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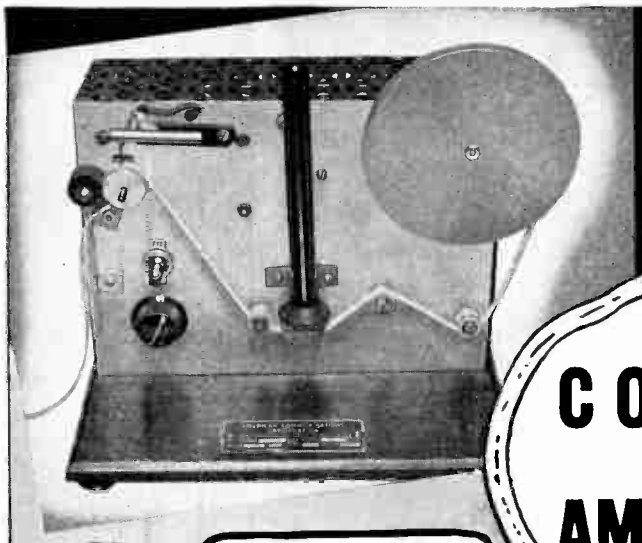

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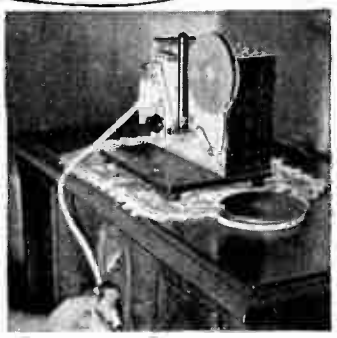

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☐ DEALER
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All-Wave Radio

EDITED BY M. L. MUHLEMAN

VOL. 3, NO. 9 SEPTEMBER, 1937

COVER ILLUSTRATION

WIDE-RANGE REPRODUCTION OF RADIO AND RECORDED MUSIC IN THE HOME: ON THE DESK TOP IS THE HIGH-FIDELITY RADIO AND THE POWER AMPLIFIER WITH VOLUME EXPANDER. IN THE DESK DRAWER IS THE PHONOGRAPH TURNTABLE AND PICKUP. TO THE RIGHT OF THE DESK IS THE WIDE-RANGE LOUDSPEAKER WITH INFINITE BAFFLE. ALL UNITS BUT THE TUNER ARE DESCRIBED IN THIS ISSUE.

CONTENTS

ENRIQUE HIDALGO, WINNER OF SECOND PRIZE IN THE ALL-WAVE RADIO CHAMPIONSHIP DX CONTEST, BROADCASTING OVER STATION CMHJ DURING THE CUBAN NATIONAL JUNIOR REGATTA, AND WON BY THE CREW OF THE CIENFUEGOS YACHT CLUB TO THE RIGHT, MR FELIX GONZALEZ, ANNOUNCER OF THE STATION. E. HIDALGO IS ALSO SPORTS WRITER OF THE NEWSPAPER EL COMERCIO, CIENFUEGOS, CUBA.

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Radio already gives good jobs to more than 300,000 people. And in 1936, Radio enjoyed one of its most prosperous years. More than $500,000,000 worth of sets, tubes and parts were sold—an increase of more than 60% over 1935. Over a million Auto Radios were sold, a big increase over 1935. 24,000,000 homes now have one or more Radio sets, and more than 4,000,000 autos are Radio equipped. Every year millions of these sets go out of date and are replaced with newer models. More millions need servicing, new tubes, repairs, etc. A few hundred $30, $50, $75 a week jobs have grown to thousands in 20 years. And Radio is still a new industry—growing fast!

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Editorial Quotes

BY THE EDITOR

A GREAT man has passed on. Guglielmo Marconi will be remembered not as an inventor in the sense that Singer and Fulton and Edison were inventors, but as a genius in the art of adaptation and perfection.

No more fitting tribute could be paid Marconi than a recent editorial in the New York *Herald Tribune,* which we repeat here in full:

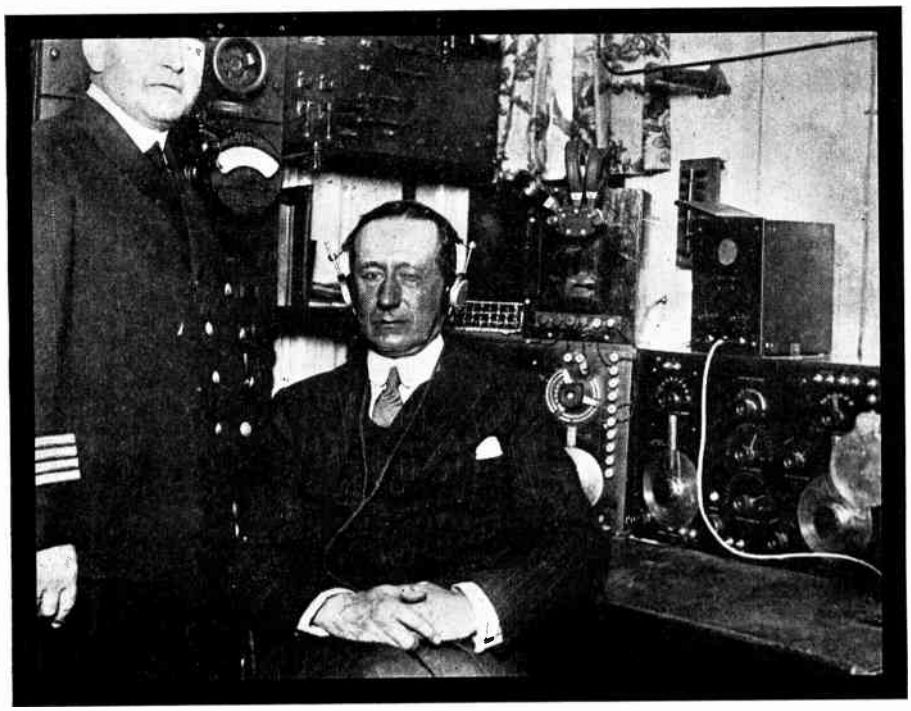
"That Guglielmo Marconi was a great inventor is hardly likely to be the verdict of history. But it is beyond question that he was the most admirable example on record of the scientific promoter. Holding many personal patents, he had none to cover what could be called any of radio's essentials. Ranking with Alexander Graham Bell as one of the two great stimulators of inventive research in modern times, he made, it is safe to say, no fundamental discovery.

"Parentage of radio goes back at least to Jean Baptiste Biot, who well over a century ago observed that frogs' legs tied to a small loop of wire jumped when an electric spark exploded across the laboratory. With the announcement in 1873 of James Clerk Maxwell's electromagnetic theory of light, it became evident that communication might be possible by invisible electric waves, a conclusion confirmed experimentally by Heinrich Hertz as early as 1885. First to send readable signals through space electrically was probably the still-living veteran, Sir Oliver Lodge. It was shortly before 1893 that young Marconi learned, from his vivid and persuasive physics teacher, Professor Augusto Righi, of the University of Bologna, of the new electric waves which he was to tame to human use.

"By 1895 Marconi stood among the first on the long honor roll of radio amateurs. Within two years he proceeded to organize his first company and began putting radio on a sound commercial basis. Then and ever since Marconi the promoter worked for the best interests of the art and science which Marconi as inventor had aided in discovering. Inventors are traditionally honorable and honored; promoters are rarely placed on their level. Marconi's distinguished career, now unfortunately cut short, is proof that putting discoveries to work may be as valuable as making them. Italy can be proud of her great son to whom the whole world is in debt."

Radio has saved thousands of lives; it has brought civilizations closer together; it has spread knowledge over the face of the earth; and in smaller ways it has brought happiness to the lonely and a cultural background to the multitude.

The thing itself—intangible, yet vital—is a lasting monument to Marconi—the man who wove its pattern.



An early photo of Marconi, taken aboard a vessel of the U. S. Navy.

•

THE Earhart - Noonan tragedy appears on the surface to have been quite an unnecessary occurrence. It is not easy to be philosophical about their passing because of this disturbing thought. A public does not readily acclimate itself to such incidents when the people involved are highly respected, and as a result there is the desire to establish blame whether it is justified or not.

The occurrence was distinctly not an act of God, but there is little doubt that fate played a hand in the rapidly moving events—that less superstitious form of fate that jells long before the actual climax, and can be traced back to that ever-present human shortcoming: lack of foresight.

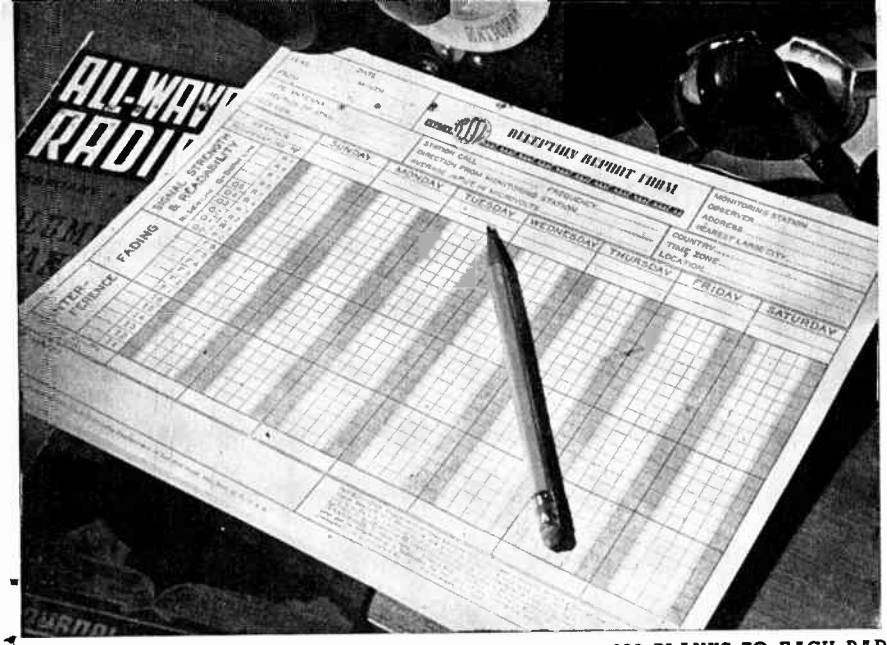
Opinions may differ as to the sources of the myriad messages which the public were lead to believe came from the plane. But by no stretch of the imagination is it reasonable to assume that more than a few of these originated with Earhart or Noonan. The remainder of the messages can have arisen only from rather miserable mentalities.

The reports of these messages made excellent newspaper copy, and probably did no harm, leastwise to the newspapers. Whether actually transmitted, or merely imagined, the message did not mislead officials. Therefore it cannot be said that the fate of the courageous pair was sealed by the irresponsible actions of some moron or crack-brain.

The fact, however, that radio was their one and only means of escape from death, yet failed them in an outlandish manner when they needed it most, is brutally ironical. Still, the equipment, and the manner in which it was installed in the plane, is beyond criticism. Something far more human than the radio failed long before the critical moment arrived that pitched the Flying Laboratory and its precious cargo into the Pacific.

"What might have been" is a sad phrase, indeed, and particularly so when

(Continued on page 460)



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100 Sheets 50c • 250 Sheets $1.00

WIDE-RANGE MUSIC for the HOME

By Chester Watzel and Willard Bohlen

FEW listeners have had the opportunity of experiencing the thrill of actual wide-range musical reproduction, principally because such systems are not generally available. Aside from a few custom-built radio receivers, and expensive commercial equipment not adaptable to home use, such electrical systems simply do not exist. The more expensive stock radio receivers offer fine reproduction of radio programs and recorded music, but cannot be classified as true wide-range instruments.

What "Wide Range" Is

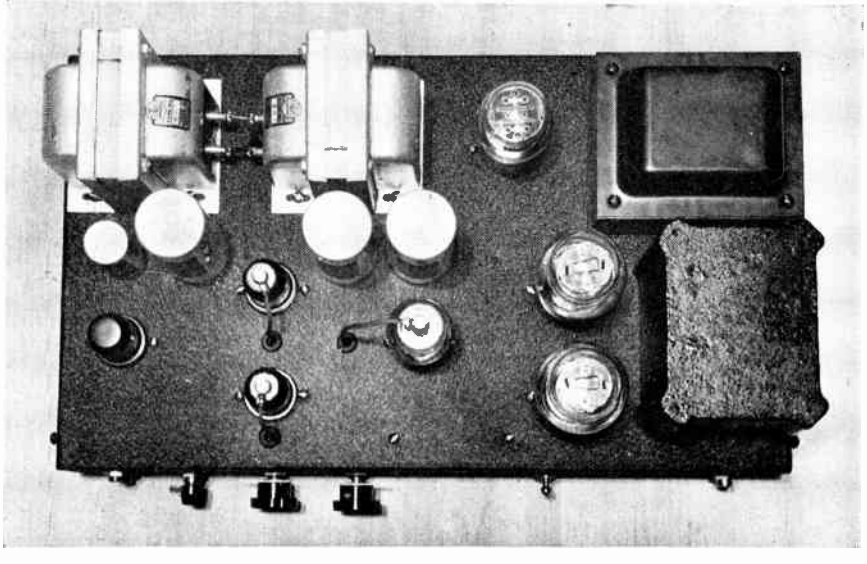
It is next to impossible to obtain wide-range reproduction unless the equipment is designed specifically for that purpose. This means that, for program entertainment, the radio receiver must be designed for local reception only and have "acceptance" characteristics that will permit the passage of the complete audio-frequency band of the station to which it is tuned, and for recorded music an electrical pickup that is capable of responding to all of the audio frequencies impressed on the record. Then, if the good work of the receiver and the pickup is to amount to anything, both the audio amplifier *and* loudspeaker system must be able to handle the same wide range of audio tones. If one, single unit in the line-up from aerial or record to the final acoustical sound is faulty or poorly designed, that unit will prove a bottle neck to the passage of a full tone range.

Our use of the term "wide range" includes more than the mere reproduction from radio or record source of the complete band of musical frequencies. It includes as well a comparatively "flat" reproduction of these frequencies so that certain tones are not amplified out of all proportion to others; a high "safety factor" to prevent distortion due to electrical or mechanical overloading; volume expansion to extend the volume range of recorded music in particular so that it is more nearly a replica of the original in sound perspective; and, lastly, provisions for eliminating the bad effects on both tone and volume level of the "back door" acoustics of the average loudspeaker system when used in the home. By using a special type of enclosed cabinet uniform performance is assured regardless of speaker location.

All of the foregoing points were taken into consideration in the design of the wide-range sound system illustrated in its entirety on the front cover of this issue. Particular care was exercised in the selection of the units employed to obtain these desirable features.

The complete system includes a small, high-fidelity radio receiver of the tuned radio-frequency type using a new distortionless power detector, a record turntable, a crystal type pickup, a combined audio amplifier and power-supply system, and a loudspeaker with a specially designed cabinet. Each is a separate unit, for the constructor to deal with as he sees fit. All can be mounted in a single cabinet, or the radio and amplifier placed in a closet and remotely controlled. The record turntable and pickup can be built into the top loudspeaker cabinet, or made into a small, portable affair that can be tucked away in the closet when not in use.

This article deals only with the construction of the amplifier and loudspeaker system. The receiver will be dealt with next month, and the article will include suggestions with regard to the use of remote tuning controls.



Looking down on the chassis of the amplifier and power-supply unit. At the rear, from left to right, are the filter chokes and condensers, the rectifier tube, and the power transformer. At the front, from left to right, are the 6C5 tube, the 6L7 and 6F5 expanders, the 6C8G, the push-pull 6L6G's, and the output transformer.

Design Features

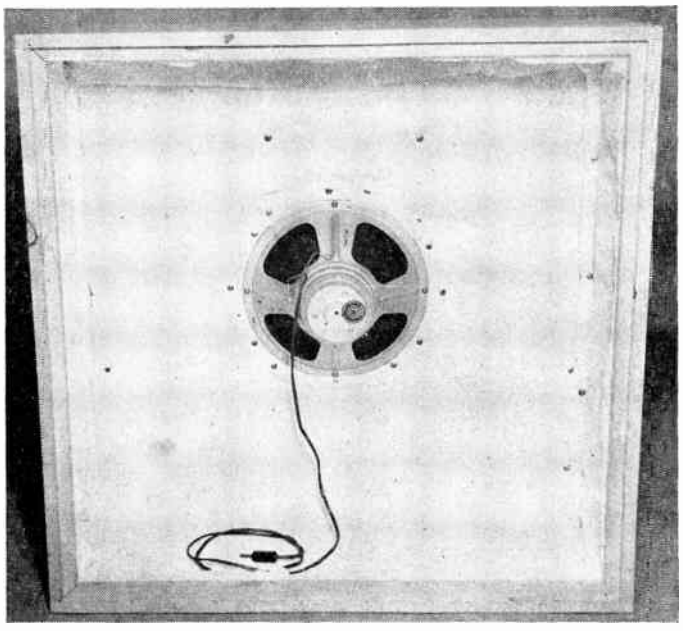
A radio transmitter is best designed by working backwards from the antenna and final power stage to the input. This also applies to an audio system, the speaker and power stage being figured first. A determination of the required output wattage is first necessary. For home use and social functions a few watts of undistorted audio power are quite sufficient. As volume expansion had to be included it was decided that 15 watts or so of really undistorted power would be ample. In handling various p. a. jobs, it has been found that this amount of audio was sufficient to cover a noisy dance crowd where a seven- or eight-piece orchestra was lost to hearing at the other end of the floor.

The speaker is a Cinaudagraph with a cone housing diameter of 12⅛". It is rated to handle from 15 to 18 watts. The frequency range is sufficiently wide for good high-fidelity reproduction, being from 40 to 8000 cycles. The speaker is used in conjunction with an "infinite baffle." This is merely an enclosed air-tight space. The greater the volume of air space contained in the infinite baffle the greater the low-frequency response. The baffle illustrated cuts off at approximately 40 cycles.

One nice feature of this speaker is that no field coil power is necessary, a permanent magnet construction being employed. Only two leads need be run to the speaker, these being from the 6-ohm winding of the output transformer in the amplifier. In this way no unwanted hum is introduced through the medium of the field winding.

With only 15 watts of power neces-

—1938 VERSION



Looking into the "infinite baffle" loudspeaker cabinet, showing the Cinaudagraph speaker with its two-wire cable, and the lining of sound-absorbing material.

sary, the power tubes may be run "strictly Class A," which is unbeatable. The versatile 6L6 tube was picked for this position. When running in straight Class A rating, these tubes require but 250 volts on the plates and no grid driving power. The power sensitivity of these tubes is high, reducing the amount of pre-amplification necessary. Another advantage of these tubes is that they may be run self-bias with no increase in distortion over fixed-bias operation. The total harmonic distortion, either way, is only 2 per cent, which is negligible. In order that the low distortion, wide frequency range and power capabilities be in no way handicapped, an audio output transformer was selected having a frequency range greater than that of the speaker.

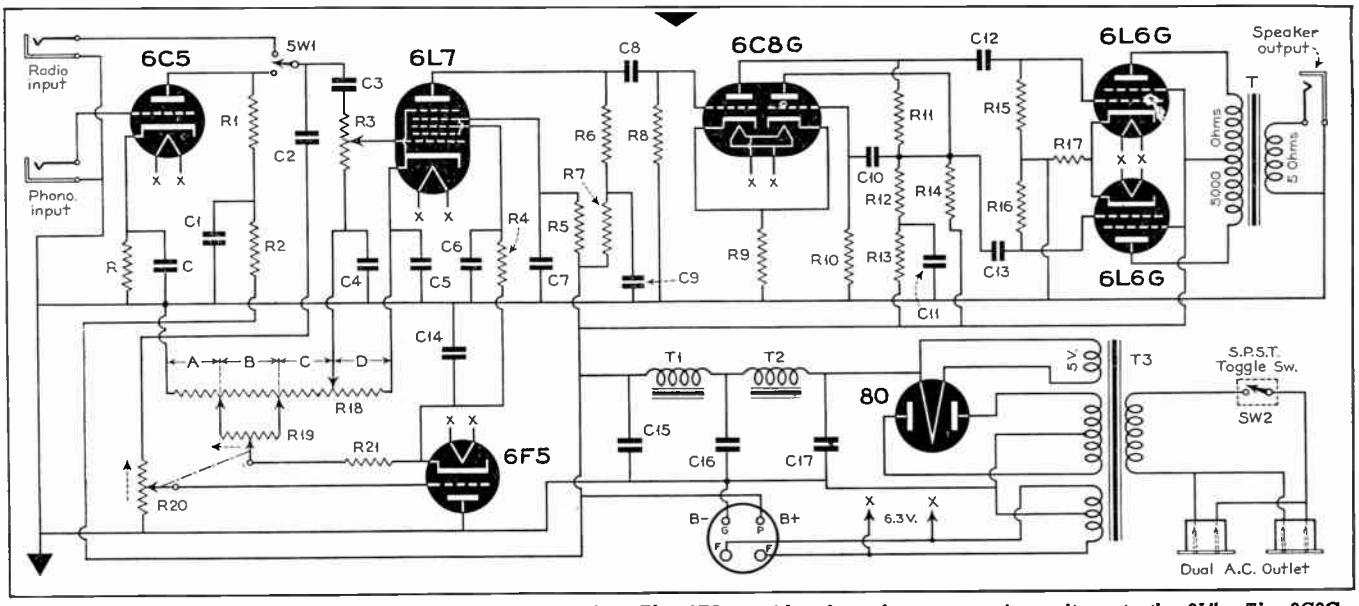
In order to make full use of the excellent characteristics of the output stage and speaker unit, straight resistance coupling is employed throughout, including the phonograph unit and the radio tuner. This calls for the utilization of a phase-inverter stage somewhere in the line-up to transform the single-ended output of the first stages into push-pull to operate the power stage. One of the new type 6C8G tubes is used for this purpose. This is a tube having two high-gain triodes with separate cathodes in one envelope and is specifically designed for phase inverter service.

Single-ended audio is fed to the upper grid of the 6C8G through condenser C8. In order to obtain push-pull output from this stage the lower grid of the tube must be fed an audio voltage of equal amplitude but opposite in phase to the upper grid. As the phase of the plate of the upper section is opposite to that of its grid, the plate resistor of this section is tapped to feed the lower grid through C10. The ratio between R11 and R12 determines the amplitude of the voltage fed to the lower grid. The value of R12 should be such that equal audio voltages appear at the grids of the 6C8G. Approximately 10,000 ohms is the value used for R12 in this particular amplifier. If means for measuring the audio amplitude on the grids is available this resistor may be varied. Otherwise the value of 10,000 ohms may be taken as near correct.

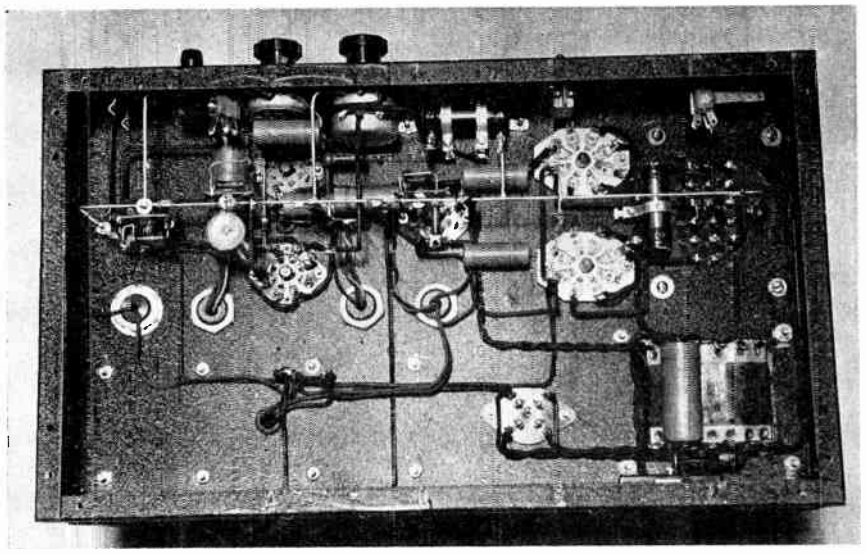
Volume Expansion

The use of volume expansion determined the design of the audio stages prior to the phase inverter. Automatic volume expansion may sound complex, but it is actually easy to hook up and is not critical as to adjustment.

The principle is simple: A 6L7 is used in the stage preceding the 6C8G. The gain of this tube may be varied over wide limits by changing the bias on its injector (No. 3) grid. With a negative 3 volts applied to this grid the tube operates at full gain. As this voltage is increased in a negative direction the gain of the tube is correspondingly reduced. Conversely, if this voltage is set at, say, negative 10 volts the gain of the tube is increased when this voltage is made less negative.



The schematic diagram of the amplifier and power supply. The 6F5 provides the volume expansion voltage to the 6L7. The 6C8G functions as a phase inverter which permits resistance coupled push-pull operation.



Under-chassis view of the amplifier and power-supply unit, showing location of parts.

The audio input to the 6L7 is divided, part running through C3 to the control grid of the 6L7, and part to the grid of the 6F5 control tube through C2. The 6F5 acts as a species of grid-controlled rectifier. An audio voltage applied to the grid of this tube appears across the load resistor, R21, as a d.c. voltage, C14 removing the audio component. The stronger the signal applied to the grid of the 6F5 the greater the voltage across R21, the cathode end of the resistor becoming more positive with increasing input to the tube.

The 6L7 injector grid is biased negatively by the voltage drop between the cathode end of R18 and the clips on this resistor running to the control R19. The settings of these clips determine the final bias on this grid. This bias voltage runs to the injector grid through R21 and R4. R4 and C6 merely form a time constant filter for the expansion.

When an audio voltage is applied to the 6F5 grid the increasing voltage drop across R21, which is in series with the injector bias voltage, causes this voltage to become more positive. This has the effect, as just explained, of increasing the gain of the 6L7.

This change in gain of the 6L7 with variation in audio signal level is utilized to provide automatic level expansion. The range in volume of an orchestra, for instance, is quite wide. When a phonograph recording is made of an orchestra, certain difficulties are encountered because of this. If the gain of the recording amplifier is too high the needle swing on the low note passages will be sufficient to break through from one groove on the record to the next. Reducing the gain corrects this condition, but if the gain contol is left in this position during the entire recording, the soft passages of the orchestra will be far below the needle-scratch level. The volume range of all recordings is, therefore, compressed so that the soft passages will be above the scratch level and the loud passages will not harm the record.

When the record is played this compressed volume range makes the reproduction sound unnatural. In order to restore the original volume range of the orchestra the volume expander on the amplifier is used. When the volume of the orchestra is increased slightly the gain of the 6L7 is also increased, greatly augmenting the volume increase. Similarly, a small drop in volume will cause a correspondingly greater drop in the speaker output. By regulating the degree of this automatic expansion the original volume range of the orchestra is restored.

Degree of Expansion

The setting of R20 determines the degree of expansion. With the control set at the ground end, no expansion is had. R19 is necessary to compensate for the change in general volume level when R20 is varied. If this control were not included, turning of R20 to its minimum position would cut the average volume enough so that the gain control, R3, would have to be turned up to compensate. On the other hand, if the average volume with the expansion control set in the off position were adjusted to the desired level, advancing this expansion control would bring the volume peaks up to ear-splitting level. R19, therefore, retains the maximum volume at the same approximate level regardless of whether or not expansion is employed. Both sections of this dual control R19-R20 should be wired so that the sliders move in the direction of the arrows on the diagram when it is turned in a clockwise direction.

Resistor R18 is divided in four sections, A, B, C and D, as shown in the diagram. D determines the control-grid bias on the 6L7. C plus D determines the bias on the 6L7 injector grid when R19-R20 is in the no-expansion position. B plus C plus D determines the minimum injector voltage with full expansion on. With the three clips on R18 set at the approximate positions indicated in the diagram, more than sufficient expansion will be obtained at the full expansion setting of R20. These clips may be adjusted to suit the individual preferences of the constructor in the matter of expansion control. Various interesting control combinations may be secured by these adjustments.

The amplifier gain with the three stages described is quite ample for use with a radio tuner. The phono-radio switch, SW1, therefore connects directly to the "radio" jack. For use with the phonograph pickup, however, additional amplification is necessary. The 6C5 stage takes care of this. The phono-radio switch automatically cuts this stage in for phonograph operation. No grid resistor is used on the 6C5, as the volume control potentiometer on the phonograph provides this.

In order to ensure phonograph reproduction on a par with radio reception, a high grade crystal pickup is used. This is the new Shure Brothers Zephyr Balanced Tracking pickup. It is very important that a good motor of constant speed be used on the turntable. Any variation in speed of the motor will produce a "sour" sounding reproduction.

Operating Notes

The photographs show clearly the construction of the amplifier. The power supply is mounted along the rear of the chassis with the audio system along the front. The tubes, from left to right, are in the same order as in the diagram. This provides the shortest leads. No shielding of leads—not even the grid leads to the tube caps—was necessary to prevent unwanted feedback or oscillation. The amplifier is unusually stable in operation with the construction shown. As there are no audio transformers except for the output transformer, T, there is no trouble from hum pickup in the low-level stages. As this output transformer operates at such a high level, and as it is well shielded anyway, no possible hum can be picked up by it.

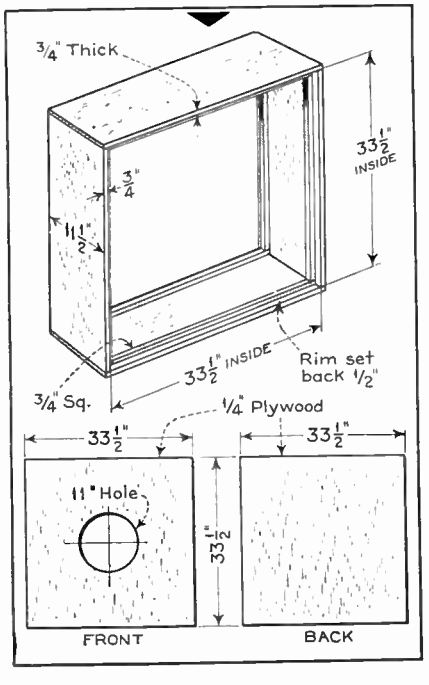
When the amplifier was originally tested, trouble was had with motorboating, excessive hum and mechanical feedback. The motorboating was caused by the grid resistors, R8 and R10, which originally were 500,000 ohms each. This trouble was cured by reducing their values to those given in the parts list. The hum was caused by the omission of input filter condenser, C17. The present hum level with C17 in circuit is negli-

gible. At the gain settings of R3 usually employed it is entirely unnoticeable.

The mechanical feedback experienced was caused by a microphonic 6L7, the vibration of the speaker setting up a terrific high-pitched howl. Several 6L7's should be on hand as some are better in this respect than others. With a sufficiently non-microphonic 6L7, this trouble will not occur. The worst tube, as far as microphonics is concerned, was a glass 6L7G. The 6C5 should be also watched for this trouble.

Outside of the troubles mentioned, all of which were easily cured, the operation of the amplifier is entirely satisfactory in every way. The gain on both the radio and phonograph positions is much higher than necessary. By adjusting the clips on R18 the expander action may be increased to the point where the amplifier is actually cut off, with no audio output. The audio fidelity comes up fully to previous expectations. There are very few radios or phonograph combinations which will touch the system in this respect. It is difficult to describe in words the fidelity of any amplifier and speaker combination. Actual listening is necessary.

An unusual and unforeseen thing turned up when the job was first tried with the phonograph pickup—the base response was far too heavy. This was experienced when using a 5-megohm volume control on the phonograph unit. When a ½-megohm control was substituted the overall frequency evened out and brought the bass down to a point where it would not wreck the speaker cone.



Constructional details of the "infinite baffle" speaker cabinet. A simple baffle board can be used if desired, but sound quality will not be as good.

The difference between the Zephyr pickup and the previously used Western Electric 4A was surprising, to say the least. This 4A pickup is a high-grade unit, and oil damped, such as was formerly used by theatres and broadcasting stations. The greatest difference between the Zephyr and the 4A is in the bass response. The 4A sounds almost as if the bass were cut off, in comparison with the Zephyr.

As the infinite baffle is air-tight, means must be employed to prevent reflection of the sound waves from the inside walls back to the speaker cone. This was accomplished by lining the entire inside of the cabinet with sound-absorbent material. The actual material used was "Kampac" tube wrapping. This was fastened to the inside walls with thumb tacks. Other material available is hair felt, obtainable from any upholsterer, rock wool or similar material.

