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APRIL 1938

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OFFICIAL ORGAN
RADIO SIGNAL SURVEY LEAGUE

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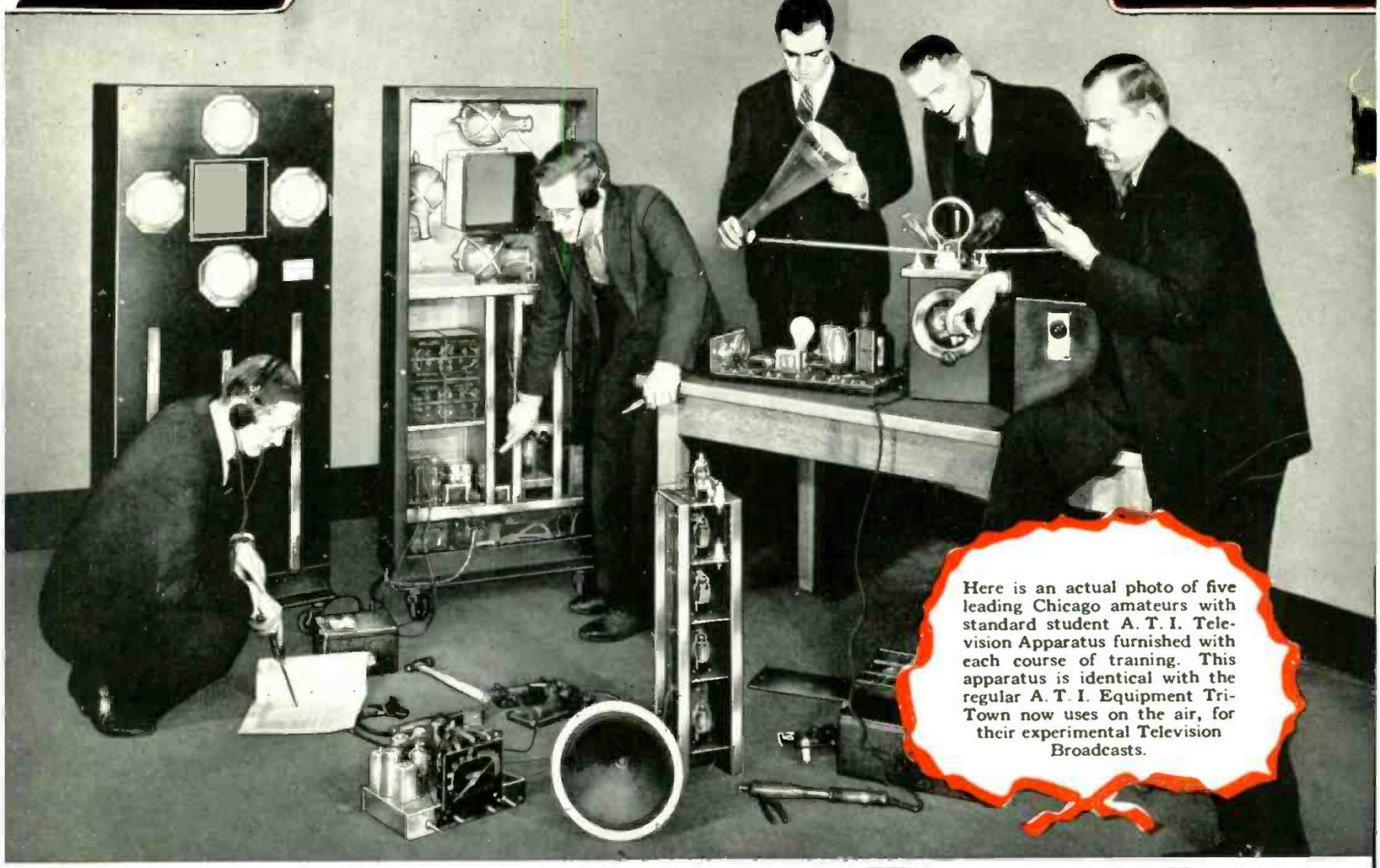

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All-Wave Radio

EDITED BY M. L. MUHLEMAN

VOL. 4, NO. 4 APRIL, 1938

COVER ILLUSTRATION

LIGHTING A 6-VOLT BULB IN SHUNT WITH A COIL FROM THE "SOUP" IN THE TANK CIRCUIT OF THE 200-WATT RIG AT W2BIG, OWNED AND OPERATED BY BEN ROBIN, NEWARK, N. J.

CONTENTS

Another shot at W2BIG—setting fire to a lead pencil held one-half inch from the tank coil of the 200-watt transmitter . . . a grim reminder of the fact that arcs from tanks cause painful burns, and may cause something worse.

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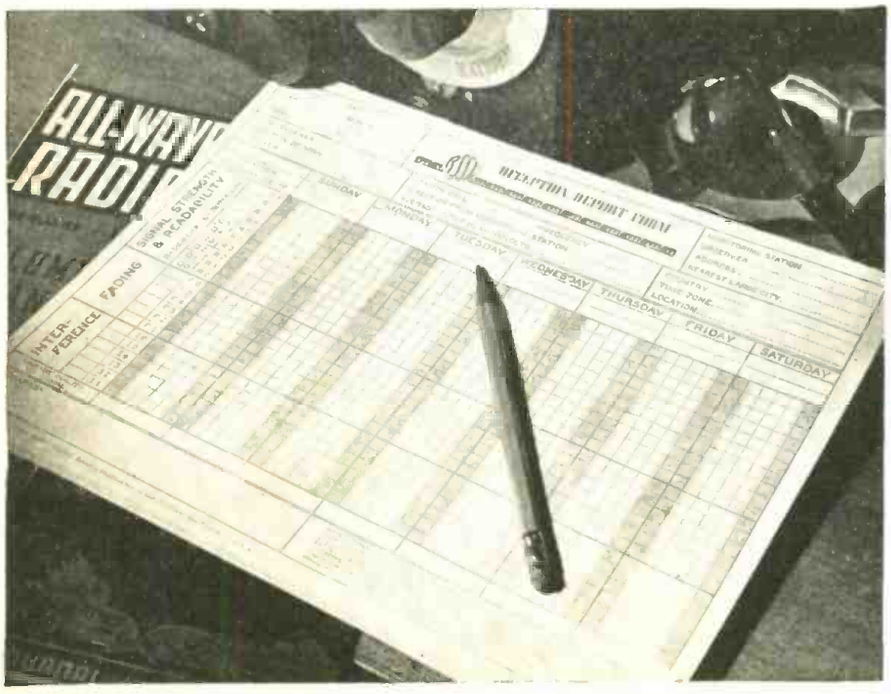

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By JOHN P. TAYLOR

• W5FQZ •

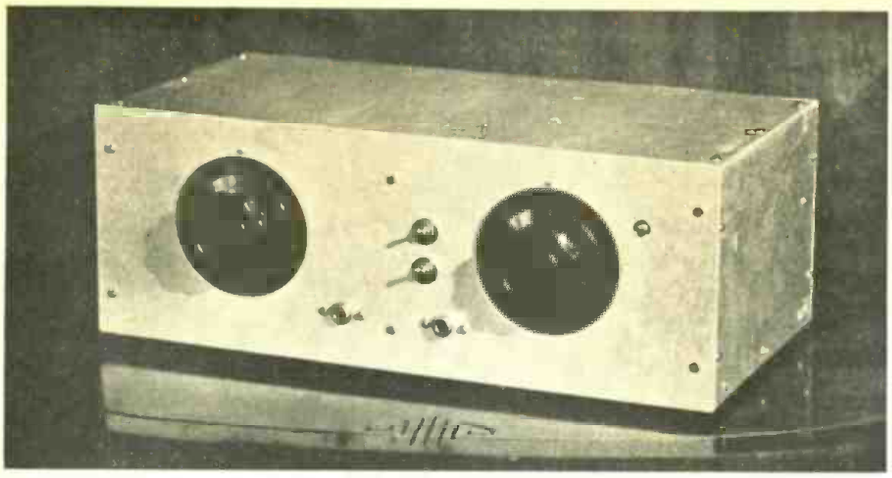

Fig. 1. Front view of the "continuous-frequency-change" unit which incorporates an improved electron-coupled-oscillator circuit of high efficiency and unusual stability.

PORTABILITY is an obvious requirement of an emergency rig. Equally as important, if less immediately obvious, is maximum flexibility. That means, among other things, rapid QSY. Since real emergency operation in instances when wire lines have failed is usually short-distance work—ten miles, twenty miles, perhaps a hundred miles at most—the 1.75 mc. and 3.5 mc. bands are called for, and that rules out "rubber" crystals. Moreover, experience indicates that two or three crystals will not answer. A handful might, but who has them, and anyway they'd be a nuisance. There is only one real solution, and that is the use of a self-controlled oscillator that can be shifted at will to any spot frequency, or neatly sandwiched into that inviting "hole" in the QRM.

Self-Excited Oscillators

It is unfortunate that self-controlled oscillators have been so frowned upon by the amateur. Admitting that this stand has been almost necessary in order to discourage indiscriminate use of these, the result—which has been largely to prevent use of this valuable device even by advanced amateurs—is regrettable. New things learned about circuits, new tubes, and new constructional materials, which have appeared since the day of "high-C" oscillator circuits, offer possibilities which amateurs might develop to considerable lengths.

The exciter unit shown in Fig. 1 serves to illustrate some of these possibilities. It is designed to provide continuous-frequency operation in the 1.75 mc. and 3.5 mc. bands with efficiency, stability and freedom from frequency modulation. Through use of a vernier oscillator condenser a band-spread dial is provided which can be read to a fraction of a kilocycle, allowing the unit to double as a frequency monitor. At the same time, the large main condenser makes possible operation at any frequency in the band of 1700-4000 kilocycles, that is, it provides for operation on the in-between emergency channels.

The unit has an output of 15 watts with a 325-volt power supply, can be operated either from an a.c. power unit or—with a Vibrapack unit—from a single 6-volt storage battery. As a low-power transmitter, it may be oscillator-keyed for break-in operation or, with suitable precautions, modulated at an output of about 10 watts. And, needless to say, it makes a highly satisfactory exciter for a high-powered rig.

Preliminary Design Considerations

No magic formula has been employed in the design of this unit—in fact, the design reeks of conservatism. One new feature—the use of a beam tube in an electron-coupled circuit—accounts for most of the surprising overall efficiency, while a second feature, long-used commercially but more or less new to amateur design, is an untuned buffer circuit which contributes most of the "stability-with-simplicity" motif. Otherwise there are no tricks.

But special and particular attention has been given to the design of the oscillator circuit. And this properly begins with an analysis of the factors affecting oscillator performance. In our case this means oscillator stability—for the paramount difficulty with self-controlled oscillators is that of a tendency to frequency "creeping." The signal which drifts merrily up through the band is a pain to everyone, and a particular pain in the neck to the Op who is trying to copy it. Not all of these termites, by any means, are self-controlled rigs. However, the tendency is admittedly a characteristic of non-crystal-controlled outfits.

If we analyze this problem of frequency drift we find that it is due in the main to the fact that the oscillator frequency changes: (a) with temperature, (b) with loading, and (c) with plate voltage. Certain methods of reducing these effects are well known, but have in general been little used by amateurs. In the unit described here, each factor has been considered and steps taken to reduce its detrimental effects. Briefly reviewed, this consideration went as follows:

Voltage Effects

The first point considered was the

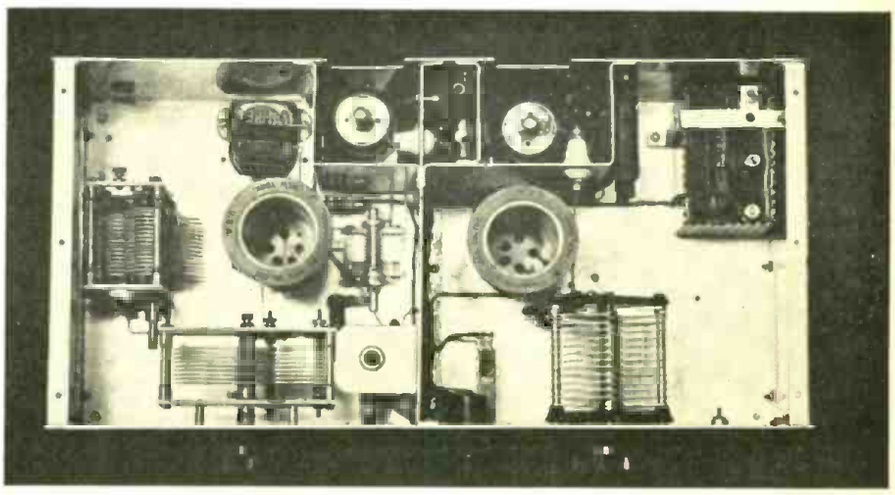

Fig. 4. Interior of the unit. Tubes are in individual compartments, and the interstage coupling circuits in a small compartment between these. No neutralization is required.

DESIGN E-C-O UNIT

Continuous-Frequency-Change Exciter of Unusual Stability—Employs Untuned Buffer Circuit

matter of change of frequency with applied voltage. Since the equipment was to be used primarily for emergency use—which meant portable-type power supply—regulation of these voltages was out of the question and, in fact, rather wide voltage changes had to be assumed.

Use of the Dow-circuit oscillator[1]—commonly referred to as the electron-coupled oscillator—was thereby indicated. In this circuit the screen grid of the tubes acts as the anode of the oscillator circuit, and is at r.f. ground potential. The grid and regular plate form a second stage comparable to the provision of a separate buffer tube.

The advantage of this circuit lies in the fact that, whereas a voltage decrease on the screen causes an *increase* in frequency, a voltage decrease on the plate causes a *decrease* in frequency. When the two voltages are properly proportioned they can be made approximately to compensate for each other. However, it should be noted that, this is accomplished only by correct proportioning of the voltages. If this is not done—and most amateur designs using this circuit do not specifically so provide—the electron-coupled oscillator will be no more free from voltage effects than any other self-controlled type.

To make sure of correct proportioning in the present unit, a potentiometer, P1, was provided for adjustment of the screen voltage. To start with, the potentiometer is set at about half scale. After all other adjustments have been made, it can be easily adjusted for correct position, simply by varying until a change of, say 10% in plate voltage (easily accomplished by placing an additional load resistor across the power supply) causes a minimum change in frequency. The change in frequency can be observed by beating a harmonic of the oscillator against one of the short-wave broadcast stations.

Temperature Effects

The second factor considered was that of temperature effects. Although it was pointed out by Dow, the fact is often overlooked that frequency changes due to temperature effects are far more important than those due to voltage changes.

There are two ways of approaching this part of the problem. First, by minimizing temperature changes and, second, by reducing the effect of such changes. Both are made use of in this unit. To begin with, advantage was taken of the fact that the temperature effect is about one part due to the tube and five parts due to the other elements of the oscillatory circuit. In an amateur rig it is hardly practical to control the temperature of these elements. However, by isolating them from the tube the temperature increase to which they are subject is reduced, and this was therefore provided for.

The next step was to use large-size wire for the inductance and for all leads, so that heating due to circulating current would be very small. Having by these means measurably reduced heating, the next course was to try to reduce the remaining effects of heating. To do this low-loss dielectrics were used at all points in the oscillatory circuit.

Recent investigations have indicated that much of the frequency drift encountered in oscillators is probably due to the high temperature coefficient of comparably poor dielectrics such as hard rubber and the like. In general these investigations show that the temperature coefficient varies somewhat as the loss. Thus, in a self-controlled oscillator the use of low-loss insulation is of value even at the relatively low frequencies for which this unit was designed. Referring to the inside view of this unit (see Fig. 4) it will be seen that all oscillator components are of ceramic insulation (the coil form is of XP53). This feature should not be underestimated as it is one of the most important points in the design. Various components can be changed through a considerable range to fit the materials available, but the use of low-loss elements in the oscillator circuit should be retained.

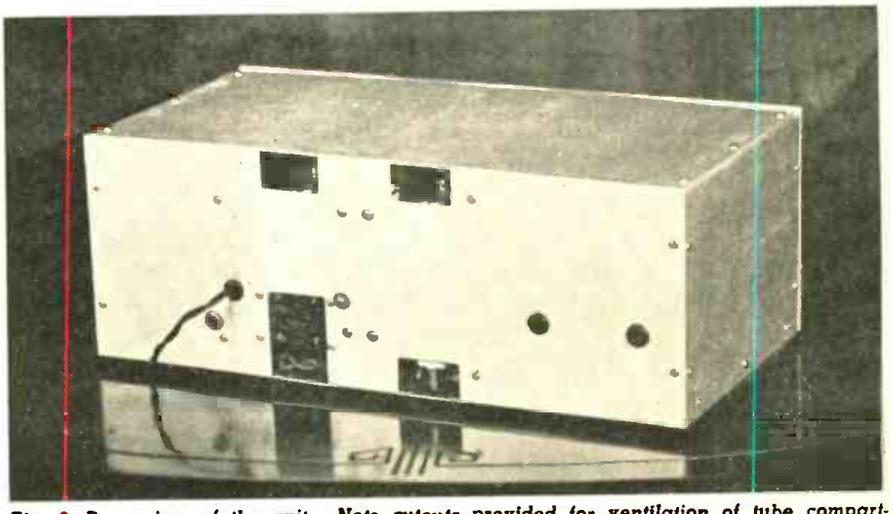

Fig. 3. Rear view of the unit. Note cutouts provided for ventilation of tube compartments. Power leads are made by means of the four-prong socket.

Load Reaction

The final design consideration, in so far as frequency drift was concerned, was that of load reaction. In order to reduce this effect a lesson was drawn from commercial design—namely, the use of an untuned buffer stage. In the unit shown this is the second part of the oscillator tube, i.e., that part for which the regular plate acts as anode. It will be noted that this plate circuit contains no tank in the usual sense, choke coupling to the output stage being employed instead. The details will be evident from the diagram.

This method of coupling is relatively inefficient in the ordinary sense of the

[1] J. B. Dow, "A Recent Development in Vacuum Tube Oscillator Circuits", Proc. I.R.E., Dec., 1931.

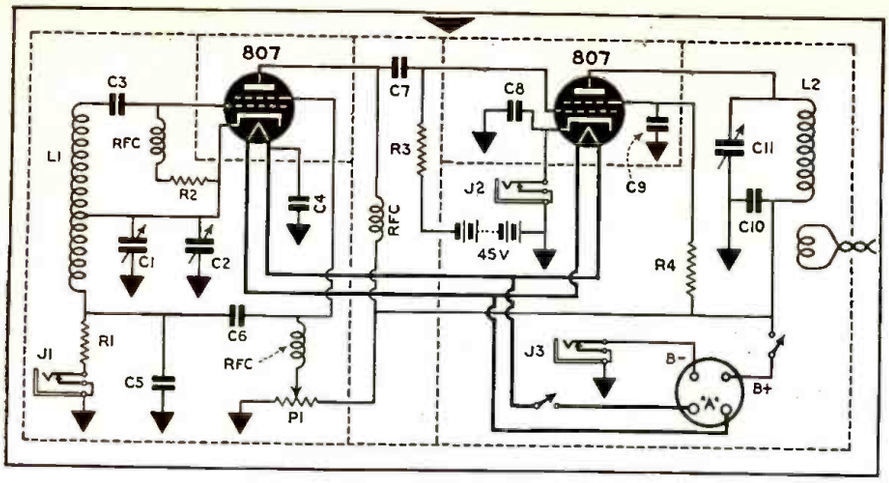

Fig. 2. Schematic diagram of the e-c-o unit. Dotted lines indicate shielding. Values of components are given at the right.

LEGEND

R1—500 ohms, 2 watts
R2—50,000 ohms, 2 watts
R3—50,000 ohms, 2 watts
R4—15,000 ohms, 10 watts
RFC—2.4 mh. r.f. chokes (3 required)
P1—50,000-ohm, 20-watt potentiometer
J1—closed-circuit jack
J2—closed-circuit jack
J3—closed-circuit jack
C1—500-mmfd. variable, ceramic insulation
C2—250-mmfd. variable, ceramic insulation
C3—100-mmfd. variable, ceramic insulation
C4—0.1 mfd., paper
C5—.01 mfd. mica
C6—.01 mfd. mica
C7—50 mmfd. mica
C8—.01 mfd., mica
C9—.01 mfd., mica
C10 .01 mfd., mica
C11—250-mmfd. variable, preferably double-spaced
L1—50 turns No. 20 bare wire on 2¼" form spaced to occupy 3½" winding length, and tapped 15th turn from bottom (see text)
L2—35 turns, No. 18 d.s.c. on 2¼" form (see text)

term, in that much more output could be obtained with a tuned circuit. However, the circuit as shown provides plenty of drive, is efficient in so far as power consumption is concerned, eliminates an extra tuning control, and helps to provide the desired isolation of the oscillator circuit. Its use, of course, is made possible by the high sensitivity of the tubes employed. Only one special precaution must be observed, and that is to keep the capacity of the coupling circuit to ground as low as possible.

Circuit and Construction

With the general design requirements as outlined above in mind, the details of the circuits and the constructional design were laid out. For the most part these will be evident from the schematic diagram (Fig. 2) and the interior view (Fig. 4). However, for the benefit of the less-experienced a few notes may be of value. Referring to the schematic, it will be seen that the unit makes use of a pair of 807's—these being beam tubes, more or less similar to the 6L6G, but with the plate lead brought out the top, a ceramic 5-prong base, and other features intended to adapt it for transmitter use. One of these tubes is employed as an electron-coupled oscillator, with the regular plate circuit forming a buffer section, while the second tube is used in a straightforward amplifier circuit. The two stages of the unit are isolated from each other by a center partition, with separate shielded compartments for the tubes, as can be seen in Fig. 4.

The arrangement of circuit elements will also be evident. Since the electron-coupled oscillator, like all self-controlled oscillators, requires high capacity in the oscillator tank circuit, two condensers, C1 and C2, are used in parallel. C1 is intended to be adjusted originally and not changed thereafter, thus allowing C2 to act as a bandspread tuner. This arrangement keeps approximately 400 mmfd. in the circuit at all times, while at the same time spreads the 1700-2000 kc. band across 200 degrees of the tuning condenser scale.

Ceramic insulation, as noted above, is used at all points in the oscillator circuit (including even the grid condenser, although this is probably going a little further than necessary).

The oscillator inductance, L1, is wound on a large-size Hammarlund form. This form is made of XP53, which has low-loss characteristics comparable to those of ceramics. The winding consists of 50 turns of No. 20 bare wire, spaced to occupy 3½", and tapped at the fifteenth turn from the bottom for the cathode connection. The oscillator tuning capacity is connected across the lower section only—the plate coil—in order to obtain better stability.

The bias resistor, R1, serves to keep the oscillator plate current low, thereby insuring efficiency in the output section of the tube. Potentiometer P1 is provided in order to allow adjustment of the screen-grid voltage, as previously mentioned. This potentiometer may be seen at the front of the unit, having been so placed in order that it might be easily adjusted with a screw driver (if desired, through a hole in the cover).

The output circuit of the oscillator tube, as previously noted, is untuned, and consists essentially of an r.f. choke with a coupling capacity feeding the second tube. An important point in this respect, though, is that if the second stage is to be operated without neutralization, this input coupling circuit must be shielded from the output circuit, and preferably from the tube itself. If a construction similar to that used here (see Fig. 4) is made use of, this is easily accomplished by providing a small separate compartment (between the two tubes) in which the coupling elements are handily placed. The arrangement of the shielding is further indicated by dotted lines in the schematic diagram.

Amplifier Bias

In the amplifier, fixed bias is used in addition to self-bias, in order that oscillator keying may be used without danger of running excessive plate current. One of the small-size portable batteries—the Burgess Z30XP is shown here—can conveniently be used for this purpose. These small batteries weigh relatively little, and save a substantial part of the plate voltage which would otherwise be lost in a self-biasing resistor.

Other details of the amplifier circuit are entirely conventional, and require no special comment. In this stage, as well as in the oscillator stage, an arrangement is made use of which allows the tuning condenser to be grounded—a convenience in construction, and a desirable feature in obtaining the necessary rugged assembly required for portable use.

The essential features of the constructional design will be evident from the three views shown. The unit is 7" high, 19" long, and 9" deep. The case is of aluminum (panel ⅛-inch thick and remainder 1/16-inch) making the whole thing surprisingly light. Referring to the front view, Fig. 1, the main controls are, of course, oscillator and amplifier tuning. In addition there are plate and filament switches, and plate current jacks for the two stages.

Referring to the back view, Fig. 3, the small cutouts which provide ventilation for the tubes will be noticed. These, or some similar arrangement, are absolutely essential as the tubes become quite hot. Plate and filament voltage connections are provided for by a 4-prong socket which takes a standard plug. The twisted-pair lead shown is a link output circuit. This may be used to feed a higher power stage or a conventional antenna coupling unit. Finally, there is a jack which allows for measurement of the total plate current (not more than 100 ma. should be drawn from a Vibrapack unit) or for negative-lead keying.

(Continued on page 222)

A New Distortionless VOLUME EXPANDER

By McMURDO SILVER
Chief Engineer, McMurdo Silver Corp.

The new distortionless volume expander which uses but two tubes. It can be connected to any good receiver or audio amplifier without difficulty.

FOR some time past the writer has been attempting to devise an expander system which at one and the same time would be non-critical of the tubes used, even when not built into a specially designed audio amplifier, and one which would allow latitude in the range of signal input voltage at which it would function without introducing distortion.

The unit pictured and diagrammed herewith is the answer. Using but two tubes, it will increase the straight audio voltage amplification of any receiver with which it is used 23 db.—but more important, it will provide from 23 to 35 db. of automatic dynamic volume expansion at signal-voltage levels between ½ and 4 volts entirely without distortion. Having such flexibility it can be added to almost any existing radio receiver having at least a detector and one audio stage, and will give as good or better results than the costly and delicate expanders found in the most expensive receivers. Yet it can be built in a few hours from standard parts for less than twelve dollars.

Compression and Expansion

To the reader familiar with the technical limitations of radio broadcasting and phonograph recording, the value of volume expansion is so self-evident as to be axiomatic. For as long as volume range limitations are what they at present are—and seemingly must remain for economic reasons—just so long will the listener be forced to be content with a volume range of between 50 and 60 db.—serious compression, if not actual distortion, when considered in the light of the 70 to 80 db. volume range needed by a symphonic orchestra to do justice to the great musical compositions available today to any listener. To even the rankest tyro it is apparent that if an 80-db. program is squeezed into a 50-db. transmission "pipe," what comes out will not be the great music which was played in the studio or concert hall.

The available volume expanders have been so delicate and complicated as to have had to be built as an integral part of an audio system. In addition to being expensive, and extremely critical of the signal volume level at which it would expand, the typical expander utilizing a 6L7 tube with gain varied by signal-provided voltage applied to an auxiliary grid has been most "picky" indeed of tubes which it could use without introducing serious distortion of its own into reproduced music. The 6L7 tubes are not uniform enough to allow a replacement to be simply inserted in an expander socket. Generally the best of half a dozen tubes tested would still leave something to be desired. The limitation of signal voltage range over which this conventional type of expander will work—usually it must be established between 1 and 2 volts—completely eliminated it as an accessory whose addition to older receivers would give them new life and tone. This is a fundamental limitation, it seems, of expanders operating through gain variation effected by variation of grid bias on any signal amplifier tube in accordance with syllabic variation of applied signal voltage.

Fundamentally, a volume expander is a means of varying amplification so soft passages can be attenuated, or maintained at the same volume level, and loud passages boosted—the exact reverse of the broadcast transmitter or recording studio monitoring operator's action. He cuts gain to soften loud passages and raises gain to boost soft passages—and so destroys quite completely the emotional message conveyed in symphonic

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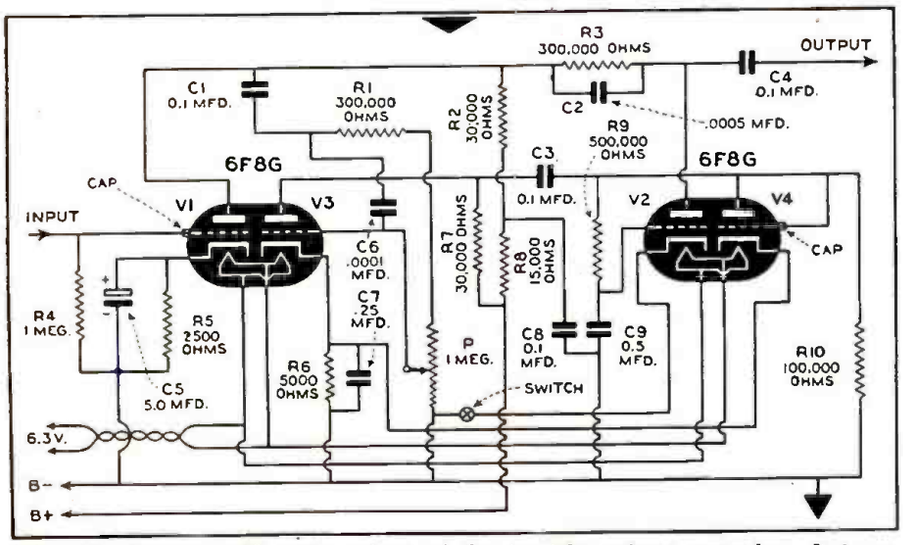

Schematic diagram, with parts values, of the two-tube volume expander. It is so designed that the completed unit can be connected into the audio circuit of a receiver without rewiring.

A PUSH-PULL 5-METER SUPER-REGENERATIVE RECEIVER

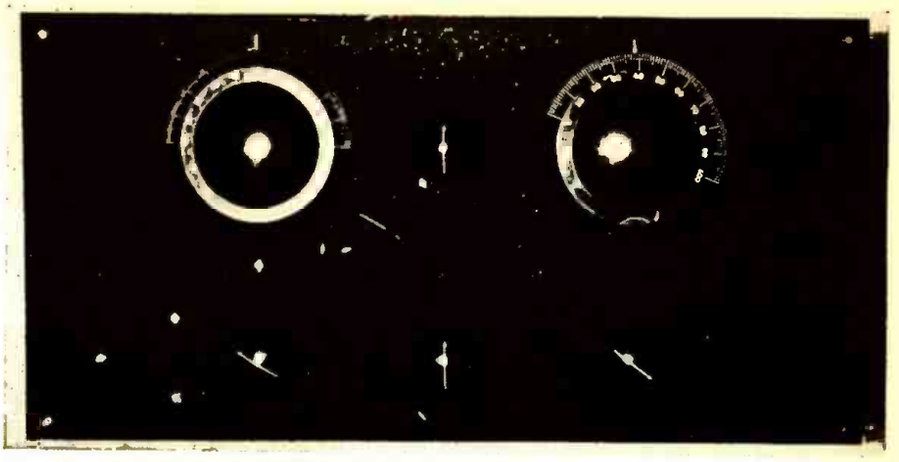

FIG. 2. FRONT VIEW OF THE COMPLETED PUSH-PULL 5-METER RECEIVER.

By R. J. HAGERTY • W6JMI

THE construction of a good ultra-high-frequency receiver is by no means a simple problem. We, personally, do not like ultra-high-frequency superheterodynes, mainly because of their susceptibility to automobile QRM. As we live in a noisy city location and also wanted a receiver for portable-mobile operation, the only choice left was a super-regenerative job.

Most all super-regenerative receivers will work after a fashion, but the question was how to improve this type of receiver. We all know that below 10 meters the gain and performance of ordinary tubes falls off rapidly and at 5 meters there is little or no gain at all. As an example, an r.f. pentode is usually tolerated only for the fact that it isolates the antenna from the detector circuit.

Push-Pull Operation

But, adopting a practice that is common in ultra-high-frequency transmitters, we decided to try push-pull in the r.f. and the detector circuits, and suffice it to say that the results were a revelation. Tubes and circuits that were only passive in their action really began to work, and the over-all performance was "hot." After considerable experimenting the circuit shown in Fig. 1 was adopted and it is highly recommended for anyone who wants a super-sensitive 5-meter receiver. It only requires two more tubes and a few more parts than a standard super-regenerator but its superior performance far outweighs the additional cost. In actual tests it was found that on 5 meters it handled like a good 10-meter receiver. And on 2½ meters it works better than the average receiver on 5 meters.

The Circuit

The r.f. stage uses a pair of 6D6's in push-pull. This is followed by 6J5G's in push-pull as detectors; a 76 is used as an interruption frequency tube; and a 41 audio completes the tube line-up. Possibly metal or other tubes could have been used in the r.f. and detector circuits, but these particular tubes have very low inter-electrode capacities. The push-pull arrangement halves these capacities so that a higher inductance coil can be used.

In this receiver its superior performance undoubtedly is due in great part to using high-L coils. This results in a high Q, and consequently a higher voltage is built up with the ultimate result of higher gain. As an example, the r.f. coil uses 11 turns of No. 14, with an inside diameter of ¾" and 1½" long. This is quite an improvement over the 6-turn, ½" coil ordinarily used in a 5-meter r.f. stage.

In order to eliminate the loading effect of the r.f. stage on the detector due to capacitative coupling—which lowers the size of the detector coil—other forms of coupling were tried. But capacitative coupling proved the better. Even so, the detector coil consists of 8 turns of No. 14 wire, ¾" inside diameter and 1¾" long, which is considerably larger than the usual detector coil. Incidentally, these coils with the tuning condensers specified give 60 degrees bandspread on a 100-degree dial.

Regeneration in the r.f. stage is accomplished by controlling the voltage to the screen grid. By its use the gain and selectivity is increased appreciably and a signal can be tuned in or out in less than 5 dial divisions.

The Detector

The detector circuit is a bit novel in that the tuned circuit is connected to the plates instead of the grids. Old-timer's will recognize this as a series-fed, push-pull Hartley circuit. The new 6J5G tubes are excellent for high-frequency work and their use in push-pull makes them doubly effective. The one critical adjustment is the feed-back condensers,

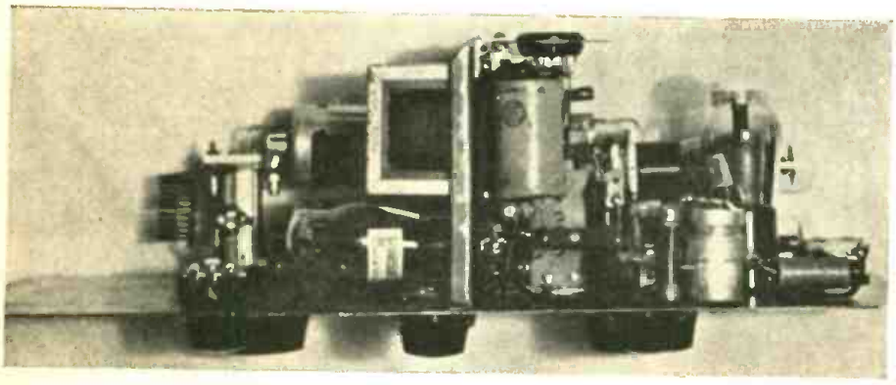

Fig. 4. Bottom view. Interruption frequency tube and its components on right side, a.f. tube and choke on left.

C5, connected from the grids to the opposite sides of the tank coil.

The interruption-frequency (i.f.) circuit is standard in every respect, but just a word as to its operation, as proper adjustment here helps in the over-all effectiveness of the receiver. The tube should oscillate at as low a frequency as possible, so the size of the by-pass condenser C7 is best determined by experiment. Try a number of .001 mfd. and .002 mfd. mica condensers across the grid coil and keep adding capacity until a high-pitched whistle is heard in the speaker. Then remove just enough capacity to eliminate the whistle. If a Bud i.f. transformer is used for L4, and connected as shown, no trouble should be experienced. A check for oscillation in this circuit can be made by removing the detector tubes and touching the plate of the i.f. tube with a small neon tube. It should glow if the circuit is working properly.

The single audio stage is sufficient as there is enough drive to operate the speaker at full room volume on practically all signals. A volume control, R8, is shown, but this can be dispensed with as the regeneration control in the r.f. stage is quite effective in this respect.

The Construction

The construction and lay-out is shown by the photographs. One large metal panel measuring 9″ by 18″ serves both as a panel and mounting for the controls and the i.f. tube. Another panel 5″ wide by 7″ high, fastened at right angles to the main panel, serves as a mounting for the r.f. tubes and audio components as well as a shield between the r.f. and detector stages. This arrangement makes for the shortest possible leads and also simplifies construction.

Fig. 3 shows how the r.f. tubes are mounted horizontally so that their grids connect right at their tuning condensers. The detector tubes are mounted horizontally on a small bent panel fastened to the detector tuning condensers. The feed-back condensers, C5—in our case small 25-mmfd. Hammerlunds—are mounted on a small piece of Victron which is fastened to the front or main panel for support.

One word of caution—the usual schematic diagram shows, in the following order, the coil, the condenser, and then the grid of the tube. This is all

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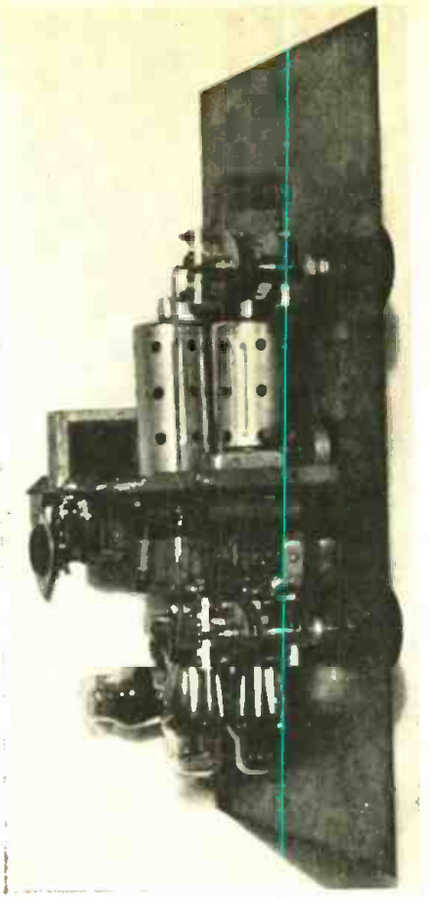
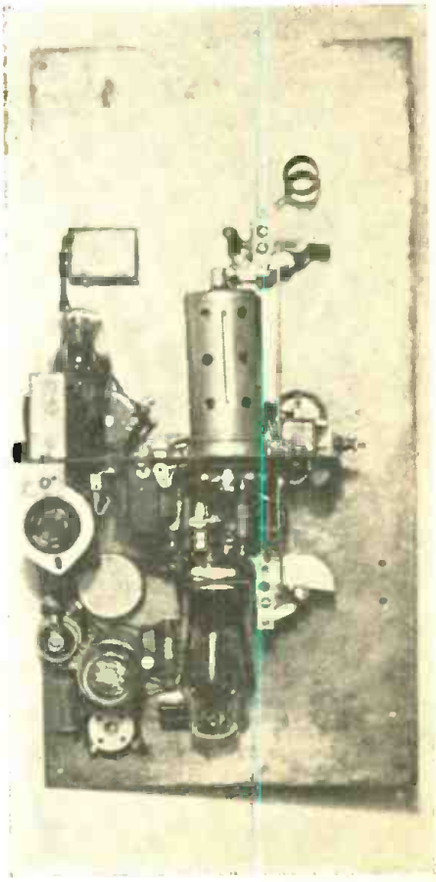


Fig. 3. (Above) Top view of receiver, shown in a vertical position. Tubes are mounted horizontally. Both r.f. and detector stages are visible.

Fig. 5. (Below) Rear view, shown in vertical position. This indicates panel layout of parts.



LEGEND

L1—11 turns No. 14 wire, ¼″ inside diameter, 1½″ long
L2—8 turns No. 14 wire, ¼″ inside diameter, 1¼″ long
L3—see text
R1—1 meg., ½-watt resistors (4 required)
R2—200-ohm., 3 watt resistor
R3—100,000-ohm wire-wound potentiometer
R4—2,000-ohm, 1 watt resistor
R5—50,000-ohm wire-wound potentiometer
R6—50,000-ohm, 2 watt resistor
R7—25,000-ohm rheostat
R8—1-megohm potentiometer (optional—see text)
R9—600-ohm, 5-watt resistor
C1—approx. 20 mmfd. dual type (2 required)
C2—0.1 mfd. paper condensers (3 required)
C3—.0001-mfd. mica condensers (4 required)
C4—3 to 30-mmfd. trimmers (2 required)
C5—3 to 30-mmfd. trimmers or 25-mmfd. variables (2 required)
C6—.002-mfd. mica condensers (2 required)
C7—.001 mfd. to .005 mfd. mica condenser (see text)
C8—0.5-mfd. paper condenser
C9—25-mfd. electrolytic condenser
C10—0.1-mfd., 600-volt condenser
RFC—Ohmite 5-meter r.f. chokes (3 required)
T1—3-to-1 audio transformer
T2—30-henry choke
LS—magnetic type loudspeaker

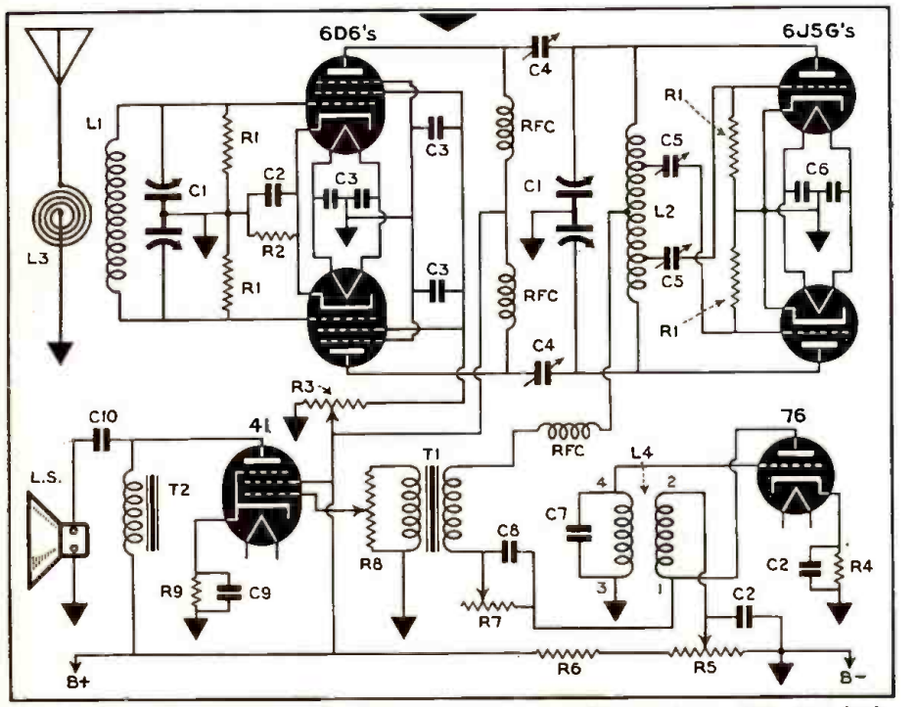


Fig. 1. Schematic diagram of the 5-meter super-regenerative receiver. Note that both the r.f. and detector stages are push-pull.

Relays And Their Use

By HENRY T. HAYDEN, Jr. • W2FO
Ward Leonard Electric Co.

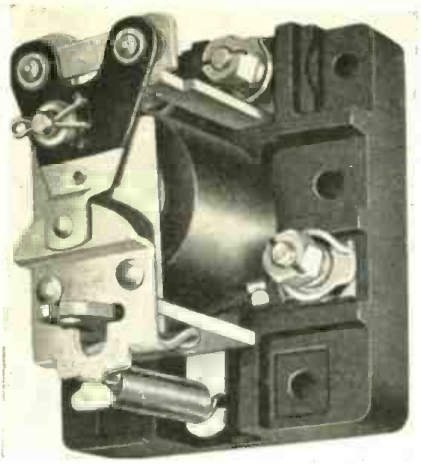


Fig. 1. Illustration of a typical midget keying relay.

RELAYS are being used more and more by amateurs who desire to keep their stations efficient and up-to-date. Their use also adds to the ease of operation and protection against damage to apparatus by overloads or other causes. Safety to the operator is another factor which should be taken into consideration. Recently a number of ham operators have been fatally injured by coming in contact with high-voltage circuits in their stations.

With the modern relay-rack mounted rigs, unsightly wires running to the operating position are minimized by the use of the proper relays. Time delay protection to the mercury-vapor rectifier tubes, interlock of transmitter cabinet doors, remote control, keying, and antenna and receiver switching are all accomplished by relays in the present-day amateur station.

Keying Relays

The most important relay in any c.w. station regardless of size is the keying relay. The high-voltage leads used in keying the transmitter should never be brought to the operating position. The reason for this is self-evident—safety.

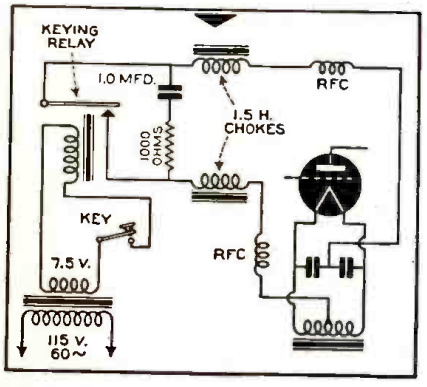


Fig. 2. A circuit suggested for the elimination of key clicks.

