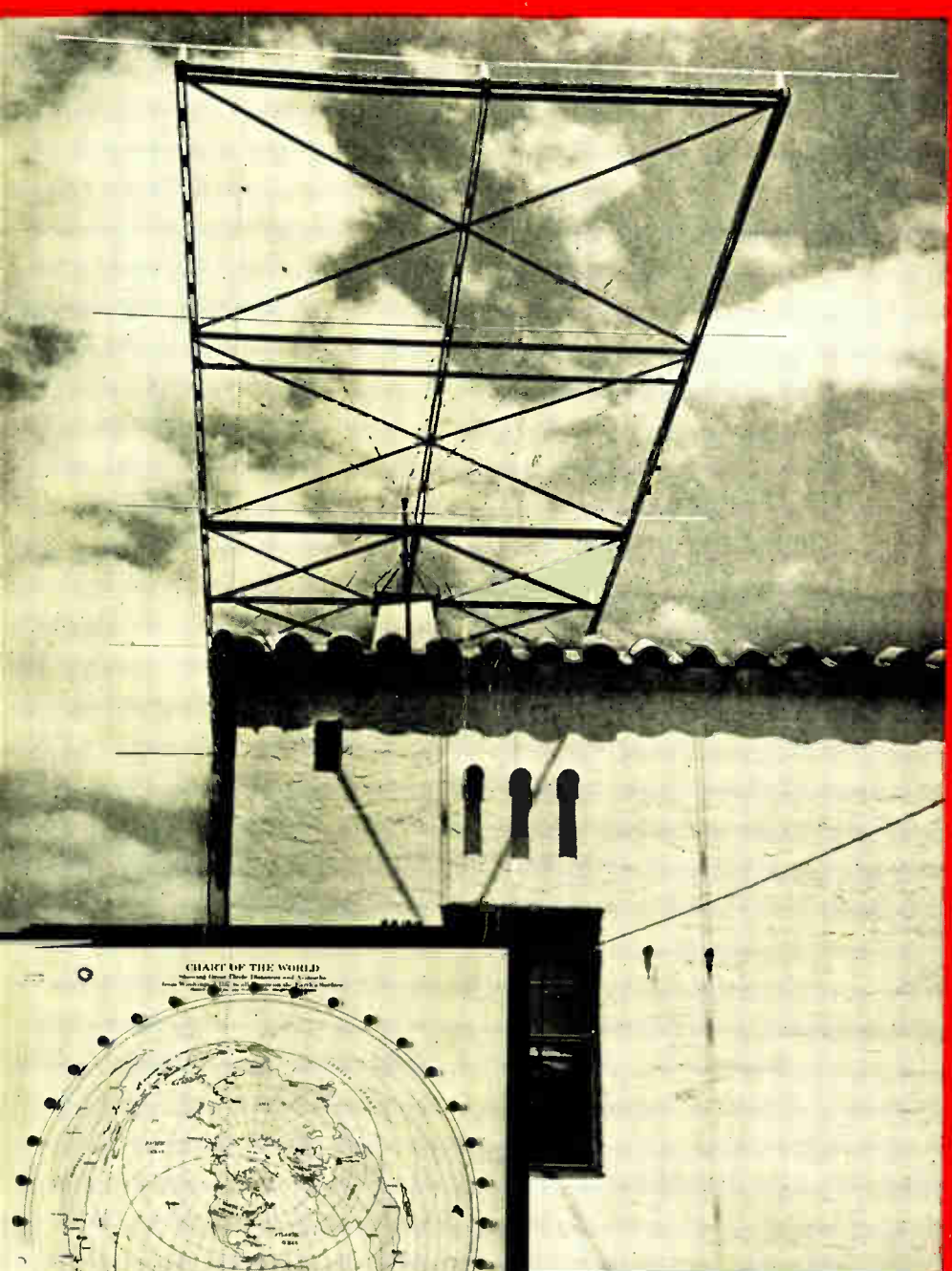
All-Wave Radio

NOVEMBER 1937

25 CENTS



TEN-METER ROTARY BEAM AT W4EDD

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Lab. Receiver

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C. W. Transmitter

For Traffic Work

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For complete information regarding the new AWR-RSSL Citation Certificates as well as the rules and regulations governing their issuance see page 517 of "October, 1937" ALL-WAVE RADIO or send a self-addressed stamped envelope to:

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4X1

All-Wave Radio

EDITED BY M. L. MUHLEMAN

VOL. 3, NO. 11 NOVEMBER, 1937

COVER ILLUSTRATION

THE TEN-METER ROTARY BEAM ANTENNA AT AMATEUR STATION W4EDD, CORAL GABLES, FLORIDA. INSET SHOWS MAP OF WORLD, WITH PILOT LIGHTS, WHICH INDICATE THE DIRECTION IN WHICH THE BEAM ANTENNA IS RADIATING SEE PAGE 568 FOR ADDITIONAL DATA

CONTENTS

J. A. LOVINGTON, AMERICAN LEGION MACHINE GUNNER, ASSISTS WOR BROADCAST THE PARADE BY AIMING W.E.'S EXPERIMENTAL "MACHINE GUN" MICROPHONE ON A PASSING BAND. THIS DEVICE PICKS UP A MAXIMUM OF SOUND FROM THE OBJECT UPON WHICH IT IS FOCUSED (PHOTO COURTESY WESTERN ELECTRIC CO.)

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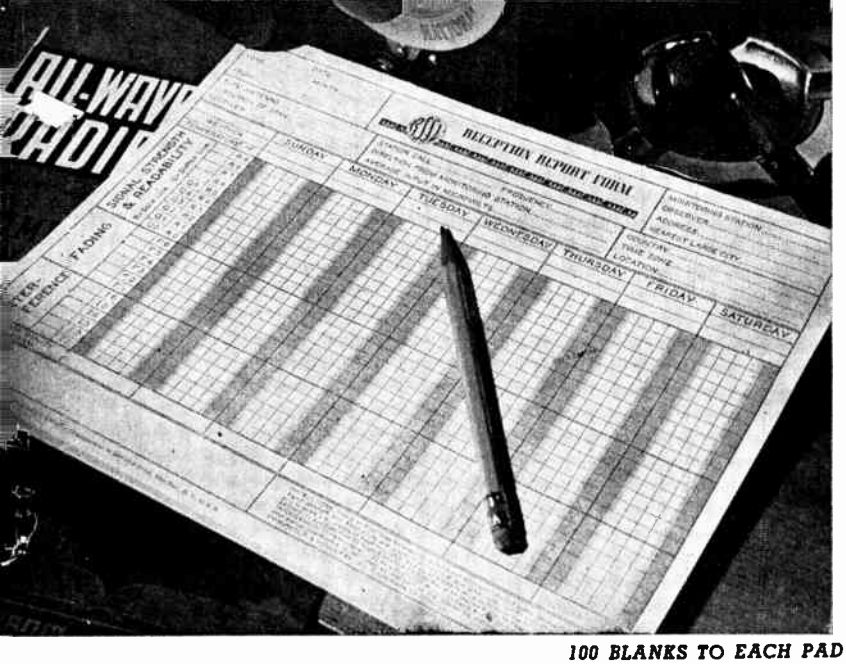

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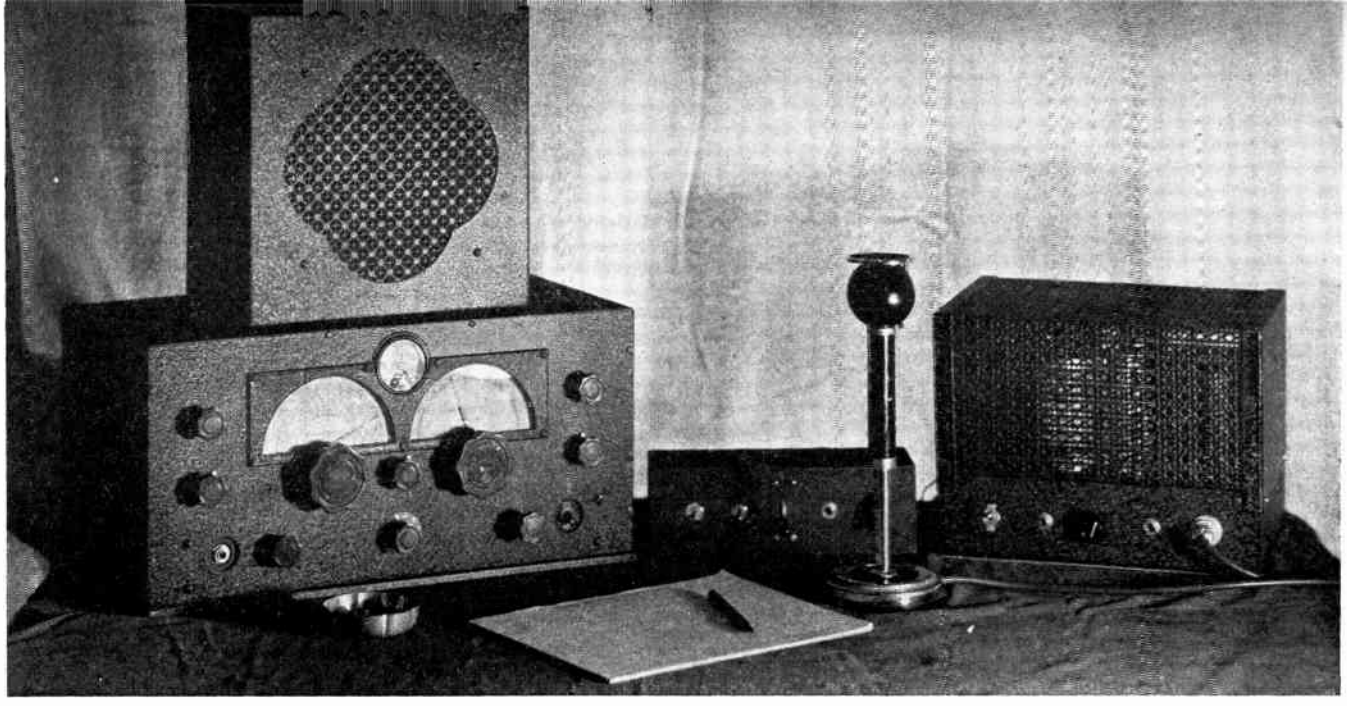


STATION SETUP SHOWING PRE-AMPLIFIER IN RELATION TO MICROPHONE AND RECEIVER.

A VERSATILE 110 DB.

AMPLIFIER COSTS LITTLE AND HAS EVERYTHING

By ALVIN J. BUTOW, W9NLK,

and JAMES E. DICKERT, W9PEI

THERE are two ways to thoroughly enjoy operating on the amateur phone bands. One is to care little for quality but to major in quantity for dx achievements. Such an operator is Amateur Enemy No. 1 to his R9 neighbors. The other way is to properly operate excellent though expensive commercial equipment, being confident of quality and satisfied with quantity. That person is Amateur Envy No. 1.

The compromise boys—you and us—have the ambition for improvement but possibly not the ready cash (or down payment) for commercial equipment.

Front view of chassis. Note the method of shielding grid leads as shown in first tube with shield can cap removed.

Doping It Out

At our station, we think we solved the problem by making use of many spare parts, some hardware, and not a whole lot of cash. Here's how we figured:

A complete station installation consists roughly of four major units: These are the r.f. portion; the modulator, including driver stage; the speech amplifier, including microphone; and the complete receiving and test equipment.

The r.f. portion allowing 500 watts input to the final already was installed in a rack. Also in this rack was the modulator and driver. The approximate 30 db. gain of this combination was not enough to cause worry about r.f. feedback, so the r.f. rack was a good place for it, particularly since the components are reather heavy. No matter what the final output of your rig will be, some of your speech gain will come from the modulator-driver as in our case. Also some gain must come from another source, that source being the speech amplifier which, regardless of final modulation power, can well be of the type herein described.

We wanted to use any type microphone available (if and when) and we wanted the speech amplifier to do a lot of other things besides appearing like a good job.

Amplifier Characteristics

Here is what we thought an amplifier must accomplish:—

1. It must have a gain of 100 db. or more.
2. It must be completely self-contained, including power supply.
3. It should be free from r.f. effects even in strong fields.
4. Its output level must be at least 10 db. (.06 watt) in order to excite a driver stage.
5. Its hum level must be negligible and the frequency characteristic practically flat to 10,000 c.p.s.

The photographs and schematic tell the rest of the story. An output level of plus 10 db. did not show noticeable distortion. Hum level could not be heard and was very difficult to measure—even with a calibrated d.c. operated amplifier—but was probably between minus 30 db. and minus 40 db. across the output.

You will notice in the schematic that quite small plate-to-grid coupling capacities and cathode bypass capacities are used in order to reduce the low-frequency response for voice work. Surprising enough, however, a frequency run showed a rise of only 2 db. from 100 to 3000 cycles, thence flat to 15,000 cycles, and a gradual drop of 4 db. to 20,000. That's as far as the G.R. beat-frequency oscillator goes, and, anyway, who cares?

With a total gain from W.E. 630-A microphone to modulator output of 140 db., and with the full 500 watts of r.f. from the final circulating in the room (some in the antenna, too, we hope) no so-called r.f. feedback was experienced in any part of the audio system.

A point that cannot be underlined too heavily is that while all reasonable precaution should be taken to shield components from r.f., lots more of it than is generally supposed can be tolerated *providing no rectification, partial or otherwise, takes place in the audio channel.* Rectification is inevitable with bad tubes, bad connections, bad resistors, bad condensers, and of course incorrect grid bias. Particularly important is the screen potential on the first tube. A semi-variable voltage divider is indicated for screen voltage supply. Incidentally, the best point for r.f. suppression is not necessarily the exact point for highest audio gain. Also r.f. is never amplified in a pre-amplifier of this type—only the rectified audio component.

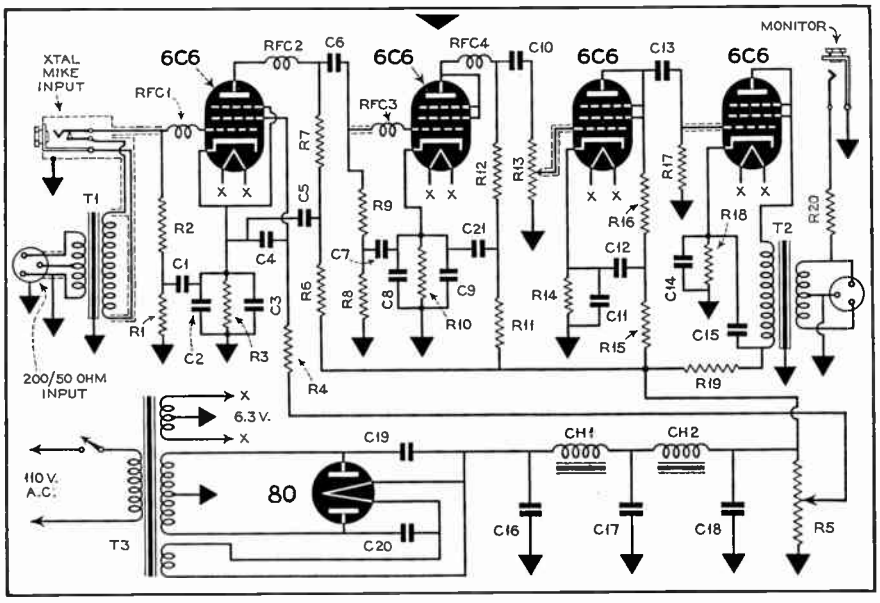
Shielding

The hum problem was much less troublesome than anticipated. However, these precautions were taken: the input transformer was mounted inside a home-made shield consisting of a piece of 2-inch iron pipe over which was placed a short length of copper pipe. The transformer was mounted on the shield, *not on the chassis.*

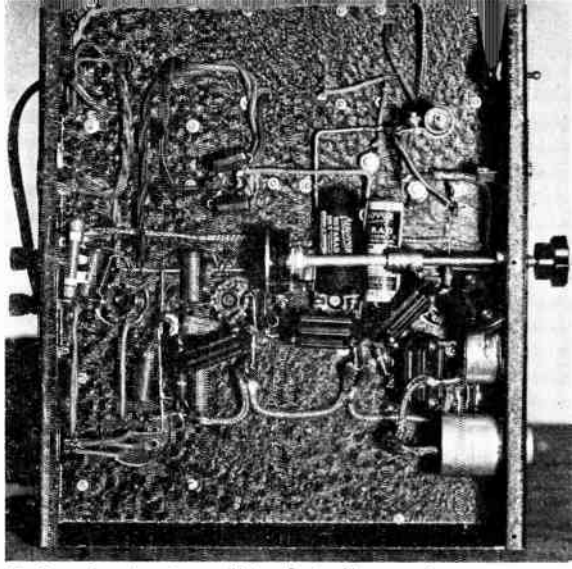
All grid leads are shielded with quarter inch copper tubing which runs directly through the tube shield to the grids. An exception is noted in the photographs where small chokes are shown at the grids. These may or may not be necessary. The tubing can be brought through the chassis by means of small quarter inch shaft bushings available at your dealer.

Shields for the input plugs are cut from old electrolytic condenser cans, the ends being drilled to take the input plug.

A chassis no smaller than 10" x 12" is recommended. In this way power transformer and input transformer are well separated. Provision for orienting the input transformer may be desirable, though this was not necessary in our case.



Schematic diagram of the microphone pre-amplifier. Parts values are given in the Legend to the right.



Under chassis view. Note that all grounds are made to a bus running directly across the center. Note also that gain control is located adjacent to the controlled tube.

The tube complement is four 6C6's for the reason that we don't know of a better type for this purpose, although there is no obvious reason why metal tubes should not be satisfactory.

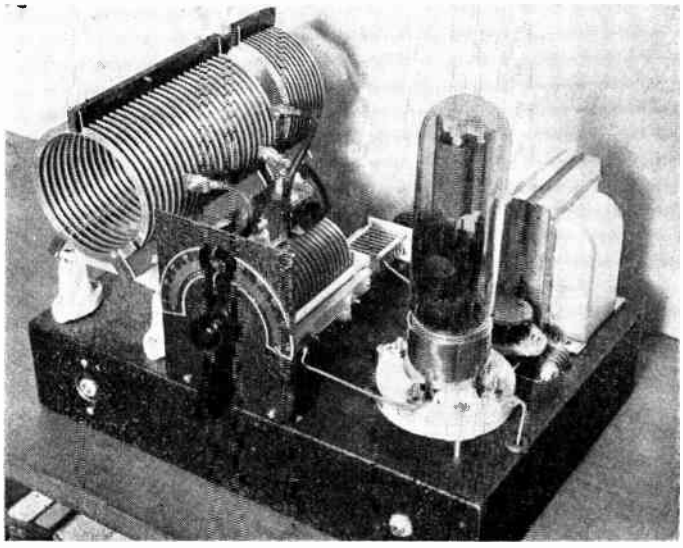
One more precaution: use all the mica postage stamp condensers you can find, particularly for the first and second stages. It is also good practice to shunt small mica capacities across all electrolytics used. The exact value is not important so long as a low-impedance path for very high frequencies is established.

LEGEND

12—mica (preferred) .01 mfd. (C1, C4, C5, C6, C7, C10, C11, C12, C13, C14, C15, C21)
4—mica postage stamp .006 mfd. (C2, C8, C19, C20)
2—electrolytic 10 mfd., 25 volt (C3, C9)
3—electrolytic 8 mfd., 450 volt C16, C17, C18)
5—100,000 ohm, ½ watt (R1, R2, R8, R9, R17)
1—3500 ohm, ½ watt (R3)
4—25,000 ohm, ½ watt (R4, R11, R15, R20)
1—25,000 ohm, 25 watt, semi-variable (R5)
3—50,000 ohm, ½ watt (R6, R12, R16)
1—250,000 ohm, ½ watt (R7)
2—2,000 ohm, ½ watt (R10, R14)
1—100,000 ohm potentiometer (R13)
1—1,000 ohm, ½ watt (R18)
1—10,000 ohm, ½ watt R19)

NOTES

1. Electrolytic cathode bypass resistors omitted from last two stages to introduce slight degeneration at lower frequencies.
2. Radio-frequency chokes are vitreous type, wound for operating frequency.
3. R20 necessary to eliminate unbalance in output when monitoring.
4. T1 and T2 standard high quality. T3 may be of small power capacity but thoroughly shielded both outside and between windings.
5. *Caution:* Do not depend on chassis for common ground.



THE COMPLETED JOB—ONE TUBE, XTAL CONTROL, 120 WATTS.

TRAFFIC RIG For 40 and 80 C. W.

By ROBERT LORD • W2ADY

Engineering Department,

AMPEREX ELECTRONICS PRODUCTS, INC.

THE average amateur operator, a few years ago, was satisfied to have his station operate efficiently on but one band. Both transmitters and receivers, at that time, proved awkward to manipulate when returning to bands other than the accustomed one. This condition was particularly true of the transmitting portion of the station. The process of changing coils, crystals, etc., plus the accompanying retuning and neutralizing process was sufficiently distasteful to discourage multiband operation.

Band Changing Problems

Present-day transmitters are much less cumbersome insofar as band changing is concerned. The development of transmitting tubes embodying a high degree of power gain has materially reduced the number of stages required. The low interelectrode capacities of these tubes make possible constant neutralization over a range of several bands. High power pentodes and beam tubes, for those amateurs who prefer them to triodes, make possible the elimination of the neutralization problem entirely. Various types of low-loss, high current r.f. switches permit coil changing for at least three bands in any one transmitter.

Despite the present availability of the aforementioned newer products, and many others to boot, the average amateur of several years' standing is still in somewhat of a quandary when the problem of band changing crops up. Said average amateur, over a period of years, has built up to the limits of his pocketbook a transmitter which is as efficient on his pet band as his experience and pocketbook has permitted. A complete rebuilding program in the interests of rapid band changing is therefore not considered worthwhile by the amateur. He usually prefers to spend his extra dollars in increasing power.

Extra transmitters for extra bands has always been considered the ideal solution of the band changing problem. When the extra transmitter is to be of the same power as the main transmitter, the time, money and additional space required are often an effective preventative to the adoption of such a program. When the extra transmitter may be of relatively low power and simple design such an arrangement is quite feasible.

An extra transmitter need not have its own power equipment. The main transmitter can furnish all necessary voltages. It is most practical, though, to mount the filament transformers directly on the extra transmitter. It is always simpler to run a single 110-volt cord than several pairs of heavy filament leads. It is also a neater way of doing the job. Several well insulated wires will suffice to carry the plate voltages.

Extra Transmitters

In the April 1937 issue of ALL-WAVE RADIO there was presented an extra transmitter embodying these general design features. This was the DX4UCW two-tube, high-power transmitter. With but two tubes—an RK-39 and a ZB-120—powers ranging from about 70 or 80 watts on 10 meters to 150 watts or so on the lower frequency bands could be obtained. With the filament transformers self contained, only three connections to the power supply of the main transmitter were required.

The bottle that made this simple two-tube, high-power transmitter possible was the Amperex ZB-120. We refer the reader back to the April article for a listing of the general characteristics of this versatile tube. Under the heading (b) was the following: "120 watts r.f. output as a Class B telegraphy amplifier with zero grid bias and a driving power of but 1.2 watts." As the figures indicate, this is a power gain of 100, which is as good or better than the power gain of various types of power pentodes and beam tubes now available.

The use of these power pentodes as crystal oscillators suggests the use of the ZB-120 for the same purpose, i.e., a one-tube, high-power, crystal-controlled transmitter. In the DX4UCW rig an extra oscillator tube was required in order to permit 10-meter operation. For lower frequency operation, however, the use of a ZB-120 as crystal oscillator is eminently practicable.

In a normal connection of a crystal-controlled oscillator, the crystal is excited by the feedback from the plate circuit through the grid-to-plate capacitance of the tube. The ZB-120 requires so low an exciting voltage, that the feedback must be reduced. This is accomplished in this transmitter by partially neutralizing the tube grid-to-plate capacity feedback. At the proper feedback to provide the required r.f. exciting voltage, it is possible to obtain high output from the ZB-120, without any harm to the crystal.

The characteristics of the ZB-120 used as a high-power crystal oscillator are such as to make it ideal for use as a one-tube traffic transmitter on the 40- and 80-meter bands. Traffic work on these two bands can be consistently handled with powers of the order of 100 watts or so, which figure may be easily obtained with the ZB-120 power oscillator, outputs of 120 watts being possible on the 80-meter band.

Ideal Break-In Operation

One requirement for rapid traffic handling is the ability to work "break-in," even directly on the transmitter frequency. Many multi-stage transmitters.

keyed in the driver or power stage, are suitable for break-in operation *if* the frequency of the other station is not too close to the transmitter frequency. For most effective use of the single frequency network type of operation now in vogue, it is imperative that the transmitter go completely "dead" with the key open. This requirement is met by the Traffic Transmitter.

Another advantage of the Traffic Transmitter is in its economical operation. There are no extra oscillator, buffer or driver stages to needlessly draw power. It is not necessary to shut off the power while receiving, as the transmitter draws nothing but filament power with the key open. It is only necessary to key when it is desired to send, and forget the power switch until the operating period is concluded.

The diagram and photograph illustrate better than words the utter simplicity of this little "transmitter." Not a resistor is required (except the usual bleeder contained in the power supply itself.) As the tube is operated under Class B conditions the grid is effectively grounded through RFC1, as far as d.c. voltage is concerned. This eliminates the grid leak, or other source of bias. Use of the secondary center tap on the filament transformer, T, eliminates the usual filament center-tapped resistor. As there are no extra elements in the ZB-120 no other resistors are necessary.

Degeneration to reduce the feedback is obtained by use of the usual "neutralizing" circuit. As very little excitation is required the degeneration or neutralization tap is located very close to the lower or "dead," end of the plate coil, L. This also permits of larger capacity in the degeneration condenser NC, making its adjustment less critical.

Construction

The positions of all components are clearly shown in the photograph. The only parts under the chassis are the three bypass condensers and the plate choke, RFC2. A row of 6 insulators on the back edge of the chassis, not shown in the photograph, make connection to the key, high voltage, and antenna. Four type 40 feed-thru insulators are used for the key and high voltage. For the antenna a pair of type 20 stand-offs connect with flexible leads to the clips on the antenna coil, L1. An ordinary a.c. outlet, also on the back edge, is used for 110-volt line input to the filament transformer.

A type 624 inductor is used for the plate coil, L, and is mounted on four type 20 stand-off insulators. This type of edgewise wound coil was chosen in preference to the more usual type because its construction adapts it ideally to the tap changing procedure necessary for proper adjustment of this circuit. The heavy inductor clips make as good a contact as if the tank leads were actually soldered in place. The usual type of coil would require soldered connections, an awkward procedure when taps must be changed.

The antenna coil, L1, is a type 623 inductor. In order to provide continually adjustable coupling this coil is pivoted. A pair of type 22 stand-off insulators, four small brackets and an old pair of binding posts provide an easily constructed swivel mounting.

No antenna tuning condensers are shown. The method of antenna tuning required will change with each particular antenna. The 10 turns of the antenna coil with the pair of inductor clips for adjustment should provide coupling to practically any antenna. As most 40- and 80-meter antennae are of the familiar Zeppelin type, either one or two antenna condensers, for parallel or series tuning, respectively, are all that are required in most cases.

The two current-reading jacks are mounted on the front of the chassis; the grid-current jack under the tube and the plate-current jack under the coil. As one side of the grid jack is grounded this jack need not be insulated from the chassis. The plate jack, however, should be insulated for the plate voltage. This is done by mounting this jack on a small piece of hard rubber, which is fastened to the chassis with two bolts. A large hole should be drilled in the chassis so as to amply clear the jack.

The ZB-120 socket should be mounted off the chassis a half inch or so to prevent possible breakdown from the plate terminal bolt to chassis. This is done with a pair of long bolts and spacers. One nice thing about this transmitter is that no large socket holes are necessary. This makes it possible to drill the entire chassis with a hand drill.

The plate condenser, C, is mounted on a pair of type 22 stand-off insulators. It is mounted far enough forward so that the shaft projects through the small panel. The shaft hole in the panel should be about an inch in diameter for ample clearance. This small "panel" was cut from an old sheet of aluminum. Any small piece of metal or wood may be used to mount the dial.

The neutralizing condenser, NC, is mounted directly to the chassis with the usual type of Trimair bracket. It should be turned upside-down for greater clearance above the chassis.

Preliminary Adjustments

Preliminary adjustments should be

PARTS LIST

AMPEREX
1—type ZB-120 tube

BLILEY
1—type LD2 80-meter crystal
1—type LD2 40-meter crystal

CARDWELL
1—type MT-150-GS tuning condenser (C)
1—type ZT-30-AS neutralizing condenser (NC)

CORNELL-DUBILIER
2—type 9 .002 mfd. 600-volt filament bypass condensers (C1)
1—type 9 .002 mfd. 2500-volt plate bypass condenser (C2)

HAMMARLUND
1—type CHX r.f. choke (RFC1)
1—type CH500 r.f. choke (RFC2)

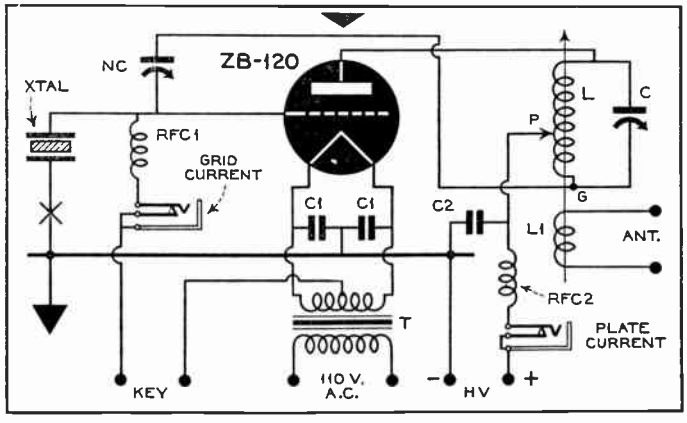
JOHNSON
1—type 624 inductor (L)
1—type 623 inductor (L1)
1—type 211 socket (for ZB-120)
1—type 204 handle indicator
4—type 20 standoff insulators (for mounting L)
4—type 22 standoff insulators (for mounting L1 and antenna posts and C)
5—type 40 feedthru insulators (for high voltage, and key connections)
1—type 225 Alsimag 5-prong socket (for crystal).

PAR-METAL PRODUCTS
1—10 x 14 x 3 inch black crackle chassis

UNITED TRANSFORMER
1—type CS409 10-volt filament transformer

YAXLEY
2—type A-2 closed-circuit jacks

MISCELLANEOUS
1—a.c. receptacle



Schematic diagram of the Traffic Rig. Simplicity is its keynote. The arrangement is ideal for break-in operation.

made with a low plate voltage of around 300 or so. The correct procedure is as follows:

(1) Set neutralizing condenser NC at maximum capacity.

(2) Place an 80-meter crystal in socket.

(3) Set inductor clips on L for 80-meter operation. The photograph shows them set in the proper positions for this band. The clip, G, going to the "grid" end of coil, L, taps at the end turn next to the antenna coil, L1. The high-voltage clip, P, is placed 3 turns away. The "plate" clip is placed 16 turns from the "grid" clip. This placed 16 active turns in use for L, with 3 turns used for degeneration.

(4) With the key closed and meters plugged into both jacks the low (about 300) plate voltage should be turned on. With the condenser, NC, still set at maximum capacity the plate condenser, C, should be rotated through its full range slowly. No indication of oscillation should be had, and both meters should show no movement. The plate meter will indicate a low non-oscillating current, while the grid meter will read zero. If any indication occurs, the high-voltage clip on L should be moved slightly from its original position, 3 turns from the end, until a non-oscillating condition is reached. This indicates that the tube is neutralized. As this neutralized position is relatively broad the original position given for the clips should be satisfactory if the construction is duplicated.

(5) A 10-watt light bulb should be connected across 4 or 5 turns of L1. These turns should be the ones nearest to the plate coil and both coils should be tightly coupled.

(6) the condenser, NC, should then be very slowly turned from its maximum capacity position while C is swung back and forth across its high-capacity end. With the capacity of NC sufficiently reduced the tube will go into oscillation, indication of which will be observed on both meters and by the light bulb. It will be observed when tuning into resonance from the low-capacity side of plate condenser, C, that, when the tube begins oscillating, the plate and grid current will both be very high, while the bulb will only light dimly. As the capacity of C is increased the plate and grid currents will come down, while the output, as indicated by the light bulb, will increase. This latter condition will hold with increasing capacity of C until the tube again stops oscillating. When tuning back into resonance the opposite will hold true, the tube first giving high output and drawing low current. The position of C for maximum output of the tube will be found to be at a slightly lower capacity setting than that where the tube begins oscillating (tuning from the high capacity side).

The condenser, NC, should be reduced from its maximum capacity position just far enough to provide stable keying. If reduced too far the feedback will be too great and will result in an unnecessarily high crystal r.f. current. A reading of 25 ma. on the grid meter indicates the maximum permissible crystal r.f. current of approximately 60 ma. (r.f.)

(7) High voltage may now be applied to the tube. This should not exceed 1250 volts. The operating conditions for maximum output on 3500 kc. are as follows:

Plate voltage—1250 volts
Plate current—140 ma.
Grid current—22 ma.
Crystal r.f. current—60 ma. (r.f.)

Note: Grid current should not exceed 25 ma. for correct crystal r.f. current.

With the high plate voltage applied, and the 10-watt bulb replaced with a 100-watt bulb, step (6) should be repeated. Condenser, NC, should this time be reduced very slowly until the

(Continued on page 611)

W4EDD—Old 2QR In Modern Dress

BACK in the days of the straight spark gap and the helix, and later when even the rotary sink signals were being cut like butter by the shrill peanut whistles of makeshift c.w. transmitters, the brothers Hugh and Harold Robinson were operating amateur station 2QR, at Keyport, New Jersey.

A lot of signals have flowed under the ionosphere since that time, and the radio wonders of yesterday have become the belly laughs of today. The once virginal ionosphere has been violated by ultra-high-frequency signals and the ether closely laced with all manner of radiations from the silly talk of the lid to the hum of the diathermy machine. And ex-2QR—or at least one member of the original combine—is, in this more enlightened day, W4EDD.

H. H. (Robbie) Robinson, President of Curtiss Aerocar Company, Inc., manufacturers of deluxe trailers, is the owner and operator of W4EDD. The station is located at Coral Gables, Florida. Views of the antenna systems, the two-story building housing the station and laboratory, and the equipment itself—to say nothing of a shot of "Robbie" himself—are on the opposite page and on the front cover.

All the active amateur bands are used by 4EDD, although he devotes the major part of his time in experimental and development work on ultra-high frequencies, with emphasis on antenna systems.

The illustration on the front cover shows his 10-meter rotary beam mounted on the roof of the shack. A reversible 1/4 horsepower motor rotates the beam through an 80-to-1 reduction gear and the beam makes the complete circle of 360 degrees in just 60 seconds. The entire beam, exclusive of the tower, weighs only 129 pounds. The inset in the cover illustration is the direction indicator map which is mounted on the wall in the operating room. On the periphery of this map of the world is a series of pilot lights separately energized from a rotary switch segment coupled to the beam rotator. The direction in which the beam antenna is radiating is indicated by the lamp that is lighted.

Another view of the beam is shown in (1) on the opposite page. This shows the horizontal radiator, reflector and director rods.

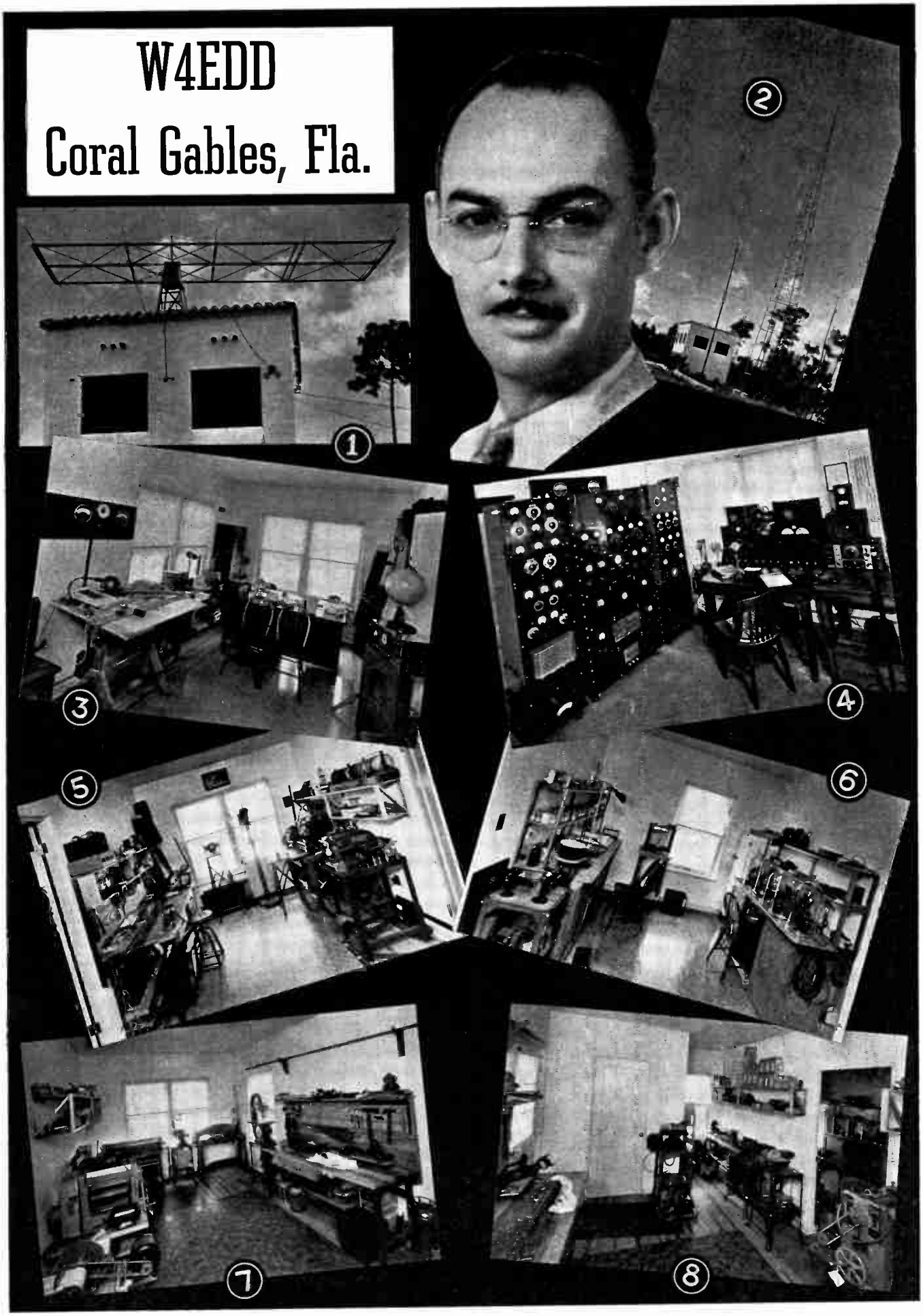
Photo (2) shows the complete two-story shack and the additional antennas. The steel tower is 150 feet high, is insulated above ground and fed with a concentric line. It is a quarter wave on 160 meters and a half wave on 80 meters. Input to this tower is from a one-kilowatt transmitter.

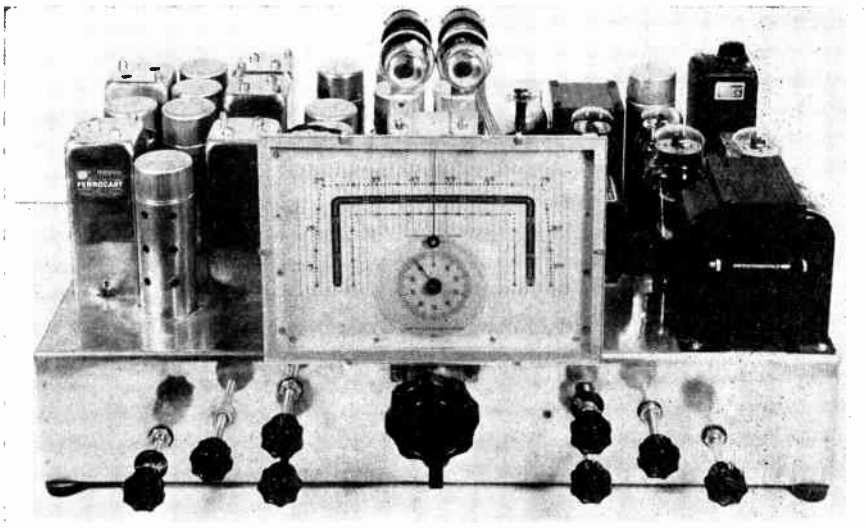
Photo (3) shows the 75-watt, 5-meter rig in the left corner; also the desk and drafting table. The west end of the same room is shown in photo (4). The transmitter at the extreme left is a 500-watt job used on 20 and 40 meters. The transmitter in the center is a kilowatt job used on 80 and 160 meters. The rig at the extreme right is another 500-watt transmitter, used on 10 meters only. On the operating table will be seen the Hammarlund Super Pro, RME-69 and National NC-101X receivers.

Photos (5) and (6) respectively show the east and west ends of the second room of the laboratory. Photos (7) and (8) show the east and west ends respectively of the third room. These two rooms are workshop and laboratory.

The shack also houses a 10-kw. gas-electric power plant and a number of water pumps so that the lab. is self-contained and independent of outside power sources.

W4EDD
Coral Gables, Fla.





