# All-Wave Radio

25 CENTS

MAY 1938

## The "KC. Quint"
**2-Tube Xtal Exciter**

## 5-Meter Portable
**Xmttr-Receiver**

## "Circuit Court"
**A New Department**

## "Staged in Wood"
**New Xmttr Design**

OFFICIAL ORGAN
RADIO SIGNAL SURVEY LEAGUE

# Get your Copy of "Practical Radio Manual" Free

# While They Last

## An Unequaled Value

WITH the PRACTICAL RADIO MANUAL, you are assured of a thorough understanding of radio and by reading ALL-WAVE RADIO you are assured of keeping abreast of events in the radio field *as they occur*. Never before have the publishers offered such a gift nor can the value of this double opportunity be equaled. Alone, a year's subscription to ALL-WAVE RADIO is worth more than the regular subscription price. Here is a 164 page book—PRACTICAL RADIO MANUAL—up to the high standards of ALL-WAVE RADIO in every respect and of inestimable value, given absolutely *free* with a subscription of one year!

## What It Is

THIS new 164-page book is in every respect up to the high standards set by the publishers of one of America's leading radio publications—ALL-WAVE RADIO, and is equally valuable to the student, the amateur and the experimenter. It contains the answer to the question "How Can I Become a Radio Amateur?" articles on the construction of sets for the amateur and short wave listener, actual questions and answers on typical radio problems, and an outline of radio theory that covers the subject from elementary fundamentals to the more advanced applications on short wave bands from 5-200 meters.

## Barb and Ernest Series Complete

IN addition to its wealth of other material, the "A-W-R PRACTICAL RADIO MANUAL" contains, for the first time, the complete "Barb and Ernest" series that attracted so much attention, a different "personalized" course of instruction in amateur radio. Mr. Granger, already well known to the followers of ALL-WAVE RADIO for his interesting feature articles, enlisted the aid of two real "Embryo Hams," Barbara and Ernest Rowland. His series of letters to them signed "Gerald," covering the ground of both theory and practice and answering their questions is justly famous. You'll be amused by some of their questions and sympathize with their struggles, but end up by having a real understanding of radio just as they did.


Actual Size 6" x 9"
Over 110 Illustrations
Bound in Durable Blue Cover

**164 Pages**

## Sets for Hams and Experimenters

FROM 5 meters up to 200 meters, outstanding set construction articles have been selected—complete with photos, parts lists, diagrams and construction plans—nothing has been omitted to make simple the building of efficient, yet inexpensive receivers and transmitters. Traffic Rig for 40 and 80 C.W.; the DX4UCW Xtal Xmtr on 10-20-40-80; C.W. Kit Transmitter; 5 & 10 Superhet; Portable or Self-Powered QRR Xmtr-Receiver; these are some of the ace construction articles in "PRACTICAL RADIO MANUAL." Very likely you may find just the set you have been looking for in this book.

## Theory Made Easy

IF you have wondered just "what makes the wheels go 'round" in your set, here is the perfect explanation. Radio theory is covered from coils and condensers to superhets in language both clear and clean cut; yet as absorbing as any novel—a complete and interesting outline of the essential radio fundamentals.

## Actual Questions & Answers

CAREFULLY selected answers to actual "Queries" from readers of ALL-WAVE RADIO cover the very problems that puzzle you. In fact, the vast wealth of "permanent-value" material which appeared in ALL-WAVE RADIO has been carefully sifted and the cream of it presented in this handy bound form for preservation and reference.

## Our Offer to You

YOU can't afford to miss the valuable monthly visit of ALL-WAVE RADIO. At $2.50 for the year, it is money well spent. But when IN ADDITION, without extra cost, you get a copy of the brand new PRACTICAL RADIO MANUAL—it's something more than a bargain! Mail enclosed card or return coupon below TODAY that you may take advantage of this outstanding offer. Remember—only a litmited quantity on hand. Act at once.

## Practical Radio Manual FREE with Subscription to A-W-R

5-38-AWR


If you do not wish to cut this page, copy on your own letterhead.

ALL-WAVE RADIO, 16 East 43 Street, New York, N. Y.
I accept your offer. Rush my free copy of A-W-R PRACTICAL RADIO MANUAL and enter my subscription to All-Wave Radio for one year. I enclose $2.50* in full payment.

Name ..... City .....

Street ..... State .....

If already a subscriber, check here and we will extend your subscription for one year ☐

BE SURE TO ENCLOSE FEE WITH THIS COUPON

—*50c postage must be added outside of the U.S.A., Canada, Mexico, and South America.

**Handsome Bond Stationery For Members of the R.S.S.L.**

## MEMBER STATIONERY

Every member will be proud to use this handsome R.S.S.L. Members' Stationery for his radio correspondence. Printed in blue ink on 8½ x 11 white bond paper, it bears the Radio Signal Survey League's official emblem.

Use of this official stationery will give prestige and dignity to your request for veries.

**100 Sheets 50c • 250 Sheets $1.00**


## • QSL CARDS •

In order that members may retain the individuality of their QSL Cards and at the same time indicate their association with the R.S.S.L., a Matrix ("Mat") has been prepared from which a metal cast can be readily made of the R.S.S.L. emblem at low cost. "Mats" can be had for either "Negative" (left) or "Positive" (right) type emblem. They are practically indestructible and are familiar to almost all printers. Be sure to specify "negative" or "positive." Above illustrations are actual size! "MATS" 25c Each Postpaid.

## • REPORT FORM BLANKS •

New in principle, these Report Form blanks have been specially designed for the recording of information essential in carrying on the work of the R.S.S.L. Printed in green ink on white bond paper, 8½x11, records can be made in either pencil or ink—each sheet covering a full week's report.

**$1.00 Per Pad (100 blanks) • Postpaid**

**(50 blanks—50c; 1 dozen report forms—15c)**

## • METALETTE R.S.S.L. SEALS •

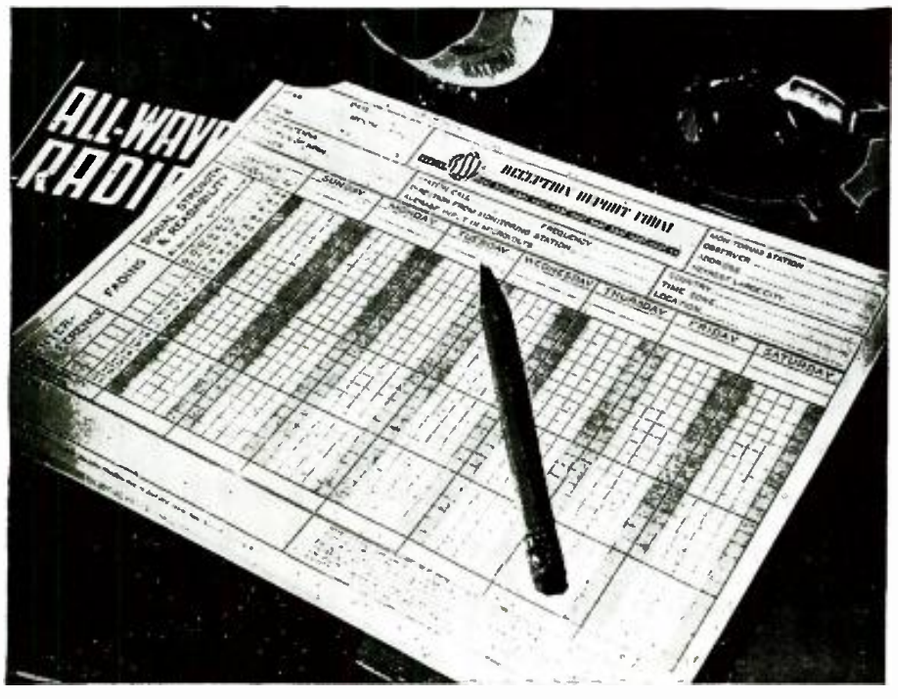
Are gummed on one side. Blue embossed on Silver. Same size as this illustration. They have the handsome appearance of real metal. Can be used on stationery, letterheads, QSL cards, etc.

**25 Seals 15c • Postpaid**

***IMPORTANT:*** Above supplies may be purchased by **R.S.S.L.** members **ONLY!** Be sure to give your Monitoring Station number with order. No orders sent C.O.D. Be sure to enclose check, stamps or M.O. with order.

# New Members Wanted!

**You are eligible** to be a member of the R. S. S. L. No special equipment required. No fees or dues. If you have a sincere desire to assist in the work for the improvement of radio reception and transmission, you can be an active member. See the R. S. S. L. News on page 256 of this issue. Take your part in this interesting work. Just mail a 3c stamp to cover postage and we'll mail application blank and full details, including samples of our membership metalette seal, report form blank, etc. Use coupon below or copy on your own letterhead.




***RADIO SIGNAL SURVEY LEAGUE***

**16 East 43 Street New York, N. Y.**

**FREE** for a three cent stamp—Complete details on joining the Radio Signal Survey League, Application Blank, etc. Without any obligation, send to—

Name .....

Street .....

City ..... State .....

5-38

# All-Wave Radio



EDITED BY M. L. MUHLEMAN

VOL. 4, NO. 5 MAY, 1938

## COVER ILLUSTRATION

**RISING ABOVE TROPICAL PALMS, THE ANTENNA MAST FOR THE 720-KC. OUTLET OF STATION PRA8, RADIO CLUBE DE PERNAMBUCO, BRAZIL, SOUTH AMERICA.**

**A Rigger descending the television mast at the BBC Television Station at Alexandra Palace, London. The mast, which rises to a height of 300 feet from the ground and stands on a hill 306 feet above sea level, carries vision and sound aerials on outriggers. (By courtesy BBC.)**

## CONTENTS



**PUBLISHED MONTHLY** by the Manson Publications Corporation, 16 East 43rd Street, New York, N. Y. Entered as second-class matter August 27, 1935, at the Post Office, New York, New York, under the Act of March 3, 1879. Additional entry as second-class matter, at East Stroudsburg, Pa., August 27, 1936. M. L. Muhleman, President and Secretary; Edwin W. Lederman, Vice President and Treasurer; Lyman F. Barry, Circulation Manager.

**SUBSCRIPTIONS:** Yearly subscription rate: $2.50 in the United States and Canada; $3.00 in foreign countries. Single copy price, 25 cents. Four weeks' notice is required for a change of address. In requesting a change, kindly give both the new and the old address.

**NEWSSTAND COPIES:** ALL-WAVE RADIO is distributed by the American News Company who make every effort to supply copies at all points where there is a demand. If you have had difficulty in obtaining ALL-WAVE RADIO where you reside communicate with our Circulation Department who will see to it that your local newsstand is supplied with copies.

**MANUSCRIPTS:** All manuscripts, except those definitely contracted for, are submitted at the author's risk and cannot be returned unless accompanied by sufficient postage. However the editors are always on the lookout for new material, and readers are invited to submit manuscripts for consideration. Notification of the acceptance or rejection of a manuscript is given within three weeks after receipt.

**ADVERTISING OFFICES:** Eastern Advertising Manager, Sanford L. Cahn, ALL-WAVE RADIO, 16 East 43rd Street, New York, N. Y. Tel: MUrray Hill 2-8761-2.

OFFICIAL ORGAN OF THE RADIO SIGNAL SURVEY LEAGUE

# You Can Receive this DX Citation


**OFFICIAL CITATION ISSUED TO S. W. BROADCAST DXERS. (APPROXIMATELY 1/9 ACTUAL SIZE—COLOR BLUE)**

THIS is a rare opportunity to establish verified proof of your DX exploits. The perfect answer to the individual who shrugs his shoulders or scoffs at your reception of DX. And any radio enthusiast knows how difficult it is to get real DX when a visitor is present.

### Handsome Certificates

THESE beautifully engraved citations are printed in blue, brown or green according to the classification, and after receiving the First Degree you may subsequently obtain the 2nd and 3rd and even higher degree citations. Measuring 8½ x 11", they are printed on a high grade, heavy bond paper excellent for framing. An award that means something. They are issued free of charge to successful applicants on payment of 25c to cover postage and mailing costs.

### Get Details Before Mailing Veries

Send for information sheet giving full details before you mail in your verifications and request for citation. Clip the coupon below or just send 3c stamp with your name and address.

"Be It Hereby Known That—

. . . . (Your Name Here) . . . .

**has submitted proof in the form of accredited verifications of the successful reception of radiophone transmission in the**

Short Wave Broadcast Band

**1st Degree, etc. etc. . . . "**

**as shown in reduced facsimile cut.**

**Citations are issued for—**

- **Short Wave Broadcast Band**
- **Standard Broadcast Band**
- **Amateur Phone Band**

### The Requirements

Space permits only a rough outline of the requirements. In general, if you successfully receive one verification of short wave or amateur phone signals from each of the six continents of the world, you qualify for First Degree; or, in the case of Broadcast Bands, reception from any four of the six continents gives you this rating. Second and Third (and higher) Degree citations may be earned by receiving additional verifications.

### If You Have Foreign Veries . . .

. . . then you are probably eligible for a citation. It is necessary to submit the actual verification cards or letters for approval by the Directors of the R.S.S.L. and they will be promptly returned.

**Citations may be secured by anyone who qualifies, whether or not he is a member of the R.S.S.L.**

RADIO SIGNAL SURVEY LEAGUE,
16 EAST 43 ST., NEW YORK, N. Y.

RADIO
SIGNAL
SURVEY LEAGUE,
16 East 43 St., New York

Send full details of DX citations

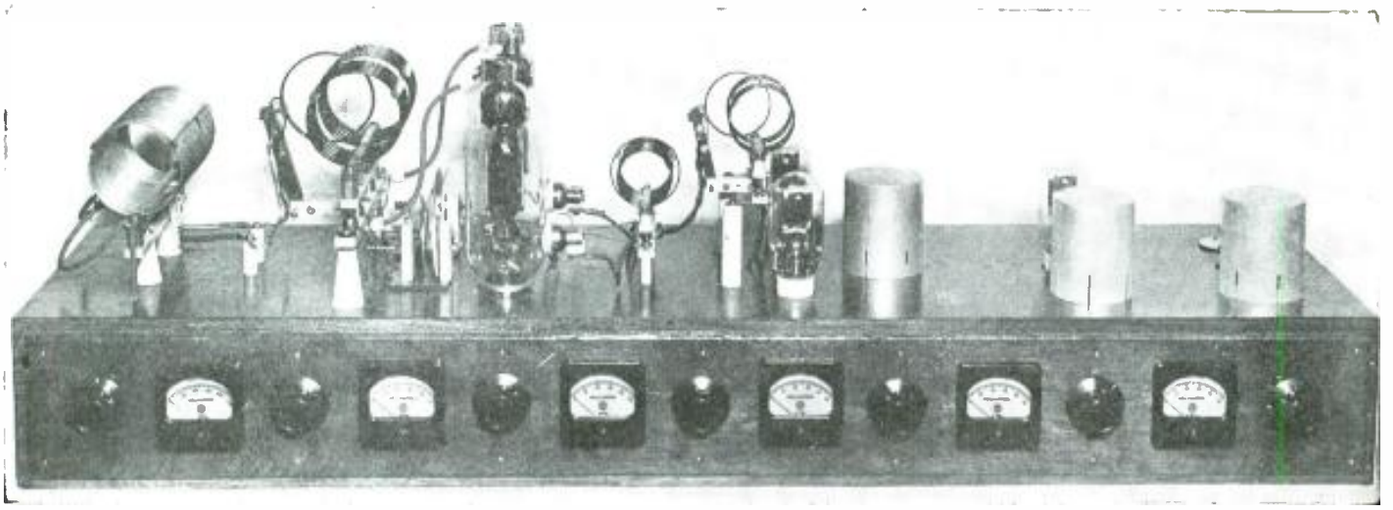
Name .....

Street .....

City ..... State .....

S-38

# STAGED IN THE WOOD



*Front view of the completed r.f. section. All meters and controls are ranged along the vertical panel.*

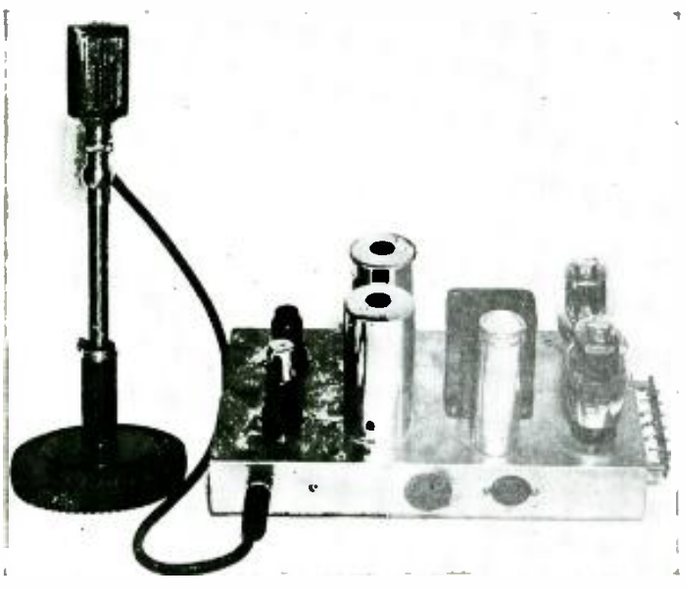
## A HIGH-POWER C.W. AND PHONE RIG IN NEW DRESS

*By E. T. TURNEY, Jr. • W2APT*

IN recent years wood has given way to metal in transmitter designs, the amateur having followed commercial practice in this respect. There is no question that metal racks, chassis and panels have their advantages, and far be it from us to under-rate the features of all-metal construction. But there is still a lot to be said for wood even though the trend has been away from it.

First of all, wood is easy to work, and the ham having only the more commonplace tools, such as saws and drills, can easily build a rig that he could never execute in metal unless he had access to a well-equipped machine shop. Secondly, wood is much cheaper than metal, and if some attention is given to detail, a transmitter "staged in the wood" can equal in appearance the far more costly metal rack-and-panel jobs. Thirdly, if considered from the angle of economy, the use of the cheaper, wood construction releases dollars for investment in components permitting the use of higher transmitter power.

We undertook the construction of just such a job, with the financial angle uppermost in mind. First, we selected only those parts that would give the most watts for the dollars invested and, aside from the speech amplifier chassis, used wood exclusively for chassis and cabinet. The result of our planning is shown in the accompanying illustrations.



*The speech amplifier with its Brush crystal mike. The use of metal is necessary here because of the high gain input stage. This unit is housed in the power-supply cabinet.*

### General Details

The rig to be described is a compromise between the flat bread-board and the completely enclosed wooden rack. The r.f. unit, from crystal oscillator to final amplifier, is built into a single chassis, as shown at the top of this page.

This unit carries all but two of the meters. The remainder of the equipment — the speech amplifier-modulator and the various power supplies — is mounted in a single wooden cabinet having three shelves or decks. This cabinet, as well as the r.f. chassis, is made entirely from oak, with the exception of the supports for the shelves and the blocks holding the casters. The shelves holding the power equipment are made of four-ply oak and are removable from the rear. A door on either side gives access to switches, bleeders, overload relays, etc. The whole unit is mounted on heavy-duty casters and may be rolled about quite easily. The front openings on the cabinet are recessed for double-thick window glass which effectively keeps out dust. It also keeps inquisitive fingers away from the plates of the rectifier tubes.

All joints are doweled and joined together with hot glue. The finished product has five coats of orange shellac

(cut five pounds to the gallon) each coat being rubbed down with a mixture of crude oil and powdered pumice. The accompanying working drawings are self-explanatory of the method of construction. If no oak is obtainable, a good grade of chestnut may be substituted.

The r.f. unit chassis is so constructed that it is readily accessible for trouble shooting or any change in circuit that might be desirable. Meters and tuning controls form a straight line on the front panel, from oscillator to final.

### Four Bands, High Power

The transmitter was designed to work in all bands from 10 to 80 meters, with doubling only for 10, and to have the all-important grid drive necessary to really kick out on 28 megacycles. Plug-in coils are used, but these are so arranged that band changing and re-tuning can be accomplished in very short order. The input to the final runs between 500 to 600 watts on phone and 800 to 900 watts on c.w.—on all bands from 80 to 10 meters.

The r.f. unit employs a 6F6 crystal oscillator, an Amperex 801 buffer-doubler, a push-pull Amperex 801 amplifier stage, and a double ended Class C final amplifier using HF-200's. A keying relay is connected in the crystal oscillator circuit and this works nicely up to at least 50 words per minute.

The speech amplifier consists of a well-shielded 6F5 high-gain triode as a booster for the Brush crystal mike. This tube is resistance-coupled to a 6C5 which is followed by a 76 resistance coupled to a second 76 transformer coupled to push-pull 2A3's which drive the ZB-120 modulator tubes. Volume is controlled in the input of the 6C5 stage.

It was considered desirable when designing the power-supply system to provide separate sources of d.c. voltage for all the stages except the buffer-doubler and amplifier, which are combined. This minimizes any chance of frequency modulation and insures stable signals. Heavy bleeders are incorporated in the bias and speech amplifier power supplies for the purpose of securing constant d.c. voltage. The voltages vary less than 5 per cent under load no-load conditions.

**COIL TABLE I**

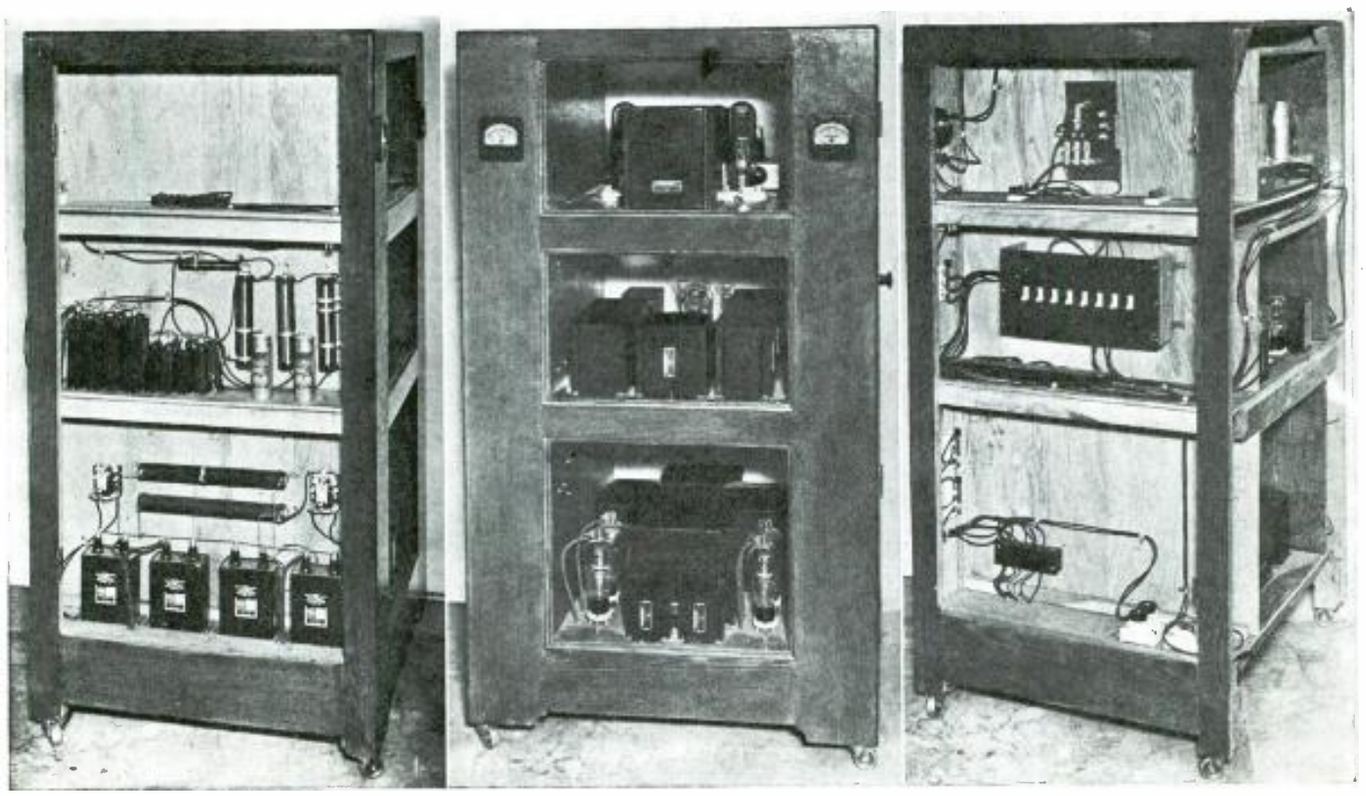
| *Band* | *L1* | *L2* | *L3* |
|---|---|---|---|
| 75 m. | 25 turns No. 18 en. 1¼" long. | 36 turns No. 18 en., c.t., 1½" long | 36 turns No. 18 en., c.t., 1½" long |
| 40 m. | 14 turns No. 18 en. spaced out | 22 turns No. 18 en., c.t., 2" long | 22 turns No. 18 en., c.t., 2" long |
| 20 m. | 7 turns No. 16 en. spaced out | 10 turns No. 16 en. spaced out | 10 turns No. 16 en. spaced out |
| 10 m. | 7 turns No. 16 en. spaced out | 6 turns No. 14 en., c.t., spaced out | 6 turns No. 14 en., c.t., spaced out |

### The R. F. Section

Before dealing with the construction of the r.f. section, a few words on the bugs and their cures in crystal oscillators are in order.

Most troubles in crystal oscillators originate in the plate circuit. Either the LC ratio is incorrect or the crystal current is too high. It has been our experience after carefully testing all standard oscillator circuits, that the ones which provide maximum performance with the greatest degree of frequency stability are those which have a medium LC ratio and, when using such tubes as the 6F6 and 6L6, not over 18 to 20 mils plate current under normal operating conditions. The medium ratio puts such things as "two peaks" completely out of the picture, and by using a double-spaced variable condenser, excellent frequency stability is secured.

We decided on a 6F6 oscillator for the simple reason that it draws but 16 mils under full load and amply excites the Amperex 801 buffer-doubler stage at all frequencies up to and including 28 mc. On second-harmonic operation the output is very stable and compares favorably with operation on the fundamental frequency. The bypass condenser—C3 in the schematic diagram—from high voltage to ground, is of the utmost importance as without this in the circuit the crystal current is in the vicinity of 85 mils and is very unsteady. The 6F6 will follow a bug as fast as the hand can manipulate it.



*Three views of the cabinet with side doors removed. Left view shows the banks of filter condensers, the bleeder resistors, and the two overload relays. Center view shows the modulator unit on upper shelf, low-voltage power supplies on center shelf, and the final and modulator supplies on lower shelf. Right view shows push-to-talk relay, a.c. line switches, and junction box.*

### *Buffer-Doubler to Final*

For the buffer-doubler and push-pull amplifier stage we selected the Amperex 801's for several reasons, one of the most important being that they require very little grid drive and can be operated at their full ratings up to and including 28 mc. without showing any color whatsoever. As a test, we loaded the buffer-doubler stage with a dummy antenna, and with 200 mils plate current no color showed at any time.

The HF-200's in the Class C final stage can be driven to full output almost by just looking hard in their general direction. With 500 watts input on 28 mc. they run cold. With 2000 volts on the plates, it is possible to operate a broadcast receiver several feet away from the transmitter without the presence of key clicks.

Link coupling won out over capacity coupling because with the former it was possible to correctly adjust each stage for maximum performance. Unless we had used variable capacity coupling between stages, no such peak results could have been obtained.

When tuning up the rig, it will be wise to keep the swinging links at minimum until all correct adjustments are made.

### *Coil Specifications*

All coils for the oscillator, buffer-doubler and push-pull amplifier stage are wound on Hammarlund SW5 forms. The links consist of four turns for the buffer-doubler and amplifier, and are

*(Continued on page 234)*

#### R.F. SECTION

**Amperex**
2—type HF-200 tubes
3—type 801 tubes

**Barker & Williamson**
2—type 80-BL coils (L4, L5)
2—type 40-BL coils (L4, L5)
2—type 20-BL coils (L4, L5)
2—type 10-BL coils (L4, L5)
1—type 80-HDVL coil (L6)
1—type 40-HDVL coil (L6)
1—type 20-HDVL coil (L6)
1—type 10-HDVL coil (L6)
1—antenna matching coil (L7)

**Birnbach**
2—1 inch standoff insulators
2—1¼ inch standoff insulators

**Bliley**
1—HF-20 type 20-meter crystal
1—B5 type 40-meter crystal
1—LD-2 type 80-meter crystal

**Hammarlund**
1—type MC-100-MX condenser (C5)
2—type MTC-50-B condensers (C7, C10)
2—type MTCD-100-B condensers (C15, C17)
1—type TCD-100-X condenser (C24)
1—type TC-50-A condenser (C25)
3—type N-10 neutralizing condensers (C6, C11, C12)
2—type N-10 neutralizing condensers (see text) (C18, C19)
4—type CH-X r.f. chokes (RFC1, 2, 3, 4)
2—type CH-8 r.f. chokes (RFC5, 6)
1—type C-500 r.f. choke (RFC7)
3—type CS-3 shield cans for L1, L2 and L3
3—flexible couplings for neutralizing condensers C6, C11, C12
12—4-prong coil forms
1—5-prong coil form
3—6-prong coil forms
1—8-prong coil form

**Insuline**
4—50-watt tube sockets

**I.R.C.**
1—50,000 ohms, ½ watt (R1)

**Kenyon**
1—type T-362 fil. trans. (T5)
1—type T-359 fil. trans. (T3)

**Raytheon**
1—type 6F6 for xtal osc.

**Simpson**
3—type 27-S, 0-100 ma. d.c. meters (M1, M2, M5)
1—type 27-S, 0-50 ma. d.c. meter (M3)
1—type 27-S, 0-250 ma. d.c. meter (M4)
1—type 57-S, 0-15 volts a.c. meter (M6)
1—type 27-S, 0-750 ma. d.c. meter (M7)
2—type 37-S, 0-2 amp. r.f. meter (M8, M9)

**Solar**
8—type CB-1-22 fixed, .002 mfd., 1000 volt (C2, C3, C4, C8, C9, C13, C14, C16)
2—type XM-25-22 fixed, .002 mfd., 2500 volt (C20, C21)
2—type XA-3-22 fixed, .002 mfd., 3000 volt (C22, C23)
1—type MW fixed mica, .0001 mfd., 1000 volt (C1)

**Ward Leonard**
1—No. 507-5-7 keying relay (REL1)
1—No. 507-196 wire wound, 6000 ohms, 25 watts (R2)
1—No. 507-196 wire wound, 6000 ohms, 50 watts (R2A)
1—No. 507-222 wire wound, 5000 ohms, 100 watts (R3)

#### SPEECH AMPLIFIER-MODULATOR

**Amperex**
2—type ZB-120 tubes

**Brush**
1—type D-1 crystal microphone

**Hammarlund**
1—type CH-X r.f. choke (RFC8)

**I.R.C.**
1—5 meg., ½ watt (R19)
3—150,000 ohms, ½ watt (R10, R14, R18)
3—50,000 ohms, ½ watt (R9, R13, R17)
3—3000 ohms, ½ watt (R7, R11, R15)
2—250,000 ohms, ½ watt (R8, R12)
1—10,000 ohms, 1 watt (R6)
1—500,000-ohm potentiometer (R16)

**Kenyon**
1—type T-251 interstage trans. (T3)
1—type T-259 input trans. (T2)
1—Ken-O-Tap modulation trans. (T1)

**Par-Metal**
1—metal chassis, 2 x 7 x 13 inches, with bottom plate

**Raytheon**
1—type 6F5
1—type 6C5
2—type 76
2—type 2A3

**Simpson**
1—type 27-S, 0-500 ma. d.c. meter (M10)

**Solar**
2—type MP-4101 fixed, .001 mfd., 1000 volt (C26, C27)
5—type DD-821 fixed, 8 mfd., 600 volt (C28, C29, C34, C36, C39)
1—type DBB-638 fixed, 8 mfd., 200 volt (C30)
3—electrolytics, 25 mfd., 50 volt (C31, C35, C37)
4—paper, 0.25 mfd., 400 volt (C32, C33, C38, C40)

**Ward Leonard**
1—wire wound, 5000 ohms, 20 watts (R4)
1—wire wound, 3000 ohms, 40 watts (R5)

**Yaxley-Mallory**
1—bias cell (B.C.)
1—open-circuit jack (J)

#### FINAL AMP. POWER SUPPLY

**Amperex**
2—type 866-A rectifiers

**Kenyon**
1—type T-652 plate trans. (T1)
1—type T-360 fil. trans. (T2)
1—type T-521 swinging choke (CH1)
1—type T-177 filter choke (CH2)

**Solar**
2—type XL-25-2 filter, 2 mfd., 2500 volt (C1, C2)

**Ward Leonard**
1—No. 507-557 wire wound, 100,000 ohms, 200 watts (R1)
1—No. 507-514 adjustable 500 mil. overload relay (REL2)

#### MODULATOR POWER SUPPLY

**Amperex**
2—type 866-A rectifiers

**Kenyon**
1—type T-665 plate trans. (T3)
1—type T-360 fil. trans. (T4)
1—type T-514 swinging choke (CH3)
1—type T-160 filter choke (CH4)

**Solar**
2—type XL-20-4 filter, 4 mfd., 2000 volt (C3, C4)

**Ward Leonard**
1—No. 509-556 wire wound, 75,000 ohms, 200 watts (R2)
1—No. 507-514 adjustable 500 mil. overload relay (REL3)

#### OSCILLATOR POWER SUPPLY

**Kenyon**
1—type T-213 power transformer (T5)
1—type T-516 swinging choke (CH5)
1—type T-166 filter choke (CH6)

**Raytheon**
1—type 83 rectifier

**Solar**
2—type XL-15-2 filter, 2 mfd., 1000 volt (C5, C6)

**Ward Leonard**
1—No. 507-224 wire wound, 10,000 ohms, 100 watts (R3)

#### BUFFER-DOUBLER POWER SUPPLY

**Kenyon**
1—type T-656 plate trans. (T6)
1—type T-510 swinging choke (CH7)
1—type T-166 filter choke (CH8)

**Raytheon**
2—type 82 rectifiers

**Solar**
2—type XL-15-2 filter, 2 mfd., 1000 volt (C7, C8)

**Ward Leonard**
1—No. 507-479 wire wound, 25,000 ohms, 160 watts (R4)

#### SPEECH AMP. POWER SUPPLY

**Kenyon**
1—type T-215 power trans. (T1)
2—type T-154 filter chokes (CH1, CH2)

**Raytheon**
1—type 80 rectifier

**Solar**
3—type DD-821 filter, 8 mfd., 600 volt (C1, C2, C3)

**Ward Leonard**
1—No. 507-334 wire wound, 500 ohms, 10 watts (R)
1—No. 507-224 wire wound, 10,000 ohms, 100 watts (R1)

#### BIAS SUPPLY

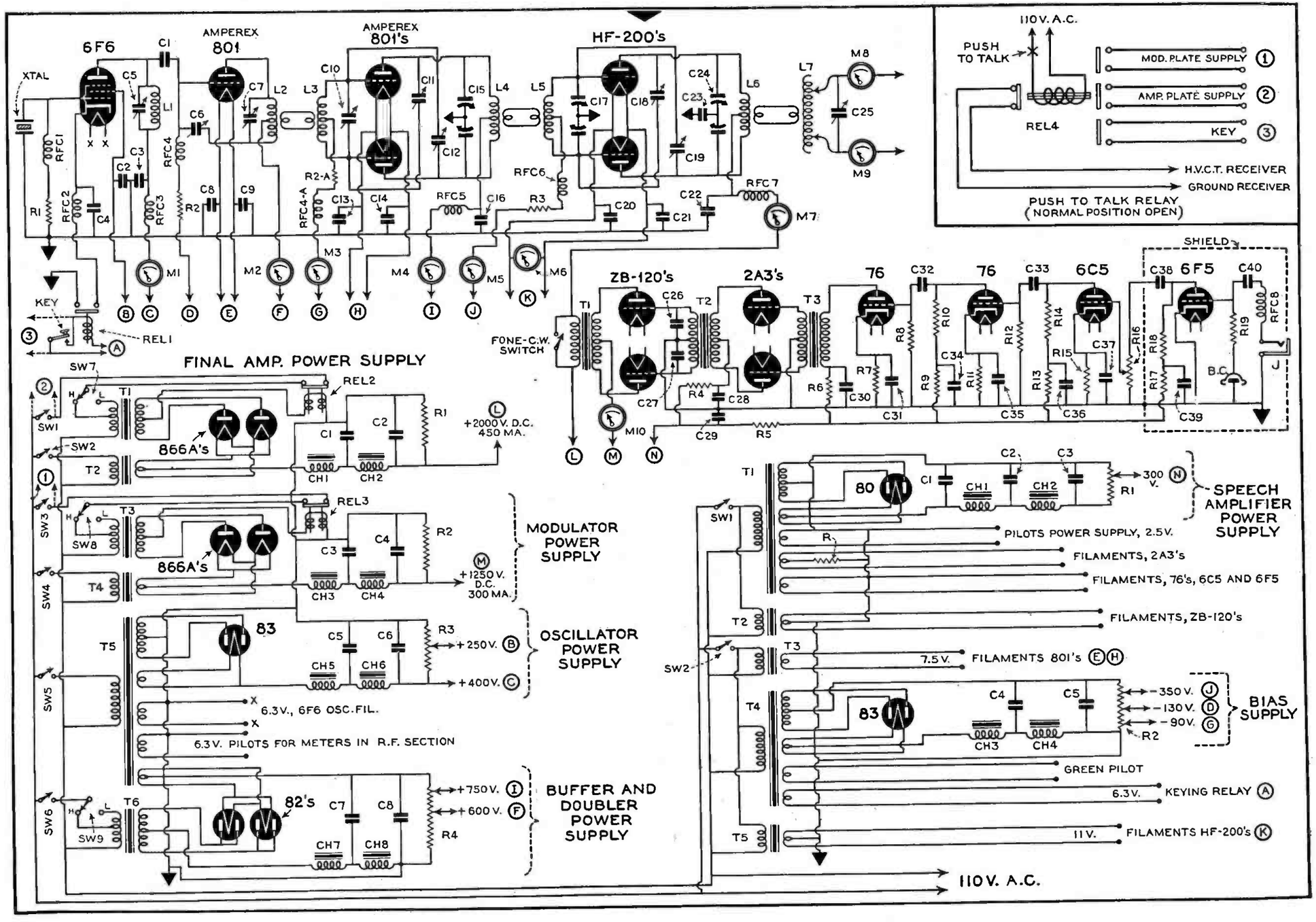
**Kenyon**
1—type T-212 power transformer (T4)
2—type T-152 filter chokes (CH3, CH4)

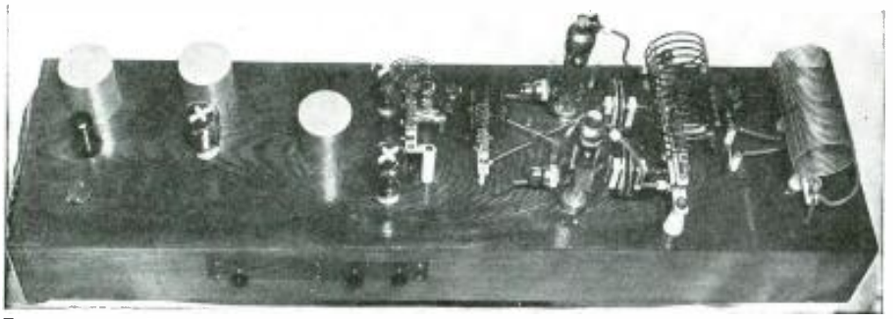
**Raytheon**
1—type 83 rectifier

**Solar**
2—type XL-6-2 filter, 2 mfd., 600 volt (C4, C5)

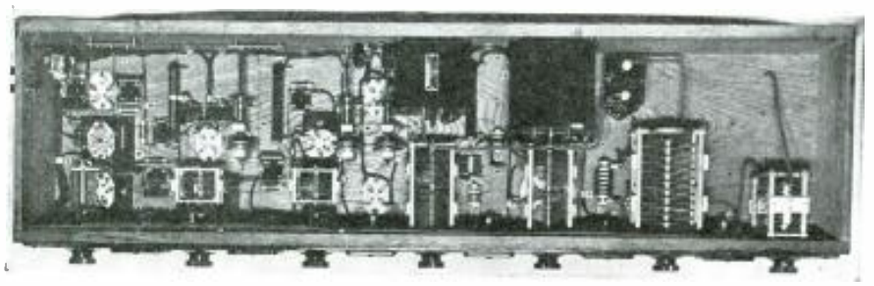
**Ward Leonard**
1—No. 507-223 wire wound, 7500 ohms, 100 watts (R2)
1—No. 131-6132 push-to-talk relay (REL4)

***On opposite page: Complete schematic diagram of the transmitter housed in wood. Connection diagram of the push-to-talk relay is given in upper corner. List of parts above.***





*Top—rear and under views of the completed r.f. section. Note orderly layout of components.*



self-supporting. Each is wound on ¾-inch stock, using No. 14 wire, and placed inside the coil and wired to the coil from filament prongs. This method presents a very neat appearance and completely eliminates the sloppy link connections which we previously had to contend with.

The coils for the remainder of the r.f. section are standard Barker & Williamson make, and with the exception of the 20-meter final, can be used as they are. On the 20-meter coil (20-HDVL) it will be necessary to remove two turns to make the coil hit resonance with C24.

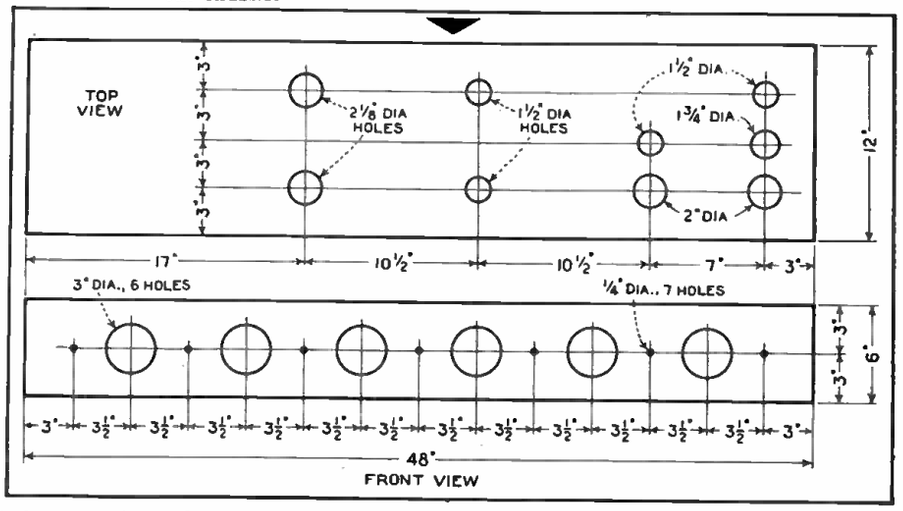
## Coil Specifications

Specifications for the coils L1, L2 and L3 in the oscillator, buffer-doubler and amplifier stages are given in Table I. A bit of trimming may be necessary if the layouts provided in this article are departed from. A turn added or subtracted will probably do the trick.

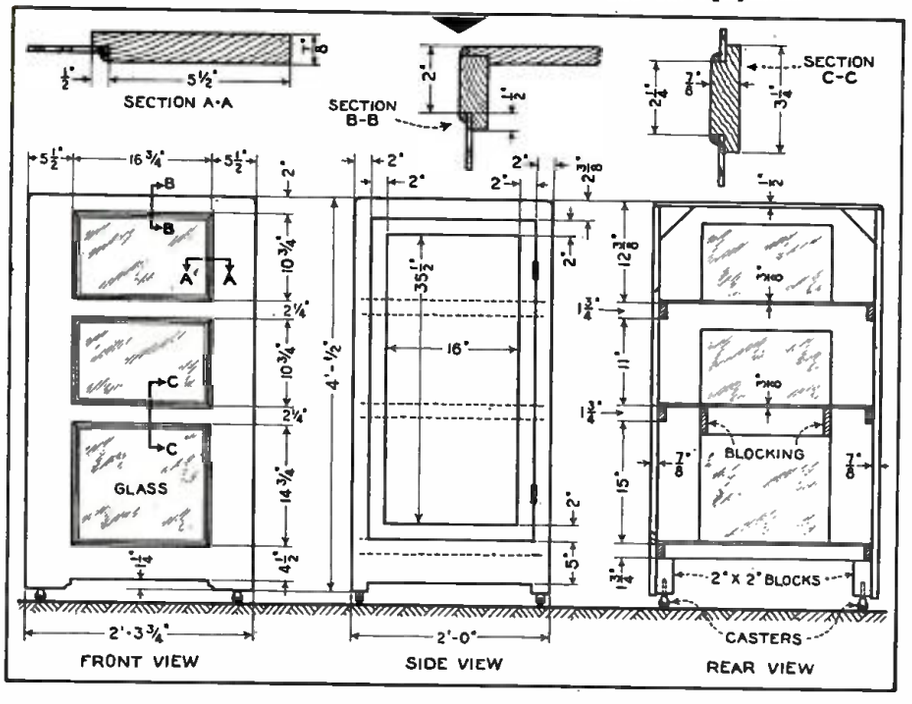
## Notes on R. F. Section

It might be well to take into consideration a few of the troubles encountered while setting up the r.f. section for operation. Starting with the crystal tuned for resonance at 7120 kc. no difficulty was experienced in obtaining plenty of grid drive for the 801 which was doubling to 14,240 kc. But the first snag was run into here, as it was impossible to get the meter in the grid circuit of the push-pull 801's to read over 5 mils. A hasty check of voltage against manufacturer's ratings showed everything to be in order. Changing the LC ratio so that the condenser in the push-pull amplifier stage was at a minimum capacity setting brought the grid drive up to 8 mils. The correct drive of 16 mils was finally obtained when the bias was brought up to about five times cut-

*Below: Working drawings of the wooden r.f. chassis.*




*Below: Working drawings of the wooden cabinet which houses the power-supplies and a.f. equipment.*




off. The doubler plate current was then 60 mils. While supplying 15 grid mils to the next stage no trouble was experienced in completely neutralizing the buffer stage, and after adjusting the grid voltage to about 300 volts negative to the HF-200's, 80 mils grid drive was secured.

