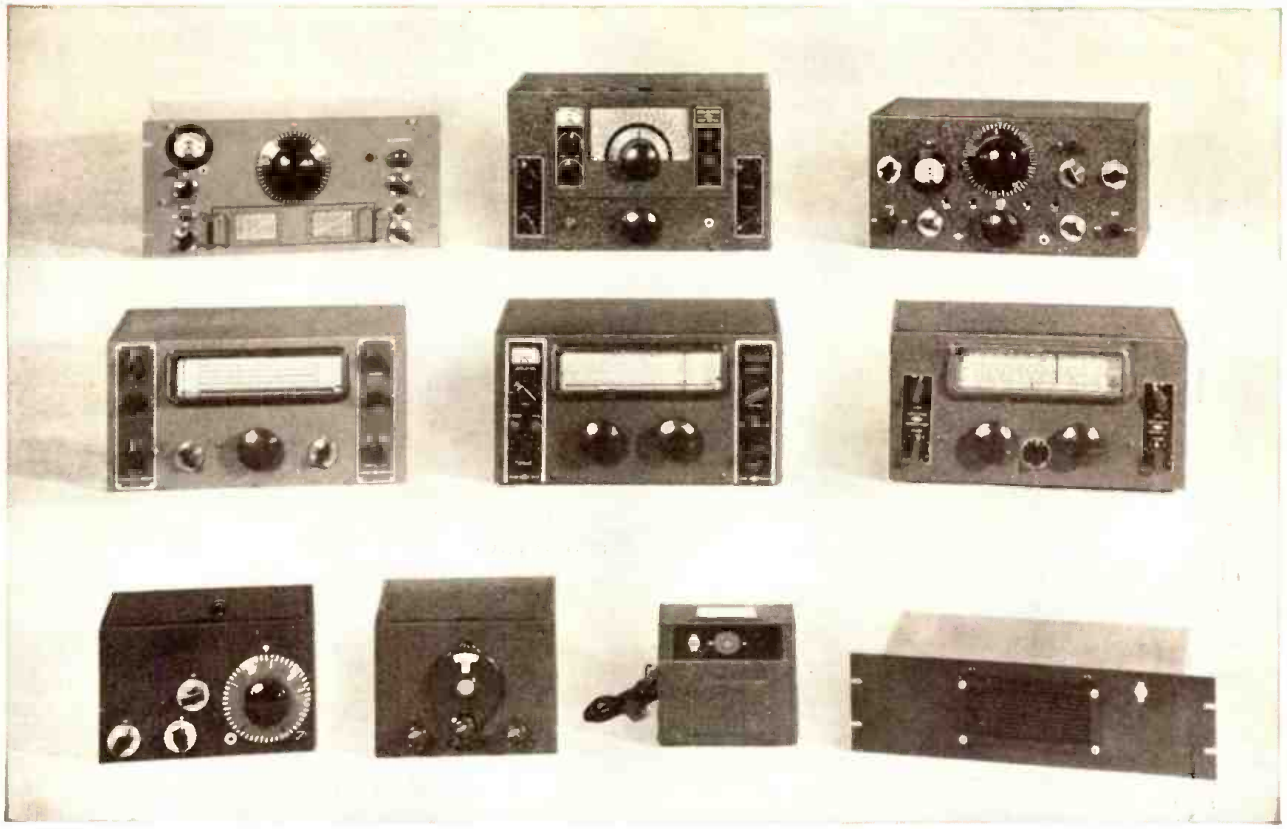
Answers to QUIZ on page 16

1. *b*
2. *c*
3. *aC, bA, cB*
4. *b, c & d*
5. *c*
6. *a, farthest; b, nearest*
7. *b & c*
8. *b*
9. *c*
10. *d (Slightly over 51,000)*
11. *Ac, Bg, Ch*
12. *e*
13. *b*
14. *b*
15. *d*
16. *b*
17. *c (He painted* "September Morn.") *Caruso, who probably fooled you, broadcast over the de Forest station in New York in 1910.*

Special
TELEVISION FEATURES
in
June Number

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.)



A FINE RECEIVER FOR EVERY PURPOSE

HRO *A professional receiver, designed for maximum performance.* Features include two high-gain preselector stages giving exceptional signal to noise ratio, crystal filter, micrometer dial, S meter, AVC, Beat Oscillator. Approximate List Price $350*. (Top row, left.)

NC-100A & NC-101X *Fine Communication Receivers with splendid tone.* These 11 tube superheterodynes are self-contained except for the speaker. The NC-100A series (Top row, center) is ideal for broadcast reception as well as communication work. The NC-101X (Top row, right) covers only the amateur bands. Features include one stage of preselection, as well as complete communication equipment. Approximate List Price $200*.

