ALL-WAVE RADIO

MAY • 1937

FOREIGN B.C. LIST

B.C. DX ON "X" BAND
new sport for the listener

THE AWR "COMMERCIAL"
a trim rig for c.w. and fone

FIVE-METER RECEIVER
a midget for a.c. or d.c.

25c U.S. and CANADA

THE JOURNAL of WORLD RADIO

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"NO TIME TO SIT DOWN" Asserts Editorial Staff of All-Wave Radio

"It's On Your Toes and Full Speed Ahead in Reporting Radio History As It's Made"

NEW YORK, April 24—The alert editorial staff of ALL-WAVE RADIO made a statement today that "Sit-Downs" were definitely and permanently "out" as far as they were concerned. "We have not time to *stand-still*, let alone *sit-down*," said this able body of experts as they began work on their June issue. They further revealed that JUNE would be "*something special*."

Aid Making News

"We're not satisfied in just reporting new developments and events of importance in the Radio Field, as they occur," they added. "We've got people on our own staff who are actually pioneering and experimenting to add to these developments and events. If you've followed ALL-WAVE RADIO the past six months, you'd have noticed the growing procession of News Scoops and original receiver, transmitter and "gadget" constructions, not to mention intelligent discussions of important problems of the hour."

Summer Specials

The Staff further pointed out the fact that it would devote a good portion of its summer issues to pertinent seasonal subjects. "Behind locked doors," they stated, "technicians are already at work designing 'Hot Weather' specials."

Laurels No "Roost"

When finally questioned as to whether they weren't very proud of their "record" to date, the staff confirmed their original views by saying, "We can't take time out to 'sit' on our laurels and look around. We're too busy piling on more."

(Continued next issue)

Can't Prevent Readers "Sitting"

"V.F.B." Reason Given

ALL-WAVE RADIO officials admit that they cannot prevent their readers from "sitting down." Ever since the appearance of the March 1936 issue, increasing numbers of ALL-WAVE RADIO readers have sat down on receipt of each new issue and have refused to budge *until the last word was finished.*

No Harm Done

Nothing but praise has resulted from this absorbing interest in Radio and its leading magazine. It was stated here that no official confirmation has been given to the rumor that local letter-carriers were joining "en route."

Edited by M. L. Muhleman

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ALL-WAVE RADIO

Reg. U. S. Pat. Off.

VOLUME 3 • NUMBER 5

GENERAL

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COVER

Bank of rectifier tubes, supplying 12,000 volts d.c., to the 5000-watt amplifier at broadcast station WOW, Omaha, Nebraska. (Photo courtesy Western Electric Co.)

FEATURES

DEPARTMENTS

A STUDY OF THE *Technical* DETAILS

A Comparison of Its Overall Fidelity, Selectivity, Sensitivity, Power Output, Tone Balance, 10,000 Cycle Attenuation, Loud Speaker Response, Noise Suppression, and Automatic Gain Control, as shown by proved Laboratory Curves (sent upon request) will prove conclusively that The Philharmonic:

1. Covers a *Greater* Wave Length Range. (3.75 to 2000 Meters.)
2. Has *Finer* Tone and *Higher Overall Fidelity*. (From 30 to 16,000 Cycles.)
3. Has a *Smoother and More Highly Perfected* Continuously Variable High Fidelity Range.
4. Has *Sharper* and *More Complete Attenuation* at 10,000 Cycles.
5. Has *Purer* and *More Perfect Fundamental Bass Response* which is Free from Cabinet Boom and Resonance.
6. Has *More Perfect Tonal Balance* at all degrees of Volume—giving the Same Perfect Reproduction of the Bass and Higher Frequencies at Low as well as High Volumes.
7. Has *Greater Pure Class A Output* with Less Harmonic Distortion.
8. Has *Smoother Loud Speaker Frequency Response* from 30 to 16,000 Cycles.
9. Has a *Higher Degree of Selectivity*, which is Continuously Variable from 2 to 16 Kc.
10. Has *More Perfect Automatic Gain Control Systems* on both R.F. and I.F. Amplifiers.
11. Has More *Usable* Sensitivity.
12. Will Give *Smoother and More Noise-Free Reception* of All Programs, Especially in Difficult Receiving Locations.
13. Has a *More Highly Developed and Distortionless Program Volume Range Expansion System*.
14. Will Give *More Perfect Reproduction from Phonograph Recordings*, Especially the Latest High Fidelity Records.
15. Will Eliminate Phonograph Needle Scratch at Low Volumes, *Without Affecting Reproduction of Low, Mid, or High Frequencies* in Any Way at Normal or High Volumes.
16. Is *Custom Built with Greater Precision*—And from Higher Quality Parts.
17. Has *More Advanced Engineering Features* Incorporated in Its Design.

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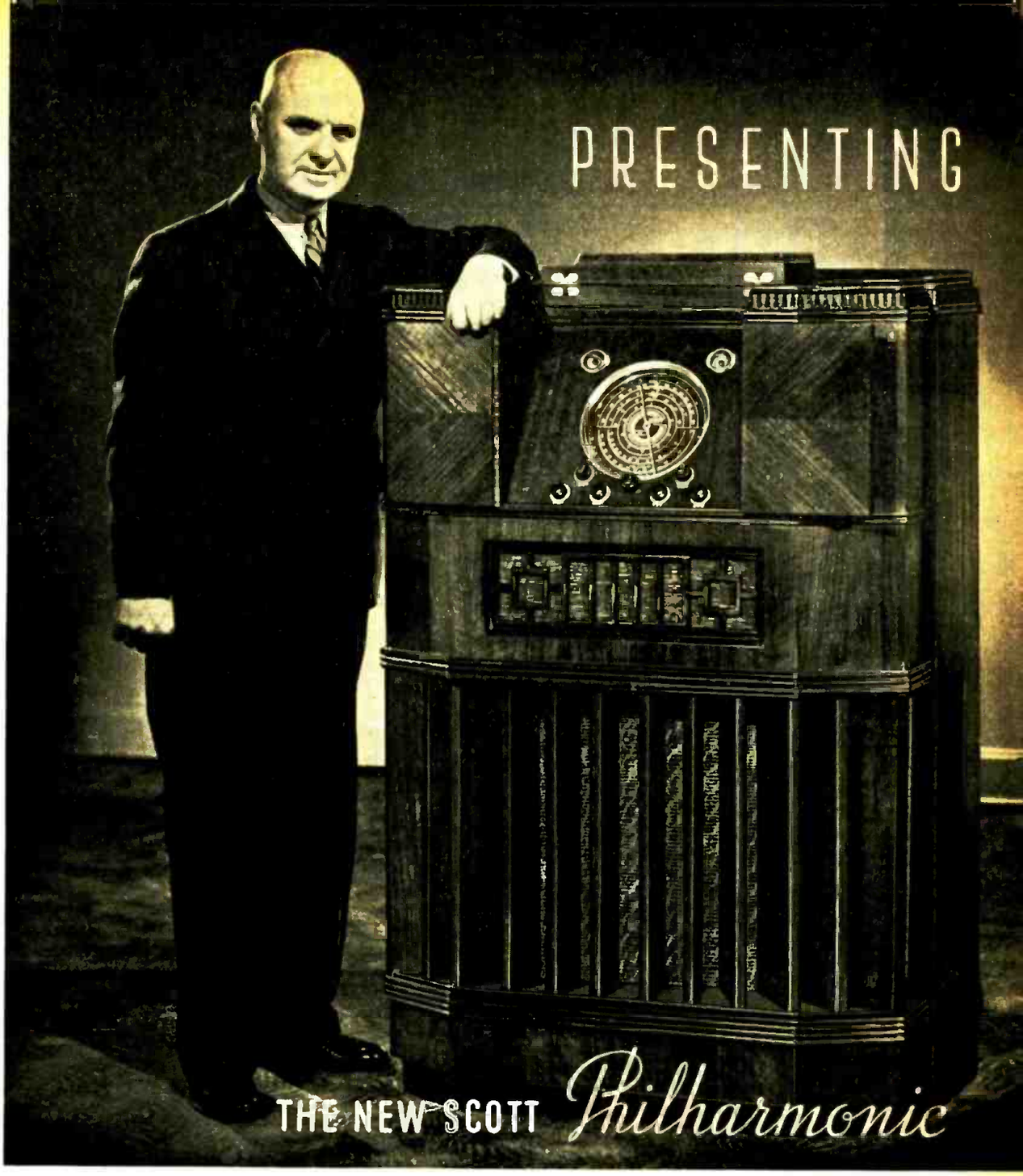

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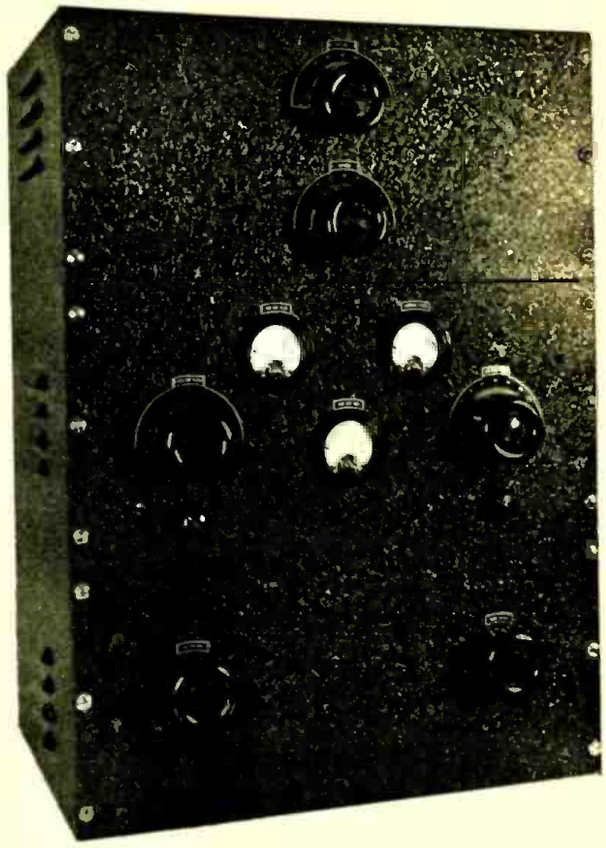
HIGH EFFICIENCY ON 10 TO 160

TWIN UNIT FOR FONE OPERATION

BY CHESTER WATZEL • W2AIF

AND WILLARD BOHLEN • W2CPA



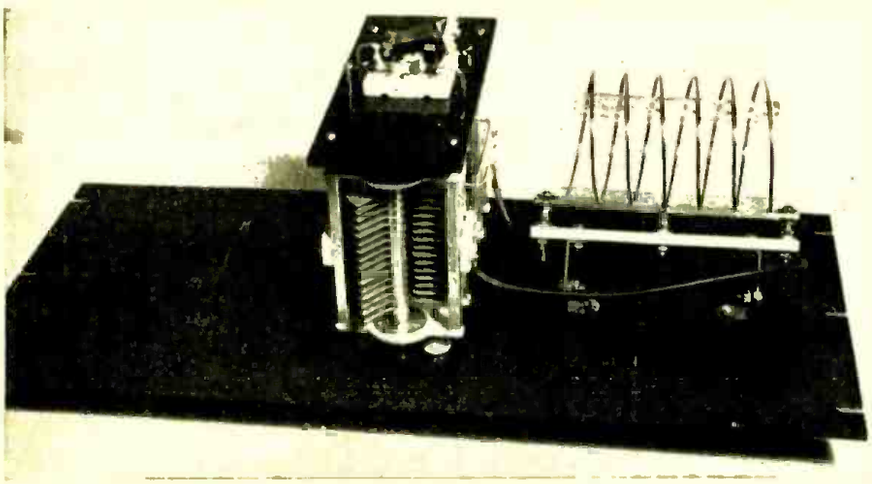
THE background for the design of this transmitter is somewhat different in that the final job is not entirely the result of individual preferences, but rather a totalization of the preferences of a number of amateurs, tempered with the practical considerations involving the cost, availability and efficiency of the component parts. Since individual preferences are usually formed as a result of experience, we felt that there was a great deal to be gained by consulting a large group of amateurs as to their ideas on the subject of an ideal transmitter, and analyzing the information from the viewpoint of modern practice. We now believe that this method of attacking the problem of a transmitter design having wide appeal was not only sound but highly productive. The results bear us out in this belief.

Criterion

In our survey of preferences, those amateurs working extensively in the 10-meter band were chosen. As you well know, 10 meters is the most difficult band in which to get a transmitter working properly. This applies particularly to phone transmitters. Irregularities in operation that do not noticeably affect a 10-meter c.w. signal are enough to floor the most ambitious phone signal. By far the worst offender is r.f. feedback, and since it is difficult to place a 10-meter transmitter at ground potential, a certain amount of r.f. floats around the equipment. And even a small amount of r.f. getting into the front end of the audio system is enough to cause rough quality and often-times an actual audio howl.

The other danger point in a 10-meter transmitter is the final r.f. stage. Adequate driving power, as well as complete neutralization, are difficult to attain at this high frequency. It is obvious, therefore, that a transmitter which operates satisfactorily on 10-meter phone is certain to give at least as good a performance on the lower frequency bands, for both phone and c.w. operation.

The first point of design to be determined in this transmitter was that of power input to the final r.f. stage. The consensus of opinion was that an input of approximately 200 watts is the maximum that need be used for successful amateur communication. And within the last two days of operation at W2AIF, this 200-watt (input) 10-meter phone transmitter got reports of R9 from Europe and Hawaii, R9 plus from Texas, and R9 "plusety-plus" (figure out that one yourself) from Peru. This with a non-directional Johnson Q antenna.



The AWR "Commercial" antenna tuning panel. Note series-parallel knife switch mounted on condenser ends.

Tube Selection

The next question to be answered was that of the tube to be used in the final r.f. stage. A T-55 was eventually selected. Choice of modulator tubes came next. As but a hundred or so of audio watts were required, a pair of Taylor 756's were picked. These tubes are

quite inexpensive and will easily provide the required output.

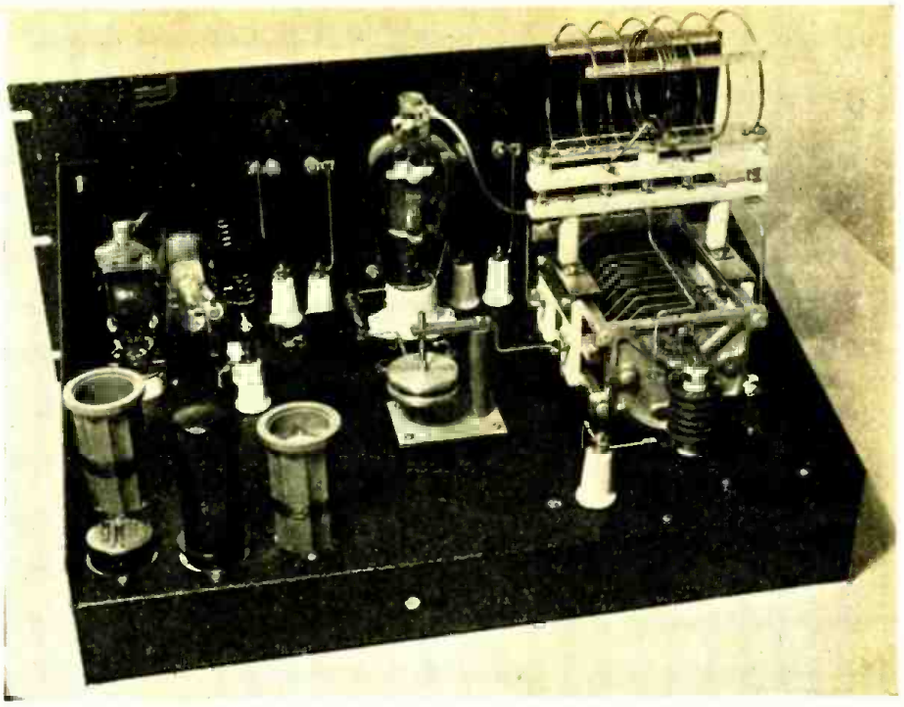
Selecting the right tubes for the crystal oscillator and buffer stages of the r.f. section provoked the most discussion. It was necessary to furnish adequate excitation to the T-55 on 10 meters without running into a lineup hard to handle when shifting to the lower frequency bands. 6L6's were used by most of the 10-meter gang for this purpose. But these tubes are uncertain of life when pushed for high output, and one is uncertain as to whether or not they require neutralization. However, as the oscillator was to run at relatively low voltage and did not require neutralization, a 6L6 was placed in this position.

While an 807 or RK-39 would make an excellent doubler-driver for the T-55, their need of neutralization when working straight through ruled them out. Neutralization in the final stage alone is sufficient complication. The "old reliable" of low-power driver tubes, the RK-25, was eventually picked for this position. None of the newer tubes of comparable rating will do as good a job as an all-around buffer-doubler tube. The elimination of a split tank in the plate circuit of the driver tube is certainly advantageous in more ways than one.

With the foregoing points of design out of the way the dual question of power supplies and transmitter housing arose. The minimum amount of power equipment is desirable from the standpoints of cost, weight and size.

For this transmitter we decided to go to the new Kenyon line. These transformers are compact, and include several multiple-winding transformers of desirable utility in minimizing the number of units to be employed. The first thought was to build both the r.f and a.f. sections of the transmitter in a single cabinet, but further thought showed the desirability of dividing the r.f. and a.f. sections into two distinct units—one for c.w. and both for phone. This decision made necessary a split in power supplies between the two cabinets, but called for the addition of but one, inexpensive filament transformer.

Par-Metal had a sufficiently diverse line of cabinets, panels and accessories to make the choice of these parts a simple one. Cabinets were available in one, two, three and four deck size (each deck accommodating a standard 8¾" high panel or equivalent) besides several sizes in the floor models. After it was found that the complete power equipment for the r.f. section could be accommodated on a single chassis, a three-deck cabinet was chosen for this section of the transmitter. As the complete audio section could also be nicely housed in a three-decker, another was used for this purpose. These two cabinets may be placed



Rear view of the "Commercial" r.f. unit chassis. The T-55 tube and its neutralizing condenser, C18, are located in the center.

either side-by-side on the operating table to form a matched-unit transmitter, or else placed one on top of the other to comprise a floor mounting cabinet. The audio section will be described next month.

The r.f unit is a complete c.w. transmitter in itself. It will take an input of 150 to 200 watts on all bands down to, and including, 10 meters. A universal antenna tuning panel is built in so that practically any antenna may be employed without the use of additional antenna tuning equipment.

Interlocking Control System

An interlocking a.c. control system is used for both transmitter sections that is worthy of mention at this point. Two control wheels will be seen mounted on the power unit panel. The one at the left controls the filament switch, while that at the right controls the plate switch. Similar filament and plate controls are mounted on the audio section power supply. An interconnecting plug-in cable joins the a.c. circuits of the two cabinets. In addition an extra a.c. socket on the back of the r.f. power chassis connects to an external remote control plate switch for the transmitter. This may be any type of s.p.s.t. switch mounted conveniently at the operating position.

The sequence of operation of this a.c. control system is as follows: The filament switch on the r.f. unit controls the entire transmitter; both filament and plate power. The remote-control switch, r.f. plate switch and a.f. plate switch are connected, successively, in series. The remote-control and r.f. plate switches then both control the plate power of both units, while the a.f. plate switch controls only the a.f. plate power. In this way it is impossible to leave the audio power on when the r.f. power is turned off, and, likewise, impossible to turn on the plate power of either section with the r.f. filament switch off. In this way the audio unit is automatically controlled from the r.f. unit switches when the two units are interconnected.

An extra a.c. socket is also mounted

Rear view of the AWR "Commercial" showing power supply at bottom, r.f. unit in the middle, and antenna unit at top. Additional coils also shown.

Rear view of the "Commercial" power-supply unit. Note compactness of layout.

on the audio unit. This makes it possible to use the audio unit to modulate the r.f. of some other transmitter, where the amateur already has a satisfactory transmitter minus audio equipment. With the a.c. line plugged into this extra socket the audio unit is an independent audio amplifier capable of furnishing an audio output of 100 watts by merely plugging in a crystal microphone and turning on the chin music.

The R. F. Unit

The design of the power supply for the r.f. unit is conventional except for the use of multiple-winding transformers for both filament and plate power. Looking at the power supply from the rear, the multiple plate transformer is in the center. It is laid on its side with the bottom mounting holes screwed to the panel. This transformer is a bit too high to be mounted in an upright position.

The two filter chokes for the high-voltage supply are at the left, up front by the panel. Immediately to the rear of these chokes are the two 2-mfd. 2000-volt filter condensers. Several feed-thru insulators safely conduct the high-voltage leads from the filter condensers through the chassis. Another feed-thru insulator, mounted just above the audio control socket, carries the high voltage. A flexible lead runs from this insulator to a stand-off insulator mounted under the r.f. chassis. The two feed-thru insulators on the back left edge of the chassis are for connection to the modulator output. When the r.f. unit is used alone, these are shunted with a jumper, as shown by the dotted lines in the schematic diagram.

The small transformer to the rear of the 866's is the filament transformer for these tubes. To the right of the power transformer and next to the panel is the multiple filament transformer. This supplies the filament voltage for the three r.f. tubes as well as the 5Z3 rectifier used for the low-voltage supply.

The remaining pieces of equipment at the right end of the chassis are the 5Z3, the low-voltage supply filter choke and the two 2-mfd. 1000-volt filter condensers for this supply. The connections on the back edge of the chassis may be identified from the diagram.

These two supplies provide voltages, under load, of 600 and 1200 volts at 200 and 250 ma., respectively. Condenser input is used on the low-voltage supply as this voltage would be too low with choke input. The bleeder resistor for the high voltage is mounted under the r.f. chassis as there is no air circulation for cooling under the power chassis. With the particular connections shown, this resistor is also across the audio output. This is of no importance as the resistor value is 50,000 ohms as compared to 8000 ohms r.f. load, placing only a slightly greater load on the modulator output. The surplus audio power available takes care of this. For the fastidious constructor, a separate lead may be run up to this bleeder.

No bleeder is used on the low-voltage supply as the drain on the 6L6 oscillator provides a sufficiently high minimum load.

The r.f. chassis, being a full 13 inches in depth, reaches all the way back to the rear door, as does the power chassis. The 7-prong connection socket is therefore mounted under the chassis, facing downward. It is placed in the rear corner, directly above the corresponding connection socket on the power chassis. The stand-off insulator (type 432) for connection to the 1200-volt lead is, as previously mentioned, also mounted under the chassis next to the feed-thru insulator which brings this voltage up to the r.f. choke for the final stage. This high-voltage lead and the 7-wire cable are the only interconnections between the power and r.f. units, providing a desirable simplicity of such wiring.

Oscillator and Buffer

There is no necessity of identifying the individual parts in the r.f. unit. The parts for each of the three stages are grouped closely together while the stages themselves are well separated. Two similar coil forms are shown in the oscillator stage. That nearest the end of the chassis is the plate coil, while the other is the cathode coil. The cathode coils are tuned with type 1BT-220 mica trimmers which are mounted inside the coils. The low r.f. voltage across this coil, and the characteristic broadness of tuning of this type of circuit, permit the use of a mica tuning condenser at this point. This condenser need only be set initially for the band in which its accompanying crystals operate and then may be forgotten. It is therefore foolish to waste a panel control for this condenser.

The tuning condenser for the plate coil is not visible in the photographs but is mounted under the chassis in a position to the front of the 6L6 tube and beside its plate coil, in a line such that its control knob on the front panel comes directly under the buffer tuning control wheel. The condenser is mounted upside down and screwed to the underside of the chassis at this point. An FC coupling and ¼" bakelite shaft of appropriate length brings the tuning to the front panel. A shaft bushing should be mounted in the panel at this point to insure smooth operation.

It will be noticed in the diagram that this oscillator tuning condenser does not connect directly across the plate coil, but goes through bypass condenser C8. The plate tank circuit of the oscillator is therefore composed of three components; L1, C7 and C8, all connected in series. As C8 is an integral part of this tank circuit, it should be mounted as closely as possible to L1 and C7 with appropriately short leads.

The plate circuit of the RK-25 has the same circuit arrangement as the oscillator, so that bypass condenser C14 is also a part of the buffer plate circuit. The mounting arrangement shown in the photos provides the shortest leads in this tank circuit. Three jack-type insulators are used to mount this buffer coil. The one nearest the panel is of the stand-off type (432J) and connects directly to the stator of the tuning condenser. The one at the center, also a 432J, takes care of the excitation tap to the T-55. More will be said about this tap later. The rear insulator is of the feed-thru type (4125J). The plate voltage for the RK-25 is connected to the underchassis

end of this insulator. The upper end of the insulator connects through C14 to the frame of tuning condenser C13. This provides leads as short as if C14 were not employed. The circuit arrangement here shown for both the oscillator and buffer plate tanks permit their tuning condensers to be mounted directly to the chassis and panel, a procedure which provides easier mounting and better grounding.

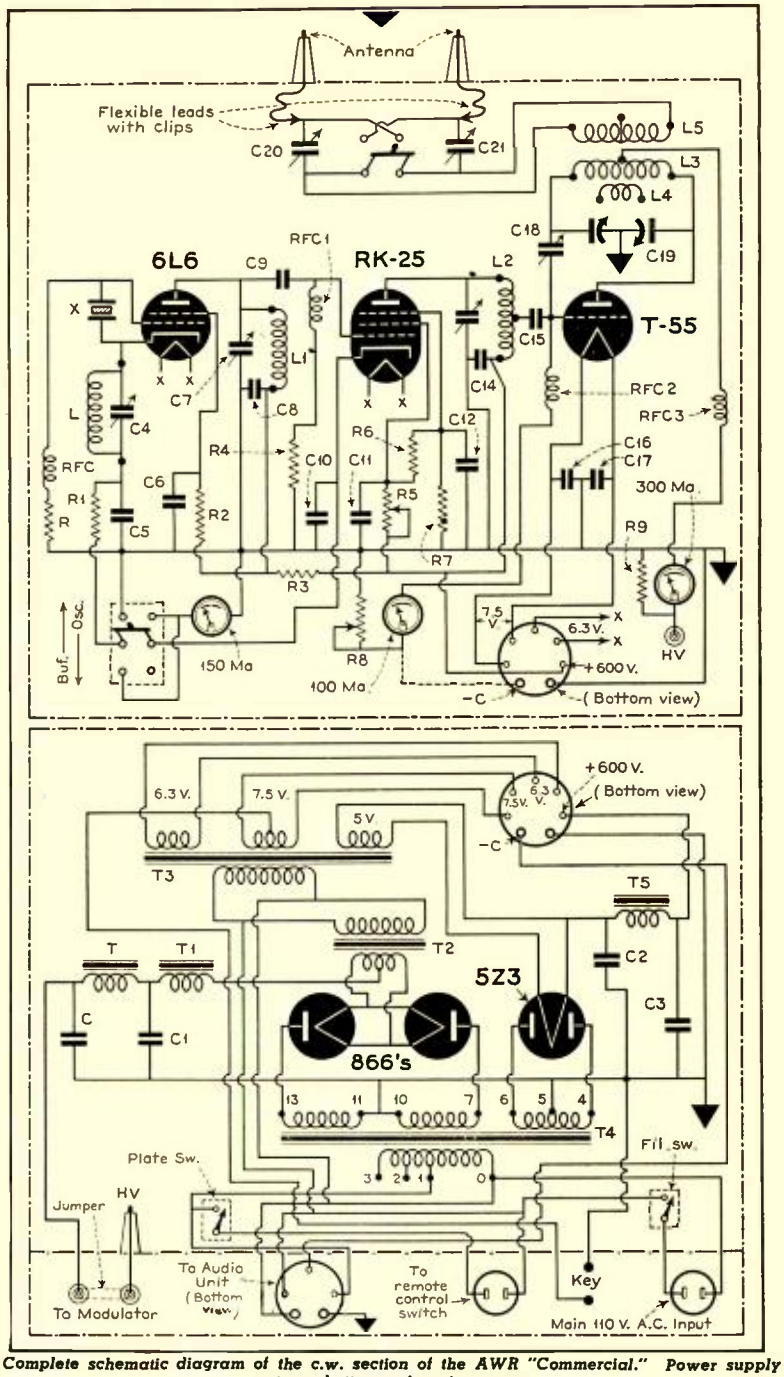
No fixed bias or cathode bias is used on the RK-25, simplifying the wiring of this stage. The parts list shows that the value of the grid leak, R4, is 50,000 ohms. This value of leak provided optimum operating conditions when the RK-25 was used as a doubler. This will be further discussed under notes on operation of the transmitter.

A d.p.d.t. switch is used to throw the 150-ma. meter (on right of panel) from the cathode circuit of the 6L6 to the cathode circuit of the RK-25. This is the same circuit that was used in the AWR 2-3 Exciter Unit and has the same advantages. When the switch is thrown to the "oscillator" position the meter is cut into the oscillator cathode circuit while the buffer cathode circuit is opened. This prevents any possibility of damaging the RK-25 with excessive out-of-resonance current while adjusting and checking the oscillator. When this switch is thrown to the "buffer" position the 6L6 cathode circuit is closed, leaving this tube on, while the meter is thrown into the RK-25 cathode circuit, this action automatically turning the buffer stage on. One other fact concerning the buffer stage should be mentioned here; screen resistor, R5, is specified as 15,000 ohms. A shorting jumper, shown in the diagram, reduces the effective value of this resistor to 12,000, a value which was found to be optimum.

The Final

The construction of the T-55 amplifier stage is conventional except for the plate coil mounting. A pair of short pieces of brass angle are screwed to the condenser frame, using the four screws holding the upper ends of the isolantite side pieces for this purpose. The mounting feet of the CI-6BTLM base are then in turn bolted to the tops of these angles. This method of mounting the plate coil furnishes an almost perfect electrical and mechanical layout for the amplifier stage. The particular method of antenna coupling used was taken into consideration when making this layout.

The r.f. wiring with this layout is extremely short and direct. The end of the plate coil nearest the T-55 goes down to the front stator connection of the plate condenser on this same side, the plate of the T-55 also connecting to this same point through a flexible lead. The other



Complete schematic diagram of the c.w. section of the AWR "Commercial." Power supply unit at bottom, r.f. unit at top.

end of the coil base connects to the rear stator on the opposite side. The side of the rear stator closest to the neutralizing condenser connects to the top plate of this condenser. The bottom plate returns directly to the T-55 grid.

Two other connections are made to this grid. One is the coupling condenser, C15, which connects to the center mounting insulator of the buffer coil. The other is an r.f. choke (RFC2) which returns directly to the grid meter. This meter is the lower one of the meter "triangle."

The plate choke, RFC3, is supported from a bracket on the back end of the plate condenser. The lower end of the feed-thru insulator leading to this choke goes to the HV standoff connection insulator (type 432) and the bleeder, R9, both of which are under the r.f. chassis.

The remaining meter on the panel, at the left (front view) is, of course, the 300-ma. plate meter. This arrangement of meters is the most logical in relation to the tuning controls, as well as the best in appearance. The two small knobs under the buffer and amplifier stage control wheels are for operation of the osc.-buffer meter switch and the oscillator plate tuning condenser, the switch knob being the one at the left of the panel.

Antenna Tuning Panel

The antenna tuning panel is almost identical with that used in the AWR 2-3 Transmitter. We have not, to date, discovered a more flexible arrangement. The same switch for throwing the antenna condensers from a series to a parallel position is used, but is mounted on a 3" x 7" hard rubber panel, which is in turn fastened to the backs of the antenna condensers. A simple method of insulating these condensers from the panel is used. The metal stand-off bushings customarily employed for mounting these condensers to the panel are replaced by type 430 insulators. These insulators are screwed to the condensers with headless 6/32 bolts, flathead 6/32's holding the insulators to the panel. 5/8" diameter holes permit the condenser shafts to project out to the control wheels without loss of r.f. The construction of the control wheels is such that it is impossible to burn the fingers when adjusting the antenna condensers.

The antenna coupling coil arrangement is more flexible than that of the AWR 2-3. In the latter antenna panel a single antenna coil was permanently fastened, the inductance being changed by shorting out turns with a jumper. In the present panel a type CI-6BTLM mounting base is fastened to the swinging brackets in place of the antenna coil itself. Using this base it is possible to plug in, as antenna coil, any Coto coil of either the B, BT or BTL series. This makes it possible to employ one of the amplifier plate coils as the antenna coil. The variety of coil sizes that may be used, and the fact that these coils may be tapped or shorted with clips without spoiling their appearance, make it possible to employ any desired inductance value in the antenna coil. The mounting brackets of the antenna coil should be placed 4" from the bottom of the antenna panel for maximum range of swing for this coil. Four small brackets form the swivel mounting for the coil base.

The antenna coupling system is made still more flexible by the use, in the amplifier plate circuit, of the new Coto series of BTL coils, which have link windings permanently placed in each coil. These links are of the proper size to

(Continued on page 272)

LIST OF PARTS FOR "COMMERCIAL"

AEROVOX
- 2—2000 volt, 2 mfd. filter (C-C1)
- 2—1000 volt, 2 mfd. filter (C2-C3)
- 9—.01 mfd. mica transmitting bypass (C5-C6-C8-C10-C11-C12-C14-C16-C17)
- 1—.00005 mfd. mica transmitting bypass (C9)
- 1—.00025 mfd. mica transmitting bypass (C15)

AMERICAN RADIO HARDWARE
- 1—type 1303 neutralizing condenser (C18)

BIRNBACH
- 16—type 4125 feedthru insulators
- 2—type 432J jack type standoff insulators (to mount buffer coil)
- 1—type 4125J jack type feedthru insulator (to mount buffer coil)
- 1—type 432 standoff insulator (HV post under RF chassis)
- 6—type 430 standoff insulators (to insulate antenna condensers from panel)
- 1—d.p.s.t. small porcelain mounted knife switch (antenna ser. par. sw.)
- 50 ft. roll of rubber covered stranded wire, for cables and power wiring.
- 50 ft. roll of No. 12 tinned soft-drawn wire, for RF and HV wiring.
- 50 ft. roll of No. 12 enam. soft-drawn wire for buffer coils.
- ½ lb. spool No. 22 enam. wire, No. 24 dsc and No. 18 dcc.
- Type 401 plugs for buffer coils (3 plugs per coil)

BLILEY
- Set of type HF2 and LD2 mounted crystals for operating frequencies desired.

COTO-COIL CO.
- 2—type CI-46 control wheels (pointer only, no scale)
- 5—type CI-47 indicator plates, No. 18, No. 19, No. 7, No. 12, No. 13
- 4—type CI-45 complete control wheels (with scales), with indicator plates No. 7, No. 13 and two No. 22
- 2—type CI-6BTLM mounting base
- Final amp. coils (L3-L4) are Coto "BTL" series (with link), type 160BTL, 80BTL, 40BTL, 20BTL and 10BTL. (See text)
- Antenna coils (L5) can be either B, BT or BTL series (see text)

HAMMARLUND
- 6—type S4 isolantite sockets, 4 prong
- 1—type S5 isolantite socket, 5 prong
- 3—type S7 isolantite sockets, 7 prong (large)
- 1—type S8 isolantite socket, octal
- 1—type MC-100-S tuning condenser (C7)
- 1—type MC-50-SX tuning condenser (C13)
- 1—type TCD-50-A tuning condenser (C19)
- 2—type MTC-150-B tuning condenser (C20-C21)
- 3—type CHX r.f. chokes (RFC-RFC1-RFC2)
- 1—type CH500 r.f. chokes (RFC3)
- Cathode and plate coils of oscillator use type SWF4 forms (L-L1)
- (For L2 coils see coil chart)
- 2—type FC shaft couplings

KENYON
- 1—type T168 250 ma. smoothing choke (T)
- 1—type T508 250 ma. swinging choke (T1)
- 1—type T360 2½V.10A. filament trans. (T2)
- 1—type T374 multiple fil. trans. 2.5V, 5V, 6.3V, 7.5V (T3)
- 1—type T654 multiple winding plate trans. (T4)
- 1—type T152 200 ma. smoothing choke (T5)

OHIOHM
- 1—10,000 ohm, 1 watt (R)
- 1—15,000 ohm, 1 watt (R7)
- 2—50,000 ohm, 1 watt (R4-R6)

OHMITE
- 1—500 ohm, 10 watt (R1)
- 1—50,000 ohm, 10 watt (R2)
- 2—5,000 ohm, 25 watt (R3-R8)
- 1—15,000 ohm, 25 watt (R5)
- 1—50,000 ohm, 200 watt (R9)

PAR-METAL
- 1—type SC-2613 3-deck cabinet
- 3—type 3679 8¾" x 19" aluminum panels, black crackle finish.
- 2—type SB-713 pairs of mounting brackets for chasses.
- 2—type 15212 chasses, 17" x 13" x 2"

RAYTHEON
- 1—type 5Z3tube
- 1—type 6L6 tube
- 1—type RK-25 tube

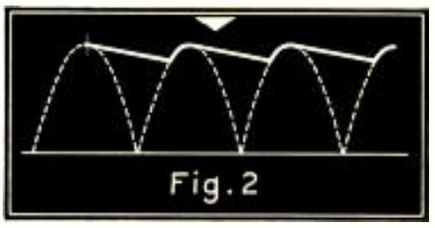
TAYLOR
- 1—type T-55 tube
- 2—type 866 tubes

TRIPLETT
- 1—2-inch bakelite case milliammeter with 0-100 scale
- 1—2-inch bakelite case milliammeter with 0-150 scale
- 1—2-inch bakelite case milliammeter with 0-300 scale

YAXLEY
- 1—d.p.d.t. rotary switch type 60 (osc.-buf. meter sw.)

MISCELLANEOUS
- 2—s.p.s.t. rotary toggle switches (fil. and plate sws.)
- 2—a.c. outlets (for 110V input and remote control connection)
- 2—binding posts (key connections)
- 1—5-prong wafer socket (for control cable to audio rack)
- 2—plate clips for 866's
- 1—plate clip for T-55
- 1—plate clip for RK-25
- 2—7-prong cable plugs
- 1—length of ¼" bakelite shaft
- 2—small knobs
- 2—panel bushings for ¼" shaft rubber grommets
- 1—piece of hard rubber 7" x 3" to mount antenna sw
- Buffer coils are mounted on 3" x ¾" hard rubber strips

A.C. RIPPLE IN POWER PACKS



Illustrating a.c. ripple produced by repeated charge and discharge of input condenser.

By Engineering Dept.
AEROVOX CORP.

CALCULATING the exact amplitude of the ripple at the input of the filter employed in power packs is a difficult procedure. Besides being dependent on the applied voltage and the current drawn by the load, the ripple is a function of the transformer characteristics and the rectifier resistance. Consequently, if the calculation has been based on one set of conditions including a given transformer and rectifier, the result would not be valid were a different transformer or rectifier used, even if the load and the applied voltage were the same.

The amount of ripple can be calculated for the hypothetical case of an ideal transformer and a perfect rectifier, i.e. when neither of the component parts have resistance or reactance. The results thus obtained are of course in error to a small degree, but the error is in the right direction; the ripple is actually smaller than the calculation would indicate, and if one designs a filter to give the desired attenuation for the calculated ripple, there is a margin of safety.

"Ripple Chart"

The chart of Fig. 1 shows the peak value of the fundamental ripple component for different values of load currents and input capacitances. Certain simplifications were assumed in deriving the equation for this chart, in order to simplify the calculation. When the filter is in operation, the condenser is charged to the peak voltage of the transformer secondary at each half cycle. Of course, the charge stops as soon as the peak has been reached. Thereafter, the condenser discharges through the load until the rising secondary voltage of the next cycle becomes higher than the condenser voltage. The condenser is then charged again to the peak voltage. The ripple consists of the repeated charge and discharge of the input condenser. This is illustrated in Fig. 2. When the load is a pure resistance, the discharge will be logarithmic but when a large enough choke is used, the discharge current will remain constant. The charge is not linear either but follows the top of a sine wave. For the purpose of this chart, it has been assumed that the charging period is very short and that the discharge current remains constant, making a saw-tooth wave-form.

Following these assumptions, the output of the rectifier is given by Terman as

$$E_e = \frac{E_{ac}}{1 + \frac{\pi X}{R}} \left\{ 1 + \frac{2X}{R} (\sin wt + \tfrac{1}{2} \sin w\,2t + 1/3 \sin 3\,wt \ldots) \right\}$$

where E_e is the voltage across the input condenser of the filter, X is the reactance of the condenser, E_{ac} is the peak voltage of the transformer secondary and R is the resistance of the load plus the resistance of the filter chokes.

In this equation the second term represents the fundamental component of the ripple voltage and the first term represents the d.c. voltage. Therefore, we can write:

$$E = \frac{2X}{R} E_{ac} = \frac{2\,XIR}{R} = 2\,XI$$

where E is the peak ripple voltage across the condenser and I is the direct current drawn by the load.

It is also possible to calculate the peak current of the fundamental ripple component passing through the condenser. This current, I_e is found to be

$$I_e = \frac{E}{X} = \frac{2\,XI}{X} = 2I$$

(Continued on page 277)

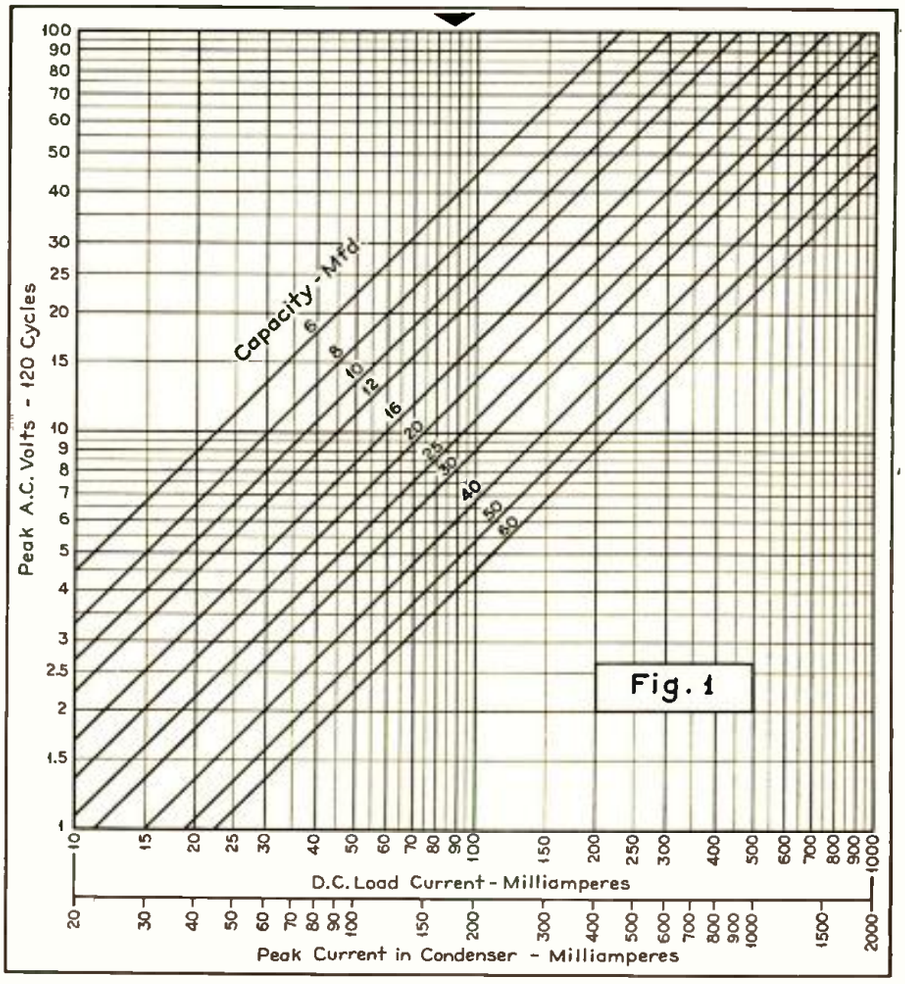


Chart from which may be determined the peak value of a ripple component for different values of load currents and input capacities. Based on use of full-wave 60-cycle rectifier; 120-cycle a.c. ripple.

THE "FLEXIBLE 400"

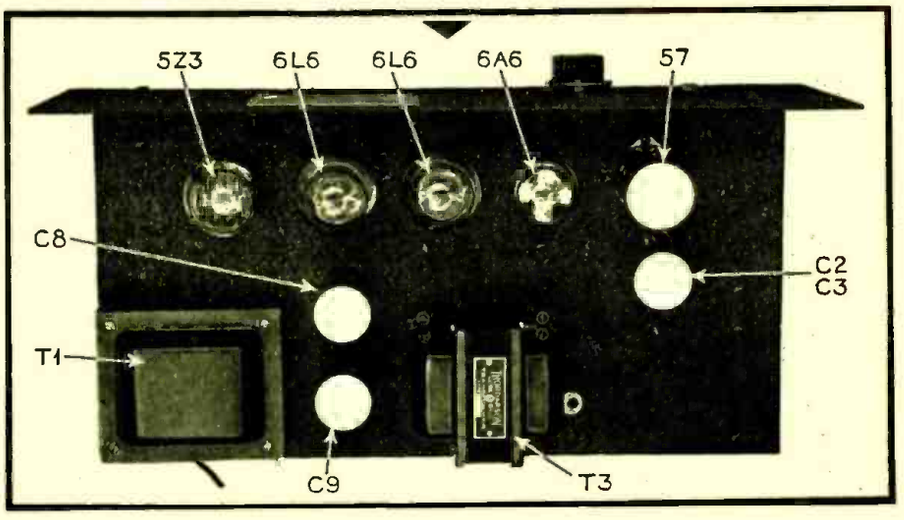
BY HARRY LAWSON • W2IER

IN connection with the experimental work carried on over a period of years by the Garden City Radio Club, the need for an almost universal type of modulator for use with all types of transmitters having not more than 50 watts input to the final stage, has been thoroughly recognized. Practically every type of modulator has been tried at one time or another, and the unit which was chosen for use in connection with the "Flexible 400" Transmitter was selected after thorough consideration had been given to many other types.

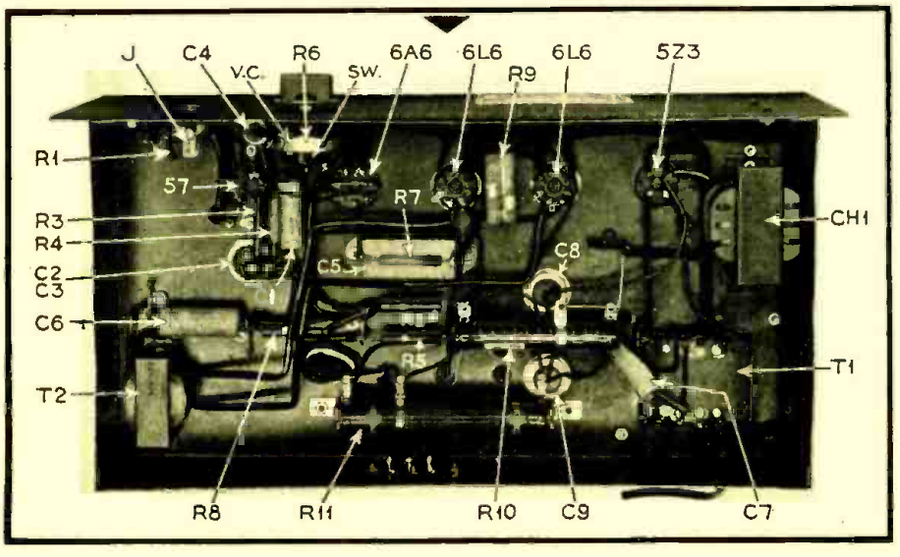
Incorporating "Quality"

Reference to the circuit diagram, the upper and lower views of the completed unit and the parts list, will indicate to the more or less experienced constructor that there is no crowding of elements in the completed job, but this superficial examination will not disclose the many ramifications of this unit. It will be noted that resistors and capacitors have been used in which more than ordinary safety factor has been incorporated. The desirability of constructing transmitters with due care for their continued performance will be made evident by the fact the "Flexible 400" has been on the air almost continually since it was built and with the single exception of the break-down of a short length of high tension cable, not another interruption has occurred.