Now to neutralizing the final; it might be mentioned first of all that the condensers C18 and C19 are Hammarlund N-10 neutralizers fitted with larger plates. It is our understanding, however, that the manufacturer will shortly have available a larger type, which will save the constructor the necessity of revamping a pair of N-10 condensers.

In the process of neutralizing, a resonance indicator made of one turn of wire in series with a 6-volt pilot light coupled to the final tank was employed. Proper neutralization could not at first be obtained. After trying by-passing, etc., the trouble was finally cured by placing a shield between the grid coil

*(Continued on page 277)*

# A LOW COST, HIGH GAIN AMPLIFIER and MODULATOR

By JAMES SILVERMAN • W2BPW

TO the experimenter and amateur of limited means, the amplifier and modulator described here will offer a method of obtaining large amounts of audio power at an extremely low cost. The distortion produced by this system is low and unobjectionable.

By an investigation of the circuit it can be seen that the first stage of the amplifier, which contains the type 57 tube, is conventionally wired. To control the gain, the normal load resistor of this tube is replaced by a 0.25-megohm potentiometer, the contact arm of which is connected to the coupling condenser.

Contrary to usual practice, the 2A5 tube, to which the 57 tube is resistance coupled, runs as a *pentode* driver for the type 10 tubes in push-pull. This procedure gives an added boost to the amplification and power obtained, yet no speech distortion becomes strongly evident.

The coupling of the 2A5 tube to the push-pull type 10 tubes is accomplished by two similar driver transformers, primaries connected in parallel, secondaries connected in series aiding. This procedure is followed so that saturation effects in the iron may be reduced, and also that the driving voltages on the type 10 tubes may not be too low. These transformers are 1¾-to-1 stepdown, and were secured from one of the well-recognized radio supply houses at $0.39 each.

### Power Transformer for Output

The main departure from usual practice is the replacement of the push-pull output transformer (the chief item of cost in a Class B system) by either a center-tapped choke or a center-tapped plate supply transformer. The power transformer is to be preferred, as it offers a means of changing the ratio of transformation—so securing the most effective coupling between the type 10 tubes and the radio-frequency amplifier which is to be modulated.

This push-pull output transformer is an ordinary power transformer, 600 volts each side of the center-tap, which cost $1.50. By making use of the primary winding either a step-up or a step-down ratio can be obtained. With the primary connected in series opposition to the total secondary winding, a step-down ratio of 1 to 0.9 results. With the connection in series aiding, a step-up ratio of 1 to 1.1 is secured. Because this ratio change is possible, a great flexibility of r.f. amplifier design results.

By adjusting the antenna coupling the current in the type 50 r.f. amplifier tube can be varied to present the correct load impedance to the type 10 tubes. This adjustment insures the maximum transfer of power from the modulator to the r.f. amplifier, and it is especially suitable when the coupling transformer does not quite match. A procedure of this type can always be resorted to, particularly if the radio-frequency amplifier tube is operating at or near full capacity after the adjustment.

It is absolutely essential to the success of this system that two separate power supply units be employed, one for the push-pull modulator and one for the final radio-frequency amplifier. These power units must not be interconnected in any way, except as shown in the circuit diagram. This restriction, of course, does not hold for any other tubes or stages in the audio- or radio-frequency amplifier sections. If it is found essential to do so, plate voltage for other tubes may be secured from either of the power supplies through a bleeder resistor.

### Wide Choice of Units

It is unnecessary to use the exact equipment described here. The circuit can be used successfully with a large variety of tubes and transformers, and is easily adaptable for very high power. All that is required of the experimenter or amateur is a little ingenuity so that he may obtain the optimum results with the equipment he decides to use.

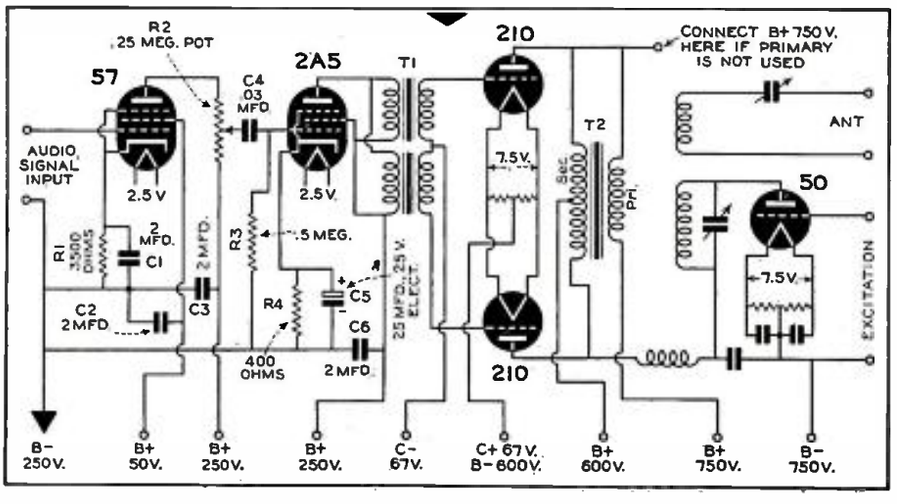
Because of the high gain, care must be taken to have long leads in the audio amplifier shielded, so that no feedback may occur. Grounding of all shielding, including transformer cores, should be resorted to.

It may be of interest to touch upon another point. One might think that the voltages employed exceed the tube ratings by too large an amount. For instance, a type 50 tube is rated at 450 volts maximum. Yet as a radio-frequency amplifier, strongly excited, it was operated normally in the transmitter at 750 volts. On occasion the voltage was boosted to 850 volts and the power input was forced above 100 watts. It was at this point that the tube, though operative, first showed signs of trouble.

For type 10 tubes, the maximum voltage seems to be approximately 750 volts when they are employed as Class B amplifiers. Above this voltage, tone quality deteriorates, probably because of insulation breakdown on voice peaks.

The use of ordinary receiving type tubes at such great overloads results in an extraordinary increase in power.

(*Continued on page 272*)




*Schematic diagram, with parts values, of amplifier-modulator providing high power at low cost.*

# A Frequency Quintupler

## Two-Tube Exciter Using Pierce and Jones Oscillators

By S. T. CARTER • STATION WSOC

HEREIN is presented a crystal-oscillator, frequency-multiplier circuit that has several advantages from an amateur's standpoint, namely, stability, high output on high order harmonics, the ability of varying the crystal frequency easily, the fact that the oscillator stage itself can easily be keyed at high speeds and, finally, complete freedom from the large number of frequency-multiplier stages necessary for high- and ultra-high-frequency work from lower frequency crystals. This point alone is well worth consideration.

The circuit offers possibilities to users of ultra-high frequencies in services other than amateur, such as police mobile units requiring crystal control, and broadcast pickup "pack" types of transmitters.

### Variable Crystal Frequency

The feature of being able to vary the crystal frequency would allow the use of low-cost, approximate cut, low-frequency crystals, thus eliminating the main cost of such transmitters, i.e., high-cost, high-frequency, precision-cut crystals.

The circuit presented has performed well in four different transmitters. In one transmitter the arrangement has been working for nearly a year, without the crystal once failing to start when the plate voltage was applied; in fact, one of the crystals was recently discovered to have a crack in it, developed in a former tri-tet oscillator. Aside from having a two-kilocycle shift in frequency, the cracked crystal was still oscillating merrily along, with no loss in output.

The idea for this exciter was derived, while experimenting with frequency multipliers for a kilowatt phone transmitter, from a combination of the now well-known Jones oscillator and the Pierce oscillator. There not being room in the transmitter frame for the number of frequency-multiplier stages required, necessity became the mother of invention.

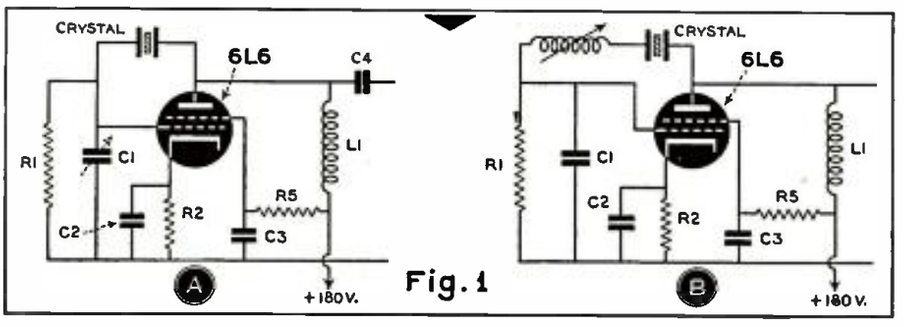
### Pierce Oscillator

The Pierce oscillator circuit is shown in Fig. 1-A. This circuit is adaptable to any transmitter where output on the crystal frequency is desired. Its output, at the plate voltage given, is sufficient to drive a single 802, RK-23, 807, 809 or 6L6 at the crystal frequency to full output. The driving power to the frequency-multiplier stage is sufficient for output in useful quantities when taking 28-mc. output from a 1.8-mc. crystal.

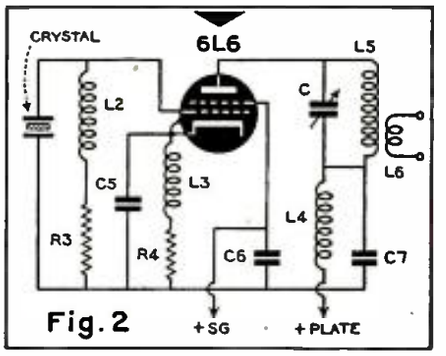
It will be noted in the circuit of Fig. 1-A that the crystal is connected between the plate and grid terminals of the oscillator tube. This tube may be any of the popular power pentode types or the beam types of power tubes. Either metal or glass types of 6L6's or 6F6's make excellent oscillators.

Tuned circuits are not required to obtain output from this oscillator; either a resistor of approximately 30,000 ohms, or an r.f. choke (L1) suitable for the frequency to be used, is all that is necessary in the plate circuit.

For those who dislike applying plate voltage across a crystal, a .001-mfd., 600-volt mica condenser may be connected in series with the crystal. Although a condenser has never been found necessary in any of the set-ups tried, no heating of the crystal or frequency drifting has been noticed at the plate voltages indicated.




*Pierce oscillator circuit: (A) with capacitive frequency variation and (B) with inductive frequency variation. L1 may be replaced with a 30,000-ohm resistor with some loss in output.*




*Circuit of the Jones oscillator.*

Smooth keying of the oscillator at high speeds is possible with the arrangement shown in Fig. 4*. This circuit is also good for break-in operation. The keying relay should be placed near the oscillator tube. The leads from the plate of the tube to the blocking condenser and relay contacts should be *short*. A smaller value of blocking condenser than .25 mfd., or long ground leads, may allow an appreciable amount of excitation to get through to the frequency-multiplier stage.

No click filter is necessary unless one is desired across the key contacts to eliminate the small inductive click that may be picked up locally. This type of click may be eliminated by using a .5-mfd. condenser in series with a 400-ohm resistor across the key contacts.

### Frequency Variation

Variations in the crystal frequency may be made through the condenser C1 in Fig. 1-A. A small variable midget condenser with a dial calibrated to represent the change in frequency might be used across a fixed capacity of .0001 mfd.

The frequency may be varied to the point where instability begins. A variable inductance in series with the crystal will also give variations in crystal frequency. (Fig. 1-B.) The inductance method will give variations in one direction while variations caused by changes in the capacity of C1 will be in the opposite direction.

In the operation of this type of oscillator, high plate voltage is not desirable.

* November, 1937, issue of *Radio*.

Keep the plate potential under 200 volts and screen potential under 100 volts. About 150 to 180 volts for the plate and 75 to 90 volts for the screen are suggested. At 175 volts for the plate and 80 volts for the screen, using a type 6F6 tube for the oscillator, the plate current should be approximately 10 milliamperes.

### *Jones Oscillator*

The method of obtaining regeneration for the frequency multiplier was, I believe, first used by Jones†. There is only one critical adjustment in the type oscillator shown in Fig 2. The combination of the condenser C5 and the r.f. choke L3 must be of such a value that regeneration is brought up to just barely below the point where self oscillation starts if any amount of power at high harmonics is desired. The adjustment is very critical and probably accounts for the trouble some constructors have had with this type of oscillator.

The combination of the Pierce and Jones circuits is shown in Fig. 3. The combination of the r.f. choke, L3, and the condenser, C5, is still critical, but not to the extent it would be if less excitation were available. The value of C5 will differ with different types of tubes and with different layouts; it will not be less than .00015 mfd. in any case and in all probability will run as high as .00035 mfd.

The value of C5 may best be arrived at experimentally. A variable condenser may be temporarily used and a rough approximation of the value made, the final unit being a fixed mica condenser having a value of about 10 per cent more than that required to bypass the feedback circuit to the point where self oscillation of the frequency-multiplier stage ceases.

Neutralization of the frequency-multiplier stage is not necessary when working straight through on the crystal frequency. There being no tuned circuit in the grid of the stage, oscillation is not possible unless there is sufficient regeneration.

Output from the combination as shown in Fig. 3 is sufficient to drive a pair of 807's as a modulated amplifier. A pair of 809's have been excited in a c.w. transmitter. This operation was on 10 meters with an 80-meter crystal.

### *Design Considerations*

When using a type 807 or glass type 6L6 tube instead of a metal type 6L6, considerably less capacity at C5 will be necessary. If 6L6 tubes are used, the glass and metal types will not be interchangeable without some change in the value of the condenser. Metal types of 6L6 should have the shield terminal tied to the cathode, *at the tube socket,* when used in the frequency-multiplier stage. If metal tubes are used for the oscillator stage, the metal shields should be left floating with no connection to the shield terminals.

For type 6L6 frequency multipliers, the plate voltage should not exceed 425 volts. Type 807 tubes may be run at higher plate voltages. If type 802's are used, the internal shield in the tube should be connected to the cathode at the tube socket. The screen and suppressor grids should be operated at their recommended positive voltages. Type 807 tubes will be more satisfactory for operation on 10 meters. For lower frequencies there is little choice over the 6L6 tubes where the plate voltage does not exceed 400 to 450 volts.

Here is a word regarding the values of L and C in the tuned circuit. Any number of manufacturers are making small plug-in coils suitable for use in this circuit. The coils used in the experimental set-up were manufactured by the Decker people and are for use with tank capacities of from 15 to 20 mmfd.

† *Radio Handbook.*

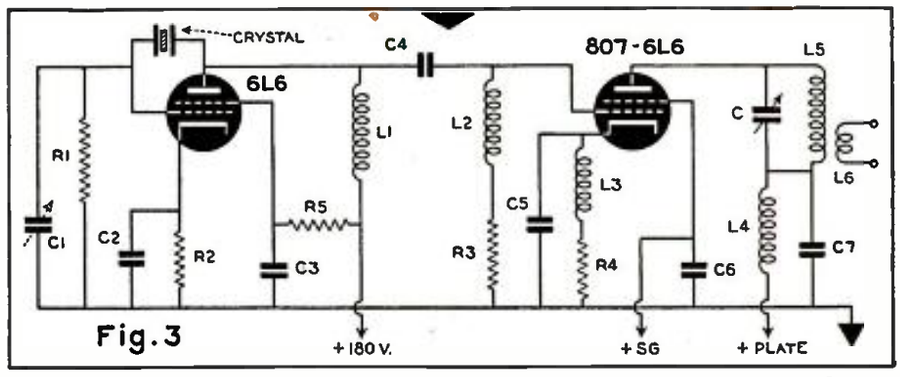


Fig. 3

***The combination oscillator and harmonic generator. Values of parts are given below.***

**LEGEND**

C—Value dependent on band desired (see text).
C1—.00015-mfd., 600-volt mica, shunted by low-capacity variable condenser if frequency variation is desired (see text).
C2—.002-mfd., 600-volt mica.
C3—.002-mfd., 600-volt mica.
C4—.002-mfd., 600-volt mica.
C5—.00015 to .00035-mfd., 600-volt mica (see text).
C6—.002-mfd., 600-volt mica.
C7—.002-mfd., 2500-volt mica.
R1—100,000 ohms, 1 watt.
R2—250 ohms, 2 watts.
R3—50,000 ohms, 2 watts.
R4—500 ohms, 10 watts, wire-wound.
R5—35,000 ohms, 2 watts.
L1—2.5 mh. r.f. choke.
L2—2.5 mh. r.f. choke.
L3—2.5 mh. r.f. choke.
L4—2.5 mh. r.f. choke.
L5—Tank coil to suit value of condenser C and frequency desired.

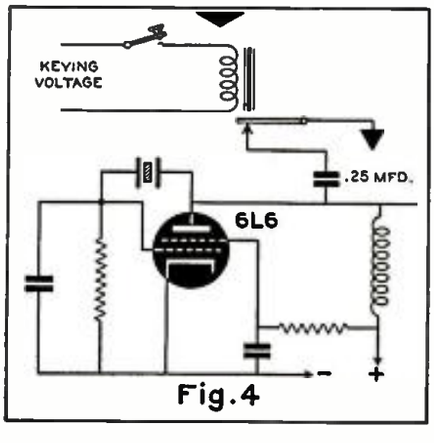


Fig. 4

***Showing manner of keying the oscillator circuit.***

### *Two Bands With One Coil*

For the amateur who does not care for plugging-in coils, a more satisfactory arrangement might be to use a tank condenser with a maximum capacity of 150 mmfd., then carefully prune the tank coils so that each coil will resonate on two amateur bands. For instance, the 10-meter coil should be adjusted so that resonance appears near minimum capacity on the condenser—then, if a 150-mmfd. condenser is used, the 20-meter band should be found near the maximum capacity setting of the condenser. The same arrangement should be carried out with the 40-80-meter bands or any other adjacent frequencies that are desired.

When two-band operation with one coil is desired with triodes having a low plate-to-filament capacity, a condenser having a lower maximum value could be used—say a maximum of 100 mmfd. This value is sufficient for type 809's, T-20's or TZ-20's; however, two-band operation with one coil has never been tried with these types.

As with any type of efficient harmonic generator, *all harmonics will be available,* the even-numbered harmonics in which the amateur will be interested and the odd-numbered harmonics in which his interest will be in keeping away from. It's very easy, in trying to get to 10 meters, to end up on the wrong frequency—too easy, in fact.

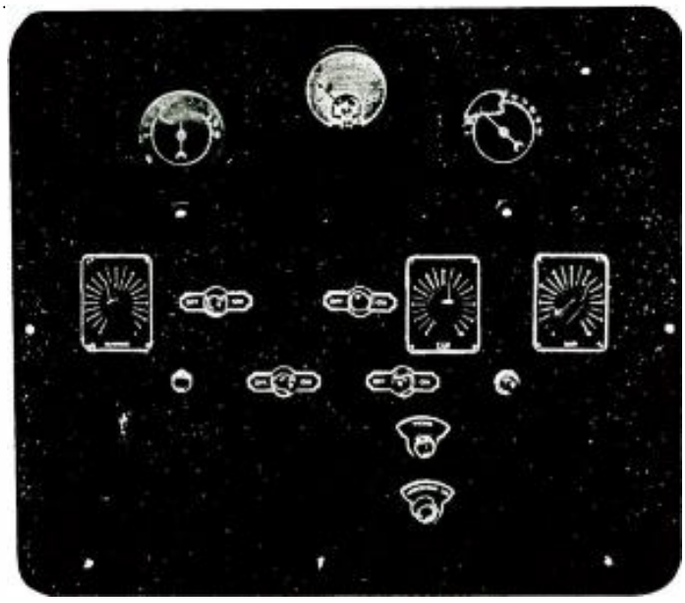
### *Determining Operating Frequency*

Use an absorption type wavemeter to determine the frequency to which the tank circuit is tuned. One can easily be made from the junk box. All that is necessary is a coil for each of the amateur bands and a tuning condenser hav-

(*Continued on page 273*)

# A Versatile 5-Meter Transmitter-Receiver

*By IRWIN WOLFE • W2KTC*



PANEL VIEW OF THE PORTABLE 5-METER TRANSMITTER-RECEIVER.

THE amateur who has never sampled the opportunities for portable and portable-mobile operation which the ultra-high frequencies offer has a new and fascinating experience ahead of him. Despite the well-known limitations of the 5-meter band over more than local distances, the simplicity and economy of equipment needed to obtain effective results have drawn many amateurs to the realms of 56 megacycles.

Granted, a snappy QSO with some VK or LU on twenty has a unique fascination . . . the clear-cut quality of a 160-meter phone 200 miles away and calling *you* is good to hear. But there's also a thrill in whirling along a highway at 40 miles an hour in your own car and carrying on a running-fire conversation with another rapidly moving vehicle.

Particularly so when, instead of a ponderous quarter kilowatt with its heavy power supplies and racks, your equipment is no more than a tiny suitcase and a microphone.

Many amateurs have ventured on 5 meters light-heartedly but with extremely low power, such as is characteristic of the average transceiver circuits. Too often they have been doomed to disappointment, for experience shows the range of such outfits is strictly limited, especially in city street operation.

### *Four Design Essentials*

When designing equipment suitable for general, all-around portable and mobile use there are four essential considerations: First, because every watt counts, efficiency is imperative. Portability is the second requisite, with light weight and distribution of load for easy carrying (as any Ham who has taken part in field day work knows) much to be desired.

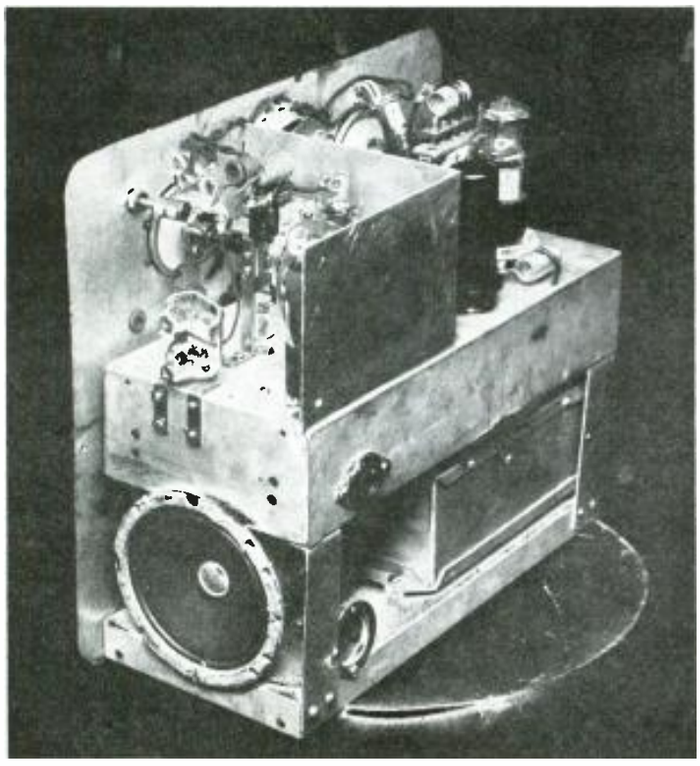
Nobody likes to find himself stuck in an out-of-the-way spot because his car won't start. Therefore low power consumption should be considered, for a rig that milks the storage battery is a potential trouble maker. And last of all, but still important, we want an outfit that can be adapted to a host of portable operation conditions.

In designing the transmitter-receiver which we are about to discuss, it was decided that a power output ranging between 5 and 10 watts is the optimum compatible with the four factors already listed. A greater output means elaborate tube lineups and heavy-duty power supplies.

To begin with, this outfit operates from the regular auto storage battery, utilizing a 300-volt, 100-milliampere Mallory Vibrapack for plate supplies. A separate plug permits the use of an external a.c. power pack when stationary operation is planned.

Aiming for versatility and compactness, the latter an asset in mobile work, the transmitter, receiver, vibrator unit and loudspeaker are all built into a single unit which fits inside a standard luggage case measuring 13½" x 15½" x 6" Such cases may be purchased for two or three dollars at almost any luggage store, the cost dictated by the owner's preferences.

This complete unit may be moved from auto to any stationary locale with a minimum of effort, as the length of the cord from the 6-volt d.c. supply may be made sufficient to permit operation at some distance from the vehicle. Furthermore, if



*Interior view of the completed 5-meter transmitter-receiver, showing layout of parts. Note position of loudspeaker. The Vibrapack is directly behind it.*

the owner possesses a boat or airplane, even further vistas are opened up.

The entire transmitter-receiver, mounted behind a black crystalline-finish panel of aluminum, has been carefully arranged so that the unit in its carrying case weighs but fifteen pounds. The cover of the case was equipped with split hinges and may be removed when the rig is in use, yet serves as a protective covering when being carried.

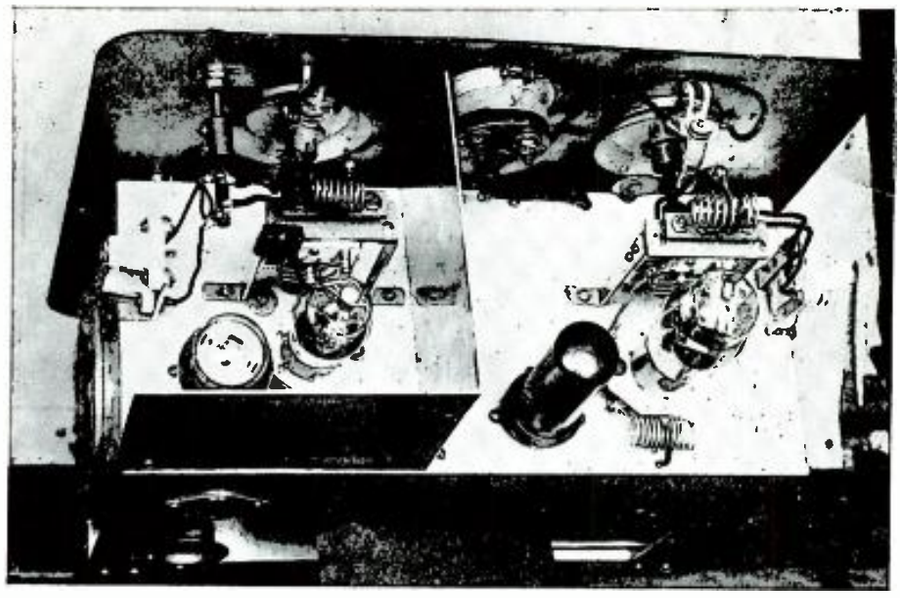
### Tube Line-Ups

In designing the transmitter, a number of different tube and circuit arrangements were first tested in "breadboard" fashion. However, because of its simplicity and efficient performance, the 6E6 was finally selected. This is a twin triode, and is employed in a push-pull oscillator circuit using an untuned grid coil. The 6A6 or RK-34, which also operate with a 6-volt filament, are suitable in the same circuit, although the latter tube brings its plate leads through the top of the envelope.

A 6L6 in Class "A" was found to give more than enough audio output to modulate this push-pull oscillator 100 per cent when using an ordinary single-button carbon microphone of any good make.

Another series of "breadboard" experiments in quest of a suitable receiver line-up revealed that the time-tested "super-regen" is fully adequate. Many types of tubes and circuit constants were tried, and the final choice was an 89 self-quenched detector, used as a triode, with a 6V6 as audio amplifier. The output is ample enough to be heard through a small magnetic speaker under even noisy local conditions.

An aluminum shield separates the transmitter and its modulator, on the



*Top deck of the transmitter-receiver. The receiver section at the left is shielded from the transmitter section by a metal baffle plate bent at right angles.*

**LEGEND**

C1—Cardwell Trimair, 15 mmfd.
C2—Cornell-Dubilier mica, 50 mmfd.
C3—Cornell-Dubilier mica, .002 mfd.
C4—Cornell-Dubilier electrolytic, 25 mfd., 50 v.
C5—Cornell-Dubilier mica, .005 mfd.
C6—Cornell-Dubilier electrolytic, 25 mfd., 50 v.
C7—Cornell-Dubilier paper, 0.5 mfd., 300 v.
C8—Cardwell Trimair, 15 mmfd.
C9—Cornell-Dubilier paper, .01 mfd., 300 v.
R1—I.R.C. 5 megohms
R2—I.R.C. 50,000-ohm potentiometer
R3—I.R.C. 25,000 ohms, 1 watt
R4—I.R.C. 500,000-ohm potentiometer
R5—I.R.C. 500 ohms, 2 watts
R6—I.R.C. 500,000-ohm potentiometer
R7—I.R.C. 200 ohms, 5 watts
R8—I.R.C. 100 ohms, 2 watts
R9—I.R.C. 25,000 ohms, 2 watts
R10—I.R.C. 25,000 ohms, 2 watts
R11—I.R.C. 2000 ohms, 1 watt
L1—4 turns No. 16 wire on grid end of L2
L2—8 turns No. 16 wire ¼" dia., 1" long
L3—12 turns No. 16 wire ½" dia., 1½" long
L4—8 turns No. 14 wire ½" dia., 1¼" long
L5—2 turns No. 16 wire ⅜" dia. (over center of L4)
J1—Yaxley 3-way jack
J2—Yaxley single-circuit jack
J3—Yaxley single-circuit jack
T1—U.T.C. CS-101 a.f. transformer
T2—Thordarson 86A02 a.f. transformer
T3—U.T.C. CS-34 a.f. transformer
LS—Wright-DeCoster 5-inch p.m. speaker
S1—s.p.s.t. toggle switch
S2—s.p.s.t. toggle switch
S3—d.p.d.t. toggle switch
S4—s.p.d.t. toggle switch
S5—s.p.s.t. toggle switch
B1—6-volt pilot light
B2—6-volt pilot light
M1—Beede 0-100 ma. meter
RFC—Ohmite 5-meter r.f. chokes
Mallory VP-552 Vibrapack

left of the panel, from the receiver circuits on the right.

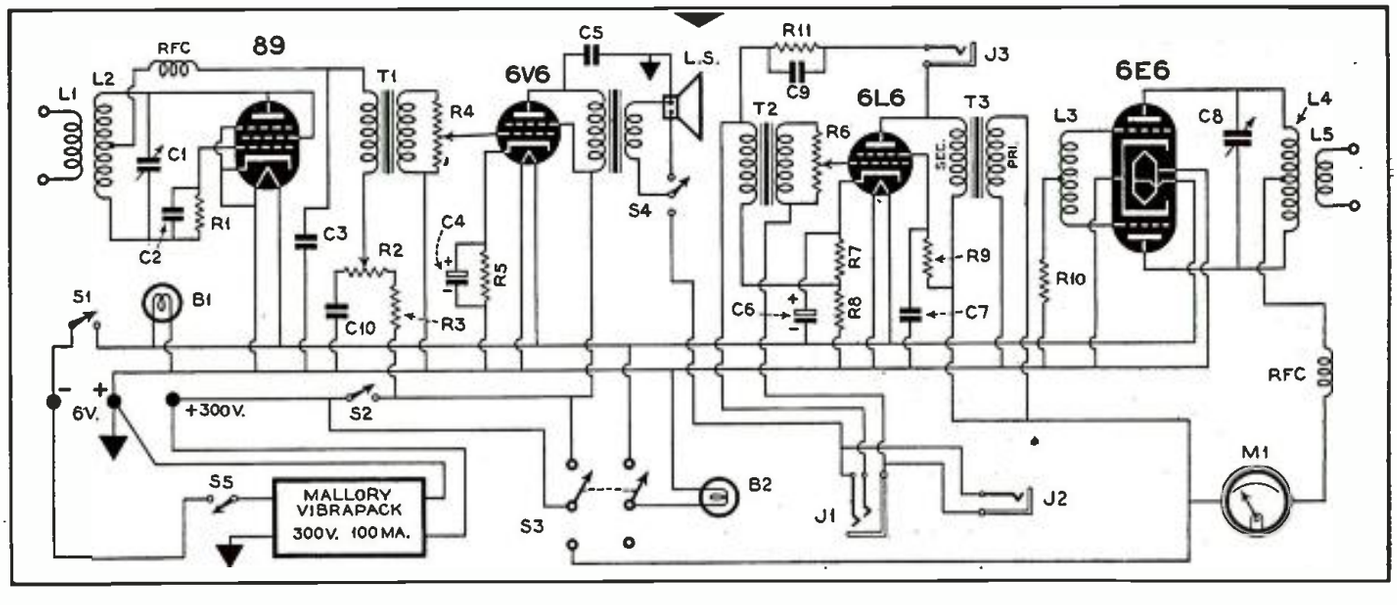
There are a number of refinements in this portable unit worthy of mention. For example, vernier dials with a 5 to 1 ratio are used in both transmitter and receiver, while small pilot lights behind the celluloid dials permit operation in a darkened room or car interior. The speaker is mounted on the lower right end of the case, behind a metal grill.

### Panel Switches

Panel switches of the toggle variety give control of filament supply, vibrator input, transmitter plate voltage and receiver. The last is a double pole, double throw switch, one pole being used to turn on the pilot light in back of the transmitter dial when the carrier is on the air. Another switch permits the operator to keep his receiver going at any time for duplex work, which is easily performed

*(Continued on page 269)*

*Below: Complete schematic diagram of the 5-meter transmitter-receiver. Circuit of receiver at the left, of transmitter at the right. Parts list above.*



# The Circuit Court

By THE CIRCUIT JUDGE

*INVERSE FEEDBACK . . . ANTENNA MATCHING . . . PHASE INVERSION . . . A.V.C.*

THE CIRCUIT ARRANGEMENT used in the Model E-155 General Electric receiver to secure audio degeneration is shown in Fig. 1. The feedback voltage is secured from the output transformer secondary which feeds the speaker voice coil. One side of this winding is grounded and the other side is connected back to the cathode circuit of the 6F6 driver tube.

Reference to the diagram shows that the feedback voltage is distributed or divided between a 50-ohm resistor in the cathode of the 6F6, a 2-mfd. condenser and a 180-ohm resistor. The purpose of the condenser is two-fold: First, it permits a higher percentage of output voltage to be fed back on high frequencies than on low frequencies and second, it isolates the d.c. in the cathode circuit from the speaker voice coil. The purpose of the 180-ohm resistor is to definitely limit the amount of feedback at the higher frequencies where the condenser impedance is small.

The amount or percentage of voice coil or output voltage fed back to the grid of the 6F6 driver tube depends upon the ratio of the 50-ohm cathode resistor to the sum of the condenser impedance for any given frequency plus the 180-ohm resistor. For 5000 cycles, the 2-mfd. condenser has an impedance of approximately 16 ohms. Therefore, at 5000 cycles, 50/16 + 180 or 25.5% of the output voltage would be fed back. At 100 cycles the 2-mfd. condenser impedance is approximately 800 ohms and the percentage of output voltage fed back would be 50/800 + 180 or about 5.1%. Thus, it may be seen that this circuit applies more feedback to high frequencies than to low frequencies and thereby provides considerable bass boost.

## A NEW DEPARTMENT

**THERE has been a steadily growing demand on the part of amateurs, experimenters and technically-inclined listeners for practical data on newly-developed circuits and circuit functions that can be readily applied to their own equipment. In the past such information could be gleaned only from engineering papers with a definite leaning toward the theoretical. In many instances it has taken months for precise data to filter down from the rarefied atmosphere in which the engineer does his work, and in some instances new circuit developments have not been generally aired at all.**

**With the institution of "The Circuit Court"—henceforth a regular monthly feature—we feel that the need for reports on the latest circuit developments, and data on their practical application, will be adequately satisfied.**

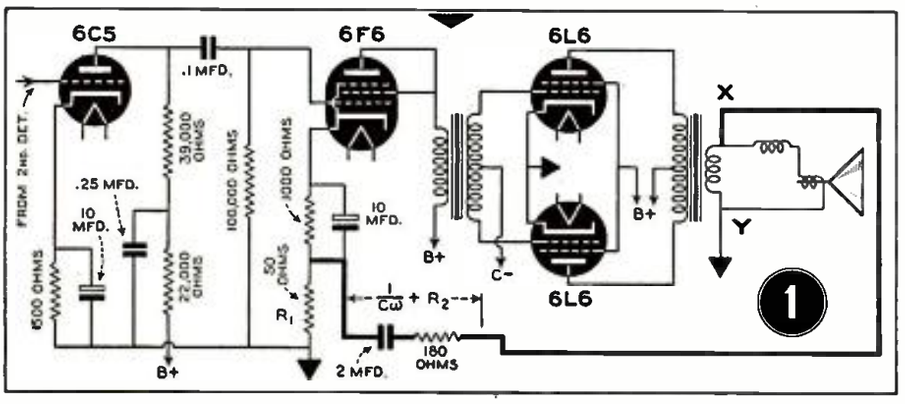
**It will also be a purpose of this department to review the various methods of obtaining desired circuit characteristics, to explain complex circuit functions, and to present improvements that can be made in existing circuits.**

**Readers are invited to correspond with the "Circuit Judge" regarding specific circuit problems or applications they would like to have covered in this department.—*Editor.***

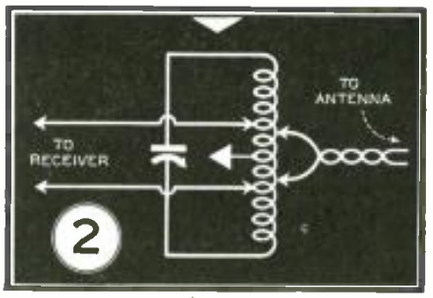
To understand how the out-of-phase output voltage gets into the 6F6 driver control grid, it is only necessary to recognize the fact that the complete grid circuit comprises the path from grid to cathode through the tube, from cathode to ground through the bias and degeneration resistors and from ground through the grid leak back to the grid. Since the 1000-ohm bias resistor in the cathode is bypassed with a 10-mfd. condenser, no audio voltage will develop across it to appear on the grid. However, the d.c. drop produced by plate current flowing from cathode to ground and back to B— does appear at the grid as its biasing voltage.

In trying this or any similar degenerative feedback circuit, the experimenter may, on first trial, connect the ground and feedback leads to the secondary of the output transformer incorrectly with resulting oscillation. Should this occur, the leads must be reversed.

As in any circuit arrangement for degenerative feedback, the gain of the amplifier is lowered and more than the usual number of stages will be required. This fact accounts for the three stages used in the General Electric Model E-155.




*Compensated inverse feedback circuit.*




*Antenna matching circuit for receiver.*

◆

**ANTENNA-MATCHING CIRCUIT FOR SHORT-WAVE RECEPTION—FIG. 2.**

FIGURE 2 SHOWS a circuit made up of an inductance coil and tuning condenser. As indicated, the antenna connections from a doublet or any two-wire feeder receiving antenna connect on each side of the grounded center of the inductance. The leads to the antenna terminals on the receiver connect further out on the inductance as indicated.

A suitable coil to cover the 6-mc., 10-mc. and 12-mc. bands when tuned by a 150-mmfd. variable condenser would be wound from No. 12 tinned copper wire and would have 20 turns 2 inches in diameter spaced one-quarter inch apart.

Alligator clips can be soldered to the antenna feeder leads and to the leads from the receiver so that all can be clipped to the tuning coil at points which will provide the strongest signal. If the

receiver has only one antenna lead or terminal and the other lead or terminal is a ground, the ground lead should be connected to the center of the coil. The antenna lead from the set can then be clipped to the coil on either side of the center.

Where twisted feeders are used, it is suggested for a start that the antenna feeders be clipped to the coil one turn out on each side from the grounded center. The leads from the receiver, if two antenna connections are available, should be tried about four turns out on each side of the grounded center. A signal should then be tuned in and the matching unit tuning condenser adjusted for maximum signal strength.

It should not be necessary to reset the receiver and feeder clips for reception over one band on the receiver, although the matching unit tuning condenser should be adjusted for each station.

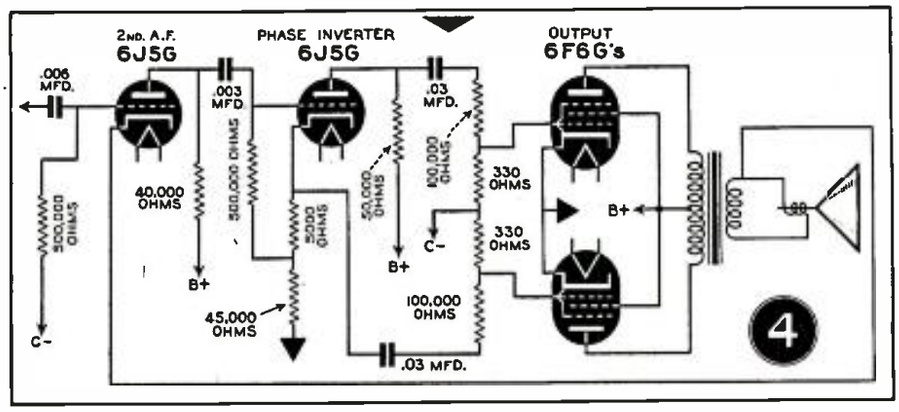
✦

**PARTIAL A.V.C. FOR MIXER STAGE —FIG. 3.**

IN SUPERHETERODYNE receivers using a 6A7 or 6A8 mixer tube, trouble sometimes develops if the full a.v.c. voltage is applied to the mixer signal grid. This trouble usually manifests itself in blocking on extremely strong signals. To avoid this difficulty, some sets are made with no a.v.c. on the mixer signal grid and these often overload at the second detector on strong signals.

The basic trouble lies within the 6A7 or 6A8, neither one of which has a suppressor grid between screen and plate. With a high a.v.c. bias on the signal grid, a small amount of secondary emission at the plate will produce blocking.

Since nothing can be done within the tube in a particular set, and since it is desirable to have some a.v.c. on the mixer, the mixer signal grid can be fed with partial a.v.c. as indicated in Fig. 3. The usual 500,000-ohm a.v.c. resistor is replaced with two 250,000-ohm resistors in series. The i.f. stage and r.f. stage, if used, can be given full a.v.c. as before. The mixer signal grid can be returned to the center junction of the 250,000-ohm resistors where the negative voltage produced by signal rectification current will be half the full amount. In most sets this will be enough to help flatten the a.v.c. characteristic of the receiver and will not be great enough to cause blocking. In the diagram, the a.v.c. resistors are marked X, Y, and Z.




*Phase inversion and degenerative feedback circuit.*

✦

**PHASE INVERSION AND DEGENERATIVE FEEDBACK—FIG. 4.**

IN FIG. 4 are shown two simple circuit arrangements, used in Philco Model 38-2 receivers, which help to produce reproduction of audio frequencies with a minimum of distortion. Each development can be studied separately and either one can be used readily by the experimenter.

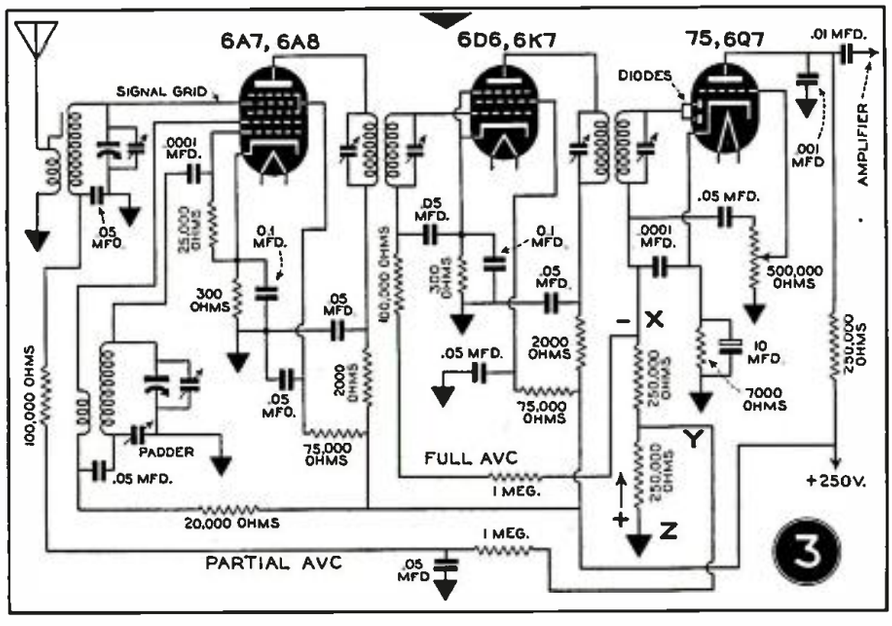
Phase inversion is obtained with a single 6J5G triode which is marked "Phase Inverter 6J5G" in the diagram. It will be noted that the plate of this triode is fed through a 50,000-ohm resistor and that the plate is coupled to the control grid of the upper 6F6G final amplifier through a .03-mfd. condenser. So far the circuit is conventional. In the cathode of the phase inverter tube there are two resistors in series between cathode and ground. The two total 50,000 ohms, or the same value used in the plate circuit of the tube.

For true push-pull operation of the final amplifier stage, the lower 6F6G control grid should be furnished with voltage identical in amplitude but opposite in phase to the voltage which appears on the upper 6F6G control grid. This desired, equal amplitude, opposite phase audio voltage is available from the cathode of the 6J5G phase inverter tube. It is known that the voltage at the cathode of a vacuum tube is exactly opposite in phase (180°) to the voltage on its plate. The fact that the cathode resistor is equal to the plate resistor makes the voltage from plate to upper 6F6G control grid equal in amplitude to the voltage fed from the inverter cathode to the lower 6F6G control grid.