The relay must be of small physical size for quick operation. See Fig. 1. The contacts should be insulated for at least 1000 volts to ground. Keying should always be done in the circuit as near ground potential as possible, *never* in the positive leads. This will minimize the possibility of breakdown of insulation of the relay to ground.

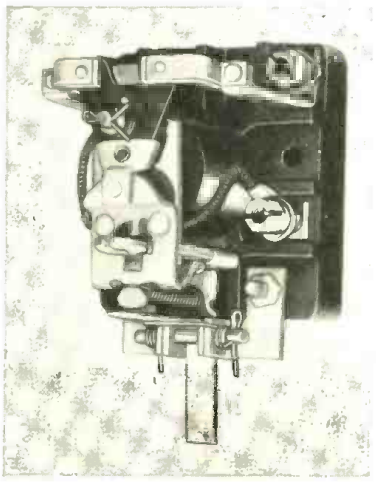


Fig. 3. A typical overload relay.

The keying relay coil may be energized from low-voltage direct or alternating current, as desired. Using a 6.3 or 7.5-volt a.c. filament supply is ideal for keying as the sparking at the key contacts is negligible. While 115-volt a.c. keying relays are available, they are not satisfactory, as it is difficult to suppress the sparking at the key contacts which is annoying to broadcast listeners.

Key clicks are also the bane of the amateur who has his station near a B.C.L. Fig. 2 shows a method of eliminating key clicks which has proved very successful at station W2FO.

If a monitor is not available for checking the outgoing signal, an additional keying relay may be used for keying a buzzer. This will enable the operator to key his transmitter properly, especially when using a "bug."

Overload Relays

The protection of valuable tubes and apparatus is of utmost importance. Several types of overload relays are available. The mechanical latch type of relay is shown in Fig. 3. This type of relay has normally closed contacts which latch open when an overload occurs, and are manually reset. This type is suitable for low-power installations. The coil is connected in the center-tap lead of the circuit to be protected and the contacts in series with the transformer primary. Do *not* connect the relay coil between the power transformer and filter as the condenser charging current will probably operate the relay every time the power circuit is closed. The best place for the overload relay coil is in the center tap of the filament of the final r.f. amplifier. The contacts may open up the main supply to all plate transformers. Any loss in excitation or other trouble will always show up in the final r.f. stage as excess plate current.

While tuning or adjusting the transmitter, it is always best to cut in series with the primary of the final plate transformer a fixed or adjustable resistor or rheostat to reduce the plate current to safe limits until resonance conditions exist.

Fig. 4 shows another type of overload relay used in remote or push-button-controlled installations. The contacts are normally closed and are connected in

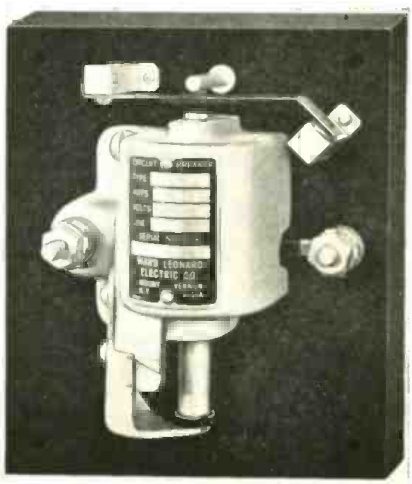


Fig. 4. Another type of overload relay, for remote installations.

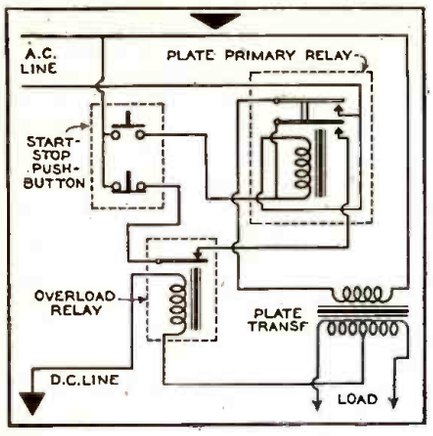


Fig. 5. Circuit set-up for push-button controlled installations, which includes the type of overload relay shown in Fig. 4.

series with the "start-stop" button shown in Fig. 5. In this circuit, a plate primary contactor or relay is used. This relay must have an auxiliary normally open contact to lock in the "start" button when it is pressed. The primary circuit opens on overload, or upon pushing the "stop" button.

Underload Relays

Most amateur phone transmitters use Class B modulation. In this system, it is desirable to protect the modulator tubes and transformers against overload should Class C r.f. excitation fail. Fig. 6 shows a form of underload relay. Connections are shown in Fig. 7. In this type of relay the drop out of the normally open contacts should be at least 75% of the pickup current. The relay is the solenoid type and must be mounted vertically for satisfactory operation.

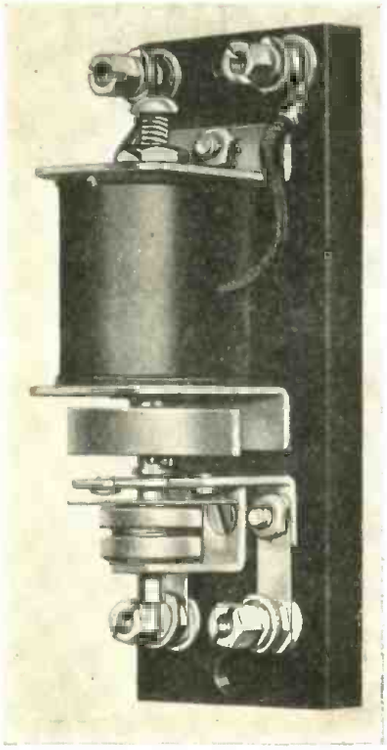


Fig. 6. Illustration of a typical underload relay. Its use is indicated in Fig. 7.

The normally open relay contacts are connected between the center-tap of the Class B transformer and ground. The coil is connected between the center-tap of the Class C transformer and ground. When the transmitter is in operation the coil is energized and the plunger closes the contacts, completing the Class B modulator circuit. Should the Class C circuit drop the load, the relay coil is de-energized, the relay plunger drops, opening the contacts and preventing possible damage to the Class B transformers or to the tubes due to sudden increase of voltage.

The pickup may be adjusted by means of a screw at the top of the relay coil. This screw is of iron and varies the gap in the magnetic circuit.

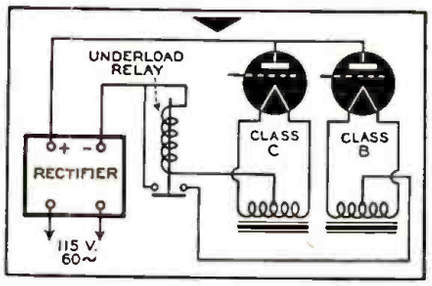


Fig. 7. Circuit with underload relay used to protect modulator tubes and transformers against overload in the event of excitation failure.

Antenna Relays

Most amateurs, having limited space available for their antennas, naturally select the best location for the transmitting antenna and string a wire any place for the receiving antenna.

The ideal arrangement would be to use the transmitting antenna for receiving also. The receiver is usually tuned to a frequency near the fundamental or harmonic frequency of the transmitting antenna. This makes a perfect antenna for receiving. A double pole double throw switch can be used for switching the antenna from transmitter to receiver and vice versa.

Manual switching is likely to cause trouble. If the switch is left in the receiving position and the transmitter operated, flash-over may occur which may damage the receiver.

The design of an antenna change-over relay must take several factors into consideration. See Figs. 8 and 9. First, the insulation must be the best obtainable for radio-frequency potentials; micalex or high grade, glazed porcelain are satisfactory insulators for this application.

Second, the contacts must be of low-resistance, non-corroding material such as silver. They must be as small in area as is consistent with the current carried, so as to reduce the capacity between front and back contacts.

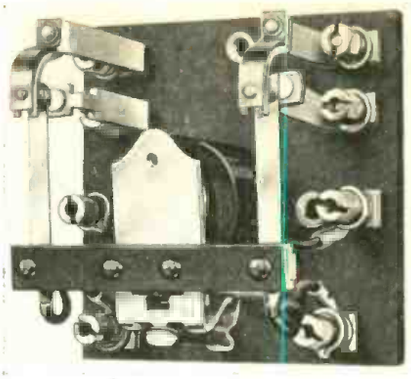


Fig. 8. Typical relay for antenna change-over from transmitter to receiver.

Third, the spacing between front and back contacts should be as great as possible without retarding the operation and speed of the relay.

Fourth, the contact arms should, if possible, be the same distance apart as the *feeder* spacers, i.e., the usual spacing of two and four inches.

Fifth, the coil must operate at the same potential as the plate transformer primary. However, in case of d.c. battery-operated portable or mobile rigs, the relay coil is operated from the battery.

For a.c.-operated transmitters, the relay coil is connected across the final plate transformer primary, so that when the transmitter is switched on the antenna is automatically switched to the transmitting position. The relay must not be sluggish in action as the antenna must be connected to the transmitter when the key is pressed.

Sometimes, an extra normally closed contact is provided for switching the receiver plate circuit at the same time. A small single pole normally closed relay may also be used for this purpose. Antenna relays may also be used for switching directional or beam antennas. When so used outdoors, however, they should

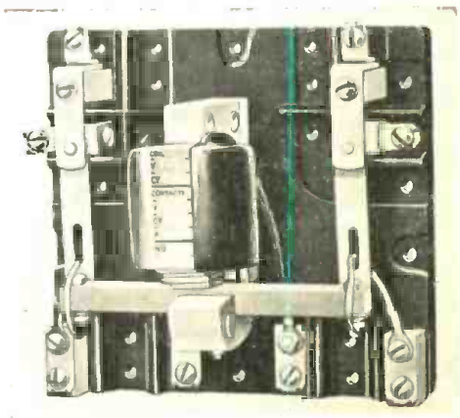


Fig. 9. Another type of antenna relay for use in conjunction with amateur transmitters.

be protected by a wooden weather-proof box with suitable insulated outlet bushings.

Remote-Control Relays

In many homes, the location of a radio station is a problem. The other members of the family will tolerate fishing tackle, cameras, tennis rackets or other sporting gear but a big radio transmitter in the corner of a living or dining room will arouse plenty of antagonism. Then too, there is apt to be a battle every time the house is cleaned and the rig detuned while dusting or a wire tripped over or loosened.

The operating position is fairly easy to locate. It is simply a desk or table in the den or corner of some room near a radiator for comfort on cold wintry nights. By means of remote-control relays, the transmitter may be located in the attic, basement, closet or even in a box on the roof if so desired.

Some amateurs operate the relays by means of small toggle or snap switches. Others use "start-stop" push button stations. Fig. 5 shows the method of push-button operation with the maintaining contact shunting the normally open "start" button and the normally closed "stop" button in series with the coil.

Another method of relay operation is by means of a mechanically latched relay with electrical reset, as shown in Fig. 10. This type of relay requires three wires for operation. The magnets simply set or release the latch as desired, the

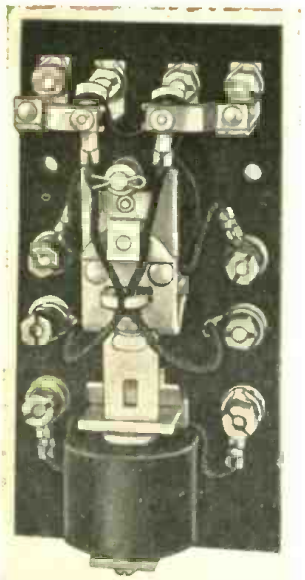
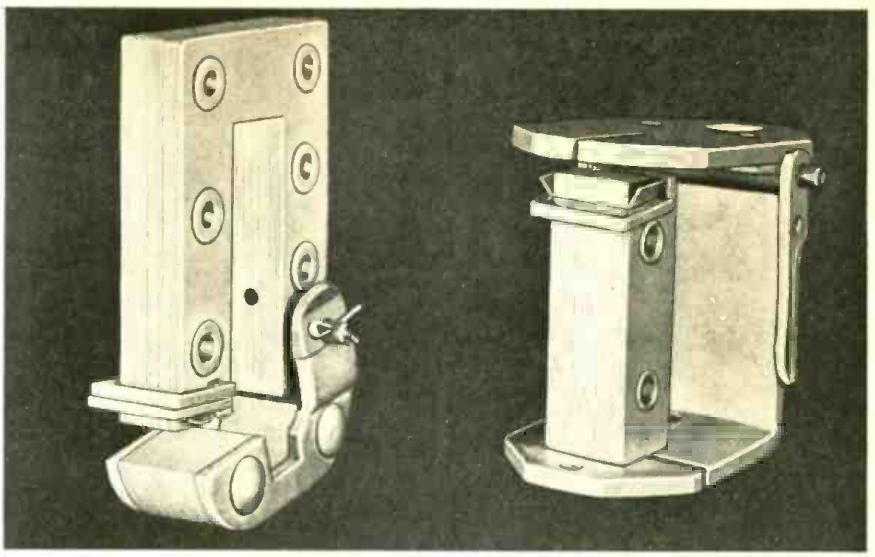


Fig. 10. A mechanically latched relay with electrical reset.

advantage being that there is no current flowing in the relay coil circuit while in operation. The design of an a.c.-operated relay involves more than appears on the surface. Let us study such a relay.

You will observe that in the larger



Figs. 11 and 12. Left: Showing laminated construction and shading coil. Right: Showing saw cut in armature to provide magnetic gap.

sizes, the magnetic circuit is laminated, as shown in Fig. 11, or else there is a saw cut from the center of the armature and pole piece to the edge, as shown in Fig. 12. This is necessary to cut down the eddy currents which, otherwise, would act like a short-circuited turn causing excess heating.

Another thing you will notice is the shading coil, also shown in Fig. 11. This is a ring, usually of copper, on top of the pole piece surrounding a portion of the pole piece but never its entirety. This ring has two functions, the principal one being to provide a local field at the top of the pole piece 90 electrical degrees from the main field. This local field acts to attract the armature, being at a maximum when the main field is at a minimum, thus preventing a.c. pulsations of the armature resulting in hum. The other function is incidental; it holds the coil in place.

Observe the machined fit of the armature and pole piece. This is necessary to prevent noise. An air gap is also provided in the magnetic circuit to prevent the relay from "holding in" by residual magnetism when the coil circuit is de-energized. Sometimes it is hard to notice this gap but, nevertheless, it is there, possibly in the form of a washer of non-magnetic material.

Care must be taken in the design and construction of the bearing, also the balance of the armature and contacts.

From this sketchy outline of relays and their use in the amateur station one can well realize that the many ways in which they may be applied is limited only by the operator's ingenuity and finances.

Wide-Angle "Eye" Tuning

IT is possible to increase the shadow-angle sensitivity of the 6E5, 6G5, or 6U5 as a tuning indicator by increasing the maximum shadow angle from the usual value of 90 degrees to approximately 180 degrees. This improvement is obtained by using a separate triode in a new circuit to control the action of the ray-control electrode in the tuning-indicator tube. The cost of using this new circuit is but little more than the cost of the additional tube.

The circuit for obtaining wide-angle tuning is shown in the accompanying diagram. When a high negative bias is applied to T_1, the plate current of T_1 is nearly zero and the voltage drop across R is nearly zero. Under this condition, the shadow angle is zero. When the grid of T_1 is at zero potential, the plate current of T_1 is high and the potential of point (a) is nearly —125 volts with respect to the cathode of the 6E5, 6G5, or 6U5. The shadow angle under these conditions is approximately 180 degrees. In the usual circuit, the maximum shadow

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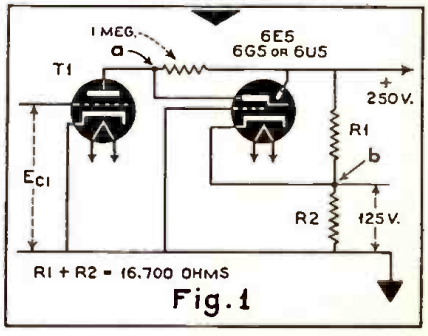


Fig. 1

Hamfest

By W8QMR (W4FCP) ex-2PI • LU4S

LILY PONS QSO . . . QRR POWER . . . TFC RECORDS . . . DX ON 160

HAM radio reaches out in more ways than one. It is an alluring flame that attracts bugs and an occasional butterfly—but in the instance we are relating it attracted a very lovely thrush—Miss Lily Pons.

It is probable that Miss Pons was first introduced to etheric voice hurling by her camera man, C. Roy Hunt, W6-CNE. While in Hollywood, Miss Pons used the mike at W6CNE to converse with her South-American manager, Mr. Enrique Gio, who spoke from LU1DA, owned and operated by Captain Felix Gunther, Buenos Aires, Argentina.

In New York again, Miss Pons wished to repeat the experience, so arrangements were made through W2KR for her and Andre Kostelanetz, well-known maestro, to visit station W2JKQ, owned and operated by William P. Schweitzer, Elizabeth, N. J. A suitable schedule was made with Mr. Gio. They chalked up a 100 per cent QSO.

We present on this page an exclusive photo taken during the evening of the contact. Miss Pons is "at the mike." To her left is Andre Kostelanetz. Mr. Schweitzer, W2JKQ, is pretending—for the sake of the photographer—to tune up his Temco kilowatt rig.

During the evening Miss Pons obligingly made a recording of a message of greeting to SV1KE, Athens, Greece, who had expressed his admiration for her. Mr. Schweitzer managed to contact SV1KE after Miss Pons had left, and played back the record, which pleased SV1KE no end.

Lily Pons, with Andre Kostelanetz at her left and W2JKQ at her right, making a contact through LU1DA, Argentina.

◆

IT'S about this time of year, as Old Sol puts the skids under Old Man Winter and the spring thaws flush the creeks to flood levels, that we hams begin to think more seriously about emergency equipment. Some of us only think about it. Some do more than that—but if the original thinking isn't in the right direction, it's pretty much wasted effort. We recently inspected an emergency rig. It was what one might term a brain storm—with a bit more storm than brains. The designer had the right idea—to build something portable and rugged, a transmitter that could be tossed in and out of an auto or truck with no damage to anything but the vehicle. The rig was rugged all right. You could drop it from an airplane without damage to the transmitter—that is if you could find an airplane that could take off with it. It was about as portable as a grand piano.

As we see it, any good transmitter up to 100 watts will make an excellent emergency job. The problem in an emergency is not the transmitter but the source of power. Have any of you lads received a QSL from W6KTY—Roy Weadon, of South Gate, Calif.? If so the photo of Fig. 1 is an old story to you—as it adorns said cards and illustrates the 800-watt emergency power supply KTY has mounted on the front of his car. And 800 watts means going places—when the going is most difficult but essential! (The card is an idea of W6CL who doesn't think along the lines of the conventional QSL card.) KTY, incidentally, is an old morse op, with forty years of brass pounding behind him before he took up ham radio! So don't look for him on 160-meter fone.

A bit of dope on the emergency power supply is in order. The generator was originally a Dodge charging generator, rewound to supply 60-cycle a.c. in accordance with directions in the book "Radio Power." The apron was removed from the front of KTY's car (a Studebaker), and a local smithy built up a foundation of cross members to support the assembly. A heavy wood plat-

(Continued on page 226)

Fig. 1. W6KTY and his 800-watt power supply cranked by the engine of his car. Really FB for emergency work.

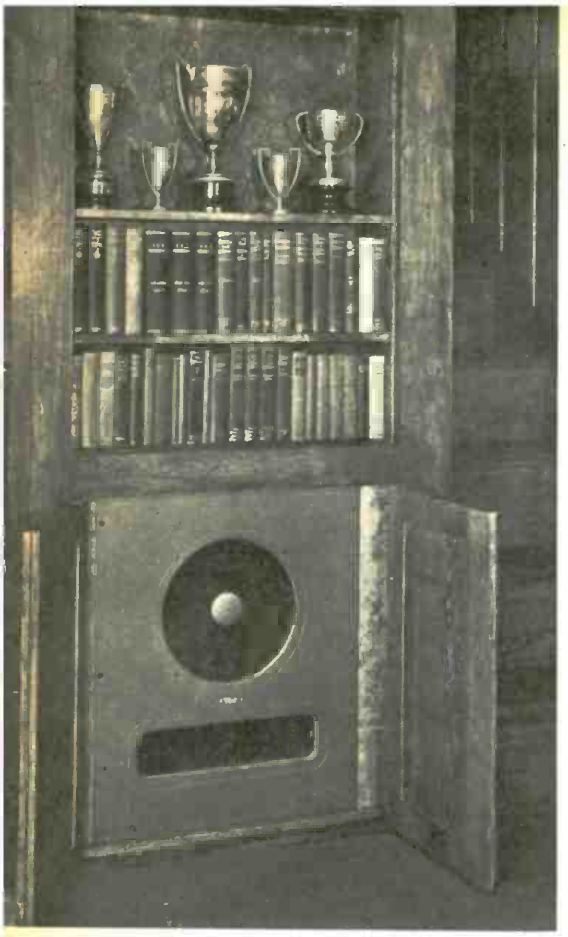


Fig. 1. One of the several remotely-located Jensen 15-inch Peridynamic speakers. A 500-ohm line is run from each of the several speakers to the main amplifier in the basement.

A DE LUXE HIGH-FIDELITY RECEIVER INSTALLATION

PART II

By JAMES MILLEN

LAST month we discussed the head end or r.f. section of the remotely located, pretuned, high-fidelity broadcast "receiver" shown in Fig. 2. In this concluding section we will briefly describe and comment upon the remaining components and the manner in which they are controlled.

The Relays, Power Supply and Switch

Directly below the group of five r.f. channels is a panel supporting six relays and a push-button switch of the locking type. The sixth relay is used to connect the phonograph pick-up. The switch is identical with those used at the various remote control stations. Any number of such stations can be installed throughout the house and the switches merely wired in parallel. It must be remembered, however, that if a program is selected by pushing a button at one station, the program cannot be turned off from another control point. Obviously, the switch shown in the photograph is used primarily for test and tuning purposes.

The relays can be conveniently operated from the same 6-volt a.c. source which supplies the heater circuits of the r.f. tubes. Inasmuch as the twenty tubes needed for the five r.f. channels draw a total of only 6 amperes (about 38 watts) almost any small transformer will provide the necessary power; the primary circuit is simply tied to the same line which supplies the audio amplifier.

Audio Amplifier

Fig. 3 shows the 15-watt, high-fidelity audio amplifier complete with power supply, dual channel input, tone control, etc. The maximum overall gain of this unit, measured from the microphone jack to the speaker terminals, is 127 db. It is a standard National item (type ASA) and although designed primarily for use with low-level crystal microphones its characteristics are ideal for the installation under discussion. Of course, the maximum gain is not required in this particular instance, but since the amplifier is provided with an auxiliary low-gain input channel, employing a separate tube, it fits into the picture very nicely.

The amplifier circuit has been laid out with great care; separate rectifier and filter circuits are used for plate and bias supplies, as only by so doing is it possible to obtain full 15 watts output from the two Class A 2A3's with negligible distortion. Fixed bias on the intermediate tubes helps to extend the audio frequency characteristics, particularly on the low frequency end, and eliminates selective degeneration at some points of the audio spectrum. Each plate and grid circuit is filtered individually, the circuit constants being such that any tendency toward instability is definitely eliminated. Hum is inaudible.

Two output circuits are provided, one of 3000 ohms, which is connected directly to the plates of the output tubes, and the other of 500 ohms from a suitable transformer. The 500-ohm circuit is used exclusively for supplying the various loudspeakers in this installation. The 2A3 output tubes, being operated in Class A, can work into widely different loads

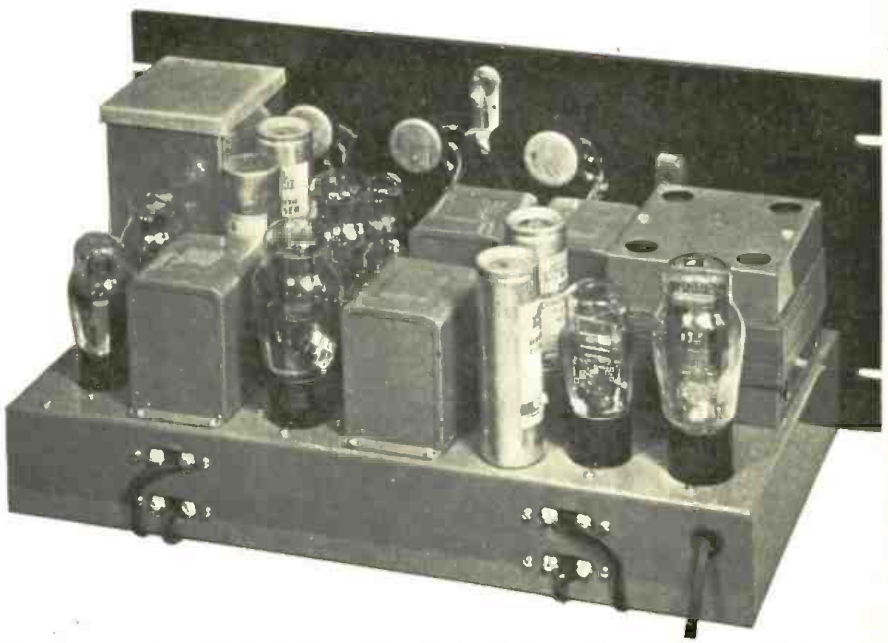


Fig. 3. Rear view of the audio amplifier used with the radio and phonograph. The output stage employs 2A3 tubes in push-pull. Two output circuits are provided: one of 3000 ohms and one of 500 ohms, the latter feeding the loudspeakers.

Fig. 2. Rear view of the complete high-fidelity broadcast receiver and phonograph mechanism. The speaker at the top is merely for use in tuning and adjusting.

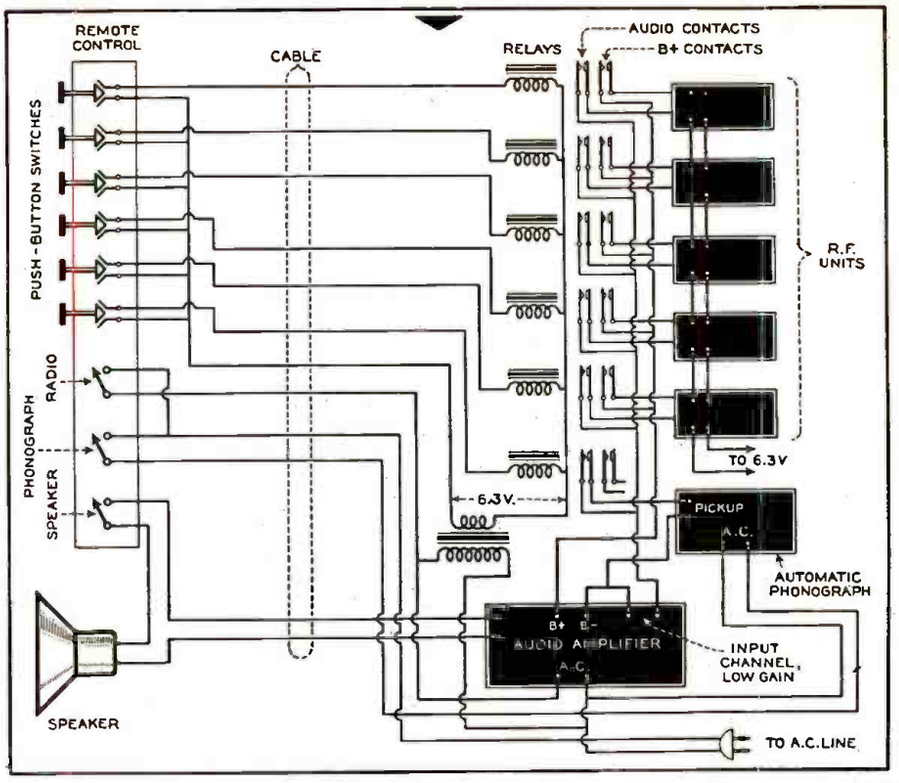


Fig. 5. The block diagram, showing inter-unit connections. The relays take care of all necessary channel switching.

with no increase in distortion, as would be the case when using pentodes or beam tubes. This makes it possible to switch on one or several loudspeakers at the same time, the only noticeable effect being a slight change in audio level. The speakers should, however, be chosen to give a fairly accurate impedance match. If, for instance, a maximum of four speakers were to be in use, each could have an input impedance of 1000 ohms. The total load on the amplifier would then vary from 1000 to 250, when the four were connected in parallel, and the impedance mis-match would never exceed 2 to 1. Under the worst conditions, this represents a loss of but 1 db.

Automatic Record Player

The phonograph equipment was selected after a survey of the many such devices on the market. It is a "Collaro," manufactured in England and imported by Wholesale Radio Service Company. It is shown mounted, in Fig. 2, upon a rectangular cabinet, 15½" x 17" x 4½", to which is attached a pair of the standard National type RRA brackets for relay rack mounting.

As such "contraptions" go, the Collaro is eminently suitable for remote operation. For instance, it will play either the 10" or 12" records, stacked in any order, and will stop automatically when the last record has been completed. It is sufficiently compact to fit easily between relay rack panels and requires no additional space at the side or back when discharging played records. The records are simply arranged in the desired sequence and are stacked on the upper spindle with the record which is to be played first at the bottom. The automatic release mechanism drops the record in a horizontal plane to the turntable below, proper centering being assured by the guiding spindle. The record drops about two inches and since it lands flat either on the turntable or on top of

(Continued on page 215)

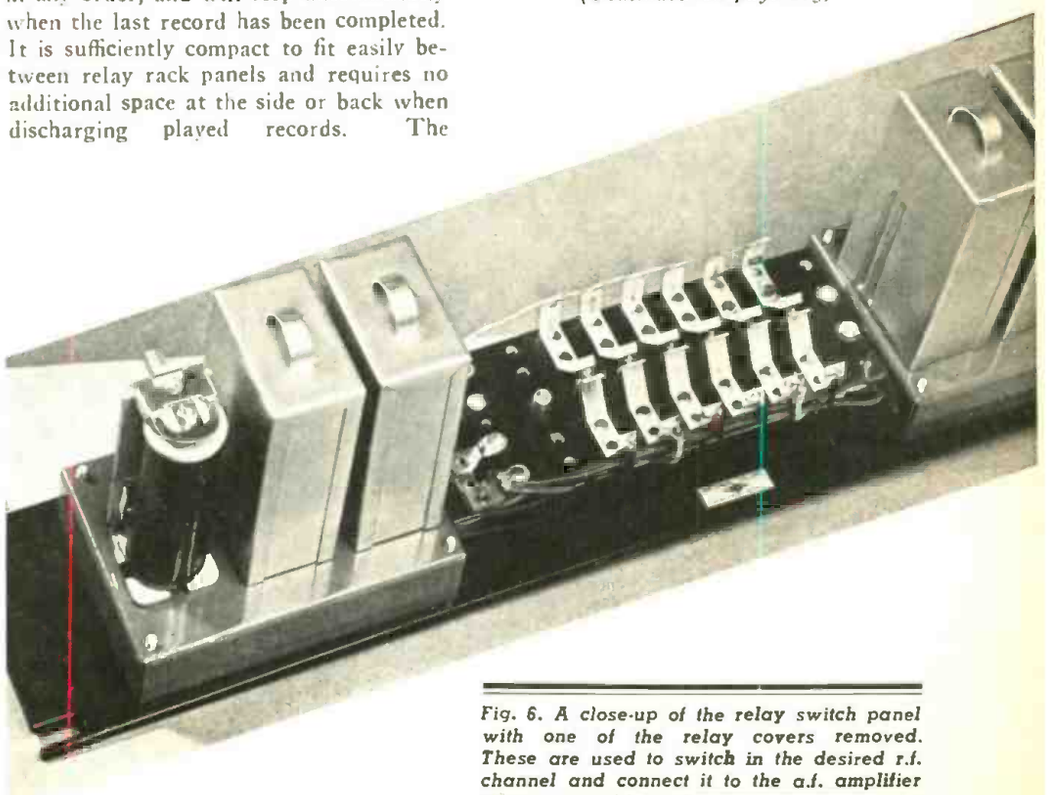


Fig. 6. A close-up of the relay switch panel with one of the relay covers removed. These are used to switch in the desired r.f. channel and connect it to the a.f. amplifier

Globe Girdling

By J. B. L. HINDS

STATION FOR MORMANS . . . NEW "G" AND "D" FREQUENCIES . . . W6XKG VERIES J STATIONS ACTIVE . . . SWISS BROADCASTS . . . NEW CHILEANS . . . THE TP's

IN this issue appears the complete World Short-Wave Station List, which includes the active Broadcast Experimental and Radiophone stations in the order of their operating frequencies.

Many changes have taken place since the publication of the last complete list, and it is therefore suggested that the present list be used for all reference purposes.

Changes in frequencies, time schedules, class, etc., have been made only in such cases where the data was known to be reliable. For this reason it may be assumed that there are certain omissions, which is the case, but there is no point in cluttering up the list with inaccurate data for the sake of making the compilation look imposing. However, additions will be made when the information can be adequately verified.

In revising the World List, we have listed Radiophone and Experimental stations on the basis of point-to-point service rather than on the uncertain method of reporting the calls of the stations contacted and the times of operation.

Your comments on the changes, and your assistance in perfecting the data included, would be greatly appreciated.

Picture veri from Praha, Czechoslovakia.

NEW STATIONS

Kc.	Meters	Call	Location
26550	11:30	GSS	Daventry, England
26450	11.34	DJV	Zeesen, Germany
26400	11.36	GSR	Daventry, England
25950	11.56	DJU	Zeesen, Germany
25850	11.61	DJT	Zeesen, Germany
25750	11.65	GSQ	Daventry, England
21500	13.95	W2XAD	Schenectady, N. Y.
21450	13.99	DJS	Zeesen, Germany
15130	19.83	W1XAL	Boston, Mass.
14010	21.41	VK5DI	Adelaide, So. Australia
11780	25.47	DJF	Zeesen, Germany
11730	25.57	W1XAL	Boston, Mass.
9550	31.41	W2XAD	Schenectady, N. Y.
9473	31.67	PJC1	Willemstad, Curacao
9180	32.68	HC1GQ	Quito, Ecuador
8650	34.68	HJ4ABU	Medellin, Colombia
7870	38.12	HC1RB	Quito, Ecuador
6400	46.88	TGQA	Quezaltenango, Guatemala

STATION CHANGES

New Frequency	New Call	Old Call	Old Frequency
9300		H1G	6280
8935		COKG	8920
6610		YNLG	6325
6133		XEXA	6170
5929 5977	CS2WD	PJC1 Radio Renascenca	5930 5977

STATIONS DELETED

Kc.	Meters	Call	Reason
15530	19.32	HS8PJ	Not in service
15440	19.43	XEBM	Not in service
11730	25.57	XETM	Not in service
9600	31.25	XEYU	Not in service
7411	40.48	HC1CE	Not in service
6120	49.02	XEFT	Not in service
6050	49.59	XEXF	Not in service
6030	49.75	XEBQ	Not in service

NON-AUTHENTICATED STATIONS

Frequency	Call	Location
17760	PZF	Dutch Guiana (Jan.)
15170	——	Peru (Feb.)
11850	CB1185	Chile (Apr.)
11800	CB1180	Chile (Apr.)
9950	COCU	Cuba (Jan.)
9565	HP5S	Panama (May)
7100	——	Mexico (Jan.)
6600	HI6H	Dom. Rep. (May)
6530	XEBC	Mexico (Apr.)
6388	HI8J	Dom. Rep. (Mar.)
6120	HP5Z	Panama (June)
5835	YV5RR	Venezuela (Nov.)

Radiophone and Experimental Stations

GSC, 9020 kc., Rugby, England, occasionally relays program material to New York.

CGA4, 9332 kc., Drummondville, Quebec, Canada, heard in Texas at 7 p.m. contacting GCB, 9280 kc.

LSY, 18115 kc., Buenos Aires, Argentina, carries musical program each Friday from 3 to 5 and 5:30 p.m.

HJY, 13650 kc., Bogota, Colombia, heard in California at 7:07 p.m. signing off the air after inverted speech contact.

HPF, 14485 kc., Panama City, Panama, heard in Oregon at 6:50 p.m. contacting WNC, 15055 kc., Hialeah, Florida.

WEL, 8950 kc. and WKD, 13435 kc., Rocky Point, N. Y., heard by Ohio listener working with HBO, 11402 kc. and HBJ, 14535 kc., Geneva, Switzerland, between 2:30 and 2:48 p.m.

WRX, 9905 kc., new Lawrenceville, N. J., station heard up-state New York contacting Rugby, England, near 3 p.m.

W9XDH, 12862.5 kc., Elgin, Ill., heard by many listeners at various times in daytime testing with W2XGB, 8655 kc., Hicksville, New York. These stations are operated by Press Wireless, Inc., Hickville, New York, and broadcast music and news.

India Broadcasts

Delhi, India, is the center of attraction from a radio point of view. Many listeners are hearing Delhi near 9590 kc. from 9:30 p.m. up to 10:45 p.m. and later. All are agreed on the location, but none have yet heard the call, or at least it has not been forwarded to this department if heard. "Delhi" and "India" mentioned and some of English understood around 10:40 p.m., such as: "This is Delhi broadcasting on 31—? meters. And now the news by . . . copyright reserved." Station carrier usually on about 9:20 p.m., chimes or bells at 9:30 p.m. followed by clock striking eight. (It should be 8 a.m. in Delhi.) Program consists of native music and songs, some selections running 10 to 15 minutes. Announcements before the English period are in native tongue. The signal for the first half hour or so holds up about R-7 but decreases in volume considerably before 10:30 p.m. The writer is of opinion that the signal is just above GSC and that the frequency is about 9585 kc. Also that code can be

heard faintly above the Delhi signal. Anyway, it is an interesting signal in its location on the band and causes us to wonder how they will all sound when the new ones come on—especially on 9550 kc.

Broadcast frequencies assigned to India to November 30th, 1937, are as follows: Delhi—15290 kc, VUD4; 15160 kc., VUE3; 11870 kc., VUD3; 9575 kc., VUD2; 9575 kc., VUE2 (Exp.); 6085 kc., VUE. Bombay—9565 kc., VUB2. Madras—6085 kc., VUM2.

Down Under

KZRM, 9570 kc. and 11840 kc. are both being used according to report from the station. These stations transmit with 1 kw. power. Languages used; 60% English, 25% Spanish and 15% local dialects.

VK5DI, 14010 kc., Adelaide, South Australia, which has been carried for a time in the non-authenticated block, has been transferred to station list as advice has been received that it is in service and broadcasting experimental programs each Sunday from 1 to 1:30 p.m. and 2 to 2:30 p.m. South Australia Time, or from 10:30 p.m. to 11 p.m. and 11:30 p.m. to 12 a.m., E.S.T., Saturday evenings. Adelaide is in the 21½ hour zone and situated to the north and west of Melbourne. The programs open and close with a recording of the laugh of the Australian Kookaburra bird, which is used on programs of VK2ME, 9590 kc. While the power of the station at present is but 50 watts, it is expected that it may be increased shortly. Mr. H. B. Wilson, Senior Technician of the station, advises it is used to gather short-wave data for the Broadcasting Network. All reports will be verified.

JZJ, 11800 kc., and JZI, 9535 Kw., are still transmitting the overseas programs from Japan. JZJ is broadcasting news in Japanese daily between 7 and 7:30 a.m. in addition to schedule in station list.

JIB, 10535 kc., Taihoku, Taiwan, has English broadcast at 9 a.m. Same program reported on 9630 kc. and that call on latter frequency is JFO.

JVT, 6750 kc., Nazaki, is heard as late as 9 a.m. on program material.

JDY, 9925 kc., Dairen, has as consistent a signal as any Japanese.

HS8PJ, Bangkok, Siam, is being retained in lists on 19020 kc., 9510 kc. and 9350 kc., until further advice is received. Reports have been received of station heard on both Monday and Thursday on 19020 and 9510 kc., but no one has reported hearing it on 9350 kc.

"Radio Burma," 6007 kc., Rangoon, Burma, reported heard in Australia between 8:40 and 9 a.m. as listed.

ZBW3, 9525 kc., Hong Kong, China, reported heard between 4 and 6 a.m., although some say station not on the air. Recent veri card states the station now has 2½ kw. power.

A beauty from Radio-Colonial. Call in red, background in blue and the band around globe in red and green.

PMH, 6720 kc., Bandoeng, Java, is reported with R-7 signal on the West Coast at 6:30 a.m.

South Africans

ZRK, 9606 kc., Klipheuvel, and ZRH, 9523 kc., Roberts Heights, South Africa, continue to be heard with excellent signals between 11:45 p.m. and 12:45 a.m. on week nights. That is, do not tune for them on Saturday night at 11:45 p.m. expecting to find them for it is then 6:45 a.m. Sunday morning in South Africa and no physical exercises are broadcast on Sundays.

The Chief Engineer of the South African Broadcasting Corporation gives the following interesting information: ZRH is at Roberts Heights, about 5 miles out of Pretoria, the capital of the Transvaal. ZRJ is at Maraisburg, 10 miles out of Johannesburg (Transvaal) along the west of the Witwatersrand (an auriferous ridge near Johannesburg Transvaal where gold-placers were first worked. The name commonly contracted to "The Rand" is now extended to the whole adjacent district). ZRK is at

The little veri card from HI8Q. Ciudad Trujillo. R.D.

LAST-MINUTE FLASHES

CJCX, 6010 kc., Sydney, N. S., Canada, advise matters of a local nature still force them to have irregular schedules.

J. O. Faris, Jr., R.S.S.L. Monitoring Class A station W11J1, Danville, Illinois, at 12:26 a.m. March 8, 1938, picked up station VR6A, Pitcairn Island, carrying on a conversation with W6NNR. Mr. Faris states signal was R-5, QSA-4 and was on the h-f end of the 20-meter band. (14,346 kc.—Ed.)

COBC, Havana, Cuba, now about 10010 kc.

PSH, 10220 kc., Rio de Janeiro, Brazil, is now scheduled daily 6 to 9 p.m.

HCJB4, heard 7410 to 7412 kc., said to be located at Portoviejo, Ecuador, and known as "La Voz de Manabi."

Reports on reception of CXA8, Colonia, Uruguay, are verified by Radio Belgrano, Belgrano 1841, Buenos Aires, Argentina.

HIG, Ciudad, Trujillo, Dom. Rep., broadcasts on 6280 and 9290 kc.

CXA2, 6000 kc., Comp. de Radiopublicidad Continental should be addressed at Juan Carlos Gomez 1431, Montevideo, Uruguay, S. A.

Czechoslovakia schedule for March as follows: OLR5B, 15320 kc. or OLR5A, 15230 kc., 6:30-7:30 a.m., 9:10-9:50 a.m. daily (ex. Sundays and holidays) 6:15-7:45 a.m. Sundays. Similar schedule for April.

OLR4A, 11840 kc. or OLR4B, 11760 kc., daily 9:55-10:50 a.m. Sunday 7:15-8:55 p.m. Sun., Wed., Sat., English news, 5-5:15 p.m.

OLR3A, 9550 kc., daily 12:55-4:40 p.m. Mon., Tues., Thurs., Fri., 8-10:35 p.m. English news at 9:45 p.m.

OLR2B, 6030 kc. or OLR2R, 6010 kc. Mon., Tues., Thurs., Fri., 4:40-5 p.m.

OK1MPT, 5145, new station, special Wed. and Sat., 5:15-5:30 p.m.

February schedule for Japanese Overseas programs as follows: JVP, 7510 kc., 2:30-4 p.m.; JZI, 9535 kc., 2:30-4 p.m. and 4:30-5:30 p.m. JZJ, 11800 kc., 12:30-1:30 a.m.; 7-7:30 a.m.; 8-9:30 a.m.; 4:30-5:30 p.m. and 6-6:30 p.m. March schedule not received, but this and April schedule probably similar to above.

Can you identify the station testing out nightly with records on 9.900 mc.?

TG2, Guatemala City, advises now on 6200 kc.

XYO is said to be call of Radio Burma, 6007 kc.—1 kw. power.

T14NRH, 9670 kc., will celebrate its tenth anniversary the entire month of May. Diploma on sepia paper in three colors to all reporting correct reception.

New stations in Dom. Rep. reported: HI5G, 6660 kc., La Vega; HI5P, 6565 kc., Puerto Plata; HI6H, 6600 Kc., Ciudad Trujillo; HI8J, 6383 kc., La Vega.

Klipheuvel, about 36 miles north of Capetown. ZRD is in one of the suburbs of Durban. All evening transmissions of these stations close with "Die Stem van Suid Afrika" and "God Save the King." Identification is not by call sign as yet but should be shortly. No changes have been since made in schedules as shown in station lists.

CR7BH, 11718 kc., Lorenco Marques, Portuguese East Africa, has been heard by several listeners of late transmitting with fairly good signal in afternoon and signing off the air at 4 p.m.

Europeans

HVJ, 15121 kc. and 5959 kc., Vatican City, are still retained in lists with schedules as previously shown and as furnished by station. It is noted that the following frequencies are assigned to HVJ:—21480, 20150, 17840, 15120, 11740, 9550 and 6030.

Veri cards have been received by listeners for reception on 11740, 6075 and 19800 kc. indicating that possibly other frequencies are to be used than those listed above. On veri card received by the writer for reception on 11740 kc. is noted the following in answer to request for information:—"Just finished installing new transmitter. Some changes to be made on schedule and frequencies." A further request has been made for complete details.