Using the Expander

Good phonograph records must be used if proper volume expansion is to be had. Some of the 25-cent records are satisfactory in this respect while others are not. All of the 65 cent records tried were amenable to expansion. On certain of the cheaper records the volume level is apparently held so even that no expansion is noticeable with the expansion control set at full. Other records, carelessly recorded, provide volume expansion in the most unexpected places. A poor singer, for instance, will suddenly raise or lower his or her voice in the middle of a note. The sudden expansion or compression of volume which results is somewhat weird in effect.

The better class of dance orchestras have a naturally smooth style of playing that is well suited to expansion. Eddie Duchin and Guy Lombardo are examples of this style of playing. Reproduction of a solo piano passage by Eddie Duchin with the expansion on full is rather startling in effect. The smooth ensemble crescendos of Guy Lombardo's orches-

(Continued on page 495)

LIST OF PARTS

BIRNBACH
- 1—type 382 100 ft. spool red slipback wire
- 1—type 174 4-wire cable (length to suit needs)
- 1—type 306 a.c. cord
- 1—type 772 single shielded wire for input cord (length to suit needs)

CINAUDAGRAPH
- 1—model FY12-12 loudspeaker.

CORNELL-DUBILIER
- 1—type KR-5888 8-8-8 mfd. filter (C, C1, C4)
- 1—type DT-4P1 .1 mfd. 400-volt working, paper (C2)
- 1—type DT-4P1 .1 mfd. 400-volt working, paper (C3)
- 1—type KR-5888 8-8-8 mfd. filter (C5, C7, C9)
- 1—type DT-4P5 .5 mfd. 400-volt working, paper (C6)
- 1—type DT-4P1 .1 mfd. 400-volt working, paper (C8)
- 1—type DT-4P1 .1 mfd. 400-volt working, paper (C10)
- 1—type KR-5888 8-8-8 mfd. filter (C11, C15, C16)
- 1—type DT-4P1 .1 mfd. 400-volt working, paper (C12)
- 1—type DT-4P1 .1 mfd. 400-volt working, paper (C13)
- 1—type DT-4P5 .5 mfd. 400-volt working, paper (C14)
- 1—type KR-508 8 mfd. filter (C17)

IRC
- 1—2,000-ohm ½ watt (R)
- 4—100,000-ohm ½ watt (R1, R10, R11, R14)
- 4—10,000-ohm ½ watt (R2, R7, R12, R13)
- 4—500,000-ohm ½ watt (R4, R15, R16, R21)
- 1—30,000-ohm 1 watt (R5)
- 2—50,000-ohm ½ watt (R6, R8)
- 1—1,500-ohm ½ watt (R9)

PARMETAL
- 1—type AF-1017 chassis and ventilated cover

RAYTHEON
- 1—type 6C5
- 1—type 6L7
- 1—type 6F5
- 1—type 6C8G
- 2—type 6L6G
- 1—type 80

UNITED TRANSFORMER CORP.
- 1—type LS-55 output transformer, 3000 or 5000 ohms to line or voice coil (T)
- 1—type CS-301 filter choke (T1)
- 1—type CS-301 filter choke (T2)
- 1—type UH-6 power transformer (T3)

WARD LEONARD
- 1—200-ohm, 25-watt wire-wound resistor with slider (R17)
- 1—3500-ohm, 25 watt wire-wound resistor with 3 sliders (R18)

YAXLEY
- 1—type N 500,000-ohm potentiometer (R3)
- 1—type DRP240 dual 250,000-10,000 ohm potentiometer (R19, R20)
- 2—type A-1 jacks (radio and fono inputs and speaker output)
- 2—type 75A shielded plugs (for input cord)
- 1—type 75 bakelite shell plug (speaker output)
- 1—type 730 s.p.d.t. jack switch (radio-phono) (SW1)

Miscellaneous
- 6—octal wafer sockets
- 1—4 prong wafer socket
- 1—dual a.c. outlet
- 1—s.p.s.t. toggle switch (SW2)

Phonograph Unit

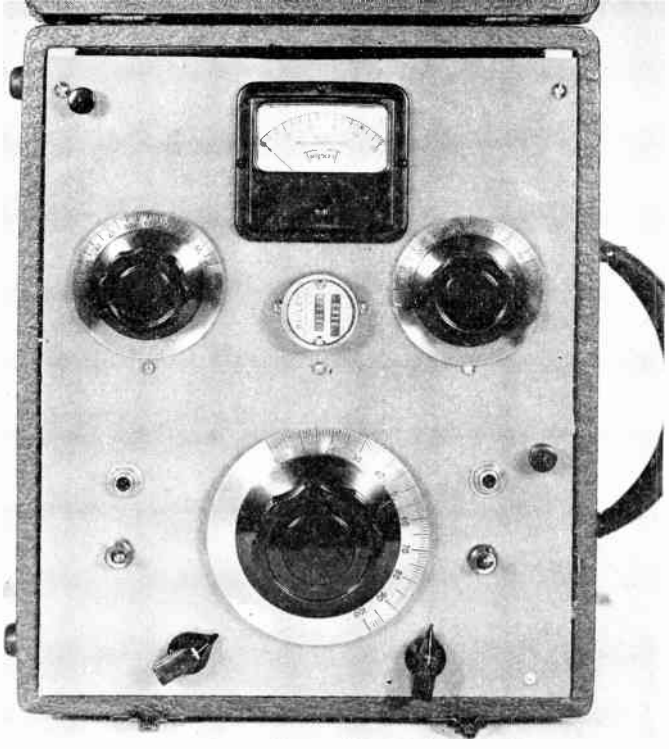
GENERAL INDUSTRIES
- 1—Green Flyer phonograph motor

SHURE BROTHERS
- 1—Model 99B Zephyr balanced tracking crystal record reproducer

YAXLEY
- 1—type N 500,000-ohm potentiometer
- 1—type A-1 jack

PORTABLE or QRR Self-Powered C. W. Xmttr-Receiver

By Myron C. Morris, W210J



The completed transmitter-receiver mounted in a portable phonograph case. Any similar case will do, or a metal cabinet can be used. The crystal is mounted directly on the front panel, below the meter.

WITH summer in full swing, amateurs are turning their thoughts to vacation and the open road. This in turn brings forth visions of an inexpensive portable rig that may be adapted to various conditions of operation away from the home shack.

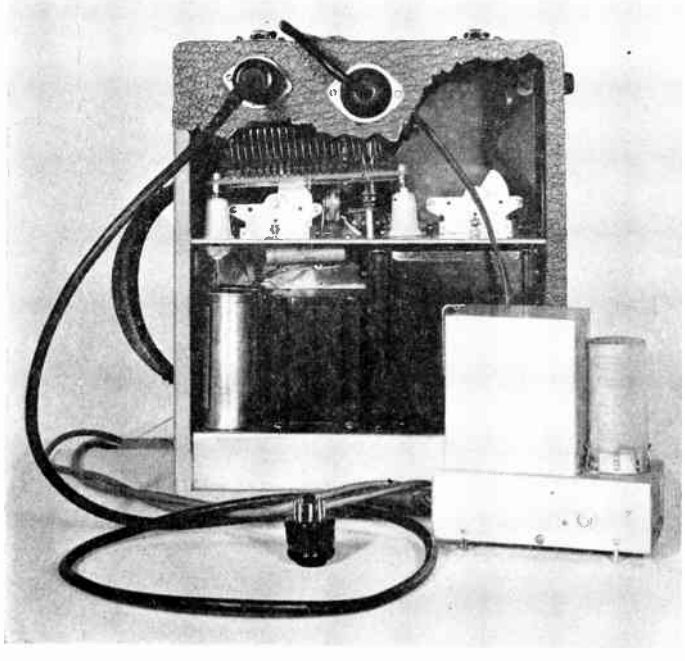
Five-meter rigs for this sort of operation are nothing new, but a compact, light-weight rig for low-frequency, fixed-portable operation, that may be used during vacation, and later retained for practical emergency operation either from power line or storage battery, is somewhat of a novelty. Such an outfit also suggests itself as an auxiliary transmitter-receiver for the shack, to be used in case of power-line or equipment failure, and ready for instant use.

Design Details

The outfit to be described was designed with these points in mind. It will fit in the back of your chariot, in a boat, a trailer, or what have you. If the operating locale is a hotel or summer bungalow, the rig will work on 110 volts a.c. if available, or from a 6-volt storage battery. On the road it may be operated portable (but not mobile, due to F.C.C. regs.) from the car battery. The method of change-over from 6 to 110 volts is simple, foolproof and effective.

In designing a rig to be used in portable service, several important factors must be kept in mind to insure stable operation and trouble-free results. One of the most important is rugged construction. Both chasses of the transmitter-receiver are bent up from heavy gauge aluminum. A strap across the back supports both chasses and makes one rugged unit, permitting the whole works to be lifted up without fear of chassis warping. The panel is made of 3/32" grade bakelite. This material is easily drilled and gives a nice finish. The entire rig measures only 10" x 12" x 6" overall. All coils and adjustments are readily available by simply tilting the front panel forward.

The 6-volt "Vibrapack" is not included in the rig itself, as it is an auxiliary unit. A single cable and plug arrangement connects the "Vibrapack" with the rest of the "works." An 8-prong socket mounted on the back of the case provides connections to the 6-volt pack. When the external cable is plugged in, it not only makes all power connections, but is so arranged that if accidentally the regular power cord is plugged into a 110-volt outlet, no damage is done, because the primary of the power transformer is opened until the "jumper" plug is inserted in the power socket.



Rear view, with case broken away, to show location of parts. The Mallory "Vibrapack," which supplies filtered high voltage from a storage battery, is shown in the foreground, plugged in ready for use.

The Transmitter

It was decided the transmitter should be capable of putting out 10 to 15 healthy watts, be crystal controlled, have a minimum of adjustments, and be easily adaptable to varying antenna requirements. The circuit decided upon was a 6L6 tetrode, with a regenerative impedance in the cathode. This circuit permits greater loading of the oscillator with lower crystal current than a straight

crystal circuit. When an active crystal is used in this circuit, the output tank may be worked at twice the crystal frequency. However, care must be used in tuning up to prevent overloading of the oscillator, and subsequent damage to the crystal. The plate is shunt fed to permit grounded rotors on the tank and antenna condensers and also to use the unusual antenna coupling circuit that is employed here. This tuning system may be used on any single-wire antenna or any single-wire feeder arrangement.

For convenience, the crystal is mounted on the front panel by fastening a small 5-prong socket on the rear of the panel and providing two holes for the crystal holder pins to pass through. The tuning condensers, C4-C5, are mounted on small angle brackets which are in turn screwed to the chassis with self-tapping screws. The plate coil, L3, is mounted on two small jack top insulators. The 6L6 oscillator tube itself is mounted "above board" to give short leads to the coil, condenser, and crystal socket. The only parts under the chassis are the screen dropping resistor, R2, and its associated by-pass condenser, and the cathode r.f. choke, L1, and its by-pass condenser. A small closed-circuit jack, J1, provides connection for the key plug. All power connections drop down to the lower chassis in a 4-wire cable.

The Receiver

The receiver must be on a par with the transmitter in performance, because you can't work 'em if you can't hear 'em. For compactness, simplicity, and general performance, a good old "blooper" fills these requirements. A 6K7 as regenerative detector has sufficient sensitivity to adequately meet all demands. A high-gain audio channel with a 6F6 follows which gives enough sock for speaker or phones as desired.

After laying out the space necessary for the power-supply section, little room was left in which a 2-tube receiver could be squeezed in, but with a little care in layout, all the parts necessary can be arranged so as even to leave a little room to spare.

The layout of the parts can be seen in the accompanying photograph. The detector tube socket is mounted on the extreme right of the chassis and is also raised on small threaded bushings. Doing this brings the grid close to the band-spread condenser, C7. The rest of the connections pass through a large hole punched in the chassis. The Mycalex coil socket is also raised on threaded posts and wired directly to the tuning condensers.

The 6F6 audio amplifier is mounted directly in front of the filter choke. The output choke, L5, is a small a.c.-d.c. affair mounted under the deck, and connected to this is a small open-circuit jack

LIST OF PARTS

AMERICAN RADIO HARDWARE
- 4—No. 1600 octal sockets
- 1—No. 1304 Mycalex coil socket
- 1—No. 1330 35 mmfd. condenser (C7)
- 1—No. 1318 100 mmfd. condenser (C8)
- 1—No. 1789 jack (J1)
- 1—No. 89 jack (J2)
- 2—No. 30 insulators
- 2—No. 154 binding posts
- 1—No. 1000 hardware assortment

BLILEY
- 1—LD2 crystal

CARDWELL
- 1—MR-260BS variable condenser (C5)
- 1—MT-50-GS variable condenser (C4)

COTO COIL
- 1—type "B" coil for each frequency (L3)

HAMMARLUND
- 1—S-8 octal socket
- 1—set SWK-4 coil, (L4)
- 2—type CH-X r.f. chokes

I.C.A.
- 2—No. 1155 bar knobs
- 2—No. 2171 2¾" dials
- 1—No. 2169 4" dial
- 1—No. 611 condenser (C6)
- 2—No. 1230 switches (S1, S2)
- 2—No. 1176 Electrolloy panels for chassis
- 2—s.p.s.t. toggle switches

I.R.C.
- 1—50,000-ohm potentiometer (R4)
- 2—.1 meg., ½ watt, (R1, R6)
- 2—.5 meg., ½ watt, (R3, R7)
- 1—15,000-ohm, 10 watt, (R5)
- 1—10,000-ohm, 10 watt, (R2)
- 1—40,000-ohm, 50 watt, (R9)

KENYON
- 1—T206 power transformer (T1)
- 1—T515 choke (L6)

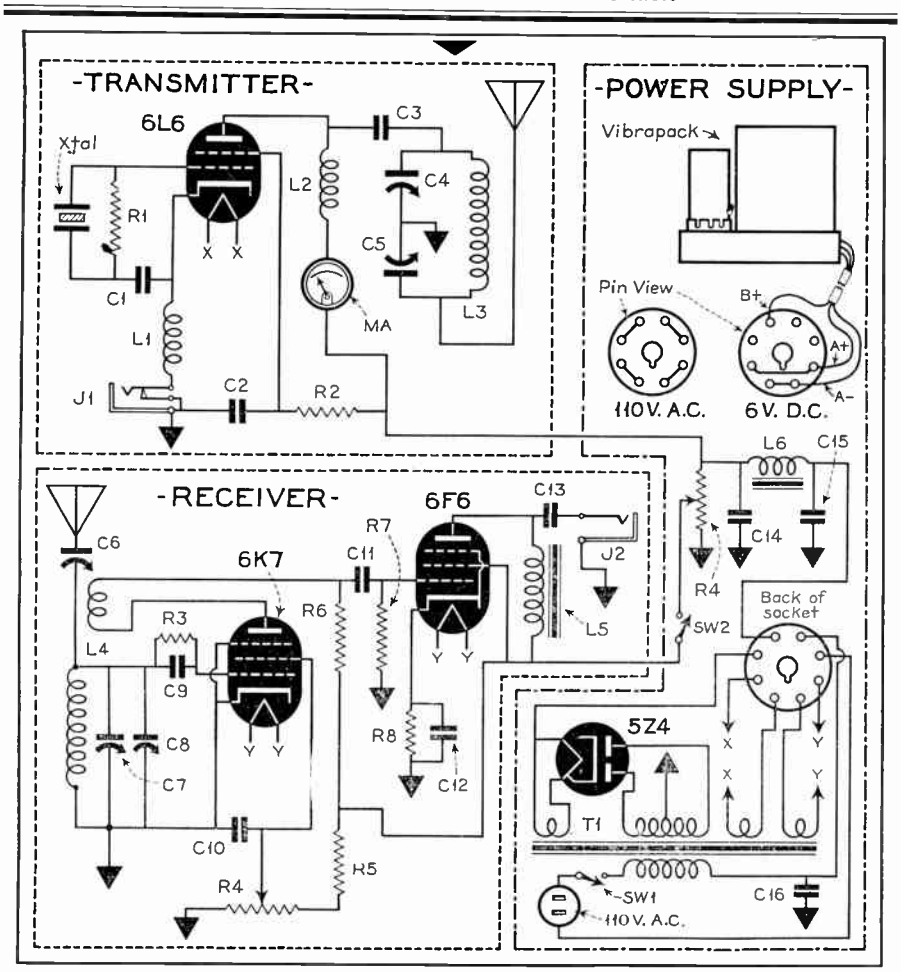
MALLORY
- 1—VP552 "Vibrapack"

MICAMOLD
- 2—BK450 8 mfd. 450-volt, (C14, C15)
- 1—TP400 .5 mfd. 400-volt, (C10)
- 3—TP600 .1 mfd. 400-volt, (C21, C11, C13)
- 1—TP600 .02 mfd. 600-volt (C16)
- 1—WM900 .0001 mfd. mica, (C9)
- 1—HM1500 .00025 mfd. mica, (C1)
- 1—HM2500 .002 mfd. mica, (C3)

RAYTHEON
- 1—6L6
- 1—6F6
- 1—6K7
- 1—5Z4

TRIPLETT
- 1—No. 322 0-100 ma. meter

Miscellaneous
- 2—8-prong octal plugs
- 1—male receptacle
- 1—female plug
- 1—a.c. cord
- 3 ft.—3-wire cable



Schematic diagram of the sections comprising the transmitter-receiver. A plug arrangement permits operation from a.c. line or 6-volt storage battery.

provided for speaker or headphone use.

The regeneration control, R4, is under the chassis as well as the tank tuning condenser, C8. The coils are wound on standard 1½" forms. The coils used are manufactured, and gave excellent results.

All connections are made with ordinary push-back wire with the exception of the connections to the tuning condensers which are made with No. 12 bus bar. Doing this ensures a permanent, rigid connection.

The Power Supply

The power supply used is necessarily unusual, because of the unique power requirements. The 110-volt a.c. supply utilizes a 5Z4 as a full-wave rectifier. A brute-force filter with a 5/25 henry swinging choke, L6, and two 8-mfd. dry electrolytic condensers, C14-C15, complete the filter. A feed-thru cable switch, SW1, turns the power supply on or off and a stand-by switch, SW2, in the B positive lead to the receiver permits killing the receiver during transmission without turning off the heaters. The line cord terminates in a female cord plug which in turn plugs into a male receptacle mounted next to the octal power socket.

The 6-volt supply uses the new Mallory "Vibrapack." This unit comprises a transformer and a synchronous vibrator and rectifier. A built-in noise filter removes all noise and vibrator "hash" from the power supply. This, however, does not filter out any ripple so an additional filter is required. To economize both on space as well as cost, the same filter as is used with the 110-volt pack is utilized by means of the previously mentioned octal power socket. This connects the output of the vibrator pack to the set filter, disconnects the primary of the set power transformer from the a.c. receptacle, and connects the filaments across the 6-volt input.

The 6-volt input leads are directly connected to the "Vibrapack." These leads must be of at least No. 10 gauge stranded wire because at the maximum output of 300 volts at 100 mils, the input current is 7 to 8 amps. A pair of battery clips provide easy connection directly to the battery posts.

Another 8-prong plug is wired to "jump" the socket, and to reconnect the filter to the 110-volt power supply.

Tuning Up Transmitter

Assuming that the transmitter-receiver has thus far come along without serious trouble or complication, the next step is to set the rig in operation. The first step, naturally, is to connect the power supply to be used.

To tune the transmitter, first turn the antenna condenser, C5, to maximum capacity. Next, set the oscillator tank condenser, C4, to approximately half capacity, press the key and quickly tune to resonance, as indicated on the plate milliammeter. Keeping the key pressed, tune the oscillator to a few mils higher than the lowest dip. This should be done by decreasing the capacity slightly. With no load, the plate current should be approximately 10 to 15 mils. If the reading is higher than this, readjust the screen voltage dropping resistor, R2, until the reading comes close to this value.

The next step is to adjust the antenna loading. First, set up the antenna, adjusting it to approximately 32 to 33 feet, depending upon the frequency used. Connect it to the antenna post and adjust the antenna condenser, C5, to maximum reading on the oscillator plate milliammeter. Retune the oscillator tank condenser to minimum dip, repeating this process until the oscillator plate current reads approximately 60 mils. This will give an input of approximately 19.5 watts.

Take the brick off the key and the transmitter is all set to ride.

Receiver Operation

Now comes the receiver. Plug in the proper coil and advance the regeneration control until a soft "plop" is heard in the phones. Adjust the series antenna condenser, C6, until a signal is heard. Readjust the condenser to a point where the set oscillates smoothly over the entire band. Turn the band-setting condenser until the desired band is reached. Note the setting of the condenser for returning to this point.

A short length of hookup wire is sufficient for the receiving antenna under most conditions.

Trouble Shooting

If any of the troubles mentioned here arise the suggested remedy will undoubtedly help. If the screen current of the oscillator "creeps" or rises slowly over a period of time, readjust the screen voltage until this condition is overcome. With a plate voltage of 325 volts, the screen voltage recommended is about 100 volts. If the crystal starts to sing, increase the antenna condenser capacity thus reducing the loading, but don't forget to retune the oscillator.

Perhaps the receiver does not oscillate. To check this, place your finger on the grid cap of the 6K7. If this brings forth a loud howl in the phones, all is well. But if no signals are heard, reverse the tickler winding connections on the plug-in coil. If the set does not slide into regeneration smoothly, adjust the tap on the power supply bleeder resistor, R4. The plate voltage should be about 250 volts.

If excessive hum is experienced when operating on a.c., connect a .02 mfd. condenser from one side of the line to the chassis. In severe cases, connect a .002 mfd. mica condenser from one plate to one side of the filament of the 5Z4, using the plate-filament combination giving the least hum. If hum is experienced while using the "Vibrapack," a short, heavy ground connection to the chassis of the power supply will cure this.

EDITORIAL QUOTES

(Continued from page 452)

the thought has been that a few dashes transmitted from the plane on 500 kilocycles might have been sufficient for the *Itasca* to have obtained bearings on the Flying Laboratory before it hit water. Sad, indeed, in light of the report that Miss Earhart dispensed with the trailing-wire antenna which would have made this possible.

"It might have been" that there was a short, hurried message of vital importance sent out on one of the plane's two short wavelengths—a message lost to nearby boats because of skip-distance effects. Had the operating frequencies of the plane been publicly announced previous to the flight, unquestionably a few listeners and amateurs would have had their receivers tuned to the plane's frequencies at *all* times, day and night, and in favorable reception areas.

There is in this country a large group of licensed amateurs, represented by the American Radio Relay League, and a large group of experienced listeners, represented by the Radio Signal Survey League. Together they form a closely-knit network of "listening posts" covering all state areas.

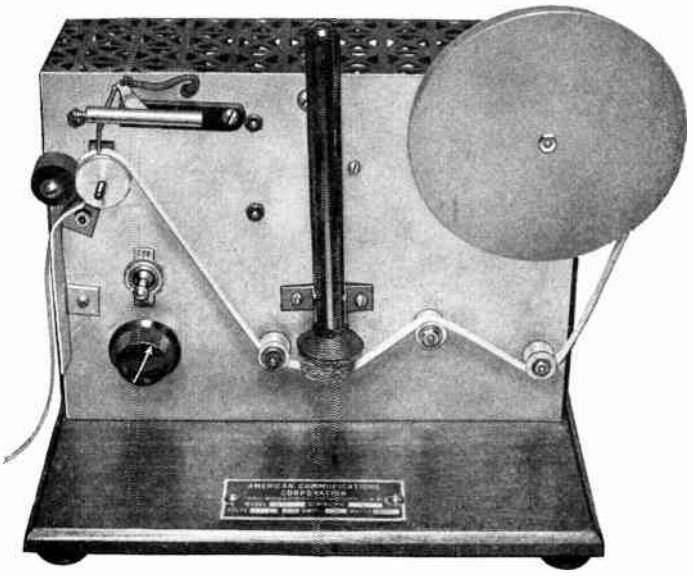
No message could possibly escape them, providing they were called upon to monitor a specific channel. If a signal skipped one area, it would be intercepted elsewhere. Licensed amateurs, and a few listeners, are proficient in code reception, so it would make little difference if signals were in this form or in voice.

We have repeatedly stressed the potential value to the nation of this widespread group of radio lookouts, ready to serve in cases of emergency. They are reliable and efficient because they are motivated by pride. They have served the public before and will do so again.

Both organizations should be advised of all special frequency allocations to expedition and flight transmitters that the members may have the opportunity of keeping a weather eye out for possible trouble. If such a practice is instituted, it may some day be instrumental in saving the lives of other Earharts and Noonans.

CODE on a TAPE

RECORDER, CONNECTED TO RECEIVER, MAKES READING EASY



Hand-made model of the code recorder. The tape passes under a sponge moistener and thence to the recording stylus in the upper left corner. The tape is drawn through by electric motor drive.

IT has become the rule rather than the exception in the field of science —and particularly in chemistry—that a new discovery opens up a multitude of general and industrial applications quite apart from the original application in mind that stimulated the research.

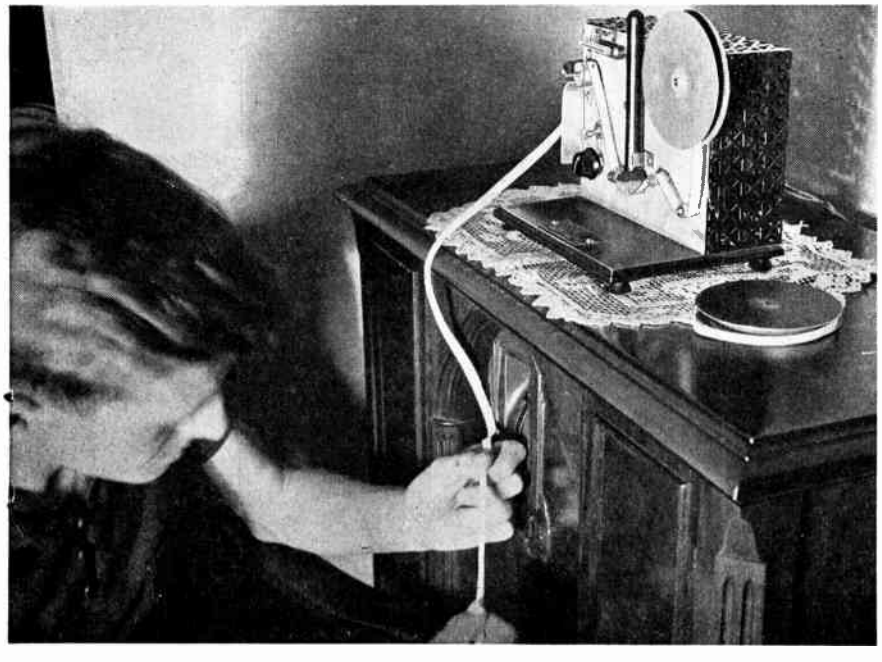
What ordinarily would be the exception has again become the rule, for specific research work in the field of radio facsimile work has yielded a special chemically-treated paper that immediately changes color upon the application of an electric current. Designs of a sepia hue appear on the white surface of the paper where it has been "scanned" electrically.

Dots and Dashes on Tape

But it is not the facsimile system we wish to describe—it is a clever and highly practical "by-product" of the discovery that has our interest. This by-product is a simple and inexpensive machine that will automatically record on "ticker tape" the actual dots and dashes of any of the radio or wire codes, and handle such transmissions at a speed of 50 words or more per minute.

Of particular interest to the radio listener, the licensed radio amateur and the prospective amateur, is the fact that the device is designed to operate directly from the output of any radio receiver. Viewed in this light, the recorder has wide applications of usefullness.

The machine opens up to the listener unacquainted with the radio code an entirely new and exciting realm of exploration. For the first time in the history of radio, the actual translation of code signals is brought within the reach of all. Since the tape records the dots and dashes, the uninitiated need only refer to any standard radio code table, such as used for code teaching, and decipher the tape markings at his leisure. The process of "decoding" can be hastened by preparing a special code table with the dot-and-dash combinations in the left-hand column and the corresponding letters in the right-hand column, and instead of arranging the table in alphabetical order, start out with the letters made up of dots only, followed by those composed of dashes only, and follow through with dot-dash and dash-dot combinations in their proper sequence.

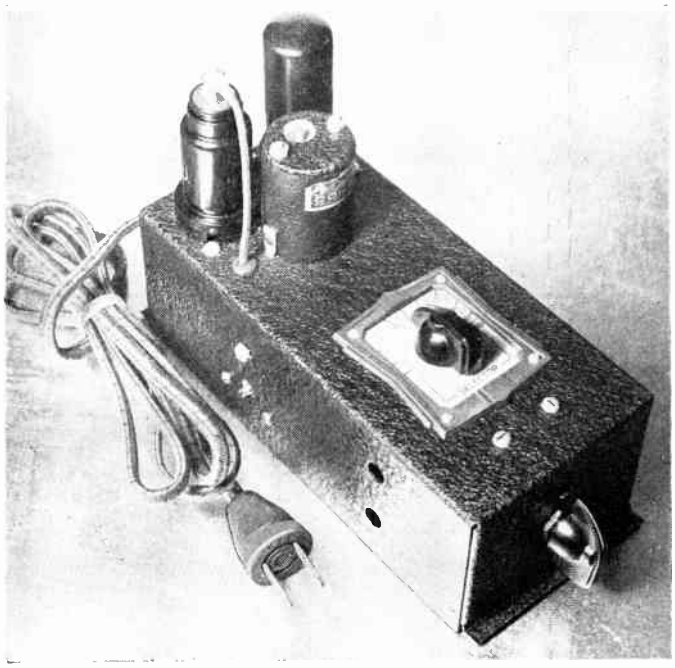


The code recorder operating from the output of a radio receiver. Dots and dashes are recorded on a chemically-treated paper tape.

Code-Station Calls Easily Determined

The listener need no longer be deaf to code signals. By means of the code recordings, complete messages can easily be transcribed (but remember that there is a law against the divulging of the contents of such messages), but what is more to the point, the listener can determine the call letters, and through these the location, of the many code stations heard between commercial phones and broadcasters in the short-wave bands. Fishing for code dx may well become as interesting a sport as fishing for dx broadcasters. It is safe to assume, also, that the constant decoding of such signals will assist the code deaf in learning to read the dots and dashes by ear.

(Continued on page 498)



The completed remote tuning control unit, ready to take over the job of receiver tuning and volume control from a distance. The unit is self-powered, which saves a lot of fuss and extra wiring.

ARMCHAIR TUNING with REMOTE CONTROL ADAPTER UNIT

By CLIFFORD E. DENTON

THE 1938 lines of radio receivers are featuring tele-tuning, push-button tuning, etc., to attract the buying public. These devices run the entire scale of mechanical and electrical ingenuity. However, they all have two things in common. First, the listener has to go to the radio receiver to tune it and the mechanical features function on the broadcast band only.

A remote control adapter unit for the broadcast band is a happy solution for the older receivers, as with such a device any set of either the t.r.f. or superheterodyne type can be brought up-to-date. With a remote control the receiver can be tuned from an easy chair, or from a different room if desired.

The unit described is very simple in design and is available in kit form with most of the parts properly placed and riveted. A calibrated scale for tuning and a volume control enable the listener to make all necessary tuning and volume adjustments without touching the regular receiver.

Circuit Design

The remote control is not only simple in construction but simple electrically as well. Two tubes are used, one for mixing the incoming signal with a local oscillator so that the intermediate frequency will fall within the range of any standard broadcast-band receiver, and the other is the rectifier for supplying plate voltage to the mixer tube. This makes the unit independent of the receiver power supply. This is an important feature as most receivers have power transformers that are just capable of supplying their own requirements.

The pentode section of the 6A8 tube is tuned in the grid circuit by means of T1 and C1, as shown in the diagram of Fig. 1. T2 is the output transformer and is used as the means of coupling to the input of the regular receiver. Several combinations are available for matching the impedance of the receiver for maximum signal input. The triode section of the 6A8 is used in a simple oscillator circuit consisting of T3 and C2. C11 is the padding condenser used for lining up the low-frequency end of the broadcast band.

The low current requirement of the 6A8 tube permits the use of a resistor, R3, instead of a choke, in the filter circuit of the 25Z6 tube. The filter circuit is completed with condensers C7 and C8. Tests indicate that there would be no advantage in the use of a choke over the resistor in the filter circuit as all of the circuits operate at radio frequencies. There is not enough hum modulation to affect the quality of the signal.