The 500,000-ohm grid leak for the phase inverter 6J5G connects the control grid of the 6J5G to the lower end of the 5000-ohm resistor in the cathode circuit. Plate current flowing from cathode down to ground produces sufficient voltage drop across the 5000-ohm resistor to furnish bias for the 6J5G phase inverter tube. No part of the cathode circuit is bypassed for any appreciable capacity from cathode to ground would unbalance the system. The fact that bypassing is omitted in the cathode introduces some degeneration although it is limited to the effect produced in the 5000-ohm resistor. Even this small amount helps to reduce distortion. There is no voltage amplification in this type of phase inversion.

The degenerative feedback action is developed in the circuits made up of the

(*Continued on page 274*)




*Method of obtaining partial a.v.c. for mixer stage.*

# Globe Girdling

By J. B. L. HINDS

***AUSTRIANS SILENT . . . MAGIC KEY RELAYS . . . "RADIO BURMA" NOW XYO "RADIO 37" . . . JAVA CHANGES . . . SWEDISH STATION ON 40 . . . OXY OUT***

OCCASIONAL requests are made by listeners as to the procedure to follow in making reports to this department; as to what information is essential, and the manner in which it should be presented.

Reliability is, of course, the main requisite; hence, we need to know the source of your information. Was it picked up from a broadcast, was it contained in a letter received by you from the station, or was it obtained from a veri card?

You can assist us a great deal by reporting promptly all new stations heard, and where possible the exact frequency and the time schedules, as announced over the air. If this data is not given by the station, advise us of the time you heard the station and its approximate frequency as indicated by the receiver dial.

Data is also desired on changes in operating frequencies, station addresses, station calls and time schedules. Check each veri card you receive against our station list and report any changes indicated.

If you will do your part, and follow this plan, we can, in turn, do a better job for all of you.

**NEW STATIONS**

| *KC* | *Meters* | *Call* | *Location* |
|---|---|---|---|
| 18480 | 16.23 | HBH | Geneva, Switzerland |
| 11260 | 26.64 | HIN | Ciudad Trujillo, D. R. |
| 9830 | 30.52 | IRF | Rome, Italy |
| 9600 | 31.25 | XEYU | Mexico City, Mexico |
| 6675 | 44.94 | HBQ | Geneva, Switzerland |
| 6600 | 45.45 | HI6H | Ciudad Trujillo, D. R. |
| 6565 | 45.70 | HI5P | Puerto Plata, Dom. Rep. |
| 6383 | 47.00 | HI8J | La Vega, Dom. Rep. |
| 6280 | 47.77 | HIG | Ciudad Trujillo, D. R. |
| 5145 | 58.30 | OK1MPT | Prague, Czechoslovakia |

**STATION CHANGES**

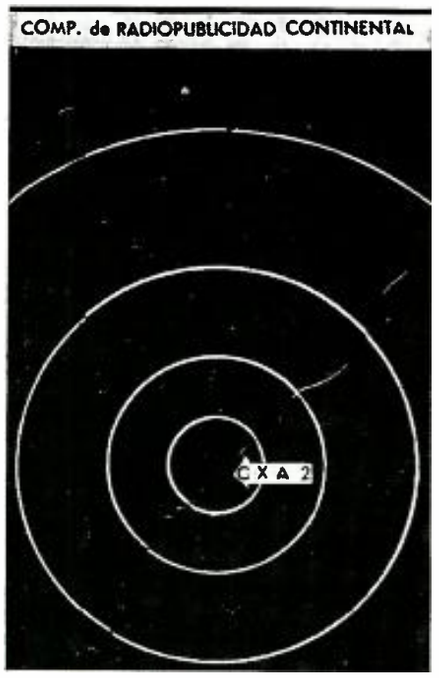
| *New Frequency* | *New Call* | *Old Call* | *Old Frequency* |
|---|---|---|---|
| 11885 | | TPA3 | 11890 |
| 11800 | | DJQ | 11795 |
| 9973 | | COBC | 9930 |
| 9610 | | YDB | 9550 |
| 9520 | | HJ6ABH | 9516.6 |
| 9290 | | HIG | 9300 |
| 9163 | | HC1GQ | 9180 |
| 9100 | | COCA | 9110 |
| 7540 | | RKI | 7520 |
| 6814 | | HIH | 6780 |
| 6660 | | HI5G | 9500 |
| 6555 | | HI4D | 6482 |
| 6420 | | HI1S | 6430 |
| 6240 | | HI8Q | 6206 |
| 6190 | | TG2 | 6180 |
| 6182 | | HI1A | 6190 |
| 6105 | | HI3C | 6730 |
| 6007 | ZYO | "Radio Burma" | 6007 |

**STATIONS DELETED**

| *Kc* | *Meters* | *Call* | *Reason* |
|---|---|---|---|
| 12500 | 24.00 | HIN | Not in service |
| 11860 | 25.29 | YDB | Not in service |
| 10370 | 28.93 | "Radio Nacionales" | Not on short waves |
| 6479 | 46.30 | HI8A | Not in service |
| 6090 | 49.26 | CRCX | Not in service |
| 6060 | 49.50 | OXY | Not in service |
| 4810 | 62.37 | YDE2 | Not in service |

**NON-AUTHENTICATED STATIONS**

| *Frequency* | *Call* | *Location* |
|---|---|---|
| 17760 | PZF | Dutch Guiana (Jan.) |
| 15170 | —— | Peru (Feb.) |
| 12000 | "Rancho Grande" | Peru (May) |
| 11850 | CB1185 | Chile (Apr.) |
| 11800 | CB1180 | Chile (Apr.) |
| 9950 | COCU | Cuba (Jan.) |
| 9565 | HP5S | Panama (May,'37) |
| 9530 | LKC | Norway (May) |
| 7410 | HCJB4 | Ecuador (Apr.) |
| 6120 | HP5Z | Panama (June) |
| 5835 | YV5RR | Venezuela (Nov.) |




***Unusual veri from CXA2, Montevideo, Uruguay. Map in red, background in blue, circular radiations in white.***

### *Radiophone and Experimental Stations*

W2XGB, 8655 kc., Hicksville, N. Y., and W9XDH, 12862 kc., Elgin, Illinois, both operated by Press Wireless, Inc., P. O. Box 296, Hicksville, N. Y., are heard broadcasting music and news quite regularly afternoons. Veri cards are furnished for reports received. They issue two cards—photos of transmitter and control room at Little Neck, N. Y.

CMA5, 17260 kc., Havana, Cuba, WQV, 14800 kc., WQP, 13900 kc. and WCG, 10380 kc., Rocky Point, are used occasionally to relay RCA's Magic Key programs on Sunday between 2 and 3 p. m.

HJA9, 7523 kc., Barranca, Colombia, heard testing with WQA, 21220 kc., Rocky Point, N. Y., by New Jersey listener at 4:30 p.m.

WOO, 12840 kc., Ocean Gate, N. J., contacting GLRZ, S. S. Aquitania. Heard in Ohio between 3:25 and 3:35 p. m.

ITK, 16385 kc., Mogdishu, Somaliland, Africa, heard working with Rome at 4:10 a. m.

JVA, 18910 kc., Nazaki, Japan, heard contacting DFG, Nauen, Germany, about 3:30 a. m.

GBC, 17080 kc., Rugby, England, heard at 4:20 p. m. working with WMA, 13390 kc., Lawrenceville, N. J.

GAB, 18040 kc., Rugby, England, heard standing by for CGA, 18180 kc., Drummondville, Canada, at 5:30 p. m.

GAA, 20380 kc., Rugby, England heard signing of with LSL4, 21160 kc., Buenos Aires, Argentina, at 12:05 p. m.

HJB, 14940 kc., Bogota, Colombia, heard between 6 and 6:30 p. m. contacting WQV, 14800 kc., at Rocky Point, N. Y.

GBB2, 13595 kc., Rugby, England heard testing with SUZ, 13820 kc. Cairo, Egypt, at 6:42 a. m.

### *Asiatics*

JZJ, 11800 kc., JZI, 9535 kc., and JVP, 7510 kc., are still transmitting the Overseas Japanese programs as shown in schedules, according to latest reports available.

An unknown Japanese station is reported testing with music between 6 and 7 a. m. near 5920 kc.

JDY, 9925 kc., Dairen, Manchukuo, has a new veri card printed in five colors; red, black, gray, yellow and tan.

Delhi, India, 9590 kc., continues to be heard but meeting with more interference and not getting out as well. Reports are now being received of a second Indian carrier being heard near 9550 kc. close to W2XAD and thought to be VUD2, 9575 kc. It is said to come on the air at 9:30 p. m., or the same hour as first mentioned station.

New Zealand was heard recently near 11000 kc., broadcasting a meeting of some kind, at which several speakers took part, with much laughter of mixed gathering, applause, etc.

VPD2, 9540 kc., Suva, Fiji Islands, reported heard and announcing frequency at 9535 as sign-off.

VK9MI, 6010 kc. and 11710 kc., M. V. Kanimbla, Sydney, Australia, broadcasts irregularly from 7 to 7:30 a.m. with occasional transmissions from 2 to 2:45 a.m. and 6 to 6:30 a.m., usually twice monthly.

"Radio Philco," Saigon, Indo-China, said to have been heard on West Coast from 8:45 to 9:30 a. m. on 6240 kc. It is assumed this station is same one carried in list on 11710 kc. Further reports would be appreciated.

XYO is call of "Radio Burma" listed on 6007 kc. and located at Rangoon. XYO is the only broadcasting station in Burma, being operated by the government experimentally. Station is said to transmit with 1 kw. power.

YDB, 11860 kc., Soerabaja, and YDE2, Solo, Java, have been dropped from lists. YDB, 9550 kc., Soerabaja, has been changed to 9610 kc. and slight changes have been made in the time schedules of Java stations, which are reflected in lists, and in accordance with late information received from Bandoeng. YDE2, mentioned above, was changed to 2500 kc. but power reduced to 25 watts.

It is also noted that the schedule received shows a correction in pencil as regards frequency of YDA shown in list on 6040 kc. between 7:30 p.m. and 2 a.m. indicating that frequency has been changed to 7400 kc., or 40.5 meters.

ZUD, approximately 8700 kc. and located in South Africa, reported heard between 5:30 and 7 a.m.

### *Europeans*

LKC, Jeloy, Norway, reported heard from 4 to 4:50 a.m. with test program on about 9526 kc. The assigned frequency of LKC is 9530, which is one of many frequencies assigned for broadcasting purposes in Norway. It is not yet known when the new stations will be in operation or how many transmitters will be employed.

SM5OU, a station in the 40-meter band, is testing a transmitter and will broadcast each Friday from 5 to 5:30 p.m. The station is operated by The Swedish Scout Society, whose address is Radio Section, Götagatan 39, Stockholm, Sweden. The exact frequency is not known. Information furnished by Ingvar Gullberg, Hedemora, Sweden, RSSL Station SM1.

OXY, 6060 kc., Copenhagen, Denmark, has been cancelled as a call according to advice from The Danish State Broadcasting Service. OZF, 9520 kc., is only transmitter at present being used in broadcasting programs, OZG, 11805 kc., may be used at any time in accordance with demands. The transmitters of these stations are situated at Skamleback.

PCJ, 9590 kc., Hilversum, Holland, is reported testing on 9080 kc. with a view to broadcasting its programs at that point to get away from the interference on 9590 kc. Station still on 9590 kc., however, with much improved signal. PCJ, 15220 kc., is said to now use the call PCJ2 on this frequency. No mention, however, is made of these changes in April program folders. PHI, 11730 kc., has been heard recently on special program.

RNE, 12000 kc., RAN, 9600 kc., RKI, 7540 kc. and RV59, 6000 kc., are carrying the Moscow broadcasts according to the latest schedules available. It will be noted that RKI has been changed in lists from 7520 to 7540 kc. Reports are also being received that station on 6030 kc. is being heard simultaneously with RNE. Berne list shows RW96 on 6030 and 6010 kc. RV59 not shown in Berne list. Authentic information would be appreciated.

A new Russian station reported heard near 15255 kc. at 3 a.m.

OER2, 6072 kc., and OER3, 11801 kc., Wien, Austria, have not been reported heard since Austria became a German state. Reports would be appreciated.

OLR3A, 9550 kc., OLR4A, 11840 kc., or OLR4B, 11760 kc.; OLR5B, 15320 kc., or OLR5A, 15230 kc.; OLR2B, 6030 kc., or OLR2A, 6010 kc., are broadcasting the scheduled Czechoslovakian programs. OK1MPT, 5145 kc., is a new station added by Czechoslovakia, and which is being used on test transmissions between 5:15 and 5:30 p.m. on Wednesdays and Saturdays.

YUA, 6100 kc., Belgrade, Yugoslavia, advise that station will be greatly extended and operate with more power in the summer of this year.

HBH, 18480 kc., HBJ, 14535 kc., HBO, 11402 kc. and HBQ, 6675 kc.,

The British Guiana Broadcasting Co., Ltd.,
Georgetown, British Guiana.

49.42 METRES. ~~VP-SMR~~ 6070 KCS.

"THE VOICE OF GUIANA."

*We have pleasure in verifying your reception of our transmission on* October 19, 1937.

*Our Schedule is as follows:—*

Monday to Saturday 5.30—9.30 p.m. (B.G. Time)
Sundays 9.00 a.m.—12.00 p.m. (B.G. Time)

*British Guiana Time is 3¾ hrs. behind G.M.T. and 1¼ hrs. ahead of E.S.T*

*Yours faithfully,*
*Secretary.*

***Impressive veri from Georgetown, Demerara. Seal and call in red.***

#### *LAST-MINUTE FLASHES*

VUD2, 9575 kc., Delhi, India, has verified our reception report by letter. Station on air 9:30 p.m.-12 midnight and 2-4 a.m.

VUB2, 9565 kc., Bombay, India, on air 9 to 10:30 p.m. and 1 to 3:30 a.m.

OLR4A, 11840 kc., and OLR4B, 11760 kc., OLR5A, 15230 kc., and OLR5B, 15320 kc., OLR3A, 9550 kc., OLR2A, 6010 kc., OLR2B, 6030 kc. and OK1MPT, 5145 kc., now in use on transmission of Czechoslovakian programs.

"Radio Rancho Grande," 12000 kc., is located at Trujillo, Peru.

XEME, Merida, now reported heard on 8560 kc.

HH2X, 11780 kc., new station.

Port-au-Prince station mentioned in this section may be new station with call HH2X.

EAQ, 9860 kc., Madrid, Spain, on air again evenings.

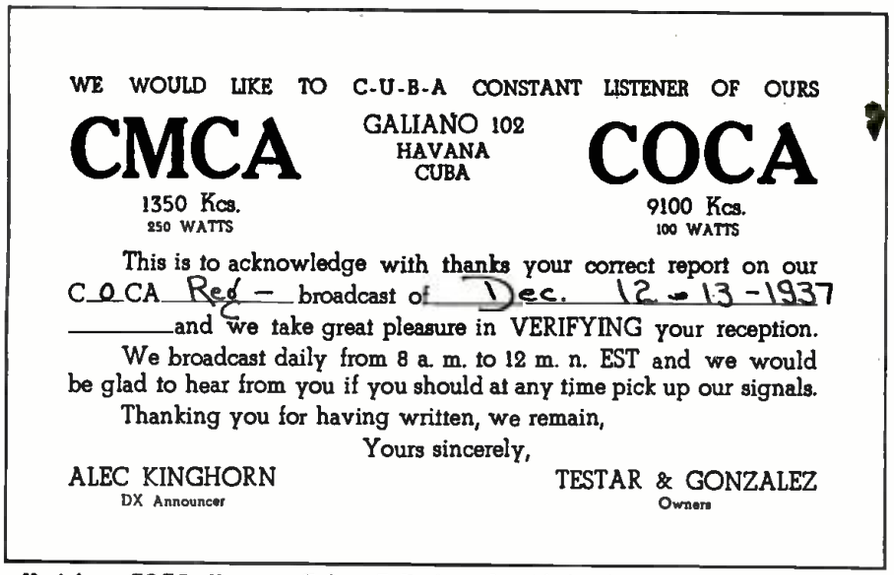
HI9B, 5885 kc., Santiago, Dom. Rep., is still transmitting on that frequency according to late report from station. Director of Communications advises HI3X is 15280 kc.; and HIT, 6630 kc. as shown in lists.

XEWW, Mexico City, advises station may be on either 9500 or 15160 kc., 8:55 a.m. to 1 a.m.

"Radio Nacional de Espana" gives address as Burgos, Spain. English program relayed to North America by "El Tablero" station, in Tenerife, EHZ, 10370 kc.

ZNB, 5900 kc., Mafeking, South Africa, again broadcasting musical programs.

Address of HI4ABU, 8650 kc., is Apartado 217, Medellin, Colombia.



WE WOULD LIKE TO C-U-B-A CONSTANT LISTENER OF OURS

**CMCA** 1350 Kcs. 250 WATTS

GALIANO 102 HAVANA CUBA

**COCA** 9100 Kcs. 100 WATTS

This is to acknowledge with thanks your correct report on our COCA Red — broadcast of Dec. 12 - 13 - 1937 and we take great pleasure in VERIFYING your reception.

We broadcast daily from 8 a. m. to 12 m. n. EST and we would be glad to hear from you if you should at any time pick up our signals.

Thanking you for having written, we remain,

Yours sincerely,

ALEC KINGHORN
DX Announcer

TESTAR & GONZALEZ
Owners

*Veri from COCA, Havana, Cuba. Calls in red, with black printing on white card.*

are being used in the broadcasts of League of Nations programs. HBJ, 14535 kc. and HBO, 11402 kc. are transmitting the regular scheduled Swiss programs. All of these programs are shown in station lists complete as taken from program schedules.

"Radio Nations," (League of Nations), consists of four units—a transmitting station at Pragins, near Nyon, on the north side of the Lake of Geneva; a receiving station at Colovrex, near Geneva; a central office at Geneva itself and a studio with recording equipment at the Palace of Nations.

HVJ, Stazione Radio, Vatican City, advise changes not yet complete. They will inform us as soon as possible.

I2RO, 11810 kc., and 9635 kc. and IRF, 9830 kc., are transmitting the Rome programs as listed, according to the program schedules sent out by them for April, 1938. It is assumed that they may not strictly follow these schedules and that other frequencies than those mentioned may be used. No further advice has been received from the station as to the various frequencies to be used when the new facilities shall have been completed.

"Radio 37," the new French station, mentioned by Department of Commerce and others as operated on 36 meters, has actually been in use for several months, according to advice from "Radio Coloniale," Paris, but only on medium wave of 360.6 and not on 36 meters. This is a private station.

TPA2, 15243 kc., TPA, 11885 kc., and TPA4, 11718 kc., are still the official frequencies of "Radio Coloniale," Paris, who advise that tests will be continued on the new trial frequencies and announcements made as used.

EAJ43, 10370 kc., Santa Cruz, Tenerife, is still relaying the programs of "Radio Nacionales," Salamanca, Spain, although announcements would indicate that frequency is used by "Radio Nacionales." The frequency of 10370 kc., "Radio Nacionales," has been removed from station list as Salamanca broadcasts only on 1258 kc., according to authentic information.

EAR, 9480 kc., Madrid, Spain, now said to be on daily with English broadcasts 7:30 to 8 p.m. and 8:30 to 9 p.m.

CS2WD, 5977 kc., Lisbon, Portugal, is the call of "Radio Renascenca." Station is being heard occasionally in afternoon as listed.

### *South Americans*

YV3RB, 9565 kc., Barquisimeto, Venezuela, is now being heard near 9578 kc., meeting some QRM from GSC but separable from it and with fair signal. This frequency may be used in place of YV3RA, 5880 kc., which is owned and operated by the same company.

YV5RC, 5800 kc., Caracas, Venezuela, uses 4 chime notes in downward scale at each fifteen-minute announcement.

PSH, 10220 kc., Rio de Janeiro, Brazil, is not being heard regularly in line with its schedules as shown.

LRU, 15290 kc., Buenos Aires, Argentina, said to show 15280 kc. on veri card. Last report from station showed 15290 kc. as listed.

VP3MR, 6070 kc., Georgetown, British Guiana, has a new veri card. Station advises that International or Imperial Reply Coupons must be enclosed with report if card is desired. Their new address is shown in list.

CXA9, 9440 kc. and CXA19, 11695 kc., Montevideo, Uruguay, reported as new stations under construction and to relay programs of CX14 and CX18. Stations expected to be in operation in May or soon after.

CXA2, 6000 kc., Montevideo, Uruguay, has new address in station list.

An unknown Spanish station is being heard nightly close to 7445 kc. Signs off anywhere from 10:45 to 11 p.m., when he gets ready, with Ted Lewis' "Good-Night Melody." Music as high as R8, but announcer drops his voice so location of station has not been determined.

HJ7ABB, 4820 kc., called Santander Broadcasting, and located at Bucaramanga, Colombia, is now being heard regularly close to the above frequency.

HJ1ABP, 9616 kc., Cartagena, Colombia, has new schedule. Also on air late and appears to cause interference with ZRK, 9606 kc.

HJ1ABE, 4860 kc., Cartagena, Colombia, reported announcing as being on 4800 kc. This station has new modernistic veri card.

HJ6ABH, Armenia, Colombia, has been changed from 9516.6 to 9520 kc., as several veri cards have been received showing the frequency as 9520 kc., although one card recently received shows call to be HJ4ABH, instead of HJ6-ABH, as reported by the Minister of Communications of Colombia.

HJ4ABU, 8650 kc., is located at Medellin, Colombia, and the address is Universidad de Antioquia. English program between 9 and 9:30 p.m. Signs off usually at 10 p.m. but occasionally at 10:30 p.m.

"Radio Rancho Grande," 12000 kc., in the midst of some beautiful code to bother at the time one wishes to get the English announcement, is the latest station on the air in Peru, and thought to be located at Trujillo. Typical Spanish programs. On the air in evening until 7:45 p.m. usually, but later occasionally. Announces as 12000 kc. or 25 meters. Closing selection said to be "Rancho Grande." One listener reports hearing announcement to the effect that station is operated by three brothers on a plantation in Peru. Operates 7 to 9 p.m. daylight saving time and also between 12 and 1 on Sunday, but if a.m. or p.m. is not known.

Station also reported heard near 10500 kc., at 12:30 a.m. with closing theme song above mentioned, accompanied by cuckoo calls and sound of moving train, which were heard by the writer recently, but on 12000 kc. on early evening program.

OAX1A, 6150 kc., Chiclayo, Peru, still being reported as heard on 6335 kc., notwithstanding the claims of station.

OAX5C, 9580 kc., Ica, Peru, still being heard between 9460 and 9480 kc. and no advice from station as to new frequency to be selected.

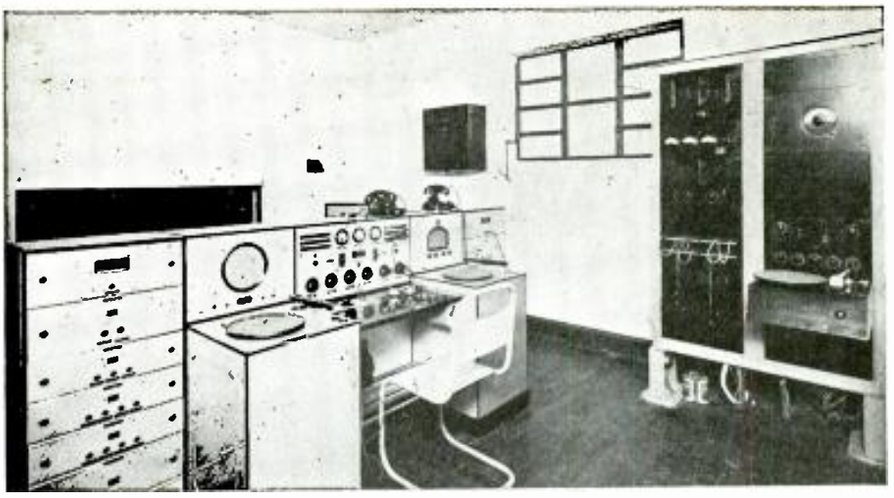
HC2CW, 8404 kc., Guayaquil, Ecuador, now being heard from 9255 to 9270 kc., and still no word from station as to what frequency station intends to work on.

HC1GQ, 9180 kc., Guayaquil, Ecuador, has been changed to 9163 kc. Station is operated by The Guayaquil and

Quito Railway Company, and will be used to advertise the beauties of Ecuador. They are now operating only on Mondays, Wednesdays and Saturdays. Regular and extended programs will be adopted as soon as new equipment is installed. Senor Guillermo Garcia Franco is Director of station. Veri cards issued free upon presentation of correct reports.

HCJB4, 7410 kc., Ecuador, has not been reported heard since the mention in "Last-Minute Flashes" in April issue.

HC1RB, 7870 kc., Quito, Ecuador, is still being heard near the above frequency. No details yet received from station. Some listeners say the call may be HC1RD.



*The monitoring control desk and auxiliary audio amplifiers at station PRA8, Pernambuco, Brazil.*

### Central Americans

TG2, 6180 kc., Guatemala, has changed frequency to 6190 kc. and is transmitting daily as per schedule in station list. Senor Julio Meza Caballeros, Director General of Electrical Communications, advises reports should be addressed as shown in list and not to Secretaria de Fomento. It is assumed such reports are not being mailed by readers of this magazine as we have not shown such an address.

TG2 opens and closes with the waltz by the Guatemalan composer, German Alcantara, entitled "The Flower of the Coffee," played by their marimba. This waltz is known the world over. At the beginning and closing of transmission, and also regularly each two or three hours, the official time of the Republic is given by the studio clock. At intervals of 30 minutes, more or less, station identification is given in several languages, including English, at which time chimes are struck six times, in the "G" octave, first three times, and after two seconds pause, three additional strokes.

The studios are in the building of the Director General of Electrical Communications, but the transmitters are located some 3 kilometers outside of Guatemala City, the transmissions being carried by wire from studios to plant. Station has 200 watts power.

TGQA, 6400 kc., broadcasts daily from the City of Quezaltenango, which is located in the western part of the Republic of Guatemala and transmits with 200 watts power. The opening and closing theme is the Guatemalan waltz "Xelaju" (which means, in the Indian dialect, Under the Ten Keys, as there were formerly ten forts guarding that part of the Indian territory). Quezaltenango is situated at an altitude of some 2500 meters above sea level. Station is known as "La Voz de Quezaltenango." Station announcements each 15 minutes in Spanish and English. Chimes are used as signal and given at announcements. Veri cards for both TGQA and TG2 are issued by TG2 so reports should be sent to them. It is not necessary to send I.R.C. postage or coin. Both stations furnish verification cards absolutely free. It is expected that TGQA will have a new card of its own at an early date. For the present they are using TG2's card changed over.

TG25 mentioned in April "Globe Girdling" is a mobile unit and is working temporarily in place of transmitter of TGS on 5713 kc. which is undergoing repairs. TG25 also works in the amateur bands of 20 and 40 meters at odd times.

TG9AA is the call of the first private amateur station which the government of Guatemala has authorized to operate, according to advice given out from the office of the American Commercial Attache, Guatemala. The frequencies assigned were not given. The station has been heard near 18450 kc. and also on the 10 and 20 meter bands.

TI4NRH, 9670 kc., Heredia, Costa Rica, will celebrate its tenth year on the air by daily broadcasts during the entire month of May, being on the air from 9 to 11 p.m. Senor Amando Cespedes Marin, the owner and operator of station, is looking forward to this occasion with much pride, as well he might, as his station is getting out wonderfully, 40 reports from New Zealand alone having been received when he wrote us. Station uses bugle calls as identification signals and plays "The March of the Wooden Soldiers" as theme song. Westminster clock chimes tell the hour at stated hours. Sepia diplomas in three colors will be sent to each listener making report.

TI8WS, 7550 kc., Puntarenas, Costa Rica, is still undecided as to where to park, as reports indicate station has been heard on 6370, 6630, 6650 and last on 5738 kc. since our comment in the April issue.

YN1GG, 6535 kc., Managua, Nicaragua, last heard near 6537 kc.

HH2T, 11570 kc., HH2R, 9545 kc. and HH2S, 5910 kc., are the listed frequencies for Port-au-Prince, Haiti. Occasional reports are received on HH2S, but none on the other two mentioned frequencies, until lately when two or three reports have been received for HH2T and HH2S on 11795 and 11785. One of these reports indicated that station was on daily from 7 to 9:50 p.m. and gave call as HH2T. As no advice

*Interior view of the transmitting station of PRA8, Radio Clube de Pernambuco, Brazil, showing the short-wave control panels and supervisor's desk.*


***The latest D-string veri card in three colors, the one shown being a reception verification of DJD, Berlin.***

can be obtained from the station, request is made that listeners make check and cover by report with a view of ascertaining the actual facts regarding the frequencies.

VP2LO, 6383 kc., St. Kitts, B.W.I., reported heard on special DX transmission from 2 to 2:45 a.m. on Sunday and also special program on week day between 5 and 5:45 p.m.

ZIK2, 10600 kc., Belize, British Honduras, reported to have announced change in time of broadcasts to 9 p.m. on Tuesdays, Thursdays and Saturdays.

Radio Martinique, 9700 kc., Fort de France, Martinique, although only shown as broadcasting until 8 p.m. is being heard on the air at times as late as midnight.

### Cubans

COBC, Havana, Cuba, advises their frequency is 9973 kc., although they seem to be much higher and quite unsettled. They use no gongs, chimes or bells and say they are on the air from 6:55 a.m. to 12 midnight. Opening and closing theme song is "Tu (You) Habanera," followed by call letters of both stations CMBC and COBC which are announced each fifteen minutes. Veri cards are forwarded upon receipt of correct reports, with which should be enclosed a dime in coin or International Reply Coupon. Station known as "El Progreso Cubano" and address as shown in list.

COCA, 9100 kc., is located at Galiano 102, Havana, Cuba. Their veri card bears the following at top—"We would like to C-U-B-A constant listener of ours." Station owned and operated by Testar and Gonzalez. Alex Kinghorn is the DX announcer. COCA, with 100 watts power, relays the programs of CMCA on 1350 kc.

COCW, 6330 kc., Havana, Cuba, is "transmitting" also on 12660 kc., and being heard on its harmonic with as good a signal as on 6330 kc. Harmonics appear quite popular in Cuba. COCO also holding up real well on 6010 and 12020 kc. although not being heard on both at all times.

COCM, 9833 kc., Havana, Cuba, now advises International Reply Coupon must be enclosed with reports of reception.

COHB, 6280 kc., Sancti-Spiritus, Santa Clara, Cuba, does not appear to be on the air.

### Dominicans

HIH, 6780 kc., San Pedro de Macoris, Dom. Rep., has been changed to 6814 kc.; HI5G, La Vega, from 9500 to 6660 kc.; HI4D, Ciudad Trujillo, from 6482 to 6555 kc.; HI1S, Santiago, from 6430 to 6420 kc.; HI8Q, Ciudad Trujillo, from 6206 to 6240 kc.; HI1A, Santiago, from 6190 to 6182 kc.; and HI3C, La Romana, from 6730 to 6105 kc. These changes were made upon advice from the Director of Communications of the Dominican Republic. In addition to those above mentioned the following changes have also been reported:—HI3X, 15280 to 15380 kc.; HIT, 6630 to 6330 kc.; and HI9B, 5885 to 6050 kc. No changes have been made in station lists, however, as stations are heard as shown in lists. Reports from listeners would be appreciated.

HI8A, 6479 kc., Ciudad Trujillo, Dom. Rep., has left the air and has been removed from station list.

HIG, Ciudad Trujillo, is operating on 6280 kc. and 9290 kc. The first mentioned frequency has been restored in list and the 9300 frequency changed to 9290 kc.

HIN, Ciudad Trujillo, Dom. Rep., has been reinstated in list at 11260 kc., in addition to its regular frequency of 6243 kc. The frequency of 12500 kc. which was shown for a while has been dropped.

HIN has assigned frequencies of 6243 and 11260 kc., although the latter is not apparently being used at present. This station is throwing a harmonic on 12486 kc.

HI6H, 6600 kc., Ciudad Trujillo, HI5P, 6565 kc., Puerto Plata, new stations, have been added to lists. The last mentioned station has been heard by several listeners.

HI8J, 6383 kc., La Vega, Dom. Rep., is now being heard and has been added to list. This station was carried in non-authenticated block on 6388 kc. A letter from owners states that station is known as "La Voz de la Provincia" and operated by Senor Antonio Batista C., Proprietor and Director.

HI2D, 6900 kc., Ciudad Trujillo, Dom. Rep., reported heard near 6215 kc. just above YV1RI, 6210 kc. Apparently many are always moving from their assigned frequencies.

### Mexicans

XEWI, 11900 kc., Mexico City, sends veri card to recent report of reception and makes no mention of change in time schedule as mentioned in April issue.

XEBC or XEVC, mentioned in this department in April as being heard broadcasting from Veracruz, has not been reported since and authentic infor-

(*Continued on page 274*)

**MAY ACE REPORTERS**

B. L. Ahman, Jr., Baltimore, Md.
George M. Alstetter, W7H4, Clarion, Pa.
Edward Ayvazian, W3F14, West Newton, Mass.
L. C. Anderson, Denair, Calif.
Charles S. Anderson, Clifton Forge, Va.
Willis E. Blanchard, W3E1, Bangor, Me.
Robert Behm, Philadelphia, Pa.
Gail T. Beyer, W9-11H55, Chicago, Ill.
Ed Bell, Columbia, S. C.
T. G. Brawley, W9J6, Greenville, Ohio.
Arthur F. G. Bruder, Allston, Mass.
Joe Brown, W7J17, McKeesport, Pa.
Wm. James Campbell, W4OH28, New York City, N. Y.
Bill Cavins, W15K10, Kansas City, Mo.
Fred A. Cook, Dutch Neck, N. J.
Richard Chapman, VE6DI, Buckingham, Quebec, Can.
H. C. Chesnut, Plattsburg, N. Y.
James M. Coleman, Staunton, Va.
L. M. Clark, Snyder, N. Y.
Charles F. Dieter, Jr., Brooklyn, N. Y.
H. J. DuMoulin, W10P1, Birmingham, Ala.
William Doniger, W4H116, Cedarhurst, N. Y.
Cecil K. Drinker, Jr., W3F63, Brookline, Mass.
Edward Davis, W4H151, Brooklyn, N. Y.
John B. Ewing, W4H120, Montclair, N. J.
J. O. Faris, W11J1, Danville, Ill.
William Fearnley, Palm Beach, Fla.
Walter J. Gyngell, Saratoga Springs, N. Y.
Walter E. Gibson, Kingston, N. H.
Donald I. Gross, West Asheville, N. C.
Charles Gerran, Jamestown, N. Y.
Ingvar Gullberg, Hedemora, Sweden.
John E. Gill, Dorchester, Mass.
William R. Goetz, W4H161, Brooklyn, N.Y.
Bill Hemmer, Belleville, Ill.
Gilbert L. Harris, W4F17, North Adams, Mass.
Clarence Hartzell, W7J7, Jeannette, Pa.
Carl F. Horton, W3F80, Athol, Mass.
George Hare, G13, Station Road, Leadenham, Eng.
Robert Jones, W8J3, Coshocton, Ohio.
Stuart Kreisher, W5H15, Reading, Pa.
C. F. Keirstead, W3F5, Framingham, Mass.
Charles E. Lannon, Dubuque, Iowa.
M. E. Leshner, W3F32, Lawrence, Mass.
Mrs. LeRoy Merritt, W7J18, Johnstown, Pa.
Earl McDonald, W3E6, Portland, Me.
Francis J. Messmer, W5H6, Conshohocken, Pa.
L. R. McPherson, Chicago, Ill.
George Mould, Wallington, Surrey, Eng.
Gordon E. McCroskey, Los Angeles, Calif.
R. B. Oxrieder, W6H5, State College, Pa.
H. Orlaw, VE5-29A7, Vancouver, B. C., Canada.
A. G. Oldenquist. Rutherford, N. J.
Anthony L. O'Kolish, Barberton, Ohio.
Homer E. Sink, Dayton, Ohio.
George Swanson, W4H99, Englewood, N. J.
George C. Starry, W7J12, Derry, Pa.
Theodore C. Smith, W5F8, Ogdensburg, N. Y.
Frank W. Stockbridge, Westboro, Mass.
Frank Sekach, W9G18, Chicago, Ill.
J. F. Satterthwaite, W9H1, Toledo, Ohio.
P. E. Thompson, New York City, N. Y.
John M. Unkefer, W8H14, Minerva, Ohio.
Alfonso Velasco, Mexico City, Mexico.
LeRoy Waite, W4F11, Ballston Spa, N. Y.
Troy Welper, W1OH, Jackson, Mich.
William G. Wise, 3rd, W31J8, San Mateo, Calif.
L. A. Weber, W4H195, East Orange, N. J.
Lee Meade Williams, W5J28, Baltimore, Md.
Howard Wilson, Jr., Ithaca, N. Y.
C. M. Whelan, W16S4, Memphis, Tenn.
Donald White, Cumberland, Md.

# Channel Echoes

By ZEH BOUCK

*IMAGE-FREQUENCY CHART . . . IF WINTER COMES . . . CONTESTS . . . ORCHIDS*

IN our March "Channel Echoes" we published a "rate-of-frequency variation" curve which we have found most useful in accurate short-wave logging. A companion curve for image frequencies we find equally indispensable, and we show the graph that applies to our own receiver in Fig. 1. Even the best of receivers with two stages of r.f. will give some image response between 10 and 20 meters. Often a station will be logged considerably off the conventional channels, and the operator will sit on that frequency for a half hour or more waiting for an announcement, only to discover that he is listening to a familiar station operating on a wavelength quite different from that indicated by the dial. Of course it is an image frequency, and the station will usually be located coming in much more powerfully at twice the intermediate frequency above the dial reading.

If an image-frequency chart or graph is prepared, the correct frequency can immediately be ascertained, and the receiver tentatively tuned to the assumed correct frequency to see if the transmission is duplicated there. In the most simple form, the regular tuning curve can be used, with the actual frequencies on the left and the image frequencies on the right. This has been done in Fig. 1, and refers only to the tuning curve No. 1. The left-hand figures are merely the regular tuning scale in megacycles plus twice the intermediate frequency—2 x 456 or 912 kc. in the case of the writer's receiver. If an unidentified signal is logged at 382.5, or "A" on the curve (No. 1) the indicated frequency is 26.1 mc. (approximately). This is indicated on the left-hand scale as per usual. However, the right-hand scale shows that it might be an image frequency of 27 mc. The frequency of 27 mc. tunes at 405 on the dial, and if the signal heard at 382.5 is an image, the same program, only louder, will be heard on 405 on the dial.

While the above system may be recommended by its simplicity, we prefer a second curve drawn twice the i.f. above the tuning curve—curve No. 2 in Fig. 1. Such a curve eliminates the inconvenient fractional readings on the left-hand side of the chart. If a signal is received at "A" on curve 1, it can be an image of a transmission at point "B" on curve 2. A horizontal line drawn from curve 2 to curve 1—from "B" to "C"—shows where the real signal will be received on curve 1.

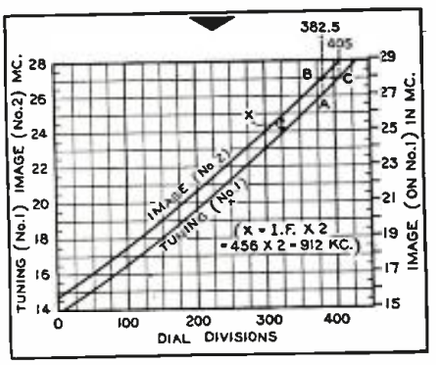



*Fig. 1. Image-frequency chart applicable to any receiver, and a distinct convenience in checking fundamentals.*

On the other hand, if it is desired to test the receiver for image-frequency response, it is only necessary to pick a signal on the tuning curve (No. 1), and then go left horizontally to curve 2 to find where the image, if any, can be tuned in.

In a very few cases where the h.f. oscillator in the receiver is tuned to a lower frequency than the signal, the image curve will of course be below the tuning curve—that is, the images will be received at a higher dial reading by twice the i.f.

WE HAVE RECENTLY listened to several talks from Berlin on "Heredity" and "Eugenics and Necessity." To identify the general theme requires little imagination. The whole series can be Mother Goosestepped as—Aryan Marry an Aryan!

✦

IT APPEARS THAT we've placed ourself in the dog-house with our old timers' guessing contests, and so, temporarily at least, we are going to drop them with the announcement next month of the winner of our April contest. The rules, apparently, were not clearly understood by all, many readers being under the impression that all who identified the various photographs would receive prize subscriptions. However, only *one* subscription was promised each month for what your department editor (who now takes it gracefully in the neck) considered to be, in his own humble and apologetic opinion, the best among the identifications submitted. However, if you really like these contests, and promise not to be sore if you lose, drop us a line and we'll seriously consider carrying on with them.

The contest in the February issue was pretty much of a give-away—the photo having appeared in other radio magazines subsequent to its original publication back in 1920. About 90% of the readers entering the contest correctly identified the picture as that of KDKA—

(*Continued on page 273*)

*Fig. 2. Our winter listening post, in Tampa, Fla., as viewed from an Army plane. Our antenna is located at the left—the one with the double insulators!*

# Night-Owl Hoots

By RAY LA ROCQUE

*GUATEMALAN CLASSICS . . . CONTEST STRETCH . . . BCB FACSIMILE . . . VERIES*
*A NEW GAME — THE ETHER RACE . . . F.C.C. FREQUENCY TEST SCHEDULES*

SHIELDED from the heat of the tropics by lofty and majestic volcanoes, in the picturesque western part of Guatemala, nestles the City of Quetzaltenango and its new and popular broadcasters TGQ and TGQA. Quetzaltenango is the second city in size in the republic and its standard broadcast station TGQ on 1450 kc. with 200 watts power serves a population of more than 50,000 people. (Pardon us while we pat ourselves on the back, but we cannot let it pass unknown that the station started broadcasting under the call TG1X on about 1480 kc., and that under that call it was listed in this column long before the information had reached any other publication.)

TGQ is a sister station of TG-1 (now on 1320 kc.) and is operated by the Director General of Electrical Communications of Guatemala. Schedule is daily from 9-11 p.m., Saturday from 8 p.m. to 1 a.m., and Sunday from 1-3 p.m. If you're tired of jam sessions and various forms of swing music now invading the American ether, you'll find refreshment in the many concerts by the best of Guatemala's marimba bands given over TGQ and TG-1, as well as their short-wave outlets TGQA and TG-2.

### Contest News

The end of the contest approaches and after totaling the scores for February we find that the first three positions are still unchanged. However, our Maine friend is running away with the contest and this month finds him far in front of Weyrich, who slipped down the ladder so that Tony Tarr is now riding close.

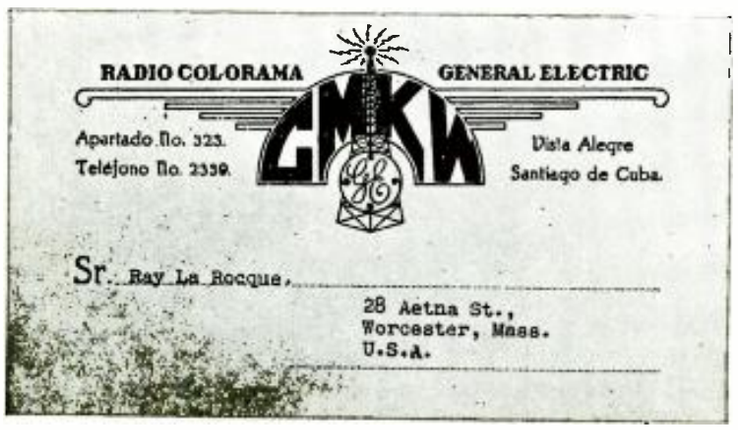
| | |
|---|---|
| C. Robert Wilson, Portland, Me. (2) | 88.1 |
| Carroll Weyrich, Baltimore, Md. (4) | 65.2 |
| Anthony C. Tarr, Seattle, Wash. (1) | 64.5 |
| Joseph T. Lippincott, Medford, Mass. (2) | 62.0 |
| Richard Holland, Gonic, N. H. (2) | 60.5 |
| William Vornkahl, Jr., Westport, Conn. (6) | 48.8 |
| Harry Honda, Los Angeles, Calif. (1) | 46.2 |
| Stanley Brus, North Braddock, Penna. (5) | 44.8 |
| Raymond Sahlbach, St. Louis, Mo. (7) | 43.8 |
| Robert Skyten, East Brookfield, Mass. (8) | 43.1 |
| Richard Wright, Chicago, Ill. (7) | 40.5 |
| Charles Hesterman, Saskatchewan, Can. (3) | 38.7 |
| Vincent Stasen, Philadelphia, Penna. (5) | 38.1 |
| Edward Urban, Cleveland Heights, Ohio (6) | 29.1 |
| Curtis Keirstead, Framingham, Mass. (8) | 28.1 |
| Earl Lever, Worcester, Mass. (8) | 23.6 |
| Kendall Walker, Yamhill, Ore. (3) | 21.7 |
| Eugene Castagnoli, Los Angeles, Calif. (3) | 17.6 |
| Walter J. Gyngell, Saratoga Springs, N. Y. (10) | 12.9 |
| Jack McKelvey, Los Angeles, Calif. (1) | 9.8 |
| Harry E. Snyder, Trenton, N. J. (10) | 9.7 |

Perhaps the race for top honors isn't hot right now, but there is plenty of competition for number two spot with only 5 points separating Weyrich in second place from Holland in fifth place. Ray Sahlbach made notable gains during February and increased his standing accordingly.