TPA2, 15243 kc., TPA3, 11890 kc., and TPA4, 11718 kc., are still being shown in program schedules issued by Radio Coloniale, although they are testing out on other frequencies, preparatory to operating their new facilities. From advice from France it is learned that the new short-wave transmitters being tested at present are located at Essarts-le-Roi, about 15 miles from Paris, and being operated on an average power of 25 kilowatts, which is much higher than the power of the transmitters now on the air and located at Pontoise. The tests are mostly being made simultaneously in conjunction with the regular transmissions. While many frequencies have been assigned it is expected that they will transmit at first on five different frequencies, namely: 17785, 15130, 11845, 9550 and 6040 kc. Reports of reception have been received for all except 9550 kc. The quality and steadiness of signals on test frequencies are much improved.

Frequencies assigned are noted to be 21490, 17785, 17780, 17765, 15295, 15130, 11845, 9585, 9570, 9550, 9520 and 6040 kc. It is assumed that frequencies will be used in relation to seasons and conditions and that the frequencies to be in service will be shown in the monthly program schedules. The transmitters will work in each case on special directional antennas for different parts of the world. The number of the antennas will be determined and fixed from conclusions made after tests are completed. It is also understood that orders have been passed on for the construction of two additional short-wave transmitters of a power of 100 kw., to be located somewhere in the center of France and to complete the organization of facilities for transmission to French Colonies and other countries.

SPW, 13635 kc. and SPD, 11535 kc., Warsaw, Poland, heard by a listener from 4 to 4:15 a.m.

IRF, 9830 kc. and IQY, 11900 kc. are carrying Italian evening broadcasts along with I2RO, Rome, on 9635 kc., but have not been added to lists for reasons set forth in this section in the March issue.

Radio National, Salamanca, Spain, is being heard through relays at many points on the dial, 6672 kc. being the latest one heard, and probably having the most consistent signal. Radio Malaga, 14440 kc., heard in late afternoons and also probably connected.

HBL, 9345 kc. and HBP, 7797 kc., carried the Swiss broadcasts to March 20th. HBO, 11402 kc. and HBJ, 14535 kc., will carry same program from March 21st on, according to information on veri card. Another report is that Switzerland will erect a new station near Berne, with 20-kw, power, to broadcast these popular programs to North and South America.

OLR2A, 6010 kc., OLR2B, 6030 kc., OLR3A, 9550 kc., OLR5A, 15230 kc. and OLR5B, 15320 kc., are still carrying the various Czechoslovakian programs. The schedules shown in the station lists were compiled from February programs furnished by Praha.

Belgrade Short-Wave Station, YUA, 6100 kc., is still broadcasting programs to its citizens in North and South America, about the 1st and 15th of each month. As stated in this section before, but for the information of inquiring listeners, these programs are relayed by DZC, 10290 kc. and DJP, 11855 kc., Zeesen, Germany. These transmissions will, of course, cease when YUA has completed and put in operation its new station now under construction.

GSQ, 25750 kc., GSR, 26400 kc. and GSS, 26550 kc., are new frequencies at Daventry, England, as added to lists.

DJS, 21450 kc., DJT, 25850 kc., DJU, 25950 kc. and DJV, 26450 kc., Zeesen, Germany, have been added to list. DJS is now operating.

Contracts have been placed for the provision of two more high-power, short-wave transmitters at the Empire station at Daventry, and for the necessary plant and auxiliary equipment. An extension to the building to house the new transmitters is under way. These developments at Daventry are in connection with the foreign language broadcasts.

HP5J—The Voice of Panama. White card with blue printing.

South Americans

PRA8, 6010 kc., is located at Recife City, Pernambuco, Brazil, and operated by Radio Club of Pernambuco. Station transmits as shown in station list with 5 kw. power, relaying the programs of long-wave station on 720 kc., which employs 25 kw. power. At the beginning of every program the studio clock strikes the hour, but in the evening program they play the national anthem (4 p.m.) Each night before leaving the air the rocking song, "Cancao de ninar" is played, preceded by the National Anthem at 9 p.m. Senor Oscar Moreira Pinto

is General Director of station and is very desirous of receiving reports from all listeners.

YV1RD, 5850 kc., Maracaibo, Venezuela, advises that new verification card for that station will be issued soon. Their new schedule appears in station list. Station is known as "Ecos del Zulia."

HC1CE, 7411 kc., Quito, Ecuador, has been taken out of station lists as mail directed to them has been returned with advice that they are not in service. Neither has a report been filed indicating they have been heard, since being added to lists.

HJ1ABG, 6042.3 kc., Barranquilla, Colombia, advises they now play as opening and closing the National Anthem and the "Los Cadetes" March. Station prefers that International Reply Coupons be enclosed with reports for verification.

"Radio Nacional del Peru," Lima, Peru, sends the writer a veri card in answer to report on their December 18th test broadcast on 15170 kc. No call for the frequency is shown on card or advice furnished. Card is a duplicate of that reproduced on page 577, November ALL-WAVE RADIO.

OAX4T, 9562 kc., Lima, Peru, is now heard by many between 7 and 8 a.m.

OAX5C, 9580 kc., Ica, Peru, when heard, is reported from 9607 to 9622 kc. No further advice received.

YV5RC, 5800 kc., Caracas, Venezuela, has extended their programs to 10:30 p.m. each week night, and broadcast dance music the last hour from the "Roof Garden" in Caracas.

PSH, 10220 kc., Rio de Janeiro, Brazil, is now broadcasting daily from 6 to 9 p.m.

PZH, 6788 kc., Paramaribo, Dutch Guiana, being heard with fair signal near 6800 kc. and signing off around 8:45 p.m. with Dutch National Anthem.

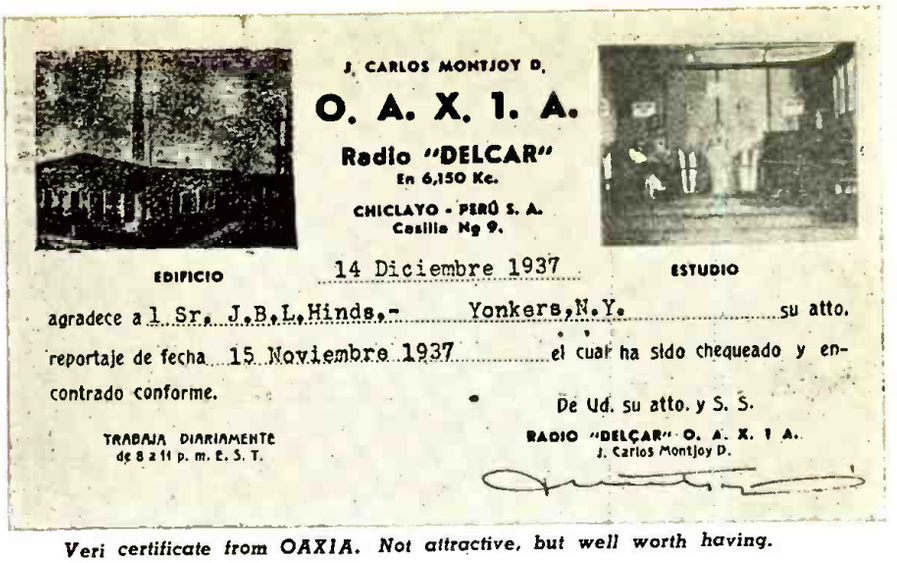
HCETC, 6975 kc., in list, still reported hovering around 9354 or 9355 and just missing WNK, Hialeah, Florida, on 9355. No further word from station or actual facts from listeners.

HC2CW, 8404 kc., Guayaquil, Ecuador, on late date heard near 9255 kc and no further word from station.

HCJB4, 7410 or 7412 kc. Does any one know if this station is related in any way to HCJB1 on 8831? Heard up to 9:45 p.m.

HCODA, 9440 kc., Guayaquil, Ecuador, is improving. Now announcing and reading letters from listeners in English. Let us hope station will soon answer letters and reports. R-8 signal at times with some code mixed in.

HC1GQ, 9180 kc., Quito, Ecuador, is another new station badly hampered by code but getting out fairly well. From announcements it operates on



Veri certificate from OAX1A. Not attractive, but well worth having.

APRIL ACE REPORTERS

Mrs. F. W. Alfred, VE8G3, London, Ont., Canada.
Ed Bell, Columbia, S. C.
G. T. Beyer, W911H55, Chicago, Ill.
David Bloch, Jamaica, N. Y.
H. D. Burrall, Albuquerque, N. M.
Wm. Bell, W14Q1, Monroe, La.
Richard Briggs, W3F73, Watertown, Mass.
W. E. Blanchard, W3E1, Bangor, Maine.
H. C. Chesnut, Plattsburg, N. Y.
L. M. Clark, Snyder, N. Y.
Wm. James Campbell, W4OH28, New York City, N. Y.
Edward H. Davis, W4H151, Brooklyn, N. Y.
Carl and Anne Eder, Willmar, Minn.
J. L. Everett, V37F3, Toronto, Ont., Canada.
Wm. Fearnley, Palm Beach, Fla.
E. C. Games, W4H202, Trenton, N. J.
Walter E. Gibson, Kingston, N. H.
Wm. R. Goetz, W4H161, Brooklyn, N. Y.
Charles Gerran, Jamestown, N. Y.
G. J. Glasspool, G74, Southampton, England.
Clarence Hartzell, W71J, Jeannette, Pa.
Harry Honda, Los Angeles, Calif.
Wm. M. Hummel, W9-11H59, Chicago, Ill.
G. L. Harris, W4F17, North Adams, Mass.
Eileen Hofmaster, Sandusky, Ohio.
Richard Haley, W10K3, Seymour, Ind.
C. D. Jaffe, W5L2, Norfolk, Va.
Robert Jones, W8J3, Coshocton, Ohio.
Ian A. Jamieson, Manchester, England.
C. F. Keirstead, W3F5, Framingham, Mass.
Stuart Kreisher, W5H15, Reading, Pa.
M. E. Leshner, W3F32, Lawrence, Mass.
R. E. G. Langton, VE29A6, Port Hammond, B. C., Canada.
Martin P. Miller, W4H150, Bronx, New York City, N. Y.
George Mould, Wallington, Surrey, England.
J. Raymond Newcomer, W518, Lititz, Pa.
H. W. Newell, W3F26, Lowell, Mass.
R. B. Oxrieder, W6H5, State College, Pa.
A. W. Oliver, Houston, Texas.
Wallace W. Smith, Louisville, Ky.
R. Simpson, VK3, Concord, West Australia.
T. D. Smith, W17R1, Burnet, Texas.
George Swanson, Englewood, N. J.
Arnold M. Stanwick, Eau Claire, Wisc.
George E. Shackle, Bolton, England.
Theo. C. Smith, W5F8, Ogdensburg, N. Y.
Israel Sinofsky, W4H153, Passaic, N. J.
J. V. Saxton, W4H48, Bronx, New York City, N. Y.
J. F. Satterthwaite, W9H1, Toledo, Ohio.
C. I. Smith, W7G4, Lancaster, N. Y.
George C. Starry, W7J12, Derry, Pa.
Frank Sekach, W9G18, Chicago, Ill.
Harold I. Tucker, W4G20, West Point, N. Y.
Alfonso Velasco, Mexico City, Mex.
George W. Weaver, Saxton, Pa.
Howard Wilson, Jr., Ithaca, N. Y.
LeRoy Waite, W4F11, Ballston Spa, N. Y.
Troy Welper, Jackson, Mich.
C. M. Whelan, W16S4, Memphis, Tenn.
Kendall Walker, W30D1, Yamhill, Oregon.
Mr. & Mrs. R. E. Weikal, W17L1, Pratt, Kansas.
L. A. Weber, W4H195, East Orange, N. J.
John A. Zieger, W4H107, Englewood, N. J.

Mondays, Wednesdays and Saturdays from 9:30 to 11:30 p.m. and closes with the selection "Blue Danube" which still seems to be quite popular on the air. Some of our friends who understand Spanish quote the announcer as saying, "Nariz del Diablo," which hardly makes sense to them.

HC1RB, 7870 kc., Quito, Ecuador, is the new station being heard regularly. From reports the station slogan is "Dairio Hablado" and the address, Correos Calda, 146, Quito. Some say the announcer gives 7890 kc. as the frequency.

HJ4ABU, 8650 kc., Madellin, Colombia, is the call and frequency announced by the new station now operating from 7:30 to 10:30 p.m. and being heard with good signal, and with English announcements at times. It is understood to be operated by Universidad de Antioquia, located at or near Medellin.

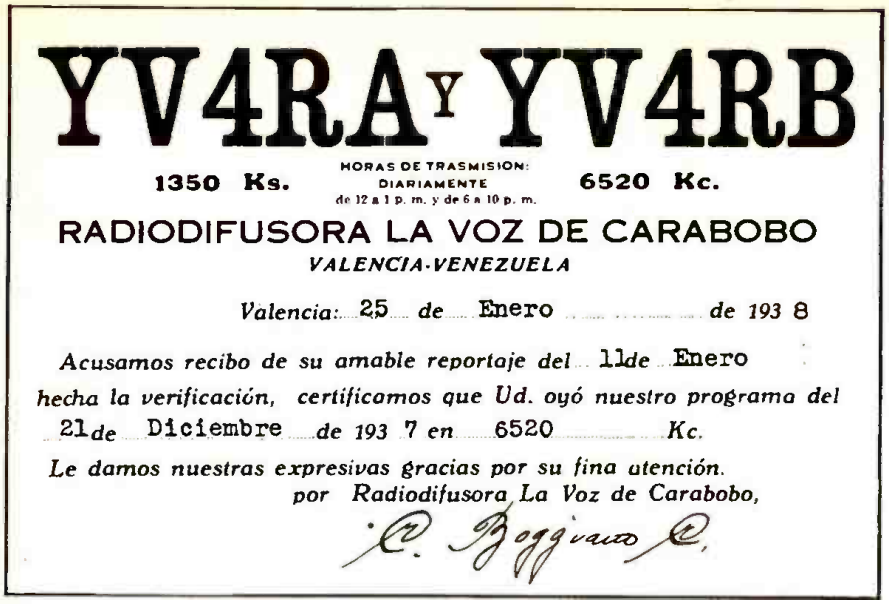
HJ3ABX, 6013 kc., Bogota, Colombia, switched temporarily to 6115 kc., near its former frequency, but is back again at 6013 kc., relaying programs of long-wave station HJ3ABZ as announced.

HKV, 8795 kc., Bogota, Colombia, advises they are using 1 kw. power on news transmissions.

HJ6ABH, 9616.6 kc., Armenia, Colombia, on veri card shows frequency as 9520 kc. and time on air as 8 to 11 a.m. and 6 to 10 p.m. daily. Reports would be appreciated.

HJ4ABP, 4880 kc., Medellin, Colombia, reported as radiating a harmonic on 9760 kc. We are reporting harmonics as heard so listeners may be apprised of the condition and not waste time in learning identity.

CB1180, 11800 kc., to be operated by Broadcasting Sociedad Nacional de Agricultura y Compania, Ltda., is call of new station to be located at Santiago, Chile, and to operate with 1 kw. power.



Calls in red, remainder in black. Picture of transmitter on reverse side.

CB1185 11850 kc., Santiago, Chile, is another new station authorized and to come on the air soon. It is understood that it will operate with 2½ kw. power.

Central Americans

YNLG, 6325 kc., Managua, Nicaragua, has been changed to 6610 kc. Senor Benjamin J. Gierra. L., owner and manager, advises that station has been improved and is now transmitting with 1 kw. power. Slogan, "Ruben Dario"—Radio Nacional. Station also transmits on 920 kc. and irregularly on 14500 kc. or 19.40 meters. Opening theme, "General Marcelo Caraveo" March; opening with bugle call thrice. Morning and afternoon sessions, "Till We Meet Again." Closing theme evenings, waltz, "Good Night Ladies." New schedule shown in station list.

YSM, 11710 kc., San Salvador, El Salvador, is on the air daily from 1 to 2:30 p.m. and YSD, 7894 kc. from 7 to 11 p.m. Sr. Victor M. Escobar, Director of Communications and also Director of stations, advises they have ordered the printing of veri cards and states that they will be forwarded to those who have made reports to the stations.

TG1X, Guatemala City, Guatemala, heard in connection with test programs of TG2 and TGQA, is an experimental call used by Guatemalan authorities.

TG25, Guatemala, heard near 5713 and 5770 kc. is said to be a mobile transmitter. How it fits into the broadcast picture is not yet known.

TIPG, 6410 kc., San Jose, Costa Rica, seems to get out better on its harmonic—12820 kc.—than on its assigned frequency.

TI8WS, 7750 kc., Puntarenas, Costa Rica, being heard at 6370 kc. but dropping the "8" from the call and announcing as "Ecos del Pacifico."

TG2, 6180 kc., Guatemala, is to remain on this frequency, although at present they appear to be near 6210 kc. Still maintaining an excellent signal.

TGQA, the new station at Quezaltenango, in the western part of Guatemala, is on the air on assigned frequency of 6400 kc., although reported from 6420 to 6460 kc. The information on these stations is from Senor Julio Meza Caballeros, Director General of Electrical Communications. Complete schedules of time on the air will be found in lists. Attractive veri cards are furnished by both stations.

YN1GG, 6535 kc., Managua, Nicaragua, reported heard near 6516 kc. and giving slogan as "La Voz de los Lagos." No report yet received from station. Department of Commerce bulletins show frequency as 6540 kc. and operator as Senor Justa Garcia Salnagar.

YNLF, 9595 kc., Managua, Nicaragua, is shown in Department of Commerce bulletin as work on 9650 kc. with 80 watts power. This is the station that claimed 1 kw. power and which nobody hears. Possibly this explains the situation somewhat.

West Indies

VP2LO, 6383 kc., St. Kitts, B. W. I., is on the air each day from 4 to 4:45 p.m. and on Sundays and most holidays from 10 to 10:45 a.m. This station is operated by I. C. A. Radio Sales and Service Laboratories in conjunction with Caribbean Broadcasting Service. The postal address is merely Station VP2LO, P. O. Office 88, St. Kitts, B. W. I. Maximum power is 500 watts phone. Announcements each 15 minutes and sometimes more often. No chimes or signals used. Carrier placed in service 5 minutes before commencement of broadcast. Mr. R. D. Stawart, Manager, states that reports are requested. Just as soon as they receive their new veri cards, they will be promptly forwarded to those who have made correct reports.

"Radio Martinique," 9700 kc., Fort de France, F. W. I., state they are on the air daily from 11:15 a.m. to 12:25 p.m. and 6 to 8 p.m.

"Radio Fort de France," 9450 kc., heard between 9350 and 9400 kc. in evening is also reported as being heard signing off at 6:30 a.m.

PJC1, 5930 kc., Willemstad, Curacao, has been changed to 5929 kc. as assigned. This station also transmits irregularly on 9473 kc. and this frequency has been added to lists.

HIG, 9300 kc., Ciudad Trujillo, Dom. Rep., has been changed from 6280 kc. where formerly shown, as station is not heard on 6280 kc. Slogan is "Radio La Opinion."

COKG, 8920 kc., Santiago, Cuba, has been changed to 8935 kc. as owners of station state they have been assigned the latter frequency. They are now opening and closing their programs with the Cuban musical rumba "La Conga." Station employs three strokes on gong at announcements.

COCX, Havana, Cuba, is back on or close to its frequency of 11435 kc. after a short silence. They are now radiating a stronger and clearer signal.

COCA, Havana, Cuba, shown in list on 9110 kc. announces address as P. O. Box 2488, although the address in station list is that given in the Cuban list of frequencies furnished by the Director of Communications.

Mexicans

XEWI, 11900 kc., Mexico City, is back on the air with much better signal and is said to transmit with 1200 watts power. New schedule, as announced over the air is shown in station list.

XECU, 6075 kc., Guadalajara, Mexico, reported heard with R-8 signal and requesting reports from listeners in the United States.

A report from Mexico City is that the University of Mexico, which operated XEXU on 9600 kc., has recently purchased a new Collins transmitter of 1500 watts power and will operate on 9580 kc. It is understood that transmitter has been already installed, but antennas are not yet completed, but station should be on the air soon. It is not known if the old call will be used or not, but it is assumed that a new call will be assigned.

XEME, Merida, Yucatan, Mexico, has an assigned frequency of 7100 kc., although shown in station lists at 7010, near where it was last heard. Director of Communications advises that station made a few test transmissions but is inactive at present.

(Continued on page 216)

Channel Echoes

By ZEH BOUCK

WHEN RADIO WAS WIRELESS . . . CONVENIENCE AND NECESSITY . . . SWL CARDS

IF anything stirred up a few echoes it was our old timers' contest in the February issue. Several readers were good enough to send in photos of their own equipment of similar vintage. N. J. Popar, W8KDV, who still has a complete 1-kw. spark rig in the attic, contributes Fig. 1, a homemade detector unit for an Audiotron (grand daddy of the Radiotron by lineal ascent —commercially, technically and by name). The leads from the tube connected to the four binding posts on the front of the panel. The semi-circle on the upper left was a carbon resistor segment used to adjust the "B" voltage which was very critical on those old detector tubes. These tubes had two filaments—the second one being available when the first went west. When both filaments were shot (though they were good for many years with careful treatment) you had to return the old tube with $12.00 to get a replacement. (It was always a mystery to us how a person got the first tube!)

Arthur Willhagen, Detroit, Mich., sends us Fig. 2, a photo of his ancient station, 8ACU. He dates this photo 1912 but I think his memory has skipped a notch. The call 8ACU, I believe, was issued for the first time after the war; and, the two tubes shown are DeForest audions of the 1920-1-2 vintage, when the DeForest plant was located at Highbridge, New York City. Also, the honeycomb coils and the unit panels were made by DeForest at that same time. Thanks a lot for the peek into the past, Messrs. Popar and Willhagen.

The prize of the year's subscription goes to Wallace W. Smith, 2851 Grinstead Drive, Louisville, Ky., for the most detailed identification. Writes Mr. Smith—"The upper photo shows a Paragon regenerative receiver. Passing to the next box we have what appears to be an early form of a DeForest audio detector with an Audiotron tube. The switch on the left was for varying the number of flashlight cells in the "B" battery and that to the right was the on-off switch for the "A" battery. The porcelain base rheostat on the end was for adjusting filament current." Mr. Smith identifies the fones as Blitzen or Baldwins. They are certainly not Baldies—and we are inclined to believe they are Western Electrics. In the lower picture, Mr. Smith marks the loose coupler as made by Adams Morgan and sold by William B. Duck. The instrument next to the coupler is a loading coil (or single slide tuner)—"Precision loading coil A-7728 in the Duck 1915 catalog, and the Amco loading coil, number 7728 in the Adams Morgan catalog." (Duck sold it for $2.25, and Adams Morgan, the manufacturer, for $2.50. So the mail order houses were cutting even in those days!) The upper instrument at the extreme right is, of course, the audion detector already described, and immediately below it is a one-stage audion amplifier.

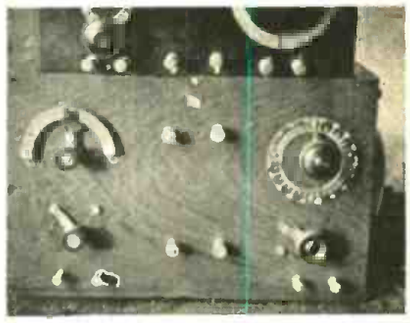


Fig. 1. Relic of ancient sea disaster—found atop Mt. Ararat.

We received a variety of different identifications, including coherors, decoherors and electrolytic detectors. We want to thank the following additional runners-up: Mr. Yeiser, Arnold Grant, Frank M. Holly, Carlton Spencer (W2FBU), Louis Frenkel, Jr., W. A. Battison (W1HE—ex NPM, KHK), James Young (RSSL W7T2) and Henry Magargle, Jr.

✦

THE CONTEST THIS month is for the identification of Fig. 3, page 211, with the advantage to the old timers. There is more to it than mere identification, however, and the free sub will go to the party who can tell the best story about the gadget. (By the way, who is the man in the picture?)

✦

THE WORD HEARD most these days on our domestic news broadcasts is "recession." It is unfortunate that a word employed with such frequency should be so difficult to pronounce. Try saying recession fifteen times fast without stumbling. "Depression" was so much easier to say.

✦

THE EIGHTH WONDER of the world:—The lady who sent in her slogan along with a facsimile and won a prize.

✦

THE BRITISH HAVE developed the serial radio drama to a high art. It is unfortunate that no American sponsor, in his search for something new (which in-

(Continued on page 211)

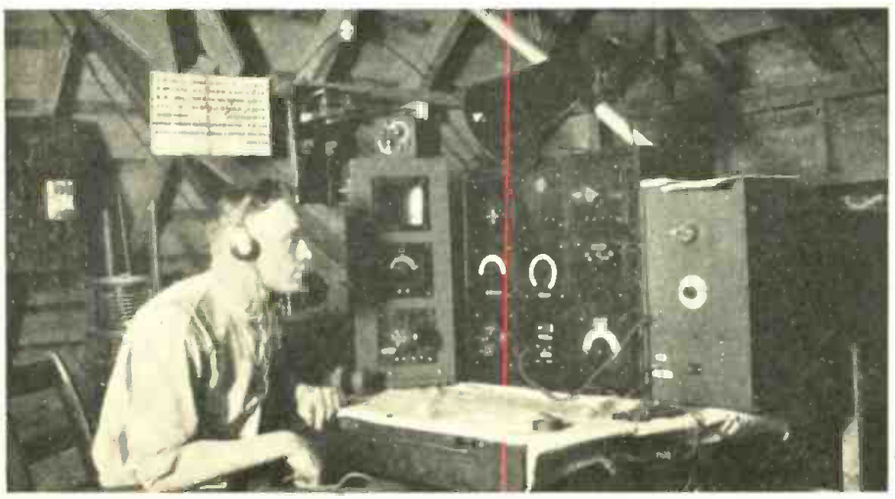


Fig. 2. From an old timer's file—when "radio" was budding and tubes were "audions."

RADIO SIGNAL SURVEY LEAGUE NEWS

R.S.S.L. SERVICE PLUS . . . MacGREGOR SURVEY A NEW HIGH . . . NEW SURVEYS VALUE OF LEAGUE PROVEN . . . MEMBER CORRESPONDENCE . . . OVERSEAS CHAPTER

WHEN VR6A, Pitcairn Island, went on the air, alert monitoring stations were among the first to pick up the signals. Within 24 hours after VR6A was in operation, reports started coming in on reception from this far-off South Pacific isle.

The first reports came from Louis G. Booth, W3G1, of Middletown, Conn.; Ernest Sawyer, W3F84, of West Medway, Mass.; Albert Pickering, Jr., W3F74 of West Medway, Mass.; Roy E. Pichette, W1-4F15 of Northampton, Mass.; J. R. Newcomer, W5H18, of Lititz, Penna., and one report sent to AWR by a friend who is not yet a member—Mr. G. T. Barron, of Philadelphia, Penna. These operators deserve special credit for picking up this new station so promptly. Each will receive 20 Class A credits.

Note the data on frequency and schedule of VR6A in the accompanying box and be sure and send in monitoring reports on this station. The survey will continue until further notice and 20 points will be awarded each month to R.S.S.L. members who send in one or more reports of reception during the month.

MacGregor Survey

Reports from the official R.S.S.L. survey on W10XAB (OX2QY) have set a new high in the annals of the League. The establishment of friendships between members throughout the world, the formation of congenial local chapters, personal correspondence with other members—all this has a very definite and significant place in the organization—but of greatest importance is the collection of definite information of scientific value to the field of radio. The enthusiastic and widespread response of members to this survey definitely shows a growing realization of the purpose of the League.

Charter members at the first meeting of the Chicago World-Wide Dial Chapter. Left to right, seated: Lester Pardini, Frank Anzalone, Charles Trezise, Thomas Barske. Standing: Eric Bristow, Richard Spiralke, Edward Schenk, George Flint, Kenneth Miller, Gail Beyer, Robert Irwin (Pres.), and Thomas Grey.

Roy Chisholm, W10H2, President of the Jackson Short-Wave League, and Troy Welper, W1OH, Supervisor of the Jackson Radio Signal Survey League (Mich.) led a combined drive of both organizations to eliminate local man-made interference. Mr. Chisholm is shown pointing at a menace—an electrical vibrator.

The MacGregor survey will terminate April 30th and a complete report analysis will appear in the June issue of AWR. Now is the time to send in final reports on this survey for which 20 merit points will be awarded toward Class "A" ratings.

New Surveys

It is perhaps too early to predict the results of the CMGF-COGF survey announced in the March issue. Early indications, however, are that the signals have not been reaching the United States as well as did those of the MacGregor Expedition which had the advantage of high antenna masts and a clear area.

A survey on the "Voice of Costa Rica," TI4NRH, is scheduled for the third week in May. (May 16-21 inclusive). Advance notice of this survey is given here for the benefit of our overseas members who might not receive their copies of the May issue in time. Full details of the attractive diploma this station will award listeners who can prove reception will appear in the May issue.

TI4NRH is one of the five original short-wave broadcast stations of the world and the owner-operator, Amanda Cespedes Marin, is an outstanding advocate of "Peace on earth—Good will to men."

R.S.S.L. Gets Action

Manifestly, it is impossible for the League to clear up all cases of interference, but gradually, with the cooperation of members, satisfactory results are being obtained. A recent case illustrates the manner in which this is being effected: Class "A" monitoring station W6H5 reported that the sixth harmonic of a well-known station in the Standard Broadcast Band was causing interference in the short-wave channels. The attention of the station management was called by League Headquarters to this harmonic emission and the following letter received in reply: "Director, R.S.S.L.: Your letter addressed to .... commenting on reported reception of sixth harmonic signals has come to my attention. We appreciate your interest in this matter and we are investigating the adjustment of the transmitter regarding the radiation of power at 5960 kc. We will be glad to receive any further comments you may receive from your members regarding this harmonic. Sincerely yours, ... Chief Engineer, Radio Broadcasting . . . . ."

Thus through a harmonic report of one of the League members, reception will probably be improved for all by the elimination of this interfering signal. Reports are always welcome giving specific details of such harmonic radiations which cause interference. They are a real help in eliminating QRM. For such voluntary reports, 5 Class "A" points will be awarded.

Photos and "QSL" Cards Wanted

Although it is impossible to print photos

of all members and their monitoring stations, we would like to have one of each member for a permanent record at New York Headquarters. The photo should be clear and sharp and show not only the member but his equipment. Each month, outstanding snapshots will appear in this department. Unusually attractive "QSL" cards have been recently received from: "Carl & Ann" Eder, W15F6; David Hutchinson, W3G23; John M. Unkefer, W8H14; Clarence O. Schwengel, W12G3; Dick Cahill, W17H1; L. E. McNamara, W29M37; and Matthew E. Leshner, W3F32. Unusual cards are always of interest.

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

No. 8—VR6A, Pitcairn Island

Official survey on this station, the equipment for which was described in the February issue, will continue until further notice. Usual operating frequencies are 14,346 kc. and 7,245 kc. VR6A is on the air most evenings after midnight, E.S.T. Credit of 20 points for reports.

No. 9—TI4NRH, Costa Rica

Advance notice for overseas members. Special program in May. R.S.S.L. survey from May 15th to 21st inclusive. May 15th—7 to 8 a.m., E.S.T. May 16th to 21st—9 to 10 p.m. All broadcasts on 9670 kc. and 980 kc. May 19th specially dedicated to R.S.S.L. members. Credit of 10 points for reports.

***MacGregor Expedition, W10XAB (WAWG or OX2QY).* Official survey No. 7 continues for the month of April, closing April 30th. Most transmissions are on 14,368 kc. after 7:30 p.m., E.S.T. Credit of 20 points for reports.**

QRR

Again "QRR", the ham radio symbol for a land emergency, comparable to "SOS" at sea, has pierced the air. Again last month, flood waters inundated scores of California towns, bringing death, disease and distress to hundreds. And once more amateur radio was instrumental in setting up emergency communication and keeping isolated localities in touch with the outside world.

Space does not permit an attempt to list the many individuals throughout the country who played important parts in this work. However, there is a thought here for the R.S.S.L. member. Why not build up portable receivers? In the event of emergencies there is a real need for sets of this type. In the extensive Mississippi and Ohio floods of '37, auto-radio sets were pressed into use, and portable receivers were placed in small boats engaged in rescue work. R.S.S.L. members could well maintain such equipment and in the event of emergency, offer it to local authorities together with their own services as operators.

In connection with the above, there is urgent need for portable short-wave equipment which operates from dry cells as well as storage batteries. The accompanying photograph illustrates the portable equipment of Clyde Criswell, W26P1, of Mission Ranch, Phoenix, Ariz. Sectional antenna masts are erected to a height of about 20 feet and fastened to the front and rear bumpers of his car. These masts support a "T" type antenna. In addition to emergency application, portable receivers are useful on summer vacations.

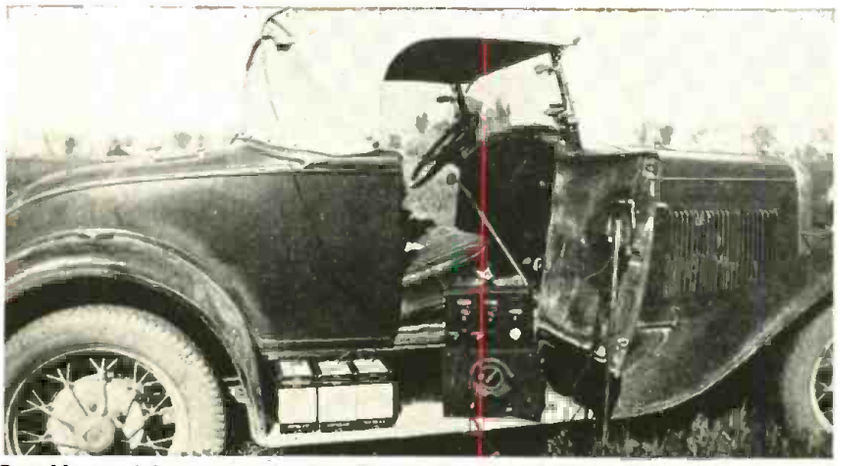
Local R.S.S.L. chapters interested in organizing emergency units should write directly to headquarters for advice and assistance. Emergency service is another important function of the League.

With R.S.S.L. Members

David Brown, W4H113; 221-12 92 Ave., Queens Village, N. Y., is eager to form a local chapter. Interested members and prospective members living near Queens Village should drop him a line.

Roy E. Chisholm, W10H2, Asst. Survey Supervisor of the Jackson (Mich.) R.S.S.L. Chapter sends us this brief pen picture of himself: He served in the World War and in 1910 helped raise the U.S.S. Maine from the bottom of Havana Harbor, Cuba; now a member of the Rose City, American Legion Post No. 324; has been around the world once, to Honolulu twice, through the Panama Canal twice; and has travelled over 34,000 miles. He has cooperated in rescue work in Ohio, Florida and other states; has been a movie actor, and was Scoutmaster of Troop 6, Boy Scouts of America, of Jackson. Has voted in Florida, California and Hawaii as well as his present home state of Michigan. And in addition to all this, may we add that Mr. Chisholm is one of our most active R.S.S.L. members.

Robert E. Soutar, VE7G1, of Hamilton, Ont., Canada, is well known as an aviator and is district delegate of the Flying Aces Club. With his 16-tube receiver, he makes a hobby of DXing and carries on an extensive correspondence with Great Britain and Ireland, Germany, South Africa, China, Cuba, Mexico, British Guiana, Australia and India. He has crossed the Atlantic seven times to visit his native Scotland and spent many vacations at Atlantic City, N. J., where he expects to be this summer. He would be glad to visit any R.S.S.L. members in the vicinity. Those interested should write directly to Mr. Soutar, whose address is 58 Delaware Ave., Hamilton, Ont., Canada.



Portable receiving equipment installed in the car of Clyde Criswell, W26P1, of Mission Ranch, Phoenix, Arizona. An example of a fine set-up for operation in case of emergency.

DX RECEPTION CITATIONS

SHORT-WAVE BROADCAST BANDS

(Tenth Degree)

Henry V. Miner, 42 Royal St., Wollaston, Mass.

(Seventh Degree)

Stanley La Rue, 309 So. Bedford Drive, Beverly Hills, Calif.

(Fifth Degree)

Arthur F. G. Bruder, 11 Everett St., Allston, Mass.

(Third Degree)

Bill King, W30D3, 604 N. 1st St., Silverton, Ore.

(Second Degree)

Fred Atherton, W4F1, 23 Royce St., Rutland, Vt.

Norman Ebling, 6028 S.E. 51st Ave., Portland, Ore.

Robert F. Rowser, Ammunition Depot Qrts. A-51, Mare Island, Calif.

(First Degree)

Sidney Bockner, 10 Linthorpe Road, Stamford Hill, N. 16, London, England.

J. Raymond Newcomer, R.F.D. 2, Lititz, Lancaster Co., Pa.

C. Davis Jaffe, W5L2, North Shore Road, Algonquin Park, Norfolk, Va.

Elvyn L. Barker, W3E4, 27 Riverview St., Portland, Maine.

Ralph Horton, W10H15, 709 First St., Jackson, Mich.

R. D. Powell, W4H10, 828 N. 4th St., Camden, N. J.

Lee Meade Williams, W5J28, 718 Allendale St., Baltimore, Md.

Gail T. Beyer, W9-11H55, 3226 Sunnyside Ave., Chicago, Ill.

Curtis F. Keirstead, W3F5, 28 Linden St., Framingham, Mass.

P. T. Brogan, 530-A Daisy Ave., Long Beach, Calif.

Edward Davis, W4H15I, 2436 E. 23rd St., Brooklyn, N. Y.

AMATEUR PHONE BANDS

(Second Degree)

George J. Glasspool, G74, 30 Duke St., Southampton, Hants, England.

Many R.S.S.L. members are connected with the military or naval service. A complete list of such "service" members is being prepared for publication. If you are a member of the Army, Navy, or Marine Corps in any capacity, either active or reserve; or if you are a member of the National Guard, or of an R.O.T.C. unit, please drop us a post card giving your name, rank and organization.

With the Chapters

The Port Washington (Wis.) Chapter No. 1 has sent a complete report of its survey on W10XAB to headquarters. W. F. Klopp, W12G2, secretary, writes that this chapter plans to handle all surveys as a unit. Each member will be assigned to monitor on a different night so that the station will be observed throughout the survey. Such a continuous monitoring plan is certain to produce data of great value.

Curtis F. Keirstead, W3F5, Secretary of the Mohawk (Mass.) Chapter was responsible for arranging the special survey with TI4NRH in May. The Mohawk Chapter seems to be on the job with some new achievement each month.

International R.S.S.L.

The first charter to an overseas chapter of the R.S.S.L. has recently been granted by the Board of Directors to the "Bolton & District Chapter of the R.S.S.L." at Bolton, Lancashire, England. George Hare, G13, District Manager of the Midland and Northern Counties Area assisted in the organization of the chapter. The charter members are: Percy Jones, (Radio 2ABF), G13-1, *Survey Supervisor;* Norman Moorcroft, (Radio 2ABT), G23, 218, Deane Road, Bolton, Lancs., England, *Secretary;* Harold Willets, G41; John Evans, G73; George E. Shackle, G72. Anyone interested in attending the meetings should address the secretary. Congratulations to Bolton & District Chapter.

The second overseas chapter application is the "East Ham & District Radio Society" of London, England. F. R. Stringer, G3, has sent us formal notice of this proposed affiliation and a full list of members will be published upon receipt at headquarters.

Mars Reached!

William E. Isaacs, G33, Bulstrode, Garrards Cross, Bucks, England, writes us that a fellow member of the W.F.S.R.A. has been experimenting 16 years with interplanetary communication by using Geissler tubes on a beam and now has photographic "proof" of two-way contact with Mars. Mr. Isaacs is looking forward to an opportunity of personally seeing this interesting set, which without tubes, aerial or ground, claims to work Mars. Wonder how they will send QSL cards from there! A veri from Mars ought to be quite something! Well, perhaps in a few years, there will be a "Worked All Planets" Citation, but we fear it is in the very remote future.

How's Your Antenna?

There are few simple things that will pep up your set or prove of greater assistance in DXing than checking aerial connections. If you haven't already tried the newer type aerials, now is the time to do so. Scores of reports from members mention the improvement of reception through the erection of better aerials. C. F. Keirstead, W3F5, of Framingham, Mass., has two new antennas—one a 92-foot doublet, running north and south and 45 ft. high; the other a rotary beam cut to precisely ¼-wave of 31 meters. It has given a great deal of gain in the direction it is pointing, especially on the 9-10,500 kc. band on which all continents have been heard.

(Continued on page 224)

NEW R.S.S.L. MEMBERS

ALABAMA
Arthur Phillips, Jr., Birmingham—W10P3
Johnnie Johnson, Jasper—W11P1

ARKANSAS
James Lee Ford, Newport—W13N1

CALIFORNIA
Geannie Costa, Benicia—W31J10
Clifford Costa, Benicia—W31J11
Leonard E. McNamara, Los Angeles—W29M37
John Cottam, Lynwood—W29M38
Jim Wilson, Maywood—W29M36
Ray Lancaster, San Francisco—W31J9

COLORADO
James J. Doyle, Florence—W21L1

CONNECTICUT
Samuel Leonard Dale, Middletown—W4G25
Allen Milton Raymond, Plainville—W3G37

GEORGIA
Carroll Ruffin Patterson, Atlanta—W7P1

IDAHO
Gilpin Amos, Kellogg—W26C8

ILLINOIS
Frank E. Trager, Berwyn—W11H72
Chester Roman, Chicago—W11H70
William Ross, Chicago—W11H74

INDIANA
Thomas H. McCormack, Culver—W11J8
Edward S. Bittner, East Chicago—W11H71
Carl A. Kowalski, Fort Wayne—W10J3
Paul Maxwell, Fort Wayne—W10J4
Vieva V. Stout, Fort Wayne—W10J5
Darwin Stout, Fort Wayne—W10J6
Carl McKaye, Fort Wayne—W10J7
Mrs. Carl A. Kowalski, Fort Wayne—W10J8
Robert J. Rex, Valparaiso—W11H73

IOWA
Robert E. Campbell, Iowa City—W14H5
John A. Bush, Mallard—W15G1
Lavern D. Mitchell, Marquette—W13G3

KANSAS
Henry L. Muth, Washington—W17K1

LOUISIANA
John B. Gordon, Baton Rouge—W13R1
William H. Bell, Monroe—W14Q1

MAINE
Anthony J. Plekowecz, Auburn—W3E13

MARYLAND
Frederick Ralph Emmel, Baltimore—W5J25

MASSACHUSETTS
Carl L. Horton, Athal—W3F80
Winward Prescott, Brookline—W3F82
Lester Linterdorfel, Holyoke—W4G26
David Strachan, Holyoke—W4G27
Henry Edgar Manning, Medway—W3F83
Gilbert L. Harris, North Adams—W4F17
Alfred Edward Arnold, Springfield—W3G38
Edward C. Hatch, West Medford—W3F81
Ernest Donald Sawyer, West Medway—W3F84

MICHIGAN
Henry W. Gostyla, Detroit—W9H12
Roy W. Fishmeister, Jackson—W10H19
Norman R. Zemer, Michigan Center—W10H20
Wendell Ashton, Ypsilanti—W9H11

MISSISSIPPI
George H. Peacock, Grenada—W12P1

MISSOURI
James Harold Mickey, Jr., Kansas City—W15K8
Benjamin F. Crawford, Jr., Kansas City—W15K9
Bill Cavins, Kansas City—W15K10
Dow B. Summers, Unionville—W15J1

NEW HAMPSHIRE
Wayne A. Langill, Claremont—W3F79
Richard James Holland, Gonic—W3F76
Carl Hamilton, Gonic—W3F78
Laurence H. Haselton, Keene—W3F77

NEW JERSEY
Steven P. Veres, Garfield—W4H211
William B. Crowell, Hightstown—W4H214
Frank Adrian, Jr., Maplewood—W4H200
Louis William Gruenberg, Midland Park—W4H198
Dominick Vassale, Newark—W4H197
George Pagonis, Paterson—W4H205
Richard C. Airhart, Roselle—W4H203
Elbert Clarence Games, Trenton—W4H202
George E. Burger, Jr., Union City—W4H207

NEW YORK
Junior Imbrie Rhodes, Jordan—W6F5
Donald Lynne, Larchmont—W4H199
Lynn M. Losee, Middlehurgh—W5G5
Charles F. Pease, Mumford—W6G4
Elliott Wolheim, New York City—W4H201
Franz Beno Kurlh, New York City—W4H206
Daniel Parke, New York City—W4H208
Bernard Ravin, New York City—W4H209
Murray Buitekant, New York City—W4H210
Horace L. Ingersoll, New York City—W4H215
Richard W. Fales, Roslyn Heights—W4H204
Richard Noel, South Wales—W7G15

OHIO
Myron F. Boden, Barberton—W8H31
Stan Elcheshen, Cleveland—W8H30
John William MacGregor, Cleveland—W8H32
Louis J. Psota, Cleveland—W8H33
Jack Carl Beck, Wooster—W8H34

OKLAHOMA
Frank E. McFarlin, Ponca City—W17M5

PENNSYLVANIA
George M. Altstetter, Clarion—W7H4
Thomas F. Dolan, Jr., Downingtown—W5J26
Mrs. LeRoy Merritt, Johnstown—W7J18
J. Raymond Newcomer, Lititz—W5H18
Kenneth White, Palmerton—W5H17
Paul A. Burrough, Philadelphia—W4H212
James W. Hart, Jr., Philadelphia—W4H213
Charles Wilson, Phoenixville—W5H16
Stuart D. Kreisher, Reading—W5H15

SOUTH DAKOTA
Dwight Howard Sholl, Hot Springs—W20G1

VIRGINIA
William Tyler Page, III, Arlington—W5J27
Epperson E. Dye, Meadowview—W8L8
H. Richard Rouse, Norfolk—W5L4
Jack Varner, Roanoke—W7L4

WISCONSIN
Fourest Auringer, Madison—W12G20

CANADIAN AND OVERSEAS MEMBERS

CANADA
Howard Carter, Chilliwack, B. C.—VE28A1
F. Holme, London, Ontario—VE8G8

CANAL ZONE
Felix E. Quayle, France Field—K5Z3

ENGLAND
Kenneth Norman Marwood, Mapperley, Notts.—G80
Edmund Wilkinson, Anderby, Lincolnshire—G82
John F. N. Wedge, London, S.E. 23—G83
Dennis Edgar Moorcock, London, S.E. 9—G84
Thomas Leslie Harwood Atkinson, Whitley Bay—G85
Norman Henry Hyde, Edmonton, N. 9, London—G86
Norman Frederick Charles Aubury, Ramsgate, Kent—G87
Richard Millson Shardlow, Sheffield, Yorkshire—G88
Frederick Stephen Alfred Jenkins, Rochford, Essex—G89
Mrs. Thomas Leonard Stevens, Wellington, Shropshire—G90
Thomas Leonard Stevens, Wellington, Shropshire—G91
H. Doughty, Welbourn, Lincs.—G92
Christopher Dennison Hammett, Middlesex—G94
Frederick Charles Judd, South Woodford, E. 18, Essex—G95
Harold Clark, Leadenham, Lincolnshire—G96
Ronald William Browning, Chigwell, Essex—G97
Cecil Woodman Torrens, Ferndown, Dorset—G98

GERMANY
Dr. H. A. Hess, Ulm (Donau)—D1

HAWAII
Douglas Worcester, Honolulu—KH1

POLAND
Ing. P. Piórko, E.E., Lodz—SP1

SOUTH AFRICA
Frederick William Hockey, Johannesburg, Transvaal—ZS2

Ultra-High

By PERRY FERRELL, Jr.