Cards and letters by the hundred have come to the Garden City Radio Club from practically all parts of the world, and the consistency with which the transmitter is heard throughout the Western United States and all parts of Europe is quite out of the ordinary. A more detailed report on this matter will be made the subject of another article. It is significant, in passing, to mention that nearly all of the reports coming from stations a great distance away indicate that the 10-meter signal received is of greater intensity and has better quality than any other 10-meter station in this country. One of the contributing factors to this high quality of speech is the Speech Amplifier we are about to describe.



The complete speech amplifier. This is the top side view of the upper panel in the modulator unit. It incorporates a pair of 6L6 tubes in the output and delivers approximately 30 watts of Class A audio.



Under-panel view of the speech amplifier. Simplicity of design and neatness of construction are so apparent from this view that no further comment is necessary.

The terms "speech amplifier" and "modulator" may be somewhat confusing to the novice and we may clarify the situation by saying that if the present unit is employed to modulate any transmitter of less than 50 watts input the unit is considered as a modulator. If, on the other hand, it is used to amplify the speech from the crystal microphone to a sufficient level to operate a more powerful modulator, such as is necessary with transmitters like the "Flexible 400" which has been designed for 400 watts input to the final stage and which actually operates on 500 or more watts, the unit we are now describing is called the "speech amplifier" and the succeeding stage, which incorporates the RK-31's, is then considered the "modulator."

Selection of Tubes

Rather than go into details regarding the actual construction of this unit, we feel that a discussion of the reasons for the selection of certain parts which have been used in producing it is more desirable. It will be noted, for instance, that the output stage comprises a pair of glass 6L6 tubes. Practically no difference was evident in operation between these glass tubes and the standard metal 6L6's. These tubes are run push-pull Class A and they will deliver approximately 15 watts of extremely good audio quality. It will be observed that there is but a single control on the speech amplifier unit and that is the gain control. The square chart frame which is shown on the front panel is used for a tabula-

SPEECH AMPLIFIER

tion of the meter readings and the condenser settings of the transmitter for operation on various frequencies.

The final selection of tubes for this unit has been a single 57 resistance coupled to a 6A6 which in turn is transformer coupled to a pair of 6L6's in push-pull. Consideration was given to the use of a 6F5, resistance coupled to a 6C5, in turn transformer coupled to a pair of 6C5's which were finally transformer coupled to a pair of 6L6's. Another tube combination was a 6C5 resistance coupled to a 6J7 with push-pull resistance coupling to a pair of 6L6's. The combination actually used in the transmitter is thought to be ideal and it will be observed that the number of tubes is very definitely limited but the output of the completed unit is more than ample for the job it is intended to do.

Parts for Speech Amplifier

AEROVOX

1—5 meg., ½ watt (R1)
1—3,000 ohm, 1 watt (R2)
1—1 meg., 1 watt (R3)
1—250,000 ohm, 1 watt (R4)
2—10,000 ohm, 1 watt (R5-R8)
1—1,000 ohm, 1 watt (R7)
1—150 ohm, 20 watt, wire wound (R9)
1—350 ohm, 50 watt, wire wound (R10)
1—25,000 ohm, 100 watt, wire wound with adjustable tap (R11)

AMERICAN RADIO HARDWARE

1—3-terminal output strip

CORNELL-DUBILIER

2—10 mfd., 25 volt electrolytics (C1-C5)
1—dual 8 mfd., 400 volt electrolytic (C2-C3)
3—.01 mfd., 600 volt tubular paper (C4-C6-C7)
1—dual 8 mfd., 600 volt paper (C8-C9)

INTERNATIONAL RESISTANCE

1—500,000-ohm volume control with a.c. switch (R6)

NATIONAL

2—octal sockets
1—6-prong isolantite socket
1—4-prong isolantite socket
1—7-prong isolantite socket
1—type T58 tube shield for 57
1—type R-100 r.f. choke
1—type HRO knob, 0 to 10 degrees
1—size C chart frame

PAR-METAL

1—type 15210 chassis, 17" x 11" x 3"
1—type 3604 panel, 8¾" x 19"

RAYTHEON

1—type 57
1—type 6A6
2—type 6L6G
1—type 5Z3

THORDARSON

1—type T-7547 power transformer (T1)
1—type T-5740 input push-pull transformer (T2)
1—type T-8458 output push-pull transformer (or type T-6140; see text) (T3)
1—type T-7549 filter choke (CH1)

YAXLEY

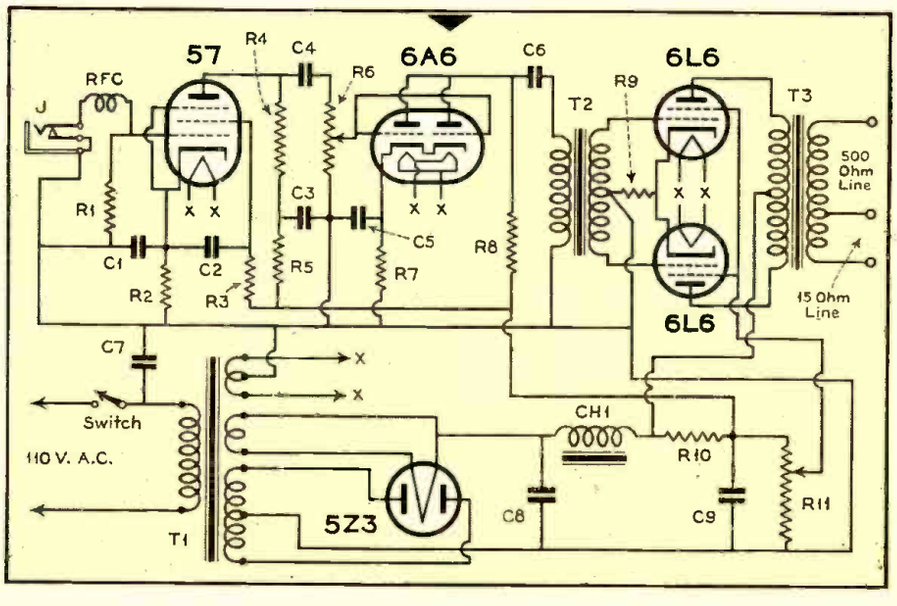
1—closed-circuit jack (J)

Additional Flexibility

In connection with the first and second articles in the series describing the "Flexible 400" attention has been called to the fact that the complete transmitter is made up in three distinct sections, namely, the Radio-Frequency unit, the Radio-Frequency Power Supply, in its individual steel compartment, and the Speech Amplifier and Modulator with their power supplies in a third steel housing. It may be desirable, in some instances, to separate the Speech Amplifier from the Modulator so that the heavy equipment used in connection with the modulator stage may be set up at a point somewhat remote from the receiving location.

Due consideration was given to this possibility and the unit, as illustrated, feeds the output of the 6L6's into a transformer which has a 500-ohm output. Therefore, it is only necessary to use a transformer with a 500-ohm input for the feeding of the Class B Modulator stage, and the distance between these two transformers can be several hundred feet, if desired. We have found Giant-Killer Cable to be an ideal line for the coupling of these transformers when the transmitter is operated in this manner. Of course, this arrangement means that a separate housing should be provided for the Speech Amplifier unit, in which case the Modulator assembly can be mounted in a steel cabinet exactly the same size as that used for the Radio-Frequency Power Supply.

We have, therefore, three distinct types of services for which the Speech Amplifier may be used. First, it may be used as the modulator for any transmitter up to 50 watts input. In that case the transformer, T-3, will have to be a unit which will couple a pair of 6L6's to whatever impedance will be found in the plate circuit of the final stage of the radio-frequency portion of the lower powered transmitter. Secondly, the 6L6's can be coupled directly—through a suitable transformer—to the input of the RK-31's, thus cutting down the actual cost of construction and somewhat simplifying the wiring. In this instance the coupling transformer, which would still remain T-3, could be placed as shown, or it could be placed on the deck of the Modulator. Thirdly, the ouput of the 6L6's may be put through a transformer designed to couple to a 500-ohm load, which is used in conjunction with another transformer designed to take a 500-ohm load in the primary and match whatever the input impedance of the higher powered modulator stage may be.



Complete schematic diagram of the speech amplifier for the "Flexible 400." The parts values are given in the list on this page.

FOREIGN DX ON THE "X" BAND

BY E. L. PETERS

PREVIOUS issues of ALL-WAVE RADIO have contained considerable data on airport beacons, weather stations, etc., but relatively little on the possibilities of European DX on the long-wave band. To the uninitiated, the heading of this article may seem a bit optimistic, but excellent foreign DX not only is possible, but a daily feature at this listening post in Nova Scotia during the fall, winter and spring months.

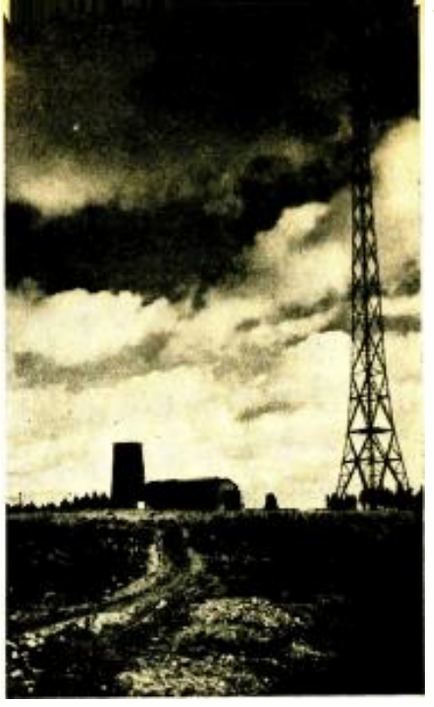
Roughly this spectrum includes everything on the real low frequencies—above the broadcast band. The upper end, 280 to 400 kc., is more or less monopolized by previously mentioned airport and weather stations, but from 280 to 150 kc. little, if any, interference is experienced. QRM from other broadcasters is practically non-existent. The only exceptions to this are found on 160 kc., with Hilversum No. 1, Holland and Radio-Romania, and on 208 kc., shared by Reykjavik, Iceland and Minsk, U.S.S.R. In both instances, the more distant ones sign early, thus leaving clear channels. The excellence of signal strength of broadcasters more than compensates for the slightly higher noise level of this band. The high quality of signals and programs makes DX'ing a real pleasure.

Stations Heard

The following list of long-wave transmitters is by no means complete—it is quite possible that many more can be tuned in. A recent issue of this magazine listed about thirty Soviets, as operating on this band. The more important ones, logged regularly, are:

K.C.	Name—Location	K.W.
153	Kaunas, Lithuania	7
160	Hilversum No. 1, Holland	100
160	Radio-Romania	150
166	Lahti, Finland	150
172	Moscow No. 1, U.S.S.R.	500
182	Radio-Paris	80
191	Deutschlandsender, Germany	60
200	Droitwich, England	150
208	Minsk, U.S.S.R.	35
208	Reykjavik, Iceland	16
216	Motala, Sweden	150
224	Warsaw No. 1, Poland	120
232	Radio-Luxembourg	150
240	Kalundborg, Denmark	60
248	Kiev No. 1, U.S.S.R.	—
260	Oslo, Norway	60

No less than fourteen foreign countries are represented in the above list. This, and the wide variety of available programs, should certainly stimulate long-wave listening. Programs in English are heard occasionally. Radio-Luxembourg broadcasts many commercials, arranged by Wireless Publicity, Ltd., London; the Soviets, with the usual propaganda in many languages, including English. In the early part of the season, Moscow carried the same programs as RNE and RAN, on short waves. Minsk and Kiev also handle many Moscow features.



Unique view of the broadcasting station at Lahti, Finland.

These signals are not mere whispers—many of them are R8 to R9. To readers who may doubt the ability of these transmitters to carry beyond the Atlantic Coast, let me assure them that some have been verified as far inland as the Middle West. A correspondent in Newfoundland writes me that they are audible throughout the summer months. Only recently and after a very sketchy try-out, two prominent American DX'ers were so enthusiastic over the potentialities of this band, that they immediately returned their expensive custom-built jobs to the manufacturer for the inclusion of long-wave coils.

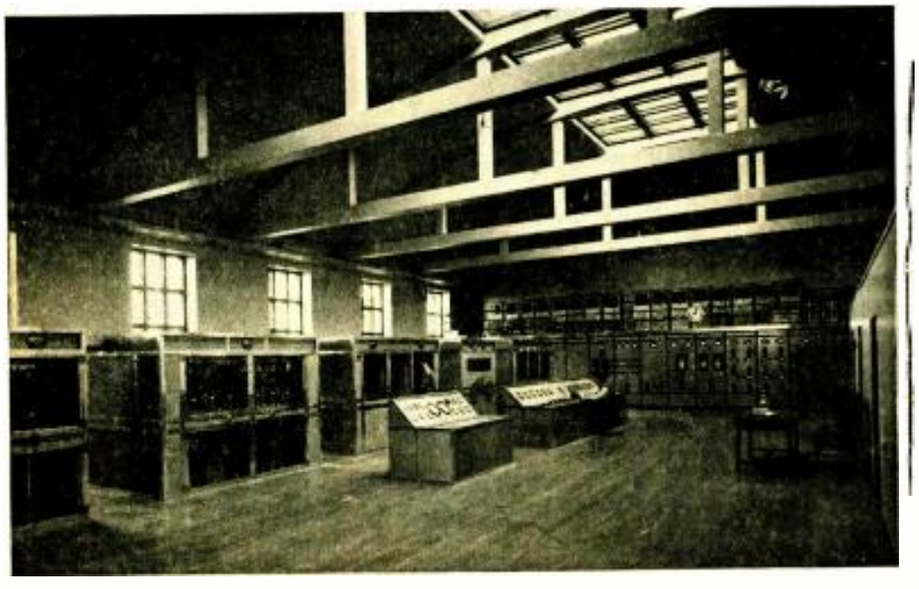
Times Heard

As in the case of medium-wave Europeans, these signals are heard twice daily—late afternoon or early evening and early morning, with best reception during the former period. This is probably due to the higher noise level in the morning hours.

A few have been heard as early as 2:00 P.M., E.S.T. carried until 7:45 P.M., in some cases. As a rule, the majority have disappeared before this time—the more distant ones signing first. Apparently, nearly all run later on Saturdays, usually with late dance programs. These make fine verification material. Radio-Paris, Oslo, Motala, Warsaw, Reykjavik, Luxembourg and Hilversum are in this class.

Moscow invariably signs at 7 P.M. and returns at 9:30 P.M. for a brief stay. Droitwich, the only BBC on this band, is off at 7 P.M. with "Big Ben" striking midnight, and the National Anthem. This conforms with the usual schedules of their medium-wave transmitters.

(Continued on page 279)



An interesting view of the transmitter room in the new broadcasting station at Lahti, Finland—one of the "X" Band stations.

Channel Echoes

By Zeh Bouck

pillosopher . . . televisionary . . . verily veries . . . european tricks

DOC BRINKLEY continues to smuggle his homilies and good precepts across the Rio Grande via XERA and XENT. His transitions from philosophy to pillosophy are veritable marvels of ingenuity. He can slide from the Lord's Prayer to a bad case of hemorrhoids and the Brinkley Hospital with the deftness of Boake Carter tying up the discovery of a new comet with the Philco automobile radio!

The Doc is beyond doubt the world's champion marathon broadcaster. He is on all night—starting around 8 P. M. and signing off about 6 A.M.—switching from one station to another with barely time to gasp a breath. Is it really Dr. John R. Brinkley—this ubiquitous murderer of the American language from his Mexican sanctuary? If so—when does he find time for his "surgical technique?" Somehow, we'd hesitate to trust our favorite prostate to the perhaps trembling digits of a medico who had been up all night, at least six nights a week, for the past six months.

◆

SPEAKING OF XERA, we wonder when the American chains are going to grab Tillie and Milly—two flowers of harmony blossoming in that dung-hill of rotten ethics and putrid advertising. These girls harmonize like pastel blues, and what they can do to the simple ballad and cowboy song would wring tears from Simon Legree. Listen to them some night—on XERA or XENT—they're worth suffering for.

◆

AS BILLY SUNDAY used to sing—"Brighten the corner where you are—television may be just around it."

Once again we show that ancient art in one of its previous reincarnations—vintage 1928. One gazed hopefully through the window in the upper center and saw all sorts of things with zig-zags of dull red light predominating. The effect can be duplicated (if you want to know what television looked like a decade ago) by closing the eyes, placing the balls of the thumbs against the balls of the eyes, and exerting a pressure of about fifty pounds to the square inch. Occasionally an image could be seen—the fringey call letters of the broadcasting station, or an equally fringey head and shoulders. This would float with varying degrees of rapidity across the field of vision, and disappear in parts or wholly like the Cheshire cat. The upper right-hand control was for synchronization—to keep the image where it belonged. However, this was usually accomplished far more satisfactorily by the rule of thumb—i.e., by placing the thumb against the periphery of the scanning disk as a light brake. You could always tell a television engineer of a decade back by the callous on his right thumb.

As Gracie Allen might put it—"Little Jack Horner sat in a corner—inventing television."

◆

W. L. DIVER, Radio Signal Survey League station W5F1, registers a complaint against The Radex Press, Philadelphia, Pa., which organization, in sponsoring a "mystery dx contest," over various stations, soaks the listener ten cents for a verification. The station in particular was CFCO, Chatham, Ontario, Canada. Mr. Diver asks—"Have rackets embraced the field of radio?" Has Mr. Diver by any chance ever heard of a box top . . ? . . a label . . ? . . a wrapper . . ? . . a carton . . ? . . a reasonably exact facsimile thereof?

Apparently Mr. Diver rightly indicts the sponsor rather than the broadcasting station—though a station is certainly responsible to a large extent for the material they broadcast. As far as verifications go—veries from the stations themselves—we do not consider it unreasonable to charge for them on a non-profit basis. The time is rapidly approaching when, if the listener wants a verification, he will have to pay for it. The high cost of verifications is quite a problem and is the reason why so many stations have discontinued sending them. For instance, take HRN, a small 500-watt station located in Tegucigalpa, Honduras, Central America. They sent veries until they estimated that it would cost the station $3,000 a year to continue the practice! Personally we wouldn't pay a cent for a verification. We don't possess a verie—we've never written for one. On the few occasions we've had to write to a broadcasting station, the subject matter has hardly been such as to stimulate verification. We simply are not interested in veries. However, were it our hobby—did we prefer them to wall paper, or Japanese prints and fine etchings, we'd doubtless be willing to pay from 10 to 25 cents for one, just as a philatelist would be glad to fork over a similar sum for an unwatermarked red surcharged five centime stamp from French Indo-China. (When the time comes that veries are really worth money, we'll go in for them in a big way. We've a friend who, up to four years ago, made the finest Johnny Walker black labels ever printed this side of Scotland.)

"Brighten the corner where you are—television may be just around it." An early receiver that picked up the pix.

◆

GETTING BACK TO the migrating medicos—those enterprising curists who find it safe to broadcast from Mexican soil. Norman Baker, when not soliciting funds for a new hospital supplementary to his institution in Muscatine, Iowa, is selling a batch of battery radios cheap. These are fully guaranteed—whether that means anything or not. Mr. Baker also guarantees a cure for cancer.

◆

SOME OF OUR European short-wave transmitters, with a half dozen or so channels, have the annoying habit of dropping a transmission in the middle of a program, and without warning. They shift frequency with no more formality than breaking a treaty.

(Continued on page 278)

A. C.–D. C. MIDGET FOR 56 M. C.

BY GEORGE B. HART • W8GCR

WE'VE seen and heard some darn good receivers, but we've never heard a more sensitive super-regenerator for 56-megacycle reception, nor seen a better-looking or more compact job than the one illustrated. Designed to meet several requirements which have always seemed desirable, the finished receiver filled the bill to everyone's satisfaction, for it combined small size with complete a.c.-d.c. operation.

Design Requirements

When we first started work on the design we decided it must be small enough to fit into the glove compartment of our Chevrolet, yet be suitable for either fixed-station or portable operation. But battery operation of the plates and heaters was decided to be impractical for the small space available, and too costly anyhow. As a result we turned to a.c.-d.c. Excellent volume, enough to operate a magnetic speaker, controllable super-regeneration and good sensitivity were also on our list.

Special precautions are of course necessary in order to have satisfactory operation from either a.c. or d.c. lines. We found that the cure for objectionable hum was thorough filtering and short connecting leads. A 30-henry choke and 50 mfd. of filter capacity effectively eliminated all but a very minute amount of the hum during a.c. operation of the set.

A 6J7 was given preference over a 6C5 as detector after it was found that a screen-grid tube permitted more completely controllable super-regeneration. Then, too, a screen-grid tube provides greater gain than does a triode. The 6J7 has been both stable and sensitive, driving the 12A7 sufficiently on nearly all signals to operate a magnetic speaker.

The Circuit

The circuit itself is entirely orthodox. A 12A7 is used as high-voltage rectifier and pentode audio output. It does a good job and the small amount of hum present in the set is undoubtedly only the inter-element pick-up in this tube.

The panel controls are only three in number and are, from left to right: super-regeneration control, tuning control, and line switch. Operation, then, is simple and straightforward. A look at the chassis shows that the layout is unusual but simple, and arranged for functional placement of parts. As can be seen from the chassis photo, such a layout of parts permits short leads (for instance, note the gridleak-condenser connection between the stator of the tuning condenser and control grid of the 6J7) and a natural-sequence hook-up. Aerial and ground connections are made to a terminal strip at the rear of the chassis while the 12A7 output to speaker is made at the front, directly beneath the tuning dial. A standard speaker outlet was found to be ideal for this.

Wiring

A detailed description of the construction of the receiver is unnecessary as the builder can readily reproduce this job by carefully studying the photographs and diagram and then proceed to mount and wire the parts. As long as it is remembered that all leads should be kept as short as possible and that all condensers and resistors of any one circuit should return to a common ground, no difficulty in construction will be experienced.

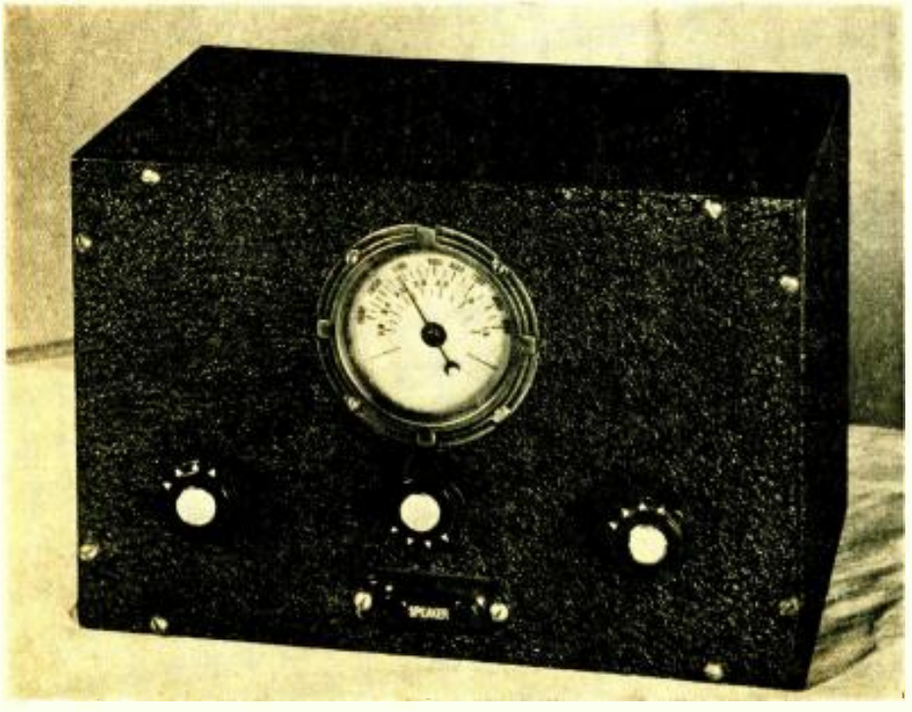
Make well-soldered connections with a hot iron and rosin-core solder. Several times in the past we have experienced excessive hum and poor operation from ultra-high frequency receivers that was eventually traced to poorly soldered connections. And again, a lot of solder on a joint does not necessarily indicate that you have a good connection electrically. Mechanical strength and electrical efficiency should go hand-in-hand for best results.

Mounting the Parts

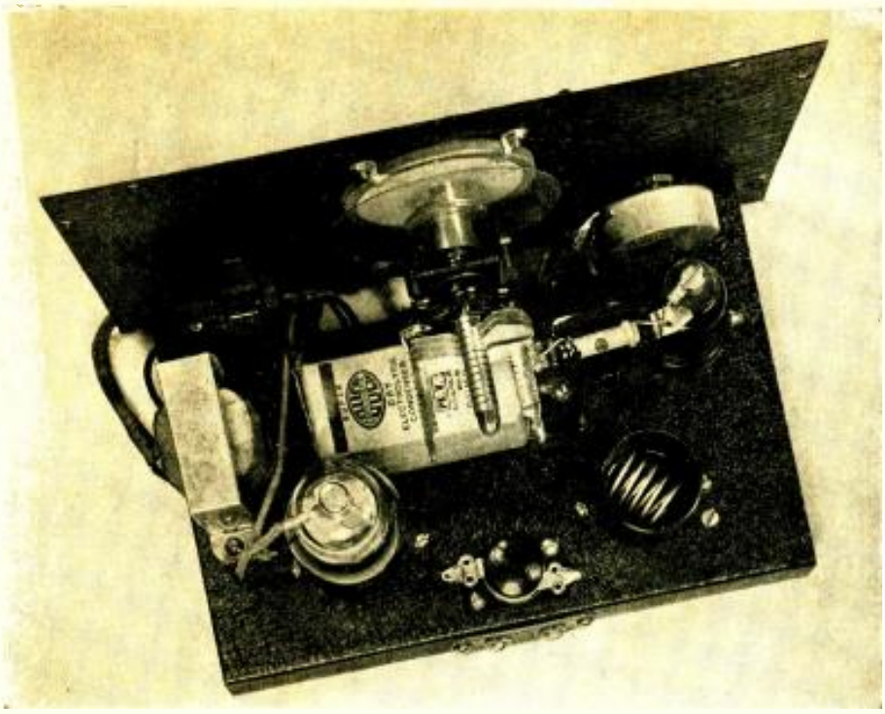
Mount the tuning condenser, C, on a small bracket of steel fastened to the chassis. An extension can then be used to lengthen the rotor shaft to the dial on the panel. It should be noted that *the chassis is a common ground for the receiver circuits but is separated from the external ground connection by C4, a 0.1-mfd. fixed condenser.*

The antenna coupling condenser, C1, may consist either of a commercially available 4-35 mmfd. variable condenser, or one may be made of two right-angle brackets about ⅛" apart and ¾" square. Bending one of these will permit the slight variation in coupling necessary to adjust the receiver so that it will pull out of super-regeneration when the control is set at the half-way position. Too much capacity at the antenna will prevent super-regeneration.

The radio-frequency choke, RFC, consists of 75 turns of No. 30 enamelled copper wire wound on a ½" dowel pin. This choke should preferably be mounted beneath the chassis to prevent a.c. pick-up from the filter choke, Ch, as well as interaction with the tuning coil L. The r-f choke is supported at right angles to



The midget a.c.-d.c. receiver designed for operation in the 5-meter band. By winding an additional coil, it will also make a good 10-meter receiver.



Above: Chassis view of the 5-meter receiver, showing location of parts. Below: The schematic diagram.

the tuning coil by soldering lugs screwed to the two ends of the dowel pin.

Plug-in coils were used to permit reception on ten meters as well as on five. Self-supporting coils were mounted in tube bases and proved very effective. The five-meter coil is shown in the photo and consists of five turns of No. 14 wire wound on a 5/8" diameter former; the ten meter coil consists of 7 turns of No. 22 bare copper wire, space-wound to cover a space of 3/4". The five-meter coil is tapped at the second turn, the ten-meter coil 1½ turns up from the bottom. It may be necessary to adjust the tap on the five-meter coil.

Any wire can be used for an aerial, even values up to several hundred feet. For best results we recommend a twelve-foot length of the wire such as used with midget a.c.-d.c. receivers; such a length then provides a quarter-plus-a half-wave antenna.

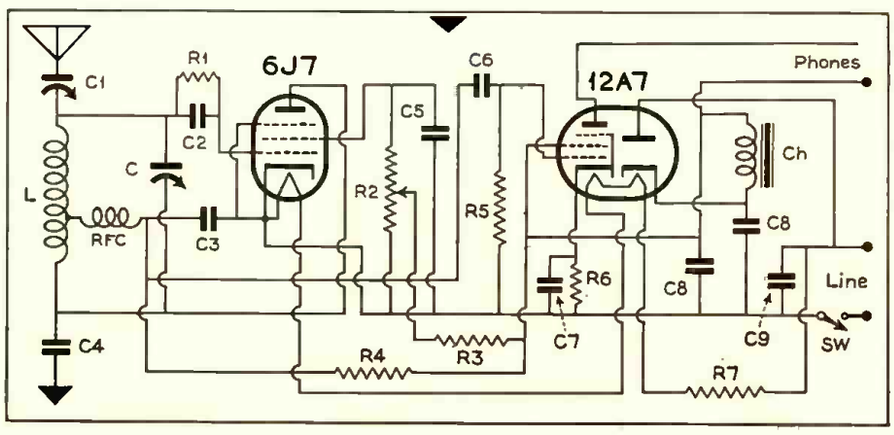
Operation of Receiver

In tuning, adjust the antenna tuning condenser, C1, for maximum hiss with the super-regeneration control, R2, three-quarters of the way advanced. Now tune for some signal in the band. Good phone signals will reduce the hiss to practically zero and excellent volume may be expected throughout the band, with no dead-spots, if the antenna tuning condenser is properly adjusted.

This set has worked a loudspeaker in a most satisfactory manner over distances of ten miles under the most adverse operating conditions. In many instances we were located in hotels in the metropolitan areas of large cities.

List of Parts

C—25 mmfd variable condenser
C1—35 mmfd variable condenser (4 mmfd min.)
C2—.0001 mfd fixed condenser
C3—.006 mfd fixed condenser
C4—0.1 mfd fixed condenser
C5—0.1 mfd fixed condenser
C6—.01 mfd fixed condenser
C7—10 mfd, 25 volt electrolytic
C8—Dual 25 mfd filter condenser
C9—0.1 mfd fixed condenser
R1—1-megohm, 1/2 watt resistor
R2—50,000-ohm potentiometer
R3—1-megohm, 1 watt resistor
R4—50,000-ohm, 1 watt resistor
R5—1-megohm, 1/2 watt resistor
R6—1000-ohm, 2 watt resistor
R7—Line cord with built-in 330-ohm resistance.
CH—30 henry, 40 mil filter choke
1—6J7 tube
1—12A7 tube
1—2-inch dial
1—Rotary type switch (SW)
1—7-prong wafer socket
1—Octal wafer socket
2—Control grid clips
1—Speaker outlet
1—Ant.-Gnd. terminal strip
1—Metal cabinet, 9 by 6 by 5 inches



Book Review

Hints on Short Wave Reception

To simplify the somewhat different operations of the short-wave feature of the modern all-wave radio set, as well as to explain in popular language just how the short waves differ from the more familiar broadcast frequencies, the Electrical Division, Bureau of Foreign and Domestic Commerce, has made available *"A Guide to Reception of Shortwave Broadcasting Stations."*

The publication was written by Lawrence C. F. Horle, a prominent Radio Engineer, working in cooperation with the Engineering Division of the Radio Manufacturers Association for this purpose.

This booklet, the foreword states, provides a simple exposition of the basic phenomena involved in the transmission of short-wave radio signals as used in broadcasting. It will assist the users of short-wave radio receivers to receive such programs as are available with minimum effort and greatest satisfaction and will aid the avoidance of futile searching for programs not available because of location or other factors.

Since there are available throughout the nation competent radio service experts, it makes no attempt to instruct the user of short-wave radio receivers in the intricacies of the servicing of receivers. And since the design and production of the modern short-wave receivers require the highest type of scientific and engineering skill, it attempts to provide no constructional detail whatsoever except such suggestions as will assist the user in providing himself with a suitable receiving antenna, it was stated.

By studying the contents of this booklet and following the brief instructions therein the user of the short-wave receiver will assure himself of getting the most out of his receiver and enjoying to the utmost a choice of the world's radio broadcasting.

Sections are devoted to installation of the set, to the characteristics of short waves, difference in time, a list of the principal short-wave broadcasting stations of the world, a list of the international assignments of call letters, and instructions as to tuning receivers. A time zone map of the world and a chart of the world showing great circle distances and azimuths from Washington, D. C., are also given, both by courtesy of the Navy Department's Hydrographic Office.

The publication will be sold through the offices of the Bureau of Foreign and Domestic Commerce in Washington and in other principal cities at 25 cents a copy.

Globe Girdling

By J. B. L. Hinds

more venezuelans . . . ecuador mix up . . . official peru list . . . french fones . . . new african catch . . . rv15 veries . . . spanish custom

IT wouldn't be a bad idea if the R.S.S.L. were to appoint a group of Radio Detectives to track down clues to station identities. If there were such a group, they would find themselves hard put at times, unless they were particularly adept at analyzing circumstantial evidence.

As a case in point, we were recently taken over the coals for garbling a station call, when the truth of the matter was that there were two stations involved rather than one. These stations were XEBT and XEFT, *one in the 30-meter band and the other in the 49-meter band, but both using the cuckoo call and a siren as means of identification.* The result has been confusion and hot words.

This demonstrates that you can't believe what you hear unless positive identification is made by the station call. Since these are not always readily deciphered, unless one is well acquainted with the language used, the poor listener is up a tree.

Radiophone and Experimental Stations

WCT, 13410 kc., WCU, 9940 kc., and WDF, 7670 kc., all located at San Juan, Porto Rico, have been added to station lists. David A. Brown, Production Manager, Radio Corporation of Porto Rico, advises that these phones operate on the frequencies shown, each with 400 watts power. Their address is P.O. Box 1414, San Juan, P. R.

VK9MI, 6010, kc. S. S. "Kanimbla" heard by Cycle Criswell, Phoenix, Arizona, at 7:10 A.M., E.S.T.

ZMBJ, 8840 kc., T. S. S. "Awatea," heard by W. E. Blanchard, Bangor, Me., conversing with VLZ, 9760 kc., between 6 and 7 A.M.

"Radio Eritrea," Asmara, Eritrea, heard by R. Simpson, Australia, on approximately 8910 kc. Opens at 10 A.M. with musical program and closes at 11 A.M. with the Italian National March.

JVD, 15860 kc., Nazaki, Japan, heard by John L. West, Cleveland, signing off with XOJ, 15800 kc., Shanghai, at 11:40 P.M.

FVA, 8960 kc., Alger, Algeria, heard

NEW STATIONS

KC	Meters	Call	Location
18776	15.98	TYD-3	Paris, France
11960	25.08	HI2X	Ciudad Trujillo, R.D.
11740	25.55	RKF	Moscow, U.S.S.R.
11718	25.60	CR7BH	Lourenco Margues, E. Africa
10680	28.09	PLQ	Bandoeng, Java
10430	28.76	TYE-3	Paris, France
9940	30.18	WCU	San Juan, P.R.
9840	30.47	FYC-2	Paris, France
9600	31.25	XEYU	Mexico, D.F.
9565	31.36	YV3RB	Barquisimeto, Venezuela
9562	31.38	OAX4T	Lima, Peru
9550	31.41	HI5E	Ciudad Trujillo, R.D.
9490	31.61	EAQ-2	Madrid, Spain
9450	31.75	———	Fort de France, Martinique
9440	31.78	HCODA	Guayaquil, Ecuador
9345	32.10	HBL	Geneva, Switzerland
9037	33.19	TYA-2	Paris, France
8075	37.15	TYB-2	Paris, France
7700	38.96	TYC-2	Paris, France
7670	39.11	WDF	San Juan, P.R.
7650	39.22	TYE-4	Paris, France
7203	41.64	EAJ	San Sebastian, Tenerife, C.I.
6675	44.94	HBQ	Geneva, Switzerland
6575	45.63	HC1VT	Ambato, Ecuador
6480	46.30	EDR-4	Palma de Mallorca, Balearic Is.
6300	47.62	TG-2	Guatemala City, Guatemala
6150	48.78	OAX1A	Chiclayo, Peru
6092	49.24	OAX4Z	Lima, Peru
5930	50.59	YV1RL	Maracaibo, Venezuela
5900	50.84	ZNB	Mafeking, So. Africa

STATION CHANGES

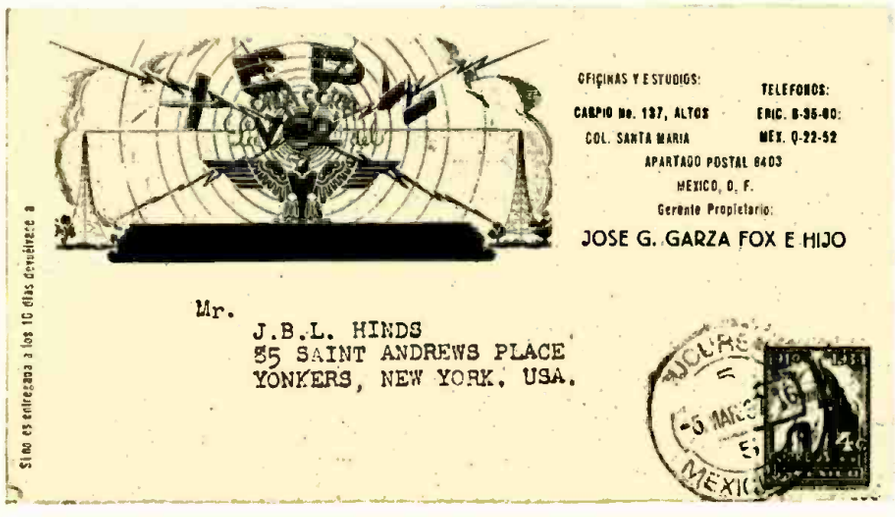
New Frequency	New Call	Old Call	Old Frequency
31600	WIXKB	WIXKA	31600
18825		PLE	18830
15800		XOJ	15795
13000	TYC	FYC	13000
11800		DJO	11795
7211		EA8AB	7010
6788		PZH	7000
6445		YVQ	6672
6340	HI1X	HIX	6340
5885		HI9B	6040

STATIONS DELETED

KC	Meters	Call	Reason
5500	54.55	TI5HH	Not in service

NON-AUTHENTICATED STATIONS

Frequency	Call	Location
15740	FTM	Reykjavik, Iceland (Dec.)
15270	HI3X	Ciudad Trujillo, R.D. (May)
14000	PZ1AA	Paramaribo, D.G. (Dec.)
10520	GOA	Shanghai, China (Jan.)
9590	VK6ME	Perth, W. Australia (Dec.)
9540	CB954	Santiago, Chile (Dec.)
9490	XTV	Canton, China (Mar.)
8910	Radio Eritrea	Asmara, Eritrea (May)
8670	YN1PR	Managua, Nic. (May)
8600	HC1EC	Quito, Ecuador (May)
7600	HC1RJ	Quito, Ecuador (May)
7200	HC1AJ	Quito, Ecuador (May)
6600	HI6H	Ciudad Trujillo, R.D. (May)
6500	YV1RM	Cristo de Aranza, Venez. (Feb.)
6425	OAX4K	Lima, Peru (May)
6420	YV6RC	Bolivar, Ven. (May)
6320	HC1RE	Quito, Ecuador (May)
6250	YV5RJ	Caracas, Venez. (April)
6128	OAX7A	Cuzco, Peru (May)
6122	OAX4P	Huancayo, Peru (May)
6122	OAX6A	Arequipa, Peru (May)
6120	HP5Z	Panama City, Pan. (May)
6110	Radio Guardia Civil	Tetuan, Sp. Morocco (May)
6045	XETW	Tampico, Mex. (May)
6000	OAX5A	Ica, Peru (May)
——	HP5A	Panama City, Pan. (May)



A beauty in red and blue, from Aguila, Mexico.

by Lyle Nelson, Yamhill, Oregon, phoning Paris about 4 A.M.

CNR, 12830 kc., Rabat, Morocco, heard phoning Sundays near 4 A.M. by R. Simpson, Australia.

ZFB, 10335 kc., and ZFA, 5025 kc., Hamilton, Bermuda, heard by Werner Howald, Los Angeles, Calif., relaying a program to New York, at 10:45 P.M.

TYA-2, 9037 kc., Paris, France, phones Indo-China and Morocco after midnight. Heard three times by Robert Behm, Philadelphia, Pa. Same station carried a program of speeches in French after 2:30 A.M., evidently a relay of Radio Coloniale, heard by R. L. Weber, West McHenry, Ill.

KUS, 18220 kc., Manila, P. I., heard talking with KKR, 15460 kc., Bolinas, California, at 5:15 P.M. by Kendall Walker, Yamhill, Oregon.

IQA, 14370 kc., Rome, Italy, heard by H. Wilson, Ithaca, N. Y., phoning SUZ, 13820 kc., Cairo, Egypt, at 12:30 P.M.

XOJ, 15800 kc., Shanghai, China, phones KWO, 15415 kc., or KWU, 15355 kc., between 8 and 11 P.M. almost nightly. Reported by J. W. Partner, Tacoma, Wash. Verification from XOJ recently received by Roy Waite, Ballston Spa, N. Y., gives address as Chinese Government Radio Administration, Sassoon House, Jinkee Road, Shanghai, China. Cards are signed by T. C. Loo, Engineering Department.

KAX, 19980 kc., Manila, P. I., heard by John L. West, Cleveland, working condition "A" with KWU, 15355 kc., Bolinas, Calif., at 7:55 P.M.

IUD, 11955, Addis Ababa, Ethiopia, heard by H. F. Shea, St. Johnsbury, Vt., calling Rome at 1 A.M.

Venezuelan Stations

An official list furnished Berne, Switzerland, recently and copy given this department shows the following stations under construction and which will be shown in the non-authenticated block until reported heard:

KC	*Call*	*Location*
6500	YV1RM	Maracaibo
6420	YV6RC	Cia Bolivar
6250	YV5RJ	Caracas

YV1RL, 5930, kc., Maracaibo, and YV3RB, 9565, kc., Barquisimeto, are added to lists in this issue.

YV1RL is shown in the official list referred to as YV1RK, which apparently is incorrect as verifications received by listeners show call to be YV1RL. YV1RL opens and closes is programs with the "National Emblem March." The station is identified each half hour in English. Address: P. O. Box 247, Maracaibo. They desire listeners be informed that they will verify only correct reports. The writer extends thanks to Capt. R. B. Oxreider, State College, Pa., for this and other items of interest.

YV1RD, Maracaibo, is reported as

Veri from Hotel Mercedes, in Dominica. Light blue with call in gray.

YV1DE, but from reports received it would seem to be incorrect also. The frequency is still reported as 5810 kc. As you know, the original call of this station was YV7RMO and the original assigned frequency 5810 kc., but a short time after its installation it changed to 6070 kc. near which frequency it has since remained. It is retained in station lists at 6070 kc.

YV5RP. 6270 kc., Caracas, is also reported incorrectly in list to Berne as YV5RQ, as verifications received show the latter call to be that of the long-wave transmitter operating on 882 kc. which is relayed by YV5RP.

YV2RA, 5710 kc., San Cristobal, has been making some changes in their transmitter, and would be pleased if listeners would report how the station is being received. Senor Juan A. Chacon, Director, advises they will soon install a new transmitter of 1000 watts to operate on the present frequency, 5710 kc.

YV1RB, 5850 kc., Maracaibo, now have an early morning program on Mondays, Wednesdays and Fridays, 5:45 to 8:15 A.M. and on Tuesdays, Thursdays and Saturdays from 5:45 to 9:45 A.M. Reports from listeners on these broadcasts as to modulation, signal strength and quality would be appreciated by the station.

Last-Minute Flashes

HJ4ABE, 6097 kc., Medellin, Colombia is now on the air 9:30 A.M. to 1 P.M. and 5-11:30 P.M. daily.

Belgrade, Yugoslavia, 6100 kc., reported heard testing on 9590 kc.

OAX4G, 6230 kc., Lima, Peru, reported changed to 6270 kc. Anyone receiving advice from station to this effect please write this department.

George Williams, New Reporter, HP5J, Panama, says HP5H new station owned by newspaper "Pan American." On April 1st on 49 meters. Also that HP5A, Panama City (no frequency yet announced) will operate with 3 kw. power.

TG-2, Guatemala City, Guatemala, may test out further at any time on or about 6310 kc.

ZBW-3, 9525 kc., "Call ZBW" now being used. Programs in English except Mondays and Thursdays, when Chinese. Time 6-10 A.M. daily. Use of other frequencies governed by local or international conditions.

CT1AA, Lisbon, Portugal, 9665 kc. Late card shows 9650 kc. No mention of other frequencies.

HP5S has requested authority to broadcast in Panama on 9565 kc.

CEB, 12300 kc., Santiago, Chile; veri cards received by listeners would indicate call is CB615. Owned by Desmaras and Cia, Ltd., Bandera 176 Casilla 761, Santiago.

HPH, 10670, Panama City, is correct instead of HBP as shown in station list.

HBQ, Geneva, Switzerland, from 7445 kc to 6675 kc.

Ecuador Mixup

Ecuador appears to be a little unsettled in radio matters. From recent lists from the Department of Commerce bulletins and from Director C. W. Jones, of station HCJB, we quote the following frequencies:

Call	*Location*	*AWR*	*Ecuador*	*Dept. of Com.*
HCODA	Guayaquil	9440	....	9447
HCETC	Quito	6895	8690	9351
HC1EC	Quito	....	....	8600
HC2CW	Guayaquill	8404	8400	8400
HC2ISB	Guayaquil	7854	7854	7854
HC1RJ	Quito	....	....	7600
HC1AY	Quito	....	....	7200
HC2RL	Guayaquil	6635	6648	6668
El Prado	Riobamba	6618	6618	6618
HC2ET	Guayaquil	4600	4600	4600
HCJB	Quito	8948	8948	....
		4107	4107	4200
HC1PM	Quito	5725	7058	....
HC1VT	Ambato	6575	6550	....
HCK	Quito	3750	....	....
HC1RE	Quito	....	....	6320

The list from Mr. Jones was furnished him by the Government Office of Inspection of Radio. The information in ALL-WAVE RADIO was received from the stations direct. HCODA must be the station causing so much comment about its call, as it is noted the Dept. of Commerce listing states it is called "La Voz del Alma."

HC1PM advises they are still on 5725 kc. but have changed their time schedule from Tuesday to Saturday from 9 to 11 P.M. They begin their transmissions with "March de Aida." This station has been heard on 5725 kc. recently.

No reports have been received of HC1EC, HC1RJ, HC1AY and HC1RE having been heard and they will be shown in the non-authenticated block.

HC1VT, Ambato, on 6550 kc., may be questionable as to frequency. It is being shown at 6575 kc. where heard most.

HCK has been turned over to radio telephonic service for Ecuador, and its class will be changed in station list if it is no longer broadcasting. But here is a little ray of hope from Ecuador—Mr. Jones advises that they will soon have the new 1000-watt transmitter for HCJB in service.

Mexican Stations

XECU, 6075 kc., Guadalajara: The time schedule has been corrected. Opens and closes with the selection "Ojos Tapatios." Moving train for signal at times.

XEYU, 9600 kc., is a new station and operating between HJ1ABP and RAN, if you can figure that out. They announce the above frequency and request reports to be sent to Nacional University of Mexico, Mexico, D. F. Time on the air 7 to 9:30 or 10 P.M.

XEDQ, 9520 kc., Guadalajara, states in letter that assigned frequency is 9520 kc. but admits they have been rambling somewhat during the period of adjustment. The adjustment apparently is not over as yet for at this writing it is carrying on around 9450 kc., pretty close to TGWA.

XEPW veri card shows them 6110 kc. Station known as "La Voz del Aguila Azteca Desde Mexico." Address: Jose G. Garza, Fox E. Hijo, Gerente-Proprietario, Apartado Postal 8403, Mexico, D. F.