### Team Competition

During the period from Feb. 6-8, the New Englanders met the Boosters and downed them to the tune of 3233 to 2596! It was the only loss the Baltimore entry suffered, but it was all the New England team needed to regain first place as they piled up a score of seven wins and no losses for February. The Keystones climbed into a third place tie with the Phantoms as they lost only twice while winning six times. The Phantoms, on the other hand, went down to defeat four times at the hands of the Bay Staters, Boosters, New Englanders and Keystones. Our Bay State boys did very well for themselves by trimming all but the two leaders, and along with the Keystones, they loom as potential "dark horses" as the competition goes into the stretch.

*Note:* To determine the names of the




*Veri from CMKW, 1350 kc., 500 watts, Santiago, Cuba.*

### STATION CHANGES, U.S.A.

*New Stations*

| | | | |
|---|---|---|---|
| KDNT | W. Denton, Texas 1420 kc. | 100 w. | Daytime |
| KPAB | Laredo, Texas 1500 kc. | 100 w. | Unlimited |
| KRIC | Beaumont, Texas 1420 kc. | 100 w. | Unlimited |
| KVNU | West Logan, Utah 1200 kc. | 100 w. | Unlimited |
| ——— | Fayetteville, N. C. 1340 kc. | 250 w. | Daytime |
| ——— | Huntsville, Texas 1500 kc. | 100 w. | Daytime |

*Frequency*

KMLB 1200 kc. to 620 kc.

*Power*

KMLB ..... (620 kc.) 100 to 500 w.
WGAR ..... (1450 kc.) 500 to 1000 w.

### STATION CHANGES, FOREIGN

*New Stations*

| | | |
|---|---|---|
| XEDH | Villa Acuna, Mexico | 1340 kc. |
| XEFM | Leon, Mexico | 1160 kc. |
| 2CY | Canberra, Australia | 850 kc. |
| 2LF | Young, Australia | 1340 kc. |
| 4AT | Athlone, Australia | 680 kc. |
| 4QR | Brisbane, Australia | 940 kc. |
| 6PH | Perth, Australia | 790 kc. |
| 6NA | Narrogin, Australia | 1340 kc. |
| 7EX | Launceston, Aust. (500 w.) | 1000 kc. |
| 7HN | Hobart, Australia | 1160 kc. |

*Frequency*

| | | | |
|---|---|---|---|
| 2AD | 1080 to 1130 | 4RO | 1330 to 1080 |
| 2KA | 1160 to 780 | 4TO | 1160 to 780 |
| 2ZB | 1120 to 1130 | 4WK | 1340 to 880 |
| 3MB | 1490 to 1470 | TG-1 | 1510 to 1320 |
| 4CA | 1390 to 1000 | TGW | 1240 to 1520 |
| 4MK | 1080 to 1390 | 1ZB | 1090 to 1070 |

*Power*

| | | | |
|---|---|---|---|
| 2GF | (1210) 100-200 | 4VL | (1430) 50-500 |
| 2KA | (1470) 100-500 | 7HO | (860) 100-500 |
| 2RG | (1470) 50-100 | 7HT | (1080) 300-500 |
| 3BO | (970) 200-500 | 7LA | (1100) 300-500 |
| 4BU | (1480) 100-500 | | |

*Call Letters*

FT4AQ to Tunis, Tunisia on 1395 kc.
FT4AA to Bizerte, Tunisia on 1435 kc.
FT4AP to Sousse, Tunisia on 1457 kc.

*Delete*

TUA (1275 kc.), Tunis (877 kc.), and CBW (600 kc.)

members who comprise each team, match the numbers in parentheses following the teams with those placed after the names in the individual scores.

*Records:* Perhaps we spoke out of turn when we stated that it was almost impossible to beat Bob Wilson and Tony Tarr's record of 1000 for a single period of competition, or then perhaps Rich Holland has accomplished the almost impossible, but the fact remains that he scored 1033 points in the period from Feb. 6-8. Rich scored 100 on KVGB (listed in the time table) and therefore received a bonus of 100 points on that station. Scoring eight other 100's he failed only on WBRK—he scored 33 on that one! 1000's were scored by Tarr—once, and by Wilson—six times! Wilson has now scored 1000 points eighteen times since the contest started—is it any wonder he leads by such a commanding margin?


*Photo veri from CMHK, Casa Virgilio.*

### With the Night Owls

*Joseph T. Lippincott,* Medford, Mass.: "Try for YVIRE on 1153 kc. They sign on at 5:45 a.m. I seldom think of them at that time, but they can be heard easily and free of QRM."

*C. Robert Wilson,* 69 Grant St., Portland, Me.: "I'm very anxious to correspond with DXer's, especially those in foreign countries not to mention my fellow contestants in the present AWR contest!"

*Harold J. Miller* (W16J6), Omaha, Nebraska: "In a veri from KFYR, they state that they have a DX program on the second Wednesday of each month."

*Paul Hultquist* (W18J1), Tucson, Ariz.: "A little information on our local broadcasters: KVOA is the largest, with 1 kw. Studios located downtown and xmtr is on the 'edge' of the city. KGAR has 250 watts on 1370 kc. The xmtr and studios are at 142 So. 6th Ave., in the building occupied by the Motor Service Co. They have a huge glass front overlooking the street and one can stand on the sidewalk and watch the announcers and engineers."

*Leo Herz,* (W11H2), Chicago, Illinois: "This is to notify you of my official resignation as Short-Wave Editor of the Globe Circlers DX Club. I am no longer connected with the GCDXC in any way."

*Richard Wright* (W11H6), Chicago, Illinois: "If any readers of Night-Owl Hoots would like to secure card verifications from WGN, I am in a position to secure the verifications for them. They verify with a plain letter. However, I can get picture post cards showing the WGN studios, type the veri message on it and send it to the station along with the listeners' report and they will mail the post card direct to the DXer.* I ask only 2c for this service, one cent for postage and the other for the picture post card. However, I will require that all those who take advantage of this offer include at least three musical selections or one selection plus a *quoted* announcement." (Splendid offer, Dick, and the Chief, for one, is going to take advantage of it.)

For the above verifications write to Richard Wright, 5762 Harper Ave., Chicago, Illinois, and if you know the locations of any U. S. transmitters, Dick would appreciate your jotting them on a slip of paper with the report as he is compiling a list of xmtr locations.

### New Veries, Veri News

KLS issues a printed veri on government post card. Call in black and ¼-inch letters at top of card. Green Ekko verification stamp attached. . . . CHLT verifies with printed letter . . . KVOD in Denver confirms reception by personal letter. Letter head: Black and brown on yellow . . . TG1X (now TGQ) verifies with the same Quetzal Bird card used by TG1 and TG2 . . . Verification from CMHK is a very interesting personal letter with photograph of studio enclosed. . . .

*Harold J. Miller* (W16J6), Chicago, helps with the following notes on verifications received: "WMBO verified by card—yellow with call letters and printing in black . . . KFYR veri is a letter with stamp attached. Stamp is black with picture of station in gold . . . WJBO veri is a government card with call in bright red and printing in black . . . WHA verification card is red with black call letters and printing . . .KVI, WGN, WMPS, and WDOD verify by letter."

### Kilocycling Around

Kilocycling around Quetzaltenango (we like that one) we learn that TGQ as well as all the other stations operated by the Director General of Electrical Communications require no return postage for their verification . . . Perhaps you didn't know that the test modulator at WMAQ transmitter is keyed from Chicago so that WENR can be tested simultaneously. The station cannot be operated from transmitter house and be modulated. All mikes are in Chicago . . . WISN tests its auxiliary transmitter every Tuesday morning from 2-2:30 a.m. The tests are conducted with 250 watts from 2-2:15, and with 1000 watts from 2:15-2:30 . . . As if the Cuban situation isn't tough enough to handle—many club bulletins and publications are still moving CMCB to 1230 kc. from various channels, especially from 630 kc. CMCB has always been on 1230 kc. and after many years of operation they are still on that frequency. Pardon, while we knock on wood! . . .

A lot of fun this new game some DXer's are playing on short waves, and there's no reason why it cannot be adapted to the standard broadcast band. They start by logging a station at a given point and time themselves with the idea of discovering how fast they can travel 'round the world via the ether waves. Of course it's not possible to travel 'round the world on the BCB—that is, not as easily as it is accomplished on the short waves. However, timing yourself on various trips across the North American continent offers a similarly pleasant pastime. Here's how it's done. One starts at either coast and continues to scan the dial, logging stations in a continuous line across the continent until the opposite coast is reached. The only rule to be observed: One cannot pass over a state without logging a station in that state.

Suppose we schedule an ether race for Night Owls during the next month, placing the starting point at either New

* Not valid when applying for Broadcast Band DX Citation unless card is signed by station official or authenticity otherwise indicated.

York or Los Angeles and requiring the contestants to start at either point and time themselves on their trans-continental voyage via the ether. You must, of course, definitely identify each station by hearing the call announced, and copy at least one musical selection. We'll be interested to see your scores, but as this is merely a game we're not going to ask you to send us any reports. Just explain the stations logged and state your time, and we'll publish the best scores. As a fore-warning, do not expect to accomplish this feat in a few hours—as it usually takes days to complete the trip.

They tell us that over in Tunis, Tunisia, the possibility of a government station of great potency is still under consideration, but that its immediate realization is prevented by lack of funds. . . . On the 16th of this month, the F.C.C. will go into a huddle to decide whether or not it shall grant applications for power in excess of 50,000 watts. . . . An NNRC member in one of their bulletins reports a VP7NF in Nassau, Bahama Islands, on 618 kc. Sked is reported to be from 10:30 a.m. to 10:30 p.m.

Among the many mysterious Latin-American stations, XEL has a high rating. This station has been reported in the AWR contest as broadcasting on 780 kc., 1100 kc., and 1370 kc. It develops, however, that the 780 station is XEN which has been there since it shifted from 700 kc. about a year ago when everyone thought it left the air. The 1370 station is XELZ which is putting a strong signal throughout America till the wee small hours daily. However, the 1100 kc. station seems definitely identified as XEL. At least, that is the call we make from our knowledge of the Castillian tongue, but here's the hitch—all letters addressed to XEL are returned marked "not located" or "no such broadcaster"! Has our Spanish ear "let us down," or is the Mexican P. O. department kidding us?

They tell us that Cuba was the first country to ratify the proposal of the Telecommunications Conference, but till the others make up their minds, the Cubans are still playing leap frog on the dials of our receivers . . . CMBS has been located on 1170 kc., which means that CMBD had to leave that channel. We've solved that one on our own hook—however, we're becoming very adept at leap frog ourselves now! To get back to Cuba, CMBD is now on 1260 kc. and shares time on this channel with CMC. CMCH is now on the air on 1110 kc. and it is believed they share with CMCJ. CMBQ seems to have all the time on 680 kc., which leaves CMCG still among the missing. Paging Mr. Weyrich!

We acknowledge receipt of the 14-page Universal Radio DX Club bulletin and inform Night Owls that they can join the URDXC for $1.25 per year. Further information from 2018 Green St., San Francisco, Calif. . . . And also many thanks to Harry Gordon for send ing us every copy of the National Radio Club bulletin. Harry's doing a swellegant job editing this bulletin. For those interested you can learn more on the NRC by writing 317 East 10th St., Erie, Penna.

Herman H. Hohenstein, of KFUO, writes regarding a DX program from that station which reached us too late to mention in our Time Table. Which is unfortunate, for KFUO has always co-operated with DX enthusiasts in every way. We did learn a few facts from the KFUO report enclosed with the notice. KFUO has been on the air since 1924, the present station was turned over

(*Continued on page 265*)

## F.C.C. TEST SCHEDULES

***Below is a completely revised and up-to-date schedule of the F.C.C. Monitoring Tests. These tests are conducted monthly during the second week of the month and are of fifteen minutes' duration. All time shown is Eastern Standard.***

| *Sign on* | *Monday* | *Tuesday* | *Wednesday* | *Thursday* | *Friday* | *Saturday* |
|---|---|---|---|---|---|---|
| 3:00 | WABY—1370 | WSJS—1310 | WTEL—1310 | WKAT—1500 | WSVS—1370 | |
| 3:05 | WMAS—1420 | WMFJ—1420 | WNBF—1500 | WJRD—1200 | WJAC—1310 | |
| 3:10 | WCAX—1200 | WAIM—1200 | WLVA—1200 | WSOC—1210 | WJTN—1210 | |
| 3:15 | WRDO—1370 | WMFD—1370 | WSAJ—1310 | WAML—1310 | WBLK—1370 | |
| 3:20 | WAGM—1420 | WEED—1420 | WWSW—1500 | WPRA—1370 | WLEU—1420 | |
| 3:25 | | WJNO—1200 | WBAX—1210 | WPAX—1210 | WCAP—1280<br>WSAY—1210 | |
| 3:30 | WQDM—1390 | WRDW—1500 | WHAT—1310 | WQAM— 560 | WDEV— 550<br>WGH—1310 | WTOL—1200 |
| 3:35 | WMFF—1310 | WIOD—1300<br>WICA— 940 | WRTD—1500 | WPRP—1420 | WCNW—1500<br>WMBS—1420 | WKBZ—1500 |
| 3:40 | WABI—1200 | WAYX—1200<br>WBLY—1210 | WBBL—1210 | WFTC—1200 | WFAS—1210<br>WMBC—1350 | WJW—1210 |
| 3:45 | WCAD—1220 | WDNC—1500<br>WPAY—1370 | WBNY—1370 | WKAQ—1240 | WOKO—1430<br>WRAW—1310 | WBNS—1430 |
| 3:50 | WLNH—1310 | WAIR—1250<br>WMBC—1420 | WHIS—1410 | WBIG—1440 | WSYB—1500<br>WDAS—1370 | WOLS—1200<br>WGAR—1450 |
| 3:55 | WIBX—1200 | WMFR—1200<br>WALR—1210 | WKOK—1210 | WFOY—1210 | WNBZ—1290<br>WSYR— 570 | WLAK—1310<br>WCOL—1210 |
| 4:00 | WWRL—1500 | WHBB—1500<br>WKRC— 550 | WFBG—1310 | WAOF—1370 | WBRE—1310 | WQBC—1360<br>WCAZ—1070 |
| 4:05 | WMBO—1310 | WSMB—1320<br>WCLE— 610 | WQAN— 880 | KPLC—1500<br>WFDF—1310 | WNLC—1500<br>WBTM—1370 | WJBO—1120<br>WSMK—1380 |
| 4:10 | WBRB—1210 | KALB—1210<br>WLBC—1310 | KWNO—1200<br>WHDL—1400 | WSPD—1340 | WGBB—1210<br>WHEC—1430 | WTAL—1310<br>WOMT—1210 |
| 4:15 | | KELD—1370<br>WOPI—1500<br>WWAE—1200 | KRIS—1330<br>WERR—1310<br>WIBM—1370 | WMFO—1370<br>WCPO—1200 | WTHT—1200<br>WAZL—1420 | WNEL—1290<br>WOSU— 570 |
| 4:20 | KVOX—1310 | WACO—1420<br>WDBO— 580<br>WBCM—1410 | KBST—1500<br>WPAR—1420 | WKEU—1500<br>KFIZ—1420 | WMBQ—1500<br>WRAK—1370 | WMSD—1420<br>WDZ—1020 |
| 4:25 | KFPW—1210 | KXYZ—1440<br>WSIX—1210<br>WCMI—1310 | KSO—1430<br>WCLO—1200 | WGCM—1210<br>WGBF— 630 | WGNY—1210<br>WBOW—1310 | WGTM—1310<br>WHBU—1210 |
| 4:30 | WMIN—1370 | KGKL—1370<br>WHEF—1500<br>WHBY—1200 | KROC—1310<br>WEOA—1370 | KFYO—1310<br>WFOR—1370<br>WAVE— 940 | WJBL—1200 | WJSW—1200<br>WKBN— 570<br>KCMO—1370 |
| 4:35 | KNET—1420 | KCMC—1420<br>WHK—1390 | KDAL—1500<br>WELL—1420 | WTMV—1500<br>KFJM—1410<br>WMPS—1430 | KATE—1420<br>WKBB—1500 | WNAD—1010<br>WQPC—1420<br>WXYZ—1240 |
| 4:40 | WBBZ—1200 | WRGV—1260<br>WADC—1320 | WTAW—1120<br>WHBC—1200 | KGCU—1240<br>WBHP—1200<br>KQV—1380 | KARK— 890<br>WJIM—1210 | KOVC—1500<br>WTJS—1310<br>WTAX—1210 |
| 4:45 | KFGQ—1370 | KTOK—1370<br>WJBK—1500 | KRMD—1310<br>WSAU—1370 | KWOS—1310<br>WCOC— 880<br>WGRC—1370 | WHLB—1370<br>WEXL—1310 | KLCN—1290<br>WMBR—1370<br>WMPC—1200 |
| 4:50 | KRBC—1420 | KGFF—1420 | KNEL—1500<br>WLAP—1420 | KOTN—1500 | KIUN—1420 | KGCA—1270 |
| 4:55 | KGIH—1200 | KFVS—1210 | KFDM— 560<br>WFAM—1200 | WEW— 760<br>WJMS—1420 | KFJB—1200 | KOCA—1210<br>KVOL—1310 |
| 5:00 | KTEM—1370 | KMAC—1370 | KPDN—1310 | KGHF—1320<br>WHDF—1370 | KGGM—1230<br>WBEO—1310 | KBIX—1500<br>WBNO—1200 |
| 5:05 | KABR—1420 | KAND—1310 | KPLT—1500<br>WCBS—1420 | KGFI—1500<br>WTRC—1310 | KGIW—1420<br>WKBV—1500 | WHBQ—1370<br>KPAC—1260 |
| 5:10 | KGEK—1200 | KLAH—1210 | KGKO— 570 | KHBG—1210 | KGDE—1200<br>WHBF—1210 | KANS—1210<br>WROL—1310 |
| 5:15 | KFJZ—1370 | KIUP—1370 | KFPL—1310<br>WDWS—1370 | KONO—1310 | KGFL—1370<br>WEMP—1310 | KTRH—1290<br>KMLB—1200 |
| 5:20 | WMBH—1420 | KFXR—1310 | KAWM—1500<br>WPAD—1450 | KGKB—1500 | KEUB—1420 | KLPM—1240 |
| 5:25 | WIL—1200 | KDLR—1210 | KGLO—1210<br>WJBC—1200 | KASA—1210 | WCAT—1200<br>WEBQ—1210 | KVSO—1210 |
| 5:30 | WOC—1370 | KICA—1370 | KRRV—1310<br>WGL—1370 | KFRO—1370 | KWYO—1370 | KWLC—1270 |
| 5:35 | KABC—1420 | KGMB—1320 | KGKY—1500 | KNOW—1500 | KIDW—1420 | KTSM—1310 |
| 5:40 | KADA—1200 | KBTM—1200 | WIBU—1210 | WMFG—1210 | KFXJ—1200 | KWTN—1210 |
| 5:45 | KLUF—1370 | KRMC—1370 | | KRLH—1420 | KGBX—1230 | WLB—1250 |
| 5:50 | | | | KCRJ—1210 | KRQA—1310 | KOBH—1370 |
| 5:55 | KHBC—1400 | | | KIUL—1210<br>KVOA—1260 | KOKO—1370 | KPFA—1210 |
| 6:00 | KRE—1370 | | | | | KIT—1270 |
| 6:05 | KXO—1500 | KORE—1420 | | KHUB—1310 | | KGBU— 900 |
| 6:10 | KWG—1200 | KOOS—1200 | | KGGC—1420 | | KFJI—1210 |
| 6:15 | KERN—1370 | KAST—1370 | | KGAR—1370 | | KGEZ—1310 |
| 6:20 | KUMA—1420 | KPQ—1500 | | KSRO—1310 | | KGVO—1260 |
| 6:25 | KVCV—1200 | KFXD—1200 | | KTRB— 740 | | KGY—1210 |
| 6:30 | KLS—1280 | KUJ—1370 | | KJBS—1070 | | KXRO—1310 |
| 6:35 | KYOS—1040 | KRNR—1500 | | KSUB—1310 | | KGCX—1450 |
| 6:40 | KSUN—1200 | KVOS—1200 | | KDON—1210 | | KFID—1120 |
| 6:45 | KGDM—1100 | KEEN—1370 | | KGU— 750 | | KINY—1310 |
| 6:50 | KIEM—1450 | KMED—1410 | | KHSL—1260 | | KFQD— 780 |
| 6:55 | KVEC—1200 | | | KROY—1210 | | KRLC—1390 |
| 7:00 | | KRKO—1370 | | | | |

# Hamfest

By W8QMR (W4FCP) ex-2PI • LU4S

*ROUND TABLE . . . CHECK AND HALF CHECK . . . DX ON 75 . . . HAM EVOLUTION*

JUST what your favorite brand of potatoes may be—Irish, Idaho, Maine or Long Island—the chances are the spuds you dish up this time of year come from Goulds, Fla.—from the back yard of W4DLH. Bill Burkhart goes in for squirters—potato-bug and signal—the latter being show in Fig. 1 which we snapped a few weeks ago just after Bill made his new WAC record. As far as Bill's potatoes are concerned, see your local grocer—as for his original WAC scoop, see ALL-WAVE RADIO for July 1937. "Four Dark Lean Horses" first worked all continents in twenty-one minutes flat. Shortly after he cut the time to seventeen minutes and then to eight minutes, ten seconds. Last January 4th Bill's potato crop looked promising and he decided to tell the world about it on 14-megacycle phone. He passed the good news on to VU2CQ (Bombay, India). VU2CQ told G5ML that he liked them French fried. G5ML voted for plain mashed to HK5AR. HK5AR confided his preference for Lyonnaise to VK4JU, who confessed a weakness for boiled potatoes with the jackets on to SU1SG. SU1SG gave W4DLH a buzz and told him that the potatoes were doing well in Goulds, Florida—all in the space of three minutes and twenty seconds.

Unfortunately, Bill's WAC was only half-baked—he forgot to work the USA!

✦

THE OTHER NITE W4IR (Pop "Dixie Squinch Owl" Jones) was working an AARS station down the line. The latter said "ZMA one—but it's kinda long—check seven five—do you wanta take it?"

"That's okay, son," said Pop—"It'll be ck 25 by the time it leaves here—K."

✦

WE DROPPED IN on W4DVO a week or so back, and cast a critical eye over the QSLs on the wall. Surrounded by a bunch of W4s, there was a card from W9BEN which brought to mind the way that tempus fugit—or just plain time marches on. BEN probably bought those cards by the thousands when his QRA (now QTH) was Savanna, Ill. Savanna was crossed out and Stockton written in. Similarly deleted was the dope on the xmttr—"1-210 tube Hi-C Hartley 550 v. R.A.C." Ditto for data on the receiver—"Aero Coils 1 Step

*Fig. 1. The signal squirter at W4DLH—"Four Dark Lean Horses."*

A. F." The legend inked in now reads "6L6 X osc. P.P. 46s. P.P. 211Ds input 550 watts" for the transmitter, and "HRO" for the receiver.

✦

W4DVO IS TOUCHY about those W4 cards on the wall. He got real riled the other night and between 1100p and 100a he called twenty-three foreign stations *on 3565 kilocycles.* He raised eleven of them—PAOPN, PAOPF, G2MI, G6NF, OE3AH, HB9T, HB9W, SM7UC, XE1A, K4DTH and CM2AD. Others called were FM8AD, YM4AA, YR5AA, G6WY, F3KH, ON4AU, K4KD, GI6TK, D4NXR, OZ9Q, EI8B and F8ZF. Power input was 75 watts to a pair of 210s. Who started this idea that 75 wasn't a dx band?

✦

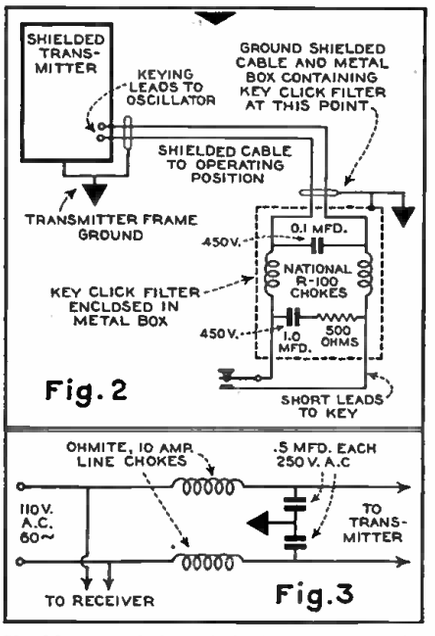
DAVE TALLEY, W2PF-WLNA, sends us Figs. 2 and 3 diagramming the keying system used in his apartment house installation to which he gives full credit for the elimination of interference on BCL sets and for his ability to work break-in on any frequency including that to which his own transmitter is tuned. Break-in is easy enough on anything but spot frequency, but PF claims that even when tuned right on the nose there is just a mild click to let him know that he's actually getting out!

IT IS PERHAPS none of our business—except in-so-far that every recognized violation of the F.C.C. rules and regs is the personal business of every amateur operator—but there are a good many embryo hams on the air operating licensed stations without benefit of an operator's license. Knowledge of radio law is a prerequisite to obtaining an operator's license, and such would-be hams doubly damn themselves on the air by admitting that they are working for their ticket!

For instance, there is a certain young lady who operates her husband's station—who admits *on the air* that she is endeavoring to gain enough speed so as to pass the code test! In so doing, she confesses to any F.C.C. monitoring station that might be eavesdropping that she is ignorant of the rules and regs (and therefore is not qualified for a license), and invites arrest and penalties to the extent of a $10,000 fine—plus a $500 fine for each day of the violation—plus two years in a federal jug.

And so far as we can find out in a layman's interpretation of legislative ter-

(*Continued on page 282*)




***Shielding and key-click filter system for break-in as used at W2PF-WLNA. The line filter (Fig. 3.) irons out the last tick in BCL sets.***

# Ultra-High

By PERRY FERRELL, Jr.

*WX FORECASTING . . . SO. AMERICAN DUPLEX . . . W3XES FACSIMILE . . . W8XEK QSLs*

TWO months ago many of the New England newspapers carried the story of a new weather forecasting service via radio. Unfortunately this column was well into print when the news arrived and we could not use the story, but upholding that faithful old maxim, "better late than never," we have outlined several of the features of this service as they pertain to the u.h.f.

The Yankee Network was the sole organizer of this elaborate system to provide an amplified weather forecast for its six million parishioners. The service is built primarily around several u.h.f. stations. One of the stations is atop the Buckminster Hotel, Boston, Mass. The other, or rather the others, are on the summit of Mount Washington, New Hampshire.

It is worthy of note here, that seldom have radio engineers assigned to the construction and installation of a radio station been forced to face and overcome such obstacles as were inflicted upon them by the peculiarities of the terrain and climatic conditions on Mount Washington. The station itself is located in the most rugged and most exposed building on the continent.

Because of the high-velocity winds atop the mountain a particularly strong antenna and foundation were needed. The new antenna to be used is a turnstile built of unusually high tensile strength steel (It will probably be in use by the middle of June.) The horizontal arms—in this case there will be sixteen—are each twelve feet long. They too must be very strong. In fact, they are constructed on the auto spring idea and so designed as to protect them from masses of ice and snow which form on all exposed objects, and to be able to withstand the impact of huge chunks of ice falling from higher arms.

*W1XOY calling W1XOV . . . Al Sise, member of group of radio men on Mt. Washington calling Boston from 6284 feet up.*

The principle behind the turnstile is that it concentrates a maximum amount of energy toward the horizon, thus by reflection practically eliminating the sky wave. This antenna will have a gain of 4 over the one now being used. In other words the signal will have a 2000-watt punch even though the transmitter power is only 500 watts.

At this writing there are three different stations using the same frequency and transmitter atop Mt. Washington. They are: W1XER experimental broadcast (not in service); W1XMX experimental facsimile, and W1XOY point-to-point communication. In Boston is the other end of the relay weather service; W1XOV, 27.1 mc. with 200 watts.

The schedule of transmission at writing is as follows:—7:20 a.m. weather report and data for 15 minutes; 10:10 a.m. weather report followed by modulated tone till 11:30 a.m. At 1:25 p.m. there is another short weather report, and again at 2:30 p.m., followed by a modulated tone until 4 p.m. On Fridays and Saturdays there are a few extra reports. In winter data is given on the roads and mountain snow.

Many thanks to Mr. I. B. Robinson, Chief Engineer, for the above.

*This could be called Jules Verne's "Trip to the Moon" but it happens to be the Observatory Building and Yankee Network's radio tower atop Mount Washington. Construction many times was halted because of 231 m.p.h. winds.*

### Broadcast Stations

W8XH, 41.0 mc., Buffalo, N. Y., announces several items of interest. First, the power of W8XH will be increased to 1000 watts in the near future. Secondly, the frequency will be changed to 41.02 mc. in accordance with F.C.C. provisions. And the third item is that shortly a portable amateur transmitter will be operated from atop the Statler Hotel. This unit will use the call W8RV and will radiate test programs on 56.20 mc. Tone modulation will also be used with the call letters announced every fifteen minutes.

W9XPD, 31.6 mc., St. Louis, Mo., notifies us of a change in operating schedule. They now operate as follows:

Monday through Friday, 9 a.m.—10.30 a.m.; 10:45 a.m.—1:15 p.m.; 1:45 p.m.—4 p.m.; 4:45 p.m.—1 a.m. Satur-

day, 9 a.m.—1:15 p.m.; 1:45 p.m.—4 p.m.; 4:45 p.m.—1 a.m. Sunday 9 a.m.—3:30 p.m.; 5 p.m.—10:15 p.m.; 11:15—1 a.m.

### *U.H.F. Mixture*

South America has entered its bid for representation in the u.h.f. On March 15th we first picked up two stations operating from Colombia. One station was in Barranquilla and the other was across the bay in Santa Marta. The Barranquilla signed off once using the call HJA-3. Santa Marta has never used a call. HJA-3 operates on 35.0 mc. with unknown power, and Santa Marta uses the 38.0-mc. channel, thus enabling duplex operation.

Judging from their experiments and conversation it appears that they are instituting a point-to-point communication system. Information received from American Tel. & Tel. advises us that we should address all reports to Mr. Bonds, Barranquilla Telephone Co., Barranquilla, Colombia . . . Clyde Criswell also reports hearing some Spanish stations near this frequency.

R.C.A. is reported to have just shipped a television transmitter to the U.S.S.R. . . . Clyde C. informs us that he is now hearing some U and TH stations on the u.h.f. These stations heard use various calls. Clyde complains that each day they change. One day they are U10 and TH178, the next day they are U9 and TH155, etc. Clyde follows that up with the question of how on earth a woman gets in the background calling, "Number please?" when these stations are supposedly owned by the U. S. Signal Corps. . . . W2XID is reported testing on 34.6 mc. also (Clyde admits that this station might be mixed up with the U and TH stations.)

The 12-meter band is getting better and better with spring coming on. W9XJL, W9XAZ and W6XKG come through best in that order. . . . The introduction of a kilowatt on 12 meters ought to make things happen. . . . Speaking of kilowatters, WDRC in Hartford, Conn., has just receved F.C.C. approval of its new station using that power on 40.3 mc.

W3XIR is reported to be testing on 41.0 mc. We might say that they will probably use that frequency. . . . Television station W2XBS came on the air March 4th. It is using the 46.25-and 49.75-mc. channels.

W8XAI, 31.6 mc., Rochester, N. Y., is doing more than its share of experimentation down here. The staff, which includes W8ABX, AC, GBN, AHK, BEN, DOD, ATH, PK, BHM, GZX, ANK, GWO, DZF, LTJ and BJW, has devised transmitters that will operate eighteen hours a day for long periods without changes in frequency or quality. W8XAI is on the air daily from 6:30 a.m. to 1:00 a.m. except Sunday when they open up at 8:00 a.m.


*"No parking unless with 88's" (love & kisses)—W8XEK, Erie Police Dept. veri. Cop one if you can.*

Clyde Criswell made a beautiful catch recently when he verified reception of W1XOU on 39.7 mc. W1XOU, pickup station operated by WDRC, was at the time using 15 watts into a 6-foot rod on the back bumper of a car. . . . W8XOY is on the air daily relaying WADC, Akron, Ohio. Reports are being asked for but we don't know anyone who has received a veri. W8XMC on 31.1 mc. is also relaying WADC.

### *Ten-Meter DX*

We hope all you amateur DX fans paid some attention to 10 meters during the A.R.R.L. contest several weeks ago. Two days listening for us netted more new stations than we had heard all year. ES5D was on representing Estonia and YR5AA came through R8 representing Roumania. PY3BP on 28.18 mc. came through very good also.

Information on WWLC seems to indicate that they are Forest Fire Stations. WWLC uses the 39.3-mc. channel, while the other stations use the 38.6-mc. channel. . . . May has for the past two years been the month for 5-meter DX. Tabulating last year's results proved that the 5-meter band was open on the 14th, 15th, 16th, 23rd, 24th, 25th and 30th. (Notice that all dates were on weekends.) A word to the wise is sufficient. Watch 5!

Barton Drittler says his town, Ossining, New York, is due to install a police radio system. Power 25 watts in main station, operations probably on 40.1 mc. . . . A letter from Mr. J. R. Heck advises that an appropriation may be approved for a u.h.f. broadcast station when they rebuild WMMN.

W10XEH-W10XEN, R.C.A., Camden, N. J., heard testing on 30.1 mc. . . . W3XES is carrying on quite an extensive program of investigation. They are determining the requirements for reliable coverage of Baltimore with the possible objective of facsimile transmission. If you can hear this station, reports would be very much appreciated. W3XES operates on 35.6 mc. from 6 to 12 p.m. with 150 watts.

The stations owned by the Massachusetts Forest Service operate on 38.6 mc. . . . Clyde C. also heard W1XMJ calling WPEV on 39.0 mc. W1XMJ is a portable-mobile unit of the Massachusetts State Police.

### *Police Veries*

Last month we said that many police radio stations verify reports. In answer to that we found that W8XEK, Erie, Pa., 37.1 mc., did a little more than that. It even has a QSL card, which we show at the top of this page.

All reports to this station should be addressed to Mr. Louis Raub, Radio Engineer, Erie Police Dept. Erie, Pa. Return postage is unnecessary.

Again we wish to thank all those station operators and listeners for their help in making this department possible. The latter with special thanks to Clyde Criswell, Mission Ranch, Phoenix, Ariz., for his invaluable aid. Address all inquiries, suggestions, material, etc., to Perry Ferrell, Jr., Linwood, New Jersey. Please enclose return postage if you desire a reply.

#### *LAST-MINUTE FLASHES*

W2XDV, 31.6 mc., the C.B.S. outlet, has again changed schedule. It now operates from 6:00 to 10:00 p.m. on weekdays; 3:00 to 5:00 p.m. and 6:00 to 10:00 p.m. Saturdays and Sundays.

Laurence A. Weber, W4H195, East Orange, N. J., reports that W2XJI the Mutual Networks station, came on the 31.6-mc. channel for about a week and then quit. . . . Also an airplane station on 27.9 mc., operations irregular. . . . W2XDR, Radio Pictures, Inc., was relaying WQXR on 43.0 mc. earlier this season. . . . A station on about 33.3 mc. announcing as "The United States Assay Offie." (It is remembered that Clyde Criswell heard and verified them about a year ago when they were near the 5-meter amateur band.). . . Correct frequency for W2XDG is announced to be 38.65 mc. . . . Finally W10XEG, an R.C.A. station, calling W2XKQ on 37.1 mc. Many thanks for the above.

# TEMCO TYPE T-50

# 50-WATT C. W.-PHONE TRANSMITTER

## A PROVING-POST REVIEW

TO begin with the general specifications of the Temco type T-50 transmitter are as follows:

**Nominal Power Output Rating:** 50 watts on c.w., 50 watt-carrier, 100% modulated, on phone.

**General Construction:** Built in two-deck enclosed cabinet, with doors in rear and top. Panels are standard 8¾ x 19-inch size. The r.f. unit, with built-in power supply is on top panel. Modulator unit, with built-in power supply, on lower panel. The r.f. unit (with its power supply) may be had alone in single deck cabinet for c.w. operation only. Panels and cabinets in grey wrinkle lacquer.

**R. F. UNIT:** Three stages employed, 6L6 in crystal oscillator, 807 as doubler-buffer and Taylor T-40 in output stage. The T-40 works straight through as a neutralized power amplifier on all bands, including 10 meters.

**Frequency Range:** The amateur 10, 20, 40, 80 and 160-meter bands are covered.

**Band Switching:** Complete band switching is employed on both the 6L6 and 807 stages for all bands. Only coil to be changed is in T-40 power stage.

**Meters:** Single 300-ma. meter, switching between grid and plate circuits of T-40. Pilot light bulb on panel to indicate oscillation of crystal stage.

**Power Supply:** Single 750-volt for all three stages, mounted directly on r.f. chassis. Full voltage applied to T-40, with voltage reduced for the 6L6 and 807.

**Antenna Coupling:** Variable link for exact matching to any low-impedance two-wire untuned line.

**Keying:** In cathode of 6L6 oscillator, permitting break-in operation.

**MODULATOR UNIT:** Three stages employed, 6J7 input tube, resistance coupled to 6C8G dual phase-inverter tube in second stage, resistance coupled to push-pull 6L6G's in modulator stage.

**Input:** Jack on panel for high-impedance microphone input directly to grid of 6J7. Any crystal microphone or other high-impedance type, such as dynamic, may be used.

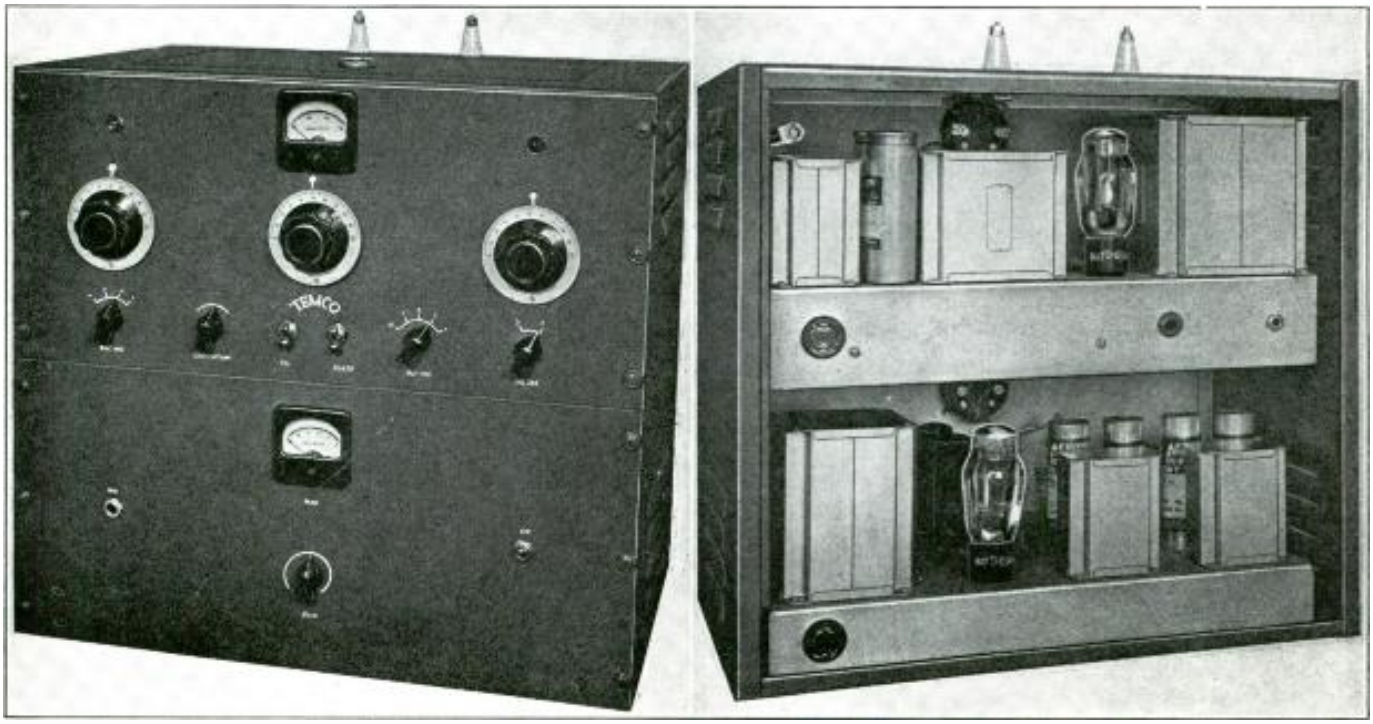
**Gain:** Overall gain of modulator unit sufficiently high to obviate necessity for pre-amplification with above mentioned microphones.

**Meters:** Single 300-ma. meter placed permanently in plate circuit of 6L6Gs. It may be used as a modulation indicator to prevent overmodulation.

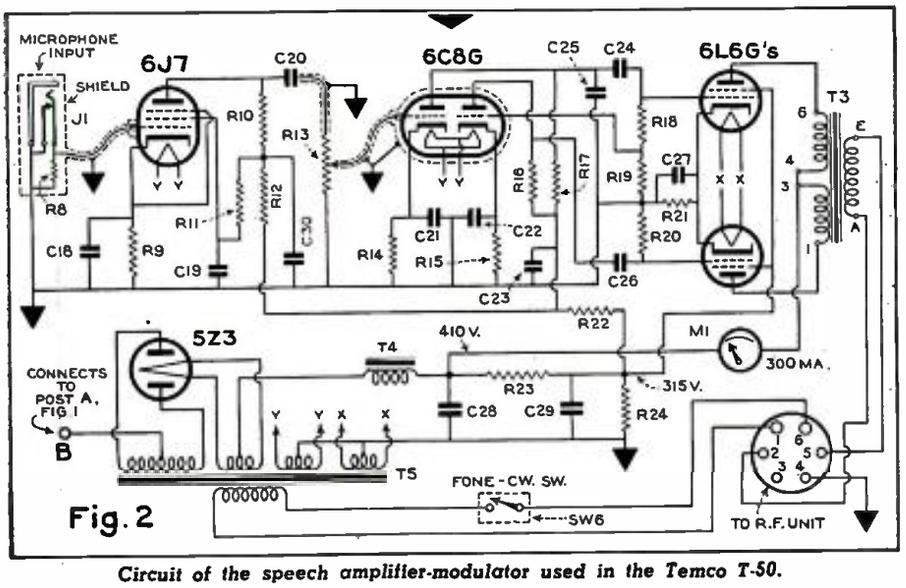
**Power Supply:** Single 400-volt supply for all three stages, mounted directly on modulated chassis.

### *General Notes*

With the foregoing general specifications in mind the details of this transmitter may be more clearly understood. The outstanding feature is that a very successful compromise has been attained between adequate power and general excellence of performance on the one hand,




*Front and rear views of the Temco Type T-50 C.W. and Phone Transmitter. The upper chassis carries the r.f. equipment, the bottom chassis the audio system.*




*Circuit of the speech amplifier-modulator used in the Temco T-50.*

and compact construction and low cost on the other. This has been accomplished, chiefly, by the choice of an input to the final r.f. amplifier stage which may be fully modulated by a pair of 6L6Gs working in Class AB1. A very simple layout of the audio system may be employed when 6L6Gs are run in this fashion, besides permitting the use of a single 400-volt power supply for the entire audio system. A greater input to the r.f. stage would call for a more complex and costly audio system.

The mechanical and electrical construction will satisfy the most critical purchaser. This shows up particularly in the assembly and wiring of the underchassis components. These are securely mounted in symmetrical fashion, well separated and adequately insulated. The r.f. wiring is all done in the "square bend" style with tinned bus, while the remainder of the wiring is neatly cabled.

### The R.F. Unit

The diagram of the complete r.f. unit, together with its power supply, is shown in Fig. 1. The oscillator stage is of the straightforward beam type with output on the crystal frequency only. This is superior to various forms of "trick" oscillator circuits, such as the regenerative type, which are liable to self-oscillation if wrong adjustments are made. The oscillator in this transmitter is, therefore, the safest to use. Very excellent 20-meter crystals are now obtainable at reasonable prices, therefore crystals ground to 14 megacycles are used in the Temco T-1 transmitters for 10-meter operation. Three different Bliley 20-meter crystals were used in testing the transmitter and all three performed perfectly, requiring no adjustment.

A jack, J, is mounted on the rear of the chassis to accommodate the key. Keying is accomplished in the cathode lead of the 6L6. This kills the output of all stages with the key open, permitting break-in operation even on the operating frequency. This feature is especially valuable for fast traffic work. A pilot light, P, is mounted on the panel above the oscillator dial and is connected in the plate-return lead of the 6L6. As the bulb is of the 60-ma. type it will light brightly with the plate current running through it. Oscillation of the crystal is indicated by a dimming of the bulb.

Two small coils, L and L1, are controlled by the isolantite wafer switch. SW, and enable the plate circuit of the 6L6 to be tuned to either 20, 40, 80 or 160 meters. The entire oscillator control is grouped at the left of the panel, with bulb P at the top, plate tuning condenser control at middle and the band switch SW at the bottom.