NC-80 & NC-81 *Excellent Communication Receivers at a moderate price.* This inexpensive 10 tube receiver uses a 1560 KC IF amplifier, giving excellent image suppression. Features include crystal filter and communication equipment. The NC-80 is for general coverage. The NC-81 covers only the amateur bands. (Middle row, left.) Approximate List Price $165*.

NC-44 *For capable performance at a very low price.* A seven tube superheterodyne with continuous coverage from 550 KC to 30 MC. A CW Oscillator is provided. (Middle row, right.) Approximate List Price $83*.

NC-510 *A specialized superheterodyne covering 28 to 64 MC.* The NC-510 (Middle row, center) is strictly a communication receiver, embodying all the features commonly needed in such work, but is specialized to give maximum performance in the range from 28 to 64 MC. Acorn tubes are used. Approximate List Price $250.

ONE-TEN *A specialized receiver for the range from 1 to 10 meters.* (Bottom row, left.) The ONE-TEN Receiver is intended primarily for the Experimenter. It is a thoroughly satisfactory receiver for the ultra-high frequencies. Four tubes are used: RF, Super-regenerative Detector, 1st Audio, and Output Audio.

SW-3 *A dependable regenerative receiver.* (Bottom row, second from left.) The SW-3's seven year reputation for performance and dependability gives it preference for many classes of work. It uses three tubes in a highly developed circuit that provides maximum sensitivity and flexibility.

POWER SUPPLIES National Power Supplies are specially designed for powering high frequency receivers, and include efficient filters for RF disturbances as well as hum frequencies. They are made in a variety of types.

★ *The List Prices given above are approximate only, and are intended only to show the price range in which each receiver falls. Complete specifications and prices will be given on request.*

NATIONAL COMPANY, INC., MALDEN, MASS.

BUILD YOUR OWN TELEVISION SIGHT and SOUND RECEIVER!

TELEVISION IS HERE!

It's an accomplished fact today. May, 1939, marks the beginning of broadcasting in New York and in many population centers of America transmitters are building. Television is a billion dollar industry with wonderful opportunities for those who know the art. Get in on it now—and qualify as an expert.

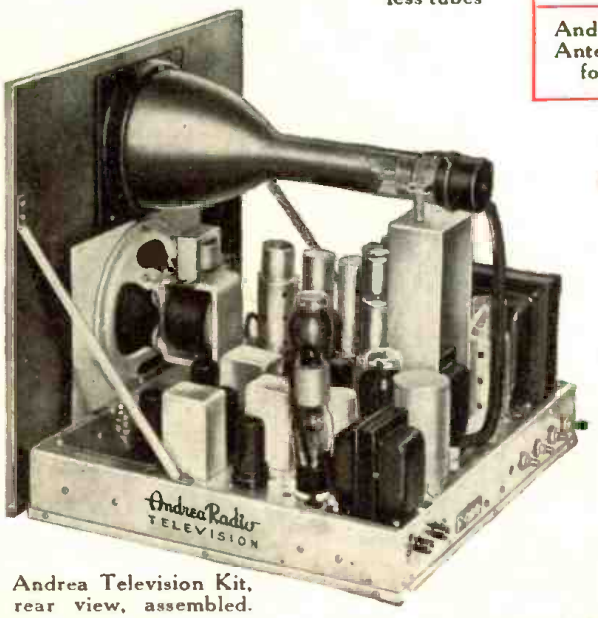
Andrea KT-E-5 Television Sight and Sound Construction Kit, front view, assembled $79.95 less tubes

F. A. D. ANDREA, who led the industry with radio kits in 1923 now leads with a television kit you can easily assemble in your own home

Of course you want television reception in your home—and, of course, you want the added fun and satisfaction of building your own. That's the way to know the "ins and outs" of this fascinating new art. You become an expert authority quickly. No one in America has the experience that F. A. D. ANDREA has in producing kits that assemble properly and work like a factory-built job. Every radio fan who remembers the early days, recalls the success of his famous Neutrodyne radio kits. Complete, step-by-step, illustrated instructions with every kit.

At right: A complete, factory-built table model television receiver, if you prefer it. Andrea "Sharp Focus" receiver MODEL I-F-5, complete with tubes $189.50.

Andrea Teleceptor $9.50
Antenna specially designed for television reception



Andrea Television Kit, rear view, assembled.

- Complete Wiring Diagrams and Step-by-Step Instructions supplied free with every Andrea KT-E-5 Kit.
  Or send $1 for diagrams and instructions alone — authoritative, detailed, profusely illustrated.

DISTRIBUTORS:

- A limited number of territories are still open. Write for full information.

IMMEDIATE DELIVERY:

We're supplying dealers with Andrea "Sharp Focus" television Kits and complete receivers as fast as possible. If your dealer hasn't ordered his yet, we'll supply you direct. Write or phone

Andrea Radio

"SHARP-FOCUS" TELEVISION

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