XEFT, 9510 kc., assigned frequency, but transmitting near 9490 kc. Reports are that 6120 kc is not to be used.

XETW, 6045 kc., Tampico, may be another short-wave station soon. Senors Flores and Martinez, owners, state XETW will relay L. W. station XEFW on 1310 kc. XETW is said to be a low-powered station.

Dominican Republic

From a recent list of stations received from the Director of Communicacions, it is noted that a new station, HI6H, 6600 kc., is under construction and a second one operating at times on 9550 kc., under the call HI5E, both located at Ciudad Trujillo. Other changes in frequencies from those shown in station lists are noted as follows:

Call	*Station Lists*	*D. R. List*
HI1H	6780	6814
HI3C	6730	6105
HI4D	6482	6555
HI8A	6479	6480
HI8Q	6240	6206
HI1A	6190	6182

While no changes have been made in station lists, it would be appreciated if those hearing these stations or receiving information from the stations would please write this department.

HI9B is shown by Director as transmitting on 6050 kc. Late advice from the station is that it is now operating on 5885 kc. This station renders a piano selection "Evocation" at opening and closing of programs. Their new time schedule is shown in station list.

HIX, Ciudad Trujillo, has branched out. They are now broadcasting on two and possibly three frequencies. The call HIX is changed to HI1X on 6340 kc. HI2X is being heard on 11960 kc. and some say an HI3X is on 15270 kc. HI1X and HI2X have been listed.

HIN, Ciudad Trujillo, reported heard near 12500 kc. The last listing, however, shows this station on 6243 and 11260 kc. although not heard recently on the latter frequency.

Following is an official list of short-wave stations operating in Peru:

No.	*KC*	*Meters*	*Call*	*Location*
1	11800	25.42	OAX5A	Ica
2	9562	31.38	OAX4T	Lima
3	9340	32.12	OAX4I	Lima
4	6425	46.69	OAX4K	Lima
5	6230	48.15	OAX4G	Lima
6	6150	48.78	OAX1A	Chiclayo
7	6128	48.96	OAX7A	Cuzco
8	6122	49.00	OAX4P	Huancayo
9	6122	49.00	OAX6A	Arequipa
10	6092	49.24	OAX4Z	Lima
11	6000	50.00	OAX5C	Ica
12	5780	51.90	OAX4D	Lima

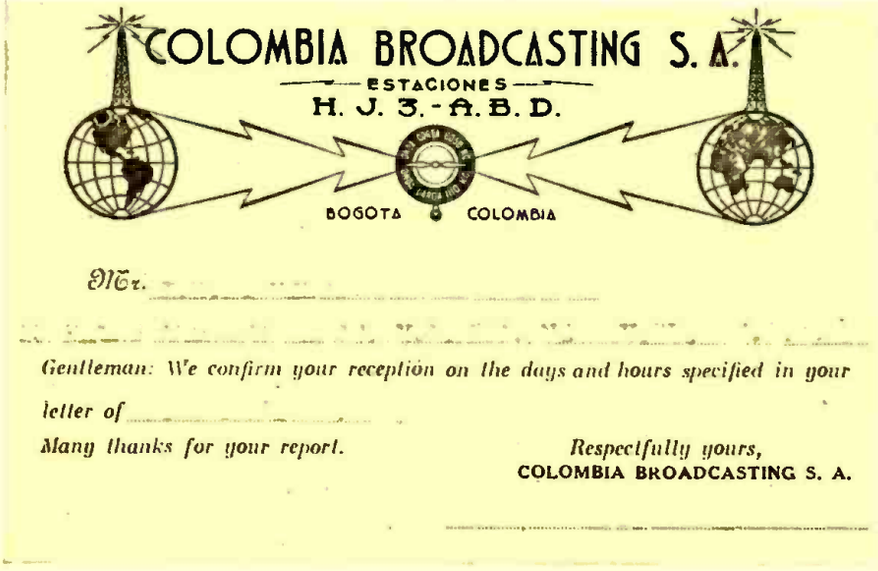
Nos. 1-2-3-5-6-10 and 12 are listed in station lists. The remaining five, Nos. 4-7-8-9-11 are shown in non-authenticated block and will be transferred to station lists when reported heard. The addresses of all twelve stations are in our possession.

Those added to lists this month are as follows: OAX4T (2) 9562 kc. and OAX4Z (10) 6092 kc., Radio Nacional, operated by Peruvian Government. Address, Ar. Petit Thouars, Lima. OAX4Z is 15-kw. station and OAX4T is 10 kw; OAX1A (6) 6150 kc. called "La Voz de Chiclayo, and address is Carlos J. Montjoy, Elias Aguirre 171, Chiclayo, Peru.

It will be noted that the call of the station on 9340 kc. is OAX4I. The assigned frequency of this station is also given as 9520 kc. but transmitting on 9340 kc. The call of station on 11800 kc. is given as OAX5A instead of "B" as reported by many.

JZJ, 11800 kc., JVN, 10660 kc., JZI, 9535 kc., and JVP, 7510 kc., are being used in the broadcasting of overseas programs. From information received from Minoe Nishimori, Hiratsuka, Japan, the hour's program each broadcast is divided as follows: News first 10 minutes, music and entertainment 40 minutes and concluding' announcements the last 10 minutes, the news being given in the language of the country for which the broadcast is intended. These programs are presented by the Broadcasting Corporation of Japan from its own studios situated at Atagoyama, Tokyo, but transmitted through the stations of the International Wireless Telephone Company of Japan at Nazaki. At present these programs are transmitted by the stations above mentioned with 20 kw. power. The statement therefore made in the January issue that the stations use 50 kw. power was in error. Mr. Nichimori says that new transmitters of 50 kw. power are now being installed at Nazaki and we will be advised when they are placed on the air.

From Mr. Nishimori's letter it seems he is much interested in short-wave DX. He has a home-built set for short wave only, using a 58, 2A7, 58, 2B7, 2A5 and 80. This superheterodyne is installed in his one-story dwelling house of wooden walls with zinc iron roof, located in Hiratsuka about 60 kilometers from Tokyo and on the seashore facing the Pacific Ocean. Four antennas are used, one with a total length of 30 meters, one 25 meters, one 7¾ meters indoor, and a


COLOMBIA BROADCASTING S. A.

ESTACIONES

H. J. 3. - A. B. D.

BOGOTA COLOMBIA

Mr. .....

Gentleman: We confirm your reception on the days and hours specified in your letter of .....

Many thanks for your report.

Respectfully yours,
COLOMBIA BROADCASTING S. A.

The latest from HJ3ABD, Bogota, Colombia.

double doublet. Every morning between 6 and 7:30, Japan Standard Time, W2XAF at Schenectady is received with R9 signal. The German, Italian and English signals are received regularly with fine strength between 10 and 12 P.M., J.S.T.

RKF, 11740 kc., Moscow, U.S.S.R., is added to station list. Reported by W. D. Flagg, Holyoke, Mass., who states it is sometimes heard around 10 A.M. (aft r RK1 phone stops) to around 3 P.M. during which time a female announcer carries on an exchange of conversation with other U.S.S.R. stations. RKF is said to have 20 kw. power.

Since Moscow has anounced they will not verify phone stations, the writer has not devoted the time to collecting data on these stations. As authentic information is furnished such high power stations may be added for calibration purposes.

Some reports are being received of a new broadcasting station and a high power phone station in Siberia.

VK6ME, 9590 kc., Perth, West Australia, again reported heard but with much interference. Some listeners say announcements give frequency as 9597 kc.

PZH, 7000 kc., Paramaribo, Dutch Guiana, is apparently on 6788 kc. and change is made in station list.

Nicaraguan Stations

YNOP, 5758 kc., Managua, Nicaragua, whose slogan is "Radiodifusora Bayer" is forwarding veri cards. W. D. Flagg, Holyoke, Mass., has letter advising since I.R. coupons are not used in Nicaragua, they only answer those whose reports are accompanied by three cents in U. S. postage.

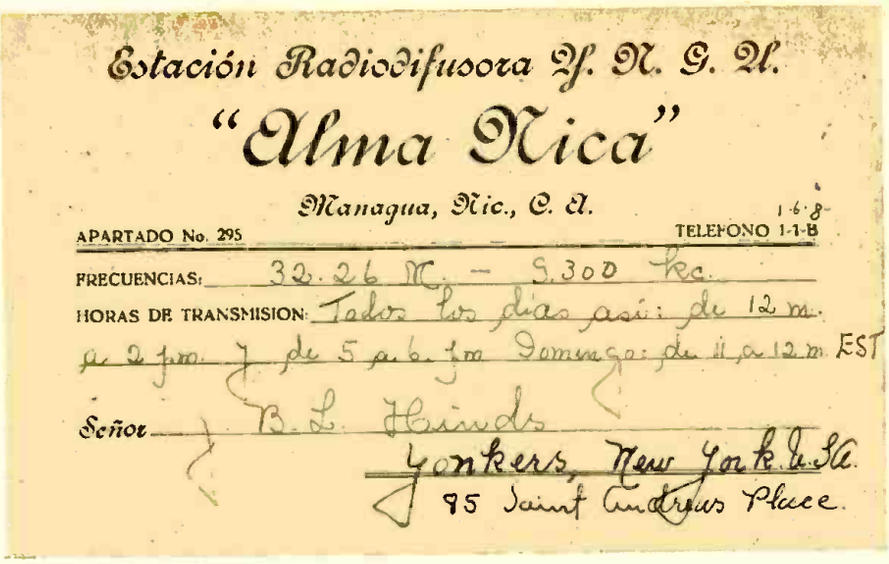
YNGU, Managua, Nicaragua, is on 9300 kc. as shown. Station slogan: "Alma Nica." Address: Apartado 295.

YN1PR, Managua, reported heard by Capt. Oxrieder, State College, Pa., near 8670 kc. Uses the slogan "Radiodifusora Pilot." In non-authenticated block.

CEB, 12300 kc., Santiago, Chile, called "Radio Service." No call yet heard and no advice from the station.

HBL, 9595 kc., and HBP, 7797 kc., still carry the Geneva program on Saturdays from 5:30 to 6 P.M. HBJ, 14535 kc., and HBO, 11402 kc., are now transmitting the Swiss program Saturday evenings from 6:45 to 8 P.M. HBQ, 6675 kc., the experimental station for special broadcasts and phone service, has been added. The frequency of 9345 kc. mentioned previously has been assigned to HBL. There is no call HBA.

TYD-3, 18776 kc., TYE-3, 10430 kc., FYC-2, 9840 kc., TYA-2, 9037 kc., TYB-2, 8075 kc., TYC-2, 7700 kc. and TYE-4, 7650 kc. French radiophones, located at Paris, have been added to lists. Special broadcasts from "Radio Colonial" are occasionally relayed by these transmitters.


Estación Radiodifusora Y. N. G. N.

"Alma Nica"

Managua, Nic., C. A.

APARTADO No. 295 TELEFONO 1-1-8

FRECUENCIAS: 32.26 M. - 9.300 Kc.

HORAS DE TRANSMISION: Todos los dias asi: de 12 m. a 2 p.m. y de 5 a 6 p.m. Domingo: de 11 a 12 m. EST

Señor B. L. Hinds

Yonkers, New York U.S.A.

95 Saint Andrews Place.

All in blue, and very attractive. This one is from YNGU, in Nicaragua.

VPD-2, Suva, Fiji Islands, changed to 8720 kc. They are again being heard and reported on 9540 kc. their former frequency, but being retained in station list at 8720 kc. until definite advice is received as to their intentions. Some claim there is a VPD-3, but the writer is of the opinion that there is but one transmitter in operation in Suva on short waves.

COCD, Havana, Cuba, advises they announce station call in English each 15 minutes. Programs are opened with the recording "In a Clock Store," and closed with "Good Night."

CFRX, 6070 kc., Toronto, is broadcasting Canadian chain programs. This is the short-wave transmitter of the Rogers Radio Broadcasting Co., Ltd., 37 Bloor St., W., Toronto, and whose transmitters are located at Aurora, near Toronto.

W4XB, Miamia, Florida, has applied for permission to transmit on 5000 watts and should be on the air soon.

ZNB, 5900 kc., Mafeking, Bechnanaland Protectorate, South Africa is government-operated, and on the air Mondays to Saturdays, 1 to 2:30 P.M., and Sundays 1:30 to 2:30 P.M. The power of this station is not known. The address is P. O. Box 106, Mafeking.

SPW, 13635 kc., Warsaw, Poland, has changed time from 11:30 A.M. to 12:30 P.M. to 12:30 to 1:30 P.M. Veri cards show time on air as 1730 to 1830 G.M.T.

East Africa

CR7BH, 11718 kc., Lourenco Marques, Portuguese East Africa, is said to be the call of the new transmitter which is being reported heard, instead of CR7BA. Our source of information is a letter just received at closing from Laurrie Williams, Port Elizabeth, South Africa, who advises that CR7BH carries the same programs as CR7AA on 6137 kc. The schedule of these stations follows: Sundays 6 to 8 A.M., 10 A.M. to 12:30 P.M., and 1:30 to 3:30 P.M. Mondays to Saturdays, (commencing 11:45 P.M. Sunday) 11:45 P.M. to 12:30 A.M., 4:30 to 6:30 A.M., 9:30 to 11 A.M. and 12:30 to 4 P.M., E.S.T. So here is a chance for listeners to add Portuguese Africa to their list of countries received.

Reports of reception are from the west by Clyde Criswell, Phoenix, Ariz., who reports CR7BA; Byron Silvius, Hollywood, Cal. (CR7BA); E. H. Clark, Hollister, Cal. (CR7BH); J. W. Partner, Tacoma, Wash. (CR7AA) and R. Simpson, Australia (CR7BA or VA). Address shown in address section, April ALL-WAVE RADIO, but please excuse our geography as it is *East* Africa, not *West* Africa, as shown. CR7BH announces in English and Portuguese, female and male announcers respectively, with plenty of jazz and popular selections so a report can easily be prepared.

RV15, Khabarovsk, U.S.S.R., is broadcasting on 4273 kc. and will continue on that frequency. Miss Rowena Meyer, Editor, advises that they did test for a few days in November last around 5700 kc. which agrees with reports received shortly after that time. Miss Meyer requests that the readers of ALL-WAVE RADIO be informed that RV15 verifies reports of the *English broadcasts only* and that reports must mention the title of at least one selection of music or topic, and requests that those filing reports be a little patient as it takes about two months for the round trip. Verifications will not be made on such reports as the following: "Heard your station on such-and-such a date and time. Heard a man singing and then a woman talking. Please send me a verification." Not all listeners seem to be aware of the fact that a report of such meager content cannot be verified.

TG2, 6310 kc., located at Guatemala

City, Guatemala, is one of the latest new stations to be heard on the air. The station is the property of the Electrical Communicacion Division of the Republic of Guatemala and reports should be forwarded to the Director General of Electrical Communications, Guatemala City, Rep. of Guatemala.

Mr. C. H. W. Nason, Technical Director, informs us that in forwarding reports of reception to TGWA, TG2X, TGS and TG2, it is a waste of money to include I. R. Coupons, unless they are from some particular country that he lacks in his personal collection. We have heard of various collectors of articles of interest, but the hobby of collecting I. R. Coupons is a new one. It is hoped that this mention may bring to Mr. Nason some "rare ones" even if the senders part with their cash.

In connection with Guatemala government-operated stations TGWA and TG2X, it might be said in answer to inquiries of listeners, that usually the call is given as TGW, the long-wave call, and no mention made of the short-wave call. In such cases application for veri cards should show the call for the frequency received.

Spanish Stations

EAJ, 7203 kc. San Sebastian, Tenerife, Canary Islands, and EDR-4, 6480 kc., Palma De Mallorca, Balearic Islands, are now listed. EAJ is known as "Radio Rachete," Spanish and French. Rebel propaganda, songs and marches. On the air 4 P.M. to midnight and later. Also calls 40-meter amateurs late at night. EDR-4 is known as Radio Poste, Nacional en Servica. War news in Spanish. Songs and marches. Shouts, "Viva Espana." We are grateful to W. D. Flagg for information furnished.

EAQ, Madrid, has a second transmitter in operation on about 9490 kc. Station call is EAQ-2. From announcements it is to broadcast programs to the English-speaking world on Tuesdays and Fridays, 7:45 to 9 P.M. EAQ on 9860 is also operating, but changes are being made in its time schedules. EAQ-2 also operates at other times than those mentioned, transmitting Spanish programs.

HS8PQ, Bangkok, Siam, is still transmitting programs on 9530 kc. and 19020 kc. It is understood there is no truth in the report that they had discontinued the issuance of veri cards. They received so many reports that they were unable to handle them with their limited force, but assure all listeners that veri cards will be issued to all making correct reports, if the listeners will be patient.

HP51, 11895 kc., Aguadulce, Panama, is being heard regularly. Their new verification cards are being received and are quite colorful. Thomas Fogarty, Secretary, English Section, advises the station slogan is "La Voz del Interior." The station is announced in English at beginning and closing of programs. They will have English announcer on all programs broadcast in English when requested by advertisers. Three notes on gong sounded three times (9) on the hour and half hour. Opening and closing selection is a typical Panama native song entitled "El Tambor de la Alegria." They request reports and advise that veri cards will be mailed free to any point in the world. No form of remuneration is necessary.

HP5L, 11740 kc., David, Panama, is not on the air as yet, at least no reports have been received of its being heard. It was to have opened on January 15th.

HJ4ABD, La Voz Catia, Medellin, Colombia, has three frequencies: 6138, 5900 and 5780. It broadcast for a time on 6138 kc. but moved off that frequency and is being heard between 5975 and 5980 kc. according to reports from listeners. Further reports requested.

HJ1ABG, 6043 kc. Barranquilla, Colombia advise that they are not so good on English and consequently use but little. They employ as interval signals one gong with chimes effect following. Begin and close their programs with a part of the Colombia National Anthem.

TIMS, 5905, Puntarenas, Costa Rica. There seems to be some question as to call and location. Reports would indicate that the call may be TILS and the location San Jose. Anyone receiving information direct from either the station or authorities, please communicate with this department.

TI5HH, 5500 kc., San Ramon, Costa Rica, has been deleted from lists as the station has not been in operation for months and it is understood that the owners are now in the bus business in San Ramon.

"Radio Guardia Civil," Tetuan, Morocco, heard by Capt. R. B. Oxrieder, State College, Pa., on 6530 kc. and later on 6110 kc.

The French station mentioned in the March issue is "Radio Fort de France," 9450 kc., Fort de France, Martinique, W. I. Schedule of time on the air in station list. Letter from Edouard Boullanger Fils, owners and operators gives no call letters. Broadcasts daily and gives news in French at each broadcast. Children's program 6:15 to 6:45 P.M. each Thursday. This station was first heard at 9440 or 9445 kc. then moved to near 9360 kc. but has been silent for a while for unknown reasons.

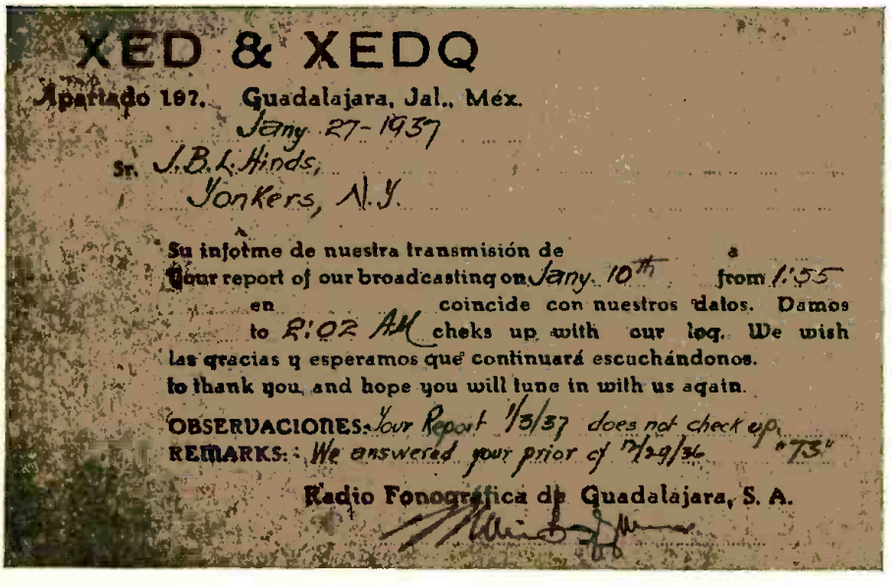
French Puzzle

R. Simpson, Australia, is puzzled over the French station which operates on approximately 7470 kc. on Sunday mornings only and opens with the "Marseillaise" at 6:30 and closes at 8:30 A.M., E.S.T. Program consists of records and most of them repeated. When writing on March 4th, Mr. Simpson states that COCQ, Havana, Cuba, has the strongest signal into Australia as this time, which is really amazing. OLR3A, 9550 kc., is rated second in signal strength.

A station near 9460 kc. heard at occasional times by R. B. Oxrieder, State College, Pa., Edwin Granger, Syracuse, N. Y., H. Wilson, Ithaca, N. Y., and the writer. Heard calling "Caracao," "Hello, Martin," acknowledging reports from listeners in broken English, mentioning "Kootwijk," "Radio Puron," "Radio Kootwijk," and announcing at one time "the first time on the air, wavelength 31.67 meters." Signs off about 8 P.M. on some broadcasts and 11 P.M. or after on others.

L. Judson Greer, Fort Smith, Arkansas, is now a full-fledged member of the "Harmonic Veri Club" and in good

(Continued on page 274)


XED & XEDQ

Apartado 107. Guadalajara, Jal., Méx.

Jany 27-1937

Sr. J.B.L. Hinds,
Yonkers, N.Y.

Su informe de nuestra transmisión de a
Your report of our broadcasting on Jany. 10th from 1:55
en coincide con nuestros datos. Damos
to 2:02 AM cheks up with our log. We wish
las gracias y esperamos que continuará escuchándonos.
to thank you, and hope you will tune in with us again.

OBSERVACIONES: Your Report 1/3/37 does not check up.
REMARKS: We answered your prior of 12/29/36 "73"

Radio Fonográfica de Guadalajara, S. A.

Another Mexican veri—this one from XEDQ, in Guadalajara.

Hamfest

By W8QMR
ex-2PI • LU4S

hamnacular . . . galsey-walsies . . . ladybug . . . qrr . . . sleet

ONE of the BCL's standing plaints against amateurdom is the content of most ham fone QSOs. It wouldn't be so bad, they complain to the R. I., if they'd only talk sense. "You can't tell me the government has any right to license a person to talk such nonsensical dither!" They are referring, of course to the ham's vernacular, and to his pet topics of conversation—tri-tets, Johnson Qs, buffer-doublers and what haven't we. Personally, we'd like to make a recording of a few BCLs doing a post mortem over a recently defunct bridge hand, and let them listen to that in their more sober moments. It is the most natural thing in the world for two amateurs to discuss their hobby when they get together —just as a couple of chess players might argue the Muzio gamhit versus the queen's pawn opening, or two philatelists get hot and bothered ahout a Pombal Commemorative Issue.

Nevertheless, we must admit a certain monotony in the suhject matter of radiofone conversations, and we list below sundry topics of conversation which might be employed after the merits of the respective rigs have been thoroughly aired and duly reported upon. (1) The pro and con of garnishing an old fashioned cocktail with fruit. (2) The nine old men. (3) Montesquieu's theories on political liherty. (4) The love of the tree toad. (5) The Songs of Solomon. (6) Warped hyperbolic space. (7) Genesis 38.9. Or simply take a tip from Lewis Carroll—

"The time has come," the walrus said.
"to talk of many things.
Of ships and shoes and sealing-wax, of
cahbages and kings."

◆

THERE IS, HOWEVER, one subject that should he definitely taboo in amateur conversations over the air—namely, the questions asked in amateur radio license examinations. And yet every day or so you will hear some Class A opr (who of all persons should know better), recently advanced from Class B, spilling to the ether—and *perhaps to the listening ears of a half dozen FCC monitors* —the exam questions put to him. This is a violation of stipulation 412 of the Rules and Regulations concerning "copying or divulging questions used in examinations," and may cost the violator his newly acquired honors plus five hundred bucks for each day of violation. (If you must violate, concentrate it all in one day—as many times as you wish —for it will only cost you half a grand.) Of course it is silly of the FCC to tell the amateur that he can't talk about the tests, when the questions and answers are given verbatim in license manuals. But while the rule stands, we suggest that all such confabs be held behind closed doors—and with the carrier off!

◆

IT IS NOT illogical that the YLs should he much more gahhier than the OMs. High in the ranks of the expert conversationalists is Dorothy of W2IXY. With something close to 200 consecutive days of consistent QSOs with Colombian HK1Z she still does an indefatigable job of rag chewing for a half hour every a.m.—from 7:30 to 8:00—on 20. We have heard her slide from monkeys to mosquitos (as a topic of conversation), which is evidence of genuine ability. Having owned several marmosets, we can testify that the logical transition would have been from monkeys to fleas.

Second only to W2IXY is Lillian at HH5PA. However, to this damsel goes an added honor in that she prefers c.w. to fone and thumbs a wicked bug with the swing of an old timer—which we understand she is. Briefly, she prefers her fist to words.

◆

WHILE PASSING out orchids to the YLs it would constitute *lese majeste* not to mention W9UJS—"S as in sugar," which confection adequately describes her voice which caresses the ether in all directions from Denver, Colorado. Apropos of the "S for sugar," we have observed that the feminops have a lingo all their own. This is quite as it should be, but some standardization seems desirable. We suggest the following:

A—ask; B—heg; C—champagne, covert charge; D—don't; E—eat; F—fancy; G—gimme; H—handout, handsome; I—I for me; J—just because; K—cat; L—lipstick; M—maybe; N—no!; P—please!; Q—question; R—roller; S—skates; T—tease; U—you; V—vino; W—whiskey-sours; X—explain; Y—yes; X—Xanthippe.

(Continued on page 279)

D. E. Chapman, (left) announcer station KGKB, and H. D. Knapp, RCA Victor engineer, in the show coach which furnished power for W5EME, at Tyler, Texas, during the sleet storm.

Night-Owl Hoots

By Ray La Rocque

portugal list . . . contest windup . . . choice reader hoots . . . cuban axe . . . curtains for all-nighters? . . . dx enemy no. 1

EACH month it seems that there is one country which stands out with some particular news regarding its broadcasting stations. Activities just across the border, where new Mexican stations are springing from nowhere over night, could well occupy the first paragraph this month. However, a little country lying just a hop, skip and a cannon shot from the boiling caldron that is Spain of today receives the nod over our border broadcasters with a complete list of stations—many of which were previously unlisted. The list of broadcasting stations in Portugal follows:

Call	*K.C.*	*Location*	*Watts*
	629	Lisbon	20000
CT1GL	1031	Parede	30000
CS1AA	1411	Lisbon	40
CS1BI	1411	Oporto	50
CS1CF	1411	Oporto	300
CS1IR	1411	Oporto	250
CS1IO	1411	Oporto	40
CS1RP	1411	Oporto	100
CS1—	1411	Oporto	50
CS1RG	1411	Oporto	50
CS1—	1411	Oporto	300
CS1SR	1411	Oporto	300
CT1AN	1411	Lisbon	40
CT1BO	1411	Lisbon	50
CT1DH	1411	Lisbon	50
CT1DR	1411	Lisbon	40
CT1EB	1411	Lisbon	40
CT1GO	1411	Parede	300
CT1IV	1411	Lisbon	40
CT1KM	1411	Lisbon	40
CT1MO	1411	Lisbon	40

Note: Two stations in Oporto have no call letters and are known as "Laboratorio Electro-Mecanico," and "Inviota Radio" respectively.

Interesting facts about broadcasting in Portugal: Only three frequencies were allotted to Portugal by the International Radio Conventions. All of the stations but two operate on one channel, 1411 kc. All of the stations on 1411 kc. are privately owned and are known as amateur stations. They operate about three hours per day and only about two or three days per week. The Parede station of the Radio Club Portugues is the only station which is allowed to use advertising material on its programs. This station is known as the most westerly station in Europe and is heard quite well in America during the winter season!

Station Changes, U.S.A.

We list the following changes just as a matter of special notice, as all of them are included in the up-to-date list of United States Stations to appear next month.

New Stations: Two stations whose construction permits were revoked because of protests were re-instated again this month. They are WOLS in Florence, S. C., on 1200 kc., and WHIP in Hammond, Ind., on 1480 kc. Another new station granted for Albert Lea, Minn., on 1200 kc. with 100 watts daytime only.

Power Increases: KIT (1250 kc.) 100-250 w.

Frequency Changes: KIT 1310-1250 kc., KHSL 950-1260 kc.

Call Letters Assigned to New Stations: WSNJ to Bridgeton, N. J., KFPA to Helena, Mont., KTKC to Visalia, Calif., WICA to Ashtabula, Ohio, KTMS to Santa Barbara, Calif., KWNO to Winona, Minn., and KOKO to La Junta, Colo.

Station Changes, Foreign

New Stations: The following new stations should be added to the list published this month along with the new Portuguese stations:

Call	*Location*	*K.C.*	*Watts*
CA9O	Tocopilla, Chile	900	100
CC133	Chillan, Chile	1330	100
CMHM	Cienfuegos, Cuba	1450	100
HCRB	Guayaquil, Ecuador (IDA)	1250	150
HC2ROZ	Guayaquil, Ecuador (IDA)	900	350
XEBX	Sabinas, Mexico	640	250
ZH—	Singapore, Straits Settlements	1332	2000
3LK	Melbourne, Australia (CDXR)	1090	2000
6GF	Kalgoorlie, Australia (CDXR)	720	2000
6WA	Minding, Australia (CDXR)	570	10000

Power Changes: CA63 (630) 250 w.; CC127 (1270) 100 w.; 4WK (1360) 50-100 (CDXR); 3YB (1060) 50-100.

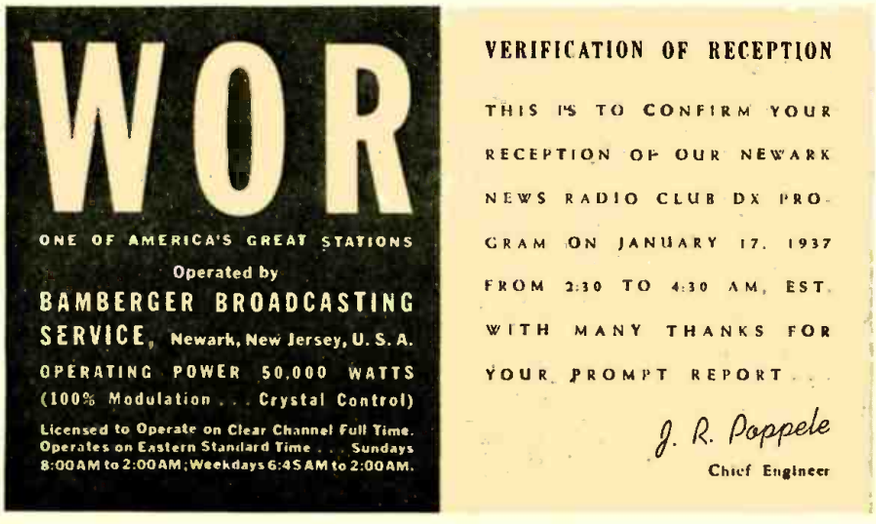
Frequency Changes: 2BH 1330-1060, 2DU 1060-660, 2MO 1360-1370, 3MA 900-1360, 3SH 1080-1130, 4AY 1450-860, 4MK 1160-1080, and 4WK 900-1360. All through courtesy of CDXR.

Delete Following: CMCR (1280) and CB144D (1440).

Call Change: CA96 (960) to CB96.

Contest News

Only a few more days remain before the closing of the 1936-37 ALL-WAVE RADIO Championship DX Contest and it is well to get your reports for April into the mail immediately if you already have not done so. Previously during the past month of scoring many reports were received just a day or two too late and had to be counted in the following month. This time there will be no following month and all reports received after midnight on April 30 will not be counted in the contest. And please make certain of the correct amount of postage on your packages. As a matter of suggestion for those entrants less than 2000 miles away



The nifty blue-and-white veri handed out by WOR as a verification.

special delivery is faster than air mail. The ideal way of course is by special delivery-air mail!

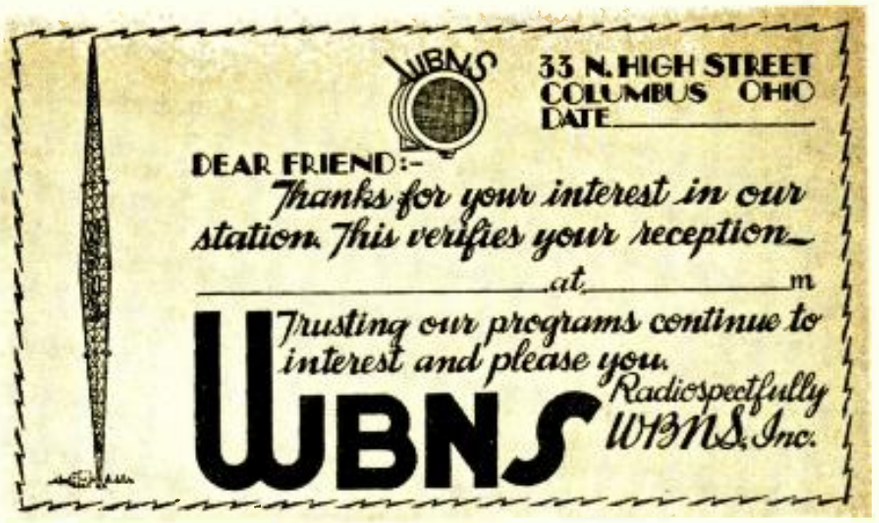
During February, the shortest month, a larger amount of reports were received than in any month since the beginning of the contest. A total of 664 reports were received on 73 different stations. Altogether 1605 reports have been received and mailed to stations since the start of the contest. That our efforts in the contest have not been in vain is revealed by the many letters of praise and thanks from the various stations that were recipients of contest reports. It's the hope of the Chief that contestants will continue to supply the stations with valuable reports after the close of the contest through the medium of the R.S.S.L.

The race for championship honors has tightened up and any one of the first seven contestants with a good score next month would not find it too difficult to be on top when the next scoring is compiled. With the later entries Weyrich, Hesterman, and Forestieri rolling along at a rapid pace, and the others fighting to hold their high standing the next two months of the contest should prove very interesting. And do not overlook our friend Hidalgo in Cuba—he more than doubled his score during February! The leaders now stand as follows:

George Brode, Philadelphia, Pa.	3758
Carroll Weyrich, Baltimore, Md.	3465
Bernard Ahman, Baltimore, Md.	3221
Charles Hesterman, Saskatoon, Sask.	2508
Carl Forestieri, New York, N. Y.	2414
Enrique Hidalgo, Cienfuegos, Cuba	2386
Joe Lippincott, Medford, Mass.	1996
Earl Lever, Worcester, Mass.	956
Leroy F. Nice, Souderton, Pa.	541
Harry M. Gordon, Erie, Pa.	475
Kendall Walker, Yamhill, Oregon	451
John Gardner, New York, N. Y.	186
Bob Beadles, Salt Lake City, Utah	150
Carl Sylvester, Yale, Mich.	83
Fred L. Van Voorhees, Millers Place, N.Y.	69
Bernardo Alcazar, Cienfuegos, Cuba	28
Vincent Stasen, Philadelphia, Pa.	26
David Hebert, Lancaster, Calif.	4

High scorer for this month by no small margin was Carroll Weyrich whose 134 reports on 41 different stations netted him a total of 2005 points. Such DXing as this is deserving of merit! Other scores for February were: Hesterman 1458, Hidalgo 1055, Lippincott 694, Ahman 459, Forestieri 394, Brode 376, Gordon 350, Lever 281, Nice 84, Stasen 26, Gardner 20. Ringing the bell in the Bullseye department fourteen times with his fine TP reception, Hesterman easily led in this field. His "bell-ringers" were: 2CO, 7ZL, 7NT, 5CL, 3GI, 3AR, XEP, 2BL, 4QG, 2FC, 3LO, 5CK, 2NC, 4RK. Other Bullseyes as follows: Weyrich 10, Poste Parisien, Rennes, CMHB, CMBD, Trondelag, PFBI, CMBZ, OKR, XEYZ, and HMI; Gordon 3, KGU, KGMB, and XEBG; Lippincott 3, LR3, LR5, LS2; Hidalgo 3, XEL, CFCN, and HJ1ABR; Ahman 1, CMJA; Lever 1, WHAZ; Forestieri 1, PRA-9.

The five border Mexicans have monopolized the lead in the number of reports since the beginning of the contest, but the month of February found two of them toppled by three Cubans, CMQ, CMCD, and CMX. The stations reported during February are listed below with the number showing how many times each station was reported: XERA 83, XENT 80, XEAW 66, CMQ 45, CMCD 33, CMX 29, XEPN 26, XELO 25, CMBX 18, CMCF 18, WNEL 18, CMBY 17, LR1 13, WKAQ 13, XEFO 13, XEW 11, XEMO 10, XEB 9, WLAC 9, CMHJ 8, CMBC 7, CMBS 6, CMK 6, CMCB 6, CMGH 6, CMCY 4, KHBC 4, CMCG 4, CFLC 4, XEL 4, TGW 4, WJAX 3, XEU 3, 3LO 3, CMBZ 3, KWSC 2, HJ1ABR 2, PRA9 2, 3AR 2, YV5RA 2, Poste Parisien 2, WPRP 2, 5CK 2, 2NC 2, 4RK 2, PRF3 2, WTRC 2 and others unlisted here shown in Bullseye dept.—one each. Every month contestants have been having scores deducted because of carelessness in reporting. Make sure you are hearing the station you list on your report and make sure you give enough material so that a check can be made at the station. Remember a report found incorrect by the station brings a penalty of a deduction of twice the original score obtained on that report. Penalties are not shown here to avoid embarrassment but contestants are notified personally of the deduction. Our nomination for the best catch of the month: Hidalgo's HJ1ABR.



A sample of the veri sent out to listeners by WBNS, Columbus, Ohio.

With the Night Owls

A few choice hoots from Night Owls extracted from the past month's communications:

Meredith M. Stroh, Kitchener, Ont.: "KGGC has installed a new transmitter and is testing early mornings. WPHR operates from 7 A.M. to local sunset."

Charles R. Wilson, Portland, Me.: "I use special antennas for every 15 degrees of reception directions and my neighborhood looks like a wire factory!" The Venezuelan station on 1200 kc. is YV1RB not YV1RD. I have their new veri card. YV1RB is S. W. call."

John R. Griggs, Continuity Editor at XEMO, Tiajuana, Mex.: "New DX cards are being made up and will soon be sent to those who have sent in reports in recent months. If you should ever want a special DX Program dedicated to your division of ALL-WAVE RADIO, just let me know and I will arrange it."

Barney Ahman, Baltimore, Md.: "So far I have a total of 90 reports for 5 days in March. Not bad, eh? So I promise at least 300 reports this month. Will that be a record? I've awakened and think I'll give Brode some competition. I hope Hesterman gets lazy and doesn't send in too many TP's because I've never heard any yet."

E. L. (Pete) Peters, Westport, N. S.: "Another new SA for me is PRB? on 1000 kc. the past few nights. A very nice signal and plenty of material for veri, but not identified beyond the first three letters. Uses a musical chime (6 strokes) and Ted Lewis 'Good Night Melody' at sign-off about 10:35 P.M. EST."

Leon Shapiro, Manager WFOY, St. Augustine, Fla.: "There will be presented from this station promptly at one o'clock every Friday morning except during the FCC monitoring period a series of two-hour programs to be known as 'Midnight Jamboree.' We shall appreciate hearing from your fellow Night Owls and after hearing from you we shall set a date for a dedication to your department of ALL-WAVE RADIO."

Mrs. A. C. Johnson, Henry, S. D.: "KGDY was off the air for about four weeks to install their new transmitter. (Explaining why they did not come on for their recently scheduled DX). Surely like AWR, I see where $2.50 goes pretty soon."

Joe Lippincott, Medford, Mass.: "Who is the Cuban station on 630?

(Continued on page 270)

Amateur Operating

BY DOROTHY HAGERTY • W6JMH

EVERY person interested in short-wave radio must be aware of the constant advancement in all branches of the art: In transmitting and receiving equipment, diathermy, television; in aircraft, marine and police activities, as well as the vast army of Amateurs. Because of their efforts and interest, all this other activity has been made possible. Amateurs are progressing rapidly, both in number and achievement.

Any of you who are active in one or more of the Amateur bands are aware of the congested conditions. There are about 50,000 licensed Amateurs at the present time. With all this existing equipment and more being added each day, the bands are pretty well saturated with short waves. And it seems to me that the Amateurs are not making as much progress in operating methods as they might.

Sociality

The manufacturers are continually turning out new tubes and parts and many of the Amateurs will work and scheme to modernize their equipment, but seem to forget all about keeping up-to-date in operating methods. Yet it is a matter of good sportsmanship and consideration for the other fellow that ought to promote better technique, rather than the former. By that I mean better quality, fewer superfluous CQ's, better keying on c.w. as well as better modulated 'phone and more intelligent conversation.

This no doubt sounds strange coming from a feminine member of the clan, but as I have been active in radio, Amateur and otherwise for some time, I have had opportunities for many observations. I am not criticizing, but merely trying to point out the absurdity of unintelligent operating. It has been my ambition to not only put out a good signal but to operate with a certain amount of technique, for I believe my opportunities for a successful contact are greater if I am mindful of both factors.

I am quite aware that Amateur radio is a hobby—yet it must be remembered that it is under the direct supervision of the Government. Good sportsmanship prevails with a certain amount of honesty and sincerity, but every so often there is someone so self-centered as to have no regard for the other fellow.

We know Amateurs have been responsible for much that has been accomplished in radio. We know, too, that they have developed a fertile field for Commercial Interests in the ultra-high frequencies. And we *should* know that if we are to continue to operate in these bands, we had better prove that we are worthy of them and raise our standard of operation.

Lawlessness

Five meters is the worst offender, with radiating receivers, poor quality, ridiculous conversations and the greater evil—illegal operation.

The illegal operator is a definite menace with not only unlawful authorization but failure to abide by regulations as well, in many cases. It should be noted that the Amended Radio Act of 1927 is severe in its fines and punishment.

I have no patience with the person who is operating unlawfully, for if a member of the "weaker sex" such as myself, with a limited knowledge of fundamentals and not an especially brilliant mind, can obtain a license with something more than a passing grade, there is not much excuse for the fellow who is able to put together an assortment of condensers, transformers and tubes—make it work and then neglect to obtain a license.

I have known of several cases of illicit operation. Some with excellent technical ability claimed they could not master the code—others pleaded lack of sufficient understanding and interest—but I can assure you that in most every case, their reluctance was due to lack of ambition and I should say—downright laziness.

Ten meters seems to be a pretty good band with a minimum of poor operation, though it takes real skill to complete a QSO when conditions are unfavorable.

Twenty-meter phone and twenty-meter c.w. in my opinion, provides the highest standard of operation and equipment. Of course the many high power stations on this band do not serve to minimize the QRM. High power is not essential. And it has been my experience that better DX results can be obtained with low power and efficient operating, with perhaps a good directional antenna, rather than a "California kilowatt."

Forty meters is positively impossible with its QRM-infested atmosphere.

Seventy-five-meter 'phone and eighty-meter c.w. seem to bring good results for the most part, depending on whether you want a rag-chew or a snappy cross-country contact. The majority of the operators in these bands are intelligent in operating technique.

One hundred-sixty meter 'phone is the limit of silly and absurd conversations. This band, unfortunately, is too close to the broadcast band and often causes quite a little consternation with improperly adjusted transmitters and failure to confine operations to within limits of the band. The comments from the average BCLs are not very complimentary and have a bad effect on Amateur radio in many instances.

Outside Impressions

We should certainly give more thought to our operating methods from the BCL standpoint. For Amateur radio, if it is to continue, is dependent to a great extent on its value to people as a whole. And the general impression of Amateur radio has not been very favorable between floods.

On two occasions I have been interviewed on a Radio Broadcast. Speaking as an Amateur in the interests of Amateurs, I had opportunity to point out the beneficial and worthwhile effects of such a hobby—not alone to the Amateur but others as well.

The comments were most interesting—favorable and otherwise. Several expressed their disapproval of Amateurs and upon investigation, I found that this was due to a bad impression received when tuning in on some absurd "ham conversation" or a gathering of drinking contestants that turned out to be an Amateur station at its worst.

Regarding conversation in the 'phone bands: there are many types—short, long, interesting, disgusting, technical and humorous. I have listened to school boys, professional men, business men, farmers. I have heard old men, young men, brilliant men and stupid men. And in regard to the YLs and XYLs—some were enjoyable and entertaining and some were revolting.

(Continued on page 276)

R. S. S. L. NEWS

GENERALLY speaking the results of the nation-wide signal survey drill were quite satisfactory, particularly in that they provided Headquarters with a wealth of useful data. We are confident now that the League machinery is in sufficiently good working order to be put to practical use. Consequently we have accepted the request from Guatemala to conduct a survey on two of their most recent transmitters. This will be the first official survey undertaken by the League and therefore its importance cannot be underestimated. Our future prestige is dependent upon the outcome, so each member is urged to lend his best efforts.

Survey Drill Results

Sectional Managers were far from swamped with member reports on HJ1ABP, much to their disappointment Headquarters, however, anticipated a small return since the time limit was purposely made narrow to determine at the outset with what rapidity members could click into service. Moreover, the dates selected for monitoring the station were made perilously close to the date of issue of ALL-WAVE RADIO, with the result that members in certain states in the west were unable to participate. Had we made no time limit or set no specific dates for the survey, the returns would undoubtedly have been heavy and more widespread, but this was just what we did not wish to do. As it is, we now have the data we required to set our future course, and hereafter the time spread will be adequate for the entire country as well as a goodly number of foreign areas. So, your Sectional Managers need not assume that the result was a failure.

Headquarters must confess to one other "trick"—the frequency of HJ1ABP was purposely misstated to determine what the reaction might be. The frequency is 9620 kc and not 9600 kc, and therefore there could have been no QRM between HJ1ABP and RAN. We were pleasantly surprised by the number of members who corrected this discrepancy in their reports, and also pleased that *not one single member* definitely reported QRM between the two stations. Any number of members emphatically stated that no such interference was present since HJ1ABP and RAN are rather widely separated in frequency. However, there was slight QRM on HJ1ABP in certain sections of the country during the drill period, and a few members rightly assumed that it was RAN since we had as good as said that QRM from this station might be expected. Their reports were therefore perfectly authentic from our point of view, particularly in view of the fact that the majority so reporting placed a question mark after RAN.

The upshot of the whole matter is that we feel that the majority of our members can be relied upon to turn in honest and valuable reports. Therefore our period for playing tricks is definitely over!

The States of New York, Ohio and Pennsylvania led the list in the number of reports turned into headquarters. However, the returns on the Guatemala survey may tell a different story, and we are looking forward to a real contest to see which states are going to head the list the next time. The tone of the letters we have received from the Sectional Managers indicates a definite pride on their part in both their states and the members they are attempting so well to serve. So pull together with your own S.M. and put your state over the top in the Guatemala survey.

Survey Reports

A number of the Sectional Managers have pointed out the lack of uniformity in the reports submitted. This, of course, lends confusion to the resultant analysis and makes it difficult to prepare an intelligent survey map at Headquarters. It is preferable that members use the standard League report blanks, but those who do not wish to do this are requested to employ at all times the standardized symbols for signal strength, readability, fading, etc. However, there is no necessity, for the present at least, that members go to the extreme labor—as many have done—of drawing up a facsimile of the RSSL Reception Report Form. Nor is it necessary that such information as type of antenna, model of receiver, etc., be included in reports sent to your S. M. or to Headquarters as the case may be. Remember that Headquarters already has this information in your original application blank. But this information should be provided in reports sent directly to stations on any unofficial surveys you may make.