THE ORTHOTECH UNIVERSAL SUPER—Advanced Model

PART II

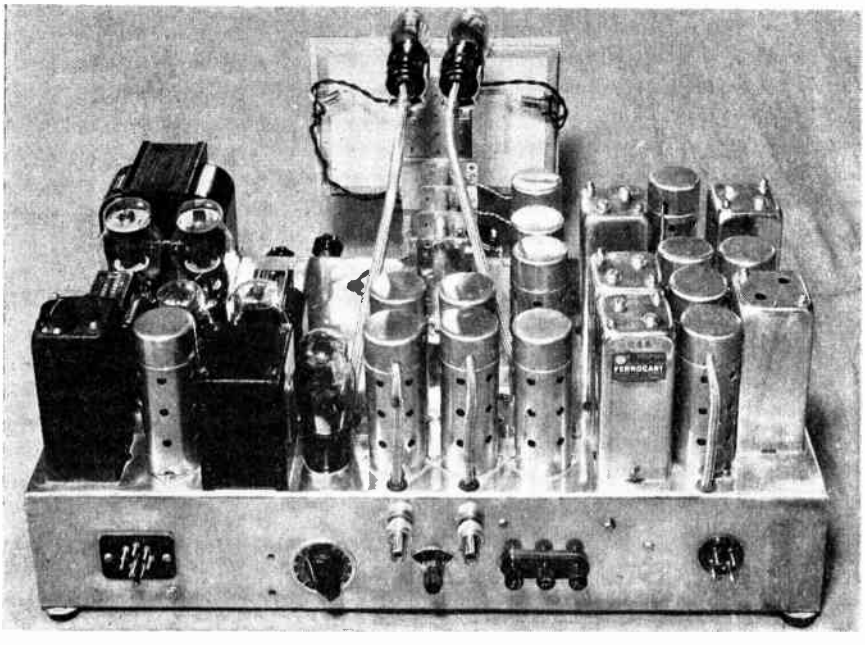
BY RAYMOND P. ADAMS

IN the first part of this article, which dealt with the construction of the basic model of the Orthotech Universal Super, it was pointed out that other features, such as a noise suppressor, could be included in the design at the outset, or added later, as the constructer desired. It was recommended, however, that if an expansion of the basic model was anticipated, the larger chassis used with the advanced model be employed as the basis of construction, rather than the chassis layout shown in Fig. 4 last month.

We will offer suggestions regarding the placement of the components of the basic model on the larger chassis, but first let us deal with the worthwhile features that may be appended to the original circuit, shown in Fig. 1 in the October issue, or the advanced model.

Adding Noise Suppression

If noise suppression is desired and the somewhat complicated Lamb arrangement employed in the advanced model fails to inspire an investment in items for a necessary second i.f. stage and separate noise channel, by all means employ the Dickert system—which is enormously efficient, is automatic and self-adjusting to carrier level in operation, is flexible enough to permit good silencing without suppression of modulation peaks, and calls for simply a two-way center-off switch and a couple of extra resistors and condensers. We have specified the use of separate second detector and first audio tubes in the Fig. 1 circuit primarily to facilitate the addition of the Dickert Noise Suppressor—which not only comes in handy in silencing the usual ignition noise interference common to high-frequency reception, but does a surprisingly good job as an automatic attenuator of sharp noise peaks riding through a receiver adjusted for wide-band service on local broadcasts.



Rear chassis view of the advanced model of the Orthotech Universal Super. Front view of the chassis is shown at the top of this page. Note dual electron-ray indicator tubes.

The circuit, shown in Fig. 5-A, is the original Dickert hookup, upon which we seem able to make few if any improvements. For an explanation of "how and why" it works, consult Mr. Dickert's article in the March issue of ALL-WAVE RADIO.

Adding Crystal Filter

A crystal filter is one refinement which we did not add to our advanced model, simply because we would never have found use for it in this particular set and the service for which the set was developed. But most hams will desire such a filter, and we have left room on the

larger chassis for the installation of the two extra i.f. transformers and the plug-in crystal socket which will be required. Here we do not recommend a variable phasing control on the chassis drop, but simply a semi-variable phaser set away under the pan where once adjusted it will not tempt the operator.

The crystal filter circuit, with proper notations for its connection into the basic or advanced circuit, is shown in Fig. 5-B.

Adding Beat-Frequency Oscillator

A beat-frequency oscillator stage will be desirable where the receiver is to be used for communications purposes (as we have said, the power transformer will easily stand additional filament load.) Such a stage should be wired as indicated in Fig. 5-C, with tube and transformer positioned as suggested in Fig. 8 if the large chassis is used.

And now getting back to the use of the larger chassis for the basic model—the following procedure is suggested in the application of the Fig. 8 chassis: Transformer T1 may be positioned over the cutout for T6 (an advanced model unit). T2 may occupy the place designated for T8. The single 6K7 i.f. tube socket would logically be installed in the hole for the 6L7 in our advanced job, with the 6H6 second detector occupying its regular place as designated. The 6C5 first audio might be positioned anywhere between the detector and the four holes for T11. T3 would replace T11, T5 would replace T13, CH1 would replace T12, and T4 would be removed from the chassis altogether and assembled, in conventional manner, on the loudspeaker frame. The P4 receptacle would logically be used for speaker plug-in; and the i.f. selectivity switch, the R23 control, the audio level control, and a.c. on-off switch might occupy front-drop holes designated in Fig. 8 for noise control, a.f. level, expansion on-off, and beat oscillator respectively.

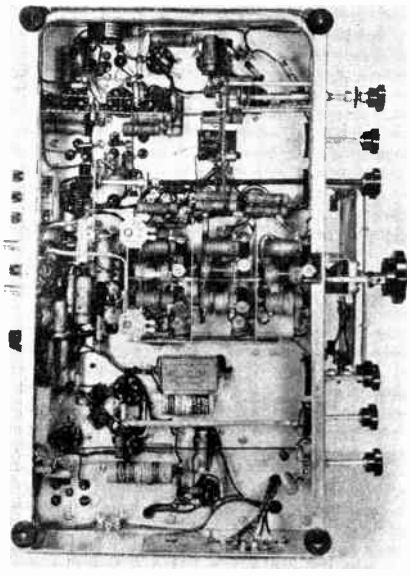
May we again repeat that a *definite physical relationship between gang condenser, r.f. section tubes, and coil assembly is imperative* and that no departures from recommended Fig. 3 layout should be attempted.

Advanced Laboratory Model

We call the advanced model a "perfected" design particularly built up around the basic circuit primarily for program distribution service; it suggests, therefore, a high quality p.a. job. But it is essentially a piece of radio receiving equipment, and as such recommends itself for duplication where the builder seeks the ultimate in performance.

The Circuit

The r.f. portion of the circuit is exactly that of the basic receiver and has been thoroughly discussed and explained. As



Under-chassis view of the Advanced Orthotech, showing location of parts.

for the i.f. section, it is essentially the basic affair with a second stage added, as shown in Fig. 6. Both T6 and T7, are band-expansion transformers. The second i.f. tube, instead of being the usual 6K7, is a 6L7, biased a little higher than the tube in the preceding stage. Both these tubes and the r.f. 6K7 are common to the manual r.f. gain control, R23, and the source of a.v.c. voltage. Screen and plate circuits are properly and individualiy bypassed and decoupled, and all coupling components are of Ferrocart Alignaire construction.

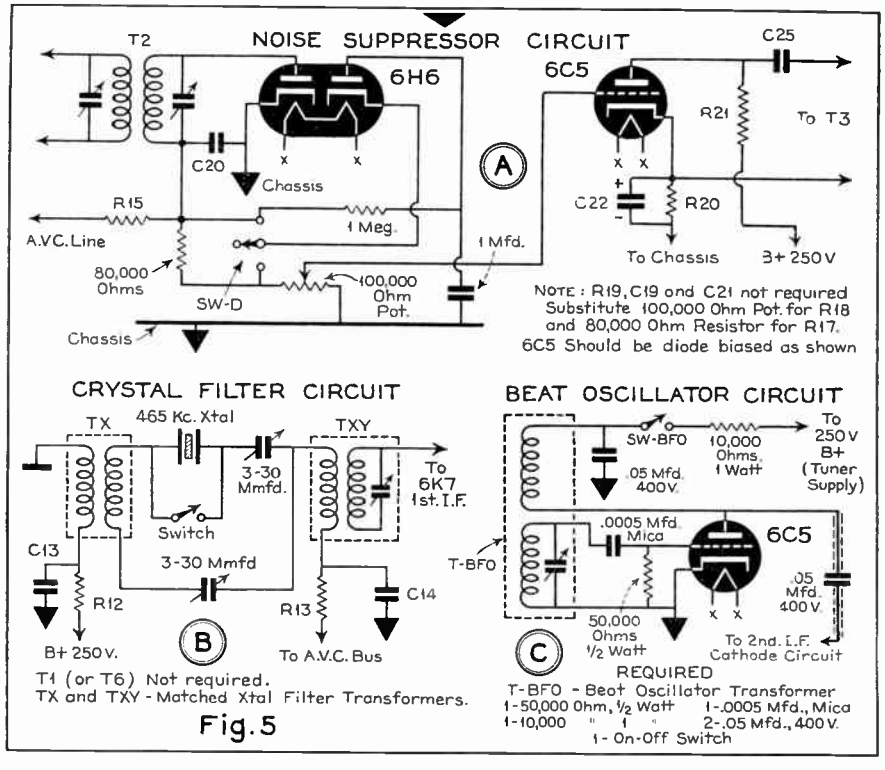
The Lamb noise silencing circuit works particularly well in this design, largely because of the T9 component, which is built for *distinctly* noise diode feed and is *not* a remade regular-run item.

The 6H6 second detector has been freed of its job of developing the a.v.c. voltage, and a separate tube has been added to the line-up for distinctly and purely a.v.c. service. The r.f. for this tube, which is a 6B8-G, is fed through the condenser C35 from the 6L7 plate, is *amplified* by the triode section of the a.v.c. tube, then rectified by the diode section. The a.v.c. voltage appears across R18A and is fed into the control line, and filtered and timed in the usual manner. The transformer T10 is identical to T9.

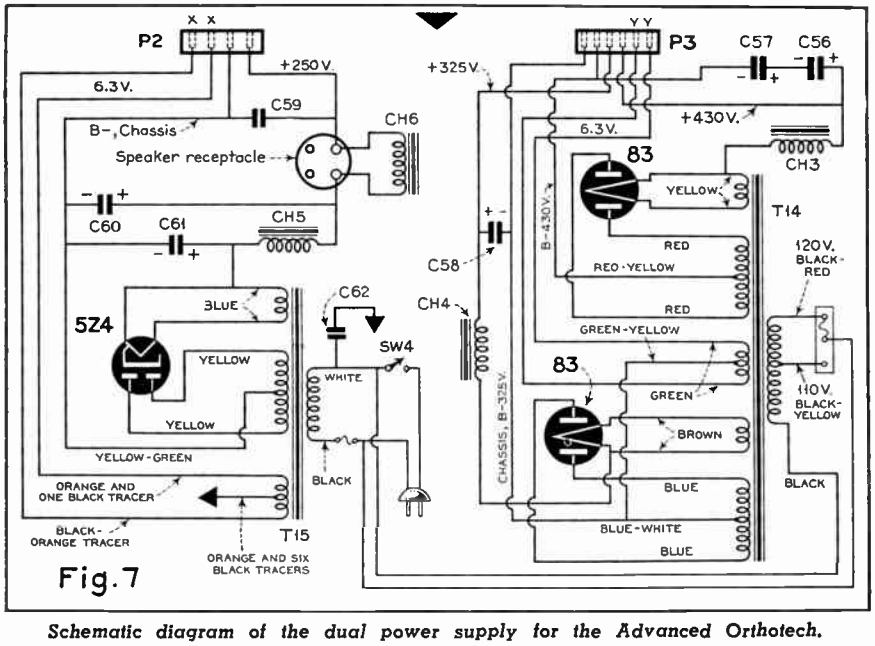
The audio circuit might seem a bit complex at first glance, but resolves itself down to a well-balanced, well-driven beam output hookup having certain supplementary and refining features.

Two input channels are incorporated; one calls for a 6J7, triode connected, and is wired for high-impedance crystal mike input; the other uses a 6L7 volume expander and is designed for radio-phono feed, the switch, SW3, permitting quick selection of either input here. Both feed a 6N7 second a.f. tube, with R30 (a center-tapped potentiometer) controlling channel level and acting as a fader or channel selector.

The expanded bias-amplifier a.f. channel, requiring a 6C5 and 6H6, is conventionally wired and needs little explanation. Suffice it to say that it sepa-



Circuits and parts data for Noise Suppressor, Crystal Filter and Beat Oscillator which may be added to either the Basic or Advanced Models of the Orthotech Universal Super.



Schematic diagram of the dual power supply for the Advanced Orthotech.

rately amplifies and rectifies a portion of the phono-radio a.f. input, and builds up a d.c. varying with average audio level, this positive voltage being applied to the 6L7 injector grid to cause a change in this bias, an increase in 6L7 conductance in relation to increased level, and a consequent artificial replacement of the original volume range of the radio or recorded music. R40 is the manual control which determines the amount of expansion desired, while R39 is a resistor whose semi-variable adjustment determines the amount of no-signal bias to be applied to the 6L7 injector. SW5 is an s.p.s.t. switch for shorting R39 and opening up the 6L7 gain when expansion is not desired.

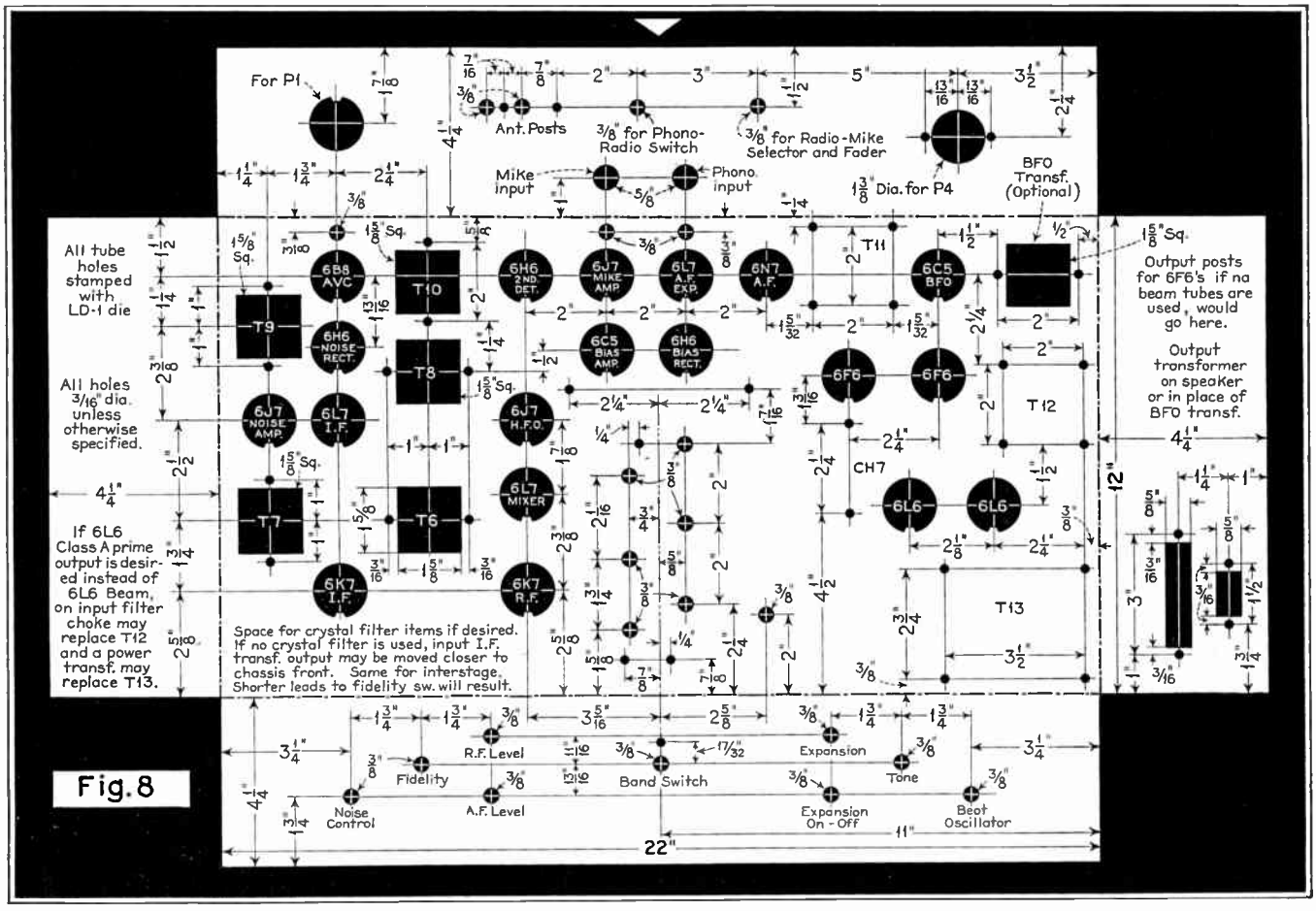
The 6F6s in push-pull drive the 6L6s in the output stage to 60 watts. Equalization in the driver stage effectively levels out the overall a.f. response curve, the curve being practically flat from 30 to 12,000 cycles and permitting full realization of the wide-band reception made initially possible by the variable characteristics of the tuned i.f. circuits. The tone control, R33, has simply been added as a means of attentuating static when atmospheric conditions interfere with good DXing.

Two separate power supplies are employed, as shown in Fig. 7. One, using a 5Z4, affords plate and filament voltages for the r.f. and control circuits of the receiver. The other develops filament voltage for all tubes in the a.f. line-up, high voltage for the 6L6 plates from one 83 rectifier and high voltage for beam screens and the plates and screens of other audio tubes from a second 83.

Construction

Detailed constructional data on the advanced model is not necessary, as the illustrations cover the principal points. However, here are a few notes on the subject:

1. Two chasses will be required, one for the receiver-amplifier proper, and one for the two power supplies. Figs. 8 and 9 not only give full drilling and cut-out data but clearly indicate layout and parts placement.



Chassis dimensions, layout and drilling data for Advanced Orthotech. This chassis is also recommended for the Basic Model if additions are made.

2. Be sure and follow r.f. assembly installation requirements exactly, as we have twice before advised.

3. If no crystal filter circuit is to be used, cutouts for T6 and T7 in Fig. 8 might very well be brought down closer to the chassis front. SW1-SW2 is a two-section switch, and as leads from both T6 and T7 are brought to it, they should be well separated, or perhaps shielded.

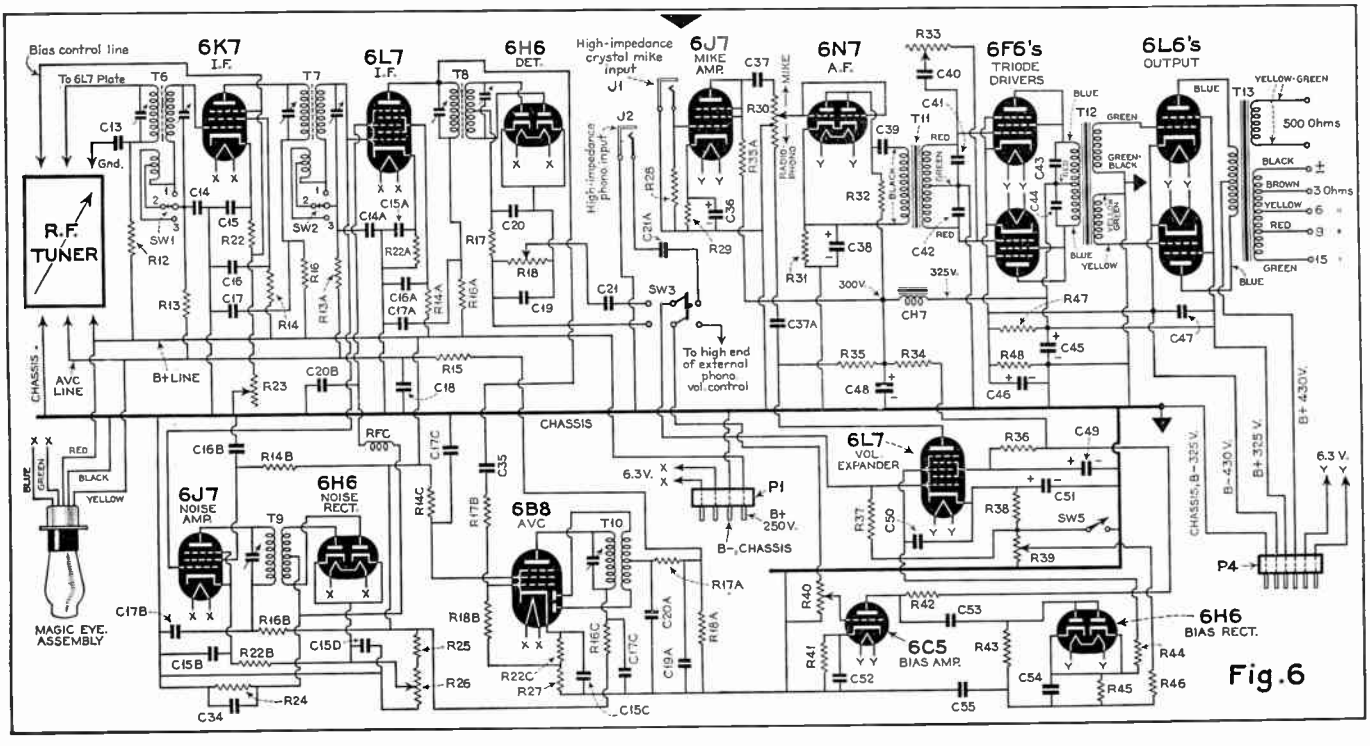
5. Shield leads running across the width of the chassis to R18, R33, R40 and SW5.

6. R30 is mounted on the rear chassis drop, as are the jacks J1, and J2, and the power receptacles P1 and P4. Be definitely sure that P1 and P4 receptacles are of the male type, and the cable plugs from the power pack are of the female type.

7. Shield the grid leads of the 6L7 expander, 6J7 mike amplifier, and 6B8 a.v.c. tubes from grid caps to and through the chassis.

8. Use plenty of tie-points. Keep wires short and direct. Don't worry too much about under-chassis neatness. If components are positioned right where they belong electrically, bypass and other ground-return leads brought to a single point on the chassis for each circuit, and the wiring made to take the shortest pos-

(Continued on page 601)



I.F.—A.F. Assembly Parts

AEROVOX

8—type 284 .1 mfd. (C15, C15A, C15B, C15C, C15D, C16, C16A, C16B)
6—type 484 .1 mfd. (C13, C17, C17A, C17B, C17C, C17D)
3—type 284 .05 mfd. (C14, C14A, C18)
5—type 1468 mica .0001 mfd. (C19, C20, C19A, C20A, C34)
1—type 1468 mica .00005 mfd. (C20B)
1—type 1467 mica .001 mfd. (C35)

CONTINENTAL

1—50,000 ohm, 3 watt (R25)
2—.5 meg., ½ watt (R18A, R18B)
2—250,000 ohms, ½ watt (R15, R45)
10—100,000 ohms, ½ watt (R13, R13A, R14A, R14B, R14C, R17, R17A, R17B, R24)
6—100 ohms, ½ watt (R12, R16, R16A, R16C, R16B, R27)
4—300 ohms, ½ watt (R22, R22A, R22B, R22C)

CROWE NAMEPLATE

3—type 284 knobs
1—chassis (See Fig. 8)

ELECTRAD (or YAXLEY equivalents)

1—type 573 12,000-ohm cathode pot. (R23)
1—type 234W 5,000-ohm pot. (R26)
1—type 205 .5 meg. audio pot. (R18)

MEISSNER

2—type 7416 band exp. i.f. transformers (T6, T7)
1—type 6139 diode i.f. transformer (T8)
2—type 6839 single tuned i.f. transformers (T9, T10)

NATIONAL UNION

1—6K7
1—6L7
2—6H6
1—6B8
1—6J7
1—6C5—(Refer to Fig. 5 for BFO parts data.)

A.F. Power Assembly Parts

AEROVOX

5—type 484 .05 mfd. (C21, C21A, C37, C37A, C53)
1—type 684 .05 mfd. (C62)
4—type 284 .5 mfd. (C40, C50, C52, C54)
1—type 484 .25 mfd. (C39)
1—type 284 .25 mfd. (C55)
1—684 .002 mfd. (C47)
2—type 684 .006 mfd. (C43, C44)
2—type 1468 .00025 mfd. mica (C41, C42)
2—type FBS5 8-8 mfd. (sections paralleled for 16 mfd. total capacity and the two units connected in series) (C56, C57)
5—type PB5 8 mfd. (C48, C58, C59, C60, C61)
1—type PB5 4 mfd. (C45)
4—type PR50 (C36, C38, C46, C51)
1—type PBS2 16 mfd. (C49)

AMPHENOL

2—PPH plug handles
2—PC1M receptacles (J1, J2)
2—matching PC1F plugs
1—MEA6 magic eye assembly (optional for expansion indication.)
9—S-8 octal molded sockets, with retainer rings
5—S-4 sockets, 4 prong, with rings (for two 83s, 5Z4, P1, and F positioning).
1—PF-4 female plug (P2)
1—PM4 male plug (for speaker cable)

CONTINENTAL

1—.1 meg, 1 watt (R42)
2—.05 meg. 1 watt (R32, R35A)
3—.03 meg. 1 watt (R34, R35, R36)
1—5000 ohm, 1 watt (R41)
1—3000 ohm, 1 watt (R29)
1—2000 ohm, 1 watt (R31)
1—300 ohm, 1 watt (R38)
1—5 megs., ½ watt (R28)
2—.5 meg., ½ watt (R37, R44)
2—.1 meg., ½ watt (R43, R46)

CROWE NAMEPLATE

1—543A or 575 dial plate for R30 (or plate with zero-center scale and increase both left and right.)
1—type 286 pointer knob for R30
2—type 284 pointer knobs

ELECTRAD (or YAXLEY equivalents)

1—type 999 2-meg. expander input pot. (R40)
1—type 892 .5-0-.5 meg. fader (R30)
1—type 208 .25 meg. tone control (R33)
1—type A-20 2000 ohm Truvolt with slider (R39)
1—10,000 ohm, 10 watt vitreous enameled (R47)
1—250 ohm, 10 watt, vitreous enameled (R48)

JEFFERSON ELECTRIC

1—type 467-525 output trans. (T13)
1—type 467-454 input trans. (T11)
1—type 467-528 driver trans. (T12)
1—type 463-541 250 ma. power trans., 2 h.v. windings (T14)
1—type 463-351 85 ma. power trans. (T15)
2—type 466-300 chokes (CH3, CH4)
1—type 466-430 choke (CH5)

NATIONAL UNION

2—83
1—5Z4
2—6F6
2—6L6
1—6N7
1—6C5
1—6J7
1—6H6
1—6L7

OXFORD-TARTAK

1—12DS speaker with 2500-ohm field (CH6) and 12-watt input

YAXLEY

1—type 10 jack switch (SW5)
1—type 760 d.p.d.t. jack switch (SW3)
1—type 680 pin plate (P4)
1—type 660 plug, with cable (P3)

MISCELLANEOUS

2—fuse blocks
1—fuse, 3 amps.
1—fuse, 2 amps.

Globe Girdling

By J. B. L. HINDS

IMPROVED STATION LIST . . . NEW RADIOPHONES . . . CHINESE CHOP SUEY . . . NEW JAPS . . . STATION FOR IRELAND . . . HARMONICAS . . . HCJB-1 OPENS UP . . .

THERE appears in this issue the short-wave station list which embodies the data referred to in our October comment, on page 522. You will observe that this is a combined list, similar to the old listing including broadcast, radiophone and experimental stations, but arranged and set up in the same style as the Short-Wave Broadcast Station List which appeared for the first time in the September issue.

The frequencies, calls, locations, etc., of the radiophone and experimental stations which have been included, are as accurate as we have been able to make them, as this data is checked back periodically against information obtained from station or government authorities. No alterations are made unless we are able to substantiate their authenticity.

The matter of frequencies and schedules as they concern radiophone and experimental stations is highly complex. It is our usual practice to compile such information from the lists prepared by the Bureau of the International Telegraph Union, at Berne, Switzerland, or from other reliable sources. Each country which is a member of the Berne Union provides lists of all its frequencies, and indicates the service to which each frequency is to be applied.

The difficulty is that listed frequencies applied to radiophone and experimental services are not necessarily put to use even though they have been assigned, and if they are put to use, there is no guarantee that they will be employed in regular service.

NEW STATIONS

KC.	Meters	Call	Location
15300	19.61	YDB	Soerabaja, Java
11710	25.62	XEWB	Guadalajara, Mexico
9685	30.98	"Radio Martinique"	Fort de France, Martinique
9520	31.51	OZF	Copenhagen, Den.
9520	31.51	YSH	San Salvador, El Salvador
9200	32.61	COBX	Havana, Cuba
7894	38.00	YSD	San Salvador, El Salvador
7520	39.89	RKI	Moscow, U.S.S.R.
6090	49.26	XEBF	Jalapa, Mexico
6080	49.34	XEWW	Mexico City, Mex.
5813	51.61	TI2H	San Jose, Costa Rica

STATION CHANGES

New Frequency	New Call	Old Call	Old Frequency
14800	WQV	WOV	14800
12840	WOO	WQO	12840
9501		PRF5	9500
9350	COBC	CO9BC	9400
8831	HCJB-1	HCJB	8948
6430		HIIS	6420
6315		HIZ	6316
6110	XEGW	XEPW	6110
6082		OAX4Z	6092
6070		VP3MR	6010
6040.5		HJ1ABG	6043
4841		HJ3ABD	6050
4790		HJ2ABC	9575
4780		HJ1ABB	9560
4780		HJ1ABB	6128
4107	HCJB-2	HCJB	4107

STATIONS DELETED

KC.	Meters	Call	Reason
15670	19.15	WAE	Telegraph station
15300	19.61	CP7	Not in service
9120	32.39	CP6	Not in service
8950	33.52	W2XBJ	Not in service
6080	49.34	CP5	Not in service

NON-AUTHENTICATED STATIONS

Frequency	Call	Location
15650	JFZ	Japan (Oct.)
14010	VK5DI	Australia (Oct.)
12007	CB1199	Chile (Sept.)
11760	CB1176	Chile (Nov.)
10373	——	Spain (Nov.)
9630	HJ7ABD	Colombia (Nov.)
9565	HP5S	Panama (May)
7600	HC1RJ	Ecuador (May)
7200	HC1AJ	Ecuador (May)
7100	——	Mexico (Nov.)
6600	HI6H	Dom. Rep. (May)
6485	HI1L	Dom. Rep. (Nov.)
6325	YNRG	Nicaragua (Nov.)
6128	OAX7A	Peru (May)
6122	OAX4P	Peru (May)
6122	OAX6A	Peru (May)
6120	HP5Z	Panama (June)
6050	XEKM	Mexico (Nov.)
6000	OAX5A	Peru (May)
5835	YV5RR	Venezuela (Nov.)

Long and short veri from "El Progreso Cubano" in blue and red.

There is an actual disadvantage, therefore, in including in our own list such radiophone and experimental stations that are not fairly active, for the listener may assume that all stations listed are "on the air" and thereby waste good time attempting to hunt down a non-existent signal.

It is preferable, we believe, to list only those stations that we know to be reasonably active. Even then, it is difficult to provide definite time schedules since the frequencies are used only when, as and if there is traffic to be handled. Moreover, there is no telling what frequency a radiophone station will use at a given time, as this is dependent, first, on prevailing weather conditions and, second, on the distance between the stations, which changes continually in ship-to-shore work.

The best that can be said is that radiophone and experimental stations are "catch as catch can" propositions, and no amount of research we may do in determining frequencies and schedules is going

to improve matters a great deal. The best we can do, we believe, is to list all the frequencies used by a given station known to be active, and generalize on time schedules.

However, it may be, with these facts before you, and with your knowledge of the conditions involved, that suggestions may be offered which will result in a satisfactory plan whereby the present list may be greatly improved. Any suggestions you may have will be greatly appreciated.

Radiophone and Experimental Stations

WQW, 10640 kc., Rocky Point, New York, reported as a new RCA radiophone station in this block in October is a radiotelegraph station.

WAE, 15670 kc., Brentwood, New York, has been removed from list as it has been learned that all the Mackay Radio transmitters located at that point are in radiotelegraph service.

KKQ, 11950 k.c., Bolinas, California. heard testing with Hawaii between 9:35 and 9:47 p.m.

TYA2, 9037 kc., Paris, France, heard at 2 a.m. broadcasting a special program to the French Colonies.

WQV, 14800 kc., and WCG, 10380 kc., Rocky Point, New York, heard relaying President Roosevelt's recent speech on the Constitution.

PLV, 9415 kc., and PLE, 18825 kc., heard testing recently at 9:55 a.m.

IQA, 14730 kc., Rome, Italy, has been heard of late relaying several Rome programs to America through Rocky Point, New York. Requested reception reports.

JVO, 10375 kc., Nazaki, heard on the West Coast talking with JDY, 9925 kc., Darien, at 7 a.m.

JZJ, 11800 kc., and JZK, 15160 kc.. continue to broadcast the set programs of Japan as heretofore but under the existing conditions it is a difficult task to identify all the frequencies being used and reported. The station on or near 9630 kc., mentioned in "Last Minute Flashes" in October, is apparently Japanese, although its call has not been determined. Some say it broadcasts simultaneously with JDY, 9925 kc., Darien, while others say with JIB, 10530 kc., Taihoku, Tawain, or JVN, 10660 kc., Nazaki.

The Chinese situation is also a complicated one and to report the stations heard which are not listed would serve no real purpose. This department has not been able to secure a complete list of radiophone and experimental stations operating in China, and consequently is not able to verify the information furnished.

ZBW3, 9525 kc., Hong Kong, is still carrying the programs from China. Only one of the assigned frequencies can be used at a time, with the others available when conditions and circumstances so demand. ZBW3 has been in operation over a considerable period and should a change to one of the other three frequencies be contemplated, listeners will be advised by announcement.

VPD2, 9540 kc., Suva, Fiji Islands, carries all programs. Station advises tests were made on 8720 kc., but this frequency has been discontinued.

The frequency 13075 kc., formerly used in broadcast service, is now employed by the new commercial radio telegraph station, VPD.

Veri attractive card from Tenerife with band in canary yellow and red.

LAST-MINUTE FLASHES

OLR4A 11840 kc., will carry programs daily, 2 to 2:15 p.m. and Mondays and Thursdays, 7 to 9:10 p.m.; OLR3A, 9550 kc., 2:30 to 4:30 p.m. daily, during November.

TI2H, 5813 kc., San Jose, Costa Rica, has changed call to TIGPH-2.

GSC, 9580 kc., Daventry, England, will be found on 9 to 11 p.m. transmission instead of GSI, 15260 kc. Other minor changes in frequencies.

HH3NW, 6325 kc., Port au-Prince, Haiti, is not in service.

SPW, 13635 kc., Warsaw, Poland, is now on daily, 6-7 p.m.; also with call SPB on 26-meter band with 2-kw. transmitter, instead of listed schedule.

HS8PJ, 9350 kc., Bangkok. Siam, also being heard on 9510 kc. Thursday and Saturdays, 8 to 10 a.m. Schedule on 9350 kc. appears irregular.

YNLG, 8505 kc., Managua. Nicaragua, reported moved to 6325 kc. but heard also on 6345 and 6650 kc.

YAK, Afghanistan, reported heard in Australia on 9640 kc. between 6 and 8 a.m., E.S.T.

COCX, Havana, states they are transmitting on 11435 kc. instead of 11500 kc. as listed.

"Radio Nacionales" is call of station on 10370 kc. heard between 8 and 9 p.m. with English program. Station located at Salamanca, Spain.

HP5J, 9590 kc., Panama City, with 3-kw., opened as a radio theater. HP5A is still using 500 watts, which would indicate that the report HP5A would open with 3 kw. was mixed.

Down East

YDB, 15300 kc., Soerabaja, Java, is the latest station in the Java chain. The latest booklet from The Netherlands Indies Broadcasting Company, Ltd., gives the following information with many interesting facts about the N.I.R.O.M.

YDB, 9550 kc., is listed but no mention is made of 9610 kc. The long-distance stations are YDA, 3040 and 6040 kc.; YDB, 9550 and 15300 kc.; YDC, 15150 kc.; PLP, 11000 kc.; PMN, 10260 kc.; and PMH, 6720 kc. It is noted that PLP broadcasts oriental music daily between 4:30 and 5:30 a.m. which explains the fact that this station was being heard before the time formerly listed. PMH also broadcasts oriental music daily, except Saturday, between 10 and 11 a.m.

ZHJ, 6080 kc., Penang, S.S., advise they are on the air each weekday from 6:40 to 8:40 a.m. The call, "ZHJ, 'J' for Jubilee, the broadcasting station of the Penang Wireless Society," is given at opening and closing and frequently during the transmission.

Broadcast is opened with clock chimes followed by vocal song, "Land of Hope and Glory," and closed with the National Anthem. The Penang Wireless Society is an amateur organization. While a few reports have been received of this station having been heard in Western United States none have been received by the writer indicating that this 49-watt station has been heard in Eastern United States.

VPB, Colombo, Ceylon, mentioned in this section in September, as being heard on 6125 kc., is still transmitting on 6160 kc. as listed, according to advice received direct from the Radio Club of Ceylon and South India. The power of the

New veri from RAN. The men are Papanin, Krenkel, Fedorov and Shirshov, the Soviet scientists wintering on a drifting ice floe in the Arctic.

short-wave transmitter, VPB, is still 300 watts. A new 5-kw. medium-wave transmitter was brought into use on June 6th last, although it is not yet working at its full power. The report that a new 5-kw. transmitter had been installed was apparently incorrect.

VPB is on the air daily from 6:30 to 11:30 a.m., except Saturday when it closes at 12:30 p.m.

Europeans

OZF, 9520 kc., is the call and frequency of the new Denmark station on the 31-meter band. They are transmitting daily, according to advice from the station, from 2 to 6:45 p.m., the broadcast for the first half being directed to South America and East Asia and from 4:15 p.m. to close of program to North America and Greenland. The assignment of OZF to this frequency would indicate that calls on other frequencies were similar ones. No mention has been made as to calls on other frequencies. The signal on 9520 kc. is not getting out so well, especially after 6 p.m. when OZF encounters interference from other stations assigned to the same frequency.

On account of the frequent shifting of stations, the fast-growing number of stations on the air, and the continual new assignments to frequencies now in use, it would seem that difficulties would be experienced in the broadcast of programs, unless some pre-arranged plan for the allotment of time on such frequencies has been made and will be carried out.

The station mentioned in this section in October near 12,560 kc. which plays badly worn recordings of "Ramona" and "Hallelujah," is probably station RNE, Moscow, U.S.S.R.

RKI, Moscow, is now on 7520 kc. The former frequency—15050 kc., has been dropped, and 7520 kc. is now being used simultaneously with RAN on 9600 kc. They announce RKI, 39.89 meters, which should make it 7520 kc., where it is shown in the station list. We have been showing for some time radiophone RKI, 7518 kc. or 39.90 meters, which will be retained until all facts are known.

OLR4A, 11840 kc., and OLR5A, 15230 kc., are still transmitting the Czechoslovakia programs as scheduled. Radio Praha advises that besides the regular experimental transmissions mentioned in their printed programs, they are now conducting test transmissions on OLR3A, 9550 kc., such tests being made after the termination of their evening programs and sometimes in the morning. All assigned frequencies of Czechoslovakia are shown in the station lists.

The Irish Free State has decided to build a short-wave radio station for its broadcasting service. The location of the new station has not as yet been determined.

A Spanish Insurgent station is being heard on announced frequency of 10373 kc. No call heard as yet, but location is given as Salamanca. EAJ43 on 10370 kc. is still broadcasting nightly. A reply to reception report for EHZ listed on 10370 brings reply, "Our call letters are only EAJ43." Possibly a little detective work is necessary!

PI1J, 7080 kc., Dordrecht, Holland, was removed from station list in October, but since then a card has been received from Dr. M. Hellingman, which shows station as amateur phone on 7088 kc. each Saturday from 11:10 to 11:50 a.m. and on 14164 kc. from 12 noon to 12:30 p.m.; during the summer one hour earlier.

QRA on card is Technical College, Dordrecht, Netherlands. Power, 50 watts. No mention is made of musical broadcasts and it is assumed it is straight phone.

LKJ1, 9530 kc., Oslo, Norway, is reported as heard on Sunday and Wednesday from 4 to 8 a.m.

South America

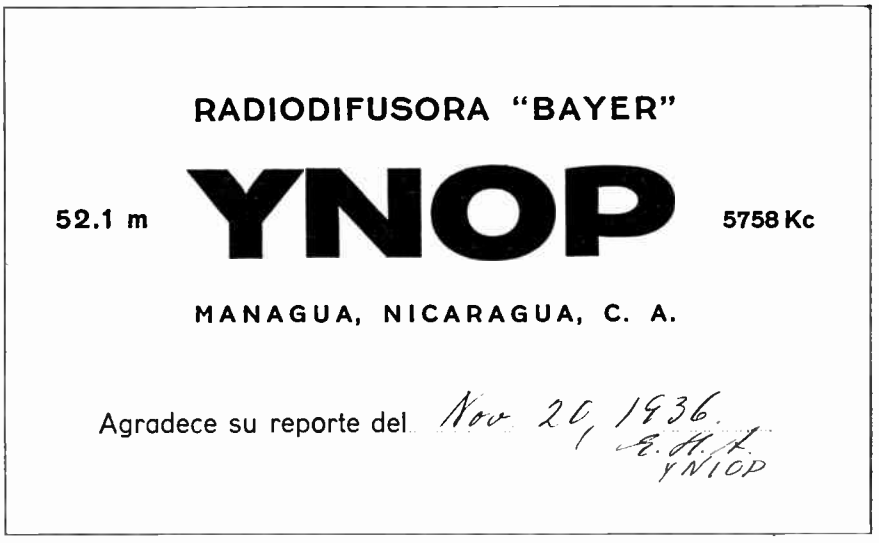
Report seems to be general through many printed sources, that the Argentine Government has granted increased power to two ace short-wave stations which were opened last summer under calls CXA8 and CXA14. While the writer has not heard either of the stations mentioned, it is not clear how stations with calls stated would be opened in Argentina, it being assumed that the prefixed letters "CX" are assigned to Uruguay.

It is possible that two short-wave stations in Argentina are or will relay programs from Uruguay, but it would seem over their own assigned calls.

And in this connection, the station being heard evenings of late on 9640 kc. is said to be CXA8 but from reports it appears that the transmission originates at Montevideo, Uruguay, and is being relayed by LR3 in Buenos Aires, and according to announcements, on 9640 kc., station on this frequency is also announced as "Radio Belgrano," Buenos Aires, which is understood to be long-wave station LR3. From all this it would appear that LR3 must have a short-wave outlet. We will show in non-authenticated block and await further developments.