WAVES AND WEATHER . . . W8XWJ HI-FI . . . W2XOY BACK . . . U-H-F REPORTS

IT was only recently we noticed that a large percentage of the u.h.f. listeners were unaware of the fact that many of the police broadcasting stations will verify correct and helpful reports of reception.

We do not deem it worth while to recite what must be in a good report as every listener with any experience should already know the points. It is more worth while, though, to put special emphasis on the weather conditions and receiver used than it is necessary for the general run of reports. The listener will find his reports better accepted by stations that operate above 37 mc. and are over 2000 miles away.

Broadcast Stations

W2XOY, 41.0 mc., Albany, N. Y., is back on the air. Their schedule is rather short, being Monday, Wednesday and Friday nights from 8 to 9 p.m.; also Saturday afternoons from 3 to 5, but will probably be extended in the near future. This station is also operated at irregular intervals for testing purposes. All reports should be addressed to: W2XOY, General Electric Co., Schenectady, New York.

W4XBW, 31.6 mc., Chattanooga, Tenn., announces that they are on the air daily from 8 to 12:30 a.m. with 100 watts. Now using a vertical J antenna, 250 feet high. Whether they verify reports or not, is still a mystery.

W8XNU, 25.95 mc., Cincinnati, Ohio: At this writing the date for the start of regular operation has not been set. Their antenna will be a vertical half-wave, fed by a quarter-wave matching stub and concentric line. Actually the top portion of the antenna will be part of WSAI's 225-foot vertical radiator. All reports will be verified by the usual letter form.

W8XWJ, 41.0 mc., Detroit, Mich. We have received several reports pertaining to the fine tone and general quality of this station's new transmitter. Congrats to the first true high-fidelity station on the u.h.f. As they also handle special programs, they devote broadcast time to the IDA-ACC every Thursday from 10:15 to 10:30 p.m.

LAST-MINUTE FLASHES

More information on W8XWJ from Frank Sekach, W9G18. Besides the weekly I.D.A., A.C.C. program, they conduct nightly classes in code practice. Time 10:30 p.m.

We also have received several reports of a new television voice channel on 41.5 mc. Can it be that the Netherlands is now offering regular programs?

W10XDD, 31.1 mc., Evansville, Ind., has been heard recently airing its 25 watts between 1 and 2 p.m.

W9XUY, Omaha, Nebr., is a new western broadcast station reported and verified by Mr. L. A. Weber, W4H195, East Orange, N. J. W9XUY was then operating on 31.6 mc., between 6:00 and 6:30 p.m. Address is c/o KOIL, Central States Broadcasting System, Omaha, Nebraska. Like all other u.h.f. stations, W9XUY is allowed to operate on any of the four broadcast frequencies at will.

Experimental Stations

What under-modulated station is testing on about 30.5 mc.? Your writer has heard this station several times in the afternoon.

What three stations are testing daily on 38.7, 38.75 and 39.0 mc.? Clyde Criswell heard the one on 39.0 announce as follows, "This is WWLC, The Agricultural Experimental Station at Beltsville (probably in Maryland; author) testing with station 1—2—54."

Where is W1XOU? Also heard by Clyde C. They announce, "This is W1XOU, mobile unit testing experimentally on 39,700 kc."

Where is W10XQ? Reported by a Conn. listener operating in the 56-mc. band, supposingly associated with the N.B.C.

And who has dope on W5XEG? Location of this station is still unknown. Can be heard daily by eastern listeners on 30.1 mc.

Who owns and operates W4XIV? Heard testing on 37.6 mc.

Who is the female police dispatcher on 37.1 mc.? This station also can be heard by east-coast listeners.

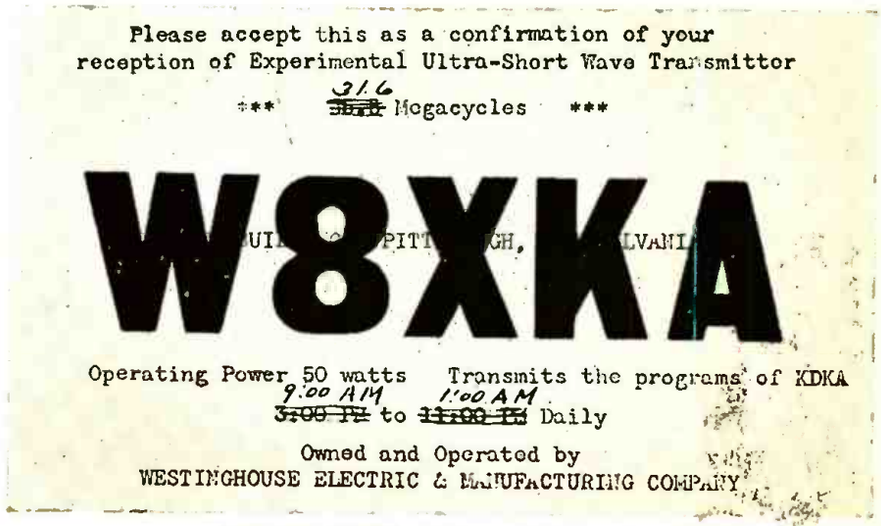
We wonder how many stations there are atop Mt. Washington? As we write this W1XER, W1XR, W1XW, W1XOY and W1XMX appear to be up there.

Let's Go Technical

The most interesting and the newest field open to the experimenter and the listener inclined toward the scientific side of listening is that of comparing reception with the various natural phenomena, i.e., humidity, temperature and barometric pressure. And then being able to concur definite rules that have little fault.

Probably the best known rule is, "Short skip on 10, listen on 5." Short and simple, but nevertheless true and effective. But of course this rule had to be based on facts obtained by tireless

(Continued on page 213)



Veri from W8XKA—31.6 mc. Call in red.

Night-Owl Hoots

By RAY LA ROCQUE

FREAK RECEPTION . . . CONTEST NEWS . . . APRIL FOOLISHNESS . . . F.C.C. FREAK TEST REVISIONS . . . CUBAN LEAP FROG . . . DANZIG ON 1303 . . . IMPOTENT VERIES

APRIL FOOL'S day ushers in the final month of actual competition in the ALL-WAVE RADIO contest, but we're not fooling you one iota when we say that it also brings down the curtain on one of the most unusual seasons in DX history. We use the expression unusual and we mean just that—reception conditions varied from one extreme to the other.

During the middle and latter part of January when the aurora borealis was generally visible throughout the length and breadth of the land, reception hit a new low, and it was difficult to hear stations over 500 miles away after sundown.

However, there were also several periods of very excellent reception. Europeans were far below par in general, but they did break through in fine style on a few mornings.

Reception from the South was the feature of the season and never before had the Chief been able to log the Latin-American stations so consistently as this season. The mid-winter slump, customary for the "Aussies" and "Zedders" was more profound than usual, but they rallied with renewed vigor to close the season in a blaze of glory.

All in all, the 1937-38 DX season put somewhat of a kink in the sunspot theory—for the morning of February 21st, which was supposed to bring about a new low in broadcast signals due to the abundance of spots on the sun, brought the best Western reception ever enjoyed on the East coast. KHBC (250 watts) in Hilo, Hawaii, on this particular morning had our R-meter flirting with 9 plus on peaks and was fully as good as WAAB, 10 kilocycles away!

The DX Forecast and the Time Table appear for the last time this month, but both these features will be renewed in September. Their discontinuance does not mean that DX will be nil, for there will be several periods of good DX to be found during the warmer months. There will still be plenty of DX for the DXer who intends to stick to the dials throughout the summer. However, material for the Time Table will be at a premium, and the uncertainties of forecasting Summer reception make it advisable to discontinue these departments till Fall. Meanwhile, interest will be centered on the progress of the Championship DX Contest which closes this month.

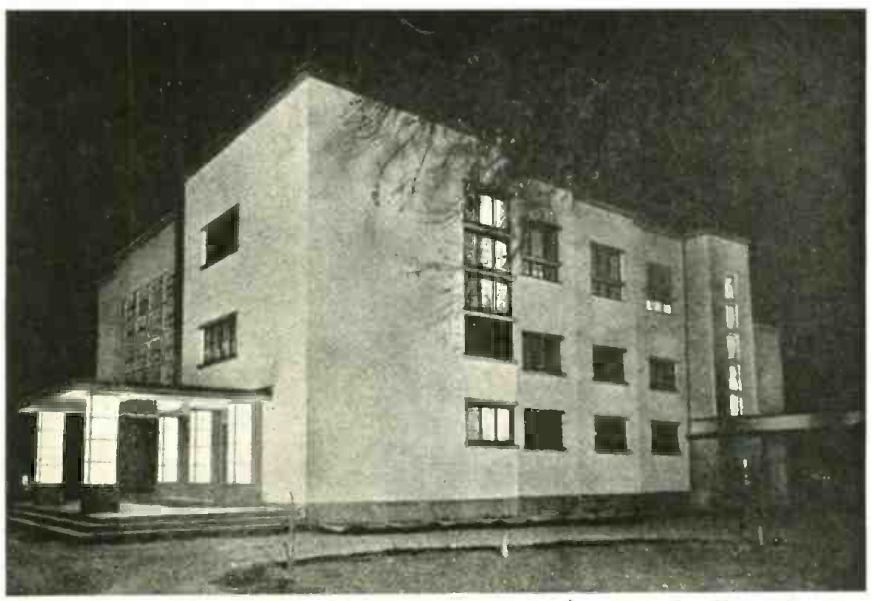


Photo of the new transmitter building of the station at Frankfurt Am Main, Germany.

STATION CHANGES, U. S. A.

New Stations

KYSM Mankato, Minnesota 1500 kc. *250* w.

Call Assigned

WGIL to Galesburg, Ill. on 1500 kc.

Power

WMMN (890 kc.) 500 to 1000
KSOO (1110 kc.) 2500 to 5000

STATION CHANGES. FOREIGN

New Stations

——— Zurich, Switzerland 1375 kc. 300 w.
CMBF Havana, Cuba 770 kc. 5000 w.
CMBQ Havana, Cuba 680 kc. 5000 w.
CMKS Guantanamo, Cuba 960 kc. ———

Frequency

CMBD 1170 to 1260 kc.
CMBS 770 to 1170 kc.
CMCY 1030 to 570 kc.

Power

CMBZ (1000) 500 to 5000 w.
CMCA (1350) 200 to 5000 w.
CMCF (810) 600 to 5000 w.
CMCJ (1110) 500 to 5000 w.
CMCY (570) 8000 to 10000 w.

Contest News

Six more percentage points were added by Bob Wilson to his robust average, and the Maine DXer is slowly and steadily pulling away from the rest of the boys. Runner-up position was assumed by Carroll Weyrich, replacing H. Orlaw, who dropped out of competition. Tommy Tarr remained in third place, but lost ground due to the mid-winter slump in TP signals. The standings follow:

C. Robert Wilson, Portland Maine (2)	84.6
Carroll Weyrich, Baltimore, Md. (4)	67.3
Anthony C. Tarr, Seattle, Wash. (1)	63.5
Richard Holland, Gonic, N. H. (2)	59.3
Joseph T. Lippincott,** Medford, Mass. (2)	59.1
Albert Bartholomew,* Bradford, N. Y. (6)	49.7
William Vornkahl, Westport, Conn. (6)	49.7
Harry Honda, Los Angeles, Calif. (1)	44.3
Stanley Brus, North Braddock, Pa. (5)	42.8
Robert Skyten, E. Brookfield, Mass. (8)	42.1
Richard Wright, Chicago, Ill. (7)	40.6
Ray Sahlbach, St. Louis, Mo. (7)	35.9
Vincent Stasen, Philadelphia, Pa. (5)	35.7
Bill Stone,* Toronto, Ontario (6)	32.4
Curtis Keirstead, Framingham, Mass. (8)	26.4
Edward Urban, Cleveland Heights, Ohio (6)	26.3
Earl Lever, Worcester, Mass. (8)	23.9
Kendall Walker, Yamhill, Ore. (3)	21.3
Mike Godjos, East Chicago, Ind. (9)	13.1
Walter Gyngell, Saratoga Springs, N. Y. (10)	10.7

Jack McKelvey, Los Angeles, Calif. (1)	10.4
Harry Snyder, Trenton, N. J. (10)	9.2
Chester Wheeler, Milford, N. H. (2)	5.5

Note: (*) Contestant missed one week of competition. (**) Contestant missed two weeks of competition. Reports in both cases will be made up the following month.

Richard Holland and Joe Lippincott, who have teamed with Wilson to make the New Englanders an almost unbeatable combination, also fattened their averages and began to close the gap between themselves and the runner-up position. Tony Tarr has started hearing the TP's again and you can bet that he'll be pressing Wilson for top honors next month. Stan Brus and Bob Skyten did very well in January and jumped six places in the standing.

Team Competition

The Internationals and the Keystones were the only teams to escape the onslaught of the Baltimore team during January—and they did so only because they were not scheduled to face the Boosters. Yessir, the Boosters mowed 'em down with seven wins and no defeats for their January score. The lead in team standing has changed three times in three months of competition. It will be close right down to the finish, with any of the first five teams very much in the competition. The standing:

	Won	Lost	Tied
Baltimore N.N.R.C. Boosters (4)	19	3	—
R.S.S.L. New Englanders (2)	18	3	—
R.S.S.L. Pacific Phantoms (1)	16	5	1
R.S.S.L. Keystone Owls (5)	13	7	1
N.N.R.C. Canadian - Americans (6)	13	8	1
R.S.S.L. Internationals (3)	8	14	—
R.S.S.L. Midwesterners (7)	7	14	1
R.S.S.L. Bay Staters (8)	7	14	—
R.S.S.L. Independents (9)	4	17	—
R.S.S.L. Northeasterners (10)	1	21	—

Note: The Numbers in parenthesis show the team number. To find the members associated with each team—match these numbers with the numbers in the individual standing.

Records: No records were broken in the individual competition, and Tony Tarr and Bob Wilson still are co-holders of the record with 1000 points. Bob, however, equalled his record six times in January—missing it twice in the first two periods of competition. Richard Holland and Carroll Weyrich missed joining the boys by one report. They scored 950's.

In the team competition the New Englanders (period Jan. 19-22) shattered their own record and hung up a score that will undoubtedly stand as a permanent record—4000 points against the Can-Ams' 951. Another record during January: The Northeasterners finally won a game! They trimmed the Independents 262-9 in the Jan. 19-22 period. Two tie games occurred in January between the Phantoms and Can-Ams, and the other between the Keystones and Midwesterners.

Veri from JBCK, Japan, received by Ike Davis, Elkhart, Texas. Sun's rays in violet.

With the Night Owls

Richard Wright (W11H6), Chicago, Illinois: "I have received a letter from ZNS. They list their schedule daily except Sunday: 1:30-1:45 p.m., 8:00-9:00 p.m., 10:30-11:00 p.m. Sunday 8:00-9:00 p.m. E.S.T. I hope to be able to hear transmission three some evening." (Since writing this Dick has heard ZNS.—*Chief)*

Carroll Weyrich, Baltimore, Md.: "CMCW is now on 1140 kc. CMBG is now broadcasting until midnight daily on 1455 kc. TGW seems permanently located on 1525 kc. The station on 1050 kc. is HJ3ABX in Bogota. I heard them with very slight interference from CBM last evening, and the fine part about it is that they *verify* through the QRC."

ALL-WAVE RADIO'S
Time Table of DX Programs
(All schedules in E. S. T.)

Specials

SUNDAY MORNING, APRIL 3

WJBO	Baton Rouge, La.	1120 kc. 2:00-4:00

SATURDAY MORNING, APRIL 9

WGAR	Cleveland, Ohio (UDXC)	1450 kc. 3:30-5:30

SUNDAY MORNING, APRIL 24

WJBO	Baton Rouge, La.	1120 kc. 2:00-4:00

Regulars

EVERY SUNDAY MORNING

KMTR	Los Angeles, Calif.	570 kc. 3:00-3:30
KVOO	Tulsa, Oklahoma	1140 kc. 12:00-1:30
HJ1ABH	Barranquilla, Colombia	1080 kc. 12:00-3:00
LR3	Buenos Aires, Argentina	950 kc. 12:00-1:30
WDAE	Tampa, Florida	1220 kc. 12:00-3:00

Frank Sekach (W9G18), Detroit, Mich. "Local CBW, 600 kc. at Windsor is now off the air permanently. The CBC in a burst of economy figured that CBL at Toronto could serve both Michigan and Ontario. They can, until XERA comes on the air. CMCF, 810 kc., has succeeded in shoving WCCO right off the ether."

Walter Schwab (W4H170), New York City: "WNEL advises me that the power has been increased to 2500 watts. The station's address is Mr. Juan Piza, Brau 59 or P. O. Box 1252, Sol St. 99, San Juan, Puerto Rico."

C. R. "Bob" Wilson (W3E3), Portland, Maine: "I'd suggest an antenna of 78 feet (flat top) on 114 feet pointed approximately 55° East of North from your location if space is at a premium, but if you have the space, use multiples of 114 feet up to 798 feet where noise to signal ratio becomes too high for comfort." (Boys—and girls, in this last paragraph lies the secret of good TA reception for it comes from one whose contest reports prove, should know what it's all about.—*Chief)*

The Aurora Night Hawk, Aurora, Illinois. "I heard a station on 1455 kc, which announced as CMBE. The location was interpreted as being Havana. An unidentified station is heard on 1175 kc. at about 1-2 a.m." (The Night Hawk neglected to place his return QRA on the letter and we have been unable to reach him, but for his information, the 1455 Cuban is CMBG which, in the Cuban Spanish, sounds very much like E. The difference is that G has somewhat of an aspirated sound, almost like the word "hey" in English. The 1175 station still remains unidentified.—*Chief)*

Edward Ayvazian, (W3F14), W. Newton, Mass.: "WGAR will DX on April 9, from 3:30-5:30 a.m. for the UDXC."

(Continued on page 225)

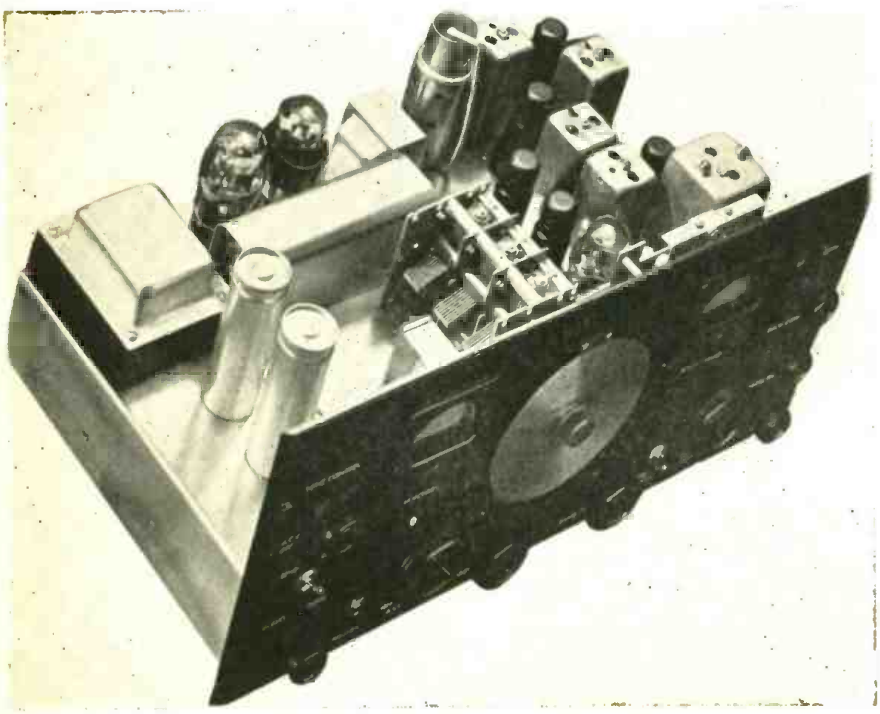
THE HALLICRAFTERS SKY CHALLENGER II

A PROVING-POST REVIEW

HALLICRAFTERS has hit another high spot in the design of the Challenger II, successor to the original Sky Challenger of last year and a close relative to the 1938 Super Skyrider.

It might be remarked at the outset that the Challenger II is not only similar in general appearance to the Super Skyrider, but also has many of the Skyrider's circuit features. A comparison of the diagram of the Challenger II on the opposite page with that of the Super Skyrider, shown on page 585 of the November 1937 issue of ALL-WAVE RADIO, will show that both employ a similar r.f. and depart in design principally in the audio end. Other than this the Super Skyrider covers a wider frequency range and contains an "S" meter together with an amplifier, but the Challenger II has a connection socket at the rear of the chassis to which an "S" meter can be connected if desired.

On the other hand, the Challenger II has a new and distinct feature not to be found in the Super Skyrider—an infinite image rejector. The rejector scale occupies the same relative position on the front panel as does the "S" meter in the Super Skyrider.



Interior view of the Sky Challenger II. The infinite image rejector components are housed in the long shield behind and to the left of the gang condenser.

General Features

A front-panel view of the Challenger II is shown at the top of this page. Of particular note is the symmetry gained by a logical grouping of control knobs, switches and tuning scales. The controls most often used in both phone and c.w. reception are lined up along the lower edge of the panel within easy reach of the operator. As an instance of the thought given to the design, the b.f.o. and xtal toggle switches work toward each other for "b.f.o. on and xtal in" with the result that the operator can instantly change from phone to xtal c.w. minus a.v.c. by the simultaneous flipping of the a.v.c. toggle switch with his left hand and by sqeezing together the b.f.o. and xtal switch toggles with two fingers of his right hand. The b.f.o. pitch control and xtal phasing control are properly located just to the right of the xtal switch, and the r.f. gain control above them, thus offering a logical sequence of manual operation with no interrupted moves of the operator's right hand. Moreover, the bandspread tuning knob is located close to the aforementioned controls which permits rapid operation with practically no lost motion.

The metal cabinet has a black crackle finish and the front panel is done in telephone black. The sharp black of this panel against the lighter black of the cabinet lends a pleasing contrast which is further emphasized by the ribbed aluminum strips along the cabinet sides.

The Controls

The large metal tuning scale occupies the central position on the front panel and is fringed by the subsidiary controls.

To its left is the control knob and scale of the infinite image rejector. To its right is the control knob and scale of the bandspread tuner.

There are five scales on the main tuning dial, each of which is calibrated in megacycles. The dial is recessed in the panel and is controlled by the knob below and to the left. This operates the main gang condenser. To the lower right of the main dial is the band-selector switch which has five positions, corresponding to the five scales on the main dial. The bands covered are as follows:

Band	*Frequency*	*Wavelength*
1	545 to 1230 kc.	550 to 243 m.
2	1.18 to 2.85 mc.	254 to 105 m.
3	2.75 to 6.82 mc.	109 to 44 m.
4	6.75 to 16.4 mc.	45 to 18.83 m.
5	15.4 to 38.1 mc.	19.5 to 7.85 m.

The bandspread dial, to the right of the main dial, is controlled by the knob directly below it. This knob rotates a three-gang, low capacity condenser which is an integral part of the main gang tuning condenser. This control is inertia-driven by a heavy flywheel on the knob shaft. The bandspread scale is in spiral form and reads from zero to 1000 degrees. A pilot light actuated through the gear train "tracks" with the scale as the knob is rotated. That is, as the scale is rotated from zero toward 1000, the light moves down at the same rate as the angle of the spiral changes so that only the "active" part of the scale is illuminated.

A 1000-degree scale would, under average conditions, be a drawback because of the time required to change from one extreme setting to another. In this instance, however, what would be a drawback is made an asset by the inclusion of the flywheel on the knob shaft. It is only necessary to give the knob a good twirl if it is desired to rapidly cover a wide scale distance, and the mechanical energy stored up in the flywheel will rotate the scale. Moreover, the inertia drive contributes a great deal to the smoothness of operation of the control.

The infinite image rejector, located to the left of the main tuning dial, is controlled by the knob directly below it. The image rejector is active only in those bands where image interference is really a problem. There are two scales on the dial, one covering Band 4 and the other covering Band 5. The proper scale is illuminated automatically when the band-selector switch is in position 4 or 5.

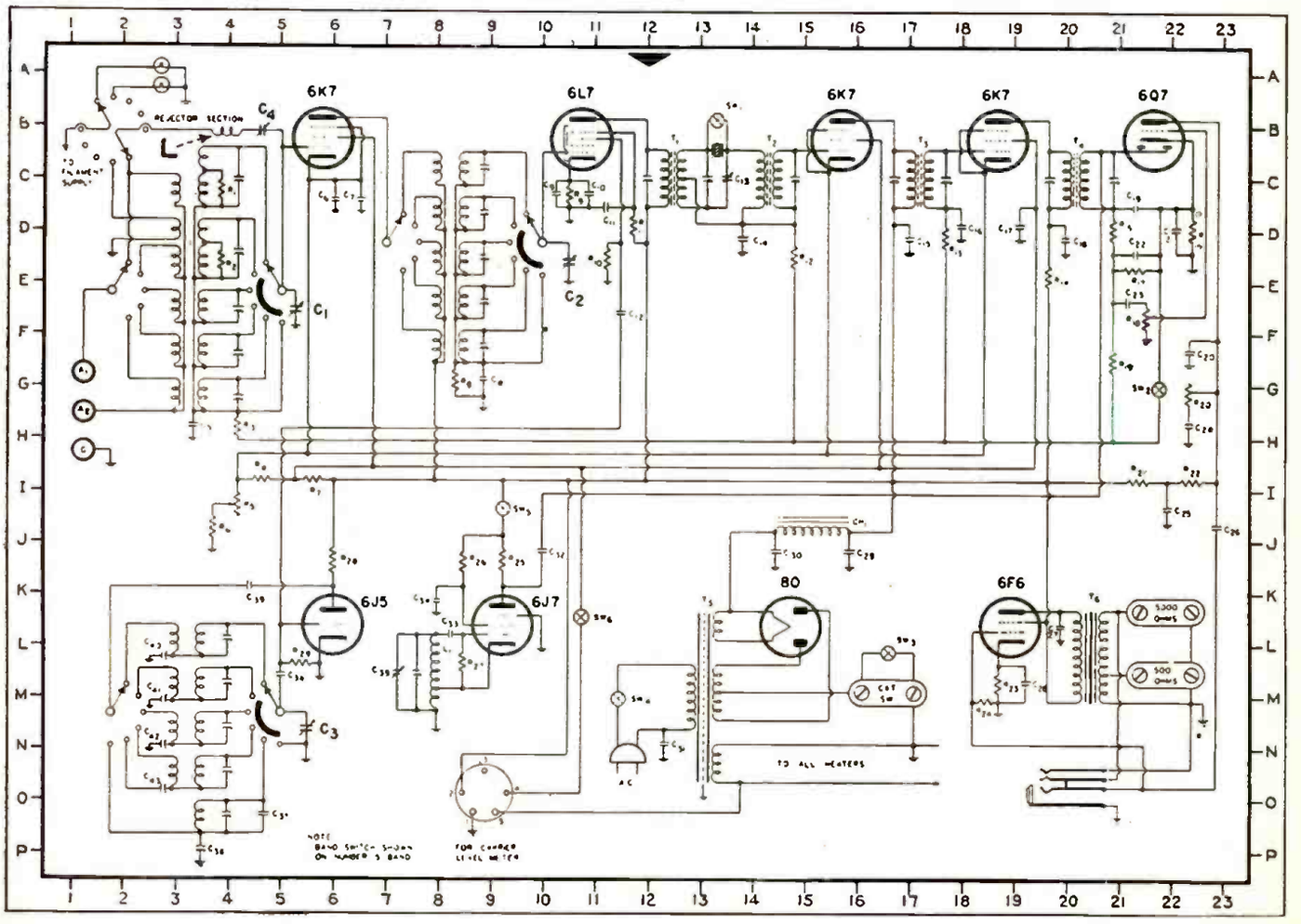
The components comprising the image rejector are housed in a metal shield parallel to the front panel. The control knob rotates a variable condenser through a flexible coupling and spiral gear train.

The controls on the left of the panel, from top to bottom, are: tone control and a.c. switch, send-receive toggle switch, and audio gain. Along the lower edge of the panel are, the headphone jack, a.v.c. on-off switch, main tuning knob, band-selector, b.f.o. toggle switch, crystal filter toggle switch, and crystal phasing control. Above the latter are the b.f.o. pitch control and r.f. gain control.

Terminal strips are provided on the rear chassis apron for doublet or Marconi antenna connections, for a send-receive relay, for 500- and 5000-ohm output from the audio power stage, and a socket for the addition of an "S" meter. The Hallicrafters permanent-magnet dynamic speaker in its separate metal case that matches the receiver is designed for connection to the 5000-ohm output terminals.

The nine tubes in the receiver have the following functions: 6K7 r.f. amplifier,

(Continued on page 223)



Road-map diagram of the Sky Challenger II. The coil L and the condenser C4 are the principal image-rejector components.

WORLD SHORT-WAVE STATION LIST

ROMAN NUMERALS — MEGACYCLES. ITALICS — METERS. • — BROADCAST STATION. ★ — DOES NOT VERIFY ◆ — NOT IN USE.

Abbreviations: O—Opening; C—Closing; I—Interval; S—Signal; I.R.C.—International Reply Coupon. Schedules in E.S.T.

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

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

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

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

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

31.600 *9.4* ★ W1XKB • Westinghouse Electric & Mfg. Co., Springfield, Mass. Daily 7 a.m.-1 a.m.

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

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

31.600 *9.4* W2XDV • New York, N. Y. (see 21.520 mc.). Mon. to Fri., 6-11 p.m. Sat., Sun., 1:30-6 p.m.; 7-10 p.m.

27.800 *10.79* DGF Reichpoftzentralamt, Berlin-Tempelhof, Germany. (P) Phones irreg. (Location, Nauen.)

27.400 *10.95* DGE Nauen, Germany. (P) Phones irreg. (see 27.800 mc.).

26.800 *11.19* DGX Nauen, Germany. (P) Phones irreg. (see 27.800 mc.).

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

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

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

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

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

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

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

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

24.300 *12.35* DGV Nauen, Germany. (P) Phones irreg. (see 27.800 mc.).

23.350 *12.85* DGT Nauen, Germany. (P) Phones irreg. (see 27.800 mc.).

22.800 *13.16* DGS Nauen, Germany. (P) Phones irreg. (see 27.800 mc.).

22.200 *13.51* DAF Norddeich, Germany. (P) (see 27.800 mc.). Irregular.

21.600 *13.89* CGG Canadian Marconi Co., Drummondville, Que., Canada. (P) So. America.

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

21.540 *13.92* ★ W8XK • Grant Bldg., Pittsburgh, Pa. O-C: Stars and Stripes Forever. Weekdays, 7-9 a.m.

21.530 *13.93* ★ GSJ • Daventry, England. (see 26.100 mc.). Daily 5:45-8:55 a.m.

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

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

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

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

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

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

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

21.440 *13.99* GAQ2 Rugby, England (P) (see 20.380 mc.). So. Africa.

21.420 *14.01* WKK American Tel. and Tel. Co., Long Lines Dept., 32 Sixth Ave., New York, N. Y. (Lawrenceville, N. J.)(P) Arg., Brazil, Peru.

21.260 *14.11* WBU Radio Corporation of America, RCA Frequency Bureau, 30 Rockefeller Plaza, New York, N. Y. (Rocky Point, N. Y.) (P) Switz., Poland.

21.240 *14.12* WQJ Rocky Point, N. Y. (P) Turkey-Iran-Levant (see 21.260 mc.).

21.220 *14.14* WQA Rocky Point, N. Y. (P) Argentina (see 21.260 mc.).

21.160 *14.19* LSL4 Compania Internacional, 143 Defensa, Buenos Aires, Arg. (P) Europe.

21.140 *14.19* KBI Manila, P. I., Radio Corporation of America, RCA Frequency Bureau, 30 Rockefeller Plaza, New York, N. Y. (P) Ger., U. S. A.

21.080 *14.23* PSA Cia Radio Internacional do Brazil, Caixo Postal 709, Rio de Janeiro, Brazil. (P) U. S. A., Spain.

21.060 *14.25* WKA Lawrenceville, N. J. (P) England (see 21.420 mc.).

21.060 *14.25* KWN Transpacific Communication Co., Ltd., 140 Montgomery St., San Francisco (Location: Dixon, Calif.). (P) P. I., Hawaii, Java, Australia, Japan, China.

21.045 *14.26* GAS4 Rugby, England. (P) (see 20.380 mc.) U. S. A.

21,035 *14.26* GAS2 Rugby, England. (P) (see 20.380 mc.) U. S. A.

20.910 *14.35* PUC Rio de Janeiro, Brazil. (P) U.S.A., Spain, Arg., irreg. (see 21.080 mc.).

20.860 *14.38* EHY Pigy Margall 2, Madrid, Spain. (P) So. Am., U. S. A.

20.860 *14.38* EDM Madrid, Spain. (P) So. Am., U. S. A. (see 20.860 mc.).

20.835 *14.40* PFF Director of the Radio Control, Telephones and Telegraphs, Scheveningscheweg 6, The Hague, Holland. (Location: Kootwijk.) (P) Java.

20.830 *14.40* PFF Kootwijk, Holland. (P) Java (see 20.835 mc.).

20.825 *14.41* PFF Kootwijk, Holland. (P) Java (see 20.835 mc.).

20.820 *14.41* KSS Radio Corporation of America, RCA Frequency Bureau, 30 Rockefeller Plaza, New York, N. Y. (Location, Bolinas, Calif.) (P) Indo-China.

20.780 *14.43* KMM Bolinas, Calif. (P) Phil. Isl. (see 20.820 mc.).

20.700 *14.49* LSY4 Buenos Aires, Arg., S. A. (P) Europe, U. S. A. (see 19.600 mc.).

20.620 *14.55* CEC Santiago, Chile. (P) U. S. A. (see 19.680 mc.).

20.500 *14.63* DGQ Nauen, Germany. (P) Phones irreg. (see 27.800 mc.).

20.380 *14.72* GAA Engr.-In-Chief's Office (Radio Branch). GPO-Armour House, London, E.C.1, England. (Location: Rugby.) (P) Arg., Brazil.

20.260 *14.81* WQQ Rocky Point, N. Y. (P) Germany, Czech. (see 21.260 mc.).

20.235 *14.83* GAL Rugby, England. (P) (see 20.380 mc.) Japan.

20.180 *14.87* WQX Rocky Point, N. Y. (P) Japan, P. I., China (see 21.260 mc.).

20.140 *14.90* DGW Nauen, Germany. (P) So. Am. (see 27.800 mc.).

20.040 *14.97* OPL Radio Leopoldville, Leopoldville, Belgian Congo, Africa. (P) Belgium.

20.020 *14.99* DFZ Nauen, Germany. (P) So. Am. (see 27.800 mc.).

19.980 *15.02* KAX Manila, P. I. (P) U. S. A., Spain, Ger. (see 21.140 mc.).

19.947 *15.04* DLO Rehmate, Germany. (P) irreg. (see 27.800 mc.).

19.900 *15.08* LSF4 Buenos Aires, Arg., S. A. (P) Europe (see 19.600 mc.).

19.820 *15.14* WKN Lawrenceville, N. J. (P) England (see 21.420 mc.).

19.720 *15.21* EAQ P. O. Box 951, Madrid, Spain. (P) Relays & tests a.m.

19.700 *15.23* DFJ Nauen, Germany. (P) So. Am. (see 27.800 mc.).

19.680 *15.24* CEC Cia Internacional de Radio, Casilla 16-D, Santiago, Chile. (P) So. Am.

19.650 *15.27* LSN5 Buenos Aires, Arg., S. A. (P) Europe (see 21.160 mc.).

19.600 *15.31* LSF Transradio Internacional, San Martin 329, Buenos Aires, Arg. (P) Europe.

19.530 *15.36* EDR2 Madrid, Spain. (P) Phones LSM-PPU-YVR mornings (see 20.860 mc.).

19.530 *15.36* EDS Madrid, Spain. (P) U. S. A., So. Am. (see 20.860 mc.).

19.520 *15.37* IRW Italo Radio, via Calabria N. 46/48, Rome, Italy. (P) Irregular.

19.480 *15.40* GAD Rugby, England. (P) (see 20.380 mc.) Kenya, Africa.

19.460 *15.42* DFM Nauen, Germany. (P) Asia and Orient (see 27.800 mc.).

19.400 *15.46* LQD Buenos Aires, Arg., S. A. (P) Europe (see 19.600 mc.).

19.380 *15.48* WSI Lawrenceville, N. J. (P) England-France (see 21.420 mc.).

19.355 *15.50* FTM 166 Rue de Montmartre, Paris, France (Location: St. Assise). (P) So. Am.

19.345 *15.52* PMA J. Sanders, Chief Engr., Java Wireless Stations, Bandoeng, Java. (P) Europe.

19.260 *15.58* PPU Companhia Radiotelegraphica Brasileira, Caixa Postal 500, Rio de Janeiro, Brazil. (P) Europe, S. A., U. S. A.

19.220 *15.61* WKF Lawrenceville, N. J. (P) England, France(see 21.420 mc.).

19.200 *15.62* ORG Brussels, Belgium. (P) Belgian Congo.

19.160 *15.66* GAP Rugby, England. (P) Australia (see 20.380 mc.).

19.140 *15.68* LSM3 Buenos Aires, Arg. (P) Europe, Peru (see 21.160 mc.).

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

19.010 *15.78* PSB Rio de Janeiro, Brazil. (P) U. S. A.-Spain (see 21.080 mc.).

18.980 *15.80* WFX Rocky Point, N. Y. (P) Norway, Sweden (see 21.260 mc.).

18.970 *15.81* GAQ Rugby, England. (P) So. Africa (see 20.380 mc.).

18.960 *15.82* WQD Rocky Point, N. Y. (E) Argentina (see 21.260 mc.).

18.940 *15.84* WTT Rocky Point, N. Y. (P) Germany (see 21.260 mc.).

18.920 *15.85* WQE Rocky Point, N. Y. (P) U.S.S.R. (see 21.260 mc.).

18.910 JVA
15.86
Nazaki, Japan. International Wireless Telephone Company of Japan, Osaka Bldg., Tokyo, Japan. Europe.

18.900 WDS
15.87
Rocky Point, N. Y. (P) Brazil (see 21.280 mc.).

18.890 ZSS
15.88
Overseas Communications, P. O. Box 962, Capetown, South Africa. (Location: Klipheuvel.) (P) England.

18.880 WQH
15.89
Rocky Point, N. Y. (P) Belgium (see 21.260 mc.).

18.860 WKM
15.91
Rocky Point, N. Y. (P) England (see 21.260 mc.).

18.820 PLE
15.94
Bandoeng, Java. (P) Europe, U.S.A., Orient (see 19.345 mc.).

18.770 TYD-3
15.98
Compagne Generale de Telegraphie Sans Fil. 79 Blvd. Haussmann, Paris. France. (P) Phones Madagascar.

18.700 DFQ
16.04
Nauen, Germany. (P) Egypt, Java. Siam, Venez., Mex. (see 27.800 mc.).

18.680 OCI
16.06
All America Cables Co., Inc., Lima, Peru. (P) C. A., S. A., U. S. A.

18.680 GAX
16.06
Rughy. England. (P) (see 20.380 mc.) India.

18.640 PSC
16.09
Rio de Janeiro, Brazil. (P) U. S. A., So. Am., irreg. (see 21.080 mc.).

18.620 GAU
16.11
Rugby. England. (P) U. S. A. (see 20.380 mc.).

18.610 GAU2
16.12
Rughy. England. (P) (see 20.380 mc.) U. S. A.

18.545 PCM
16.18
Kootwijk, Holland. (P) Java (see 20.835 mc.).

18.540 PCM
16.19
Kootwijk. Holland. (P) Java (see 20.835 mc.).

18.535 PCM
16.20
Kootwijk, Holland. (P) Java (see 20.835 mc.).

18.480 HBH
16.23
Information Section, League of Nations, Geneva, Switzerland. (E) Irregular.

18.450 HBF
16.26
Geneva, Switzerland. (E) Irregular (see 18.480 mc.).

18.440 HJY
16.25
Marconi Telegraph Co., Apartado 1591, Bogota, Colombia. (P) So. Am., U.S.A.

18.420 VWZ2
16.29
Kirkee, India. (P) England.

18.410 PCK
16.29
Kootwijk, Holland. (P) Java (see 20.835 mc.).

18.405 PCK
16.30
Kootwijk, Holland. (P) Java (see 20.835 mc.).

18.400 PCK
16.31
Kootwijk, Holland. (P) Java (see 20.835 mc.).

18.388 FZS
16.31
Postale Boite 238, Saigon. Indo-China. (P) France & Colonies.

18.345 FZS2
16.35
Saigon, Indo-China. (P) France and Colonies, Japan, China (see 18.388 mc.).

18.340 WLA
16.36
Lawrenceville, N. J. (P) England (see 21.420 mc.).

18.325 GAS3
16.37
Rugby. England. (P) (see 20.380 mc.) U.S.A.

18.310 GAS
16.38
Rugby, England. (P) U.S.A. (see 20.380 mc.).

18.295 YVR
16.39
Maracay, Venezuela. (P) U.S.A., Europe.

18.290 ZSL
16.40
Klipheuvel. So. Africa. (P) England (see 18.890 mc.).

18.270 ITQ
16.42
Asmara, Eritrea. Africa. (P) Italy and Colonies.

18.270 IUD
16.42
Minister of Marine. Addis Ababa, Ethiopia. (P) Italy and Colonies.

18.250 FTO
16.43
St. Assise. France. (P) No. & So. Am. (see 19.355 mc.).

18.220 KUS
16.46
Manila, P. I. (P) U.S.A., China, Japan (see 21.140 mc.).

18.210 GAW2
16.47
Rugby. England. (P) (see 20.380 mc.) U.S.A.

18.200 GAW
16.48
Rugby, England. (P) U.S.A. (see 20.380 mc.).

18.190 JVB
16.49
Nazaki, Japan. (P) Java, P. I., U. S. A. (see 18.910 mc.).

18.180 CGA
16.51
Drummondville. Que. (P) England (see 21.600 mc.).

18.135 PMC
16.54
Bandoeng, Java. (P) Europe (see 19.345 mc.).

18.115 LSY
16.56
Buenos Aires. Arg. (E) Europe, U.S.A. (see 19.600 mc.).

18.090 TYE
16.58
Paris, France. (P) U. S. A. (see 18.776 mc.).

18.075 PCV
16.59
Kootwijk, Holland. (P) Java (see 20.835 mc.).

18.070 PCV
16.60
Kootwijk, Holland. (P) Java (see 20.835 mc.).

18.065 PCV
16.61
Kootwijk, Holland. (P) Java (see 20.835 mc.).

18.060 KUN
16.61
Bolinas, Calif. (P) Japan (see 20.820 mc.).

18.040 GAB
16.63
Rugby, England. (P) Canada (see 20.380 mc.).

18.040 KQR
16.63
Bolinas, Calif. (P) Australia, P. I. (see 20.820 mc.).

18.020 KQJ
16.65
Bolinas, Calif. (P) Japan (see 20.820 mc.).

18.000 KQG
16.67
Bolinas, Calif. (P) Panama, Manchukuo.

17.980 KQZ
16.69
Bolinas, Calif. (E) China (see 20.820 mc.).

17.975 ZFF
16.69
Hamilton, Bermuda. (P) U. S. A., Br. Colonies (see 10.335 mc.).

17.950 KBD
16.71
Manila, P. I. (P) U. S. A., China, Japan (see 21.140 mc.).

17.940 WQB
16.72
Rocky Point, N. Y. (P) Switzerland (see 21.260 mc.).

17.920 WQF
16.74
Rocky Point, N. Y. (P) Portugal, Liberia (see 21.260 mc.).

17.900 WLL
16.76
Rocky Point, N. Y. (P) Spain (see 21.260 mc.).

17.890 TFN
16.77
Reykjavik. Iceland. (P) Irregular (see 12.235 mc.).

17.860 WQC
16.80
Rocky Point, N. Y. (P) Poland (see 21.260 mc.).

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

17.790 GSG
16.86
● Daventry, England. (See 26.100 mc.) Daily 2-4:15 a.m.; 5:45 a.m.-12 noon; 12:20-4 p.m.

17.785 IZL
16.87
● Nazaki, Japan. (See 21.520 mc.) Irregular.

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

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

17.770 PHI
16.88
● Philips Radio. Hilversum, Holland. Call: Seven languages. I: Metronome 80 beats per minute. C: National Anthem—Wilhelmus. Sun. 7:35-10:30 a.m. Mon. to Fri. (exc. Wed.) 8:25-10:30 a.m.