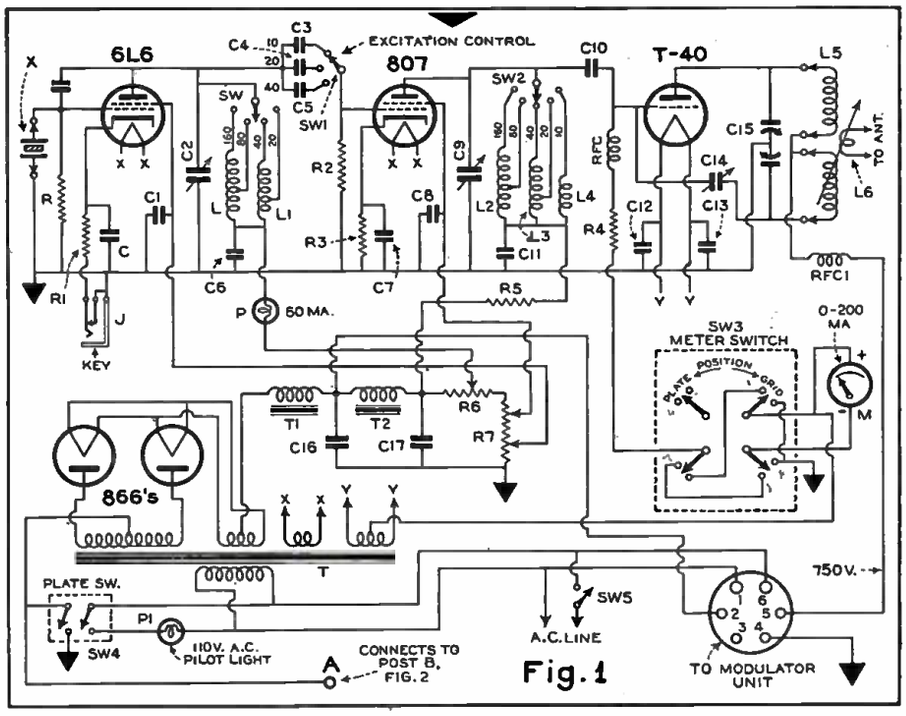
In order to control the amount of excitation from the 6L6 to the 807 an excitation control, consisting of the switch SW1 and condensers C3, C4 and C5, takes care of this adjustment. The knob for control of this excitation switch is conveniently placed on the panel just to the right of the band switch.

The buffer-doubler stage employs an 807 beam tube. The use of this tube permits this stage to double to 10 meters with sufficient excitation to the T-40 so that it may be plate modulated at full input on this band. The excitation to the T-40 is, of course, more than ample on the lower frequency bands and is reduced to the proper value by means of the excitation control just described.

Isolantite wafer switch, SW2, and coils L2, L3 and L4, enable the plate circuit of the 807 to be tuned with condenser C9 to any of the bands from 10 to 160 meters. This coil and switch arrangement, which is mounted under the chassis, is a particularly neat affair. All three coils are mounted at right angles to each other. L2 is tapped to cover the 80- and 160-meter bands, while L3 is tapped to cover the 20- and 40-meter bands. L4, the 10-meter coil, is air wound and soldered directly to the switch contacts. This construction permits the 807 to double efficiently to 10 meters, despite the use of band switching.

The plate tuning control for the 807 is in the center of the panel. The knob for the band switch, SW2, is to the lower right of the plate dial. A flexible shaft between this knob and the switch permits the switch to be placed for shortest

*(Continued on page 269)*




*The circuit of the r.f. section of the Temco T-50. Of special interest is the excitation control ganged with the band-change switch.*

# RADIO SIGNAL SURVEY LEAGUE NEWS

*TI4NRH ANNIVERSARY SURVEY . . . DX AWARDS . . . NEW CHAPTERS . . . PITCAIRN*

THIS month's official Survey will be on TI4NRH, Heredia, Costa Rica. This interesting little station is transmitting a special program throughout the month of May in celebration of its tenth anniversary of being one of the "five original short-wave broadcast stations of the world." According to Mr. Amando Cespedes Marin, the founder and director of TI4NRH, the other four pioneer short-wave stations were: London, Eindhoven, Schenectady and Pittsburgh. TI4NRH's special broadcasts start the first of May and continue each night until May 31st, inclusive, each day's program being dedicated by Mr. Marin to personal friends, leading radio clubs or institutions. It is particularly pleasing, in times like these, to note, that one of the programs is dedicated to the "Church and Our Good Lord" in a spirit of fostering international peace and good will. The May 19th program, to quote from Mr. Marin's friendly booklet is "To the Radio Signal Survey League, All-Wave Radio, and Mr. Lyman F. Barry, Director, whose members identify with minute details the broadcast of NRH and think she is 'the most friendly station in the world'."

### The Heredia Station

Mr. Marin gives us the following specific information about TI4NRH: The power input is 500 watts. The transmitter uses a 47, 46, 210, 203A, and a pair of 852s in push-pull in the final. The modulator uses push-pull 203As and the speech amplifier a five-stage unit. The antenna is 4000 feet above sea level and the signals radiated from it have been heard all over the world.

*Amando Cespedes Marin, the founder and director of TI4NRH, Heredia, Costa Rica, now celebrating his tenth anniversary on the air.*

The R.S.S.L. special survey is from May 15-21st inclusive and the usual monitoring reports should be sent directly to the Radio Signal Survey League, 16 East 43rd Street, New York. Ten Class "A" credits will be given for reports received on this survey.

Those wishing a copy of the handsome 14"x18" diploma-verification illustrated in these columns should send 10 cents in coin, carefully wrapped, to Mr. Amando Cespedes Marin, Apartada 40, Heredia, Costa Rica. (Do not send International Reply Coupon.) Name and address of sender should be carefully printed.

On May 19th a special message of greeting from M. L. Muhleman, Editor of ALL-WAVE RADIO, and from Lyman F. Barry, Director of R.S.S.L., will be read over the air from TI4NRH. Don't fail to give Mr. Marin a report on strength of signal, interference (if any), in addition to the usual details of programs heard.

### Class "A" Stations

Based on official survey reports of the MacGregor Expedition, CMGF-COGF, VR6AY, and various miscellaneous and voluntary reports, the following League members have earned the recognition of being designated Class "A" Monitoring Stations of the R.S.S.L. These members have demonstrated their earnest desire to aid the League in carrying on its service:

David Brown, W4H113, Queens Village, N. Y.
James Campbell, W40H28, New York, N. Y.
David R. Jack, VE6F2, Ottawa, Ont., Canada.
C. F. Keirstead, W3F5, Framingham, Mass.
James C. Kneeland, W3F42, Worcester, Mass.
Matthew F. Leshner, W3F32, Lawrence, Mass.
Roy E. Pichette, W1-4F15, Northampton, Mass.
Albert Pickering, W3F74, West Medway, Mass.
C. Roman, W11H70, Chicago, Ill.
Robert F. Rowser, W31J5, Mare Island, Calif.
Ray Shaffar, W14H6, Waterloo, Iowa.
George Swanson, W4H99, Englewood, N. J.
C. M. Whelan, W16S4, Memphis, Tenn.

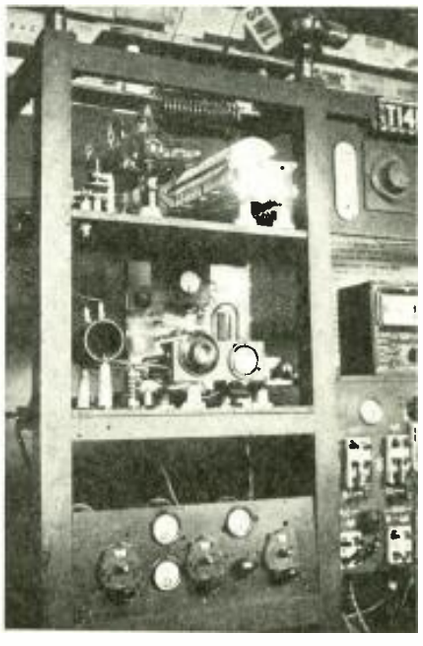
### Class A Credits

Though complete details and rules governing the award of Class "A" designation have already appeared in this department, there are still occasional questions from members of which the following are typical: "If I send in a report each week on a survey, do I get extra credit?" *Answer:* No, reports are always helpful and welcome, but credit is given only once, for each survey. "If the same survey is held for a second month, can I report again and get credit?" *Answer:* Yes, you get credit for one or more reports *each* month. For example, should a 10 point survey continue for three months you can secure a maximum of 30 points by sending in a report during each of the three months. "If a station has two calls, does this count double?" *Answer:* No, not unless so designated. Ordinarily it is considered as one survey, even though it may be on both broadcast and short-wave bands.

### Award of DX Citations

Although it is not necessary to be a member of the R.S.S.L. to receive DX Citations, the Directors of the R.S.S.L. act as the judges and pass upon each application after inspecting and examining the actual verifications, which are then returned. A First Degree Citation indicates reception from all six continents, while a Tenth Degree Citation indicates reception from ten different stations in each of the six different continents.

Leading all other contestants, Henry V. Miner, of Wollaston, Mass., has been awarded the Tenth Degree Citation for the Short-Wave Broadcast Bands. A Seventh Degree Citation in the same bands went to Stanley LaRue, of Beverley Hills, Calif., and a Fifth Degree Citation went to Arthur



*View of the radio-frequency section of the 500-watt transmitter at TI4NRH. A pair of 852s are used in the final amplifier stage.*

F. G. Bruder of Allston, Mass. Third Degree Citations in the S.W. Broadcast Bands were awarded to George J. Pasquale of Wellsville, N. Y., and Bill King, W30D3, of Silverton, Ore.

On Amateur Phone Bands, J. F. Satterthwaite, W9H1, of Toledo, Ohio, has a huge lead over all contestants with a Sixth Degree Amateur Phone Band Citation. Next come Homer Bohlender, of Brookville, Ohio, with a Third Degree Amateur Phone Citation and George J. Glasspool, G74 of Southampton, Hants, England, with a Second Degree Citation.

The only citation thus far issued in the Standard Broadcast Band (verified reception from only *four* continents necessary) is to Arthur F. G. Bruder, Allston, Mass.

A number of applications came in just too late for this issue and the announcements of further awards for DX reception will appear in the R.S.S.L. News next month.

***With the Chapters***

*"Acers" Chapter*—A Charter has just been granted to the Atlantic Coast Emergency Receiving Sets (ACERS) Chapter of Atlantic City, N. J. The Survey Supervisor is Edgar C. Watts, W4J1; the Secretary is Seymour de Beer, Jr. W4J2, and the charter members are: Augusta Watts, W4J4; Vernon de Beer, W4J3; Harold M. Byerly, W4J6; Nicholas J. Cooney, W4J7; and Kathryn de Beer, W4J5. Meetings are held the second and fourth Monday of each month and those interested may write the Chapter Secretary, Mr. Seymour de Beer, Jr., 1 North Albany Ave., Atlantic City, New Jersey.

*Mohawk Chapter Visits WORC*—C. F. Keirstead, W3F5, Secretary of the Mohawk (Mass.) Chapter sends a most interesting report of the last meeting of the Chapter. Space permits only a few extracts: "Opened meeting with a visit to WORC in Worcester, where Mr. Russel Brooks took us through the studios and control room and explained the operation of the station. Four new members were admitted at this meeting which was concluded with a business session at the home of Ray LaRocque, W3F15. Carl Horton, W3F80, was elected Chapter President. At a future meeting, the local Edison men will talk on interference problems and their solution. Meeting closed with refreshments of sandwiches, coffee and cake."

*New England Convention*—The Mohawk (Mass.) Chapter is considering the possibility of sponsoring an R.S.S.L. Convention this summer at Worcester, Mass., where not only other Chapters, but individual members from throughout New England, New York and New Jersey would be welcomed. In order to determine whether the plan would be worthwhile, will all R.S.S.L. members who might be interested in attending such a New England Convention drop a postal to headquarters? If the response is sufficient to warrant going ahead, due notice will appear in these columns.

***With the Members***

Among the recently admitted Ham members are Rider Hersey, W1KYM, of Winthrop, Mass.; Yvon Johnson, W9ZSB, of Glen Ellyn, Ill.; Dwayne Eskridge, W6LKE, of Tempe, Ariz. Richard L. Gulatsi, Jr., in renewing his R.S.S.L. membership for 1938 tells us he now operates W2KRF, mostly on 5-meter phone. William Skinner, W9G9, of Detroit, Mich., recently passed his exam. and now operates amateur station W8ROV on 3663 kc. He is anxious to contact other R.S.S.L. Hams and receive reports on his sigs from members. B. M. Kinsley now operates W1LBY and Jerry E. Behagen operates W9QUN.

In answer to many requests, the QRA of VR6AY is Mr. Andrew Young, VR6AY, Pitcairn Island, South Pacific Ocean. International Reply Coupons *must* be enclosed. Only a limited supply of veries are available, so if you fail to get one, you will know the reason.

A report from Malcolm Herrick, of Youngstown, Ohio, tells of an interesting conversation overheard the other month between the Soviet Rescue Expedition and the scientists adrift on the floating ice. To quote his report "I heard UPOL a couple of days before they were picked up calling Moscow and asking the time and giving their position . . . also calling the transport ships. Heard Moscow answer and say it was just 4:25 a.m. Moscow time." Reception was reported by many members of the Expedition to British Guiana (VP3BG). Headquarters is always glad to receive reports of unusual and interesting receptions.

*Sandstorms*—Roy E. Dement, W19P2, of Plainview, Texas, writes an interesting description of the effect of the sandstorms which they have experienced for several days, on local radio reception. Says Mr. Dement, "The air will be so thick with the fine particles that listening on the regular broadcast band is impossible, even in tuning in a 250-watt station 45 miles away. Then switching to the short-wave bands, they come in with the loudest, clearest, most steady signal at any time! Especially the

## R.S.S.L. OFFICIAL SURVEYS NOS. 8 and 9

### *No. 8—VR6AY, Pitcairn Island*

**Official survey on this station will continue during May, closing May 31st. Usual operating frequency 14.346 kc. on phone. N.B.C. may rebroadcast on a national hook-up as was first tried on April 6th. See description of equipment in Feb. AWR and of the island in this issue. Credit of 20 points for reports on original transmissions.**

### *No. 9—TI4NRH, Costa Rica*

**TI4NRH, Heredia, Costa Rica. R.S.S.L. survey May 15th-21st inclusive. 9-10 p.m. every night on 9670 kc. May 19th specially dedicated to the R.S.S.L. See description of station and this survey in adjoining columns. Credit of 10 points for reports.**


***One of the largest and handsomest veries ever issued—it measures 14 by 18 inches. Lithographed in brown and black. See text for details as to how you can obtain one.***

Europeans—Zeesen and Daventry in particular. Daventry will pound in here with an R9 signal, with no fade, immediately after the high wind has died down, say 24 hours after the sandstorm! That is one condition that gets under my skin, for with the flying particles of sand in the air causing an untold amount of natural static as above mentioned on the broadcast band, one would think reception would be infinitely worse (if possible!) on the short- and ultra-short-wave bands. Even the hard-to-get SPW, SPD came in with better signals right after one of these sandstorms."

***With Our Overseas Members***

Another "G" amateur recently welcomed into the ranks of the R.S.S.L. is Mr. John Dalton, G144, of Hull, Yorkshire, England, operator of G5JD. Mr. Dalton can be heard on 7148 and 14,130 kc. usually on c.w. Who will be the first American R.S.S.L. Ham to contact this brother member overseas? Other new British amateur members are: George Yale, 2DDK; Edgware, London, and Peter Leslie Stiles, 2BHR, East Sheen, London, England.

The following are new appointments of R.S.S.L. officials in Great Britain:

*Home Counties*

*Area Manager* — George Yale, 2DDK, G145; 40 Raeburn Road, Edgware, Middlesex.

*Durham*

*County Representative* — Newby Whyvel, G68; 245 Geneva Road East, Darlington.

*Essex*

*County Representative* — Wm. E. Barber, G103; 60 Haldane Road, East Ham, London, E. 6.

*Northumberland*

*County Representative* — J. Batey, G66; "Blue House," North Road, Newcastle-on-Tyne 2.

***"PITC"***

The signal survey on VR6AY, Pitcairn Island, has probably aroused more interest among our readers than any survey thus far, despite the fact that picking up signals from this remote romantic spot means burning plenty of midnight oil.

The following brief description of the island and its history is given in response to many requests from R.S.S.L. members. Those interested in obtaining more complete information are referred to *The Heritage of the Bounty,* by Harry L. Shapiro, a splendid story of the Pitcairn Island of today; to *Mutiny on the Bounty,* of motion picture fame; to *Pitcairn Island,* or to *Men Against The Sea,* all of the last named books being by Charles B. Nordhoff & James Norman Hall—truly gripping novels of the mutiny and the circumstances leading to the settlement of the island. The Encyclopedia Britannica also presents a most illuminating article. For details covering Pitcairn's present transmitter, VR6AY, see February ALL-WAVE RADIO.

Pitcairn Island was discovered in 1767 and named after the British officer who somewhat later fired the first shot in the battle of Lexington. In 1787, the British ship of war *Bounty* sailed to Tahiti. After a stay of several months, she was about to return to England when a mutiny broke out. The captain, together with several of his crew were set adrift in a small sail boat in which, after a perilous, gruelling, open sea voyage of 3600 miles they eventually reached safety. The causes of the mutiny were given as bad food, brutal discipline, the desire to remain at Tahiti, etc. Certainly the life in crowded warships of those days, particularly on long cruises, was filled with privations of every sort. Some of the mutineers returned to Tahiti, were later caught and hung; others sailed to Pitcairn Island, 1400 miles southeast. In this latter group were nine Englishmen from the *Bounty,* six native men, and eleven native women. The *Bounty* was burned at the foot of rocky Pitcairn's cliffs so passing ships would see no signs of habitation.

Little time was lost in building huts. But quarrels broke out in this garden spot, followed by jealousies and bloodshed. Soon only Alexander Smith of the men remained alive. An almost illiterate man, he taught himself to read from an old Bible in his sea chest and ruled as a patriarch among the surviving wives and children of this little band of exiles. So well did he teach the lesson of the Golden Rule, as well as his native English language that, when many years later, for the first time since the mutiny, a passing boat stopped there, captain and crew were astounded to hear the inhabitants speaking good English and living in a quiet, well-ordered community with regular religious services. Even to this day, Pitcairn Islanders observe the Sabbath with a devout religious devotion, all too rare in these times. No intoxicants are used and the more religious folk even abstain from meat, shell fish and the use of tea and coffee.

**OFF TO PITCAIRN!**

***W. S. Bellem and G. P. Lindley pictured aboard the Colombian Liner "Haiti" prior to leaving for the new home of VR6AY. (Photo courtesy Press News Photo Service)***

Geographically, Pitcairn Island is 4650 miles almost due south from San Francisco, 4000 miles west of Valpariso, Chile; 3775 miles from Honolulu, T.H.; 3800 miles from Wellington, New Zealand, and 5325 miles from Sydney, Australia. A good map will show it as a tiny dot, almost 1400 miles E.S.E. of Tahiti. It is today a British possession under the general supervision of the British High Commissioner for the Western Pacific, although the local affairs of the island are entirely democratic, being governed by a local council, called a Parliament, and elected by the inhabitants. Incidentally, Pitcairn Island had "votes for women" several decades before other countries followed suit.

The present population is about 200. Fishing and agriculture are the main occupations, although the men are expert sailors and many have shipped as seamen all over the world. Some of the Pitcairn Islanders have emigrated to other parts of the world and one, at least, a Miss McCoy, lives in the United States today. The present leader of the community is Parkins Christian, Chief Magistrate. He is a direct descendant of Lieutenant Fletcher Christian, the second in command of the *Bounty.*

Although the island has a school and church, there is no doctor. In the event of emergency, it would be impossible to secure medical aid without the use of radio. Radio is also of importance in contacting approaching vessels so that the islanders can gather fresh fruits and vegetables from the plantations on the upper slopes of the island. As Pitcairn Island is about two miles long and a mile wide, and as many of the paths are rough and winding, this all takes time. Andrew Young, after reading through magazines and books of instruction, rigged up a home-made transmitter and taught himself the code. Finally, after studying the equipment of visiting ships, he improved his set until he could transmit perhaps 50 miles, using the call "PITC."

We can well imagine the excitement of the islanders when they learned that modern radio equipment was being donated and sent. Doubtless, they eagerly watched for the smoke of the steamer bringing the coveted sets and we can imagine the rush to launch their whale boat on hearing the alarm bell announce that a ship had been sighted. It took several round trips, in a tropical downpour, to carry the many packages and crates ashore, and many a toilsome trip up the steep path to the plateau where the village lies.

Mr. Lew Bellem, W1BES, remained to set up the outfit and instruct Andrew Young, Honorary R.S.S.L. member, in its use.

It must have been thrilling indeed to send out that first call and then have America, Australia, and New Zealand come back reporting fine reception. The call letters VR6A, used at first, were later changed to VR6AY (standing for Andrew Young, the operator).

A permit has been issued by the British Government for the operation of the station for island business and for communication with passing ships. Meanwhile, QSL's will be sent while they last. Only 1000 were taken to the island, though likely more will be prepared later. Be sure and enclose International Reply Coupon to prepay return postage.

Pitcairn Island will continue to be the Official League Survey for May. After the early part of May, the transmitter of VR6AY will be operating on storage-battery power with a windcharger, instead of the temporary gasoline-operated generator now being used. The reduced power operation of about 60 watts will be a new challenge to all listeners. Members, pick up this station and send in a report before the close of the survey on May 31st!

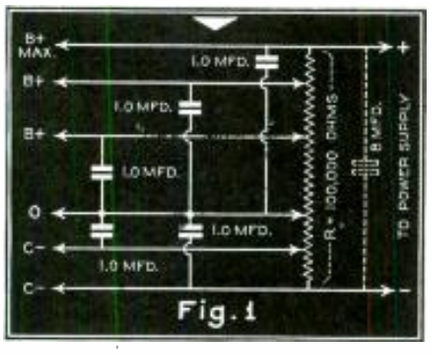
# Queries

*MICROVOLTS INPUT . . . VOLTAGE DIVIDERS . . . SUPER-REGENERATION*

**Question No. 63:** I have connected an "R" meter in the a.v.c. circuit of my receiver, and have calculated a table allowing for gains in preselection stages, etc., in an endeavor to calibrate the meter in microvolts input. I have logged some overseas stations showing as high as 2000 microvolts input. What values should I expect?—*G. A. B., Ashland, Ohio.*

**Answer:** Calibrating a signal strength meter purely by mathematics is next to impossible. Rarely indeed will the amplification in any stage be the expected theoretical value. The correct procedure is to calibrate against a known and controlled input. However, this is a laboratory job usually outside of the capabilities of even the fairly serious experimenter. In the case of G. A. B., the calculated values are about 100 times too high. Using a short antenna—about 35 feet long including lead-in—the foreign locals (Daventry and Berlin) have an average input on the east coast of the U. S. A. of between 10 and 20 microvolts.

Without elaborate equipment, and the knowledge of how to use it, it will perhaps be best to convert signal strength or "S" units into microvolts. Unfortunately, such a conversion will not be the same for different types of receivers. For instance, some receivers will produce an S-9 signal with 8 microvolts input, while others will require 50 or more microvolts for the same intensity output. The following table, however, should be helpful as it gives the approximate conversion for two typical receivers. Receiver No. 1 employs a single stage of r.f. amplification followed by two stages of i.f. Receiver No. 2 has an additional stage of r.f.




***A simplified voltage divider system that will supply "B" and "C" potentials from any well-filtered d.c. source.***

*THE primary purpose of the Queries Department is to solve the technical and semi-technical problems of our readers who feel they require such assistance. However, questions, so long as they are related to radio, need not be of a technical nature. ¶Every question will be answered personally, by mail. A self-addressed and stamped envelope should be included. ¶In questions concerning specific apparatus, it will be of considerable assistance to our technicians if the inquiry is accompanied with a wiring diagram, original operating instructions, and all relevant literature. While it is the desire of this department to be of assistance in all possible instances, it should be borne in mind that the manufacturer will occasionally be in a position to give better advice concerning his own product, and usually maintains a technical department at the service of those who purchase his equipment.*

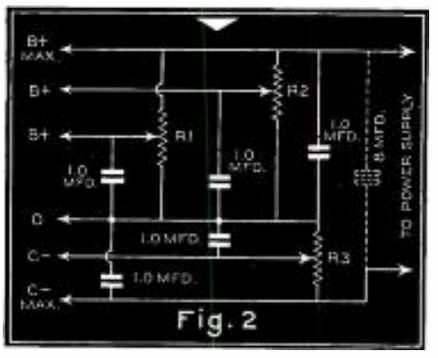
| S UNITS | MICROVOLTS INPUT | |
|---|---|---|
| | *Receiver No. 1* | *Receiver No. 2* |
| 0 | .6 | .2 |
| 1 | .7 | .4 |
| 2 | .8 | .6 |
| 3 | .9 | .8 |
| 4 | 1.7 | 1.5 |
| 5 | 3.0 | 2.0 |
| 6 | 6.0 | 3.0 |
| 7 | 15.0 | 4.0 |
| 8 | 25.0 | 5.0 |
| 9 | 50.0 | 7.0 |

◆

### A VOLTAGE DIVIDER

**Question No. 64:** I should like to build a simple voltage-divider arrangement which could be used with any power supply—for instance that in any receiver so that different voltages would be available for external and experimental purposes.—*A. O. C., Glens Falls, N. Y.*

**Answer:** To properly design a voltage-divider system, all voltages should be known—that of the supply source as well as the voltages required—and also the current drain at the various taps. However, the circuit shown in Fig. 1 will probably answer our correspondent's requirements when used as he suggests.




***This arrangement is somewhat more convenient as instantaneously and continuously variable "B" voltages can be had over the entire voltage range.***

Resistor R is rated at 80 watts. This is perhaps higher than really necessary, but considerable current may pass through the grid bias section, and it is difficult to secure 100,000-ohm wire-wound resistors with lower wattage ratings. The required number of extra sliders should be purchased. The arrangement shown will provide B plus maximum and two variable B plus voltages, as well as two variable C minus voltages (where low and very exact values of C bias are required, it will be better to substitute a separate resistor for the C-bias section, as suggested in Fig. 2). The 8.0-mfd. condenser can be omitted if a similar capacitor is connected across the output of the power pack or supply.

A somewhat more convenient arrangement is indicated in Fig. 2, where R1 and R2 are 100,000-ohm potentiometers. In this circuit each of the variable high-voltage taps may be instantly changed to any value between zero and maximum. Resistor R3 provides the C-bias voltages—here one fixed (maximum) and one variable. This resistor is rated at 2000 ohms, 10 watts—wire-wound, with a single slider. Additional potentiometers and condensers may be used if more B-plus voltages are required—and, of course, additional sliders and condensers for added C bias voltages.

◆

### SUPER-REGENERATION AND LOW FREQUENCIES

**Question No. 65:** I wish to congratulate you on your a.c.-d.c. receiver for 56 megacycles. A friend of mine built it and it works very well indeed—so well that I should like to build the same set

(*Continued on page 275*)

# SHORT-WAVE BROADCAST STATION LIST

***Frequencies (upper numerals) expressed in megacycles. Change decimal to comma to read in kilocycles. Italic numerals are wavelength in meters. Star ★ indicates station does not verify. Diamond ◆ indicates station not in use. All schedules given in E.S.T. Abbreviations: O—Opening; C—Closing; I—Interval; S—Signal; I.R.C.—International Reply Coupon.***

41.000 W2XHG *7.32* New York, N. Y. National Broadcasting Co., 30 Rockefeller Plaza. Daily 9 a.m.-12 midnight.

41.000 W2XOY *7.32* Albany, N. Y. Address: General Electric Co., 1 River Road, Schenectady, N. Y. Mon., Wed., Fri., 8-9 p.m.; Sat., 3-5 p.m.

41.000 W8XWJ *7.32* Detroit, Mich. 4465 Penobscot Bldg. Weekdays 9 a.m.-11 p.m.; Sundays, 10 a.m.-5 p.m.

38.650 W2XDG *7.76* New York, N. Y. (See 41.000 mc.) Daily 9 a.m.-12 midnight.

31.600 W1XKA *9.4* ★ Boston, Mass. (See W1XK, 9.570 mc.) Daily 7 a.m.-1 a.m.

31.600 W1XKB *9.4* ★ Springfield, Mass. Hotel Kimball, Westinghouse Electric & Mfg. Co. Weekdays 6 a.m.-1 a.m.; Sundays, 8 a.m.-1 a.m.

31.600 W8XKA *9.4* Pittsburgh, Pa. (See W8XK, 21.540 mc.) Daily 10 a.m.-1 a.m.

31.600 W3XKA *9.4* Philadelphia, Pa. 1622 Chestnut St. Daily 10 a.m.-11 p.m.

31.600 W2XDV *9.4* New York, N. Y. (See 21.520 mc.) Weekdays, 6-10 p.m.; Sat. & Sun., 3-5 p.m., 6-10 p.m.

26.550 GSS *11.30* Daventry, England. (See 26.100 mc.) Irregular.

26.450 DJV *11.34* Zeesen, Germany. (Exp.) (See 17.760 mc.) Irregular.

26.400 GSR *11.36* Daventry, England. (See 26.100 mc.) Irregular.

26.100 GSK *11.49* ★◆ Daventry, England. British Broadcasting Corp., Broadcasting House. London W1. Big Ben strikes the hour according to arrangement program. C: God Save the King. I: Bow Bells.

25.950 W6XKG *11.56* Los Angeles, Calif. 1417 So. Figueroa St. Continuously 24 hours each day.

25.950 DJU *11.56* Zeesen, Germany. (Exp.) (See 17.760 mc.) Irregular.

25.850 DJT *11.61* Zeesen, Germany. (Exp.) (See 17.760 mc.) Irregular.

25.750 GSQ *11.65* Daventry, England. (See 26.100 mc.) Irregular.

21.550 GST *13.92* ★◆ Daventry, England. (See 26.100 mc.)

21.540 W8XK *13.92* Pittsburgh, Pa. Grant Bldg. O-C: Stars and Stripes Forever. Weekdays, 6:45-9 a.m.

21.530 GSJ *13.93* ★ Daventry, England. (See 26.100 mc.) Daily 5:45-10:30 a.m.

21.520 W2XE *13.94* New York, N. Y. 485 Madison Avenue. C: Star Spangled Banner. Mon. to Fri., 7:30-10 a.m.; Sat.-Sun., 8 a.m.-1 p.m.

21.520 JZM *13.94* ◆ Tokyo, Japan. Overseas Section, The Broadcasting Corp. of Japan. O-C: Kimigayo National Anthem. Musical chimes follow. (See 11.800-9.535-7.510 mc.)

21.500 W2XAD *13.95* Schenectady, N. Y. (See 15.330 mc.) Daily 8 a.m.-12 noon.

21.470 GSH *13.97* ★ Daventry, England. (See 26.100 mc.) Daily 5:45 a.m.-12 noon.

21.460 W1XAL *13.98* Boston, Mass. World Wide Broadcasting Corp., University Club. O: News, Blaze Away. C: Star Spangled Banner. Irregular. 10 cents for veri.

21.450 OLR6A *13.99* Praha (Prague), Czechoslovakia. Radiojournal, Praha XII Fochova Tr. 16. O-C: Melody New World Symphony and Cathedral chimes. I: 9 note trumpet call, repeated. Irregular. (See 6.010-6.030-9.550-15.230-15.320 mc.)

21.450 DJS. *13.99* Zeesen, Germany. (Exp.) (See 17.760 mc.) Daily 12:05 a.m.-11 a.m.

19.020 HS8PJ *15.77* Bangkok, Siam. Superintending Engineer, Post and Telegraph Dept., Technical Section. O: 3 chimes, English Mondays, 8:10 a.m.

18.480 HBH *16.23* Geneva, Switzerland. Information Section, League of Nations. Sundays, 10:45-11:30 a.m.

17.800 TGWA *16.85* Guatemala City, Guatemala, C. A. Radiodifusora Nacional, TGWA. O-C: Simple Melody, Marimba, repeated three times. (See 15.170-11.760-9.685 mc.) Irregular.

17.790 GSG *16.86* Daventry, England. (See 26.100 mc.) Daily 1-3:15 a.m., 5:45 a.m.-12 noon, 12:20-4 p.m.

17.785 JZL *16.87* Nazaki, Japan. (See 21.520 mc.) Irregular.

17.780 W3XAL *16.87* New York, N. Y. 30 Rockefeller Plaza. Sun., 9 a.m.-5:35 p.m.; Mon. to Fri., 9 a.m.-4:40 p.m., 5-6:35 p.m.; Sat., 8 a.m.-5:35 p.m.

17.780 W9XAA *16.87* ◆ Chicago, Ill. 666 Lake Shore Drive. S: 3 chimes each 15 minutes. O: Star Spangled Banner.

17.770 PHI *16.88* Hilversum, Holland. Philips Radio. Call: Seven languages. I: Metronome 80 beats per minute. C: National Anthem—Wilhelmus. Sun., 7:25-10:30 a.m.; Mon. to Fri. (exc. Wed.), 8:25-10:30 a.m.

17.760 DJE *16.89* Berlin, Germany. German Short Wave Station, Broadcasting House. I: 9 musical notes. Folk Song. C: National Horst-Wessel Lied and Deutschlandlied. Daily 12:05 a.m.-5:50 a.m.; 6-8 a.m.; 8:10-10 a.m. Sunday only, 11:10 a.m.-12:25 p.m.

17.760 W2XE *16.89* Wayne, N. J. (See 21.520 mc.) Irregular.

17.755 ZBW-5 *16.90* ◆ Hong Kong, China. (See 9.525 mc.)

15.370 HAS-3 *19.52* Budapest, Hungary. Director Radio, Hungarian Post, Gyali St., 22. I: Musical Box Melody; O: Bells ringing; C: Lord Bless the Hungarian (national anthem). Sunday, 9-10 a.m.

15.340 DJR *19.56* Zeesen, Germany. (See 17.760 mc.) Daily 8-9 a.m.; 4:50-10:45 p.m.

15.330 W2XAD *19.56* Schenectady, N. Y. General Electric Co., 1 River Road. O: Spark Discharge. C: Star Spangled Banner. Daily 12:30-7 p.m. Specials irregular.

15.320 OLR5B *19.58* Prague, Czechoslovakia. (See 21.450 mc.) Daily ex. Sun. 6:30-7:30 a.m., 9:10-9:50 a.m.; Sun., 6:15-7:45 a.m., 7:15-8:55 p.m.

15.310 GSP *19.60* ★ Daventry, England. (See 26.100 mc.) Daily 1:45-4 p.m., 6:20-8:30 p.m.

15.300 YDB *19.61* Soerabaja, Java. Daily 7:30 p.m.-2 a.m. (See 15.150 mc.)

15.290 LRU *19.62* Buenos Aires, Argentina, S. A. Radio El Mundo, Maipu. 555. O-C: Spanish only. Daily 7-9 a.m.

15.280 H13X *19.63* Ciudad Trujillo, Dom. Rep., W. I. J. R. Saladin, Director of Radio Communications. S: Bells. Weekdays 12:10-1:10 p.m.; Sundays, 7:40-10:40 a.m.

15.280 DJQ *19.63* Zeesen, Germany. (See 17.760 mc.) Daily 12:05-5:50 a.m., 6-8 a.m., 8:10-10 a.m., 4:50-10:45 p.m. Sunday, 11:10 a.m.-12:25 p.m.

15.270 W2XE *19.64* Wayne, N. J. (See 21.520 mc.) Mon. to Fri., 1-6 p.m.; Sat. & Sun., 2:30-6 p.m.

15.260 GSI *19.66* ★ ◆ Daventry, England. (See 26.100 mc.)

15.250 W1XAL *19.67* Boston, Mass. (See 21.460 mc.) Sun., 11 a.m.-12 noon; Mon. to Fri. inc., 1:30-3 p.m.; specials irregular.

15.243 TPA-2 *19.68* Paris, France. Minister des Postes, Boulevard Haussmann, 98, Bis. I: Three tones F in Morse. O-C: La Marseillaise; S: chimes ¼ hours. Daily 5-10 a.m.

15.230 OLR5A *19.70* Prague, Czechoslovakia. (See 21.450 mc.) Daily ex. Sun., 6:30-7:30 a.m., 9:10-9:50 a.m. Sun., 6:15-7:45 a.m., 7:15-8:55 p.m.

15.220 PCJ *19.71* Hilversum, Holland. Philips Radio. Tues., 3:30-5 a.m.; Wed., 9 a.m.-12 noon.

15.210 W8XK *19.72* Pittsburgh, Pa. (See 21.540 mc.) Daily 9 a.m.-7 p.m.

15.200 DJB *19.74* Zeesen, Germany. (See 17.760 mc.) Daily 12:05 a.m.-11 a.m.; 11:10 a.m.-12:25 p.m.; 4:50-10:45 p.m. Sunday, 8-9 a.m.

15.190 ZBW-4 *19.75* ◆ Hong Kong, China. (See 9.525 mc.)

15.180 GSO *19.76* ★ Daventry, England. (See 26.100 mc.) Daily 1-3:15 a.m.; 5:45-10 a.m.; 4:15-6 p.m.

15.170 TGWA *19.78* Guatemala City, Guatemala. (See 17.800-11.760-9.685 mc.) Sun., 10:30 a.m.-5:30 p.m.; Mon., 7:50-9 a.m.; 12:45-5:30 p.m.

15.160 OLR5C *19.79* Prague, Czechoslovakia. (See 21.450 mc.) Irregular.

15.160 XEWW *19.79* Mexico, D. F. (See 9.500 mc.) Irregular.

15.160 JZK *19.79* Nazaki, Japan. (See 21.520 mc.) Irregular.

15.155 SM5SX *19.80* Stockholm, Sweden. Royal Technical University. Weekdays 11 a.m.-5 p.m.; Sunday 9 a.m.-5 p. m.

15.150 YDC *19.80* Bandoeng, Java. Address, N. I. R. O. M., Koningsplein West 5, Batavia, Java, N. E. I. Weekdays 4:30-10:30 a.m. (Sat. 11:30 a.m.), 6-7:30 p.m., 10:30 p.m.-2 a.m. Sunday 4:30-10:30 a.m., 7:30 p.m.-2 a.m.

15.140 GSF *19.82* ★ Daventry, England. (See 26.100 mc.) Daily 1-3:15 a.m., 5:45-a.m.-12 noon, 4:15-6 p.m.

15.130 W1XAL *19.83* Boston, Mass. (See 21.460 mc.) Mon. to Fri. inc., 11 a.m.-12 noon. specials irreg.

15.121 HVJ *19.84* Vatican City, Vatican. Stazione Radio HVJ, Citta del Vaticano. I: Clock ticks 5 m. S: Bells. C: (spoken) Laudetur Jesus Christus. Weekdays 10:30-10:45 a.m.

15.110 DJL *19.85* Zeesen, Germany. (See 17.760 mc.) Daily 12-2 a.m.; 8-9 a.m.; 10:40 a.m.-4:30 p.m. Sunday only 6-8 a.m.

15.040 RKI *19.95* Moscow, U.S.S.R. Radio Centre. Solianka 12. Call: "This is Moscow Calling." O-C: Internationale. Irregular. No I.R.C. required.

14.970 LZA *20.04* Sofia, Bulgaria. Director General, Telegraphs and Telephones. O: Racherutza (Bulgarian Folk Dance). C: National Anthem and Hymn of His Majesty the King. Weekdays 5-6:30 a.m.; 12-2:45 p.m.; Sundays 12 a.m.-4 p.m.

14.935 PSE *20.09* Rio de Janeiro, Brazil. (P) U.S.A., Europe. Broadcasts German program 4-4:10 p.m. Wednesdays. (See 21.080 mc.)

14.600 JVH *20.55* Nazaki, Japan. (See 21.520 mc.) Phones Europe, B.C. irreg.

14.535 HBJ *20.64* Geneva, Switzerland. (E) (See 18.480-7.797 mc.) League, Sun., 1:45-2:30 p.m.; Mon., 1:30-1:45 a.m.; Swiss, Mon., 6:45-8:15 p.m.

14.010 VK5DI *21.41* Adelaide, South Australia. Box 392, G.P.O. O-C: "Laugh Australian Kookahurra hird." Sat. 10:30-11 p.m.; 11:30 p.m.-12 a.m.

13.635 SPW *22.00* — Warsaw, Poland. Polskie Radio 5. Mazowiecka St. I: Melody/chime. O: The Haunted Castle. C: Polish National Anthem. Mon. to Fri. 6-8 p.m., Sat. and Sun. 6-9 p.m.

12.235 TFJ *24.52* — Reykjavik, Iceland. Icelandic State Broadcasting Service, P. O. Box 547. First half English. C: Icelandic National Orchestra and chorus voices. Sundays 1:40-2:30 p.m.

12.000 RNE *25.00* — Moscow, U.S.S.R. (See RKI, 15.040 mc.) Daily 10:15-11:15 p.m.; Sun. 6-7 a.m., 10-11 a.m.; Wed. 6:30-7:30 a.m. No IRC required.

11.960 HI2X *25.08* — Ciudad Trujillo, Dom. Rep. (See 15.280 mc.) Tues. and Fri. 8:10-10:10 p.m. Sunday 7:40-10:40 a.m.

11.900 CD1190 *25.21* — Valdivia, Chile. Casilla 642. Daily 10 a.m.-1 p.m., 3-6 p.m., 7-10 p.m.

11.900 XEWI *25.21* — Mexico, D. F. P. O. Box 2874. S: 2 strokes gong. O-C: May Angels Guard Thee. Daily 7:30 p.m.-12 a.m.; Sundays 12:30-2 p.m.

11.900 OLR4D *25.21* — Prague, Czechoslovakia. (See 21.450 mc.) Irregular.

11.895 XEXR *25.22* — Mexico, D. F. Departmento Autonomo de Propaganda y Publicidad. Daily 6-11:30 p.m.

11.895 HP5I *25.22* — Aguadulce, Panama, C. A. Emisora HP5I. English—beginning and closing I: three notes gong, thrice (9) ea. 30 mins. O-C: El Tambor de la Algeria. Daily 7:30-9:30 p.m. Veri cards free.

11.885 TPA3 *25.24* — Pontoise, France. (See 15.243 mc.) Daily 1-4 a.m., 10:15 a.m.-5 p.m.

11.880 XEUZ *25.25* — Mexico, D. F. F. J. Stavoli, Chief Eng'r, Radio Nacional. (See 6.130 mc.) S: 5 bells (chimes). O-C: Marcha Dragona. Daily 10 a.m.-1 p.m.; 7 p.m.-2 a.m. Dx 1-2 a.m.

11.880 XEXA *25.25* — Mexico, D. F. Secretaria de Educacion Publica. O-C: March of the Toys. Weekdays 8:30-11 a.m., 2:30-4:30 p.m., 7 p.m.-12 a.m.; Sun., 7 p.m.-12 a.m.

11.875 OLR4C *25.26* — Prague, Czechoslovakia. (See 21.450 mc.) Irregular.

11.870 W8XK *25.26* — Pittsburgh, Pa. (See 21.540 mc.) Daily 7-11 p.m.

11.860 GSE *25.29* ★ ◆ — Daventry, England. (See 26.100 mc.)

11.855 DJP *25.31* — Zeesen, Germany. (Exp.) (See 17.760 mc.) Irregular.

11.840 CSW4 *25.34* — Lisbon, Portugal. Emissora Nacional, Rua do Quelhas, No. 2. (See 11.040-9.940 mc.) O-C: A Portuguesa—National Anthem. Daily 1-2:10 p.m.

11.840 OLR4A *25.34* — Prague, Czechoslovakia. (See 21.450 mc.) Daily ex. Sun. 9:55-10:50 a.m.; Sun., Wed., Sat., News 5-5:15 p.m. Sun. 7:15-8:55 p.m.

11.840 KZRM *25.34* — Manila, P. I. Erlanger and Galinger, Inc., Insular Life Bldg. (See 9.570) Weekdays 5-9 a.m. Sat. to 10 a.m., 4:30-6 p.m., Sun. 4-10 a.m.

11.830 W2XE *25.36* — Wayne, N. J. (See 21.520 mc.) Daily 6:30-11 p.m.

11.830 W9XAA *25.36* — Chicago, Ill. (See 17.780 mc.) Week days 9 a.m.-6 p.m., Sun 9-11 a.m., 1-5:30 p.m.

11.820 XEBR *25.38* — Hermosillo, Con., Mexico. Apartado 68. O-C: Over The Waves. Daily 1-4 p.m.; 9 p.m.-12 a.m.

11.820 GSN *25.38* ★ ◆ — Daventry, England. (See 26.100 mc.)

11.810 I2RO-4 *25.40* — Rome, Italy. 5 Via Montello. O: Bells of Rome. C: Italian Royal March and Giovinezza. I: bird call—black cap bird. (See 9.635-9.830 mc.) 5-8:45 a.m., 10 a.m.-3 p.m., 6-7:30 p.m.

11.805 OZG *25.41* — Copenhagen, Denmark. The Danish State Broadcasting Service. (See 9.520 mc.) O: One gong stroke. C: There is a Winsome Land. Irregular.

11.801 OER-3 *25.42* — Wien, Austria. Osterr. Radioverkehrs A.G., Johannesgasse 4h, Wien 1, Austria. Call: "Hier Radio Wien." I: Metronome—60 beats per min. Weekdays 9 a.m.-5 p.m. Sat. to 6 p.m.

11.800 JZJ *25.42* — Nazaki, Japan. (See 21.520 mc.) Daily 12:30-1:30 a.m., 7-7:30 a.m., 8-9:30 a.m., 4:30-5:30 p.m., 6-6:30 p.m.

11.800 COGF *25.42* — Matanzas, Cuba. General Betancourt 51 (Playa). O-C: Vals Diana. Weekdays 1-4 p.m., 6-10 p.m. Sun. 9-10 p.m.

11.800 DJO *25.42* — Zeesen, Germany. (See 17.760 mc.) 7:15-10:45 p.m.

11.796 OAX5A *25.43* — Ica, Peru, S. A. Avenida San Luis. O: March, "Relator." C: "Estrellita." Daily 12-4 p.m., 7-11:30 p.m.

11.790 W1XAL *25.43* — Boston, Mass. (See 21.460 mc.) Mon. to Fri. inc., 4:15-6:30 p.m.; Sat. 6-6:30 p.m.; Sun. 1-6:30 p.m. Specials irreg.