YV5RC, 5800 kc., is said to be throwing a harmonic on 11600 kc. and YV1RB, 5850, likewise on 11700 kc. Harmonics seem to be getting popular, which is a sad trend.

YV5RR, 5835 kc., is the call of new short-wave station to be located at Caracas, Venezuela, and to be called "Nueva Caracas." It will rebroadcast the programs of long-wave station YV5RS.



Veri from Managua, Nicaragua, in plain black and white.

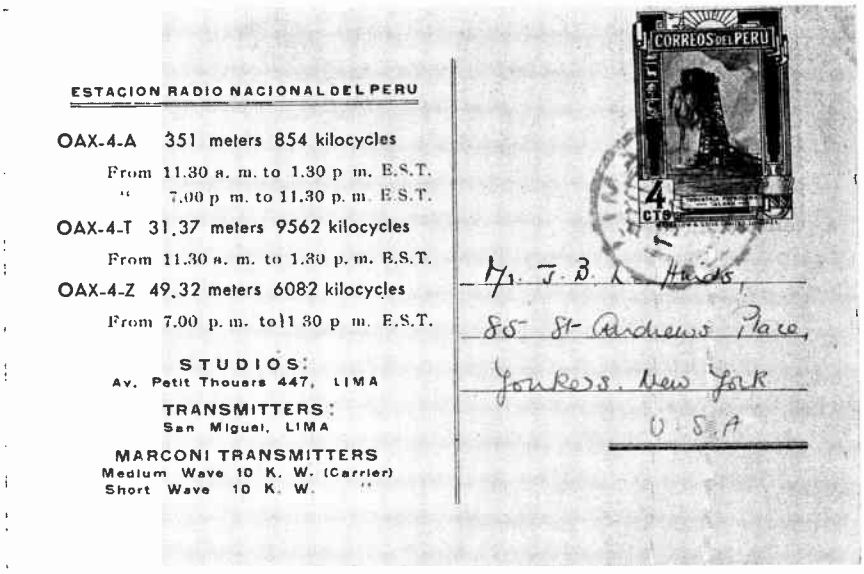
1300 kc. The owner of the station is Sr. Mario Garcia Arocha, who has been granted permission to install the transmitter by the Venezuelan Ministry of Labor and Communications.

VP3MR, 6010 kc., Georgetown, British Guiana, has changed frequency to 6070 kc.

HCJB, Quito, Ecuador, is now on the air with its new 1-kw. transmitter and getting out with a very consistent signal, although meeting with some interference, but overriding it fairly well. Mr. Clarence W. Jones, Director, advises they are now on 8831 kc. (call HCJB-1) instead of 8948 kc., daily except Mondays. HCJB-2 is on 4107 kc., 200 watts power, and HCJB-3, is on 974 kc., with low power, for local reception.

HJ7ABD, 9630 kc., is the latest addition to the Colombia stations and is located at Bucaramanga. It is understood to be another frequency of HJ2ABD (5980 kc.) and apparently working simultaneously with the latter.

It has a much better signal than HJ2ABD when last heard, which would indicate that improvements have been made.



Veri from Peru, covering stations OAX4A, OAX4T and OAX4Z. Card black and white.

New Chilean

A new station in Chile, on 11760 kc., is broadcasting from 6 to 11 p.m. It is announced as "Broadcasting Populares." The location is Santiago. Some say the call is CB1176 and that it relays the programs of CB89. It is located between GSD and DJD and is getting out with fairly good signal. This station also will be placed in the non-authenticated block for the present.

CB960, 9600 kc., Santiago, Chile, advises their power is still 500 watts, and they appreciate they are not getting out very well. Power will be increased in October to 1.5 kw. The organ selection at close each night is "Some Where a Voice is Calling," by Jesse Crawford.

Peruvian

OAX4Z, 6082 kc., and OAZ4T, 9562 kc., Lima, Peru, are the calls and frequencies as shown on veri card covering report to OAX4Z. Both short-wave stations are shown on the address side, with verification on the reverse side, but no mention as to which station covered. It is noted that OAX4Z transmits from 7 to 11:30 p.m. and OAX4T only from 11:30 a.m. to 1:30 p.m.

Numerous comments have been made regarding the station near 12000 kc. Several calls have been advanced and many say its location is Santiago, Chile. The writer has a tip that instead of being "Radio Vitalacio," it may be the call is some other and its location Valdivia, Chile.

PRF5, 9501 kc., Rio de Janerio, Brazil, still broadcasts daily except Sundays from 4:45 to 5:45 p.m. as follows: Mondays, 4:45 to 5:30 p.m. with Portuguese program, and from 5:30 to 5:45 p.m. with English program. Tuesdays, Esperanto, 4:45 to 5:45 p.m. Wednesdays, German and Brazilian. Thursdays, Italian. Fridays, Spanish. Saturdays, French. The program is German on Wednesday is broadcast from 4 to 4:10 p.m. over station PSE, 14935 kc.

CP5, 6080 kc.; CP6, 9120 kc.; and CP7, 15300 kc., La Paz, Bolivia, are not broadcasting and have been removed from station lists. "Radio Illimani" has been transferred to the Government and broadcasts are only being made on long waves.

HJ1ABG, Barranquilla, Colombia, is now on 6040.5 kc., although veri cards still show 6042.5 kc. During the programs very little English is used. One stroke on gong with chimes following at each ¼ hour. Station advises that the signals heard of moving trains, bugle calls and baby crying are used in connection with advertising announcements and not at any set times.

HJ4ABP, 6030 kc., Medellin, Colombia, is now known as "Emisora Claridad."

HJ3ABD, 6050 kc., Bogota, Colombia, now advises that their exact frequency is 4841, kc. or 61.97 meters, and change has therefore been made in station list.

West Indies

COCM, Havana, Cuba, remains in list at 9840 kc. as no authoritative advice has been received as to its assigned or exact frequency. Some listeners say they announce 9775 kc. Station is called "Transradio Colombia" and relays the program of CMCM, Havana.

COBC, 9350 kc., Havana, Cuba, is now shown in list in accordance with veri card received. Station relays programs of long-wave station CMBC on 630 kc. and is known as "El Progreso Cubano."

COBX, 9200 kc., Havana, Cuba, has been added to lists. This is the station mentioned in October as CODX.

By a resolution dated July 16, 1937, Sr. Alberto Alvarez, Director Tecnico, San Mignel No. 194, Havana, Cuba, has been authorized to install transmitting equipment with power of 200 watts, the call to be CMBX. There is also authorized at station CMGH, located at Alvarez E. Blanchet No. 25, Matanzas, Cuba, equipment of 200 watts power to re-broadcast programs originating in station CMBX, Havana.

The re-broadcast station, according to information received from the Department of Commerce, to which call letters CO9BX were assigned (now COBX) will operate on the following frequencies: 6220 kc. (48.23 meters); 9200 kc. (32.61 meters); and 11620 kc. (25.82 meters).

HI1S, Santiago de los Caballeros, Dominican Republic, has changed frequency from 6420 to 6430 kc.

HI1L, 6485 kc., located at Santiago de los Caballeros, Dominican Republic, is thought to be a new station on week nights and usually signing off at 7:30 p.m., but occasionally coming back again between 8 and 9 p.m. Station will be shown in the non-authenticated block until it is determined if this is a new station or an old station with a new call.

Radio Martinique

"Radio Martinique," Fort de France, Martinique, is the name of the station being heard at about 9685 kc., from about 6:30 to 7:50 p.m. The address is P.O. Box 136. It is understood to have no connection with Radio Fort de France on 9450 kc. "Radio Martinique" is being listed tentatively in station list at 9685 kc.

Mexican Stations

XEKM, 6050 kc., is the latest short-wave station in Mexico. It is said to be testing on the above frequency, and reports of reception would be appreciated. Station is operated by Hemmer and Romero, Leon, Guanajuato, Mexico, and will relay the programs of long-wave station XEKL on 1240 kc. Address is apartado 181, Leon.

XEWB, 11710 kc., Guadalajara, Jalisco; and XEBF, 6090 kc., Jalapa, Mexico, have been transferred from the non-authenticated block to station lists in this issue.

XEWW:—6080 kc., is the third frequency assigned to this station. It is now listed on 6080, 9500 and 15160 kc.

XETA, 11760 kc., Monterrey, Mexico, mentioned in this section in August, and shown in station list, advises the writer that they have not as yet been broadcasting on short waves, but before this issue reaches you it will doubtless have been heard, as tests were about to be made. XETA will relay the programs of long-wave station XET.

XEXA, 6133 kc., Mexico, D. F., has revised its time schedule. This station devotes a half hour daily from 11 to 11:30 p.m. to tourist business, which broadcasts are announced and conducted in English and Spanish.

Between 11 p.m. and 12 a.m. each Sunday they broadcast "The National Hour" in English, and subjects of general interest are discussed.

XEXA also transmits on 11880 kc. irregularly.

XECR, 7380 kc., Mexico, D. F., has been turned over to the Departmento Autonomo de Publicidad and is broadcasting each Sunday evening from 7 to 8 p.m. The hour's program consists of numbers by local talent in both English and Spanish. Station employs no signals or identification except numerous English and Spanish announcements. Power is 20 kw.

XEGW, 6110 kc., Mexico, D. F., is the new call of former station XEPW on same frequency. They now have a new plant and studios and still relay the programs of XEJW on 870 kc.

The station transmitting on 7100 or 7110 kc. is located at Guadalajara, Jalisco, Mexico, and operated by the National Revolutionary Party of Mexico. It is said the station slogan is "Radiodefusora del Pueblo." The assigned frequency is 7080 kc. No call letters have yet been assigned. The reported address is 210 Madero St., Guadalajara.

NOVEMBER ACE REPORTERS

Mrs. F. W. Alfred, VE8G3, London, Ont., Canada
Kenneth Axelson, W11H18, Chicago, Illinois
David E. Brown, W4H113, Queens Village, New York
W. E. Blanchard, W3E1, Bangor, Me.
Alden Fowler, Greensburg, Ind.
John D. Gallivan, K5Z1, Balboa, Canal Zone
Edwin Granger, W5F2, Syracuse, New York
R. R. Gross, W7J10, McKeesport, Pa.
Chris. D. Jaffe, Norfolk, Va.
Robert Jones, W8J1, Coshocton, Ohio
Norman F. Kriebel, Ambler, Pa.
M. E. Leshner, W3F32, Lawrence, Mass.
John McLaughlin, Providence, R. I.
Manno Nelson, Niles, Michigan
R. B. Oxrieder, W6H5, State College, Pa.
John Ottman, Greenwich, Conn.
F. M. Pow, VE24A1, South Edmonton, Alberta, Canada
Clive Peterson, Philipsburg, St. Martin, N. W. I.
J. V. Saxton, W8H48, Bronx, New York City, N. Y.
J. Parker Shipley, Jr., Omaha, Neb.
N. B. Sanders, Cincinnati, Ohio
Harvey E. Sells, Atlanta, Ga.
Walter Schwab, New York City, N. Y.
John Unkefer, W8H14, Minerva, Ohio
Alfonso Velasco, Mexico City, Mexico
Roy Waite, W4F11, Ballston Spa, N. Y.
Kendall Walker, W30D1, Yamhill, Oregon.

Central America

TIRCC, 6550 kc., San Jose, Costa Rica, has new schedule. Four notes of gong are used as signals and their programs are opened and closed with organ selection, "The Lost Chord."

From TIRCC veri card it is noted that Amanda Cespedes Marin, operator and owner of TI4NRH, shown in list at 9670 kc., is again the Chief Engineer of TIRCC. This would indicate that TI4NRH is not broadcasting.

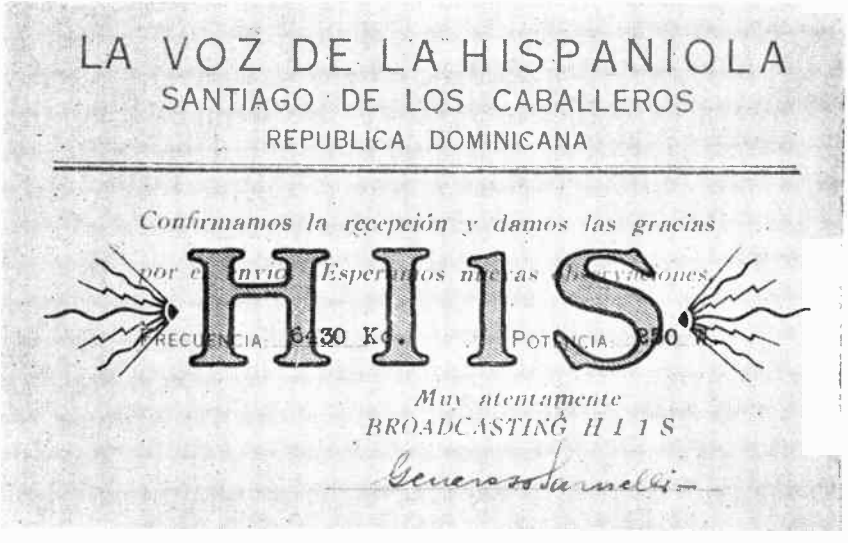
A station by the call of YNRG is reported heard at about 6355 kc. but announcing as transmitting on 6325 kc. The location given is Managua, Nicaragua, C. A.

TG2, 6310 kc., Guatemala City, Guatemala, has changed frequency, it is understood, although the new frequency is not known. Reports have been received of a Guatemalan station being heard near 6180 kc., but call not given. It is possible that this is TG2.

TI2H, 5813 kc., San Jose, Costa Rica, is shown in station list. Station slogan is "Alma Tica." Signs off with Ted Lewis' "Good-Night Melody." TI2H is owned and operated by Senor Gonzalo Pinto H, owner of TIGPH.

YSD, 7894 kc.; YSH, 9520, and YSM, 11710 kc., are the frequencies of the new El Salvador stations located at San Salvador as reported and heard. A letter verification for YSM has been received by the writer, but no mention was made of other frequencies, or details of the operation. All three frequencies have been listed, but it is not known if all will be maintained. They are operated by the Government of El Salvador, Senor Victor M. Escobar, Director General, being in charge, and relaying the programs of station ZSS, Radio Nacionales.

W1XAL, Boston, has applied to the Federal Communications Commission for permission to erect a new 10-kw. transmitter, which will be used in addition to the 20-kw. transmitter now in service. It is understood that the new transmitter will be used for the broadcasting of programs to South and Central America and the West Indies. The frequency to be used is not known.



From Dominica. HIIS in red, remainder in blue.

Amateur Phones

The following is a list of 20-meter amateur phone stations not previously reported or listed:

Country	*Frequency*	*Calls*	*Time Heard*
Australia	HF	VK2TI—2HZ	6:22-7:50 a.m.
Australia	LF	VK2NO—2TC—2VV—2QR	5:39 to 7 a.m.
Australia	LF	VK3PE—3ZB—3TL	6:15 to 7:31 a.m.
Australia	LF	VK3TD—3HC—3HG	6:30 to 6:45 a.m.
Australia	LF	VK4VD—5KG—5GM	5:43 to 7 a.m.
Australia	HF	VK4NY—4TY	5:39-6:20 a.m.
Australia	LF	VK5JN—5TI—6FO—7AB	5:10 to 6:42 a.m.

(*Continued on page 599*)

Channel Echoes

By ZEH BOUCK

IN OLD MADRID . . . ECHOES . . . PEPSODENTAL . . . DEAD PERIODS

IN the lingo of Clem McCarthy, Europe and Asia today are suffering from a series of leftists and rightists to the jaw—not to mention a few of them below the belt. In the end, mightist will be on the side of the rightist, and the leftists will take the leftist-overs. It all sounds somewhat confused—but no more so than the various designations of the different factions as broadcast by partisan interests. For the benefit of those who may listen to the news bulletins on the Spanish situation from the short-wave outlets of several countries, we have compiled the following table on nomenclature—giving the country from which the broadcast emanates and the designations as employed by that country.

COUNTRY	DESTINATION	
	Rebel	*Loyalists*
England	Insurgents	Loyalists
Moscow	Rebels	The Spanish Government
Germany	Nationalists	Reds—Communists
Italy	Facists and Facist Spain	Reds—Communists—Anarchists
Rightists	Leftists	Rightists
Leftists	Rightists	Leftists
General Franco	The Spanish Government	Rebels

Fig. 1. No free sub for this—but pick the guy who never sang "Sweet Adeline."

CHANNEL ECHOES . . . the mike in the accompanying photo dates the picture back a decade or more—probably more. The event was of considerable moment at the time. It seems that in those days there was a law called "prohibition" that worked out something like "non-intervention" in Spain. There were two habits in those days—one drinking Old Fashioneds at seventy-five cents a throw, and the other demonstrating in front of a microfone that prohibition was a success and that the drink evil had been banished forever. In Fig. 1, we have a wet prepared to debate it out with a dry. Just who the gentlemen were, we're not quite certain. One of them was pretty high up in the Anti-Saloon League and claimed he had never taken a drink in his life. We'll leave it to you to pick out the dry. (No free subscription this month.)

◆

CHANNEL ECHOES . . . in writing up the Earhart-Noonan mystery a month or so back, we were curious enough to look through our files of old aircraft radio photos—and we ran across the rather primitive looking rig shown in Fig. 2—an early installation made by the writer. The transmitter is on top—and the receiver below. The box at the bottom was a combination A and B battery box and cellarette.

A bit of radio history was made in that plane. The first aerial description of air races was broadcast at Cleveland back in 1928—as well as several other firsts among the airplane programs picked up on the ground and rebroadcast by regular stations. Blanche Anthony sang five thousand feet over New York City—and we met the Los Angeles far out to sea when she was delivered to the U. S. A. by Germany, the last named program being carried over WOR with Louis A. Witten announcing.

◆

THE FREE SUB for the radiodor of the month goes to Nelson Bucher, of Narberth, Pa., who nominates Amos and Andy and comments—"We might be inclined to wonder how the original Pepsodent toothpaste made our teeth so bright

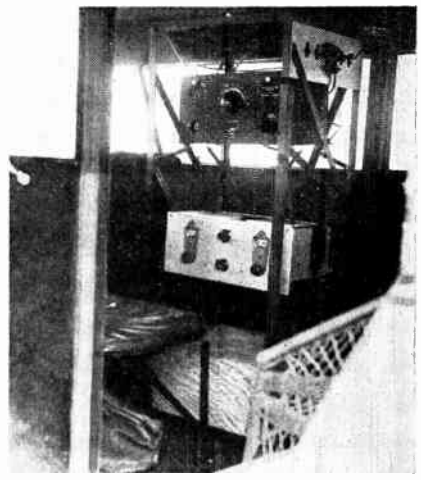


Fig. 2. An old airplane installation that made a few records in its day.

so shiny and so safely ere it had been improved several times and before that marvelous new ingredient Irium (I guess that's how it is spelled) was added." (Don't let that worry you. Ever since 1923 the manufacturers of each year's radio sets have announced that at last perfect tone quality had been achieved. And they're still improving upon the perfect.—Z. B.) "Come to think of it, just what is this marvelous Irium? Is it perhaps some new element—number 94 or 95? Or is it merely calcium carbonate precipitated in a new way? If this general bad advertising were not enough, we could add Pepsodent's crowning error, their *self-condemning* advertising of Pepsodent tooth-powder, concerning which we are told that 15,000,000 cans have been sold. Then we are asked 'Can 15,000,000 families be wrong?' I answer emphatically NO! If fifteen million cans have been sold to fifteen million families, that means that no family ever went back for a second can, which must mean that the powder is punk. Why should I contradict their judgment and buy a can of the stuff?"

◆

WE ARE SERIOUSLY considering the promotion of a campaign for dirty stories on the air. We don't mean the worst of the traveling salesman and the

(Continued on page 614)

Night-Owl Hoots

By RAY LA ROCQUE

AWR CONTEST STARTS . . . DOPE ON CMBZ . . . FCC QRM RULING . . . LRZ TO 125 KILOWATTS . . . GREEKS HAVE A STONE FOR IT . . . WFLA-WSUN BREAK SIAMESE TIE

ON your mark, get set—and on the 7th of this month—GO! A quick start in the 1937-38 AWR Championship DX Contest will help greatly toward building a substantial lead that will endure through many snags that might be met later in the contest. Though the time for enrollment in team competition has expired, there is still much time for enrollment as an individual contestant—with possibilities of being appointed to a team later if someone should be dropped from a team during the contest.

For the benefit of those who did not see last month's AWR we are reprinting elsewhere in this department the complete rules of the contest. Before competition gets under way we say that each team member must be expected to cooperate fully with other members of his team. Inactivity on the part of a member, even for a short period of time, may cause his team severe losses. Therefore the following additional ruling is made necessary: A team member failing to submit any reports during a week of competition will be notified that if the same inactivity is repeated, his name will be dropped into the individual competition and he shall be replaced by another DXer from the individual list as soon as possible. In the event that a replacement is not immediately available the score of one team member shall be doubled in each competition to allow for the loss of one member.

With the Night Owls

The lines that follow are notes kindly submitted by helpful Night Owls and by the radio stations and are reprinted because of their general interest.

C. J. Cooper, Vancouver, British Columbia: "I would like to inform you that CFCT (1450 kc.) in Victoria, B. C., will increase its power from 50 to 500 watts shortly."

Herman H. Hohenstein, Director, KFUO, St. Louis, Mo.: "In observance of National Lutheran Radio Week, Rev. G. Christian Barth, Cincinnati, Ohio, member of the Board of Directors of the Lutheran Church will sponsor a globe-encircling sacred Lutheran DX program over WLW during the morning of November 5, 2:00-2:30 a.m. The program will also be relayed by W8XAL on short waves. Tune in, tell others, and write to Pastor Barth, c/o WLW after the program."

Isaac T. Davis, Elkhart, Texas: "Sunday mornings offer the best opportunity for hearing Trans-Pacific stations because of the fact that locals do not begin their broadcasting quite as early on that morning."

STATION CHANGES, U.S.A.

Delete

KYCA	Prescott, Ariz.	1500 kc.	

STATION CHANGES, FOREIGN

New Stations

———	Athens, Greece	601 kc.	15000 w.
———	Bansca Bysterica, Czech. (IDA)	765 kc.	———
———	Dacca, India	1167 kc.	5000 w.
———	Lucknow, India	1022 kc.	5000 w.
———	Trichinopoly, India	758 kc.	5000 w.
JBCK	Seishin, Korea	850 kc.	10500 w.
JOKG	Koufu, Japan (IDA)	800 kc.	500 w.
JOMG	Kiyazuki, Japan (IDA)	600 kc.	500 w.

Power

CKCK		1010 kc.	500	to	1000 w.
CKX		1120 kc.	100	to	1000 w.
JOCK-2	(IDA)	970 kc.	10000	to	50000 w.
JOAK	(IDA)	760 kc.	500	to	1000 w.
MTCY	(IDA)	560 kc.	100000	to	10000 w.
VUL		1086 kc.	100	to	5000 w.

Frequency

VUB	855-1231 kc.
VUC	810-1276 kc.
VUL	1200-1086 kc.
VUM	770-1420 kc.

DELETE

VUG	Calcutta, India	933 kc.

Nifty veri from XEMO, Tijuana, Mexico. Green on cream background.

Anthony C. Tarr, Seattle, Washington: "3AR still on 580 kc., and 2YC on 840 kc. JOHK, JOIK, and possibly others, broadcast news in English from 4:55-5:00 a.m. daily, in parallel with JVN on s.w.—Good material for reports. A Jap is heard on 850 kc. with an R7 signal. Cannot find it listed. Do you know call and location? (New JBCK with 10½ kw. in Seishin, Korea is now operating on 850 kc.—Chief). Also heard new one around 7 a.m. on 540 kc. believed to be a Russian. Any information on this one?"

Manuel A. Salas, Director, CMBZ, Havana, Cuba: "Particulars regarding CMBZ: Slogan, "Radio Salas"; power, 1000 watts; opening and closing theme, popular melodies, nightingales and canaries; interval signal, 4 chimes; schedule, 7:45 a.m. to 12:30 a.m.; postal address, P.O. Box 866."

New FCC Ruling

After a recent conference with the Navy Department regarding the use of 550 kc. by standard broadcast stations, the Federal Communications Commis-

sion adopted the following policy in order that the stations on the aforementioned channel may not create interference to naval communication activities: "No station will be licensed with greater night power than one kilowatt, or day power greater than 5 kilowatts on 550 kc. No application for a new broadcast station or increase in power or time of operation of an existing station will be considered which is located less than 300 miles from the nearest coast of the United States, unless approval of the Navy Department is submitted in writing with the application. No new station or increase in power or time of operation of an existing station will be authorized which is located at a distance of 300 to 500 miles from the nearest coast, unless approved by the Navy Department."

Kilocycling Around

The Havana station, CMCM seems to be definitely on 850 kc. which leads to the conclusion that CMBC will remain on its present frequency and not make any change as announced by the Cuban Radio Bureau a few months ago. . . . The UDXC reports that CMCY has moved to 570 kc. And that other new Cubans have appeared on 990 and 870 kc. . . . The new XERB in Tiajuana, Mexico, will operate on 730 kc.—and XEPN will then undoubtedly move off of 730 onto another Canadian channel. . . . A news items says that the corner stone for the first broadcasting station in Greece has been laid. We hope there are no slip-ups! 601 kc. will be the frequency and 15 kw. the power. . . . "Ike" Davis is "sorta" proud of the fact that JOJG's announcer, Michido Uda, has revealed the fact that Ike was the first DXer to report that station and is still the most distant reporter at this date. Another record held by this Texas Demon of the Dials is his distinction of having been the first listener in the United States to report reception of Australian 2CR.

WFLA-WSUN, which has been one station since its inception, will soon be divided into two separate stations according to a recent grant of the FCC. WFLA will operate from Clearwater on Monday, Wednesday, Friday and part time on Sunday, while WSUN will operate from St. Petersburg on Tuesday, Thursday, Saturday and part time on Sunday. . . . We wonder what happens to these stations that are supposed to come on the air in Portland, Me. WGAN, license for which was granted very long ago, has never made an appearance and will probably be deleted without ever having come on the air. This same situation occurred when about one year ago a construction permit was granted for a WSPG on the very same frequency, only to be deleted without having made the slightest attempt to broadcast. . . . WJBR of Gastonia, N. C., also has been dropped from the active list by the FCC—they never came on the air. The same fate has befallen KYCA of Prescott, Ariz. . . . Examiner Bramhall has recommended that the FCC grant KGO's application for increase to 50,000 watts. KGO, one of NBC's key stations on the west coast is now operating with only 7500 watts! . . . Another station slated to go to 50 kw. soon is WWL in New Orleans whose channel is clear of any U. S. station at night.

ALL-WAVE RADIO'S DX FORECAST FOR NOVEMBER

EASTERN NORTH AMERICA

General Forecast: *The DX season can now be called "in full swing." Europeans should be reaching good quality by the end of the month. Trans-Pacifics should reach their peak during the first two weeks of the month and reliable Latin-American reception is almost certain.*

Forecast

Rennes 1040 kc.	1st-30th, 2-3 a.m. R7. Most consistent European. Sometimes on at 1:45. Should be better at end of month.
F - - -	1st-30th, 2-3 a.m. R4-7. French stations best of Europeans. All come on around 2 a.m. and are good till about 3 a.m. when fading commences. Best bets in order of signal strength follow: Radio Normandie-1113, Paris-695, Marseilles-749, Toulouse-776 and 913, Lille-1213, Poste Parisien-959, Nice-1186, Lyons-648, and Bordeaux-1077.
D - - -	15th-30th, 12-2 a.m. R5. Germans best after locals sign. They fade around 2 a.m. Best bets in order are: Frankfurt-1195, Cologne-658, Leipzig-785, Berlin-841, Munich-740, and Hamburg-900.
I - - -	15th-30th, 1:45-3 a.m. R6. Italians are irregular. On the air a little earlier on Mondays. Identified by interval signal, canaries singing. Best bets in order are: I1BO-1222, I1TO and I1TR (simultaneously) - 1140. I1MI-813, I1RO-713.
- YA	1st-30th, 4-6:30 a.m. R3-4. New Zealanders may come in—especially during first 2 weeks. Best bets in order: 4YA-790, 1YA-650, and 3YA-720.
LR - -	1st-30th, 7-10 p.m. R8. The following Argentines can be heard best at this hour—some of them even later: LR1-1070, LR3-950, LR4-990, LR5-830, LR6-870, LS2-1190, LRA-750.
PRE8 980 kc.	1st-30th, 6-8 p.m. R6. Good reception in localities not too well covered by KDKA.
YV5RA 960 kc.	1st-30th, 7-10 p.m. R6. Best heard early before XEAW signs on.
YV5RQ 882 kc.	1st-30th, 7-12 p.m. R6. A new Venezuelan which was heard occasionally last season. Interference from CMQ and CRCO.
HJ1ABR 1400 kc.	1st-30th, 7 p.m. to 1 a.m. R7. This one can be heard signing off just after the locals have signed—and less frequently coming through the locals. Slogan "Radio Philco" and relays HJ1ABP.
CM - -	1st-30th, sunset till 1 a.m. R6-9. CMQ-880 kc. is by far the best Cuban. Others which should be heard fairly easily when reception is good are: CMX-920, CMBS-770, CMCF-815, CMBY-970, CMCJ-1110, CMCO-1200, CMBC - 630, CMCM - 850, CMCY-570.
XE - -	1st-30th, 12-2 a.m. R4-9. Powerful border stations heard R9 consistently. Other than these the following should be good targets in Mexico: XEP-1160, XEK-990, XEMO-860, XET-690, XEU-1010. Many more may be picked up after midnight.
XEFO	1st-30th, 1-2 a.m. R9. Daily program in English for American listeners.
TGW 1210 kc.	7th, 14th, 21st, 28th, 12-6 a.m. R7. Regular Sun. morning DX program.
TIPG 625 kc.	1st-30th, 7-12 p.m. R5. A good catch. Requires sharp tuning and patience.
HIX 800 kc.	1st-31st, 7-9 p.m. R6. Sometimes breaks through the locals, but is more often heard on DX programs. Watch Time-Table.
WKAQ 1240 kc.	1st-30th, 7-8 p.m. R7. Can be heard just around sunset before locals get too strong.

WESTERN NORTH AMERICA

General Forecast: *TP's are really at their best now and may be heard all over the dial in good localities and with fairly decent equipment. Latin-American reception is also very good in November and the latter part of the month may even bring in a European or two in the not too far west.*

Forecast

Call - - YA	1st-30th, 4-6:30 a.m. R5-8 in following order: 4YA-790 (R7-8), 1YA-650 (R7), 3YA-720 (R6), 2YC-840 (R6), and 2YA-570 (R5-6).
JO - -	1st-30th, 5-7 a.m. JOHK-770 (R6), JOIK-810 (R6), JOBK-1-690 (R5).
Austl.	1st-30th, 5-6:30 a.m. unless otherwise stated. The following R6: 4QN-600, 2CO-670, 2NR-77, 2BL-740, 4QG-800, 3GI-830, 2GZ-990 till 6, 2KY - 1040, 4AK - 1220, 4BH - 1380 (R7), 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 with a good receiver and a good location.
KGU 750 kc.	1st-30th, 3-5 a.m. R6. Other Hawaiians: KHBC-1400, 3-4:30 a.m. R7-8. KGMB-1320, 4-5:30 a.m. R7-8.
Rennes 1040 kc.	15th-30th, 2-3 a.m. R5. One of the two signals from Europe which have succeeded in crossing the Mississippi with any regularity. Heard in midwest and southwest — seldom in northwest.
R.Normandie 1113 kc.	15th-30th, 2-3 a.m. R6. See Rennes.
YV5RC 960 kc.	1st-30th. R6 just before XEAW comes on the air. Heard best in Southwest and Midwest.
LR1 1070 kc.	1st-30th, 2-3 a.m. R8. Heard on occasional tests.
PRE8 980 kc.	1st-30th, 7-9 p.m. R7. Only in Southwest.
TGW 1210 kc.	7th, 14th, 21st, 28th. 12-6 a.m. R8. See East forecast.
WKAQ 1240 kc.	10th only, 2:40-3 a.m. R8-9 (weaker in Northwest).
WNEI. 1290 kc.	13th only, 3:20-3:40 a.m., R8-9 (weaker in Northwest.)

Cheers and Jeers

This month we pause to hand out three cheers to two individual DXers who have helped greatly to make the DX Forecast for western DXers as successful as our eastern forecast. Anthony C. Tarr, the "Ear of the Puget Sound" in Seattle, Wash., has supplied us everything needed in the way of information on conditions in the Northwest. Since hearing from Isaac T. (Ike) Davis, of Elkhart, Texas, we have had all the ditions in the Southwestern section of necessary particulars concerning the con-

ditions in the southwestern section of this country. With both these boys entered in the new AWR contest, Champion Hesterman will have plenty of trouble defending his crown. While speaking of our Saskatoon Night Owl we might echo a few cheers for the improvements he has made in the CJXR during the summer months!

You'll pardon us if we have to "wind up" before casting any jeers this month—but they have to be hurled across the continent to Seattle, Washington's KRSC which has recently joined the ranks of the all nighters. With KRSC on the air 24 hours daily, KIRO broadcasting till 5 a.m., KXA till 6, and KOL till 4, the Northwest is not much better than the east for the DXer who likes his DX without local QRM.

Last-Minute Items

XEMU is a new station in Piedras Negras, Mexico, operating on 580 kc. Undoubtedly they are replacing XELO who have moved westward to Tiajuana. . . . The power of "Radio Napoli" at Naples, Italy, on 1104 kc. has been raised to 10,000 watts. . . . According to the UDXC the new Geraldton, Australia, station will bear the call 6GE instead of the originally assigned 6GN. . . . 'Tis said that station LR2 in Buenos Aires will increase its power to 125,000 watts. We'll have to hear it to believe it! . . . CKMO has a veri card that is both unique and clever. The card was submitted to us by Harry Honda, Los Angeles, Calif., who is the source of the following item. . . . KMED and KRLC are now operating on their new frequencies. KMTR conducts a special short-wave hour every Saturday at midnight. The hour features amateur chatter, DX tips, and short-wave news. Jim Guest is M.C.

CMQ with their new rig of 25,000 watts is reaching the west coast very well according to reports—and they are even better at times than their short-wave, COCQ! . . . Harry Honda also informs that KHBC signs at 6 a.m. daily with "Song of the Islands." . . . Recent listings in various club and other periodicals all show changes in the Chinese station list—but each of them disagrees with the others. We're steering clear of any of them till we get some definite info. on the changes. Besides—who knows but we may awake to find a flock of JO's replacing the ZG's some fine morning!!

ALL-WAVE RADIO'S
Time Table of DX Programs

(All schedules given in Eastern Standard Time)

Specials

MONDAY MORNING, NOV. 1

WTOC Savannah, Ga.	1260 kc. 3:00-4:00

FRIDAY MORNING, NOV. 5

WLW Cincinnati, Ohio	700 kc. 2:00-2:30

SUNDAY MORNING, NOV. 7

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

THURSDAY MORNING, NOV. 11

WHIS Bluefield, W. Va.	1410 kc. 2:30-3:30
WLLH Lowell, Mass.	1370 kc. 1:45-2:00

SUNDAY MORNING, NOV. 21

KVOR Colorado Springs, Colo. (IDA)	1270 kc. 3:00-4:00

FRIDAY MORNING, NOV. 26

WLLH Lowell, Mass.	1370 kc. 1:00-1:15

SUNDAY MORNING, NOV. 28

WJBO Baton Rouge, La.	1120 kc. 2:00-4:00
XEAA Mexicali, Mex. (IDA)	750 kc. 3:00-5:00

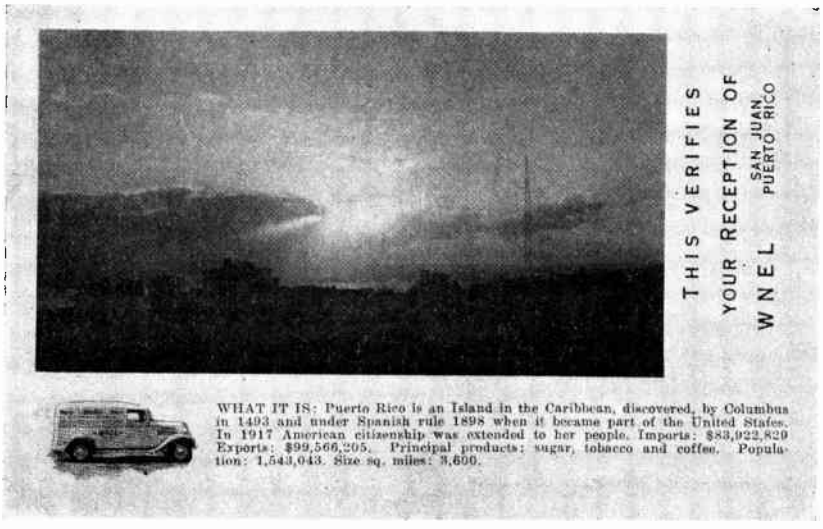
Regulars

EVERY SATURDAY MORNING

KRLC Lewiston, Idaho	1390 kc. 3:00-4:00

EVERY SUNDAY MORNING

KMTR Los Angeles, Calif.	570 kc. 12:00-12:30



A beauty from WNEL, San Juan, Puerto Rico. Note tower in photo.

Contest rules
AWR CHAMPIONSHIP DX CONTEST FOR 1937-38

Participants are required to send reports on stations located in the band 500 to 1600 kc. heard during the contest to Ray La Rocque, 28 Aetna St., Worcester, Mass. Reports must be in accordance with the following rules:

1. *Eligibilty:* Any person able to twist a dial is eligible to participate in this contest, employees of AWR excepted.

2. *Reportable stations:* Stations in the United States or Canada can be reported only on DX or test programs (any program which deviates from the regular daily schedule of the station.) All foreign stations may be reported at any time during the days of competition.

3. *Reports:* Reports must be made on 3 x 5 inch slips of light weight bond paper —obtainable at any stationery or "five-and-ten" store for about one cent per pad—and each report must contain at least one definite item which can be checked for verification as well as all the technical information shown in illustrated report. It is preferable, but not necessary, that you arrange your report similar to the one illustrated on page 530, October AWR. Reports must be written in ink or typed. No pencil reports allowed.

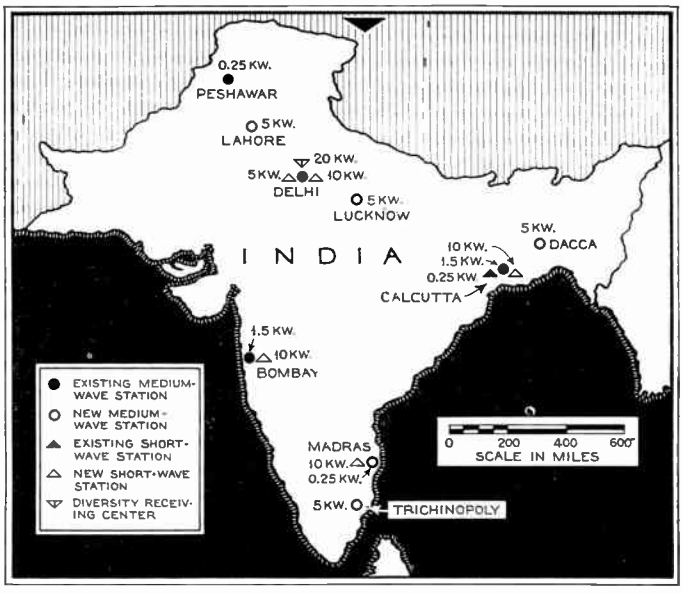
4. *Scoring:* Competition will be divided into two groups. Participants will participate individually as well as in teams. Each individual competitor does not necessarily have to be a member of a team, but each team member automatically becomes an individual participant. Scores will be totaled twice weekly (not monthly as last season). The first competition will include Sunday, Monday, Tuesday, and the second, Wednesday, Thursday, Friday, and Saturday.

4. a.—*Individual contest:* Each contestant will enter on separate slips reports for his ten best stations for each semi-weekly period of competition. As last year, we are assuming that the station heard by the least number of DXers each period is the best catch. So 100 points will be awarded for each station heard during each competition. This 100 will be divided equally among the contestants reporting that particular station. Hence the more reports there are on a station, the less the score will be on that station. Scores will be totaled twice weekly. Instead of counting totals, an average will be maintained by dividing the total points by the number of stations reported, i.e., ten per competition. If a contestant should fail to report the required number of stations, his score will be divided by 10 just as it would be if he had submitted the full number. The contestant having the highest average at the close of the contest will be declared winner.

4. b.—*Team scoring:* Each member of the winning team will receive an award, regardless of his own individual standing.

(Continued on page 613)

DEVELOPMENTS OF BROADCASTING IN INDIA



BROADCASTING SYSTEM OF ALL-INDIA RADIO (COURTESY B.B.C.)

CONSIDERABLE progress has been made this year with the different projects to be financed with the Government of India's grant of Rs. 4,-000,000 for broadcasting. The technical problem that now confronts the Broadcasting Department of the Government of India, All-India Radio (states an official announcement issued by the India Office), is that of providing a service over an area of nearly two million square miles with the limited funds available.

In the development of broadcasting in India it has been accepted by All-India Radio as a fundamental precept that a satisfactory broadcasting system must provide a measure of service to the whole country. This immediately determines the principle of operating transmitting stations on the short wavelengths. At the same time it is admitted that this is not, in itself, a final solution. Simultaneously with the provision of a short-wave or "second-grade" service to the whole area, a medium-wave "first-grade" service is necessary for the large towns. The basic principle of broadcasting development in India, therefore, is to provide a short-wave service to the whole country and to support this by a continual expansion of the area served by medium-wave stations as funds become available.

Ten Transmitters Ordered

To this end ten transmitters have been ordered. Four short-wave "key" stations will be established at Delhi, Bombay, Calcutta, and Madras, and will be of 10 kw. aerial power. A second short-wave transmitter of 5 kw. power is also to be provided at Delhi for special purposes. The development program does not envisage any future increase in the number of short-wave stations. The short-wave stations will provide a 'second-grade' service to the whole of India. At the same time five medium-wave stations have been ordered, and will be situated at Lahore, Lucknow, Trichinopoly, Dacca, and Madras, the first four stations having a power of 5 kw. The Madras medium-wave station will have a power of 250 watts and will give a service to the city only, as Madras will also be provided with a 10-kw. short-wave transmitter. With these stations, and the existing medium-wave stations at Delhi, Bombay, Calcutta, and Peshawar, All-India Radio will have in operation five short-wave stations and nine medium-wave stations. Two of the new stations are expected to be in operation by the end of the year: the 10-kw. short-wave station at Delhi and the 5-kw. medium-wave station at Lahore.