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

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

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

17.750 IAC
16.91
Director, Centro di Coltano Radio, Pisa, Italy. (P) Phones ships.

17.740 HSP
16.91
Superintending Engineer, Post and Telegraph Dept., Radio Technical Section, Bangkok, Siam. (P) Europe, Japan.

17.710 CJA-3
16.94
Drummondville, Que. (P) England, Australia (see 21.600 mc.).

17.699 IAC
16.95
Pisa, Italy. (P) Phones ships (see 17.750 mc.).

17.690 LQB
16.96
Buenos Aires, Arg., S. A. (P) Europe, Brazil (see 19.600 mc.).

17.650 XGM
17.00
Radio Administration, Sassoon House, Shanghai, China. (P) Phones irreg.

17.520 DFB
17.12
Nauen, Germany. (P) Egypt, Java, Siam, Venez., Mex. (see 27.800 mc.).

17.510 VWY2
17.13
Kirkee, India. (P) England.

17.480 VWY2
17.16
Kirkee, India. (P) England.

17.341 DGR
17.30
Nauen, Germany. (P) So. Am. (see 27.800 mc.).

17.280 FZE8
17.36
Djibouti, French Somaliland, Africa. (P) France—Irregular.

17.265 DAF
17.38
Norddeich. Germany. (P) Phones ships irreg. (see 27.800 mc.).

17.260 CMA5
17.37
Cuba Transatlantic Radio Corp., Apartado No. 65, Havana, Cuba. (P) Phones and tests evenings.

17.120 WOO
17.52
Ocean Gate, N. J. (P) Phones ships daytime.

17.120 WOY
17.52
Lawrenceville, N. J. (P) Irregular (see 21.420 mc.).

17.080 GBC
17.56
Rugby, England. (P) Phones ships daytime (see 20.380 mc.).

16.965 DAF
17.68
Norddeich. Germany. (P) (see 27.800 mc.). Irregular.

16.385 ITK
18.31
Mogdishu, Somaliland, Africa. (P) Italy and Colonies.

16.270 WLK
18.44
Lawrenceville, N. J. (P) Arg., Brazil, Peru (see 21.420 mc.).

16.240 KTO
18.47
Manila, P. I. (P) U.S.A., Germany (see 21.140 mc.).

16.233 FZR
18.48
Saigon, Indo-China. (P) France and Colonies (see 18.388 mc.).

16.214 FZR2
18.50
Saigon, Indo-China. (P) France and Colonies (see 18.388 mc.).

16.155 KBT
18.57
Manila, P. I. (P) Europe, Japan, P. I. (see 21.140 mc.).

16.140 GBA
18.59
Rugby, England. (P) So. Am., China irreg. (see 20.380 mc.).

16.112 IRY
18.62
Rome, Italy. (P) Irregular.

16.050 JVC
18.69
Nazaki, Japan. (P) China (see 18.910 mc.).

16.030 KKP
18.71
Radio Corporation of America, RCA Frequency Bureau. 30 Rockefeller Plaza, New York, N. Y. (Location: Kahuku. Hawaii.) (P) P. I., U. S. A.

16.000 WKQ
18.75
Rocky Point, N. Y. (P) Venezuela (see 21.260 mc.).

15.960 WKO
18.79
Rocky Point, N. Y. (P) Colombia (see 21.260 mc.).

15.930 FYC
18.83
Pontoise, France. (P) Asia, Fr. Col.

15.880 FTK
18.89
St. Assise. France. (P) Indo-China (see 19.355 mc.).

15.865 CEC
18.91
Santiago, Chile. (P) So. Am. (see 19.680 mc.).

15.860 JVD
18.90
Nazaki, Japan. (P) China, U. S. A. (see 18.910 mc.).

15.810 LSL3
18.97
Buenos Aires, Arg. (P) Europe, Brazil (see 21.160 mc.).

15.800 HRE4
18.99
Tegucigalpa, Honduras. (P) C. A., S.A., W. I., U.S.A.

15.795 XOJ
19.00
Shanghai, China. (E) Europe, U. S. A. (see 17.650 mc.).

15.775 WSH
19.02
Lawrenceville, N. J. (P) England. France (see 21.420 mc.).

15.760 WPE
19.04
Rocky Point, N. Y. (P) Cent. Am., West Indies (see 21.260 mc.).

15.760 JYT
19.04
Kemikawa-Cho, Japan. (E) U. S. A., Europe.

15.740 JIA
19.06
Chureki, Japan. (P) Japan, France.

15.660 JVE
19.16
Nazaki, Japan. (P) Java, U. S. A. (see 18.910 mc.).

15.620 JVF
19.21
Nazaki, Japan. (P) U.S.A., Manchukuo (see 18.910 mc.).

15.530 HSG-2
19.32
Bangkok, Siam. (P) Europe, Japan (see 17.740 mc.).

15.505 CMA-5
19.36
Havana, Cuba. (P) Phones and tests irregularly (see 17.260 mc.).

15.490 KEM
19.37
Bolinas, Calif. (P) Java, Siam (see 20.820 mc.).

15.475 KKL
19.39
Bolinas, Calif. (P) Indo-China, Manila (see 20.820 mc.).

15.460 KKR
19.41
Bolinas, Calif. (P) P. I., Japan (see 20.820 mc.).

15.445 WQZ
19.42
San Juan, P. R. (P) U. S. A. (see 13.410 mc.).

15.430 KWE
19.44
Bolinas, Calif. (P) China (see 20.820 mc.).

15.415 KWO
19.46
Dixon, Calif. (P) P. I., Hawaii, Japan, Australia, Java, China (see 21.060 mc.).

15.400 HRM3
19.48
Tela, Honduras. (P) C. A., W. I., U. S. A., S. A.

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

15.360 DZG
19.53
Zeesen, Germany. (E) (see 17.760 mc.). Irregular.

15.355 KWU
19.54
Dixon, Calif. (P) P. I., Hawaii, Japan, Australia, Java, China (see 21.060 mc.).

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

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

15.320 OLR5B
19.58
● Prague, Czechoslovakia. (See 21.450 mc.) Daily, ex. Sun. & Holidays, 6:30-7:30 a.m., 10:05-11 a.m. Sun. & Holidays, 6-7:30 a.m. (See 15.230 mc.)

15.310 GSP *19.60* ★ — ●Daventry, England. (See 26.100 mc.) Daily 1:45-4 p.m.

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

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

15.280 HI3X *19.63* — ●J. R. Saladin, Director of Radio Communications, Ciudad Trujillo, Dominican Republic. S: Bells. Weekdays 12:10-1:10 p.m.; Sundays 7:40-10:40 a.m.

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

15.270 W2XE *19.64* — ●Wayne, N. J. (See 21.520 mc.) Mon. to Fri. 1-2:15 p.m.

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

15.252 RIM *19.67* — Tashkent, U.S.S.R. (P) Phones Moscow (see 14.790 mc.).

15.250 W1XAL *19.67* — ●Boston, Mass. (See 21.460 mc.) Sun. 11 a.m.-12 noon; specials irregular.

15.243 TPA-2 *19.68* — ●Minister des Postes, Boulevard Haussmann, 98, Bis., Paris, France. I: Three tones F in Morse. O-C: La Marseillaise; S: chimes ¼ hours. Daily 6-11 a.m.

15.230 OLR5A *19.70* — ●Prague, Czechoslovakia. (See 21.450 mc.) Daily ex. Sun. and holidays, 6:30-7:30 a.m., 10:05-11 a.m.; Sun. and holidays, 6-7:30 a.m. (See 15.320 mc.).

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

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

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

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

15.180 GSO *19.76* ★ — ●Daventry, England. (See 26.100 mc.) Daily 2-4:15 a.m.; 5:45-10 a.m.; 4:15-6 p.m.

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

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

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

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

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

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

15.140 HHX *19.82* — Port-Au-Prince, Haiti. (P) U. S. A.

15.140 GSF *19.82* ★ — ●Daventry, England. (See 26.100 mc.) Daily 2-4:15 a.m.; 5:45 a.m.-12 noon.

15.130 W1XAL *19.83* — ●Boston, Mass. (See 21.460 mc.) Daily exc. Sat. 3:15-3:45 p.m.

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

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

15.055 WNC *19.92* — American Tel. and Tel. Co., Long Lines Dept., 32 Sixth Ave., New York, N. Y. (Hialeah, Fla.) (P) 9 a.m.-9 p.m.

15.070 PSD *19.91* — Rio de Janeiro, Brazil. (P) U.S.A., Arg. (see 21.080 mc.).

15.040 WQG *19.95* — Rocky Point, N. Y. (P) Cuba (see 21.260 mc.).

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

14.985 YSL *20.02* — Director of Communications, Rep. of El Salvador, San Salvador, Salvador. (P) U.S.A., C.A., S.A.

14.980 KAY *20.03* — Manila, P. I. (P) Japan, Siam, Java, Europe. (See 21.140 mc.)

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

14.940 HJB *20.06* — Bogota, Colombia. (P) U. S. A., So. Am. (see 18.440 mc.)

14935 PSE *20.09* — ●Rio de Janeiro, Brazil. (P) U.S.A., Europe. Broadcasts German program 4-4:10 p.m. Wednesdays (see 21.080 mc.).

14.920 KQH *20.11* — Kahuku, Hawaii. (P) Japan, P. I., Fiji, U. S. A., Oceania (see 16.030 mc.).

14.915 IQX *20.11* — Tripoli, Africa. (P) Italy and Colonies.

14.910 JVG *20.12* — Nazaki, Japan. (P) Formosa, Europe (see 18.910 mc.).

14.845 OCJ *20.19* — Lima, Peru. (P) C.A., S.A., U.S.A. (see 18.680 mc.).

14.830 WKU *20.23* — Rocky Point, N. Y. (P) Germany (see 21.260 mc.).

14.800 WQV *20.27* — Rocky Point, N. Y. (P) Germany (see 21.260 mc.).

14.790 RTZ *20.28* — Radio Centre, Solianka 12, Moscow, U.S.S.R. (Location: Irkutsk.) (P) calls Moscow.

14.785 WDC *20.29* — Rocky Point, N. Y. (P) Mexico (see 21.260 mc.).

14.770 WEB *20.31* — Rocky Point, N. Y. (P) England (see 21.260 mc.).

14.736 IQA *20.36* — Rome, Italy. (P) Phones Japan and Egypt; sends music at times (see 19.520 mc.).

14.690 PSF *20.42* — Rio de Janeiro, Brazil. (P) U.S.A., So. Am. (see 21.080 mc.).

14.665 DFD *20.46* — Nauen, Germany. (P) Egypt, Java, Venez. (see 27.800 mc.).

14.653 GBL *20.47* — Rugby, England. (P) Phones Japan (see 20.380 mc.).

14.620 EHY *20.52* — Madrid, Spain. (P) So. Am. (see 20.860 mc.).

14.620 EDM *20.52* — Madrid, Spain. (P) So. Am. (see 20.860 mc.).

14.605 DGZ *20.54* — Nauen, Germany. (P) So. Am. (see 27.800 mc.).

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

14.590 WMN *20.56* — Lawrenceville, N. J. (P) England (see 21.420 mc.).

14.535 HBJ *20.64* — ●Geneva, Switzerland. (E) (See 18.480 mc.) Mondays 3-3:15 a.m.

14.530 LSN *20.65* — Buenos Aires, Arg. (P) U. S. A., Brazil (see 21.160 mc.).

14.525 XDA *20.65* — Chapultepec, Mexico. (P) U.S.A., Europe.

14.500 LSM2 *20.69* — Buenos Aires, Arg., S. A. (P) U.S.A. and S.A. (see 21.160 mc.).

14.485 TIR *20.71* — Tropical Radio Telegraph Co., San Jose, Costa Rica. (Location: Cartago.) (P) Phones WNC days.

14.485 TIU *20.71* — Cartago, Costa Rica. (P) Phones WNC days (see 14.485 mc.).

14.485 YNA7 *20.71* — Tropical Radio Telegraph Co., Managua, Nicaragua. (P) U.S.A., C.A., S.A.

14.485 HPF *20.71* — Tropical Radio Telegraph Co., Panama City, Panama. (P) U.S.A., C.A., S.A.

14.485 HRF *20.71* — Tropical Radio Telegraph Co., Tegucigalpa, Honduras. (P) Phones 8 a.m.-8 p.m.

14.485 HRM5 *20.71* — Tela, Honduras. (P) U.S.A. (see 14.485 mc.).

14.485 TGF *20.71* — Tropical Radio Telegraph Co., Guatemala City, Guat. (P) U.S.A.

14.485 HRL5 *20.71* — La Lima, Honduras. (P) U.S.A., S.A., (see 14.485 mc.).

14.480 PLX *20.72* — Bandoeng, Java. (P) Phones Europe and B.C. irregular to 3 p.m. (see 19.345 mc.).

14.470 WMF *20.73* — Lawrenceville, N. J. (P) England, France (see 21.420 mc.).

14.460 DZH *20.75* — Zeesen, Germany. (E) (see 17.760 mc.). Irregular.

14.460 KBH *20.75* — Manila, P. I. (P) U.S.A., Europe (see 21.140 mc.).

14.440 GBW *20.78* — Rugby, England. (P) Phones U.S.A. (see 20.380 mc.).

14.435 LSJ2 *20.78* — Buenos Aires, Arg., S. A. (P) Europe, America (see 21.160 mc.).

14.423 FYA *20.80* — Paris, France. (P) So. Am., Fr. Colonies, Portugal (see 18.776 mc.).

14.410 DOT *20.82* — Konigs W'n, Germany. (P) Europe (see 27.800 mc.).

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

13.990 GBA2 *21.44* — Rugby, England. (P) Phones So. Am. (see 20.380 mc.).

13.930 WIK *21.53* — Rocky Point, N. Y. (P) Italy Vatican (see 21.360 mc.).

13.900 WQP *21.58* — Rocky Point, N. Y. (P) Denmark, Poland (see 21.260 mc.).

13.885 WQT *21.60* — Rocky Point, N. Y. (P) Belg., Switz. (see 21,260 mc.).

13.855 WQU *21.65* — Rocky Point, N. Y. (P) Spain, Portugal, Liberia (see 21.260 mc.).

13.820 SUZ *21.70* — P. O. Box 795, Cairo, Egypt. (P) Europe, Iraq.

13.780 KKW *21.77* — Bolinas, Calif. (P) Australia, Phil. Isl. (see 20.820 mc.).

13.760 TYE-2 *21.80* — Paris, France. (P) Phones U. S. days (see 18.776 mc.).

13.745 CGA-2 *21.83* — Drummondville, Que. (P) Europe (see 21.600 mc.).

13.740 RIS *21.84* — Tiflis, U.S.S.R. (P) Calls Moscow (see 14.790 mc.).

13.720 KLL *21.87* — Bolinas, Calif. (P) Japan (see 20.820 mc.).

13.705 WGT *21.89* — San Juan, P. R. (P) U. S. A., Cuba, Pan., Venez. (see 13.410 mc.).

13.690 KKZ *21.91* — Bolinas, Calif. (P) Manchukuo, Hawaii (see 20.820 mc.).

13.650 HJY *21.98* — Bogota, Colombia. (P) So. Am., U.S.A. (see 18.440 mc.).

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

13.595 GBB2 *22.07* — Rugby, England. (P) Egypt (see 20.380 mc.).

13.585 GBB *22.08* — Rugby, England. (P) Canada (see 20.380 mc.).

13.560 JVI *22.12* — Nazaki, Japan. (P) Manchukuo, Java (see 18.910 mc.).

13.560 XDW *22.12* — Chapultepec, Mexico. (P) U. S. A., S. A., Europe.

13.480 WAJ *22.26* — Rocky Point, N. Y. (P) U. S.S.R. (see 21.260 mc.)

13.465 WKC *22.28* — Rocky Point, N. Y. (P) Holland, France (see 21.260 mc.)

13.450 WEX *22.30* — Rocky Point, N. Y. (P) England (see 21.260 mc.)

13.435 WKD *22.33* — Rocky Point, N. Y. (P) England (see 21.260 mc.)

13.420 WHR *22.35* — Rocky Point, N. Y. (P) France (see 21.260 mc.)

13.415 GBL2 *22.36* — Rugby, England. (P) Japan (see 20.380 mc.)

13.410 WCT *22.37* — Radio Corporation of Porto Rico, P. O. Box 1414, San Juan, P. R. (P) Phones Miami 9 a.m.-9 p.m. Salvador, Salvador. (P) C. A., S.A., U.S.A. (see 14.985 mc.)

13.410 YSJ *22.37* — Ciudad Trujillo, D.R. (P) Phones 8 a.m.-8 p.m.

13.410 HI2I *22.37* — Rugby, England (P) Japan (see 20.380 mc.)

13.405 GBJ *22.38* — Lawrenceville, N. J. (P) England (see 21.420 mc.)

13.390 WMA *22.40* — Asmara, Eritrea, Africa. (P) Italy and colonies.

13.380 IDU *22.42* — Hialeah, Florida. (P) Phones 8 a.m.-8 p.m. (see 15.055 mc.)

13.370 WOJ *22.44* — Maracay, Venezuela. (P) U.S.A., So. Am.

13.345 YVQ *22.48* — Drummondville, Que. (P) England (see 21.600 mc.)

13.285 CGA3 *22.58* — Norddeich, Germany. (P) Phones ships irreg. (see 27.800 mc.)

13.275 DAF *22.60* — Hamilton, Bermuda. (P) U. S.A., Br. Colonies (see 10.335 mc.)

13.265 ZFE *22.61* — Manila, P. I. (P) U.S.A., Europe, Japan, China (see 21.140 mc.)

13.240 KBJ *22.66* — Nauen, Germany. (P) U.S.A., Mex., Cuba (see 27.800 mc.)

13.180 DGG *22.76* — Rome, Italy. (P) Phones Japan 5-8 a.m., and works Cairo days.

13.105 IRJ *22.89* — Norddeich, Germany. (P) Phones ships irreg. (see 27.800 mc.)

13.100 DAF *22.90*

13.060 HRE3 *22.97* — Tegucigalpa, Honduras. (P) C.A., W.I., S.A., U.S.A.

13.060 HRL3 *22.97* — La Lima, Honduras. (P) C.A., W.I., S.A., U.S.A.

13.000 TYC *23.08* — Paris, France. (P) Egypt (see 18.776 mc.)

12.985 DFC *23.10* — Nauen, Germany. (P) Egypt, Java, Siam, Venez., Mex. (see 27.800 mc.)

12.960 GBE *23.15* — Rugby, England. (P) Portugal (see 29.380 mc.)

12.940 GBC2 *23.18* — Rugby, England. (P) Iceland (see 20.380 mc.)

12.865 IAC *23.32* — Pisa, Italy. (P) Phones ships irreg. (see 17.750 mc.)

12.840 WOO *23.36* — Ocean Gate, N. J. (P) Phones ships days.

12.840 WOY *23.36* — Lawrenceville, N. J. (P) Irregular (see 21.420 mc.)

12.832 HJA-3 *23.38* — Barranquilla, Colombia. (P) So. Am., U.S.A.

12.830 CNR *23.38* — Director General des Postes, Rabat, Morocco. (P) France 2:30 a.m.-3:30 p.m., B.C. irreg.

12.795 IAC *23.45* — Pisa, Italy. (P) Phones, ships and tests Tripoli, irreg. (see 17.750 mc.)

12.780 GBC *23.47* — Rugby, England. (P) Phones irreg. (see 20.830 mc.)

12.500 HIN *24.00* — ●Ciudad Trujillo, Dom. Rep., W. I. (sec 6.243 mc.) Daily exc. Sun. 11:40 a.m.-1:40 p.m.; 7:10-9:50 p.m.

12.295 ZLT5 *24.40* ★ — Supt. Posts and Telegraph, G.P.O., Wellington, New Zealand. (P) Australia.

12.290 GBU *24.41* — Rugby, England. (P) U.S.A. (see 20.380 mc.)

12.280 KUV *24.43* — Manila, P. I. (P) U.S.A.-Europe, Japan (see 21.140 mc.)

12.280 GBU2 *24.43* — Rugby, England. (P) U.S.A. (see 20.380 mc.)

12.250 TYB *24.49* — Paris, France (P) Morocco. (see 18.776 mc.)

12.235 TFJ *24.52* — Reykjavik, Iceland. (P) Eng.

12.235 TFJ *24.52* — ●Icelandic State Broadcasting Service, P. O. Box 547, Reykjavik, Iceland. First half English. C: Icelandic National Orchestra and chorus voices. Sundays 1.40-2:30 p.m.

12.215 TYA *24.56* — Paris, France. (P) Algeria see 18.776 mc.)

12.185 FRU4 *24.62* — Saigon, Indo-China. (P) France and Colonies (see 18.388 mc.)

12.150 GBS *24.69* — Rugby, England. (P) U.S.A. (see 20.380 mc.)

12.140 GBS2 *24.71* — Rugby, England. (P) U.S.A. (see 20.380 mc.)

12.130 DZE *24.73* — Zeesen, Germany. (E) (see 27.800 mc.)

12.120 TPZ *24.75* — Service Algerien des Postes, T. and T., 137 Rue de Constantine, Alger, Algeria, Africa. (P) 12-1 a.m. Irreg.

12.100 TIR6 *24.79* — Cartago, Costa Rica, C.A. (P) U.S.A., C.A., So. Am.

12.100 CJA *24.79* — Drummondville, Que. (P) Australia (see 21.600 mc.)

12.060 PDV *24.88* — Kootwijk, Holland. (P) Java (see 20.835 mc.)

12.055 PDV *24.89* — Kootwijk, Holland. (P) Java (see 20.835 mc.)

12.050 VRR5 *24.90* — Stony Hill, Jamaica. (P) U.S.A., Br. Col.

12.050 PDV *24.90* — Kootwijk, Holland. (P) Java (see 20.835 mc.)

12.035 DGL *24.93* — Nauen, Germany. (P) So. Am. (see 27.800 mc.)

12.020 JVK *24.96* — Nazaki, Japan. (P) China, Europe (see 18.910 mc.)

12.015 FZR3 *24.97* — Saigon, Indo-China. (P) France and Colonies, U.S.A. see 18.388 mc.)

12.000 RNE *25.00* — ●Moscow, U.S.S.R. (see RKI, 13.040 mc.) Daily 10:15-11:15 p.m.; Sun. 6-7 a.m., 10-11 a.m.; Wed. 6:30-7:30 a.m. *No IRC required.*

11.991 FZS *25.02* — Saigon, Indo-China. (P) U.S.A., France and Colonies, Orient (see 18.388 mc.)

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

11.955 IUC *25.09* — Addis Ababa, Ethiopia. (P) Italy and Colonies (see 18.270 mc.)

11.950 KKQ *25.11* — Bolinas, Calif. (P) Hawaii (see 20.820 mc.)

11.940 FTA *25.13* — St. Assise, France. (P) Morocco (see 19.355 mc.)

11.905 HRM2 *25.20* — Tela, Honduras. (P) C.A., W.I., S.A., U.S.A.

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

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

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

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

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

11.890 TPA3 *25.24* — ●Pontoise, France (see 15.243 mc.) Daily 2-5 a.m. 11:15 a.m.-6 p.m.

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

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

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

11.870 W8XK *25.26* — ●Pittsburgh, Pa. (Sec 21.340 mc.) Daily 7-11 p.m.

11.860 YDB *25.29* — ●Soerabaja, Java (see 15.150 mc.) Daily 10:30 p.m.-2 a.m.

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

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

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

11.840 OLR4A *25.34* — ●Prague, Czechoslovakia (see 21.450 mc.) Irregular.

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

11.830 W2XE *25.36* — ●Wayne, N. J. (see 21.520 mc.) Daily 2:30-6 p.m., 6:30-12 a.m.

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

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

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

11.810 I2RO-4 *25.40* — ●5 Via Montello, Rome, Italy. O: Bells of Rome. C: Italian Royal March and Giovinezza. I: bird call—black cap bird (see 9.635 mc.) Daily 5-8:45 a.m., 10 a.m.-12:20 p.m.

11.805 OZG *25.41* — ●Skamlebaek, Denmark (see 6.060 mc.) Irregular.

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

11.800 IZJ *25.42* — ●Nazaki, Japan (see 21.520 mc.) Daily 12:30-1:30 a.m. 8-9 a.m.; 3-4 p.m.; 4:30-5:30 p.m., 6-6:30 p.m.

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

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

11.795 DJO *25.43* — ●Zeesen, Germany (Exp.) (see 17.760 mc.) Irregular.

11.790 WIXAL *25.43* — ●Boston, Mass. (see 21.460 mc.) Mon. to Fri. 4:45-6:30 p.m., Sat. 4-6:30 p.m., Sun. 1-6:30 p.m., Mon. and Fri. 9-10 p.m. Specials irregular.

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

11.770 DJD *25.49* — ●Zeesen, Germany (see 17.760 mc.) Daily 10:40 a.m.-4:30 p.m.; 4:50-10:45 p.m.

11.760 TGWA *25.50* — ●Guatemala City, Guatemala, C.A. (see 17,800-15.170-9.685 mc.) Mon. to Fri. 7:30 p.m.-12 a.m.; Sat. 7:30 p.m.-1 a.m.; Sun. 7:30 p.m.-12 a.m. *No IRC necessary.*

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

11.760 OLR4B *25.50* — ●Prague, Czechoslovakia (see 21.450 mc.) Irregular.

11.750 GSD *25.53* ★ — ●Daventry, England (see 26.100 mc.) Daily 2-4:15 a.m.; 8:55 a.m.-12 noon; 12:20-4 p.m.; 6:20-8:30 p.m.; 9:20-11:20 p.m.

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

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

11.730 W1XAL *25.57* — ●Boston, Mass. (see 21.460 mc.) Mon. to Fri. Inc. 9-10 p.m.

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

11.718 TPA-4 *25.60* — ●Pontoise, France (see 15.243 mc.) Daily 6:15-8:15 p.m.; 10 p.m.-1 a.m.

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

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

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

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

11.710 VK9MI *25.62* — ●M. V. Kanimbla, McIllwraith and McEacharn, Bridge St., Sydney, Australia. 11 p.m.-7:35 a.m.

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

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

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

11.680 KIO *25.68* — Kahuku, Hawaii. (P) U.S.A., Australia, Fiji Is. (see 16.030 mc.)

11.670 PPQ *25.71* — Rio de Janeiro, Brazil. (P) U.S.A., So. Am. (see 19.260 mc.)

11.670 IUJ *25.71* — Addis Ababa, Ethiopia. (P) Italy and Colonies (see 18.270 mc.)

11.660 JVL *25.73* — Nazaki, Japan. (P) Japan Col. (see 18.910 mc.)

11.595 VRR4 *25.87* — Stony Hill, Jamaica. (P) U.S.A., Br. Col.

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

11.560 CMA5 *25.95* — Havana, Cuba. (P) Irregular (see 17.260 mc.)

11.540 XGR *26.00* — Shanghai, China. (P) Tests irregularly. (see 17.650 mc.)

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

11.530 KBL *26.02* — Manila, P. I. (P) U.S.A., Europe (see 21.140 mc.)

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

11.413 CJA4 *26.28* — Drummondville, Que. (P) Australia, England (see 21.600 mc.)

11.402 HBO *26.31* — ●Geneva, Switzerland (see 18.480 mc.) Mondays 2:30-2:45 a.m. Fridays 2-2:15 p.m.

11.340 DAF *26.46* — Norddeich, Germany. (P) Phones ships irreg. (see 27.800 mc.)

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

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

11.000 ZLT5 *27.27* — Wellington, N.Z. (P) Australia (see 12.295 mc.)

10.980 ZLT4 *27.32* Wellington, N.Z. (P) Australia (see 12.295 mc.)
10.960 JZB *27.37* Nazaki, Japan. (E) (see 21.520 mc.) Irregular.
10.955 HSG *27.38* Bangkok, Siam. (P) Malaya, India (see 17,740 mc.)
10.940 FTH *24.73* St. Assise, France. (P) So. Am. (see 19.355 mc.)
10.910 TGA6 *27.50* Guatemala City, Guatemala, C.A. (P) Cent. Am., So. Am.
10.910 KTR *27.50* Manila, P. I. (P) U.S.A., Europe, Japan. (see 21.140 mc.)
10.860 FRS-8 *27.62* Saigon, Indo-China. (P) France, U.S.A., Japan (see 18.388 mc.)
10.860 KBA *27.62* Manila, P. I. (P) U.S.A. (see 21.140 mc.)
10.850 DFL *27.65* Nauen, Germany. (P) So. Am. (see 27.800 mc.)
10.840 KWV *27.68* Dixon, Calif. (P) P. I., Hawaii, Japan, Australia, Java, China (see 21.060 mc.)
10.795 GCL *27.79* Rugby, England. (P) Japan see 20.380 mc.)
10.770 GCB *27.86* Rugby, England. (P) Australia, Japan (see 20.380 mc.)
10.760 PSG *27.88* Rio de Janerio, Brazil. (P) Europe, U.S.A., So. Am. (see 21.080 mc.)
10.740 JVM *27.93* ●Nazaki, Japan (see 21.520 mc.) 4:30-7:30 a.m. Irregular.
10.740 JVM *27.92* Nazaki, Japan. (P) Europe Irregular (see 18.910 mc.)
10.680 PLQ *28.09* Bandoeng, Java. (P) Phones Kuala Lumnur, Medan and Makasser 5:30-9 a.m., 10 p.m.-2 a.m. (see 19.345 mc.)
10.675 WNB *28.10* Lawrenceville, N. J. (P) Bermuda (see 21.420 mc.)
10.670 CEC *28.12* Santiago, Chile. (P) So. Am., U.S.A. (see 19.680 mc.)
10.670 HPH *28.12* Panama City, Pana. (P) C.A., U.S.A., S.A. (see 14.485 mc.)
10.670 CEC *28.12* ●Cia Internacional de Radio, Casilla 16-D. Santiago, Chile. Daily exc. Sat. and Sun. 7-7:20 p.m. (see CED. 10.230 mc.)
10.660 JVN *28.14* Nazaki, Japan. (P) Japan, U.S.A. (see 18.910 mc.)
10.660 JVN *28.14* ●Nazaki, Japan (see 21.520 mc.) Daily 1:40-2:30 a.m., 3-7:45 p.m.
10.640 WQW *28.20* Rocky Point, N. Y. (P) Germany (see 21.260 mc.)
10.630 WED *28.22* Rocky Point, N. Y. (P) Chile (see 21.260 mc.)
10.620 WEF *28.25* Rocky Point, N. Y. (P) Europe, Orient (see 21.260 mc.)
10.620 EHX *28.25* Madrid, Spain. (P) So. Am., Europe (see 20.860 mc.)
10.610 WEA *28.28* Rocky Point, N. Y. (P) Italy, France (see 21.260 mc.)
10.600 WQW *28.30* Rocky Point, N. Y. (P) Germany-Poland (see 21.260 mc.)
10.600 ZIK2 *28.30* ●Government Radio Station ZIK2. Wireless Branch, Post Office, Belize, British Honduras, C.A. Tues., Thurs., Sat. 7:30-7:45 p.m.
10.550 WOK *28.44* Lawrenceville, N. J. (P) Argentine-Brazil-Peru (see 21.420 mc.)
10.535 JIB *28.48* Taihoku, Taiwan, Japan. (P) Janan, B.C. irreg.
10.525 VK2ME *28.50* Amalgamated Wireless Ltd., 47 York St., Sydney, Australia. (P) Europe.
10.525 VLK *28.50* Sydney, Australia (P) Europe
10.520 CFA-4 *28.52* Drummondville, Que. (P) Australia (see 21.600 mc.)
10.480 ITF *28.63* Mogdishu, Somaliland, Africa. (P) Italy and Colonies (see 19.987 mc.)
10.440 DGH *28.74* Nauen, Germany. (P) Egypt, Java, Siam, Mex., Venez. (see 27.800 mc.)
10.430 YBG *28.76* Medan, Sumatra, Radio Service, Serdangweg 2, Sumatra, D.E.I. (P) Java.
10.430 TYE-3 *28.76* Paris, France. (P) Phones U.S.A. irreg. (see 18.776 mc.)
10.420 XGW *28.79* Shanghai, China. (P) Tests GBP-KAY early a.m. Musical tests 10:45 a.m.-3 p.m. (see 17.650 mc.)
10.420 PDK *28.79* Kootwijk, Holland. (P) Java (see 20.835 mc.)
10.415 PDK *28.80* Kootwijk, Holland. (P) Java (see 20.835 mc.)
10.410 PDK *28.82* Kootwijk, Holland. (P) Java (see 20.835 mc.)
10.410 KES *28.82* Bolinas, Calif. (P) Japan (see 20.820 mc.)
10.400 KEZ *28.85* Bolinas, Calif. (P) China, Argentina (see 20.820 mc.)
10.390 KER *28.87* Bolinas, Calif. (P) Phil. Isl. (see 21.260 mc.)

10.380 WCG *28.90* Rocky Point, N. Y. (P) Norway-Sweden-U.S.S.R. (see 21.260 mc.)
10.375 JVO *28.92* Nazaki, Japan. (P) Manchukuo (see 18.910 mc.)
10.370 *28.93* ●Radio Nacionales, Salamanca, Spain. Daily 9-9:45 p.m.
10.370 EAJ43 *28.93* ●Radio Club Tenerife, Apartado 225, Santa Cruz, Tenerife, C.I. Daily 2:15-3:30 p.m.; 6-7 p.m.; 7:10-9:30 p.m.
10.370 EHZ *28.93* ●Tablero, Tenerife, C. I. Daily 3-4 p.m.; 6-8:15 p.m.
10.350 LSX *28.93* ●Transradio Internacional, San Martin, 329, Buenos Aires, Argentina, S.A. C: San Lorenzo March. Irregular 5-8 p.m.
10.335 ZFD *29.03* Engineer - In - Charge, The Havana and Bermuda Cable Co., Hamilton (St. George) Bermuda. (P) U.S.A., Br. Colonies.
10.330 ORK *29.04* ●Director de Communications, Bruxelles, Belgium. I: Carrillion. O: Towards The Future. C: Brabanconne. Daily 1:30-3 p.m.
10.310 PPM *29.10* Rio de Janeiro, Brazil. (P) U.S.A.-Europe-S.A. (see 19.260 mc.)
10.300 LSL2 *29.13* Buenos Aires, Arg. (P) Europe, So. Am. (see 21.160 mc.)
10.290 DZC *29.15* Zeesen, Germany. (E) (see 27.800 mc.) Irregular.
10.260 PMN *29.24* ●Bandoeng, Java, D.E.I. (see PLP. 11.000 mc.) Weekdays 5:30-11 a.m. (Sat. 11:30 a.m.); 6-7:30 p.m.; 10:30 p.m.-2 a.m.; Sundays 5:30-11 a.m.; 7:30 p.m.-2 a.m.
10.250 LSK3 *29.27* Buenos Aires, Arg. (P) Europe, U.S.A. and S.A. (see 19.600 mc.)
10.230 CED *29.33* ●Antofagasta, Chile (see CEC 10.670 mc.) Sat. and Sun. 7-7:20 p.m.
10.220 PSH *29.35* ●Cia Radio International do Brazil, Caixa Postal 709, Rio de Janeiro, Brazil. IRC or 5c Stamps any country. Daily 6-9 p.m.
10.210 DGD *29.38* Nauen, Germany. (P) Irreg. (see 27.800 mc.)
10.170 RIO *29.50* Bakou, U.S.S.R. (P) Calls U.S.S.R. stations (see 14.790 mc.)
10.140 OPM *25.59* Leopoldville, Belg.-Congo. (P) Belgium (see 20.040 mc.)
10.135 CQN *29.60* ●Chief of Radio Station CQN, Post Office Bldg., Macao (Portuguese) China. O: Maria de Fonte. C: National — A Portuguese. Mon. and Fri. 7-8:30 a.m.
10.128 DON *29.62* Konigs W'n., Germany. (P) Europe. (see 27.800 mc.)
10.120 PSI *29.64* Rio de Janeiro, Brazil. (P) Argentina (see 21.080 mc.)
10.080 RIR *29.76* Tiflis, U.S.S.R. (P) Calls U.S.S.R. stations (see 14.790 mc.)
10.070 EDM *29.79* Madrid, Spain. (P) So. America (see 20.860 mc.)
10.070 HRL2 *29.79* La Lima, Honduras (P) C.A., U.S.A., W.I., S.A.
10.055 ZFB *29.84* Hamilton, Bermuda. (P) U.S.A. (see 10.335 mc.)
10.055 SUV *29.48* Cairo, Egypt. (P) Europe, Iraq. (see 13.820 mc.)
10.042 DZB *29.87* Zeesen, Germany. (E) (see 27.800 mc.) Irregular.
10.040 HII *29.88* Ciudad Trujillo. D.R. (P) Phones 8 a.m.-8 p.m.
10.040 HJA3 *29.88* Barranquilla, Colombia. (P) So. Am.-U.S.A.
9.990 KAZ *30.03* Manila, P. I. (P) U.S.A., Europe, Japan, Java, China (see 21.140 mc.)
9.966 IRS *30.08* Rome, Italy. (P) Irregular.
9.950 GBU *30.13* Rugby, England. (P) U.S.A. (see 20.380 mc.)
9.940 YSG *30.18* San Salvador, Salvador. (P) Phones 8 a.m.-8 p.m. (see 14.985 mc.)
9.940 HPF-2 *30.18* Panama City, Panama. (P) Phones 8 a.m.-8 p.m. (see 14,485 mc.)
9.940 TIV-2 *30.18* San Jose, Costa Rica. (P) Phones 8 a.m.-8 p.m. (see 14.485 mc.)
9.940 HRF-5 *30.18* Tegucigalpa, Honduras. (P) Phones 8 a.m.-8 p.m. (see 14.485 mc.)
9.940 WCU *30.18* San Juan, P. R. (P) Miami 7 p.m. on (see 13.410 mc.)
9.940 YNA2 *30.18* Managua, Nicaragua (P) U.S.A.
9.940 HRL7 *30.18* La Lima, Honduras (P) U.S.A., C.A., W.I., S.A.
9.940 HRM6 *30.18* Tela, Honduras (P) U.S.A., C.A., W.I., S.A.
9.940 TGF3 *30.18* Guatemala City, Guatemala, C.A. (P) C.A., W.I., U.S.A., So. Am.

9.940 CSW3 *30.18* ●Lisbon, Portugal (see 11.840-11.040 mc.) Daily 6-8 p.m.
9.930 COBC *30.21* ●Apartado 132, Havana, Cuba. Daily 7 a.m.-12:30 a.m.
9.930 HJY *30.21* Bogota, Colombia (P) Argentina (see 18.440 mc.)
9.925 GCU2 *30.23* Rugby, England (P) U.S.A. (see 20.380 mc.)
9.925 JDY *30.23* ●Dairen Broadcasting Station, Sholokugai 3, Dairen, Kwantung Leased Territory. Daily 7-8 a.m., English 7:40-8 a.m.
9.920 DGM *30.24* Nauen, Germany (P) Europe (see 27.800 mc.)
9.917 XDY *30.25* Chapultepec, Mexico (P.) U.S.A., Europe, C.A.
9.905 WRX *30.29* Lawrenceville, N. J. (P) England, France
9.900 GCE *30.30* Rugby, England (P) Portugal (see 20.380 mc.)
9.890 LSN2 *30.33* Buenos Aires, Arg. (P) U.S.A. (see 21.160 mc.)
9.870 WON *30.40* Lawrenceville, N. J. (P) England (see 21.420 mc.)
9.860 EAQ *30.43* ●P. O. Box 951, Madrid, Spain. O: La Verbena de la Paloma. C: Himno de Riego or Good Night Melody. (see EAR 9.480 mc.) Irregular.
9.840 FYC-2 *30.49* Paris, France. (P) Asia, Fr. Colonies (see 18.776 mc.)
9.840 JYS *30.49* Kemikawa-Cho, Japan. (E) Irregular.
9.833 COCM *30.51* ●Apartado 33, Havana, Cuba. Daily 8 a.m.-12 midnight.
9.830 IRF *30.50* Rome, Italy. (E) Irregular. (see 19.520 mc.)
9.800 LSI *30.59* Buenos Aires, Arg. (P) Europe (see 19.600 mc.)
9.790 GCW *30.64* Rugby, England. (P) Phones U.S.A. (see 20.380 mc.)
9.760 VLJ *30.74* Sydney, Australia. (P) Java, New Zealand (see 10.520 mc.)
9.760 VLZ2 *30.74* Sydney, Australia. (P) Java, New Zealand (see 10.520 mc.)
9.750 COCQ *30.77* ●Calle 25, No 445. Havana, Cuba. Weekdays 6:55 a.m.-1 a.m.; Sundays 6:55 a.m.-12:01 a.m.
9.750 WOF *30.77* Lawrenceville, N. J. (P) England. France (see 21.420 mc.)
9.720 TGZ *30.86* Guatemala City, Guatemala. (P) Phones 8 a.m.-8 p.m. (see 14.485 mc.).
9.710 GCA *30.88* Rugby, England. (P) Argentina, Brazil (see 20.380 mc.).
9.700 *30.93* ●Radio Martinique, P. O. Box 136, Fort De France, F. W. I. O-C: "La Marseillaise". Daily 11:15 a.m.-12:25 p.m.; 6-8 p.m.
9.685 TGWA *30.98* ●Guatemala City, Guatemala, C. A. (See 17.800-15.170-11.760 mc.) 9-11 p.m. Irregular. No IRC necessary.
9.675 DZA *31.00* Zeesen, Germany. (E) (see 27.800 mc.).
9.670 TI4NRH *31.02* ●Apartado 40, Heredia, Costa Rica. Tues., Thurs., Sat. 9-10 p.m.; Sundays 7-9 a.m. Irregular 11:30 p.m.-12:30 a.m.
9.666 CR6AA *31.04* ●Caixa Postal 103, Lobito, Angola. Portuguese West Africa. I: 3 notes on piano; A-C-B. Portuguese, French and English. Wed. and Sat. 2:45-4:30 p.m.
9.660 LRX *31.06* ●Buenos Aires, Argentina, S. A. (See LRU, 15.290 mc.) Daily 9:30 a.m.-11:30 p.m.
9.660 PSJ *31.06* Rio de Janeiro, Brazil. (P) So. Am., Europe (see 21.080 mc.).
9.650 CS2WA *31.09* ●Antonio Augusto de Aguair, 144 Lisbon, Portugal. I: Cookoo, 3 times. C: A Portuguesa (national anthem). Tues., Thurs., Sat. 4-7 p.m.
9.650 DGU *31.09* Nauen, Germany. (P) Egypt, Asia, Mex., Venez. (see 27.800 mc.).
9.645 HH3W *31.10* ●P. O. Box A117, Port-au-Prince, Haiti, W. I. S: 4 chime notes and siren each 15 min. before announcements. Daily exc. Sunday 1-2 p.m.; 7-8:30 p.m.
9.640 CXA8 *31.12* ●Director, Colonia, Uruguay. S. A. Daily 6 p.m.-11 p.m.
9.635 I2RO-3 *31.13* ●Rome, Italy. Daily 12:20-6 p.m. So. Am. 6-7:30 p.m. No. Am. 7:30-9 p.m. (see 11.810 mc.).
9.630 HJ7ABD *31.15* ●Bucaramanga, Colombia, S. A. Daily 12-1 p.m., 6-11 p.m.

9.620 FZR *31.17* — Saigon, Indo-China. (P) France and Colonies, U. S. A. (see 18.388 mc.)

9.616 HJ1ABP *31.20* — ● P. O. Box 37, Cartagena, Colombia, S. A. O-C: Under The Double Eagle. Daily 7-9 a.m.; 11 a.m.-1:20 p.m.; 6-11 p.m.

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

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

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

5.595 HBL *31.27* — ● Geneva, Switzerland (see 18.450 mc.) Irregular.

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

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

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

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

9.590 VK2ME *31.28* — ● Amalgamated Wireless, Ltd., 47 York St., Sydney, Australia. Clock strikes at hour, chimes ¼ hr. I: Kookaburra bird call. C: God Save The King. Sunday 1-3 a.m.; 5-9 a.m.; 9:30-11:30 a.m.