On the other hand, it is preferable, and certainly desirable, that signal strength, etc., be shown in the form of a curve rather than merely stated as Q5R9 and so on. This can easily be done on a plain sheet of paper and should take but a few moments. The symbols can be written in along the left edges of the sheet and the curves drawn in a horizontal plane with the hours of listening jotted down from left to right. This is the same basic method used in the RSSL form and can be easily followed.

The Guatemala Survey

The data on this survey is given in the accompanying box. Transmissions will take place each day from May 2nd to May 8th inclusive, from 10 P.M. to 1:00 A.M., Central Standard Time, or 11:00 P.M. to 2:00 A.M. Eastern Standard

(Continued on page 259)

R.S.S.L. OFFICIAL SURVEYS NOS. 1 AND 2

The following surveys are to be conducted for the Director-general of Electrical Communications, Guatemala City, Guatemala, Central America. The stations to be monitored will transmit the same program simultaneously on two frequencies, one in the standard broadcast band, and the other in the short-wave broadcast band.

STANDARD BROADCAST BAND DIVISION

Call of station to be monitored is TG1. It will operate on a frequency of 1510 kc., but may later change frequency during the test. Special broadcast will run from May 2nd to May 8th, inclusive. Will commence each evening at 10:00 P.M. and close at 1:00 A.M., Central Standard Time.

SHORT-WAVE BROADCAST DIVISION

Call of station to be monitored is TG2. It will operate on a frequency of 6310 kc., but may alter that frequency during the course of the test. Schedules the same as for TG1, given above.

Queries

improving selectivity . . . antenna problem . . . a case of oscillation

THE primary purpose of the Queries Dept. 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. Rather than publish the answers to many questions each month—in a necessarily abbreviated form—we shall select only one or two of general interest which will be elaborated upon and answered in detail. These questions will be numbered, an index will be published periodically, and, in time your files of this department should prove a valuable reference work.

IMPROVING SELECTIVITY

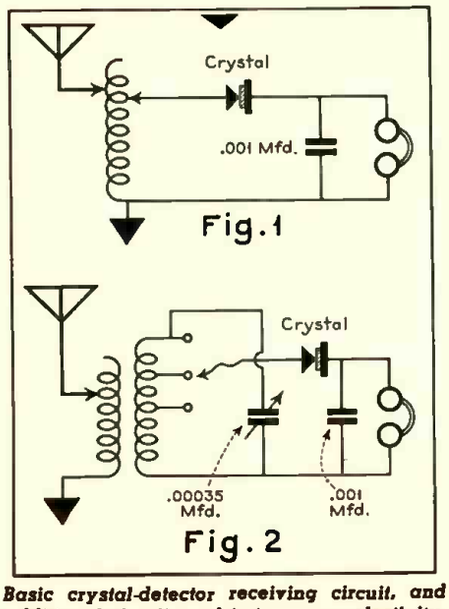
Question No. 30:

I have built the crystal radio receiver as described in your December 1936 issue. I am happy to state that it operates very well. However, I live in a vicinity where there is a long-wave broadcasting station and a police short-wave station. The standard broadcasting station comes through very clearly, but I occasionally hear the police signals in the background. Is there any way that I can separate these stations so that I can get either one of them without interference from the other? I should be grateful for any information concerning this problem. Also, I can only receive the two local stations. Can anything be done to make this receiver effective for distances up to fifty miles? *J. O., Johnson City, N. Y.*

Answer:

The circuit used by J. O. is a very simple and elementary one. It is neither sensitive nor selective. Increasing the number of taps on the coil will increase both selectivity and sensitivity, because more taps will permit the operator to tune in the station more accurately. By staggering the taps it is possible to tap every turn.

If this does not help, we suggest revising the circuit in accordance with Fig. 1. It is well to remember that any resistance in a circuit tends to make that circuit tune broadly. In the original circuit published in the December ALL-WAVE RADIO, the crystal detector, which has considerable resistance, is in the ground circuit (or, more properly, the antenna circuit). In Fig. 1, the antenna circuit may be tuned sharply—without the broadening effect of the crystal. Also, we now have two tuned circuits—the antenna circuit and the crystal or detector circuit—which contributes still further selectivity. It is another general radio principle that selectivity can always be increased by increasing the number of tuned circuits.



Basic crystal-detector receiving circuit, and additional circuit used to increase selectivity.

In Fig. 1, the antenna circuit is said to be closely coupled to the detector circuit. If the selectivity is still insufficient, a third radio rule may be resorted to which recognizes the fact that selectivity is improved by loosening the coupling. Fig. 2 shows an improved circuit with looser coupling. Both coils are wound on the same tube, which should be about four inches long and two inches in diameter. The antenna (or primary) coil consists of 40 turns of No. 28 wire, while the detector or secondary coil is wound with 90 turns of the same wire. (Any type of insulation will be satisfactory.) The primary is tapped at the 4th, 8th, 16th, 24th and 32nd turns, and the secondary at the 15th and 45th turns. The primary and secondary windings should be separated by about one quarter of an inch. If still further selectivity is desired, the primary and secondary should be so arranged that the degree of coupling can be varied. A simple method is to wind the secondary on a slightly larger tube, cutting the number of turns down to 80, so that it can be slid farther away from the primary. In some cases it may be desired to employ tight coupling, in which instances the secondary can be slid over the primary.

The receiver is tuned by selecting the best ground and crystal taps, and by the tuning condenser. This condenser has a capacity of 350 micromicrofarads. The condenser which "bypasses" the radio-frequency currents around the high-resistance telephone receivers, has a capacity of .001 microfarad.

The circuit of Fig. 2 represents about as good a crystal receiver as can be made. The range will necessarily be limited, but such receivers have been known to be effective for distances of several hundreds of miles. Much depends upon location, the power of the transmitter and the height and length of the receiving aerial. As the sound heard in the telephone receivers is actually the energy picked up by the antenna, the longer and higher the aerial the better.

If still more sensitivity is required, we suggest that J. O. experiment with different crystals. Sensitivity varies with the quality of the crystal, and different results will be obtained with various crystals of the same type.

Having exhausted the possibilities of the crystal receiver, a vacuum tube is the next and logical step. Everything but the crystal can be retained and utilized in the tube set.

ANTENNA PROBLEM

Question No. 31:

I recently purchased a Sky Chief Model S-14 receiver, and from reports of other persons operating short-wave receivers I am not getting the results I should. I am using a doublet type antenna, with a twisted lead-in. I get much better results when I remove one of the lead-in wires from the set.—*F. V., Ozone Park, N. J.*

Answer:

This is a familiar experience. It will

(Continued on page 280)

PERHAPS the first requirements of a facsimile system for amateur use are that it be comparatively simple in construction and that it augment rather than change the user's present equipment. A system designed to operate on a single carrier, and at audio frequencies, or to interrupt a carrier at audio frequencies, would be ideal. With this in mind the system here described was set up to test the effectiveness of simple facsimile at audio frequencies.

The problem of synchronizing mechanisms at two distant points was easily solved by the use of synchronous phonograph turntables. At both the transmitting and receiving ends the motors were operated off regular 60-cycle, 110-volt lines with excellent results. There is some variation in frequency between separate power sources, but it takes quite a little difference to make the received picture unrecognizable. Ordinary spring-motor-operated turntables give excellent results if carefully adjusted, or, for that matter, any type turntable where the speed can be closely regulated.

How it is Done

The original picture to be transmitted is drawn on a circular piece of drawing paper with a soft graphite pencil, as shown in Fig. 1, and all isolated segments connected by means of lines drawn with the soft pencil to a common contact in the center, so as to form complete electrical circuits. The graphite acts as a conductor at audio frequencies. To prevent the transmission of the connecting lines, they are coated with coil dope, or a similar insulating solution, so that the conducting graphite underneath does not come in contact with the "scanner." The resultant "facsimile"—a reproduction of an actual transmission—is shown in Fig. 2.

The paper original is then placed on the turntable and held firmly by a threaded ring in the center. This also serves to make contact to the motor frame through which audio frequency voltage is applied from a separate a.f. oscillator. A threaded rod, geared to the motor center, carries a brass contact "scanner" progressively from the outside edge of the original drawing to the center as the rod revolves, in the same manner that a sound recording is made. As the scanner passes over uninsulated areas of graphite the audio-frequency impulses supplied through the motor frame are imparted to the brass contact and from there to the input of the transmitter modulation equipment. The complete layout is shown in Fig. 3. The audio impulses impressed on the carrier can be picked up on any receiver tuned to the proper frequency.

Fig. 2. Reproduction of an actual facsimile transmission by radio.

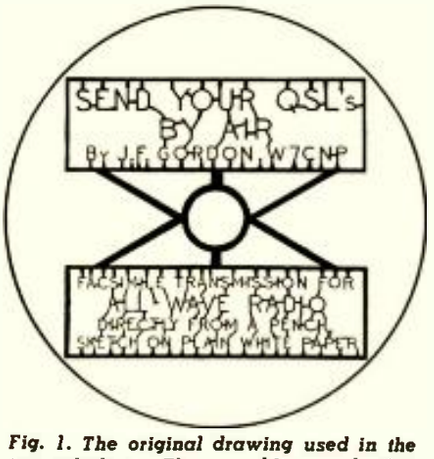
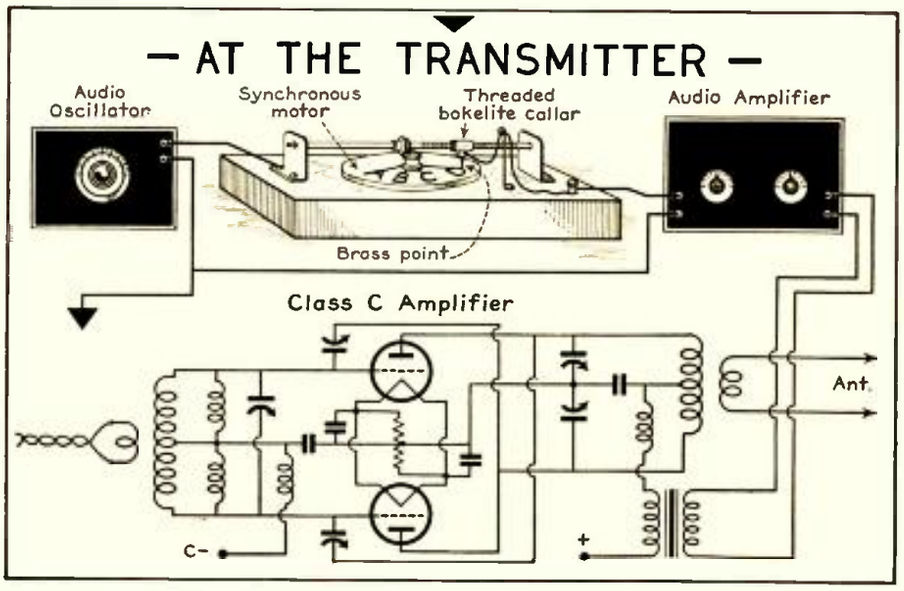
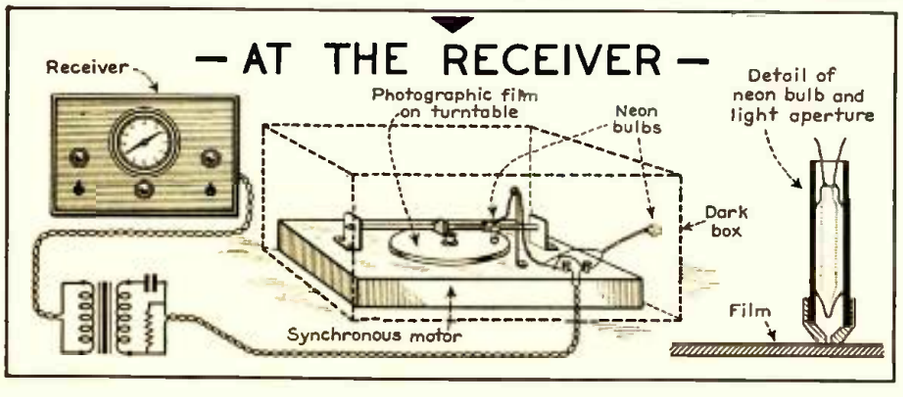


Fig. 1. The original drawing used in the transmission. The graphite conducting lines connecting the letters are covered with coil dope, and therefore are not transmitted, as can be seen from Fig. 2.

The receiving mechanism must necessarily be housed in a dark box so as not to expose the film prematurely. A small neon bulb can be placed in parallel with the one on the slider and placed outside the box for monitoring purposes. The operator at the receiving end merely waits until he sees an impulse on the monitoring light, and then starts the mechanism, after which the machine takes care of itself until the film is completed.





Experiments with this equipment have shown that pictures can be received at any distance providing the signal is strong and the motors synchronized. (Hints on handling of sensitive film, and film developing, by J. K. Thompson.)

It is apparent that many improvements in detail and construction can be made by the experimenter to suit his individual needs. Although the present system gives but forty lines per inch, letters and handwriting larger than one quarter inch are easily recognizable.

"BARB" AND "ERNEST"—
Transmitters

Set To Go

Dear Gerald:

After reading your last letter about superheterodyne receivers, the boss and I feel more at home with our Philco, even though it is without a beat-frequency oscillator and therefore, as we see it, distinctly not a "Ham Receiver." But we hope for better things!

And another thing, the broader aspects of radio are certainly more interesting than the fundamentals. Probably this is so because it is less difficult to obtain a clear picture of the operation of a transmitter or receiver when there are no fundamental laws to keep in mind. This has been evident in your last two letters, in which you have refrained from dragging in such brain fags as reactance, electron flow, impedance, grid bias and the rest of the headaches. Still, we realize that all this stuff is important, and will prove to be a necessary part of our knowledge, but what you call the "surface stuff" is what we like.

Being on the second leg of the "course," we suppose your future letters will deal more with the practical than the theoretical, which seems to indicate that the time has come to take the exam. Well, you say the word, and henceforth we will trust that we can pick up enough practical dope from you so that we will know something about our equipment before we actually put it to use.

Your idea of putting us on 10-meter phone is okay with us. Considering that we are in an apartment, have limited space for the equipment, and do not hanker for a power house, 10 meters would seem to be the best band for a couple of Class B hams who hanker for a bit of real DX and local rag chewing without disrupting the neighborhood. We're all for it unless you get a better idea. So start your planning, and hope we come running at you with a ticket one of these days.

Barb and Ernest

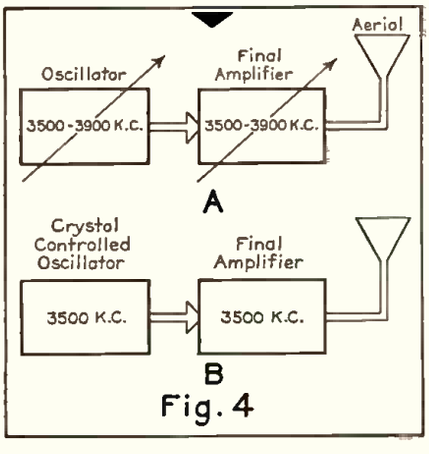


Fig. 4

Block diagrams illustrating transmitters having variable-frequency and fixed-frequency tuning, the one at B being crystal controlled.

✦

Transmitters and Things

Dear Barb and Ernest:

So be it—take a shot at the exam any time. You're both okay on code and I think you've done enough boning on theory and regs to be able to handle the second half of the ordeal. Time will tell! Lots of luck in any case.

Yes—the idea is to leave you to your own devices insofar as the examination is concerned, and get down to the practical design and operation of the type of equipment you will use. This is not all "surface stuff" by any means, but I venture to say that you will find it interesting just the same—and probably easier to grasp.

No change in mind about 10 meters, and my next letter will deal with the preliminary plans, with some sidelights on antennas, power requirements, why we will use certain components, and similar points having a bearing on the design of both the transmitter and receiver.

Meanwhile we will take a parting shot at the block diagram, and deal with the one point so far not considered; transmitter operating frequencies.

To begin with, a transmitter is usually tuned to a desired frequency in a given amateur band and not moved from that frequency thereafter. Although an amateur is privileged to operate his transmitter on any frequency in any of the bands his license covers, it is often to his advantage to select an operating frequency in each of the bands he works and stick to them, so that other amateurs will know where to tune for his signals. This, however, is by no means a universal practice as there is also an advantage in shifting the operating frequency of a transmitter to get out from under heavy interference from another station. Moreover, in the 40-meter band in particular, the average amateur listens only in the vicinity of his own transmitter frequency with the result that it is impossible to raise him unless you alter the frequency of your own transmitter so that it will fall within the frequency range over which he will tune his receiver.

Pro's and Con's

The advantages and disadvantages of both fixed-frequency and variable-frequency operation of a transmitter are dependent upon a number of factors. The prime factor is the frequency band in which the transmitter is operated. The 40-meter c.w. band is highly congested and therefore it is advantageous to be able to shift transmitter frequency at will, for the dual purpose of seeking a spot free of QRM and to be able to park on or near the frequency of a station you desire to work. On the other hand, the 10-meter band is not as yet overcrowded and therefore there is less reason for shifting frequency to get away from QRM. Moreover, the average amateur working in the phone section of this band is able to cover at least half of the band with his receiver after a CQ and therefore has a reasonable chance of spotting you without the necessity of your shifting your own transmitting frequency to the vicinity of his.

Another factor involved with fixed- and variable-frequency operation is the frequency stability of the transmitter itself. Though a self-excited oscillator in a transmitter permits operation at any desired frequency point, such an oscillator is not altogether stable and is subject to frequency drift. In such an instance it is often difficult to hold the signal at the receiving point. If we assume that the receiver itself does not drift in frequency, it is obvious that it is quite impossible to hold a signal that drifts in frequency unless the receiver is constantly returned to compensate for the difference.

Drift

The drift of a self-excited oscillator is not so serious a matter in the longer wavelength bands, such as 80 and 160 meters, for the ratio of change is small. Moreover, self-excited oscillators of the electron-coupled type are moderately stable if properly treated with the result that the features of variable frequency can be enjoyed in these bands. On the shorter wavelengths however, such as 10, 20 and possibly 40 meters, the effects of frequency drift are more apparent.

It is at these frequencies in particular where the crystal-controlled oscillator is of exceptional value, for the frequency

EMBRYO RADIO HAMS
And Things

drift of this type of oscillator is practically negligible. But the use of a crystal in the oscillator circuit limits the transmitter to a single operating frequency in each of the bands worked, and it is therefore impossible to shift frequency unless additional crystals are employed, and even in this case the frequency range is not constantly variable, but can be adjusted only in steps, with a separate crystal for each additional step required. This is so because a crystal will oscillate at one frequency only, with the exception of special types and the new variable gap crystal holders which will provide a variation of a few kilocycles on either side of the fixed frequency—usually a sufficient spread to get out from under bad QRM.

Variable-Frequency Operation

You already know that the simplest form of c.w. transmitter is nothing more than a vacuum-tube oscillator coupled to an antenna. Many existing c.w. transmitters are of this type, and their power is dependent upon the size of the vacuum tube used and the plate voltage. If such a vacuum-tube oscillator is self-excited, it may be tuned to any desired frequency by means of the coil and variable condenser in the circuit, the frequency band and the range over which the circuit may be tuned depending upon the coil and condenser values.

This form of transmitter is not stable to begin with and, as you also know, its stability is further affected by coupling the oscillator directly to the antenna, for, in this case, a change in the effective capacity of the antenna system, which can be brought about by the swinging of the wires, will also alter the frequency of the oscillator.

This effect is readily eliminated by placing an additional vacuum tube between the oscillator and the antenna. This removes the antenna load and capacity from the plate circuit of the oscillator tube, and since the additional tube is used to amplify the radio-frequency power generated by the oscillator, it is possible to feed as much or more power to the antenna without placing a heavy load on the oscillator tube itself. Therefore the oscillator tube runs at a reduced and constant load and under these conditions is not subject to large variations in frequency caused by changing load conditions or alterations in output capacity.

Such a transmitter is shown in block diagram form at A in Fig. 4. The oscillator runs lightly loaded and supplies only the small amount of power required to drive the final amplifier where the radio-frequency power is developed. The tuned circuits of both the oscillator and the final amplifier are variable, as indicated by the slanting arrows, and in this particular case the transmitter has coils and condensers of such value that any frequency in the 3500- to 3900-kc band can be used. All the transmitter circuits are tuned to the same frequency, and if the operating frequency is to be changed, all the circuits must be retuned.

Though the arrangement shown at A has a higher degree of frequency stability than a transmitter composed of an oscillator only, its stability can be immeasurably improved by using a crystal-controlled oscillator in conjunction with a final amplifier, as shown at B in Fig. 4. In this case, however, the operating frequency cannot be changed unless the crystal is changed; that is, if the crystal used is ground to a frequency of 3500 kc, the transmitter will not function on, say, 3600 kc even though the tuned circuits are adjusted to this frequency. Consequently the circuits are not indicated as being variable as the transmitter can operate on 3500 kc only, unless a crystal of a different frequency is substituted for the 3500-kc crystal. If a 3600-kc crystal were used, of course, the oscillator and final amplifier tuned circuits would be adjusted to 3600 kc and locked at that point.

Fixed-Frequency Operation

It may be said, therefore, that if the oscillator in the transmitter is crystal controlled, the operation is on a fixed frequency. This does not imply, however, that the transmitter cannot be operated at frequencies that are harmonics of the original crystal frequency.

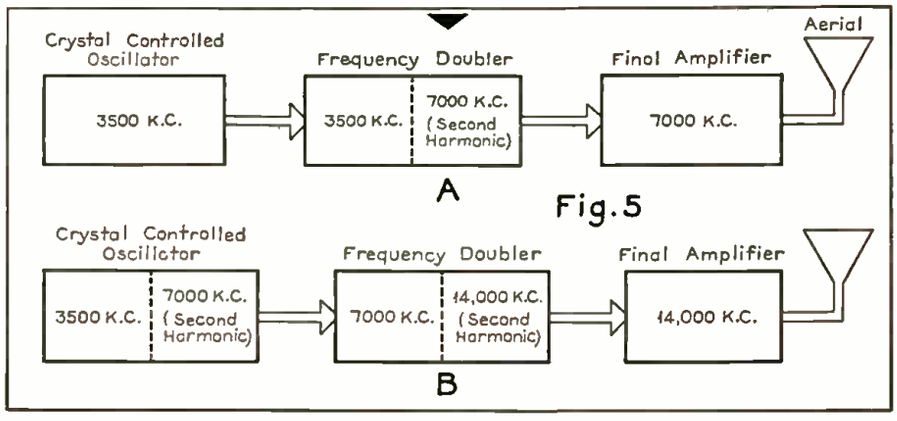
When the government alloted frequency bands to the amateurs it selected bands that are harmonically related to each other so that most harmonic radiation from an amateur transmitter would automatically fall in another amateur band rather than in channels allocated to commercial stations. It was a nice way of making the amateur suffer for his own shortcomings, but it has since shown itself to be a blessing in disguise.

To clarify this, let us assume that a transmitter operating on a frequency of 7000 kc, which is the low-frequency end of the 40-meter band, is radiating a strong second harmonic. As you already know, the second harmonic is twice the fundamental frequency, the third harmonic three times the fundamental frequency, etc. Therefore, the second harmonic of the 7000-kc signal would fall at 14,000 kc, the low-frequency end of the 20-meter amateur band, and not in one of the commercial channels adjacent to 20 meters.

This harmonic relation of the ham bands has become a blessing since the advent of crystal control, for it is possible to operate a transmitter at a fixed and highly stable frequency in two or more bands with but one crystal.

The manner in which this may be accomplished is shown at A in Fig. 5. An additional tube is connected between the oscillator and the final amplifier and the tube so biased that it will produce a strong second harmonic of the frequency

(Continued on page 276)



Block diagrams illustrating the manner in which a crystal-controlled transmitter can be operated in a number of bands with the same crystal.

RADIO PROVING POST

THE NEW HAMMARLUND SUPER-PRO

THE 1937 Hammarlund Super-Pro is not a new receiver in the usual sense of the word; it is a logical and orderly refinement of the original Super-Pro introduced last year.

Among the refinements are: the use of metal tubes where they are of distinct benefit, a merging of the r.f. and i.f. gain controls into a single sensitivity control, the addition of calibrations on all panel controls, the inclusion of a 7.5 to 15-meter band in one model and a 1000 to 2000-meter band in another model.

Three Basic Models

The standard model, shown in Fig. 1, has a continuous range from 15 to 560 meters in the following frequency ranges: 540 to 1160 kc., 1160 to 2500 kc., 2.5 to 5 mc., 5 to 10 mc., and 10 to 20 mc. The short-wave model has a continuous range from 7.5 to 240 meters in the following ranges: 1250 to 2500 kc., 2.5 to 5 mc., 5 to 10 mc., 10 to 20 mc., and 20 to 40 mc. The long-wave model tunes from 15 to 2000 meters but omits the 2.5 to 5-mc. band. Otherwise all three models are identical and employ the same number of tubes for the same functions on all bands.

These models employ a total of eight metal and eight glass tubes, two of the glass tubes being in the power-supply unit where one is used as the high-voltage rectifier and the other as the C-bias rectifier.

The revised chassis is shown in Fig. 2 which clearly indicates the locations of the metal tubes. An illustration of the exposed r.f. and high-frequency oscillator coil assemblies is shown in Fig. 3. The 10-meter oscillator coil assembly for the short-wave model is shown in Fig. 4. The coil, together with its air trimmer condenser is rigidly mounted on an isolantite base. The inductance is precisely adjusted by means of the screw which extends above the top of the coil form and alters the position of a copper disc in relation to the coil turns.

New Tube Lineup

The original Super-Pro used glass tubes throughout. The new receiver em-

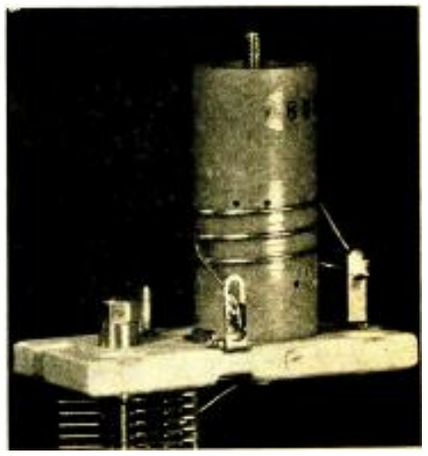


Fig. 4. The 20- to 40-mc. oscillator coil assembly. Note air trimmer below base and adjusting screw for copper tuning disc.

ploys metal 6K7 tubes in the r.f. amplifier stages, a 6L7 converter or mixer, a 6J7 high-frequency oscillator, a 6C5 a.f. voltage amplifier, and a 6F6 triode-connected pentode as a driver for two additional triode-connected 6F6 tubes in push-pull in the power stage. The 6K7 tubes offer better performance than the 6D6 glass tubes originally used in the r.f. amplifier stages, and the 6L7 converter tube provides better conversion gain than the glass 6A7 formerly used. Therefore the r.f. end of the receiver, which is the most vital point, has been considerably improved. There was nothing to be gained by using metal tubes in the three i.f. stages, nor in the circuits of the second detector, avc or beat-frequency oscillator. Consequently glass tubes were retained in these positions, as well as in the power supply.

Fig. 1. Front-panel view of the new Hammarlund Super-Pro with calibrated manual controls. The band-width control has a range from 3 to 16 kc., and the beat-oscillator control from zero to 2500 cycles on either side of zero beat.

Circuit Refinements

The circuit of the new receiver is much the same as that of the original Super-Pro (see page 347 August 1936 ALL-WAVE RADIO.) However, as previously mentioned, the r.f. and i.f. gains have been resolved into a single sensitivity control which adjusts the bias on the grids of the two r.f. tubes and the three i.f. tubes. This control is so connected that the signal gain of the receiver may be adjusted to the most desirable operating level with relation to local

noise, with the panel toggle switch in either the "Manual" or "AVC" control position. This is convenient as it is often desirable to limit the gain of a receiver so that during the reception of a signal running into deep fades, the noise background cannot become excessive.

It might also be added at this point that the avc can be used very effectively during the reception of c.w. signals. When the "CW-MOD" toggle switch is thrown to the "CW" position, an additional capacity is connected into the avc filter. This condenser provides a slower avc time constant, with the result that the automatic bias is not reduced so rapidly that the receiver gain comes up between dots and dashes. Given a signal of constant input level, the gain of the receiver with the avc on remains practically constant for code speeds in excess of about 15 wpm. At the same time the avc will take care of any fades providing they are not too rapid. Under most conditions, c.w. reception on this receiver is more reliable with the avc in operation.

In the new circuit all secondary coils are isolated from the grids of the r.f. and oscillator tubes. Coupling condensers are included in each grid circuit and bias voltages reach the grids through resistors. Such circuits are less subject to instability, and bias feed is independent of coil switching operations. In this arrangement the low ends of all secondary coils are directly grounded.

Band-Width Control

The tone control originally used has been eliminated, as sufficient frequency correction for differing programs can be obtained with the band-width control. The front-panel calibrations for this control range from 3 to 16, representing band widths ranging from 3000 to 16,000 cycles, or 3 to 16 kc. With this control set at 3, 4, 6, 10 and 16, audio cut-off on an average broadcast program occurred at 1400, 1750, 2750, 4800 and 7500 cycles respectively. The actual i.f. selectivity curves for these settings are shown in Fig. 5, and the resultant audio response curves are shown in Fig. 6. With such control the use of any form of auxiliary tone correction based on the attenuation of the higher audio frequencies is superfluous. With the band-width control set at 3—the position of maximum selectivity—the band width at 100 times input is only 8.5 kc. With the control at 16—the least selective position—the band width at 100 times input is 24 kc. In this latter position there is no sideband cutting and a high degree of program fidelity is provided. Since the control is continuously variable, any desired degree of fidelity can be obtained.

The sensitivity and audio gain controls are calibrated in arbitrary units, from 0 to 10. The beat oscillator control is calibrated in cycles and reads up to 2500 cycles, in 500-cycle steps, on either side of the zero beat position.

Technical Characteristics

The receiver has an exceptionally high degree of sensitivity—amounting to about 0.8 microvolt with a 6-to-1 signal to noise ratio, even in the 20 to 40-mc band. The image-rejection ratio in this same band is approximately 150 to 1, and 1900 to 1 at 14 mc. At 7 mc it is in the vicinity of 10,000 to 1, and jumps to 175,000 to 1 at 1000 kc.

The avc action is also exceptionally good, the change in output being only 2 to 1 for an input change in signal level of 33,000 to 1. On this basis the avc system will regulate anything within reason and hold it pretty well constant. With the sensitivity control on full and the avc on, what appears to be a moderate signal turns out to be a couple of power houses that completely block the receiver when

(Continued on page 267)

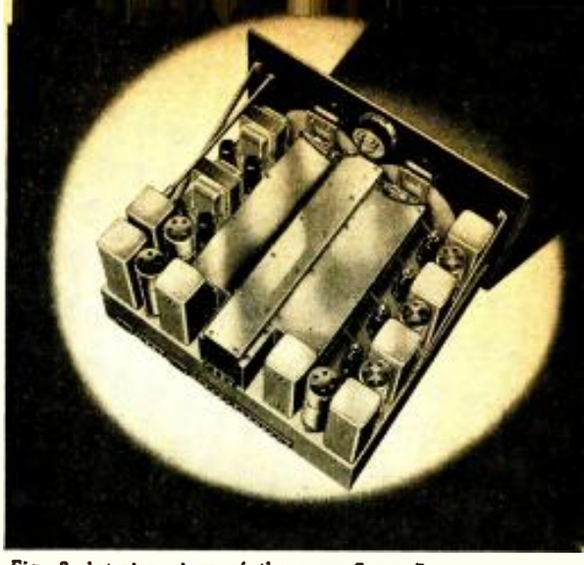


Fig. 2. Interior view of the new Super-Pro, showing where the metal tubes are located. Note that all units are enclosed and therefore protected from dust and damage.

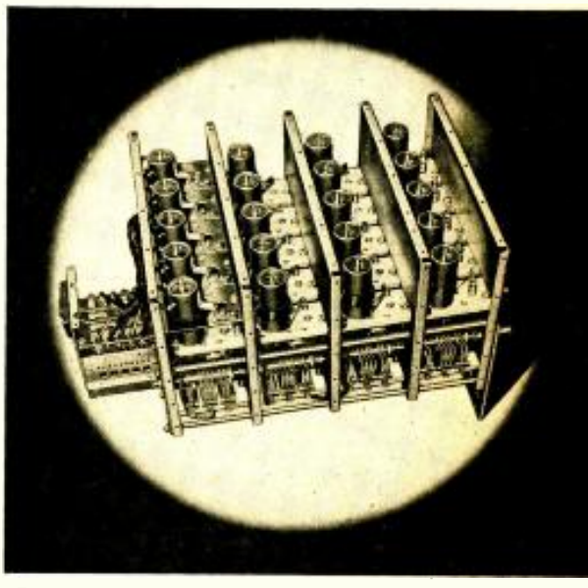
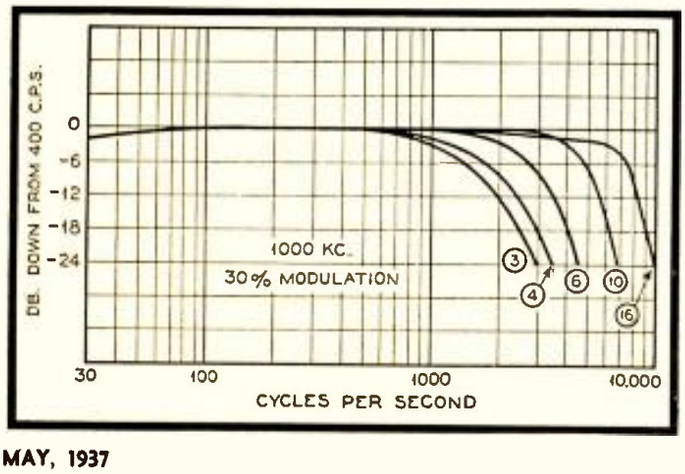
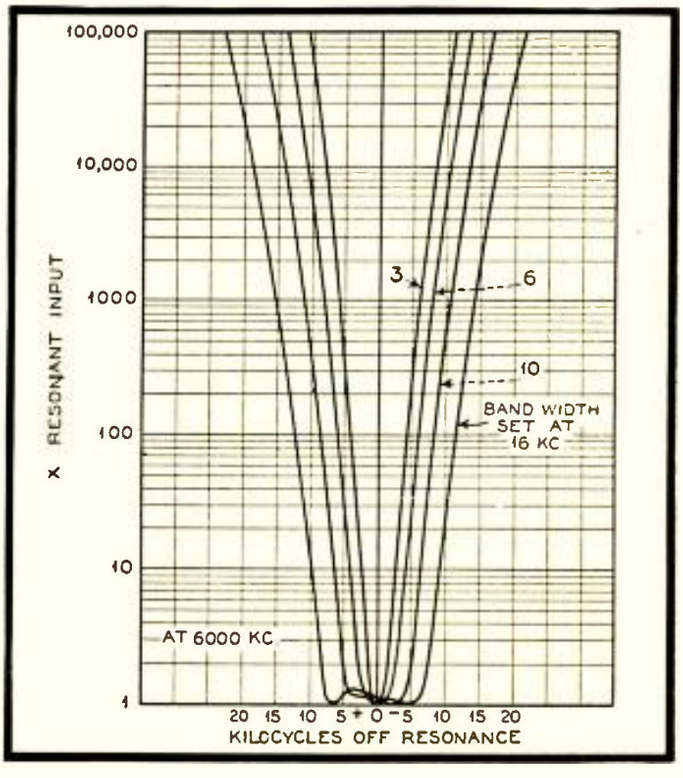


Fig. 3. View of the coil and condenser assembly comprising the heart of the r.f. section of the new Super-Pro. Note the gang of twelve band-spread condensers.

Fig. 5. (right) The i.f. selectivity curves of the Super-Pro for various band-width settings. Measurements taken at 6000 kc. Fig. 6. (below) Audio response curves of the Super-Pro, showing cut-off for various positions of band-width control.





FOREIGN BROADCAST STATIONS

LIST OF FOREIGN STATIONS OPERATING IN THE U. S. BROADCAST BAND

THE stations in the accompanying list are grouped in channels of 10 kilocycles separation for the convenience of listeners accustomed to the U. S. system of station frequency allocation. Some countries have stations operating on odd or split frequencies. To find the exact frequency of these stations simply add the number in parentheses following the location to the frequency shown above it. Thus, at the beginning of the list, under "510 KC," the frequency of the station at Hamar, Austria, is 519 kilocycles.

Canadian, Mexican, Cuban and other nearby stations, have their location printed in capital letters for the sake of ease in picking them out of the list.

The number to the right of each station is the power of the station in watts.

510 KC		
———	Hamar, Austria(9)	700
———	Insbruck, Austria(9)	1000
———	Tartu, Estonia(7)	500
520 KC		
———	Ljubljna, Yugoslavia(7)	5000
———	Vipuri, Finland(7)	———
RW34	Stalingrad, U.S.S.R.(2)	10000
530 KC		
———	Wilno, Poland(6)	50000
I-1BZ	Bolzano, Italy(6)	10000
540 KC		
CJRM	MOOSE JAW, SASK.	1000
HAL	Budapest, Hungary(6)	120000
550 KC		
———	Beremunster, Switz.(6)	100000
CFNB	FREDERICKTON, N. B.	500
RW52	Tchita, U.S.S.R.(6)	20000
XEFC	MERIDA, MEXICO	100
2CR	Cummock, Australia	10000
560 KC		
———	Athlone, Irish F. S.(5)	100000
———	Klapeida, Lithuania(5)	10000
I-1PA	Palermo, Italy	4000
MTCY	Shinkyo, Manchuokuo	100000
RW41	Syktyvkar, U.S.S.R.(3)	1200
RW42	Gorki, U.S.S.R.(5)	10000
XEAO	MEXICALI, MEXICO	250
XGOH	Chengtu, China	10000
XLHB	Shanghai, China	45
ZUG	Grahamstown, U. of So. Af.	10000
6WA	Minding, Australia	10000
570 KC		
———	Magnitogorsk, U.S.S.R.(1)	10000
———	Stuttgart, Germany(4)	100000
CB57	Santiago, Chile	5000
CMCX	HAVANA, CUBA	150
CX-2	Montevideo, Uruguay	———
RW68	Tcheliabinsk, U.S.S.R.(7)	1500
2YA	Wellington, N. Zealand	60000
580 KC		
———	Alps-Grenoble, Fr.(3)	60000
CC58	Temuco, Chile	500
CFPR	PRINCE RUPERT, B. C.	50
CHRC	QUEBEC, P. Q.	100
CKCL	TORONTO, ONTARIO	100
CKUA	EDMONTON, ALBERTA	500
JFCK	Taichu, Formosa	1000
PRB5	Franca, Brazil	50
PRC3	Pelotas, Brazil	250
PRD6	Piracecaba, Brazil	———
PRG6	Cruzeiro, Brazil	250
PRP7	Campos, Brazil	250
RW36	Archangel, U.S.S.R.(6)	10000
XQHA	Shanghai, China	250
YLZ	Riga, Latvia(3)	15000
3WV	Horsham, Australia	10000
590 KC		
———	Vienna-Bisamburg, Aus.(3)	100000
JOAK-1	Tokyo, Japan	150000
LS-10	Buenos Aires, Argentina	6000
XHKB	Tongchow, China	100
7ZL	Hobart, Australia	1000
600 KC		
CFCF	MONTREAL, P. Q.	400
CJOR	VANCOUVER, B. C.	500
CMW	HAVANA, CUBA	1400
CNR	Rabat, Morocco(1)	2500
CRCW	WINDSOR, ONTARIO	500
FJP	Noumea, New Caledonia	500
FQN	ST. PIERRE & MIQ. IS.	250
JONG	Miyazaki, Japan	500
PRH2	Porto Alegre, Brazil	25000
RW82	Frounze, U.S.S.R.(8)	2500
SBD	Sundsvall, Sweden(1)	10000
XMHA	Shanghai, China	1000
ZTC	Cape Town, U. of So. Af.	10000
4QN	Clevedon, Australia	7000
610 KC		
CX-4	Montevideo, Uruguay	1000
I-1FI	Firenze, Italy	20000
JOJK	Kanazawa, Japan	3000
RW18	Pratigorsk, U.S.S.R.	10000
RW22	Oufa, U.S.S.R.(7)	10000
RW50	Oust-Abakansk, U.S.S.R.(7)	2500
RW79	Mourmansk, U.S.S.R.	10000
XEXM	MEXICO CITY, MEX.	1000
XGSS	Tsunshi, China	15
2FC	Sydney, Australia	3500
620 KC		
———	Brussels, Belgium	1500
———	Cairo, Egypt	20000
———	Trondelag, Norway(9)	20000
CB62	Santiago, Chile	1000
CT1AA	Lisbon, Portugal(9)	20000
LV3	Cordoba, Argentina	2000
RW31	Ivanovo, U.S.S.R.	10000
TIPG	San Jose, Costa Rica	1000
XHHK	Shanghai, China	100
4ZP	Invercargill, N. Z.	450
630 KC		
CA63	Iquiqua, Chile	———
CFCO	CHATHAM, ONTARIO	100
CFCY	CHARLOTTET'N, P.E.I.	1000
CJRC	WINNIPEG, MAN.	500
CKOV	KELOWNA, B. C.	100
JOKK	Okayama, Japan	500
LS3	Buenos Aires, Argentina	5000
OKP	Praha, Czechoslovakia	120000
RW28	Vladivostok, U.S.S.R.(5)	1200
RW32	Vladivostok, U.S.S.R.(5)	10000
RW84	Oust-Abansk, U.S.S.R.(5)	1200
XEZ	MERIDA, MEXICO	500
3AR	Melbourne, Australia	4500
640 KC		
———	Shanghai, China	100
———	Lyons, France(8)	90000
CB64	Vina del Mar, Chile	1000
CC64	Concepcion, Chile	1000
CMBC	HAVANA, CUBA	150
JOIDG	Hamamatsu, Japan	500
RW29	Petrozavodsk, U.S.S.R.(8)	10000
RW56	Penza, U.S.S.R.	1200
XEBX	SALTILLO, MEXICO	250
ZTJ	Johannesburg, So. Af.(5)	10000
5CK	Crystal Brook, Austl.	7500
650 KC		
———	Cologne, Germany(8)	100000
CX-6	Montevideo, Uruguay	50000
JOUK	Akita, Japan	300
TIGPH	San Jose, Costa Rica	1000
1-YA	Auckland, New Zealand	10000
660 KC		
———	Jerusalem, Palestine(9)	20000
———	Manchester, Gr. Britain(8)	70000
RW38	Alexandrovsk, U.S.S.R.(2)	2000
XEAL	MEXICO CITY, MEXICO	1000
XGOA	Nanking, China	75000
670 KC		
———	Sottens, Switzerland(7)	100000
JOTK	Matsue, Japan	500
LS4	Buenos Aires, Argentina	7000
MTFY	Harbin, Manchuokuo	3000
PRA7	Ribeirao Preto, Brazil	———
PRE6	Nictheroy, Brazil	1500
PRG5	Santos, Brazil	750
RW23	Groznyl, U.S.S.R.(6)	1000
VOWR	ST. JOHNS, NFLD.	500
2CO	Corowa, Australia	1000
680 KC		
———	Belgrade, Yugoslavia(6)	2800
———	Salisbury, So. Rhodesia(1)	1500
CB68	Valparaiso, Chile	1000
CMCG	HAVANA, CUBA	150
CW27	Salto, Uruguay	250
JOVK	Hakodate, Japan	500
LKD	Bodo, Norway(6)	500
RDN	San Salvador, Salvador	500
RW17	Kazan, U.S.S.R.(6)	10000
RW27	Makhatch, U.S.S.R.(9)	4000
RW46	Karaganda, U.S.S.R.(6)	1200
RW71	Petropavlovsk, U.S.S.R.(9)	1200
RW74	Tcheboksary, U.S.S.R.	1200
VAS	GLACE BAY, N. S.	2000
690 KC		
———	Paris FPTT, France(5)	120000
CFRB	TORONTO, ONTARIO	10000
CJCJ	CALGARY, ALBERTA	100
CX-8	Montevideo, Uruguay	500
JOBK-1	Osaka, Japan	10000
LV6	Mendoza, Argentina	500
PRA6	Sao Paulo, Brazil	5000
XET	MONTERREY, MEX.	500
XGOY	Kunming, China	250
6WF	Perth, Australia	3500
700 KC		
———	Malmberget, Sweden(4)	200
HJN	Bogota, Colombia	500
JOCG	Asahigawa, Japan	500
RW48	Elista, U.S.S.R.(4)	500
SBA	Stockholm, Sweden	55000
VPB	Colombo, Ceylon	1750
XMHC	Shanghai, China	500
ZP15	Villarica, Paraguay	———
2NR	Lawrence, Australia	7000
710 KC		
I-1RO	Rome, Italy(3)	120000
JODK-1	Keijo, Korea	10000
LS-1	Buenos Aires, Argentina	5000
RW16	Samara, U.S.S.R.	10000
XGML	Kashing, China(4)	7.5
XGOS	Chunking, China(1)	1000
720 KC		
JORK	Kochi, Japan	500
JFBK	Tainan, Formosa	1000
PRA3	Rio de Janeiro, Brazil	1500
RW9	Kiev, U.S.S.R.(2)	36000
XEH	MONTERREY, MEX.	100
XLHC	Shanghai, China	50
XLHD	Shanghai, China	50
3YA	Christchurch, N. Z.	10000
6GF	Kalgoorlie, Austl.	2000
730 KC		
———	Assiut, Egypt(1)	100
———	Tallinn, Estonia(1)	20000
CB73	Santiago, Chile	1000
CFPL	LONDON, ONTARIO	100
CJCA	EDMONTON, ALTA.	1000
CKAC	MONTREAL, P. Q.	5000
CKPR	FORT WILLIAMS, ONT.	100
CMK	HAVANA, CUBA	3000
CX10	Montevideo, Uruguay	1000
EAJ2	Madrid, Spain(1)	3000
EAJ5	Seville, Spain(1)	5500
JOCK-1	Nagoya, Japan	10000
LV2	San Juan, Argentina	1000
RW65	Saransk, U.S.S.R.(4)	1000
XEBC	AGUA CALIENTE, MEX.	5000
XEPN	PIEDRAS NEGRAS, MX.	50000
XHGS	Wuchow, China	50
5CL	Adelaide, Australia	2000
740 KC		
———	Marseilles, France(9)	100000
———	Munich, Germany	100000
———	Pori, Finland(9)	1000
———	Sortavala, Finland(9)	200
JOSK	Kokura, Japan	1000
RW64	Ordjonikidze, U.S.S.R.	10000
XHHB	Shanghai, China	50
2BL	Sydney, Australia	3000
750 KC		
———	Katowice, Poland(8)	12000
———	Maritzburg, U. of So. Af.	10000
CMCW	HAVANA, CUBA	150
HS7PJ	Bangkok, Siam	10000
LRA	Buenos Aires, Argentina	10000
LUHO	T'ung Hsien, China	20
RW64	Urdjomikidze, U.S.S.R.(2)	10000
XEAM	MATAMOROS, MEX.	25
XGOK	Canton, China	1000
XQKB	Tientsin, China	150
ZTD	Durban, U. of So. Af.	1500
7NT	Kelso, Australia	7000
760 KC		
———	Burghead, Gr. Britain(7)	60000
———	Falkirk, Gr. Britain(7)	50000
CB76	Valparaiso, Chile	10000
CMHX	CIENFUEGOS, CUBA	200
JOAK	Dairen, Manchuokuo	1000
RW78	Ijevsk, U.S.S.R.(7)	———
XEOK	TIAJUANA, MEXICO	200
XLHI	Shanghai, China	7.5
XLHJ	Shanghai, China	100
2YB	New Plymouth, N. Z.	100
770 KC		
———	Toulouse, France(6)	120000
CMBS	HAVANA, CUBA	150
CX12	Montevideo, Uruguay	1000
JOHK	Sendai, Japan	10000
LKF	Fredrikstad, Norway(6)	1000
RW26	Stalino, U.S.S.R.(6)	10000
VUM	Madras, India	200
3LO	Melbourne, Australia	3500