Choice of Short Wavelengths

The application of short wavelengths to Indian broadcasting differs in one very important aspect from the application made by the European countries. In India the short-wave service is essentially an internal service, whereas the European short-wave services are primarily intended for oversea listeners. It is expected that the Indian short-wave stations will normally operate in the daytime on the 30-meter and 49-meter bands, and at night principally on the new 60-meter and 90-meter bands for broadcasting which will be proposed at the forthcoming Cairo Conference.

It is considered that there should be no interference between the Indian short-wave stations operating an internal service and the European and other short-wave stations operating an international service, as the Indian day wavelengths are the European night wavelengths, and the Indian night wavelengths are not used by the broadcasting stations operating an international service.[1]

Direct and Indirect Ray Service

The distinction which has previously been drawn between the use of medium wavelengths and short wavelengths for broadcasting in India is based on the principle that the technically 'perfect' broadcasting service can be given only by use of the 'direct ray.'[2] The range of the direct ray on the medium wavelengths is, however, small—especially in India, where severe atmospherics are present for large periods of the year. In actual fact the area which will be covered by a first-grade direct-ray service when all the medium-wave stations envisaged in the development program are in operation will be approximately two percent of the total area of India. The fundamental importance of the short-wave, indirect-ray service is therefore very evident.

It may be asked why indirect-ray transmission is not satisfactory on the medium waves. In Europe good long-distance, indirect-ray reception is sometimes obtained, but this is possible only because of the relative absence of atmospheric disturbances. These depend upon wavelength and their strength is, in general, proportional to wavelength: the shorter the wavelength, the less the atmospheric disturbance. It is desirable, therefore, to choose as short a wavelength as possible to avoid atmospheric disturbances, and this is limited only by the intervention of the phenomenon of 'skip distance.' As the Indian short-wave

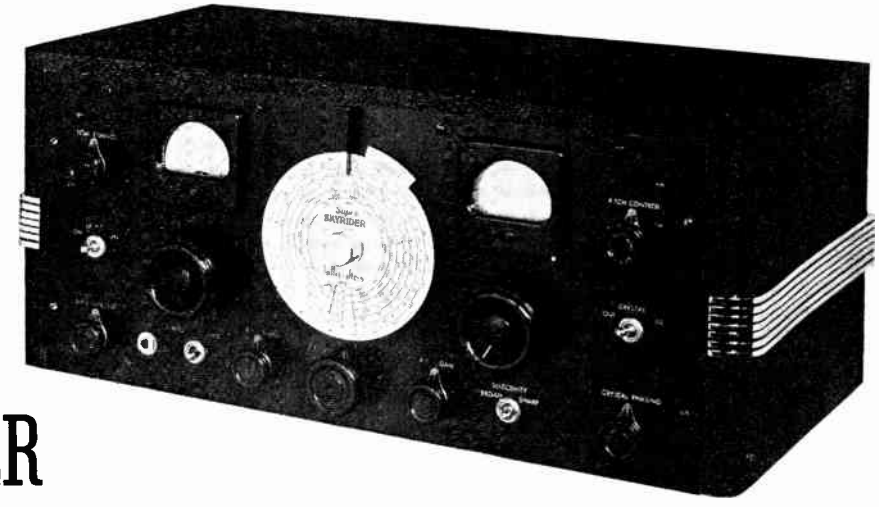
(Continued on page 610)

[1] The use of the 30- and 49-meter bands during the daytime should tend to limit reception to India, neither of these wavelengths being good DX bands during daylight periods. The 60- and 90-meter bands to be used during darkness have short skips, and in consequence may also limit reception to India. However, under favorable conditions, these new stations may well be heard at great distances.—Ed.

[2] Previously known as the "ground wave," which was recently found to be non-existent.—Ed.

A PROVING-POST REVIEW

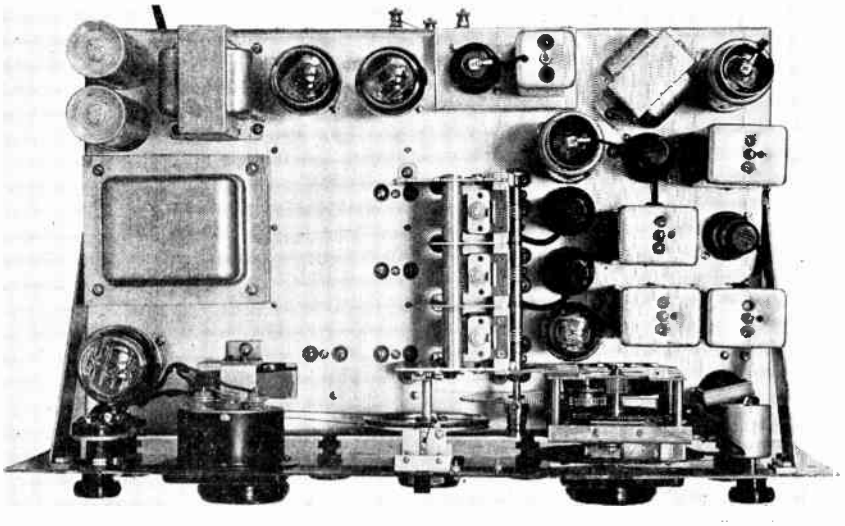
The Hallicrafters SUPER SKYRIDER



MANUFACTURERS of communications type receivers are gradually awakening to the fact that there exists an immense potential market for their products outside of the actual communications services. We are referring to the serious all-wave listener who is not completely satisfied with the parlor variety of receiver. To sell him on a communications receiver of high quality, it is only necessary to emancipate it somewhat from its former laboratory dress and present it to him as a receiver with all communications features which is still presentable in the average living room. Hallicrafters has definitely made a noteworthy bid in this field with the new 1938 Super Skyrider.

The Listener Angle

There are no features particularly desirable in communications work which will not contribute to the efficiency of all-wave operation. High usable sensitivity, achieved through careful design, adequate tone control, and independent r.f. and a.f. gain controls, will bring in many short-wave broadcast stations that would otherwise be submerged in the noise level. The use of the beat-frequency oscillator has long been appreciated in the location of weak stations and it is of additional value in accurate loggings and calibration (by means of the "zero beat" method.) It is, of course, practically essential in slow-speed code reception in which more and more listeners are becoming interested.



Top-of-chassis view of the Super Skyrider. Note heavy flywheels on tuning controls and gear train on band-spread condenser coupling.

The crystal filter, which for some time has been considered of value exclusively in communications work, is of equal importance in DX broadcast reception. It contributes a degree of selectivity not otherwise obtainable without sacrifice of intelligibility. As a matter of fact, station announcements can be understood with the crystal filter in circuit that would otherwise be utterly lost in a babel of interference. The phasing feature of the crystal is also of considerable moment in DX reception, and single carrier heterodynes, in the form of continuous whistles, are readily eliminated.

The inclusion of these features in the 1938 Super Skyrider means additional controls, but the operation is no more complex than that of an expensive and highly efficient camera—and members of the family not interested in the special advantages of communications equipment will find the receiver as simple to operate as any other set requiring attention only to band changing, one tuning dial, volume and tone controls.

While the new Super Skyrider is styled in the modernistic mode, its general appearance is not its sole gesture, aside from communications features, to the all-wave listener. A satisfactory approach to high-fidelity reception has been made possible by the use of both sharp and broad i.f. tuning adjustments (exclusive of the crystal) with the result that the relatively wide acceptance band required for quality reception of broadcast programs is obtainable by the flick of a switch. This feature is backed up by a husky push-pull audio power stage

capable of 13 watts output to the large permanent-magnet dynamic speaker which has a power-handling capacity of 18 watts.

The Amateur Angle

While in the foregoing we have emphasized the utility of this receiver to the all-wave listener enthusiast, we have merely taken it for granted it was already understood that this receiver was primarily a first-class communications job, and therefore particularly applicable to amateur operation. Aside from the features previously outlined, the ham will appreciate such refinements as adequate electrical band-spread, the calibrated "S" meter operating in conjunction with a separate amplifier, controlled b.f.o. voltage feed for weak-signal reception, provisions for feeding the receiver output into a 500-ohm line, and so on.

Receiver Controls

All controls are clearly shown in the accompanying front-panel view of the receiver. The upper left-hand control is the combination on-off switch and tone control, the latter providing excellent reduction of background noise in the bass position and high note brilliance in the full clockwise position. Below this is the a.v.c. on-off toggle switch, and at the bottom of the panel the beat-frequency injector control. By means of this it is possible to control the b.f.o. voltage injected into the diode second detector circuit which is of assistance in securing the maximum signal strength from a weak c.w. station.

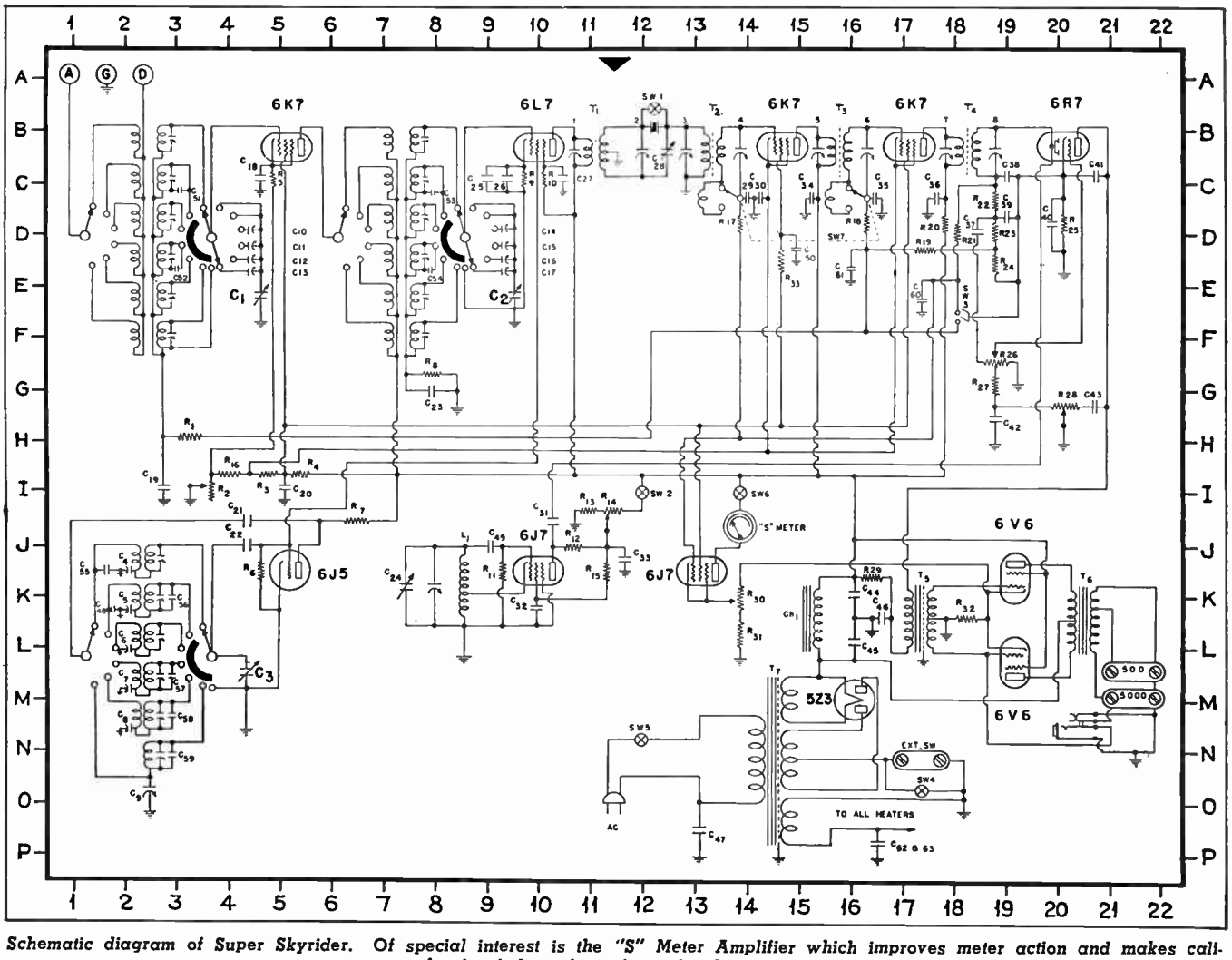
The headphone jack is to the right of the b.f.o. switch, and the send-receive switch to the right of the jack. The send-receive switch breaks the plate circuits and is paralleled with posts on the rear of the chassis for use with a relay in amateur break-in operation. Immediately above is the main tuning control wheel which operates the main tuning dials, directly calibrated in megacycles. To the lower left of the main dial is the a.f. gain control, while in a similar position to the right will be found the r.f. gain control. Directly under the main dial is the 6-position band switch. The i.f. selectivity switch, with "broad" and "sharp" positions, is located to the right, and just above it is the band-spread control wheel. The lower right hand control is for crystal phasing—the switch above cuts the crystal in and out of circuit, and the upper right hand control governs the pitch of the beat frequency.

The scales to the left and right respectively of the main tuning dial are the signal strength meter, calibrated in "S" units, and the band-spread dial. Band-spread is achieved electrically by means of very small variable air condensers paralleling the main gang condenser.

Mechanical Features

The excellent construction of the receiver is evident from the accompanying views. Control knobs and wheels are large and easy to handle. Both tuning controls—the main and the band-spread —are inertia driven. The tuning wheels can be twirled and heavy flywheels will carry the dials for some distance under momentum. This feature contributes considerably to the ease of tuning.

Front panel and chassis are husky and the two are anchored by side brackets which prevent chassis warping and consequent alteration of circuit constants. The aforementioned features are shown in the top-of-chassis view.



Schematic diagram of Super Skyrider. Of special interest is the "S" Meter Amplifier which improves meter action and makes calibration independent of circuit adjustments.

Note from the under-chassis view that solid partition shielding is employed between the coils associated with each of the three manually-tuned stages. Also note that these coils are aligned by means of air dielectric trimmer condensers for the sake of frequency stability. There are six of these trimmers used in conjunction with each stage.

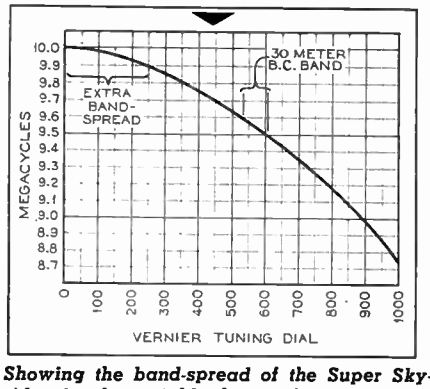
It will also be noted from this view that all four corners of the chassis frame are welded to stout angle brackets.

Band-Spread

The band-spread dial is an exceedingly clever mechanical arrangement whereby a moving light (raised and lowered) illuminates only the correct portion of a spiral dial covering 1000 degrees. The accompanying band-spread curve was plotted during the tests and shows the band-spread obtained between 8.7 and 10 megacycles. It will be observed that the 9.5 to 9.6 mc. short-wave broadcast band is normally covered with 75 divisions—or 1.33 kilocycles to a division, which is quite sufficient for easy tuning and accurate logging. The band-spread tapers considerably at the lower end of the scale, and this can be employed if still greater band-spread is desired. For instance, setting 9.6 megacycles at zero, the same s.w. broadcast band would be spread over approximately 250 divisions, or 0.4 kilocycle per division.

Uniform spread in all six wavebands is attained through the use of additional condensers which are connected in series with the gang condenser by means of the band selector switch.

About our only criticism of this receiver is the fact that the band-spread and the main dials work in numerically opposite directions. While the direct reading frequency engravings on the main dial are of course increased as the numbers increase, the frequency is lowered on the band-spread dial as the divisions increase. Of course, one soon becomes accustomed to this.



Showing the band-spread of the Super Skyrider in the neighborhood of 9.5 mc. Increased band-spread can be achieved by setting the main dial so as to utilize the lower portion of the band-spread dial over the desired spectrum.

Hallicrafters has succeeded largely in eliminating one objection to a separate band-spread dial—namely, the difficulty in re-setting the main dial so that accurate logging and re-logging will be maintained on the band-spread dial. The use of a genuine vernier on the periphery of the main dial makes it possible to set the main dial to within one-tenth of a degree and to return to that same setting again and again with assurance that the loggings on the band-spread dial will hold with satisfactory precision.

The Circuit

Checking the controls against the accompanying circuit diagram, we find the individual sections of the waveband switch located at 4-D, 4-L and 9-D. Six bands are provided with the following coverage:

Band 1 ..... 545 to 1555 kc.
Band 2 .....1545 to 4300 kc.
Band 3 .....4.2 to 10.2 mc.
Band 4 .....9.8 to 20.5 mc.
Band 5 .....19 to 36 mc.
Band 6 .....35 to 62 mc.

The on-off switch is located at 12-M, the beat-frequency switch at 12-I, the switch controlling the "S" meter (actuated by the r.f. gain control) at 14-I, the crystal filter switch at 12-B, and the send-receive switch at 17-0. Broad and sharp tuning is accomplished by altering the coupling of the i.f. transformers T2 and T3, this being controlled by the ganged switches shown at 14-C and 16-C.

The r.f. gain control, R2, is located at 4-I; the compensated a.f. gain control, R26, is at 19-F; the tone control, R28, at 20-G; the "S" meter level control, R30, at 14-K, and the a.v.c. on-off switch at 18-EF.

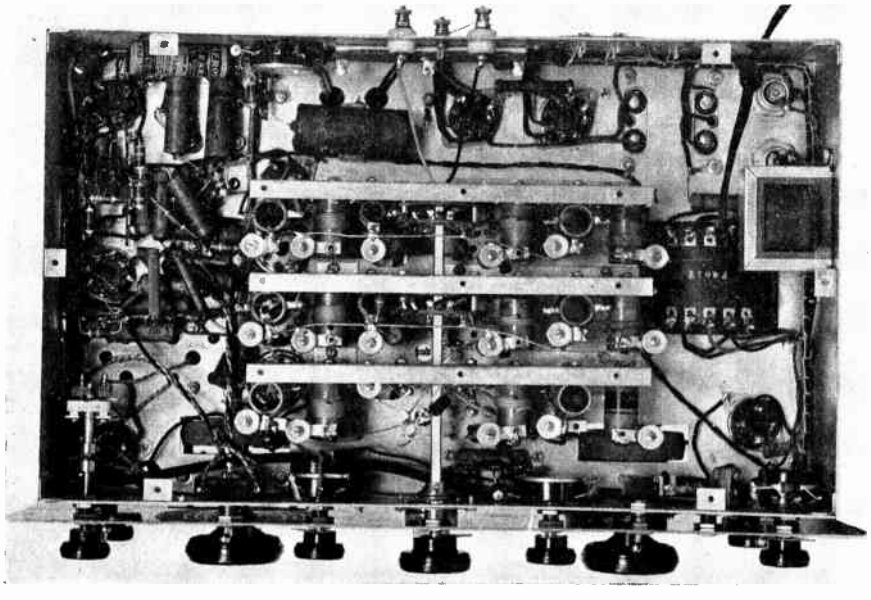
There are eleven tubes in the circuit —a 6K7 in the r.f. stage, a 6J5 high-frequency oscillator, a 6L7 mixer, 6K7 first i.f. stage, 6K7 second i.f. stage, a 6R7 functioning as second detector, a.v.c. and a.f. voltage amplifier, two 6V6 beam-power tubes in the push-pull output stage, a 5Z3 power-supply rectifier, a 6J7 in the beat-frequency oscillator circuit at 10-K in the diagram, and to the right of this the 6J7 "S" meter amplifier.

The control grid of the "S" meter amplifier tube is connected to the a.v.c. line with the result that alterations in signal voltage will be indicated by the signal level meter connected in the plate circuit of the 6J7. The meter is adjusted for zero setting by means of the potentiometer, R30, which controls the steady negative bias for the 6J7 and therefore the plate current. Resistors R30 and R31 form a voltage divider which is in shunt with the bias resistor, R32, in the common cathode circuit of the 6V6 output tubes. The "S" meter operates in "reverse"—that is, zero adjustment corresponds to the maximum flow of plate current. When so adjusted by means of the potentiometer R30 the meter will read zero under no-signal conditions. However, the appearance of a signal-developed voltage in the a.v.c. line will tend to drive the 6J7 control grid more negative and consequently reduce plate current flow, the relative change being indicated by the meter. The higher the signal level the less the flow of current in the plate circuit of 6J7 and the *greater* the reading on the "S" meter scale, since it operates in reverse.

One advantage of this arrangement is that it is independent of all other circuit adjustments which might affect the "S" meter calibration or place restrictions on the operation of the receiver. Moreover, the "reversed gain" of the 6J7 provides a more uniform meter response to weak and strong signals alike.

The manual r.f. gain control, R2, varies the steady bias on the r.f. and

(Continued on page 603)

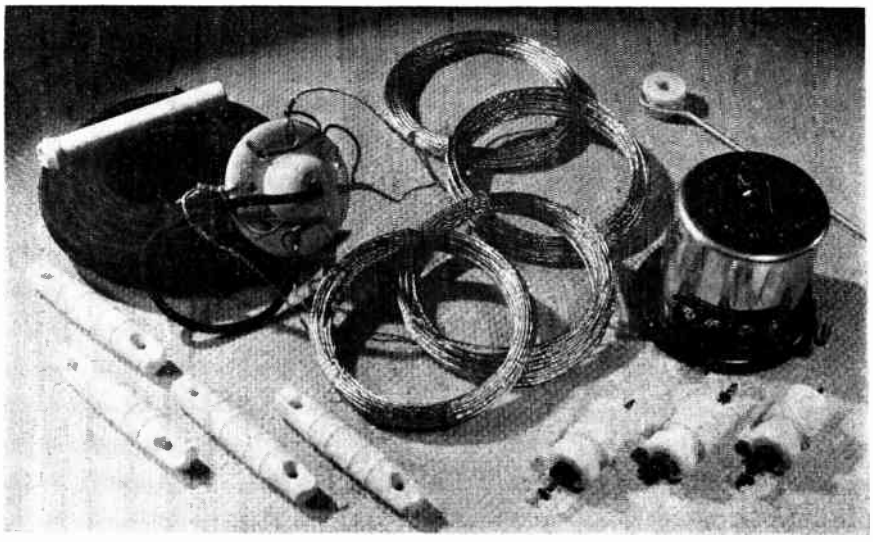


Under-chassis view, showing coil shield partitions and air trimmer condensers.

SELECTIVE-BEAM RECEIVING ANTENNA

By E. T. TURNEY • W2APT

Engineering Department,
TECHNICAL APPLIANCE CORP.



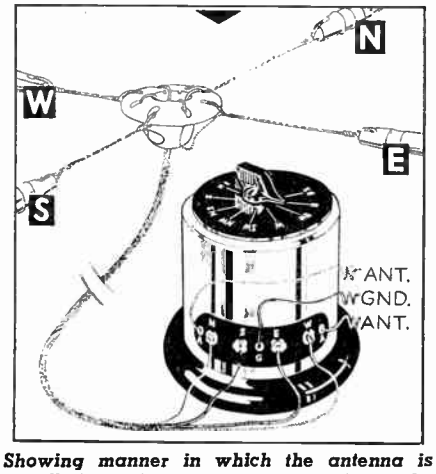
Units comprising the Selective-Beam Receiving Antenna. The antenna is "beamed" by means of the rotary switch in the case to the right of the four separate rolls of wire.

THE wide interest in the directional properties of antennae in recent years has created a demand for a receiving antenna system employing a minimum of apparatus that may be aimed simply and quickly at the path of a desired signal.

Beam Antennae

Mechanically-rotated beam antenna systems, used principally for transmission, serve also for reception, and provide the desirable aiming feature, but with the disadvantages of design complexity, high cost and one-band operation at the higher frequencies only.

Nevertheless, this type of antenna system has blazed a new trail in amateur radio, as it points to the answer to our interference problems arising from overcrowded bands, faulty transmitter operation, and often sheer cussedness of operators. There is no doubt that if we had an antenna which we might beam at will by means of some simple gadget, and thereby increasing the strength of a desired signal from one direction and reducing the strength of signals from other directions, we would not only increase our operating efficiency, but greatly improve the signal discrimination of our receivers by the addition of this "directional selectivity."



Showing manner in which the antenna is installed, and the connections from the switch case to the receiver.

If you will stop to consider for a moment that the frequency selectivity of a receiver is governed to a large extent by relative signal input level, it will be appreciated that the addition to any receiver of the directional selectivity of a beam type antenna will also improve frequency selectivity by virtue of a decrease in input level of unwanted signals arriving from directions other than that of the desired signal. The total gain in *overall* signal selectivity is therefore boosted considerably by the use of a beam type antenna.

With the realization that a simplified and inexpensive multi-band beam antenna system would be of distinct value to the amateur, a study was made of the possibilities along these lines. The result of these studies was the development of a fixed antenna system which can be beamed electrically by a switch placed on the operating table.

The system is composed of two horizontal doublets spaced 90 degrees apart, each having its own transmission line. Both doublets are cut to peak in the 7-megacycle band and at harmonics of this frequency, thus providing multi-band operation. The transmission lines terminate in a special switch.

Theory of Operation

Operated separately, either one of the two doublets is bi-directional, and will favor signals arriving from a direction at right angles to the horizontal span. If one doublet is run, say, north and south, and the other east and west, four signal paths at right angles to the spans are favored. Under these circumstances, however, signals arriving from intermediate angles are not favored to the same degree.

To increase the scope of the system, the leads of the two transmission lines are so connected to the special switch that alternate combinations are provided, such as the uni-directional characteristics of an "L" type antenna. For instance, one leg of one doublet and one leg of the other doublet can be used for obtaining a directional effect 45 degrees from either one of the two doublet legs. By means of this selector switch any direction can be selected at the operator's will for best results.

The transmission lines are matched to the doublets, and to the receiver input by means of a coupling transformer. The coupler terminates in two leads for the doublet antenna binding posts, and one ground lead to bleed off accumulated static charges which would otherwise discharge through the receiver input circuit.

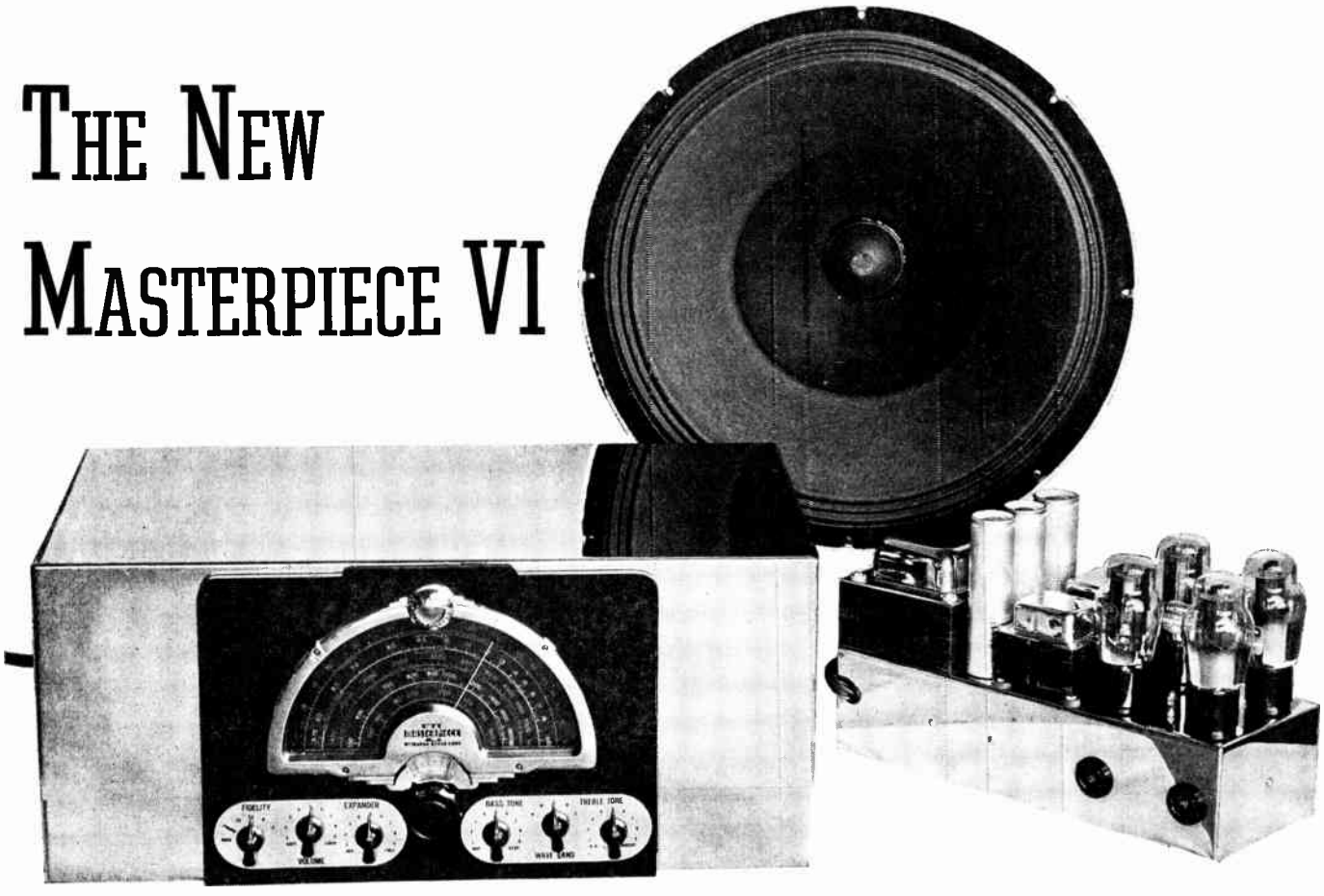
Results Achieved

Tests on the final model indicated that the input level of most signals could be boosted two or more R's by selecting such legs of the doublets by means of the switch that the antenna system favored the direction of the desired signal. Operation of the switch resolves itself into a parallel of the usual tuning procedure—rotation of the knob on the switch to the point where the signal level is maximum.

But of more interest than the gain of a few R's in the level of a desired signal, is the large increase in overall signal discrimination of the receiver, due to an actual reduction in level in signal from

(Continued on page 614)

THE NEW MASTERPIECE VI



By McMURDO SILVER

CHIEF ENGINEER, McMURDO SILVER, INC.

THE new Masterpiece VI is particularly interesting, since it is one of the few exceptions among the season's new models which does not confine its newness to mechanical features and gadgets such as automatic tuning. It is one of the very few of next year's receivers in the development of which the research engineer has been able to pull out of the bag new circuit features which do not just simplify, but which very materially improve actual reception, be it local high fidelity, channel-splitting selectivity of a new order, or the bagging of the more elusive low-powered stations on long or short waves.

Since the Masterpiece VI is custom built only the basic design may be here described—each individual receiver will vary from this as may be necessary, within the limits of good engineering only, to satisfy the needs and desires of its particular owner. Through such flexible design, coupled with individualized custom building, is produced a receiver combining DX-getting sensitivity, 4- to 32-kc. selectivity, tone of a range and purity that is really startling—in a word, everything that the cultured music lover, the professional communication operator and the DX fan can desire.

Completely shielded by individual coil shields on top of the chassis, by partition shields isolating every successive circuit, and by a complete cover-shield, the entire tuner is built like a battleship, a steel chassis 21 inches long, 13 inches wide, 3 inches high, and 3-32 of an inch thick. This thickness—about twice the ordinary—is what insures the permanent retention during an unusually long life of the performance originally built into each receiver. Such durable construction reduces the probability of trouble in service to exactly what it ought to be—only tube deterioration with continued use.

Tube Functions

To keep this at a minimum, the age-old maxim that a straight line is invariably the shortest distance between two points has governed design. The result is that no more tubes are used to perform the multifarious circuit functions of this receiver than are absolutely essential. Twenty-one is the number which provide the fifteen functions of tuned r.f. amplification, first detection, oscillation, r.f. a.v.c., i.f. amplification, i.f. a.v.c., tuning indication, second detection, beat-frequency reception, pre-amplification for microphone and phonograph operation, volume expansion, intermediate audio amplification, push-pull audio power amplification, and power rectification. This is only about one and one-half tubes per function.

In the block diagram of Fig. 1 a simplified picture is presented of the function and progression of each of these twenty-one tubes—a visual proof to the initiate of their need and intelligent use to provide the utmost in results with a minimum of tubes. And these tubes may be metal or glass—or both types may be mixed and used together—as desired, so universal is the design and shielding.

Two stages of tuned r.f. amplification operate on four of the five wavebands, or from 140 to 19,000 kc. They are not used on the fifth band from 19,000 to 70,000 kc. simply because over the major portion of this range they would contribute loss, not gain, due to unavoidable tube element capacity.

The two-stage r.f. amplifier is controlled by the Fidelity (selectivity) knob so that it may be switched in or out to vary selectivity. This is the first of the new features, which instead of broadening the r.f. amplifier and so losing selectivity in order to prevent side-band cutting in high-fidelity reception, permits one stage to be switched completely out when it is not needed. This new treatment gives all the previously unavoidably

lost amplification and selectivity of the r.f. amplifier to the receiver, and is a marked contribution to both extreme, as well as broad high-fidelity, selectivity.

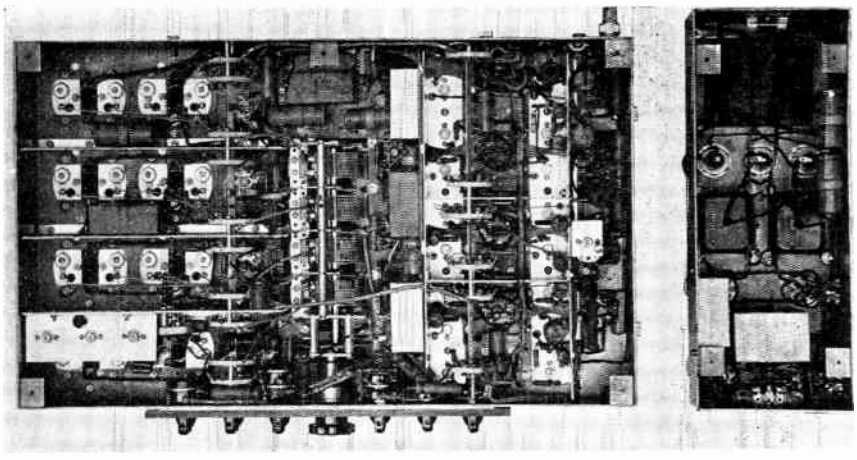
Low First-Circuit Noise

High r.f. amplification coupled with low i.f. amplification shifts the limit of inherent circuit noise from the usual first detector-oscillator circuits of most superheterodynes to its last retreat, the antenna circuit. The inherent circuit noise is so extraordinarily low even at the maximum sensitivity of 15/100ths microvolt absolute that it is created only by the movement of electrons in the supposedly solid copper wire of the antenna coil.

To insure the sort of frequency stability that keeps the receiver tuned "on the nose" even to a 16-meter station over hours at a time, a special oscillator circuit, using a 6J7 tube electron coupled to the 6L7 first detector, has been developed. This circuit is compensated not only for frequency drift, but for output, too, so that the oscillator voltage is not only constant over each waveband, but is constant from band to band. This helps materially in attaining the complete elimination of dead or weak spots in different bands, keeps each dial range "hot" and equally so, and holds all this constant even over widely varying a.c. line-voltage variations—yet needs no auxiliary voltage-regulator tubes to do this.

R. F. Automatic Volume Control

In superheterodynes the major portion of the selectivity is had in the i.f. amplifier, which usually drives the a.v.c. system. Thus, the more selective the receiver, the less will be the a.v.c. voltage developed on channels adjacent to a desired signal. In trying to tune a weak station next to a powerful local, the local station can easily overload the r.f. circuits, which receive no a.v.c. voltage because of the i.f. selectivity.



Under-chassis views of the receiver and combined power supply and a.f. output amplifier.

This impairs the excellent i.f. selectivity through r.f. overload, and makes the receiver seem broad near super-powered stations. The remedy is a separate r.f. a.v.c. system driven by the first detector. In the Masterpiece VI a 6B8 r.f. pentode and diode rectifier, in one bulb is driven by the first detector to control the r.f. amplification only, to the degree necessary to prevent adjacent channel overload with its inevitable selectivity impairment. This a.v.c. responds only to strong signals, and operates the r.f. amplifier at full gain on all signals except those so strong as to overload it.

Wide-Range Selectivity

The i.f. amplifier is optionaliy two or three stage, 465 kc., being controlled for selectivities of 4, 8, 12 and 32 kc. by the Fidelity knob. It is an entirely new approach to the variable selectivity i. f. amplifier problem and provides the great selectivity variation ratio of 4 to 32 kc., or 8:1. Two factors determine maximum selectivity—the merit, or Q, of each tuned circuit, and the total number of circuits. Coils of Q high enough to give a flat-topped, band-pass filter nose 4-kc. wide and a bandwidth only 15 kc. wide at 10,000 times signal strength—something totally new in extreme selectivity—will show a very pronounced valley or dip between their broadened peaks in any ordinarily used selectivity variation system. This will produce, at least, a decreased bass response in high-fidelity reception, and at worst, most annoying double tuning.

The only remedy is to use coils of much lower Q for broad high-fidelity selectivity. This, carried to a logical conclusion, necessitates two different i. f. amplifiers to get 4- to 32-kc. selectivity, and both variable over the range which each can cover without trouble. This the Masterpiece VI provides through six, instead of the usual two, three or at most four, i.f. transformers. Three are of low Q, for broad high-fidelity selectivity, and three are supersharp, using coils with a Q of 195, or 50% more than in the ordinary transformers. Each, housed in a large low-loss shield, is tuned by air-trimmer condensers such as show no shift of capacity or loss of Q despite extreme variation of temperature or humidity, and which do not shift with vibration or handling.

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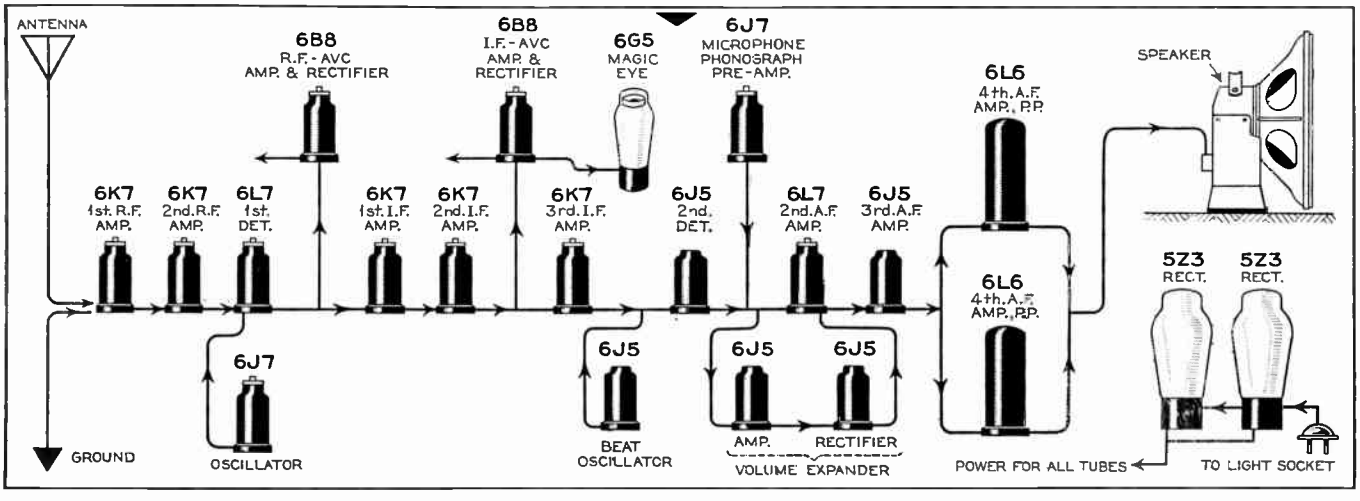


Fig. 1. Diagram showing function of each tube in the Masterpiece VI receiver. Note separate a.v.c. amplifiers, pre-amplifier for microphone or phonograph, and the volume expander.

RADIO SIGNAL SURVEY LEAGUE NEWS

NO steps have as yet been taken with regard to the formation of an intercommunication network for the League until further opinions are received from members. Approval of members is required before any definite activity can be entered. Consequently, if you have not already notified headquarters of your opinion of the proposal, please re-read the Directors' report under the heading, "Intercommunication," on page 534 of the October issue of ALL-WAVE RADIO; then drop us a postcard, stating your views.

WANC Survey

The signal survey on WANC continues. The frequency of the station is 2726 kilocycles, and hours of operation are from 8 to 10 p.m. every Monday night.

There has been some confusion as to the type of transmissions from this station, and for this reason many members may have failed to intercept the signals.

WANC is a Special Emergency Station operated by the American Legion Post at Jamestown, N. Y. It is not a broadcast station and therefore does not transmit programs. Contacts are made with amateur stations for test purposes, and therefore the station *is not on the air continuously*. Some listeners have tuned to WANC's frequency and, not hearing the signal immediately have given up.

If you have been unsuccessful in your attempt to intercept signals from WANC, try again, as headquarters is anxious to receive complete reports from all sections of the country.