11.780 DJF *25.47* — Zeesen, Germany. (Exp.) Irregular. (See 17.760 mc.)

11.770 DJD *25.49* — Zeesen, Germany. (See 17.760 mc.) Daily 10:40 a.m.-4:25 p.m., 4:50-10:45 p.m.

11.760 TGWA *25.50* — Guatemala City. Guatemala, C. A. (See 17.800-15.170-9.685 mc.) Mon. to Fri. 7:30 p.m.-12 a.m.; Sat. 7:30 p.m.-1 a.m.; Sun. 7:30 p.m.-12 a.m. No IRC necessary.

11.760 XETA *25.50* — Monterrey, Mexico. Apartado 203. Daily 7-11 p.m.

11.760 OLR4B *25.50* — Prague, Czechoslovakia. (See 21.450 mc.) Daily ex. Sun., 9:55-10:50 a.m.; Sun., Wed., Sat., News 5-5:15 p.m. Sun. 7:15-8:55 p.m.

11.750 GSD *25.53* ★ — Daventry, England. (See 26.100 mc.) Daily 1-3:15 a.m., 10:45 a.m.-12 noon; 12:20-4 p.m.; 4:15-6 p.m.; 6:20-8:30 p.m.; 9:20-11:20 p.m.

11.740 HP5L *25.55* — David, Chiriqui. Panama, C.A. Apartado 139. Daily 4-7 p.m.

11.730 PHI *25.57* — Hilversum, Holland. (See 17.770 mc.) Irregular.

11.730 W1XAL *25.57* — Boston, Mass. (See 21.460 mc.) Mon. to Fri. inc., 9-11 p.m. Specials irreg.

11.720 CJRX *25.60* — Winnipeg, Manitoba, Canada. Royal Alexandra Hotel. Weekdays 6 p.m.-12 a.m. Sundays 5-10 p.m.

11.718 TPA-4 *25.60* — Pontoise, France. (See 15.243 mc.) Daily 5:15-7:15 p.m., 9 p.m.-12 a.m.

11.718 CR7BH *25.60* — Lourenco Marques, Portuguese East Africa. (See CR7AA, 6.137 mc.) Weekdays 4:30-6:30 a.m.; 9:30-11 a.m.; 12:30-4 p.m. Sundays, 5-7 a.m.; 10 a.m.-12:30 p.m.; 2-4 p.m.

11.710 YSM *25.62* — San Salvador, El Salvador, C. A. Director of Communicaciones. O-C: Bird singing before first and last announcement. Daily 1-2:30 p.m. No IRC required.

11.710 Philco *25.62* Radio — Saigon, Indo-China. 211-213D Rue Catinat. Daily 6:30-9:30 a.m. News in French, 9-9:10 a.m.

11.710 XEWB *25.62* — Guadalajara, Jal., Mexico. Juarez 289. Daily 7-11 p.m.

11.710 VK9MI *25.62* — Sydney, Australia. M. V. Kanimbla, McIllwraith and McEacharn, Bridge St. Irregular 7-7:30 a.m.

11.705 SBP *25.63* — Motala, Sweden. Chief Engineer. Mon. to Fri. 1:20-2 a.m., 6-9 a.m., 11 a.m.-1:30 p.m.; Sat., 1:20-2 a.m., 6 a.m.-1:30 p.m.; Sun., 3 a.m.-1:30 p.m.

11.700 HP5A *25.64* — Panama City, Panama, C. A. P. O. Box 954. O-C: "Anvil Chorus." Daily 11:45 a.m.-1 p.m., 6-10 p.m.; Sundays—open at 10 a.m.; Thurs., Fri., Sat.—open at 5 p.m.

11.700 CB1170 *25.64* — Santiago, Chile, S. A. Radio Otto Becker, Casilla 706. Daily 10 a.m.-2 p.m.; 4-11 p.m. Anglo American hour 6-6:45 p.m. Tues., Thurs., Sat.—English.

11.570 HH2T *25.93* — Port-au-Prince, Haiti, W. I. Societe Haitienne Radiodifusion, P. O. Box 103. S: 4 tones gong 1-3-2-4, English and French O-C: The Swan. Special programs, irregular.

11.535 SPD *26.01* — Warsaw, Poland. (See 13.635 kc.) Mon. to Fri. 6-8 p.m.; Sat. and Sun. 6-9 p.m.

11.435 COCX *26.23* — Havana, Cuba. P. O. Box 32. S: 5 bells. English each ½ hr. O-C: Pajarillo Barranqueno. Daily 8 a.m.-1 a.m.

11.402 HBO *26.31* — Geneva, Switzerland. (See 18.480-7.797 mc.) League—Sun. 7-745 p.m. Mon. 1-1:15 a.m. Swiss—Mon. 6:45-8:15 p.m.

11.260 HIN *26.64* — Ciudad Trujillo, Dom. Rep., W. I. (See 6.243 mc.) Daily ex. Sunday 11:40 a.m.-1:40 p.m., 7:10-9:50 p.m.

11.040 CSW2 *27.17* — Lisbon, Portugal. (See 11.840-9.940 mc.) Daily 2:10-6 p.m.

11.000 PLP *27.27* — Bandoeng, Java, N.E.I. J. Sanders, Chief Engr., Java Wireless Stations. Weekdays 4:30-10:30 a.m. (Sat. 11:30 a.m.); 6-7:30 p.m. 10:30 p.m.-2 a.m.; Sunday 4:30-10:30 a.m.; 7:30 p.m.-2 a.m.

10.740 JVM *27.93* — Nazaki, Japan. (See 21.520 mc.) 4:30-7:30 a.m. Irregular.

10.670 CEC *28.12* — Santiago, Chile, S. A. Cia Internacional de Radio, Casilla 16-D. Daily exc. Sat. and Sun. 7-7:20 p.m. (See CED. 10:230 mc.)

10.660 JVN *28.14* — Nazaki, Japan. (See 21.520 mc.) Daily 1:40-2:30 a.m., 3-7:45 a.m.

10.600 ZIK2 *28.30* — Belize, British Honduras, C.A. Government Radio Station ZIK2. Wireless Branch, Post Office. Tues., Thurs., Sat. 7:30-7:45 p.m.

10.370 EAJ43 *28.93* — Santa Cruz, Tenerife, C.I. Radio Club Tenerife, Apartado 225. Daily 3-4:30 p.m., 5-7 p.m., 7:45-8:45 p.m., 9-10 p.m.

10.370 EHZ *28.93* — Tablero, Tenerife, C. I. Daily 3-4 p.m.; 6-8:15 p.m.

10.350 LSX *28.93* — Buenos Aires, Argentina, S.A. Transradio Internacional, San Martin, 329. S.A. C: San Lorenzo March. Irregular 5-8 p.m.

10.330 ORK *29.04* — Bruxelles, Belgium. Director de Communications. I: Carillon, O: Towards The Future. C: Brabanconne. Daily 1:30-3 p.m.

10.260 PMN *29.24* — Bandoeng, Java, D.E.I. (See PLP. 11.000 mc.) Weekdays 5:30-11:30 a.m.; 6-7:30 p.m.; 10:30 p.m.-2 a.m.; Sundays 5:30-11:30 a.m.; 7:30 p.m.-2 a.m.

10.230 CED *29.33* — Antofagasta, Chile. (See CEC 10.670 mc.) Sat. and Sun. 7-720 p.m.

10.220 PSH *29.35* — Rio de Janeiro, Brazil, S.A. Cia Radio International do Brazil. Caixa Postal 709. IRC or 5c Stamps any country. Daily 6-9 p.m.

10.135 CQN *29.60* — Macao (Portuguese), China. Chief of Radio Station CQN, Post Office Bldg. O: Maria de Fonte. C: National—A Portuguese. Mon. and Fri. 7-8:30 a.m.

9.973 COBC *30.09* — Havana, Cuba. Apartado 132. O-C: Tu (You), Habanera. S: none. Daily 6:55 a.m.-12 midnight. IRC or 10c coin.

9.940 CSW3 *30.18* — Lisbon, Portugal. (See 11.840-11.040 mc.) Daily 6-8 p.m.

9.925 JDY *30.23* — Dairen, Kwantung Leased Territory. Dairen Broadcasting Station, Sholokugai 3. Daily 7-8 a.m., English 7:40-8 a.m.

9.860 EAQ *30.43* — Madrid, Spain. Calle 'Medinaceli, 6. O: La Verbena de la Paloma. C: Himno de Riego or Good Night Melody. (See EAR 9.480 mc.) Irregular.

9.833 COCM *30.51* — Havana, Cuba. Apartado 33. IRC required. Daily 8 a.m.-12 midnight.

9.830 IRF *30.52* — Rome, Italy. (See 11.810-9.635 mc.) Daily 12:10-1 p.m., 6-7:30 p.m.

9.750 COCQ *30.77* — Havana, Cuba. Calle 25, No. 445. Weekdays 6:55 a.m.-1 a.m.; Sundays 6:55 a.m.-12:01 a.m.

9.700 *30.93* — Fort de France, Martinique, F.W.I. Radio Martinique, P. O. Box 136. O-C: "La Marseillaise." Daily 11:15 a.m.-12:25 p.m.; 6-8 p.m.

9.685 TGWA *30.98* — Guatemala City, Guatemala, C.A. (See 17.800-15.170-11.760 mc.) 9-11 p.m. Irregular. No IRC necessary.

9.670 TI4NRH *31.02* — Heredia, Costa Rica, C.A. Apartado 40. S: Bugles O-C: March of the Wooden Soldiers. Tues., Thurs., Sat. 9-10 p.m.; Sundays 7-8 a.m. (May—daily-9-11 p.m.)

9.666 CR6AA *31.04* — Lobito, Angola, Portuguese West Africa. Caixa Postal 103. I: 3 notes on piano; A-C-B. Portuguese, French and English. Wed. and Sat. 2:45-4:30 p.m.

9.660 LRX *31.06* — Buenos Aires, Argentina, S.A. (See LRU, 15.290 mc.) Daily 9:30 a.m.-11:30 p.m.

9.650 CS2WA *31.09* — Lisbon, Portugal. Antonio Augusto de Aguair, 144. I: Cookoo, 3 times. C: A Portuguesa (national anthem). Tues., Thurs., Sat., 4-7 p.m.

9.645 HH3W *31.10* — Port-au-Prince, Haiti, W. I. P. O. Box A117. S: 4 chime notes and siren each 15 min. before announcements. Daily exc. Sunday, 1-2 p.m.; 7-8:30 p.m.

9.640 CXA8 *31.12* — Colonia, Uruguay, S. A. Director, Radio Belgrano, Belgrano 1841, Buenos Aires, Argentina. Daily 6 p.m.-11 p.m.

9.635 I2RO-3 *31.13* — Rome, Italy. 3-6 p.m., 7:30-9 p.m. (See 11.810-9.830 mc.)

9.630 HJ7ABD *31.15* — Bucaramanga, Colombia, S. A. Daily 12-1 p.m., 6-11 p.m.

9.616 HJ1ABP *31.20* — Cartagena, Colombia, S. A. P. O. Box 37. O-C: Under the Double Eagle. Weekdays 9 a.m.-1:30 p.m., 4:30-10 p.m. Sun. 4:30-9 p.m.

9.610 YDB *31.20* — Soerabaja, Java, N. E. I. (See 15.150 mc.) Weekdays 4:30-10:30 a.m. (Sat. to 11:30 a.m.), 6-7:30 p.m., 10:30 p.m.-2 a.m. Sundays 4:30-10:30 a.m., 7:30 p.m.-2 a.m.

9.606 ZRK *31.23* — Klipheuvel, South Africa. (See 6.097.5 mc.) Weekdays 11:45 p.m.-12:45 a.m.; 3:20-7:20 a.m.; 9-11:45 a.m. Sundays 3:30-4:30 a.m. or 4-5 a.m.; 8-11:40 a.m.

9.600 XEYU *31.25* — Mexico City, Mexico. Justo Sierra No. 16. Daily 3:30-4:30 p.m.. 8 p.m.-12 a.m.

9.600 RAN *31.25* — Moscow, U.S.S.R. (See RKI, 15.040 mc.) Daily 7-9:15 p.m.

9.600 CB960 *31.25* — Santiago, Chile, S. A. Casilla 1342. O: Babes in Toyland. C: Somewhere a Voice Is Calling (organ). Daily 10:30 a.m.-1 p.m.; 8:30-11 p.m.

9.595 HBL *31.27* — Geneva, Switzerland. (See 18.450 mc.) Irregular.

9.595 YNLF *31.27* — Managua, Nicaragua, C. A. Calle, 15 de Set No. 206. Daily 8-9 a.m.; 1-3 p.m.; 6:30-10:30 p.m. Veri—5c U. S. postage.

9.590 VK6ME *31.28* — Perth, West Australia. Address, Amalgamated Wireless, Ltd., 47 York St., Sydney, Australia. Daily exc. Sun., 6-8 a.m.

9.590 W2XE *31.28* ◆ — Wayne, N. J. (See 21.520 mc.)

9.590 W3XAU *31.28* — Philadelphia, Pa. 1622 Chestnut St. Daily 12 noon-8 p.m., 11 p.m.-12 a.m.

9.590 VK2ME *31.28* — Sydney, Australia. Amalgamated Wireless, Ltd., 47 York St. Clock strikes at hour, chimes ¼ hr. I: Kookaburra bird call. C: God Save The King. Sunday 1-3 a.m.; 5-9 a.m., 10:30 a.m.-12:30 p.m.

9.590 HP5J *31.28* — Panama City, Panama, C. A. Apartado 867. News 6:30 p.m. O: Blackhorse Troop March. C: Discipline Honor and Abregacion. Weekdays 12-2 p.m.; 5-10:30 p.m. Sundays 10:30 a.m.-2 p.m.; 8-10 p.m.

9.590 PCJ *31.28* — Hilversum, Holland. (See 15.220 mc.) Sunday 1:10-1:35 p.m.. 2-3 p.m., 7-9 p.m.; Tues. 1:45-3:30 p.m.; Wed. 7-9:30 p.m.

9.580 GSC *31.32* ★ — Daventry, England. (See 26.100 mc.) Daily 6:20-8:30 p.m., 9:20-11:20 p.m.

9.580 VLR *31.32* ★ — Melbourne, Australia. Australian Broadcasting Commission. G. P. O. Box 1686. O: Recording, song. Australian Lyre Bird. C: God Save The King. S—3 notes, gong; time signals and P. O. chimes. Sun. 3-7:40 a.m. Weekdays 9:35 p.m.-2 to 2:30 a.m.; 3:30-8:30 a.m.; Sat. to 9 a.m.

9.580 OAX5C *31.32* — Ica, Peru, S. A. Radio Universal, Avenida San Luis. Weekdays 11:30 a.m.-4 p.m.; 7-11:30 p.m.

9.570 W1XK *31.33* ★ — Boston, Mass. Hotel Bradford, Westinghouse Electric and Mfg. Co. O-C: Stars and Stripes Forever. Weekdays 6 a.m.-1 a.m. Sunday 8 a.m.-1 a.m.

9.570 KZRM *31.33* — Manila, P. I. (See 11.840 mc.) Weekdays 5-9 a.m. Sat. to 10 a.m., 4:30-6 p.m. Sun. 4-10 a.m.

9.565 YV3RB *31.36* — Barquisimeto, Venezuela, S. A. Sr. Arturo Ramos Maggi, Prop. Daily 11:30 a.m.-12:30 p.m.; 5:30-9:30 p.m.

9.562 OAX4T *31.38* — Lima, Peru, S. A. Radio Nacional, Peruvian Government, Av. Petit Thouars 447. 7-8 a.m.; 11:30 a.m.-1:30 p.m.

9.560 DJA *31.38* — Zeesen, Germany. (See 17.760 mc.) Daily 12:05 a.m.-11 a.m.; 4:50-10:45 p.m.

9.550 XEFT *31.41* — Veracruz, Mexico. Av. Independencia 28. S: Chimes, bugle calls or cuckoo horn. English at closing. O-C: Vals Poetico. Weekdays 10:30 a.m.-4:30 p.m.; 7:30 p.m.-12:30 a.m.; Sundays 9 p.m.-12:30 a.m.

9.550 W2XAD *31.41* — Schenectady, N. Y. (See 15.330 mc.) Daily 7:30 p.m.-12 a.m. Specials Irregular.

9.550 HI5E *31.41* — Ciudad Trujillo, Dom. Rep., W. I. Sr. H. Chavez. Irregular.

9.550 OLR3A *31.41* — Prague, Czechoslovakia. (See 21.450 mc.) Daily 12:55-4:40 p.m. Mon., Tues., Thurs., Fri. 8-10:35 p.m. English news 9:45 p.m.

9.545 HH2R *31.44* — Port-au-Price, Haiti, W. I. (See HH2T, 11.570 mc.) • Special programs irregular.

9.540 VPD-2 *31.45* — Suva, Fiji Islands. Amalgamated Wireless, Ltd. C: God Save the King. Daily 5:30-7:00 a.m. No signals.

9.540 DJN *31.45* — Zeesen, Germany. (See 17.760 mc.) Daily 4:50-10:45 p.m.

9.535 JZI *31.46* — Nazaki, Japan. (See 21.520 mc.) Daily 2:30-4 p.m. 4:30-5:30 p.m.

9.530 W2XAF *31.48* — Schenectady, N. Y. (See W2XAD 15.330 mc.) Daily 4 p.m.-12 a.m.; specials irregular.

9.530 LKJ-1 *31.48* — Oslo, Norway. Ministere du Commerce, Administrator des Telegraphes. I: Piano motif Grieg's Sigurd Jorsalfar. C: National—Yes, We Love This Country. Daily 5-8 a.m.; 11 a.m.-5 p.m.

9.525 ZBW-3 *31.49* — Hong Kong, China. Hong Kong Broadcasting Committee, P. O. Box 200. I-O-C: none. Weekdays 11:30 p.m.. 1:15 a.m., Mon.-Thurs., 4-10 a.m., Tues., Wed., Fri., 3-10 a.m., Sat., 3-11 a.m., Sun. 9 p.m.-1:30 a.m., 3-9:30 a.m.

9.524 FIQA *31.50* — Tananarive, Madagascar. (See 6.000 mc.) Daily 12:30-12:45 a.m.; 3:30-4:30 a.m.; 10-11 a.m. simultaneously on 6.000 mc.

9.523 ZRH *31.50* — Roberts Heights, South Africa. (See 6.097.5 mc.) Weekdays 11:45 p.m.-12:45 a.m., 5-7:30 a.m., Sunday 3:30-4:30 a.m. or 4-5 a.m.

9.520 OZF *31.51* — Copenhagen, Denmark. (See 11.805 mc.) Daily 2-6 p.m.

9.520 YSH *31.51* — San Salvador, El Salvador, C.A. (See 11.710 mc.) Irregular.

9.520 XEDQ *31.51* — Guadalajara, Jal., Mexico. Apartado 107. O-C: Mexican Dance—Jarabe Tapatio. Daily 12-4 p.m., 8 p.m.-12 a.m. Occasional DX Sunday 2-4 a.m.

9.520 HJ6ABH *31.51* — Armenia, Colombia, S. A. O-C: The Spanish Soldiers. S: Blows on Marimba. News 7-10 p.m. Weekdays 8-11 a.m.; 6-10 p.m. Sundays 7-10 p.m.

9.510 GSB *31.55* ★ — Daventry, England. (See 26.100 mc.) Daily 1-3:15 a.m.; 12:20-4 p.m., 4:15-6 p.m.; 6:20-8:30 p.m.; 9:20 to 11:20 p.m.

9.510 HJU *31.55* — Buenaventura, Colombia, S.A. O-C: Palmira, English each 5 mins. Mon., Wed., Fri. 12-2 p.m.; 8-11 p.m.

9.510 HS8PJ *31.55* — Bangkok, Siam. (See 9.350-19.020 mc.) Mon. and Thurs. 8-10 a.m.

9.510 VK3ME *31.55* — Melbourne, Australia. Amalgamated Wireless Ltd., 167-9 Queen St. S: chimes and striking on hour. C: God Save the King. Daily exc. Sun. 4-7 a.m.

9.504 OLR3B *31.57* — Prague, Czechoslovakia. (See 21.450 mc.) Irregular.

9.501 PRF5 *31.58* — Rio de Janeiro, Brazil, S. A. P. O. Box 709. I: Three-note gong. C: Brazilian National Anthem. (See PSE 14.935 mc.) Daily exc. Sun. 4:45-5:45 p.m.

9.500 XEWW *31.58* — Mexico, D. F. Apartado 2516. Daily 9 a.m.-12 M.

9.480 EAR *31.65* — Madrid, Spain. English daily, 7:30-8 p.m., 8:30-9 p.m. (See EAQ 8.860 mc.)

9.473 PJC1 *31.67* — Willemstad, Curacao, N.W.I. Irregular. (See 5.929 mc.)

9.450 "Radio France" *31.75* — Fort de France, Martinique, F.W.I. Edouard Boullanger Fils. Daily 11:30 a.m.-12:30 p.m.; 6:15-7:15 p.m.; 8-9 p.m.

9.440 HCODA *31.78* — Guayaquil, Ecuador, S. A. Apartado 704. Daily exc. Sunday 8-11 p.m. Veri—5c U. S. postage.

9.428 COCH *31.81* — Havana, Cuba. P. O. Box 41. English each 15 mins. S: chimes 15 m. 2 blows gong adv. O-C: Organ: Maria My Own. Daily 8 a.m.-12 a.m.

9.350 HS8PJ *32.09* — Bangkok, Siam. (See 19.020 mc.) Thursday 8-10 a.m.

9.345 HBL *32.10* — Geneva, Switzerland. (See 18.480 mc.) Irregular.

9.340 OAX4J *32.12* — Lima, Peru. Radio Internacional, Casilla 1166. S: 3 chimes gong. C: "Whistler and His Dog"—Veri slow. Daily 12 noon-12 a.m.

9.300 YNGU *32.26* — Managua, Nicaragua, C. A. Apartado 295. Weekdays 12-2 p.m.; 5-6 p.m. Sun. 11 a.m.-12 noon. Veri—5c U. S. Postage.

9.290 HIG *32.29* — Ciudad Trujillo, Dom. Rep., W. I. Av. Jose Trujillo No. 20. O-C: National Anthem. Daily 7:10-8:40 a.m., 12:40-2:10 p.m., 8:10-9:40 p.m.

9.200 COBX *32.61* — Havana, Cuba. San Miguel No. 194. Daily 11 a.m.-12 midnight.

9.163 HC1GQ *32.74* — Quito, Ecuador, S. A. Guayaquil and Quito Ry. Co., P. O. Box 159. Veri cards free. C: Blue Danube. Mon., Wed., Sat., 9:30-11:30 p.m.

9.125 HAT-4 *32.88* — Budapest, Hungary. (See HAS-3, 15.370 mc.) Sun. and Wed., 7-8 p.m.; Sat., 6-7 p.m.

9.100 COCA *32.97* — Havana, Cuba. Galiano No. 102. Daily 8 a.m.-12 a.m.

9.030 COBZ *33.32* — Havana, Cuba. P. O. Box 866. S: 4 chimes. O-C: Record, "Popular Melodies." 7:45 a.m.-12:30 a.m. Sat. to 2 a.m.

8.935 COKG *33.55* — Santiago, Cuba. Apartado 137. O-C: La Conga. S: 3 strokes on gong. Daily 7:55 a.m.-12 midnight.

8.831 HCJBI *33.97* — Quito, Ecuador, S. A. Casilla 691. O: March Patria. I: 4 blows on gong. C: Ecuadorian National Anthem. Daily exc. Mon., 7:30-8:45 a.m., 11:30 a.m.-2:30 p.m., 5-10 p.m. (to 7 p.m. on 4.107 mc.; after 7 p.m. on 4.107 and 8.831 mc.). Veri—5c U. S. Postage.

8.795 HKV *34.13* — Bogota, Colombia, S. A. Ministerio de Guerra, Military Service. Mon. and Thurs. news 7-7:30 p.m.

8.665 COJK *34.62* — Camaguey, Cuba. Finlay No. 3, Altos. S: 3 tone gong, each ¼ hr. English Ann., each ½ hr. O: "Allegiance March." C: None. Weekdays 10:30 a.m.-12:30 p.m., 7-10:30 p.m.; Sat. 11 p.m.; Sun. 10 a.m.-12:30 p.m.

8.650 HJ4ABU *34.97* — Medellin, Colombia, S. A. Universidad de Antoquia. Weekdays 7:30-10:30 p.m.

8.580 YN1PR *34.97* — Managua, Nicaragua, C. A. A. Mejewsky, Gerente. Daily 1-2:30 p.m.; 7:30-10:30 p.m. Veri—5c U. S. Postage.

8.404 HC2CW *35.70* — Guayaquil, Ecuador, S. A. Casilla 1166. O-C: Sangre Equatoriana. Weekdays 11:30 a.m.-12:30 p.m.; 7-11 p.m. Sun. 3-5 p.m. Veri—5c U. S. Postage.

7.894 YSD *38.00* — San Salvador, El Salvador, C. A. (See 11.710 mc.) Daily 7-11 p.m.

7.870 HC1RB *38.12* — Quito, Ecuador, S. A., Correos Calda, 146. Daily 8:30-11 p.m.

7.854 HC2JSB *38.19* — Guayaquil, Ecuador, S. A. P. O. Box 805. S: Gong. O-C: El Corcovado (Carioca fox). Daily 11 a.m.-2 p.m.; 4-11 p.m. Veri—5c U. S. Postage.

7.797 HBP *38.49* — Geneva, Switzerland. Radio Suisse, S. A., 12, Quai de la Poste. (E) No opening or closing selection. Irregular. (See 14.535-11.402 mc.)

7.550 TI8WS *39.74* — Puntarenas, Costa Rica, C. A. Apartado 75. Weekdays 5-7 p.m., 8:30-10 p.m. Sun. 4-5 p.m.

7.540 RKI *39.79* — Moscow, U.S.S.R. Daily 7-9:15 p.m. (See 15.040 mc.)

7.510 JVP *39.95* — Nazaki, Japan. (See 21.520 mc.) 3-7:30 a.m. Irregular. Overseas, daily 2:30-4 p.m.

7.380 XECR *40.65* — Mexico, D. F. Departmento Autonomo de Publicidad. Sun. 7-8 p.m. No signals or O-C selection.

7.211 EA8AB *41.60* — Santa Cruz. Tenerife, C. I. Radio Club Tenerife, Apartado 225. O-C: Lady of Spain. English on Saturdays only. Mon., Wed., Fri., Sat., 3:15-4:15 p.m.

7.200 YNAM *41.67* — Managua, Nicaragua, C. A. A. Majewsky, Gerente. Daily 7-10 p.m. Veri—5c U. S. Postage.

7.177 CR6AA *41.80* — Lobito, Portuguese West Africa. (See 9.666 mc.) Wed. and Sat. 2:45-4:30 p.m.

7.100 FO8AA *42.25* — Papeete, Tahiti. Radio Club Oceanien, Alfred T. Poria, Pres. Tues. and Fri., 11 p.m.-1 a.m.

7.030 EA9AH *42.67* — Tetuan, Spanish Morocco, Africa. El Coronel Jefe de Estado, de las Mayor de las Fuezas, Militares, Apartado 124. Daily 4-4:25 p.m.; 12-2:30 a.m. Irregular.

7.010 XEME *42.80* — Merida, Yucatan, Mexico. Irreg. 6-11 p.m.

6.975 HCETC *43.01* — Quito, Ecuador, S. A. Apartado 134. Sat. and Mon. 7:45-9 p.m. Veri—5c U. S. postage. Veri slow.

6.900 HI2D *43.48* — Ciudad Trujillo, Dom. Rep., W. I. Associated cia Dominicana. Daily 6:40-8:40 a.m.; 10:40 a.m.-2:40 p.m.; 4:40-8:40 p.m.

6.900 TI2RS *43.48* — San Jose, Costa Rica, C. A. Sr. Rogelia Sotela, Prop. Daily ex. Sun. 9:30-11 p.m.

6.850 TIOW *43.80* — Port Limon. Costa Rica, C. A. P. O. Box 45. Weekdays 10-11:30 p.m.; Sun. 2-3 p.m.

6.814 HIH *44.03* — San Pedro de Macoris, Dom. Rep., W. I. Daily 12:10-1:40 p.m., 7:40-9 p.m. Sun. 5:10-6:40 p.m. DX 2:40-3:40 a.m.

6.800 HI7P *44.12* — Ciudad Trujillo, Dom. Rep., W. I. Calle Jose Reyes No. 25. Weekdays 12:40-1:40 p.m.; 6:40-8:40 p.m.; Sun. 9:40-10:40 a.m.

6.788 PZH *44.20* — Paramaribo (Surinam), Dutch Guiana, S. A. Weekdays 2:45-4:45, 5:45-9:45 p.m. Sun. 9:45-11:45 a.m. Veri slow.

6.750 JVT *44.44* — Nazaki, Japan. (See 21.520 mc.) 2-2:30 a.m.; 4:30-9 a.m. Irregular.

6.720 PMH *44.64* — Bandoeng, Java, D. E. I. (See PLP, 11.000 mc.) Weekdays 4:30-11 or 11:30 a.m., Sundays 4:30-11 or 11:30 a.m., 9:30 p.m.-1:30 a.m.

6.690 TIEP *44.84* — San Jose, Costa Rica, C. A. Apartado 257. Daily 7-11 p.m.

6.675 HBQ *44.94* — Geneva, Switzerland. (See 18.480 mc.) League — Sun. 1:45-2:30 p.m.

6.668 HC2RL *44.99* — Guayaquil, Ecuador, S. A. P. O. Box 759. O-C: Ecuadorian National Anthem. English each 15 mins. Sunday 5:45-7:45 p.m.; Tues. 9:15-11:15 p.m. Veri—5c U. S. postage.

6.660 HI5G *45.05* — La Vega, Dom. Rep., W. I. Daily 6:40-8:40 a.m.; 10:40 a.m.-2:40 p.m., 4:40-8:40 p.m.

6.630 HIT *45.25* — Ciudad Trujillo, Dom. Rep. Apartado 1105. O-C: Anchors Aweigh. English. Daily exc. Sun. 12:10-1:40 p.m.; 6:10-8:40 p.m. DX 1st Sat. 11:10 p.m.-1:10 a.m.

6.618 El Prado *45.33* — Riobamba. Ecuador, S. A. Apartado 98. English each 15 mins. O: Bugle call. Thursday 9:15-11:15 p.m. Veri—U. S. postage.

6.610 YNLG *45.39* — Managua, Nicaragua. 5a Calle No. 207. O: "General Marcelo Caraveo" March. Opening with bugle call thrice. Morning and afternoon broadcasts "Till We Meet Again." C: "Good Night Ladies." Weekdays 8-9 a.m.; 1-3 p.m.; 6-10 p.m. Sundays 10 a.m.-1 p.m.; 8:30-11 p.m. Veri—5c U. S. postage.

6.600 HI6H *45.45* — Ciudad Trujillo, Dom. Rep., W. I. Irregular.

6.580 "Radio Guardia Civil" *45.59* — Tetuan, Spanish Morocco. Africa. O: March of the Caliph. C: Spanish National Anthem. I and S: chimes. Daily 2-3 p.m.; 7-8 p.m.

6.575 HC1VT *45.63* — Ambato, Ecuador, S. A. Mon., Wed., Fri., 8-10:15 p.m. Veri—U. S. postage.

6.565 HI5P *45.70* — Puerto Plata. Dom. Rep., W. I. Daily 5-9 p.m.

6.555 HI4D *45.77* — Ciudad Trujillo, Dom. Rep., W. I. Mon. & Sat. 11:55 a.m.-1:40 p.m., 4:40-7:40 p.m.

6.550 TIRCC *45.81* — San Jose, Costa Rica, C. A. Apartado 1064. S: 4 notes on gong. O-C: The Lost Chord—Organ. Tue., Thur., Sat., 6-7 p.m. Religious. Sundays 10 a.m.-7 and 8 p.m.; Thurs. 8 p.m.

6.545 YV6RB *45.84* — Ciudad Bolivar, Venezuela, S. A. Apartado 34. Daily 7:10 p.m.; Sun. 3-6 p.m.

6.535 YN1GG *45.91* — Managua, Nicaragua, C. A. Daily 6-10 p.m.; Veri—5c U. S. postage.

6.520 YV4RB *46.01* — Valencia, Venezuela, S. A. C: Bugle call. taps and off. Daily 11 a.m.-1:30 p.m.; 5:30-9:30 p.m.

6.500 HIL *46.15* — Ciudad Trujillo, Dom. Rep., W. I. Apartado 623. Daily 12:10-1:40 p.m., 5:40-7:40 p.m.

6.500 YV1RM *46.15* — Maracaibo, Venezuela, S. A. Daily 6-9:30 p.m.

6.480 EDR-4 *46.30* — Palma de Mallorca, Belearic Islands. Radio Poste. Daily 4:30-5:15 p.m.

6.480 HI1L *46.30* — Santiago de los Caballeros, Dom. Rep., W.I. Radioemisora Nacional "El Diario." Apartado 356. I: Xylophone note O-C: Dominican National Anthem. Weekdays 7-8:30 a.m., 12-2 p.m., 5:30-9:30 p.m.

6.465 YV3RD *46.40* — Barquisimeto, Venezuela, S.A. Radio Barquisimeto, Avda, Bella Vista No. 335. Daily 11:30 a.m.-1:30 p.m.; 5:30-9:30 p.m.

6.450 HI4V *46.51* — San Francisco de Macoris, Dom. Rep., W. I. Mella No. 25. S: 4 strokes on gong. O-C: National Anthem. Daily 2:40-4:40 p.m., 7:10-9:10 p.m.

6.420 HI1S *46.73* — Santiago de los Caballeros, Dom. Rep., W.I. P. O. Box 112. Daily 11:40 a.m.-1:40 p.m.; 5:40-7:40 p.m.

6.420 YV6RC *46.73* — Ciudad Bolivar, Venezuela, S. A. Daily 10:30 a.m.-1:30 p.m.; 4:30-9:30 p.m.

6.410 TIPG *46.80* — San Jose, Costa Rica, C.A. Apartado 225. O-C: Parade of the Wooden Soldiers. Daily 7-9:30 a.m.; 12-2 p.m.; 4-11:30 p.m.

6.400 TGQA *46.88* — Quezaltenango, Guatemala, C. A. (Address — See TG2, 6.190 mc.) O-C: Waltz-Xelaju S: Chimes. Daily 9-11 p.m., Sat. to 1 a.m., Sun. 12 noon-3 p.m.

6.400 YV5RH *46.88* — Caracas, Venezuela, S.A. Apartado 1931. Weekdays 11 a.m.-1:30 p.m.; 4:30-9:30 p.m.; Sun. 9:30 a.m.-1:30 p.m.; 5-7:30 p.m.

6.383 VP2LO *47.00* — St. Kitts, B.W.I. P. O. Box 88. No chimes or signals. O: "Rule Brittania." C: "God Save the King." Daily 4-4:45 p.m. Sundays and holidays in addition 10-10:45 a.m.

6.383 HI8J *47.00* — La Vaga, Dom. Rep., W.I. Daily 5-8 p.m.

6.375 YV5RF *47.10* — Caracas, Venezuela, S.A. Apartado 983. C: Organ: Blue Danuhe. Daily 6:30-7:30 a.m.; 10:30 a.m.-1:30 p.m.; 4:30-10:30 p.m.

6.360 YV1RH *47.17* — Maracaibo, Venezuela, S.A. P. O. Box 261. O: Jealusie. C: Er Weicht der Sonne Nicht — march. Weekdays 5:30-7 a.m.; 10:30 a.m.-1:30 p.m.; 4:30-10:30 p.m. English 10-10:30 p.m. Sunday 8:30 a.m.-2:30 p.m.

6.351 HRP1 *47.24* — San Pedro Sula, Honduras, C.A. Sr. Joaquin Mendoza, Director. O: March—Boy Scouts. C: National Anthem Honduras. S: gongs. Daily 12-2 p.m.; 8-10 p.m. Veri—5c U. S. postage.

6.340 HI1X *47.32* — Ciudad Trujillo, Dom. Rep., W.I. (See 15.280 mc.) Weekdays 12:10-1:10 p.m.; Tues. and Fri. 8:10-10:10 p.m.; Sun. 7:40-10:40 a.m.

6.330 COCW *47.39* — Havana, Cuba. Apartado 130. Daily 7 a.m.-12 midnight.

6.315 HIZ *47.51* — Ciudad Trujillo, Dom. Rep. W.I. Apartado 1092 and 771. Weekdays 11:10 a.m.-2:10 p.m.; 4:40-9:40 p.m. Sundays 11:40 a.m.-2:40 p.m.

6.300 YV4RD *47.62* — Maracay, Venezuela, S.A. Sr. Luis Croquer, Prop. Weekdays 11:30 a.m.-12:30 p.m.; 5:30-9:30 p.m.

6.280 COHB *47.77* — Sancti-Spiritus, Santa Clara, Cuba. P. O. Box 85. Weekdays 9-10 a.m., 12-10 p.m. Sun. 10 a.m.-10 p.m.

6.280 HIG *47.77* — Ciudad Trujillo, Dom. Rep., W.I. Daily 7:10-8:40 a.m., 12:40-2:10 p.m., 8:10-9:40 p.m. (See 9.290 mc.)

6.275 OAX4G *47.81* — Lima, Peru, S.A. Avda. Abancay, 915-923, or P. O. Box 2234. C: Good Night Sweetheart. Daily 7-11 p.m.

6.270 YV5RP *47.85* — Caracas, Venezuela, S.A. P. O Box 508. Daily 6-11:45 p.m.

6.250 YV5RJ *48.00* — Caracas, Venezuela, S.A. Sr. Edmundo Suegart, Prop. P. O. Box 1008. Daily 5:30-9:30 p.m.

6.243 HIN *48.05* — Ciudad Trujillo, Dom. Rep., W.I. Carlo Arzobispo Merino No. 97. English each 15 mins. (See 11.260 mc.) Weekdays 11:40 a.m.-2:40 p.m.; 7:10-9:10 p.m. Sun. 11:10 a.m.-3:40 p.m. Veri slow.

6.240 HI8Q *48.08* — Ciudad Trujillo, Dom. Rep., W.I. Sr. Julio O. Garcia Alardo, Director. Sunday only 5:40-9:40 p.m.

6.235 HRD *48.11* — La Ceiba, Honduras, C.A. Sr. Tuilo Castaneda, Director. English on the hour. O: Solo Tuyo. C: Intermezzo No. 1 Piano 10:58 p.m. Good Night Melody. No signals. Daily exc. Sun. 8-11 p.m.

6.230 YV1RG *48.15* — Valera, Venezuela, S.A. Radio Valera. S: 1 bell O-C: Local March. Daily 11 a.m.-12:30 p.m.; 5:30-9:30 p.m.

6.210 YV1RI *48.31* — Coro, Venezuela, S.A. Radio Coro. S: 4 marimba tones. Spanish Ann. each 15 m. O-C: March—The Three Coro. Daily 7:30-9:30 p.m.

6.200 XEXS *48.39* — Mexico, D. F. Secretaria de la Economia Nacional. Daily 7-11 p.m.

6.190 TG2 *48.47* — Guatemala City, Guatemala, C. A. Director General of Electrical Communications. O-C: The Flower of the Coffee—Marimba. S: chimes "G" octave 3, pause 2 sec. 3 more. Weekdays 6-11 p.m. Sat. to 1 a.m. Sunday 7 a.m.-9 p.m. No IRC required.

6.182 HI1A *48.53* — Santiago de los Caballeros. Dom. Rep., W. I. P. O. Box 423. I: Gong. C: Anchors Aweigh. Daily 6:40 a.m.-4:40 p.m.; Thurs. and Sundays, 7:40-9:40 p.m. Band concerts.

6.160 VPB *48.70* — Colombo, Ceylon. Radio Club of Ceylon and So. India. P. O. Box 282. S: Time on hour, 6 pips. I: Bow Bells, infrequently. Daily 6:30-11:30 a.m. Sat. 12:30 p.m.

6.158 YV5RD *48.72* — Caracas, Venezuela, S. A. Radio Venezuela. I: 5 strokes of bell. O-C: Triunfo Aereo. Weekdays 6:30-7:30 a.m.; 10:30 a.m.-1:30 p.m.; 3:30-10 p.m. Sun. 8:30 a.m.-10:30 p.m.

6.150 OAX1A *48.78* — Chiclayo, Peru, S. A. Sr. J. Carlos Montjoy D., Casilla No. 9. O: Anclas Arriba. C: Good Night Melody. Daily 8-11 p.m.

6.150 CJRO *48.78* — Winnipeg, Manitoba, Canada. (See CJRX, 11.720 mc.) Weekdays 6 p.m.-12 a.m. Sundays 5-10 p.m.

6.150 HI5N *48.78* — Moca, Dom. Rep., W. I. Daily 6:40-8:40 a.m.; 10:40 a.m.-2:40 p.m.; 4:40-8:40 p.m.

6.150 ZRD *48.78* Durban, South Africa. (See 6.097.5 mc.) Weekdays 11:45 p.m.-12:45 a.m.; 3:30-7:30 a.m.; 9 a.m.-3:45 p.m.; Sat. to 4 p.m.. Sun. 8-11:30 a.m., 12 noon-3:20 p.m.

6.145 HJ4ABE *48.82* Medellin. Colombia. S. A. I: Morse-letter "M." S: 4 chimes. Daily 9:30 a.m.-1 p.m.; 5-11:30 p.m.

6.140 W8XK *48.86* Pittsburgh, Pa. (See 21.540 mc.) Daily 11 p.m.-1 a.m.

6.140 ZEB *48.86* Bulawayo, Rhodesia. South Africa. (See ZEC, 5.800 mc. for address.) Sun. 3-5 a.m.; Tues. and Thurs. 1:15-3:15 p.m.

6.137 CR7AA *48.88* Lourenco Marques, Portuguese East Africa. P. O. Box 594. O: A Maria de Fonte. C: A Portuguesa. Weekdays 12:15-1 a.m.; 4:30-6:30 a.m.; 9:30-11 a.m.; 12:30-4 p.m. Sundays 5-7 a.m.; 10 a.m.-12:30 p.m.; 2-4 p.m.

6.133 XEXA *48.91* Mexico, D. F. (See 11.880 mc.) Weekdays 8:30-11 a.m.; 2:30-4:30 p.m.; 7 p.m.-12 a.m. Sunday 7 p.m.-12 a.m.

6.130 VP3BG *48.94* Georgetown, British Guiana, S. A. Crystal Broadcasting Co.. Philharmonic Bldgs. O: Serenade. C: Good Night My Love and God Save the King. Mon., Wed., Fri., 3-4:45 p.m., 4:45-7:45 p.m.; Tues., Thurs., Sat., 10:15-11:15 a.m., 3-7:45 p.m.; Sun. 6:45-8:45 a.m., 10:30-1:45 a.m.. 4-6:15 p.m.

6.130 XEUZ *48.94* Mexico, D. F. (See 11.880 mc.) Daily 10 a.m.-1 p.m.; 7 p.m.-2 a.m. DX 1-2 a.m.

6.130 ZGE *48.94* Kuala Lumpur, Malay States. S. S. Sun., Tues., Fri., 6:40-8:40 a.m.

6.130 LKJ1 *48.94* Jeloy, Norway. (See 9.530 mc.) Daily 11 a.m.-5 p.m.

6.130 COCD *48.94* Havana, Cuba. P. O. Box 2294. English each 15 mins. O: In a Clock Store. C: Good Night. Weekdays 9 a.m.-1 a.m. Sundays 10 a.m.-8 p.m. (DX 1-3 a.m.)

6.130 VE9HX *48.94* Halifax, N. S., Canada. P. O. Box 998. O-C: Oh Canada. Chimes 15 min. period. Veri, 10c coin. Sun., 12 noon-11 p.m. Mon. to Fri., 7 a.m.-11 p.m. Sat., 11:55 a.m.-11 p.m.

6.125 CXA4 *48.98* Montevideo, Uruguay, S. A. Mercedes 823. Daily 10:30 a.m.-12:30 p.m.; 3:30-9:30 p.m.

6.122 OAX6A *49.00* Arequipa, Peru, S. A. Munoz Najar 141. Casilla 293. O: La Marcha de los Marino. C: Nacional del Peru. Daily 7-11 p.m.

6.122 HP5H *49.00* Panama City, Panama, C. A. Apartado 1045. Daily 10 a.m.-1. p.m.. 5-11 p.m.; English hour 10-11 p.m.; Sundays 8 a.m.-2 p.m.

6.120 W2XE *49.02* Wayne, N. J. (See 21.520 mc.) Daily 11:30 p.m.-12:30 a.m.

6.115 OLR2C *49.06* Prague, Czechoslovakia. (See 21.450 mc.) Irregular.

6.110 GSL *49.10* ★ Daventry, England. (See 26.100 mc.) Irregular.

6.110 XEGW *49.10* Mexico, D. F. Enrique Arzamendi, Gen'l Mgr. O-C: Vail a dolid Aztec—march. Daily exc. Mondays 11 a.m.-4 p.m.; 7 p.m.-12 a.m. Mondays 9 a.m.-4 p.m.

6.109 VUC *49.10* Calcutta, India. 1 Garstin Place. S: none. C: God Save the King. Daily 8 a.m.-12:30 p.m. 11 p.m.-12:30 a.m.

6.105.1 HJ6ABB *49.14* Manizales, Colombia, S. A. Apartado 175. Daily 11 a.m.-1 p.m.; 5-8 p.m. Veri slow.

6.105 HI3C *49.14* La Romana, Dom. Rep., W.I. Sr. Roberto Palli B., Director. Week days 12:10-2:10 p.m., 6:10-10:40 p.m. Sun. 12:10-2:40 p.m.