780 KC

	Leipzig, Germany(5)	120000
CB78	Santiago, Chile	1000
CHWK	CHILLIWACK, B. C.	100
CKSO	SUDBURY, ONTARIO	1000
CMJK	CAMAGUEY, CUBA	1000
JOPK	Shizuoka, Japan	500
LT-1	Rosario, Argentina	4000
PRD-2	Rio de Janeiro, Brazil	1000
XEL	MEXICO CITY, MEX.	1000
XLHA	Shanghai, China	50
YV1RN	Maracaibo, Venezuela	——

790 KC

	Lwow, Poland(5)	50000
CMGH	MATANZAS, CUBA	250
EAJ-1	Barcelona, Spain(5)	7500
JOGK	Kumamoto, Japan	10000
LR-10	Buenos Aires, Argentina	10250
RW51	Naitchik, U.S.S.R.(4)	1000
XLIJ	Wusih, China	50
ZTB	Bloemfontaine, U. of So. Af.	10000
4YA	Dunedin, New Zealand	10000

800 KC

	Cardiff, Gr. Britain(4)	70000
HIX	CIUDAD TRUJILLO, D.R.	1000
JOKG	Kofu, Japan	500
PRG2	Sao Paulo, Brazil	10000
TIX	San Jose, Costa Rica	——
4QG	Brisbane, Australia	2500

810 KC

CMCF	HAVANA, CUBA	600
CX14	Montevideo, Uruguay	5000
1-1MI	Milan, Italy(3)	50000
JOIK	Sapporo, Japan	10000
VUC	Calcutta, India	2000
XEXC	AGUASCALIENTES, MEX.	350

820 KC

	Bucharest, Roumania(3)	12000
CB82	Santiago, Chile	1000
CMHW	CIENFUEGOS, CUBA	100
CW23	Salto, Uruguay	250
JBBK-2	Heijo, Japan	500
LV7	Tucuman, Argentina	1000
PRH8	Rio de Janeiro, Brazil	1000
XEBG	TIAJUANA, MEXICO	1000
XLKB	Tientsin, China(5)	55
2ZH	Napier, N. Z.	90

830 KC

CMJX	CAMAGUEY, CUBA	500
JOFK	Hiroshima, Japan	30000
RW39	Moscow, U.S.S.R.(2)	100000
XGF	Tainan, China(3)	7.5
XGWH	Wu-hu, China	30
3GI	Longford, Australia	7000

840 KC

	Berlin, Germany (1)	100000
CB84	Valparaiso, Chile	1000
CC84	Talcahuano, Chile	100
CFQC	SASKATOON, SASK.	1000
CRCT	TORONTO, ONTARIO	5000
F31-CD	Saigon, Fr. Indo-China	12000
LT8	Rosario, Argentina	500
PRB9	Sao Paulo, Brazil	5000
VOGY	ST. JOHNS, NFLD.(1)	100
XERA	VILLA ACUNA, MEX.	350000
XGTM	Chang-sha, China	15
XHHA	Shanghai, China	1000
ZBW	Hongkong, China	2000
2YC	Wellington, N. Z.	250

850 KC

	Sofia, Bulgaria	100000
	Strasbourg PTT, Fr.(9)	35000
CX-16	Montevideo, Uruguay	10000
EAJ3	Valencia, Spain	3000
HI4V	TRUJILLO CITY, D.R.	25
HSPJ	Bangkok, Siam(6)	2500
LKA	Aalesund, Norway	350
LKB	Bergen, Norway	1000
LKP	Parsgrund, Norway	——
RW73	Simferopal, U.S.S.R.(9)	10000
VQ7LO	Nairobi, Kenya(8)	600
VUB	Bombay, India(5)	2000
XEFE	NUEVO LAREDO, MEX.	20
XLIQ	Hongchow, China	100
XOHB	Shanghai, China	100
5RM	Renmark, Australia	1000

860 KC

	Pozan, Poland(8)	16000
	Radio Agen, Paris	15000
PRA3	Rio de Janeiro, Brazil	2500
XEJW	MEXICO CITY, MEX.	——
XEMO	TIAJUANA, MEXICO	5000
XENC	MEXICO CITY, MEX.	50
XGOF	Tsinan, China	500
XHHD	Shanghai, China	50
4AY	Ayr, Australia	100
7HO	Hobart, Australia	7000

870 KC

	London, Gr. Britain(7)	50000
	Tunis, Tunisia(7)	——
JOAK-2	Tokyo, Japan	150000
LR6	Buenos Aires, Argentina	26000
RW85	Igarka, U.S.S.R.(1)	2000
XEFB	MONTERREY, MEX.	200
XLIL	Suchow, China	50
2GB	Sydney, Australia	1000

880 KC

	Graz, Austria(6)	7500
	Helsinki, Finland(4)	10000
CFJC	KAMLOOPS, B. C.	100
CMQ	HAVANA, CUBA	500
CRCO	OTTAWA, ONTARIO	1000
LV2	Cordoba, Argentina	2000
RW61	Iochar-Ola, U.S.S.R.(8)	1000
TIEP	San Jose, Costa Rica	500
VUD	Delhi, India(2)	20000
XHHV	Shanghai, China	100
YV5RQ	Caracas, Venezuela(2)	——
1YX	Auckland, New Zealand	500
6PR	Perth, Australia	500

890 KC

CB89	Santiago, Chile	1000
CX-18	Montevideo, Uruguay	1000
JOLG	Tottari, Japan	500
MTBY	Hoten, Manchuokuo	1000
XEW	MEXICO CITY, MEX.	50000
XGAK	Kashing, China(5)	15
ZP9	Asuncion, Paraguay(8)	1500

900 KC

	Hamburg, Germany(4)	100000
CB90	Valparaiso, Chile	1000
CW29	Soriano, Uruguay	50
HIG	TRUJILLO CITY, D. R.	50
KZIB	Manila, Philippine Is.	1000
LU2	Bahia Blanca, Argentina	2000
PRB7	Rio de Janeiro, Brazil	500
XGON	Nanking, China	200
XTGM	Tongchow, China	100
2LM	Linsmore, Australia	500
2ZP	Wairoa, New Zealand	210
3MA	Mildura, Australia	100

910 KC

	Radio-Toulouse, Fr.(3)	100000
CJAT	TRAIL, B. C.	1000
CKY	WINNIPEG, MAN.	15000
CRCM	MONTREAL, P. Q.	5000
JOLK	Fukuoka, Japan	500
LR2	Buenos Aires, Argentina	12000
RW30	Dnepropetrovsk, USSR.(3)	10000
XENT	NUEVO LAREDO, MEX.	50000
XLIM	Hanim, China	50
4RK	Rockhampton, Australia	2000

920 KC

	Brno, Czechoslovakia(2)	32000
CMX	HAVANA, CUBA	1000
HHK	PT. AU PRINCE, HAITI	1000
JOQK	Nugata, Japan	500
XEAA	MEXICALI, MEX.	200
XHHX	Shanghai, China	1000
ZJV	Suva, Fiji Islands	7500
2ZR	Nelson, New Zealand	60

930 KC

CB93	Santiago, Chile	2500
CFAC	CALGARY, ALBERTA	100
CFCH	NORTH BAY, ONT.	100
CFLC	PRESCOTT, ONT.	100
CHNS	HALIFAX, N. S.	1000
CKPC	BRANTFORD, ONT.	100
CX20	Montevideo, Uruguay	2000
HI-1J	SAN FRANCISCO, D. R.	40
JOAG	Nagasaki, Japan	500
ON4RB	Brussels, Belgium(2)	200
PRA8	Pernambuco, Brazil	5000
PRB2	Curityba, Brazil	250
PRC4	Amparo, Brazil	50
PRC7	Bello Horizonte, Brazil	250
RW55	Engelo, U.S.S.R.(2)	1000
TIRH	San Jose, Costa Rica	50
VUG	Delhi, India(3)	1000
XEBH	HERMOSILLO, MEX.	500
3UZ	Melbourne, Australia	650

940 KC

	Algiers, Algeria(1)	12000
JOBK-2	Osaka, Japan	10000
PRF4	Rio de Janeiro, Brazil	10000
SBB	Goteberg, Sweden(1)	10000
VOAS	ST. JOHNS, NFLD.	100
XEFO	MEXICO CITY, MEX.	5000
XEXO	MEXICO CITY, MEX.	500
XHHE	Shanghai, China	100
3ZR	Greymouth, N. Z.	250

950 KC

	Breslau, Germany	100000
	Poste Parisien, Fr.(9)	60000
CJOC	LETHBRIDGE, ALTA.	100
CMCD	HAVANA, CUBA	250
CRCS	CHICOUTIMI, P. Q.	100
JOOG	Oibihiro, Japan	500
LR3	Buenos Aires, Argentina	31000
RW40	Gomel, U.S.S.R.(9)	1000
RW54	Gomel, U.S.S.R.(9)	1000
XGOP	Peiping, China	300
YNVA	Managua, Nicaragua	30
ZTP	Pretoria, U. of So. Af.(2)	500
2UE	Sydney, Australia	1000

960 KC

	Bordeaux, France(8)	3000
CA96	Coquimbo, Chile	——
CC96	Curico, Chile	100
CFRN	EDMONTON, ALTA.	100
CHNC	NEW CARLISLE, P. Q.	1000
OAX4E	Lima, Peru	50
PRF3	Sao Paulo, Brazil	5000
XEAW	REYNOSA, MEX.	50000
RW13	Odessa, U.S.S.R.(8)	10000
RW67	Oukhta, U.S.S.R.(9)	2000
RW69	Odessa, U.S.S.R.	10000
XHHE	Shanghai, China	100
2ZF	Palmerston N., N. Z.	250
5DN	Adelaide, Australia	300

970 KC

	Belgast, Gr. Britain(7)	100000
CB97	Santiago, Chile	1000
CMBY	HAVANA, CUBA	150
CX22	Montevideo, Uruguay	250
JODK-2	Heijo, Korea	10000
LV9	Salta, Argentina	500
XHIB	Wusih, China	75
3BO	Bendigo, Australia	1000

980 KC

	Torun, Poland	24000
CNO	Casablanca, Morocco(3)	25
I-1GE	Genoa, Italy(6)	10000
JOXK	Tokushima, Japan	500
PRC6	Rio de Janeiro, Brazil	1000
PRE8	Rio de Janeiro, Brazil	22000
TINRH	San Jose, Costa Rica	300
XMHB	Shanghai, China	500
2LV	Invernell, Australia	——
2ZJ	Gisborne, New Zealand	500
6AM	Northam, Australia	2000

990 KC

	Hilversum, Holland	120000
JOCK-2	Nagaya, Japan	10000
LR4	Buenos Aires, Argentina	16000
XEAF	NOGALES, MEXICO	750
XEK	MEXICO CITY, MEX.	100
XES	TAMPICO, MEXICO	100
XGCK	Chaching, China	7.5
XGOD	Hangchow, China	2000
2GZ	Orange, Australia	2000

1000 KC

	Daventry, Gr. Britain(3)	70000
CMBZ	HAVANA, CUBA	500
HJ3ABH	Bogota, Colombia(5)	2000
JOBG	Maebashi, Japan	500
OAX4O	Lima, Peru	——
OKR	Bratislavia, Czech.(4)	13500
PRB6	Sao Paulo, Brazil	1000
PRE7	Sao Paulo, Brazil	5000
RW86	Tchernigov, U.S.S.R.(3)	5000
TIGH	San Jose, Costa Rica	500
VOCM	ST. JOHNS, NFLD.	50
VUU	Dekra Dun, India	300
XEBI	AGUASCALIENTES, MEX.	25
XEBK	NUEVO LAREDO, MEX.	100
XEXS	MEXICO CITY, MEX.	100
XGMK	Poatung, China	15
XGOT	Talyuan, China	50
ZP3	Asuncion, Paraguay	300
4GR	Toowoomba, Australia	500

1010 KC

CB101	Santiago, Chile	1000
CHML	HAMILTON, ONT.	100
CHWC	REGINA, SASK.	500
CKCD	VANCOUVER, B. C.	100
CKCK	REGINA, SASK.	500
CKCO	OTTAWA, ONTARIO	100
CKIC	WOLFVILLE, N. S.	50
CKWX	VANCOUVER, B. C.	100
CMJA	CAMAGUEY, CUBA	50
CX24	Montevideo, Uruguay	2500
HI4D	TRUJILLO CITY, D. R.	25
TIGA	Cartago, Costa Rica	30
XEU	VERACRUZ, MEX.	250
XGOW	Hangkow, China	5000
3HA	Hamilton, Australia	300
4ZB	Dunedin, New Zealand	78
4ZM	Dunedin, New Zealand	100
4ZO	Dunedin, New Zealand	25

1020 KC

	Krakow, Poland(2)	2000
EAJ-15	Barcelona, Spain(2)	3000
EAJ-19	Oviedo, Spain(2)	700
JOFG	Fukui, Japan	300
PRH4	Sao Paulo, Brazil	——
XEJ	JUAREZ, MEXICO	1000
XHHG	Shanghai, China	100
2KY	Sydney, Australia	1000

1030 KC

	Konigsberg, Germany(1)	10000
CD103	Magallanes, Chile	100
CFCN	CALGARY, ALBERTA	10000
CKLW	WINDSOR, ONTARIO	5000
CMCY	HAVANA, CUBA	8000
CT-1GL	Lisbon, Portugal	30000
JBAK	Fusan, Korea	150
LR9	Buenos Aires, Argentina	5000
XEB	MEXICO CITY, MEX.	10000
3DB	Melbourne, Australia	600

1040 KC

	Rennes, France	120000
CP4	La Paz, Bolivia	10000
JONK	Nagano, Japan	500
RW70	Leningrad, U.S.S.R.	10000
XHHH	Shanghai, China	100
5PI	Port Pirie, Australia	2000

1050 KC

	Falkirk, Gt. Britain	50000
CMKD	SANTIAGO, CUBA	250
CRCK	QUEBEC, P. Q.	1000
CX26	Montevideo, Uruguay	2000
HIT	TRUJILLO CITY, D. R.	100
HJ3ABX	Bogota, Colombia	1000
I-1BA	Bari, Italy(9)	20000
JOHG	Kagoshuma, Japan	500
OAX4A	Lima, Peru	1500
OAX4H	Lima, Peru	——
RW33	Krasnodar, U.S.S.R.	1000
TIFA	San Jose, Costa Rica	75
XHKA	Tientsin, China	100
2CA	Canberra, Australia	500

1060 KC

	Radio-Cite, Paris, Fr.(8)	800
CB106	Santiago, Chile	150
HJ1ABG	Barranquilla, Colombia	5000
JOIG	Toyanau, Japan	500
RW57	Tirospol, U.S.S.R.(8)	4000
XEA	GUADALAJARA, MEX.	125
XEMG	ATZCAPOTZALCO, MEX.	100
XHHI	Shanghai, China	100
2DU	Dubbo, Australia	100
3YB	Melbourne, Australia	25
4MB	Mayborough, Australia	50

1070 KC

———	Bordeaux, France(7)	100000
CMBX	HAVANA, CUBA	500
CMHA	SAGUA LA GRANDE, CU.	50
JOOK	Kyoto, Japan	300
LR1	Buenos Aires, Argentina	50000
VUA	Allahabad, India	100
XGOX	Honan-fu, China	200
XKRI	Canton, China(1)	100
6WB	Katanning, Australia	2000

1080 KC

———	Zareb, Yugoslavia(6)	800
JOJG	Yamagata, Japan	500
LT3	Rosario, Argentina	4500
OAX4F	Lima, Peru	50
PRC8	Rio de Janeiro, Brazil	250
SCC	Falun, Sweden(6)	2000
XEBA	GUZMAN, MEX.	20
ZHHT	Shanghai, China	200
ZP7	Asuncion, Paraguay(3)	700
2AD	Armidale, Australia	———
4MK	Mackay, Australia	100
4TO	Fawnsville, Australia	200

1090 KC

CC109	Rancagua, Chile	100
CX28	Montevideo, Uruguay	3000
EAJ7	Madrid, Spain(5)	10000
JBBK-1	Heijo, Korea	———
RW75	Vinnitza, U.S.S.R.(5)	10000
XEAQ	TIAJUANA, MEXICO	1000
XGOB	Loyang, China	250
XLIO	Shaohing, China	———
1ZB	Auckland, N. Z.	350

1100 KC

———	Madana, Latvia(4)	50000
CMCJ	HAVANA, CUBA	500
CRCV	VANCOUVER, B. C.	500
I-1NA	Naples, Italy(4)	1500
OAX4J	Lima, Peru	———
XHHS	Shanghai, China	100
YV5RG	Caracas, Venezuela	100
7LA	Lanceston, Australia	300

1110 KC

———	Radio Normandie, Fr.(3)	10000
CB111	Vina del Mar, Chile	1000
CD111	Magallanes, Chile	100
HIL	TRUJILLO CITY, D. R.	20
HJ3ABD	Bogota, Colombia(1)	50
LS-5	Buenos Aires, Argentina	5000
OKK	Moravska, Czech.(3)	112000
XELO	PIEDRAS NEGRAS, MX.	10000
YV5RE	Caracas, Venezuela	200
2VW	Sydney, Australia	1000

1120 KC

———	Shaerbeek, Belgium(2)	100
———	Newcastle, Gr. Britain(2)	1000
———	Alexandria, Egypt(2)	500
CD112	Osarno, Chile	100
CHLP	MONTREAL, P. Q.	100
CHSJ	ST. JOHN, N. B.	500
CKOC	HAMILTON, ONTARIO	500
CKX	BRANDON, MANITOBA	1000
CMGF	MATANZAS, CUBA	150
CMKM	MANZANILLO, CUBA	50
CW31	Salto, Uruguay	250
HAE	Nyiregyhaza, Hungary(2)	6200
LV5	San Juan, Argentina	500
ON4GT	Brussels, Belgium(2)	100
ON4RC	Brussels, Belgium(2)	100
XLHM	Shanghai, China	50
XLH	Shanghai, China	200
YV1RF	Maracaibo, Venezuela	250
4BC	Brisbane, Australia	1000

1130 KC

CB113	Quillota, Chile	100
CMJI	CIEGO DE AVILA, CUBA	50
CX30	Montevideo, Uruguay	500
SBH	Horby, Sweden(1)	10000
XEJP	MEXICO CITY, MEX.	100
XGOL	Foo-Chow, China	250
XGOC	Nan-Chang, China	500
ZP-1	Asuncion, Paraguay	1000
3SH	Swan Hill, Australia	50
4VL	Charleville, Australia	50
6ML	Perth, Australia	500

1140 KC

———	Cardiff, Gr. Britain(9)	20000
———	London, Gr. Britain(9)	20000
———	Manchester, Gr. Britain(9)	20000
CB114	Santiago, Chile	5000
CMBG	HAVANA, CUBA	200
I-1TO	Turin, Italy	7000
I-1TR	Trieste, Italy	10000
XHHL	Shanghai, China	100
2HD	Newcastle, Australia	500
4YO	Dunedin, N. Z.	200

1150 KC

———	Kosice, Czechoslovakia(8)	2600
CMJP	CAMAGUEY, CUBA	200
HC2ET	Guyaquil, Ecuador(3)	300
HI4M	TRUJILLO CITY, D. R.	20
HJ1ABJ	Santa Marta, Colombia	———
HJ1ABM	Cartagena, Colombia	50
LR8	Buenos Aires, Argentina	7000
XEC	TIAJUANA, MEXICO	100
XEDW	MINATITLAN, MEX.	20
XGOZ	Chinkeang, China	100
XKYY	Tsangchow, China	15
YV1RE	Maracaibo, Venezuela(3)	75
YV4RG	Maracay, Venezuela(3)	100
2WG	Wagga, Australia	200
2ZM	Gisborne, N. Z.	250

1160 KC

———	Monte Ceneri, Switz.(7)	15000
CB116	Valparaiso, Chile	1000
CMHJ	CIENFUEGOS, CUBA	200
CMKG	SANTIAGO, CUBA	———
LT5	Resistencia, Arg.	500
PRC2	Porto Alegre, Brazil	3000
PRD8	Nictheroy, Brazil	1000
PRD9	Sorocaba, Brazil	50
PRG4	Jaboticabal, Brazil	250
XEAS	SALTILLO, MEXICO	50
XEBI	MERIDA, MEXICO	20
XEBZ	MEXICO CITY, MEX.	100
XED	GUADALAJARA, MEX.	500
XEP	JUAREZ, MEXICO	500
XHHU	Shanghai, China	100
2KA	Katoomba, Australia	100

1170 KC

———	Copenhagen, Denmark(6)	10000
CC117	Concepcion, Chile	100
CMBD	HAVANA, CUBA	150
CX32	Montevideo, Uruguay	500
XLIE	Wusih, China	50
2NZ	Narrabi, Australia	2000
2ZD	Masterton, New Zealand	12

1180 KC

———	Nice PTT, France(6)	60000
CB118	Santiago, Chile	5000
CMJO	CIEGO DE AVILA, CUBA	50
LKM	Tromsoe, Norway(6)	100
RW20	Kharkov, U.S.S.R.(5)	10000
XEFA	MEXICO CITY, MEX.	500
XHHZ	Shanghai, China	150
3KZ	Melbourne, Australia	600

1190 KC

———	Cassel, Germany(5)	2000
———	Coblenz, Germany(5)	2000
———	Frankfurt, Germany(5)	25000
———	Freiburg, Germany(5)	5000
———	Kaiserslautern, Germany(5)	1500
———	Trier, Germany(5)	2000
HIJ	TRUJILLO CITY, D. R.	10
LS2	Buenos Aires, Argentina	30000
VONF	ST. JOHNS, NFLD.(5)	500
XLKA	Peiping, China(4)	30
2CH	Sydney, Australia	1000

1200 KC

———	Praha No. 2, Czech.(4)	5000
CB120	Valparaiso, Chile	1000
CHAB	MOOSE JAW, SASK.	100
CKNX	WINGHAM, ONTARIO	50
CKTB	ST. CATHERINES, ONT.	100
CMCO	HAVANA, CUBA	250
CW33	Florida, Uruguay	75
HH2V	PT. AU PRINCE, HAITI	300
HJ3ABE	Bogota, Colombia	1000
LT9	Santa Fe, Argentina	500
OAX4B	Lima, Peru	250
OAX5B	Ica, Peru	———
PRG9	Sao Paulo, Brazil	500
VUL	Lahore, India	100
XHHN	Shanghai, China	100
YV5RD	Caracas, Venezuela	1000
3YL	Christchurch, N. Z.	250
5KA	Adelaide, Australia	300

1210 KC

———	Lille, France(3)	60000
CD121	Osorno, Chile	100
CJCS	STRATFORD, ONTARIO	50
CJCU	AKLAVIK, N. W. TER.	50
CKBI	PRINCE ALBERT, SASK.	100
CKCH	HULL, P. Q.	100
CKMC	COBALT, ONTARIO	50
CMHI	SANTA CLARA, CUBA	150
CX34	Montevideo, Uruguay	500
LV--10	Mendoza, Argentina	500
TGW	Guatemala City, Guat.	10000
XEAT	PARRAL, MEXICO	250
XEE	DURANGO, MEXICO	50
XEFV	JUAREZ, MEXICO	100
XETH	PUEBLA, MEXICO	100
XHKC	Tsingtao, China	100
XLPH	Pinghu, China	15
XLTC	Wusih, China	150
2GF	Grafton, Australia	100
6KG	Kalgoorlie, Australia	85

1220 KC

———	Bloemendaal, Holland	100
———	Norvik, Norway(2)	300
CMJE	CAMAGUEY, CUBA	50
HI5E	TRUJILLO CITY, D. R.	20
HJ3ABF	Bogota, Colombia	———
I-1BO	Bologna, Italy	50000
PRA-9	Rio de Janeiro, Brazil	22000
TIVCA	San Jose, Costa Rica	———
XEBL	MAZATLAN, MEXICO	50
XEDA	ANAYA, MEXICO	200
XETF	VERACRUZ, MEXICO	12
XGOT	Peiping, China	500
4AK	Oakey, Australia	1000
4ZL	Dunedin, New Zealand	100

1230 KC

———	Gleiwitz, Germany	5000
CMCB	HAVANA, CUBA	150
LS8	Buenos Aires, Argentina	15000
XEFJ	MONTERREY, MEX.	100
XLIR	Hangchow, China	50
YNOP	Managua, Nicaragua	100
2NC	Newcastle, Australia	2000

1240 KC

———	Eskilstuna, Sweden	200
———	Juan les Pins, France(9)	2000
———	Orebro, Sweden	200
———	Saffle, Sweden	400
———	Varberg, Sweden	200
CB124	Valparaiso, Chile	250
CJCB	SYDNEY, N. S.	1000
CMHB	SANCTI SPIRITUS, CUBA	50
CW35	Paysandu, Uruguay	250
LU7	Bahia Blanca, Argentina	2000
LV-14	La Rioja, Argentina	500
PRA5	Sao Paulo, Brazil	5000
XEAC	TIAJUANA, MEXICO	250
XEAY	MEXICO CITY, MEX.	100
XEKL	LEON, MEXICO	500
XELA	SALTILLO, MEXICO	50
XHHY	Shanghai, China	100
2ZL	Hastings, New Zealand	50
3TR	Sale, Australia	500
6CK	Cork, Irish Free State	1000
6IX	Perth, Australia	500

1250 KC

———	Kiruna, Sweden(8)	200
———	Kuldiga, Latvia(8)	10000
———	Rome No. 3, Italy(8)	1000
CMKC	SANTIAGO, CUBA	100
CX36	Montevideo, Uruguay	250
EAJ8	San Sebastian, Spain(8)	———
HC2JB	Guayaquil, Ecuador	30
HJ1ABE	Cartagena, Colombia	———
HJ4ABK	Medellin, Colombia	300
MABS	Siangyang, China	35
OAX1A	Chiclayo, Peru	300
OAX4L	Miraflores, Peru	100
XEXH	SAN LUIS POTOSI, MEX.	250
XLIF	Wusih, China	75
XLWU	Wusih, China	50

1260 KC

———	Nurnberg, Germany(7)	2000
CB126	Santiago, Chile	1000
PRE3	Rio de Janeiro, Brazil	10000
XHHP	Shanghai, China	100
1-ZM	Manurava, New Zealand	200
3WR	Shepparton, N. Z.	50

1270 KC

CA127	Antofagasta, Chile	100
CC127	Chillan, Chile	———
CMHD	CAIBARIEN, CUBA	250
LKK	Kristianssand, Norway(6)	500
LKS	Stavangu, Norway(6)	500
LS9	Buenos Aires, Argentina	6000
PRB4	Santos, Brazil	1000
PRG7	Jahu, Brazil	200
TUA	Tunis, Tunisia(5)	500
XDYF	Wuhu, China	75
XEXB	JALAPA, MEXICO	250
YNLF	Managua, Nicaragua	20
YV3RA	Baraquisimeta, Venez.	———
ZP4	Asuncion, Paraguay(5)	150
2SM	Sydney, Australia	1000
3YB	Warnambool, Australia	50

1280 KC

———	Aberdeen, Gr. Britain(5)	1000
———	Dresden, Germany(5)	250
———	Stara-Zagora, Bulgaria(5)	2000
CMCU	HAVANA, CUBA	150
PRG3	Rio de Janeiro, Brazil	10000
XEMX	MEXICO CITY, MEX.	100
XHJA	Hangkow, China	100
XHHQ	Shanghai, China	80
XQKC	Tientsin, China	100
3AW	Melbourne, Australia	600
4ZC	Otago, N. Z.	45

1290 KC

———	Klagenfurt, Austria(4)	6000
———	Linz, Austria(4)	15000
———	Vararlburg, Austria	6000
CX38	Montevideo, Uruguay	5000
XGOE	Yungning, China	1000
4BK	Brisbane, Australia	500

1300 KC

———	Danzig, Danzig(3)	500
CB130	Santiago, Chile	1000
CPX	La Paz, Bolivia	5000
HI7P	TRUJILLO CITY, D. R.	25
LT-10	Santa Fe, Argentina	500
LU6	Mar del Plata, Argentina	500
OAX4C	Lima, Peru	———
VOAC	ST. JOHNS, NFLD.	20
XQHC	Shanghai, China	1000
2TM	Tamworth, Australia	1000

1310 KC

CHCK	CHARLOTTETOWN, P.E.I.	50
CJKL	KIRKLAND LAKE, ONT.	1000
CJLS	YARMOUTH, N. S.	100
CKCV	QUEBEC, P. Q.	100
SBC	Malmo, Sweden(2)	2500
SBI	Norrkoping, Sweden(2)	250
SBJ	Trolhatan, Sweden(2)	250
SBK	Karlstad, Sweden(2)	250
XEAG	CORDOBA, MEXICO	10
XECW	MEXICO CITY, MEX.	10
XEFW	TAMPICO, MEXICO	250
XETB	TORREON, MEXICO	125
XEX	MONTERREY, MEXICO	125
5AD	Adelaide, Australia	300

1320 KC

CB132	Valparaiso, Chile	1000
CD132	Valdivia, Chile	100
CMOX	HAVANA, CUBA	200
CW39	Payoandu, Uruguay	100
HAE-2	Magyarovar, Hungary(1)	1250
HJ3ABK	Bogota, Colombia	50
HJ4ABQ	Medellin, Colombia	1000
PRE2	Rio de Janeiro, Brazil	500
XLIA	Ningpo, China	15
1-ZJ	Auckland, New Zealand	100
3BA	Ballarat, Australia	50

1330 KC

———	Bremen, Germany	2000
———	Flensburg, Germany	2000
———	Hanover, Germany	2000
———	Lodz, Poland(9)	2000
———	Magdenberg, Germany	2000
———	Stettin, Germany	2000
CMHK	CRUCES, CUBA	250
CX4O	Montevideo, Uruguay	500
HJ1ABA	Barranquilla, Colombia	100
PRC5	Belem, Brazil	100
PRD7	Sorocaba, Brazil	500
PRF8	Bahia, Brazil	50
XGSA	Kiangyin, China	10
XLIK	Chang-Chow, China	75
2BH	Broken Hill, Australia	100
4RO	Rockhampton, Australia	50

1340 KC

———	Cairo, Egypt	500
———	Konigsberg, Germany(8)	2000
———	Milan, Italy	4000
———	Radio-Vitus, Paris, Fr.(8)	800
———	Salzburg, Austria	2000
CB134	Santiago, Chile	1000
CMJL	CAMAGUEY, CUBA	75
CMJW	CAMAGUEY, CUBA	———
CW19	Rivera, Uruguay	60
HRN	Tegucigalpa, Honduras	50
LKR	Rjukan, Norway(8)	150
LT7	Corrientes, Argentina	500
PRB3	Juiz de Fora, Brazil	250
PRD4	Araraguara, Brazil	250
XEFE	NUEVO LAREDO, MEX.	250
XEXD	JALAPA, MEXICO	350
XHHR	Shanghai, China	50
2RN	Dublin, Ir. Fr. State(8)	1000
4ZR	Balclutha, N. Z.	10
5MU	Murray Bridge, Australia	200

1350 KC

———	Tampere, Finland(1)	700
———	Turin, Italy	200
CMCA	HAVANA, CUBA	200
CMKW	SANTIAGO, CUBA	———
HJ1ABK	Barranquilla, Colombia	———
LKN	Notodden, Norway(7)	150
LS6	Buenos Aires, Argentina	6000
XQKA	Tientsin, China	150
YV4RA	Valencia, Venezuela	500
3GL	Geelong, Australia	100
4PM	Port Moresby, Papua	100

1360 KC

CD136	Magallanes, Chile	100
CMJH	CIEGO DE AVILA, CUBA	50
CW41	San Jose, Uruguay	50
XQHD	Shanghai, China	200
4WK	Warwick, Australia	50

1370 KC

———	Basle, Switzerland(5)	500
———	Berne, Switzerland(5)	500
CC137	Temuco, Chile	100
CKCW	MONCTON, N. B.	100
CMGE	CARDENAS, CUBA	150
CX42	Montevideo, Uruguay	1000
HIZ	TRUJILLO CITY, D. R.	100
XELZ	MEXICO CITY, MEX.	100
XEI	MORELIA, MEX.	100
XECZ	SAN LUIS POTOSI, MEX.	100
YV5RI	Caracas, Venezuela	———
2MO	Gunnedah, Australia	100
3HS	Horsham, Australia	1000

1380 KC

———	Halsingborg, Sweden(4)	200
CB138	Santiago, Chile	150
CMCR	HAVANA, CUBA	150
XLHE	Shanghai, China	50
XLHF	Shanghai, China	50
4BH	Brisbane, Australia	1000

1390 KC

———	Montpelier, France(3)	5000
———	Radio Lyons, France(3)	25000
———	Varna, Bulgaria(3)	2000
CB139	Valparaiso, Chile	1000
CJGX	YORKTOWN, SASK.	100
CMJC	CAMAGUEY, CUBA	150
HIH	SAN PEDRO, D. R.	75
LR-11	La Plata, Argentina	500
XLIN	Wusih, China	50
2GN	Goulburn, Australia	200
3MB	Birchip, Australia	———
4CA	Cairns, Australia	100
7BU	Burnie, Australia	———

1400 KC

———	Uddevalla, Sweden(2)	500
CB140	San Antonio, Chile	100
CMGC	MATANZAS, CUBA	100
CMKR	SANTIAGO, CUBA	100
CW37	Colonia, Uruguay	4500
FFZ	Shanghai, China	250
HI6Y	TRUJILLO CITY, D. R.	100
HJ1ABR	Cartagena, Colombia	———
OAX6B	Arequipa, Peru	150
SBL	Umea, Sweden(2)	1000
SBM	Hudeksvall, Sweden(2)	1000
SBN	Ornskoldsvik, Sweden(2)	500
TGX	Guatemala City, Guat.	50
XLHO	Shanghai, China	100
YV4RE	Valencia, Venezuela	———
YV6RA	Bolivar, Venezuela	250
2ZO	Palmerston, N. Z.	100

1410 KC

———	Halmstad, Sweden(1)	200
CC141	Concepcion, Chile	100
CKFC	VANCOUVER, B. C.	30
CKMO	VANCOUVER, B. C.	100
CMCQ	HAVANA, CUBA	320
CX44	Montevideo, Uruguay	200
HI-1A	SANTIAGO, D. R.	50
PRF6	Bahia, Brazil	500
PRF9	Porto Alegre, Brazil	500
PRG8	Bauru, Brazil	250
2KO	Newcastle, Australia	500

1420 KC

———	Alexandria, Egypt(9)	500
———	Turku, Finland(9)	600
———	Vass Vassa, Finland	500
CKGB	TIMMINS, ONTARIO	100
CRCY	TORONTO, ONTARIO	100
3XY	Melbourne, Australia	600

1430 KC

CC143	Talca, Chile	100
CMJP	CAMAGUEY, CUBA	75
CW25	Duranzo, Uruguay	500
HAE-3	Miskolc, Hungary(8)	1250
RW-10	Minsk, U.S.S.R.(8)	100000
2WL	Wollongong, Australia	600
4GY	Gumpie, Australia	50

1440 KC

———	Boras, Sweden(7)	200
———	Kalmar, Sweden(7)	200
CB114A	Santiago, Chile	100
CB144B	Santiago, Chile	100
CB144C	Santiago, Chile	100
CB144D	Santiago, Chile	150
CMOA	HAVANA, CUBA	150
HI-5N	SANTIAGO, D. R.	100
HP5-O	Colon, Panama	25
LS-11	La Plata, Argentina	700
TIFS	Cartago, Costa Rica	7.5
XEFI	CHIHUAHUA, MEX.	250
XLHQ	Shanghai, China	40
2QN	Deniliquin, Australia	———
4IP	Ipswich, Australia	100

1450 KC

———	Paris, France(6)	20000
CC145	Rancagua, Chile	100
CFCT	VICTORIA, B. C.	75
CHGS	SUMMERSIDE, P. E. I.	50
CX46	Montevideo, Uruguay	1500
XEF	JUAREZ, MEXICO	100
XLIB	Suchow, China	15

1460 KC

———	Courtrai, Belgium(5)	100
CMKF	HOLGUIN, CUBA	50
CW47A	San Jose, Uruguay	100
PRA4	Bahia, Brazil	500
PRC9	Campinos, Brazil	250
PRD5	Rio de Janeiro, Brazil	1000
PRE5	Uberaba, Brazil	250
HAE-4	Pecs, Hungary(5)	1250
ON4ED	Antwerp, Belgium(5)	100
ZP5	Asuncion, Paraguay(5)	150
7UV	Ulverstone, Australia	300

1470 KC

———	Bournemouth, Gr. Britain(4)	1000
———	Plymouth, Gr. Britain(4)	300
CMOK	HAVANA, CUBA	150
CW43	Lavelleja, Uruguay	100
HI8Q	TRUJILLO CITY, D. R.	25
LT-11	Parana, Argentina	500
XGDZ	Chang-Chow, China	10
2BE	Bega, Australia	100
2RG	Murrumbridges, Australia	50
3ZM	Christchurch, N. Z.	60

1480 KC

———	Gavle, Sweden(3)	200
CW47	Canelones, Uruguay	250
PRB8	Mogy das Cruces, Brazil	50
PRD3	Taubate, Brazil	50
PRE9	Portaleza, Brazil	500
PRF2	Rio Claro, Brazil	250
XQHF	Shanghai, China	200
2AY	Albury, Australia	100
4BU	Bundaberg, Australia	100

1490 KC

———	Binche, Belgium(2)	100
———	Nemes, France(2)	200
———	Upsala, Sweden(2)	200
CX48	Montevideo, Uruguay	1500
EAJ43	Tenerife, Canary Islands	8000
ON4CE	Chatelineau, Belgium(2)	100
ON4RW	Liege, Belgium(2)	100
XLKS	Kashing, China	20
2TM	Tamworth, Australia	50

1500 KC

———	Beziers, France	1500
———	Krestinehamm, Sweden	200
———	Pietarsaari, Finland	250
———	Seraing, Belgium	100
———	Vellereille, Belgium	100
———	Verviers (No. 1), Belgium	100
———	Verviers (No. 2), Belgium	100
CB150	Santiago, Chile	10000
CJIC	S. STE. MARIE, ONT.	100
CMCN	HAVANA, CUBA	100
EAJ50	Las Palmas, Canary Islands	250
ON4EX	Liege, Belgium	150
ON4FC	Liege, Belgium	150
VUP	Peshavar, India	250
XHHT	Shanghai, China	100
XOCL	Tsinan, China	7.5
XQHG	Shanghai, China	250
YV1RA	Maracaibo, Venezuela	100
3AK	Melbourne, Australia	200

1510 KC

———	Jankoping, Sweden(5)	200
———	Karlskrona, Sweden(5)	200
CFRC	KINGSTON, ONT.	100
CKCR	WATERLOO, ONT.	100
YDA8	Transjongpriak, Java	500

Time. The broadcasts from both stations will be dedicated to the RSSL and ALL-WAVE RADIO.

Station TG1 will operate on a frequency of 1510 kc., and station TG2 on a frequency of 6310 kc. There is a possibility that during the tests the frequencies may be altered slightly, so look for both stations in the approximate vicinities of the frequencies mentioned above. Include in your report the original frequency and also any other frequencies that may be employed.

There is, of course, no necessity for your monitoring the signals on each of the seven days included in the schedule, but the more time you can spend at it, the better. Moreover, it is not expected that members should monitor both TG1 and TG2 unless they are signed up in both the Standard Broadcast and Short-Wave Broadcast Divisions. However, *all* reports should be sent to your Sectional Manager, and if *both* stations are monitored, make out the reports on *separate forms*.

All reports should be in the mail on or before Tuesday, May 11th. This should give everyone plenty of time to prepare the results of the test and get them off to the Sectional Managers. If no S. M. has been appointed for your state, send your reports directly to Headquarters.

New S. M. Appointments

Four more appointments were made this month; namely, for the States of Alabama, Arizona, Illinois and West Virginia. The names and addresses of these new Sectional Managers are given below:

ALABAMA
Howard J. duMoulin, W10P1
1119 29th St., Birmingham

ARIZONA
John Binder, Jr., W26P2
1025 9th St., Phoenix

ILLINOIS
J. O. Faris, Jr., W11J1
1803 N. Verm St., Danville

WEST VIRGINIA
Carl Soendlin, W8L1
Oak St., P. O. Box 1094, Logan

Members in these states should send their Guatemala survey reports to their respective Sectional Managers.

M. L. MUHLEMAN
Acting Director

R.S.S.L. NEWS

(Continued from page 249)

SHORT-WAVE STATION LIST

BROADCAST STATIONS INDICATED BY DOTS • PHONE (P) • EXPERIMENTAL (E) • HOURS IN E.S.T.

KC	Meters	Call	Location	Time
31600	9.4	W1XKB	• Boston, Mass.	Daily 9 A.M.-12 A.M.
31600	9.4	W8XKA	• Pittsburgh, Pa.	3-11 P.M. daily
31600	9.4	W3XKA	• Philadelphia, Pa.	Daily 12-10 P.M.
31600	9.4	W8XWJ	• Detroit, Mich.	Sunday 2:30-7:30 P.M. Daily 6:15 A.M.-12:30 P.M., 2-5 P.M., 7-10 P.M.
26100	11.49	GSK	• Daventry, England	Not in use
25950	11.56	W6XKG	• Los Angeles, Calif.	Continuously 24 hours each day
24380	12.3	CRCX	• Bowmanville, Ont.	Experimental
21540	13.92	W8XK	• Pittsburgh, Pa.	6:30 A.M.-9 A.M. daily
21530	13.93	GSJ	• Daventry, England	Not in use
21520	13.94	W2XE	• Wayne, N. J.	7:30 A.M.-12 noon daily
21520	13.94	JZM	• Nazaki, Japan	Irregular
21500	13.95	NAA	Washington, D. C.	(E) Time signals
21470	13.97	GSH	• Daventry, England	6-8:45 A.M. (Sundays on 5 A.M.) 9 A.M.-12 noon daily
21450	13.99	OLR6A	• Prague, Czechoslovakia	Irregular (see 6010-9550-11840 kc.)
21420	14.01	WKK	Lawrenceville, N. J.	(P) Phones LSN - PSA daytime; HJY - OCI-OCJ irregular
21160	14.19	LSL	Buenos Aires, Arg.	(P) Phones GAA mornings; DFB-DHO-PSE-EHY irreg.
21140	14.19	KBI	Manila, P. I.	(P) Tests and relays P. M. irregular
21080	14.23	PSA	Rio de Janeiro, Brazil	(P) Phones WKK-WLK daytime
21060	14.25	KWN	Dixon, Calif.	(P) Phones afternoon irregular
21020	14.29	LSN	Buenos Aires, Arg.	(P) Phones WKK-WLK daily; EHY, FTM irregular
20910	14.35	PSB	Rio de Janeiro, Brazil	(P) Phones N. Y. and Madrid irreg.
20860	14.38	EHY	Madrid, Spain	(P) Phones LSM-PPU-LSY mornings
20860	14.38	EDM	Madrid, Spain	(P) Phones LSM-PPU-LSY mornings
20835	14.40	PFF	Kootwijk, Holland	(P) Phones Java days
20830	14.40	PFF	Kootwijk, Holland	(P) Phones Java days
20825	14.41	PFF	Kootwijk, Holland	(P) Phones Java days
20820	14.41	KSS	Bolinas, Calif.	(P) Phones Far East A.M.
20380	14.72	GAA	Rugby, England	(P) Phones LSL mornings; LSY-LSM-PPU irregular
20040	14.97	OPL	Leopoldville, Belgian Congo, Africa	(P) Tests with ORG mornings and noon
20020	14.99	DHO	Nauen, Germany	(P) Phones PPU-LSM-PSA-LSL-YVR A.M.
19987	15.01	CFA	Drummondville, Que.	(P) Phones North America irregular
19980	15.02	KAX	Manila, P. I.	(P) Phones KWU evenings; DFC - JVE A.M.; early A.M.
19820	15.14	WKN	Lawrenceville, N. J.	(P) Phones GAU A.M.
19720	15.21	EAQ	Madrid, Spain	(P) Relays & tests A.M.
19680	15.24	CEC	Santiago, Chile	(P) Phones OCI - HJY afternoons
19620	15.29	VQG	Nairobi, Kenya, Africa	(P) Phones GAD 7-8 A.M.
19600	15.31	LSF	Buenos Aires, Arg.	(P) Phones and tests irregularly
19530	15.36	EDR2	Madrid, Spain	(P) Phones LSM-PPU-YVR mornings
19530	15.36	EDX	Madrid, Spain	(P) Phones LSM-PPU-YVR mornings
19520	15.37	IRW	Rome, Italy	(P) Phones LSM-PPU mornings. Broadcasts irregularly
19500	15.40	LSQ	Buenos Aires, Arg.	(P) Phones daytime irregularly
19355	15.50	FTM	St. Assise, France	(P) Phones LSM-PPU-YVR mornings
19345	15.52	PMA	Bandoeng, Java	(P) Phones Amsterdam 3-11 A.M.
19270	15.57	PPU	Rio de Janeiro, Brazil	(P) Phones DFB-EHY-FTM mornings
19235	15.60	DFA	Nauen, Germany	(P) Phones HSP - KAX early mornings
19220	15.61	WKF	Lawrenceville, N. J.	(P) Phones GAS - GAU mornings
19200	15.62	ORG	Brussels, Belgium	(P) Phones OPL A.M.
19160	15.66	GAP	Rugby, England	(P) Phones Australia A.M.
19140	15.68	LSM	Buenos Aires, Arg.	(P) Phones DFB-FTM-GAA-GAB A.M.
19020	15.77	HS8PJ	• Bangkok, Siam	Mondays 8-10 A.M.
18970	15.81	GAQ	Rugby, England	(P) Phones ZSS A.M.
18960	15.82	WQD	Rocky Point, N. Y.	(E) Tests LSY irreg.
18920	15.85	WQE	Rocky Point, N. Y.	(E) Programs, irreg.
18910	15.86	JVA	Nazaki, Japan	(P) Phones Europe days to 8:30 P.M.
18890	15.88	ZSS	Klipheuvel, So. Africa	(P) Phones GAQ-GAU mornings
18825	15.94	PLE	Bandoeng, Java	(P) Phones San Francisco 7-8:30 A.M. Tokyo 8:30 P.M.-7 A.M.
18776	15.98	TYD-3	Paris, France	(P) Phones Madagascar
18680	16.06	OCI	Lima, Peru	(P) Phones CEC - HJY days; WKK-WOP noon
18640	16.09	PSC	Rio de Janeiro, Brazil	(P) Phones N. Y. and B. A. irreg.
18620	16.11	GAU	Rugby, England	(P) Phones VWY - ZSS early A.M.; Lawrenceville daytime
18545	16.18	PCM	Kootwijk, Holland	(P) Relays and phones Java early A.M.
18540	16.19	PCM	Kootwijk, Holland	(P) Relays and phones Java early A.M.
18535	16.20	PCM	Kootwijk, Holland	(P) Relays and phones Java early A.M.
18480	16.23	HBH	Geneva, Switzerland	(E) Relays to N. Y. mornings irreg.
18450	16.26	HBF	Geneva, Switzerland	(E) Commercial; irreg.
18440	16.25	HJY	Bogota, Colombia	(P) Phones CEC - OCI noon; music irreg.
18410	16.29	PCK	Kootwijk, Holland	(P) Phones PLE - PMC early A.M.
18405	16.30	PCK	Kootwijk, Holland	(P) Phones PLE - PMC early A.M.
18400	16.31	PCK	Kootwijk, Holland	(P) Phones PLE - PMC early A.M.
18388	16.31	FZS	Saigon, Indo-China	(P) Phones FTK early mornings
18340	16.36	WLA	Lawrenceville, N. J.	(P) Phones GAS A.M.
18310	16.38	GAS	Rugby, England	(P) Phones WLA-WMN mornings
18295	16.39	YVR	Maracay, Venezuela	(P) Phones DFB-EHY-FTM mornings
18270	16.42	IUD	• Addis Ababa, Ethiopia	Irregular
18250	16.43	FTO	St. Assise, France	(P) LSM-LSY A.M.
18220	16.46	KUS	Manila, P. I.	(P) Phones Bolinas nights
18200	16.48	GAW	Rugby, England	(P) Relays and phones N. Y. irreg.
18190	16.49	JVB	Nazaki, Japan	(P) Phones Java early mornings, U. S. evenings
18180	16.51	CGA	Drummondville, Que.	(P) Phones GBB A.M.
18135	16.54	PMC	Bandoeng, Java	(P) Phones Amsterdam 3-11 A.M.
18115	16.56	LSY3	Buenos Aires, Arg.	(E) Phones DFB-FTM-GAA-PPU A.M.; evening broadcasts occasionally
18090	16.58	TYE-1	Paris, France	(P) Phones New York evenings
18075	16.59	PCV	Kootwijk, Holland	(P) Phones PLE early mornings
18070	16.60	PCV	Kootwijk, Holland	(P) Phones PLE early mornings
18065	16.61	PCV	Kootwijk, Holland	(P) Phones PLE early mornings
18060	16.61	KUN	Bolinas, Calif.	(P) Phones Manila afternoons and nights
18040	16.63	GAB	Rugby, England	(P) Phones LSM noon
18020	16.65	KQJ	Bolinas, Calif.	(P) Phones afternoons; irregular
17980	16.69	KQZ	Bolinas, Calif.	(E) Tests and relays to LSY irreg.
17940	16.72	WQB	Rocky Point, N. Y.	(E) Tests with LSY, A.M.
17920	16.74	WQF	Rocky Point, N. Y.	(P) Phones Ethiopia irregular
17900	16.76	WLL	Rocky Point, N. Y.	(E) Relays to Geneva and Germany, A.M.
17850	16.81	LSN	Buenos Aires, Arg.	(P) Phones S. A. irreg.
17790	16.86	GSG	• Daventry, England	1-3:15 A.M., 6-8:45 A.M. (Sundays on 5 A.M.) 9 A.M.-12 noon daily
17785	16.87	JZL	• Nazaki, Japan	Irregular
17780	16.87	W3XAL	• Bound Brook, N. J.	8 A.M.-4 P.M. daily
17780	16.87	W9XAA	• Chicago, Ill.	Not in use at present
17775	16.88	PHI	• Huizen, Holland	Sun. 7-10 A.M., Mon., Tues., Thurs., Fri. 8-9:30 A.M. Sat. 8-10 A.M.
17760	16.89	W2XE	• Wayne, N. J.	12 noon-1 P.M. daily
17760	16.89	DJE	• Zeesen, Germany	12:05-5:15 A.M., 5:55-11 A.M. daily
17755	16.90	ZBW5	• Hong Kong, China	Daily 11:30 P.M.-1:30 A.M. ex. Sat. Mon. & Thurs. 4-10 A.M. Tues., Wed., Fri., Sun., 3-10 A.M. Sat. 3-11 A.M., 9 P.M.-1:30 A.M.
17750	16.91	IAC	Pisa, Italy	(P) Phones and tests to ships A.M.
17740	16.91	HSP	Bangkok, Siam	(P) Phones DFB early A.M.
17710	16.94	CJA-3	Drummondville, Que.	(P) Phones Australia and Far East early A.M.