NEW R.S.S.L. MEMBERS

ALABAMA
Harry Barron O'Rear, Jasper—W10P2

CALIFORNIA
Edwin F. Leak, Loomis—W30J6
Douglas M. Perry, Los Angeles—W29M26
Vincent Honnold, Los Angeles—W29M27
W. Hallgren, Santa Rosa—W31J6

DELAWARE
Charles A. Higgins, Jr., Wilmington—W5J18

FLORIDA
Earl Beusse, Tampa—W7T3

ILLINOIS
Edgar C. Haviland, Chicago—W11H45
William J. Panzella, Chicago—W11H50
Jack Kovitz, Chicago—W11H47
Robert Truhlar, Chicago—W11H46
Darrell W. Britton, Vandalia—W12K5
Cloyd A. Bacon, Villa Park—W12H6

INDIANA
George H. Duncan, Logansport—W11J7
Ned W. Tarman, New Paris—W11H49

IOWA
Vincent Leroy Jager, Davenport—W13H2

KANSAS
Ralph E. Weikal, Pratt—W17L1

MARYLAND
Wilton Harrison Shaw, Jr., Baltimore—W5J16
Carroll G. Uternahlen, Baltimore—W5J15
Harry Gorsuch Conner, Baltimore—W5J17

MASSACHUSETTS
Reuben Daniels, Chelsea—W3F55
Edward A. Forrest, Norfolk Downs—W3F57
Custer Charles Edwards, Peabody—W3F60
William S. Vallette, Townsend—W3F59
Donald C. Battin, Townsend—W3F56

MICHIGAN
Ted Farrand, Horton—W10H9
J. L. Wright, Jackson—W10H12
Spencer Evans, Jackson—W10H11
Anthony Calderone, Jackson—W10H8
Lloyd De Young, Jackson—W10H13
Eugene Brandenburg, Jackson—W10H10
Warren G. Gerry, Kalamazoo—W10H44

MISSOURI
Joseph Dixon Andrew, Webster Groves—W13L9
George C. Bergmann, Wellston—W13L10

NEBRASKA
Parker Shipley, Omaha—W16J5

NEVADA
Raymond E. Gregg, Reno—W29H1

NEW HAMPSHIRE
Adelbert Jay Wood, Jr., Concord—W3F58
Raymond H. Benton, Plymouth—W3E8

NEW JERSEY
Christopher J. Yorio, Jersey City—W4H140
John M. Klimczak, Passaic—W4H146

NEW YORK
Edward H. Davis, Brooklyn—W4H151
John Gerety, Jr., New York City—W4H142
Martin P. Miller, New York City—W4H150
Frank Perraud, New York City—W4H144
Maurice P. Johnson, Jamestown—W7G12
Stan Anderson, Jamestown—W7G11
William Kester, Rochester—W6F4
Vere R. Hunt, Rye—W4G21
Royce Staves, Rome—W5F7
George Fenner Volzing, Whitestone—W4H145
Klaus Otto Emil Kurt Alexander Mayer, Long Island City—W4H141
Jack Holterman, Flushing—W4H148

OHIO
Herbert Tucker, Akron—W8H26
Steve Shewchik, Akron—W8H25
Virgil Junker, Dayton—W9J16

OKLAHOMA
Morris E. King, Hinton—W17N1
Hugh Robinson, Miami—W15M3

OREGON
Walter Ray Lewis, Echo—W28D1
William Bentson, Salem—W30D5
Carlos Kenney, Salem—W30D6

PENNSYLVANIA
Howard Dutkin, Philadelphia—W4H143
Robert L. Suter, Philadelphia—W4H147
John W. Terkats, Philadelphia—W4H149

RHODE ISLAND
Frederick A. Hawksley, Cranston—W3G28
John Townsend Sackett, Newport—W3G26
George Holmes Wilson, Providence—W3G27

TEXAS
Stanley S. Troth, Whittenburg—W19N1

VERMONT
James William Gay, St. Albans—W4E11
James Warner Botsford, Middlebury—W4E12

VIRGINIA
William C. Nelson, Hampton—W5L3
Charles Alexander Andrews, Richmond—W5K3
Bernard Lee Ransone, Richmond—W5K4

WISCONSIN
Bob Albrecht, Milwaukee—W12G13
Roy Bickelhaupt, Milwaukee—W12G14
Edward Anthony Willihnganz, Sheboygan—W12G15
John H. Zäss, Wauwatosa—W12G13

FOREIGN MEMBERS

AUSTRALIA
Jack Dorsett, Glenelg, South—VK4

CANADA
Robert Eric Glyn Langton, Port Hammond, B. C.—VE29A6
Beverly James Aiton, Sussex, N. B.—VE1C1
Thomas A. Brooks, Levack, Ont.—VE9E1

CUBA
Frank Arango, Regla, Havana—CO4

ENGLAND
Thomas Alfred Appleby, Sheffield 7, Yorks—G26
John Pilling, Blackpool, Lancashire—G28
Charles Edgar Pellatt, Chatham, Kent—G25
John Morris Davies, N. Greenford, Middlesex—G24
Douglas John George Legge, Carlton, Nottinghamshire—G27
Henry Ivor Wright, Cricklewood, London, N.W. 2—G30
Henry James Hathrill, Acton, Middx—G29
William Albert Clemenson, West Hampstead, London, N.W.—G31

NEW ZEALAND
Lynn H. Harris, Lower Hutt—ZL1
Alec Toms, Lower Hutt—ZL2

Australian Survey

The additional survey this month is to cover the signals from 2NZ, Inverell, N.S.W., Australia. The test program will run from 4 to 5 a.m., eastern standard time, November 8th only. The frequency of 2NZ is 1170 kc.

Those members hearing the station and desiring a verification should address their reception reports to Station 2NZ, P.O. Box 3, Inverell, N.S.W., Australia. But be sure to also send a signal report to your Sectional Manager for transmission to League headquarters.

Sectional Managers

October has brought its usual changes of addresses. The Sectional Managers for the States of Maryland and Vermont have moved to new locations and members in these States should use the new addresses provided below.

MARYLAND
CARROLL H. WEYRICH,
112 Alden Road,
Parkville.

VERMONT
FRED ATHERTON,
23 Royce St.,
Rutland.

Station Interference Survey

Reports from members on station interference have been few and far between. Are we to assume that peace reigns in the short-wave broadcast bands? It doesn't sound that way to us, and unless some action is taken station interference will continue unabated. But action is out of the question unless League members provide the cold, factual data required if headquarters is to make representations to the offending stations.

This is the most important of all sur-

(Continued on page 613)

Hamfest

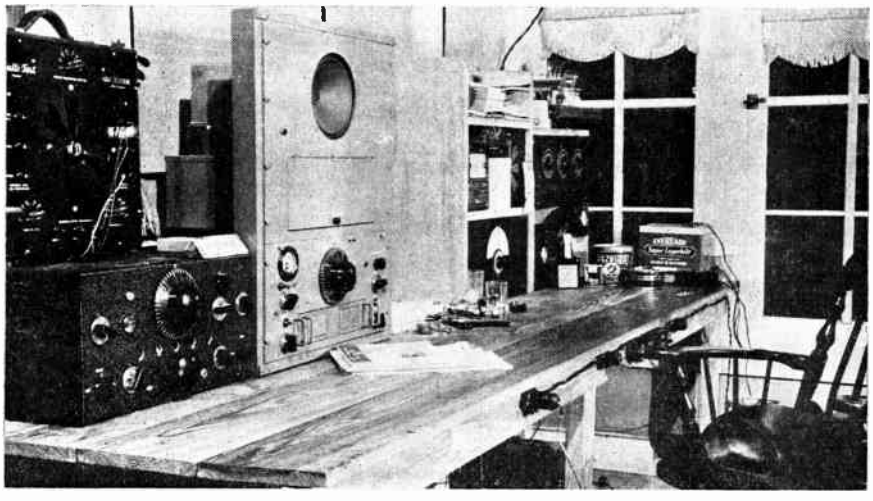
By W8QMR ex-2PI • LU4S

QMR AS IS . . . MONITORS . . . THE RED MENACE . . . BROKEN IN FOR BREAK-IN

WE expected to publish a flock of pictures of ham rigs this month. Dave Talley, W2PF, and radio aide in the Second Corps Area for the AARS, promised to send us everything from Governor's Island down. Results nil—a stove pipe or something hadn't been installed and they couldn't take a picture of the transmitter without the stove pipe. W2BSK, up at Mount Whiteface Observatory, which towers above Lake Placid, N. Y., has similarly let us down with a dozen or so photos of the observatory, rig, antennas, and the R.P.I. five-meter experiments recently conducted from that point of vantage. BSK promised everything except a pass on the toll road leading up to Mount Whiteface. So there was nothing left for us to do but take a special request photo of our own rig—and which appears on this page. the dope follows:

With the exception of the HRO and a few minor details, the rig changes from month to month. However, at the time the photo was taken, a National NC-101X graced the left end of the operating table. The HRO—relay rack model—is next—to the right. Just below the speaker is the coil compartment, and with the usual complement of coils—one in the set and three in the compartments—there are two compartments vacant which provide an excellent cellarette for small glasses, bottles, bottle openers, corks and cork-screws. Jim Millen tells us that a brass rail can be obtained at a slight extra cost. Next on the table is the straight key—and then the Mac Key. Proceeding to the right we have a Browning-35 which is used as a monitor and as an emergency receiver. Above the Browning is a Triplett field strength and modulation meter. The transmitter is to the extreme right—a low power but highly effective job employing TZ20s in the final and working with 80 watts input for a 100 per cent reliable job in the ENY AARS net. Just above the transmitter is an emergency job with 6L6s, used mostly as an oscillator when grinding crystals. In the background is an RCA piezo-electric calibrator with B supply for a d.c. note.

Other miscellany in the background: Item—one can of Walter Raleigh smoking tobacco, contributed by Brown and Williamson, manufacturers. (Attention Mr. Cooper, President: Can is now almost empty.) Item—one pack of Wing cigarettes, also manufactured by Brown and Williamson. (Last pack in the carton.) Item—one bottle of bonded Mount Vernon rye, made by National Distilleries, Baltimore, Md. (This is last bottle in case. Baltimore paper please copy.) On the chair is our dot-and-dash-hound, Mimi. Relatively little can be discerned of her face—Mimi having no respect for time exposures.



Candid shot of the shack at W8QMR. Note burned out tubes under the table.

◆

ANOTHER PROMISE that hasn't materialized as yet is a diagram of the rig used by W8QWA. With an input of only ten watts to a pair of 45s in push-pull, this station in Ausable Forks, N. Y., does a remarkable job on the 3.5-megacycle band. We hope to pass on this dope to our embryo ham readers next month.

◆

SPEAKING OF MONITORS (we did—a half dozen paragraphs above), we obtain definitely more stable operation by operating ours at half the transmitter frequency. Any monitor will generate a sufficiently powerful second harmonic to provide an adequate heat, and the drift is of course less at the lower frequency and the stability greater—particularly if a power supply is used instead of batteries. Naturally any drift or other form of instability will be twice as great at the second harmonic, but the point is that the instability is usually less than one-half as bad at half the transmitter frequency—thus something is gained.

◆

IT HAPPENS THAT out our way we're registered with the Communist Party—more or less a matter of protest against the inadequacies of the Republicans, Democrats, *et al.* This fact of course is well known in our little community of a hundred souls, and it is vaguely rumored that our cellar is amply stocked with bombs, and that our radio equipment is used for direct communication with the USSR. The town council is closer to the truth in that latter assumption. Anyhow, the theory was beautifully substantiated the other day when we received a QSL card from Operator Cerebin. URS 1390 Moscow!

Needless to say the upright citizens were about ready to run us out of town, when, in the course of our operations with the Army Amateur Radio System, we received a franked envelope from the War Department. Then the rumor went about that at last the G-men were getting

(Continued on page 615)

WORLD SHORT-WAVE STATION LIST

BOLD NUMERALS: MEGACYCLES. LIGHT NUMERALS: METERS. DOT (●): STA TION DOES NOT VERIFY. DIAMOND (◆): STATION NOT IN USE.

Abbreviations: (E)—Experimental; (P)—Radiophone; (O)—Opening; (C)—Closing; (I)—Interval; (S)—Signal; (I.R.C.)—International Reply Coupon.

Mc. & M.	*Call*	*Location & Schedule*
31.600 9.4	W1XKA ●	Boston, Mass. (see W1XK 9.570 mc.) Daily 7 a.m.-1 a.m.
31.600 9.4	W8XKB ●	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.-12 Midnight.
31.600 9.4	W3XKA	Philadelphia, Pa. (see W3XAU 9.590 mc.) Daily 9 a.m.-10 p.m.
31.600 9.4	W8XWJ	4465 Penobscot Bldg., Detroit, Mich. Daily exc. Sun. 10:30 a.m.-5 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.)
26.100 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	W6XKG	Washington Blvd. at Oak St., Los Angeles, Calif. Continuously 24 hours each day.
24.380 12.3	CRCX	Rural Route No. 4, Bowmansville, Ontario, Canada. **Experimental.**
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.)
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.** Daily 6:45-9 a.m.
21.530 13.93	GSJ ●	Daventry England (see 26.100 mc.) Daily 5:45-8:55 a.m.; 9:15 a.m.-12 noon.
21.520 13.94	W2XE	485 Madison Ave., 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 11.800-15.160 mc.)
21.500 13.95	NAA	Washington, D. C. (E) Time signals.
21.470 13.97	GSH ●	Daventry, England. (see 26.100 mc.) Daily 5:45-8:55 a.m.; 9:15 a.m.-12 noon.
21.460 13.98	WIXAL	World Wide Broadcasting Corp., University Club, Boston, Mass. O: **News, Blaze Away.** C: **Star Spangled Banner. Irregular.**
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 15.230-11.840 mc.)
21.420 14.01	WKK	American Tel. and Tel. Co., Long Lines Dept., 32 Sixth Ave., New York, N. Y. (Lawrenceville, N. J.) (P) Phones LSN-PSA daytime; HJY-OCI-OCJ irregular.
21.260 14.11	WBU	Radio Corporation of America, RCA Frequency Bureau, 30 Rockefeller Plaza, New York, N. Y. (Rocky Point, N. Y.) (P) Irregular.
21.220 14.14	WQA	Rocky Point, N. Y. (P) Irregular (see 21.260 mc.)
21.160 14.19	LSL	Compania Internacional, 143 Defensa, Buenos Aires, Arg. (P) Phones GAA mornings; DFB-DHO-PSE-EHY irreg.
21.140 14.19	KBI	Manila, P. I. Radio Corporation of America, RCA Frequency Bureau, 30 Rockefeller Plaza, New York, N. Y. (P) Tests and relays p.m. irregular.
21.080 14.23	PSA	Cia Radio Internacional do Brazil, Caixo Postal 709, Rio de Janeiro, Brazil. (P) Phones WKK-WLK daytime.
21.060 14.25	KWN	Transpacific Communication Co. Ltd., 140 Montgomery St., San Francisco (Location: Dixon, Calif.) (P) Phones afternoon irregular.
21.020 14.29	LSN	Buenos Aires, Arg. (P) Phones WKK-WLK daily; EHY, FTM irregular (see 21.160 mc.)
20.910 14.35	PSB	Rio de Janeiro, Brazil. (P) Phones N. Y. and Madrid irreg. (see 21.080 mc.)
20.860 14.38	EHY	Pigy Margall 2, Madrid, Spain. (P) Phones LSM-PPU-LSY mornings.
20.860 14.38	EDM	Madrid, Spain. (P) Phones LSM-PPU-LSY mornings. (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) Phones Java days.
20.830 14.40	PFF	Kootwijk, Holland. (P) Phones Java Java days.
20.825 14.41	PFF	Kootwijk, Holland, (P) Jhones Java days (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) Phones Far East a.m.
20.500 14.63	DGQ	Nauen, Germany. (P) Phones irreg. (see 27.800 mc.)
20.380 14.72	GAA	Engr.-In-Chiefs Office (Radio Branch) GPO-Armour House, London E.C.1. England. (Location: Rugby) (P) Phones LSL mornings; LSY-LSM-PPU irregular.
20.140 14.90	DGW	Nauen, Germany. (P) Phones irreg. (see 27.800 mc.)
20.040 14.97	OPL	Radio Lepoldville, Leopoldville, Belgian Congo Africa. (P) Tests with ORG mornings and noon.
20.020 14.99	DFZ	Nauen, Germany. (P) Phones PPU-LSM-PSA-LSL-YVR a.m. (see 27.800 mc.)
19.987 15.01	CFA	Canadian Marconi Co., Drummondville, Que., Can. (P) Phones North America irregular.
19.980 15.02	KAX	Manila, P. I. (P) Phones KWU evenings; DFC-JVE a.m.; early a.m. (see 21.140 mc.)
19.947 15.14 15.04	DLO	Rehmate, Germany. (P) Phones irreg. (see 27.800 mc.)
19.820	WKN	Lawrenceville, N. J. (P) Phones GAU a.m. (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) Phones irreg. (see 27.800 mc.)
19.680 15.24	CEC	Cia Internacional de Radio, Casilla 16-D, Santiago, Chile. (P) Phones OCI-HJY afternoons.
19.620 15.29	VQG	Nairobi, Kenya, Africa. (P) Phones GAD 7-8 a.m. (see 6.082 mc.)
19.600 15.31	LSF	Transradio Internacional, San Martin 329, Buenos Aires, Arg. (P) Phones and tests irregularly
19.530 15.36	EDR2	Madrid, Spain. (P) Phones LSM-PPU-YVR mornings (see 20.860 mc.)
19.530 15.36	EDX	Madrid, Spain. (P) Phones LSM-PPU-YVR mornings (see 20.860 mc.)
19.520 15.37	IRW	Italo Radio, via Calabria N. 46/48, Rome, Italy. (P) Phones LSM-PPU mornings. Broadcasts irregularly.
19.500 15.40	LSQ	Buenos Aires, Arg. (P) Phones daytime irregularly (see 19.600 mc.)
19.460 15.42	DFM	Nauen, Germany. (P) Phones irreg. (see 27.800 mc.)
19.355 15.50	FTM	166 Rue de Montmartre, Paris, France (Location: St. Assise). (P) Phones LSM-PPU-YVR mornings.
19.345 15.52	PMA	J. Sanders, Chief Engr., Java Wireless Stations, Bandoeng, Java. (P) Phones Amsterdam 3-11 a.m.
19.260 15.58	PPU	Companhia Radiotelegraphica Brasileira, Caixa Postal 500, Rio de Janeiro, Brazil. (P) Phones DFB-EHY-FTM mornings.
19.220 15.61	WKF	Lawrenceville, N. J. (P) Phones GAS-GAU mornings (see 21.420 mc.)
19.200 15.62	ORG	Brussels, Belgium. (P) Phones OPL a.m.
19.160 15.66	GAP	Rugby, England. (P) Phones Australia a.m. (see 20.380 mc.)
19.140 15.68	LSM	Buenos Aires, Arg. (P) Phones DFB-FTM-GAA-GAB a.m. (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.
18.970 15.81	GAQ	Rugby, England. (P) Phones ZSS a.m. (see 20.330 mc.)
18.960 15.82	WQD	Rocky Point, N. Y. (E) Tests LSY irreg. (see 21.260 mc.)
18.920 15.85	WQE	Rocky Point, N. Y. (E) Programs, irreg. (see 21.260 mc.)
18.910 15.86	JVA	Nazaki, Japan. International Wireless Telephone Company of Japan, Osaka Bldg., Tokyo, Japan. Europe Days to 8:30 p.m.
18.890 15.88	ZSS	Overseas Communications, P. O. Box 962, Capetown, South Africa (Location, Klipheuvel). (P) Phones GAQ-GAU mornings.
18.880 15.89	WQH	Rocky Point, N. Y. (P) Irregular. (see 21.260 mc.)
18.825 15.94	PLE	Bandoeng, Java. (P) Phones San Francisco 7-8:30 a.m. Tokyo 8:30 p.m.-7 a.m. (see 19.345 mc.)
18.776 15.98	TYD-3	Compagne Generale de Telegraphie Sans Fil, 79 Blvd. Haussmann, Paris, France. (P) Phones Madagascar.
18.700 16.04	DFQ	Nauen, Germany. (P) Phones irreg. (see 27.800 mc.)
18.680 16.06	OCI	All America Cables Co., Inc., Lima, Peru. (P) Phones CEC-HJY days; WKK-WOP noon.
18.640 16.09	PSC	Rio de Janerio, Brazil. (P) Phones N. Y. and B. A. irreg. (see 21.080 mc.)
18.620 16.11	GAU	Rugby, England. (P) Phones VWY ZSS early a.m.; Lawrenceville daytime (see 20.380 mc.)
18.545 16.18	PCM	Kootwijk, Holland. (P) Relays and phones Java early a.m. (see 20.835 mc.)
18.540 16.19	PCM	Kootwijk, Holland. (P) Relays and phones Java early a.m. (see 20.835 mc.)
18.535 16.20	PCM	Kootwijk, Holland. (P) Relays and phones Java early a.m. (see 20.835 mc.)
18.480 16.23	HBH	Geneva, Switzerland. (E) Relays to N. Y. mornings irreg. (see 18.450 mc.)
18.450 16.26	HBF	Geneva, Switzerland. (E) Commercial: irreg. (see 14.535mc.
18.440 16.25	HJY	Marconi Telegraph Co., Apartado 1591, Bogota, Colombia. (P) Phones CEC-OCI noon; music irreg.
18.410 16.29	PCK	Kootwijk, Holland. (P) Phones PLE-PMC early a.m. (see 20.835 mc.)
18.405 16.30	PCK	Kootwijk, Holland. (P) Phones PLE-PMC early a.m. (see 20.835 mc.)
18.400 16.31	PCK	Kootwijk, Holland. (P) Phones PLE-PMC early a.m. (see 20.835 mc.)
18.388 16.31	FZS	Postale Boite 238, Saigon, Indo-China. (P) Phones FTK early mornings.
18.340 16.36	WLA	Lawrenceville, N. J. (P) Phones GAS a.m. (see 21.420 mc.)
18.310 16.38	GAS	Rugby, England. (P) Phones WLA-WMN mornings (see 20.380 mc.)
18.295 16.39	YVR	Maracay, Venezuela. (P) Phones DFB-EHY-FTM mornings.
18.270 16.42	IUD	Minister of Marine, Addis Ababa, Ethiopia. (E) Irregular.
18.250 16.43	FTO	St. Assise, France. (P) LSM-LSY a.m. (see 19.355 mc.)
18.220 16.46	KUS	Manila, P. I. (P) Phones Bolinas nights (see 21.140 mc.)
18.200 16.48	GAW	Rugby, England. (P) Relays and phones N. Y. irreg. (see 20.380 mc.)
18.190 16.49	JVB	Nazaki, Japan. (P) Phones Java early mornings, U. S. evenings (see 18.910 mc.)
18.180 16.51	CGA	Drummondville, Que. (P) Phones GBB a.m. (see 19.987 mc.)
18.135 16.54	PMC	Bandoeng, Java. (P) Phones Amsterdam 3-11 a.m. (see 19.345 mc.)
18.115 16.56	LSY3	Buenos Aires, Arg. (E) Phones DFB-FTAM-GAA-PPU a.m.; evening broadcasts occasionally (see 19.600 mc.)
18.090 16.58	TYE-1	Paris, France. (P) Phones New York evenings (see 18.776 mc.)
18.075 16.59	PCV	Kootwijk, Holland. (P) Phones PLE early mornings (see 20.835 mc.)
18.070 16.60	PCV	Kootwijk, Holland. (P) Phones PLE early mornings (see 20.835 mc.)
18.065 16.61	PCV	Kootwijk, Holland. (P) Phones PLE early mornings (see 20.835 mc.)
18.060 16.61	KUN	Bolinas, Calif. (P) Phones Manila afternoons and nights (see 20.820 mc.)
18.040 16.63	GAB	Rugby, England. (P) Phones LSM noon (see 20.380 mc.)

18.020 16.65	KQJ	Bolinas, Calif. (P) Phones afternoons; irregular (see 20.820 mc.)
17.980 16.69	KQZ	Bolinas, Calif. (E) Tests and relays to LSY irreg. (see 20.820 mc.)
17.940 16.72	WQB	Rocky Point, N. Y. (E) Tests with LSY, a.m. (see 21.260 mc.)
17.900 16.76	WLL	Rocky Point, N. Y. (E) Relays to Geneva and Germany, a.m. (see 21.260 mc.)
17.850 16.81	LSN	Buenos Aires, Arg. (P) Phones S. A. irreg. (see 21.160 mc.)
17.790 16.86	GSG	Daventry, England (see 26.100 mc.) Daily 2-4:15 a.m., 5:45-8:55 a.m. 9:15-10:30 a.m. 12:20-3:45 p.m. 4-6 p.m. 9-11 p.m.
17.785 16.87	JZL	Nazaki, Japan (see 21:520 mc.) Irregular.
17.780 16.87	W3XAL	30 Rockefeller Plaza, New York, N. Y. Daily 9 a.m.-6:15 p.m., 7-9 p.m.
17.780 16.87 ◆	W9XAA	666 Lake Shore Drive, Chicago, Ill. S: 3 chimes each 15 minutes. O: **Star Spangled Banner.**
17.770 16.88	PHI	Philips Radio, Hilversum, Holland. Call: Seven languages. I: Metronome 80 beats per minute. C: National Anthem. Sun., 7:25-10:25 a.m., Mon., Tues., Thurs., Fri. 8:25-10 a.m., Sat. 8:25-10:20 a.m.
17.760 16.89	DJE	German Short Wave Station, Broadcasting House, Berlin, Germany. I: 9 musical notes., Folk Song. C: National **Horst-Wessel Lied and Deutschlandlied.** Daily 12:05-11 a.m.; Sunday 11:10 a.m.-12:25 p.m.
17.760 16.89 ◆	W2XE	Wayne, N. J. (see 21.520 mc.) Mon. to Fri. 6:15-8 p.m. Sat., Sun. 6:30-8 p.m.
17.755 16.90	ZBW-5	Hong Kong, China (see 9.525 mc.)
17.750 16.91	IAC	Director, Centro di Coltano Radio, Pisa, Italy. (P) Phones and tests to ships a.m.
17.740 16.91	HSP	Superintending Engineer, Post and Telegraph Dep't., Radio Technical Section, Bangkok, Siam. (P) Phones DFB early a.m.
17.710 16.94	CJA-3	Drummondville, Que. (P) Phones Australia and Far East early a.m. (see 19.987 mc.)
17.699 16.95	IAC	Pisa, Italy. (P) Phone and tests to ships a.m. (see 17.750 mc.)
17.650 17.00	XGM	Radio Administration. Sassoon House, Shanghai, China. (P) Phones irreg.
17.620 17.03	IBC	San Paolo, Italy. (P) Irregular.
17.545 17.10	VWY	Poona, India. (P) Phones GAU-GBC-GBU mornings.
17.520 17.12	DFB	Nauen, Germany. (P) Phones PPU-YVR-KAY mornings (see 27.800 mc.)
17.480 17.16	VWY	Poona, India. (P) Phones GAU-GBC-GBU daytime.
17.341 17.30	DGR	Nauen, Germany. (P) Phones irreg. (see 27.800 mc.)
17.280 17.36	FZE8	Djibouti, French Somaliland, Africa. (P) Irregular.
17.265 17.38	DAF	Norddeich, Germany. (P) Phones ships irreg. (see 27.800 mc.)
17.260 17.37	CMA5	Cuba Transatlantic Radio Corp. Apartado No. 65, Havana, Cuba. (P) Phones and tests evenings.
17.260 17.37	DAN	Nordenland, Germany. (P) Phones ships a.m. (see 27.800 mc.)
17.120 17.52	WOO	Ocean Gate, N. J. (P) Phones ships daytime.
17.120 17.52	WOY	Lawrenceville, N. J. (P) Phones England irregularly (see 21.420 mc.)
17.080 17.56	GBC	Rugby, England. (P) Phones ships daytime (see 20.380 mc.)
16.910 17.54	JZD	Nazaki, Japan. (P) Phones ships irreg. (see 18.910 mc.)
16.385 18.31	ITK	Mogdishu, Somaliland, Africa. (P) Irregular.
16.305 18.39	PCL	Kootwijk, Holland. (P) Special relays and phones irreg. (see 20.835 mc.)
16.300 18.44	WLK	Lawrenceville, N. J. (P) Phones England irreg. (see 21.420 mc.)
16.250 18.46	FZR	Saigon, Indo-China. (P) Phones FTA-FTK early a.m. (see 18.388 mc.)
16.240 18.47	KTO	Manila, P. I. (P) Phones JVE-KWU evenings (see 21.140 mc.)
16.140 18.59	GBA	Rugby, England. (P) Phones, Argentina & Brazil irreg. (see 20.380 mc.)
16.117 18.62	IRY	Rome, Italy. (P) Phones IDU-ITK a.m.
16.050 18.69	JVC	Nazaki, Japan. (P) Phones Hong Kong early a.m. (see 18.910 mc.)
16.030 18.71	KKP	Radio Corporation of America, RCA Frequency Bureau, 30 Rockefeller Plaza, New York, N. Y. (Location, Kahuku, Hawaii. (P) KWU a.m. & p.m. Tests JVF-KTO-PLE mornings.
15.930 18.83	FYC	Pontoise, France. (P) Phones 9:00 a.m. and irreg.
15.880 18.89	FTK	St. Assise, France. (P) FZR-FZS-LSM-PPU-YVR mornings (see 19.355 mc.)
15.860 18.90	JVD	Nazaki, Japan. (P) Phones Shanghai early a.m.; to KWU 4 p.m. and 4 a.m. daily. (see 18.910 mc.)
15.860 18.90	CEC	Santiago, Chile. (P) Phones OCJ a.m. (see 19.680 mc.)
15.810 18.97	LSL	Buenos Aires, Arg. (P) GAA, a.m.; GCA, PSE, PSF, p.m. (see 21.160 mc.)
15.800 18.99	XOJ	Shanghai, China. (E) Phones GBA 6-7 a.m., KWO-KWU 8-11 p.m. (see 17.650 mc.)
15.760 19.04	JYT	Kemikawa-Cho, Japan. (E) Tests KKW-KWE-KWU evenings.
15.740 19.06	JIA	Chureki, Japan. (P) Nazaki early a.m.
15.700 19.11	WJS	Press Wireless Inc., Little Neck, L. I., N. Y. (Location, Hicksville, N. Y.) (P) Phones Ethiopia irregular.
15.660 19.16	JVE	Nazaki, Japan. (P) Phones PLE early a.m.; KTO eves. (see 18.910 mc.)
15.625 19.20	DCJ	Lima, Peru. (P) Phones CEC days (see 18.680 mc.)
15.620 19.21	JVF	Nazaki, Japan. (P) Phones KWO-KWU after 4 p.m. (see 18.910 mc.)
15.550 19.29	CO9XX	Frank H. Jones, Tuinucu, Cuba (E) Irregular.
15.530 19.32	HSC-2	Bangkok, Siam. (P) Phones JVE late p.m. and early a.m. (see 17.740 mc.)
15.530 19.32	HS8PJ	Bangkok, Siam (see 19.020 mc.) Occasional Mondays 8-10 a.m.
15.505 19.36	CMA-3	Havana, Cuba. (P) Phones and tests irregularly (see 17.260 mc.)
15.490 19.37	KEM	Bolinas, Calif. (P) Phones Java and China; irregular (see 20.820 mc.)
15.475 19.39	KKL	Bolinas, Calif. (P) Phones Manila and Japan; irregular (see 20.820 mc.)
15.460 19.41	KKR	Bolinas, Calif. (P) Phones Manila and Japan; irregular (see 20.820 mc.)
15.450 19.42	IUG	Addis Ababa, Ethiopia. (P) Phones irregular (see 18.270 mc.)
15.430 19.44	KWE	Bolinas, Calif. (P) Tests JYK-JYT-PLE evenings (see 20.820 mc.)
15.415 19.46	KWO	Dixon, Calif. (P) Phones JVF evenings (see 21.060 mc.)
15.370 19.52	HAS-3	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 19.53	DZG	Zeesen, Germany (see 17.760 mc.) **Irregular.**
15.355 19.54	KWU	Dixon, Calif. (P) Phones Japan. Manila and Java evenings (see 21.060 mc.)
15.340 19.56	DJR	Zeesen, Germany (see 17.760 mc.) Daily 8-9 a.m.; 4:50-10:45 p.m.
15.330 19.56	W2XAD	General Electric Co., 1 River Rd., Schenectady, N. Y.; O: Spark Discharge. C: **Star Spangled Banner.** Daily 11 a.m.-9 p.m.
15.320 19.58	OLR5B	Prague, Czechoslovakia, (see 21.450 mc.) **Irregular** (see 15.230-11.840 mc.)
15.310 19.60 ●	GSP	Daventry, England (see 26.100 mc.) Daily 6:20-8:30 p.m.
15.300 19.61	YDB	Soerabaja, Java. Daily 7:30 p.m.-2 a.m. (see 15.150 mc.)
15.300 19.61	XEBM	P. O. Box 50, Mazatlan, Mexico. Daily 9-10 a.m.; 1-2 p.m., 8-10 p.m.
15.290 19.62	LRU	Radio El Mundo, Maipu, 555, Buenos Aires, Argentina, S.A. O-C: English only. Daily 7-9 a.m.
15.280 19.63	HI3X	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 19.63	DJQ	Zeesen, Germany (see 17.760 mc.) Daily 12:05-5:45 a.m.; 6-8 a.m.; 8:10-11 a.m.; 4:50-10:45 p.m. Sunday 11:10 a.m.-12:25 p.m.
15.270 19.64	W2XE	Wayne, N. J. (see 21.520 mc.) Mon. to Fri. 1-6 p.m. 8 p.m.-12 a.m. Sat. & Sun. 2:30-6 p.m. 8 p.m.-12 a.m.
15.260 19.66 ●	GSI	Daventry, England (see 26.100 mc.) Daily 12:20-3:45 p.m. 9-11 p.m.
15.252 19.67	RIM	Tashkent, U.S.S.R. (P) Phones RKI early mornings (see 14.790 mc.)
15.250 19.67	W1XAL	Boston, Mass. (see 21.460 mc.) Week days 2:30-4:30 p.m. Sundays 10:15 a.m.-12 noon.
15.243 19.68	TPA-2	Minister des Postes, Boulevard Haussmann, 98, Bis., Paris, France. I: Three tones **F** in Morse. O-C: **La Marseillaise;** S: chimes ¼ hour. Daily 6-11 a.m.
15.230 19.70	OLR5A	Prague, Czechoslovakia (see 21.450 mc.) Daily 2-2:15 p.m. **News.**
15.220 19.71	PCJ	Philips Radio, Hilversum, Holland. Tues. 4:30-6 a.m., Wed. 8-11 a.m.
15.210 19.72	W8XK	Pittsburgh, Pa. (see 21.540 mc.) Daily 9 a.m.-7 p.m.
15.200 19.74	DJB	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 19.75	ZBW-4	Hong Kong, China (see 9.525 mc.)
15.183 19.76	RV96	Moscow, U.S.S.R. (see RKI 15.040 mc.) **Irregular.**
15.180 19.76 ●	GSO	Daventry, England (see 26.100 mc.) Daily 2-4:15 a.m.; 4-6 p.m.; 6:20-8:30 p. m.
15.160 19.79	OLR5C	Prague, Czechoslovakia (see 21.450 mc.) **Irregular** (see 15.230-11.840 mc.)
15.160 19.79	XEWW	Mexico, D. F. (see 9.500 mc.) Daily 9 a.m.-12 midnight.
15.160 19.79	JZK	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.
15.155 19.80	SM5SX	Royal Technical University, Stockholm, Sweden. Daily 11:00 a.m.-5 p.m.
15.150 19.80	YDC	N.I.R.O.M., Koningsplein West 5, Batavia, Java, N.E.I. (Location-**Soerabaja**). 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 19.82 ●	GSF	Daventry, England (see 26.100 mc.) Daily 10:45 a.m.-12 noon; 1-6 p.m.; 6:20-8:30 p.m.
15.121 19.84	HVJ	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 19.85	DJL	Zeesen, Germany (see 17.760 mc.) Daily 12-2 a.m.; 8-9 a.m.; 11:35 a.m.-4:30 p.m.; Sunday 6-8 a.m.
15.055 19.92	WNC	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 19.91	PSD	Rio de Janeiro, Brazil. (P) Phones B. A. irreg. (see 21.080 mc.)
15.040 19.95	RKI	Radio Centre, Solianka 12, Moscow, USSR. Call: "This is Moscow Calling." O-C: **Internationale.** Irregular. **No I.R.C. required.**
15.040 19.95	HIR	Compania Dominicana de Telefones, Ciudad Trujillo, R. D. (P) Phones WNC days.
14.985 20.02	YSL	Director of Communicacions, Rep. of El Salvador, San Salvador, Salvador. (P) Phones days irreg.
14.980 20.03	KAY	Manila, P. I. (P) Phones DFC-DFD-GCJ early a.m.; KWU evenings (see 21.140 mc.)
14.970 20.04	LZA	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 20.06	HJB	Bogota, Colombia. (P) Phones WNC-PPU-YVQ days (see 18.440 mc.)
14.940 20.06	HJA-3	Compania Telefonica Central, Bogota,, Colombia (Location, Barranquilla.) (P) Phones 8 a.m.-8 p.m.
14.940 20.06	HJA-9	El Centro, Colombia. (P) Phones 8 a.m.-8 p.m. (see 14.940 mc.)
14.940 20.06	HIH	Ciudad Trujillo, R.D. (P) Phones 8 a.m.-8 p.m. (see 15.040 mc.)
14.935 20.07	PSE	Rio de Janeiro, Brazil. (P) Phones LSL-WLK day irreg.; EDM-EHY 8 a.m. Broadcasts German program 4-4.10 p.m. Wednesdays (see 21.080 mc.)
14.920 20.11	KQH	Kahuku, Hawaii. (P) Tests irregularly (see 16.030 mc.)
14.910 20.12	JVG	Nazaki, Japan. (P) Phones Formosa and broadcasts 1-2:30 a.m. irreg. (see 18.910 mc.)
14.845 20.19	OCJ2	Lima, Peru. (P) Phones HJY and others daytime (see 18.680 mc.)
14.800 20.27	WQV	Rocky Point, N. Y. (E) Tests Europe irreg. (see 21.260 mc.)
14.790 20.28	RIZ	Radio Centre, Solianka 12, Moscow, U.S.S.R. (Location: Irkutsk). (P) Calls RKI 9:30 a.m. (see 21.260)
14.770 20.31	WEB	Rocky Point, N. Y. (E) Tests with Europe; irregular (see 21.260 mc.)
14.730 20.37	IQA	Rome, Italy. (P) Phones Japan and Egypt: sends music at times. (see 19.520 mc.)
14.690 20.42	PSF	Rio de Janeiro, Brazil. (P) Phones LSL-WLK-WOK daytime (see 21.080 mc.)
14.665 20.46	DFD	Nauen, Germany. (P) Phones irreg. (see 27.800 mc.)
14.653 20.47	GBL	Rugby, England. (P) Phones Nazaki early a.m. (see 20.380 mc.
14.620 20.52	EHY	Madrid, Spain. (P) Phones LSM mornings irreg. (see 20.860 mc.)
14.620 20.52	EDM	Madrid, Spain. (P) Phones PPU-PSA-PSE mornings (see 20.860 mc.
14.605 20.54	DGZ	Nauen, Germany. (P) Phones irreg. (see 27.800 mc.)
14.600 20.55	JVH	Nazaki, Japan (see 21.520 mc.) **Irregular.**
14.590 20.56	WMN	Lawrenceville, N. J. (P) Phones England days (see 21.420 mc.)
14.535 20.64	HBJ	Radio Suisse, S.A., 12, Quai de la Poste, Geneva, Switzerland. No opening or closing selection. Call —"League of Nations Wireless." Saturdays 6:45-8:30 p.m.
14.530 20.65	LSN	Buenos Aires, Arg. (P) Phones PSF-WLK-WOK irreg. (see 21.160 mc.)
14.485 20.71	TIR	Tropical Radio Telegraph Co., San Jose, Costa Rica (Location, Cartago). (P) Phones WNC days.
14.485 20.71	TIU	Cartago, Costa Rica (P) Phones WNC days (see 14.485 mc.)
14.485 20.71	YNA	Tropical Radio Telegraph Co., Managua, Nicaragua. (P) Phones WNC days.

14.485 HPF
20.71
Tropical Radio Telegraph Co., Panama City, Panama. (P) Phones daytime.

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

14.485 HRM
20.71
Tela, Honduras. (P) Phones WNC days (see 14.485 mc.)

14.485 TGF
20.71
Tropical Radio Telegraph Co., Guatemala City, Guat. (P) Phones WNC days.

14.485 HRL5
20.71
La Lima, Honduras. (P) Phones WNC 5:45 p.m. (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) Phones England day time (see 21.420 mc.)

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

14.440 GBW
20.78
Rugby, England. (P) Phones Lawrenceville daytime (see 20.380 mc.)

14.410 DOT
20.82
Konigs W'n, Germany. (P) Phones irreg. (see 27.800 mc.)

14.410 IBC
20.82
San Paolo, Italy. (P) Irregular.

14.250 WIOXDA
21.00
Schooner Morrissey. (P) Irregular.

13.990 GBA2
21.44
Rugby, England. (P) Phones Argentina & Brazil irreg. (see 20.380 mc.)

13.900 WQP
21.58
Rocky Point, N. Y. (E) Tests daytime (see 21.260 mc.)

13.820 SUZ
21.70
P. O. Box 795, Cairo, Egypt. (P) Phones DFC-DGU-GBB daytime.

13.780 KKW
21.77
Bolinas, Calif. (P) Special relays; tests afternoon and evening (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) Phones Europe irreg. (see 19.987 mc.)

13.738 RIS
21.82
Tiflis, U.S.S.R. (P) Tests with Moscow irregular (see 14.790 mc.)

13.720 KLL
21.87
Bolinas, Calif. (P) Special relays; tests afternoon and evening (see 20.820 mc.)

13.690 KKZ
21.91
Bolinas, Calif. (P) Tests Japan and Java early a.m.; days Honolulu (see 20.820 mc.)

13.667 HJY
21.98
Bogota, Colombia. (P) Phones CEC afternoons (see 18.440 mc.)

13.635 SPW
22.00
Polskie Radio, 5, Mazowiecka St., Warsaw, Poland. Mon., Wed., Fri. 12:30-1:30 p.m. Sun. 11:30 a.m.-1:30 p.m.

13.610 JYK
22.04
Kemikawa-Cho, Japan. (E) Tests irregular a.m.

13.600 ZMBJ
22.06
TSS **Awatea**, Union Line S.S., Coy Head Office, Wellington, New Zealand. Daily 1-3 a.m., Sundays 6:30-7 p.m.