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

9.590 PCJ *31.28* — ● Hilversum, Holland, (see 15.220 mc.) Sunday 1:25-1:40 p.m., 2-3 p.m., 7-9 p.m.; Tues. 1:45-3:30 p.m.; Wed. 7-9 p.m.

9.580 GSC *31.32* ★ — ● Daventry, England (see 26.100 mc.) Daily 4:15-6 p.m., 6:20-8:30 p.m., 9:20-11:20 p.m.

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

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

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

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

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

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

9.560 DJA *31.38* — ● Zeesen, Germany (see 17,760 mc.) Daily 12:05 a.m.-11 a.m.; 4:50-10:45 p.m.

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

9.550 YDB *31.41* — ● Soerabaja, Java N.E.I. (see 15.150 mc.) Weekdays 5:30-10 a.m. (Sat 11:30 a.m.) 6-7:30 p.m., 10:30 p.m.-2 a.m. Sun. 5:30-10 a.m. 7:30 p.m.-2 a.m.

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

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

9.550 OLR3A *31.41* — ● Prague, Czechoslovakia (see 21.450 mc.) Daily 7:15-9:55 p.m. News 5-5:15 p.m. (if no regular program.)

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

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

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

9.535 JZI *31.46* — ● Nazaki, Japan (see 21.520 mc.) Daily 3-4 p.m.; 4:30-5:30 p.m.

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

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

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

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

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

9.520 OZF *31.51* — ● Copenhagen, Denmark (see OXY 6.060 mc. Daily 2-6 p.m.

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

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

9.516.6 HJ6ABH *31.52* — ● Armenia, Colombia, S.A. O-C: The Spanish Soldiers. S: Blows on Marimba. News 7-10 p.m. Weekdays 8-11 a.m.; 6-10 p.m. Sundays 7-10 p.m.

9.510 GSB *31.55* ★ — ● Daventry, England (see 26.100 mc.) Daily 2-4:15 a.m.; 12:20-4 p.m., 4:15-6 p.m.; 6:20-8:30 p.m.; 9:20 to 11:20 p.m.

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

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

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

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

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

9.500 HI5G *31.58* — ● La Vega, Domonican Republic, W.I. Daily. 6:40-8:40 a.m.; 10:40 a.m.-2:40 p.m.; 4:40-8:40 p.m.

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

9.490 KEI *31.61* — Bolinas, Calif. (P) Indo-China, Manchukuo. (see 20.820 mc.)

9.480 EAR *31.65* — ● P. O. Box 951, Madrid. Spain. English daily. 7:30 p.m. Mon., Tues., Thurs., 9:30 p.m. German Sat. 9:30 p.m.

9.480 KET *31.65* — Bolinas. Calif. (P) Australia, Hawaii. (see 20.820 mc.)

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

9.470 WET *31.68* — Rocky Point, N. Y. (P) Argentina, Venez. (see 21.260 mc.)

9.460 IQN *31.71* — Tripoli, Africa. (P) Phones Italy a.m.

9.450 WES *31.75* — Rocky Point, N. Y. (P) Colombia, Brazil. (see 21.260 mc.)

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

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

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

9.415 PLV *31.86* — Bandoeng, Java. (P) Phones San Francisco 9:30-10:30 a.m. (see 19.345 mc.)

9.400 XDZ *31.92* — Chapultepec, Mexico. (P) Europe, S.A., U.S.A., C.A.

9.385 PGC *31.97* — Kootwijk, Holland. (P) Java (see 20.835 mc.)

9.375 PGC *32.00* — Kootwijk, Holland. (P) Java (see 20.835 mc.)

9.370 PGC *32.02* — Kootwijk, Holland. (P) Java (see 20.835 mc.)

9.355 WNK *32.07* — Hialeah, Florida. (P) Phones 8 a.m.-8 p.m. (see 15.055 mc.)

9.350 CEC *32.09* — Santiago. Chile. (P) U.S.A., So. Am. (see 19.680 mc.)

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

9.345 HBL *32.10* — ● Geneva, Switzerland (see 18.450 and 7.797 mc.) Fridays 2:30-2:45 p.m.; 7:30-7:45 p.m.; 8-8:15 p.m. Monday 6:45-8 p.m. Swiss Program.

9.340 OAX4J *32.12* — ● Radio Internacional, Casilla 1166 Lima, Peru. C: "Whistler and His Dog"—Veri slow. Daily 12-3 p.m. 5 p.m.-1 a.m.

9.332 CGA4 *32.15* — Drummondville, Que. (P) England, Europe (see 21.600 mc.)

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

9.300 HIG *32.36* — ● Ciudad Trujillo, Dom. Rep., W.I. Av. Jose Trujillo No. 20. Daily 7:10-9:10 a.m.; 11:40 a.m.-2:10 p.m.; 3:40-9:40 p.m.

9.280 GCB *32.33* — Rugby, England. (P) Canada (see 20.380 mc.)

9.240 PDP *32.47* — Kootwijk, Holland. (P) Java (see 20.835 mc.)

9.235 PDP *32.49* — Kootwijk, Holland. (P) Java (see 20.835 mc.)

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

9.180 HC1GQ *32.68* — ● Quito, Ecuador, S.A. C: Blue Danube Mon., Wed., Sat. 9:30-11:30 p.m.

9.180 ZSR *32.68* — Klipheuvel, S. Africa. (P) England (see 18.890 mc.)

9.170 WNA *32.72* — Lawrenceville, N. J. (P) England (see 21.420 mc.)

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

9.110 KUW *32.93* — Manila. P. I. (P) U.S.A., Siam. Java, China (see 21.140 mc.)

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

9.091 CGA-5 *33.00* — Drummondville, Que. (P) Phones Europe days (see 21.600 mc.)

9.044 VWY *33.17* — Kirkee, India. (P) England.

9.040 TYA2 *33.19* — Paris, France. (P) Algerie (see 18.776 mc.)

9.037 TYA-2 *33.19* — Paris, France. (P) Algeria; B.C. irreg. (see 18.776 mc.)

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

9.020 GCS *33.26* — Rugby, England. (P) U.S.A. (see 20.380 mc.)

9.010 KEJ *33.30* — Bolinas, Calif. (P) Java, Hawaii (see 20.820 mc.)

9.005 GCS2 *33.31* — Rugby, England. (P) U.S.A. (see 20.380 mc.)

9.005 TFK *33.31* — Reykjavik, Iceland. (P) Irregular (see 12.235 mc.)

9.000 FRS9 *33.33* — Saigon, Indo-China. (P) Fr., U.S.A. (see 18.388 mc.)

8.975 VWY *33.43* Kirkee, India. (P) England.

8.960 TPZ2 *33.48* Alger, Algeria, Africa. (P) Phones Paris 12-1 a.m. (see 12.120 mc.)

8.950 WEL *33.52* Rocky Point, N. Y. (P) U.S.S.R., Europe (see 21.260 mc.)

8.940 WKL *33.56* Rocky Point, N. Y. (P) Denmark, Poland (see 21.260 mc.)

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

8.930 WEC *33.59* Rocky Point, N. Y. (P) Germany, Spain, Portugal (see 21.260 mc.)

8.900 ZLT3 *33.71* Wellington, N. Z. (P) Australia (see 12.295 mc.)

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

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

8.790 TIN *34.13* Cartago. Costa Rica. (P) C. Am. (see 14.485 mc.)

8.790 TIM *34.13* San Jose, Costa Rica. (P) Phones 8 a.m.-8 p.m. (see 14.485 mc.)

8.775 PNI *34.19* Makasser, D.E. I. (P) Java.

8.765 DAF *34.23* Norddeich, Germany. (P) Phones ships irreg. (see 27.800 mc.)

8.760 GCQ *34.35* Rugby, England. (P) So. Africa. (see 20.380 mc.)

8.730 GCI *34.36* Rugby. England. (P) Phones India. (see 20.380 mc.)

8.710 KBB *34.44* Manila, P. I. U. S. A., Europe. (see 21.140 mc.)

8.700 VWZ *34.48* Kirkee, India. (P) England.

8.680 GBC *34.56* Rugby, England. (P) Irregular. (see 20.380 mc.)

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

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

8.630 CMA5 *34.76* Havana, Cuba. (P) Irregular. (see 17.260 mc.)

8.610 TYD2 *34.84* Paris, France. (P) Madagascar. (see 18.776 mc.)

8.580 TYF2 *34.97* Paris, France. (P) U.S.A. (see 18.776 mc.)

8.580 TGA5 *34.97* Guatemala City, Guatemala, C.A. (P) C.A., W.I., U.S.A., So. Am.

8.580 YNIPR *34.97* ● A. Mejewsky, Gerente, Manegua, Nicaragua, C.A. Daily 1-2:30 p.m.; 7:30-10:30 p.m. Veri—5c U. S. postage.

8.560 WOY *35.05* Lawrenceville, N. J. (P) Irregular. (see 21.420 mc.)

8.560 WOO *35.05* Ocean Gate, N. J. (P) Phones ships days.

8.550 HPI *35.09* Panama City, Panama. (P) Phones 8 a.m.-8 p.m. (see 14.485 mc.)

8.515 IAC *35.23* Pisa, Italy. (P) Phones irreg. (see 17.750 mc.)

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

8.380 IAC *35.80* Pisa, Italy. (P) Phones ships irregularly.

8.330 DAS *36.01* Rugen, Germany. (P) Phones ships irreg. (see 27,800 mc.)

8.195 ITD *36.61* Mogdishu, Somaliland, Africa. (P) Italy and Colonies.

8.185 PSK *36.65* Rio de Janeiro, Brazil. (P) U.S.A., Arg. Broadcasts irreg. (see 21.080 mc.)

8.155 PGB *36.79* Kootwijk, Holland. (P) Java (see 20.835 mc.)

8.140 FRU5 *36.86* Saigon, Indo-China. (P) France and Colonies. (see 18.388 mc.)

8.075 WEZ *37.15* Rocky Point, N. Y. (P) England. Turkey, Levant. (see 21.260 mc.)

8.075 TYB-2 *37.15* Paris, France. (P) Phones Morocco irreg. (see 18.776 mc.)

8.035 CNR *37.33* Rabat, Morocco. (P) France 2:30 a.m.-3:30 p.m. B.C. irreg. (see 12.830 mc.)

7.985 HRH6 *37.57* Tela, Honduras. (P) C.A., W.I., S.A., U.S.A.

7.970 HRE2 *37.64* Tegucigalpa, Honduras. (P) C.A., W.I., U.S.A., S.A.

7.970 XGL *37.64* Shanghai, China. (P) U.S.A., Europe. (see 17.650 mc.)

7.960 VLZ *37.69* Sydney, Australia. (P) New Zealand. (see 10.520 mc.)

7.955 HSJ *37.71* Bangkok, Siam. (P) Europe, P.I., Java. (see 17.740 mc.)

7.935 PSL *37.81* Rio de Janeiro, Brazil. (P) U.S.A., Europe, So. Am. (see 21.080 mc.)

7.920 GDP *37.88* Rugby, England. (P) Australia. (see 20.380 mc.)

7.901 LSL *37.97* Buenos Aires, Arg. (P) Brazil. (see 21.160 mc.)

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

7.890 ITV *38.02* Asmara, Eritrea, Africa. (P) Italy and Colonies.

7.880 JYR *38.05* Kemikawa-Cho, Japan. (E) Irregular.

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

7.860 SUX *38.17* Cairo, Egypt. (P) Europe, Iraq. (see 13.820 mc.)

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

7.840 PGA *38.27* Kootwijk, Holland. (P) Java (see 20.835 mc.)

7.835 PGA *38.29* Kootwijk, Holland. (P) Java (see 20.835 mc.)

7.830 PGA *38.31* Kootwijk, Holland. (P) Java (see 20.835 mc.)

7.820 OCO *38.36* Lima, Peru. (P) S.A., U.S.A., C.A. (see 18.680 mc.)

7.812.5 DFT *38.40* Nauen, German. (P) Asia, Egypt, Mex., Venez. (see 27.800 mc.)

7.810 VRR3 *38.41* Stony Hill, Jamaica. (P) U.S.A., Br. Col.

7.797 HBP *38.49* ● Radio Suisse, S.A., 12, Quai de la Poste, Geneva, Switzerland. (E) No opening or closing selection. Monday 6:45-8 p.m. Swiss program.

7.790 YNA4 *38.49* Managua, Nicaragua. (P) U.S.A., C.A., S.A. (see 14.485 mc.)

7.770 PDM *38.61* Kootwijk, Holland. (P) Java (see 20.835 mc.)

7.765 PDM *38.63* Kootwijk, Holland. (P) Java (see 20.835 mc.)

7.760 PDM *38.66* Kootwijk, Holland. (P) Java (see 20.835 mc.)

7.740 CEC *38.76* Santiago, Chile. (P) So. America (see 19.680 mc.)

7.735 PDL *38.78* Kootwijk, Holland. (P) Java (see 20.835 mc.)

7.730 PDL *38.81* Kootwijk, Holland. (P) Java (see 20.835 mc.)

7.715 KEE *38.39* Bolinas, Calif. (P) China, Hawaii (see 20.820 mc.)

7.700 TYC-2 *38.96* Paris, France. (P) Egypt (see 18.776 mc.)

7.685 TIO *39.04* Cartago, Costa Rica, C. A. (P) Cent. Am., So. Am., U.S.A.

7.670 WDF *39.11* San Juan, P. R. (P) Dom. Rep. U.S.A. 11 a.m.-7 p.m. (see 13.410 mc.)

7.650 TYE-4 *39.22* Paris, France. (P) Phones U.S.A. (see 18.776 mc.)

7.625 RIM *39.34* Tashkent, U.S.S.R. (P) Calls Moscow (see 14.790 mc.)

7.620 IUB *39.37* Addis Ababa, Ethiopia. (P) Italy and Colonies (see 18.270 mc.)

7.610 KWX *39.42* Dixon, Calif. (P) P.I., Hawaii, Japan, Australia, Java, China (see 21.060 mc.)

7.570 HHZ *39.63* Part-Au-Prince, Haiti. (P) Dom. Rep., Jamaica.

7.565 WQM *39.66* Lawrenceville, N. J. (P) England, France (see 21.420 mc.)

7.565 KWY *39.66* Dixon, Calif. (P) P.I., Hawaii, Japan, Australia, Java, China (see 21.060 mc.)

7.555 WOZ *39.71* Lawrenceville, N. J. (P) England (see 21.420 mc.)

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

7.520 RKI *39.89* ● Moscow, U.S.S.R. Daily 7-9:15 p.m. (see 15.040 mc.)

7.520 KKH *39.89* Kahuku, Hawaii. (P) P.I., U.S.A., China (see 16.030 mc.)

7.510 JVP *39.95* Nazaki, Japan. (P) Europe irregular (see 18.910 mc.)

7.510 JVP *39.95* ● Nazaki, Japan (see 21.520 mc.) 3-7:30 a.m. Irregular.

7.470 JVQ *40.16* Nazaki, Japan. (P) Java (see 18.910 mc.)

7.470 HJP *40.16* Bogota, Colombia. (P) So. Am. (see 18.440 mc.)

7.430 FYA2 *40.38* Paris, France. (P) Portugal, So. Am. Fr. Col. (see 18.776 mc.)

7.415 WEG *40.46* Rocky Point, N. Y. (P) France (see 21.260 mc.)

7.400 WEM *40.45* Rocky Point, N. Y. (P) England, Hawaii, Little Am. (see 21.260 mc.)

7.390 ZLT-2 *40.60* Wellington, N. Z. (P) Australia (see 12.295 mc.)

7.390 JVR *40.60* Nazaki, Japan. (P) China (see 18.910 mc.)

7.380 XDB *40.65* Chapultepec, Mexico. (P) U.S.A., Europe.

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

7.370 KEQ *40.71* Kahuku, Hawaii. (P) Japan, P.I., U.S.A., Fiji, Oceana (see 16.030 mc.)

7.345 GDL *40.84* Rugby, England. (P) Japan (see 20.380 mc.)

7.332.5 DLC *40.92* Rehmate, Germany. (P) Europe (see 27.800 mc.)

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

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

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

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

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

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

6.990 JVS *42.92* Nazaki, Japan. (P) China. (see 18.910 mc.)

6.980 XDJ *42.98* Chapultepec, Mexico. (P) U.S.A., Europe.

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

6.965 WIZ *43.07* Rocky Point, N. Y. (P) Italy, Vatican (see 21.260 mc.)

6.950 WKP *43.17* Rocky Point, N. Y. (P) Europe, C.A. (see 21.260 mc.)

6.912 IPJ *43.40* Tripoli, Africa. (P) Italy and Colonies.

6.905 GDS *43.45* Rugby, England. (P) U.S.A. (see 20.380 mc.)

6.905 HRL4 *43.45* La Lima, Honduras. (P) C. A., W.I., S.A., U.S.A.

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

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

6.890 KEB *43.54* Bolinas, Calif. (P) Java, P.I. (see 20.820 mc.)

6.880 CGA-7 *43.60* Drummondville, Que. (P) Phones Europe days. (see 21.600 mc.)

6.860 KEL *43.73* Bolinas, Calif. (P) Tests KAZ-PLV early a.m. (see 20.820 mc.)

6.852 WGU *43.78* San Juan, P.R. (P) Cuba, Venez., Pan., Haiti, D.R., U.S.A. (see 13.410 mc.)

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

6.845 KEN *43.83* Bolinas, Calif. (P) Manchukuo, U. S. A. (see 20.820 mc.)

6.810 TGA2 *44.05* Guatemala City, Guatemala, C.A. (P) C.A., W.I., U.S.A., S.A.

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

6.790 CMA5 *44.18* Havana, Cuba. (P) Irregular. (see 17.260 mc.)

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

6.780 HIH *44.25* ● San Pedro de Macoris, Dom. Rep., W.I. Daily 12:10-1:40 p.m.; 7:40-9 p.m. Sun. 5:10-6:40 p.m. DX 2:40-3:40 a.m.

6.765 XDZ *44.35* Chapultepec, Mexico. (P) U.S.A., Europe.

6.760 CJA-6 *44.38* Drummondville, Que. (P) Australia. (see 21.600 mc.)

6.755 WOA *44.41* Lawrenceville, N. J. (P) England. (see 21.420 mc.)

6.750 JVT *44.44* Nazaki, Japan. (P) U.S.A., Japan. (see 18.910 mc.)

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

6.740 WEJ *44.51* Rocky Point, N. Y. (P) Norway, Sweden. (see 21.260 mc.)

6.732.5 KBK *44.56* Manila, P. I. (P) U.S.A.-Europe. (see 21.140 mc.)

6.732 WDA *44.56* Rocky Point, N. Y. (P) Canada, So. Am., Cent. Am., Curacao. (see 21.260 mc.)

6.730 HI3C *44.58* ● Sr. Roberto Palli. B., La Romana, Dom. Rep., W.I. English announcements regular. Weekdays 12:10-2:10 p.m.; 6-10-11 p.m. Sun. 12-10-2:40 p.m.

6.725 WQO *44.60* Rocky Point, N. Y. (P) Germany. (see 21.260 mc.)

6.720 PMH *44.64* ● Bandoeng, Java, D.E.I. (see PLP. 11.000 mc.) Weekdays 5:30-11 or 11:30 a.m., Sundays 5:30-11 or 11:30 a.m., 9:30 p.m.-1:30 a.m.

6.718 WDB *44.66* Rocky Point, N. Y. (P) P.R., D.R., Haiti. (see 21.260 mc.)

6.710 KEF *44.71* Bolinas, Calif. (P) Mexico, U.S.A. (see 20.820 mc.)

6.690 TIEP *44.84* ● Apartado 227, San Jose, Costa Rica, C.A. Daily 7-11 p.m.

6.690 CGA-6 *44.84* Drummondville, Que. (P) Europe. (see 21.600 mc.)

6.675 HBQ *44.94* Geneva, Switzerland. (E) Irregular. (see 18.450 mc.)

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

6.650 IAC *45.11* Pisa, Italy. (P) Phones slips irreg. (see 17.750 mc.)

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

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

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

6.600 DAF *45.45* Norddeich, Germany. (P) Europe. (see 27.800 mc.)

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

6.575 HC1VT *45.63* ● Ambato, Ecuador, S.A. Mon., Wed., Fri. 8-10:30 p.m. Veri—U. S. postage.

6.550 TIRCC *45.81* ● Apartado 1064, San Jose, Costa Rica, C.A. S: 4 notes on gong. O-C: The Lost Chord—Organ. Tues., Thurs., Sat., 6-7 p.m. Religious Sundays 10 a.m.-7 and 8 p.m.; Thurs. 8 p.m.

6.545 YV6RB *45.84* ● Apartado, 34, Ciudad Bolivar, Venezuela, S.A. Daily 7:10 p.m.; Sun. 3-6 p.m.

6.535 YN1GG *45.91* ● Managua, Nicaragua, C.A. Daily 6-10 p.m.; Veri—5c U. S. postage.

6.520 YV4RB *46.01* ● Valencia, Venezuela, S.A. C: Bugle call, taps and off. Daily 11 a.m.-1:30 p.m.; 5:30-9:30 p.m.

6.500 HIL *46.15* ● Apartado 623, Ciudad Trujillo, Dom. Rep., W.I. Daily 12:10-1:40 p.m., 5:40-7:40 p.m.

6.500 YV1RM *46.15* ● Maracaibo. Venezuela, S.A. Daily 6-9:30 p.m.

6.482 HI4D *46.28* ● Ciudad Trujillo, Dom. Rep. W.I. Mon. & Sat. 11:55 a.m.-1:40 p.m.; 4:40-7:40 p.m.

6.480 EDR-4 *46.30* ● Radio Poste, Palma de Mallorca, Balearic Islands. Daily 4:30-5:15 p.m.

6.480 HI1L *46.30* ● Radioemisora Nacional "El Diario." Apartado 356, Santiago de los Caballeros, Dom. Rep., W. I. I: Xylophone notc O-C: Dominican National Anthem. Weekdays 7-8:30 a.m., 12-2 p.m., 5:30-9.30 p.m.

6.479 HI8A *46.30* ● Apartado 1312, Ciudad Trujillo. Dom. Rep., W. I. English each 15 mins. O-C: March General Alvare Obregon. S: 2 strokes of bell. Daily 8:40-10:40 a.m.; 2:40-4:40 p.m.; Sat. 9:10-10:40

6.465 YV3RD *46.40* ● Radio Barquisimeto, Avda, Bella Vista No. 335, Barquisimeto, Venezuela, S. A. Daily 11:30 a.m.-1:30 p.m.; 5:30-9:30 p.m.

6.450 HI4V *46.51* ● Mella No. 25, San Francisco de Macoris, Dom. Rep. O-C: National Anthem. Daily 2:40-4:40 p.m., 7:10-9:10 p.m.

6.445 YVQ *46.55* Maracay, Venezuela. (P) South Am.

6.430 HI1S *46.66* ● P.O. Box 112, Santiago de los Cabelleros, Dom. Rep., W. I. Daily 11:40 a.m.-1:40 p.m.; 5:40-7:40 p.m.

6.420 YV6RC *46.73* ● Ciudad Bolivar, Venezuela, S. A. Daily 10:30 a.m.-1:30 p.m.; 4:30-9:30 p.m.

6.416 HJA3 *46.76* Barranquilla, Colombia. (P) So. Am. (see 14.940 mc.)

6.410 TIPG *46.80* ● Apartado 225, San Jose, Costa Rica. C.A. O-C: Parade of the Wooden Soldiers. Daily 7-9:30 a.m.; 12-2 p.m.; 4-11:30 p.m.

6.400 TGQA *46.88* ● Quezaltenango, Guatemala, C. A. (address — See TG2, 6.180 mc.) Daily 7-9 p.m.

6.400 YV5RH *46.88* ● Apartado 1931, Caracas, Venezuela, S. A. Weekdays 11 a.m.-1:30 p.m.; 4:30-9:30 p.m.; Sun. 9:30 a.m.-1:30 p.m.; 5-7:30 p.m.

6.383 VP2LO *47.00* ● P.O. Box 88, St. Kits, B.W.I. No chimes or signals. O: "Rule Brittania." C: "God Save The King." Daily 4-4:45 p.m. Sundays and holidays in addition 10-10:45 a.m.

6.375 YV5RF *47.10* ● Apartado 983, Caracas, Venezuela, S.A. C: Organ: Blue Danube. Daily 6:30-7:30 a.m.; 10:30 a.m.-1:30 p.m.; 4:30-10:30 p.m.

6.360 YV1RH *47.17* ● P. O. Box 261, Maracaibo, Venezuela, S.A. O: Jealusie. C: Er Weicht der Sonne Nicht — march Weekdays 5:30-7 a.m.; 10:30 a.m.-1:30 p.m.; 4:30-10:30 p.m. English 10-10:30 p.m. Sunday 8:30 a.m.-2:30 p.m.

6.351 HRPI *47.24* ● Sr. Joaquin Mendoza, Director, San Pedro Sula, Honduras, C.A. O: March —Boy Scouts. C: National Anthem Honduras. S: gongs. Daily 12-2 p.m.; 8-10 p.m. Veri—5c U. S. postage.

6.340 HI1X *47.32* ● Ciudad Trujillo, Dom. Rep., W.I. (see 15.280 mc.) Weekdays 12:10-1:10 p.m.; Tues. and Fri. 8:10-10:10 p.m.; Sun. 7:40-10:40 a.m.

6.330 COCW *47.39* ● Apartado 130, Havana, Cuba. Daily 7 a.m.-12 midnight.

6.315 HIZ *47.51* ● Apartado 1092 and 771, Ciudad, Trujillo, Dom. Rep., W.I. Weekdays 11:10 a.m.-2:10 p.m.; 4:40-9:40 p.m. Sundays 11:40 a.m.-2:40 p.m.

6.300 YV4RD *47.62* ● Sr. Luis Croquer, Prop., Maracay, Venezuela, S.A. Weekdays 11:30 a.m.-12:30 p.m.; 5:30-9:30 p.m.

6.280 COHB *47.77* ● P. O. Box 85, Sancti-Spiritus, Santa Clara, Cuba. Weekdays 9-10 a.m., 12-10 p.m. Sun. 10 a.m.-10 p.m.

6.275 OAX4G *47.81* ● Avda, Abancay, 915-923, or P.O. Box 2234 Lima, Peru, S.A. C. Good Night Sweetheart. Daily 7-11:30 p.m.

6.270 YV5RP *47.85* ● P.O. Box 508, Caracas, Venezuela, S.A. Daily 6-11:45 p.m.

6.250 YV5RJ *48.00* ● Sr. Edmundo Suegart, Prop., P. O. Box 1008, Caracas, Venezuela, S.A. Daily 5:30-9:30 p.m.

6.243 HIN *48.05* ● Carlo Arzobispo Merino No. 97, Ciudad Trujillo, Dom. Rep., W.I. English each 15 mins. (see 12.500 mc.) Weekdays 11:40 a.m.-2:40 p.m.; 7:10-9:10 p.m. Sun. 11:10 a.m.-3:40 p.m. Veri slow.

6.235 HRD *48.11* ● Sr. Tuilo Castaneda, Director, La Ceiba, Honduras, C.A. English on the hour. O: Solo Tuyo. C: Intermezzo No. 1. Piano 10:58 p.m. Good Night Melody. No signals. Daily exc. Sun. 8-11 p.m.

6.230 YV1RG *48.15* ● Radio Valera, Valera, Venezuela, S.A. S: 1 bell O-C: Local March. Daily 11 a.m.-12:30 p.m.; 5:30-9:30 p.m.

6.210 YV1RI *48.31* ● Radio Coro, Coro, Venezuela, S.A. S: 4 marimba notes. Spanish Ann. each 15 m. O-C: March — The Three Colors. Daily 7:30-9:30 p.m.

6.206 HI8Q *48.34* ● Julio O. Garcia Alardo, Ciudad Trujillo, Dom. Rep., W.I. Sunday only 5:40-9:40 p.m. (Daily later).

6.200 XEXS *48.39* ● Secretaria de la Economia Nacional, Mexico, D.F. Daily 7-11 p.m.

6.190 HI1A *48.47* ● P. O. Box 423, Santiago de los Caballeros, Dom. Rep. W.I. I: Gong C: Anchors Aweigh. Daily 6:40 a.m.-4:40 p.m.; Thurs. and Sundays, 7:40-9:40 p.m. Band concerts.

6.180 TG2 *48.54* ● Director General of Electrical Communications. Guatemala City, Guatemala, C.A. Weekdays 6-11 p.m. Sat. to 1 a.m. Sunday 7-11 a.m.; 3-8 p.m. No IRC Required.

6.160 VPB *48.70* ● Radio Club of Ceylon and So. India. P. O. Box 282, Colombo, Ceylon. S: Time on hour, 6 pips. I: Bow Bells, infrequently. Daily 6:30-11:30 a.m. Saturdays 12:30 p.m.

6.158 YV5RD *48.72* ● Radio Venezuela, Caracas, Venezuela, S.A. I: 5 strokes of bell. O-C: Triunfo Aereo. Weekdays 6:30-7:30 a.m.; 10:30 a.m.-1:30 p.m.; 3:30-10 p.m. Sun. 8:30 a.m.-10:30 p.m.

6.150 OAX1A *48.78* ● Sr. J. Carlos Montjoy D., Casilla No. 9, Chiclayo, Peru, S.A. O: Anclas Arriba. C: Good Night Melody. Daily 8-11 p.m.

6.150 CJRO *48.78* ● Winnipeg, Manitoba, Canada (see CJRX, 11.720 mc.) Weekdays 6 p.m.-12 a.m. Sundays 5-10 p.m.

6.150 HI5N *48.78* ● Moca, Dom. Rep., W.I. Daily 6:40-8:40 a.m.; 10:40 a.m.-2:40 p.m.; 4:40-8:40 p.m.

6.150 ZRD *48.78* ● Durban, South Africa. (see 6.097.5 mc.) Weekdays 11:45 p.m.-12:45 a.m.; 3:30-7:30 a.m.; 9 a.m.-3:45 p.m.; Sat. to 4 p.m.; Sun. 8-11:30 a.m., 12 noon-3:20 p.m.

6.145 HJ4ABE *48.82* ● Medellin, Colombia, S.A. I: Morse-letter "M" S: 4 chimes. Daily 9:30 a.m.-1 p.m.; 5-11:30 p.m.

6.140 W8XK *48.86* ● Pittsburgh, Pa. (see 21.540 mc.) Daily 11 p.m.-1 a.m.

6.140 ZEB *48.86* ● Bulawayo, Rhodesia, South Africa (see ZEC, 5.800 mc. for address). Sun. 3-5 a.m.; Tues. and Thurs. 1:15-3:15 p.m.

6.137 CR7AA *48.88* ● P.O. Box 594, Lourenco Marques, Portuguese East Africa. O: A Maria de Fonte. C: A Portuguesa. Weekdays 12:15-1 a.m.; 4:30-6:30 a.m.; 9:30-11 a.m.; 12:30-4 p.m. Sundays 5-7 a.m.; 10 a.m.-12:30 p.m.; 2-4 p.m.

6.133 XEXA *48.91* ● Mexico, D.F. (see 11.880 mc.) Weekdays 8:30-11 a.m.; 2:30-4:30 p.m.; 7 p.m.-12 a.m. Sunday 7 p.m.-12 a.m.

6.130 VP3BG *48.94* ● Crystal Broadcasting Co., Philharmonic Bldgs., Georgetown, British Guiana, S.A. O: Serenade. C: Good Night My Love and God Save The King. Mon., Wed., Fri. 3-4:45 p.m., 4:45-7:45 p.m.; Tues., Thurs., Sat. 10:15-11:15 a.m., 3-7:45 p.m.; Sun. 6:45-8:45 a.m., 10:30-1:45 a.m., 4-6:15 p.m.

6.130 XEUZ *48.94* ●Mexico D. F. (see 11.880 mc.) Daily 10 a.m.-1 p.m.; 7 p.m.-2 a.m. DX 1-2 a.m.

6.130 ZGE *48.94* ●Kuala Lumpur, Malay States, S.S. Sun., Tues., Fri. 6:40-8:40 a.m.

6.130 LKJ1 *48.94* ●Jeloy, Norway (see 9.530 mc.) Daily 11 a.m.-5 p.m.

6.130 COCD *48.94* ●P.O. Box 2294, Havana, Cuba. English each 15 mins. O: In a Clock Store. C: Good Night. Weekdays 9 a.m.-1 a.m. Sundays 10 a.m.-8 p.m. (DX 1-3 a.m.)

6.130 VE9HX *48.94* ●P.O. Box 998, Halifax, N.S., Canada. O-C: Oh Canada. Chimes 15 min. period. Sun. 12 noon-11 p.m. Mon. to Fri. 7 a.m.-11 p.m. Sat. 11:55 a.m.-11 p.m.

6.125 CXA4 *48.98* ●Mercedes 823, Montevideo, Uruguay, S.A. Daily 10:30 a.m.-12:30 p.m.; 3:30-9:30 p.m.

6.122 OAX6A *49.00* ●Munoz Najar 141, Casilla 293, Arequipa, Peru, S. A. O: La Marcha de los Marino. C: Nacional del Peru. Daily 7-11 p.m.

6.122 HP5H *49.00* ●Apartado 1045, Panama City, Panama, C. A. Daily 10 a.m.-1 p.m., 5-11 p.m.; English hour 10-11 p.m.; Sundays 8 a.m.-2 p.m.

6.120 W2XE *49.02* ◆ ●Wayne, N. J. (see 21.520 mc.)

6.115 OLR2C *49.06* ●Prague, Czechoslovakia. (see 21.450 mc.) Irregular.

6.110 GSL *49.10* ★ ●Daventry, England. (see 26.100 mc.) Daily 9:20-11:20 p.m.

6.110 XEGW *49.10* ●Enrique Arzamendi, Gen'l Mgr., Mexico, D.F. O-C: Vail a dolid Aztec—march. Daily exc. Mondays 11 a.m.-4 p.m.; 7 p.m.-12 a.m. Mondays 9 a.m.-4 p.m.

6.109 VUC *49.10* ●1 Garstin Place, Calcutta, India. S: none. C: God Save The King. Daily 8 a.m.-12:30 p.m. 11 p.m.-12:30 a.m.

6.105.1 HJ6ABB *49.14* ●Apartado 175, Manizales. Colombia, S.A. Daily 11 a.m.-1 p.m.; 5-8 p.m. Veri slow.

6.100 YUA *49.18* ●Director, Bureau Central de Presse, Belgrade, Yugoslavia. S: Short tune on flute. O-C: National Anthem. Daily 12:45 a.m.-8:30 a.m., 1-6 p.m.

6.100 W9XF *49.18* ●20 N. Wacker Drive, Chicago, Ill. O-C: Star Spangled Banner. Daily 6-9:05 p.m.-1:05-2 a.m.

6.100 W3XAL *49.18* ●Bound Brook, N. J. (see 17.780 mc.) Sat. and Sun. 6 p.m.-1 a.m. Mon. to Fri. 7 p.m.-1 a.m.

6.097.5 ZRJ *49.20* ●African Broadcasting Co., Inc., P.O. Box 4559, Johannesburg, South Africa. Physical session. O: Bugles—Reveille. C: Cook House. I: chimes. C: God Save The King. Weekdays 11:45 p.m.-12:45 a.m.; 3:15-7:30 a.m.; 9-11:30 a.m. (8:30-11:30 a.m. Sat.) Sunday 3:30-4:30 a.m. or 4-5 a.m., 8-11:30 a.m.

6.097.5 ZRK *49.20* ●Klipheuval, South Africa. Weekdays 12 noon-4 p.m. Sundays 12 noon-3:20 p.m.

6.095 JZH *49.22* ●Nazaki, Japan (see 21.520 mc.) Irregular.

6.090 CRCX *49.26* ★ ●Rural Route No. 4, Bowmansville, Ont., Canada. Weekdays 7:45 a.m.-5 p.m. Sundays. 10:45-5 p.m.

6.090 ZBW2 *49.26* ◆ ●Hong Kong, China (see 9.525 mc.)

6.090 XEBF *49.26* ●Insurgentes 34, Jalapa, Mexico. Daily 7-11 p.m.

6.085.7 HJ5ABD *49.30* ●Cali, Colombia, S.A. Daily 11 a.m.-2 p.m.; 6-11 p.m.

6.082 VQ7LO *49.33* ●P.O. Box 777, Nairobi, Kenya Colony, Africa. English used. C: God Save The King. Time signal 6 pips on hour. Daily exc. Sunday 5:30-6 a.m. Daily 11:15 a.m.-2:15 p.m. Tues. and Thurs. 8:15-9:15 a.m.

6.082 OAX4Z *49.32* ●Lima, Peru (see OAX4T, 9.562 mc.) Daily 7 p.m.-12:30 a.m.

6.080 W9XAA *49.34* ●Chicago, Ill. (see 17.780 mc.) Weekdays 7-8:30 a.m., 8-11 p.m., Sun. 11 a.m.-1 p.m., 8-11 p.m.

6.080 ZHJ *49.34* ●Penang Wireless Society Headquarters, 40 Perak Road, Penang, S.S. O: Chimes, Vocal song, "Land of Hope and Glory". C: "God Save the King". Weekdays 6:40-8:40 a.m.

6.080 VE9CS *49.34* ●743 Davie St., Vancouver, B.C. Canada. O: O Canada: C: God Save The King. S: 3 strokes gong. Sun. 12 noon-1:30 a.m. Mon., Thurs., Sat. 9:30 a.m.-8:30 p.m. Tues., Wed., Fri. 9:30 a.m.-2:30 a.m.

6.080 HP5F *49.34* ●Hotel Carlton, Colon, Panama, C.A. Weekdays 11 a.m.-1 p.m.; 7-10 p.m.; Sun. 10:45-11:30 a.m. 7-10 p.m.

6.080 XEWW *49.34* ●Apartado 2516, Mexico D.F. Irregular (see 9:500 mc.)

6.079 DJM *49.35* ●Zessen, Germany (see 17.760 mc.) Irregular.

6.075 XECU *49.38* ●Hidalgo 579, Guadalajara Jal., Mexico. O-C: Ojos Tapatious. T: Train in motion. Daily 9-11 a.m.; 1-4 p.m.; 8-11 p.m. or 12 a.m.

6.072 OER-2 *49.41* ●Wien, Austria. (Alternates days with 11.801 kc.) Weekdays 9 a.m.-5 p.m. Sat. to 6 p.m.

6.070.5 HJ3ABF *49.42* ●Apartado 317, Bogota, Colombia, S.A. C: Good Night Sweetheart. Daily 11 a.m.-2 p.m. 6-11 p.m. Veri Slow.

6.070 YV1RD *49.42* ●P. O. Box 100, Maracaibo, Venezuela, S. A. Daily 8 p.m.-12 a.m.

6.070 VP3MR *49.42* ●16, Robb and Hincks St., Georgetown, British Guiana, S.A. S: Time signals, studio clock. O: The Bond of Friendship. C: Ted Lewis' Goodnight Melody and God Save the King. Veries — I.R.C. or coin. Weekdays 4:15-8:15 p.m. Sundays 7:45-10:45 a.m.

6.070 CFRX *49.42* ●37 Bloor St., West, Toronto, Ontario, Canada. Week days 7:30 a.m.-12 midnight. Sunday 10:30 a.m.-12 midnight.

6.065 XEXR *49.46* ●Departmento Autonomo de Propaganda y Publicidad, Mexico, D. F. Daily 6-11:30 p.m.

6.065 SBO *49.46* ●Motala, Sweden (see 11.705 mc.) Daily 1:30-5 p.m.

6.060 W8XAL *49.50* ●Crosley Radio Corp., Cincinnati, Ohio. Daily 6 a.m.-8 p.m., 10 p.m.-2 a.m.

6.060 W3XAU *49.50* ●Philadelphia, Pa. (see 9.590 mc.) Daily 8-11 p.m.

6.060 OXY *49.50* ●Stratsradiofonien, Heibergsgade 7, Copenhagen, Denmark. O: one gong stroke. C: There is a Winsome Land. Irregular.

6.054.3 HJ6ABR *49.55* ●Pereira, Caldas, Colombia, S. A. No English. Official March—El Hombre Payaso. C: Overture — Chorus Voices. No signals. Daily 9:30 a.m.-12 noon; 6:15-10 p.m.

6.050 GSA *49.59* ★ ●Daventry, England (see 26.100 mc.) Daily 12:20-4 p.m.

6.045 XETW *49.62* ●Madero 204—Oriente, Tampico, Mexico. S:—chimes. O-C: Cavalry March. Weekdays 10 a.m.-10 p.m., Sundays 10 a.m.-4 p.m. No IRC required.

6.042.3 HJ1ABG *49.65* ●Apartado 674, Barranquilla, Colombia S.A. S: 1 gong with chimes ea. ¼ H. O-C: National Anthem and "Los Cadetes" March. Daily 11 a.m.-11 p.m.; Sun. 11 a.m.-9 p.m. IRC preferred.

6.040 YDA *49.67* ●Tandjong Priok, Java N. E. I. (see 15.150 mc.) Daily 7:30 p.m.-2 a.m.

6.040 W4XB *49.67* ●News Tower, Miami, Florida. 7 p.m.-12 a.m. and variable day hours.

6.040 W1XAL *49.67* ●Boston, Mass. (see 21.460 mc.) Mon. to Fri. 7-9 p.m., Fri. 10-11 p.m.; specials irregular.

6.030 OLR2B *49.75* ●Prague. Czechoslovakia (see 21.450 mc.) Daily 12:55-4:40 p.m., Mon., Wed., Fri. 8-10:35 p.m. (see 6.010 mc.)

6.030 HP5B *49.75* ●P.O. Box 910, Panama City, Panama, English and Spanish O-C: March, Panama. No signals or bells. Daily 11:30 a.m.-1 p.m.; 5-10 p.m.

6.030 VE9CA *49.75* ●Toronto General Trust Bldg., Calgary, Alberta, Canada. C: Lights Out. S: None. Weekdays 9 a.m.-1 a.m. Thurs. to 2 a.m. Sun. 12 noon-12:30 a.m.

6.030 PGD *49.75* Kootwijk, Holland. (P) Java (see 20.835 mc.)

6.025 PGD *49.79* Kootwijk, Holland. (P) Java (see 20.835 mc.)

6.020 PGD *49.83* Kootwijk, Holland. (P) Java (see 20.835 mc.)

6.020 DJC *49.83* ●Zeesen, Germany (see 17.760 mc.) Daily 10:40 a.m.-4:30 p.m.

6.020 XEUW *49.83* ●Av. Independencia 98, Veracruz, Mexico. S: Marimba. O: March Victoria. C: La Golondrinas. Daily 8 a.m.-12 midnight.

6.015 HI3U *49.88* ●Apartado 23, Santiago de los Caballeros. Dom. Rep., W. I. O-C: Organ, Maric My Own. Weekdays 7:10-8:40 a.m.; 10:40 a.m.-1:40 p.m.; 4:40-9:40 p.m. Sun. 10:40 a.m.-1:40 p.m. only.

6.015 XEWI *49.88* ●Mexico, D.F. (see 11.900 mc.) Irregular.

6.013 HJ3ABX *49.89* ●Apartado 26-65, Bogota, Colombia, S. A. Weekdays 10:30 a.m.-2 p.m.; 5:30-11:30 p.m.; Sundays 12-1:30 p.m.; 6-11 p.m.

6.010 PRA8 *49.92* ●Recife City, Pernambuco, Brazil, S.A., Avenida Cruz Cabuga N. 394. O: Studio clock strikes hour. National Anthem 4 p.m. C: Rocking song, Cancao de Ninar preceded by National Anthem. 9 p.m. Weekdays 9 a.m.-12 noon; 1-3 p.m.; 4-9 p.m. Sundays 9 a.m.-12 noon; 3-9 p.m. and later.

6.010 VK9MI *49.92* ●M. V. Kanimbla, Sydney, Australia (see 11.710 mc.) 11 p.m.-7:35 a.m.

6.010 COCO *49.92* ●P. O. Box 98, Havana, Cuba, English and Cuban. Daily 8 a.m.-10 p.m.

6.010 CJCX *49.92* ●Eastern Broadcasters, Ltd., Radio Bldg., Sydney, N. S., Canada. Irregular.

6.010 OLR2A *49.92* ●Prague, Czechoslovakia (see 21.450 mc.) Daily 12:55-4:40 p.m.; Mon., Wed., Fri. 8-10:35 p.m. (see 6.030 mc.)

6.007 ZRH *49.94* ●Roberts Heights, South Africa (see ZRJ 6.097.5 kc.) Weekdays 10 a.m.-4 p.m., Sat. to 4:45 p.m., Sundays 10:30 a.m.-12 noon, 12:15-3:15 p.m.

6.007 Radio *49.94* Burma ●Burma Independent Wireless. Rangoon, Burma C: God Save the King. Daily 9:10-9:40 a.m.

6.005 HP5K *49.96* ●P.O. Box 33, Colon, Panama, C.A. S: 3 chimes, ea. 15 m. O-C: Merry Widow Waltz. Daily exc. Sun. 7-9 a.m.; 11:30 a.m.-1 p.m.; 6-11 p.m. Sun. 10 a.m.-12 a.m.