Short-Wave Station List

KC	Meters	Call	Location	Time
17699	16.95	IAC	Pisa, Italy	(P) Phones and tests to ships A.M.
17620	17.03	IBC	San Paulo, Italy	(P) Irregular
17545	17.10	VWY	Poona, India	(P) Phones GAU-GBC-GBU mornings
17520	17.12	DFB	Nauen, Germany	(P) Phones PPU-YVR-KAY mornings
17480	17.16	VWY	Poona, India	(P) Phones GAU-GBC-GBU daytime
17280	17.36	FZE8	Djibouti, French Somaliland, Africa	(P) Irregular
17260	17.37	CMA5	Havana, Cuba	(P) Phones and tests evenings
17260	17.37	DAN	Nordenland, Germany	(P) Phones ships A.M.
17120	17.52	WOO	Ocean Gate, N. J.	(P) Phones ships daytime
17120	17.52	WOY	Lawrenceville, N. J.	(P) Phones England irregularly
17080	17.56	GBC	Rugby, England	(P) Phones ships daytime
16910	17.74	JZD	Nazaki, Japan	(P) Phones ships irreg.
16385	18.31	ITK	Mogdishu, Somaliland. Africa	(P) Irregular
16305	18.39	PCL	Kootwijk, Holland	(P) Special relays and phones irreg.
16300	18.44	WLK	Lawrenceville, N. J.	(P) Phones England irreg.
16250	18.46	FZR	Saigon, Indo-China	(P) Phones FTA - FTK early A.M.
16240	18.47	KTO	Manila, P. I.	(P) Phones JVE-KWU evenings
16140	18.59	GBA	Rugby, England	(P) Phones Argentina & Brazil irreg.
16117	18.62	IRY	Rome, Italy	(P) Phones IDU - ITK A.M.
16050	18.69	JVC	Nazaki, Japan	(P) Phones Hong Kong early A.M.
16030	18.71	KKP	Kahuku. Hawaii	(P) KWU A.M. & P.M. Tests JVF - KTO - PLE mornings
15930	18.83	FYC	Pontoise, France	(P) Phones 9:00 A.M. and irreg.
15880	18.89	FTK	St. Assise. France	(P) FZR - FZS - LSM - PPU-YVR mornings
15860	18.90	JVD	Nazaki, Japan	(P) Phones Shanghai early A.M.; to KWU 4 P.M. and 4 A.M. daily
15860	18.90	CEC	Santiago, Chile	(P) Phones OCJ A.M.
15810	18.97	LSL	Buenos Aires, Arg.	(P) GAA. A.M.; GCA, PSE, PSF, P.M.
15800	18.99	XOJ	Shanghai, China	(E) Phones GBA 6-7 A.M., KWO-KWU 8-11 P.M.
15760	19.04	JYT	Kemikawa-Cho, Japan	(E) Tests KKW-KWE-KWU evenings
15740	19.06	JIA	Chureki, Japan	(P) Nazaki early A.M.
15700	19.11	WJS	Hicksville, L. 1., N. Y.	(P) Phones Ethiopia irregular
15670	19.15	WAE	Brentwood, N. Y.	(E) Tests afternoons
15660	19.16	JVE	Nazaki, Japan	(P) Phones PLE early A.M.; KTO eves.
15625	19.20	OCJ	Lima, Peru	(P) Phones CEC days
15620	19.21	JVF	Nazaki, Japan	(P) Phones KWO-KWU after 4 P.M.
15595	19.24	DFR	Nauen, Germany	(E) Tests and relays mornings irreg.
15530	19.32	HSC-2	Bangkok, Siam	(P) Phones JVE late P. M. and early A.M.
15530	19.32	HS8PJ	●Bangkok, Siam	Mondays 8-10 A.M. occasionally
15505	19.36	CMA-3	Havana, Cuba	(P) Phones and tests irregularly
15490	19.37	KEM	Bolinas, Calif.	(P) Phones Java and China; irregular
15475	19.39	KKL	Bolinas, Calif.	(P) Phones Manila and Japan; irregular
15460	19.41	KKR	Bolinas, Calif.	(P) Phones Manila and Japan; irregular
15450	19.42	1UG	Addis Ababa, Ethiopia	(P) Phones irregular
15430	19.44	KWE	Bolinas, Calif.	(P) Tests JYK - JYT - PLE evenings
15415	19.46	KWO	Dixon, Calif.	(P) Phones JVF evenings
15370	19.52	HAS3	●Budapest, Hungary	Sunday 9-10 A.M.
15360	19.53	DJT	●Zeesen, Germany	Irregular
15355	19.54	KWU	Dixon, Calif.	(P) Phones Japan, Manila and Java evenings
15340	19.56	DJR	●Zeesen, Germany	8-9 A.M. daily
15330	19.56	W2XAD	●Schenectady, N. Y.	10 A.M.-6 P.M. daily
15320	19.58	OLR5B	●Prague, Czechoslovakia	Irregular (see 6010-9550-11840 kc.)
15310	19.60	GSP	●Daventry, England	Not in use
15300	19.61	CP7	●La Paz, Bolivia	No regular schedule
15300	19.61	XEBM	●Mazatlan, Mexico	Daily 9-10 A.M., 1-2 P. M., 8-10 P.M.
15280	19.63	LRU	● Buenos Aires, Arg.	7 A.M.-7 P.M. daily
15280	19.63	DJQ	● Zeesen, Germany	6-8 A.M., 8:15-11 A.M. 4:50-10:45 P.M. daily. Sun., 11:10 A.M.-12:25 P.M.
15270	19.64	W2XE	●Wayne, N. J.	1-7 P.M. daily
15260	19.66	GSI	●Daventry, England	12:15-4 P.M. daily
15252	19.67	RIM	Tashkent, USSR.	(P) Phones RKI early mornings
15243	19.68	TPA2	●Pontoise, France	6-11:05 A.M. daily
15220	19.71	OLR5A	●Prague, Czechoslovakia	Irregular (see 6010-9550-11840 kc.)
15220	19.71	PCJ	●Hilversum, Holland	Tues., 4:30-6 A.M., Wed., 8-11 A.M.
15210	19.72	W8XK	●Pittsburgh, Pa.	9 A.M.-7 P.M. daily
15200	19.74	DJB	●Zeesen, Germany	12:05 A.M.-5:15 A.M., 5:55-11 A.M., 11:10 A.M.-12:25 I.M., 4:55-10:45 P.M. daily. 8-9 A.M. Sun. only.
15190	19.75	ZBW-4	●Hong Kong. China	Daily ex. Sat. 11:30 P. M.-1:30 A.M. Mon. & Thurs. 4-10 A.M. Tues., Wed., Fri., Sun., 3-10 A.M. Sat., 3-11 A.M., 9 P.M.-1:30 A. M.
15183	19.76	RV96	●Moscow, USSR.	Not in use
15180	19.76	GSO	●Daventry, England	1-3:15 A.M. daily
15160	19.79	OLR5C	●Prague, Czechoslovakia	Irregular (see 6010-9550-11840 kc.)
15160	19.79	JZK	●Nazaki, Japan	Irregular
15150	19.80	YDC	●Soerabaja, Java	5:30-10 A.M., 6-8:30 P. M., 10:30 P.M.-2 A.M. daily
15145	19.81	RKI	● Moscow, USSR.	Broadcasts irreg. Sun. Phones RIM A.M.
15140	19.82	GSF	●Daventry, England	6-8:45 A.M. (Sundays on 5 A.M.) 9 A.M.-12 noon, 4-5:45 P.M., 6-8 P.M., 9-11 P.M. daily
15121	19.84	HVJ	● Vatican City, Vatican	10:30-10:45 A.M. weekdays
15110	19.85	DJL	●Zeesen, Germany	12-2 A.M., 8-9 A.M., 11:35 A.M.-4:30 P.M. daily. Sunday 6-8 A.M.
15070	19.91	PSD	Rio de Janeiro, Brazil	(P) Phones B. A. irreg.
15055	19.92	WNC	Hialeah, Fla.	(P) Phones daytime
15040	19.95	H1R	Ciudad Trujillo, R. D.	(P) Phones WNC days
14985	20.02	YSL	San Salvador, Salvador	(P) Phones days irreg.
14980	20.03	KAY	Manila, P. I.	(P) Phones DFC-DFD-GCJ early A.M.; KWU evenings
14970	20.04	LZA	●Soña, Bulgaria	Weekdays 5-6:30 A.M., 12-2:45 P.M. Sundays 12 A.M.-4:30 P.M.
14940	20.06	HJB	Bogota, Colombia	(P) Phones WNC-PPU-YVQ days
14935	20.07	PSE	Rio de Janeiro, Brazil	(P) Phones LSL-WLK day irreg.; EDM-EHY 8 A.M. Broadcasts irreg.
14920	20.11	KQH	Kahuku, Hawaii	(P) Tests irregularly
14910	20.12	JVG	Nazaki, Japan	(P) Phones Formosa and broadcasts 1-2:30 A.M. irreg.
14845	20.19	OCJ2	Lima, Peru	(P) Phones HJY and others daytime
14800	20.27	WOV	Rocky Point, N. Y.	(E) Tests Europe irreg.
14790	20.28	RIZ	Irkutsk, USSR.	(P) Calls RKI 9:30 A.M.
14770	20.31	WEB	Rocky Point, N. Y.	(E) Tests with Europe; irregular
14730	20.37	IQA	Rome, Italy	(P) Phones Japan and Egypt; sends music at times
14690	20.42	PSF	Rio de Janeiro, Brazil	(P) Phones LSL-WLK-WOK daytime
14653	20.47	GBL	Rugby, England	(P) Phones Nazaki early A.M.
14620	20.52	EHY	Madrid, Spain	(P) Phones LSM mornings irreg.
14620	20.52	EDM	Madrid, Spain	(P) Phones PPU-PSA-PSE mornings
14600	20.55	JVH	●Nazaki, Japan	(E) Phones DFB-GTJ-PCJ - TYB early mornings. Broadcasts irreg.
14590	20.56	WMN	Lawrenceville, N. J.	(P) Phones England days
14535	20.64	HBJ	●Geneva, Switzerland	Phones irregular BC-6:45-8 P.M. Saturdays
14530	20.65	LSN	Buenos Aires, Arg.	(P) Phones PSF-WLK-WOK irreg.
14485	20.71	TIR	Cartago, Costa Rica	(P) Phones WNC days
14485	20.71	TIU	Cartago, Costa Rica	(P) Phones WNC days
14485	20.71	YNA	Managua, Nicaragua	(P) Phones WNC days
14485	20.71	HPF	Panama City, Panama	(P) Phones daytime
14485	20.71	HRM	Tela, Honduras	(P) Phones WNC days
14485	20.71	TGF	Guatemala City. Guat.	(P) Phones WNC days
14485	20.71	HRL5	La Ceiba, Honduras	(P) Phones WNC 5:45 P.M.
14480	20.72	PLX	Bandoeng, Java	(P) Phones Europe and B.C. irregular to 3 P.M.
14470	20.73	WMF	Lawrenceville, N. J.	(P) Phones England day time
14460	20.75	DZH	●Zeesen, Germany	Irregular
14440	20.78	GBW	Rugby, England	(P) Phones Lawrenceville daytime
14410	20.82	IBC	San Paolo, Italy	(P) Irregular
14410	20.80	D1P	Zeesen, Germany	(E) Experimental; irreg.
14250	21.00	W10XDA	Schooner Morrissey	(P) Irregular
13990	21.44	GBA2	Rugby, England	(P) Phones Argentina & Brazil irreg.
13900	21.58	WQP	Rocky Point, N. Y.	(E) Test daytime
13820	21.70	SUZ	Cairo, Egypt	(P) Phones DFC-DGU-GBB daytime
13780	21.77	KKW	Bolinas, Calif.	(P) Special relays; tests afternoon and evening
13760	21.80	TYE-2	Paris, France	(P) Phones U. S. days
13745	21.83	CGA-2	Drummondville, Que.	(P) Phones Europe irreg.
13738	21.82	RIS	Tiflis, USSR.	(P) Tests with Moscow irregular

KC	Meters	Call	Location	Time
13720	21.87	KLL	Bolinas, Calif.	(P) Special relays; tests afternoon and evening
13690	21.91	KKZ	Bolinas, Calif.	(P) Tests Japan and Java early A.M.; days Honolulu
13667	21.98	HJY	Bogota, Colombia	(P) Phones CEC afternoons
13635	22.00	SPW	●Warsaw, Poland	12:30 A.M.-1:30 P.M., Mon., Wed., Fri.
13610	22.04	JYK	Kemikawa-Cho, Japan	(E) Tests irregular A.M.
13600	22.06	ZMBJ	●"TSS Awatea," Wellington, N. Z.	See 8840 kc.
13595	22.07	GBB2	Rugby, England	(P) Phones Canada days
13585	22.08	GBB	Rugby, England	(P) Phones CGA3-SUV-SUZ daytime
13560	22.12	JVI	Nazaki, Japan	(P) Phones Manchukuo irregularly
13465	22.28	WKC	Rocky Point, N. Y.	(E) Tests and relays irregular
13435	22.33	WKD	Rocky Point, N. Y.	(E) Tests and relays irregular
13415	22.36	GCJ	Rugby, England	(P) Tests with JVH afternoons
13410	22.37	WCT	San Juan, P. R.	(P) Phones WNC 5:45 P.M.
13410	22.37	YSJ	San Salvador, Salvador	(P) Phones WNC days
13390	22.40	WMA	Lawrenceville, N. J.	(P) Phones GAS-GBS GBU-GBW daily
13380	22.42	IDU	Asmara, Eritrea, Africa	(P) Phones Italy early A.M. and sends music
13345	22.48	YVQ	Maracay, Venezuela	(P) Phones WNC-HJB days
13285	22.58	CGA3	Drummondville, Que.	(P) Phones England days
13240	22.66	KBJ	Manila, P. I.	(P) Phones nights and early A.M.
13220	22.70	IRJ	Rome, Italy	(P) Phones Japan 5-8 A.M., and works Cairo days
13160	22.76	DGG	Nauen, Germany	(P) Relays to Riverhead days
13020	23.04	JZE	Nazaki, Japan	(P) Phones ships irreg.
13000	23.08	TYC	Paris, France	(P) Phones CNR A.M.
12985	23.11	DFC	Nauen, Germany	(P) Phones KAY-SUV-SUZ early A.M.
12865	23.32	IAC	Pisa, Italy	(P) Phones ships irreg.
12860	23.33	RKR	Novosibirsk, USSR	(P) Daily, 7 A.M.
12840	23.36	WQO	Ocean Gate, N. J.	(P) Phones ships days
12830	23.37	HJC	Barranquilla, Colombia	(P) Phones HJB-HPF-WNC days
12830	23.38	HJA-3	Barranquilla, Colombia	(P) Phones HJB-HPF-WNC days
12830	23.38	CNR	Rabat, Morocco	(P) Phones FYB-TYB-FTA near 4 P.M.
12830	23.38	CNR	●Rabat, Morocco	Special broadcasts irreg.
12795	23.45	IAC	Pisa, Italy	(P) Phones ships and tests Tripoli, irreg.
12780	23.47	GBC	Rugby, England	(P) Phones VWY early A.M.
12394	24.21	DAN	Nordenland, Germany	(P) Phones ships irreg. mornings
12300	24.39	CEB	●Santiago, Chile	11 A.M.-1 P.M., 4-8 P.M., 10-11 P.M. daily
12300	24.39	PLM	Bandoeng, Java	(P) Phones 2ME near 6:30 A.M.
12295	24.40	ZLU	Wellington, N. Z.	(P) Phones ZLJ early A.M.
12290	24.41	GBU	Rugby, England	(P) Phones Lawrenceville days
12280	24.43	KUV	Manila, P. I.	(P) Phones early A. M.
12250	24.49	TYB	Paris, France	(P) Phones JVH-XGR and ships irreg.
12235	24.52	TFJ	Reykjavik, Iceland	(P) Phones England days
12235	24.52	TFJ	●Reykjavik, Iceland	English broadcast each Sun., 1:40-2:30 P.M.
12220	24.55	FLJ	Paris, France	(P) Phones ships irreg.
12215	24.56	TYA	Paris, France	(P) Algeria days
12150	24.69	GBS	Rugby, England	(P) Phones Lawrenceville days
12130	24.73	DZE	●Zeesen, Germany	Irregular
12100	24.79	CJA	Drummondville, Que.	(P) Tests VIY early A. M. and evenings
12060	24.88	PDV	Kootwijk, Holland	(P) PLE - PLV - PMC early mornings
12055	24.89	PDV	Kootwijk, Holland	(P) PLE - PLV - PMC early mornings
12050	24.90	PDV	Kootwijk, Holland	(P) PLE - PLV - PMC early mornings
12020	24.95	VIY	Rockbank, Australia	(P) Tests CJA6 early A.M. and evenings
12000	25.00	RNE	●Moscow, USSR.	Sun. 6-7 A.M., 10-11 A.M., Wed. 6-7 A.M.
11991	25.02	FZS	Saigon, Indo-China	(P) Phones FTA - FTK early A.M.
11960	25.08	HI2X	●Cuidad Tryillo, R. D.	Tues. & Fri., 8-10-10:10 P.M.
11955	25.09	IBC	San Paolo, Italy	(P) Irregular
11955	25.09	IUC	●Addis Ababa, Ethiopia	12-1 A.M.; music at times
11950	25.11	KKQ	Bolinas, Calif.	(P) Relays programs to Hawaii eve.
11940	25.13	FTA	St. Assise, France	(P) Phones FZS - FZR early A.M.
11935	25.14	YNA	Managua, Nicaragua	(P) Cent. and S. A. stations, days
11900	25.21	XEW1	●Mexico City, Mexico	Sun. 12:30-2 P.M. Mon., Wed., Fri., 3-4 P.M., 9 P.M.-12 A.M. Tues., Thurs.,, 7:30 P.M.-12 A.M. Sat., 9 P.M.-12 A.M. (see 6015 kc.)
11900	25.21	OLR4D	●Prague, Czechoslovakia	Irregular (see 6010-9550-11840 kc.)
11895	25.22	XEXR	●Mexico City, Mexico	6-11:30 P.M.
11895	25.22	HP5I	●Aguadulce, Panama	7:30-9:30 P.M. daily
11885	25.24	TPA3	●Pontoise, France	4-5 A.M., 11:15 A.M.-6 P.M. daily
11880	25.25	XEXA	●Mexico City, Mexico	8-11:30 A.M., 3-5 P.M., 7-11 P.M. ex. Sunday
11875	25.26	OLR4C	●Prague, Czechoslovakia	Irregular (see 6010-9550-11840 kc.)
11870	25.26	W8XK	●Pittsburgh, Pa.	7-9 P.M. daily
11860	25.29	YDB	●Soerabaja, Java	10:30 P.M.-2 A.M. daily
11860	25.29	GSE	●Daventry, England	Not in use
11855	25.31	DJP	●Zeesen, Germany	Irregular
11830	25.36	W2XE	●Wayne, N. J.	7-10 P.M. daily
11840	25.34	OLR4A	●Prague, Czechoslovakia	Sunday 2-7:30 A.M. Daily ex. Sun. 8:55 A.M.-12 noon, 2:25-4:30 P.M. Thurs. & Sat., 5-7:30 A.M. Mon. & Thurs., 8-10 P.M. (America)
11830	25.36	W9XAA	●Chicago, Ill.	Weekdays 9 A.M.-6 P.M. Sun. 9-11 A.M., 1-5:30 P.M.
11820	25.38	XEBR	●Hermosillo, Mexico	1-4 P.M., 9 P.M.-12 A.M. daily
11820	25.38	GSN	●Daventry, England	Not in use
11810	25.40	2RO4	●Rome, Italy	6:43 A.M.-12:30 P.M. (See 9635 kc.)
11800	25.42	OER-2	●Vienna, Austria	Weekdays 9 A.M.-5 P.M. Saturdays to 5:30 P.M.
11800	25.42	OAX5A	●Ica, Peru	Daily 1 A.M.-12 noon, 4-11 P.M.
11800	25.42	JZJ	●Nazaki, Japan	9-10 A.M., 4-5 P.M., 8-9 P.M., 12-1 A.M. daily
11800	25.42	DJO	●Zeesen, Germany	Irregular
11790	25.43	W1XAL	●Boston, Mass.	Daily 4:30-6:30 P.M.
11770	25.49	DJD	●Zeesen, Germany	11:35 A.M.-4:30 P.M., 4:50-10:45 P.M.
11760	25.51	OLR4B	●Prague, Czechoslovakia	Irregular (see 6010-9550-11840 kc.)
11750	25.53	GSD	●Daventry, England	12:15-4 P.M., 6-8 P.M., 9-11 P.M. daily
11740	25.55	RKF	Moscow, U.S.S.R.	(P) Calls U.S.S.R. phones often
11740	25.55	HP5L	●David, Panama	4-7 P.M. daily
11730	25.57	PHI	●Huizen, Holland	Irregular
11720	25.60	CJRX	●Winnipeg, Manitoba	Week Days 6 P.M.-12 A.M. Sundays 5-10 P.M.
11720	25.60	TPA4	●Pontoise, France	6:15-8 P.M., 10 P.M.-1 A.M. daily
11718	25.60	CR7BH	●Lourenco Marques, E. Africa	Sundays 6-8 A.M., 10 A.M.-12:30 P.M., 1:30-3:30 P.M. Weekdays, Mon. to Sat., 11:45 P.M. (Sunday)-12:30 A.M., 4:30-6:30 A.M., 9:30-11 A.M., 12:30-4 P.M.
11710	25.62	Philco Radio	●Saigon, Indo-China	Daily 6:30-9:30 A.M. News: French 9-9:10 A.M.
11710	25.62	VK9MI	●Sydney, Australia; "S.S. Kanimbla"	11 P.M.-7 A.M. Irregular
11705	25.63	SM5SX	●Stockholm, Sweden	Weekdays 6:25-7 A.M., 11 A.M.-5 P.M. Sun., 3 A.M.-5 P.M.
11680	25.68	KIO	Kahuku, Hawaii	(P) Phones Far East early A.M.
11670	25.62	PPQ	Rio de Janeiro, Brazil	(P) Phones WCG-WET-LSX evenings
11660	25.73	JVL	Nazaki, Japan	(P) Phones Taiwan eve. Broadcasts irreg. 1-2:30 A.M.
11595	25.87	VRR4	Stony Hill, Jamaica	(P) Phones WNC 5:45 P.M.
11570	25.93	HH2T	●Port-au-Price, Haiti	Sp'l programs irreg.
11560	25.95	CMB	Havana, Cuba	(P) Phones New York irreg.
11538	26.00	XGR	Shanghai, China	(P) Tests irregularly
11500	26.09	XAM	Merida, Mexico	(P) Phones XDF-XDM-XDR irreg.
11495	26.10	VIZ3	Rockbank, Australia	(P) Tests CJA4 early A.M.
11435	26.24	COCX	●Havana, Cuba	8 A.M.-1 A.M. daily
11413	26.28	CJA4	Drummondville, Que.	(P) Phones VIZ3 early A.M.
11402	26.31	HBO	●Geneva, Switzerland	Phones irreg. BC 6:45-8 P.M. Saturdays
11260	26.64	HIN	●Ciudad Trujillo, R. D.	Daily 11:40 A.M.-1:40 P.M., 4:30-6 P.M., 7:10-9:10 P.M.
11275	26.61	XAM	Merida, Mexico	(P) Phones XDR-XDM irregular
11050	27.15	ZLT	Wellington, N. Z.	(P) Phones VLZ early mornings
11040	27.17	CSW	●Lisbon, Portugal	12-6 P.M. daily

Short-Wave Station List

KC	Meters	Call	Location	Time
11000	27.27	PLP	● Bandoeng, Java	BC phones Makasser 2-5 A.M., 8:30-10:30 P.M., 5-10 A.M., 6-8:30 P.M., 10:30 A.M. - 2 A.M. daily
10975	27.35	OCI	Lima, Peru	(P) Phones CEC - HJY days
10975	27.35	OCP	Lima, Peru	(P) Phones HKB early evenings
10960	27.37	JZB	● Nazaki, Japan	Irregular
10955	27.38	HSG	Bangkok, Siam	(P) Phones irregularly
10940	27.43	FTH	St. Assise, France	(P) Phones So. America irreg.
10910	27.50	KTR	Manila, P. I.	(P) Phones DFC early A.M. irreg.
10850	27.63	DFL	Nauen, Germany	(P) Relays programs afternoons irreg.
10840	27.68	KWV	Dixon, Calif.	(P) Phones Japan, Manila, Hawaii, A.M.
10795	27.79	GCL	Rugby, England	(P) Phones Japan days
10790	27.80	YNA	Managua, Nicaragua	(P) Phones So. America days, irreg.
10770	27.86	GBP	Rugby, England	(P) JYS and XGR irreg.; Phones VLK early A.M. & P.M.
10740	27.93	IVM	● Nazaki, Japan	4-7:30 A.M., irregular
10680	28.09	PLQ	Bandoeng, Java	(P) Phones Knala Lumpur, Medan and Makasser 5:30-9 A.M., 10 P.M.-2 A.M.
10675	28.10	WNB	Lawrenceville, N. J.	(P) Phones ZFB daytime
10670	28.12	CEC	Santiago, Chile	(P) Phones HJY - OCT daytime
10670	28.12	HBP	Panama City, Panama	(P) Phones 4:15-4:15 P.M.
10670	28.12	CEC	● Santiago, Chile	Daily ex. Sat. and Sun., 7-7:20 P.M. (see CED, 10230 KC.)
10660	28.14	PSG	Rio de Janeiro, Brazil	(P) Phones N. Y., B. A., Madrid
10660	28.14	JVN	Nazaki, Japan	(P) Phones JIB early A.M.; Relays JOAK irreg.
10660	28.14	JVN	● Nazaki, Japan	4-7:40 A.M. irreg.; 4-5 P.M. daily
10620	28.25	WEF	Rocky Point, N. Y.	(E) Relays program service irregularly
10620	28.25	EHX	Madrid, Spain	(P) Phones CEC and EHZ afternoons
10610	28.28	WEA	Rocky Point, N. Y.	(E) Tests Europe irreg.
10550	28.44	WOK	Lawrenceville, N. J.	(P) Phones LSN - PSF - PSH-PSK nights
10530	28.49	JIB	Tawian, Japan	(P) Phones JVL - JVN early mornings to 8 A.M.; sp'l he's 3-4 A.M. Sun.
10520	28.52	VK2ME	Sydney, Australia	(P) Phones GBP - HVJ early A.M.
10520	28.52	VLK	Sydney, Australia	(P) Phones GBP - HVJ early A.M.
10520	28.52	CFA-4	Drummondville, Que.	(P) Phones N. Am. days
10480	28.63	ITK	Mogdishu, Somaliland, Africa	(P) Irregular
10440	28.74	DGH	Nauen, Germany	(P) Phones HSG - HSI - HSP early A.M.
10430	28.76	YBG	Medan, Sumatra	(P) Phones PLV - PLP early A.M.
10430	28.76	TYE-3	Paris, France	(P) Phones U.S.A. irreg.
10420	28.79	XGW	Shanghai, China	(P) Tests GBP - KAY early A.M. Musical tests 10:45 A.M.-3 P.M.
10420	28.79	PDK	Kootwijk, Holland	(P) Phones PLV A.M., and special programs irreg.
10415	28.80	PDK	Kootwijk, Holland	(P) Phones PLV A.M., and special programs irreg.
10410	28.82	PDK	Kootwijk, Holland	(P) Phones PLV A.M., and special programs 3:30-4 P.M.
10410	28.82	KES	Bolinas, Calif.	(P) Phones S. A. and Far East irreg.
10400	28.85	KEZ	Bolinas, Calif.	(P) Phones Hawaii and Far East irreg.
10390	28.87	KER	Bolinas, Calif.	(P) Phones Far East, early evening
10380	28.90	EAJ43	● Santa Cruz, Tenerife, C. I. C. I.	2:15-3:50 P.M., 6-7 P.M., 7:10-8 P.M. daily
10380	28.90	WCG	Rocky Point, N. Y.	(E) Programs, irreg.
10375	28.92	JVO	Nazaki, Japan	(P) Manchuria and Dairen early A.M.
10370	28.93	EHZ	● Tablero, Tenerife, C. I.	(P) Phones EDN 3:30-6 A.M.; B.C. 3-4 P.M., 6-8:15 P.M.
10350	28.98	LSX	● Buenos Aires, Arg.	Mon., Tues., Fri., 5-6 P.M.
10335	29.03	ZFD	Hamilton, Bermuda	(P) Phones afternoons
10330	29.04	ORK	● Brussels, Belgium	1:30-3 P.M. daily
10310	29.10	PPM	Rio de Janeiro, Brazil	(P) Tests New York and B.A. evenings
10300	29.13	LSQ	Buenos Aires, Arg.	(P) Phones GCA - HJY - PSH afternoons
10300	29.13	LSL	Buenos Aires, Arg.	(P) Phones GCA - HJY - PSH afternoons. Broadcasts irreg.
10290	29.15	DZC	● Zeesen, Germany	Used irregularly
10290	29.15	HPC	Panama City, Panama	(P) Phones C. A. and S. Am. daytime
10260	29.24	PMN	● Bandoeng, Java	BC Phones Sydney and Medan 8:30-10:30 P.M., 2-5:30 A.M., 5:30-10 A.M., 6-8:30 P.M., 10:30 P.M. - 2 A.M. daily
10250	29.27	LSK3	Buenos Aires, Arg.	(P) Afternoons
10230	29.33	CED	● Antofagasta, Chile	Retransmits programs of CEC, 10670 KC., daily ex. Sat. and Sun., 7-7.20 P.M.
10220	29.35	PSH	Rio de Janeiro, Brazil	(P) Phones LSL-WOK evenings; broadcasts irreg.
10160	29.53	RIO	Bakou, USSR.	(P) Phones RIR-RNE irreg. A.M.; News irreg. 11 P.M.-3 A.M.
10140	29.59	OPM	Leopoldville, Belg.-Congo	(P) Calls 7-11 A.M. daily. Phones ORK afternoons
10120	29.64	PSI	Rio de Janeiro, Brazil	(P) Phones LSL irreg.
10080	29.76	RIR	Tiflis, USSR.	(P) Phones RIM-RKI 7-11 A.M.
10070	29.79	EDN	Madrid, Spain	(P) Phones YVR afternoons
10055	29.84	ZFB	Hamilton, Bermuda	(P) Phones WNB days
10055	29.84	SUV	Cairo, Egypt	(P) Phones DFC-DGU-GCA-GCB days
10042	29.87	DZB	● Zeesen, Germany	Irregular
10040	29.88	HJA3	Barranquilla, Colombia	(P) Tests early evenings, irreg.
9990	30.03	KAZ	Manila, P. I.	(P) Phones JVQ-KWX-PLV early A.M.
9966	30.08	IRS	Rome, Italy	(P) Tests irregularly
9950	30.13	GBU	Rugby, England	(P) Phones WNA evenings
9940	30.18	WCU	San Juan, P. R.	(P) Phones WNC irreg., 6-8 P.M. daily
9940	30.18	CSW	● Lisbon, Portugal	6:30-8 P.M. daily
9930	30.21	HKB	Bogota, Colombia	(P) Phones CEC - OCP-PSH - PSK afternoons
9930	30.21	HJY	Bogota, Colombia	(P) Phones LSQ afternoons
9890	30.33	LSN3	Buenos Aires, Arg.	(P) Phones WOK-WLK; broadcasts evenings irregular
9870	30.40	WON	Lawrenceville, N. J.	(P) Phones and tests; England irreg.
9860	30.43	EAQ	● Madrid, Spain	Saturday 1-3:30 P.M.; daily 5:15-9:30 P.M.
9840	30.47	FYC-2	Paris, France	(P) Phones U.S.A. irreg.
9840	30.47	IYS	Kemikawa-Cho, Japan	(E) Tests irregular
9830	30.50	IRM	Rome, Italy	(P) Phones JVP - JZT - LSX-WEL A.M.
9810	30.58	DFE	Nauen, Germany	(P) Relays and tests afternoons irreg.
9800	30.59	GCW	Rugby, England	(P) Phones Lawrenceville eve. and nights
9800	30.59	LSI	Buenos Aires, Arg.	(P) Relays very irreg.
9760	30.74	VLJ	Sydney, Australia	(P) Phones PLV - ZLT early A.M.
9760	30.74	VLZ	Sydney, Australia	(P) Phones PLV - ZLT early A.M.
9750	30.77	COCQ	● Havana, Cuba	8 A.M.-12 mid. daily
9750	30.77	WOF	Lawrenceville, N. J.	(P) Phones GCU irreg.
9710	30.88	GCA	Rugby, England	(P) Phones LSL afternoons
9700	30.93	LQA	Buenos Aires, Arg.	(P) Tests and relays early evenings
9675	31.00	DZA	● Zeesen, Germany	Irregular
9670	31.02	TI4NRH	● Heredia, Costa Rica	Daily 9-10 P.M., 11:30 P.M.-12 A.M.; Sat. night to 2 A.M. Sun.
9665	31.04	CT1AA	● Lisbon, Portugal	Tues., Thurs., Sat., 3-6 P.M.
9660	31.06	CR6AA	● Lobito, West Africa	3:45-5:30 P.M. Wed. & Sat.
9660	31.06	LRX	● Buenos Aires, Arg.	7-11:30 P.M. daily
9660	31.06	PSJ	Rio de Janeiro, Brazil	(P) Irreg., Argentina
9635	31.13	2RO3	● Rome, Italy	12:30-6 P.M. daily ex. Sat. Sat., 1:20-5:30 P.M. Mon., Wed., Fri., Amer. Hour 6-7:30 P.M.; Tues., Thurs., Sat., Lat. Amer. 6-7:45 P.M.
9630	31.15	CFA5	Drummondville, Que.	(P) Phones No. America days
9620	31.17	HJ1ABP	● Cartagena, Colombia	7-9 A.M., 11 A.M.-1:20 P.M., 6-11 P.M. daily
9620	31.17	DGU	Nauen, Germany	(P) Phones SUV A.M. Relays irreg.
9620	31.17	FZR	Saigon, Indo-China	(P) Phones Paris early A.M.
9610	31.22	YDB	● Soerabaja, Java	Sunday 5:30-10:30 A.M., 7:30 P.M.-2 A.M. Weekdays 5:30-10:30 or 11 A.M. (Sat. 11:30 A.M.), 6-7:30 P.M., 10:30 P.M.-2 A.M.
9600	31.25	CQN	● Macao, China	Mon. & Fri. 7-8:30 A.M.
9600	31.25	RAN	● Moscow, USSR.	7-9:15 P.M. daily
9600	31.25	XEYH	● Mexico D. F.	7-10 P.M. daily
9600	31.25	CB960	● Santiago, Chile	Daily 11:30 A.M.-2 P.M., 9:30 P.M.-12 A.M.
9595	31.27	HBL	● Geneva, Switzerland	5:30-6 P.M. Saturdays
9595	31.27	HH3W	● Port-au-Price, Haiti	1-2 P.M., 7-8:30 P.M.; ex. Sunday
9595	31.27	YNLF	● Managua, Nicaragua	8-9 A.M., 1-3 P.M., 6:30 10:30 P.M. daily

Short-Wave Station List

KC	Meters	Call	Location	Time
9590	31.28	W3XAU	● Philadelphia, Pa.	Daily ex. Sun. & Wed. 12-8 P.M. Sun. & Wed. 12-7 P.M. Also Thurs. 10-11 P.M.
9590	31.28	VK2ME	● Sydney, Australia	Sunday 1-3 A.M., 5-9 A.M., 9:30-11:30 A.M.
9590	31.28	HP5J	● Panama City, Panama	Week days 12-1:30 P.M. 6-10 P.M. Sun. 10:30 A.M.-1:30 P.M., 7-10 P.M.
9590	31.28	PCJ	● Hilversum, Holland	Sun. 2-3 P.M., 7-8 P.M. Tues. 1:30-3 P.M. Wed. 7-10 P.M.
9580	31.32	GSC	● Daventry, England	4-5:45 P.M. daily
9580	31.32	VK3LR	● Melbourne, Australia	Week days 3:30-8:30 A.M., 8:45-9:45 A.M. Sun. 3-7:30 A.M., 8:45-9:45 A.M.
9575	31.33	HJ2ABC	● Cucuta, Colombia	11 A.M.-12 noon; 6:30-9 P.M. daily
9570	31.33	W1XK	● Boston, Mass.	Weekdays 6:30 A.M.-1 A.M. Sundays, 8 A.M.-1 A.M.
9565	31.36	VUY VUB	● Bombay, India	Thurs. and Fri., 11 P.M.-12:30 A.M.; Sun., 1:30-3:30 A.M.
9565	31.36	YV3RB	● Barquisimeto, Venezuela	Daily 11:30 A.M.-12:30 P.M., 5:30-9:30 P.M.
9562	31.38	OAX4T	● Lima, Peru	7-11 P.M.
9560	31.38	DJA	● Zeesen, Germany	12:05-5:15 A.M., 4:50-10:45 P.M. daily
9560	31.38	HJ1ABB	● Barranquilla, Colombia	7 A.M.-12:30 P.M. daily
9550	31.41	HI5E	● Ciudad Trujillo, R. D.	Irregular
9550	31.41	OLR3A	● Prague, Czechoslovakia	Sunday 2-7:30 A.M. Daily ex. Sun. 8:55 A.M.-12 noon. 2:25-4:30 P.M. Thurs. & Sat., 5-7:30 A.M. Mon. & Thurs. 8-10 P.M. (America)
9545	31.44	HH2R	● Port-au-Prince, Haiti	Special programs irreg.
9540	31.45	DJN	● Zeesen, Germany	12:05-5:15 A.M., 5:55-11 A.M., 4:50-10:45 P.M. daily
9535	31.46	JZI	● Nazaki, Japan	9-10 A.M., 2:30-3:30, 8-9 P.M. daily
9530	31.48	W2XAF	● Schenectady, N. Y.	4 P.M.-12 A.M. daily
9530	31.48	LKJ1	● Jeloy, Norway	5-8 A.M., 11 A.M.-5 P.M. daily
9525	31.49	ZBW3	● Hong Kong, China	Daily ex. Sat. 11:30 P.M.-1:30 A.M.; Mon. & Thurs. 4-10 A.M.; Tues., Wed., Fri., Sun. 3-10 A.M.; Sat., 3-11 A.M., 9 P.M.-1:30 A.M.
9520	31.51	HJ4ABH	● Armenia, Colombia	Weekdays 8-11 A.M., 6-10 P.M. Sundays 7-10 P.M.
9520	31.51	XEDQ	● Guadalajara, Mexico	Daily 12-4 P.M., 8 P.M.-12 A.M. Occasional Sunday DX 2-4 A.M.
9510	31.55	GSB	● Daventry, England	1-3:15 A.M., 12:15-5:45 P.M., 6-8 P.M., 9-11 P.M. daily
9510	31.55	VK3ME	● Melbourne, Australia	Mon., Sat. 4-7 A.M.
9510	31.55	HJU	● Buenaventura, Colombia	12-2 P.M., 8-11 P.M., Mon., Wed., Fri. (See 6120 kc.)
9510	31.55	XEFT	● Vera Cruz, Mexico	Irregular (see 6010-9550-11840 kc.)
9504	31.57	OLR3B	● Prague, Czechoslovakia	4:45-5:45 P.M. ex. Sun. 6:40-8:40 A.M., 10:40 A.M.-2:40 P.M., 4:40-8:40 P.M.
9500	31.58	PRF5	● Rio de Janeiro, Brazil	11 A.M.-1 P.M., 5-10:30 P.M. Sun. 9A.M.-3P.M.
9500	31.58	HI5G	● La Vega, R. D.	(P) Phones Indo-China and China A.M.
9500	31.58	HJ1ABE	● Cartagena, Colombia	Tues. & Fri., 7:45-9 P.M. English and irregular
9490	31.61	KEI	Bolinas, Calif.	(P) Phones Australia early A.M.
9490	31.61	EAQ-2	● Madrid, Spain	(P) Phones WEL evenings & nights
9480	31.65	PLW	Bandoeng, Java	(E) Tests LSX-PPM-ZFD evenings
9480	31.65	KET	Bolinas, Calif.	(P) Phones Italy A.M.
9470	31.68	WET	Rocky Point, N. Y.	11:30 A.M.-12:30 P.M., 6:15-7:15 P.M., 8-9 P.M. daily
9460	31.71	ICK	Tripoli, Africa	Daily ex. Sun. 12-2 P.M., 8-9 P.M., 10 P.M.-12 A.M.; Sun., 12 noon-2 P.M., 12 A.M.-6 A.M.
9450	31.75	"Radio Fort de France"	● Fort de France, Martinique	8-11 P.M. ex. Sunday
9450	31.75	TGWA	● Guatemala City, Guate.	(P) Tests mornings
9440	31.78	HCODA	● Guayaquil, Ecuador	Daily 8 A.M.-12 A.M.
9430	31.80	YVR	Maracay, Venezuela	(P) Phones San Francisco 9:30-10:30 A.M.
9428	31.81	COCH	● Havana, Cuba	(P) Phones XAM irreg., days
9415	31.86	PLV	Bandoeng, Java	(P) Phones East Indies nights
9400	31.92	XDR	Mexico City, Mexico	(P) Phones East Indies nights
9385	31.97	PGC	Kootwijk, Holland	(P) Phones East Indies nights
9375	32.00	PGC	Kootwijk, Holland	Thurs., 8-10 A.M.
9370	32.02	PGC	Kootwijk, Holland	
9350	32.09	HS8PJ	● Bangkok, Siam	
9345	32.10	HBL	Geneva, Switzerland	(E) Broadcasts and phones irreg.
9340	32.12	OAX4I	● Lima, Peru	6-11:30 P.M. daily
9330	32.15	CGA4	Drummondville, Que.	(P) Phones GCB-GDB-GBB afternoons
9300	32.27	YNGU	● Managua, Nicaragua	Weekdays 12-2 P.M., 5-6 P.M. Sundays 11 A.M.-12 noon
9280	32.33	GCB	Rugby, England	(P) Phones Canada afternoons
9240	32.47	PDP	Kootwijk, Holland	(P) Phones East Indies nights
9235	32.49	PDP	Kootwijk, Holland	(P) Phones East Indies nights
9180	32.68	ZSR	Klipheuvel, S. Africa	(P) Phones Rugby afternoons seasonally
9170	32.72	WNA	Lawrenceville, N. J.	(P) Phones GBS-GCU-GCS afternoons
9147	32.79	YVR	Maracay, Venezuela	(P) Phones EHY afternoons
9125	32.88	HAT4	● Budapest, Hungary	6:00-7:00 P.M. Sundays
9120	32.89	CP6	● La Paz, Bolivia	No regular schedule
9110	32.93	KUW	Manila, P. I.	(P) Tests and phones early A.M.
9091	33.00	CGA-5	Drummondville, Que.	(P) Phones Europe days
9037	33.19	TYA-2	Paris, France	(P) Phones Algiers, irreg.
9020	33.26	GCS	Rugby, England	(P) Phones Lawrenceville afternoons
9010	33.30	KEJ	Bolinas, Calif.	(P) Relays programs to Hawaii eve.
8975	33.42	CJA5	Drummondville, Que.	(P) Phones Australia nights, early A.M.
8975	33.43	VWY	Poona, India	(P) Phones GBC-GBU mornings
8960	33.48	FVA	"Radio Algiers," Alger, Algeria, Africa	(P) Phones Paris 12-1 A.M. daily
8950	33.52	WEL	Rocky Point, N. Y.	(E) Tests with Europe, irreg.
8950	33.52	W2XBJ	Rocky Point, N. Y.	(E) Tests irregularly
8948	33.53	HCJB	● Quito, Ecuador	7:30-8:45 A.M. daily. 11:30 A.M.-2:30 P.M., 5-10 P.M. ex. Mondays (To 7 P.M. on 4107 k.c., after 7 P.M. on 4107 and 8948 k.c.)
8930	33.59	WEC	Rocky Point, N. Y.	(P) Phones Ethiopia irregular
8900	33.71	ZLS	Wellington, N. Z.	(P) Phones VLZ early mornings
8840	33.94	ZMBJ	● TSS "Awatea," Wellington, N. Z.	B.C. Sundays 6:40 P.M. Daily 1-3 A.M.
8830	33.98	LSD	Buenos Aires, Arg.	(P) Relays to New York early evenings
8795	34.13	HKV	● Bogota, Colombia	(E) Tests early evenings and nights; broadcasts news Mon. and Thurs. 7-7:30 P.M.
8790	34.13	TIR	Cartago, Costa Rica	(P) Phones Cent. America daytime
8775	34.19	PNI	Makasser, D. E. I.	(P) Phones PLV early mornings
8760	34.35	GCQ	Rugby, England	(P) Phones ZSR afternoons
8740	34.35	WXV	Fairbanks, Alaska	(P) Phones WXH nights
8730	34.36	GCI	Rugby, England	(P) Phones VWY afternoons
8720	34.40	VPD-2	● Suva, Fiji Islands	5:30-7 A.M. daily
8710	34.44	KBB	Manila, P. I.	(E) 6-8 A.M. special broadcast
8680	34.56	GBC	Rugby, England	(P) Phones ships and New York daily
8665	34.62	CO9JQ	● Camaguey, Cuba	7:45-9:00 P.M. weekdays. Sundays irreg.
8650	34.68	WVD	Seattle, Wash.	(P) Tests irregularly
8630	34.76	CMA	Havana, Cuba	(P) Phones N. Y. irreg.
8560	35.05	WOO	Ocean Gate, N. J.	(P) Phones ships days
8515	35.23	IAC	Pisa, Italy	(P) Phones irreg.
8505	35.27	YNLG	● Managua, Nicaragua	Daily 1-2:30 P.M., 7:30-9:45 P.M.
8500	35.29	IZF	Nazaki, Japan	(P) Phones ships irreg.
8470	35.39	DAN	Nordenland, Germany	(P) Phones ships irreg.
8404	35.70	HC2CW	● Guayaquil, Ecuador	Weekdays 11:30 A.M.-12:30 P.M., 7-11 P.M. Sundays 3-5 P.M.
8185	36.65	PSK	Rio de Janeiro, Brazil	(P) Phones LSL-WOK evenings. Broadcasts irreg.
8155	36.79	PGB	Kootwijk, Holland	(P) Phones Java irreg.
8140	36.86	LSC	Buenos Aires, Arg.	(P) Tests evenings and nights irreg.
8120	36.95	KTP	Manila, P. I.	(P) Phones KWX-KWV-PLV-JVQ A.M.
8110	37.00	ZP10	● Asuncion, Paraguay	8-10 P.M.
8075	37.15	WEZ	Rocky Point, N. Y.	(E) Program service P.M.; irregular
8075	37.15	TYB-2	Paris, France	(P) Phones Morocco irreg.
8035	37.33	CNR	Rabat, Morocco	(P) Phones France nights
8035	37.33	CNR	● Rabat, Morocco	Special broadcasts irreg.
7970	37.64	XGL	Shanghai, China	(P) Tests early mornings
7960	37.69	VLZ	Sydney, Australia	(P) Phones ZLT early A.M.
7955	37.71	HSJ	Bangkok, Siam	(P) Phones Berlin, Manila, Java irregular
7935	37.81	PSL	Rio de Janeiro, Brazil	(P) Phones N. Y. and Madrid irreg.
7920	37.88	GCP	Rugby, England	(P) Phones VLK irreg.
7900	37.97	LSL	Buenos Aires, Arg.	(P) Phones PSK-PSH evenings