A properly tapered volume control, R5, is placed in the cathode and antenna circuit in a conventional manner. This control is very satisfactory and enables

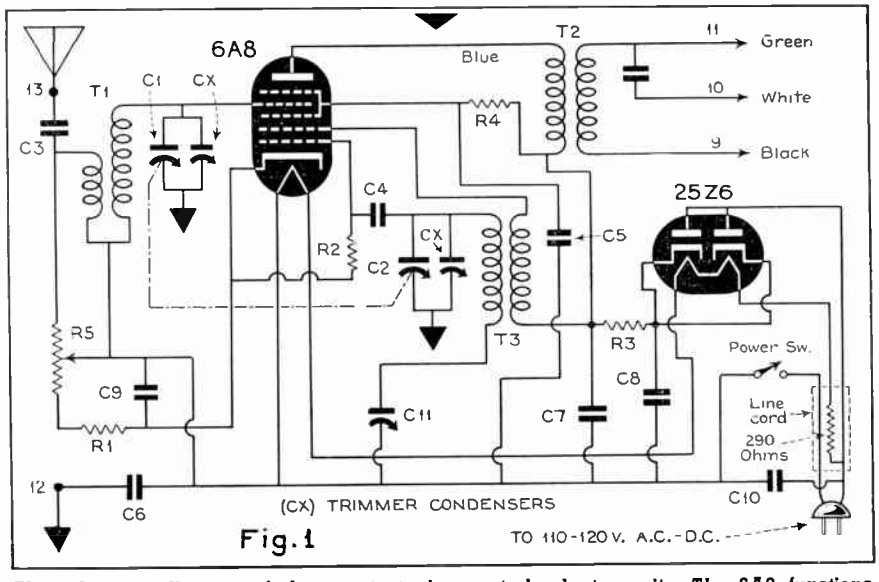


Fig. 1

The schematic diagram of the remote tuning control adapter unit. The 6A8 functions as mixer and oscillator, the 25Z6 as power-supply rectifier. C1 and C2 are the ganged tuning condensers, and R5 the volume control.

the operator to make volume adjustments when tuning without going to the receiver.

Wiring Notes

The wiring is very simple as most of the parts are properly placed, but for the less experienced constructor a special step-by-step pictorial wiring layout is shown in Fig. 2.

Make all connections as short and direct as possible, using the wire furnished with the kit. Resistors and condensers are supported by their own leads but these should be cut as short as possible to permit easy wiring. Mount resistors and condensers so as to avoid shorts to the chassis or other parts of the unit. The grid lead passing through the chassis hole marked "X" should be just long enough to permit the grid clip which is soldered to the other end to be slipped over the cap of the 6A8 tube.

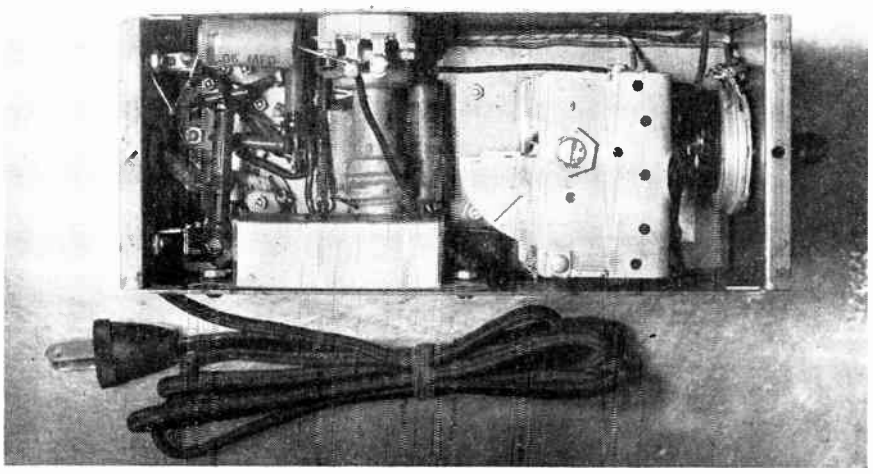
The electrolytic condensers, C7 and C8, are in a cardboard box and are fastened to the inside wall of the chassis, as shown in the under-view photo. Solder the leads to their respective terminals before fastening the condenser block in place. This will make for easier wiring. Any serviceman can complete the wiring of the unit in an hour at the most and the most inexperienced constructor can do a neat job in three hours. Use the solder furnished with the kit and have a good clean, hot iron for the best results.

Operating Notes

To place the remote control adapter unit in operation, insert the 6A8 and the 25Z6 tubes in their proper sockets and run two wires from the radio receiver and the unit. These wires can be a twisted pair or a flat twin cable. Connect one end of each of these wires to the antenna and ground posts of the radio receiver. The other ends are connected as follows:

If the radio receiver has a low-impedance antenna primary, then the wire from the antenna post of the radio receiver should be connected to terminal 10 on the adapter. Connect the ground lead to terminal 9 on the adapter and leave terminal 11 unconnected.

If the receiver has a high-impedance primary, connect the antenna wire from the receiver to terminal 11 and the ground lead to terminals 9 *and* 10.

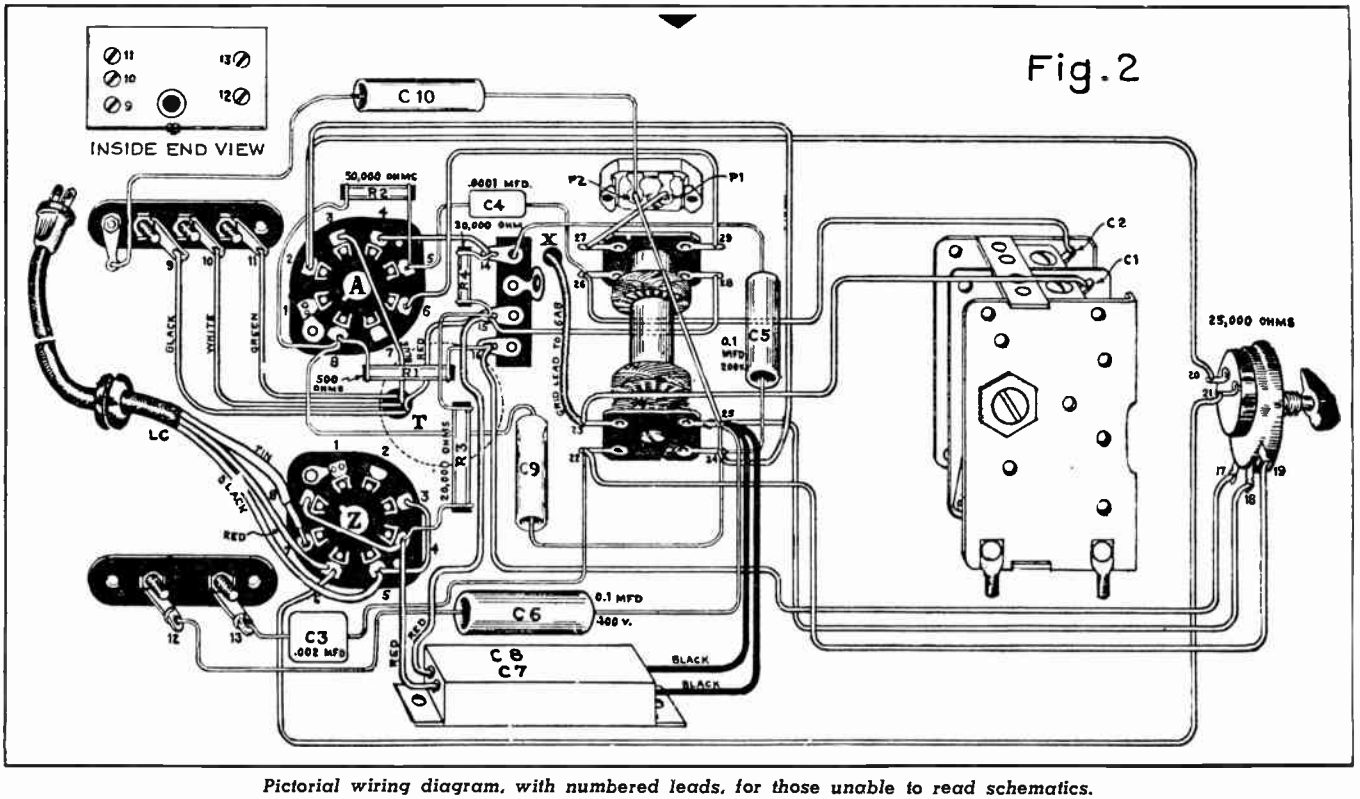


Interior of adapter, showing correct mounting of parts. Note that pictorial diagram below follows this layout.

The primary impedance of the antenna coil in the receiver may be unknown. If so, try both connections for best results.

The regular antenna formerly connected to the radio should now be connected to terminal 13 of the adapter unit. The ground is connected to terminal 12. Plug in the line cord to a convenient receptacle and turn on the unit by rotating the volume control knob to the right. The radio receiver should be turned on at this time and the tuning dial adjusted until the receiver is operating at the low-frequency end of the broadcast band (off a local or powerful station). The radio receiver volume control should be set for proper volume level. Once the control unit is operating properly it will

(Continued on page 485)



Pictorial wiring diagram, with numbered leads, for those unable to read schematics.

Globe Girdling

By J. B. L. HINDS

NEW STATION LIST . . . DUTCH PUZZLE . . . NEW AUSSIE ON WAY . . . OAX5B TO OAX5A
W2XAF TO UP POWER . . . ROME ON 11810 . . . SIAM SCHEDULE . . . JAVA ON SPLIT

WITHIN a very short time a new DX season will be upon us. It is difficult to make forecasts, but we venture to say that many new records will be marked up and equally as many new records broken before the season is over.

It is difficult to forecast results in the short-wave bands at any time, since high-frequency radio waves are erratic to begin with. It would be more difficult to make forecasts for this year due to the presence of a maximum sun-spot cycle. Nevertheless, the improvements made in transmitters and receivers, the trend toward increased station power, the use of beam antennas, and the fact that the effect of sun spots on short-wave transmissions is as yet not completely determined, lead us to believe that the coming season will be a wow.

The arrival of a new season calls for improvements of another nature as well —the manner in which we present data on short-wave stations and an increased effort on our part to obtain even more station information, and while it is hot.

We have commenced our series of improvements by revamping the broadcast section of the short-wave station list. You will find it in this issue. It will be noted that we have attempted to include all vital data, such as station addresses, signatures, etc., in the one list so that you need not in the future start a hunt through back issues for such data.

We hope you'll like it.

Radiophone and Experimental Stations

KBJ, 13240 kc., Manila, P. I., heard by West Coast listener conversing with KKZ, 13690 kc., Bolinas, Calif.

OPL, 20040 kc., Leopoldville, Belgian Congo, Africa, phones or works c.w. with ORK, 10330 kc., Brussels, Belgium, daily between 4:30 and 11:30 a.m.

OPM, 10140 kc., Belgian Congo, works with ORK between 2 and 3:30 p.m. Heard clearly on East Coast.

TYE1, 18090 kc., Paris, France, heard recently in Pennsylvania relaying a program of "Radio Coloniale" to America.

OCI, 18680 kc., Lima, heard recently in Eastern United States relaying program to WKK, 21420 kc., Lawrenceville.

NEW STATIONS

KC.	*Meters*	*Call*	*Location*
15160	19.79	XEWW	Mexico City, Mexico
15155	19.80	SM5SX	Stockholm, Sweden
11840	25.34	KZRM	Manila, P. I.
11805	25.41	OXY	Skamleback, Denmark
11700	25.64	HP5A	Panama City, Panama
9570	31.33	KZRM	Manila, P. I.
9524	31.50	FIQA	Tananarive, Madagascar
9030	33.32	COBZ	Havana, Cuba
7411	40.48	HC1CE	Quito, Ecuador
6500	46.15	YV1RM	Maracaibo, Venezuela
6330	47.39	COCW	Havana, Cuba
6007	49.94	"Radio Burma"	Rangoon, Burma

STATION CHANGES

New Frequency	*New Call*	*Old Call*	*Old Frequency*
11796	.....	OAX5A	11800
9550	.....	XEFT	9510
9400	CO9BC	COBC	9363
8580	.....	YN1PR	8650
6580	.....	"Radio Guardia Civil"	6485
6158	.....	YV5RD	6156
6130	.....	VP3BG	6132
6082	.....	VQ7LO	6060

STATIONS DELETED

K.C.	*Meters*	*Call*	*Reason*
6018	49.85	ZHI	Not in service

NON-AUTHENTICATED STATIONS

Frequency	*Call*	*Location*
9565	HP5S	Panama (May)
8910	"Radio Eritrea"	Africa (May)
7600	HC1RJ	Ecuador (May)
7200	HC1AJ	Ecuador (May)
6600	HI6H	Dom. Rep. (May)
6320	HC1RE	Ecuador (May)
6128	OAX7A	Peru (May)
6122	OAX4P	Peru (May)
6122	OAX6A	Peru (May)
6120	HP5Z	Panama (June)
6035	CXA2	Uruguay (June)
6035	SM5SX	Sweden (August)
6000	OAX5C	Peru (May)
5795	HI2H	Costa Rica (July)

Veri from VP3BG, British Guiana, in black and white.

WXA, 9920 kc., Juneau, Alaska, heard by Kentucky listener, working WVD, 8650 kc., Seattle, Wash., between 2:15 and 2:52 a.m. The transmitter used by WXA is a Western Electric 400 watter. Station is controlled by the Signal Corps, U. S. Army, and transmitter works also on 5327.5 and 11550 kc.

XOJ, 15800 kc., Shanghai, heard with R8 signal in Eastern United States calling JVH on 14600 kc. near 10:30 p.m.

IDU, 13380 kc., Asmara, Eritrea, Africa, heard in the Middle West phoning Rome between 6 and 7 a.m.

Nippon

JZJ, 11800 kc., and JZK, 15160 kc., Nazaki, Japan, are transmitting the Overseas programs as detailed in the station lists. From contacts made by the writer the programs are coming in much better on 11800 kc. than on 15160 kc., there being considerable interference on the last mentioned frequency. The carrier on 11800 kc. is quite consistent and holding up well over the local electrical interferences of automobile ignition and those through the house line, which in the opinion of the writer, are much more annoying than those due to weather conditions.

Reports indicate that special test programs are being transmitted by JZJ, 11800 kc., and JZK, 15160 kc., between 9 and 10 a.m., following the Overseas broadcasts between 8 and 9 a.m.

JZJ, 11800 kc., and JZK, 15160 kc., are also being used for special test programs to Eastern United States between 6:30 and 7:30 a.m. and 5:30 and 6:30 p.m. These transmissions are in addition to those shown in station lists.

JIB, 10530 kc., Taiwan, (Formosa), classed as radiophone station is apparently broadcasting early mornings. Heard recently on special program at 4:30 a.m. with good signal. This program was being rebroadcast by JVN on 10660 kc., and JZI on 9535 kc.

"Radio Burma," 6007 kc., or 4994 meters, is on the air. This station is operated by the Indian Posts and Telegraph Dept., Burma Independent Wireless, Rangoon, Burma.

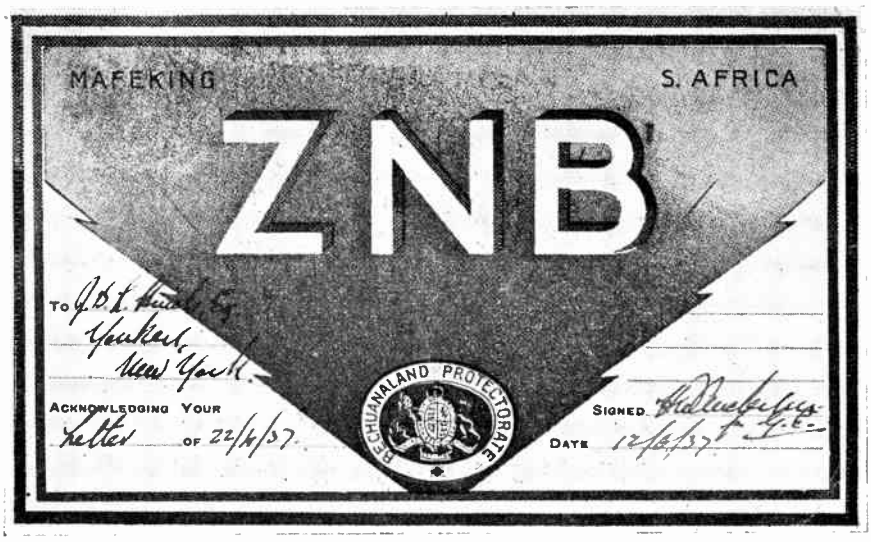
HZA, mentioned in August issue, was heard by Scott Walls, Quartermaster, S.S. *President Pierce* of the Dollar Lines, announcing as HZA—"H" for Horses, "Z" for Zebra and "A" for America. Testing, Zedah. Wavelength announced as 46.—? meters, last two figures not distinguishable. Mr. Scott was not able to learn if the station was testing *at* Zedah or *for* Zedah.

VPD, Colombia, Ceylon, 6160 kc., is reported heard on the West Coast, although some say on 6125 kc. and working never later than 9:30 a.m. Report has it that the station has increased to 5 kw. power, but this has not yet been confirmed.

HS8PJ, 19020 kc., Bangkok, Siam, is broadcasting on Mondays 8 to 10 a.m. and HS8PJ, 9350 kc., on Thursdays, 8 to 10 a.m. as shown in station list. This advice just received from the Superintending Engineer of the Post and Telegraph Department at Bangkok.

VK6ME, 9590 kc., Perth, West Australia, verifies by letter, and it is noted that they are issued by the Amalgamated Wireless (Australasia), Ltd., 47 York St., Sydney.

FO8AA, 7100 kc., "Radio Club Oceanien," Papeete, Tahiti, is being heard as late as 1:40 a.m.



White letters with blue shading, red background flare, and blue and red border.

YDB, Soerabaja, Java recently transferred from 9610 kc. to 9550 kc., is now said to be heard simultaneously on both 9550 and 9610 kc.

PLV, 9415 kc., (P) is said to be carrying the same program. Oh, if the writer only had a telephone to each station!

CR7AA, 6137 kc., and CR7BH, 11718 kc., advise that these stations transmit simultaneously except that CR7BH does not work on the transmission from 12:15 to 1 a.m., CR7AA alone carrying the program between those hours. Both transmitters employ 300 watts power.

Africans

ZNB, 5900 kc., Mafeking, South Africa, is owned and controlled by the Bechuanaland Protectorate Administration. Transmitter is a Collins Type FXC—power 200 watts. The station has been heard at many points in the United States, Scotland, India and Australia. English is used entirely in all programs.

VQ7LO, Nairobi, Kenya Colony, Africa, operated by the Cable and Wireless Limited, has changed frequency from 6060 kc. to 6082 kc., and changed time schedule. All programs in English except between 12:45 and 1:15 p.m. on Mondays and Fridays, when in Hindustani. Station transmits with 500 watts power.

FIQA, Tanararive, Madagascar, advises that they have recently moved to new quarters and have improved their broadcasting facilities. They are now transmitting simultaneously on 50.00 and 31.50 meters as shown in station list, which should make their frequencies 6000 and 9524 kc., respectively. Department of Commerce bulletin states the call is, "Madagascar, Radio Tananarive" and that they may also transmit on the 25-meter band. A report from Australia indicates they were heard on the 31-meter band but near 9590 kc., playing recordings for an hour and closing with the "Marseillaise." An outside source of information shows time schedule to be 9 to 11 a.m., 1:30 to 2:30 p.m. and 6 to 7 p.m. which agrees with the Australian report (1:30 to 2:30 p.m.)

Last Minute Flashes

COCM, "Transradio Columbia," Havana, will soon be on the air. Frequency not yet assigned.

KZRM, Manila, announces 9530 kc. instead of 9570 kc. as listed.

COBZ, 9030 kc., Havana, Cuba, on air 7:45 A.M. to 12:30 A.M. daily. Saturday to 2 A.M. Sunday.

Moscow says RKI is on 15000 kc. or 19.95 meters. The writer figures approximately 15040 kc. for 19.95 meters.

CB615 is call of "Radio Service," 12300 kc., Santiago, Chile. It is assumed that CB615 on 6150 kc. has been discontinued.

Some say PRF5, 9500 kc., is on 6620 kc.

COCW, 6330 kc., is called "La Voz de las Antillas." Address: Apartado 130, Havana, Cuba. On air 7 A.M. to 12 A.M. daily.

SM5SX, Stockholm, Sweden, 15155 kc. on air 11 A.M. to 5 P.M.

SPB, 11705 kc., Motala, Sweden, 6 to 9 A.M. and 11 A.M. to 4 P.M.

SPO, 6065 kc., Motala, Sweden (not SPB) 4 to 5 P.M.

HP5A, Panama City, Panama, 11700 kc., on air 10 AM. to 10:30 P.M. daily.

SPW, 13635 kc., is said to announce Sunday schedule from 11:30 A.M. to 1:30 P.M. Station has new veri card worth tuning for.

Station close to 12000 kc. mentioned in this issue as relaying programs of CMCF, Havana, Cuba, may be located in Santiago, Chile or Santiago, Cuba.

Europeans

2RO, Rome, Italy, is now broadcasting all programs on 11810 kc.

SPW, 13635 kc., Warsaw, Poland, is now broadcasting on Sundays in addition to Mondays, Wednesdays and Fridays, at the same time, namely, 12:30 to 1:30 p.m.

OXY, Skamleback, Denmark, mentioned in August "Globe Girdling" is now being heard on 11805 kc. and shown there in station list. Several test programs have been heard on this frequency, the programs being transmitted by directional antenna to North America, the test being made with different aerials at stated periods under transmissions 1,

2 and 3. Announcements in English as follows: "This is the Danish short-wave transmitter operating on 11805 kc. This is a test transmission directed to North America." No other call mentioned. They maintain a good R8Q4 signal throughout. It is assumed that other frequencies will be employed as they progress and reports of listeners accordingly will be appreciated.

OLR5A, 15230 kc., and OLR4A, 11840 kc., are carrying the programs on Transmissions 1 and 3 from Czechoslovakia. The Oriental transmission No. 2 has been discontinued for the time being.

SM5SX, Stockholm, Sweden, has been included in station list on 15155 kc., where heard by many. Other frequencies will be added as determined.

The black, white and green veri from CR7BH, 11,718 kc., 250 watts.

The station near COCH, and on about 9415 kc., broadcasting between 6:15 and 6:30 p.m. and closing with church bells ringing, has many guessing. The language used appears to be Dutch. Some think it PJC1, but the frequency does not agree, nor the time heard, as Eastern Standard Time is 24 minutes faster than Curacao time.

South America

OAX5A, Radio Universal, at Ica, Peru, is sending out their veri cards covering reported reception. The call on card is being changed in ink from OAX5B to OAX5A. Frequency is 11796 kc., instead of 11800 kc. as heretofore shown.

OAX1A, 6150 kc., Chiclayo, Peru, reported heard on 6335 and 6355 kc.

OAX4T, 9562 kc., and OAX4Z, 6092 kc., Lima, Peru, are not being heard to any extent if regularly on the air. Reports from Lima indicate that OAX4T has a power of 10 kw. and OAX4Z 15 kw. A letter recently received by a listener from the Engineer of Nacional Radio states that the first named station is on 9080 kc. and the last named on 6500 kc.

CB615, 6150 kc., Santiago, Chile, in answer to a letter for information about that station, sends a card the same as one sent for 12300 kc., but does mention the call as CB615. It does not indicate if CB615 is off the air on 6150 kc. and its place taken by CB615 on 12300 kc. This does not seem plausible, however, taking into consideration the method of assignment of calls by frequencies.

HC1CE, Quito, Ecuador, shown in non-authenticated block as HC1EC, 8600 kc., is on 7411 kc. or 40.48 meters and broadcasts each Thursday evening from 9 to 10 p.m. This station is called "El Condor." Sr. R. Enriquez is the operator. Address is Ave. Colombia No. 170, Apartado Postal 485.

HJ1ABB, Barranquilla, and HJ2ABC, Cucuta, Colombia, are still being heard on or near 4780 and 4785 kc., respectively. HJ3ABD, Colombia Broadcasting, 6050 kc., has joined the other 62-meter stations by shifting recently to 4850 kc. where they are maintaining a fairly strong signal but encountering considerable static, making it difficult for clear reception.

These three stations will be retained in station list at their old assigned frequencies until accurate information as to present frequencies is received.

YV1RH, 6360 kc., Maracaibo, Venezuela, has revised its time schedule which is shown in this issue. This station is operated by Sr. G. Nouel, Technical Director, and its slogan is "Ondas del Lago" (Waves of the Lake). Employs 360 watts power. Transmitter and studio are at La Arriaga, Maracaibo.

YV5RD, 6158 kc., Caracas, Venezuela, has new time schedule, given this issue. The new plant mentioned in August "Last Minute Flashes" will maintain 5-kw. power on long-wave station YV5RB, on 1200 kc., and 3-kw. on YV5RD. Advice will be furnished this department by the station of the probable date of completion of the new facilities.

VP3BG, Georgetown, British Guiana, advises they are transmitting on 6130 kc. instead of 6132 kc. as listed heretofore, and state that they have not been off the air a single day since they commenced broadcasting in January 1935.

They operate with 400 watts power and will soon increase to 1000 watts, when, they say, they should hop over our way with better results. This station is operated by the Crystals Broadcasting Company, and is located in the Philharmonic Buildings at Georgetown. Charles Kellman is the Director of the station. Revised time schedule is shown in this issue.

YN1PR, which styles itself "La Voz de la Pilot," at Managua, Nicaragua, has again shifted to 8580 kc. This station has improved somewhat in the quality of its signal and is announcing in English frequently.

Panama

HP5K, 6005 kc., Colon, Panama, have revised their time schedule and state that present plans call for an increase in power of transmitter, notice of which will be forwarded in due course.

HP5A, Panama City, Panama, mentioned many times in this section, has at last shown up with its 3 kilowatts on 11700 kc. or 25.64 meters. They request reports and announce in English after each number. Address your reports to P. O. Box 954.

HP5H, 6122 kc., Panama City, Panama, seems a little undecided as to whether it will remain at that frequency or not as it has been reported at several points in the 49 band and on an early-morning test broadcast near 6430 kc.

It is not surprising that many of the lower powered stations in the 49 band fail to break through, or those with fair power fail to be heard without interference. It would seem to the writer that the stations involved might find it of mutual benefit to get together in an effort to lay out non-conflicting time schedules or separate frequency channels.

Cubans

COCW, 6330 kc., is another new station at Havana, Cuba, said to be called the "Voice of Santillas." It relays the programs of long-wave station CMW on 600 kc. Cuba appears to be running a good second to its Mexican neighbor in installing new short-wave transmitters.

The address of CMW is Sr. Adolfo Gil, Director Tecnico, Paseo de Marti No. 105, Havana, Cuba.

COBZ, 9030 kc., 33.32 meters, Havana, is now on the air relaying the programs of long-wave station CMBZ on 1000 kc. or 299.8 meters. Veri cards are

Cuban views and address side carries the confirmation. The station is known as "Radio Salas" and the address is 14 S. Safael St., or P. O. Box 866, Havana, Cuba. This is the station which was heard for a time near 9200 kc. and which was mentioned in "Last Minute Flashes" in August.

COGF, 11800 kc., Matanzas, Cuba, is transmitting some very worthy programs and maintaining a good consistent signal. Spanish and English announcements are made frequently. Opening and closing selection "Vals Diana." Complete time schedule is now shown in station list. COGF relays the programs on long-wave station CMGF on 1120 kc. St. Bernabe de la Torre is proprietor.

COBC, Havana, Cuba, reported in August station list on 9363 kc. has been changed to CO9BC, 9400 kc., its experimentally assigned frequency, as advice has been received from the station that the call letters COBC have not been authorized as yet. CO9BC relays the programs of long-wave station CMBC on 640 kc. from 7 a.m. to 12:30 a.m. The address of both stations is Monte No. 139. or Apartado No. 132, Havana, Cuba.

Another Spanish-speaking station is broadcasting evenings close to 12000 kc. and apparently leaving the air about 10:00 p.m. There is bad c.w. interference. From announcement in English just before closing it is thought to be a short-wave station relaying programs of CMCF, Havana, Cuba. There is a possibility of two stations at this point, one each side of the code signal mentioned.

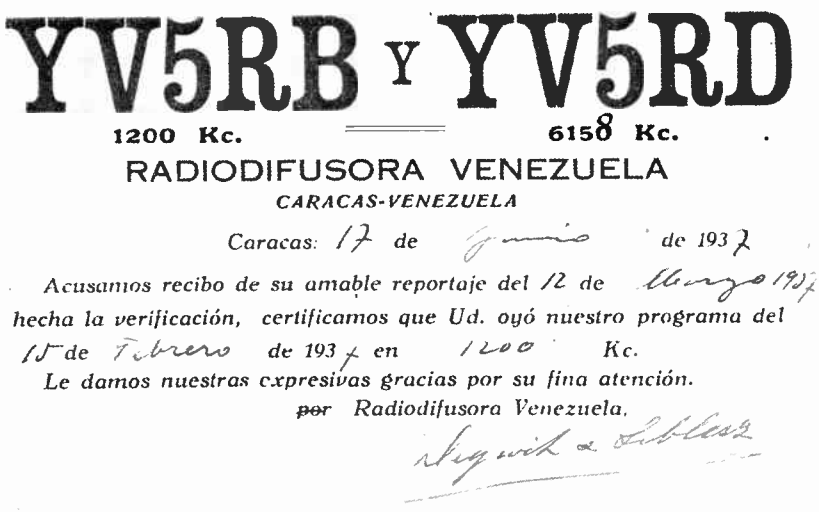
Mexico

XEWW, Mexico, D. F., has been added to list, as it is now on 15160 kc. as well as on 9500 kc. where originally placed. On 15160 kc. it interferes with JZK and on 9500 kc with HJ1ABE. Otherwise the Mexican stations are fairly quiet at this writing.

XEFT, 9510 kc., Veracruz, Mexico, is now on 9550 kc. and has been changed in station list. This is the Mexican station reported heard on 9550 kc. mentioned in "Globe Girdling" in August. Advice was received direct from Station that the Mexican Radio Commission has authorized the change. The 6120-kc. frequency is still retained but not in use at present.

TI2PG, 20-meter transmitter of TIPG, 6410 kc., San Jose, Costa Rica, heard on the air announcing that TIPG was soon going on the air on 25 meters with additional transmitter.

TI2H, 5795 kc., San Jose, Costa Rica, mentioned in July issue and carried in the non-authenticated block, does not appear to be known there as the reception report sent by the writer was returned as "uncalled for." This station is on the air with good signal strength, but only Spanish is spoken. It would seem that someone should be able to identify this broadcaster, who is wandering between 5795 and 5813 kc.



Another combination veri, for long- and short-wave stations in Caracas.

U. S. Stations

W1XAL, Boston, Mass., has curtailed its broadcasting activities during the summer months, the 11790-kc frequency being used. Special test programs are, however, being directed to South and Central Americas on 15250 kc., which are broadcast mostly in Spanish. Reports are being requested of listeners in the territory mentioned.

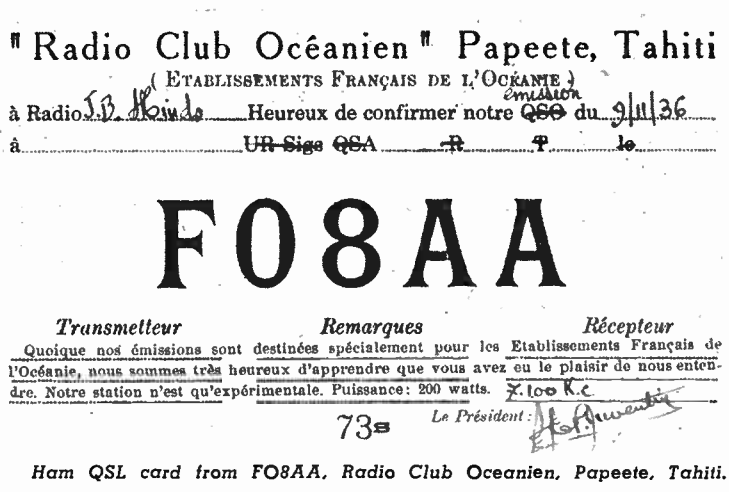
WIOD, 6040 kc., the short-wave outlet of the Isle of Dreams Broadcasting Corporation, at Miami, advises that station will return to the air not later than September 15th and will employ 5 kw. power in its transmissions.