13.595 GBB2
22.07
Rugby, England. (P) Phones Canada days (see 20.380 mc.)

13.585 GBB
22.08
Rugby, England. (P) Phones CGA3-SUV-SUZ daytime (see 20.380 mc.)

13.560 JVI
22.12
Nazaki, Japan. (P) Phones Manchukuo irregularly (see 18.910 mc.)

13.465 WKC
22.28
Rocky Point, N. Y. (E) Tests and relays irregular (see 21.260 mc.)

13.435 WKD
22.33
Rocky Point, N. Y. (E) Tests and relays irregular (see 21.260 mc.)

13.415 GCJ
22.36
Rugby, England. (P) Tests with JVH afternoons (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.

13.410 YSJ
22.37
San Salvador, Salvador. (P) Phones WNC days (see 14.985 mc.)

13.390 WMA
22.40
Lawrenceville, N. J. (P) Phones GAS-GBS-GBU-GBW daily (see 21.420 mc.)

13.380 IDU
22.42
Asmara, Eritrea, Africa. (P) Phones Italy early a.m. and sends music.

13.370 WOJ
22.44
Hialeah, Florida. (P) Phones 8 a.m.-8 p.m. (see 15.055 mc.

13.345 YVQ
22.48
Maracay, Venezuela. (P) Phones WNC-HJB days.

13.285 CGA3
22.58
Drummondville, Que. (P) Phones England days (see 19.987 mc.)

13.275 DAF
22.60
Norddeich, Germany. (P) Phones ships irreg. (see 27.800 mc.)

13.240 KBJ
22.66
Manila, P. I. (P) Phones nights and early a.m. (see 21.140 mc.)

13.220 IRJ
22.70
Rome, Italy. (P) Phones Japan 5-8 a.m., and works Cairo days.

13.180 DGG
22.76
Nauen, Germany. (P) Relays to Riverhead days (see 27.800 mc.)

13.100 DAF
22.90
Norddeich, Germany. (P) Phones ships irreg. (see 27.800 mc.)

13.020 JZE
23.04
Nazaki, Japan. (P) Phones ships irreg. (see 18.910 mc.)

13.000 TYC
23.08
Paris, France. (P) Phones CNR a.m. (see 18.776 mc.)

12.985 DFC
23.10
Nauen, Germany. (P) Phones KAY-SUV-SUZ early a.m. (see 27.800 mc.)

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

12.860 RKR
23.33
Novosibirsk, U.S.S.R. (P) Daily 7 a.m. (see 14.790 mc.)

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

12.830 HJC
23.37
Barranquilla, Colombia. (P) Phones HJB-HPF-WNC days (see 14.940 mc.)

12.830 HJA-3
23.38
Barranquilla, Colombia. (P) Phones HJB-HPF-WNC days (see 14.940)

12.830 CNR
23.38
Director General des Postes, Rabat, Morocco. (P) Phones FYB-TYB-FTA near 4 p.m. Special broadcasts 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 VWY early a.m. (see 20.830 mc.)

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

12.300 CB615
24.39
Radio Service, Desmaras and Cia., Ltd., Casilla 761, Santiago, Chile, S.A. Daily 12-2 p.m. 5-8 p.m.

12.300 PLM
24.39
Bandoeng, Java. (P) Phones 2ME near 6:30 a.m. (see 19.345 mc.)

12.295 ZLU
24.40 ●
Supt. Posts and Telegraph, G.P.O., Wellington, New Zealand. (P) Phones ZLJ early a.m.

12.290 GBU
24.41
Rugby, England. (P) Phones Lawrenceville days (see 20.380 mc.)

12.280 KUV
24.43
Manila, P. I. (P) Phones early a.m. (see 21.140 mc.)

12.250 TYB
24.49
Paris, France (P) Phones JVH-XGR and ships irreg. (see 18.776 mc.)

12.235 TFJ
24.52
Reykjavik, Iceland. (P) Phones England days.

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.

12.220 FLJ
24.55
Paris, France. (P) Phones ships irreg. (see 18.776 mc.)

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

12.150 GBS
24.69
Rugby, England. (P) Phones Lawrenceville days (see 20.380 mc.)

12.130 DZE
24.73
Zeesen, Germany (see 17.760 mc..) **Irregular.**

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 CJA
24.79
Drummondville, Que. (P) Tests VIY early a.m. and evenings (see 19.987 mc.)

12.055 PDV
24.90
Kootwijk, Holland. (P) PLE-PLV-PMC early mornings (see 20.835 mc.)

12.050 PDV
24.88
Kootwijk, Holland. (P) PLE-PLV-PMC early mornings (see 20.835 mc.)

12.035 DGL
24.93
Nauen, Germany. (P) Phones irreg. (see 27.800 mc.)

12.055 PDV
24.89
Kootwijk, Holland. (P) PLE-PLV-PMC early mornings (see 20.835 mc.)

12.020 VIY
24.95
Amalgamated Wireless Ltd., 47 York St., Sydney, Australia (Location Rockbank). (P) Tests CJA6 early a.m. and evenings.

12.000 RNE
25.00
Moscow, U.S.S.R. (see RKI, 15.040 mc.) Sun. 6-7 a.m.; 10-11 a.m.; 4-5 p.m.; Mon. 4-5 p.m.; Wed. 6-7 a.m.; 4-5 p.m.; Fri. 4-5 p.m.

11.991 FZS
25.02
Saigon, Indo-China. (P) Phones FTA-FTK early a.m. (see 18.388 mc.)

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

11.955 IBC
25.09
San Palo, Italy. (P) Irregular.

11.955 IUC
25.09
Addis Ababa, Ethiopia. (E) 12-1 a.m.; music at times (see 18.270 mc.)

11.950 KKQ
25.11
Bolinas, Calif. (P) Relays programs to Hawaii eve. (see 20.820 mc.)

11.940 FTA
25.13
St. Assise, France. (P) Phones FZS-FZR early a.m. (see 19.355 mc.)

11.935 YNA
25.14
Managua, Nicaragua. (P) Cent. and S. A. stations, days. (see 14.485 mc.)

11.900 XEWI
25.21
P. O. Box 2874, Mexico, D.F. S: 2 strokes gong. O-C: **May Angels Guard Thee.** Sun. 12:30-2 p.m. Mon., Wed., Fri. 3-4 p.m.; 9 p.m.-12 a.m.; Tues., Thurs. 7:30 p.m.-12 a.m.; Sat. 9 p.m.-12 a.m. (see 6.015 mc.)

11.900 OLR4D
25.21
Prague, Czechoslovakia (see 21.450 mc.) **Irregular** (see 15.230-11.840 mc.)

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: threo notes gong, thrice (9) ea. 30 mins. O-C: **El Tambor de la Algeria.** Daily 7:30-9:30 p.m. **Veri cards free.**

11.885 TPA3
25.24
Pontoise, France (see 15.243 mc.) Daily 2-5 a.m. 12:15-6 p.m.

11.880 XEXA
25.25
Secretaria de Educacion 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** (see 15.230-11.840 mc.)

11.870 W8XK
25.26
Pittsburgh, Pa. (see 21.540 mc.) Daily 7-9 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 (see 17.760 mc.) **Irregular.**

11.840 OLR4A
25.34
Prague, Czechoslovakia (see 21.450 mc.) Daily 2:30-4:30 p.m. Mon. & Thurs. 7-9:10 p.m.

11.840 KZRM
25.34
Erlanger and Galinger, Inc., Regina Bldg., David St., Manila, P. I. Daily 4-10 a.m. (see 9.570 mc.)

11.830 W2XE
25.36 ◆
Wayne, N. J. (see 21.520 mc.)

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, Son. 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 2RO-4
25.40
5 Via Montello, Rome, Italy. O: **Bells of Rome.** C: **Italian Royal March and Giovinezza.** I: bird call—black cap bird. Daily 6:43 a.m.-6 p.m.; Sat. off 5:30 p.m. Am. Hours—M, W, F, 6-7:30 p.m. So. Am. Hr. T, Th, S, 6-7:45 p.m.

11.805 OXY
25.41
Skamleback, Denmark (see 6.060 mc.) Daily 5-10 p.m.

11.801 OER-2
25.42
Osterr. Radioverkehrs A.G., Johannesgasse 4h, 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 JZJ
25.42
Nazaki, Japan (see 21.520 mc.) Daily 8-9 a.m.; 3-4 p.m.; 4:30-5:30 p.m.

11.800 COGF
25.42
General Betancourt 51, (Playa) Matanzas, 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 (see 17.760 mc.) **Irregular.**

11.790 W1XAL
25.43
Boston, Mass. (see 21.460 mc.) Daily exc. Sun. 5-6:30 p.m.

11.770 DJD
25.49
Zeesen, Germany (see 17.760 mc.) Daily 11:35 a.m.-4:30 p.m.; 4:50-10:45 p.m.

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

11.700 OLR4B
25.50
Prague, Czechoslovakia (see 21.450 mc.) **Irregular** (see 15.230-11.840 mc.)

11.750 GSD
25.53 ●
Daventry, England (see 26.100 mc.) Daily 2-4:15 a.m.; 12:20-3:45 p.m.; 6:20-8:30 p.m.; 9-11 p.m.

11.740 RKF
25.55
Moscow, U.S.S.R. (P) Calls U.S.S.R. phones often (see 14.790 mc.)

11.740 HP5L
25.55
Apartado 129, David, Chiriqui, Panama, C. A. Daily 4-7 p.m.

11.730 XETM
25.57
Villahermosa, Mexico. Daily 6-11 p.m.

11.730 PHI
25.57 ◆
Hilversum, Holland (see 17.770 mc.)

11.720 CJRX
25.60
Royal Alexandra Hotel, Winnipeg, Manitoba, Canada. Weekdays 6:30-11:00 p.m. Sundays 5-10 p.m.

11.720 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 YSM
25.62
Director of Communicaciones, San Salvador, El Salvador, C. A. Daily 8-10:30 p.m.

11.710 Philco Radio
25.62
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
Jaurez 289, Guadalajara, Mexico. Daily 7-11 p.m.

11.710 VK9MI
25.62
M.V. **Kanimbia**, McIlwraith and McEacharn, Bridge St., Sydney, Australia. 11 p.m.-8 a.m. and later.

11.705 SBP
25.63
Chief Engineer, Motala, Sweden. Daily 6-9 a.m., 11 a.m.-4 p.m.

11.700 HP5A
25.64
P. O. Box 954, Panama City, Panama, C.A. O-C: "**Anvil Chorus**". Daily 10 a.m.-10:30 p.m.

11.680 K1O
25.68
Kahuku, Hawaii. (P) Phones Far East early a.m. (see 16.030 mc.)

11.670 PPQ
25.62
Rio de Janeiro, Brazil. (P) Phones WCG-WET-LSX evenings (see 19.260 mc.)

11.660 JVL
25.73
Nazaki, Japan. (P) Phones Taiwan eve. Broadcasts irreg. 1-2:30 a.m. (see 18.910 mc.)

11.595 VRR4
25.87
Stony Hill, Jamaica. (P) Phones WNC 5:45 p.m.

11.570 HH2T
25.93
Societe Haitienne Radiodiffusion, 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 CMB
25.95
Havana, Cuba. (P) Phones New York irreg. (see 17.260 mc.)

11.538 XGR 26.00 Shanghai, China. (P) Tests irregularly. (see 17.650 mc.)

11.500 XAM 26.09 Director General de Correos, Merida, Yucatan, Mexico. (P) Phones XDF-XDM-XDR irreg.

11.500 COCX 26.09 P. O. Box 32, Havana, Cuba. S: 5 bells. English each ½ hr. O-C: **Pajarillo Barrangueno.** Daily 8 a.m.-1 a.m.

11.495 VIZ3 26.10 Rockbank, Australia. (P) Tests CJA4 early a.m. (see 12.020 mc.)

11.413 CJA4 26.28 Drummondville, Que. (P) Phones VIZ3 early a.m. (see 19.987 mc.)

11.402 HBO 26.31 Geneva, Switzerland (see HBJ, 14.535 mc.) Mondays 12:40-1:40 a.m. Saturdays 6:45-8:30 p.m.

11.340 DAF 26.46 Norddeich, Germany. (P) Phones ships irreg. (see 27.800 mc.)

11.275 XAM 26.61 Merida, Mexico. (P) Phones XDR-XDM irregular (see 11.500 mc.)

11.050 ZLT 27.15 Wellington, N. Z. (P) Phones VLZ early mornings (see 12.295 mc.)

11.040 CSW 27.17 Emissora Nacional, Rua do Quelhas, Lisbon, Portugal. Daily 2-6 p.m.

11.000 PLP 27.27 J. Sanders, Chief Engr., Java Wireless Stations, Bandoeng, Java; D.E.I. 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.

10.975 OCI 27.35 Lima, Peru. (P) Phones CEC-HJY days (see 18.680 mc.)

10.975 OCP 27.35 Lima, Peru. (P) Phones HKB early evenings (see 18.680 mc.)

10.960 JZB 27.37 Nazaki, Japan. (see 21.520 mc.) **Irregular.**

10.955 HSG 27.38 Bangkok, Siam. (P) Phones irregularly (see 17.740 mc.)

10.940 FTH 24.73 St. Assise, France. (P) Phones So. America irreg. (see 19.355 mc.)

10.910 KTR 27.50 Manila, P. I. (P) Phones DFC early a.m. irreg. (see 21.140 mc.)

10.850 DFL 27.63 Nauen, Germany. (P) Relays programs afternoons irreg. (see 27.800 mc.)

10.840 KWV 27.68 Dixon, Calif. (P) Phones Japan, Manila, Hawaii, a.m. (see 21.060 mc.)

10.795 GCL 27.79 Rugby, England. (P) Phones Japan days (see 20.380 mc.)

10.790 YNA 27.80 Managua, Nicaragua. (P) Phones So. America days, irreg. (see 14.485 mc.)

10.770 GBP 27.86 Rugby, England. (P) JYS and XGR irreg.; Phones VLK early a.m. & p.m. (see 20.380 mc.)

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

10.680 PLQ 28.09 Bandoeng, Java. (P) Phones Kuala Lumpur, 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) Phones ZFB daytime (see 21.420 mc.)

10.670 CEC 28.12 Santiago, Chile. (P) Phones HJY-OCT daytime (see 19.680 mc.)

10.670 HPH 28.12 Panama City, Pana. (P) Phones 4:15-4:15 p.m. (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 PSG 28.14 Rio de Janeiro, Brazil. (P) Phones N. Y., B. A., Madrid (see 21.080 mc.)

10.660 JVN 28.14 Nazaki, Japan. (P) Phones JIB early a.m.; Relays JOAK irreg. (see 18.910 mc.)

10.660 JVN 28.14 Nazaki, Japan (see 21.520 mc.) Daily 3-7:30 a.m.

10.620 WEF 28.25 Rocky Point, N. Y. (E) Relays program service irregularly (see 21.260 mc.)

10.620 EHX 28.25 Madrid, Spain. (P) Phones CEC and EHZ afternoon (see 20.860 mc.)

10.610 WEA 28.28 Rocky Point, N. Y. (E) Tests Europe irreg. (see 21.260 mc.)

10.550 WOK 28.44 Lawrenceville, N. J. (P) Phones LSN-PSF-PSH-PSK nights (see 21.420 mc.)

10.530 JIB 28.49 Taihoku, Tawian, Japan. (P) Phones JVL-JVN early mornings to 8 a.m.; sp'l be's 3-4 a.m. Sun.

10.520 VK2ME 28.52 Sydney, Australia. (P) Phones GBP-HVJ early a.m. (see 12.020 mc.)

10.520 VLK 28.52 Sydney, Australia. (P) Phones GBP-HVJ early a.m. (see 12.020 mc.)

10.520 CFA-4 28.52 Drummondville, Que. (P) Phones N. Am. days (see 19.987 mc.)

10.480 ITK 28.63 Mogdishu, Somaliland, Africa. (P) Irregular. (see 19.987 mc.)

10.440 DGH 28.74 Nauen, Germany. (P) Phones HSG-HSJ-HSP early a.m. (see 27.800 mc.)

10.430 YBG 28.76 Medan, Sumatra, Radio Service, Serdangwek 2, Sumatra, D.E.I. (P) Phones PLV-PLP early a.m.

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) Phones PLV a.m., and special programs irreg. (see 20.835 mc.)

10.415 PDK 28.80 Kootwijk, Holland. (P) Phones PLV a.m., and special programs irreg. (see 20.835 mc.)

10.410 PDK 28.82 Kootwijk, Holland. (P) Phones PLV a.m., and special programs 3:30-4 p.m. (see 20.835 mc.)

10.410 KES 28.82 Bolinas, Calif. (P) Phones S. A. and Far East irreg. (see 20.820 mc.)

10.400 KEZ 28.85 Boilnas, Calif. (P) Phones Hawaii and Far East irreg. (see 20.820 mc.)

10.390 KER 28.87 Bolinas, Calif. (P) Phones Far East, early evening (see 21.260 mc.)

10.380 WCG 28.90 Rocky Point, N. Y. (E) Programs, irreg. (see 21.260 mc.)

10.375 JVO 28.92 Nazaki, Japan. (P) Manchukuo and Dairen early a.m. (see 18.910 mc.)

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 28.98 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) Phones afternoons.

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) Tests New York and B.A. evenings (see 19.260 mc.)

10.300 LSQ 29.13 Buenos Aires, Arg. (P) Phones GCA-HJY-PSH afternoons (see 19.600 mc.)

10.300 LSL 29.13 Buenos Aires, Arg. (P) Phones GCA-HJY-PSH afternoons. Broadcasts irreg. (see 21.160 mc.)

10.290 DZC 29.15 Zeesen, Germany (see 17.760 mc.) **Irregular.**

10.290 HPC 29.15 Panama City, Panama. (P) Phones C. A. and S. Am. daytime (see 14.485 mc.)

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) Afternoons (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 Rio de Janeiro, Brazil. (P) Phones LSL-WOK evenings; broadcasts irreg. (see 21.080 mc.)

10.210 DGD 29.38 Nauen, Germany. (P) Phones irreg. (see 27.800 mc.)

10.160 RIO 29.53 Bakou, U.S.S.R. (P) Phones RIR-RNE irreg. a.m.; News irreg. 11 p.m.-3 a.m. (see 14.790 mc.)

10.140 OPM 29.59 Leopoldville, Belg.-Congo. (P) Calls 7-11 a.m. daily. Phones ORK afternoons (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 Portuguesa.** Mon. and Fri. 7-8:30 a.m.

10.180 DON 29.62 Konigs W'n., Germany. (P) Phones irreg. (see 27.800 mc.)

10.120 PSI 29.64 Rio de Janeiro, Brazil. (P) Phones LSL irreg. (see 21.080 mc.)

10.080 RIR 29.76 Tiflis, U.S.S.R. (P) Phones RIM-RKI 7-11 a.m. (see 14.790 mc.)

10.070 EDN 29.79 Madrid, Spain. (P) Phones YVR afternoons (see 20.860 mc.)

10.055 ZFB 29.84 Hamilton, Bermuda. (P) Phones WNB days (see 10.335 mc.)

10.055 SUV 29.48 Cairo, Egypt. (P) Phones DFC-DGU-GCA-GCB days (see 13.820 mc.)

10.042 DZB 29.87 Zeesen, Germany (see 17.760 mc.) **Irregular.**

10.040 HJA3 29.88 Barranquilla, Colombia. (P) Tests early evenings, irreg. (see 14.940 mc.)

9.990 KAZ 30.03 Manila, P. I. (P) Phones JVQ-KWX-PLV early a.m. (see 21.140 mc.)

9.966 IRS 30.08 Rome, Italy. (P) Tests irregularly.

9.950 GBU 30.13 Rugby, England. (P) Phones WNA evenings (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 3018 Panama City, Panama. (P) Phones 8 a.m.-8 p.m. (see 14.485 mc.)

9.940 TIZ-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 after 7 p.m. (see 13.410 mc.)

9.940 CSW 30.18 Lisbon, Portugal (see 11.040 mc.) Daily 6-9 p.m.

9.930 HKB 30.21 Bogota, Colombia. (P) Phones CEC-OCP-PSH-PSK afternoons (see 18.440 mc.)

9.930 HJY 30.21 Bogota, Colombia. (P) Phones LSQ afternoons (see 18.440 mc.)

9.925 JDY 30.23 Dairen, Manchukuo, Japan. Daily 7-8 a.m.

9.920 DGM 30.24 Nauen, Germany. (P) Phones irreg. (see 27.800 mc.)

9.890 LSN3 30.33 Buenos Aires, Arg. (P) Phones WOK-WLK; broadcast evenings irregular (see 21.160 mc.)

9.870 WON 30.40 Lawrenceville, N. J. (P) Phones and tests; England irreg. (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.** Sat. 1-3:30 p.m. Daily 5:15-9:30 p.m.

9.840 COCM 30.49 Apartado 33, Havana, Cuba. Daily 8 a.m.-12 midnight.

9.840 FYC-2 30.49 Paris, France. (P) Phones U.S.A. irreg. (see 18.776 mc.)

9.840 JYS 30.49 Kemikawa-Cho, Japan. (E) Tests irregular.

9.830 IRM 30.50 Rome, Italy. (P) Phones JVP-JZT-LSX-WEL a.m. (see 19.520 mc.)

9.800 GCW 30.59 Rugby, England. (P) Phones Lawrenceville eve. and nights (see 20.380 mc.)

9.800 LSI 30.59 Buenos Aires, Arg. (P) Relays very irreg. (see 19.600 mc.)

9.760 VLJ 30.74 Sydney, Australia. (P) Phones PLV-ZLT early a.m. (see 12.020 mc.)

9.760 VLZ 30.74 Sydney, Australia. (P) Phones PLV-ZLT early A.M. (see 12.020 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) Phones GCU irreg. (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) Phones LSL afternoons (see 20.380 mc.)

9.700 LQA 30.93 Buenos Aires, Arg. (P) Tests and relay early evenings (see 19.600 mc.)

9.685 30.98 Radio Martinique, P. O. Box 136, Fort de France, Martinique, F.W.I. **O:C: "La Marseillaise".** Daily 6:30-7:50 p.m.

9.675 DZA 31.00 Zeesen, Germany (see 17.760 mc.) **Irregular.**

9.670 TI4NRH 31.02 Apartado 40, Heredia, Costa Rica. C.A. Daily 9-10 p.m.; 11:30 p.m.-12 a.m.; Sat. to 2 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) Irreg., Argentina (see 21.080 mc.)

9.650 CTIAA 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) Phones SUV in a.m. Relays irreg. (see 27.800 mc.)

9.645 HH3W 31.10 P. O. Box A117, Port-au-Prince, Haiti, W.I. Daily exc. Sunday 1-2 p.m.; 7-8:30 p.m.

9.635 2RO-3 31.13 ◆ Rome, Italy (see 11.810 mc.)

9.630 CFA5 31.15 Drummondville, Que. (P) Phones No. America days (see 19.987 mc.)

9.620 FZR 31.17 Saigon, Indo-China. (P) Phones Paris early a.m. (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.

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

9.600 XEYU 31.25 Universidad Nacional, Mexico, D.F. Daily 7-10 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 11:30 a.m.-2 p.m.; 9:30 p.m.-12 a.m. **Veri Slow.**

9.595 HBL 31.27 Geneva, Switzerland (see HBJ, 14.535 mc.) Saturdays 5:30-6 p.m.

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 W3XAU 31.28 1622 Chestnut St., Philadelphia, Pa. Daily 11 a.m.-7 p.m.

9.590 VK2ME 31.28 Amalgamated Wireless, Ltd. 47 York St., Sydney, Australia. Clock strikes at hour, chimes ¼ hr. 1: Kookaburra bird call. C: **God Save The King.** Sunday 12:30-2:30 a.m.; 4:30-8:30; 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: **Disciplne Honor and Abnegation.** 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 2-3 p.m.; 7-8 p.m. Tues. 1:30-3 p.m., Wed. 7-10 p.m.

9.580 GSC 31.32 ● Daventry, England (see 26.100 mc.) Daily 9-11 p.m.

9.580 VK3LR 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. Sunday 3-7:30 a.m.; Mon to Fri. 9:45 p.m.-2 a.m., 3-:30-8:30 a.m.; Sat. 9:45 p.m.-2:15 a.m.; 3:30-9 a.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.) Daily 4-10 a.m.

9.646 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. Daily 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 HI5E 31.41 Sr. H. Chavez, Ciudad Trujillo, Dom. Rep., W. I: **Irregular.**

9.550 OLR3A 31.41 Prague, Czechoslovakia (see 21.450 mc.) Irregular (see 15.230-11.840 mc.)

9.545 HH2R 31.44 Port-au-Prince, 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 5:30-7:30 a.m. No signals.

9.540 DJN 31.45 Zeesen, Germany (see 17.760 mc.) Daily 12:05 a.m.-11 a.m.; 4:50-10:45 p.m.

9.535 JZI 31.46 Nazaki, Japan (see 21:520 mc.) 4:30-7:30 a.m. **Irregular.**

9.530 W2XAF 31.48 Schenectady, N. Y. (see W2XAD 15.330 mc.) Daily 4 p.m.-12 a.m.

9.530 LKJ-1 31.48 Ministere 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 Radio 31.50 Liberte Stato Operai, 25 Liberte, Paris, France. Daily 7-8 p.m. (see 7.380 mc.)

9.520 OZF 31.51 Copenhagen, Denmark (see OXY 6.060 mc.) Daily 2-6:45 p.m.

9.520 HJ4ABH 31.51 Armenia, Colombia, S.A. O-C: **The Spanish Soldiers.** S: Blows on Marimba. **News 7-10 p.m.** Weekdays 8-11 a.m.; 6-10 p.m. Sundays 7-10 p.m.

9.520 YSH 31.51 San Salvador, El Salvador, C.A. (see 11.710 mc.) Daily 8-10:30 p.m.

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.**

9.510 GSB 31.55 ● Daventry, England (see 26.100 mc. Daily 2-4:15 a.m.-12:20-3.45 p.m., 4-6 p.m., 9-11 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 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 (see 15.230-11.840 mc.)

9.501 PRF5 31.58 P.O. Box 709, Rio de Janeiro, Brazil, S.A. I: three-note gong. C: Brazilian National Anthem. Daily exc. Sun. 4:45-5:45 p.m.

9.500 HI5G 31.58 La Vega, Dominican 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 HJ1ABE 31.58 Apartado 31, Cartagena, Colombia, S.A. O: Organ—**Song of the Islands.**. English each hour; clock strikes the hour. C: **Aloha Oe. DX** 9:30-10:30 p.m. Weekdays 6:45 a.m.-11 p.m.; Sun. 9 a.m.-3 p.m.

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

9.490 KEI 31.61 Bolinas, Calif. (P) Phones, Indo-China and China a.m. (see 20.820 mc.)

9.480 EAR 31.65 P. O. Box 951, Madrid, Spain. Daily 6:30-8:30 p.m.; 10-11 p.m.

9.480 PLW 31.65 Bandoeng, Java. (P) Phones Australia early a.m. (see 19.345 mc.)

9.480 KET 31.65 Bolinas, Calif. (P) Phones WEL evenings & nights (see 20.820 mc.)

9.470 WET 31.68 Rocky Point, N. Y. (E) Tests LSX-PPM-ZFD evenings (see 21.260 mc.)

9.460 ICK 31.71 Tripoli, Africa. (P) Phones Italy a.m.

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.

9.450 TGWA 31.75 Radiodifusora Nacional, Guatemala City, Guatemala, C.A. Daily exc. Sun. 12-2 p.m.; 8-9 p.m.; 10 p.m.-12 a.m.; Sun. 12-2 p.m.; 12 a.m.-6 p.m.; **No I.R.C. necessary.**

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

9.430 YVR 31.80 Maracay, Venezuela, (P) Tests mornings.

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 XDR 31.92 Mexico City, Mexico. (P) Phones XAM irreg., days.

9.385 PGC 31.97 Kootwijk, Holland. (P) Phones East Indies nights (see 20.835 mc.)

9.375 PGC 32.00 Kootwijk, Holland. (P) Phones East Indies nights (see 20.835 mc.)

9.370 PGC 32.02 Kootwijk, Holland. (P) Phones East Indies nights (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 HS8PJ 32.09 Bangkok, Siam (see 19.020 mc.) Thursdays 8-10 a.m.

9.350 COBC 32.09 Apartado 132, Havana, Cuba. Daily 7 a.m.-12:30 a.m.

9.345 HBL 32.10 Geneva, Switzerland. (E) Broadcasts and phones irreg. (see 14.535 mc.)

9.340 OAX4J 32.12 Radio Internacional Casilla 1166 Lima, Peru. C: Organ: **Good Night Sweetheart.** . Daily 12-3 p.m.; 5 p.m.-1 a.m.

9.330 CGA4 32.15 Drummondville, Que. (P) Phones GCB-GDB-GBB afternoons (see 19.987 mc.)

9.300 YNGU 32.27 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.**

9.280 GCB 32.33 Rugby, England, (P) Phones Canada afternoons (see 20.380 mc.)

9.240 PDP 32.47 Kootwijk, Holland. (P) Phones East Indies nights (see 20.835 mc.)

9.235 PDP 32.49 Kootwijk, Holland. (P) Phones East Indies nights (see 20.835 mc.)

9.200 COBX 32.61 San Miguel #194, Havana, Cuba. Daily 8 a.m.-11:30 p.m.

9.180 ZSR 32.68 Klipheuvel, S. Africa. (P) Phones Rugby afternoons seasonally (see 18.890 mc.)

9.170 WNA 32.72 Lawrenceville, N. J. (P) Phones GBS - GCU - GCS afternoon (see 21.420 mc.)

9.147 YVR 32.79 Maracay, Venezuela. (P) Phones EHY afternoons.

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) Tests and phones early a.m. (see 21.140 mc.)

9.091 CGA-5 33.00 Drummondville, Que. (P) Phones Europe days (see 19.987 mc.)

9.037 TYA-2 33.19 Paris, France. (P) Phones Algiers, 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) Phones Lawrenceville afternoons (see 20.380 mc.)

9.010 KEJ 33.30 Bolinas, Calif. (P) Relays programs to Hawaii eve. (see 20.820 mc.)

8.975 CJA5 33.42 Drummondville, Que. (P) Phones Australia nights, early a.m. (see 19.987 mc.)

8.975 VWY 33.43 Poona, India. (P) Phones GBC-GBU mornings.

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. (E) Tests with Europe, irreg. (see 21.260 mc.)

8.900 ZLS 33.71 Wellington, N. Z. (P) Phones VLZ early mornings (see 12,295 mc.)

8.840 ZMBJ 33.94 Wellington, N. Z. (see 13.600 mc.) Sun. 6:40-7 p.m.; daily 1-3 a.m.

8.831 HCJB1 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—U.S. Postage.

8.830 LSD 33.98 Buenos Aires, Arg. (P) Relays to New York early evenings (see 19.600 mc.)

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

8.790 TIR 34.13 Cartago, Costa Rica. (P) Phones Cent. America daytime (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) Phones PLV early mornings.

8.765 DAF 34.23 Norddeich, Germany. (P) Phones ships irreg. (see 27.800 mc.)

8.760 GCQ 34.35 Rugby, England. (P) Phones ZSH afternoons (see 20.380 mc.)

8.740 WXV 34.35 Fairbanks, Alaska. (P) Phones WXH nights.

8.730 GCI 34.36 Rugby, England. (P) Phones VWY afternoons (see 20.380 mc.)

8.710 KBB 34.44 Manila, P. I. (E) 6-8 A.M. special broadcast. (see 21.140 mc.)

8.680 GBC 34.56 Rugby, England, (P) Phones ships and New York daily, (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. Week days 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.

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

8.650 WVD 34.68 517 Federal Office Bldg., Seattle, Wash. (P) Tests irregularly.

8.630 CMA 34.76 Havana, Cuba. (P) Phones N. Y. irreg. (see 17.260 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.)

8.505 YNLG 35.27 Sr. Benjamin T. Guerra, L.. Managua, Nicaragua, C.A. Daily 1-2:30 p.m.; 7:30-9:45 p.m. **Veri—U. S. postage.**

8.500 JZF 35.29 Nazaki, Japan. (P) Phones ships irreg. (see 18.910 mc.)

8.404 HC2CW 35.70 Casilla 1166, Gauyaquil, Ecuador, 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—U. S. postage.**

8.330 DAS 36.01 Rugen, Germany. (P) Phones ships irreg. (see 27.800 mc.)

8.185 PSK 36.65 Rio de Janeiro, Brazil. (P) Phones LSL-WOK evenings. Broadcasts irreg. (see 21.080 mc.)

8.155 PGB 36.79 Kootwijk, Holland. (P) Phones Java irreg. (see 20.835 mc.)

8.140 LSC 36.86 Buenos Aires, Arg. (P) Tests evenings and nights irreg. (see 19.600 mc.)

8.120 KTP 36.95 Manila, P. I. (P) Phones KWX-KWV-PLV-JVQ a.m. (see 21.140 mc.)

8.110 ZP10 37.00 Radio Prieto ZP10, Asuncion, Paraguay, S.A. Daily 8-10 p.m.

8.075 WEZ 37.15 Rocky Point, N. Y. (E) Program service p.m.; irregular (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) Phones France nights. Special broadcasts irreg. (see 12.830 mc.)

7.970 XGL 37.64 Shanghai, China. (P) Tests early mornings (see 17.650 mc.)

7.960 VLZ 37.69 Sydney, Australia. (P) Phones ZLT early a.m. (see 12.020 mc.)

7.955 HSJ 37.71 Bangkok, Siam. (P) Phones Berlin, Manila, Java irregular (see 17.740 mc.)

7.935 PSL 37.81 Rio de Janeiro, Brazil. (P) Phones N. Y. and Madrid irreg. (see 21.080 mc.)

7.920 GCP 37.88 Rugby, England. (P) Phones VLK irreg. (see 20.380 mc.)

7.900 LSL 37.97 Buenos Aires, Arg. (P) Phones PSK-PSH evenings (see 21.160 mc.)

7.894 YSD 38.00 San Salvador, El Salvador, C. A. (see 11.710 mc.) Daily 8-10:30 p.m.

7.890 IDU 38.02 Asmara, Eritrea, Africa. (P) Irregular.

7.890 CJA-2 38.02 Drummondville, Que. (P) Phones Australia nights. (see 19.987 mc.)

7.880 JYR 38.05 Kemikawa-Cho, Japan. (E) Tests and relays irregularly.

7.860 SUX 38.17 Cairo, Egypt. (P) Phones GCB afternoons (see 13.820 mc.)

7.855 LQP 38.19 Buenos Aires, Arg. (P) Tests evenings irreg. (see 19.600 mc.)

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

7.840 38.27 **PGA** Kootwijk, Holland. (P) Phones Java irreg. (see 20.835 mc.)

7.835 38.29 **PGA** Kootwijk, Holland. (P) Phones Java irreg. (see 20.835 mc.)

7.830 38.31 **PGA** Kootwijk, Holland. (P) Phones Java irreg. (see 20.835 mc.)

7.812.5 38.40 **DFT** Nauen, Germany. (P) Phones irreg. (see 27.800 mc.)

7.797 38.49 **HBP** Geneva, Switzerland (see HBJ, 14.535 mc.) Saturdays 5:30-6 p.m.

7.790 38.49 **YNA** Managua, Nicaragua. (P) Phones Cent. & So. America daytime (see 14.485 mc.)

7.770 38.61 **PDM** Kootwijk, Holland. (P) Special relays to E. Indies (see 20.835 mc.)

7.765 38.63 **PDM** Kootwijk, Holland. (P) Special relays to Dutch Indies (see 20.835 mc.)

7.760 38.66 **PDM** Kootwijk, Holland. (P) Special relays to E. Indies (see 20.835 mc.)

7.740 38.76 **CEC** Santiago, Chile. (P) Phones evenings to 8:30 p.m. (see 19.680 mc.)

7.735 38.78 **PDL** Kootwijk, Holland. (P) Special relays to E. Indies (see 20.835 mc.)

7.730 38.81 **PDL** Kootwijk, Holland. (P) Special relays to E. Indies (see 20.835 mc.)

7.715 38.39 **KEE** Bolinas, Calif. (P) Relays programs to Hawaii seasonally (see 20.820 mc.)

7.700 38.96 **TYC-2** Paris, France. (P) Phones Cairo irreg. (see 18.776 mc.)

7.670 39.11 **WDF** San Juan, P. R. (P) Dom. Rep. 11 a.m.-7 p.m. (see 13.410 mc.)

7.669 39.11 **TGF** Guatemala City, Guate. (P) Phones TIU-HPF daytime (see 14.485 mc.)

7.650 39.22 **TYE-4** Paris, France. (P) Phones U.S.A. irreg. (see 18.776 mc.)

7.626 39.31 **RIM** Tashkent, U.S.S.R. (P) Phones RKI early mornings (see 14.790 mc.)

7.620 39.37 **IUB** Addis Ababa, Ethiopia. (E) Irregular (see 18.270 mc.)

7.610 39.42 **KWX** Dixon, Calif. (P) Phones KKH nights; KAZ-KTP-PLV-JVT-JVM a.m. (see 21.060 mc.)

7.565 39.66 **KWY** Dixon, Calif. (P) Phones Shanghai early mornings (see 21.060 mc.)

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

7.520 39.89 **RKI** Moscow, U.S.S.R. Daily 7-9:15 p.m. (see 15.040 mc.)

7.520 39.89 **KKH** Kahuku, Hawaii. (P) KEE-KEJ evenings. KWX-KWV nights (see 16.030 mc.)

7.518 39.90 **RKI** Moscow, U.S.S.R. (P) Phones RIM early mornings (see 14.790 mc.)

7.510 39.95 **JVP** Nazaki, Japan (see 21.520 mc.) 3-7:30 a.m. **Irregular.**

7.500 40.00 **CFA-6** Drummondville, Que. (P) Phones N. America days (see 19.987 mc.)

7.470 40.16 **JVQ** Nazaki, Japan. (P) Relays and phones early a.m. (see 18.910 mc.)

7.470 40.16 **HJP** Bogota, Colombia. (P) Phones HJA3-YVQ early evenings (see 18.440 mc.)

7.430 40.38 **ZLR** Wellington, N. Z. (P) Phones VLJ early mornings (see 12.295 mc.)

7.411 40.48 **HCICE** Apartado 485, Quito, Ecuador, S.A. Thursdays 9-10 p.m. **Veri—U. S. postage.**

7.400 40.45 **WEM** Rocky Point, N. Y. (E) Special relays evenings (see 21.260 mc.)

7.390 40.60 **ZLT-2** Wellington, N. Z. (P) Phones Sydney 3-7 a.m. (see 12.295 mc.)

7.385 40.62 **DEK** Vienna, Austria. (P) Tests early evenings very irreg. (see BC 11.801 mc.)

7.380 40.65 **"Radio Liberte"** Paris, France (see 9.523 mc.) Daily 7-8 p.m.

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

7.370 40.71 **KEQ** Kahuku, Hawaii. (P) Relays programs evenings (see 16.030 mc.)

7.345 40.84 **GDL** Rugby, England. (P) Phones Japan irreg. a.m. (see 20.380 mc.)

7.332.5 40.92 **DLC** Rehmate, Germany. (P) Phones irreg. (see 27.800 mc.)

7.211 41.60 **EA8AB** 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.

7.203 41.64 **EAJ** San Sebastian, Gomera, C.I. (see 10.370 mc.) Daily 4 p.m.-12 a.m. and later.

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

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

7.100 42.25 **FD8AA** Radio Club Oceanien, Alfred T. Poria, Pres. Papette, Tahiti, Tues. and Fri. 11 p.m.-1 a.m.

7.030 42.67 **EA9AH** 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.

6.990 42.92 **JVS** Nazaki, Japan. (P) Phones China mornings early (see 18.910 mc.)

6.977 43.00 **XBA** Tacubaya, D. F., Mex. (E) 6-8 p.m. daily.

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

6.950 43.17 **WKP** Rocky Point, N. Y. (E) Relays programs evenings (see 21.260 mc.)

6.950 43.17 **GBY** Rugby, England. (P) Phones U. S. A. irreg. (see 20.380 mc.)

6.922 43.34 **IUF** Addis Ababa, Ethiopia. (E) Irregular (see 18.270 mc.)

6.905 43.45 **GDS** Rugby, England. (P) Phones WOA-WNA-WCN evenings (see 20.380 mc.)

6.900 43.48 **HI2D** Asociacion 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.

6.890 43.54 **KEB** Bolinas, Calif. (P) Tests KAZ-PLV early a.m. (see 20.820 mc.)

6.880 43.60 **CGA-7** Drummondville, Que. (P) Phones Europe days (see 19.987 mc.)

6.860 43.73 **KEL** Bolinas, Calif. (P) Tests KAZ-PLV early a.m. (see 20.820 mc.)

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

6.845 43.83 **KEN** Bolinas, Calif. (P) Used irregularly (see 20.820 mc.)

6.830 43.92 **CFA** Drummondville, Que. (P) Phones N. America nights (see 19.987 mc.)

6.820 43.99 **XGDX** Central Broadcasting Committee of Kuomintang, Nanking, China. Chinese except English 8:15 a.m. E.S.T. O-C: No regular selections. Weekdays 5:30-8:30 a.m. Sun. 7-9 a.m.

6.800 44.12 **HI7P** Calle Jose Reyes No. 35, 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.

6.795 44.15 **GAB** Rugby, England. (P) Phones Canada irreg. (see 20.380 mc.)

6.788 44.20 **PZH** 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 44.25 **HIH** 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.**

6.760 44.38 **CJA-6** Drummondville, Que. (P) Phones Australia early a.m. (see 19.987 mc.)

6.755 44.41 **WDA** Lawrenceville, N. J. (P) Phones GDW - GDS - GCS evenings (see 21.420 mc.)

6.750 44.44 **JVT** Nazaki, Japan. (P) Phones JOAK and Pt. Reyes irreg. (see 18.910 mc.)

6.750 44.44 **JVT** Nazaki, Japan (see 21.520 mc.) 4:30-7:30 a.m. **Irregular.**

6.732.5 44.56 **KBK** Manila, P. I. (P) Phones irreg. (see 21.140 mc.)

6.730 44.58 **HI3C** 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 44.60 **WQD** Rocky Point, N. Y. (E) Tests evenings irreg. (see 21.260 mc.)

6.720 44.64 **PMH** 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.

6.690 44.84 **TIEP** Apartado 227, San Jose, Costa Rica, C.A. Daily 7-11 p.m.

6.690 44.84 **CGA-6** Drummondville, Que. (P) Phones Europe irregularly (see 19.987 mc.)

6.675 44.94 **HBQ** Geneva, Switzerland. (E) Broadcasts and phones irreg. (see 14.535 mc.)