KC	Meters	Call	Location	Time
7890	38.02	IDU	Asmara, Eritrea, Africa	(P) Irregular
7890	38.02	CJA-2	Drummondville, Que.	(P) Phones Australia nights
7880	38.05	JYR	Kemikawa-Cho, Japan	(E) Tests and relays irregularly
7860	38.17	SUX	Cairo, Egypt	(P) Phones GCB afternoons
7855	38.19	LQP	Buenos Aires, Arg.	(P) Tests evening irreg.
7854	38.19	HC2JSB	●Guayaquil, Ecuador	9 A.M.-2 P.M., 4-11 P.M. daily
7840	38.27	PGA	Kootwijk, Holland	(P) Phones Java irreg.
7835	38.29	PGA	Kootwijk, Holland	(P) Phones Java irreg.
7830	38.31	PGA	Kootwijk, Holland	(P) Phones Java irreg.
7797	38.47	HBP	●Geneva, Switzerland	5:30-6 P.M., Saturdays
7790	38.49	YNA	Managua, Nicaragua	(P) Phones Cent. & So. America daytime
7770	38.61	PDM	Kootwijk, Holland	(P) Special relays to E. Indies
7765	38.63	PDM	Kootwijk, Holland	(P) Special relays to Dutch Indies
7760	38.66	PDM	Kootwijk, Holland	(P) Special relays to E. Indies
7740	38.76	CEC	Santiago, Chile	(P) Phones evenings to 8:30 P.M.
7735	38.78	PDL	Kootwijk, Holland	(P) Special relays to E. Indies
7730	38.81	PDL	Kootwijk, Holland	(P) Special relays to E. Indies
7715	38.39	KEE	Bolinas, Calif.	(P) Relays programs to Hawaii seasonally
7700	38.96	TYC-2	Paris, France	(P) Phones Cairo irreg.
7670	39.11	WDF	San Juan, P. R.	(P) Phones WNC irreg.
7669	39.11	TGF	Guatemala City, Guate.	(P) Phones TIU-HPF daytime
7650	39.22	TYE-4	Paris, France	(P) Phones U.S.A. irreg.
7626	39.31	RIM	Tashkent, USSR.	(P) Phones RKI early mornings
7620	39.37	IUB	●Addis Ababa, Ethiopia	Irregular
7610	39.42	KWX	Dixon, Calif.	(P) Phones KKH nights; KAZ-KTP-PLV-JVT-JVM A.M.
7565	39.66	KWY	Dixon, Calif.	(P) Phones Shanghai early mornings
7550	39.74	TI8WS	●Puntarenas, Costa Rica	Sun., 4-5 P.M. Weekdays, 5-7 P.M., 8:30-10 P.M.
7520	39.89	KKH	Kahuku, Hawaii	(P) KEE-KEJ evenings. KWX-KWV nights
7518	39.90	RKI	Moscow, USSR.	(P) Phones RIM early mornings
7510	39.95	JVP	●Nazaki, Japan	(P) Tests Point Reyes early A.M.; broadcasts 2:30-3:30 P.M. daily
7500	40.00	CFA-6	Drummondville, Que.	(P) Phones N. America days
7470	40.16	JVQ	Nazaki, Japan	(P) Relays and phones early A.M.; broadcasts Mon., Thurs., 2-3, 4-5 P.M.
7470	40.16	HJP	Bogota, Colombia	(P) Phones HJA3-YVQ early evenings
7445	40.30	HBQ	Geneva, Switzerland	(E) Relays special B.C. evenings irreg.
7430	40.38	ZLR	Wellington, N. Z.	(P) Phones VLJ early mornings
7400	40.45	WEM	Rocky Point, N. Y.	(E) Special relays evenings
7390	40.60	ZLT-2	Wellington, N. Z.	(P) Phones Sydney 3-7 A.M.
7385	40.62	OEK	Wein, Austria	(P) Tests early evenings very irreg.
7380	40.65	XECR	●Mexico City, Mexico	Sundays 6-8 P.M.
7370	40.71	KEQ	Kahuku, Hawaii	(P) Relays programs evenings
7345	40.84	GDL	Rugby, England	(P) Phones Japan irreg. A.M.
7211	41.60	EA8AB	●Santa Cruz, Tenerife, C. I.	Mon., Wed., Fri., Sat., 3:15-4:15 P.M.
7203	41.64	EAJ	●San Sebastian, Tenerife, C. I.	4 P.M.-12 A.M. and later
7200	41.67	YNAM	●Managua, Nicaragua	Daily 7-10 P.M.
7100	42.25	FO8AA	●Papeete, Tahiti	Tues. & Fri. 11 P.M.-1 A.M.
7080	42.37	PI1J	●Dordrecht, Holland	Sat., 10:10-11:10 A.M.
7030	42.67	EA9AH	●Tetuan, Spanish Morocco, Africa	4-4:25 P.M. daily; 12-2:30 A.M. irregular
6990	42.92	JVS	Nazaki, Japan	(P) Phones China mornings early
6977	43.00	XBA	Tacubaya, D. F., Mex.	(E) 6-8 P.M. daily
6950	43.17	WKP	Rocky Point, N. Y.	(E) Relays programs evenings
6950	43.17	GBY	Rugby, England	(P) Phones U.S.A. irreg.
6922	43.34	IUF	Addis Ababa, Ethiopia	(E) Irregular
6905	43.45	GDS	Rugby, England	(P) Phones WOA-WNA. WCN evenings
6900	43.48	HI2D	●Ciudad Trujillo, R. D.	Daily 6:40-8:40 A.M., 10:40 A.M.-2:40 P.M., 4:40-8:40 P.M.
6895	43.51	HCETC	●Quito, Ecuador	8:15-10:30 P.M. ex. Sun.
6890	43.54	KEB	Bolinas, Calif.	(P) Tests KAZ - PLV early A.M.
6880	43.60	CGA-7	Drummondville, Que.	(P) Phones Europe days
6860	43.73	KEL	Bolinas, Calif.	(P) Tests KAZ - PLV early A. M.
6850	43.80	TIOW	●Port Limon, Costa Rica	Weekdays 10-11:30 P.M. Sun. 2-3 P.M.
6845	43.83	KEN	Bolinas, Calif.	(P) Used irregularly
6830	43.92	CFA	Drummondville, Que.	(P) Phones N. America nights
6820	43.99	XGOX	●Nanking, China	Weekdays 5:30-8:30 A.M., Sun. 7-9 A.M.
6800	44.12	HI7P	●Ciudad Trujillo, R. D.	Daily 12:45-1:45 P.M.; 6:45-8:45 P.M. Sun., 9:45-10:45 A.M.
6795	44.15	GAB	Rugby, England	(P) Phones Canada irreg.
6788	44.20	PZH	●Paramaribo, D. Guiana	Sunday, 9:45-11:45 A.M. Weekdays 2:45 - 4:45, 5:45-9:45 P.M.
6780	44.25	HIH	●San Pedro de Macoris, R. D.	Daily 12:10-1:40 P.M., 7:40-9 P.M. Sunday 5:10-6:40 P.M. DX 2:40-3:40 A.M.
6760	44.38	CJA-6	Drummondville, Que.	(P) Phones Australia early A.M.
6755	44.41	WOA	Lawrenceville, N. J.	(P) Phones GDW-GDS-GCS evenings
6750	44.44	JVT	Nazaki, Japan	(P) Phones JOAK and Pt. Reyes irreg.
6750	44.44	JVT	●Nazaki, Japan	4:40-7:40 A.M. daily
6730	44.58	HI3C	●La Romana, R. D.	Weekdays 12:10-2:10 P.M., 6:10-7:40 P.M. Sun., 12:10-2:40 P.M.
6725	44.60	WOQ	Rocky Point, N. Y.	(E) Tests evenings irreg.
6720	44.64	PMH	●Bandoeng, Java	Phones early A.M. B.C. 5:30-11 A.M. daily
6718	44.66	KBK	Manila, P. I.	(P) Phones A.M. seasonally
6690	44.84	TIEP	●San Jose, Costa Rica	7-11 P.M. daily
6690	44.84	CGA-6	Drummondville, Que.	(P) Phones Europe irregularly
6680	44.91	DGK	Nauen, Germany	(P) Relays to Riverhead evenings irreg.
6675	44.94	HBQ	Geneva, Switzerland	(E) Broadcasts and phones irreg.
6650	45.11	GBY	Rugby, England	(P) Phones U.S.A. irreg.
6650	45.11	IAC	Pisa, Italy	(P) Phones ships irreg.
6635	45.21	HC2RL	●Guayaquil, Ecuador	Sun. 5:30-7:30 A.M. Tues. 9-11 P.M.
6630	45.25	HIT	●Ciudad Trujillo, R. D.	12:10-1:40 P.M., 6:10-8:40 P.M. ex. Sun. 1st Sat., DX 11:10 P.M.-1:10 A.M.
6618	45.33	Prado	●Riobamba, Ecuador	Thursday 9-11 P.M.
6575	45.63	HC1VT	●Ambato, Ecuador	Mon., Wed., Fri., 8-10:30 P.M.
6550	45.81	TIRCC	●San Jose, Costa Rica	Daily 12-2 P.M., 6-9:30 P.M.
6548	45.82	XBC	Vera Cruz, Mexico	(E) 7-8 P.M. irreg.
6545	45.84	YV6RB	●Ciudad Bolivar, Venez.	7-10 P.M. daily; 3-6 P.M. Sun.
6535	45.91	YN1GG	●Managua, Nicaragua	6-10 P.M. daily
6520	46.01	YV4RB	●Valencia, Venezuela	11 A.M.-1:30 P.M., 5:30-9:30 P.M. daily
6500	46.15	HIL	●Ciudad Trujillo, R. D.	12-2 P.M., 6-8 P.M.
6482	46.28	HI4D	●Ciudad Trujillo, R. D.	Mon. & Sat., 11:55 A.M.-1:40 P.M., 4:40-7:40 P.M.
6480	46.30	EDR-4	●Palma de Mallorca, Balearic Is.	4:30-5:15 P.M. daily
6479	46.30	HI8A	●Ciudad Trujillo, R. D.	Daily 8:40-10:40 A.M., 2:40-4:40 P.M. Sat., 9:10-10:40 P.M.
6450	46.51	HI4V	●San Francisco de Macoris, R. D.	11:40 A.M.-1:40 P.M., 5:10-6:40 P.M. daily
6445	46.55	YVQ	●Moracay, Venezuela	8-9 P.M. Saturdays
6445	46.55	YVQ	●Moracay, Venezuela	(P) Phones LSL irreg.
6420	46.72	HI1S	●Santiago de los Caballeros, R. D.	11:40 A.M.-1:40 P.M., 5:40-7:40 P.M.
6415	46.77	HJA3	Barranquilla, Colombia	(P) Phones HJA2 evenings
6410	46.80	TIPG	●San Jose, Costa Rica	7:30-9:30 A.M., 12-2 P.M., 6-11:30 P.M. daily
6400	46.88	YV5RH	●Caracas, Venezuela	7-11 P.M. irreg.
6375	47.10	YV5RF	●Caracas, Venezuela	5:30-9:30 P.M. ex. Sun.
6360	47.17	YV1RH	●Maracaibo, Venezuela	6-11 P.M. daily
6351	47.24	HRP1	●San Pedro de Sula, Honduras	12-2 P.M., 7:45-10 P.M. daily ex. Sunday
6340	47.32	HI1X	●Ciudad Trujillo, R. D.	Sun. 7:40-10:40 A.M. Daily 12:10-1:10 P.M. 8:10-10:10 P.M. Ex. Tues. & Fri.
6330	47.39	JZG	●Nazaki, Japan	5-7 A.M. irregular
6325	47.43	HH3NW	●Port-au-Prince, Haiti	1-2 P.M., 7-8:30 P.M. ex. Sunday
6316	47.50	HIZ	●Ciudad Trujillo, R. D.	Daily 11:30 A.M.-2:45 P.M., 5:30 P.M.-9 P.M. Sat. to 10 & 11 P.M.
6300	47.62	TG2	●Guatemale City, Guatemala	9-11 P.M., irreg.
6300	47.62	YV4RD	●Maracay, Venezuela	6:30-9:30 P.M. ex. Sun.
6280	47.77	COHB	●Sancti-Spiritus, Cuba	9-10 A.M., 12-1 P.M., 4-6 P.M., 9-11 P.M. daily
6280	47.77	HIG	●Ciudad Trujillo, R. D.	7:10-8:40 A.M., 12:40-2:10 P.M., 8:10-9:40 P.M.
6270	47.85	YV5RP	●Caracas, Venezuela	6-11:45 P.M. daily
6243	48.05	HIN	●Ciudad Trujillo, R. D.	(See 11260 kc.) Weekdays 11:40 A.M.-2:40 P.M., 7:10-9:10 P.M. Sun. 11:10 A.M.-3:40 P.M.
6240	48.08	HI8Q	●Ciudad Trujillo, R. D.	Daily 10:40 A.M.-1:40 P.M. 4:40-8:40 PM
6235	48.11	OCM	Lima, Peru	(P) Phones afternoons
6235	48.11	HRD	●La Ceiba, Honduras	8-10:30 PM., Sundays 4-6 P.M.
6230	48.15	OAX4G	●Lima, Peru	7-11 P.M. daily
6230	48.15	YV1RG	●Valera, Venezuela	6-9:30 P.M. daily
6210	48.31	YV1RI	●Coro, Venezuela	7:30-9:30 P.M. daily

KC	Meters	Call	Location	Time
6200	48.39	COKG	● Santiago, Cuba	Sundays 12:01-1 A.M., 5-6 P.M., 9:30-10:30 P.M. daily
6200	48.39	XEXS	● Mexico City, Mexico	7-11 P.M.
6190	48.47	HI1A	● Santiago de Caballeros, R. D.	Daily 11:40 A.M.-1:40 P.M., 7:40-9:40 P.M.
6170	48.62	HJ3ABF	● Bogota, Colombia	11 A.M.-2 P.M. 6-11 P.M.
6160	48.70	VPB	● Colombo, Ceylon	Daily 6:30-9 and 10 A.M.
6156	48.73	YV5RD	● Caracas, Venezuela	Weekdays 10:30 A.M.-1:30 P.M., 4:30-10 P.M.; Sundays 8:30 A.M.-12:30 P.M., 2:30-10:30 P.M.
6150	48.78	HJ4ABU	● Pereira, Colombia	Daily 9:30 A.M.-12 Noon, 6:15-10 P.M.
6150	48.78	CJRO	● Winnipeg, Manitoba	Weekdays 6 P.M.-12 A.M., Sundays 5-10 P.M.
6150	48.78	GBT	Rugby, England	(P) Phones U.S.A. days
6150	48.78	HI5N	● Santiago de los Caballeros, R. D.	Daily 6:40-8:40 A.M., 10:40 A.M.-2:40 P.M., 4:40-8:40 P.M.
6150	48.78	OAX1A	● Chiclayo, Peru	7-10:30 P.M. daily
6150	48.78	CB615	● Santiago, Chile	4-7 P.M. daily
6140	48.86	W8XK	● Pittsburgh, Pa.	9 P.M.-1 A.M. daily
6140	48.86	ZEB	● Bulawayo, Rhodesia, Africa	Sun. 3-5 A.M.; Tues. & Thurs. 1:15-3:15 P.M.
6138	48.88	HJ4ABD	● Medellin, Colombia	Weekdays 10 A.M.-2 P.M., 4-11 P.M. Sun., 11 A.M.-3 P.M., 7-11 P.M. (see 5900 and 5780 kc.)
6137	48.88	CR7AA	● Lourenco Marques, Africa	Sundays 6-8 A.M., 10 A.M.-12:30 P.M., 1:30-3:30 P.M. Mon. to Sat., 11:45 P.M. (Sunday)-12:30 A.M., 4:30-6:30 A.M., 9:30-11 A.M., 12:30-4 P.M.
6133	48.91	XEXA	● Mexico City, Mexico	8-11:30 A.M., 3-5 P.M., 7-11 P.M. ex. Sunday
6132	48.92	VP3BG	● Georgetown, Br. Guiana	6-8:45 P.M. daily
6130	48.94	ZGE	● Kuala Lumpur, S.S.	Sun., Tues., Fri., 6:40-8:40 A.M.
6130	48.94	LKJ1	● Jeloy, Norway	11 A.M.-5 P.M. daily
6130	48.94	COCD	● Havana, Cuba	Weekdays 9 A.M.-1 A.M. Sundays 1-3 A.M., 10 A.M.-8 P.M.
6130	48.94	VE9HX	● Halifax, Nova Scotia	Sun. 2-10:45 P.M., Mon. to Fri. 6:30 A.M.-10:45 P.M., Sat. 11 A.M.-10:45 P.M.
6128	48.96	HJ1ABB	● Barranquilla, Colombia	11:45 A.M.-1 P.M., 5:30-10 P.M. daily
6125	48.98	CXA4	● Montevideo, Uruguay	8 A.M.-12 noon, 2-10 P.M. daily
6122	49.00	HJ3ABX	● Bogota, Colombia	Weekdays 10:30 A.M.-2 P.M., 5:30-11:30 P.M.; Sundays 12-1:30 P.M., 6-11 P.M.
6120	49.02	XEFT	● Vera Cruz, Mexico	Daily 11 A.M.-4 P.M., 7:30 P.M.-12 A.M.
6120	49.02	W2XE	● Wayne, N. J.	10-11 P.M. daily
6117	49.04	XEUZ	● Mexico City, Mexico	8 P.M.-2 A.M. daily
6115	49.06	OLR2C	● Prague, Czechoslovakia	Irregular (see 6010-9550-11840 kc.)
6110	49.10	HJ4ABB	● Manizales, Colombia	11 A.M.-1 P.M., 5-8 P.M.
6110	49.10	GSL	● Daventry, England	Not in use
6110	49.10	VUC	● Calcutta, India	Mon., 8-9 A.M. Wed., 10:30-11:30 A.M.
6110	49.10	XEPW	● Mexico City, Mexico	10 A.M.-12 noon, 2-4 P.M., 8 P.M.-12 A.M.
6100	49.18	Belgrade	● Belgrade, Yugoslavia	1 A.M.-5:15 P.M. daily
6100	49.18	W9XF	● Chicago, Illinois	Daily ex. Sat. 11:05 P.M.-2 A.M.
6100	49.18	W3XAL	● Bound Brook, N. J.	Daily 5-10 P.M. Sat. to 12 A.M.
6097.5	49.20	ZTJ	● Johannesburg, S. Africa	Sunday 4-5 A.M., 12:15-3:15 P.M. Weekdays 12-12:45 A.M., 3:15-5 A.M., 9 A.M.-4 P.M.
6097	49.20	HJ4ABE	● Medellin, Colombia	11 A.M.-12 noon, 6-10:30 P.M. daily
6095	49.22	JZH	● Nazaki, Japan	Irregular
6092	49.24	OAX4Z	● Lima, Peru	7-11:30 P.M. daily
6090	49.26	CRCX	● Bowmansville, Ont.	Weekdays 12 noon-8 P.M. Sunday 11 A.M.-8 P.M. Sat. "Northern Messenger," 11 P.M.-12 A.M.
6090	49.20	ZBW-2	● Hong Kong, China	Daily ex. Sat. 11:30 P.M.-1:30 A.M.; Mon. & Thurs., 4-10 A.M.; Tues., Wed., Fri., Sun., 3-10 A.M.; Sat., 3-11 A.M., 9 P.M.-1:30 A.M.
6090	49.26	HJ4ABC	● Ibague, Colombia	6-11 P.M.
6085	49.30	HJ5ABD	● Cali, Colombia	11 A.M.-2 P.M., 6-11 P.M. daily
6080	49.34	W9XAA	● Chicago, Ill.	Weekdays 7:30-9 A.M., 6 P.M.-1 A.M. Sun. 11 A.M.-1 P.M., 6 P.M.-1 A.M.
6080	49.34	ZHJ	● Penang, S. S.	6:40-8:40 A.M.
6080	49.34	CP5	● LaPaz, Bolivia	No regular schedule
6080	49.34	VE9CS	● Vancouver, B. C.	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.
6080	49.34	HP5F	● Colon, Panama	Daily ex. Sunday, 11 A.M.-1 P.M., 7-10 P.M.; Sun. 10:45-11:30 A.M., 7-10 P.M.
6079	49.35	DJM	● Zeesen, Germany	Irregular
6075	49.38	XECU	● Guadalajara, Mexico	9-11 A.M., 1-4 P.M., 8-11:30 P.M. or 12 A.M.
6070	49.42	YV1RD	● Maracaibo, Venezuela	Daily 8 P.M.-12 A.M. Sun. 8 A.M.-8 P.M.
6065	49.46	XEXR	● Mexico City, Mexico	6-11:30 P.M.
6060	49.50	W8XAL	● Cincinnati, Ohio	6:30 A.M.-8 P.M., 11 P.M.-2 A.M. Weekdays
6060	49.50	W3XAU	● Philadelphia, Pa.	8-11 P.M. daily ex. Thurs. (8-10 P.M.)
6060	49.50	VQ7LO	● Nairobi, Kenya Colony, Africa	Mon. to Fri. 5:45-6:15 A.M., 11:30 A.M.-2:30 P.M. Tues. and Thurs., 8:30-9:30 A.M. Sat., 11 A.M.-3 P.M. Sun., 11:30 A.M.-2:30 P.M.
6060	49.50	OXY	● Skamleback, Denmark	1-6:30 P.M. Sunday 11 A.M.-6:30 P.M.
6050	49.59	GSA	● Daventry, England	Not in use
6050	49.59	HJ3ABD	● Bogota, Colombia	Weekdays 9 A.M.-2 P.M., 6 P.M.-12 A.M. Tues. & Thurs. to 3 P.M. Wed. & Fri. begin 5:30 P.M.
6050	49.59	XEXF	● Mexico City, Mexico	8 P.M.-12 A.M.
6043	49.62	HJ1ABG	● Barranquilla, Colombia	Daily 11 A.M.-11 P.M. Sun., 11 A.M.-8 P.M.
6040	49.67	PRA8	● Pernambuco, Brazil	9:30-11:30 A.M., 2:30-8:30 P.M.
6040	49.67	YDA	● Tandjong Priok, Java	10:30 P.M.-2 A.M. daily
6040	49.67	W4XB	● Miami, Florida	Temporarily off the air. Undergoing repairs.
6040	49.67	W1XAL	● Boston, Mass.	Mon., Tues., Fri., 7:30-9:30 P.M. Sundays 5-7 P.M.
6030	49.75	OLR2B	● Prague, Czechoslovakia	Irregular (see 6010-9550-11840 kc.)
6030	49.75	HP5B	● Panama City, Panama	12-1 P.M., 5-10 P.M.
6030	49.75	HJ4ABP	● Medellin, Colombia	6-10:30 P.M. daily
6030	49.75	PGD	Kootwijk, Holland	(P) Phones Java and E. Indies irreg.
6030	49.75	VE9CA	● Calgary, Alberta, Can.	Weekdays 9 A.M.-1 A.M.; Thursdays to 2 A.M.; Sundays 12 noon-12:30 A.M.
6030	49.75	XEBQ	● Mazatlan, Mexico	8-11:30 P.M.
6025	49.79	PGD	Kootwijk, Holland	(P) Phones Java and E. Indies irreg.
6025	49.79	HJ1ABJ	● Santa Marta, Colombia	11:30 A.M.-2 P.M., 5:30-10:30 P.M. daily
6020	49.83	PGD	Kootwijk, Holland	(P) Phones Java and E. Indies irreg.
6020	49.83	DJC	● Zeesen, Germany	11:35 A.M.-4:30 P.M.
6020	49.83	XEUW	● Vera Cruz, Mexico	7 A.M.-11 P.M. daily
6018	49.85	ZHI	● Singapore, S. S.	Mon., Wed., Thurs. 5:40-8:10 A.M.; Sat. 10:40 P.M.-1:10 A.M.; 2nd & 4th Sundays, 5:10-6:40 A.M.—organ
6015	49.88	HI3U	● Santiago de los Caballeros, R. D.	Weekdays 7:10-8:40 A.M., 10:40 A.M.-1:40 P.M., 4:40-9:40 P.M. Sundays, 10:40 A.M.-1:40 P.M. only
6015	49.88	XEWI	● Mexico City, Mexico	Irregular (see 11900 kc.)
6012	49.90	HJ3ABH	● Bogota, Colombia	11:30 A.M.-2 P.M., 6-11 P.M.; Sun. 12-2 P.M., 4-11 P.M.
6010	49.92	VP3MR	● Georgetown, Br. Guiana	Sunday, 7:45-10:15 A.M. Weekdays, 4:45-8:45 P.M.
6010	49.92	VK9MI	● Sydney, Australia "S.S. Kanimbla"	11 P.M.-7 A.M. Irregular
6010	49.92	COCO	● Havana, Cuba	8 A.M.-10 P.M. daily
6010	49.92	OLR2A	● Prague, Czechoslovakia	Sunday 2-7:30 A.M. Daily ex. Sun. 8:55 A.M.-12 noon, 2:25-4:30 P.M. Thurs. & Sat., 5-7:30 A.M. Mon. & Thurs., 8-10 P.M. (America)
6005	49.96	HP5K	● Colon, Panama	7:30-9 A.M., 11:30 A.M.-1 P.M., 6-11 P.M.
6005	49.96	CFCX	● Montreal, Que.	Weekdays 7:45 A.M.-1 A.M. Sundays, 9 A.M.-11:15 P.M.
6005	49.96	VE9DN	● Montreal, Que.	Sat., 11:30 P.M.-1 A.M., Fall, Winter & Spring
6000	50.00	HJ1ABC	● Quibdo, Colombia	Sun., 3-5 P.M.; Wed., Sat., 5-6 P.M.; daily 6-9 P.M.
6000	50.00	XEBT	● Mexico City, Mexico	10 A.M.-1 A.M. daily
6000	50.00	FIQA	● Tananarive, Madagascar	3:30-4:45 A.M., 7 A.M.-1 P.M. daily
6000	50.00	RV59	● Moscow, USSR.	4-5 P.M., Sun., Mon., Wed., Fri.
5980	50.17	HJ2ABD	● Bucaramanga, Colombia	Daily 11:30 A.M.-12:30 P.M., 6-10 P.M.
5969	50.26	HVJ	● Vatican City, Vatican	2-2:15 P.M., Sunday 5-5:30 A.M.
5955	50.35	HJN	● Bogota, Colombia	Daily 11 A.M.-2 P.M., 5-10:30 P.M.
5940	50.51	TG2X	● Guatemala City, Guat.	Daily 4-6 P.M.; Mon., Thurs., Sat., 10 P.M.-11:30 P.M.; Sundays, 1-2 P.M.

Short-Wave Station List

KC	Meters	Call	Location	Time
5930	50.59	YV1RL	● Maracaibo, Venezuela	Weekdays, 11 A.M.-1 P. M., 4:30 - 9:30 P.M. Sun., 8:30 A.M.-2:30 P.M
5910	50.76	YV4RH	● Valencia, Venezuela	8-11:30 P.M. daily
5910	50.76	HH2S	● Port-au-Prince, Haiti	7-10 P.M.
5905	50.80	TIMS	● Puntarenas, Costa Rica	6-11 P.M. daily
5900	50.84	ZNB	● Mafeking, South Africa	Sun., 1:30 - 2:30 P.M. Mon. to Sat., 1-2:30 P. M.
5900	50.85	HJ4ABD	● Medellin, Colombia	Weekdays 10 A.M.-2 P. M., 4-11 P.M. Sundays 11 A.M.-3 P.M., 7-11 P.M. (see 6138 & 5780 kc.)
5885	50.98	HI9B	● Santiago de los Caballeros, R. D.	Weekdays, 7:30 - 8:45 A.M., 12-2 P.M., 5-7:45 P.M. Sunday, 11:45 A.M.2:45 P.M.
5880	51.02	YV3RA	● Barquisimeto, Venezuela	Daily 11:30 A.M.-12:30 P.M., 5:30-9:30 P.M.
5880	51.02	IUA	● Addis Ababa, Ethiopia	Used irregularly
5875	51.11	HRN	● Tegucigalpa, Honduras	6:30-8 P.M., 8:30-10 P. M. daily
5865	51.15	HI1J	● San Pedro de Macoris, R. D.	11:40 A.M.-1:40 P.M., 5:40-9:40 P.M. daily
5853	51.20	WOB	Lawrenceville, N. J.	(P) Phones ZFA P.M.
5850	51.28	YV1RB	● Maracaibo, Venezuela	Daily ex. Sun. 10:45 A. M.-12:45 P.M., 4:45-9:45 P.M. Sun. 8:45 A.M.-9:45 P.M. Mon., Wed., Fri., 5:45-8:15 A. M. Tues., Thurs., Sat., 5:45-9:45 A.M.
5830	51.28	GBT	Rugby, England	(P) Phones U.S.A. irreg.
5843	31.33	KRO	Kahuku, Hawaii	(P) Tests early mornings
5830	51.46	TIGPH	● San Jose, Costa Rica	8-11 P.M. daily ex. Sun.
5825	51.50	HJA2	Bogota, Colombia	(P) Phones HJA3 afternoons irreg.
5800	51.72	KZGF	Manila, P. I.	(P) Tests A.M. irreg.
5800	51.72	YV5RC	● Caracas, Venezuela	Sunday 8:30-11:30 A.M., 1:30-10 P.M. Weekdays 10:45 A.M.-1:30 P.M., 4-10:30 P.M. Sat. —close 9:30 P.M.
5800	51.72	ZEC	● Salisbury, Rhodesia, Africa	Sun. 3-5 A.M.; Tues. & Fri. 1:15-3:15 P.M.
5790	51.81	JVU	Nazaki, Japan	(P) Phones JZC early mornings
5780	51.90	CMB-2	Havana, Cuba	(P) Phones and tests irregularly
5780	51.90	OAX4D	● Lima, Peru	9-11:30 P.M. Wed., Sat.
5780	51.90	HJ4ABD	● Medellin, Colombia	Weekdays 10 A.M.-2 P. M., 4-11 P.M. Sunday 11 A.M.-3 P.M., 7-11 P.M. (see 6138 & 5900 kc.)
5758	52.10	YNOP	● Managua, Nicaragua	8:30-10:30 P.M. daily ex. Sunday
5750	52.17	XAM	Merida, Mexico	(P) Phones XDR-XDF early evenings
5730	52.36	JVV	Nazaki, Japan	(P) Phones JZC early A.M.
5725	52.40	HC1PM	● Quito, Ecuador	Saturdays 9-11 P.M.
5713	52.51	TGS	● Guatemala City, Guat.	Sun., Wed., Fri., 6-8 P.M.
5710	52.54	YV2RA	● San Cristobal, Venez.	Sundays 5:30-10 P.M. Weekdays 11:30 A.M.-12:30 P.M., 5:30-9 P. M.
5705	52.59	CFU	Rossland, Canada	(P) Phones CFO and CFN eves.; news, 8:30-8:45 P.M.
5670	52.91	DAN	Nordenland, Germany	(P) Phones ships irreg.
5500	54.55	TI5HH	● San Ramon, Costa Rica	3:30-5 P.M., 8-9:30 P.M. daily
5445	55.10	CJA7	Drummondville, Que.	(P) Phones Australia early A.M.
5435	55.20	LSH	Buenos Aires, Afg.	(P) Relays LR4 and tests evenings
5395	55.61	CFA7	Drummondville, Que.	(P) Phones No. America irregular
5260	57.03	WQN	Rocky Point, N. Y.	(E) Program service; irregular
5140	58.37	PMY	● Bandoeng, Java	Daily 4:45-10:45 A.M., 5:45 P.M.-2:15 A.M.
5110	58.71	KRG	Bolinas, Calif.	(P) Phones irregularly evenings
5080	59.08	WCN	Lawrenceville, N. J.	(P) Phones GDW evenings seasonally
5025	59.76	ZFA	Hamilton, Bermuda	(P) Phones WOB evenings
5040	59.25	RIR	Tiflis, USSR.	(P) Phones afternoons irregular
5015	59.82	KUF	Manila, P. I.	(P) Phones Bolinas; irregular
4975	60.30	GBC	Rugby, England	(P) Phones ships afternoon and nights
4905	61.16	CGA8	Drummondville, Que.	(P) Phones GDB - GCB afternoons
4820	62.20	GDW	Rugby, England	(P) Phones WCN-WOA evenings
4810	62.37	YDE2	● Solo, D. E. I.	5:30-11 A.M., 5:45-6:45 P.M., 10:30 P.M.-2 A. M. daily
4795	62.56	VE9BK	● Vancouver, Canada	Weekdays 11:30-11:45 A. M., 2:30-3 P.M., 7:30-8 P.M. Sat. (same ex. last), 7-7:30 P.M.
4752	63.13	WOY	Lawrenceville, N. J.	(P) Tests irregularly
4752	63.13	WOO	Ocean Gate, N. J.	(P) Phones ships irreg.
4752	63.13	WOG	Lawrenceville, N. J.	(P) Phones Rugby irreg.
4600	65.22	HC2ET	● Guayaquil, Ecuador	9:15-10:45 P.M., Wed. & Sat.
4555	65.95	WDN	Rocky Point, N. Y.	(P) Tests Rome and Berlin evenings
4550	65.93	KEH	Bolinas, Calif.	(P) Phone; irreg.
4510	66.52	ZFS	Nassau, Bahamas	(P) Phones WND daily; tests GYD - ZSV irregular
4465	67.19	CFA2	Drummondville, Que.	(P) Phones No. America; irregular days
4420	67.87	ZMBJ	● TSS "Awatea," Wellington, N. Z.	(See 8840 kc.)
4355	68.88	IAC	Pisa, Italy	(P) Phones and tests irreg.
4348	69.00	CGA9	Drummondville, Que.	(P) Phones ships and Rugby evenings
4320	69.40	GDB	Rugby, England	(P) Phones CGA8 and tests evenings
4295	69.90	WTDV	St. Thomas, Virgin Is.	(E) Weather reports, 8 A.M.-12 noon; 3-6 P.M.
4295	69.90	WTDW	St. Croix, Virgin Is.	(E) Weather reports, 8 A.M.-12 noon; 3-6 P.M.
4295	69.90	WTDX	St. John, Virgin Is.	(E) Weather reports, 8 A.M.-12 noon; 3-6 P.M.
4273	70.21	RV15	● Khabarovsk, USSR.	Daily ex. 6, 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.
4272	70.22	WOO	Ocean Gate, N. J.	(P) Phones ships afternoons and eve.
4272	70.22	WOY	Lawrenceville, N. J.	(P) Tests evenings
4107	73.05	HCJB	● Quito, Ecuador	(See 8948 kc.)
4002	75.00	CT2AJ	● Ponta Delgada, Azores	Wed. and Sat., 5-7 P.M.
3750	80.00	HCK	● Quito, Ecuador	Mondays 8:30-10:30 P. M. and occasional specials
3310	90.63	CJA8	Drummondville, Que.	(P) Phones Australia A.M.
3040	98.68	YDA	● Batavia, Java	Sunday 5:30-10:30 A.M., 7:30 P.M.-2 A.M. Weekdays 5:30-10:30 or 11 A.M. (Sat. 11:30 A.M.), 6-7:30 P.M., 10:30 P.M.-2 A.M.

the toggle switch is thrown to the "Manual" position.

As for frequency drift from a cold start—the best we could register was 2 kc., yet we believe the Hammarlund people conservatively place the drift in the vicinity of 7 kc.

Calibration is about as perfect as one could expect; i.e., *on the nose* on all bands, or as Hammarlund would put it, held within a tolerance of plus or minus ½%. We know of nothing that lends more assurance to the operator of a receiver than this form of accuracy. Perfect calibration such as this eliminates every particle of guesswork, and this, coupled with the almost negligible frequency drift, means that one can tune to the nose of any station almost immediately after turning on the receiver. Moreover, since separate variable gang condensers are used for band spread on each range where this feature is provided, it has been possible to so choose capacity values that each band spread scale division from 0 to 50 is equal to approximately 4 kc., and each division from 50 to 100 is equal to 5 kc. *irrespective of which short-wave range is in use.* This means that it is possible to make very precise frequency checks on received signals, and even make a close determination of sideband widths.

Speaking of band spread, the short-wave model incorporating the 20 to 40-mc. range provides a spread of 90 divisions for the 28 to 30 mc. ham band.

THE NEW SUPER-PRO

(Continued from page 255)

Air Tests

Most readers undoubtedly realize that no accurate indication of the DX abilities of a receiver can be presented by the mere listing of stations heard. Given the proper conditions—and that's when the average listener logs most of his

(Continued on page 279)

On the Market

Miller DeLuxe I.F. Transformers

THE J. W. MILLER CO., Los Angeles, California, now has available a new series of DeLuxe Intermediate-Frequency Transformers using what is believed to be the finest and most practical design in air dielectric tuning condensers. These condensers are so constructed that about 70% of the total capacity is *fixed*—air dielectric of course—and 30% variable by means of semi-circular plates which are held under positive contact and permanently in position by a trifingered phosphor bronze spring. This type of construction provides an ease of adjustment which is not obtainable in conventional designs, it is said. Capacity variation is said to be nil even after forty-eight hours under 90% humidity conditions.

The supporting base on which the condenser is constructed consists of genuine Isolantite. High circuit "Q" is obtained with the air-dielectric tuning condenser, which has a "Q" of approximately 10,000 as compared with a "Q" of 1000 or less for mica compression types. Carefully designed windings in both air and iron core types are used to provide maximum coil "Q".

Another unusual feature for air dielectric condenser type intermediate-frequency transformers is that in the Miller DeLuxe series both primary and secondary circuits are adjustable from the top of the shield. The transformer is assembled in an aluminum shield 2" square and 4½" long, which is finished in fine black crackle Kem-Art baked enamel.

Those DeLuxe Intermediate-Frequency Transformers are desirable not only for new equipment but also for replacement and modernization work. Available in both standard and variable selectivity types with either air core or iron core. ALL-WAVE RADIO.

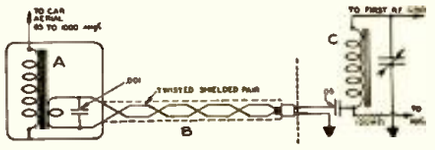
◆

Arvin Phantom Filter

AN UNUSUAL method of connecting an autoradio receiver to the antenna of the car is embodied in the new 1937 Arvin Car Radio Line.

A circuit of the entire system is shown in the accompanying diagram. Essentially the circuit consists of three separate parts —the antenna coupler, the transmission line and the tuned resonance circuit.

The antenna coupler is designed to resonate at 500 kc. with an antenna capacity of 75 mmfd. Higher capacities, of course, resonate the input circuit to lower frequencies with a slight reduction in efficiency although performance is quite satisfactory with metal insert top antenna such as used in 1936 Dodge cars.



Energy in the antenna is impressed on the primary of Coil A where it is induced into the low-impedance secondary and fed into the matched line B, which is loaded with 1,000 mmfd. capacity at the input end.

Terminating at the antenna coil in the receiver, the twisted pair is coupled in series with the antenna coil winding and the capacity of the line and loading condenser becomes the automatic volume control condenser.

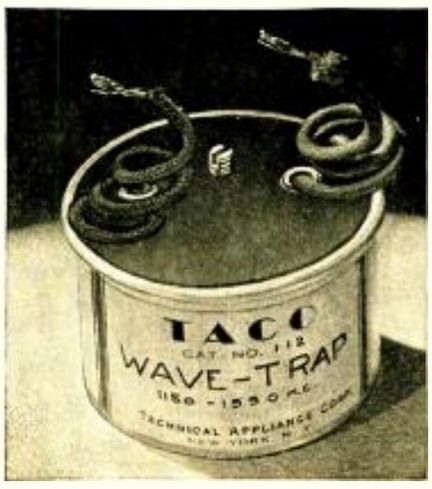
High-Q construction utilizing all the efficiency obtainable by iron core and double-pie coil design permits an over-all gain of from 14 to 24 in the antenna stage insuring high station pick-up ability.

The Phantom Filter combines all the desirable features of the Hazeltine Series fed antenna system with a transmission line input system, and in so doing sets new standards of radio reception, reducing background hiss and station crosstalk to a minimum, it is said. ALL-WAVE RADIO.

◆

New TACO Wavetrap

THE TACO Wave Trap now comes to the rescue of set owners located in the vicinity of powerful broadcasting stations. This inexpensive device tunes out any overbearing signal so that weaker signals can be tuned in and their programs enjoyed. Such a trap is especially desirable with older type sets notorious for their broad tuning.



The Taco Wave Trap comes in three frequency ranges: 450-750, 750-1150, and 1150-1550 kc., or the complete coverage of the broadcast wave band. A unit of the particular frequency range in which the offending station falls, is selected. A set-screw adjustment then permits the tuning of the trap to the precise frequency to eliminate the heretofore overriding signal. The trap connects between antenna and set. Further details may be had by writing Technical Appliance Corp., 17 East 16 St., New York City. ALL-WAVE RADIO.

◆

New UTC Preamplifier

UNITED TRANSFORMER CORP., 72 Spring Street, New York, N. Y. has just brought out a new innovation in preamplifiers with a unit which obtains its power supply directly from the main amplifier. It incorporates

a 6F5 resistance coupled to a 6C5, providing 60 db gain. The input is high impedance and the output universal line impedances. Filtering is provided in the preamplifier to assure low hum level. If desired, a separate power supply can also be obtained for this unit. ALL-WAVE RADIO.

◆

Hammarlund Parts Circular Service

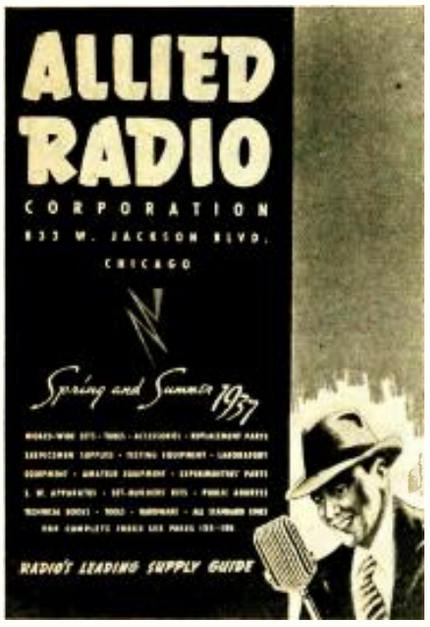
TO ASSIST THOSE who are in need of detailed information on its lines of condensers, i.f. transformers, etc., the Hammarlund Manufacturing Co., Inc., has issued attractively illustrated design circulars.

Each circular deals with but one product line, such as I. F. Transformers, "HF" Micro Condensers, "MC" Midget Condensers, "MTC" Transmitting Condensers, etc. and provides all necessary mechanical and electrical specifications, values, types available, list prices, etc.

Circulars covering the items listed above are now available and may be obtained upon request to the company. Other circulars are in the process of preparation. ALL-WAVE RADIO.

New 156 Page Radio Catalog

ALLIED RADIO CORPORATION announces the release of an attractive new 156-page Spring 1937 Catalog. Of interest to Servicemen, Dealers, Amateurs, Experimenters and Sound Specialists, it includes more than



10,000 exact duplicate and replacement parts; 53 new Knight Radios, featuring Automatic Dialing, AFC, Touch-o-matic Tuning, etc., new plastic, portable, phono-radio and auto models; complete lines of Amateur transmitting and receiving gear; matched unit Public Address systems from 8 to 60 watts; Test instruments; Build-Your-Own kits; Ruralpower Windchargers and generators; books, tools, etc. A free copy may be obtained by writing to Allied Radio, 833 W. Jackson Blvd., Chicago, Ill. ALL-WAVE RADIO.

◆

New Audak Pickups

TWO NEW MICROMATIC Pickups, Models AT Z14 and AT-26 for twelve-and eighteen-inch records respectively, have just been announced by the Audak Company, 500 Fifth

Avenue, New York. These units are said to give a real wide range response and to have a very smooth and rising characteristic at the low end—beginning at 300 cycles and gradually increasing to 10 db at 70 cycles—correctly compensating for the attenuation in recording at the low end.

Above 300 cycles they are substantially flat, with no peaks, to well beyond any requirement of the finest present day recordings.

The manufacturer will gladly supply complete literature on these and other Audax units. ALL-WAVE RADIO.

Oil Burner Ignition Interference Suppressor

OIL BURNER IGNITION systems have long been a source of severe interference to radio reception. An ignition interference suppressor in an Isolantite insulated tube has been developed by Continental Carbon Inc., 13900 Lorain Avenue, Cleveland, Ohio. The suppressor is intended for use in series with each high tension lead of an oil burner's ignition system.

The suppressor, which has a resistance of 15,000 ohms, damps transient radio frequency oscillations in the high tension circuit, effectively reducing radio interference. This action is similar to that of auto-radio spark plug interference suppressors. The body of the suppressor is 3½ inches long and 13/16 inch in diameter. A solderless cable terminal is provided at one end, and a universal type threaded stud and double threaded brass insert in the suppressor permit convenient connection to practically all standard ignition transformers.

Continental Carbon has announced that this device shall be known as Filternoys Suppressor OB15. Two are required for most oil burners.—ALL-WAVE RADIO.

◆

New Triumph Signal Generator

"NO DRIP PAN required" is the claim for the new 1937 Model 120A direct-reading 115-volt, 50-60 cycle a.c. operated Signal Generator announced by the Triumph Manufacturing Company, 4017 W. Lake Street, Chicago, Illinois.