6.005 CFCX *49.96* ●P.O. Box 1690. Montreal, Quebec, Canada. Weekdays 7:44 a.m.-1 a.m. Sundays 9 a.m.-11:15 p.m.

6.005 VE9DN *49.96* ●Montreal, Quebec, Canada (see CFCX, 6.005 mc.) Sat. 11 p.m.-12 a.m. Fall, winter and spring.

6.000 CXA2 *50.00* ●Rio Negro, Montevideo, Uruguay, S.A. O: Voluntary Trumpeter. C: Good Night Melody. Daily 10:30 a.m.-10:30 p.m.

6.000 XEBT *50.00* ●P.O. Box 79-44 Mexico, D.F. I: 3 blasts on cuckoo horn. Siren near closing. O: Las Mananitas. C: Lieberstraum. Daily 10 a.m.-12:15 a.m.

6.000 HJ1ABC *50.00* ●Sr. Rafel Valencia Ibanez, Quibdo, Colombia, S.A. O-C: March. Relator S: 2 blows Chinese Gong. Sunday 3-5 p.m. Wed., Sat. 5-6 p.m. Daily 6-9 p.m.

6.000 FIQA *50.00* ●Director of Posts and Telegraphs Tananarive, Madagascar. Daily 12:30-12:45 a.m.; 3:30-4:30 a.m.; 10-11 a.m.

6.000 RV59 *50.00* ●Moscow, U.S.S.R. (see RKI, 15.040 mc.) No. IRC required. Sun., Mon., Fri. 4-5 p.m.

5.977 CS2WD *50.19* ●Rua Capelo, 5, Lisbon, Portugal, O-C: Our Lady of Fatima. I: none. Daily 2:30-4:30 p.m. Sundays and Thursday 6-7 a.m.

5.970 OAX4P *50.25* ●Cuzco 25, Huancayo. Peru, S.A. Daily 12-1 p.m., 9 p.m.-12:30 a.m.

5.969 HVJ *50.26* ● Vatican City (see 15.121 mc.) 2-2:15 p.m. Sun. 5-5:30 a.m.

5.955 HJN *50.35* ●Minister of Education Nacional, Bogota, Colombia. Daily 11 a.m.-2 p.m.; 5-10:30 p.m.

5.940 TG2X *50.51* ●De la Policia Nacional, Guatemala City, Guatemala. C. A. Daily 4-6 p.m. Mon., Thurs., Sat. 10-11:30 p.m. Sundays 1-2 p.m. No I.R.C. required.

5.930 YV1RL *50.59* ●P.O. 247, Maracaibo, Venezuela, S.A. Weekdays 11 a.m.-1 p.m.; 4:30-9:30 p.m. Sun. 8:30 a.m.; 2:30 p.m.

5.929 PJCI *50.60* ●Curacaosche Radio Vereeniging, Willemstad, Curacao, N.W.I. O: Electrical gong, 4 strokes and repeat 5 mins. O-C: National anthem. Weekdays 6:36-8:36 p.m. Sun. 10:36 a.m.-12:36 p.m.

5.915 VRR2 *50.72* Stony Hill, Jamaica. (P) U.S.A., Br. Col.

5.910 YV4RH *50.76* ●Valencia, Venezuela, S. A. Daily 8-11:30 p.m.

5.910 HH2S *50.76* ●Port-au-Prince, Haiti, W.I. (see 11.570 mc.) Daily 7-10 p.m.

5.905 TILS *50.80* ●P.O. Box No. 3, San Jose, Costa Rica, C.A. S: none. O: Washington and Lee Swing. C: Adios Mi Chapparrita. Weekdays 12-3 p.m.; 6-11 p.m. Sundays irregular.

5.900 ZNB *50.85* Bechuanaland Protectorate Govt., Mafeking, South Africa. (P) Irregular.

5.885 HI9B *50.98* ●P.O. Box 95, Santiago de los Caballeros, Dom. Rep., W.I. O-C: Piano Solo—Vals Evocation. Weekdays 7:25-8:40 a.m.; 11:55 a.m.-2:10 p.m.; 4:55-7:40 p.m. Sundays 11:40 a.m.-2:40 p.m.

5.880 YV3RA *51.02* ●Barquisimeto, Venezuela (see YV3RB. 9.565 mc.) Daily 11:30 a.m.-12:30 p.m.; 5:30-9:30 p.m.

5.875 HRN *51.11* ●Tegucigalpa, Honduras, C.A. C: Good Night Melody (Ted Lewis). Daily 7-10 p.m. Veris—10c U. S. cash. Veri slow.

5.865 HI1J *51.15* ●Apartado 204, San Pedro de Macoris, Dom. Rep., W.I. O-C: Waltz, Sweet Remembrance. English very seldom. S: none. Daily 11:40 a.m.-1:40 p.m.; 5:40-9:40 p.m.

5.853 WOB *51.20* Lawrenceville, N. J. (P) Bermuda. (see 21.420 mc.)

5.850 YV1RB *51.28* ●P.O. Box 37, Marcaibo, Venezuela, S.A. English and Spanish. O-C: Strike Up The Band. Weekdays 5:30-8:30 a.m.; 10:30 a.m.-1:30 p.m.; 3:30-10:30 p.m. exc. Tues., Thurs., Sat. to 9:30 a.m. Sundays 7:30 a.m.-2 p.m.; 3:30-4:30 p.m.; 5:30-9:30 p.m.

5.845 KRO *51.33* Kahuku, Hawaii. (P) Japan, P.I., U.S.A., Australia, China. (see 16.030 mc.)

5.830 TIGPH *51.46* ●Apartado 800, San Jose, Costa Rica, C.A. C: Good Night Melody (Ted Lewis) Weekdays 8-11 p.m.

5.825 HJA5 *51.50* Santa Marta, Colombia. (P) So. America.

5.820 CEC *51.55* Santiago, Chile. (P) So. America (see 19.680 mc.)

5.813 TIGPH-2 *51.61* ●Apartado 800, San Jose, Costa Rica, C.A. C: Good Night Melody. Daily 7-11 p.m.

5.810 HRB3 *51.64* Tegucigalpa, Honduras. (P) C.A., W.I., S.A., U.S.A.

5.800 YV5RC *51.72* ●P.O. Box 2000, Caracas, Venezuela, S.A. I: 4 chimes. O-C: Official IBB March. Bugles, whistles before closing. Sundays 8:30-11:30 a.m., 3:30-9:30 p.m. Weekdays 7-8 a.m., 10:30 a.m.-1:30 p.m., 3:45-10:30 p.m.

5.800 ZEC *51.72* ●P.O. Box 792, Salisbury, Rhodesia, South Africa. Sun., 3-5 a.m.; Tues. and Fri. 1:15-3:15 p.m.

5.790 JVU *51.81* Nazaki, Japan. (P) Manchukuo. (see 18.910 mc.).

5.780 CMA5 *51.90* Havana, Cuba. (P) Irregular. (see 17.260 mc.)

5.780 OAX4D *51.90* ●All American Cables, Ltd., Casilla 2336, Lima, Peru, S.A. Signs on and off Morse code. No signals. English and Spanish. Wed., Sat. 9-11:30 p.m.

5.758 YNOP *52.10* ●Radio Bayer, Managua, Nicaragua, C.A. Weekdays 8:30-10:30 p.m. Veri—5c U. S. Postage.

5.755 YV2RA *52.13* ●San Cristobal, Venezuela. English occasional and at closing. S: 6 strokes gong. O-C: March, El Capitan. Weekdays 11:30 a.m.-12:30 p.m.; 5:30-9 p.m. Sun. 5:30-10 p.m.

5.730 JVV *52.36* Nazaki, Japan. (P) Japan, China. (see 18.910 mc.)

5.725 HC1PM *52.40* ●P.O. Box 664, Quito, Ecuador, S.A. O-C: La Marcha de Aida. Saturdays 9-11 p.m.

5.713 TGS *52.51* ●Casa de Presidencial, Guatemala, C.A. Sun., Wed., Fri. 6-8 p.m. No. I.R.C. necessary.

5.705 CFU *52.59* Radio Station CFU, Rossland, Canada. (P) Phones CFO and CFN eves.; news, 8:30-8:45 p.m.

5.700 LSP3 *52.63* Buenos Aires, Arg., S.A. (P) Chile. (see 21.160 mc.)

5.670 DAF *52.91* Norddeich, Germany. (P) Phones ships irreg. (see 27.800 mc.)

5.635 DAS *53.24* Rugen, Germany. (P) Phones ships irreg. (see 27.800 mc.)

5.335 DOG *56.23* Konigs W'n., Germany. (P) Europe. (see 27.800 mc.)

5.330 HRL6 *56.29* La Lima, Honduras. (P) C.A., W.I., S.A., U.S.A.

5.265 CEC *56.98* Santiago, Chile (P) Co. America, U.S.A.

5.265 KEC *56.98* Bolinas, Calif. (P) Japan, Hawaii. (see 20.820 mc.)

5.260 WQN *57.03* Rocky Point, N.Y. (P) Denmark, Germany, Poland. (see 21.260 mc.)

5.255 DOF *57.09* Konigs, W'n., Germany. (P) Europe. (see 27.800 mc.)

5.220 ZFC *57.47* Hamilton, Bermuda. (P) U.S.A., Br. Colonies. (see 10.335 mc.)

5.205 VRR9 *57.64* Stony Hill, Jamaica. (P) P.S.A., Br. Col.

NOTICE!

NOW that Austria is a German State, the International Prefixes, OEA-OEZ originally allotted to Austria will undoubtedly be dropped and replaced by "D" calls. We would greatly appreciate reports from listeners on any noted changes in Austrian calls—such as the present OER-3 on 11.801 mc., and OER-2 on 6.072 mc., Wien, Austria.

5.146 PMY *58.30* ●Bandoeng Radio Society, Nillmy Bldg., Bandoeng, Java, N.E.I. O: March, Le Rene Passe. C: On chimes, Good Night and National Anthem. Sun. 6:30 p.m.-1:30 a.m. 4-10:30 a.m. Mon. to Fri. 5:30 p.m.-2:30 a.m. 4-10:30 a.m. Sat. 5:30 p.m.-2 a.m. 4-11:30 a.m.

5.085 WRB *59.00* Lawrenceville, N. J. (P) England, France (see 21.420 mc.)

5.077 WCN *59.08* Lawrenceville, N. J. (P) England (see 21.420 mc.)

5.068 WPM *59.20* Lawrenceville, N. J. (P) England (see 21.420 mc.)

5.053 WOT *59.98* Lawrenceville, N. J. (P) Irregular (see 21.420 mc.)

5.040 RIR *59.25* Tiflis, U.S.S.R. (P) Calls U.S.S.R. stations (see 14.790 mc.)

5.025 ZFA *59.76* Hamilton, Bermuda. (P) U. S. A. (see 10.335 mc.)

5.015 KUF *59.82* Manila, P. I. (P) U.S.A. (see 21.140 mc.)

4.975 GBC *60.30* Rugby, England. (P) Phones ships (see 20.380 mc.)

4.905 CGA8 *61.16* Drummondville, Que. (P) England, Europe, No. Am. (See 21.600 mc.)

4.900 HJ3ABH *61.22* ●Apartado 565, Bogota, Colombia, S. A. I: 3 chime notes. Weekdays 11:30 a.m.-2 p.m. 6-11 p.m. Sunday 12.- p.m.; 4-11 p.m.

4.895 CEC *61.29* Santiago, Chile. (P) Argentina (see 19.680 mc.)

4.880 IUM *61.48* Addis Ababa, Ethiopia. (P) Italy and Colonies (see 18.270 mc.)

4.880 HJ4ABP *61.48* ●Emisora Claridad, Medellin, Colombia, S. A. Daily 8 a.m.-11 p.m.

4.860 HJ1ABE *61.73* ●Apartado 31, Caragena, Colombia, S. A. O: organ—Song of the Islands. English each hour clock strikes the hour. C: Alohe Oe. Weekdays 7 a.m.-1:45 p.m. 4-11:30 p.m. Sundays 9 a.m.-3 p.m.

4.860 TGY *61.73* Guatemala City, Guatemala, C.A. (P) Cent. Am. U.S.A.

4.841 HJ3ABD *61.97* ●Apartado 509, Bogota, Colombia. O: Pari Ti Rio Rita. C: Rio Rita and National Anthem. Weekdays 9 a.m.-2 p.m., 6 p.m.-12 a.m., Tues. and Thurs. to 3 p.m. Wed. and Fri. begin 5:30 p.m.

4.820 HJ7ABB *62.24* ●Santander Broadcasting, Bucaramanga, Colombia, S. A. 6-11 p.m.

4.820 GDW2 *62.20* Rugby, England. (P) Phones U.S.A. (see 20.380 mc.)

4.810 GDS2 *62.37* Rughy, England. (P) U.S.A. (see 20.380 mc.)

4.810 YDE2 *62.37* ●Solo, Java, N.E.I. (see 15.150 mc.) Daily 5:30-11 a.m.; 5:45-6:45 p.m.; 10:30 p.m.-2 a.m.

4.790 HJ2ABC *62.63* ●Sr. Pompilio Sanchez, Prop., Cucuta, Colombia, S. A. Daily 11 a.m.-12 noon, 6:30-9 p.m.

4.780 HJ1ABB *62.76* ●Apartado 715 Barranquilla, Colombia, S.A. I: 3 chimes. S: 1 chime between advertisements. C: La Golondrina 7-9 a.m. 11-1 p.m., 5:30-10 p.m.

4.752 WOY *63.13* Lawrenceville, N. J. (P) Irregular (see 21.420 mc.)

4.752 WOO *63.13* Ocean Gate, N. J. (P) Phones ships irreg.

4.740 HJ6ABC *63.29* ●Ibague, Colombia, S.A. Daily 6-11 p.m.

4.660 HJ2ABJ *64.38* ●Santa Marta, Colombia, S.A. Daily 11:30 a.m.-2 p.m.; 5:30-10:30 p.m.

4.600 HC2ET *65.22* ●P.O. Box 824, Guayaquil, Ecuador, S.A. I: 12 chimes. Wed. and Sat. 9:15-10:45 p.m. Veri—5c U. S. postage.

4.555 WDN *65.86* Rocky Point, N. Y. (P) Germany, U.S.S.R. (see 21.260 mc.)

4.540 WIR *66.08* Rocky Point, N. Y. (P) Irregular (see 21.260 mc.)

4.535 WDG *66.15* Rocky Point, N. Y. (P) England (see 21.260 mc.)

4.512 ZFS *66.49* Nassau, Bahamas. (P) U.S.A., England.

4.500 DAS *66.67* Rugen, Germany. (P) Phones ships irreg. (see 27.800 mc.)

4.465 CFA2 *67.19* Drummondville, Que. (P) No. America (see 21.600 mc.)

4.400 DAF *68.18* Norddeich, Germany. (P) Phones ships irreg. (see 27.800 mc.)

4.355 IAC *68.88* Pisa, Italy. (P) Phones and tests irreg. (see 17.750 mc.)

4.348 CGA9 *69.00* Drummondville, Que. (P) Phones ships and England (see 21.600 mc.)

4.320 GDB *69.40* Rugby, England. (P) Phones Canada (see 20.380 mc.)

4.280 KMI *70.09* Dixon, Calif. (P) P.I., Hawaii, Japan, Australia, Java, China (see 21.060 mc.)

4.273 RV15 *70.21* ●Radio Committee. Khabarovsk. U.S.S.R. English, 2 a.m., EST and at announcements. Daily exc. 6th 12-18-24-30th 3 p.m.-8 a.m. On 6-12-18-24-30th 7:10 p.m.-8 a.m. English programs start at 2 a.m. No I.R.C. necessary.

4.287 WOM *69.97* Hialeah, Florida. (P) Phones 8 a.m.-8 p.m. (see 15.055 mc.)

4.272 WOO *70.22* Ocean Gate, N. J. (P) Phones ships afternoons and eve.

4.272 WOY *70.22* Lawrenceville, N. J. (P) Irregular (see 21.420 mc.)

4.178 WOY *71.81* Lawrenceville, N. J. (P) Irregular (see 21.420 mc.)

4.178 WOO *71.81* Ocean Gate, N. J. (P) Phone ships arregular.

4.107 HCJB-2 *73.05* ●Quito, Ecuador, S.A. (see 8.831 mc.)

4.097 WND *73.20* Hialeah, Florida. (P) Phones 8 a.m.-8 p.m. (see 15,055 mc.)

4.002 CT2AJ *75.00* ●Ponta Delgada, Island of St. Michael, Azores. Wed. and Sat., 5-7 p.m.

3.040 YDA *93.68* ●Batavia, Java, N.E.I. (see 15.150 mc.) Weekdays 5:30-10 a.m. (Sat. 11:30 a.m.) 6-7:30 p.m., 10:30 p.m.-2 a.m. Sun. 5:30-10 a.m., 7:30 p.m.-2 a.m.

Queries

TUNING EYE . . . COMMUNICATION RECEIVERS . . . CODE INTERFERENCE

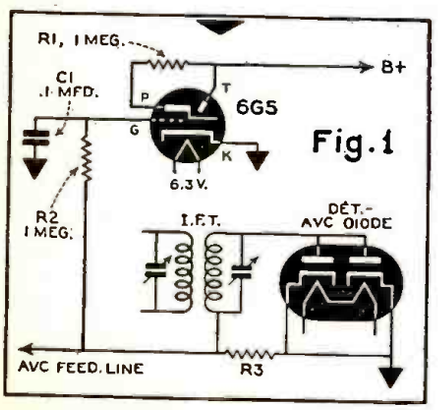
THE primary purpose of the Queries Department is to solve the technical and semi-technical problems of our readers who feel they require such assistance. However, questions, so long as they are related to radio, need not be of a technical nature. ¶Every question will be answered personally, by mail.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

ROTARY CONVERTERS

Question No. 59: My receiver is a Super-Skyrider 1937 SX-11, which I am now operating on 110 volts a.c. I am contemplating moving to a locality in New York City where only d.c. is available. I understand that there are devices on the market which make it possible to operate a.c. receivers from direct current. I should appreciate your advising me whether such devices are satisfactory, whether noise or hum is introduced into the receiver, and whether they can supply the necessary plate voltages.—*G. F. B., Jr., New York City.*

Answer: G. F. B., Jr., is referring to a converter. It is a combination motor and generator in one frame. When the 110-volt d.c. mains are connected to the input side, the generator section will supply 110-120 volts, 60-cycle alternating current. The receiver is simply plugged in to this a.c. output in the usual way. The converter therefore does not supply the plate voltages directly—the power transformer and rectifier in the receiver taking care of this exactly as if the set were operating from a standard 110-volt a.c. source.

No more hum will be experienced with a converter than with house current a.c. However, noise is another matter, and unless the converter is in first class condition—commutator, brushes and rings clean and properly adjusted—considerable noise will be introduced into the radio. Even when correctly adjusted a filter must be employed in conjunction with the converter to eliminate this interference. However, such filters are built-in as a rule and need not be purchased or connected separately.



Fundamental circuit for using the 6G5 tuning eye tube.

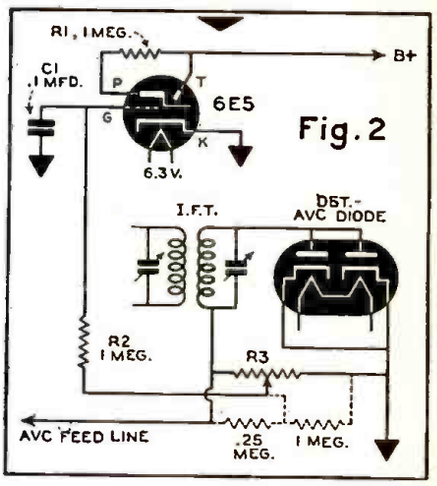
The efficiency of the converter is not very high—running about 60%. The cost of operating the radio will therefore be approximately 66% higher than when connecting direct to the a.c. mains (assuming the same rate). G. F. B., Jr., could doubtless get away with a 110-watt model, but on general principles we'd advise the larger 150-watt job. Complete and equipped with the filter, this will cost $27.20 in a radio mail order house.

Converters can also be obtained to operate from 6, 12 and 32-volt d.c. sources.

MAGIC EYE TUNING INDICATOR

Question No. 60: I recently bought a new and modern receiver, but am somewhat disappointed in its not having a magic tuning eye. I understand that this can be installed, and should like to know how to go about it.—*H. A. T., Atlanta, Ga.*

Answer: H. A. T. is well located to secure the necessary parts and specific advice on his question. We suggest that he visit the Wholesale Radio Service Co., at 430 W. Peachtree Street or the Garvin Electric Company, at 69 Forsyth Street, N. W.—both in Atlanta. However, we shall answer H. A. T.'s question to the best of our ability on paper—for his benefit and that of many other readers who have requested similar advice.



A slightly different arrangement is required for the 6E5 tube.

The most convenient way of effecting the installation is to obtain a magic eye kit which includes the tube (a 6E5 or a 6G5), socket, mounting bracket, resistor, escutcheon and five or six flexible leads. The installation is not difficult if you are a reasonably good mechanic and know enough about radio to follow the wiring diagram and locate the proper points of connection.

As a rule the 6G5 type of tube will be employed. The connections are slightly more simple, and the eye will not completely close on the a.v.c. voltages existing in most modern receivers. (It goes without saying that the magic eye should, ordinarily, be installed only in receivers having automatic volume control.) The connections for the 6G5 are shown in Fig. 1. In some kits, resistor R1 may be connected at the socket. In such cases, there will be only five leads from the assembly. Resistor R2 is connected between the control grid and the source of a.v.c. voltage, and by-passed by C1. The cathode is grounded to the chassis (excepting in a.c.-d.c. models, where it should be connected to the negative side of the B supply system). The B plus

(Continued on page 221)

CHANNEL ECHOES

(Continued from page 191)

evitably ends up with a box top, label or wrapper) hasn't thought enough of the idea to follow suit. Daventry, at the present writing, is doing an ambitious job with "The Count of Monte Cristo" and is up to episode X!

◆

IF WE HAD anything to do other than judging in this radiodor business, we'd nominate first as reek-of-the-month—any month out of the year—those domestic short-wave stations carrying excessive commercials. The worst offender of all is W9XJL on 26,100 kilocycles—which station endeavors to sell double-decker beds to the Eskimos, fur coats to South Sea Islanders and Tums to the African cannibals—that is providing they come to Superior, Wisconsin, or Duluth to buy them. The F.C.C. regulates domestic broadcasting on the basis of "Public convenience and necessity." It should be able similarly to permit short-wave broadcasting only on a basis of "International convenience and necessity." Because a few sponsors and commercial departments may consider us a nation of morons, they should not be permitted to encourage a similar opinion on the part of the rest of the world.

Our second choice would be the hick scripts as typified by Lum and Abner and Uncle Ezra—on the grounds of lack of verisimilitude. Anyone who has lived in the rural districts and slopped down hard cider with the genuine article—those two-fisted scandal mongers, back-biting masters of scurrility that would make Janus look like a beheaded man—simply froths at the mouth at the picture of radio's halo-crowned rubes.

◆

HOWEVER, AS WE can't give ourself the free subscription, we pass it on to Warren H. Stark, 2117 North 62nd Street, Wauwatosa, Wisconsin, who picks our third choice—Jack Benny.

Stench sleuth Stark also recounts a good one about Edwin C. Hill, who, after telling how kind Luckies were to the throat, "proceeded to his next scoop until he had to stop with a coughing jag." According to Stark he coughed his way through the program and sold him on Camels.

◆

C. M. W., MEMPHIS, Tenn., lashes into KPRC and KTHS for "thrusting nauseating stuff in the chain breaks. KPRC will cut the instant a program *seems* finished, and I have heard up to three plugs in the chain break. One day I foned and said 'naughty naughty'—and was told, with no blushing on the part of the station, to 'go to hell' in exactly those words!"

Al Jolson walked off with the honors in our February issue, and is still in the running according to Charles H. Spilman, Jr., of Providence, R. I. Following a recent Jolson opus, "We just turned the house over to a firm of professional fumigators and moved in with our mother-in-law. The smell of the soap Jolson advertises doesn't come anywhere near the aroma of his broadcasts. I once heard a gag on Jolson's program that I thought was quite funny. I learned later that it originated with Stoopnagle and Bud who had been Jolson's guest stars the week before."

Louis C. Sciez is a runner up with

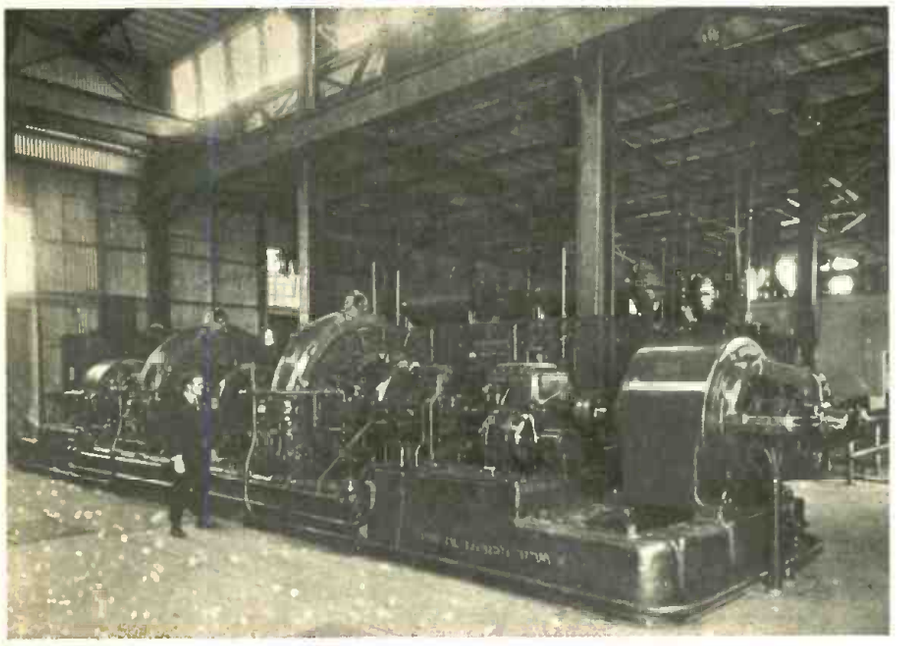
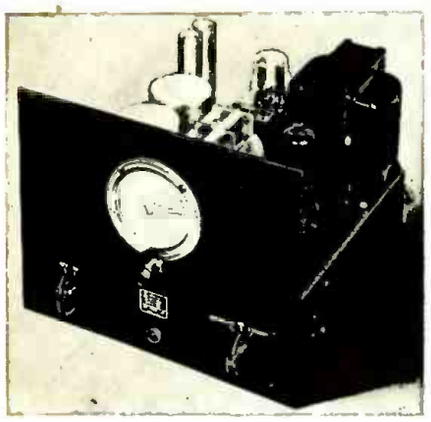


Fig. 3. Power plant for Radio City's television project. If not—what? It's your guess.

On The Market

THE MEISSNER "SIGNAL-SHIFTER"

THE MEISSNER "Signal-Shifter" is a variable-frequency, electron-coupled exciter unit with ganged buffer stages, designed for use with amateur transmitting equip-



ment to enable the operator to conveniently change the transmission-frequency from his operating desk. Five sets of three plug-in coils each provide for operation on the 10-, 20-, 40-, 80- and 160-meter amateur bands. Accurate tracking and proper design hold output constant over entire range of each band.

The vernier dial may be read to 1/10 of one division and the full range of each band is covered by the 315-degree rotation by having the tuning condenser connected across different percentages of the various coils on different bands. A 13-to-1 tuning ratio is provided by the geared dial system which is absolutely free of back-lash. This dial control is the only external adjustment affecting the frequency of the unit, thus eliminating accidental or unintentional frequency-shift and permitting accurate logging of frequencies against dial calibration. A single internal adjustment is provided which must be set when unit is first installed or when changing tubes. No alignment adjustments are necessary when coils are changed.

The "Signal-Shifter" is link-coupled directly to the final stage of a low- or medium-power transmitter or to the preceding amplifier in a high-power transmitter, thus eliminating one or more doubler stages. Power output is more than sufficient to drive a conventional power stage such as RK-20's, 802's, 807's or similar tubes directly on the operating frequency without further doubling. Two frequency-doubling circuits are provided on all bands, except 160 meters, which minimize the effect of load-variation on the oscillator frequency. Ganged tuning-adjustment for all tuned circuits makes operation simple and convenient with single-dial control.

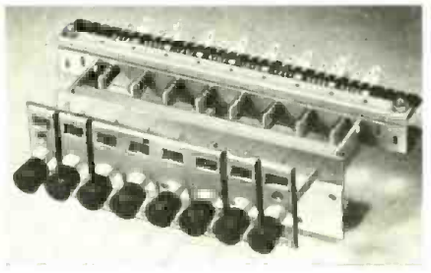
The Meissner "Signal-Shifter" does not employ a quartz crystal for frequency control and yet its frequency stability under operating conditions is superior to that of many crystal-controlled oscillators, it is said. A specially-developed Hi-C electron-coupled oscillator circuit and the dual-buffer arrangement for load-isolation are large factors in determining this degree of stability. Rigid mechanical construction and sturdy bus-bar wiring insure against changes due to ordinary handling and usage.

During a 21-day actual operation period at amateur station W9WWI (John Maxon, Mt. Carmel, Ill.) the maximum variation of calibration observed under varying conditions of temperature and humidity was .008% or 300 cycles at the operating frequency of 4,000,000 cycles (75 meters). The frequency shift with load variation as observed during this period was less than 500 cycles from no-load to full-load. ALL-WAVE RADIO.

◆

NEW MALLORY-YAXLEY SWITCH

MALLORY-YAXLEY has just brought out a line of Multiple Push-Button Switches for use in: Automatic Station Selector Tuning, Inter-Office Communication Systems, Telephone and Annunciator Systems, Signal Generator Frequency Selection, Set Ana-



lyzers, Tube Checkers, Multimeters, Transmitter Crystal and Meter Switching, and other applications requiring a device for making, breaking, or transferring multiple circuits in any desired sequence.

This type of switch is also referred to as a "ladder" switch. Pushing any button automatically releases the button which has previously been depressed.

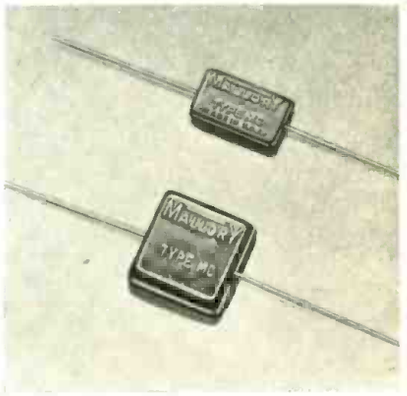
Mallory-Yaxley Multiple Push-Button Switches have all of the typical features of Yaxley construction—sliding, wiping contact motion, plus the use of heavy silver plating on all current-carrying parts to insure permanent, low-resistance contacts.

The bakelite insulation is specially selected for its imperviousness to moisture and its extremely low losses. This permits the switch to be used in hook-ups where the switch is included as part of an r.f. circuit.

The switches are available in two distinct circuit combinations—one designed for circuit-closing applications, and the other for circuit-transfer applications. Special folder on request. ALL-WAVE RADIO.

MALLORY MICA CONDENSERS

MALLORY ANNOUNCES a new line of mica condensers—compact, mechanically strong, and moisture-proof, made of the best grade of clear India mica. After specially treat-



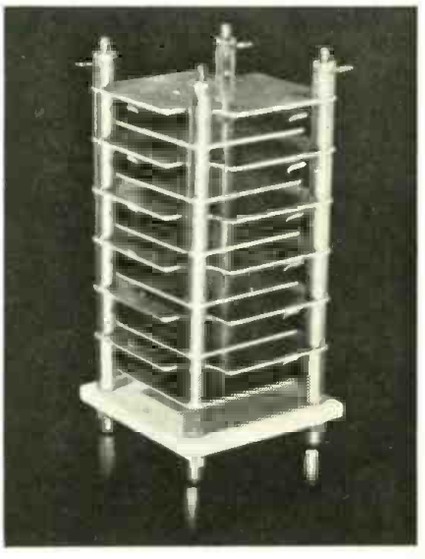
ing the mica-tin foil to exclude moisture, air and foreign matter, it is clamped under pressure to the terminal leads. The junction between the foil and lead terminals assures perfect low-resistance contact, preventing the bakelite molding material from affecting this connection. Lead wires are soft tinned metal which may be bent or twisted without breaking. Special catalog on request. ALL-WAVE RADIO.

◆

CARDWELL FIXED TRANSMITTING CONDENSERS

ALLEN D. CARDWELL Mfg. Corp., of Brooklyn, New York, announce the addition of a new line of fixed capacitors, plug-in type. These units will enable a tank condenser, used on 40, 20, or 10, to resonate an inductance designed for 80- or 160-meter operation. Plates are readily removable for

(*Continued on page 214*)



Deacon Moore's master-of-ceremonying with his orchestra.

Herman Harjes (RSSL W4-H4O finds XENT no Rose of the Rio Grande and clocked 18 minutes of advertising in a half-hour broadcast. He objects also to the type of medical misinformation which escapes across the border from this station.

Corespondent Harjes makes an excellent suggestion—namely that we confine ourself not merely to radiodors, but also pick a best program of the month. We have had in mind doing this for some time, and shall try it starting with the May issue. However, as tastes in entertainment vary considerably, we shall divide our nominations into four groups—clasical music, jazz, sketches and humor. Recommendations from readers will be more than welcome!

ULTRA-HIGH

(Continued from page 195)

listening and application of scientific fact. Another rule that will soon gain prominence is that a rapidly falling barometer generally means good reception. When this takes place in conjunction with a rising temperature, results should be especialy good even on 5.

It was found several years ago by those experimenters located at Mount Washington, N. H., that reception of their signals closely followed the variation in temperature at 6000 feet. In fact, it was plausibe to forecast rain or snow when rising signal strengths indicated the arrival of a warmer air mass aloft. In this particular case, the receiving point was at the extreme end of the surface wave, (we find it more convenient and and more understandable to consider that there is such a thing as a ground wave, although it has been proved more recently that there is not) therefore it was affected by each and every variation in signal strength. That is, stratification of the lower atmosphere tended to bend the waves, extending them at the same time, thereby giving a greater signal strength.

The above bending of the waves gives skipless DX on 5 meters, which can be connected with the long ground wave on, perhaps, 10 or 20 meters. In some cases this type has existed up to 300 miles. Lower atmosphere bending takes place

(*Continued from page 212*)

fixed capacity adjustment. Type illustrated is the JCO-45-OS (45 mmfd., .250-inch air gap, 7500 v., Alsimag 196 insulation). ALL-WAVE RADIO.

◆

BUD U.H.F. TRANSMITTING CONDENSERS

IN ORDER TO MEET the stringent requirements of ultra-high-frequency transmission, Bud Radio, Inc., of Cleveland, Ohio, has just announced a new series of Transmitting Condensers especially designed for use in Ultra-High Frequency Circuits.

There are no closed inductive loops in the frame. Metal tie rods are used because they permit a rigid type of construction, but they are insulated from the end plates with ceramic bushings one inch long.

The rotor connection is placed at the most logical point—the electrical center of the rotor. This contact is a four-point self-cleaning phosphor bronze spring. By placing the rotor connection in the center, a better capacity balance to ground is obtained, and the amplifier can be made mechanically and electrically symmetrical. This type of condenser construction is necessary in order to avoid parasitic oscillation because it eliminates the "circuit within a circuit" effect that results from the use of an ordinary condenser at ultra-high frequencies.

A complete selection of capacities can be had in both the De Luxe type with rotor plates 3¼" in diameter, and in the Junior type with rotor plates 2¼" in diameter. This new series is made only in split-stator types. ALL-WAVE RADIO.

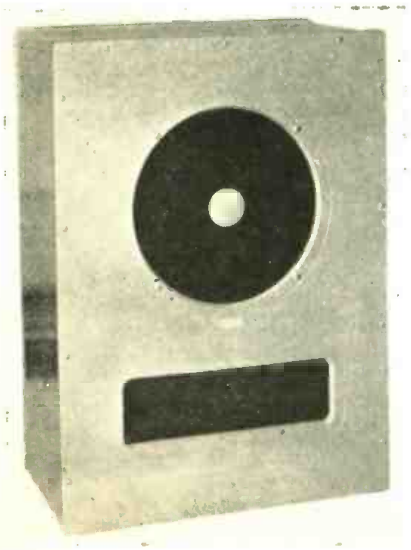
◆

NEW JENSEN BASS REFLEX UNITS

THE ENCLOSURES FOR the speakers have been so designed that they can be used with 18-inch and Auditorium Speakers that are now being used in the field. The enclosure is shipped knocked down and all that is necessary to do is to set up the enclosure and put the speaker unit in place.

All Jensen public-address speakers—8", 10", 12", 15", Auditorium and 18" speakers are now offered as complete reproducers; no baffles necessary.

For further information on the New Auditorium and 18-Inch Bass Reflex Enclosures, write for special folder to Jensen Radio Manufacturing Company, 6601 South Laramie Ave., Chicago, Ill. ALL-WAVE RADIO.



◆

KENYON TELEVISION UNITS

DEFLECTING YOKE type T-700 recently introduced by Kenyon Transformer Co., Inc., New York, N. Y., is designed for use with cathode ray tubes of the electromagnetic deflection type.

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

The low-frequency coils are so constructed that a low-impedance line may be run to them from the new output transformers type T-112. This helps to minimize pick-up and eliminate coupling condensers.

More than ample deflection with negligible distortion is obtained from the type T-700 yoke on nine-inch tubes at a plate voltage of 6000.

The new type T-111 high-frequency sweep output transformer is wound with low capacity coils in order to effectively pass the higher harmonics of 13,200 cycles necessary for the production of a linear deflection.

The power transformers T-203, T-204, and T-208 are carefully insulated for the high voltages at which they must operate and at the same time compactness is retained. ALL-WAVE RADIO.

◆

NEW SILVER "ORPHEON" RECEIVER

NEWS FOR THE music lover—a milestone marker in radio progress—is the new "Orpheon" straight music radio built by the McMurdo Silver Corporation.

Just a word about its outward differences from today's usual radio (since photos could not be secured before press time). In place of five bands to tune, it has *one*, for local and semi-local broadcast reception only. It has a separate tuner and a separate 20-watt amplifier, both providing ultimate audio response and musical richness. A separate Chippendale cabinet houses the 15-inch giant speaker (18-inch speaker optional), plus concealed automatic phonograph mechanism. No extra controls—just the "tone box" needed for sound-range control.

A matching "treasure chest" of unobtrusive size conceals the remote tuner, which a 25-foot flat cable connects to the speaker and amplifier across the room. Beauty of sound, unobtrusively controlled, is the keynote of the "Orpheon." ALL-WAVE RADIO.

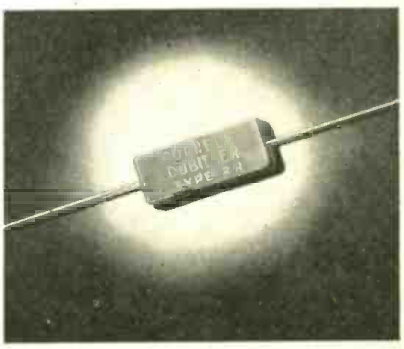
◆

C-D TYPE 2R CAPACITORS

THE STABLE FREQUENCY requirements of push-button tuning prompted the Cornell-Dubilier Electric Corporation to introduce a mica capacitor specifically designed to adhere to the rigid radio-frequency limits. These new units, C-D type 2R, assure highest degree accuracy.

A brand new silver-plated mica construction method accounts for a capacity tolerance well within 3%, extremely high "Q" and excellent "retrace." Encased in low-loss bakelite, C-D type 2R's are protected against physical damage and electrical change. These compact units have a remarkable low temperature coefficient of plus .003 degrees, Centigrade.

Rated at 1000 volts d.c. test, the Cornell-Dubilier type 2R mica capacitors are available in a capacity range from 10 mmfd. to 1100 mmfd. For further information on these new units, address requests to the Cornell-Dubilier Electric Corporation, South Plainfield, New Jersey. ALL-WAVE RADIO.



only when the lapse rate of the lower atmosphere is subnormal, or to put it in a simple form, when a layer of warm air is over a layer of cold air. Of course this is only a theory and therefore is open to discussion. Some experimenters have even suggested that it is possible for those waves to have been reflected back from some heavenly body.

A pet hobby of the so-called experimenters and researchers is cracking up the theories of others. One which was recently broken up, is that u.h.f. waves cannot be refracted after dark. By comparing log books and reports, recently, both Clyde Criswell and your reporter are fully convinced that it is, as he stated, "a myth." The proof in his case is very outstanding. Last November he heard at 21 G.M.T. the night television broadcast of Alexandra Palace, London. Clyde puts forward the idea, not totally new, that the u.h.f. waves tend to follow the warm layers of the ionosphere. What do you think about it?

Deviating from the subject at hand somewhat, we have noted, along with many others, that the antenna is practically unimportant for 100 to 300-mile work (above 40 mc.), by lower atmosphere bending. To further substantiate the idea mentioned above, is the noted fact that the waves from u.h.f. transmitters do not follow the great circle route. Although it has never been proven, evidence has been gathered from various sources that is very convincing. A very conspicuous piece of work is that done by the R.C.A. on the field strength of the London television signals. They found on several occasions the strength of the signals was the same whether received on a diamond antenna pointed toward London or a diamond pointed in the opposite direction.

Heard

W10XAM, 31.1 mc., N.B.C. portable mobile unit testing with W9XBS at noon.

W2XRW, 37.1 mc., New York City, N. Y., a new police outlet. Clyde says it must be using at least 500 watts with such a wallop.

W6XID, 31.1 mc., Beverly Hills, Calif. Heard every day in the afternoon on the east coast.

W1XOV, 27.1 mc., Boston, Mass., heard working W1XER and exchanging weather reports at 11:30 a.m.

J2MI, 28.02 mc., Tokyo, Japan. Heard by Clyde C. at 8 p.m. with an R8 signal. Guess some of the fellows over there are still home at that.

W9XRA, 33.1 mc., Pueblo, Colo., recently verified a report for which we are very grateful. W9XRA has a very consistent signal with only 25 watts.

W6XHN, 37,1 mc., Pittsburg, Calif. The author chalked up another first in verifying this station. Very good signal.

W1XBL, 37.1 mc., Quincy, Mass. Another R9 plus station in Arizona.

W1XOY, 41.0 mc., heard calling W1XOV at 1:45 p.m.

In closing we would like to say that during April the u.h.f. should be watched closely as many unusual conditions will pop up from time to time.

Now how about hearing from more of u.h.f. listeners? We are pretty sure many of you fellows are holding out. We would like to know just what you are hearing and when, and don't forget the more of you who turn in reports the better column we can turn out.

Address all letters to Perry Ferrell, Jr., Linwood, New Jersey. Please enclose return postage if you desire a reply; envelopes are not necessary.

DE LUXE B. C. SET

(Continued from page 185)

another record, an air cushion is formed between the approaching surfaces which allows it to settle smoothly with no danger of chipping the edges.

The Collaro is fitted with automatic repeat and reject levers, located at the left hand side of the turntable platform. It was not considered necessary to install a remote control link to actuate these levers, although it could be very easily accomplished with simple solenoids.

Speakers

The standard 8-inch permanent-magnet dynamic speaker, mounted at the top of the rack, is used primarily to facilitate checking audio levels, tuning r.f. amplifiers, and making other adjustments before switching to the remotely-located high-fidelity speakers. Ordinarily it is disconnected from the circuit by means of a panel switch. In our case, 15-inch Jensen Peridynamic speakers were chosen as being best suited for the type of installation illustrated in Fig. 1.

The special speaker cabinet allows the unit to be placed in any convenient corner or small compartment, which would be unsuitable from the acoustical standpoint if conventional speaker mounting were to be used. At best, a radio loudspeaker is just another piece of furniture and if it can be concealed, or at least made inconspicuous, so much the better.

Wiring

The block diagram, Fig. 5, indicates the connections between any remote control point and the relay rack equipment. A total of twelve wires will be required, seven for actuating the six relays, three for the two power circuits, and two for the loudspeaker. It is not, of course,

necessary to run separate cables from each switch installation to the basement, but merely from one control point to another, all switches being connected in parallel. Thus, a new control point can be conveniently added at any time.

There are, of course, innumerable refinements and additions which can be made to the basic system that has been described; for instance, we found an automatic time clock to be well worth while, since its unfailing memory would always pick out the correct station at the right time.

This is not supposed to have been a "How to build it" essay, but rather a sketchy description of how we attempted to prove that, at least in our particular case, the proverb mentioned at the beginning of the previous article no longer applies, and in the hope that it will provide suggestions and ideas to those readers of ALL-WAVE RADIO who would like to secure a more complete reception of their favorite broadcast programs and recordings.

GLOBE GIRDLING

(Continued from page 190)

XEXA, 6170 kc., Mexico City, has been changed to 6133 kc., as the Mexican authorities advise that station was assigned the latter frequency.

XEBM, 15440 kc., Mazatlan, Mexico; XETM, 11730 kc., Villahermosa; XEYU, 9600 kc., Mexico City; XEXF, 6050 kc., Mexico City; and XEBQ, 6030 kc., Mazatlan, have been removed from station lists as the Director of Communications advises that the licenses have been revoked and stations are not operating. XEFT, 6120 kc., Vera Cruz has also been deleted and XEFT will use only 9550 kc., where it is now transmitting.