W2XAF, 9530 kc., and W2XAD, 15330 kc., the General Electric Company's stations at Schenectady, New York, have permission for the erection of a new 100-kilowatt transmitter. The new equipment will involve a cost of more than $100,000 and will materially increase the present power of 18 to 25 kw.

The new transmitter, which is expected to be in operation in the early part of 1938, will use a linear, radio-frequency amplifier and may be used by either of the two short-wave stations. Upon completion it will be the most powerful in America and probably in the world.

The General Electric Company are also installing in the tower of the State Office building in Albany, New York, a short-wave, ultra-high-frequency transmitter, which may solve some of the problems bothering radio engineers today. The transmitter is to be used experimentally and will operate on the 5 to 7 meter wavelengths. It will have a receiving radius of about 30 miles. A 20-foot pole atop the building will be

Combination veri from CMGF, long wave, and COGF, short wave. Matanzas, Cuba.


"Radio Club Océanien" Papeete, Tahiti

(Etablissements Français de l'Océanie)

à Radio SB Hinds Heureux de confirmer notre émission du 9/11/36

à ... UR Sigs QSA R T lo

F08AA

Transmetteur Remarques Récepteur

Quoique nos émissions sont destinées spécialement pour les Etablissements Français de l'Océanie, nous sommes très heureux d'apprendre que vous avez eu le plaisir de nous entendre. Notre station n'est qu'expérimentale. Puissance: 200 watts. X 100 K.c

73s Le Président:

Ham QSL card from FO8AA, Radio Club Oceanien, Papeete, Tahiti.

used in conjunction with the transmitter.

Unlike the ordinary radio wave used in broadcasting commercial programs, these ultra-high-frequency waves are similar to light waves. They presumably travel in a straight line to the horizon, bounce off buildings and other obstacles in the same manner as a mirror reflects a beam of light. These peculiarities are some of the things General Electric engineers say they hope to understand more fully.

Engineers in automobiles will circle the office building in a 30-mile radius. In each automobile there will be a portable receiver. These engineers will observe receiving results. In localities where the best results are noted, a more permanent receiving station will be temporarily erected for further observation.

Here is a chance for listeners to ascertain if the signals can be heard at a distance of more than 30 miles.

WTDV, WTDW and WTDX—all on 4295 kc.—weather report stations in the Virgin Islands, have been deleted from station list as stated before. These stations have been turned over by the Public Works Department to the United States Marine Corps, and are being used for contacting their airplanes.

Jottings

A Department of Commerce bulletin states that Mr. Jardillier, Minister of Posts, Telegraphs and Telephones, France, made some interesting statements with regard to new broadcasts of the French Colonial radio station in his speech at a meeting of "Radio-Liberte" a short time ago.

In the near future experimental broadcasting will be carried on, and it is anticipated that shortly the new installations will be used for simultaneous broadcasting in various directions. The power of the new broadcasting station is to be gradually increased to 50 kw. which will considerably improve the receptive power in the colonies as well as in other parts of the world.

It is also understood that extensive improvements are being carried out at the short-wave broadcasting stations of the British Broadcasting Corporation at Daventry, where the power will be increased to 75 kw. and possibly more. The British station will be composed of 23 antenna systems, which will be able to radiate in 12 different directions. The new French Colonial station will only be a small achievement in comparison to this, but the reception of its broadcasts in distant French colonies, where the programs are popular, should greatly increase radio interest.

From a clipping from a Tokyo paper we note that Dr. Shintaro Uda, of Tokyo Imperial University, is conducting tests in under-water communication by means of extra-ultra-short waves.

There appears to be definite news of a new Australian short-wave station being constructed at Geelong, Victoria, for the P.M.G. Dept. of the Australian Commission. Further data will be given later.

Amateur Phones

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

Country	*Frequency*	*Calls*	*Time Heard*
Australia	L.F.	VK2XU—2BQ	1:30-2 a.m.
Australia	H.F.	VK2HI	1:15 a.m.
Australia	L.F.	VK3AR—3KR—3HJ	12:40-1:45 a.m.
Australia	H.F.	VK3BG—3KK	2:05-2:50 a.m.
Australia	L.F.	VK4PK—4FE—5GB	1:15-2 a.m.
Africa (South)	L.F.	ZU6N—ZS5AB	7-10 a.m.
Africa (Egypt)	14375 kc.	SU1SG	11:30 p.m.
Africa (Egypt)	14000 kc.	SU1SG	7 p.m.
Argentina	L.F.	LU1CA	9 p.m.
Brazil	L.F.	PY1DS	9:38 p.m.
Brazil	H.F.	PY1FR—5AM	6:22-7:44 p.m.
Chile	L.F.	CE4BE	7:17 p.m.
Colombia	L.F.	HK1DG	12:25 a.m.
Colombia	H.F.	HK1LZ	12 a.m.
Cuba	L.F	CO2TY—2BY	8:45-9 p.m.
England	L.F.	G2AK—G5LU	4:35-8:59 p.m.
England	L.F.	G5BM—5LK	11:50-2:20 a.m.
England	L.F.	G6XI—6NY—6BW—6CL	5-7:18 p.m.
England	L.F.	G6TV—6YR	12:30-1 a.m.
England	H.F.	G6FS	12 a.m.
England	L.F.	G8LP—8IK	5:16-5:52 p.m.
France	H.F.	F3KH—8PQ—8CW	12:05-12:45 a.m.
France	L.F.	F8QD—8UI	3:35-4:30 p.m.
France	L.F.	F3MT—3GR—3OO—3MN—3LE	12-1:25 a.m.
France	L.F.	F3IX—3MF—8XT—8KD	11:10 p.m.-1:45 a.m.
Holland	L.F.	PA0BD—PA0MQ	4:37 p.m.-12:35 a.m.
Holland	H.F.	PA0MZ	4:56 p.m.
Hawaii	A.B.	K6BNZ—6NZQ—6KMB	11:15 p.m.-1:29 a.m.
Irish Free State	L.F.	EA3J—EA2L	5:55-7:15 p.m.
Ir. Free St. (N.)	H.F.	GI5QX	8:47 p.m.
Italy	L.F.	I1IT	6:20 p.m.
Iraq	L.F.	YI2BA	9:30 p.m.
Kuala Lumpur, S.S.	H.F.	VS2AK	8-10 a.m.
Mexico	L.F.	XE1Y—1BC—2FC—3AH	3:23 p.m.-12:30 a.m.
Portugal	L.F.	CT1IY—1OZ	4:34-6:40 p.m.
Portugal	H.F.	CT1JW	7:35 p.m.
Philippine Islands	H.F.	KA1AA	7-10 a.m.
Peru	L.F.	OA4LA—4AG—4AL	10:16 p.m.-1:45 a.m.
Peru	H.F.	OA4AN	10:20 p.m.
Scotland	L.F.	GM5MW	7:16 p.m.
Uruguay	L.F.	CX2AK	6:08 p.m.
Venezuela	L.F.	YV5AG—5ABB	8:17-9:28 p.m.
Venezuela	L.F.	YV5AI—5AE	12:40-1 a.m.

W10XDA "Schooner Morrissey" in station list at 14250 kc. also uses 8655 kc. and 12862 kc. The last named frequency is said to be used mostly.

Denzel D. Murphy, a contributor to this section and a member of the R. S. S. L., requests notice that he wishes to exchange QSL's with other members throughout the world. His address is P. O. Box 137, Fairmont, West Virginia.

We are afforded much pleasure in acknowledging letters and reports from Mr. William A. Byrn, Jr., Nashville. Tenn.; Edward S. Dutcher, Paterson, N. J.; John Evanovsky, Clifton, N. J.; Ingvar Gullberg, Hedemora, Sweden; Albert W. Griffin, Somerville, Mass.; D. C. Greenwood, East Longmeadow, Mass.; Denzel D. Murphy, Fairmont, W. Va.; A. B. McKean, South Pasadena, Calif.; Charles F. Stephens, Randolph, Mass.; W. H. Thurston, Kansas City, Mo.; Scott Walls, San Francisco, Calif.; Baker Young, Parma, Idaho; and extend to them and the many others who regularly give assistance to this department the thanks of ALL-WAVE RADIO and the writer.

Your continued loyalty and support are greatly appreciated. It is always our pleasure to reply to your questions and give such assistance as is 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 stamped envelope if you desire a reply.

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

Channel Echoes

By ZEH BOUCK

THE FATE OF KHAQQ AND ITS COURAGEOUS CREW

THE fate of Earhart and Noonan will probably always remain a mystery. In approaching a solution to it about all one can do is to apply a bit of common sense to the very few known facts and discount as nonsense 99% of what appeared in the newspapers.

The manner in which the plane missed its objective Howland Island is a minor though more tragic part of the mystery. The island is but a dot—a bare mile across, with an elevation of only a few feet—in the largest ocean in the world. It would be practically invisible on the horizon. From the point-of-view of theoretical navigation, the size of the island has no significance. Captain Kidd, using the crude instruments of several centuries ago, one of which was a bucket of water as a mirror, indicated the position of buried treasure within a few square feet by lunar calculations. Navigating for Howland Island from the deck of a boat would be a mere matter of routine for an experienced navigator such as Noonan. To accomplish the same feat from an airplane is a more difficult matter. It is possible to secure a "fix"—or definite position—only at noon, or between dusk and dawn when simultaneous observations can be made on two or more celestial objects. At other times dead reckoning—*assumed* direction and *assumed* distance of travel must be considered. These are both functions of drift. On waters which have been charted for hundreds of years, the calculation or allowance for drift is a simple formality. In a plane flying over visible land, it is also easy to calculate. However, at any altitude above the sea, or flying above clouds in winds of uncharted direction and velocity, drift must be computed by calculations which themselves *may be in error due to drift!* Under such circumstances radio navigation is the only answer to the problem, and this was not effectively available at the time and place.

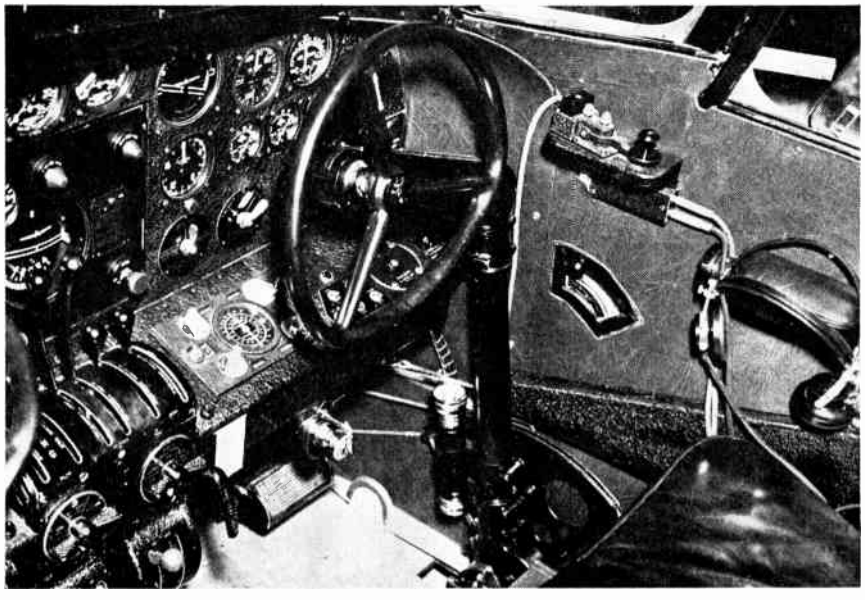
THE last message received from KHAQQ was at 8:44 a.m. local time, and, according to newspaper reports read—"We are on the line of position 157-337. Will repeat this message on 6210 kilocycles. We are now running north and south."

Part of this message makes sense, and would indicate that Noonan had taken an observation of the sun and had secured a line of position—or a "Sumner line." For all practical purposes this is a straight line, at right angles to the bearing of the sun, which passes through the exact position of the observer. In other words, the plane was somewhere on that line. The usual procedure in such a case is to continue on course until the bearing of the sun changes by about 30 degrees—due to its own motion and that of the plane—at which point a second Sumner line is plotted. The first line is now moved toward the second line in accordance with the course and distance traveled as figured by dead reckoning. The intersection of the two lines will now give a "fix" or position of the plane.

The degrees 157-337 on the compass rose checks with the sun's bearing of 65 degrees, which is about right for the approximate position of the plane, the time of day and year. This was apparently the first line of position Noonan had taken that day—otherwise he would have obtained a fix, and the exact position of the plane would have been radioed. Also, apparently, Noonan did not have much faith in the dead reckoning of the past few hours, or he would have crossed his course with the line of position, and given at least an approximate position on that line. As he was apparently dubious concerning even a fairly approximate position, he would not head for where he thought the island might be. There were only two logical things for him to do—one to fly approximately east to hasten the relative motion of the sun so that he could make a second observation as quickly as possible, secure a second line of position and a fix, from which point he could set his course for the island. On the other hand, if he were *very sure* that he was either north or south of his course, he might draw a line of position parallel to his own but passing through Howland Island. He would then set a perpendicular course between the two lines, and fly until by dead reckoning he reached the line of position through Howland, then turn at right angles and follow this second line to Howland.

Just what happened will never be known. The flying "north and south" part of Earhart's message simply doesn't make sense. It is possible that in those

(Continued on page 495)



The radio control equipment aboard KHAQQ, Miss Earhart's "Flying Laboratory." Note transmitting key and arm rest on cabin wall. (Photo courtesy Western Electric Co.)

Night-Owl Hoots

By RAY LA ROCQUE

DX FORECAST . . . NEW DX CONTEST . . . RECOGNITION FOR DXERS . . . "RADIO SFAX" HAWAIIAN FIRE GODDESS . . . FREQUENCY FEUD ENDS . . . ADD-WORD PUZZLE . . .

ONCE again September has rolled around and with its arrival we unroll our plans for the entertainment of DXers during the coming season. Needless to say that we will continue the monthly Time Table of DX programs and the publication of complete station lists at regular intervals. Publication of both these features will commence next month. Besides these regular features, we announce now two new features which we hope will be of material benefit in helping the broadcast band DXer have a good time during the winter months.

Monthly DX Forecast

It is our belief that to list each month stations that have been heard by listeners one or two months ago, is just about as useless as a weather report giving conditions for a date in the past. As most DXers who have never kept an accurate log or have never studied conditions at various times of the year depend on just such lists for their DXing, they invariably miss many good catches each season. So it is for their benefit and for the benefit of many who are just beginning, as well for the "old timers" who can use the department as a reminder, that we inaugurate this month ALL-WAVE RADIO's monthly DX forecast.

It is our intention each month to predict the foreign stations that DXers in this country and Canada should hear with not too much difficulty. It will have to be borne in mind, however, that these predictions will of course be affected by local interference of various forms and that they should be taken as general for a given section of the country and not for your particular city. We will not claim to be infallible. A few predictions will doubtless turn out to be false ones, but it is hoped that these will be so greatly overshadowed by correct ones that everyone will benefit materially from the forecasts.

For the present we will divide the country into only two sections—East and West. Central DXers can determine from their locations and the "R" ratings in the forecasts which stations should carry overland into the heart of the U. S. A. Later we hope to be able to classify our predictions into three separate groups. As a matter of note, the time shown in the forecast is not the schedule of the station, but the hours during which reception from that station is at its peak. In order to save space, the location of the station is omitted. Reference to the world station list published regularly in ALL-WAVE RADIO will reveal the location of the station.

NEW U. S. STATIONS

Call	Location	Frequency	Power
WOMI	Owensboro, Ky.	1500	100
KHBG	Okmulgee, Okla.	1210	*100*
KLBM	La Grande, Ore.	1420	100
————	Toledo, Ohio	1200	*100*
————	Dubuque, Iowa	1340	*500*
————	St. Cloud, Minn.	1420	100
————	Fresno, Calif.	1310	100
————	Lawrence, Mass.	680	*1000*
————	Pittsfield, Mass.	1310	100
————	Centralia, Wash.	1440	500
————	Salisbury, Md.	1200	*250*
————	Sioux City, Iowa,	1420	100
————	Austin, Texas	1120	*1000*
————	Lufkin, Texas	1310	*100*

(Power in italics indicates station operates daytime only.)

POWER CHANGES

Call	Frequency	Old Power	New Power
WATR	1290	100	250
WRAX	920	250	1000

DELETED STATIONS

WLTH	1400	facilities to WBBC
WARD	1400	facilities to WBBC

OTHER CHANGES

Old Call	New Call	Old Frequency	New Frequency
WLWL	WBUL	1100	1100
WJOY	WHAL	950	950
KHSL	————	950	1260
WATR	————	1190	1290
KALB	————	1420	1210
————	KRIS	1330	Corpus Christi, Tex.)

NEW FOREIGN STATIONS

Call	Location	Frequency	Power
————	Tunis, Tunisia	1395	200
————	Bizerte, Tunisia	1435	350
————	Sfax, Tunisia	1415	30
————	Sousse, Tunisia	1455	30

POWER CHANGES

Call	Location	Frequency	Old Power	New Power
2RN	Dublin, Ir. Fr. St.	1348	1000	500
——	Tallinn, Estonia	731	20000	50000

Veri from YV1RF (not YV1RH) 1120 kc., Maracaibo, Venezuela.

New A.W.R. Contest

This season's championship contest will officially open sometime in November and will consist of two competitions in one contest. Wherever possible contestants will be grouped into teams of four DXers representing a club, city, town, state, section, or merely a group banded together under a common name. Each member of the winning team will receive an award regardless of his position in the individual competition. In the individual contest team members will compete individually against other team members as well as against any free-lance DXers who may enter the contest unattached to any team.

Photo veri from KFVS, Hotel Marquette, Cape Girardeau, Mo.

Individual scoring will be vaguely similar to last season's contest. In fairness to those who cannot DX every day of the week, competition will take place only on Saturdays and Sundays and on a few holidays. As last year, 100 points will be awarded for each station heard during the day of competition—the 100 to be divided equally among the contestants reporting that station. However, instead of counting totals as in last season's contest, a goal of 10 stations per day has been set for each contestant to attain. In this way the contestant's average will be determined by dividing his total by the number of required reports. For example: If you have a total of 1000 points for the first day of competition your average is 100 per station or a perfect score. If your total is 900 you have an average of 90. Your average will be based on ten reports per day regardless of whether you are able to report the required ten stations each day of competition. You will not be allowed more than ten reports per day—if you should hear more than ten eligible stations you should pick your best catches and weed out the others until you have only ten ready to submit.

Team scoring: All teams must be entered before the start of the contest. A schedule will be arranged and one team will compete against only one other opponent each day of competition. The daily winners will be determined by adding the totals of all four members of the team and matching the score against that of the four members of the opposing team. The team having the best won and lost record at the close of the season will be declared winner. The same set of ten reports will count as your individual score as well as your team score. Only one set of ten reports can be submitted per day and no station may be reported more than once the same day.

To make it possible for the less experienced DXer to compete as well as the advanced DXer, the following stations will be eligible for reports this season: Any program broadcast by a U. S. or Canadian station [on a day of scheduled competition] which deviates from the regular daily schedule of the station—that is any DX or test program may be reported. Stations outside of these two countries may be reported at any time they are heard during a day of scheduled competition.

Complete rules will be published next month, but we urge every DXer who intends to participate to enter his name with the Chief Night Owl now, so that he can be placed on a good team and so that a schedule for teams can be arranged in advance. Any club or local group wishing to enter one or more teams is requested to send us at once the name and address of each team member and the proposed name of the team. Please choose short names for your teams, such as *Texas Tuners, RSSL Rascals, Denver*

(Continued on page 476)

BROADCAST BAND DX FORECAST FOR SEPTEMBER

EASTERN NORTH AMERICA

General Forecast: *Summer static will be prevalent and about the only foreign reception to be expected in the east during September should come from Latin America.*

Call	*Frequency*	*Forecast*
LR1	1070	Tune from 15th to 30th from 8-10 p.m. Maximum sig. to be expected R7. Audible only in localities remote from WTAM. Slogan "Radio El Mundo" uses chimes like NBC.
LR4	990	15th to 30th. 8-10 p.m. R6. Not audible in WBZ area.
LR5	830	15th-30th, 8-10 p.m. R7. Usually in clear when reception favorable. Slogan "Radio Excelsior."
LR6	870	15th-30th, 8-10 p.m. R6. Occasionally breaks thru WENR on east coast. Slogan—"Radio Splendid."
LS2	1190	15th-30th, 8-10 p.m. R7. Very often breaks thru WOAI. Slogan—"Radio Prieto."
YV5RA	960	15th-30th, 8-10 p.m. R5. A tough one to hear as XEAW offers much competition for YV5RA. Uses chimes—Slogan—"Broadcasting Caracas."
CMQ	880	1st-30th, 9 p.m.-1 a.m. R9. CMQ's new 25 kw. should make it easily audible at all times on this channel with a little QRM from CRCO.
CMX	920	1st-30th 9 p.m.-1 a.m. R8. CMX occasionally breaks thru the Americans with good volume as do the following Cubans: CMBS-770, CMCF-815, CMBY-970, CMCJ-1110.
XEW	890	1st-30th, 1-1:15 a.m. R8. Uses chimes often—Slogan—"Voice of Latin America from Mexico."
TGW	1210	Sundays, 12-6 a.m. R6. Usually Marimba music and descriptive talks on Guatemala in English.
XEFO	940	1st-30th, 1-2 a.m. R8. Daily program in English for American listeners.

WESTERN NORTH AMERICA

General Forecast: *In the western sections some trans-Pacific reception may be possible during the latter part of September from the more powerful Aussies and New Zealand stations. Latin Americans having late schedules may break through the local stations after sundown. In the southwest many Mexican stations just across the border are heard all year.*

Call	*Frequency*	*Forecast*
2CK	640	15th-30th, 3-7:30 a.m. R4. Strongest just before closing at sign off.
3YA	720	15th-30th, 3-6 a.m. R4. Same as 2CK.
4YA	790	15th-30th, 3-6 a.m. R4. Same as 2CK.
CMQ	880	1st-30th, 11 p.m.-1 a.m. R8. Should break through on the coast frequently, especially during last hour.
XEW	890	1st-30th, 12-1:15 a.m. R7. See XEW East list.
TGW	1210	Sundays, 12-6 a.m. R7. See East list.
LS2	1190	15th-30th, 11-12 p.m. R8. Should be heard frequently unless sign-off time is changed to earlier hour. See East forecast.
LR1	1070	15th-30th, 11-12 p.m. R7. Should break through locals occasionally. See East forecast.

PREFERRED TUBE TYPES

THE accompanying list of popular tube types, compiled by RCA Radiotron Labs, is presented as an aid in reducing the number of types from which selections are made. These should be given special consideration when designing equipment. Chart I classifies the types according to their function and cathode voltages. This chart is intended to assist the user in choosing a tube type for an application. Chart II classifies all-metal tubes in numerical order. Chart III classifies glass-type tubes in numerical order. The final column in Chart II and III lists similar tube types.

CHART I

Cathode Volts	2.0	5.0		6.3		25.0	
Type Classification	Glass	All-Metal	Glass	All-Metal	Glass	All-Metal	Glass
DIODES							
Detector - Twin				6H6			
Rectifier - Full-wave		5T4 5W4	5U4-G 5Y3-G	6X5	6X5-G		
Rectifier-Doubler						25Z6	25Z6-G
TRIODES							
Voltage Amplifier-							
Medium Mu	1H4-G			6C5 6J5	6J5-G		
Medium Mu with Diodes				6R7	6R7-G		
High Mu				6F5			
High Mu with Diodes				6Q7	6Q7-G		
Class B Amplifier - Twin	1J6-G			6N7	6N7-G		
BEAM POWER TUBES				6L6	6L6-G	25L6	25L6-G
PENTODES							
Voltage Amplifier-							
Sharp Cut-off	1E5-G			6J7	6J7-G		
Remote Cut-off	1D5-G			6K7	6K7-G		
Remote Cut-off with Diodes	1F7-G						
Power Amplifier	1F5-G			6F6	6F6-G 6K6-G	25A6	25A6-G
PENTAGRID CONVERTERS	1C7-G			6A8	6A8-G		
PENTAGRID MIXERS				6L7	6L7-G		
ELECTRON-RAY TUBES					6E5 6G5		

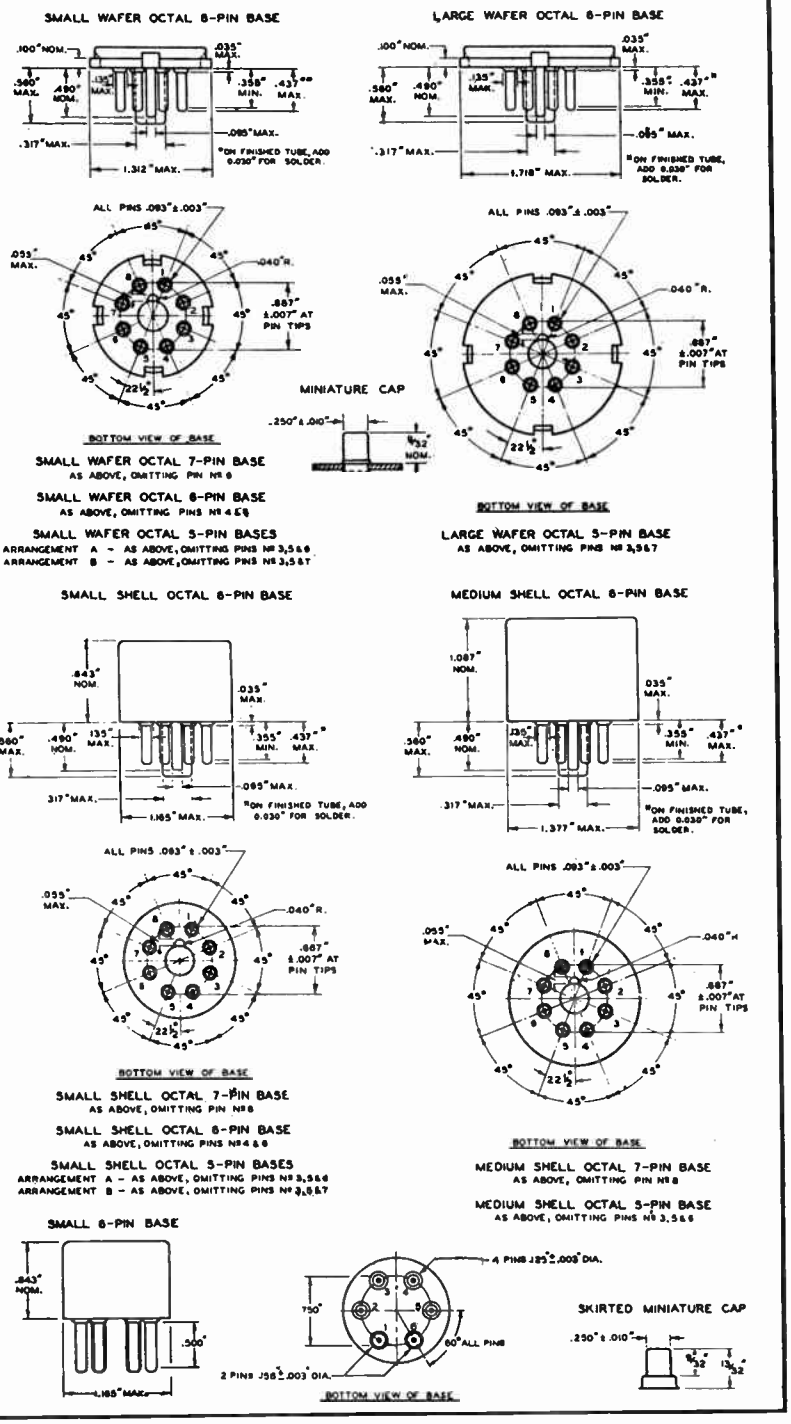
CHART II
ALL-METAL TUBES

TUBE TYPE	BASE	SOCKET CONNECTIONS	SIMILAR TYPE
5T4	Large Wafer Octal 5-Pin	5T	5U4-G 5Z3
5W4	Small Wafer Octal 5-Pin	5T	5Y3-G 80
6A8	Small Wafer Octal 8-Pin	8A	6A7 6A8-G
6C5	Small Wafer Octal 6-Pin	6Q	6C5-G
6F5	Small Wafer Octal 5-Pin	5M	6F5-G
6F6	Small Wafer Octal 7-Pin	7S	6F6-G 42
6H6	Small Wafer Octal 7-Pin	7Q	6H6-G
6J5	Small Wafer Octal 6-Pin	6Q	6J5-G
6J7	Small Wafer Octal 7-Pin	7R	6C6 6J7-G
6K7	Small Wafer Octal 7-Pin	7R	6D6 6K7-G
6L6	Small Wafer Octal 7-Pin	7AC	6L6-G
6L7	Small Wafer Octal 7-Pin	7T	6L7-G
6N7	Small Wafer Octal 8-Pin	8B	6A6 6N7-G
6Q7	Small Wafer Octal 7-Pin	7V	6Q7-G
6R7	Small Wafer Octal 7-Pin	7V	6R7-G
6X5	Small Wafer Octal 6-Pin	6S	6X5-G 84
25A6	Small Wafer Octal 7-Pin	7S	25A6-G 43
25L6	Small Wafer Octal 7-Pin	7AC	25L6-G
25Z6	Small Wafer Octal 7-Pin	7Q	25Z5 25Z6-G

CHART III
GLASS TUBES

TUBE TYPE	BASE	SOCKET CONNECTIONS	SIMILAR TYPE
1C7-G	Small Shell Octal 8-Pin	G-7Z	1C6
1D5-G	Small Shell Octal 7-Pin	G-5Y	1A4
1E5-G	Small Shell Octal 7-Pin	G-5Y	1B4
1F5-G	Medium Shell Octal 7-Pin	G-6X	1F4
1F7-G	Small Shell Octal 8-Pin	G-7AQ	1F6
1H4-G	Small Shell Octal 7-Pin	G-5S	30
1J6-G	Small Shell Octal 8-Pin	G-7AB	19
5U4-G	Medium Shell Octal 5-Pin	G-5T	5T4 5Z3
5Y3-G	Medium Shell Octal 5-Pin	G-5T	5W4 80
6A8-G	Small Shell Octal 8-Pin	G-8A	6A7 6A8
6E5	Small 6-Pin	6R	-
6F6-G	Medium Shell Octal 7-Pin	G-7S	6F6 42
6G5	Small 6-Pin	6R	-
6J5-G	Small Shell Octal 6-Pin	G-6Q (6J5-G)	6J5
6J7-G	Small Shell Octal 7-Pin	G-7W (6J7-G)	6C6 6J7
6K6-G	Small Shell Octal 7-Pin	G-7S	41
6K7-G	Small Shell Octal 7-Pin	G-7R (6K7-G)	6D6 6K7
6L6-G	Medium Shell Octal 7-Pin	G-7AC	6L6
6L7-G	Small Shell Octal 7-Pin	G-7T	6L7
6N7-G	Medium Shell Octal 8-Pin	G-8B	6A6 6N7
6Q7-G	Small Shell Octal 7-Pin	G-7V	6Q7
6R7-G	Small Shell Octal 7-Pin	G-7V	6R7
6X5-G	Small Shell Octal 6-Pin	G-6S	6X5 84
25A6-G	Medium Shell Octal 7-Pin	G-7S	25A6 43
25L6-G	Medium Shell Octal 7-Pin	G-7AC	25L6
25Z6-G	Small Shell Octal 7-Pin	G-7Q (25Z6-G)	25Z5 25Z6

BASES AND DIMENSIONS



SOCKET CONNECTIONS

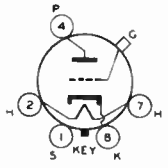
BOTTOM VIEWS

KEY TO TERMINAL DESIGNATIONS OF SOCKETS

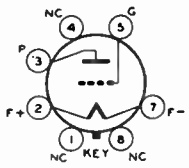
Alphabetical subscripts D, P, and T indicate, respectively, diode unit, pentode unit, and triode unit in multi-unit types.

Numerical subscripts are used (1) in multi-grid types to indicate relative position of grids to cathode or filament, and (2) in multi-unit types to differentiate between two identical electrodes which would otherwise have the same designation.