Humorously playing upon the objectionable features of older generators, Triumph points out that the high sensitivity of modern radio receivers necessitates a signal generator which will attenuate a signal to absolute zero without r.f. leakage, thus permitting accurate sensitivity measure-

ments. Maximum output signal strength has been increased to 200,000 microvolts to provide for automatic frequency control service work.

The frequency range of the Model 120A is from 100 kc. to 27 mc. on fundamentals, and to 75 mc. on direct calibrated dial. The r.f. signal may be modulated at 30% with a 400-cycle audio tone supplied through a separate tube in a suppressor injection circuit. The audio tone may be used alone or external modulation may be supplied to the generator. Calibrated microvolt attenuation from approximately 1 mv. to 50,000 is accomplished with a dual attenuator system.

The Model 120A Signal Generator employs a 6C6 r.f. oscillator, a 76 suppressor injection audio modulator and a 76 rectifier tube. The entire unit is supplied in a black crackle finished metal case 6¼" x9". x5½" deep. ALL-WAVE RADIO.

◆

New ARHCO Products

THE AMERICAN RADIO Hardware Co., 476 Broadway, New York, N. Y., have introduced two new units designed expressly for amateur use.

The new neutralizing condenser, shown in the illustration, is of the high-voltage air dielectric type mounted on a Mycalex base and with a Mycalex-insulated screwdriver capacity adjustment with locking screw to assure permanent adjustment. This condenser is designed for use with the RCA type 800 tube. The capacity range is 0.25 mmfd to 5 mmfd.

The new feeder spreaders introduced by this company, and shown in the accompanying illustration, are also made of Mycalex and therefore provide high efficiency under all climatic conditions. They may be obtained in 2", 4" and 6" lengths. ALL-WAVE RADIO.

◆

U.T.C. Varimatch Bulletin

THE UNITED TRANSFORMER Corp. announces the release of a new Varimatch Bulletin incorporating valuable information and application charts. Included in this bulletin are the Varimatch transformers, Varimatch Input transformers, PA Varimatch transformers, Line Varimatch transformers.

Pick up a copy at your favorite distributor or write to United Transformer Corporation, 72 Spring Street, New York, N. Y. ALL-WAVE RADIO.

Have a report on them but cannot tell what his call is."

Cappie Hadley, DX Commentator, WLAC, Nashville, Tenn.; "Thanks for listing the tips period in AWR. Anytime you have any tips too late to include in Night Owl Hoots, just drop me a card, and Ill be glad to put them on the air."

Carl Forestieri, New York, N. Y.: "Are radio stations stamp collectors? Every time I send a new commemorative stamp to a station as return postage, the veri comes back with an ordinary 3c current issue!"

Carroll Weyrich, Baltimore, Md.: "Try for YV5RA in the early evening when Spanish-speaking stations dominate the dial. I have heard them occasionally coming through XEAW. This makes the third time I've logged the station under different calls. First YV1BC, then YV1RC, and now YV1RA."

Now it's the Chief's turn to hoot. First we'll tackle the questions and the first seems to be regarding a Brazilian on 1000 kc. beginning with PRB. Well AWR's list shows PRB6 in Sao Paulo using 1 kw. on that channel. There is also another in the same city on that channel using 5 kw. Call is PRE7. PRB6 is owned by Sociedade Radio Cruzerro do Sul, and PRE7 by Sociedade Radio Cosmos . . . The Cuban station Joe Lippincott asks about on 630 is CMBC. They are listed as 640 and announce as 640 but actually come in on 630. Many have been misdirected in the contest and reported this station as CMCB, but CMCB is still on 1230 kc. despite all listings to the contrary! . . . Arrangements have been completed for a special program dedicated to readers of Night-Owl Hoots from station WFOY for the morning of April 30 from 1-3 A.M.

It is our wish to thank the following for their letters of encouragement and their help in compiling the information in this department: Reginald Vining, Cortland, N. Y.; F. H. Witty, Lynn, Mass.; Clermont Zimmerman, Sunbury, Penna.; Kenneth Albrecht, Hartford, Conn.; Earl Lever, Worcester, Mass.; George Brode, Philadelphia, Penna.; Clarence Burnham, Gloucester, Mass.; Harry E. Snyder, Trenton, N. J.; George Bird, Pawhuska, Okla.; Enrique Hidalgo, Cienfuegos, Cuba; George Roche, Amesbury, Mass.; Morton Blender, Boston, Mass.; Ray Prutting, Bridgeport, Conn.; John Brennan, Dorchester, Mass.; Walter Scholz, Carlinsville, Ill.; John Gardner, New York City; Charles Hesterman, Saskatoon, Sask.; Bob Gaiser, Butler, N. J.; Jose Rodriquez, Habana, Cuba; William Wheatley, Brooklyn, N. Y.; Allan Hoppenstedt, Oradell, N. J.; Kendall Walker, Yamhill, Ore.; Julian Schaeffer, Cleveland, Ohio; Walter L. Chambers.

NIGHT-OWL HOOTS

(Continued from page 247)

Lexington, Mass.; Art Collins, Buffalo, N. Y.; Carl and Anne Eder, Willmar, Minn.; Edward Ayvasian, West Newton, Mass.; Charles E. Roach, Camden, N. J.; Bob Beadles, Salt Lake City, Utah; Anthony C. Tarr, Seattle, Wash.; Charles H. Williams, Greenburg, Penna.; Nancy Lee Saxton, Chicago, Ill.; William F. Herzog, Center Moriches, N. Y.; Harry Gordon, Erie, Penna.

Kilocycling Around

The Cuban Radio Bureau is beginning to "lay down the law" to the bad-boy broadcasters. Two stations have felt the axe during the past month. CMBN and CMCR are the stations whose licenses have been revoked by the CRB . . . A new Mexican ruling states that each program shall contain at least 25% typically Mexican music. Wonder if the voices of such as Rose Dawn, Alma, Gayle Norman, Doc Baker, and John R. Brinkley and other border celebs are considered typically Mexican music? . . . According to the GCDXC, HJ1ABE on 1250 kc. uses 500 watts and transmits daily from 11:30 A.M. to 1 P.M. then 6-10:20 P.M. EST . . . XEMO is the only "high-level" modulated, high-power transmitter on the Pacific Coast . . . Thanks to XEFW for a fine program on the 11th. We hope you heard it.

"A new 5-kilowatt station on 804 kc. was inaugurated Feb. 1 at Pennon, near Beaumaris, Isle of Anglesey." This from the bulletin of the UDXC . . . The new XEBX in Sabinas, Coahuila, Mexico, known as "La Voz de la Region Carbonifera" (the Voice of the Coal Region) was inaugurated for the purpose of advertising the Coal region of Coahuila and to advertise the attractiveness of the region to tourists, according to its owner, Benito Garza Ortegon. Schedule will probably be 5-8 A.M., 11 A.M. to 2 P.M. and 6 P.M. to midnight (CST) . . . XEFO is also attempting to interest tourists in the advantages of a Mexican vacation tour with many early morning programs in English . . . The NNRC is the authority for the statement that KVOX will begin testing sometime in May . . . The best veri of the month: CMKG's attractive multi-colored card thirst-quenchingly decorated with Bacardi bottles and antenna towers! Though they are listed on 1160 kc. reception of the station was on 1135 kc. . . By the time the next DX season rolls around all-night broadcasting may be a thing of the past for United States stations. We've heard rumors that the FCC intend to take the matter seriously during the summer and they've been more or less confirmed by the broadcasters themselves who are not too sure of their position. Listen to most all-nighters and you'll hear them begging for reports in order to have the program continued! . . . A very unusual and thoroughly interesting veri is the property of "Pete" Peters of Nova Scotia. Along with a personal letter verifying his reception of PRF4 of the Radio Jornal do Brasil he received a copy of the newspaper which contained a complete reproduction of his letter to the station along with a translation of the letter into Portuguese. Notation is made at the top of the page regarding the fact that PRF4's signals travel far into the distant lands. Evidently they had not previously been correctly reported by anyone at such a distance as the letter certainly was given a prominent space in this important Brazilian daily. . . . Thanking our friend Enrique Hidalgo for his courtesy to AWR on the past DX programs from CMHJ we'd like to mention that the DX Director at CMHJ labors incessantly so that DXers of North America may find more pleasure in their DXing. . . . Station WWL was the first station in the Mississippi Valley to broadcast musical programs. That was back in March 1922! This bit of information is forwarded to us by George Brode of Philadelphia.

STOP PRESS NEWS

An air mail letter arriving at the last minute from Clemente Vasallo Gomez, owner of HJ1ABK, "La Voz de la Patria" (The Voice of the Country) in Barranquilla, Colombia, reveals the following: "Wishing to contribute to the celebration of the first anniversary of your department, (Night-Owl Hoots) we are arranging a special program dedicated to you from 2:30 to 3:00 A. M., E. S. T. on Saturday April 24, 1937."

The program will be one of typical Colombian music by the nationally known duetto Campuzano-Cano. HJ1ABK is operating on 1350 kc. and the address is Apartado Postal 580, Barranquilla, Colombia. This is believed to be the first early morning DX program conducted by the station and should provide an excellent opportunity to add this friendly Colombian station to your log.

Three Jeers

We cannot think of anyone at whom we'd like to throw our three jeers this month outside of that perpetual all-nighter during the past season. He not only refused to sign off for one single

(Continued on page 280)

100 BLANKS TO EACH PAD

FOR THE RSSL MEMBER

• 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 • Postpaid

ARE YOU ELIGIBLE FOR MEMBERSHIP IN THE RADIO SIGNAL SURVEY LEAGUE?

There is only one requisite for Membership, namely: That you be sincere in your desire and efforts to assist the league in fulfilling its public service of "improving domestic and international radio transmission and reception conditions." Here is an opportunity to help make radio history and at the same time do a real public service.

JOIN THE R.S.S.L. TODAY! NO FEE! A POST CARD WILL FETCH YOUR APPLICATION BLANK.

• QSL CARDS •

No QSL Cards have, as yet, been prepared. 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" (above) 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

METALETTE R.S.S.L. SEALS

Are gummed on one side. Blue embossed on Silver. Same size as above 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 and send to:

RADIO SIGNAL SURVEY LEAGUE
16 East 43 Street, New York, N. Y.

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.

Note: Those who prefer to design their own stationery or who would like to add the R.S.S.L. emblem to stationery they already have can secure "Mats" (Matrices) of the above two illustrations (actual size). For details see section headed "QSL CARDS."

100 Sheets 50c • 250 Sheets $1.00

AWR "COMMERCIAL"

(Continued from page 232)

furnish an approximately correct match to a 400-or 500-ohm antenna feeder line, such as is employed with the popular Johnson Q type of antenna. No connecting wires are shown in the photographs between the antenna feed-thru insulators in the top of the cabinet and the antenna tuning condensers. These leads should be made flexible, with clips placed on the ends. When the antenna panel is in use these leads are clipped to the antenna condensers themselves. When the link on the final plate coil is in use they should be clipped to the plate coil base instead.

The Coils

It is possible to use the linkless coils in the final in place of the link coils, when such links are not necessary. It might be well to point out that the B, BT, and BTL series are identical except that the BTL's have both a center tap *and* a link winding, the BT's have the center tap but no link, while the B's have neither tap nor link. All coils of the three series may be plugged into the type CI-6BTLM base. This information is given here to prevent confusion when the constructor comes around to selecting the coils necessary for the bands and antennas he desires to employ.

The amplifier plate condenser, C19, has a capacity of 50 mmfd. per section, giving an effective series capacity across the tank coil of 25 mmfd. This capacity is sufficiently high to tune all the specified coils from 10 to 80 meters. The 160-meter coils require a higher capacity condenser, which may be a Hammarlund type TCD-225-X. The TCD-50-A type is preferable for the higher frequency bands due to its higher voltage-breakdown rating.

Resistor, R8, the gridleak for the T-55, is specified as 5000 ohms. In practice part of this resistor is shorted out so that the effective resistance is 4000 ohms. Experiment will dictate the optimum value for this resistor.

Operation and Testing

The operation of this transmitter is comparatively simple, due to the elimination of unnecessary links, tuned circuits and neutralizing condensers. Some of the transmitters we have seen described which employ link coupling between several stages would deplete a radio store stock of coils when used for multi-band operation. We are, as a matter of principle, opposed to the use of link coupling except where the stages so coupled are separated by a distance of feet rather than inches. We have not, as yet, found a single instance where capacity coupling did not give as great or greater a power transfer than link coupling when the coil was properly tapped.

When first testing the transmitter the 866's should be left out of their sockets to avoid the possibility of contacting the high voltage while playing with the oscillator and buffer stages. The osc.-buffer switch should be thrown to the oscillator position, thus placing the meter in the oscillator circuit and taking the voltage from the RK-25. With the oscillator stage tuned up for greatest output on the band desired the switch should be thrown over to the buffer position and the buffer dial quickly tuned to resonance, as shown by the greatest dip of the meter. It should be realized that this meter, when in the buffer position, reads the combined control grid, screen grid, suppressor grid and plate currents, the same as it does in the oscillator position. Approximately 40 ma. should be allowed for the control, suppressor and screen grid currents. This figure of 40 ma., subtracted from the buffer tube reading,

COIL WINDING DATA

Oscillator Cathode Coils

For 40-meter xtal—5 turns No. 22 enam. spaced diameter of wire

For 80-meter xtal—12.5 turns No. 22 enam. spaced diameter of wire

For 160-meter xtal—26 turns No. 24 dsc close-wound

(Use SWF-4 coil forms)

Oscillator Plate Coils

For 20 meters—6 turns No. 22 enam. spaced diameter of wire

For 40 meters—12 turns No. 22 enam. spaced diameter of wire.

For 80 meters—30 turns No. 24 dsc close-wound

For 160 meters—65 turns No. 24 dsc close-wound

(Use SWF-4 coil forms)

RK-25 Plate Coils

For 10 meters—5 turns No. 12 enam. spaced out 1¾", tap 2 turns down.

For 20 meters—10 turns No. 12 enam. spaced out 2", tap 3 turns down.

For 40 meters—20 turns No. 12 enam. spaced out 2¼", tap 4 turns down.

For 80 meters—40 turns No. 18 dcc close wound, tap 10 turns down.

For 160 meters—85 turns No. 24 dsc close-wound, tap 18 turns down.

(All these coils are 1½" in diameter, air wound, and mounted on 3 x ¾" hard rubber or victron strips. 3 plugs (type 401) are used for each coil. All taps are from plate ends of coils.)

will give the approximately correct plate current. The combined current reading of the RK-25, when tuned to resonance with the T-55 coupled and working, should not—and need not—be over 90 ma., even with the RK-25 doubling to 10 meters.

The key should next be closed, with the 866's still out of their sockets, and the T-55 neutralized. When this tube is once neutralized the 866's may be replaced (with the power off), the plate circuit tuned to resonance and the antenna coupled. The plate current of the T-55 should not be over 150 ma. when loaded by the antenna.

It will be noticed that the grid of the T-55 is tapped down on the RK-25 plate coil. This accomplishes several desirable purposes. First, it provides a good impedance match between the two tubes. Second, it is a means of loading the RK-25 to the desired plate current—the nearer the tap to the plate end the higher the plate current. Third, it reduces the r.f. voltage at the grid of the T-55, providing less r.f. voltage and more r.f. current at this point. This is in line with recommendations of the Taylor people, to keep the r.f. voltage at this point at a low value.

Crystal Choice

The line-up of tubes used in the r.f. section permits of a high degree of flexibility in the choice of crystals. It was originally planned to run the RK-25 as a straight amplifier for 10-meter operation. Experiments with the transmitter showed that sufficient excitation could be secured for the T-55 on 10 meters with the RK-25 operating as a doubler from 20 meters; this amount of excitation being secured without exceeding any of the ratings on the RK-25. This simplified operation greatly, eliminating the necessity of the 6L6 plate circuit working on 10 meters.

The 6L6 may be used in either of three modes of operation; it may be used as a straight oscillator, with its plate coil tuned to the crystal frequency, by placing a shorting plug in the cathode coil socket; by plugging in the proper cathode coil to form a tritet circuit, it may be used as a doubler; finally, it may be used as a quadrupler with sufficient output to adequately excite the RK-25.

This flexibility of operation of the oscillator and buffer-doubler stages makes it possible, for instance, to use an 80-meter crystal for 10-meter operation of the T-55 as a straight amplifier, using

the 6L6 as a quadrupler; the same procedure may be followed using 160-meter crystals for 20-meter operation. It is, on the other hand, possible to place the amplifier output on the crystal frequency directly on all bands from 20 to 160 meters. A small number of crystals in this transmitter will make available a maximum number of operating frequencies.

A full set of Bliley HF2 and LD2 crystals were available for testing this transmitter. Before obtaining these we looked upon the use of 20-meter crystals with some degree of skepticism. After using the HF2 type of 20-meter crystal in both the DX4UCW transmitter (April ALL-WAVE RADIO) and in the present transmitter we find that our skepticism has turned to approval.

Next month we will describe in full the a.f. section of this transmitter, as well as complete dope on the operation of the two sections for phone work.

The present unit, as stated before, is a complete c.w. transmitter of moderately high power. We honestly believe it to be the best appearing transmitter we have built to date. The combination of control wheels, scales and indicator plates (used over the meters also) really do dress up the rig.

The transmitter, when first placed on the air, worked five of the first six stations called; it has a crystal note that is a distinct pleasure to listen to.

GLOBE GIRDLING

(Continued from page 244)

standing, by receiving a verification from long-wave station WMFN, throwing a harmonic on 35 meters. The long-wave station is being rebuilt at Grenada, Miss.

Java: Changes have been made in time schedules of broadcasting stations and up-to-date information shown in schedules of radiophone stations showing the time of each on the air and with what countries working. PLQ, 10680 kc, radiophone at Bandoeng, has been added. Letter from Mr. Sanders states that reception reports of phone stations will be verified by them as usual. It is the understanding that all programs originating from the NIROM will be verified by that organization and including those rebroadcast by the Java stations, PMH, PMN and PLP.

Veri Slow

The following stations are still shown as being slow in forwarding verifications covering reception reports filed: HJ1ABB, HJ4ABD, HJ4ABB, Colombia; HCETC, Ecuador; HRN, Honduras; CB960, Chile, HI2D, Dominican Republic; TIEP, TIPG, TIGPH, Costa Rica; VP3BG, British Guiana; PZH, Dutch Guiana. HI7P and HI9B cards are being received so they have been removed from list. No further reports have been received of HRN forwarding veries, so the report in last issue may have been a "false alarm."

Amateur Phones

The following is a list of 20-meter amateur phone stations reported in late lists and which have not been listed in previous reportings in this section:

Country	*Frequency*	*Calls*	*Time*
Australia	LF	VK2OQ	1:16 A.M.
	HF	VK3AL-VK5AI	3:30 A.M.-7 A.M.
Argentina	LF	LU6PE	7 P.M.
Baffin Land	LF	VE5TV	8:30 A.M.
Belgium	LF	ON4BG-ON4KD	6 P.M.
	LF	ON4ZE-ON4VK-ON4US	2:30-9 A.M.
	LF	ON4ZD-ON4ZO	2:30-9 A.M.
	HF	ON4VC	6:19 P.M.
Bel. Congo	LF	ON4CGW	3:30 P.M.
Bahamas	LF	VP7AB	1:45 A.M.
Colombia	LF	HJ5AHA-HJ4EA	1 P.M.-3:15 A.M.
Denmark	HF	OZ3U	2:40 A.M.
England	LF	G5PP-G5SA	3:35 A.M.-2:30 A.M.
	LF	G6RA	3:16 P.M.
	HF	G2DL-G5ZI-G8HI	4:20 A.M.-5:20 P.M.-4:05 A.M.
France	LF	F8DL	2:30 A.M.
	HF	F8II-F8LG	2:00-3:50 A.M.
Greece	HF	SV1KE	3:30 P.M.
Holland	LF	PAOAD	5:22 P.M.
Ireland	HF	GI5QX	6:15 A.M.
India	HF	VU2CG	7:30 A.M.
	LF	VU7FY	8 A.M.
Jamaica	LF	VP5PZ	9 P.M.
	HF	VP5AF	11:30 P.M.
Labrador	HF	VO6L	2 P.M.
Morocco	LF	EA9AH	2-5 P.M.
Newfoundl'd	HF	VO2N	7:17 A.M.
Norway	LF	LA1G	4 A.M.
Peru	LF	OA4I	10:45 P.M.
Switzerland	LF	HB9T	3 A.M.
So. Africa	HF	ZS2X	11:30 P.M.
	LF	ZS6AJ	6 P.M.
Tunis	LF	FT4AA	1:55 A.M.
	HF	FT4AG	5 P.M.
Tanganyika	LF	VQ3MSN	4 P.M.
Tasmania	LF	VK7JB	8 A.M.
Uruguay	HF	CX1CC	5 & 11 P.M.
Venezuela	LF	YV1AD-YV1AP-YV5AA	6:49 A.M.-6-11 P.M.
	HF	YV1AV	6-11 P.M.

We are very gateful to all those who have supplied information for this 20-meter section. It is noted, however, that a few are not yet setting up the data in line with our several requests—that of supplying information on each station as to the date and time received, if on the high-frequency (HF) or low-frequency (LF) side of the American Amateur band. It is also best to state them by countries and preferably include the current unusual stations, leaving out those known to have been reported before.

It is with pleasure we acknowledge letters and reports from John M. Burbank, Atchison, Kansas; W. H. W. Cassell, Portsmouth, Va.; Zygmunt Drega, Ware, Mass.; Norman I. Euerrd, Laredo, Texas; Norman Ebling, Portland, Oregon; Kenneth Ferguson, Los Angeles, Calf.; Robert C. Gill, Baltimore, Md.; Raymond R. Gross, McKeesport, Pa.; Rex R. Huey, Fort Slocum, New York; B. Mariana, New York City, N. Y.; Roy Meyers, Los Angeles, Calif.; A. E. G. Penny, Montreal, Quebec, Canada; Weston E. Reed, Yorktown Heights,

New York; E. G. Riggle, Massillon, Ohio; Murray Shaw, Harmony, R. I.; Joseph Smith, Hicksvile, New York; D. F. Thomas, Proctorville, Ohio; George M. Alstetter, Oakland, Md.; Charles Baker, Baldwin, N.Y.; Willis E. Blanchard, Bangor, Me.; Morton W. Blender, Boston, Mass.; Richard Chapman, Buckingham, Que., Canada; H. C. Chestnut, Plattsburg, N. Y.; Edward Davis, Brooklyn, N. Y.; Francis Delmore, Morristown, N. J.; Mrs. Kenneth L. Eastburn, Kinsley, Kan.; George Eggart, Pensacola, Fla.; John Hartshorn, Texarkana, Ark.; Robert N. Jameson, Haverford, Pa.; James C. Kneeland, Worcester, Mass.; Stanley Koenig, New York, N. Y.; John W. May, Wilkinsburg, Pa.; W. H. Meyers, Denver, Colo.; Joseph S. Meyers, Jr., Lexington, Va.; James E. Moore, San Francisco, Calif.; Minoe Nishimori, Haratsuka, Japan; Frederic H. Peran, Buffalo, N. Y.; Sverre Petersen, Jr., Brooklyn, N. Y.; Herman Ruppert, New York, N. Y.; Ernest Sandquist, Downey, Calif.; Bob Sawada, Isleton, Calif.; E. Schutz, Chicago, Ill.; Harry E. Snyder, Trenton, N. J.; Wm. R. Stein, New York, N. Y.; James L. Trenton, California, Pa.; Edward F. Vogel, Erie, Pa.; Clinton Wardrop, Hollywood, Calif.; Charles H. Williams, Greensburg, Pa.; Paul Wirtz, Baltimore, Md.; C. R. Wilson, Portland, Me.; and Theodore Witty, Towaco, N. J., and to extend to them the thanks of ALL-WAVE RADIO and the writer of this section for their interest and assistance.

Letters from our friends are much appreciated. It will be our pleasure to answer your questions pertaining to reception, unknown stations, or station matters in general. We are grateful for your reports of stations heard, changes in frequencies, time schedules and other items of interest to the readers.

Address your letters to me at 85 Saint Andrews Place, Yonkers, New York, enclosing self-addressed stamped envelope, should you desire a reply.

All questions of a technical nature should be forwarded to Queries Editor, ALL-WAVE RADIO, 16 East 43 Street New York, N. Y.

EMBRYO HAMS

(Continued from page 253)

of the oscillator r.f. that drives it. Therefore if the oscillator crystal frequency is 3500 kc, the second harmonic output of the frequency doubler tube will be 7000 kc. It is this frequency, therefore, that drives the final amplifier tube, and the frequency of the radiated signal is therefore 7000 kc rather than 3500 kc.

There are, of course, tuned circuits involved with each of the stages of this transmitter. The oscillator and frequency doubler input are tuned to 3500 kc, while the frequency doubler output and final amplifier are tuned to 7000 kc. If it were desired that the transmitter operate on 14,000 kc, an additional frequency-doubler tube could be included to double the 7000-kc output of the first doubler to 14,000 kc. In this case the final amplifier circuits would be tuned to 14,000 kc.

However, operation on this frequency can be had without the use of an additional doubler tube by using the second harmonic of the crystal oscillator frequency to drive the doubler, as shown at B in Fig. 5. In this case the output circuit of the oscillator and the input circuit of the doubler are tuned to 7000 kc, while the doubler output and final amplifier are tuned to 14,000 kc. By the addition of another doubler tube, the transmitter could be made to operate on 28,000 kc in the same manner previously outlined. This could also be accomplished under proper conditions, with the same arrangement shown at B in Fig. 5, by doubling in the final amplifier itself.

Thus, with three tubes and a single crystal, it is possible to operate the transmitter in four different bands. For 3500-kc "straight-through" operation, doubling is dispensed with and all circuits are tuned to 3500 kc. For 7000 kc operation, doubling is accomplished in the output of the oscillator, and the frequency-doubler tube is used as a buffer amplifier. For 14,000 kc operation, the frequency is doubled twice, as at B in Fig. 5, and for 28,000-kc operation the final amplifier is made to double, or an additional doubler is employed.

It is obvious, of course, that if three crystals of different frequency were available, three fixed frequencies in four bands would be available, a total of twelve operating points.

Until recently it has been difficult to produce crystals that were satisfactory on frequencies higher than 7000 kc. However, now that good 14,000 kc, 20-meter, crystals are available, less doubling is required for operation in the higher frequency bands. If one desired to operate only in the 10- and 20-meter bands, for instance, a 20-meter crystal could be used for straight-through operation from oscillator to final amplifier on 14,000 kc., and by doubling in the output of the oscillator for operation on 10 meters. With the addition of an 80-meter crystal and the necessary coils, the same two-tube transmitter could be operated on 80 and 40 meters.

The frequency stability afforded by crystal control far outweighs the disadvantages previously mentioned, particularly in view of the fact that two or more crystals will provide an equal number of fixed-frequency spots in each band worked. Then it is a simple matter to switch from one fixed frequency to another to break clear of QRM.

Well, so much for that. 73.

Gerald

HAM OPERATING

(Continued from page 248)

There is much controversy as to c.w. or 'phone preference . . . it matters not. There is room for improvement in both places, "hi"

Shallow Talk

However, I am interested in c.w. operation and promote most of my activities in that direction. It is not that I don't enjoy 'phone—I do. It is personal and of greater appeal to my friends—but truthfully, some of the conversation on 'phone has rather discouraged me at times. I refer to the group who try to mix liquor with radio, and the "young punk" who talks about nothing for hours at a time. Especially too, some of the YLs heard—they giggle and gurgle and if I thought I sounded anything like some I've heard—I'd vow to never get within ten feet of a mike! Otherwise 'phone is excellent. It requires more technical ability and in some cases a Class A license.

I would add that c.w. fascinates me until I hear someone calling CQ, CQ, CQ some twenty-five times without signing, or until I hear a fist too inclined to dots. There are certainly some rare sounding c.w. signals in the atmosphere—all the way from groans and squeaks—to chirps and squawks.

I believe there are a few who will agree with me when I humbly and "hamfully" suggest a minimum of unnecessary CQs—intelligent conversation seasoned with *good* humor—properly adjusted equipment with few harmonics—legal operation within limits of Amateur bands and a little more attention to operating technique. Why create a questionable atmosphere when an Amateur is capable

of ability and knowledge that many others lack?

Gain By Error

Oh, I have been guilty of several of these things mentioned. I have become confused in more than one QSO, I've forgotten whether I sent four dots or five—I've called CQ when it wasn't necessary—my signal has been found to be chirpy occasionally—and I've faced a mike when I didn't know what on earth to say—and said the wrong thing or laughed when I should have been quiet.

But I'm not proud of these things. I've mentioned them to let you know that I don't regard myself above reproach. Anyway, there is some excuse for me as I am one of the "weaker sex" and admit that you men are superior—but I have tried to benefit by mistakes and believe that there is ever room for improvement. "wat sa OM?"

And that's the dope on that!

A. C. RIPPLE

(Continued from page 233)

The relation between the load current, the size of the condenser and the peak ripple voltage is shown in Fig. 1, while the current I_c passing through the condenser can also be found from the same chart. The a.c. ripple is measured along the Y-axis, while both the load current and the condenser current are measured along the X-axis. The oblique lines represent different con-

denser sizes. This chart was made for a frequency of 120 cycles.

Using the Chart

The use of the chart is best illustrated by an example: A power-pack containing a full-wave rectifier working from a 60-cycle line has to supply 100 ma. to a load and the size of the input condenser is 8 mfd. What is the peak voltage of the ripple and what is the current through the condenser? Enter the chart from the "D.C. Load" scale, follow the 100 ma. line until it intersects the line marked 8 mfd. From this intersection follow the horizontal line towards the left and find the ripple; 33 volts. The peak current is found to be 200 ma.

Note that the ripple does not depend on the applied voltage but on the load current and the condenser size only. The ripple current through the condenser does not depend on the condenser size but is simply twice the load current.

Suppose that the ripple voltage in the above example had to be limited to 10 volts, what size of condenser would be needed? Again follow the vertical line marked "100 M.A." but this time find the crossing between this line and the 10-volt line. The intersection so found is between the 25 mfd. and 30 mfd. line. By estimation one can determine the correct value; 27 mfd. In practice the next higher commercial size should be employed. Note that the peak condenser current is still 200 ma.

There is a limit to the amount of current a condenser can stand. The maximum current depends on the construction of the condenser and the size. So, by employing a larger size the current-carrying capacity has been increased and the condenser will not become so hot.

There is a great difference between the current-carrying capacity of electrolytics of different types. It is all a matter of radiating or conducting the heat away. A condenser in a metal can which is tightly bolted to the chassis can easily conduct heat to the chassis, but the cardboard type must depend on radiation and convection. Constructors often do not provide sufficient room around these condensers in order to radiate the developed heat. Such points should be considered when deciding upon the layout.

Different Frequencies

The chart of Fig. 1 was made for a frequency of 120 cycles, or full-wave rectification of a 60-cycle supply. Those who wish to solve problems involving different frequencies may still use the chart, but then all condenser values marked along the oblique lines should be divided by f/120, where f is the frequency in question. Also, for half-wave rectification, the power-line frequency should be considered as f. In cases of full-wave rectification, f is twice the power-line frequency. For example: when half-wave rectification is used and the line frequency is 60 cycles, the chart can be used if all condenser values on the chart are multiplied by two. Another possibility is to leave the condenser values unchanged and multiply all ripple values by two. Full-wave rectification of 120 cycles, which makes f = 240, would call for capacity values equal to one-half of those shown in the chart.

In conclusion let us give below the attenuation to be obtained from a single-section and a double-section filter. If the choke in a filter section is L_1 henries and the condenser C_1 mfd. and if the values for a second section are L_2 and C_2, the residual hum voltage is for one filter section:

$$\text{hum} = \frac{10^6}{(2\pi f)^2 L_1 C_1} \text{ E volts (peak)}$$

For two filter sections:

$$\text{hum} = \frac{10^{12}}{(2\pi f)^4 L_1 L_2 C_1 C_2} \text{ E volts (peak)},$$

CHANNEL ECHOES

(Continued from page 237)

THE DEUTSCHE Kurzwellensender, DJD, registered a few heils for the first President of the United States on February 22nd with "To the Memory of George Washington." The British Broadcasting Corporation completely ignored the occasion. Still peeved over that little matter of 1776.

◆

IF YOU ARE interested in greyhound racing, a final in merry England is known as a "decider"—according to a sports commentator on the Daventry string. A recent decider was won by a sturdy bitch called "Rotten Row"—named doubtless after one of Anthony Eden's little confabs with the House of Commons.

◆

A BROADCAST FROM RAN, Moscow, on "Who's Who in The Soviet Union," was scheduled for 7:00 P. M., February 7th. We understand this broadcast was followed with another program one second later.

◆

REPRESENTATIVE CELLER of New York has introduced a bill in Congress calling for the establishment of a federally-owned Pan American short-wave broadcasting station to cost $750,000. Unless you are as lazy as we, you will write to your own congressman and senators urging that this bill be pushed through. It is high time that our international representation be placed on some basis other than box tops, labels, *et al.* W1XK is doing its noble bit but its efforts are pretty much submerged in the commercial pollutions of other stations.

NEW SUPER-PRO

(Continued from page 267)

DX—the average good receiver will bring in stations located in such far-off countries as Australia, Japan, the U.S.S.R., etc. It is obvious, therefore, that a list of such stations is not apt to be very impressive.

Nevertheless, we should like to point out that the new Super-Pro was tested in a location over-run with noise of such high amplitude that it almost continuously kicked down the tuning meter to an equivalent of an approximate R6. Moreover, the antenna used was an unmatched doublet hardly worth the insulators that support it. Yet in the face of such drawbacks, the following stations in the 20-meter phone band were picked up in slightly over an hour of listening, *and every one of them was QSA5.* These were: G6ML, G2PU, G6PY, G6LK and G5JO in England; HK1GK in Colombia; F8KW in France; K6GLB in Hawaii; CE3EN in Chile, OA4N in Peru, and CT1FI in Portugal. Later the same evening, during a period of one-half hour, six VK's, one ZL and one SM were picked up, also QSA5.

Since the receiver was used for a short period on some frequency checks, a bit of listening was done throughout the three short-wave ranges for commercial c.w. stations. Few were below an R7 and some of these were: SUW in Egypt, PZB in Surinam, EPA in Persia, FYR in French Guiana, FQO in French Equatorial Africa, VIZ in Australia, PLK in Netherlands Indies, CNR (also bc station) in Morocco, TFB in Iceland, to say nothing of batches of J and R stations. Solid reception was had on every one of these stations, and though their interception is by no means a feat, the consistent results obtained speak well for the avc action. and sensitivity in relation to noise level, of the Super-Pro.

HAMFEST

(Continued from page 245)

SODDEN RAIN had fallen on the streets of Tyler, Texas all Friday afternoon. The mercury dropped that night, and the wind whipped the deluge into sleet—a vast tonnage of ice that by 2:00 A.M., Saturday morning had crippled every power line, and had isolated Tyler from the rest of the world via bus, train, automobile, telephone and telegraph. At 8:30 A.M., the sergeant of the Tyler police was hit with a bright idea, and skated around to an RCA-Victor mobile demonstration laboratory (that had arrived the day before) to see if this trailer could supply juice for a ham transmitter. It could—three kilowatts

J. M. Burke, Jr., owner of station W5EME

of the same so long as there was gasoline left in Tyler. So the laboratory was skidded around to the home of J. M. Burke, Jr., owner and operator of W5EME.

They were on the air by 10:00 A.M., and handled a continuous stream of emergency traffic until 1:15 A.M., Monday morning—and for another six hours starting at 4:00 P.M. Five hundred watts of fone was employed on 160. Burke and Heath Lamb, W5PH, divided the honors, with D. E. Chapman, announcer at KGKB, and Harold D. Knapp, RCA-Victor engineer in charge of the trailer, spelling at the mike. (Camden, N. J., papers pse copy.)

Chalk up another score for amateur radio!

♦

BREVITY IS THE soul of wit—and of approved calling technique. W1BES, Providencer Rhode Island, puts on a daily 20-meter demonstration of the fact that a snappy CQ can get results. And it seems to us that we recall something in the Rules and Regs on just that subject.

DX ON THE "X" BAND

(Continued from page 236)

Radio-Romania leaves the air at approximately 5:05 P.M. and Hilversum continues on that frequency until 6:40 P.M. or later. Except Saturdays, Radio-Paris is off at 7:15 P.M., Reykjavik about 6:45 P.M., and Lahti, Oslo, Motala, Warsaw, Kaunas, Deutschlandsender and Kalundborg have usually disappeared by 6 P.M., or possibly a bit earlier. These sign-off times may vary slightly.

Many of the evening signals are again heard on their morning schedules, with

some of the customary early morning features, such as devotional, health exercises, etc. These signals, although not received as well as in the evening, provide fine DX.

Radio-Romania is the first to appear—at 11:30 P.M., E.S.T. with a rooster crowing three times, a musical selection and Gym. A woman announcer. The Soviets, Warsaw, Kalundborg, Kaunas and the German are all on at midnight—possibly earlier. Luxembourg and Lahti, by 1:15 A.M., Radio-Paris at 1:45 A.M., Motala at 1:55 A.M., and Hilversum at 2:40 A.M. Droitwich has been noticed a few times this past season, with special cricket broadcasts, but the regular features are too late for reception here. The same applies to Reykjavik.

Summary

During the past season, these signals have been much more consistent than anything from that direction on medium-waves. First noticed about September 1st and continued without a break to the present time (March 17th). After an auspicious beginning the broadcast band Europeans faded out almost entirely and except for brief periods, were not heard again for at least two months. During this time, the low-frequency ones were never absent. Last season (1935-36) they were held fully a month later than the medium-wave broadcasters, with Droitwich an easy R9 in April.

Daily comparisons of European signals bring out one interesting fact—and this is not the product of a vivid imagination: Maximum signal strength is never attained on the two bands simultaneously. In other words, peak performance on both, at the same time, is unknown. To the casual observer, this may seem a mere coincidence, but consistent listening and checking proves it to be more than that. In fact, signal intensity on either band is a good indication of prevailing conditions on the other. This applies to trans-Atlantic reception. Possibly someone, better qualified than this observer, can explain this apparent phenomenon. A careful check-up by the Radio Signal Survey League would, I believe, substantiate these findings.

QUERIES

(Continued from page 250)

very often happen that an open antenna will give better results than a doublet—and vice versa. An open antenna is what the Sky Chief is working on when one of the doublet leads is disconnected. This is worth trying on any short-wave receiver—as it only takes a moment to disconnect one wire. If reception is improved—and you have no serious noise problem—the chances are your receiver will give you better results on an ordinary antenna—something from seventy-five to one hundred feet long including lead-in. (Or merely connect both doublet leads to the antenna post.) Try this antenna with and without ground.

A CASE OF OSCILLATION

Question No. 33:

I have a Clarion Jr. a-c Model 60 radio, which uses three 24As, two 45s and an 80. When the volume control is turned up the set oscillates strongly. All tubes test okay, and I have tried a new volume control. The only way I seem to be able to stop the oscillation is by taking off the grid cap to the second 24A which goes to the second section of the 3-gang condenser. The set will operate this way, but with distortion and not so much volume.—*W. R. T., Bronx, N. Y. C.*

Answer:

Disconnecting grid leads is a sure way to cure oscillation—but, as W. R. T. observes, the cure usually has secondary effects. We assume that the trouble was not always present—that the set operated satisfactorily when new. Something, then, has obviously happened to it. We suggest that all voltages be checked on general principles. If these are okay, the chances are the trouble is due to an open bypass condenser somewhere in the circuit. Obtain a 1 mfd. condenser, (paper, not electrolytic) and ground one side to the chassis. Then tap the open side to every resistor and connection you can get at in the receiver while the set is oscillating. You will probably find one connection which will stop the oscillation *without impairing reception.*

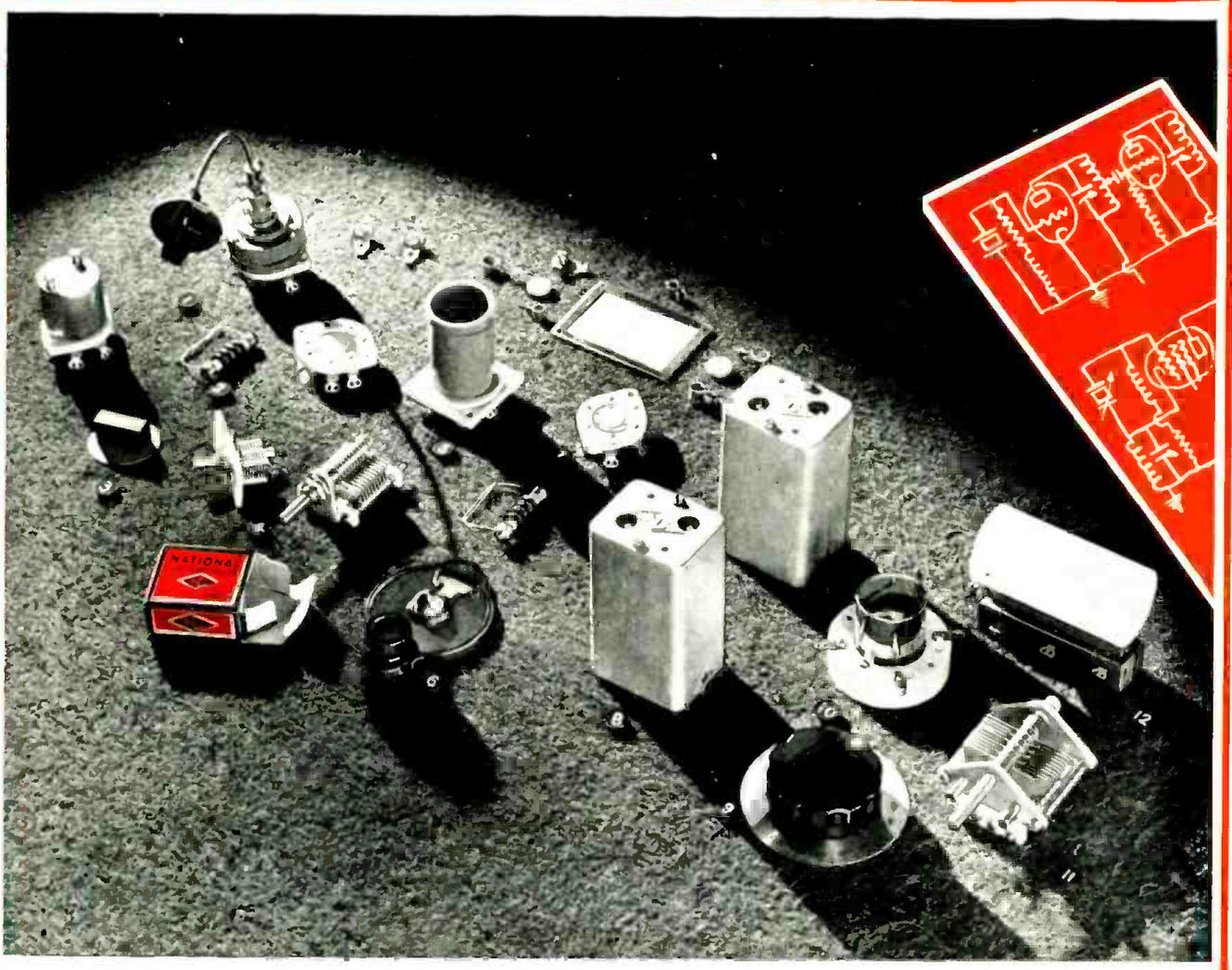
If the trouble has been more or less apparent ever since W. R. T. has owned the receiver, we suggest that he install shielded grid leads from the grid caps to the tuning condenser—of course grounding the shields. It will be necessary to realign the receiver by letting up on the trimmers.

NIGHT-OWL HOOTS

(Continued from page 270)

hour during the 24 hour day, but insisted on broadcasting on every available channel on the broadcast band—yes, even in the cracks between the channels. So let loose boys, and fire all the jeers you have left at Public DX Enemy No. 1, Old Man Static!

The Chief Night Owl requests reports and letters of interest to other DXers from every reader of this department. Please address your communications to Ray La Rocque, 135 Highland St., Worcester, Mass.



EXCITERS, for example

National makes the parts it takes to build transmitters, and build them well. Take exciters, for example. From adjustable-frequency crystal holder to fixed-tuned tank, National parts show specialized fitness for this work. The parts, shown in the group above, have become standard equipment for fine exciters. All are described in the National Catalogue and Catalogue supplement, both free for the asking at your dealers.

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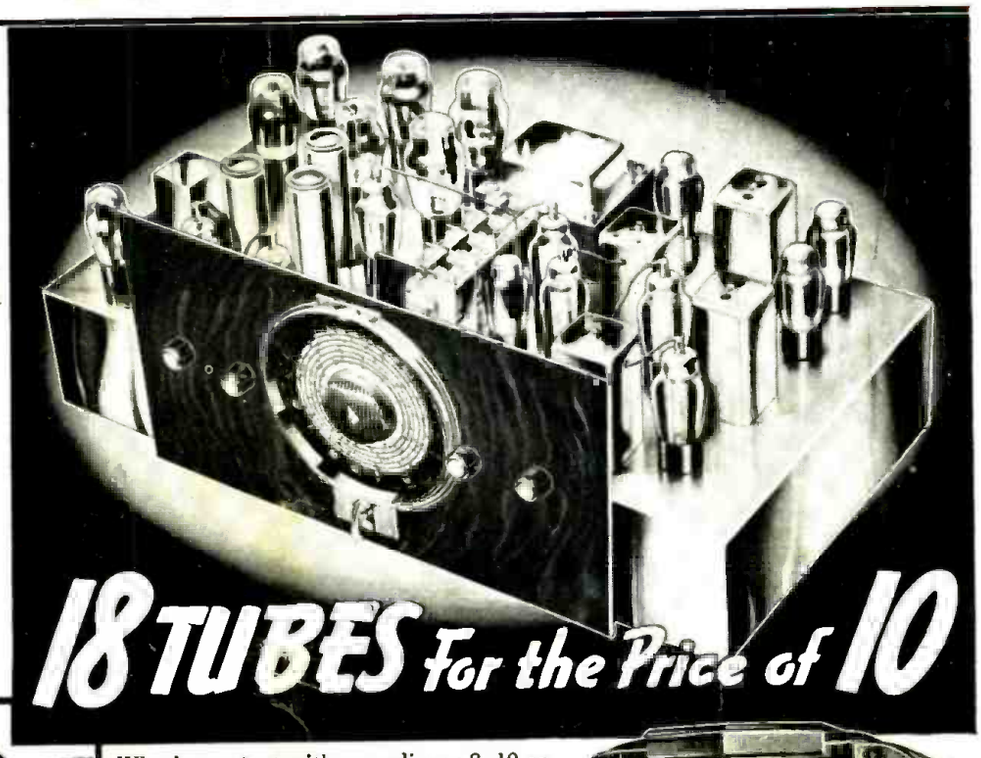

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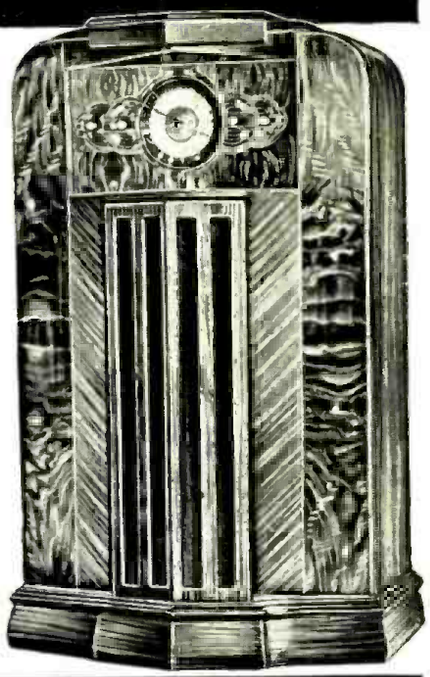

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