XETA, 11760 kc., Monterrey, Mexico, is now being heard daily between 3 and 4 p.m. This station was off the air and was mentioned in this section in August and November 1937.

XEBC or XEVC, are the reported calls of Veracruz, Mexico, heard near 6530 kc. The operating company is said to be connected with some laboratory in Veracruz.

CJCX, 6010 kc., Sydney, Nova Scotia, Canada, has been heard with R-8 signal. It is understood that COCO was not on the air at the time.

U. S. Stations

W2XAD, 21500 kc. and 9550 kc., Schenectady, N. Y., has been added to lists. These two frequencies will assist in carrying the General Electric's enlarged short-wave broadcast schedule,

making four frequencies in all, in transmitting programs to international listeners. The broadcasting schedule has been increased by two and one-half hours with the use of the new frequencies recently granted by the Federal Communications Commission.

W6XKG, 25950 kc., Los Angeles, Calif., has taken our suggestion kindly to issue veri cards instead of letter verification and are having some printed for use.

W1XAL, 11730 kc. and 15130 kc., Boston, Mass., the new frequencies allotted by the F. C. C., has been added to list with time on the air as shown. W1XAL advises veri cards will be issued only where ten cents is enclosed.

It is reported that recommendations have been made to the Federal Communications Commission that it permit the Mormons to build a short-wave station twelve miles west of Salt Lake City, Utah, at a cost of $193,000. The church proposes to arrange listening posts throughout the world and broadcast cultural features, peace and educational programs.

W3XAU, 9590 kc., Philadelphia, Pa., has extended daily program schedule with broadcasts between 11 p.m. and 12 a.m.

Amateur Phones

The following is a short list of 20-meter amateur phone stations not previously reported or listed:

Country	*Frequency*	*Call*	*Time Heard*
Africa (South)	LF	ZS3F-ZS1J	11:50 p.m.-12:41 a.m.
Africa (South)	HF	ZS1AX-ZU5M	11:42 p.m.-12:07 a.m.
Africa (South)	HF	ZS6AA-ZT1AD	11:09 p.m.-11:39 p.m.
Africa (Fr.Mor.)	LF	CN8AV	5:03 p.m.
Africa (So. Rhodesia)	LF	ZE1JR	12:13 a.m.
Chile	LF	CE1AI	11:17 p.m.
Colombia	LF	HK1JC	7:07 p.m.
Cuba	HF	CO2CC-2WZ	8:08-9:05 p.m.
Cuba	LF	CO2HY-2LW-60M	6:10-6:28-7 p.m.
Cuba	LF	CO8RC-CO2RL	6:23 p.m.-9:16 p.m.
Costa Rica	LF	TI1AS	6:45 p.m.
Dom. Rep.	HF	HI2W	5:22 p.m.
Dom. Rep.	LF	HI3N-1P-5X	6:30-6:43 p.m.
Hawaii	AB	K6NZQ-6GAS	5:50 p.m.-10:09 p.m.
Haiti	HF	HHF-HH4AS	5:30-10:42 p.m.
Haiti	LF	HH2B-2X	6:48-11:20 p.m.
Mexico	HF	XE2GF	2:35 p.m.
Mexico	LF	XE2HD	7:40 p.m.
Newfoundland	LF	VO2N	9:20 p.m.
Venezuela	LF	YV4AV-5AZ-1CK	6:12-6:45-8:03

Listeners who received VP3THE on 20-meter band and elsewhere, while station was in British Guiana, are still receiving verifications through the National Broadcasting Company, New York, or from VP3BG, British Guiana. Some of the veries from the latter station were written on the back of VP3BG's veri card and signed by Director of VP3BG and mailed from Georgetown.

In concluding, the sincere thanks of the writer are extended to all who have contributed to the section, either by report or kindly comment.

It is a pleasure to answer your queries as to unknown stations, reception conditions and station matters in general and to assist wherever we can. Your letters and reports are greatly appreciated.

Address your communications to Mr. J. B. L. Hinds, 85 Saint Andrews Place, Yonkers, New York, enclosing self-addressed stamped envelope in case you desire a reply.

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

VOLUME EXPANDER

(Continued from page 177)

and classical music through its volume variation. Quite the simplest volume expander is "one hand on the volume knob" except that the average listener cannot follow symphonic music to control gain the right amounts and at the proper moments. So what is needed is an automatic "reversed-a.v.c.," operating in the audio amplifier to reverse the transmitter monitoring operator's destructive "gain riding."

The Expander Circuit

This new volume expander consists of two 6F8G tubes (each two 6J5s in one bulb)., a 1-megohm potentiometer to control the degree of expansion, ten ½-watt resistors and nine fixed condensers—mighty little, indeed, for what it will give to any radio.

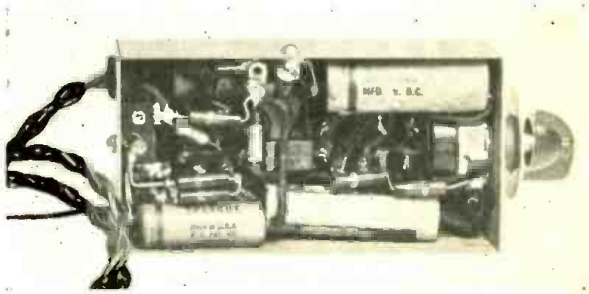
Looking at Fig. 2, the first section of one 6F8G, V1, acts as a straight resistance-coupled audio amplifier, either to increase receiver volume when the expander is not in use, or to pick up some of the average signal volume loss which occurs when the expander is in operation. Its circuit is purely conventional except for the 300,000-ohm resistor, R3, between the plate of V1 and the output coupling condenser, C4. This resistor is shunted by a 500-mmfd. condenser to hold up treble response. This resistor, in series with the plate resistance of V2—one triode section of the second 6F8G—forms a signal-controlled volume-control potentiometer. From the "arm" or join of the two resistances making it up is fed the signal to the following stage. This triode, V2, has a definite plate-to-cathode resistance and by causing the signal to vary this tube resistance, we in effect turn the volume control "knob" up or down automatically.

This is done by taking the signal appearing at the plate of V1 and feeding it to V3 through the potentiometer, P, for further amplification. The signal is then applied to V4 which is connected as a diode rectifier. In order to cause the reverse a.v.c. or volume expansion action so obtained to vary, not at audio frequency, but at the slower rate at which volume varies in music, the rectified d.c. taken from the rectifier V4 is filtered by the 0.5-mfd. condenser, C9, and ½-megohm resistor, R9, connected to the grid of V2. This filter delays any change in volume by ¼ second, so that changes caused by the expander will not be too sudden or too slow, but correct for symphonic or classical music. The degree of volume expansion is controlled by the potentiometer P, which regulates the voltage actually used to vary the "gain control potentiometer" consisting of the 300,000-ohm resistor, R3, and the internal resistance of V2.

In action this expander, when operating at the low level of ½ volt from the detector which should precede it, will give any desired degree of expansion from zero to 23 db., depending only upon the setting of potentiometer P. From an average 1-volt signal input it gives 28 db. expansion, 33 db. for a 2-volt signal and 35 db. for a 3-volt average signal input. This it does without distortion due to curvature of any signal-amplifying tube characteristic curves, and such distortion as is intentionally introduced through over-biasing of expander amplifier tube V3 is completely ironed out by the syllabic filter R9-C9 in the grid circuit of V2, which allows no audio-frequency voltage to get through, but only the slow variations in rectified d.c. provided by the diode V4

Characteristics of Unit

A custom-built embodiment of this expander illustrated in Fig. 1 is but 4¾" long, 2½" wide and 5½" high over its tubes. It may be mounted in the side of a receiver cabinet by the nut on its control knob shaft bushing, thus re-



Under-chassis view of the completed volume expander showing layout of condensers, resistors and expander control.

quiring but one 3/8" hole for mounting. Connection to the receiver requires but the breaking of one audio grid circuit connection, to which the leads marked "Input" and "Output" are connected, and the connection of the four remaining leads to the receiver's 6.3-volt filament circuit, one to B— and one to B+ at any convenient point in the receiver.

In the circuit shown, when the expander control potentiometer, P, is turned "off," its on-off switch breaks the cathode lead to V2, thus eliminating its low-resistance shunt from the audio circuit and allowing the full 23 db. gain of V1 to be added into the receiver's audio circuit. No hum will show up due to the increased audio amplification because of the filter, R8-C8, in the plate circuit of the audio amplifier V1—even with receivers having very poor power-supply filtration.

Obtaining Volume Compression

For the operator seeking noise reduction in communication work, a simple change makes this expander a noise squelcher which is extraordinary efficacious. Instead of applying to the grid of V2 the rectified signal voltage from V4 in such polarity as to cause the resistance of V2 to increase with increasing signal voltage and so provide volume expansion, reversal of plate-grid and cathode connections to V4 will make a volume compressor. To be effective upon noise crashes of short duration, the value of the 0.5-mfd. filter condenser C9 should be cut to about .001 mfd. or .002 mfd., and in order that noise crashes may be cut to less than average signal volume, a 2000-ohm, ½-watt resistor shunted by a 0.25-mfd. condenser should be connected between the cathode of V2 and ground. With these connections, which may be taken care of by a three-contact, two-position switch, either volume expansion or extremely efficacious noise silencing can be had—or volume compression which in effect will raise the average signal level compared to noise in the capacity C9 from V2 grid to ground be 0.5-mfd. to follow syllabic variations.

WIDE-ANGLE TUNING

(Continued from page 182)

angle is only 90 degrees because the potential of the ray-control electrode (a) does not become negative with respect to cathode.

The accompanying curve shows the relation between shadow angle and control voltage when T_1 is a type 76. Other tube types may be used in place of the 76; the shadow-angle characteristic with the

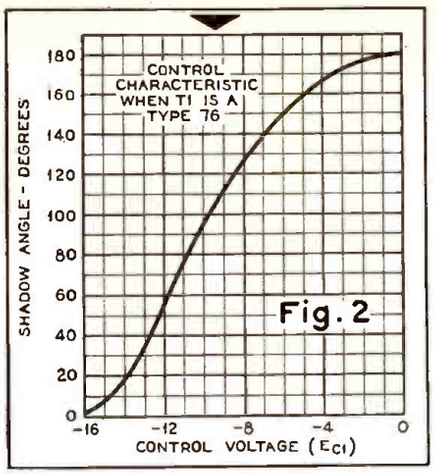


Fig. 2

76 is shown merely to illustrate the performance of the circuit. For example, when T_1 is a 6J5, the cut-off voltage is approximately—12 volts; when T_1 is a 6K7, the cut-off voltage is approximately —40 volts, provided the suppressor is connected to control grid and screen voltage is obtained from the 250-volt source through a 5-megohm resistor.

A well-defined shadow angle is not obtained over the entire range of 180 degrees. The edges of the pattern are sharp for shadow angles from 0 to approximately 150 degrees; from 150 degrees to 180 degrees, the edges of the pattern are not sharp. However, by reducing the potential of point (b) with respect to ground, the maximum shadow angle is reduced and the edges of the pattern are sharp over the entire range. A suitable compromise can be made easily. In order to stabilize the potential of point (b), it is suggested that the bleeder current through R_1 be approximately 15 milliamperes.

(From data supplied by Engineering Dept., RCA-Radiotron)

5-METER RECEIVER

(Continued from page 179)

right for a schematic but it isn't so good in actual practice as it makes longer leads and upsets the symmetry of the circuit. Fig. 1 shows the detector coil attached directly to the tube. This is accomplished by using two soldering lugs attached to the condenser stators—one going downward and being soldered onto the plate prong of the detector tube socket; the other lug coming out horizontally with the detector coil and one end of the coupling condenser, C4, soldered onto it. The other end of the coupling condenser solders onto the plate prong of the r.f. tube socket along with one end of the choke, RFC. This sounds more complicated than it really is, but it all boils down to the point that there are practically no leads, which

means that there are no stray capacities to upset the balance, and it all helps to give higher gain.

Other arrangements might appeal to the constructor, but the above horizontal mounting is strongly recommended. Placing the r.f. and detector stages "back to back" is a logical one, and especially so when one realizes that this puts the coils far enough apart physically, and this, with the mounting shield, eliminates the possibility of interaction. All this without any long leads anywhere.

The i.f. tube with its associated coil, condensers, etc., is mounted in the corner of the main panel and is sufficiently isolated to prevent any interaction with the rest of the circuit. The audio tube mounts horizontally underneath the r.f. tubes on the smaller panel along with the rest of its circuit components. This is shown clearly in Figs. 4 and 5.

Adjustment and Operation

In getting the receiver into operation for the first time one should start with the audio stage and work backwards. The audio can be checked by touching the grid lead to the pentode with a finger and noting the noise. Methods for adjusting the i.f. circuit have been given above.

The detector stage is next. Disconnect the coupling condensers, C4, or adjust to minimum capacity; pull out the i.f. tube and turn up the voltage controls. Now adjust the feed-back condensers, C5, starting from minimum capacity, until the detectors break into oscillation as evidenced by the hiss in the speaker. Turn these condensers back until the tubes are just below the point of oscillation. Replace the i.f. tube and you should hear the characteristic rushing noise in the speaker. The ideal condition is where the i.f. tube takes control and furnishes the necessary super-regeneration, while the detector tubes are just under the point where they superregenerate by themselves.

Incidentally, while checking here we found that the super-regenerative detectors operated very well by themselves. But the separately quenched oscillator provided better sensitivity on weak signals, and as it also gave a lower hiss level it was decided to include it in the circuit.

Now connect the r.f. stage and adjust the r.f. tuning control. When the r.f. stage is in resonance with the detector stage you should hear the usual superregenerative hiss, while on either side of resonance there isn't any noise. Now tighten up the coupling condensers, C4. At this point it is advisable to have a signal of some sort. In our case a shielded transceiver set in the middle of the band and without any aerial was placed far enough away to provide a weak signal in the receiver. A signal

TABLE I

Typical Operating Conditions
(All voltages measured to ground)

R.F. plates	250 volts
R.F. screens	100 volts
Detector plates	15 volts
I.F. plate	25 volts
A.F. plate	240 volts
A.F. screen	250 volts
Total drain at 250 volts	60 mils.
Total fil. current at 6.3 volts	1.9 amps.

generator or the harmonic of a lower frequency transmitter will work just as well. The coupling condensers should be tightened as much as possible as is consistent with increase in signal strength. The feed-back condensers will probably require slight readjustment. Then the antenna coupling will have to be adjusted to the particular antenna in use. A very convenient way is to wind the antenna coil, L3, in the form of a helix or pancake and slide this between the center turns of the r.f. coil.

The last adjustment is to set the voltage controls for the most sensitive operation of the receiver. Here a very weak signal should be used and the detector, i.f. and the r.f. screen voltages set for the maximum gain and sensitivity as well as lowest hiss level.

Table I gives typical operating voltages to facilitate in lining up the receiver. Once these controls are set they do not require readjustment in tuning over the band—only the r.f. and detector tuning controls being used.

Results Obtained

Now as to actual results: For purposes of test, the r.f. stage was disconnected, the antenna connected to the push-pull detectors and the set compared to another 5-meter receiver using a 76 self-quenched detector, 76 first audio and a 41 second audio. The signal strength was the same, but three things were immediately apparent: 1st—that the push-pull detectors had a lower hiss level; 2nd—that a strong signal did not overload the detectors, and the quality on weaker signals was better; and 3rd—the tuning was sharper.

But when the r.f. stage was added things really began to happen. Every signal, with the exception of those already R8 or R9, could be brought up 2 and 3 R's. Signals that had never been heard before were copied 100%. Then the receiver was compared to many other 5-meter receivers and to date it has outperformed them all. Signals that could not even be heard in the average receiver were copied R3 and R4. Not only was the push-pull receiver more sensitive, but its better selectivity was demonstrated time and again. In the average receiver when a strong signal completely took out a weaker one, in most cases the weaker

signal could still be copied in the push-pull job.

All in all, may we say that the inclusion of two more tubes has proved a revelation to us.

QUERIES

(*Continued from page 210*)

voltage applied to the target can be as high as 250. It should not be lower than 100 volts.

Where sufficient tuning indication is not secured, it will probably be desirable to shift to a 6E5 tube, the shadow of which closes at 8 volts. In this case, the control voltage should be secured by tapping on to the diode load resistor, R3, as shown in Fig. 2. This tap should be adjusted until, on a strong signal, the shadow of the eye just closes. Where the load resistor R3 is of such a type that it is impossible to tap it, the resistor may be replaced with a potentiometer of the same total value, with the grid lead connected to the arm, and the adjustment made as described above. Or, instead of the potentiometer, a fixed resistor (of the same value) which a moveable center tap can be used. A simpler method is to connect a high-ohmage potentiometer (at least 1,000,000 ohms, so as not to affect the a.v.c. voltage) across R3, with the grid lead again brought down to the arm. Or, if desired, fixed resistors can be connected as suggested by the dotted lines. This will provide about the right potential for effective tuning indication.

TO BUY OR NOT TO BUY?

Question No. 61: I should like to have your opinion as to whether it would be wise to buy a communications receiver just for listening purposes. I should like to have a receiver that has r.f. and i.f. stages, band coverage from 4 meters up to 550, good sensitivity and selectivity so that I could listen to stations all around the world. I want a radio for listening purposes only, and not for communication, but I have heard that communication receivers are more sensitive and selective than regular all-wave receivers.—*A. E. K., Hibbing, Minn.*

Answer: Many of the better all-wave broadcast type receivers are on a par with the communications receivers on the matter of noise level, sensitivity and selectivity (excepting when a crystal is used on the communications job). However, the communications receivers are easier to tune on the high frequencies—though in general considerably more skill is required to get the most out of such receivers. The crystal is definitely useful—even on phone—but again experience is required. The communications

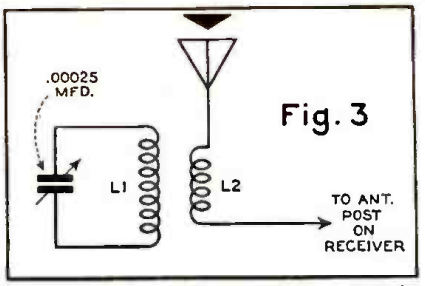


Fig. 3

A wave-trap circuit for eliminating code interference as well as some QRM on the broadcast band.

receiver can be compared with a complicated reflex camera and the standard broadcast receiver to a more simple form of folding camera. The average person will secure much better results with the more elementary camera. However, in the hands of the expert, the reflex will do things that could not possibly be accomplished with the simple camera. Also, for taking ordinary pictures, nine days out of ten, both cameras will give equally good results.

In addition, the appearance of the communications receivers should in many instances be taken into consideration. While they are handsome examples of workmanship, they are rarely pieces of furniture which would be welcome in the average sitting room. (However, note the Proving Post review in the January, 1938 issue.)

If A. E. K. is equally interested in short-wave reception and American broadcast fare, with high-quality reproduction, our recommendation is the purchase of a good all-wave broadcast type receiver. On the other hand, if short-wave reception is his real meat, and particularly if he has a den or a study all to himself, he will get more satisfaction from the communications job—after he gets the hang of it. And our advice is to purchase a model with crystal filter.

As for the ultra-short waves around 4 meters which our correspondent mentions, he might well consider the purchase of a special receiver for these frequencies—letting the communications type take care of things from 7.5 or 10 meters up.

CODE INTERFERENCE

Question No. 62: I am experiencing considerable code interference on my five-tube superheterodyne—on all bands. I only get this interference when I tune in a station. It does not show up between stations. Can anything be done to my set to eliminate or reduce this?—*A. O. C., Boston, Mass.*

Answer: A. O. C. is undoubtedly experiencing interference from ship and shore stations (nice location for that—Boston) operating close to his intermediate frequency. He would only hear this when there *is* an intermediate frequency—i.e., when there is a broadcasting station

tuned in. Another characteristic of this type of interference is that the pitch of the code signal varies as the broadcast station is tuned. (Other types of interference may give the same effect.)

Many receivers have a wavetrap in the antenna circuit which is tuned to the intermediate frequency. We have no way of telling if such is the case with friend A. O. C. Usually this takes the form of an adjustable screw protruding from the rear of the chassis. This screw should be adjusted until the interference is at a minimum.

Such wavetraps can be purchased at most mail-order radio stores for between one and two dollars. They are accompanied with full directions for installation—usually two posts being provided for connection between antenna and receiver. Fig. 3 is a diagram of such a trap that can be built up more economically if some of the parts happen to be available. Coil L1 consists of 150 turns of wire on a 2-inch form, and L2 of from 5 to 10 turns wound over the center of L1. Any convenient insulated wire can be used without making much difference, though No. 25 enameled will wind exactly 50 turns to the inch. The condenser has a capacity of 250 micromicrofarads, and the combination will tune from about 200 to 750 meters. This range will make it useful for eliminating other forms of interference. Some latitude is permitted on the constants given. However, for effectiveness against the type of interference described by our correspondent, it is essential that the capacity and inductance be such that the combination will tune to the intermediate frequency of his receiver.

The more turns on L2 the more effective will be the trapping action. As many turns as possible should be used without cutting down on the desired signal response.

E-C-O EXCITER

(*Continued from page 176*)

Adjustment and Operation

Providing the unit has been carefully built along the above lines, the adjustment and operation are ridiculously simple. With the amplifier tube removed from the socket, the oscillator is turned on and the semi-fixed condenser, C1, adjusted so that, with the plates of condenser C2 all the way out, the frequency is just a little above 2000 kc. When this has been done the 1.75-mc. band will occupy something more than 200 degrees on the scale of the oscillator tuning condenser. If this is then calibrated at a number of points—by checking the harmonics against short-wave stations of known frequencies—a calibration curve can be drawn which will enable setting to 1 kc. with an ordinary-type dial (closer if a vernier dial is used).

The amplifier tube is then inserted and the tuning range of the output stage checked. In order to avoid use of plug-in coils (although plug-in forms are used, just in case) the output stage is designed to operate either as a straight amplifier, or as a doubler. Thus, condenser C11 should tune to the 1.75-mc. band when almost all the way in, and to the 3.5-mc. band when nearly all the way out. If the constants given are followed, this will automatically be the case. If somewhat different ones are used, some trimming of the coil size may be required to accomplish this. In any event, this is easily done and it will be found that the output when doubling is practically the same as when working straight through.

Moreover, no trouble in obtaining this output will be encountered, nor will there be any tendency to instability, due to the careful shielding and the fact that the oscillator stage has plenty of second-harmonic output. With a plate potential of 325 volts and a total power drain of 80 ma., which can conveniently be obtained from a Vibrapack unit, the oscillator plate and screen current (the combined currents are indicated when the jacks are located as shown) is about 15 ma., and the "loaded" plate current of the amplifier stage about 65 ma. Under these conditions the output (as actually measured in a dummy antenna) is 14.4 watts. The total plate input is 26 watts, of which 5 watts is consumed by the oscillator stage and 21 watts by the amplifier stage.

For emergency operation, break-in is almost a necessity, and this ordinarily means oscillator keying. With this transmitter it is simply accomplished by plugging the key into jack J1. The bias battery used in the amplifier stage holds the plate current down when the key is up. For a typical adjustment the amplifier plate current will be 65 ma. with key down and 75 ma. with key up. Thus, the power drain remains substantially constant, which makes for stability and tends to reduce key chirps.

If it is desired to modulate the output this may be done at slightly reduced output power—say 10 watts. It should be remembered that if modulator power is taken from the same power supply, the modulator must be of the constant-drain type, or else frequency modulation may occur. Consequently, Class B modulators are ruled out (unless a separate power supply is used). It is suggested that a Class A modulator be used. Power, of course, will have to be reduced to a point where power drain will not exceed the 100-ma. limit of the Vibrapack unit. Of course if a genemotor is

used, more current may be drawn and power considerably increased.

No tests have been made with this unit at voltages in excess of 350 volts. However, there is reason to believe that it can be used at voltages as high as 500 volts, at which approximately twice as much power output should be obtainable.

Comparison with Crystal Control

As a final commentary, it is interesting to compare this unit with a crystal-controlled rig designed for the same purpose. Tests of frequency drift under actual operating conditions have shown that after a filament warm-up period of five minutes and then plate voltage applied, the drift is approximately 100 cycles in the first five minutes, approximately 100 cycles additional in the next fifteen minutes, and another 100 cycles in the next half hour—a total drift of a little over 300 cycles in an hour. X and Y-cut crystals (which have temperature coefficients of 30 to 50 cycles, or more) will ordinarily drift this much. Low-drift crystals (more expensive) will, of course, not drift as much if properly used—but too high a crystal current and the like will often cause even these to drift. In any event, 300 cycles in an hour is not objectionable.

Now as to power consumption: If we assume a power input of 26 watts to a crystal-controlled oscillator, and an efficiency of 50%, we arrive at an output of 13 watts, or less than the exciter shown here (just an example of what the high-sensitivity of beam tubes makes possible).

In so far as number of controls are concerned, we have two tuning controls, whereas a crystal-controlled oscillator may only have one for one-band operation, but for two-band operation would require either plug-in coils or two tuned circuits, as for instance in a tri-tet. The adjustment of this unit is very simple, and probably easier than that of many crystal circuits (such as the tri-tet). In a pinch it can be tuned without any meter—simply by using maximum antenna current (indicated by any approximate means as a guide).

Note on Modifications

Few amateurs follow specifications exactly, and the present unit has been described with this fact in mind. It should provide a good "taking-off-point"—a start from which considerable further progress can be made. Possible modifications will be immediately evident. In the matter of tubes, for instance, the writer originally used 6L6G's. These gave nearly equal performance, with the exception of some tendency to "singing" in the amplifier stage. They also have the disadvantage of introducing "mud" insulation in the oscillator stage, and have the octal base, which the writer feels is poorly adapted for transmitter application. The RK-49 would overcome these latter difficulties.

It would be interesting, if one desires low power only, to try 6V6 or 6V6G tubes. These have only half the filament consumption, and might be used in conjunction with a vibrator unit of the receiver type. Power output of 5 watts or so should be possible, and the total drain would be low enough to enable use of a small motor-cycle-type storage battery.

Interesting experiments with the oscillator circuit are also possible. Still better stability could probably be obtained in a number of ways. For instance, by neutralizing the buffer circuit, perhaps by a small capacity from the amplifier grid to the oscillator screen grid. Or again, by using a two-section condenser (it would have to be big) across the oscillator tank, with the center point forming the cathode tap. Similarly, the inter-stage coupling and power-supply circuits offer room for experiment. An arrangement for switching to crystal control can be added if desired. And there is always room for the still-to-be-devised "perfect" antenna coupling scheme.

SKY CHALLENGER II

(Continued from page 199)

6L7 detector-mixer, 6J5 high-frequency oscillator, 6K7 first i.f. amplifier, 6K7 second i.f. amplifier, 6Q7 second detector-a.v.c.-a.f. amplifier, 6F6 pentode a.f. power amplifier, 6J7 beat-frequency oscillator, and 80 full-wave rectifier.

The 6J5 high-frequency oscillator, at K-6 in the diagram, is electron-coupled to the injector grid of the 6L7 mixer. The electron-coupled beat-frequency oscillator, at K-9, is coupled to the diode of the 6Q7 through the coupling capacitor C32, at J-10.

The a.v.c. voltage developed in the diode load circuit controls the 6K7 r.f. tube and the two 6K7 i.f. tubes. The a.v.c. voltage can be removed, when desired, by the switch SW2, at G-22 in the diagram. In this instance, the three controlled tubes are biased by the drop in voltage across the cathode resistors R5 and R6, at I-4, the former being the r.f. gain control.

Separate coils are used in each band in the r.f. and high-frequency oscillator circuits. No harmonics of the oscillator are used on any of the bands. Segments in the band-switching mechanism short out the coils not in use.

The two i.f. transformers, T1 and T2, associated with the crystal, and the transformers T3 and T4 in the second i.f.

stage, are of the iron-core type which provide high gain and a better signal-to-noise ratio.

The a.f. gain control, at F-22, is in the grid circuit of the 6Q7 triode. The tone control, at G-22, is in the plate circuit of the same tube. Resistance coupling is used between the 6Q7 and the 6F6 power tube.

The headphone jack is also connected in the plate circuit of the 6Q7 but is insulated from the high voltage by the blocking condenser C26, at J-23. When phones are plugged in the secondary of the output transformer T6 is shorted, which silences the speaker.

A total of 32 mfd. is used in the power-supply filter, at J-15, each of the electrolytic condensers C29 and C30 having a capacity of 16 mfd.

The switch SW6, at K-11, is coupled to the shaft of the r.f. gain control, and is used to cut in or out the "S" meter which can be plugged into the receptacle shown at 0-9 in the diagram.

The Image Rejector

The image-rejector is a new development and of considerable interest. It has a variable control by which it is possible to eliminate image interference appearing on a desired signal. It is only necessary to "tune" the image rejector to the fundamental frequency of the station causing the image, which will always be removed from the frequency of the desired station by twice the i.f. frequency—or 930 kc. in the Challenger II.

Referring to the circuit diagram, the image rejector is composed of the inductance L and capacity C4, located at B-4 and B-5 respectively. Instrumental in its action is the primary coil of the r.f. transformer in use and also the power-factor correction resistor R1 or R2—also depending upon the transformer in use.

At the frequency of the desired signal, the image rejector circuit acts much the same as any r.f. transformer with a slight degree of capacity coupling. But at the image frequency the voltage induced on the tube grid through C4 and the voltage induced to the same grid by means of the transformer coupling are opposite in sign and therefore cancel out. With the proper adjustment of C4 little actual coupling exists at the image frequency.

Receiver Tests

The salient points relative to the electro-mechanical design of the Challenger II are: Smooth-operating controls; very accurate calibration of the main tuning dial . . . really more precise than we had anticipated; adequate bandspread on the 1000-degree spiral scale to satisfy both listener and amateur; negligible frequency drift as measured from a cold start, and frequency stability once the receiver is warmed up.

The infinite image rejector works to perfection. It is a highly practical device and proved to be a great aid in the 10- and 20-meter bands where image interference is a common bother. It is a new experience to be able to wipe out images of commercial code signals, and such broadcasters as DZH whose images spill into the 20-meter band, and to do so without any apparent effect on the desired signal.

The rejector was also tried on the 13-mc. band where there were two R9 plus images from local ham phone stations. Much to our surprise the rejector wiped out these images completely . . . which suggests that the word "infinite" may be used without reservations.

The sensitivity and selectivity of the Challenger II is on a par with that of the Super Skyrider. For some reason which we are at a loss to explain, auto ignition interference in the 10-meter band appeared less pronounced, yet the gain at this frequency is well up, as evidenced by excellent reception of down-under hams operating in this band. The 20-meter band showed up equally as well, all points considered, and we managed to pick up all continents in one evening, with VR6A, Pitcairn Island, thrown in (with an R9 signal) about 2 o'clock the next morning.

Obviously, comparable results were had in the other amateur bands and in the short-wave broadcast bands where the image rejector was again of value. During the reception of c.w. signals, with b.f.o. on, no change in pitch was noted when varying the r.f. gain control.

Throwing in the crystal filter has little effect on signal volume. Moreover, it is most definitely practical for use on phone signals where we found it of distinct advantage in reducing QRM. Though tuning in such instances was more critical, it was accomplished with comparative ease.

The receiver has an audio output of 3.5 watts which the 8-inch dynamic speaker handles very nicely. Though the speaker cabinet and the grille design are of metal, there was no apparent vibration.

R.S.S.L. NEWS

(Continued from page 194)

Foreign Managers

For the benefit of members and prospective members in foreign countries, Section Managers and Assistants have been appointed who can furnish application blanks for R.S.S.L. membership, latest information on surveys and assist in the formation of local Chapters. The appointments for 1938 are as follows:

AUSTRALIA

Cecil John Robert Howard VK1; 219 Ellena St., Maryborough, Queensland

CANAL ZONE

John D. Gallivan, K5Z1, Box 64, Balboa

CUBA

Ulpiano Muniz, CO3, San Julian de Guano, Pinar Del Rio

◆

GREAT BRITAIN

Area No. 1 & 2 (Northern & Midlands)

Section Manager—George Hare, G13, Station Road, Leadenham, Lincs.

Area No. 4 (Southern)

Section Manager—F. R. Stringer, G3; 62 Bedford Road, Walthamstow, London, E. 17

Cheshire County

County Representative—P. F. Atkinson, G2; 102, Prenton Road East, Birkenhead.

Derbyshire County

County Representative—J. S. Gingell, G6; High St., Swanwick Village.

Lancashire County

County Representative — Percy Jones, G13/1; 16, Exeter Ave., Tonge Moor, Bolton, Lancs.

Lincolnshire County

County Representative — John Terrence Anglin, G40; 233, Welholme Road, Grimsby, Lincs.

◆

Northamptonshire County

County Representative—J. A. Munns, G99; 24, High St., Wellingborough.

Staffordshire County

County Representative—A. Gower, G109; Spring Cottage, Overseal, Nr. Burton-on-Trent.

Warwickshire County

County Representative—J. Mann, GE1; 105, Grenhill Road, Blackheath, Birmingham.

ICELAND

Arni Sigardsson, TF1, P. O. Box 743, Reykjavik

IRELAND

County Fermanagh

County Representative—Wm. O. McGregor, G18/1; Lavaran, Kesh P. O.

NEW ZEALAND

L. H. Hanis, ZL1, 21 Raroa Road, Lower Hutt

PHILIPPINE ISLANDS

Enrique del Castillo, KA1; (Radio KA7EC); Ma-ao Central, Occ. Negros

POLAND

Ing. P. Piorko, E. E.; SP1; Sienkiewicza 9, m. 20, Lodz

SWEDEN

Ingvar Gullberg, SM1; 3, Borgaregatan, Hedemora, Dalecarlia

SWITZERLAND

John Gysin, HB1; (Radio HB9AV and HB1AV), 34 Rue de Debarcadere, Bienne

SOUTH AFRICA

Martin John Louw, ZS1; 95, Balfour Street, Woodstock, West Province

NIGHT-OWL HOOTS

(*Continued from page 197*)

Robert "Bob" Skyten (W3F67), East Brookfield, Mass.: "Station on 580 kc. is a Mexican. I've heard the first two call letters as XE—but that's all I got. Is there a station on 1240 that has the slogan 'Radio Coloniale?' I thought I heard a foreign station on 1240 after WKAQ signed at 9 p.m. last night." (We know nothing of either station. Perhaps our Dean of Latin-American reception—Carroll Weyrich—can tell us something of these two mysterious Latins.—*Chief)*

Anthony C. "Tony" Tarr, Seattle, Wash.: "Station 2GN said that they regretted my report did not coincide with their log, and sent me a complete list of Aussie stations which I thought was decent of them. Said there had been several frequency shifts which might account for my incorrect report. I notice 4MK is listed on their frequency (1390) and wonder when they left 1080?"

Raymond Sahlbach (W13L4), St. Louis, Mo.: "This letter concerns a Colombian station I heard, but failed to get a complete call and city. As my report states the call is HJ—F on 1240 kc. and I could not identify it completely due to rapid Spanish of announcer." (Can anyone identify this one?—*Chief)*

April Foolishness

April Fool News Items: All DX Clubs have declared a truce and promise to discontinue cluttering their bulletins with quarrelsome editorials attacking other clubs and to devote some space to DX news—Yeh, and WNEW, WAAB, and the other all-nighters promise to quit broadcasting after midnight because they feel so sorry for DXers!

From Del Rio, Texas, via the AF

ALL-WAVE RADIO'S DX FORECAST FOR APRIL 1938

EASTERN NORTH AMERICA

General Forecast: *April usually brings good reception from the West and from the Aussies and Zedders who will probably hold out till the middle or latter part of the month. The Latin-Americans should not show any decline over last month's reception and if we are to judge by their consistent appearance during the Winter months they should hold out through the Summer.*

Specific Forecast

LR5 830 kc. — 1st-30th, 7-11 p.m., R7. LR5 seems to be the most consistently reported Argentinan. Others heard are: LR1 (1070), LR6(870), LR3(950), LS2 (1190), LR4(990).

YV5RQ 882 kc. — 1st-30th, 7-9 p.m., R6. If you're on the alert you can distinguish this one from CMW which is only 2 kc. lower in frequency. Other Venezuelan stations heard are: YV5RA(960), and YV5RG (1005), YV1RF(1120).

TIPG 625 kc. — 1st-30th, 9-11:30 p.m., R6. TIPG is being heard often this year. TIX(650) is also another Costa Rican being reported often.

OAX4A 854 kc. — 1st-30th, 8-11:30 p.m., R7. This station sometimes difficult to separate from CMCM(850) and WABC(860).

HJ1ABH 1080 kc. — 1st-30th, 8-11 p.m. (Sun. till 3 a.m.), R5. This one is being heard especially well on Sunday mornings till about 3 a.m. Other Colombians heard during the evening: HJ3ABB(1105), and HJ3ABE(1220).

TGW 1525 kc. — 1st-30th, 8-11 p.m., R8. TGW is pounding in on this frequency, while TG-1 is no longer being heard on 1510. The latter, possibly has shifted to another channel.

CM.. — 1st-30th, anytime after dark, R9 (and then some). Not attempting to list the infinite number of Cubans that can be heard we merely advise you to tune every other channel and if there isn't a Cuban riding over everything else, why it just isn't the right night for Cubans. When you hear one—they all come through. We might mention that CMBS is being heard on 1160 kc., though they are announcing 1170!

XELZ 1370 kc. — 1st-30th, 12-2 a.m., R7-8. The newest Mexican to be heard well, XELZ a mere 100 watter, packs the sock of a kilowatter. Of course XEW(890), XEFO(940), ZEMO(860), and the many others are also picked up at regular intervals.

KHBC 1400 kc. — 1st-30th, 3-4:30 a.m., R9! We called this a 100 watter, but we should have said 250 watter. Even so, Hawaii is still a long way from Worcester and an R9 signal from there on a mere 250 watts output is something! They must feed some of Popeye's famous spinach into their antenna. Other Hawaiian stations heard are: KGU(750) from 3-4 a.m., and KGMB(1320) 4-5:30 a.m.

4YA 790 kc. — 1st-15th, 4-6:30 a.m., R4. This is the strongest of the Zedders with the following stations also putting an occasional signal into the East: 1YA(650), 3YA(720), 2YC(840), and 2YA(570).

4QN — 1st-15th: 5-6:30 a.m., R3. You may also hear the following if you happen to be listening when the atmospheric conditions are right: 5CL(730), 4QG (800), and 2BL(740).

WESTERN NORTH AMERICA

General Forecast: *Down-under signals should hold up very well on the coast during April, but the DXers farther inland may have trouble hearing them toward the latter part of the month. Eastern prediction can be used for western U.S.A. as well on Latin-American reception. Therefore, we shall not repeat any of the Latins listed in the Eastern Forecast, but we refer you to that list for your forecast!*

Specific Forecast

4YA 790 kc. — 1st-30th, 4-6:30 a.m., R5-8. Others heard in order in which they are listed: 1YA(650), 3YA(720), 2YC(840), and 2YA(570).

4QN 600 kc. — 1st-30th, 5-6:30 a.m., R6. The following are also heard at about the same "R" reading as 4QN: 2CO(670), 2NR (770), 2BL(740), 4QG(800), 3GI (830), 2GZ(990) till 6, 2KY(1040), 4WK(1220), 4BH(1380), 2CR(550), 3KZ(1180), 2CH(1190). The following at R5 or less as stated: 4BU(1480), 3BA(1320), on at 5:30, 3DB(1030), 2GB(870), 5CL(730), 7NT(710) on at 6, 2WL(1430) on at 5:30, 3LK(1090), 3LO(770), 5CK(640). Many more may be picked up by diligent tuning when conditions are favorable.

KGU 750 kc — 1st-30th, 3-5 a.m., R6. Other Hawaiians: KHBC(1400) 3-4:30 a.m., R7-9, KGMB(1320) 4-5:30 a.m., R7-8.

JOAK-2 870 kc. — 1st-30th, 6-7 a.m., R2-3. No regular Jap reception is to be expected in April, but should they come through we list a few which are more likely to be heard: JOIK(810), JOHK(770), JOAK-1(590), JOBK-2(940), JOHG (1050).

(April Fool) News Service we have the following: Doc Brinkley will decrease his power on XERA to 50 watts because the Canadian listeners want to hear CBL, and because no one is interested in what he says anyhow! . . . And don't let 'em fool ya night owls—those aren't facsimile transmission signals you're hearing on 710 after WOR's regular transmission—those creaky cringling sounds are the Newark N.N.R.C. contingent fooling around their receivers with screw drivers and shall we say sledge hammers! They're sort of jealous of the standing of their fellow Can-Ams and Boosters, and sorry that their DX prowess was not sufficient to warrant their entering the contest this year! . . . And of course you've heard that the Cubans are not going to shift any of their stations any longer—you have? Well we haven't!

HAMFEST

(Continued from page 183)

form is mounted on this foundation. The platform supports first the bearing for the counter-shaft and, secondly the wooden box arrangement in which the generator is cradled, as shown in Fig. 1. The counter-shaft is coupled to the crank-pin with a piece of pipe slotted as indicated in Fig. 2, the slots at one end being at right angles to those at the other end to provide some universal joint action.

The power supply is good for 800 watts, and the voltage regulation excellent, the change being only two volts with a 100-watt variation in load. There is practically no difference in engine speed (in other words the frequency is constant) with a 200-watt shift in load. The frequency is checked with an electric clock—the number of seconds indicated in one minute being the frequency

Fig. 2. Details of the connecting link between counter-shaft and crank pin. Simple and effective with enough universal joint action to take up play.

per second—and the speed of the motor adjusted for 60 cycles.

✦

HOW DID YOU make out in the AARS speed contest? First prize went to W5GEY who turned in perfect copy at 65 wds per minute! He won a Mackey. Now we'll have another lid splattering up the ether with a Gatling bug. Second prize—a Bliley LD2 xtal—went to W2-BCX who limped along at fifty. Best copy, however, was turned in by a non-member (AARS), W9HUM who copied 100 words perfectly at 65 words per minute (65 wds would have been sufficient).

AWR donated three subscriptions as prizes.

✦

WE UNDERSTAND THAT Arthur Lynch, W2DKJ, has put a 2.5-meter signal from his home in Garden City, Long Island, into the New Jersey Palisades—an airline, we judge, of from 25 to 30 miles. We're beginning to believe that we'll have to get down to light frequencies before we even hit "quasi optical" effects!

✦

ON THE EVENING of February 25th, at 7:45, we logged W9WTN on 10 meters, and made the notation that his modulation was of broadcast quality—the best speech we had ever heard on the band. W9WTN was testing. He was worried about his modulation!

INDEX TO ADVERTISERS

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In these few short months the NC-80X has become part of the National tradition. Their advanced circuit details, including the wide-range crystal filter and high IF frequency for image rejection, have brought a new standard of performance to the low priced field. Their thorobred construction keeps that performance consistently high. And their convenience makes operation swift, accurate, and tireless.

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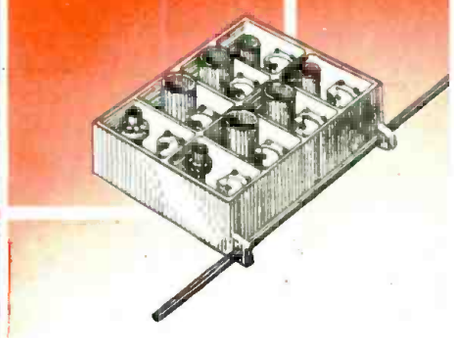

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From Philadelphia to the ARCTIC

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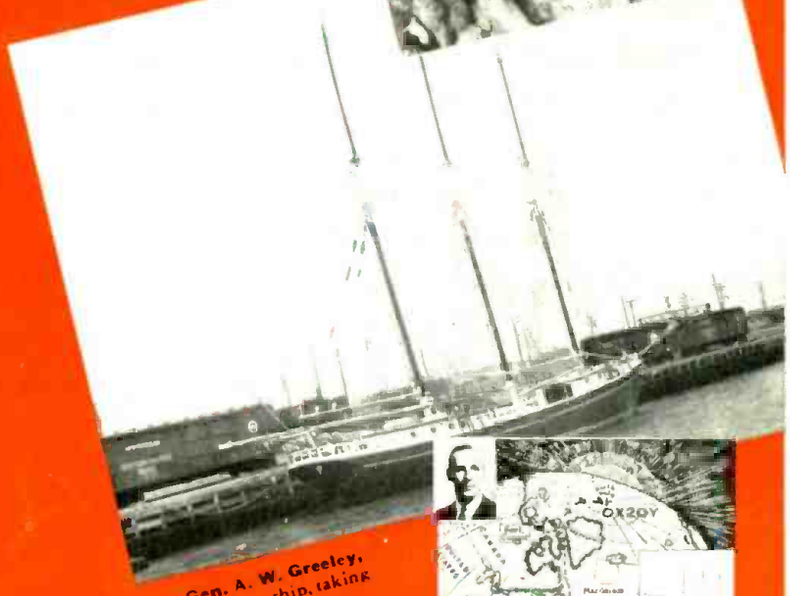
Capt. C. J. McGregor of the McGregor Arctic Expedition.



The Gen. A. W. Greeley, the McGregor ship, taking on supplies.

The McGregor Expedition QSL card, with Mr. A. G. Sayre, radio operator for the expedition.

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