6.100 YUA *49.18* Belgrade, Yugoslavia. Director, Bureau Central de Presse. S: Short tune on flute. O-C: National Anthem. Daily 12:45 a.m.-8:30 a.m., 1-6 p.m.

6.100 W9XF *49.18* Chicago, Ill. 20 N. Wacker Drive. O-C: Star Spangled Banner. Daily 6-9:05 p.m.-1:05-2 a.m.

6.100 W3XAL *49.18* Bound Brook, N. J. (See 17.780 mc.) Sat. and Sun. 6 p.m.-1 a.m. Mon. to Fri. 7 p.m.-1 a.m.

6.097.5 ZRJ *49.20* Johannesburg, South Africa. African Broadcasting Co., Inc., P. O. Box. 4559. Physical session. O: Bugles—Reveille. C: Cook. House. I. chimes. C: 'God Save the King. Weekdays 11:45 p.m.-12:45 a.m.; 3:15-7:30 a.m.; 9-11:30 a.m. (8:30-11:30 a.m. Sat.) Sunday 3:30-4:30 a.m. or 4-5 a.m., 8-11:30 a.m.

6.097.5 ZRK *49.20* Klipheuval, South Africa. Weekdays 12 noon-4 p.m. Sundays 12 noon-3:20 p.m.

6.095 JZH *49.22* Nazaki, Japan. (See 21.520 mc.) Irregular.

6.090 ZBW2 *49.26* ◆ Hong Kong, China. (See 9.525 mc).

6.090 XEBF *49.26* Jalapa, Mexico. Insurgentes 34. Daily 7-11 p.m.

6.085.7 HJ5ABD *49.30* Cali, Colombia, S.A. Daily 11 a.m.-2 p.m.; 6-11 p.m.

6.082 VQ7LO *49.33* Nairobi, Kenya Colony, Africa. P. O. Box 777. English used. C: God Save the King. Time signal 6 pips on hour. Daily exc. Sunday 5:30-6 a.m. Daily 11:15 a.m.-2:15 p.m. Tues. and Thurs. 8:15-9:15 a.m.

6.082 OAX4Z *49.32* Lima, Peru. (See OAX4T, 9.562 mc.) Daily 7 p.m.-12:30 a.m.

6.080 W9XAA *49.34* Chicago, Ill. (See 17.780 mc.) Weekdays 7-8:30 a.m., 8-11 p.m., Sun. 11 a.m.-1 p.m., 8-11 p.m.

6.080 ZHJ *49.34* Penang, S.S. Penang Wireless Society Headquarters, 40 Perak Road. O: Chimes, Vocal song, "Land of Hope and Glory." C: "God Save the King." Weekdays 6:40-8:40 a.m.

6.080 VE9CS *49.34* Vancouver, B.C., Canada. 743 Davie St. O: O Canada: C: God Save the King. S: 3 strokes gong. Sun. 12 noon-1:30 a.m. Mon., Thurs., Sat. 9:30 a.m.-8:30 p.m. Tues., Wed., Fri. 9:30 a.m.-2:30 a.m.

6.080 HP5F *49.34* Colon, Panama. C.A. Hotel Carlton. Weekdays 11 a.m.-1 p.m.; 7-10 p.m.; Sun. 10:45-11:30 a.m. 7:10 p.m.

6.080 XEWW *49.34* Mexico, D.F. Apartado 2516. Irregular. (See 9:500 mc.)

6.079 DJM *49.35* Zeesen, Germany. (See 17.760 mc.) Irregular.

6.075 XECU *49.38* Guadalajara, Jal., Mexico. Hidalgo 579. O-C: Ojos Tapatious. I: Train in motion. Daily 9-11 a.m.; 1-4 p.m.; 8-11 p.m. or 12 a.m.

6.072 OER-2 *49.41* Wien, Austria. (Alternates days with 11.801 mc.) Weekdays 9 a.m.-5 p.m. Sat. to 6 p.m.

6.070.5 HJ3ABF *49.42* Bogota, Colombia, S.A. Apartado 317. C: Good Night Sweetheart. Daily 11 a.m.-2 p.m. 6-11 p.m. Veri slow.

6.070 YV1RD *49.42* Maracaibo, Venezuela, S.A. P. O. Box 100. Daily 8 p.m.-12 a.m.

6.070 VP3MR *49.42* Georgetown, Demerara, British Guiana, S.A. Luckie's Chambers, Fogartys Bldg. S: Time signals, studio clock. O: The Bond of Friendship. C: Ted Lewis' Goodnight Melody and God Save the King. Veries—I.R.C. required. Weekdays 4:15-8:15 p.m. Sundays 7:45-10:45 a.m.

6.070 CFRX *49.42* Toronto, Ont., Canada. 37 Bloor St., West. Week days 7:30 a.m.-12 midnight. Sunday 10:30 a.m.-12 midnight.

6.065 XEXR *49.46* Mexico, D.F. Departmento Autonomo de Propaganda y Publicidad. Daily 6-11:30 p.m.

6.065 SBO *49.46* Motala, Sweden. (See 11.705 mc.) Daily 1:30-5 p.m.

6.060 W8XAL *49.50* Cincinnati, Ohio. Crosley Radio Corp. Daily 6 a.m.-7 p.m., 10 p.m.-2 a.m.

6.060 W3XAU *49.50* Philadelphia, Pa. (See 9.590 mc.) Daily 8-11 p.m.

6.054.3 HJ6ABR *49.55* Pereira, Caldas, Colombia, S. A. No English. Official March—El Hombre Payaso. C: Overture—Chorus Voices. No signals. Daily 9:30 a.m.-12 noon; 6:15-10 p.m.

6.050 GSA *49.59* ★ Daventry, England. (See 26.100 mc.) Irregular.

6.045 XETW *49.62* Tampico, Mexico. Madero 204—Oriente. S: chimes. O-C: Cavalry March. Weekdays 10 a.m.-10 p.m., Sundays 10 a.m.-4 p.m. No IRC.

6.042.3 HJ1ABG *49.65* Barranquilla. Colombia, S. A. Apartado 674. S: 1 gong with chimes ea. ¼ hr. O-C: National Anthem and "Los Cadetes" March. Daily 11 a.m.-11 p.m.; Sat. to 1 a.m. Sun. 11 a.m.-9 p.m. IRC preferred.

6.040 YDA *49.67* Batavia, Java, N. E. I. (See 15.150 mc.) Daily 7:30 p.m.-2 a.m.

6.040 W4XB *49.67* Miami, Florida. News Tower. 7 p.m.-12 a.m. and variable day hours.

6.040 W1XAL *49.67* Boston, Mass. (See 21.460 mc.) Mon. to Fri., 7-8:45 p.m., Sun. 8-9 p.m. Specials irreg.

6.030 OLR2B *49.75* Prague. Czechoslovakia. (See 21.450 mc.) Mon., Tues., Thurs., Fri., 4:40-5 p.m.

6.030 HP5B *49.75* Panama City, Panama, C. A. P. O. Box 910. English and Spanish O-C: March, Panama. No signals or bells. Daily 11:30 a.m.-1 p.m.; 5-10 p.m.

6.030 VE9CA *49.75* Calgary, Alberta, Canada. Toronto General Trust Bldg. C: Lights Out. S: None. Weekdays 9 a.m.-1 a.m. Thurs. to 2 a.m. Sun. 12 noon-12:30 a.m.

6.020 DJC *49.83* Zeesen, Germany. (See 17.760 mc.) Daily 10:40 a.m.-4:25 p.m.

6.020 XEUW *49.83* Veracruz, Mexico. Av. Independencia 98. S: Marimba. O: March Victoria. C: La Golondrinas. Daily 8 a.m.-12 midnight.

6.015 HI3U *49.88* Santiago de los Caballeros, Dom. Rep., W. I. Apartado 23. O-C: Organ, Marie My Own. Weekdays 7:10-8:40 a.m.; 10:40 a.m.-1:40 p.m.; 4:40-9:40 p.m. Sun. 10:40 a.m.-1:40 p.m. only.

6.015 XEWI *49.88* Mexico, D. F. (See 11.900 mc.) Irregular.

6.013 HJ3ABX *49.89* Bogota, Colombia. S. A. Apartado 26-65. Weekdays 10:30 a.m.-2 p.m.; 5:30-11:30 p.m.; Sundays 12-1:30 p.m.; 6-11 p.m.

6.010 PRA8 *49.92* Recife City, Pernambuco, Brazil, S. A. Avenida Cruz Cabuga N. 394. O: Studio clock strikes hour. National Anthem 4 p.m. C: Rocking song, Cancao de Ninar preceded by National Anthem. 9 p.m. Weekdays, 9 a.m.-12 noon; 1-3 p.m.; 4-9 p.m. Sundays 9 a.m.-12 noon; 3-9 p.m. and later.

6.010 VK9MI *49.92* Sydney. Australia. M. V. Kanimbla. (See 11.710 mc.) Irregular 7-7:30 a.m.

6.010 COCO *49.92* Havana, Cuba. P. O. Box 98. English and Cuban. Daily 8 a.m.-10 p.m.

6.010 CJCX *49.92* Sydney, N. S., Canada. Eastern Broadcasters, Ltd., Radio Bldg. Irregular.

6.010 OLR2A *49.92* Prague, Czechoslovakia. (See 21.450 mc.) Mon., Tues., Thurs., Fri., 4:40-5 p.m.

6.007 ZRH *49.94* Roberts Heights, South Africa. (See ZRJ, 6.097.5 mc.) Weekdays 10 a.m.-4 p.m.; Sat. to 4:45 p.m.; Sundays 10:30 a.m.-12 noon, 12:15-3:15 p.m.

6.007 XYO *49.94* Rangoon, Burma. Burma Independent Wireless. C: God Save the King. Daily 9:10-9:40 a.m.

6.005 HP5K *49.96* Colon, Panama, C. A. P. O. Box 33. S: 3 chimes. each 15 min. O-C: Merry Widow Waltz. Daily exc. Sun. 7-9 a.m.; 11:30 a.m.-1 p.m.; 6-11 p.m. Sun. 10 a.m.-12 a.m.

6.005 CFCX *49.96* Montreal, Que., Canada. P. O. Box 1690. Weekdays 7:44 a.m.-1 a.m. Sundays 9 a.m.-11:15 p.m.

6.005 VE9DN *49.96* Montreal, Que., Canada. (See CFCX. 6.005 mc.) Sat. 11 p.m.-12 a.m. Fall, winter and spring.

6.000 CXA2 *50.00* Montevideo, Uruguay, S. A. Comp. de Radio Publicidad Continental, Juan Carlos Gomez 1431. O: Voluntary Trumpeter. C: Good Night Melody. Daily 10:30 a.m.-10:30 p.m.

6.000 XEBT *50.00* Mexico, D. F. P. O. Box 79-44. I: 3 blasts on cookoo horn. Siren near closing. O: Las Mananitas. C: Liebestraum. Daily 10 a.m.-12:15 a.m.

6.000 HJ1ABC *50.00* Quibdo, Colombia, S.A. Sr. Rafel Valencia Ibanez. Quibdo, Colombia, S.A. O-C: March, Relator S: 2 blows Chinese Gong. Sunday 3-5 p.m. Wed., Sat. 5-6 p.m. Daily 6-9 p.m.

6.000 FIQA *50.00* Tananarive, Madagascar. Director of Posts and Telegraphs. Daily 12:30-12:45 a.m.; 3:30-4:30 a.m.; 10-11 a.m.

6.000 RV59 *50.00* Moscow, U.S.S.R. (See RKI, 15.040 mc.) No. IRC required. Sun., Mon., Fri. 4-5 p.m.

5.977 CS2WD *50.19* Lisbon, Portugal. Rua Capelo, 5. O-C: Our Lady of Fatima. I: none. Daily 2:30-4:30 p.m. Sundays and Thursday 6-7 a.m.

5.970 OAX4P *50.25* Huancayo, Peru, S.A. Cuzco 25. Daily 12-1 p.m., 9 p.m.-12:30 a.m.

5.969 HVJ *50.26* Vatican City. (See 15.121 mc.) 2-2:15 p.m. Sun. 5-5:30 a.m.

5.955 HJN *50.35* Bogota, Colombia, S.A. Minister of Education Nacional. Daily 11 a.m.-2 p.m.; 5-10:30 p.m.

5.940 TG2X *50.51* Guatemala City, Guatemala, C.A. De la Policia Nacional. Daily 4-6 p.m. Mon., Thurs., Sat. 10-11:30 p.m. Sundays 1-2 p.m. No. I.R.C. required.

5.930 YV1RL *50.59* Maracaibo, Venezuela, S.A. P. O. 247. Weekdays 11 a.m.-1 p.m.; 4:30-9:30 p.m. Sun. 8:30 a.m.; 2:30 p.m.

5.929 PJC1 *50.60* Willemstad, Curacao, N.W.I. Curacaosche Radio Vereeniging. O: Electrical gong, 4 strokes and repeat 5 mins. O-C: National anthem. Weekdays 6:36-8:36 p.m. Sun. 10:36 a.m.-12:36 p.m.

5.910 YV4RH *50.76* Valencia. Venezuela, S. A. Daily 8-11:30 p.m.

5.910 HH2S *50.76* Port-au-Prince, Haiti, W.I. (See 11.570 mc.) Daily 7-10 p.m.

5.905 TILS *50.80* San Jose, Costa Rica, C.A. P. O. Box No. 3. S: none. O: Washington and Lee Swing. C: Adios Mi Chapparrita. Weekdays 12-3 p.m.; 6-11 p.m. Sundays irregular.

5.885 HI9B *50.98* Santiago de los Caballeros, Dom. Rep., W.I. P. O. Box 95. O-C: Piano Solo—Vals Evocation. Weekdays 7:25-8:40 a.m.; 11:55 a.m.-2:10 p.m.; 4:55-7:40 p.m. Sundays 11:40 a.m.-2:40 p.m.

5.880 YV3RA *51.02* Barquisimete, Venezuela. (See YV3RB, 9.565 mc.) Daily 11:30 a.m.-12:30 p.m.; 5:30-9:30 p.m.

5.875 HRN *51.11* Tegucigalpa, Honduras, C.A. C: Good Night Melody (Ted Lewis). Daily 7-10 p.m. Veris—10c U. S. cash. Veri slow.

5.865 HI1J *51.15* San Pedro de Macoris, Dom. Rep., W.I. Apartado 204. O-C: Waltz, Sweet Remembrance. English very seldom. S: none. Daily 11:40 a.m.-1:40 p.m.; 5:40-9:40 p.m.

5.850 YV1RB *51.28* Maracaibo, Venezuela, S.A. P. O. Box 37. English and Spanish. O-C: Strike Up the Band. Weekdays 5:30-8:30 a.m.; 10:30 a.m.-1:30 p.m.; 3:30-10:30 p.m. exc. Tues., Thurs., Sat. to 9:30 a.m. Sundays 7:30 a.m.-2 p.m.; 3:30-4:30 p.m.; 5:30-9:30 p.m.

5.830 TIGPH *51.46* San Jose, Costa Rica, C.A. Apartado 800. C: Good Night Melody (Ted Lewis). Weekdays 8-11 p.m.

5.813 TIGPH-2 *51.61* San Jose, Costa Rica, C.A. Apartado 800. C: Good Night Melody. Daily 7-11 p.m.

5.800 YV5RC *51.72* Caracas, Venezuela, S.A. P. O. Box 2009. I: 4 chimes. O-C: Official IBC March. Bugles, whistles before closing. S: 4 chimes, ea. 15 mins. Sundays 8:30-11:30 a.m., 3:30-9:30 p.m. Weekdays 7-8 a.m., 10:30 a.m.-1:30 p.m., 3:45-10:30 p.m.

5.800 ZEC *51.72* Salisbury, Rhodesia, South Africa. P. O. Box 792. Sun., 3-5 a.m.; Tues. and Fri. 1:15-3:15 p.m.

5.780 OAX4D *51.90* Lima, Peru, S.A. All American Cables, Ltd., Casilla 2336. Signs on and off Morse code. No signals. English and Spanish. Wed., Sat. 9-11:30 p.m.

5.758 YNOP *52.10* Managua, Nicaragua, C. A. Radio Bayer. Weekdays 8:30-10:30 p.m. Veri—5c U. S. postage.

5.755 YV2RA *52.13* San Cristobal, Venezuela. Apartado 37. English occasional and at closing. S: 6 strokes gong. O-C: March, El Capitan. Weekdays 11:30 a.m.-12:30 p.m.; 5:30-9 p.m. Sun. 5:30-10 p.m.

5.725 HC1PM *52.40* Quito, Ecuador, S. A. P. O. Box 664. O-C: La Marcha de Aida. Saturdays 9-11 p.m.

5.713 TGS *52.51* Guatemala City, Guatemala, C. A. Casa de Presidencial. Sun., Wed., Fri., 6-8 p.m. No IRC necessary.

5.146 PMY *58.30* Bandoeng, Java, N. E. I. Bandoeng Radio Society, Nillmy Bldg. O: March, Le Rene Passe. C: On chimes, Good Night and National Anthem. Sun. 6:30 p.m.-1:30 a.m., 4-10:30 a.m. Mon. to Fri., 5:30 p.m.-2:30 a.m., 4-10:30 a.m. Sat., 5:30 p.m.-2 a.m., 4-11:30 a.m.

5.145 OK1MPT *58.30* Prague, Czechoslovakia. (See 21.450 mc.) Wed. and Sat. 5:15-5:30 p.m.

4.900 HJ3ABH *61.22* Bogota, Colombia, S. A. Apartado 565. I: 3 chime notes. Weekdays 11:30 a.m.-2 p.m., 6-11 p.m. Sunday 12——p.m., 4-11 p.m.

4.880 HJ4ABP *61.48* Medellin, Colombia, S. A. Emisora Claridad. Daily 8 a.m.-11 p.m.

4.860 HJ1ABE *61.73* Cartagena, Colombia, S. A. Apartado 31. O: Organ—Song of the Islands. English each hour clock strikes the hour. C: Alohe Oe. Weekdays 7 a.m.-1:45 p.m., 4-11:30 p.m. Sundays, 9 a.m.-3 p.m.

4.841 HJ3ABD *61.97* Bogota, Colombia, S. A. Apartado 509. O: Pari Ti Rio Rita. C: Rio Rita and National Anthem. Weekdays 9 a.m.-2 p.m., 6 p.m.-12 a.m., Tues. and Thurs. to 3 p.m. Wed. and Fri. begin 5:30 p.m.

4.820 HJ7ABB *62.24* Bucaramanga, Colombia, S. A. Santander Broadcasting. P. O. Box 37. Daily 6-10:30 p.m.

4.790 HJ2ABC *62.63* Cucuta, Colombia, S. A. Sr. Pompilio Sanchez, Prop. Daily 11 a.m.-12 noon, 6:30-9 p.m.

4.780 HJ1ABB *62.76* Barranquilla, Colombia, S. A. Apartado 715. I: 3 chimes. S: 1 chime between advertisements. C: La Golondrina 7-9 a.m., 11-1 p.m., 5:30-10 p.m.

4.740 HJ6ABQ *63.29* Ibague, Colombia, S. A. Daily 6-11 p.m.

4.660 HJ2ABJ *64.38* Santa Marta. Colombia, S. A. Daily 11:30 a.m.-2 p.m.; 5:30-10:30 p.m.

4.600 HC2ET *65.22* Guayaquil, Ecuador, S. A. P. O. Box 824. I: 12 chimes. Wed. and Sat. 9:15-10:45 p.m. Veri—5c U. S. postage.

4.273 RV15 *70.21* Khabarovsk, U.S.S.R. Radio Committee. English, 2 a.m., EST and at announcements. Daily exc. 6th, 12-18-24-30th 3 p.m.-8 a.m. On 6-12-18-24-30th 7:10 p.m.-8 a.m. English programs start at 2 a.m. No IRC necessary.

4.107 HCJB-2 *73.05* Quito, Ecuador, S. A. (See 8.831 mc.)

4.002 CT2AJ *75.00* Ponta Delgada, Island of St. Michael, Azores. Wed. and Sat., 5-7 p.m.

3.040 YDA *93.68* Batavia, Java, N. E. I. (See 15.150 mc.) Weekdays 4:30-10:30 a.m. (Sat. 11:30 a.m.) 6-7:30 p.m., 10:30 p.m.-2 a.m. Sun. 4:30-10:30 a.m., 7:30 p.m.-2 a.m.

## NIGHT-OWL HOOTS

*(Continued from page 250)*

to its present owners, the Evangelical Lutheran Church, by the Lutheran Layman's League as an outright gift.

Recent World Radio Markets bulletin of the Dept. of Commerce states that the one broadcasting station in the free city of Danzig operates on 1303 kc. with 500 watts. Schedule is from 6 a.m. to midnight local time. "Bob" Wilson who hears this station at regular intervals can't believe they are using only 500 watts . . . JOAK, Tokyo, now using 150,000 watts and is the highest-powered station in the Orient.

Latest veries rec'd: KGU, a government post card printed in ordinary black type with ¼" letters for call. A multi-colored seal bearing the words Aloha from Hawaii is affixed to the upper left corner of the card . . . WDEL also a gov't card with typed message. The card is also marked "Reception Verified —WDEL" with an impression stamp. . . . Letter veries from Bordeaux and Rennes, the latter containing a picture post card showing the studio building. . . . Picture post card view of the Cabana Fortress in colors from CMBZ—with call in red on back of card . . . OAX4A card printed on two sides with no call letters outstanding. OAX4Z and OAX4T, the short wavers, are also shown and no distinction is made as to which station was reported.

### *Cheers and Jeers*

Before casting any jeers, we might offer a little explanation, so that they will not be misunderstood. By jeering the F.C.C. this month on facsimile broadcasting grants, we're not going to let anyone accuse us of any radical tactics. Our opposition is not relative to facsimile broadcasting, but to the use of broadcast-band channels after midnight for the purpose. At the present time, several owners of standard broadcast stations are licensed to operate facsimile transmitters, among them being such prominent stations as KFBK, KMJ, KSD, KSTP, WGH, WGN, WHK, WHO, WOR, and WSM—with plenty more to come later! In the case of the clear-channel stations, very few other stations can suffer from the broadcasts, but some of the stations are located on channels in use by other broadcasters and such transmissions will prevent any after midnight tests by other stations. It seems that there are plenty of available frequencies in the short-wave spectrum, which could and should be used for facsimile transmission, without utilizing the already overcrowded broadcast band.

# ON THE MARKET

### NEW UTAH SPEAKERS

TWO NEW 3½" speakers have been announced by Utah; one p.m. Dynamic and one Electrodynamic. Utah claims vast improvement in the performance of these


small speakers; among them are the proportioning of the generated harmonics in the cone surface to enable these small speakers to produce exceptional tone quality.

The announced specifications are as follows: The Electrodynamic Speaker—Field coil, 450 ohms; voice coil, 3½ ohms; output 5 watts; frequency range, 200 to 8000 cycles.

The Permanent Magnetic Dynamic Speaker—The permanent magnet is designed to give a flux density in the air gap that gives this speaker practically the same performance as the electrodynamic with a saving of from 3 to 6 watts current consumption. ALL-WAVE RADIO.

◆

### NEW MARION METERS

MARION ELECTRICAL Instrument Company, Manchester, New Hampshire, announce the release of a new line of ultra-fine meters, popularly priced. All meters feature a D'Arsonval movement of 2% accuracy or


better, large clear reading scales, ample torque to allow use in any position, balanced and calibrated for such use with no loss of accuracy.

Magnets are aged both naturally and artificially to insure maximum stability. The pivots are the finest obtainable, set in high-grade sapphire jewels, eliminating all possible friction in the movement. Completely sealed against dust.

One-milliampere meter movements regularly supplied with 50-millivolt drop within 2%. Can also be furnished with any millivolt drop from 50 up. Meter illustrated is the model 54-S with overall dimensions of 4⅝ inches x 4 3/16 inches, set in bakelite case. Barrel diameter 2 45/64 of an inch, barrel depth 1 inch.

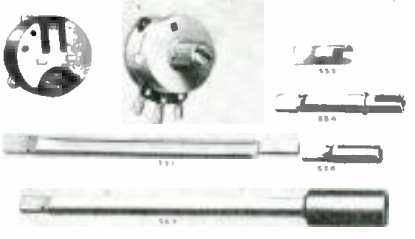
Literature available on request to factory or New York office of P. W. Mack, 1270 Broadway. ALL-WAVE RADIO.

◆

### MALLORY-YAXLEY MIDGET VOLUME CONTROLS

MALLORY-YAXLEY announces a new line of Midget Volume Controls—plain, single tap, double tap and duals—available in resistance values from 5,000 ohms to 3 megohms inclusive and in all necessary tapers.

They have flexibility—adaptability—universality—and attachable switches where necessary. A feature of this new development is a line of 17 Plug-in Shafts (Pat. applied for) which give the 56 controls a range of over 1000 exact replacements!



A special or exact replacement is made by merely plugging in the required type of shaft. A small stock of the new controls and shafts assures the serviceman of a replacement for almost any midget—and for a few of the old large style controls (where little or no current is to be carried by the control).

Complete information is available from any Mallory-Yaxley Distributor. ALL-WAVE RADIO.

◆

### ALADDIN PBH TUNER

THE ALADDIN PBH tuner is an automatic device designed for a superheterodyne receiver with an intermediate frequency of 456-465 kc. This unit consists of two circuits—antenna and oscillator, adjustments being made from the front and both circuits being tuned simultaneously by a single adjustment.

The antenna stage is a high-impedance, inductively coupled primary type and provides a gain of from 2.5 to 5 across the broadcast band.

The oscillator is a modified Colpitts design for use with a pentagrid converter, 6A8-6A7, or a separate triode oscillator such as a 6C5 in conjunction with a 6L7, supplying 14-18 volts across a 50,000-ohm grid leak. Inductance padding is provided which permits 3-point alignment cross-over over the band.

Alignment of the Aladdin PBH tuner can be made by the average layman with an ordinary small screw driver. It is sug-

gested that means for switching from manual to automatic tuning be placed on the wave-band switch in order not to affect the tuning range of the receiver on conventional broadcast or short-wave reception.

The unit has 6 buttons and provides band coverage as follows:

Buttons 1 and 2—1630-945 kc.
Buttons 3-4-5-6—1070-540 kc.

In tests made for stability on the PBH tuner, the device exhibited a maximum drift of 5.9 kc. negative for a 35° C. rise from room temperature. This drift was linear with temperature change and provided recurring values. It is, therefore, suggested that stations selected be aligned when the receiver has attained its operating temperature to overcome any stability problem. ALL-WAVE RADIO.

◆

### SOLAR TRANSMICA CAPACITORS

HERE IS ILLUSTRATED the high voltage, heavy current-carrying Transmica line of mica dielectric transmitting capacitors engineered by Solar Mfg. Corp., 599 Broadway, N. Y. City.

Like the Solarex and Transoil lines, Transmica units are tested individually for highest efficiency.

Remarkably stable, due to special solar clamp construction. Clamp, anchored into case, eliminates hum. Hermetically sealed glazed porcelain case.

Full specifications may be had by writing to this manufacturer. ALL-WAVE RADIO.

### IRC SILENT SPIRAL CONNECTOR

DUE TO THE popularity of the Silent Spiral Connector which eliminates metal-to-metal sliding contact, this feature has now been added to all IRC Metallized Type Controls sold through the jobbing trade. This exclusive IRC feature was available formerly only on special replacement controls.

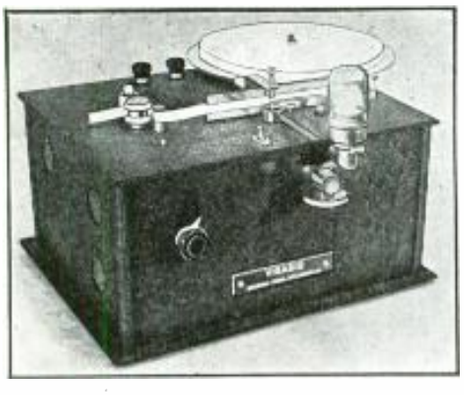
By providing continuous electrical connection by means of a spiral coil spring between center terminal and volume adjustment arm, the IRC Silent Spiral Connector does away with one of the most common causes of noise in ordinary controls after they have been in service a while. Combined with the IRC 5-Finger Silent Element Contactor it provides double assurance of controls that are permanently quiet and trouble-free. ALL-WAVE RADIO.

◆

### NEW VISASIG RECORDER

FROM UNIVERSAL Signal Appliances, 64 West 22nd St., New York City, comes announcement of a greatly improved Visasig model, No. V-5, to sell at no higher price than heretofore.

Recording words effectively at a speed up to 200 wpm, the new Visasig has audio-frequency band-pass filter to allow recording through interference; low-pass filter for weak signals when noise level is high; both filters switch-controlled.



One smart aluminum cabinet, finished with heavy black crackled baked enamel, contains the recorder, amplifier, rectifier, filters, tape-puller and reel.

Complete literature on this new model may be had by writing the company at the above address. ALL-WAVE RADIO.

### JEFFERSON D.C. AMPLIFIER

THE MOST RECENT amplifier development of the Jefferson Electric Company, Bellwood, Ill., utilizes "25L6" metal tubes to develop 10 watts of audio power,—and is for connection to 115-volt direct current electric systems. This makes it possible to make use of a p.a. amplifier in those sections of cities where only direct current is available as a source of power and eliminates the need for a converter. One output, one driver, and one hum-free push-pull input transformer are used with one filter and one plate choke.

The extremely high gain of 139 decibels is attained with perfect stability of operation. It is possible to use microphones of the lowest output levels such as the velocity and condenser types, which swing the amplifier to full output of 10 watts. Chassis of heavy welded steel finished in black baked crystal enamel are available with or without socket and transformer mounting holes. Bulletin PA-15 describes all parts and includes complete circuit diagram. ALL-WAVE RADIO.

◆

### TINY METAL-CAN ELECTROLYTICS

A NEW METAL-CAN electrolytic with insulating jacket and of extremely compact dimensions is announced by Aerovox Corporation, 70 Washington St., Brooklyn, N. Y.


The Dandee condenser is available in capacities of 4, 8, 12, 16, 24, 30 and 40 mfd., and in working voltages of 100, 250, 350 and 450. Both capacities and working voltages are full values.

Despite its diminutive size, the Dandee is a full-fledged metal-can hermetically-sealed electrolytic, electrically and mechanically protected by a strong paper jacket. The 3½-inch tinned pigtail leads provide for connections and support the unit. The edges of the protective tubing are spun over the ends of the metal can so that the leads, even when bent at right angles close to the unit, cannot short. Polarity is clearly indicated by the red sealing disk at one end and black at the other. ALL-WAVE RADIO.

◆

### NEW RCA CATHODE-RAY TUBE

RCA IS MAKING available through their transmitting-tube distributors a new RCA Low-Voltage Cathode-Ray Tube of the high-vacuum, electrostatic deflection type. This new tube, designated as RCA-902, will be of interest to the radio engineer, serviceman, amateur, and experimental laboratory.

The 902 is small in size, has a 2-inch diameter fluorescent viewing screen, and operates with an anode No. 2 voltage as low as 400 volts and as high as 600 volts. It is provided with two sets of electrostatic plates for deflection of the electron beam. The brilliant luminous spot produced by this new tube has a greenish hue. The 902 is electrically interchangeable with the RCA-913, provided the anode No. 2 supply is 400 volts or more.


Because of its relatively low cost, small size, and its ability to produce a bright image at low voltages, the 902 is especially suited for use in portable oscillographic equipment. ALL-WAVE RADIO.

◆

### NEW LIFETIME MIKES

THE LIFETIME Corp., 1010 Madison Ave., Toledo, Ohio, announce the development of two new types of velocity microphones. Model 20 is equipped with 15 feet of low-loss cable, and Model 80, with a higher level, is equipped with 25 feet of low-loss cable with detachable plug.


According to the manufacturer, an entirely new structural feature prevents accentuation of bass response when working very close to the mike. The directional characteristics of these microphones are said to reduce feedback to a minimum, allow radically higher gain and decrease extraneous noise in installations where the unit must be used in close proximity to the speakers. ALL-WAVE RADIO.

◆

### NEW SHURE HAND MIKES

A SERIES OF new Carbon and Crystal "Military-Type" Hand Microphones, completely functional in character and modern in appearance, has been announced by Shure Brothers, 225 W. Huron Street, Chicago, Ill.

One of the outstanding features of the new microphone is the entirely new case design which not only eliminates the conventional handle, but makes the microphone fit naturally and conveniently in the palm of the hand, thus providing a new ease in handling and operating.

The "Military-Type" microphone is small, light and compact. May easily be

slipped into the pocket when not in use. It is especially advantageous in portable equipment because of the small storage space and simplified handling it requires.

An improved spring-lever type positive-action switch (which operates both "press-to-talk" and On-Off) is optional. Relay contacts can be furnished.

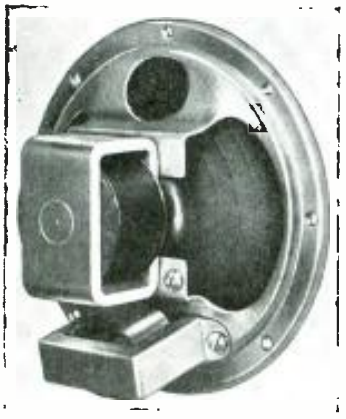
In addition to the standard units, Shure "Military-Type" Hand Microphones are also available in new anti-noise "close-talking" models based on a new design principle which makes possible true high intelligibility close-talking performance with practically complete elimination of background noise.

All models are finished in attractive black morocco-grain with bright polished modern grille. ALL-WAVE RADIO.

◆

### JENSEN SERIES "S" SPEAKERS

WITH THE INTENTION of more nearly meeting the demands for replacement speakers in radio servicing, Jensen has just announced a new line of speakers featuring high quality with low cost. These speakers



are being manufactured now in 5, 6 and 8-inch sizes. They are compact and light, yet ruggedly built. All are offered with adjustable impedance transformers or fixed impedance transformers and are available with an assortment of field coils.

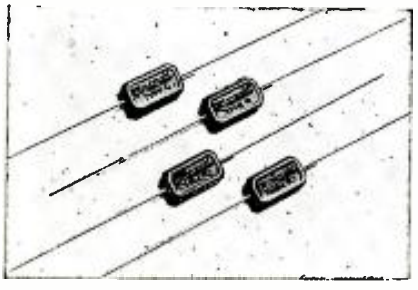
Full descriptive literature available on request from the Jensen Radio Manufacturing Company, 6601 South Laramie Avenue, Chicago, Ill. ALL-WAVE RADIO.

◆

### MICAMOLD TYPE GL CONDENSER

THE MICAMOLD Radio Corporation now offers what is said to be the smallest condenser manufactured—1/2"x1/4"x3/16". It is a mica condenser molded in bakelite.

The condenser section is made up of metal plates that are integral with the



lead terminals and mica films. The assembly is rigidly clamped in a steel channel. The new unit has an excellent "Q" factor and the capacity is very stable under working conditions.

The type GL condenser is easily assembled in limited spaces where the conventional types cannot be used. It is ideal for tuning and coupling purposes on compact coil assemblies.

Any capacity from 2.5 mmfd. to 50 mmfd. can be supplied with a minimum tolerance of plus or minus 1 mmfd. ALL-WAVE RADIO.

◆

### SOLAR MINICAP TUBULARS

THREE YEARS AGO Solar introduced "little giant" dry electrolytic condensers, made possible by the etching of aluminum foil. They were much smaller in size than earlier types and have contributed much toward size reduction of radio sets and lower costs.

Now Solar announces another engineering advance, a dry electrolytic condenser, the Minicap tubular, startling in further size reduction, in simplification, and in price: 1. Radically smaller size. 2. In single values only, obviating all dangers of inter-coupling or inner-leakage between sections. 3. Hermetically sealed in metal cans, they will last for years. 4. Being in tubular form, they are susceptible to easy mounting, singly or in multiple. 5. Electrical characteristics are as good or better than with larger types. 6. Makes possible the economies of standardization and interchangeability between radio sets. 7. Simplifies servicing and replacement stocks. 8. Lower prices.

The advanced features of this new Minicap tubular have been subjected to tests extending over a year and a half, it is said.

To gain the advantages of standardization, Solar has adopted 23 different stock sizes, comprising all commonly required


capacities in 4 different working voltage ratings; namely, 100 volts, 150 volts, 300 volts, and 450 volts. These have been available for some time for manufacturers' use. They are now also made available for service work. ALL-WAVE RADIO.

◆

### PLUG-IN TYPE NOISE FILTER

TO MEET THE steadily growing demand for a plug-in type radio noise filter, Sprague Products Company, North Adams, Mass., has introduced a new unit having a number of important features. Tests have proved it to be unusually effective in reducing radio interference caused by electric razors, heating pads, hair dryers, and practically all fractional horsepower electrical motor or vibration devices commonly used in homes or business houses.

Made in convenient round size, 2" long by 1 7/16" diameter, the new Sprague filter can be plugged into any socket conveniently —even in double wall receptacles where the larger size of old style square or oblong filters sometimes interfered with use of the second socket.


Equally important, the Sprague unit has male prongs of a new and longer type, assuring excellent contact at all times. The female socket at the opposite end is also devised for sturdy contact that will not wear loose.

The filter is designed either for installation directly at the power line outlet of the radio receiver so that no interference will enter the line cord and be radiated to the set or antenna system; or at the power outlet to which the noise-making electrical appliance is to be attached. ALL-WAVE RADIO.

◆

### A DEMAGNETIZER

THE NEED FOR a cheap instrument which can be used whenever needed to demagnetize tools and various iron pieces has been apparent for some time.


The American Communications Corporation has announced their new American Demagnetizer which is very effective in eliminating this condition. It can be used on watches, tools, testing equipment, and many other devices. It can also be used for producing a very powerful alternating current field for test purposes. ALL-WAVE RADIO.

(*Continued on page 279*)

## 5-METER PORTABLE

(Continued from page 239)

with this particular rig. Still another switch shifts the receiver output from speaker to headphones.

In addition to the five toggles, there are also three jacks on the front panel. One is a three-pole type which allows the use of a combination handset as well as regular microphone. A second is for headphones, and the last takes a key for i.c.w. work.

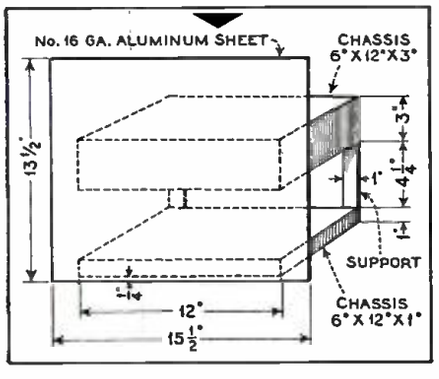
The i.c.w. tone is secured by causing a regenerative howl through feeding back voltage from modulator to microphone transformer. Mike voltage, incidentally, comes through a voltage drop in the cathode resistor of the modulator.

A single 0-100 milliammeter in the middle of the panel measures the oscillator plate current, normally in the neighborhood of 60 mils while under load.

The coils for transmitter and receiver are air wound to half inch diameter with 14 gauge wire and mounted on small, plug-in micalex strips, enabling venturesome souls to try their hand at either 10 meters or the more mysterious regions of 110 megacycles, should they wish. There is no reason why both units cannot operate with excellent efficiency on the even higher frequencies.

Two knurled nuts on either side of the panel permit easy and instant removal from the case for adjustments and inspection. With transmitter and receiver both in operation during duplex work, the total storage battery drain is approximately 14 amperes. During the past summer of continuous use in an automobile, no difficulty was experienced and it was found unnecessary to advance the charging rate of the car generator.

A single suppressor in the coil lead of the car ignition system eliminated all interference from that source and QSO's have been maintained consistently, with the vehicle in motion through city streets, over distances of five to ten miles.




***Constructional details of the panel and chassis for the 5-meter transmitter-receiver.***

In favorable locations communication up to 75 miles has been established with good reception of signals on both ends.

### *Antenna Set-Ups*

A variety of antenna set-ups may be used to secure highly satisfactory results. For portable, yet stationary, transmissions, a "Q" type aluminum rod radiator with 500-ohm spaced feeder is excellent. Banana plugs at the end of this line allow easy attachment to the jacks in the side of the carrying case. The mobile antenna consists of two 45-inch door hinge type rods on either side of the car, fed with twisted 16 gauge rubber-covered transmission line.

A little adjustment and experimentation in circuit constants will pay sizable dividends in performance, for this rig, compact and small as it may be, proves a little giant in action, maintaining satisfactory communication over far greater distances than the average portable equipment of the transceiver type. The cost of parts needed to construct the entire set should not exceed $40.

Afloat, in your car or even among the clouds, portable-mobile work on 5 meters means many hours of the most enjoyable QSO's. Spring and the summer months, when the moble gang swings into action throughout every metropolitan area, are not far away. Whether you prefer to work the brother Ham around the block who has a unity coupled 19, or climb to the pinnacle of the highest mountain for 5-meter DX, you'll find this unit versatile, efficient and ready to achieve whatever you ask of it.

## TEMCO XMTTR

(Continued from page 255)

possible leads, the shaft of the switch being at right angles to the panel.

The amplifier stage is particularly efficient in layout and operation. One of the recently announced Taylor T-40's is used. This tube is rated at 1000 volts and 115 ma. for maximum input. With only 750 volts on the plate the tube loafs along at but 75% of its maximum ratings. This assures long life for the tube.

A standard split-stator, plate-neutralized circuit is employed. The low internal capacities of the T-40 permit fixed neutralization on all bands. The coils in this stage must be changed for each band. As the plate coil of the T-40 is the only one to be changed in going from band to band this is, however, no particular hardship. Standard coils are employed for all five bands. These are split at the center to permit the insertion of a variable antenna coupling link, L6. This link is swiveled to the

coil mounting base so that the T-40 may be loaded to the exact desired degree.

Switch SW3 throws the meter M from the grid to the plate circuits of the T-40. The knob for this switch is at the lower right of the panel, with the T-40 plate condenser dial above and the plate circuit pilot light, P1, above the dial. Due to the ingenious design of the switches, no current is broken when they are turned with the transmitter in operation. This precludes arcing of any of the contacts, and also prevents either the 6L6 or the 807 from operating with screen voltage but no plate voltage, a procedure detrimental to the tubes. Meter M also serves, indirectly, for tuning indication of the 807, resonance of the 807 plate condenser C9 being indicated by maximum reading of the meter. The 807 may be tuned by itself by removing the plate cap from the T-40 and placing SW3 in its "Grid" position.

The single power supply for the r.f. unit furnishes 750 volts under load. A two-section, choke-input filter furnishes adequate regulation and filtering. A pair of 866 rectifier tubes easily handle the current and voltage requirements. The filter condensers, C16 and C17, are of the high-voltage, oil-filled type, assuring adequate protection from breakdown.

As all filament and heater voltages are taken from the single plate transformer, T, it is necessary to open the d.c. circuit to take plate voltage off the tubes. This is accomplished with the plate switch, SW4, which opens the center-tap-to-ground lead. This effectively removes all voltage, even from the filter chokes and condensers. As the power supply in the modulator unit also has a combined plate and filament transformer the center tap of the latter transformer also is opened by plate switch SW4.

The r.f. and modulator units are interconnected with a single 6-wire cable. Wires 1 and 6 bring the 110-volt a.c. down to the modulator unit. Wire 4 is the common ground. Wires 2 and 5 open the high-voltage lead to the T-40 plate coil so that this voltage will run through the secondary of the modulation transformer. When the r.f. unit is used by itself a dummy plug with a jumper between prongs 2 and 5 is inserted into the socket on the rear of the unit. This will close the high-voltage circuit to the T-40.

### *The Modulator Unit*

The input tube of the audio system—see Fig. 2—is a metal 6J7, pentode connected for high voltage gain. An interesting feature is the very complete shielding employed for the microphone-to-grid input circuit. The microphone jack is mounted at the left of the panel. It supports a small round shield can which completely encloses the microphone jack, J1, and the grid resistor R8. A short shielded grid lead runs from this shield to the grid cap, which is further shielded by a metal tube type of shield. This completely shielded input circuit, when used with a shielded microphone cord and plug prevents any hum or r.f. pickup in this circuit. The fact that the gain control can be opened fully with no trace of feedback indicates the effectiveness of the shielding.

The microphone jack is of the closed-circuit type. This grounds the grid of the 6J7 when the microphone plug is removed, thereby preventing any trouble which might be caused by an open grid input circuit. This is a handy kink which might well be used in other transmitters.

The second tube in the audio lineup is a 6C8G. This is a dual high-mu triode with separate cathodes for each section. As the 6L6G's running under class AB1 conditions require no grid drive, it is permissible to drive them directly from the phase-inverter stage. This general design, coupled with the use of a high-impedance microphone eliminates all audio transformers from the modulator

*(Continued on page 272)*

# *Listen* Radio Servicemen!

FOR a long time there had been a real need for a Radio Servicemen's Organization that could band together the competent radio servicemen in a democratic, self-governing association without subsidy from or control by any other division of the radio industry.

Radio Servicemen of America, Inc., has this as its prime objective.

But to achieve this end and win a place for the service group as a recognized factor in this complex industry, four things are necessary:

**A.** THE selection of only qualified members.

**B.** A direct voice in the affairs of the association by every individual through elected, regional representatives.

**C.** THE insistence upon rigid ethical professional standards that will earn a right to the confidence and cooperation of manufacturers and publishers.

**D.** A quality of service that will earn the respect and patronage of the public.

**These objectives are assured in the newly completed plan of Radio Servicemen of America, Inc. HERE'S WHY!**

1. There are 20 districts, each of which is represented by elected representatives, for all the affiliated chapters in that district.
2. Qualifications for membership are determined by local chapters.
3. Local membership in a local chapter where such local chapters exist, is necessary to full membership in the national organization.
4. Quality, *not* quantity is the membership aim.