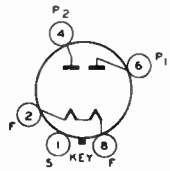
F = Filament
G = Grid
H = Heater
K = Cathode
NC = No Connection
P = Plate
P_{BF} = Beam-Forming Plates
S = Shell
TA = Target



5M



G-5S



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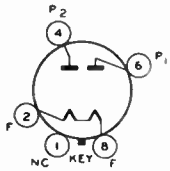

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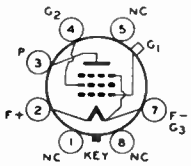
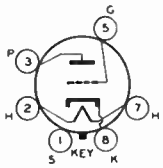
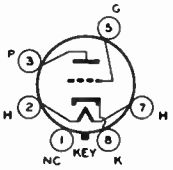


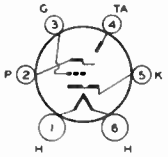
G-5Y



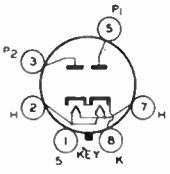
6Q



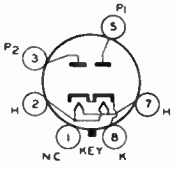
G-6Q(8J5-G)



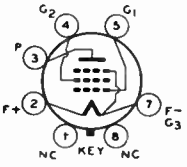
6R



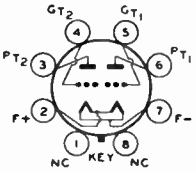
6S



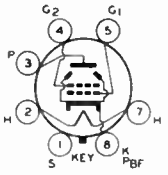
G-6S



G-6X



G-7AB



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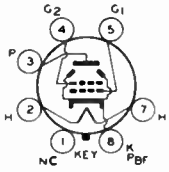

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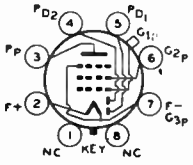

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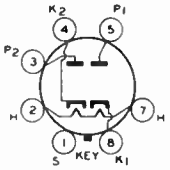

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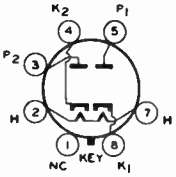
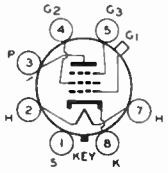
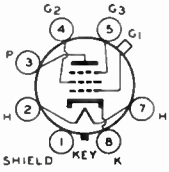


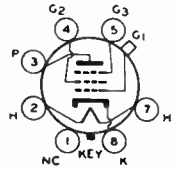
G-7Q(25Z6-G)



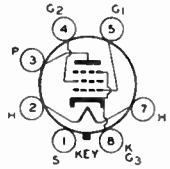
7R



G-7R(6J7-G)



G-7R(6K7-G)



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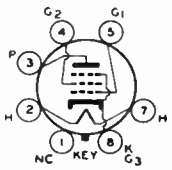

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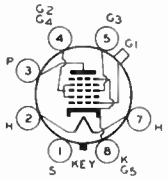
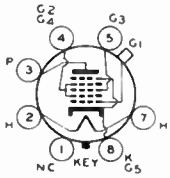
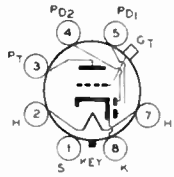


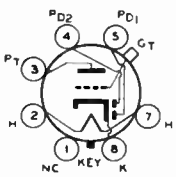
7T



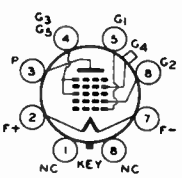
G-7T



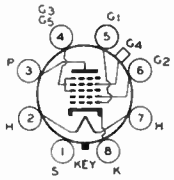
7V



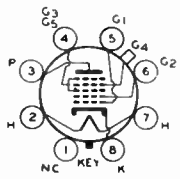
G-7V



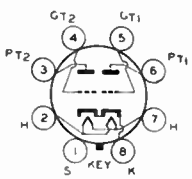
G-7Z



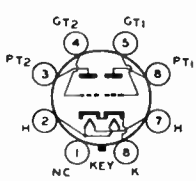
8A



G-8A



8B



G-8B

A PROVING-POST REVIEW

The TEMCO FONE-C. W. TRANSMITTER

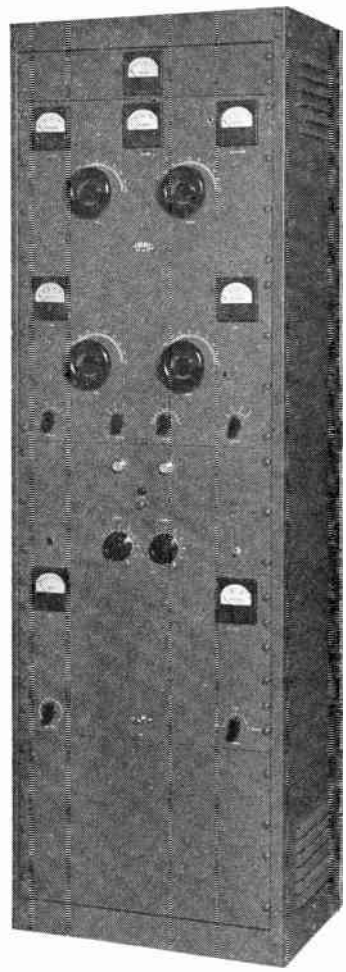


Fig. 1. Front view of the Temco 350-500 watt fone and c.w. transmitter. The housing is on casters and is easily moved about.

THE pros and cons of commercialism vs. homemade equipment will probably never cease to echo in radio club forums. And as usual there is much to be said on both sides of the argument. As a rule, comparison is made with an automobile, and the proponent for commercial equipment remarks that one buys an automobile rather than make it himself. Whereupon the other side argues that if it were cheaper to make your own automobile than to buy a factory-made product, such doubtless would be the common practice, and also, if a person had to pass an examination comparable to that of a Class A radio quiz in order to secure a driving license, he'd probably have to build several automobiles to know enough about them to qualify! The rebuttal will then state that the homemade car would probably be a menace on the road, requiring constant tinkering and adjustment and would rarely if ever work with the smooth efficiency of the factory product. And the final argument on the other side usually points out the fact that many cars are homemade for the simple pleasure of constructing them, or to incorporate ideas not available in commercial models; and that rather than constituting a flimsy menace on the road, some of these homemade cars represent the finest and safest racing designs on the tracks today. The comparison is an excellent one.

The radio newcomer should and usually will build his own transmitters during his first few years in the game. This provides an essential part of his radio education. And some experimenters will always make their own transmitting equipment. Home construction forms an important side of their hobby, particularly when there exists a leaning toward technical development.

On the other hand there is the experienced amateur—fundamentally an operator—whose interest lies principally in operating a fool-proof transmitter in rag chew or traffic handling. About his equipment there must be nothing of a haywire or experimental nature. He demands a handsome, sleek-looking instrument—as well groomed as his new car. And when he sits himself in front of the operating desk and pushes a button or two, he wants the same assurance of flawless, service-free operation he expects from his car when he steps on the starter and puts it in gear.

Paging the Old Timers!

Commercial equipment appeals particularly to the old timer coming back on the air after years of apostasy. Probably the majority of amateurs suffer a period of inactivity following the school and college age—when the business of making a living becomes of paramount importance, complicated with other interests—usually matrimonial. But a bit later the bug will bite again—perhaps during some chance listening on the family all-wave receiver.

The old timer feels an itching for the key. However, he probably has neither the time nor place—nor even the inclination—to build his own equipment. Moreover the xyl, while she may protest only weakly against a radio station, will usually veto vehemently the proposition of a machine shop. The old timer by this time is probably reasonably successful, and will write out a check for a communications receiver and a medium-power commercial transmitter—exactly as he would for a new automobile (and the cost will be about the same, though the xyl needn't know that).

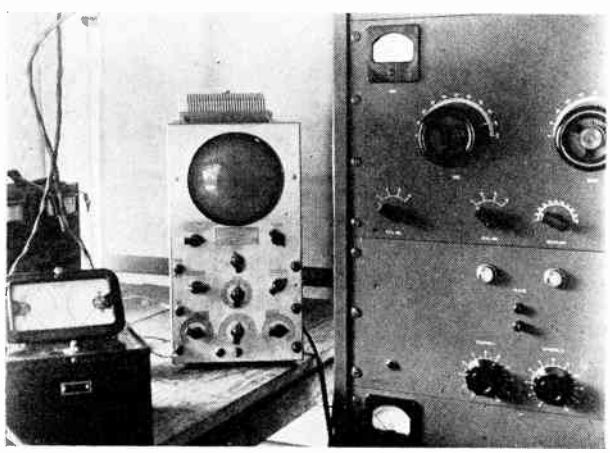


Fig. 4. The Temco transmitter on laboratory test. The instruments to the left are a modulation meter and a cathode-ray oscilloscope.

The Temco 350 Watter

The Temco design, illustrated and described in this review, represents a close approach to the ideal commercial transmitter for the average experienced amateur. It is exceedingly handsome in appearance, as will be appreciated from

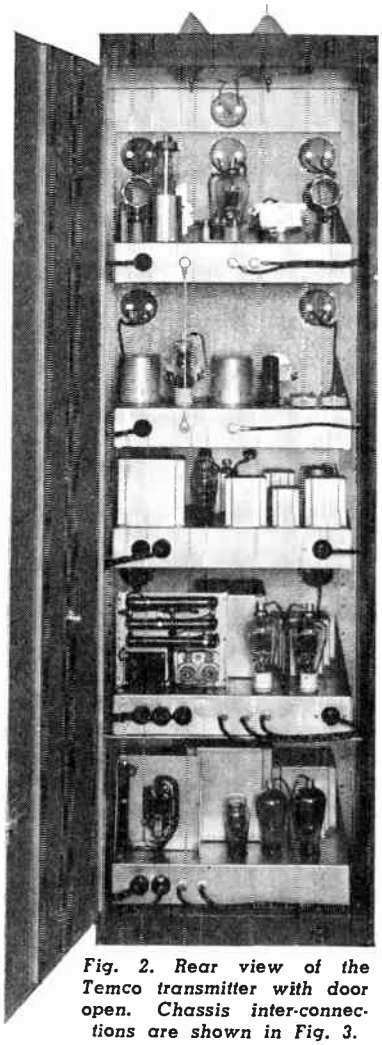


Fig. 2. Rear view of the Temco transmitter with door open. Chassis inter-connections are shown in Fig. 3.

the front view of Fig. 1. The behind-the-scene photo of Fig. 2 indicates that this appearance is more than skin deep. The construction is of a high degree of excellence throughout. The transmitter is merely plugged into a convenient 115-volt receptacle, connected to a suitable antenna, and it is ready for dependable, perfect c.w. and fone transmission, without any adjustments other than those associated with tuning and gain. The choice of power is ideal. It is sufficiently high—350 to 400 watts on fone and up to 500 watts c.w.—for consistent round-the-world communication with a good location and antenna, and at the same time it plugs into the standard lighting circuit without special lines or fuses.

Technical Details

An idea of the electrical details is best obtained from the pictorial block diagram of Fig. 3. The exciter unit, which is the fourth panel from the bottom in the front-view photo, consists of a 6L6 crystal controlled oscillator and an RK-25 buffer or doubler, as the case may be. Any one of four crystals and four tank coils for both oscillator and buffer can be chosen by switches on the front of the panel—contributing the utmost in flexibility. The oscillator is keyed in the cathode circuit, thus making break-in operation possible on the operating frequency. The power amplifier unit, next to the top panel in Fig. 1, utilizes an RK-20A in the intermediate amplifier and a pair of Taylor T-55s in the push pull final. These latter are cross-neutralized, and the entire r.f. line-up is stable on all bands. The intermediate and final tank coils are plugged in. The experienced operator, familiar with the transmitter, can change wave bands in less than one minute. The operator not familiar with the control settings at different bands, can change plug-in coils, and retune the transmitter in about two minutes.

The antenna circuit is link-coupled to the final tank coil. An antenna tuning unit is available if desired, but the link can be effectively connected directly to a low impedance untuned transmission line, such as EO1 cable or Bassett concentric feeder.

Audio Channel

The speech amplifier unit is the third from the bottom in Fig. 1. Two channels are provided, one high-gain for the crystal mike, and one of lower gain for a phonograph pickup. The tubes are a 6J7, a 6N7 (operated as a triode with the second grid used for mixing the input from the phonograph pickup) into two 6C5s in push-pull which in turn drive two 2A3s. These last drive the two RK-31s in the Class B modulator. The speech amplifier unit contains its own power supply system, employing an 82 and 5Z3 rectifying tubes.

The bottom panel in Fig. 1 contains the modulator and a C bias supply system for the entire transmitter. The Class B modulating tubes shown are T55s, but in the transmitter tested, RK-31s were employed. A 5Z3 rectifier is used in the bias supply system. The Class B modulator plate modulates the final.

Power Supply

The second unit from the bottom in the front view illustration is the high and low voltage supply, using two 66s and a 5Z3 as rectifiers. A plate potential of 1250 volts is applied to the intermediate r.f. amplifier, final, and modulators, while 550 volts is available for the oscillator and buffer unit.

In the block diagram of Fig. 3, the heavy connecting lines indicate the main circuits, while the dotted lines show incidental circuits, such as C bias.

Controls

Going from the bottom up, the left-hand control on the second panel is the filament rheostat. The center control is a heavy-duty toggle switch which turns on the filaments, while the right-hand knob controls the high voltage, with

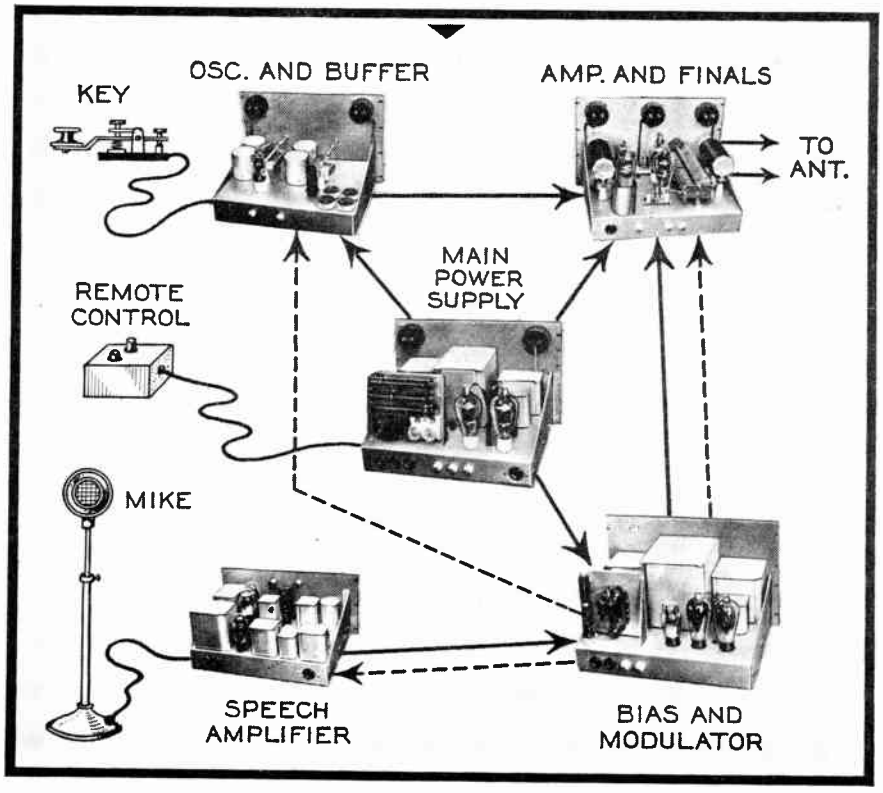


Fig. 3. Pictorial block diagram of the Temco transmitter, showing chassis interconnections. The dotted lines indicate bias supplies.

"off," "tuning" and "operating" positions. At "tuning" a resistor is inserted in series with the primary of the power transformer, reducing the plate voltages to all tubes fed from the main power-supply unit. The left and right-hand dials on the third panel respectively control the gain to the microphone and pickup channels. The small toggle switch to the right turns on the speech amplifier. The two push-buttons in the center of the panel operate a relay which applies plate potentials in accordance with the setting of the "off-tuning-operating" switch. The lower left knob of panel four is the crystal selector, while next to the right selects the oscillator tank coil. Excitation between the crystal oscillator and the buffer is controlled by the third control, while the right-hand switch selects the buffer tank coil. The left-hand tuning wheel tunes the crystal tank circuit and the right-hand one that of the buffer. The controls on the fifth panel, from left to right, tune the final and intermediate tanks respectively.

The rig is most adequately metered. Reading as you do this page—that is from left to right and down—the meters in Fig. 1 are: Antenna current, final plate current, final grid excitation, intermediate plate current, crystal plate current, buffer plate current, filament volts and last, in the lower right, the modulation plate current.

Operation

This transmitter is exceptionally simple to tune and operate, very safe, and practically fool-proof. The r.f. amplifiers being of Class C design are biased to beyond cut-off, and no plate current is drawn, with the exception of in the crystal tank circuit, until r.f. is fed through. The transmitter is adequately fused, and high voltages are automatically removed from all circuits when the rear door is opened. The selection of fone or c.w. transmission is effected by a plug type switch on the rear of the high- and low-voltage unit, which, on c.w. shorts the secondary of the Class B output transformer, and opens the negative side of the high voltage to the modulator stage.

Application of the high voltage is controlled as already explained through a relay operated by the push-buttons on the front panel. These buttons are duplicated on the remote control unit which is usually located on the operating desk and which also provides a closed-circuit keying jack.

The transmitter is adequately monitored with pilot lights. When the filaments are turned on, a green light glows in the left center of panel 3. With the plate voltages applied, a red pilot light to the right is illuminated. A small red light, at the lower left on the same panel, glows when the speech amplifier is turned on.

The use of four crystals provides an unusual degree of flexibility, not merely in changing from one band to another, but in selecting *different frequencies in the same band*—either by using two or more crystals in the same band, or by doubling and quadrupling. In either case, frequency shift to get around QRM can be made almost instantaneously—by the mere flip of one or more switches—and the most minor of retuning adjustments. In cases of closely adjacent channels, retuning may not be necessary at all. With the conventional complement of crystals—one each in the 160, 80, 40 and 20-meter bands, the crystals can so be chosen as to provide one frequency in the 160-meter band, two in the 80-meter band, three in the 40-meter band, three in the 20-meter band and two in the 10-meter band!

The Temco transmitter was tested on all bands during its short stay in the AWR laboratory—excepting the 10-meter band which was dead at the time. Fone was employed on all legal bands, and c.w. on all bands excepting the 160-meter allocation. Performance was excellent—exceptionally consistent for summer QSOs. Europe was worked at will, as was the west coast, Central America and Mexico. R reports were almost invariably 5, even when on the few occasions the S report fell below 8. This is evident of the purity of the emission—and of course it follows that practically all T reports were 9X. Reports of R5, S8 and 9, and 9X were the usual order. W6OIU, of Los Angeles, California, came back after a very brief CQ from our Proving Post in New York State with an RST589X report, with the comment that "u sure bang in hr thru plenty QRN es QRM." The frequency was 7081.2 kc. and the power input to the final at that QSO was running 375 watts.

Various antennas were used, all being center fed with Birnbach EO1 cable, terminating directly at the final link. Half-wave doublets were used on 40 and 80, and later a 102-foot compromise antenna gave excellent results on 80 to 20. These aerials were operated against ground through a series condenser for fone work on the 160-meter band.

Laboratory tests substantiated the consistently complimentary reports in operating contacts. Modulation was checked on both a Triplett modulation meter and the oscilloscope, as shown in Fig. 4. The final is easily modulated at 100%, and the waveform is distortionless. Incidentally, the Triplett modulation meter provides a very convenient method of applying a rectified signal to the oscilloscope. The output of the monitoring jacks is merely connected to the vertical deflection plates through the usual amplifier.

Our only objection to the transmitter was a bad rectifier noise from the mercury vapor 866s, which was particularly noticeable on the broadcast bands, and made break-in operation impossible below 7300 kc. This trouble, however, has since been corrected by the insertion of r.f. chokes in series with each rectifier plate lead.

NIGHT-OWL HOOTS

(Continued from page 471)

Dialers, etc. In order to assure yourself a position on a good team, write the Chief Night Owl immediately specifying the type of team you prefer.

There will be no entry fee for contestants and you will not be required to subscribe to ALL-WAVE RADIO or to clip any coupons. Awards for the winners will be in the form of permanent trophies and certificates of merit which will make very attractive additions to the listening posts of the winners. The exact nature and number of awards will be disclosed at an early date in the contest. Enroll now!

With the Night Owls

Being a department devoted to the publication of a few informative morsels extracted from the correspondence of the month: *George L. Brode,* Philadelphia, Pennsylvania: "WLWL has changed to WBUL since the purchase of the station by Arde Bulova. WICC, according to a recent veri, uses a three-element phased antenna. They have been on the air 11 years."

Leonard S. Parks, Engineer, CKSO, Sudbury, Ontario: "CKSO will have a new ¼-wave vertical radiator in operation before fall."

William B. MacDonald, Chief Engineer, WLLH, Lowell, Mass.: "WLLH test schedule is as follows: the second Thursday of each month, 1:45 to 2 a.m. and the last Friday of each month 1 to 1:15 a.m."

Carl Forestieri, Bronx, New York City: "I received a card from KHBC, Hilo, Hawaii, verifying my contest report of March 11, but, for the second time the Seal of Pele—Hawaiian Goddess of Fire—was missing." (Mystery: *What happens to these seals?*—Chief).

Francisco J. Stavoli, Chief Engineer, XEFO, Mexico City, Mexico: "The stations of the National Radio Network, XEFO on 940 kc. and XEUZ on 6120 kc. present a DX program every night from 1 to 2 a.m. dedicated especially to our listeners in North America."

Kilocycling Around

At exactly 3 p.m. on September 15,

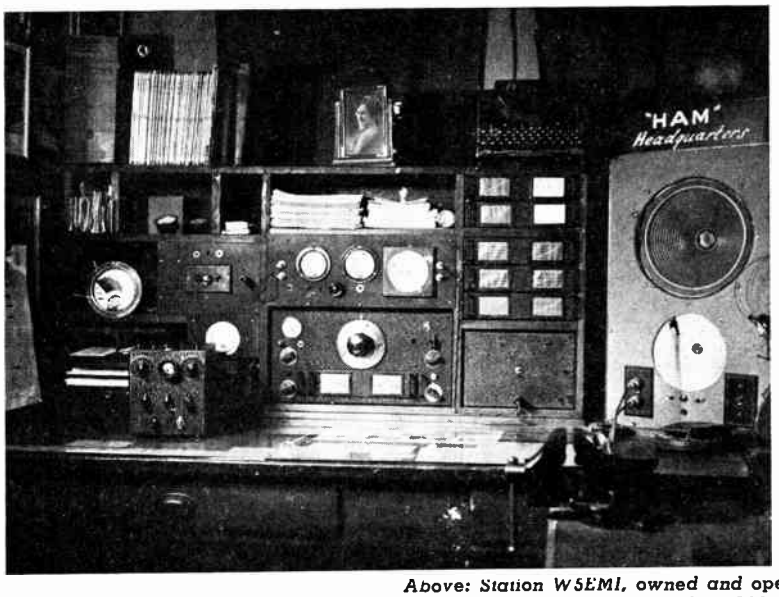
(Continued on page 480)

Hamfest

By W8QMR ex-2PI • LU4S

BUY UR TICKET? . . . HAMFESTERING . . . SKED SKIDS

EVER since some time before 1912 when radio licenses were first thought of, the amateur seems to have lived in a constant fear of being taxed for his privilege to transmit. Amateur organizations have consistently been solid against license fees, and just recently the A. R. R. L. shied at the proposition when brought up in the Connecticut legislature. And yet, in all these years—and we've been with amateur radio since the old Morse days — we have never heard one sound argument against putting a dollar-and-cents value on radio licenses, while there are plenty of things that can be said in favor of it.



Above: Station W5EMI, owned and operated by George L. Bird, Pawhuska, Oklahoma. Below: View of the rig which employs a W.E. 42A in the final.

We are not at this time advocating that the radio amateur be taxed for his license. It is certainly not an editorial policy of ALL-WAVE RADIO—nor even necessarily a personal policy of the writer. But we do wish some one would tell us what drawbacks of the system might conceivably outweigh its obvious advantages.

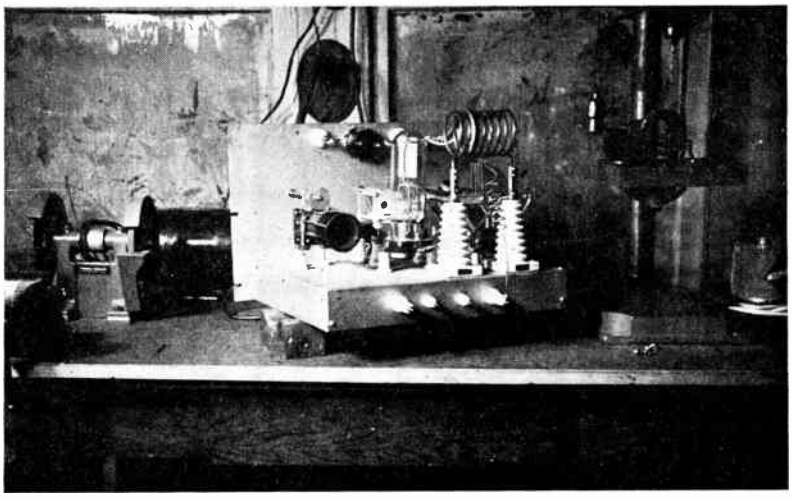
Were we championing such a program, we would not tax the amateur station only. Rather we would advocate license taxes for all transmitters—amateur, broadcast, commercial, etc., the amount of tax to vary with the power output and type of service in such a manner as to place the burden where it can best be borne, and at the same time not to overtax essential high-power services. It would be stipulated that the income from such as gasoline taxes are used for high-the government only for radio purposes—such as gasoline taxes are used for highway improvement. This would make possible adequate radio inspection, monitoring, etc., with improved conditions in all radio fields.

The amateur tax would be sufficiently low—say ten cents per watt for a three-year license period—so as not to discourage entry into the amateur ranks. No beginner would object to paying one dollar a year for the privilege of operating with a pair of 6L6s—and the 100-watt ham, with probably $300.00 or more invested in his equipment, would hardly kick at a $3.00 a year fee. (He probably pays five times that for his auto plates!) At the same time, grading the fee in accordance with power to the finals would tend somewhat to discourage the indiscriminate use of excessive powers with a betterment in operating conditions.

Some amateurs might attempt to operate in excess of their legal ratings, but very much on the whole illicit practices would be reduced. Having paid for his license, the amateur will value it that much more—we humans are funny that way. Also, with the 100 per cent efficient inspection and monitoring service which the tax income would provide, station-call bootlegging and other violations would be practically eliminated.

The amateur would rank much higher in the minds of the average congressman and the layman BCL who fail to appreciate the amateur's value to the army and navy, his utility in emergencies, his development work in radio—and who look upon the ham as more or less of a nuisance supported by the government at the government's expense. His status would be considerably enhanced, and the BCL, who pays nothing for the privilege

(Continued on page 496)



RADIO SIGNAL SURVEY LEAGUE NEWS

NEW R.S.S.L. MEMBERS . . . FOREIGN SECTIONAL MANAGERS . . . QRM SURVEY DATA ON SIGNAL REPORTING . . . LISTENER DX RECEPTION CITATIONS . . .

WITH summer on the way out, we are preparing to resume the normal League activities. Things will start popping next month, so don't miss the October issue. Here's why:

The Noise Survey Division will get into full swing. Plans will be offered members for clearing up man-made interference in their respective localities. A simple noise locator will be described which will be a great help in tracking down hidden nests of electrical interference. There will also be some good dope on what is being done to clear up this form of MX in towns and cities in the U. S.

Signal Surveys

Official signal surveys will also be resumed next month. We have a number of requests on file, but have withheld them until the vacation season is over.

But equally as important to R. S. S. L. members as well as the listening public will be the continuance of the station interference survey in the international broadcast bands. Communications are going out to all Sectional and Territorial Managers within the week regarding this important undertaking, and further details regarding interference reports will appear in the next issue for the benefit of members. If we all pull together, we can do a lot toward clearing up the international broadcast bands. Foreign members will be requested to monitor U. S. stations operating on these frequencies so that the survey will assume world-wide proportions.

Foreign members of the R. S. S. L. are requested to submit all station reports to their Territorial Managers in such localities where they have been appointed. If there is no manager in your territory or province, send reports direct to Headquarters.

For the time being members in England and New Zealand are requested to send their reports to the managers representing these countries. A manager for each area will eventually be appointed.

The managers so far appointed in foreign countries are listed below.

NEW R.S.S.L. MEMBERS

ARKANSAS
Jack Bailes, Eureka Springs—W15M2
Carl Madison Smith, Malvern—W14P1

AUSTRALIA
Ray Simpson, Concord West, N.S.W.—VK3

CALIFORNIA
George C. Sholin, San Francisco—W31J13
Calvin Reed Moreland, Compton—W29M15
Irving Furst, Los Angeles—W29M16
Ben Bauman, Los Angeles—W29M17
Paul E. Wilson Jr., Compton—W29M18
Rob't W. Smith, Compton—W29M19
Robert Bean, Compton—W29M20
Paul E. Wilson, Compton—W29M21
Walter Robert Brownlee, Compton—W29M22

CANADA
Thomas Douglas, New Westminster, B. C.—VE29A4

CANAL ZONE
Rudolph F. Majewski, P.A.D., France Field—HP1

CONNECTICUT
E. F. Reed, Noank—W3G25
David Hutchinson, Manchester—W3G23
Rob't Carlson Jr., Bridgeport—W4G17
John Fitzpatrick, Bridgeport—W4G18

DISTRICT OF COLUMBIA
George Walter Schreech, Washington—W5J12

ENGLAND
Eric Penrose, London—G4
Dan Mason Gledhill, Devon—G5
Joseph Stephen Gingell, Derbyshire—G6
Wm. James Colclough, London—G7

ILLINOIS
Cyrus B. Will, Kenilworth—W12H5
Harry Francis Ray Jr., Vandalia—W12K2
Robert R. Irwin, Chicago—W11J36
Eric A. Bristow, Chicago—W11H37
Earl Diehl, Belleville—W13L7

INDIANA
Richard Dudgeon, Indianapolis—W11K2
John L. Carpenter, South Bend—W11H35
Jack Gordon Gibson, Hobart—W11H38
Wm. Bruce Cameron, Indianapolis—W11K3

KENTUCKY
Howard Finlay, Harlan—W9L1

LOUISIANA
Frank John Gleeson, New Orleans—W12S1

MARYLAND
Wm. Edward Hamaker, Salisbury—W4K1

MASSACHUSETTS
Edw. Lendioszek, East Hampton—W4F12
John A. Collis, Belchertown—W3F53

MICHIGAN
George Lawrence Curtis, Detroit—W9G13
Harvey H. Curtis, Detroit—W9G12
Jack P. Probst, Highland Park—W9G11
Robert Lee Greaige, Jackson—W10H4
Forrest E. Beck Jr., Detroit—W9G14

MISSOURI
Ralph H. Reitz, St. Louis—W13L6

NEW HAMPSHIRE
Theodore J. Towne, Newmarket—W3F52

NEW JERSEY
John Bradford Ewing, Montclair—W4H120
Lewis W. Biebigheiser, Morristown—W4H122
Joseph H. Schmitt, Red Bank—W4H125
Lemuel E. Cavileer, Haddon Heights—W4H126

NEW YORK
Herbert S. Handler, Baldwin—W4H128
Roy Waite, Ballston Spa—W4F11
Hugh W. Caulkins, New York City—W4H129
Richard Gulatsi Jr., Mt. Vernon—W4H121
Alex Bleiman, New York City—W4H123
Franklin Frederick Vagt, Queens Village—W4H124

NEW ZEALAND
L. H. Harris, Lower Hutt—ZL1

OHIO
Kenneth R. Myers, Columbus—W9J15
Edward Graf, Cleveland—W8H22
Jim Glore, Mariemont—W10K7
Richard Hamilton Yount, Bradford—W9J14
Ralph Paul Erlick Jr., Cincinnati—W10K8
Paul J. Crowley, Cleveland—W8H23

PENNSYLVANIA
George C. Starry, Derry—W7J12
Harry F. Deibert, Walnutport—W5H12
F. J. Schrameyer, Philadelphia—W4H130
Rob't Earl Hardee, U.S.S. Selfridge No. 357, Philadelphia—W4H127
Jack Loftus, Pittsburgh—W7J9
Raymond R. Gross, McKeesport—W7J10
Edwin Blair Henry Jr., Pittsburgh—W7J11

RHODE ISLAND
Jacob Hagopian, Providence—W3G24

SCOTLAND
Walter Abbey Anderson, Selkirk—G8

SOUTH AFRICA
Martin John Louw, Woodstock, West Province—ZS1

TENNESSEE
Ed Westcott, Nashville—W11M1
Clarence W. Edmonson Jr., Lookout Mountain—W10N3

TEXAS
T. D. Smith, Burnet—W17R1

VERMONT
Richard Hill, St. Albans—W4E5
Richard Thwing, St. Albans—W4E6
Rob't Walter English, St. Albans—W4E7
Raymond G. Minor, St. Albans—W4E8
Edward S. Gagnon, St. Albans—W4E9

VIRGINIA
Wells Gresham, Norfolk—W5K1
Christopher Davis Jaffe, Norfolk—W5L2

WASHINGTON
Derrell R. Shearer, Pe Ell—W29C3
Harry F. Wood, Waverly—W26C4

WEST VIRGINIA
W. Frank Hackensmith, Wheeling—W8J2
Archie H. Browning, Logan—W8L6
Elvan Lanham, Logan—W8L7

WISCONSIN
Edward Dornbush, Sheboygan Falls—W12G6
Edgar Wippermann, Columbus—W12G7
Jerry E. Behagen, Milwaukee—W12G8
Philip John Sharrow, Columbus—W12G9

FOREIGN MANAGERS

CANADA

SASKATCHEWAN
Charles Hesterman, VE21A1,
2014 Lorne Ave., Saskatoon

BRITISH COLUMBIA
Charles J. Cowper, VE29A2,
1823 Comox St., Vancouver

ALBERTA
F. M. Pow, VE24A1,
10013-83 Ave., Edmonton

QUEBEC
Richard Chapman, VE6D1,
High Falls Power Station, Buckingham

CUBA

ALL CUBA
Ulpiano Muniz, CO3,
San Julian de Guano,
Pinar del Rio

NEW ZEALAND

ALL N. Z.
L. H. Harris, ZL1,
21 Raroa Road,
Lower Hutt

ENGLAND

ALL G. B.
Frank R. Stringer, G3
62 Bedford Road,
Walthamstow, London

New Vermont Manager

Mr. Orrin H. Carpenter, W4E2, of Waterbury, our former Sectional Manager for Vermont, has found it necessary to turn in his resignation. Mr. Carpenter has moved out of the state. We are sorry to have lost his services.