6.668 44.99 **HC2RL** P. O. Box 759, Guayaquil, Ecuador, S.A. O-C: **Ecuadorian National Anthem.** English each 15 mins. Sunday 5:30-7:30 p.m.; Tues. 9-11 p.m. **Veri—U. S. postage.**

6.650 45.11 **GBY** Rugby, England. (P) Phones U.S.A. irreg. (see 20.380 mc.)

6.650 45.11 **IAC** Pisa, Italy. (P) Phones ships irreg. (see 17.750 mc.)

6.630 45.25 **HIT** 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 45.33 **El Prado** Apartado 98, Riobamba, Ecuador, S.A. English ea. 15 mins. O: Bugle call. Thursday 9:15-11:15 p.m. **Veri—U. S. postage.**

6.600 45.45 **DAF** Norddeich, Germany. (P) Phones irreg. (see 27.800 mc.)

6.580 45.59 **"Radio 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 45.63 **HC1VT** Ambato, Ecuador, S.A. Mon., Wed., Fri. 8-10:30 p.m. **Veri—U. S. postage.**

6.550 45.81 **TIRCC** Apartado 1064, San Jose, Costa Rica, C. A. S: 4 notes on gong **D-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.

6.548 45.82 **XBC** Vera Cruz, Mexico. (E) 7-8 p.m. irreg.

6.545 45.84 **YV6RB** Apartado, 34, Ciudad Bolivar, Venezuela, S.A. Daily 7:10 p.m.; Sun 3-6 p.m.

6.535 45.91 **YNIGG** Managua, Nicaragua, C.A. Daily 6-10 p.m.; **Veri—5c U. S. postage.**

6.520 46.01 **YV4RB** 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 46.15 **HIL** Apartado 623, Ciudad Trujillo, Dom. Rep., W.I. Daily 12-2 p.m.; 6-8 p.m.

6.500 46.15 **YVIRM** Maracaibo, Venezuela, S.A. Daily 6-9:30 p.m.

6.482 46.28 **HI4D** Ciudad Trujillo, Dom. Rep. W.I. Mon. & Sat. 11:55 a.m.-1:40 p.m.; 4:40-7:40 p.m.

6.480 46.30 **EDR-4** Radio Poste, Palma de Mallorca, Balearic Islands. Daily 4:30-5:15 p.m.

6.479 46.30 **HI8A** Apartado 1312, Ciudad Trujillo, Dom. Rep., W.I. English each 15 mins. O-C: March **General Alvaro Obregon.** S: 2 strokes of bell. Daily 8:40-10:40 a.m.; 2:40-4:40 p.m.; Sat. 9:10-10:40 p.m.

6.450 46.51 **HI4V** Santiago Francisco de Macoris, Dom. Rep., W.I. Daily 11:40 a.m.-1:40 p.m.; 6:40-9:15 p.m.

6.445 46.55 **YVQ** Gobierno de Venezuela, Maracay, Venezuela, S.A. 8-9 p.m. Saturdays.

6.445 46.55 **YVQ** Maracay, Venezuela. (P) Phones LSL irreg.

6.430 46.66 **HIIS** P.O. Box 112, Santiago de los Caballeros, Dom. Rep., W.I. Daily 11:40 a.m.-1:40 p.m.; 5:40-7:40 p.m.

6.420 46.73 **YV6RC** Ciudad Bolivar, Venezuela, S.A. Daily 10:30 a.m.-1:30 p.m.; 4:30-9:30 p.m.

6.415 46.77 **HJA3** Barranquilla, Colombia. (P) Phones HJA2 evenings (see 14.940 mc.)

6.410 46.80 **TIPG** Apartado 225, San Jose, Costa Rica, C.A. O-C: **Parade of the Wooden Soldiers.** Daily 7:30-9:30 a.m.; 12-2 p.m.; 6-11:30 p.m.

6.400 46.88 **YV5RH** 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.

6.375 47.10 **YV5RF** 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 47.17 **YVIRH** P. O. Box 261, Maracaibo, Venezuela, S.A. O: **Jealusie.** C: **Er Weicht der Sonne Nicht**—march. Weekdays 5:45-6:45 a.m.; 10:30 a.m.-1:30 p.m.; 3:30-10:30 p.m. English 10-10:30 p.m. Sunday 8:30 a.m.-2:30 p.m.

6.351 47.24 **HRPI** Sr. Manuel E. Escota, Director, San Pedro Sula, Honduras, C.A. Weekdays 12-2 p.m.; 7:45-10 p.m. **Veri—5c U. S. postage.**

6.340 47.32 **HIIX** 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 47.39 **JZG** Nazaki, Japan (see 21.520 mc.) **Irregular.**

6.330 47.39 **CDCW** Apartado 130, Havana, Cuba. Daily 7 a.m.-12 midnight.

6.325 47.43 **HH3NW** Port-au-Prince, Haiti, W.I. (see HH3W, 9.645 mc.) Weekdays 1-2 p.m.; 7-8:30 p.m.)

6.315 47.51 **HIZ** 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.

6.310 47.54 **TG2** Director General of Electrical Communications, Guatemala City, Guatemala, C.A. **Irregular.** 11 p.m.-2 a.m. **No I.R.C. required.**

6.300 47.62 **YV4RD** 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 47.77 **CDHB** 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.

6.280 47.77 **HIG** Av. Jose Trujillo No. 20, Ciudad Trujillo, Dom. Rep., W.I. Daily 7:10-8:40 a. m.; 12:40-2:10 p.m.; 8:10-9:40 p.m.

6.275 47.81 **DAX4G** Avda. Abancay, 915-923, Lima, Peru, S.A. C. **Good Night Sweetheart.** Daily 7-11:30 p.m.

6.270 47.85 **YV5RP** P. O. Box 508, Caracas, Venezuela, S.A. Daily 6-11:45 p.m.

6.250 48.00 **YV5RJ** Sr. Edmundo Suegart, Prop., Caracas, Venezuela, S.A. Daily 5:30-9:30 p.m.

6.243 48.05 **HIN** Calle Arzobispo Merino #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.

6.240 48.08 **HI8Q** Julio O. Garcia Alardo, Ciudad Trujillo, Dom. Rep., W.I. Daily 10:40 a.m.-1:40 p.m.; 4:40-8:40 p.m.

6.235 48.11 **DCM** Lima, Peru. (P) Phones afternoons (see 18.680 mc.)

6.235 48.11 **HRD** Sr. Tulio 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.

6.200 COKG 48.39 — Apartado 137, Santiago, Cuba. Daily 5-6 p.m.; 9:30-10:30 p.m.; Sundays 12:01-1 a.m.

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 11:40 a.m.-1:40 p.m.; 7:40-9:40

6.170 HJ3ABF 48.62 — Apartado 317, Bogota, Colombia, S.A. C: Good Night Sweetheart. Daily 11 a.m.-2 p.m.; 6-11 p.m.

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 HJ4ABU 48.78 — 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.

6.150 CJRO 48.78 — Winnipeg, Manitoba, Canada (see CJRX, 11.720 mc.) Weekdays 6:30-11 p.m. Sundays 5-10 p.m.

6.150 GBT 48.78 — Rugby, England. (P) Phones U.S.A. days (see 20.380 mc.)

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 OAX1A 48.78 — Sr. J. Carlos Montjoy D., Casilla No. 9, Chiclayo, Peru. Daily exc. Sat. 8-11 p.m.; Sat. 8 p.m.-12 a.m.

6.140 W8XK 48.86 — Pittsburgh, Pa. (see 21.540 mc.) Daily 10 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.

6.133 HJ4ABD 48.88 — Sr. Luis Emiro Mejia, Gerente, Medelin, Colombia, S.A. O-C: Part 4a William Tell (see 5.900-5.780 mc.) Weekdays 10 a.m.-2 p.m.; 4-11 p.m. Sun. 11 a.m.-3 p.m.; 7-11 pm. Veri slow.

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. Week-days 10:15-11:15 a.m. 3-7:45 p.m. Sundays 6:45-8:45 a.m.; 4:45-6:45 p.m. Veri slow.

6.130 ZGE 48.94 — Kuala Lumpur, Malaya States, S.S. Sun., Tues., Fri. 6:40-8:40 a.m.

6.130 LKJI 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 1-3 a.m. DX 10 a.m.-8 p.m.

6.130 VE9HX 48.94 — P.O. Box 998, Halifax, N. S., Canada. O-C: Oh Canada. Chimes 15 min. periods. Sun. 3:55-9:45 p.m. Mon. to Fri. 6 a.m.-9:45 p.m. Sat. 10 a.m.-9:45 p.m.

6.125 CXA4 48.98 — Mercedes 823, Montevideo, Uruguay, S.A. Daily 8 a.m.-12 noon; 2-10 p.m.

6.122 HP5H 49.00 — Voice of the People, Panama City, Panama, C. A. Daily 7-10 p.m.

6.122 HJ3ABX 49.00 — 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.

6.120 XEFT 49.02 ◆ — Vera Cruz, Mexico (see 9.550 mc.)

6.120 W2XE 49.02 ◆ — Wayne, N. J. (see 21.520 mc.)

6.120 XEUZ 49.02 — F. J. Stavoli, Chief Eng'r., Radio Nacional, Mexico, D. F. 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.

6.115 OLR2C 49.06 — Prague, Czechoslovakia (see 21.450 mc.) S: Bells. Irregular (see 15.230-11.840 mc.)

6.110 HJ4ABB 49.10 — Apartado 175, Manizales, Colombia, S.A. Daily 11 a.m.-1 p.m.; 5-8 p.m. Veri slow.

6.110 GSL 49.10 ● ◆ — Daventry, England (see 26.100 mc.)

6.110 XEGW 49.10 — Enrique Arzamendi, Gen'l. Mgr., Mexico, D.F. S: 5 chimes of gong. O-C: Vail a dolid Azteca 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.

6.100 YUA 49.18 — Director, Bureau Central de Presse, Belgrade, Yugoslavia. S: Short tune on flute. O-C: National Anthem. Daily 12:45 a.m.-6 p.m.

6.100 W9XF 49.18 — 20 N. Wacker Drive, Chicago, Ill. O-C: Star Spangled Banner. Daily 5-8:05 p.m., 12:05-1 a.m.

6.100 W3XAL 49.18 — Bound Brook, N. J. (see 17.780 mc.) Daily 9:15 p.m.-1 a.m.

6.097 ZTJ 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. Sun. 4-5 a.m.; 12:15-3:15 p.m. Weekdays 12-12:45 p.m.; 3:15-5 a.m. and 9 a.m.-4 p.m.

6.097 "Radio 49.94 Burma" — Burma Independent Wireless, Rangoon, Burma. C: God Save the King. Daily 9:10-9:40 a.m.

6.097 HJ4ABE 49.20 — Medellin, Colombia, S. A. I: Morse letter "M." S: 4 chimes. Daily 9:30 a.m.-1 p.m.; 5-11:30 p.m.

6.095 JZH 49.22 — Nazaki, Japan (see 21.520 mc.) Irregular.

6.090 CRCX 49.26 ● — Bowmanville, Ont., Canada (see 24.380 mc.) Weekdays 12-8 p.m.; Sun 11 a.m.-8 p.m. Sat. Northern Messenger 11 p.m.-12 a.m.

6.090 ZBW-2 49.26 — Hong Kong, China (see 9.525 mc.)

6.090 XEBF 49.26 — Insurgentes 34, Jalapa, Mexico. Daily 7-11 p.m.

6.090 HJ4ABC 49.26 — Ibague, Colombia, S.A. Daily 6-11 p.m.

6.085 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 49.33 — Lima, Peru (see OAX4T, 9.562 mc.) Daily 7-11:30 p.m.

6.080 W9XAA 49.34 — Chicago, Ill. (see 17.780 mc.) Weekdays 7:30-9 a.m., 6 p.m.-1 a.m. Sun. 11 a.m.-1 p.m., 6 p.m.-1 a.m.

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 — Zeesen, Germany (see 17.760 mc.) Irregular.

6.075 XECU 49.38 — Hidalgo 579, Guadalajara Jal., Mexico. O-C: Ojos Tapatious. I: Train in motion. Daily 9-11 a.m.; 1-4 p.m.; 8-11:30 p.m. or 12 a.m.

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 Sts., Georgetown, British Guiana, S.A. S: Time signals, studio clock. O: Empire Parade. C: Ted Lewis' Goodnight Melody. 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. Daily exc. Sun. 6:30 a.m.-11 p.m.; Sun. 9:30 a.m.-11 p.m.

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 4-5 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 7-10 p.m.

6.060 OXY 49.50 — Statsradiofonien, Helbergsgade 7, Copenhagen, Denmark. O: one gong stroke. C: There is a Winsome Land. Weekdays 1-6:30 p.m. Sun. 11 am.-6:30 p.m.

6.050 GSA 49.59 ● ◆ — Daventry, England (see 26.100 mc.)

6.050 XEXF 45.59 — Secretaria de la Economia Nacional. Mexico, D. F. Daily 8 p.m.-12 a.m.

6.045 XETW 49.62 — Francisco I. Madero, 10, Tampico, Mexico. Daily 7 p.m.-12 a.m.

6.040.5 HJ1ABG 49.66 — Apartado 674, Barranquilla, Colombia S.A. S: 1 gong with chimes ea. ¼ H. O-C: National Anthem. Daily 11 a.m.-11 p.m.; Sun. 11 a.m.-8 p.m.

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 — Herald Bldg., Miami, Fla. Schedule not known.

6.040 WIXAL 49.67 — Boston, Mass. (see 21.460 mc.) Sundays 5-7 p.m.

6.030 OLR2B 49.75 — Prague, Czechoslovakia (see 21.450 mc.) Irregular, (see 15.230-11.840 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 HJ4ABP 49.75 — Emisora Claridad, Medellin, Colombia, S.A. Daily 8 a.m.-11 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 XEBQ 49.75 — Astillero 35, Mazatlan, Mexico. Daily 8-11:30 p.m.

6.030 PGD 49.75 — Kootwijk, Holland. (P) Phones Java and E. Indies irreg. (see 20.835 mc.)

6.025 PGD 49.79 — Kootwijk, Holland. (P) Phones Java and E. Indies irreg. (see 20.835 mc.)

6.025 HJ1ABJ 49.79 — Santa Marta, Colombia, S.A. Daily 11:30 a.m.-2 p.m.; 5:30-10.30 p.m.

6.020 PGD 49.83 — Kootwijk, Holland. (P) Phones Java and E. Indies irreg. (see 20.835 mc.)

6.020 DJC 49.83 — Zeesen, Germany (see 17.760 mc.) Daily 11:35 a.m.-4:30 p.m.

6.020 XEUW 49.83 — Av. Independencia 98, Vera Cruz, 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 Maria 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.

6.012 HJ3ABH 49.90 — Apartado 565, Bogota, Colombia, S.A. I: 3 chime notes. Weekdays 11:30 a.m.-2 p.m.; 6-11 p.m. Sun. 12-2 p.m.; 4-11 p.m.

6.010 VK9MI 49.92 — M. V. Kanimbla, Sydney, Australia (see 11.710 mc.) 11 p.m.-8 a.m. and later.

6.010 COCO 49.92 — P.O. Box 98, Havana, Cuba. English and Cuban. Daily 8 a.m.-10 p.m.

6.010 OLR2A 49.92 — Prague, Czechoslovakia (see 21.450 mc.) Irregular (see 15.230-11.840 mc.)

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 6:44 a.m.-12 midnight. Sundays 8 a.m.-10:15 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 HJ1ABC 50.00 — Sr. Rafel Valencia Ibanez, Quibdo, Colombia, S.A. O-C: March, Relator. S: 2 blows Chinese gong. Sun. 3-5 p.m. Wed., Sat. 5-6 p.m. Daily 6-9 p.m.

6.000 XEBT 50.00 — P.O. Box 79-44. Mexico, D.F. I: 3 blasts on cookoo horn. Siren near closing. O: Las Mananitas. C: Lieberstraum. Daily 10 a.m.-12:15 a.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 I.R.C. required.

5.980 HJ2ABD 50.17 — Calle 2 No. 1205, Bucaramanga, Colombia, S.A. Daily 11:30 a.m.-12:30 p.m.; 6-10 p.m.

5.969 HVJ 50.26 — Vatican City (see 15.121 mc.) 2-2:15 p.m. Sun. 5-530 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 PJC1 50.59 — Curacaosche Radio Vereeniging, Willemstad, Curaco, 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.

5.930 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.

5.910 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 50.84 — Government Engineer, Mafeking, South Africa. Mon. to Fri. 1-2:30 p.m. Sun. 1:30-2:30 p.m.

5.900 HJ4ABD 50.85 — Medellin, Colombia, S.A. (see 6.138-5.780 mc.) Weekdays 10 a.m.-2 p.m.; 4-11 p.m. Sun. 11 a.m.-3 p.m.; 7-11 p.m. **Veri slow.**

5.885 HI9B 50.98 — P.O. Box 95, Santiago de los Caballeros Dom. Rep., W.I. O-C: Piano Solo—Vals Evocacion. 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.

5.880 IUA 51.02 — Addis Ababa, Ethiopia. (E) Irregular (see 18.270 mc.)

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) Phones ZFA p.m. (see 21.420 mc.)

5.850 YV1RB 51.28 — P.O. Box 37, Maracaibo, Venezuela, S.A. English and Spanish. O-C: **Strike Up The Band.** Daily exc. Sun. 10:45 a.m.-12:45 p.m.; 4:45-9:45 p.m. Sun. 8:45 a.m.-9:45 p.m.; Mon., Wed., Fri. 5:45-8:15 a.m. Tues., Thurs., Sat. 5:45-9:45 a.m

5.845 KRO 51.33 — Kahuku, Hawaii. (P) Tests early mornings (see 16.030 mc.)

5.830 GBT 51.28 — Rugby, England. (P) Phones U.S.A. irreg. (see 20.380 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 HJA2 51.50 — Bogota, Colombia. (P) Phones HJA3 afternoons irreg. (see 14.940 mc.)

5.813 TI2H 51.61 — Apartado 800, San Jose, Costa Rica, C.A. Daily 7-11 p.m.

5.800 KZGF 51.72 — Manila, P. I. (P) Tests a.m. irreg. (see 21.140 mc.)

5.800 YV5RC 51.72 — P.O. Box 2009, Caracas, Venezuela, S.A. I: 4 chimes. O-C: Official **IBB March.** Bugles, whistles before closing. Weekdays 7-8 a.m. 10:30 a.m.-1:45 p.m. 3:45-10:30 p.m. Sundays 8:30 a.m.-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.

5.970 JVU 51.81 — Nazaki, Japan. (P) Phones JZC early mornings (see 18.910 mc.)

5.780 CMB-2 51.90 — Havana, Cuba. (P) Phones and tests irregularly (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.

5.780 HJ4ABD 51.90 — Medellin, Colombia, S.A. (see 6.138-5.900 mc.) Weekdays 10 a.m.-2 p.m.; 4-11 p.m. Sun. 11 a.m.-3 p.m.; 7-11 p.m. **Veri slow.**

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 each 15 mins. 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.

5.750 XAM 52.17 — Merida, Mexico. (P) Phones XDR-XDF early evenings. (see 11.500 mc.)

5.730 JVV 52.36 — Nazaki, Japan. (P) Phones JZC early a.m. (see 18.910 mc.)

5.725 HCIPM 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 City, 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.

5.670 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.)

5.445 CJA7 55.10 — Drummondville, Que. (P) Phones Australia early a.m. (see 19.987 mc.)

5.435 LSH 55.20 — Buenos Aires, Arg. (P) Relays LR4 and tests evenings (see 19.600 mc.)

5.395 CFA7 55.61 — Drummondville, Que. (P) Phones No. America irregular (see 19.987 m.c.)

5.355 DOG 52.63 — Konigs W'n., Germany. (P) Phones irreg. (see 27.800 mc.)

5.255 DOF 57.09 — Konigs, W'n., Germany. (P) Phones irreg. (see 27.800 mc.)

5.140 PMY 58.37 — Nilimy Bldg., Bandoeng, Java, N.E.I. O: March, **Le Rene Passe,** C: On chimes, **Good Night and National Anthem.** Daily 4:45-10:45 a.m.; 3:45 p.m.-2:15 a.m.

5.110 KEG 58.71 — Bolinas, Calif. (P) Phones irregularly evenings (see 20.820 mc.)

5.080 WCN 59.08 — Lawrenceville, N. J. (P) Phones GDW evenings seasonally (see 21.420 mc.)

5.025 ZFA 59.76 — Hamilton, Bermuda. (P) Phones WOB evenings (see 10.335 mc.)

5.040 RIR 59.25 — Tiflis, U.S.S.R. (P) Phones afternoons irregular (see 14.790 mc.)

5.015 KUF 59.82 — Manila, P. I. (P) Phones Bolinas; irregular (see 21.140 mc.)

4.975 GBC 60.30 — Rugby, England. (P) Phones ships afternoon and nights (see 20.380 mc.)

4.905 CGA8 61.16 — Drummondville, Que. (P) Phones GDB-GCB afternoons (see 19.987 mc.)

4.841 HJ3ABD 61.97 — Apartado 715, Barranquilla, 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 GDW 62.20 — Rugby, England. (P) Phones WCN-WOA evenings (see 20.380 m.c.)

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) Tests irregularly (see 21.420 mc.)

4.752 WOO 63.13 — Ocean Gate, N. J. (P) Phones ships irreg.

4.752 WOG 63.13 — Lawrenceville, N. J. (P) Phones Rugby irreg. (see 21.420 mc.)

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 U.. S. post.**

4.555 WDN 65.86 — Rocky Point, N. Y. (P) Tests Rome and Berlin evenings (see 21.260)

4.550 KEH 65.93 — Bolinas, Calif. (P) Phones; irreg. (see 20.820 mc.)

4.512 ZFS 66.49 — Nassau, Bahamas. (P) Phones WND daily; tests GYD-ZSV irregular.

4.500 DAS 66.67 — Rugen, Germany. (P) Phones ships irreg. (see 27.800 mc.)

4.465 CFA2 67.19 — Drummondville, Que. (P) Phones No. America; irregular days (see 19.987 mc.)

4.420 ZMBJ 67.87 — Wellington, N. Z. (see 13.600 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 Rugby evenings (see 19.987 mc.)

4.320 GDB 69.40 — Rugby, England. (P) Phones CGA8 and tests evenings (see 20.380 mc.)

4.273 RVI5 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) Tests evenings (see 21.420 mc.)

4.107 HCJB-2 73.05 — Quito, Ecuador, S.A. (see 8.948 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., Sat., 5-7

3.750 HCK 80.00 — Quito, Ecuador, S.A. Mon 8:30-10:30 p.m. **Veri—U. S. postage.**

3.310 CJA8 90.63 — Drummondville, Que. (P) Phones Australia a.m. (see 19.987 mc.)

3.040 YDA 98.68 — 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.

GLOBE GIRDLING

(Continued from page 578)

Africa	LF	ZS6AJ—ZT5P	8-7:30 a.m.
Algeria	HF	FA3HC	5:05 p.m.
Africa (French Morocco)	LF	CN8AG—8AN	4:53-5:39 p.m.
Argentina	LF	LU1CA—1EX—4KA	6:25 to 8:50 p.m.
Alaska	AB	K7FST—7EST	4:30-7:45 p.m.
Chile	LF	CE3AK	7:30 p.m.
Cuba	LF	CO2AG—2CC—2SE—2EC	6:30 to 11:37 p.m.
Costa Rica	LF	TI1AF—3AB	11:45 p.m.-12:35 a.m.
England	LF	G2SB—2AK—2AV—5PT	7 p.m. to 12:57 a.m.
France	LF	F8KI	1:38 a.m.
Holland	LF	PAOUN	1:30 a.m.
Haiti	LF	HH5KH	11:40 p.m.
Java	LF	PK2WL	6:13 a.m.
		XE2QA	7:10 p.m.
Mexico	HF	XE1AK—1PT—2BJ	
Mexico	LF	9:36 p.m.-6:05 a.m.-1:37 a.m.	
Sweden	HF	SM5XV	4:45 p.m.
Tunis	HF	FT4AN	3:19 p.m.

* LF: Low-frequency end of 20-meter band. HF: High-frequency end of 20-meter band. AB: American band—within limits of U. S. Amateur 20-meter band.

XW6A, 14150 kc., presumably on a ship, heard working K4SA, Porto Rico, at 6:05 a.m. recently. Said he was about 3000 miles off the coast of California.

K7VA, reported under Alaska in October 20-meter list should have read W7VA. This station was working K6OQE, Hawaii, a few mornings later and stated it was operating portable.

Amateur station HO2U mentioned in "Last Minute Flashes" in October is on a ship on around-the-world cruise. The prefix "HO" is not used in the International list hence assumed by this station. The address given, P.O. Box 181, El Cerrito, Calif., is that of a friend of the operator who is caring for the mail while he is enroute. All reports will be answered and the exact location given at the time of observation. On September 15, 1937, the ship was nearing Japan. It will go to India, Africa and Europe, across Atlantic, South America and up the West Coast to California.

Acknowledgment

It affords us much pleasure to acknowledge and thank the many readers for their numerous letters and reports which so demonstrate their loyalty and support. Their comments and helpfulness is greatly appreciated.

It will always be our pleasure to reply to your inquiries and give assistance wherever possible with regard to unknown stations, reception and station matters in general.

Address your letters to Mr. J. B. L. Hinds, 85 Saint Andrews Place, Yonkers, New York, enclosing self-addressed envelope if you desire reply.

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

Queries

Question No. 44: In answer to Question No. 34 in the A.R.R.L. License Manual, much of the explanation is left out. If the answer were memorized parrot-fashion, it would doubtless get the applicant by, but would leave him still without an intelligent idea as to how an oscillator works. I can draw the graph with my eyes closed, but I'm still doubtful as to what really happens, and it is no simple problem to me to understand how two different types of currents—a.c. and d.c.—can ramble peacefully around in the same circuit at the same time and not blow a head off or something.—*G. B. T., Los Angeles, Calif.*

Answer: Question No. 34 reads—"Draw a simple schematic diagram showing a self-excited oscillator using a single vacuum tube and briefly explain its operation." As G. B. T. remarks, while the answer will doubtless get one by in the examination, it leaves the student with an inadequate idea as to how an oscillator functions. This is a common failing of all but engineering texts, and is due to the fact that an oscillator operates in a highly complex manner and nothing short of an involved mathematical dissertation is really satisfactory in explaining it. However, we'll do the best we can without getting beyond the depth of the average reader.

G. B. T. has drawn the diagram correctly as shown in Fig. 1. This is the familiar Hartley circuit. It will be convenient to consider coil L as composed of two sections—X and Y. Actually these could very well be two separate coils with a common connection to the filament and placed close to each other in the proper inductive relationship.

A simple analogy will assist in making an elementary explanation clear. We are all familiar with the howl produced when the telephone receiver is held to

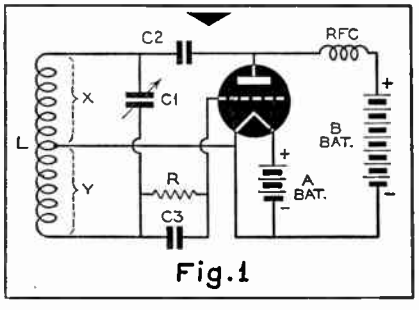


Fig. 1. The diagram that fills the bill on the U.S. government exam.

OSCILLATORS—AND HOW THEY WORK

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.

the mouth-piece of a telephone transmitter. What happens is that an incidental sound from the receiver is picked up by the mouth piece; which in turn makes a sound in the receiver that is again picked up by the microphone to make another sound in the receiver, etc., etc. The result of say a thousand or so of these sounds per second is the howl. The microphone-receiver circuit can be said to be oscillating.

As suggested in Fig. 2, the receiver is equivalent to the plate circuit, or X of Fig. 1, and the microphone compares with the grid circuit Y. An initial impulse in the grid circuit causes a change in the plate circuit in accordance with the familiar action of the vacuum tube. However, X, the plate circuit, is closely coupled to the grid circuit, Y (as the receiver was closely "coupled" to the microphone), and the change in X will cause another change in Y. This change in Y will cause a change in X which again will induce a change in Y, and so on and so forth until the tube is turned off. This interchange of impulses is termed oscillation.

While the above is a reasonably ac-

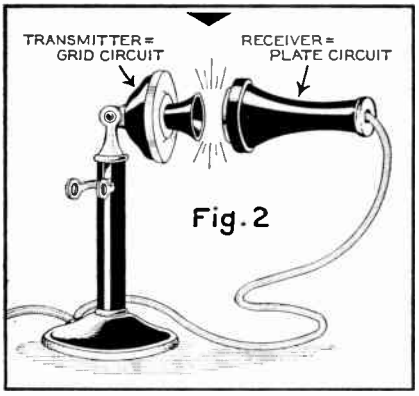


Fig. 2. Familiar analogy which helps explain how the circuit in Fig. 1 works. The RFC in Fig. 1 makes the r.f. go where it belongs.

ceptable idea of how the circuit of Fig. 1 oscillates, and should provide the student with a fairly satisfactory idea of what makes the wheels go 'round—the following exposition is a bit more technical and more accurate.

We learn from elementary electricity that whenever the strength of an electric current varies, so does the magnetic field about the conductor change. If that changing field "cuts" another conductor, a potential will be induced in that second conductor. As the field expands the polarity of the induced potential will be in one direction, and as it contracts or collapses it will be reversed.

Changes in the r.f. plate current through X are, of course, controlled by the grid circuit, Y. Section X and Y are so coupled that any variations in X will assist the voltage in Y which caused the variation in X. Assume an original impulse in Y (positive to the grid) which causes the plate current to increase. The expanding field in X will induce a potential in Y that builds up that original impulse (increases the positive grid charge). The building-up process continues until the plate current reaches a maximum imposed by the plate voltage, plate resistance, etc. (There must be some limit or the tube would blow up!) When the plate current no longer changes (increases in this case), there will be no change in the field surrounding X, and the grid circuit can return to its original potential which would produce a lower plate current. But as the plate current begins to drop, so does the

(Continued on page 605)

ORTHOTECH SUPER

(Continued from page 573)

sible path, appearance will more or less take care of itself.

9. A second magic eye may be installed for expansion indication. It should be connected either so as to measure total injector bias (its shadow will here open with expansion) or so as to measure rectified a.f. voltage at the 6H6 (here the shadow will close with expansion).

10. Fuse all a.c. inputs to power transformers. Fuses of 3-ampere rating are suggested for T14. A separate a.c. on-off switch is advised, connected so as to operate both power transformers simultaneously.

Be extremely careful when operating or testing this receiver not to come in contact with points of high potential.

Adjustment and Operation

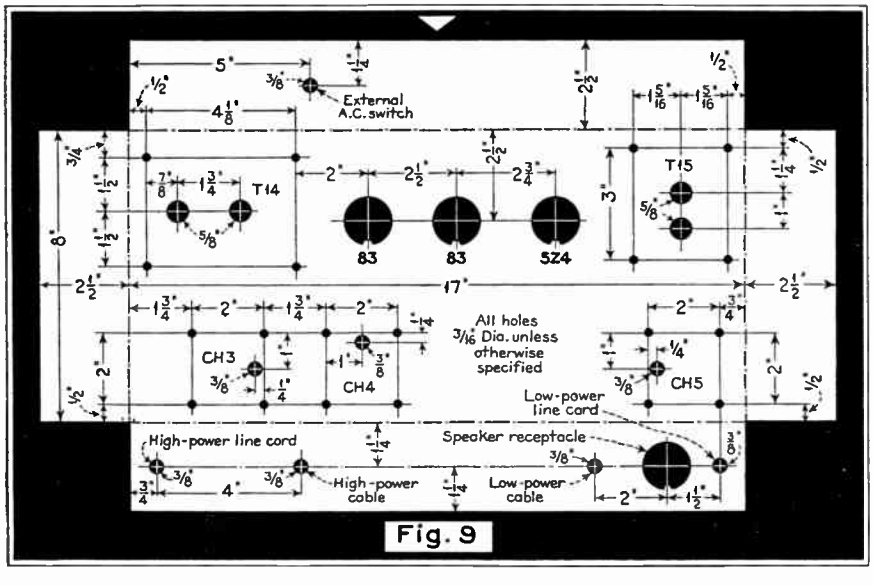
1. The voltage measurements for the i.f. and r.f. plates, screens, and cathodes should be the same as for similar tubes in the basic model, with 6L7 i.f. cathode reading about 10 volts with R23 adjusted for maximum gain; ditto for 6J7 noise amplifier (variable bias reading) and 6B8 a.v.c. tube; 6N7 cathode, minus 4 volts; 6F6 plates, 325 volts, and cathodes minus 25 volts (total 6F6 and 6L6 current flows through R48, and this bias voltage is also read at beam cathodes); 6L6 plates, 430 volts; 6L6 screens, 325 volts; 6J7 mike amp. cathode, minus 4 volts, plate, 165 volts; 6L7 expander plate, approx. 200 volts to ground, screen approx. 100 volts to ground, cathode 15 volts to ground.

2. Adjust R30 for maximum desired a.f. radio channel level, turn SW3 for radio input, close SW5, set the SW1-SW2 switch in the "sharp" position, open R26, and align i.f. and r.f. stages, following instructions previously given in the first article.

3. Select a short-wave band and adjust R23 for maximum receiver sensitivity and minimum noise level. Tune in a strong signal and adjust the T10 trimmer for maximum shadow close on the magic eye tuning indicator. Then adjust the T9 trimmer, with R26 closed for maximum noise channel amplification, until maximum attenuation of the signal is effected. Move to the highest frequency band, tune in a signal more or less "buried" in ignition or other man-made noise, and vary the adjustment of R26; if the noise is above signal level, it will be attenuated without noticeable harm to the signal at some point of adjustment.

4. Close R26 and R23 so that minimum r.f.-i.f. and noise-channel gain is had, move the SW1-SW2 selector switch arm for wide-band reception, tune in a local broadcaster transmitting an orchestral program. Fidelity should be noticeably excellent at all a.f. levels as determined by the manual adjustment of R18.

5. Open SW5, and with R40 set for minimum input to the expander-bias audio channel, adjust R39 until the signal is attentuated to a minimum consistent with fair and distortionless amplification. *(Do not adjust it for 6L7 cut-off).* Now readjust R30 until speaker volume is at normal level, then open R40 until a.f. input to the expander-bias channel is such as to give a rectified output sufficient to cause variations in the 6L7 injector bias with variations in general a.f. level—and a variation in 6L7 conductance such as to permit an effective magnification of the shift from shallow to deep modulation extremes. R40 should



Details of chassis for dual power supply.

ON THE MARKET

TRIADYNE 6AC5G DYNAMIC-COUPLED TUBE

TRIAD MFG. CO., INC., Pawtucket, R. I., has introduced a new positive grid Class A power amplifier tube similar to the output section of the well-known 6B5. It is designed for dynamic coupling with a type 76 driver.

The 6AC5G has a 6.3-volt heater which draws 0.4 ampere. When used as a Class A power amplifier, its rated undistorted output is 3.7 watts. The amplification factor is 125. ALL-WAVE RADIO.

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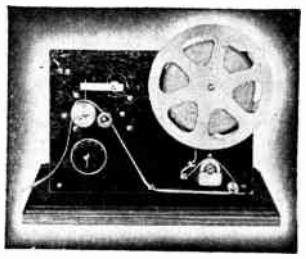
AMERICAN CODE READER

AMERICAN COMMUNICATIONS CORP., 1650 Broadway, New York, N. Y., has placed on the market a new device, named the "American Code Reader," which connects to the output of any radio receiver and automatically records on a moving tape the actual dots and dashes of amateur and commercial code stations.

The Code Reader, shown in the accompanying illustration, uses a specially treated paper tape which is drawn through the machine by a small a.c. motor run directly from the light socket. Plain water



is used to make the tape active before it reaches the recording stylus, the tape moistener itself requiring no attention.

The Code Reader may also be used in conjunction with a key and dry cell for making recordings of your own "fist." Or in conjunction with a key and audio oscillator for both visual and aural perception.

The standard model American Code Reader will record code signals up to a speed of 50 words per minute. A commercial model will handle speeds up to 300 words per minute. ALL-WAVE RADIO.

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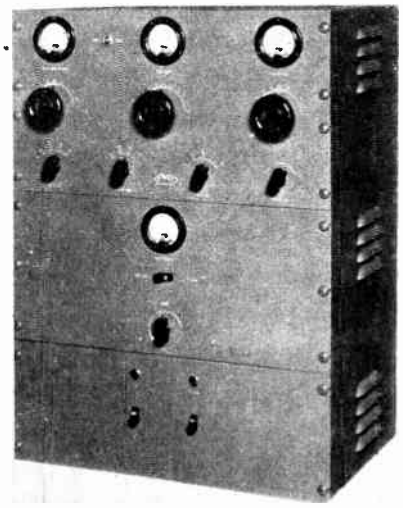
TEMCO 100-WATT TRANSMITTER

TRANSMITTER EQUIPMENT Manufacturing Co., Inc., 130 Cedar St., New York, N. Y., has introduced a compact, self-contained 100-watt transmitter for phone and c.w. operation in the amateur bands.

As shown in the accompanying illustrations, the r.f. section is built on a single chassis and uses a 6L6 crystal oscillator and harmonic generator, an RK-25 buffer-doubler, and a T55 final amplifier, operated Class C. Both the oscillator and buffer stages employ band switching, con-

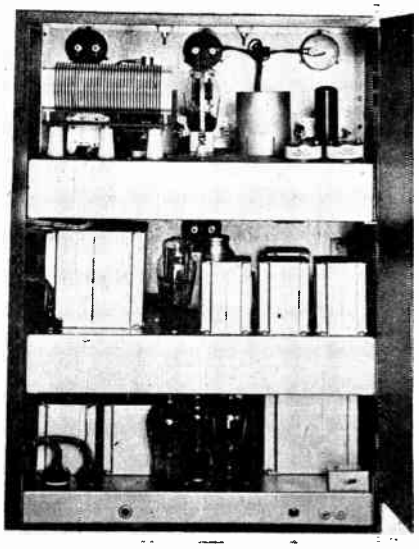


trolled from the front panel, covering the five bands from 1500 to 30,000 kc. Provisions for four crystal holders are incorporated and selection is made by means of a panel switch. The final stage employs fixed neutralization, and shifting from one band to another does not necessitate neutralizing adjustments.

The speech amplifier-modulator uses a 6F5, a 6C5, and two 6C5s in push-pull driving a pair of 6L6s in push-pull operated Class AB_2. The power-supply unit, at bottom of cabinet, is in two sections; one supplying 1000 volts to the final and the second supplying 350 and 550 volts respectively to the oscillator and buffer.

The speech amplifier-modulator has an overall gain of 110 db., and its audio range is 80 to 8000 cycles within plus or minus 3 db.

Four flush type bakelite cased meters are provided for reading crystal, buffer, final and modulator plate currents as well as the grid current of the final amplifier. Two



switches with associated pilot lights control the filament and plate circuits. There is also a switch for c.w. and phone operation. A gain control on the front panel takes care of modulation level. ALL-WAVE RADIO.

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RCA KINESCOPES FOR TELEVISION

RCA, RADIOTRON DIVISION, has made available through their transmitting tube distributors two new RCA cathode-ray tubes intended for television reception. They are being made available at this time for the convenience of experimenters and amateurs who wish to construct experimental television receiving equipment. Identified by the type numbers RCA-1800 and RCA-1801, these new tubes are known as Kinescopes.

Both types are of the electromagnetic-deflection type and employ viewing screens on which pictures appear with a yellowish hue. RCA-1800 has a 9-inch screen, while RCA-1801 has a 5-inch screen.

Both types employ 2.5-volt heaters drawing 2.1 amperes. The RCA-1800 requires voltages ranging from 3000 to a maximum of 7000 on the high-voltage electrode, while RCA-1801 operates on voltages rang-

ing from 2000 to 3000 maximum. Special precautions are therefore necessary in the design of the power-supply equipment, and in the handling of components during experimentation, to prevent dangerous shocks.

The tubes have been released for experimental purposes only. They should be of interest to amateurs and experimenters residing within the primary coverage area of present television stations, and to amateurs alone who contemplate experimentation in the field of ultra-high frequency television transmission and reception. ALL-WAVE RADIO.

◆

MALLORY 12-VOLT VIBRATOR POWER SUPPLY

THE SUCCESS OF the standard 6-volt series of Mallory Vibrapacks has resulted in an insistent demand for a 12-volt vibrator power supply to be used on airplanes, buses and motor boats for powering radio transmitters, receivers, direction-finding equipment, and other scientific apparatus.

To meet this demand P. R. Mallory and Company, Inc., of Indianapolis, announces

(Continued on page 604)

(Continued from page 601)

be adjusted then on so as to afford expansion proper to selected programs, with the SW5 switch off when expansion is not desired.

The receiver is then ready for use in general service. If phonograph input is desired, simply flick SW3, selecting the desired level with R30, or by means of an additional control on the phonograph assembly. If crystal mike input is desired, simply fade the R30 control from the radio-phono to the 6J7 channel.

SUPER SKYRIDER

(Continued from page 586)

i.f. tubes. Being independent of the a.v.c. system, it is possible to set the control for any degree of minimum gain desired for the purpose of reducing or altogether eliminating background noise when the a.v.c. system is in use. When the a.v.c. bias feed line is cut in, the same three tubes are automatically controlled, but with amplification limits dependent upon the position of the manual gain control.

Iron-core transformers are used in the i.f. stages. Transformers T2 and T3 have separate windings which, when in circuit, over-couple the primaries and secondaries and thereby provide a broad resonance curve—of the order of about 20 kc., for high-fidelity reception. Under these conditions the overall frequency response of the receiver is reasonably flat from 30 to 7000 cycles and about 15 db down from 7000 to 10,000 cycles. With the i.f. selectivity switch set in the "sharp" position (extra transformer windings out of circuit) the receiver cuts off at about 2000 cycles. Additional selectivity, of the order of hundreds of cycles, can be obtained by use of the crystal filter.

Operation

Extensive operating tests were performed on this receiver over a period of a month, and it was also used in regular amateur communications work where it performed in excellent style.

It requires approximately one hour to reach complete temperature stability, though it is reasonably free of drift one minute after being turned on. The frequency drift during the heating-up period at 14 megacycles was found to be in the neighborhood of 25 kilocycles.