- **BUT SERVICE TO ITS OWN MEMBERSHIP IS a *Big Personal Reason* WHY YOU SHOULD HAVE A MEMBERSHIP IN**

**Radio Servicemen of America, Inc.**

Regular mailings of advance information on new circuits . . . A monthly house organ, exclusively for members . . . A publicity program in newspapers, trade publications and on the air . . . Free, expert technical information . . . A National Speakers' Bureau to provide authoritative speakers for local chapters . . . An educational program in the interest of better servicing . . . Membership costs only *$2.00 A YEAR* for national dues for 1938.

**Don't Wait!** Fill out the application. We will send you full details of the organization, more application blanks . . . everything you need to join this new and important effort to organize servicemen for better servicing and more profit. Mail the blank today with your check to—

**Radio Servicemen of America, Inc.**
**Joe Marty, Jr., Executive Secretary**
**304 S. Dearborn Street** **Chicago**

***Sponsored by RMA and Sales Managers Clubs***

***Radio Servicemen of America, Inc.***
***(Incorporated Not for Profit)***
304 South Dearborn St., Chicago, Ill.

**APPLICATION FOR MEMBERSHIP**

Gentlemen:

I hereby make application for membership in the Radio Servicemen of America, Inc.

Affiliated with Local Chapter in .....
Personal Name .....
Home Address .....
City ..... State .....
Firm Name .....
Address .....
Telephone (home) ..... (firm) .....
Years Experience ..... Age .....
Membership in other Associations .....
Whole or Part Time Radio Serviceman .....
If Part Time, what portion is devoted to Radio Servicing
(¼, ½, ⅔, etc.) .....
What are your other duties .....
Education other than Radio .....
Radio Training or Courses .....
Testing Equipment .....
.....
.....

It is my sincere desire to become a member and adhere to your principles of fair competition and ethics and if accepted do solemnly swear (or affirm) that I will faithfully fulfill my obligation as a member of the Radio Servicemen of America, Inc.

Signed .....
Applicant

Approved: Chapter Secretary .....

Executive Secretary .....

Enclosed—Check ☐ M. O. ☐ Cash ☐

except for the modulation output transformer. This effects a saving in both cost and weight.

As the 6L6G modulator is of the Class AB1 type no special precautions are necessary for stabilization of any of the voltages applied to it. Cathode resistor R21 self-biases the tubes. Screen voltage is obtained from a simple bleeder system consisting of R23 and R24. This places 315 volts on the screens, the plates running at 410 volts (these voltages being reduced by the amount of the cathode resistor drop).

The power supply employs a 5Z3 rectifier tube, eliminating any possible mercury vapor hash. Interstage filtering prevents interaction between the stages. R23 and C29 isolate and filter the screens of the 6L6Gs from their plates. The plates of the 6C8G are isolated and filtered by R22 and C23. A further isolating filter for the 6J7 plate is provided by R12 and C30. These various filter sections are arranged in progressive order so that the 6J7 and 6C8G each have three-section filtering of their voltage circuits.

Meter M1 reads the plate current of the 6L6Gs. As this current increases under modulation, the degree of modulation may be estimated from this meter. This is convenient in preventing overmodulation.

A toggle switch SW6 turns off the entire modulator unit when c.w. operation is desired. This switch is mounted at the right of the panel and is marked "Fone-C.W."

The knob below the meter is for the gain control, R13. This is the most effective position in the tube line-up for this control. The diagram indicates that the 6C8G and its grid lead to the gain control are shielded. This is in line with the complete shielding of the input circuit to the 6J7.

### *Operation*

The transmitter was air tested at an amateur station located within a few miles of New York City. Before being placed on the air the output was checked with a dummy load on the various bands covered by the transmitter. A standard 60-watt bulb was connected across the output posts, the load on the T-40 being varied by means of the movable antenna link coil. With the tube loaded to its maximum of 115 ma. the actual plate voltage was 760 volts, an input of 87.4 watts. The bulb lit to full brilliancy on all bands. As this degree of brilliancy was only estimated by eye the exact output could not be accurately measured, but was at least 60 watts. This represents an efficiency in the final stage of over 70 per cent. This output was obtained on 10 meters as well as the other bands, indicating no drop in efficiency on this high-frequency band, a common fault in many transmitters.

The excitation to the T-40 was ample even on 10 meters, the grid current of the tube running from 20 to 25 ma., depending on which 20-meter crystal was employed. The T-40 could be over-excited on the other bands, the excitation control on the panel being used to bring it down to a normal value.

The outstanding fact of note found when testing the transmitter was the high degree of smoothness encountered in tuning up. With the proper crystal in the oscillator stage and coil in the final stage it was only necessary to set the two band switches to their marked positions and swing the dials. Tuning of the entire r.f. section could be accomplished in a matter of seconds, with no fear of operation on the wrong frequency. The fact that the T-40 remained perfectly neutralized on all bands with the original factory setting contributed to this ease of tuning. The antenna load on the T-40 could be set exactly by adjusting the antenna link.

As 10 meters is the most difficult band to get a multi-band transmitter "perking" properly on, this band was selected for the actual air tests. The test period extended through both the c.w. and phone periods of the annual A.R.R.L. DX Contest, affording an excellent opportunity for determining the worth of this little transmitter. The regular transmitter in use was the "AWR Commercial," employing a T-55 in the final stage running at an input about double that of the T-40. The two transmitters were alternated in working stations. In a check-up of stations worked on both the transmitters, and signal strength reports received, it was found that no appreciable difference in results, one way or the other, could be noted. A large number of foreign stations in all continents but Asia were worked, with signal strengths ranging all the way up to QSA5-R9.

For the phone period of the DX Contest a standard D-104 type of crystal microphone was pressed into service. 100% modulation of the full 60-watt carrier could be obtained with the gain control only half-way open. This excess gain permitted effective phone operation when talking in a low tone of voice several inches from the microphone. This aided greatly in putting across the natural sound of the speaker's voice. The large number of foreign contacts on phone attested to the "carrying" power of a really good phone signal, even though the carrier power was "low" as reckoned by the high-power phone boys.

## CHEAP MODULATOR

(*Continued from page 235*)

Such operation is one of the reasons why the cost of construction per watt of output power is so low. It may be argued

that the tube life would be considerably shortened under such operation. This has not turned out to be the case. The transmitter in which this system is used has been operating well over a year without trouble of any sort in the modulator-r.f. amplifier section.

Because of the arrangement and equipment employed, and the driving of each item to full capacity, the cost of the system is a fraction of the cost of regular Class B equipment capable of delivering an equal amount of power. The distortion produced by the modifications discussed here seems to be very low, and so the results are most gratifying. The writer now finds on his hands an excess of audio power, so that he can *overmodulate* 100% (if he should ever desire to do such a thing) the 70 watts input to the r.f. amplifier.

## KC. QUINTUPLER

(*Continued from page 237*)

ing a maximum capacity of anything between 35 and 150 mmfd.

The circuit of a satisfactory absorption-type meter is shown in Fig. 5. Extreme accuracy is not necessary. All that is desired is to determine roughly the location of the amateur bands. Calibration can be made from the receiver.

An easy method of calibrating is to couple the wavemeter to the receiver aerial, as shown in Fig. 6. The wavemeter, when tuned to the frequency of a received signal, will act much as a wave trap.

The wavemeter will be invaluable in adjusting the various coils in any transmitter where frequency doubling is used. Where the method of using one coil for two amateur bands is used, the frequency-multiplier stage will probably show three distinct resonance points, all with about the same output. The wavemeter will quickly show just which ones to use.

With the care due any transmitter in construction and use, this unit has presented fewer problems and given less trouble than any other tried. The arrangement has been used by W4DSY for nearly a year, and has performed admirably.

The writer would be pleased to receive comments from those who construct this exciter. Address S. T. Carter, Radio Station WSOC, Mecklenburg Hotel, Charlotte, North Carolina. Any inquiries will be answered where postage for a reply is enclosed.

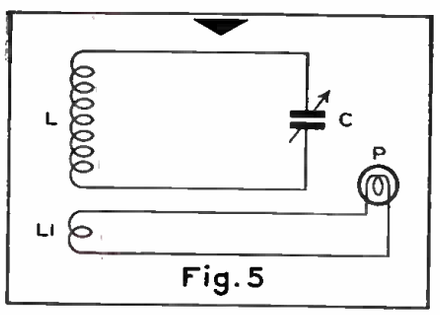


Fig. 5

*Circuit of wavemeter. L and C to suit frequency. L1, single turn spaced ¼" from L. L and L1 wound on 4-prong plug-in forms. P is a pilot light.*

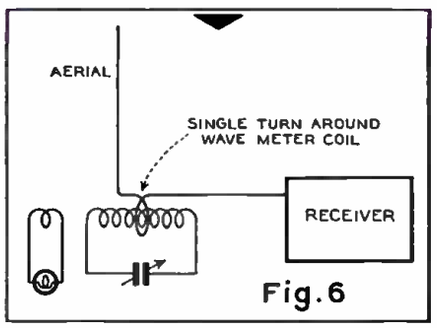


Fig. 6

*Showing manner of calibrating the absorption type wavemeter.*

## CHANNEL ECHOES

(*Continued from page 247*)

studio, control room, station, with operators, engineers, commentators and announcers—during the first broadcast of presidential election returns.

Ducking over-ripe tomatoes and rotten eggs from several hundred runners up, we give the free sub to Stanley Brus, 1441 Bell Avenue, North Braddock, Pa. He writes concerning "KDKA's initial broadcast reporting the Harding-Cox election returns, November 2nd, 1920.

"The broadcast was made possible through the cooperation of the late Dr. Harry P. Davis and Frank Conrad of 8XK fame. KDKA's first 'studio' was a canvas tent atop a 9-story building of the Westinghouse plant at East Pittsburgh. It was blown down during a wind storm and replaced with a one-room studio. Several years later the station was moved to a hill, known as Greensburg Pike, overlooking the Westinghouse works and located about two miles from East Pittsburgh. I had the pleasure of listening to that broadcast. However I think the excitement was too much for me to pay any attention to the nature of the program, and it wasn't until the following day that I realized what it was all about. I listened at the home of a friend—not being able to afford the luxury of a wireless in those days."

✦

THE OTHER MONDAY we listened to the BBC Empire Orchestra's "Humoreske" program. Among other things they played Letter's humorous sketch "A Southern Wedding." As the announcer put it, "In 'A Southern Wedding' a trombone and a flute are married by a bassoon, and we shall hear the trombone groom and the flute bride saying 'I will'." Ah yes—whimsical, delicate and touching! A southern wedding. One could almost hear the shot-gun saying "You must!"

✦

THE ACCOMPANYING photo—Fig. 2—is of our winter listening post in Tampa, Fla. Our antenna is located at the left—the one with the double insulators! This photo was taken by Sergeant Floyd

Brewer of the 31st Reconnaissance Squadron, U. S. Army Air Corps during winter maneuvers in Florida. All maneuvers were directed by radio, the field station being located at the airport on Davis Island—the little fellow completely surrounded. These maneuvers provided some two weeks of highly interesting and different short-wave radio listening between 7 and 4 megacycles. Everything with wings—from P-35 pursuit planes to the "Flying Fortresses"—are equipped with two-way radio. We recommend a turn of the dials to you folks located near Selfridge Field, Langley at Norfolk, Va., San Antonio, Texas, Pensacola, Fla., France Field, C. Z., San Diego, Calif., and Mitchell Field, Garden City, L. I., N. Y.

✦

FREE SUBSCRIPTION for the Radiodor of the month goes to Galen Balfe, 190 Middle Street, Lowell, Mass. (RSSL W3F33). He nominates the Rinso program, "The Big Town," which can be heard reekly on Tuesday evenings. Stench sleuth Balfe writes:

"The program is good—Claire Trevor and Ed Robinson doing their excellent best. The stench arises from a dramatized commercial lasting two and a half minutes, with much ado about nothing. The husband, a husky brute, is scrapping with his poor wife, half dead from overwork with a scrub-board and dishes. The announcer breaks in with a plug for Rinso, and they both laugh, make up, don coats, and rush off to the store. Then another plug at the end and a perfectly good program has been ruined!"

✦

AND JUST TO clear the atmosphere, we nominate, as the best programs on the air—

*Humor:* Sunday evening with Charlie McCarthy (who's this guy Bergen, anyway?) and the Stroud Twins. (Chase and Sanborn.)

*Symphonic Music:* The Ford Hour. Sunday at 9:00, E.S.T.; C. B. S.

*Sketch:* One Man's Family, which drinks Tenderleaf Tea but also has babies and divorces. Wednesday of course.

*Drama:* Lux Theater of the Air—if you hold your nose during the commercials. Mondays.

## THE CIRCUIT COURT

(*Continued from page 241*)

output transformer winding and the cathode of the 2nd a.f. 6J5G. Plate current in this tube passes from cathode to ground and B— through the output coil on the output transformer. Since the cathode is not bypassed at all, the voltage across the output winding appears at the grid of the 2nd a.f. 6J5G out of phase with the signal voltage being fed to the amplifier.

Distortion and hum are largely cancelled out, and since the degenerative feedback extends back to the input circuit the performance of all of the amplifier components will be given some correction.

In applying such a system to another receiver, it may be necessary to interchange the cathode and ground connections to the output winding. One connection will feed back out-of-phase voltage which will produce the desired degeneration. Reversal of these connections will feed back in-phase voltage causing regeneration and violent oscillation.

## GLOBE GIRDLING

(*Continued from page 246*)

mation from Mexico advises no record of another station going on the air there.

XEYU, Mexico City, has retained its old call and frequency and is back on 9600 kc. Address is said to be Justo Sierro No. 16, Mexico City. XEYU relays the programs of long-wave station XEXX.

XETA, 11760 kc., Monterrey, Mexico, shown in list as transmitting between 7 and 11 p.m., is reported to be broadcasting only between 3 and 3:30 p.m.

### *U. S. Stations*

W8XK, Pittsburgh, Pa., advises that during the past few months since installing their new directional antenna, short-wave mail reports have increased tremendously and as a result they have been verifying all reports and probably will continue to do so for some time, although it has not been definitely decided as to whether this will be permanent or not. We have removed the symbol from station list indicating that they do not verify.

W8XAL, 6060 kc., Cincinnati, Ohio, now closes its programs at 7 p.m., instead of 8 p.m., as formerly. Otherwise the schedule remains the same.

### Canadians

CRCX, 6090 kc., Bowmansville, Ontario, Canada, has closed down and left the air. It is with regret that we report the passing of this station as it was one of the older stations on the air and always maintained excellent programs. The writer recalls when it operated experimentally under the call VE9GW.

CJCX, 6010 kc., Sydney, Nova Scotia, Canada, is still having difficulties and consequently is irregularly on the air.

### Amateur Phones

The following is a list of 20-meter amateur phone stations not previously reported or listed:

| Country | Frequency | Calls | Time Heard |
|---|---|---|---|
| Australia | LF | VK2GU—2EC—2AT | 7 to 8:10 a.m. |
| Australia | LF | VK2OG | 7:27 a.m. |
| Australia | HF | VK2VK | 7:10 a.m. |
| Australia | HF | VK2DK—2UY | 1:30-1:40 a.m. |
| Australia | LF | VK3ZB—3KU—3NP—3MX | 3:33 to 7:52 a.m. |
| Australia | LF | VK4JX | 7:25 a.m. |
| Australia | HF | VK5FL | 7:12 a.m. |
| Australia | LF | VK2CI—2ABG—2UC—3ZL—3IW | 3:40-7:50 a.m. |
| Africa (So.) | LF | ZS2S | 2 a.m. |
| Africa (So.) | LF | ZS6DW | 11:45 p.m. |
| Africa (Egypt) | LF | SU1WM | 6:35 p.m. |
| Africa (Fr. Morocco) | LF | CN8MU | 2:35 a.m. |
| Africa (Algeria) | HF | FA3QV | 9:10 p.m. |
| Argentina | LF | LU4BK | 6:20 p.m. |
| Bermuda | HF | VP9L | 7:03 a.m. |
| Barbadoes | LF | VP6TB | 7:04 a.m. |
| Brazil | HF | PY2AC | 12:30 a.m. |
| Chile | LF | CE1BE—3AX—3AL | 7:40 p.m.-1:30 a.m. |
| Chile | HF | CE1AH | 12:12 a.m. |
| Cuba | LF | CO2LY—2EG—2KC | 6:05 to 8 p.m. |
| Cuba | LF | CO2HS—5EO—8BC | 5:11 to 10:32 p.m. |
| Colombia | LF | HK3LDC | 9 p.m. |
| Costa Rica | HF | TI2HP | 7 p.m. |
| Dom. Rep. | HF | HI9I | 7:15 a.m. |
| England | LF | G2AI—2PU—2XV | 5:54 to 8 p.m. |
| England | LF | GW5TJ—G5LU | 6 p.m. & 7:19 a.m. |
| England | LF | G5TP—6KH—6JQ | 5:45 to 7 p.m. |
| England | LF | G6LK—6PY—6WX—6JF | 5:46 to 6:50 p.m. |
| England | LF | G5QN—6DD—8BI | 3 to 3:10 a.m. |
| England | HF | G2TR—6HV—6KL | 8 p.m.-7:49 a.m.-6:43 p.m. |
| England | HF | G5LL | 3:20 a.m. |
| England | LF | G8SB—G8MX | 2:40-3:30 a.m. |
| Ecuador | LF | HC2HP | 7 p.m. |
| France | LF | F3LW—3KI—8PU | 2:30 p.m. to 1:34 a.m. |
| France | LF | F8DL | 3:13 a.m. |
| Greece | LF | SV1KE | 7:10 p.m. |
| Holland | LF | PAOEO—PAOFB | 5:45-11:25 p.m. |
| Honduras | HF | HR1UG | 11 p.m. |
| Hawaii | AB | K6KRS—6OQE | 12:30-1 a.m. |
| Haiti | LF | HH2X | 7:36 p.m. |
| Haiti | HF | HH4AS | 8:18 p.m. |
| Irish Free State | LF | EI3J | 7:28 a.m. |
| Irish Free State | LF | EI4L—GI2CC | 4:03-6:20 p.m. |
| Italy | HF | I1KN | 1:35 a.m. |
| Labrador | LF | VO3Z | 8:40 a.m. |
| Mexico | LF | XE2BJ—XE1GR | 4:50 p.m. & 1 a.m. |
| Newfoundland | HF | VO1X | 9:45 p.m. |
| Nicaragua | LF | YN2DG | 6:45 p.m. |
| Nicaragua | HF | YN1OP | 9 p.m. |
| Norway | LF | LA1F | 12 a.m. |
| Portugal | LF | CT1KG—1QE | 5:45-5:40 p.m. |
| Portugal | LF | CT1QH—1QA | 6:10-7:54 p.m. |
| Pitcairn Island (14.346 mc.) | | VR6AY | 8 p.m. to 3 a.m. |
| Poland | HF | SP1DC—2HH | 11:30 p.m.-12:20 a.m. |
| Rumania | HF | YR5AA | 11:15 p.m. |
| Sweden | LF | SM7YA | 12:45 a.m. |
| Sweden | HF | SM5SV | 12:10 a.m. |
| Scotland | HF | GM2UU | 6:25 a.m. |
| Switzerland | HF | HB9J | 10:20 p.m. |
| Venezuela | LF | YV1AQ—1AP—4AA | 6:45 to 7:20 p.m. |

The following information is furnished by an English RSSL member:

ZL "hams" are not allowed on 20 meters after midnight, New Zealand Time or 7:30 a.m., E. S. Time.

VO6D, Labrador, cannot reply to short-wave listeners unless an International Reply Coupon is enclosed with reports on reception.

The Kenyon Transformer Co., Inc., New York, state that they have been authorized to advise that there has regretfully been some misunderstanding in regard to the issuance of official QSL verification cards to short-wave listeners who have heard W10XAB or OX2QY, the stations of the MacGregor Arctic Expedition.

At the present writing, official MacGregor Expedition QSL cards are only issued to amateurs who have actually established communication with the Expedition which has been reported back by radio by A. G. Sayre, to the American Radio Relay League. However, the reports of short-wave listeners will be brought to the attention of Mr. Sayre upon the return of the Expedition, to be checked against the official log, and it is hoped that verification of such reports can be given.

### Acknowledgment

We are afforded much pleasure in acknowledging the many letters and reports from readers and listeners and extend our thanks for your continued loyalty and support. It is always a pleasure to hear from you and to answer your questions on reception, unknown stations and station matters in general.

Address your letters to Mr. J. B. L. Hinds, 85 St. Andrews Place, Yonkers, New York, enclosing self-addressed stamped envelope if you desire a reply.

All questions of a technical nature should be forwarded to Queries Editor, ALL-WAVE RADIO, 16 East 43rd Street, New York, N. Y.

## QUERIES

(*Continued from page 259*)

for 10, 20, 40, 80 and 160-meter operation, and shall appreciate your supplying coil winding dope.—*L. K., Chicago, Ill.*

**Answer:** This receiver is of the super-regenerative type, and while such receivers will work on any bands, they tune too broadly to be recommended for other than ultra-short-wave use. We suggest that L. K. construct one of the many excellent receivers described in AWR, from time to time, designed for operation on the longer waves.

## QUERIES INDEX

THE Queries Department is now well along in its third year of existence. We are up to and through with *Question Number 65*. Not a high number, it is true—but when it is considered that each question is answered in the form of a short article, it represents something approaching an encyclopedia of radio information *on the subjects you wish most to know about*. For your convenience we are publishing our second index with cross references. Items marked with the asterisk (*) are also listed in our previous index which appears in the March 1937 issue of AWR. Items marked with the dagger (†) receive detailed treatment in the ALL-WAVE RADIO PRACTICAL RADIO MANUAL. The index published in the March 1937 number covered from January 1936 (Question No. 1) to February 1937 (Question No. 24) inclusive. The current index runs from March 1937 (Question No. 25) through May 1938 with Question No. 65. Also appended are those items from the first index which receive no mention in the present index.

### INDEX

*The following subjects, not covered in the foregoing index, are indexed in the March, 1937, issue of* AWR:

Automatic Volume Control
Convertors (radio-frequency)
Directional Antennas
Filters (line)
Great Circle Distances
Grounds
Harmonics (reversed effects)
Hum
Indicators (tuning—how to connect *meters*)
Line Filters
Noise
Off-Frequency Reception
Ohm's Law in Tube Circuits
Reception Problems
Reverse Harmonic Effects
Soldering Technique
Volume Expansion

## STAGED IN WOOD

(*Continued from page 234*)

and the HF-200's. The coil had been placed too near the final amplifier tubes and its magnetic field was cutting the plates. Moving the coil two inches further away cured all the difficulties and complete neutralization was then obtained. Applying plate voltage and tuning the final tank to resonance showed a minimum plate current of 30 mils.

### *Loading the Final*

Now a few words about loading: A 600-ohm line terminating in a Johnson Q was clipped on at a resonant point on the antenna coil; i.e., about four turns each side of center. The swinging link was partially turned so as to just cut the field of the final tank coil. The antenna tuning condenser was adjusted to give maximum indication of plate current. The swinging link was then pushed further into the center of the tank coil until normal loading was indicated by the final plate milliammeter operating at desired current level. The plate tuning meter remained at the minimum point at all times.

Under no condition should it be necessary to retune the plate tank condenser during these adjustments. If, when resonance is obtained, the plate tank does require readjustment, it is an indication that the impedance network is not correctly matched.

### *The Speech Amplifier*

Special consideration was given the speech equipment. Various types of bias were tried for optimum output and quality, and the following line-up is the direct result of our experiments to secure as low distortion as possible with a good frequency response to both lows and highs. A high-gain triode was incorporated with a well-shielded chassis to drive a 6C5. This tube is followed by two 76's with resistance coupling with the last of the 76's driving push-pull 2A3's operating Class A. The output of this stage drives a pair of ZB-120 modulators operated push-pull Class B.

The speech amplifier is mounted on the top deck of the power-supply cabinet in

order to eliminate running a low-impedance line with its consequent losses from the 2A3's to the ZB-120's.

At this point a word about the selection of a modulation transformer is in order. For a transformer to operate at maximum efficiency, it must be so designed that the resistance load on the secondary presented by the Class C stage will be faithfully reflected into the primary. This necessitates a low core leakage reactance together with a goodly amount of iron to offset saturation effects. It should also be of the variable-impedance type so that it will not be rendered obsolete in cases where tubes or circuit changes are found desirable. The Ken-O-Tap met these requirements, so in it went.

The idea behind all speech equipment is to reproduce as faithfully as possible the characteristics of the input speech envelope with a negligible amount of distortion, and to guard against the introduction of any other audio components, such as hum, etc. In this respect the decoupling resistors and bypass condensers in the low-level stages employing the 6C5 and 76 tubes are of the utmost importance. Of equal importance is the r.f. choke, RFC8, in the microphone input lead, which prevents r.f. picked up by the microphone cable from reaching the grid of the 6F5 high-gain triode.

### *Checking the Speech Amplifier*

A dummy load consisting of an output transformer of about 6000 ohms impedance was used in checking the speech equipment. This was connected to the output of the 2A3's and the voice-coil winding of the transformer connected to a pair of phones.

If any hum is noticeable it may easily be traced by working backwards toward the input stage, removing first the 2A3 tubes, then the 76, etc. Even though all leads are shielded and the circuit has been exactly followed, each amplifier presents its own problems with regard to hum. Since the input stage of the speech amplifier described operates at a high level, it is particularly susceptible to this disturbance, and every precaution should be taken in proper shielding.

### *The Power Supplies*

During the past few months the writer visited over fifty ham stations with the idea of checking transmitter efficiency. A good a.c.-d.c. voltmeter with a sensitivity in the order of 20,000 ohms-per-volt was taken along for the purpose of checking manufacturers' ratings and voltage regulation. The result was astonishing. In many cases, where the owner of the transmitter had been influenced by "bargain specials" or was short on power-supply engineering, a voltage drop of from 100 to 400 volts was measured when load was placed on the power-supply equipment. As a result, the writer made it a point in designing the power equipment for the transmitter described, to use reliable components and to take all reasonable precautions against poor voltage regulation.

As the first step in this direction, mercury-vapor rectifier tubes were selected for use in those power units subjected to variable load. Secondly, oversized bleeders were used, and these draw sufficient current from the supply circuits to maintain good voltage regulation. Thirdly, the transformers and condensers selected for the supply units were those having a sufficient safety factor to accommodate peak loads and voltage peaks. Though such components cost slightly more than general run-of-the-mill parts, they are economical in the long run. As a further precaution—or economy—overload relays were included in the final and modulator supplies.

There are, altogether, six power supplies, namely: oscillator, buffer-doubler and amplifier, final amplifier, speech amplifier, modulator, and a bias supply for all tubes in the r.f. section with the exception of the crystal oscillator.

The power supplies are not directly connected to the r.f. and speech equipment in the schematic diagram, but interconnecting leads are marked with identical letters, so it is simple to follow through on all direct connections.

### *"Push-to-Talk"*

A "Push-to-Talk" relay, REL4, is used in conjunction with the transmitter. It is shown in the upper right corner of the schematic diagram. The paired leads (1), (2) and (3) connect to points (1), (2) and (3) respectively at the left of the diagram. Leads (1), for example, connect across switch SW3 which controls the primary circuit of the high-voltage transformer, T3, which supplies the plates of the 866A's in the modulator power supply. Leads (2) connect across SW1, and leads (1) across the key contacts in the cathode circuit of the crystal oscillator.

### *Final Checking*

Before going on the air with the transmitter, it should be loaded with a dummy antenna and the hum level, quality, etc., checked. This can be done by the use of a simple diode and dry cell arrangement, the circuit for which will be found in any of the Amateur Handbooks.

With no signal, the static plate current of the ZB-120's should be in the vicinity of 90 mils, and for 100 per cent modulation about 250 mils on peaks. The plate current of the final amplifier should remain absolutely steady at all times.

If the microphone cable is over ten feet long, it should be run through a 500-ohm line so as to reduce hum pickup.

## ON THE MARKET

(*Continued from page 268*)

### C-D "BEAVER" CONDENSERS

THE CORNELL-DUBILIER "Beaver," type BR, is a brand new *extra-small* etched-foil dry electrolytic.

The Beaver is the result of many years of concentrated laboratory research and experimentation. These capacitors, not only from the standpoint of extremely small size and excellent electrical characteristics, but because of their simplicity in construction and ready ease of wiring in a circuit, will at once appeal to the servicemen who have long been looking for a real *small* condenser. ALL-WAVE RADIO.

✦

### ELECTRO-VOICE CARBON MIKE

A MODERNLY DESIGNED, fine quality carbon microphone, model 100, has just been announced by Electro-Voice Mfg. Co., 330 E. Colfax Ave., South Bend, Indiana.

This microphone has an internal shock absorber, extremely low noise level, combination locking stand and cable connector. It comes furnished with 6 feet of cable and 5/8"—27 stand coupling. Finished in smooth black and chromium. Button current (each) 3-5 m.a. for close talking or feedback reduction—12-20 m.a. for normal work. ALL-WAVE RADIO.

✦

### RCA TRANSMITTING TUBE MANUAL TT-3

A NEW 192-PAGE Manual TT-3 covering RCA Air-Cooled Transmitting Tubes has just been made available.

This book contains complete characteristics and ratings for each of the various types. Besides this material, there are included many curves and circuit diagrams; charts to assist the tube user in selecting conveniently a tube type for a particular application; and chapters covering installation, ratings, and application of transmitting tubes, as well as the design of rectifiers, filters, and transmitters. ALL-WAVE RADIO.

✦

### NEW IRC RESISTOR AND VOLUME CONTROL CATALOG

A COMPLETELY NEW and attractively printed 12-page catalog, detailing the complete merchandise line of IRC Standard Resistors

and Volume Controls has just been issued by the International Resistance Company, 401 North Broad Street, Philadelphia, Pa. Copies may be obtained upon request to IRC jobbers or direct from the manufacturer.

In addition to the standard IRC items such as the Type BT Insulated Metallized Resistors, Power and Precision Wire Wound Resistors and Motor Radio Suppressors, the catalog includes a number of items recently added to the line. Among these are the IRC Type CS Volume Controls featuring both the Silent Spiral Connector and the 5-Finger Silent Element Contactor; IRC Special Replacement Controls; Type BW Insulated Low Range Resistors; Type MW-2J Insulated Center Tap Wire Wound Resistors; Ultra-High Range Metallized Resistors; as well as seven new Precision Resistor Types; and the new, improved IRC Resistance Analyzer and Indicator which is direct reading and continuously variable from 0 to 1.0 megohm. ALL-WAVE RADIO.

✦

### "WHOLESALE" SPRING AND SUMMER CATALOG

WHOLESALE RADIO SERVICE Company, of 100 Sixth Avenue, New York City, announces the release of their new 1938 Spring and Summer catalog, Number 71.

Three outstanding features of the new catalog are the great new line of Lafayette receivers, a brilliant array of advanced sound systems and public-address equipment, and a new camera section, featuring all the latest type cameras and photographic accessories.


Copies of the new catalog may be obtained by writing to or calling at Wholesale Radio Service Co., Inc., 100 Sixth Avenue, New York; 901 West Jackson Blvd., Chicago; 265 Peachtree Street, Atlanta; 110 Federal Street, Boston; 219 Central Avenue, Newark; 542 East Fordham Road, Bronx; or 90-08 166th Street, Jamaica, L. I. ALL-WAVE RADIO.

✦

### "WHOLESALE" OPENS CAMERA DEPARTMENT

WHOLESALE RADIO Service Company of 100 Sixth Avenue, New York, has established a complete camera and photographic supply department. A large variety of still and motion picture cameras, projectors and enlargers as well as accessory equipment will be found in the new department.

Mr. M. Donald Langer, well known photographer, exhibitor and instructor, will be in charge. Mr. Langer is a member of the Pictorial Photographers of America and the Royal Photographic Society of Great Britain, and he brings to his new post a

wealth of practical and theoretical experience which he will be glad to pass on to Wholesale's new camera clientele.

Wholesale's Spring Catalog, soon to come off the press, will contain a comprehensive listing of cameras and supplies for both still and motion picture photography. Copies of the new catalog may be obtained by calling at, or writing to Wholesale Radio Service Co., Inc., 100 Sixth Avenue, New York City; 901 W. Jackson Boulevard, Chicago, Illinois; 265 Peachtree Street, Atlanta, Georgia; 110 Federal Street, Boston, Massachusetts; 219 Central Avenue, Newark, New Jersey; 542 East Fordham Road, Bronx, New York or 90-08 166th Street, (Merrick Road) Jamaica, Long Island, N. Y. ALL-WAVE RADIO.

◆

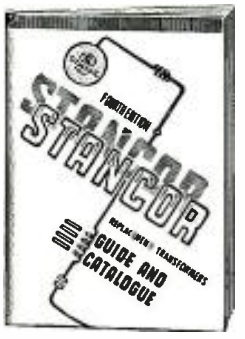
### NEW STANCOR SERVICE GUIDE

LONG AWAITED by the trade, Stancor's new Service Guide No. 125 has just been issued. This valuable 32-page manual should prove a boon to all dealers and servicemen throughout the country. In this Guide, Stancor is announcing the only 100% radio transformer replacement line, it is said.

It contains accurate listings of over 2800 sets, and the necessary transformers and chokes to service them. All popular manufacturers are represented.

To insure accuracy the material was secured from factory service notes and all eight Rider Manuals.

The information is clearly presented and very easy to find. As additional assistance, the book also contains the tube set-up of all sets listed. Much other valuable information is given that should prove beneficial.




The Guide is free and may be obtained through the jobbers throughout the country or direct from the Standard Transformer Corporation, 1500 N. Halsted St., Chicago. ALL-WAVE RADIO.

◆

### NEW BARGAIN FLYER

WHOLESALE RADIO SERVICE Company of 100 Sixth Avenue, New York City, has just released a handsome rotogravure bargain flyer containing several hundred items of great interest to the broadcast listener, serviceman, radio amateur, public-address specialist and experimenter.

A number of 1938 model all-wave receivers in both console and table models, manufactured by a nationally-famous maker, are offered for the first time anywhere at manufacturer's cost price, it is said.

Amateurs will find several of the newest 1938 communications receivers as well as a 30-watt crystal-controlled c.w. transmitter complete with built-in power supply.

A complete 40-50 watt public-address system with speakers, flare baffles, velocity microphone and all accessory equipment is listed in addition to a convertible 6-volt d.c.—110 volt a.c. 30-40 watt system. Speakers of all types and sizes, ranging from a "woofer" and "tweeter" theatre combination in acoustic enclosure to small dynamics for a.c.-d.c. midgets are offered at new low prices. Innumerable bargains for the serviceman and experimenter, including several cathode-ray oscillograph kits are also offered.

Copies of the new flyer, C-5, will be forwarded promptly upon request to Wholesale Radio Service Company, 100 Sixth Avenue, New York, N. Y., 901 West Jackson Blvd., Chicago, Ill., 265 Peachtree Street, Atlanta, Ga., 110 Federal Street, Boston, Mass., 90-08 166th Street (Merrick Rd.) Jamaica, L. I., 219 Central Avenue, Newark, N. J., or 542 East Fordham Road, Bronx, New York. ALL-WAVE RADIO.

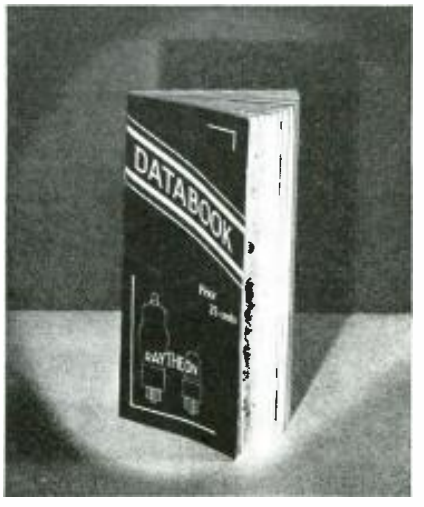
◆

### *RAYTHEON TUBE "DATABOOK"*

E. S. RIEDEL, General Sales Manager of the Raytheon Production Corp., has just announced what he considers the most complete databook containing the chief technical data on all tube types—from the oldest tube to the newest. Prepared in the form of a compact 200-page pocket size book, it includes a wealth of information on tube applications and uses—maximum ratings, values of essential characteristics and the more important characteristics in operating curves for each active tube.

The information on these curves is even more valuable and useful than the ratings and nominal characteristics,—as it has not been heretofore generally available in convenient and readily accessible form.

Much of this information has previously been obtainable only by a limited number of receiver design engineers. Data are given on all tubes that have been at all widely used in the past in receivers and amplifiers that are still handled in the trade as replacements; also on all types announced up to the end of 1937. For



completeness there is included the necessary data on resistor, radio receiving, special receiving tubes and panel lamps.

The Raytheon Databook might even be considered a treatise on tubes—as it gives definitions of the various tube characteristics and terms and explanations of how these quantities may be determined from the characteristic curves; simple circut diagrams showing the essentials of the various sections of a modern radio receiver, including the newest features, and convenient charts for determining the proper values of certain tube circuit constants and operating voltages.

The new Raytheon "Databook" is available at all Raytheon jobbers. ALL-WAVE RADIO.

◆

### "ALLIED" SPRING AND SUMMER CATALOG

ALLIED RADIO CORP. of Chicago announces the release of its new 164-page Spring and Summer 1938 Catalog. Featuring important new developments in every field of radio, the new catalog forms an exhaustive index to modern radio equipment.

Actually four complete catalogs bound in one, the Allied book devotes separate sections to radio receiving sets, service equipment and replacement parts, public address, and amateur gear.

Highlights of the new Catalog are: 62 new models of the Knight Radios with latest features such as push-button electric tuning, automatic frequency control, volume expansion, phono-radio combinations, arm-chair cabinets, etc.; the new line of Knight "integrated" Sound Systems, completely new in engineering design and styling; latest advances in test equipment; new amateur transmitting and receiving equipment; and more than 12,000 exact duplicate and replacement parts, including the new Knight brand parts.


New developments in typography and illustration have been incorporated to make the new Catalog more legible and easier to use. A free copy may be obtained by writing to Allied Radio Corporation, 833 West Jackson Boulevard, Chicago. ALL-WAVE RADIO.

## HAMFEST

(*Continued from page 251*)

minology, any operator who works this YL is liable to similar penalities. The same applies to her husband for permitting the violation!

While anyone may *speak over a mike* in the presence of a licensed operator, no one but a licensed amateur operator may legally *touch a key* regardless of whether another operator is there or not. If you must violate the law, there is no sense in advertising the fact—particularly to the enforcement agency!

✦

WE WERE HAVING a chat with a W6 the other night and he told us that he had recently been down in Houston, Texas, and had met a W5 whom he described as "a phone op—but really a good egg when you get to know him."

It's funny what happens to perfectly fine folks when you give them a license and turn them loose behind a ham fone transmitter. Take Exhibit A for instance—a lad with an excellent sense of humor who can tell the most hilarious tale (in company) without cracking a smile and who, being a perfect gentleman, leaves the laughter and applause to his audience. He would sooner eat ground glass than laugh at his own jokes. But put a mike in his hands, and what happens? He immediately becomes a bore who would be unceremoniously kicked out of any decent company. He relieves himself of things stupid beyond imagination, and chortles "HI" at his own witlesscisms. Put him behind the wheel of a car and he'll give the other guy the right of way, let a pedestrian cross the street, and stop when the light flashes yellow. In company he'll graciously surrender the floor and make himself exceedingly popular as a good listener.

If he hogged the road the way he does the air he'd end in the hospital—ditto if he transplanted his radio technique to the parlour.

Of course there are exceptions—but as usual, they prove the rule. We often wonder why all this fuss about "push to talk." It seems to be overwhelmingly the other way around—talk to push—talk until you push the other fellow under the ultimate skip and fade!

✦

THE HAM-MAP FOR this month is of W9YLI (you can have the cut for the asking, OM), Burlington, Wis., who describes his rig as follows—"Owned and operated by Roger Mohr. Line up: a pr T20s in the final, modulated by a pr of 46s Class B, using a DB carbon mike. Receiver is a new Silvertone Precision 10-tube super with xtal tuning down to and including 10 meters. Using a Johnson Q for both transmitting and receiving. The transmitter is now operating on 20-meter fone. At the left is a listening monitor—and to the right test equipment."

✦

WHICH REMINDS US that 10 sure is pounding in these days down Florida way—GM6RG, ZT2G, W7EMP, W6PDB, W6NWK (portable mobile at sea) VE4ADV, (America's doughnut vendor), W6NJP, W6GUQ, W6CUU, W6GUP, YV6AL, G6WX, K6PCF, K6MVV (who will not QSL swl cards), K6LCV, K6OJI, W6IXP, W6RGP, W6PBD, PA$\phi$GN, F8RR, G6HB, ON4NC, G6GX, G2HG, D3BEN, G5ML and EI2L.

✦

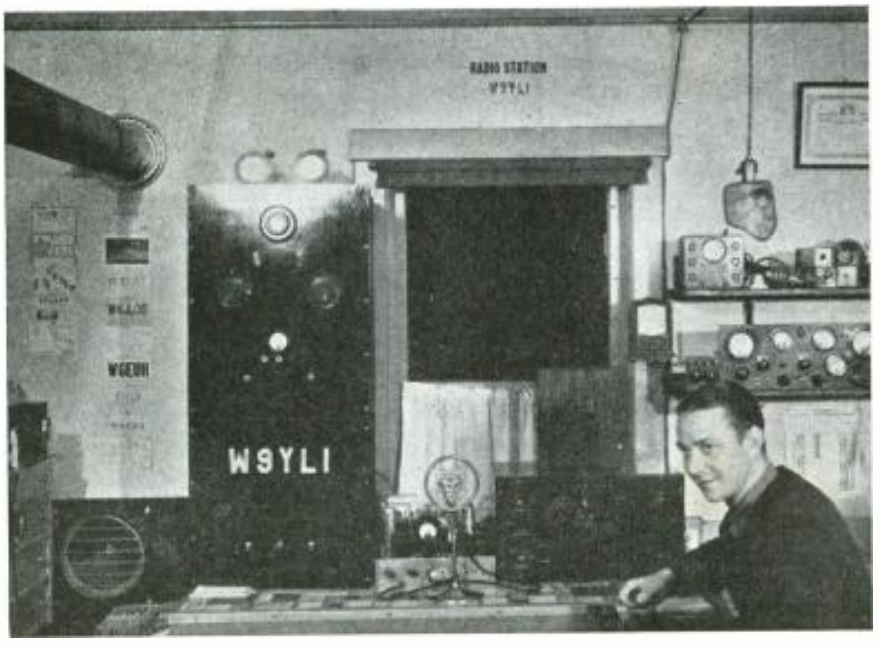
AND BELIEVE IT or not, the other end of the amateur spectrum isn't half the back yard of ham radio we've always thought it. Between 300a and 400a the 160-meter has real dx possibilities. During a momentary spell of insomnia, we logged W2KQJ, W2IOO and W9WPY—all with S-8 or 9 signals down here on the Gulf of Mexico. The 160 band, in the wee hours, is a perfect traffic band; and we believe that more hooks could be cleared in shorter order with skeds up there than on 40.

✦

DEAR 8QMR: Wot's this CQ-dx business aniwa? I hrd a W1 in Boston calling it the other nite and didn't answer seeing tt I'm only abt a thousand miles away. He ended up with a QSO with a bird just across the Charles River in Cambridge. Yrs—HI.

✦

YE EDITOR OF AWR is going about these days referring to a dummy load as a Charlie McCarthy antenna.




***Ham-map of the month—W9YLI. The test equipment on the right is something every ham needs, but few possess.***

## INDEX TO ADVERTISERS

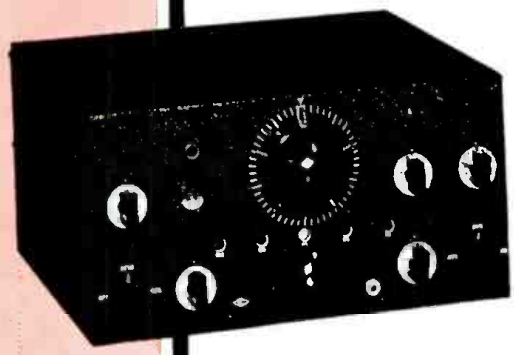




HUGHES PRINTING CO.
EAST STROUDSBURG, PA.

## HRO

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



## NC—101X

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

## NC—81X

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

## ONE—TEN

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

**A FINE RECEIVER FOR EVERY PURPOSE**

**NATIONAL COMPANY, INC., MALDEN, MASS.**

MAY 4 1938

*Introducing*

# 2 NEW Hallicrafters Receivers . .

## the SKY BUDDY

Only an organization with the facilities, experience and resources of the Hallicrafters could build a practical communications receiver to sell at this low price.

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

- 5 Tubes
- 3 Bands
- Complete Coverage 18.5 MC to 545 KC
- Built-In Speaker
- Separate Band Spread Dial
- Easily Adapted for Battery Operation
- All Necessary Controls

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

## and the SKY CHAMPION

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

See the New SKY CHAMPION at your Hallicrafters dealer today or write for complete information.

Amateur's Net Price (Including Speaker and Tubes) **$49.50**

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

A champion endorses the SKY CHAMPION. Mr. T. R. McElroy Famous World's Champion Code Operator says: "Congratulations on the SKY CHAMPION. It's got performance you can't get for twice the money elsewhere!"

**All Hallicrafters Receivers Available At Liberal Time Payments**

# the hallicrafters inc.

2605 Indiana Avenue, Chicago, U. S. A.
Cable Address: "Hallicraft" Chicago

**WORLD'S LARGEST BUILDERS OF AMATEUR COMMUNICATIONS RECEIVERS**