We welcome as his successor Mr. Fred Atherton, W4F1, of 65 East St., Rutland, Vermont.

All Vermont members are requested to send survey reports to Mr. Atherton in the future.

League Membership

League membership is growing by leaps and bounds, which means that we are going to be able to conduct superior surveys this coming fall and winter. However, all members do not work in all frequency bands, so that an even larger membership than the present one is desirable.

Headquarters is anxious to see a much larger increase in membership, and requests that each present member do his level best to bring in at least one additional member during this month. Come on, fellows, do your part toward making the League a power in radio affairs.

Additional membership is particularly urgent in Delaware, Mississippi, North Dakota, Wyoming and Alaska. Also in New Brunswick, Canada, in Mexico, and in the Hawaiian and Philippine Islands. Come on, you fellows, join up!

We are including in the "News" this month a list of new members who signed up during last month.

Also data on signal reporting for those who missed the original notes.

Signal Reporting

The only practical form of signal reporting is one universally used and understood. The measurement of signal input in microvolts is an accurate means of stating the reception conditions, and is clear to any engineer analyzing a summarized report. However, this type of reading is beyond the scope of the average receiver and it is therefore necessary to fall back on the standardized "QSA" and "R" systems which, though having arbitrary values, are sufficiently accurate for the purposes of signal survey work.

The "QSA" reports deal strictly with *signal readability* and the "R" reports with *signal strength*. When both are given, other factors are indicated, because if signal strength is high but signal readability low, it is a foregone conclusion that the received signal is not adequately modulated, local interference is high, or another station is interfering with the one being monitored.

The "QSA" or signal-readability scale follows. For the sake of brevity, the "SA" is dropped, and in making reports it is sufficient to refer to signal readability as Q1, Q2, etc.

LISTENER CITATIONS

THE long-awaited information on Listener Citation Certificates will appear next month. Full data as to how you can obtain such certificates will be included.

Citations will be issued for world reception of stations in the Standard Broadcast Band, the International Short-Wave Broadcast Bands, and the Amateur Phone Bands. Each certificate will indicate the listener's total record.

The authenticity of each Citation will be certified by the Radio Signal Survey League. Complete reception records will be kept on file at Headquarters.

Q0—Only carrier audible (by means of beat-frequency oscillator)
Q1—Hardly perceptible, unreadable
Q2—Weak, readable now and then
Q3—Fairly good; readable, but with difficulty
Q4—Good, readable
Q5—Very good, perfectly readable

The complete "R" scale of signal strength follows:

R0—Only carrier audible (by means of beat-frequency oscillator)
R1—Faint signals, just audible
R2—Weak signals, barely audible
R3—Weak signals, copiable in absence of interference
R4—Fair signals, readable
R5—Moderately strong signals
R6—Strong signals
R7—Good strong signals, copiable through interference
R8—Very strong signals
R9—Extremely strong signals

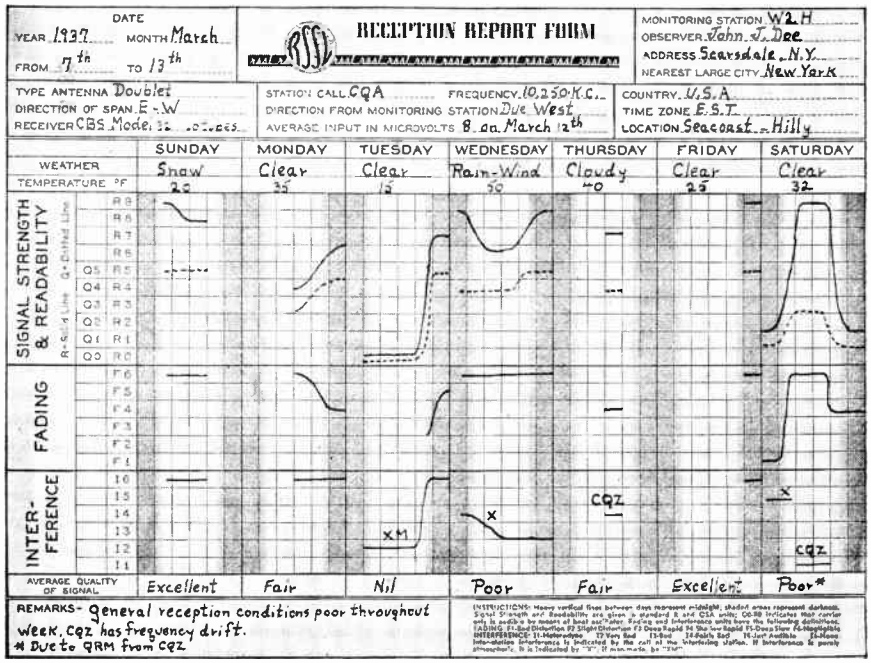
Signal fading is indicated by the letter F, the complete scale following:

F1—Bad distortion (selective fading)
F2—Slight distortion
F3—Deep, rapid
F4—Shallow, rapid
F5—Deep slow
F6—Negligible

The League has also adopted a scale for indicating the degree of station, static, or man-made noise interference. The letter I is used and this, together with a number, indicates the degree of station interference (QRM). If it is static interference (QRN) the letter I is preceded by the letter X. If noise interference, the letter I is preceded by the letters XM. The complete scale follows:

I1—Heterodyne (whistle)
I2—Very bad
I3—Bad
I4—Fairly bad
I5—Just audible
I6—None

Since it is the aim of the League to provide accurate surveys to stations, it should be evident that bad reports are just as valuable as good ones. *A report should be made even if the station being surveyed cannot be picked up in your locality.* Without such information the station cannot very well improve transmission conditions.

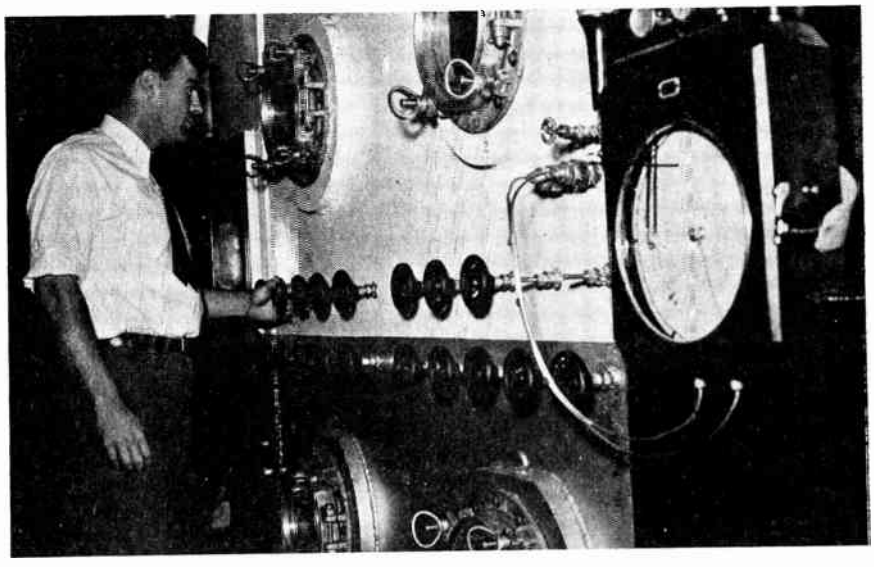


Showing method of reporting the characteristics of signals on the new R.S.S.L. forms. The vertical shaded areas represent periods of darkness. Spaces are provided for weather conditions, temperature, signal strength and readability, fading, interference, and average signal quality. The report blanks may be filled in with pencil or ink.

BOXING the ELEMENTS

THE effect of wind, rain, sleet, snow, Arctic and tropical temperatures, six-mile altitudes and power dives upon aeronautical transmitting radio equipment can all be duplicated within a few hours by radio engineers at the General Electric Company, in two new rooms recently completed for radio test purposes.

The walls of the two steel rooms where the tests are carried out are 18 inches thick, supported by 12-inch steel beams. One-half inch steel plate covers the exterior with a sheet steel interior protecting insulation of cork and glass wool. Large portholes of one-inch glass permit operators to study the equipment without being subjected to the same strains as are placed upon the apparatus being tested.



Exterior of "Room of Horrors," showing controls for regulating temperature.

Any Condition Simulated

The temperature in the "flying room" may be dropped to 40 degrees below zero and raised to 160 degrees above zero. An automatically controlled humidity plant permits the injection of live steam into the room where the effect of a relative humidity from 30 to 100 per cent upon the transmitters may be observed.

The air pressure at 30,000 feet elevation is about four pounds per square inch, as compared to 15 pounds at sea level. This high altitude pressure is created by the use of vacuum pumps which reduce the pressure as desired. The outside air pressure against the room, when the interior has been set to duplicate an altitude of 30,000 feet, is 370 tons, necessitating the heavy, thick steel walls. A pressure of 25 tons is forced against the doors, two feet thick, leading into the rooms.

20,000-volt and 24 low-voltage input leads provide power for the testing of as many as 20 transmitters in the room at one time.

The effect of wind velocity upon apparatus is duplicated by two large fans which generate a wind velocity equivalent to 30 miles per hour.

A dry ice plant provides cold air for the rooms and high temperatures are obtained by 30 kilowatts of heat supplied by five electric heaters.

By being able to maintain temperatures, pressure and humidity in the rooms, and at the same time being able to rapidly change them, engineers are able to subject apparatus to the same tests it would undergo in a five-mile power dive.

Near the "flight room" is a newly-constructed "shaking machine" for testing the effects of vibration upon aviation radio equipment. The new machine, one of the largest ever built for such purposes, affords precision adjustments of both frequency and amplitude of vibration.

A stroboscope is used with the machine in the vibration tests. By synchronizing the light with the vibration, various parts of the radio apparatus can be studied in motion.

Such facilities have given General Electric radio engineers a new conception of electrical and mechanical designs for radio equipment in filling the need for improved, more efficient apparatus.

NIGHT-OWL HOOTS

(Continued from page 476)

"Brooklyn's Own Station"— WBBC will assume the facilities of two of the three other stations on its channel and WARD and WLTH will pass into oblivion as the result of a recent decision of the F.C.C. WBBC will have three-fourths of the time on 1400 kc., the remaining one-fourth being used by WVFW also in the city across the bridge.

This decision culminates one of the longest feuds for one frequency in the history of American broadcasting. As far back as we can recall there have been battles for supremacy on 1400 kc. in Flatbush every time the day for renewal of license approached.

At approximately the same time that you are leisurely and enjoyably (we hope) absorbing the information contained herein, engineers and constructors are putting the finishing touches on the new transmitting equipment for CMQ (photos shown last month.) The popular Cuban broadcaster's new vertical radiator extending to a height of some 302 feet into the ozone is scheduled to commence radiating soon with an antenna power of 25,000 watts. This power is five times that used by the most powerful station in Cuba at present which is the present CMQ transmitter. With increased power and new equipment CMQ's programs should be heard easily throughout the entire United States—yes and we've little doubt that Canadian listeners will find CMQ over-riding their own comparatively lower powered CRCO in Ottawa on many a wintry eve. . . . WRAX was granted an increase to one kilowatt. The reason—to counteract the interference caused by CMX, WWJ, and KPRC.

'S a fack! There's a "Radio Sfax" (we pause while you replace your uppers) located in—you guessed it—Sfax, Tunisia, North Africa. The station emits a mere 30 watts into the ether on a frequency in the vicinity of 1415 kc. . . . Tallinn's (Esthonia) new 50-kw. transmitter should be in operation on 731 kc. ere the coming of another moon, thus replacing the old 15-kw. rig. The power of the new station can be stepped up to 120 kw. . . . One of the reasons LR5's signals are heard so well throughout the world is the fact that the sta-

(Continued on page 497)

Queries

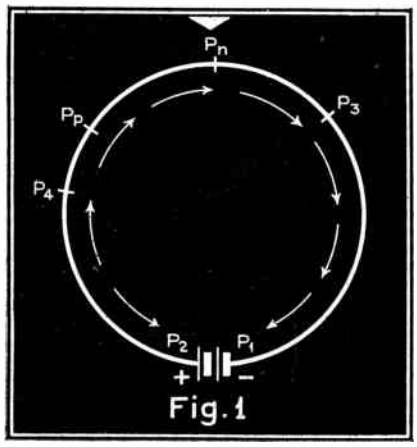
THE VARIOUS METHODS OF OBTAINING GRID BIAS

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.

QUESTION NO. 40: While I have studied quite a number of texts, and follow the semi-technical magazines, the manner in which a grid bias can be secured through a resistor is not altogether clear to me, and I should appreciate an explanation if such can be given in simple language.—*R. M. S., Louisville, Ky.*

ANSWER: There are several methods of securing a grid bias by means of resistors—and they all follow the same general fundamental electrical principle that when a current passes through a resistor a voltage exists across the terminals of that resistor, a positive potential at one end and a negative potential at the other. The grid bias usually refers to the *difference* in potential existing between the control grid of a tube and the cathode—the grid being negative with respect to the cathode. Thus, if a potential exists across a resistor, a grid can be biased by connecting the negative end to the grid and the positive terminal to the cathode. The voltage drop, or potential, may be obtained across a gridleak, a cathode resistor, or in the power-supply system.

In considering the currents responsible for this voltage drop, it will be convenient to think of them from the classical rather than the electronic point-of-view as flowing from positive to negative. Fig. 1 shows an ideal circuit, current supplied by the battery flowing from positive to negative through a length of wire. The arrows show the direction of current flow.

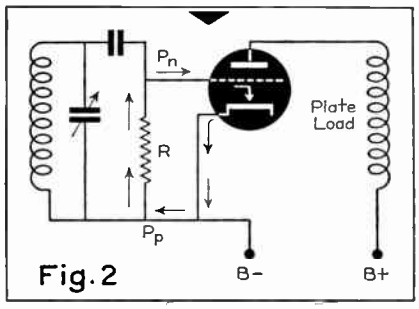


Circuit illustrating the relative voltage drop in a wire carrying an electric current.

It is obvious that point P_1 (at the negative terminal) is at a negative potential with respect to P_2 (at the positive terminal). Starting at P_1, and going along the wire (in a direction opposite to that of the current flow), we get closer and closer to the positive terminal. Thus any point on the wire, P_3 or P_4 is closer to the positive terminal than P_1, and is therefore positive with respect to P_1. Starting at P_3, we continue to P_4 which is closer to the positive terminal, and P_4 is therefore positive with respect to P_3. We may now state a general rule (considering current as flowing positive to negative and opposed to the electron stream): *Starting from any point in an electrical circuit such as P_n, and traversing the circuit in a direction reversed to the current flow to any other point such as P_p, P_n will be at a negative potential with respect to P_p.* And now to get back to grid bias.

Grid-leak Bias

Fig. 2 shows a simple grid-leak bias circuit. Any r.f. current applied to the grid will be subject to rectification—just as a.c. is rectified in a standard rectifier



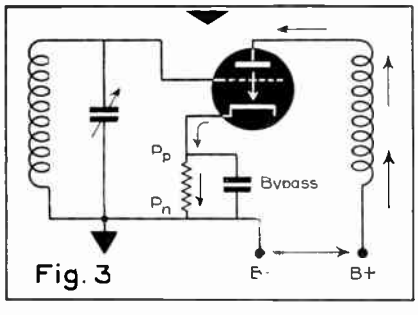
Manner in which bias is obtained with the use of a grid-leak and condenser.

circuit, except that in the circuit shown the grid acts as a plate. On the positive half of each cycle, electrons will be drawn to the grid, and a direct current will flow through the grid leak, R, as indicated by the arrows. The current circuit corresponds to that of Fig. 1, and if we choose some point in it, such as P_n at the grid, and traverse the current circuit backwards to P_p at the cathode, it follows that the grid must be negative with respect to the cathode! The extent of potential difference will be determined by the strength of the rectified current and the resistance of the grid leak—in accordance with Ohm's law which states that the potential drop across a resistor equals the current in amperes times the resistance in ohms—or $E=IR$, where E is voltage, I current and R resistance.

Cathode Bias

A cathode bias system functions in a somewhat similar manner, and such a circuit is illustrated in Fig. 3. Again the direction of current flow, from positive to negative, is indicated by arrows.

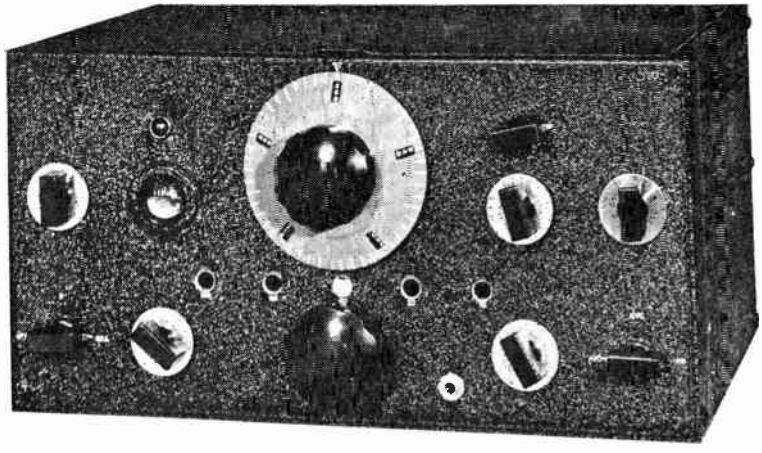
(Continued on page 500)



The grid of this tube is biased by the voltage drop across a resistor in the cathode circuit.

A PROVING-POST REVIEW

The NATIONAL NC-101X



THE National Company's NC-101X is a communications type receiver designed solely for operation on the amateur bands between 1715 and 30,000 kilocycles. By the use of specially-shaped gang-condenser plates, uniform bandspread of 400 dial divisions—or over *eight feet of dial*—is secured on *each* of the four bands. By limiting the tuning range to such comparatively narrow bands, efficiency of an unusually high degree has been made possible. Optimum coupling between radio-frequency stages has been achieved, with a pronounced improvement in the image-frequency ratio. In addition, the limitation of the band widths facilitates the attainment of absolutely perfect tracking of r.f., detector and oscillator circuits without the use of a panel trimming control.

Acquaintance is best made with this receiver by inspection of the control arrangements as shown in the front view photograph.

Controls

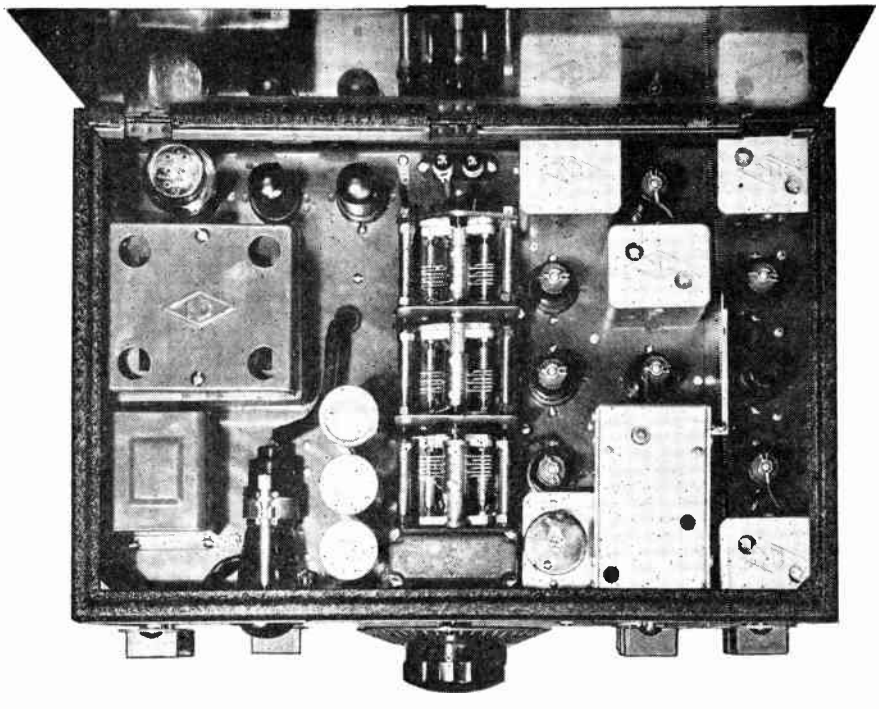
The control in the upper right varies the tonal output with somewhat unconventional modifications. Rotated to the extreme counter-clockwise position, the high-frequency cut-off starts at 1500 cycles. In the middle position the characteristic is practically flat from 50 to 10,000 cycles, and at the extreme clockwise position bass cut-off starts at 300 cycles.

Immediately below is a three-position control switch—off, transmit and receive. In the transmitting position, the filaments are lighted but no plate voltages applied. The transmit and receive contacts are also brought out to posts on the rear deck of the receiver for connection to a relay for break-in operation. The switch operates with a surprisingly subdued click in the speaker or fones and does not disturb the keying swing.

To the right of the switch is the r.f. gain control, and immediately above is the 6E5 tuning indicator. By adjusting the r.f. gain to the point of fluctuation of the eye, the position of the gain control can be interpreted in signal strength, S, units. A pilot light above the tuning eye is illuminated when the control switch is in any position other than "off."

The large center dial is the tuning control, and is the familiar preloaded, PW type dial. The numbers read from zero to five hundred in steps of ten, the figures changing when out of sight on the lower part of the dial. Immediately below the tuning dial is the wave-band change control which operates the automatic plug-in coils. The coils are moved, as a unit, and plugged into their respective circuits—only one set of coils being in any way electrically connected at a time. Thus the advantages of plug-in coils are retained, plus the convenience of band-switching. About one complete revolution of the control wheel is required to shift to an adjacent band, during which process an indicator is moved behind the row of windows in the panel to show the band for which the coils are plugged in.

The fone jack is to the right of the band control, and still farther to the right the audio gain control. Above this is the combination crystal switch and phase control. At zero the crystal is out, and at other settings the phasing characteristic is altered. By means of the phase control it is possible to eliminate one interfering heterodyne on a fone



Interior of NC-101X. Gang condensers with specially shaped plates are used to obtain uniform band spread. Crystal filter is to the right of tuning dial mechanism.

signal or one interfering c.w. signal. Above the phasing control is the crystal selectivity adjustment whereby the bandwidth can be adjusted when employing the crystal filter—from extremely sharp tuning as may occasionally be desired in c.w. reception to a width sufficiently wide to permit intelligibility on speech while still taking advantage of crystal selectivity and phasing.

The upper right-hand control varies the pitch of the beat-frequency oscillator. When tuned to zero, the b.f.o. is tuned exactly to the intermediate frequency, and beat notes of identical strength will be heard on both sides of the carrier or c.w. signal—with some loss in amplification due to the detuning. When adjusted to other than zero, a beat note will result with the signal tuned in perfectly. A second beat note will also be heard on the other side of the zero beat position on the tuning dial—but this will be much weaker than the first due to the fact that the signal has been detuned by twice the frequency of the beat note. As it is possible to beat on either side of the carrier, a beat position can be chosen which does not favor an interfering signal. Intelligent operation of the crystal-phasing control, crystal-selectivity control and the beat-frequency control results in truly single-signal reception that successfully copes with practically the worst conditions encountered in the congested amateur bands.

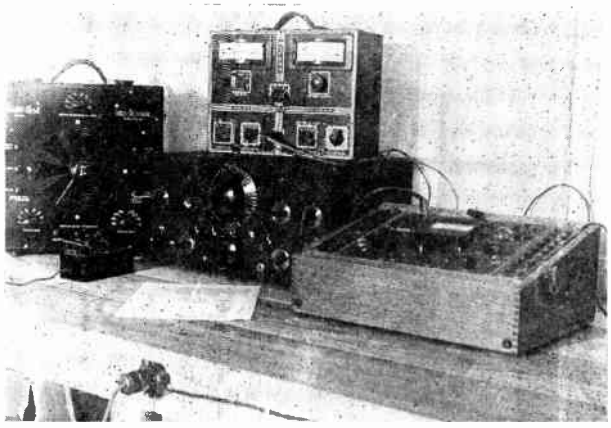


Fig. 2. The NC-101X on laboratory test. Instruments are beat-frequency oscillator, all-wave oscillator, crystal-controlled oscillator and db output meter.

The three-position switch in the lower left cuts in automatic volume control and the beat-frequency oscillator.

The Circuit

The circuit, with the exception of the crystal filter, is that of a conventional superheterodyne with one stage of tuned r.f. preceding the first detector. It is shown in Fig. 1. The crystal filter circuit is shown separately in the lower left-hand block, Fig. 1-A.

Checking the circuit against the controls as shown in the photo, the tone control will be located at J-21, and comprises the variable resistor R_{32}, choke L_2 and condenser C_{29}. It will be observed that the tone control functions in the power tube circuit—which is a minor criticism on the part of the present reviewer, as it does not permit tone control action when tones are used. If adequate tone control cannot be secured in the output circuit of the 6C5 second detector, the logical alternative would be to plug the tones into the power tube circuit with a volume limiting resistor.

The two sections of the control switch, X_1 and X_2 will be found at K-11 and M-10 respectively. The r.f. gain control is located at F-17, and the audio gain at D-21. The phasing control will be identified at L-4, with the switch at K-4, with the selectivity control just below it. The beat-frequency oscillator circuit is located at H-15, and the combination control switches, for "AVC,"

(Continued on page 501)

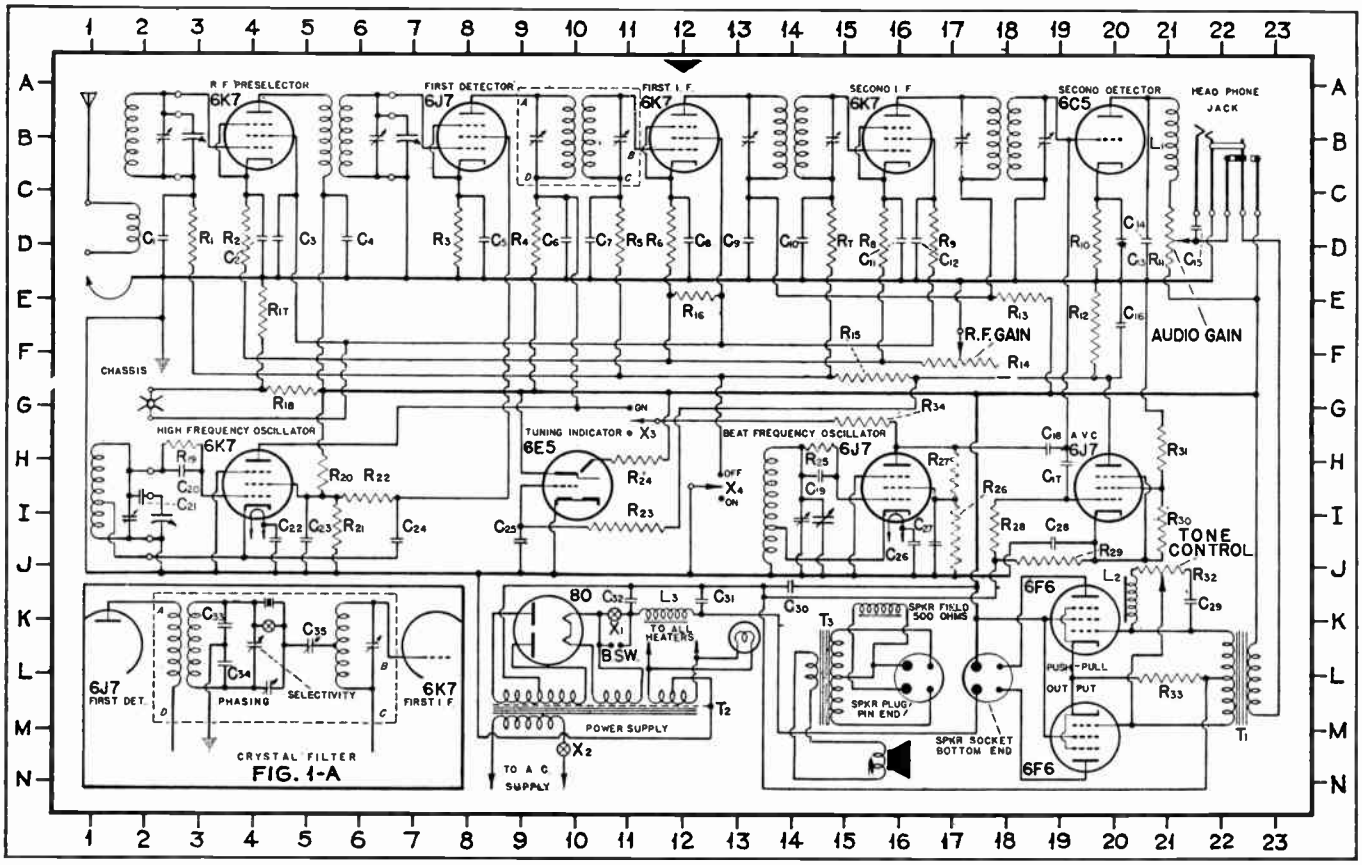


Diagram of the NC-101X. Crystal filter circuit is shown in the left corner, Fig. 1-A.