Excellent results were obtained in all bands. While the location of our laboratory is such that 5-meter reception from regular stations is practically impossible, tests with a laboratory transmitter indicated that the new Super Skyrider can be used on the 56-megacycle band with the selectivity control in the "broad" position for reception from stations having reasonably good frequency control.

(Continued from page 602)

their new Vibrapack, Model VP-G556, which is designed for operation from a 12-volt storage battery, and delivers a nominal maximum output of 300 volts at 100 milliamperes, with three lower voltage outputs of 275, 260 and 225 volts instantly available at the turn of a switch. A special synchronous or self-rectifying vibrator is employed which provides excellent voltage regulation, long life and high efficiency.

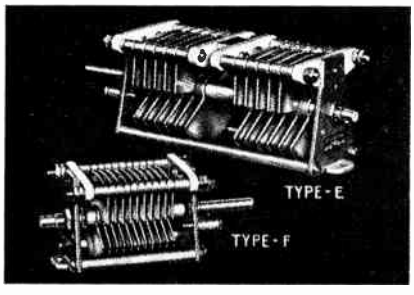
In appearance the Vibrapack VP-G556 is very similar to the equivalent 6-volt Model VP-552, and all installation and operating instructions apply equally to both models, with the exception that the current drain of the VP-G556 is one-half that of the VP-552 because of the higher operating voltage.

An interesting technical data sheet on Mallory Vibrapacks, called "Perfect Portable Power" may be obtained without charge from any Mallory-Yaxley Distributor, or from the factory. ALL-WAVE RADIO.

◆

NEW JOHNSON TRANSMITTING CONDENSERS

E. F. JOHNSON CO., Waseca, Minn., have announced their new types E and F variable condensers for use in transmitters. Both types are small in size and light weight, and have shafts that extend front and rear. Insulation is Alsimag 196. Plates are polished and have rounded



edges. Overhead mounting of the stator in these types results in a low minimum capacity. They are designed for either chassis or panel mounting and require very little space.

Type E has rotor plates 2½ inches in diameter, and type F 1⅞ inches in diameter. Single section types are available in maximum capacities ranging from 49 to 248 mmfd., and plate spacings from .045 to .125. Dual section units are available in maximum capacities from 49 to 201 mmfd., and similar plate spacings. ALL-WAVE RADIO.

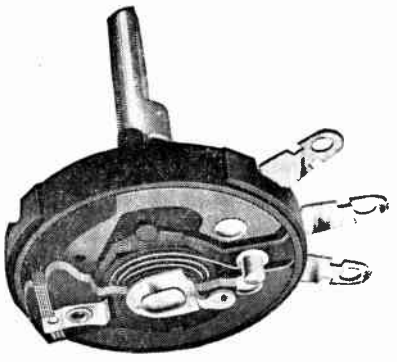
◆

NEW IRC REPLACEMENT CONTROLS

DEFINITE ELIMINATION of sliding, metal-to-metal contact in volume controls, with resulting elimination of the most common cause of noise, has been announced by the International Resistance Company in its new line of special replacement Metallized type Controls.

This exclusive IRC development which comes as the result of two years of engineering research is known as the Silent Spiral Connector.

By means of a spiral spring wire, positive and continuous electrical connection is obtained between the center terminal and the volume adjustment arm. Thanks to this replacement of slide and friction with solid, positive contact, there is no chance for noise to develop at this point where most control noises originate.



The Silent Spiral Connector comes as IRC's answer to the demand for better, quieter controls for those critical special replacement jobs that cannot be handled with standard control types. This, together with the exclusive "Knee Action" 5-Finger Element Contact, is double assurance that these new IRC Controls are exceptionally quiet, and permanently so. The Silent Spiral Connector is supplied on all of the new Special Replacement Metallized Controls. These controls are readily identified by the letter "J" preceding their part number in the IRC Volume Control Guide.

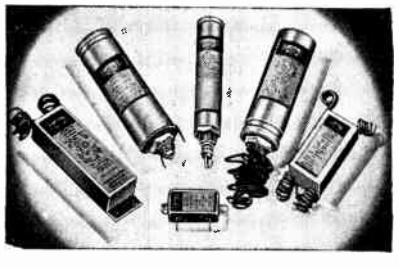
This new IRC Guide, just completed, lists the proper standard and special IRC replacements for almost every radio receiver made up to the present time. It also contains a wealth of volume control information, resistance calculation data, etc.

The Guide is free upon request, either through IRC jobbers or direct to the International Resistance Company, 401 N. Broad St., Philadelphia, Pa. ALL-WAVE RADIO.

◆

NEW C-D CATALOG

HERALDING THE 1937-38 radio parts season with a still greater line, is the Cornell-Dubilier Electric Corporation. Illustrated here are a few of the latest type condensers for which demands have necessitated an increased production schedule.



A new complete listing of the various types of radio capacitors now in demand has just been released. Known as Catalog 151A, this booklet may be obtained by writing to the Cornell-Dubilier Electric Corporation, South Plainfield, New Jersey. ALL-WAVE RADIO.

NEW BLILEY 10-METER CRYSTAL

BLILEY ELECTRIC CO., has developed a quartz oscillating crystal for 10 meters which, aside from offering simple 28-mc. transmitter design, is the real answer to 5-meter crystal control. By the use of the 10-meter crystal in the oscillator circuit and doubling to 5 meters by means of any of the accepted methods, the same simplicity of design and ease of operation that is possible with crystal control on the lower frequencies is made possible on 5 meters.

Bliley has printed a special bulletin dealing with the design and construction of simple crystal-controlled low and medium powered 5-meter transmitters using this new unit. If you wish a copy, write to Bliley Electric Company, Union Station Building, Erie, Pa., and request Engineering Bulletin E-5. ALL-WAVE RADIO.

◆

NEW SUPREME SIGNAL GENERATOR

THE NEW SUPREME Model 581 Signal Generator and Frequency Modulator employs a 340-degree dial which has an actual scale length of over 8 feet! New hairline indicating shadow-tuner "spot lights" the individual range and frequency desired eliminating parallex. The 38-to-1 ratio between tuning knob and condenser results in micro-meter tuning and real accuracy. Emits (1) unmodulated r.f., (2)

400-cycle amplitude modulated r.f., (3) 24-kc. band frequency modulated r.f., (4) Fixed 400-cycle a.f., (5) Variable 0 to 10,000-cycle a.f. Use with any scope for visual alignment. Send for full particulars to Supreme Instruments Corporation, Greenwood, Mississippi. ALL-WAVE RADIO.

◆

INSULATED-MOLDED CARBON RESISTORS

CARBON RESISTORS WITH a bakelite molded jacket, providing additional protection against moisture, "shorts" and other contingencies, are now offered by Aerovox Corporation of Brooklyn, N. Y. These attractive resistors with color-coding lacquer stripes, have 2" pigtail leads of tinned copper, that cannot loosen. Resistance values range from 100 ohms to 10 megohms, and are held within 10% plus or minus for standard units. Closer tolerances on special order. The units are offered in ½ and 1 watt ratings. ALL-WAVE RADIO.

QUERIES

(Continued from page 600)

field about X begin to collapse. This induces a potential in Y (now negative to the grid) which causes the plate current to fall (hastening the collapse of the field about X), and this continues until the plate current reaches a minimum imposed by circuit factors. Anyway, it can't go below zero. When the plate current ceases to fall, there is no change in the field (if any remains) about X, and the grid circuit is free to return to its normal condition. As it does so, the plate current increases, the field expands surrounding X, and the induced potential in Y increases the positive charge on the grid, thus still further increasing the plate current . . . etc., etc., etc.,—and we start all over again.

Thus we have oscillations—which is about as good as we can do in the way of an explanation without going into higher mathematics.

As to direct and alternating currents playing merry-go-round in the same circuits, there is nothing wrong about that under certain conditions. Such currents exist simultaneously in almost every vacuum tube circuit—in some part of the circuit. However, very often it is desirable to separate these currents for one or both of two reasons—to make the r.f. current go where it is supposed to go, or to keep it from going were it is not supposed to go.

In Fig. 1, were it not for the radio-frequency choke, RFC, any r.f. in the plate circuit would tend to ground itself (to filament) through the low-impedance path offered by the "B" battery. However, the choke, RFC, blocks this path, and forces the r.f. through condenser C2 and coil section X to the filament, which path is obviously necessary if oscillations are to be produced.

(Continued on page 607)

Backwash

"IDEAL RECEIVER"

Editor: Having been a constant reader of ALL-WAVE RADIO for over a year, I wish to compliment you on your good work in publishing a magazine of consistently good quality, of interest to the less technical minded reader as much as it is to the engineer. Your departments concerning various types of DX as well as "Channel Echoes" by Zeh Bouck are fine, so keep up the good work.

Having built my own receivers for a number of years past, I have come to a pretty good idea of what should constitute a dandy all-around receiver for the DX chaser, both in the amateur bands and short-wave broadcast bands. However, I have scouted around inside many magazine covers, and, believe it or not, have never come across a receiver constructional article which embodied enough power, sensitivity and simplicity to suit my ideals.

I am going to offer my suggestions, and should you think enough of them, please publish an article on component values for such a set.

This ideal set should be a superheterodyne of about eight tubes including a rectifier, and composed of h.f. oscillator, first detector, two i.f. stages of 1560 to 1600 kc. (doing away with the necessity of a preselector), diode detector, first audio, and a.v.c.; separate beat oscillator, and pentode power output. I should suggest the following desirable features:

1. Metal tubes.

2. Band spread (for ham bands and s.w. broadcast bands. This need not be a general coverage receiver. I personally care about the above two and U.S.N.R. channels owing to my service connection).

3. Plug-in coils (practically a necessity in any simple receiver).

4. Switching arrangement from manual volume control to a.v.c. or vice-versa.

5. Self-contained power supply. All a.c.

6. Speaker separate of receiver cabinet. (Does away with microphonics.)

7. A good solid tuning dial minus backlash.

8. Jack for headphone plug, which cuts signal from power stage. (A fellow won't bother the neighbors during night DX sessions.)

This is the first letter of this sort I've ever written and may possibly sound like a pipe dream. However, I should appreciate your mentioning the subject in "Backwash" and see how much response it creates.

ROY B. ROSENBURY, RM3c
U.S.N.C.R.
CANTON, OHIO

(Something on this order might be excellent, but let's leave it to our readers to decide.—Editor).

HAM QSL's

Editor: Why all this fuss about QSL? Why not give the S.W.L. a break and present his views? I for one have had quite an experience with some tin horn sports. Have sent out no less than 60 S.W.L. cards with enough stamps to cover the postage and a very conscientious report such as weather, QRM, QRN, receiver, antenna (height, direction), temperature and other necessary information, but strange to say I received only *eleven* QSL cards over a period of six months. Nice going!

I'll quote CO2LY (a 100% ham): "Thanks for your clever card and fine report. Glad to QSL. Best 73s. Sincerely, *Manuel Gonzalez.*"

And K6BAZ: "Thanks fr fb rpt on my sig. Vy psd to find return postage. Hope to hear from you again on hearing my sig. 73s, *Kenneth Lum King.*"

Just to show that there are a few hams who appreciate my efforts to help them in their hobby.

There are two hams (?) who belong in the "Great I am Hall," and decorated with garlic. A certain ham (?) in Princeton, N. J., who is on 10 meters, is terribly annoyed by S.W.L's (I agree there are some people who expect too much of a ham). When I received the QSL from this ham, one would get the impression that he was giving away some extremely rare gold coins. Another nominee is VP—. While listening one bad day I heard him calling his head off for W3QV. He said the call was urgent. I sent a card to W3QV and one to VP— re: call. W3QV was good enough to reply but not VP—.

W hams are the ones who reply the least. G is next. South America next. Then comes Canada. Then the West Indies. All Cubans seem to be more than just human.

I did want to be a ham but now I think I'll wait till those tin horn sports become human and realize that this radio is meant to be a hobby and works two ways. The S.W.L. also invested in valuable equipment. There should be a distinction between an S.W.L. and a chance listener. Maybe I'm wrong. Anyway the hams can have the air to themselves now.

Thanks for keeping ALL-WAVE RADIO void of all screwy inventions and pictures. Also for the clear-cut design and arrangement of the articles. I, for one, appreciate your efforts to publish the best magazine on the market.

W4H69,
TRENTON, N. J.

(There are good and bad apples on both sides of the fence. What we need to do most of all is eliminate the fence. —Editor).

ORCHIDS FROM ENGLAND

Editor: I have just finished reading my first copy of your excellent magazine and I certainly am sorry that I have not seen it before. We have wireless magazines galore over here but I think that not one of them can equal yours. Short-wave work is my own particular fad and I think that your station lists are the biggest and best that I have yet seen. Mr. Hinds' "Globe Girdling" is a very helpful department to the DXer and I wish him the best of success.

I am also anxious to join the RSSL and I hope it will be possible for you to forward the enclosed letter to the proper party.

LEONARD WRIGHT,
LIVERPOOL 19, ENGLAND

(Your praise is highly appreciated. RSSL Membership Blank has been sent you.—Editor).

◆

HAM TAX

Editor: I have been reading ALL-WAVE RADIO since last December and want to compliment you on your fine work.

J. B. L. Hinds has improved the station list 100% by revising it the way he did. The station list is now the most complete and accurate of any available. His "Globe Girdling" is also very complete and interesting and is a great help in logging stations.

Ray La Rocque has also improved his FB "Night-Owl Hoots" by adding the DX Forecast. It is the first DX Forecast I've seen that appears in a magazine.

Zeh Bouck's write-up on the Earhart-Noonan tragedy was very complete. His "Channel Echoes" is always a wow and I sure like to read his opinions. He says what he thinks no matter what. If only more columnists would do likewise!

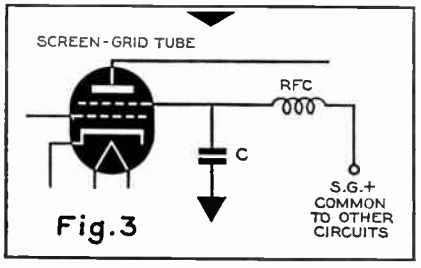
I don't agree with W8QMR about making amateurs pay for a license. Most amateurs need all the money they can spare for improving their rigs, etc. Ten cents per watt would be far too much to pay. Have mercy on the boys with kilowatt rigs!

20 meter DX has been fairly good so far this summer, and I'm expecting great results when the cool season rolls around. I've just had some S.W.L. cards printed and would be glad to trade cards, photos, or letters with any other S.W.L., wherever your magazine is read. All mail received will be answered.

BAKER YOUNG, W27F1,
BOX 263,
PARMA, IDAHO

(Thanks for the compliments. Whether or not a ham tax is advisable, the kilowatters could afford it. But we're neutral . . or possibly just a shade on your side.—Editor).

In Fig. 3 we have the screen-grid portion of an amplifying circuit. It is desirable that r.f. current in that circuit exist in no other circuit—particularly a circuit common with another tube such as the power circuit supplying screen voltages to other tubes. Thus we include the bypass condenser, C, which by-



The radio-frequency choke in this diagram keeps the r.f. from going where it doesn't belong.

passes all such current directly to ground (rather than permitting them to find their way there via the common power supply) and to make doubly sure none will get through to the positive screen grid connection we also insert the choke, RFC, which holds up an effective Stop Sign to r.f. currents of the frequency to be encountered.

MASTERPIECE VI

(Continued from page 589)

These six transformers are switched completely in and out of circuit by the Fidelity knob, giving in effect three separate and distinct i.f. amplifiers at the user's selection. The fourth selectivity choice is obtained through r.f. amplifier variation as previously described. Details of this most interesting new selectivity system appeared in the July issue of ALL-WAVE RADIO, and are worth a careful reading, for any system that will double the best previous ratio of admitted tone range to rejection of unwanted signals is rather something.

I.F. Automatic Volume Control

Following the i.f. amplifier is the second, or i.f., a.v.c. system. Duplicating the r.f. system, it operates as an automatic sensitivity control to adjust gain to optimum for each different strength of received signal. It holds volume constant to 3 db., or negligible variation, over the tremendous signal strength range of 8 to 3,000,000 microvolts—a range of 375,000 times. The 6G5 tuning indicator is actuated by the i.f. a.v.c. amplifier and rectifier, which further amplifies its action over that possible from the i.f. amplifier alone, making it so sensitive that it registers signals as weak as 1 microvolt.

"Infinite Impedance" Detector

The second detector of any superheterodyne is the point at which impairment of audio tone usually first becomes markedly possible. The best diode detectors, such as are habitually used and rated as "distortionless" are actually only so for signal modulation percentages of up to 50%—or maybe 65% in extraordinarily favorable instances. Yet in practically every broadcast program on the air, modulation percentages will range up to 100%—at which levels the diode second detector introduces quite noticable harmonic distortion. And the final tone quality from the loudspeaker can be no better than the audio amplifier receives at very best.

Therefore, in the interest of a purity of tone which cannot be obtained with

conventional second detectors, the Masterpiece VI uses the new infinite impedance second, or audio, detector. Not only is it the only currently practical detector which will handle all modulation percentages up to 100% without introducing distortion, but unlike the diode, its input resistance being very high, it does not load down the i.f. transformer feeding it and so impair its selectivity.

Soon this type of detector should replace currently used diodes as audio detectors, for its cost is no more—except where it requires an additional rather than a multi-purpose tube in cheap receivers. Its use in the Masterpiece VI results in an audio system showing absolutely no measurable *total* distortion up to 8 watts output, and rising only to 2½ per cent at full 34 watts output. This is *total* distortion—that contributed by every audio tube and circuit, and is not the usual rating of receiver distortion which is based upon output stage ratings only, and ingenuously ignores distortion introduced by all other audio circuits.

Expansion and Inverse Feedback

The shorter the path which the pure audio signal delivered by the second detector must follow before it reaches the ear, the purer it can be kept—if this path be big enough not to crowd it. Upon this self-evident truth, the audio amplifier is made as simple as it may be to produce desired results. No useless paralleled or push-pull tubes are used where they are not honestly needed just to pad up the tube total. Every tube must do full work to earn its place in the Masterpiece VI, and the audio amplifier is no exception.

It starts with a 6J7 pre-amplifier used for microphone and weak phone pickup operation only. Either this pre-amplifier or the second detector feeds the 6L7 expansion amplifier, as determined by the Fidelity knob setting. This 6L7 is used in a new volume expander circuit which completely eliminates not only overload on expanded loud music passages, but kills distortion at low, medium and high expansion levels, does not cut volume down as it is turned into circuit, and eliminates the need of specially selected tubes. The volume expansion which restores to classical and symphonic music the original full volume range monitored out before broadcast transmission or phonograph recording, is controlled by the knob regulating the amplification of the 6J5 volume expander amplifier and the 6J5 expander rectifier tubes. The 6L7 second audio stage feeds the 6J5 third audio driver stage. Here tone is again conserved by following expensive broadcast station and p.a. practice, with a hum-balanced, magnetically-shielded high permeability A-metal transformer feeding the push-pull 6L6 Class A-AB$_1$ power amplifiers. Using inverse feedback for extreme stability and tonal purity,

these two tubes develop 34 watts output, of which 2 watts is used in the 10% inverse feedback circuit.

Bass and Treble Controls

Separate and independently variable bass and treble tone control circuits are brought to two of the knobs on the control panel, giving to the user even more flexibility as to tone than is provided in broadcast station control rooms.

Bass is true, not synthetic and boomy, right down to 30 cycles. It is reproduced as actual audible sound, not just usual speaker overloading *without* audible sound, by the 18-inch giant speaker housed in one of the acoustic consoles which employ the new peri-dynamic and bass-reflex principles which make reasonable sized cabinets superior to even infinitely large baffles.

Treble tone can be raised 8 db., leveled off flat, or dropped 30 db. as desired by the operator, while a total bass boost of 18 db. is available at the turn of the bass knob. Bass can be made flat down to 30 cycles, or dropped down 30 db. for noise reduction. With either control, tone is continuously variable between the limits given above, so that tone may be adjusted to suit any personal taste, broadcast program condition, or home acoustics, which, as are well known, are not only never the same in two different homes but are never like broadcast studio acoustics.

Double tone control, plus automatic tone compensation circuits, enable quality to be held exactly as desired irrespective of volume adjustment—and no one ever reproduced a symphony orchestra at original volume in his home, which is one of the reasons why radio

reproduced symphonies seldom sound like the originals.

Wide Band Spread

Naturally, as in any receiver worth its salt in terms of permanence of dial calibration, sensitivity, selectivity and tone, all r.f., oscillator and i.f. trimmers are air-dielectric for absolute dependability. Gang condenser insulation is special high-frequency Mycalex, and high-frequency tube sockets Isolantite.

Band spread is accurate and provides permanent relogging through a secondary 0-200 division illuminated dial below the main 9-inch five-band color-coded calibrated dial. It gives over six feet of dial length and 1600 readable divisions to each of the five wavebands—plenty of space to each short-wave band to make tuning easy.

The beat-frequency oscillator enables easy short-wave station finding, and c.w. code reception—which latter may be "single-signal" by off-set tuning the beat oscillator, so steep are the sides of the i.f. selectivity curve in the 4-kc. position.

All controls are on the 12½" by 9½" walnut Micarta panel and are, left to right: Fidelity, Phono and Microphone; Volume; Expander; Tuning (automatic 16:1 and 80:1 ratios); Bass Tone; Wave Band; and Treble Tone and Beat Oscillator.

Such is a very brief description of a few of the salient points of the new Masterpiece VI. What these mean to the serious radio user in practise is best left to trial and test.

INDIA RADIO

(Continued from page 583)

service is an internal service, appreciable skip distance is not acceptable. The choice of wavelength is therefore determined by the lowest waveband not subject to appreciable "skip distance" during the duration of the transmission.

Medium-wave Transmissions

The new medium-wave stations will operate in the normal medium waveband, the present allocations being between the limits of 200 and 400 meters. The actual wavelengths have been chosen after extensive listening tests to determine which frequency channels were least disturbed by interference from distant stations audible in India after dark in the winter months.

TRAFFIC RIG

(Continued from page 568)

oscillating condition is reached. When making this adjustment with 300 volts on the plate, NC could be reduced in capacity more than necessary without harm to either tube or crystal. With high plate voltage, however, too great a reduction in the capacity of NC will result in excessive grid, plate and crystal currents. The capacity of NC should be reduced just enough to provide stable keying. This adjustment is not at all critical but should be made carefully, as suggested, to prevent possible damage to tube or crystal. It would be an excellent idea to mount a small dial on NC so that the proper position may be checked or duplicated. It would also be wise to tighten the locking nut on this condenser so that the proper setting will not be accidentally disturbed.

Once NC is properly set the plate condenser may be swung completely through resonance without causing the grid current to rise higher than about 25 ma. The crystal, therefore, cannot be injured during tuning operations once the proper position of NC is found.

While the reader may infer from the above instructions that the adjustments are extremely critical and something liable to pop at the first opportunity, such is not the case. We have merely explained the preliminary adjustment procedure so that a careless operator will not first apply high voltage, swing the condenser aimlessly and damage something. The transmitter is actually very easy to adjust if the instructions are meticulously followed, and is practically foolproof in operation once NC is correctly set and locked. There are just not enough parts in this "transmitter" to make it difficult to either construct or operate.

The transmitter will operate as well on 40 meters as on 80. This particular transmitter was tested on 40 by merely replacing the crystal with the proper 40-meter one and moving the plate tap on L down so that 14 active turns were employed instead of 16. It might be wiser to move this plate tap still further down on the coil, with a corresponding adjustment of the high-voltage tap, as explained in step (5). A different setting of NC will be required than that used for 80-meter operation. The use of a smaller active coil will permit of higher capacity in C to reach resonance.

All adjustments should preferably be first made with low plate voltage, final adjustment of NC being made with high voltage applied. It is not necessary, of course, to use the full 1250 volts to realize a useful output. Voltage of be-

tween 500 and 1000 will provide sufficient output for effective communication on 40 and 80 meters.

Transmitter Characteristics

The note from this little transmitter is crystal PDC. When a power supply of reasonably good regulation (choke input filter) is used no chirp can be detected when keying. The varying resistance of the lamp bulb during tests may cause a slight chirp. This condition will not exist when an antenna is connected as the resistance of the antenna remains constant.

One peculiarity of this transmitter is that there is no spark visible across the key. Consequently no key clicks. This is accounted for by the fact that the crystal requires a tiny fraction of a second to start oscillating. This peculiarity of keyed crystal oscillators is often employed for key-click elimination. It has been necessary, heretofore, to follow a low-power keyed crystal oscillator with one or more higher powered stages. In our particular case we can "crystal key" an entire 120-watt transmitter and still use only one tube and one stage. This is surely worthwhile.

If we were writing this article from Los Angeles, instead of somewhere in the wilds of the East, we would say that "this 120-watt 'exciter' would also make a good low-power 'transmitter' for local work." Being on the East Coast, however, we will merely say this, this 120-watt transmitter will also make an excellent exciter for a really high-powered final stage. This should prove helpful for the West Coast boys who need a kilowatt to work the same stuff the East Coast boys do with 100 watts or so. Seriously, however, this 120-watt "exciter-transmitter" will permit of the construction of a two-stage kilowatt rig wherein nothing is overloaded.

Conclusion

In closing, we would like to differentiate between this transmitter and previous

ones which used a "50 watt" type of tube in a crystal oscillator circuit. It is possible, by very critical adjustment, to pull a weakly oscillating high power stage into step with a loosly coupled crystal. Such an adjustment, however, holds over but a few kilocycles, so that the transmitter is liable to oscillate on an undesired frequency if not carefully watched. This cannot happen with the ZB-120 as the stage is merely regenerative with correct setting of NC. If the circuit is detuned, or the crystal removed it will merely cease operation. The plate current in this case will drop back to a safe value of 50 ma. or so.

R.S.S.L. NEWS

(Continued from page 590)

veys, and it offers every member the opportunity to be of public service. But neither the League nor listeners in general will benefit one bit unless each of us does his part.

How about it, fellows? Let's get going. This is the time of year when we can accomplish the most, so let's not let the grass grow under our feet.

M. L. MUHLEMAN
Acting Director

NIGHT-OWL HOOTS

(Continued from page 582)

A schedule will be arranged and one team will compete against only one other opponent in each semi-weekly competition. The semi-weekly winners will be determined by adding the totals of all four members of the team and matching the score against that of the opposing team. The team having the best won and lost record at the close of the contest will be declared winner. In case of a tie, the team with the highest scoring average will receive the award. The same set of 10 reports will count as the contestant's individual score as well as his team score. Only one set of ten reports can be submitted per semi-weekly competition, and no station may be reported more than once during the same semi-weekly period of competition.

5. *Time:* The contest begins November 7, 1937, and will continue to and include April 24, 1938. At the end of each week the contestant must prepare his 20 reports and have them in the mails not later than the following Tuesday at midnight local time.

6. *Judge:* Any controversies that may arise during the contest will be settled by the only judge in the contest, the Chief Night Owl, Ray La Rocque, whose decisions in all cases will be final.

7. *Awards:* These will be announced by AWR at a later date.

8. *Exceptions, Penalties, and Bonuses:* A person unable to compile 10 reports in one period of competition (Sunday through

Tuesday, or Wednesday through Saturday) may submit as many stations as possible. His score will then be divided by 10 just as though he had submitted his 10 reports, thus considerably decreasing his average.

A bonus to the extent of twice the actual points scored will be awarded for every report on a program listed in AWR's TIME TABLE OF DX PROGRAMS. As last year, a penalty of twice the amount originally scored will be deducted for every report found to be incorrect after checking with the station.

BEAM ANTENNA

(Continued from page 587)

directions other than that of the desired signal. Signals swamped in QRM when employing the usual type of antenna were brought up to good readability when the beam antenna was switched in and properly phased by means of the selector switch. The improvement gained in this instance is three-fold; first, because the level of the desired signal is increased by virtue of the directional properties of the antenna system; second, because the levels of undesired signals arriving from other directions are reduced, and third, because the first two advantages gained favor the frequency selectivity of the receiver.

The array with two doublets and selector switch, together with impedance-matching transformer, has provided satisfactory performance on all the amateur bands. For frequencies lower than 3500 kc., points North or East are recommended because these switch bands convert the system into a bi-directional "T" type of receiving antenna and make it suitable not only for the lower frequency amateur bands but the entire broadcast band as well.

CHANNEL ECHOES

(Continued from page 579)

farmer's daughter variety, but the kind of risqué tales that the BBC gets away with, and which at present would be censored by our unenlightened broadcasting system.

For instance, in a broadcast on October 6th, Daventry put over a program entitled "Flying High"—an entertainment presented by ex-members of the Royal Air Force. In the course of the festivities one of the entertainers tells the story of his wedding day and how he succeeded in getting well plastered before returning home following the ceremony. Finding a houseful of guests he seats himself at the piano and pounds out a few ditties. He continues—"And I say, there was a lass there I'd never

seen before. Damme a pretty little bit she was, and she sez as 'ow she like to sing a song. Sez she, 'Tuck Me in My Little Bed,' accompanied by the bridegroom. Right-o, sez I, and started for the stairs."

While we wouldn't go quite so far as Edward Hope, who writing the Lantern for the New York *Herald Tribune,* yearned for an island all his own where he could erect a broadcasting station from which he might tell all the dirty stories he had ever heard, we still think that a bit of smut on the air would be both healthy and invigorating. There is no sense in denying that we all like stories a little on the shady side. There is a bit of Rabelais in all of us. Why by a hypocrite? The vast— very, very vast majority of us like to hear a good smutty story—so why shouldn't we listen to them over the air? Oh yes—the women and children. Well, just for the fun of it, delve back into memory and fish up the smuttiest story you ever heard, and then recall the sex of the person who told it to you.

No one was ever corrupted by a risqué story. If a person was so innocent that he or she failed to get the point—then it went completely over his or her head, and no harm or good was done. On the other hand if the person does get the point, then he or she is already corrupted—if you insist that an appreciation of smutty wit is evidence of corruption.

What we are really trying to do is to inject a bit of sophistication into radio broadcasting—exactly as we have it in literature, on the stage and in pictorial art. Which reminds us of a story. . . . .

HAMFEST

(Continued from page 591)

wise to the Red, and the army was out after us. The good citizens decided on non-intervention and have merely been waiting around hopefully for the execution.

Unfortunately we let them down terribly by mailing an official communication ourself in a penalty envelope. Now they figure we've even got the government bamboozled.

✦

IT'S AN ETERNAL mystery to us why more c.w. operators do not use break-in. It's the most simple matter in the world, and in 99 cases out of a hundred all that is needed is a second antenna—no relays or other complications. Room for the auxiliary antenna may be advanced as an objection, but for all practical purposes—or at least the majority of them—a few feet of indoor wire will suffice. With any sort of a modern receiver it will be possible to work break-in up to

within a few kc. of your transmitting frequency. And by far most transmitting is done on frequencies remote from one's own transmitting frequency. With a careful installation—a shielded transmitter with shielded keying leads, and the receiving aerial at right angles to the transmitting antenna — break-in operation will often be possible even on spot frequencies without the use of relays.

There is nothing like break-in to speed up traffic and to develop a decent operating technique.

✦

A GOOD TIME was had by all in the ZCB contest on Monday night, September 13th-14th. It occurs to us that Army amateurs might use the ZCAA call more frequently rather than CQ—ZCAA being a CQ to ARRS members only. Not that the lads in the Army System should get snooty and exclusive, but they have a lot more in common in the way of operating technique than the average amateur, as well as a mutual interest in the System.

✦

THE SEASON FOR hamfests is in full swing—from Asbury Park to San Francisco. If one may judge from stray comments on the air, most of them are riotous successes. However, there exists some variance in opinion concerning the hamfest held recently in Schenectady, N. Y. There were door prizes galore—about one for every other person attending, and the lad who won first prize—we forget his call, but he's from New England—a National NC81X, assures us that the occasion was festive, and the banquet the finest food he ever ate. On the other hand, W2EGF, a home-town boy, says the food was lousy and that he wouldn't have fed it to a cat. To quote EGF, you could see through the filet mignon. EGF is in the radio business and he won a grid-leak.

✦

DEAR W8QMR: How come? Every time you sit down to the set and tune over the band, you don't hear anything except a bunch of lads in nicely established QSOs. Not a single, lone CQ. Then you throw the switches and in desperation send out a CQ of your own. Pull the switch and twirl the dial. What do you hear? Somebody coming back at you? No. Just the band full of fellows sending CQ. How come?—HI."

✦

W9CLH, G. W. LANG, 714 May Street, Elgin, Illinois, is "going places" on the 56-60 megacycle band.

The rig consists of a 6A6 oscillator using a low-drift crystal, 6A6 doubler into a pair of 354 Gammatrons in the final, Class B modulated.

The antenna system is a stacked vertical using four half waves in phase with reflectors a quarter wave behind pointing East and is 125 feet in height.

Heard cards have been received from W1JIS, W1KHO, W1JQA, W1FZH, W1ESI, W1JJE, W1DYI, W1HXE, W1KCY, W1FKV, W1DUJ, W1KQJ, W2EQD, W2JUW, W3GSO, W3DNU,, W3GLF, W3CGF, W3CXP, W3DBG, W3EIS, W3AWS, W5EHM, W8QVC, W8QMF, and W8NZ. Nightly schedules are kept with W8CVQ.

W9CLH is located 30 miles West of Chicago and puts an R9 plus signal into the Chicago Area. A very careful record is being kept and all radio amateurs hearing W9CLH are urged to send cards stating signal strength, time of reception and weather conditions.

INDEX TO ADVERTISERS

HUGHES PRINTING CO.
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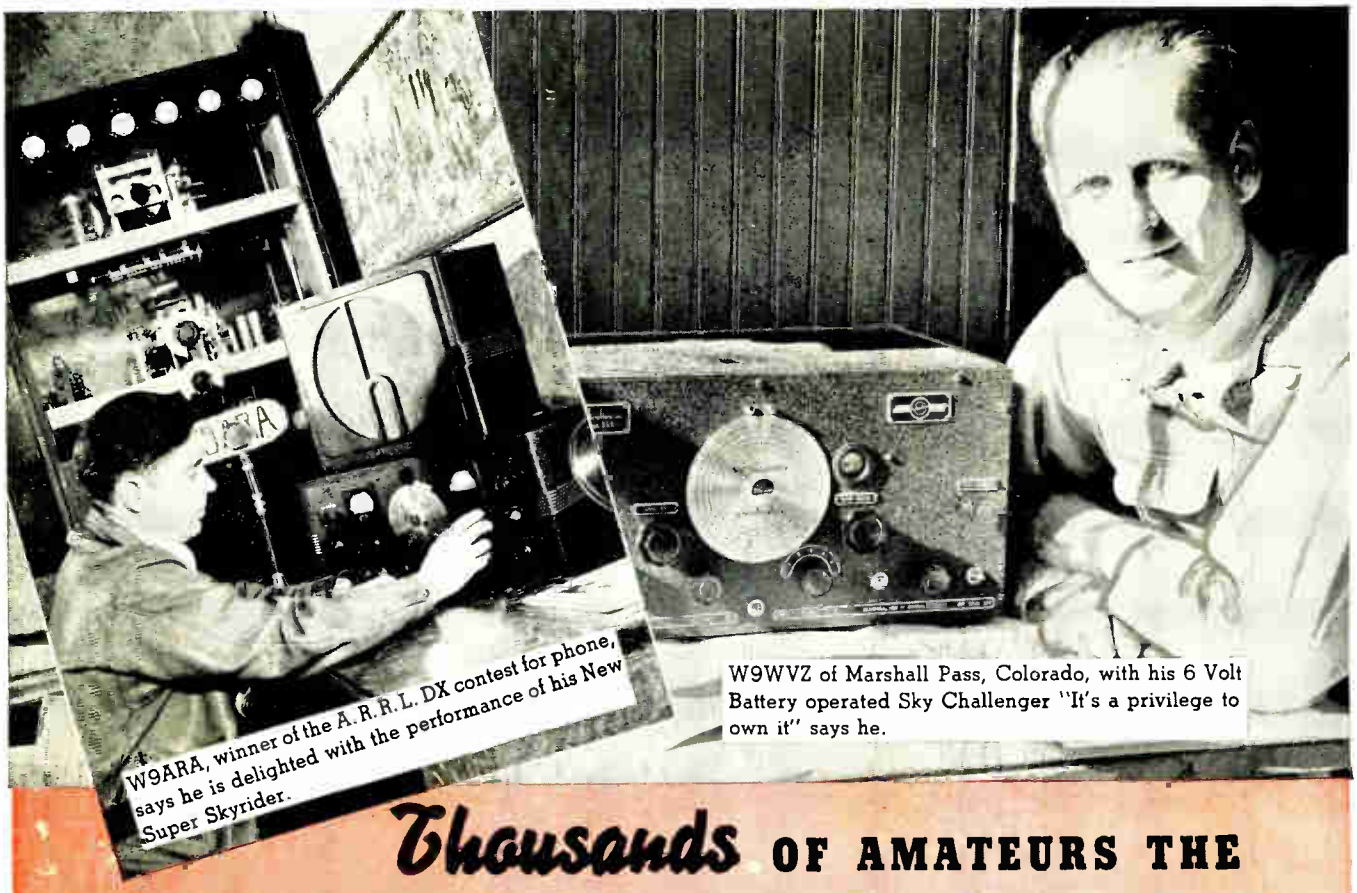
Announcing

NATIONAL NC-80X

The new National NC-80X Receiver is ready. It embodies basic new improvements that for the first time make it possible to design a high-performance communication receiver at a low price. A new crystal filter circuit provides continuously variable selectivity from 400 cycles to 5 kilocycles, and wide phasing range. By its use, noise and interfering signals are reduced enormously. A high IF frequency (1560 KC) separates image frequencies by so great a span that they are readily rejected. These features make it practical to eliminate preselector stages. Use of new tubes designed for very low plate voltages allow AC-DC operation without sacrifice in performance. Thanks to such refinements, it has been found possible to engineer this new receiver with the high quality of the NC-100X, including the famous Movable Coil Tuning Unit, and yet achieve the remarkably low price of $88.00 Net, complete with speaker, tubes, and power supply. Two models are available, the NC-80X with coverage from 550 KC to 30 MC, and the NC-81X Amateur Model (illustrated) covering five amateur bands with extreme bandspread. The new National Catalogue No. 270 describes this fine receiver in detail.

NATIONAL COMPANY, INC., MALDEN, MASS.



W9ARA, winner of the A.R.R.L. DX contest for phone, says he is delighted with the performance of his New Super Skyrider.

W9WVZ of Marshall Pass, Colorado, with his 6 Volt Battery operated Sky Challenger "It's a privilege to own it" says he.

Thousands OF AMATEURS THE WORLD OVER USE HALLICRAFTERS RECEIVERS

If we had a telephoto camera, we could catch pictures of thousands of radio amateurs enjoying the marvelous performance, the razor-sharp selectivity and fine sensitivity of their Hallicrafters Receivers. Here are a few caught in Ninth District. We may show more in the future so why not send us a snapshot of your rig with your Hallicrafters receiver?

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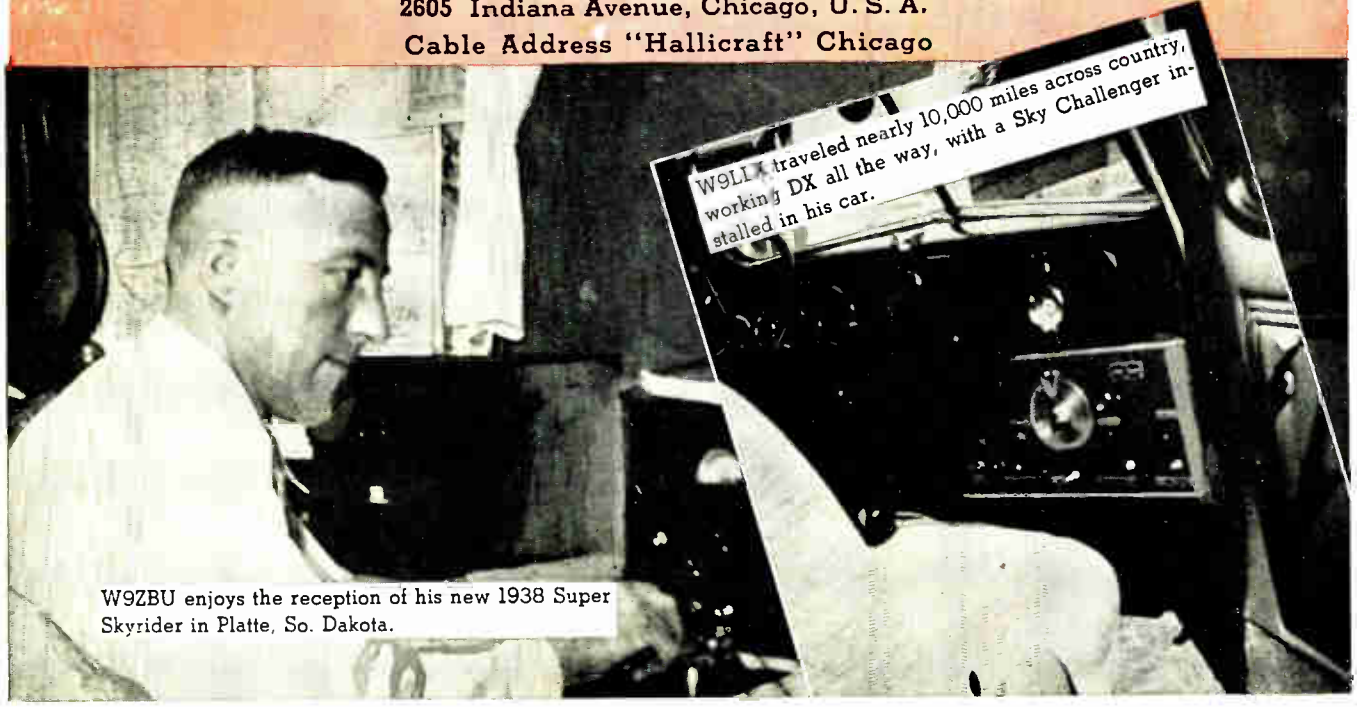

W9LLX traveled nearly 10,000 miles across country, working DX all the way, with a Sky Challenger installed in his car.

W9ZBU enjoys the reception of his new 1938 Super Skyrider in Platte, So. Dakota.