WORLD RADIO

STATION-CALL PREFIXES

PREFIXES USED BY COMMERCIAL AND BROADCAST RADIO STATIONS

CAA-CEZ ..... Chile
CFA-CKZ ..... Canada
CLA-CMZ ..... Cuba
CNA-CNZ ..... Morocco
COA-COZ ..... Cuba
CPA-CPZ ..... Bolivia
CQA-CRZ ..... Portuguese Colonies
CSA-CUZ ..... Portugal
CUA-CXZ ..... Uruguay
CYA-CZZ ..... Canada
D ..... Germany
EAA-EHZ ..... Spain
EIA-EIZ ..... Irish Free State
ELA-ELZ ..... Liberia
EPA-EQZ ..... Persia
ESA-ESZ ..... Esthonia
ETA-ETZ (See "I") ..... Ethiopia
F ..... France
G ..... United Kingdom
HAA-HAZ ..... Hungary
HBA-HBZ ..... Switzerland
HCA-HCZ ..... Ecuador
HHA-HHZ ..... Haiti
HIA-HIZ ..... Dominica
HJA-HKZ ..... Colombia
HPA-HPZ ..... Panama
HRA-HRZ ..... Honduras
HSA-HSZ ..... Siam
HVA-HVZ ..... Vatican City
HZA-HZZ ..... Hedjaz
I ..... Italy & Colonies
J ..... Japan
K ..... U. S. & Possessions
LAA-LNZ ..... Norway
LOA-LWZ ..... Argentina
LXA-LXZ ..... Luxemburg
LYA-LYZ ..... Lithuania
LZA-LZZ ..... Bulgaria
M ..... Great Britain
N ..... United States
OAA-OCZ ..... Peru
OEA-OEZ ..... Austria
OFA-OHZ ..... Finland
OKA-OKZ ..... Czechoslovakia
ONA-OTZ ..... Belgium & Colonies
OUA-OZZ ..... Denmark
PAA-PIZ ..... Netherlands
PJA-PJZ ..... Curacao
PKA-POZ ..... Netherlands Indies
PPA-PYZ ..... Brazil
PZA-PZZ ..... Surinam
R ..... U.S.S.R.
SAA-SMZ ..... Sweden
SOA-SRZ ..... Poland
STA-SUZ ..... Egypt
SVA-SZZ ..... Greece
TAA-TCZ ..... Turkey
TFA-TFZ ..... Iceland
TGA-TGZ ..... Guatemala
TIA-TIZ ..... Costa Rica
TKA-TZZ ..... France & Colonies
U ..... U.S.S.R.
VAA-VGZ ..... Canada
VHA-VMZ ..... Australia
VOA-VOZ ..... Newfoundland
VPA-VSZ ..... British Colonies
VTA-VWZ ..... British Indies
VXA-VYZ ..... Canada
W ..... United States
XAA-XFZ ..... Mexico
XGA-XUZ ..... China
XYA-XZZ ..... British India
YAA-YAZ ..... Afghanistan
YBA-YHZ ..... Netherlands Indies
YIA-YIZ ..... Iraq
YJA-YJZ ..... New Hebrides
YLA-YLZ ..... Latvia
YMA-YMZ ..... Danzig
YNA-YNZ ..... Nicaragua
YOA-YRZ ..... Roumania
YSA-YSZ ..... El Salvador
YTA-YUZ ..... Yugo-Slavia
YVA-YWZ ..... Venezuela
ZAA-ZAZ ..... Albania
ZBA-ZJZ ..... British Colonies
ZKA-ZMZ ..... New Zealand
ZPA-ZPZ ..... Paraguay
ZSA-ZUZ ..... South Africa
ZVA-ZZZ ..... Brazil

PREFIXES USED BY AMATEUR C. W. AND PHONE RADIO STATIONS

AC4 ..... Tibet
AR ..... Syria
CE ..... Chile
CM ..... Cuba (cw)
CN8 ..... Morocco
CO ..... Cuba ('Phone)
CP ..... Bolivia
CR4 ..... Cape Verde
CR5 ..... Portuguese Guinea
CR6 ..... Angola
CR7 ..... Mozambique
CR8 ..... Portuguese India
CR9 ..... Macao
CR10 ..... Timor
CT1 ..... Portugal
CT2 ..... Azores
CT3 ..... Madeira
CX ..... Uruguay
D4 ..... Germany
EA ..... Spain
EI ..... Irish Free State
EL ..... Liberia
EP, EQ ..... Iran (Persia)
ES ..... Estonia
ET ..... Abyssinia (Ethiopia)
F3 ..... France
F8 ..... France
FA3, FA8 ..... Algeria
FB8 ..... Madagascar
FD8 ..... Togo (French)
FE8 ..... Cameroons (French)
FF8 ..... French West Africa
FG8 ..... Guadeloupe
FI8 ..... French Indo-China
FK18 ..... New Caledonia
FL8 ..... French Somaliland
FM8 .....I. .... Martinique
FN8 ..... French Indies
FO8 ..... French Oceania, Tahiti
FP8 ..... St. Pierre & Miquelon
FQ8 ..... Fr. Equatorial Africa
FR8 ..... Reunion
FT4 ..... Tunisia
FU8 ..... New Hebrides
FY8 ..... French Guyane
G ..... Great Britain
GI ..... Northern Ireland
HA ..... Hungary
HB ..... Switzerland
HC ..... Ecuador
HH ..... Haiti
HI ..... Dominican Republic
HJ, HK ..... Colombian Republic
HP ..... Panama
HR ..... Honduras
HS ..... Siam
HZ ..... Hedjaz
I ..... Italy
J ..... Japan
K4 . Porto Rico, Virgin Islands (U. S.)
K5 ..... Canal Zone (U. S.)
K6 ... Guam, Hawaii, Midway Island, Samoa (U. S.)

K7	Alaska
KA	Philippine Islands (U.S.)
LA	Norway
LU	Argentina
LX	Luxembourg
LY	Lithuania
LZ	Bulgaria
MX	Manchukuo
N	U. S. Naval Reserve Stations
NX	Greenland
NY	Canal Zone
OA	Peru
OE	Austria
OH	Finland
OK	Czechoslovakia
OM	Guam
ON	Belgium, Bel. Congo
OZ	Denmark
PA	Netherlands
PI	Netherlands
PJ	Curacao
PK	Neth. Indies
PX	Andorra
PY	Brazil
PZ	Surinam
SM	Sweden
SP	Poland
ST	Sudan
SU	Egypt
SV	Greece
TA	Turkey
TF	Iceland
TG	Guatemala
TI	Costa Rica
U, UE, UK, UX	U.S.S.R.
VE	Canada
VK	Australia
VO	Newfoundland
VP1	British Honduras
VP2	Antigua, St. Kitts-Nevis
VP3	British Guiana
VP4	Trinidad & Tobago
VP5	Cayman Islands, Jamaica Turks & Caicos Islands
VP6	Barbardos
VP7	Bahamas
VP8	Falkland Islands, South Georgia
VP9	Bermuda
VQ2	Northern Rhodesia
VQ3	Tanganyika
VQ4	Kenya
VQ5	Uganda
VQ6	British Somaliland
VQ8	Mauritius
VQ9	Seychelles
VR1	Gilbert & Ellice Islands
VR2	Fiji Islands
VR3	Fanning Island
VR4	Br. Solomon Islands
VR5	Tonga Islands
VR6	Pitcairn Island
VS1, VS2, VS3	Malaya
VS4	North Borneo
VS5	Sarawak
VS6	Hong Kong
VS7	Ceylon
VS8	Bahrein Island
VS9	Maldive Islands
VU	India
W	United States
XE	Mexico
XU	China
YA	Afghanistan
YI	Iraq
YL	Latvia
YM	Danzig
YN	Nicaragua
YR	Roumania
YS	Salvador
YT, YU	Jugoslavia
YV	Venezuela
ZA	Albania
ZB1	Malta
ZB2	Gibraltar
ZC1	Transjordania
ZC2	Cocos Islands
ZC3	Christmas Island
ZC4	Cyprus
ZC5	Palestine
ZD1	Sierra Leone
ZD2	Nigeria, Cameroons (British)
ZD3	Gambia
ZD4	Gold Coast, Togoland (British)
ZD6	Nyasaland
ZD7	Saint Helena
ZD8	Ascension
ZE1	Southern Rhodesia
ZK1	Cook Islands
ZK2	Niue
ZL	New Zealand
ZM	Western Samoa
ZP	Paraguay
ZS, ZT, ZU	South Africa
ZU9	Tristan da Cunha

ARMCHAIR TUNING WITH REMOTE CONTROL UNIT

(Continued from page 463)

not be necessary to readjust the volume control of the radio receiver.

Now adjust the remote control unit, with the volume control on the adapter turned well up, tune in a station by means of the selector knob on top of the remote control unit. Start with a station at the high-frequency end of the broadcast band. Adjust the two compensators, cx, on the remote control tuning condensers by means of a screw driver inserted through the holes located in the side of the chassis. These should be adjusted to bring in the signal with the maximum amount of volume. Next tune in a station at the low-frequency end of the scale and adjust the padding condenser, C11 through the single hole which is to the rear of the tuning condenser compensators. This adjustment should be made for maximum response as well.

The remote control unit should cover the broadcast band if the adjustments are properly made. No trouble should be experienced with interference from stations picked up directly by the receiver if a good quiet spot on the receiver tuning dial is selected for the intermediate frequency. If a strong or local station is located close to the frequency selected, there may be some whistles or "birdies" present when tuning in the weaker stations on the remote control. This can be eliminated by changing the intermediate frequency slightly, or adjusting the compensator located in the top of the round shield can which is on top of the adapter chassis near the tubes.

LIST OF PARTS

Parts listed below are supplied mounted on a black lacquered steel chassis.

2—Octal 8-prong metal tube sockets
1—Meissner output i.f. transformer, T2
1—Meissner Ant.-Oscillator coil, T1, T3
1—two-gang tuning condenser, C1, C2
1—selector dial plate and escutcheon
1—volume control and power switch, R5
2—bakelite bar type control knobs
1—Isolantite padding condenser, C11
1—three-terminal tie lug
1—three-terminal lug strip
1—two-terminal lug strip
2—rubber grommets

The following parts are necessary to complete the construction of the unit.

1—500-ohm, ½ watt resistor, R1
1—50,000-ohm, ½ watt resistor, R2
1—20,000-ohm, 1 watt resistor, R3
1—30,000-ohm, ½ watt resistor (R4)
1—.002 mfd., mica condenser, C3
1—.0001 mfd., mica condenser, C4
1—.1 mfd., 200-volt paper condenser, C5
1—.1 mfd., 400-volt paper condenser, C6
1—dual section 4-4 mfd. electrolytic condenser, C7, C8
1—290-ohm resistance line cord and plug
1—metal tube grid shield
1—metal tube grid clip
2—.05 mfd., 200-volt condensers, C9, C10.
hook-up wire, machine screws, solder,

Precaution

It should be pointed out that once the remote control adapter unit has been adjusted for a given point on the receiver tuning dial, the position of the receiver dial should not be altered. If it is, it will have to be returned to its original position, or the adapter unit readjusted to the new receiver dial setting.

It is understood, of course, that all tuning is done with the remote control unit, as this supplements the receiver tuning dial. The latter remains in the one position at all times.

SHORT-WAVE BROADCAST STATION LIST

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

Mc. & M.	*Call*	*Location & Schedule*
31.600 9.4 ●	**WIXKA**	Boston, Mass. (see W1XK 9.570 mc.) Daily 7 a.m.-1 a.m.
31.600 9.4 ●	**WIXKB**	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 9 a.m.-1 a.m.
31.600 9.4	**W3XKA**	Philadelphia, Pa. (see W3XAU 9.590 mc.) Daily 10 a.m.-11 p.m.)
31.600 9.4	**W8XWJ**	4465 Penobscot Bldg., Detroit, Mich. Daily exc. Sun. 10:30 a.m.-5 p.m.
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, Bowmanville, Ontario Canada. **Experimental.**
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 6:30-9 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.** Daily exc. Sun. 6:30-9:30 a.m.; Sun. 7-9 a.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.)
21.470 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.)
19.020 15.77	**HS8PJ**	Superintending Engineer, Post and Telegraph Dept., Technical Section, Bangkok, Siam. O: 3 chimes, English Mondays, 8:10 a.m.
17.790 16.86	**GSG**	Daventry, England (see 26.100 mc.) Daily 12-2:15 a.m., 5:45-8:55 a.m.; 9:15 a.m.-12 noon; 12:15-6 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 8 a.m.-8 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. 7:25-10:35 a.m., Mon., Tues, Thurs., Fri. 8:25-10 a.m., Sat. 8:25-10:25 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 12:05-5:15 a.m., 5:55-11 a.m.; Sunday 11:10 a.m.-12:25 p.m.
17.760 16.89 ◆	**W2XE**	Wayne, N. J. (see 21.520 mc.)
17.755 16.90	**ZBW-5**	Hong Kong, China (see 9.525 mc.)
15.530 19.32	**HS8PJ**	Bangkok, Siam (see 19.020 mc.) Occasional Mondays 8-10 a.m.
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.**
15.340 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 10 a.m.-8 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	**CP7**	Casilla 637, La Paz, Bolivia. O: One gong and chimes following. **Irregular.**
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 12:05-5:15 a.m.; 6-8 a.m.; 8:15-11 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.) Daily exc. Sun. 2-5 p.m.; Sun. 12-3 p.m.; 4-5 p.m.
15.260 19.66 ●	**GSI**	Daventry, England (see 26.100 mc.) Daily 12:15-4 p.m.; 9-11 p.m.
15.250 19.67	**WIXAL**	Boston, Mass. (see 21.460 mc.) **Irregular.**
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 1/4 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 12:05-5:15 a.m.; 5:55-11 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 12-2:15 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.)
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 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).** Daily 5:30-10 a.m.; 6-8:30 p.m.; 10:30 p.m.-2 a.m.
15.140 19.82 ●	**GSF**	Daventry, England (see 26.100 mc.) Daily 4-6 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.
15.040 19.95	**RKI**	Radio Centre, Solianka 12, Moscow, U.S.S.R. Call: "This is Moscow Calling." O-C: **Internationale.** Daily 7-9:15 p.m. **No I.R.C. required.**
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.
14.600 20.55	**JVH**	Nazaki, Japan (see 21.520 mc.) **Irregular.**
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.
14.460 20.75	**DZH**	Zeesen, Germany (see 17.760 mc.) **Irregular.**
13.635 22.00	**SPW**	Polskie Radio, 5, Mazowiecka St., Warsaw, Poland. Mon., Wed., Fri., Sun. 12:30-1:30 p.m.
13.600 22.06	**ZMBJ**	TSS **Awatea,** Union Line S.S., Coy Head Office, Wellington, New Zealand. Daily 1-3 a.m., Sundays 6:40-7 p.m.
12.500 24.00	**HIN**	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 24.39	**CEB**	Radio Service, Desmaras and Cia., Ltd., Casilla 761, Santiago, Chile, S.A. Daily 11 a.m.-1 p.m.; 4-8 p.m.; 10-11 p.m.
12.235 24.52	**TFJ**	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.
12.130 24.73	**DZE**	Zeesen, Germany (see 17.760 mc.) **Irregular.**
12.000 25.00	**RNE**	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.
11.960 25.08	**HI2X**	Ciudad Trujillo, Dom. Rep. (see 15.280 mc.) Tues. and Fri. 8:10-10:10 p.m.
11.900 25.21	**XEWI**	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 25.21	**OLR4D**	Prague, Czechoslovakia (see 21.450 mc.) **Irregular** (see 15.230-11.840 mc.)
11.895 25.22	**XEXR**	Departamento Autonomo de Propaganda y Publicidad, Mexico, D. F. Daily 6-11:30 p.m.
11.895 25.22	**HP5I**	Emisora HP5I, Aguadulce, Panama. English—beginning and closing. I: three notes gong, thrice (9) ea. 30 mins. O-C: **El Tambor de la Alegria.** Daily 7:30-9:30 p.m. **Veri cards free.**
11.885 25.24	**TPA3**	Pontoise, France (see 15.243 mc.) Daily 2-5 a.m.; 12:15-6 p.m.
11.880 25.25	**XEXA**	Secretaria de Educacion Publica, Mexico, D. F. O-C: **March of the Toys.** Daily exc. Sun. 8-11:30 a.m.; 3-5 p.m.; 7-11 p.m.
11.875 25.26	**OLR4C**	Prague, Czechoslovakia (see 21.450 mc.) Irregular (see 15.230-11.840 mc.)
11.870 25.26	**W8XK**	Pittsburgh, Pa. (see 21.540 mc.) Daily 7-9 p.m.
11.860 25.29	**YDB**	Soerabaja, Java (see 15.150 mc.) Daily 10:30 p.m.-2 a.m.
11.860 25.29 ● ◆	**GSE**	Daventry, England, (See 26.100 mc.)
11.855 25.31	**DJP**	Zeesen, Germany (see 17.760 mc.) **Irregular**
11.840 25.34	**OLR4A**	Prague, Czechoslovakia (see 21.450 mc.) Daily 2:30-4:30 p.m. Mon. & Thurs. 7-9:10 p.m.
11.840 25.34	**KZRM**	Erlanger and Galinger, Inc., Regina Bldg., David St., Manila, P. I. Daily 4-10 a.m. (see 9.570 mc.)
11.830 25.36	**W2XE**	Wayne, N. J. (see 21.520 mc.) Daily exc. Sun. 5:30-11 p.m. Sun. 6-11 p.m.
11.830 25.36 ◆	**W9XAA**	Chicago, Ill. (see 17.780 mc.)
11.820 25.38	**XEBR**	Apartado 68, Hermosillo, Son. Mexico. O-C: **Over The Waves.** Daily 1-4 p.m.; 9 p.m.-12 a.m.
11.820 25.38 ● ◆	**GSN**	Daventry, England (see 26.100 mc.)
11.810 25.40	**2RO-4**	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 25.41	**OXY**	Skhamleback, Denmark (see 6.060 mc.) **Testing evenings.**
11.801 25.42	**OER-2**	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 25.42	**JZJ**	Nazaki, Japan (see 21.520 mc.) Daily 8-9 a.m.; 3-4 p.m.; 4:30-5:30 p.m.

Mc. & M. Call		*Location & Schedule*
11.800 25.42	**COGF**	General Betancourt 51, (Playa) Matanzas, Cuba. O-C: **Vals Diana.** Daily exc. Sun. 1-3 p.m., 6-10 p.m.
11.796 25.43	**OAX5A**	Avenida San Luis, Ica, Peru, S.A. Daily 12-4 p.m. 7-11:30 p. m.
11.795 25.43	**DJO**	Zeesen, Germany (see 17.760 mc.) **Irregular.**
11.790 25.43	**WIXAL**	Boston, Mass. (see 21.460 mc.) Daily exc. Sun. 4-5:30 p.m.
11.770 25.49	**DJD**	Zeesen, Germany (see 17.760 mc.) Daily 11:35 a.m.-4:30 p.m.; 4:50-10:45 p.m.
11.760 25.50	**XETA**	Apartado 203, Monterrey Mexico. Daily 7-11 p.m.
11.760 25.50	**OLR4B**	Prague, Czechoslovakia (see 21.450 mc.) **Irregular** (see 15.230-11.840 mc.)
11.750 25.53 ●	**GSD**	Daventry, England (see 26.100 mc.) Daily 12-2:15 a.m.; 12-15-4 p.m.; 6:20-8:30 p.m., 9-11 p.m.
11.740 25.55	**HP5L**	Apartado 129, David, Chiriqui, Panama, C. A. Daily 4-7 p.m.
11.730 25.57	**XETM**	Villahermosa, Mexico. Daily 6-11 p.m.
11.730 25.57 ◆	**PHI**	Hilversum, Holland (see 17.770 mc.)
11.720 25.60	**CJRX**	Royal Alexander Hotel, Winnipeg, Manitoba, Canada. Weekdays 6:30-11:00 p.m. Sundays 5-10 p.m.
11.720 25.60	**TPA-4**	Pontoise, France (see 15.243 mc.) Daily 6:15-8:15 p.m.; 10 p.m.-1 a.m.
11.718 25.60	**CR7BH**	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 25.62	**Philco Radio**	211-213D Rue Catinat, Saigon, Indo-China. Daily 6:30-9:30 a.m. **News in French** 9-9:10 a.m.
11.710 25.62	**VK9MI**	S.S. **Kanimbla.** Mellhwraith and McEacharn, Bridge St., Sydney, Australla. 11 p.m.-8 a.m. and later.
11.705 25.63	**SBG**	Chief Engineer, Motala, Sweden. Daily 1:20-2:05 a.m.; 6-9 a.m.; 11 a.m.-1:30 p.m.
11.700 25.64	**HP5A**	P. O. Box 954, Panama City, Panama, C.A. Daily 6-10:30 p.m.
11.570 25.93	**HH2T**	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.**
11.500 26.09	**COCX**	P. O. Box 32, Havana, Cuba. S: 5 bells, English each ½ hr. O-C: **Pajarillo Barrangueno.** Daily 8 a.m.-1 a.m.
11.402 26.31	**HBO**	Geneva, Switzerland (see HBJ, 14.535 mc.) Saturdays 6:45-8:30 p.m.
11.040 27.17	**CSW**	Emissora Nacional, Rua do Quelhas, Lisbon, Portugal. Daily 12-6 p.m.
11.000 27.27	**PLP**	J. Sanders, Chief Engr., Java Wireless Stations, Bandoeng, Java, D.E.I. Daily 5-10 a.m. 6-8:30 p.m.; 10:30 p.m.-2 a.m.
10.960 27.37	**JZB**	Nazaki, Japan. (See 21.520 mc.) **Irregular.**
10.740 27.93	**JVM**	Nazaki, Japan (see 21.520 mc.) 4:30-7:30 a.m. **Irregular.**
10.670 28.12	**CEC**	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 28.14	**JVN**	Nazaki, Japan (see 21:520 mc.) Daily 3-7:30 a.m.
10.370 28.93	**EAJ43**	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 28.93	**EHZ**	Tablero, Tenerife, C. I. Daily 3-4 p.m.; 6-8:15 p.m.
10.350 28.98	**LSX**	Transradio Internacional, San Martin, 329, Buenos Aires, Argentina, S.A. C: **San Lorenzo** March. **Irregular 5-8 p.m.**
10.330 29.04	**ORK**	Director de Communications, Bruxelles, Belgium. I: Carrillion. O: **Towards The Future.**. C: **Brabanconne.** Daily 1:30-3 p.m.
10.290 29.15	**DZC**	Zeesen, German (see 17.760 mc.) **Irregular.**
10.260 29.24	**PMN**	Bandoeng, Java, D.E.I. (see PLP, 11.000 mc.) Daily 5:30-10 a.m.; 6-8:30 p.m.; 10:30 p.m.-2 a.m.
10.230 29.33	**CEO**	Antofagasta, Chile (see CEC 10.670 mc.) Sat. and Sun. 7-7:20 p.m.
10.135 29.60	**CQN**	Chief of Radio Station CQN, Post Office Bldg., Macao (Portuguese) China. O: **Maria da Fonte.** C: National—**A Portuguesa.** Mon. and Fri. 7-8:30 a.m.
10.042 29.87	**DZB**	Zeesen, Germany (see 17.760 mc.) **Irregular.**
9.940 30.18	**CSW**	Lisbon, Portugal (see 11.040 mc.) Daily 6-8 p.m.
9.860 30.43	**EAQ**	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.
9.750 30.77	**COCQ**	**Calle 25, No. 445, Havana, Cuba. Weekdays 6:55 a.m.-1 a.m.; Sundays 6:55 a.m.-12:01 a.m.**

Mc. & M. Call		*Location & Schedule*
9.675 31.00	**DZA**	Zeesen, Germany (see 17.760 mc.) **Irregular.**
9.670 31.02	**TI4NRH**	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 31.04	**CR6AA**	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 31.06	**LRX**	Buenos Aires, Argentina, S.A. (see LRU, 15.290 mc.) Daily 9:30 a.m.-11:30 p.m.
9.650 31.09	**CT1AA**	Antonio Augusto de Aguair, 144 Lisbon, Portugal. I: Cookoo, 3 times. C: **A Portuguesa** (national anthem.) Tues., Thurs., Sat. 4-7 p.m.
9.645 31.10	**HH3W**	P. O. Box A117, Port-au-Prince, Haiti, W.I. Daily exc. Sunday 1-2 p.m.; 7-8:30 p.m.
9.635 31.13 ◆	**2RO-3**	Rome, Italy (see 11:810 mc.)
9.616 31.20	**HJIABP**	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 31.25	**RAN**	Moscow, U.S.S.R. (see RKI, 15.040 mc.) Daily 7-9:15 p.m.
9.600 31.25	**XEYU**	Universidad Nacional, Mexico, D.F. Daily 7-10 p.m.
9.600 31.25	**CB960**	Casilla 1342, Santiago, Chile, S.A. O: **Babes In Toyland.** C: **Rhapsody in Blue** (organ). Daily 11:30 a.m.-2 p.m.; 9:30 p.m.-12 a.m. **Veri slow.**
9.595 31.27	**HBL**	Geneva, Switzerland (see HBJ, 14.535 mc.) Saturdays 5:30-6 p.m.
9.595 31.27	**YNLF**	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 31.28	**VK6ME**	Amalgamated Wireless Ltd., Perth, West Australia. (Address 47 York St., Sydney, Australia). Daily exc. Sun. 6-8 a.m.
9.590 31.28	**W3XAU**	1622 Chestnut St., Philadelphia, Pa. Daily exc. Sun. and Wed. 11 a.m.-7 p.m. Sun. and Wed. 11 a.m.-6 p.m.
9.590 31.28	**VK2ME**	Amalgamated Wireless, Ltd. 47 York St., Sydney, Australia. Clock strikes at hour, chimes ¼ hr. I: Kookaburra bird call. C: **God Save The King.** Sunday 12-2 a.m.; 4:30-8:30 a.m.; 10:30 a.m.-12:30 p.m.
9.590 31.28	**HP5J**	Apartado 867, Panama City, Panama, C. A. **News** 6:30 p.m. O: **Blackhorse Troop March.** C: **Discipline 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 31.28	**PCJ**	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 31.32 ● ◆	**GSC**	Daventry, England (see 26.100 mc.)
9.580 31.32	**VK3LR**	Australian Broadcasting Commission, G.P.O. Box 1686, Melbourne, Australia. O: Recording, song, **Australian Lyre Bird.** C: **God Save The King.** Sun. 3:30-7:30 a.m. Weekdays 9:45 p.m.-8:30 a.m. exc. Saturdays to 9 a.m.
9.575 31.33	**HJ2ABC**	Sr. Pompilio Sanchez, Prop., Cucuta, Colombia, S.A. Daily 11 a.m.-12 noon; 6:30-9 p.m.
9.570 31.33 ●	**WIXK**	Westinghouse Electric and Mfg. Co., Boston, Mass. O-C: **Stars and Stripes Forever.** Daily 7 a.m.-1 a.m.
9.570 31.33	**KZRM**	Manila, P. I. (see 11.840 mc.) Daily 4-10 a.m.
9.565 31.36	**YV3RB**	Sr. Arturo Ramos Maggi, Prop., Barquisimeto, Venezuela. Daily 11:30 a.m.-12:30 p.m.; 5:30-9:30 p.m.
9.562 31.38	**OAX4T**	Radio Nacional, Peruvian Government, Av. Petiti Thouars, Lima, Peru. Daily 7-11 p.m.
9.560 31.38	**DJA**	Zeesen, Germany (see 17.760 mc.) Daily 12:05-5:15 a.m.; 4:50-10:45 p.m.
9.560 31.38	**HJIABB**	Apartado 715, Barranquilla, Colom.-bia, S.A. Daily 7 a.m.-12:30 p.m. **Veri slow.**
9.550 31.41	**XEFT**	Av. Independencia 28, Santa Cruz, 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 31.41	**YDB**	Soerabaja, Java N.E.I. (see 15.150 mc.) Weekdays 5:30-10:30 a.m. or 11 a.m.; 6-7:30 p.m.; 10:30 p.m.-2 a.m. Sunday 5:30-10:30 a.m.; 7:30 p.m.-2 a.m.
9.550 31.41	**HI5E**	Sr. H. Chavez, Ciudad Trujillo, Dom Rep., W. I.; **Irregular.**
9.550 31.41	**OLR3A**	Prague, Czechoslovakia (see 21.450 mc.) Irregular (see 15.230-11.840 mc.)
9.545 31.44	**HH2R**	Port-au-Prince, Haiti, W.I. (see HH2T, 11.570 mc.) **Special programs Irregular.**

Mc. & M. Call		*Location & Schedule*
9.540 31.45	**VPD-2**	Amalgamated Wireless, Ltd., **Suva**, Fiji Islands. C: **God Save the King.** Daily 5:30-7:30 a.m.
9.540 31.45	**DJN**	Zeesen, Germany (see 17.760 mc.) Daily 12:05-5:15 a.m.; 5:55-11 a.m.; 4:50-10:45 p.m.
9.535 31.46	**JZI**	Nazaki, Japan (see 21.520 mc.) 4:30-7:30 a.m. **Irregular.**
9.530 31.48	**W2XAF**	Schenectady, N. Y. (see W2XAD, 15.330 mc.) Daily 4 p.m.-12 a.m.
9.530 31.48	**LKJ-1**	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 31.49	**ZBW-3**	Hong Kong Broadcasting Committee, P.O. Box 200, Hong Kong, China. I-O-C: none. Daily exc. Sat. 11:30 p.m.-1.30 a.m. Mon. and Thurs. 4-10 a.m. Tues., Wed., Fri., Sun. 3-10 a.m., Sat. 3-11 a.m.; 9 p.m.-1:30 a.m.
9.524 31.50	**FIQA**	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 31.50	**Radio Liberte**	Stato Operal, 25 Liberte, Paris, France. Daily 7-8 p.m. (see 7.380 mc.)
9.520 31.51	**HJ4ABH**	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 31.51	**XEDQ**	Apartado 197, 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 31.55 ●	**GSB**	Daventry, England (see 26.100 mc.) Daily 12-2:15 a.m.; 12:15-6 p.m.; 9-11 p.m.
9.510 31.55	**HJU**	Buenaventura, Colombia, S.A. O-C: **Palmira.** English each 5 mins. Mon., Wed., Fri. 12-2 p.m.; 8-11 p.m.
9.510 31.55	**VK3ME**	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 31.57	**OLR3B**	Prague, Czechoslovakia. (See 2.450 mc.) **Irregular** (see 15.230-11.840 mc.)
9.500 31.58	**PRF5**	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 31.58	**HI5G**	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 31.58	**HJIABE**	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 31.58	**XEWW**	Apartado 2516, Mexico, D.F. Daily 7 p.m.-12 a.m.
9.480 31.65	**EAR**	P.O. Box 951, Madrid, Spain. Daily 6:30-8:30 p.m.; 10-11 p.m.
9.450 31.75	**"Radio Fort de France"**	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 31.75	**TGWA**	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 31.78	**HCODA**	Guayaquil, Ecuador, S.A. Daily exc. Sunday 8-11 p.m. **Veri—U.S. postage.**
9.428 31.81	**COCH**	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.
9.400 31.91	**CO9BC**	Monte No. 139, Apartado No. 132, Havana, Cuba. Daily 7 a.m.-12:30 a.m.
9.350 32.09	**HS8PJ**	Bangkok, Siam (see 19.020 mc.) Thursdays 8-10 a.m.
9.340 32.12	**OAX4J**	Radio Internacional Casilla 1166, Lima, Peru. C: Organ: **Good Night Sweetheart.** Daily 12-3 p.m.; 5 p.m.-1 a.m.
9.300 32.27	**YNGU**	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.**
9.125 32.88	**HAT-4**	Budapest, Hungary (see HAS-3, 15.370 mc.) Sun. and Wed. 7-8 p.m.; Sat. 6-7 p.m.
9.120 32.89	**CP6**	La Paz, Bolivia, S.A. (see CP7, 15.300 mc.) **Irregular.**
9.030 33.32	**COBZ**	P.O. Box 866, Havana, Cuba. Daily 6-11 p.m.
8.948 33.53	**HCJB**	Casilla 691, Quito, Ecuador, S.A. O: March **Patria.** I: 4 blows on gong. C: **Ecuadorian National Anthem.** Daily 7:30-8:45 a.m. Exc. Mon. 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 mc. and 8.948 mc.) **Veri—U.S. postage.**

Mc. & M.	Call	Location & Schedule
8.840 33.94	**ZMBJ**	Wellington, N. Z. (see 13.600 mc.) Sun. 6:40-7 p.m.; daily 1-3 a.m.
8.795 34.13	**HKV**	Ministerio de Guerra, Military Service, Bogota, Colombia, S.A. **Mon. and Thurs. news 7-7:30 p.m.**
8.665 34.62	**COJK**	Calle del General Gomez, No. 4, Camaguey, Cuba. Weekdays 7:45-10 p.m. Sundays irregular.
8.580 34.97	**YNIPR**	A Mejewsky, Gerente, Managua, Nicaragua, C.A. Daily 1-2:30 p.m.; 7:30-10:30 p.m. **Veri—5c U.S. postage.**
8.505 35.27	**YNLG**	Sr. Benjamin T. Gurranne, L., Managua, Nicaragua, C.A. Daily 1-2:30 p.m.; 7:30-9:45 p.m. **Veri—5c U.S. postage.**
8.404 35.70	**HC2CW**	Casilla 1166, Guayaquil, Ecuador, S.A. O-C: **Sangre Ecuatoriana.** Weekdays 11:30 a.m.-12:30 p.m.; 7-11 p.m. Sun. 3-5 p.m. **Veri—U. S. postage.**
8.110 37.00	**ZPIO**	Radio Prieto ZP10, Asuncion, Paraguay, S.A. Daily 8-10 p.m.
7.854 38.19	**HC2JSB**	P.O. Box 805, Guayaquil, Ecuador, S.A. S: Gong. O-C: **El Corcovado** (Carioca fox). Daily 9 a.m.-2 p.m.; 4-11 p.m. **Veri—U. S. postage.**
7.797 38.49	**HBP**	Geneva, Switzerland (see HBJ, 14.535 mc.) Saturdays 5:30-6 p.m.
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.
7.510 39.95	**JVP**	Nazaki, Japan (see 21.520 mc.) 3-7:30 a.m. **Irregular.**
7.411 40.48	**HCICE**	Apartado 485, Quito, Ecuador, S.A. Thursdays 9-10 p.m. **Veri—U.S. postage.**
7.380 40.65	**"Radio Liberte"**	Paris, France (see 9.523 mc.) Daily 7-8 p.m.
7.380 40.65	**XECR**	Secretaria de Relaciones Exteriores, Mexico, D.F. Sundays 6-8 p.m.
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	**EAI**	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	**FO8AA**	Radio Club Oceanien, Alfred T. Poria, Pres., Papeete, Tahiti. Tues. and Fri. 11 p.m.-1 a.m.
7.080 42.37	**PI1I**	Dr. M. Hellingman, Prop., Dordreeht, Holland. Sat. 10:10-11:10 **a.m.**
7.030 42.67	**EA9AH**	El Coronel Jefe de Estado, de las Mayor de las Fuezas, Militares, Teman, Spanish Morocco, Africa. Daily 4-4:25 p.m.; 12-2:30 a.m. irregular.
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.**
6.900 43.48	**HI2D**	Assoeiacion 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.
6.850 43.80	**TI8W**	P. O. Box 45, Port Limon, Costa Rica, C.A. Weekdays 10-11:30 p.m.; Sun. 2-3 p.m.
6.820 43.99	**XGOX**	Central Broadeasting 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.
6.788 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.**
6.750 44.44	**JVT**	Nazaki, Japan (see 21.520 mc.) 4:30-7:30 a.m. **Irregular.**
6.730 44.58	**HI3C**	Sr. Roberto Palli, R., 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.
6.720 44.64	**PMH**	Bandoeng, Java N.E.I. (see PLP, 11.000 mc.) Daily 5:30-11 a.m.
6.690 44.84	**TIEP**	Apartado 227, San Jose, Costa Rica, C.A. Daily 7-11 p.m.
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.**
6.630 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.**
6.580 45.59	**"Radio Guardia Civil"**	Tetuan, Spanish Morocco, Africa. O: March of the Caliph. C: **Spanish National Anthem.** 1 and S: chimes. Daily 2-3 p.m.; 7-8 p.m.
6.575 45.63	**HCIVT**	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. Daily 12-2 p.m.; 6-9:30 p.m.
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.
6.420 46.73	**HIIS**	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.
6.410 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	**COCW**	Paseo de Marti No. 105, Havana, Cuba. Daily 6 p.m.-12 a.m.
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.
6.316 47.50	**HIZ**	Calle Duarte No. 68, Ciudad Trujillo, Dom. Rep., W.I. Daily 11:30 a.m.-2:45 p.m.; 5:30-9 p.m.; Sat. to 10 and 11 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 6:30-9:30 p.m.
6.280 47.77	**COHB**	P. O. Box 85, Sancti-Spiritus, Santa Clara, Cuba. Daily 9-10 a.m.; 12-1 p.m.; 4-6 p.m.; 9-11 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	**OAX4G**	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	**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 48.15	**YVIRG**	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 48.31	**YVIRI**	Radio Coro, Coro, Venezuela, S.A. Daily 7:30-9:30 p.m
6.200 48.39	**COKG**	Apartado 137, Santiago, Cuba. Daily 5-6 p.m.; 9:30-10:30 p.m.; Sundays 12:01-1 a.m.
6.200 48.39	**XEXS**	Secretaria de la Economia Nacional, Mexico, D.F. Daily 7-11 p.m.
6.190 48.47	**HIIA**	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 48.62	**HJ3ABF**	Apartado 317, Bogota, Colombia, S.A. C: **Good Night Sweetheart.** Daily 11 a.m.-2 p.m.; 6-11 p.m.
6.160 48.70	**VPB**	Radio Club of Ceylon and So. India, P. O. Box 282, Colombo, Ceylon. S: Time on hour, 6 pips. 1. Bow Bells, infrequently. Daily 7-9:30 a.m.; Saturdays to 12:30 p.m.
6.158 48.72	**YV5RD**	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 48.78	**HJ4ABU**	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 48.78	**CJRO**	Winnipeg, Manitoba, Canada (see CJRX, 11.270 mc.) Weekdays 6.30-11 p.m. Sundays 5-10 p.m.
6.150 48.78	**HI5N**	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 48.78	**OAX1A**	Sr. J. Carlos Montjoy D., Casilla No. 9, Chielayo, Peru. Daily exc. Sat. 8-11 p.m.; Sat. 8 p.m.-12 a.m.
6.150 48.78	**CB615**	Santiago, Chile (see CEB, 12.300 mc.) Daily 4-7 p.m.
6.140 48.86	**W8XK**	Pittsburgh, Pa. (see 21.540 mc.) Daily 9 p.m.-1 a.m.
6.140 48.86	**ZEB**	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.
6.138 48.88	**HJ4ABD**	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 p.m. **Veri slow.**
6.137 48.88	**CR7AA**	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 48.91	**XEXA**	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 11 a.m.-2 p.m.; 5-10 p.m.
6.130 48.94	**VP3BG**	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 48.94	**ZGE**	Kuala Lumpur, Malaya States, S.S. Sun., Tues., Fri. 6:40-8:40 a.m.
6.130 48.94	**LKJI**	Jeloy, Norway (see 9.530 mc.) Daily 11 a.m.-5 p.m.
6.130 48.94	**COCD**	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 48.94	**VE9HX**	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.
6.128 48.96	**HJIABB**	Apartado 715, Barranquilla, Columbia, S.A. I: 3 chimes. S: I chime between advertisements. C: **La Golondrina.** Daily 11:45 a.m.-1 p.m.; 5:30-10 p.m. **Veri slow.**
6.125 48.98	**CXA4**	Mercedes 823, Montevideo, Uruguay, S.A. Daily 8 a.m.-12 noon; 2-10 p.m.
6.122 49.00	**HP5H**	Voice of the People, Panama City, Panama, C. A. Daily 7-10 p.m.
6.122 49.00	**HJ3ABX**	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 49.02	**XEFT** ◆	Vera Cruz, Mexico (see 9.550 mc.)

Mc. & M.	Call	Location & Schedule
6.120 49.02	W2XE ◆	Wayne, N. J. (see 21.520 mc.)
6.120 49.02	XEUZ	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 49.06	DLR2C	Prague, Czechoslovakia (see 21.450 mc.) S: Bells, **Irregular** (see 15.230-11.840 mc.)
6.110 49.10	HJ4ABB	Apartado 175, Manizales, Colombia, S.A. Daily 11 a.m.-1 p.m.; 5-8 p.m. **Veri slow.**
6.110 49.10	GSL ● ◆	Daventry, England (see 26.100 mc.)
6.110 49.10	XEPW	Enrique Arzamendi, Gen'l. Mgr., Mexico, D.F. S: 5 chimes of gong. O-C: **Vall 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 49.10	VUC	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 49.18	YUA	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 49.18	W9XF	20 N. Wacker Drive, Chicago, Ill. O-C: **Star Spangled Banner.** Daily exc. Sat. and Sun. 10:05 p.m.-1 a.m.; Sat. 11 p.m.-1 a.m. Sun. 10:05-11 p.m.; 12:05-1 a.m.
6.100 49.18	W3XAL	Bound Brook, N. J. (see 17.780 mc.) Daily 8:30-10 p.m.
6.097 49.20	ZTJ	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 49.20	HJ4ABE	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 49.22	JZH	Nazaki, Japan (see 21.520 mc.) **Irregular.**
6.092 49.24	OAX4Z	Lima, Peru (see OAX4T, 9.562 mc.) Daily 7-11:30 p.m.
6.090 49.26	CRCX ●	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 49.26	ZBW-2	Hong Kong, China (see 9.525 mc.)
6.090 49.26	HJ4ABC	Ibague, Colombia, S.A. Daily 6-11 p.m.
6.085 49.30	HJ5ABD	Cali, Colombia, S.A. Daily 11 a.m.-2 p.m.; 6-11 p.m.
6.082 49.33	VQ7LO	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.**
6.080 49.34	W9XAA ◆	Chicago, Ill. (see 17.780 mc.)
6.080 49.34	ZHJ	Penang Wireless Society Headquarters, 40 Perak Road, Penang, S.S. Daily 6:40-8:40 a.m.
6.080 49.34	CP5	La Paz, Bolivia, S.A. (see CP7, 15.300 mc.) **Irregular.**
6.080 49.34	VE9CS	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 49.34	HP5F	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.
6.079 49.35	DJM	Zeesen, Germany (see 17.760 mc.) **Irregular.**
6.075 49.38	XECU	Hidalgo 579, Guadalajara Jab., Mexico. O-C: **Ojos Tapatious.** I: Train in motion. Daily 9-11 a.m.; 1-4 p.m.; 8-11:30 p.m. or 12a.m.
6.070 49.42	YVIRD	P. O. Box 100, Maracaibo, Venezuela, S. A. Daily 8 p.m.-12 a.m.
6.070 49.42	CFRX	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 49.46	XEXR	Departamento Autonomo de Propaganda y Publicidad, Mexico, D. F. Daily 6-11:30 p.m.
6.063 49.46	SBG	Motala, Sweden (see 11.705 mc.) Daily 1:30-5 p.m.
6.060 49.50	W8XAL	Crosley Radio Corp., Cincinnati, Ohio. Weekdays 6:30 a.m.-8 p.m.; 11 p.m.-2 a.m.
6.060 49.50	W3XAU	Philadelphia, Pa. (see 9.590 mc.) Daily 7-10 p.m.
6.060 49.50	OXY	Statsradiofonien, Heibergsgade 7, Copenhagen, Denmark. O: one gong stroke. C: **There Is a Winsome Land.** Weekdays 1-6:30 p.m. Sun. 11 a.m.-6:30 p.m.
6.050 49.59	GSA ● ◆	Daventry, England (see 26.100 mc.)
6.050 49.59	HJ3ABD	Apartado 509, Bogota, Colombia, S. A. O: **Para Ti Rio Rita.** C: **Rio Rita** and National Anthem. Week-days 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.
6.050 49.59	XEXF	Secretaria de la Economia Nacional, Mexico, D. F. Daily 8 p.m.-12 a.m.
6.045 49.62	XETW	Francisco I. Madero, 10, Tampico, Mexico. Daily 7 p.m.-12 a.m.
6.043 49.62	HJIABG	Apartado 674, Barranquilla, Colombia S. A. Daily 11 a.m.-11 p.m.; Sun. 11 a.m.-8 p.m.
6.040 49.67	YDA	Tandjong Priok, Java N. E. I. (see 15.150 mc.) Daily 10:30 p.m.-2 a.m.
6.040 49.67	W4XB	Herald Bldg., Miami, Fla. **In service again before Sept. 15.**
6.040 49.67	WIXAL	Boston, Mass. (see 21.460 mc.) **Irregular**
6.030 49.75	OLR2B	Prague, Czechoslovakia (see 21.450 mc.) **Irregular.** (see 15.230-11.840 mc.)
6.030 49.75	HP5B	P.O. Box 910, Panama City, Panama. English and Spanish. C: **A Happy Good Night and Good Night Sweetheart.** Daily 11:30 a.m.-1 p.m.; 5-10 p.m.
6.030 49.75	HJ4ABP	Emisora Philco, Medellin, Colombia, S.A. Daily 8 a.m.-11 p.m.
6.030 49.75	VE9CA	Toronto General Trust Bldg., Calgary, Alberta, Canada. Weekdays 9 a.m.-1 a.m. Thurs. to 2 a.m. Sun. 12 noon-12:30 a.m.
6.030 49.75	XEBQ	Astillero 35, Mazatlan, Mexico. Daily 8-11:30 p.m.
6.025 49.79	HJIABJ	Santa Marta, Colombia, S.A. Daily 11:30 a.m.-2 p.m.; 5:30-10:30 p.m.
6.020 49.83	DJC	Zeesen, Germany (see 17.760 mc.) Daily 11:35-4:30 p.m.
6.020 49.83	XEUW	Av. Independencia 98, Vera Cruz, Mexico. S: Marimba. O: March **Victoria.** C: **La Golondrinas.** Daily 8 a.m.-12 midnight.
6.015 49.88	HI3U	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 49.88	XEWI	Mexico, D.F. (see 11.900 mc.) **Irregular.**
6.012 49.90	HJ3ABH	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 49.92	VP3MR	16, Robb and Hincks Sts., Georgetown, British Guiana, S.A. Weekdays 4:45-8:45 p.m.; Mon., Wed., Fri. 10:15-11:15 a.m. Sun. 8:45-11:15 a.m.
6.010 49.92	VK9MI	Sydney, Australia (see 11.710 mc.) 11 p.m.-8 a.m. and later.
6.010 49.92	COCO	P.O. Box 98, Havana, Cuba. English and Cuban. Daily 8 a.m.-10 p.m.
6.010 49.92	OLR2A	Prague, Czechoslovakia (see 21.450 mc.) **Irregular** (see 15.230-11.840 mc.)
6.007 49.94	"Radio Burma"	Burma Independent Wireless, Rangoon, Burma. C: **God Save The King.** Daily 9:10-9:40 a.m.
6.005 49.96	HP5K	P.O. Box 33, Colon, Panama, C.A. 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 49.96	CFCX	P.O. Box 1690, Montreal, Quebec, Canada. Weekdays 6:44 a.m.-12 midnight. Sundays 8 a.m.-10:15 p.m.
6.005 49.96	VE9DN	Montreal, Quebec, Canada (see CFCX, 6.005 mc.) Sat. 11 p.m.-12 a.m. Fall, winter and spring.
6.000 50.00	HJIABC	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 50.00	XEBT	P.O. Box 79-44, Mexico, D.F. I: 3 blasts on cookoo horn. Siren near closing. O: **Las Mananitas.** C: **Liebestraum.** Daily 10 a.m.-1 a.m.
6.000 50.00	FIQA	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 50.00	RV59 ◆	Moscow, U.S.S.R. (see RKI, 15.040 mc.) **No I.R.C. required.**
5.980 50.17	HJ2ABD	Calle 2 No. 1205, Bucaramanga, Colombia, S.A. Daily 11:30 a.m.-12:30 p.m.; 6-10 p.m.
5.969 50.26	HVJ	Vatican City (see 15.121 mc.) 2-2-15 p.m. Sun. 5-5:30 a.m.
5.955 50.35	HJN	Minister of Education Nacional, Bogota, Colombia. Daily 11 a.m.-2 p.m.; 5-10:30 p.m.
5.940 50.51	TG2X	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 50.59	PJCI	Curacaosche Radio Vereeniging, Willemstad Curacao, N.W.I. O: Electrical gong, 4 strokes and repeat 5 mins. O-C: National anthem. Weekdays 6:36-8:36 p.m. Sun. 10:36 a.m.-12:36 p.m.
5.930 50.59	YVIRL	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 50.76	YV4RH	Valencia, Venezuela, S.A. Daily 8-11:30 p.m.
5.910 50.76	HH2S	Port-au-Prince, Haiti, W.I. (see 11.570 mc.) Daily 7-10 p.m.
5.905 50.80	TILS	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 50.84	ZNB	Government Engineer, Mafeking, South Africa. Mon. to Fri. 1-2:30 p.m. Sun. 1:30-2:30 p.m.
5.900 50.85	HJ4ABD	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 50.98	HI9B	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 51.02	YV3RA	Marquisimeto, Venezuela (see YV3RB, 9.565 mc.) Daily 11:30 a.m.-12:30 p.m.; 5:30-9:30 p.m.
5.875 51.11	HRN	Tegucigalpa, Honduras, C.A. C: **Good Night Melody** (Ted Lewis.) Daily 7-10 p.m. **Veries—10c U.S. cash. Veri slow.**
5.865 51.15	HIIJ	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.
5.850 51.28	YVIRB	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.
5.830 51.46	TIGPH	Apartado 800, San Jose, Costa Rica, C.A. C: **Good Night Melody** (Ted Lewis). Weekdays 8-11 p.m.
5.800 51.72	YV5RC	P.O. Box 2009, Caracas, Venezuela, S.A. I: 4 chimes. O-C: Official **IBB March.** Bugles, whistles before closing. Daily exc. Sun. 7-8 a.m.; 10:45 a.m.-1:45 p.m.; 3:45-9:30 p.m. Sunday 8:30 a.m.-10:30 p.m.
5.800 51.72	ZEC	P.O. Box 792, Salisbury, Rhodesia, South Africa. Sun. 3-5 a.m.; Tues. and Fri. 1:15-3:15 p.m.
5.780 51.90	OAX4D	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 51.90	HJ4ABD	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 52.10	YNOP	Radio Bayer, Managua, Nicaragua, C.A. Weekdays 8:30-10:30 p.m. **Veri—5c U. S. Postage.**
5.755 52.13	YV2RA	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.
5.725 52.40	HCIPM	P.O. Box 664, Quito, Ecuador, S.A. O-C: **La Marcha de Aida.** Saturdays 9-11 p.m.
5.713 52.51	TGS	Casa de Presidencial, Guatemala City, Guatemala, C.A. Sun., Wed., Fri. 6-8 p.m. **No I.R.C. necessary.**
5.140 58.37	PMY	Nillmy 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.
4.810 62.37	YDE2	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.
4.600 65.22	HC2ET	P.O. Box 824, Guayaquil, Ecuador, S.A. I: 12 chimes. Wed. and Sat. 9:15-10:45 p.m. **Veri U. S. postage.**
4.420 67.87	ZMBJ	Wellington, N. Z. (see 13.600 mc.)
4.273 70.21	RV15	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.**
4.107 73.05	HCJB	Quito, Ecudaor, S.A. (see 8.948 mc.)
4.002 75.00	CT2AJ	Ponta Delgada, Island of St. Michael, Azores. Wed. and Sat., 5-7 p.m.
3.750 80.00	HCK	Quito, Ecuador, S.A. Mon 8:30-10:30 p.m. **Veri—U. S. postage.**
3.040 98.68	YDA	Batavia, Java, N.E.I. (see 15.150 mc.) Sun. 5:30-10:30 a.m.; 7:30 p.m.-2 a.m Weekdays 5:30-10:30 or 11 a.m. (Sat. 11:30 a.m.), 6-7:30 p.m.; 10:30 p.m.-2 a.m.

Backwash

MR. COOPER OBLIGES

Editor: We appreciate your expression and the publicity which you have given us, and in order that these pipe smokers may not suffer for lack of Sir Walter Raleigh I am having sent you a case containing 24 tins of this delectable tobacco which I will leave to you to pass around to the most deserving objects amongst that group of "Pirates," also leaving it to you as to how many tins, if any, remain in your hands as "rake-off" for doing the job.

GEORGE COOPER, *President,*
BROWN & WILLIAMSON TOBACCO CORP.

The 24 tins have been received and delivered, and the boys are happy. We took 2 tins for our share. Nice, clean fun all around.—Editor.

◆

FUN ON FIVE

Editor: Have been busy studying for a Ham ticket so have got in little dxing. But dx on 5 meters was fair last month. Picked up the following: W2JCY, W2CUZ, W2CUF, W2HEJ, W2HUT, W2MO, W2RB, W2AMJ, W2EJP, W2JVZ—all over 200 miles. Also heard a number in Connecticut, including W1HDF, W1IJ, W1JLK and W1MY.

Here are some hints for listeners on 5 meters: Listen in when there is a rapid change in temperature, after a heavy rain, and when there is a full moon out (not everyone agrees on the last one.)

For you listeners on the east coast, listen in for W1BCR. He is on almost every night after 7 o'clock and is running close to a kilowatt input.

NORMAN GERTZ, W3F48,
PROVIDENCE, R. I.

It has been our experience that reception in the 5-meter band is very poor when there is a full moon—principally because most of the boys are sparking with the yl's. Such osculations don't get out.—Editor.

◆

LOUSY SWL REPORTS

Editor: The enclosed card was received by me this morning and I am curious to know how I would check the meager information on the card with my log.

I pride myself with the fact that I QSL 100 per cent and always welcome SWL cards, but cards such as the enclosed are not considered worthy of a QSL from this station as they contain no report of any specific transmission.

I do not condemn the R.S.S.L. or its activities, but when the good nature of the Ham is imposed upon by the QSL-collecting fraternity we feel inclined to pass up all SWL cards from then on.

Please do not misunderstand my reasons for complaint; I merely wanted to pass it on to you so you could take any action necessary if you so desired.

H. F. HEKEL, W9VGC,
DENVER, COLORADO

The card referred to comes from a member of the R.S.S.L. No information given other than signal report and request for QSL card. All listeners should realize that a Ham cannot gain any useful data from a signal report unless date and time of reception is also given. Moreover, a listener has no right to expect a QSL card from a Ham—which amounts to the same thing as a veri—unless he provides adequate proof of reception . . . the call of the station being worked and a short reference to something said by the Ham from whom the QSL card is requested. Any Ham is perfectly justified in ignoring SWL cards which fail to establish actual reception of his signals. Many thanks, 9VGC.—Editor.

◆

WANTS MORE R.S.S.L. NEWS

Editor: How about more R.S.S.L. news? We want it, all right. That's the only kick out of me, but it's a big enough one.

How about some of you boys writing to this listening post? Especially you fellows who wander around the 160, 75, and 5 meter bands. No stamp—you write—I write . . . also pictures as long as they last.

JAMES BARNES, W4H112,
368 WALNUT ST.,
ROYERSFORD, PENNA.

R.S.S.L. activities will be given considerably more space in future issues. Vacations and the summer heat have made it advisable to curtail general activitirs until the fall. But, we're ready to shoot next month.—Editor.

◆

RECEPTION PAR EXCELLENCE

Zeh Bouck: Every time the writer picks up a copy of ALL-WAVE RADIO he finds you beefing about commercials and is only surprised at the restraint of your language, also at your seeming naivete—one would think this was something new. You remind me of Mark Twain and the weather.

Two years ago the writer was about to throw the radio in the ash can in disgust, being restrained only by the Philharmonic and a few similar things, when by the Grace of Allah he beheld a vision . . . behold he would fix the ——— for keeps.

First you get a really good loudspeaker and put it in a cabinet by itself out in the dining room, hall, or some place as far from where you normally sit as possible. (No, this is not to prevent one from hearing but so you can turn music up to a realistic level without having it blare in your face and still keep the bass notes up.)

Next you procure a wide-spaced 4-gang Yaxley switch with 11 contacts per gang and about 15 of those double semi-variable condensers such as are used to tune intermediates. With these and 3 coils you build a simple 3-stage t.r.f. set which, of course, tunes 20 or 30 kc. wide and being devoid of oscillator, a.v.c., a.f.c., n.s.c., c.o.d., etc., will produce quality such as owners of 18-tube supers never heard.

Need I say that you tune the condensers to ten separate stations? The Yaxley never fails and the condensers never change. In back of the pointer you put a 2″ disk with one letter for each station.

Put a limiting resistor in the cathode returns and run the lead through the fourth gang to 3 or 4 resistors of values suitable to your location, so all the stations come in at about the same level . . . thence to the manual volume control. This is much better for good quality and range than a.v.c.

Use separate units for a.c. switch and v.c.—better for the lazy. The whole set will go easily on a 9 by 12 chassis and sits on any end table by the favorite easy chair.

And finally—Great is Allah—you put in the center of the panel under the Yaxley pointer a snap switch connected in the voice coil line. Then when the announcer smirks that we will now hear from Lady Esther, your hand reaches out and snaps said switch. A great and unholy joy floods your being, a sensation like mashing a mosquito that is about to sink his proboscis, a never failing joy that will linger through the years, as I can attest from watching the expressions on the faces of my family. This is much better than monkeying with the volume control—from long training you know how long the blurbs last and turn on the switch again almost to the second.

You can tune with scarcely a glance, go from one end of the band to the other with one zip and not a sound, and there she blows tuned right on the nose. You settle back with a smirk of your own and radio becomes a thing of joy again instead of a continual irritation.

Seriously, it surprises me that service men and local shops don't build such sets and put them in the hands of suitable customers. No one who has used such a set for a week will ever go back to the conventional set. There is the further advantage that the installation can be housed to suit the individual taste—craftily concealed in an end table for instance—instead of the abortions the big companies give birth to annually. No one with any taste would have one in sight if there were any other way.

All this adds up to a seven-tube radio set that never gets out of order till some condenser or tube gives up the ghost.

The writer is no engineer but merely wishes his fellow sufferers well, so this

(Continued on page 502)

BOOK REVIEWS

AN HOUR A DAY WITH RIDER Series: D-C Voltage Distribution in Radio Receivers; Alternating Currents in Radio Receivers; Resonance and Alignment; and Automatic Volume Control—By John F. Rider. Stiff paper covers. 8¼ x 5½ inches, 96 pages, profusely illustrated, 60 cents each. Published by John F. Rider, Publisher, 1440 Broadway, New York City.

In a subject that has as wide a scope and as many ramifications as radio, a working knowledge of its fundamentals is important whether it be considered from the viewpoint of amateur, experimenter, or serviceman. If considered from the viewpoint of the first two, such knowledge is essential to their enjoyment—they know why certain effects are obtainable and why others are not—they know what they are doing and why. Looking at it through the eyes of a serviceman, such knowledge is a necessity in his business—he must know what he is doing, if he is to make a financial success of his enterprise.

The books of the *An Hour a Day With Rider* series—there are four published to date—provide a source of information on subjects of interest and importance no matter under which classification you find yourself. Each subject is complete in itself, but each one is a natural development of a preceding book.

In *An Hour a Day With Rider on D-C Voltage Distribution in Radio Receivers,* the author starts with a general review of direct current and its behavior when flowing through a conductor. A chapter is devoted to series circuits and another to the practical applications of such circuits as found in radio receivers. In the next two chapters parallel and series-parallel circuits are explained and their applications illustrated. Now if you are interested in interpreting the functioning of the various complicated systems of networks in present-day receivers, the explanations of fundamental circuits will be of the greatest assistance. Rider gives examples of networks and analyzes just how the current flows—its polarity at different points in the circuit—and its value due to the IR drop in the several resistors.

Alternating currents assume many different forms in a receiver and these are discussed in *An Hour a Day With Rider on Alternating Currents in Radio Receivers.* The author first explains the oscillatory motion of electrons in alternating-current circuits and from that point shows the natural development of the theory of the cycle and frequency. A chapter is devoted to the differences between peak, effective, and average values of alternating currents. Ordinarily sine waves are explained with the aid of higher mathematics, but Rider attacks the problem differently without recourse to mathematics, and does the job as effectively as we have ever seen. Next are explanations of the phase relations of alternating currents and then complex and modulated waves. The last chapter discusses the different forms the signals assume as they progress through a typical superheterodyne receiver.

The third book of the series, *An Hour a Day With Rider on Resonance and Alignment,* starts off with a review of tuned circuits and the various factors which enter into their functioning. After a chapter on the proper alignment procedure to follow in receivers in general, come two on the alignment of t.r.f. and superheterodyne sets. The last third of the book contains a discussion on the alignment of various types of oscillator, r.f., detector, and other circuits, including image suppression circuits, double conversion systems, converter circuits, etc. The use of the cathode-ray oscillograph for visual alignment is explained and illustrated by oscillograms of resonance curves, made in the author's laboratory.

Automatic Volume Control has become a standard feature on practically every well-made receiver on the market today. It appears in several forms: simple and delayed a.v.c. and noise suppression systems. Each of these different classifications is explained in detail in *An Hour a Day With Rider on Automatic Volume Control,* as well as the various control factors that play such a prominent part in all a.v.c. systems—in fact, an entire chapter is devoted to these factors. After a chapter on simple a.v.c. comes a discussion of the application of the principles embodied in that to delayed a.v.c., with examples of its use in several commercial receivers. Quiet a.v.c. and automatic tone control are elaborately treated and the last chapter deals with trouble-shooting in various types of a.v.c. systems.

In these four books the author has successfully explained the theory of his subjects without resorting to the usual mathematics, which more often confuse than clarify—in fact, the most complicated mathematical computation in the whole series is the calculation of the total resistance of a circuit containing resistors in parallel! The theory underlying each subject is well explained and illustrated with numerous diagrams and oscillograms and this theory is tied in with practical applications that are encountered in everyday practice.

◆

NOTES ON AMATEUR RADIO TRANSMITTER DESIGN, compiled by James Millen, published by James Millen, Inc., Malden, Mass. Brown paper cover, 6½" by 9½", 130 pages including manuals and catalog. Price 50 cents.

This compilation is not offered as a handbook on amateur transmitter design, but as a miscellaneous collection of ideas, suggestions, and handy data which should be of value to the oldtimer and newcomer alike.

It consists mostly of constructional articles representative of the most prominent designs in exciter units, final stages, complete transmitters, modulators and power supplies. Full details are given for the Ham who wishes to build his own rig or revamp his present equipment.

There is also a chapter on antennae which includes some really worthwhile pointers on the design and erection of masts, etc.

The book also includes instruction manuals on the HRO Receiver, the NC-100 Receiver, the CRM Cathode Ray Oscilloscope, and the National Company Catalogue.

The Ham will find this compilation valuable as a reference work.

◆

MEISSNER INSTRUCTION BOOK, published by Meissner Manufacturing Co., Mt. Carmel, Ill. Orange paper cover, 8½" by 11", with 113 pages including catalog. Price 50 cents.

This instruction book, profusely illustrated with complete schematic and pictorial wiring diagrams, chassis layouts and unit drawings, covers the details for the construction of twenty modern receivers and adapters, from the latest 4-tube a.c.-d.c. to the ultra-modern 14-tube communications receiver using a beat-frequency oscillator, crystal filter, noise silencer and push-pull 6L6 beam tube output.

Instructions also include alignment and operating data, and complete list of parts for each job.

Among the special adaptors described are, a phonograph oscillator, a beat-frequency oscillator and a noise silencer. In the instructions on these units, step-by-step wiring tables are included for those not experienced in set building.

A 32-page catalog of the complete line of Meissner parts is included in the forepart of the book.

◆

MORE MONEY IN RADIO

MORE MONEY IN RADIO—an elaborate and informative brochure dealing with the present opportunities in the radio field open to the industrious, is available free of charge from the Sprayberry Academy of Radio, 2548 University Place, N.W., Washington, D. C., to those interested in making radio their life's work.

The forepart of the brochure outlines the numerous branches of the radio field where opportunities exist, and the possibilities for the man with the proper knowledge of opening a business of his own.

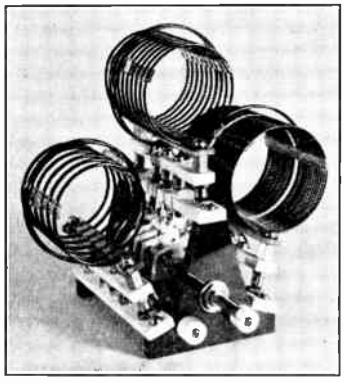
The personalized Sprayberry Training is covered in detail, and examples given of the scope of the complete course.

Write to Sprayberry Academy of Radio at above address for your copy. ALL-WAVE RADIO.

On The Market

BAND-SWITCHING TURRET

BARKER & WILLIAMSON, Ardmore, Pa., are marketing a new band-switching unit, known as the Model "B" Turret, designed for operation in exciter stages and final amplifiers where plate voltage does not exceed 1000 volts and with inputs up to 100 watts.



Rapid selection of any three bands is made possible by a positive-action wiping contact switch which is a part of the turret assembly.

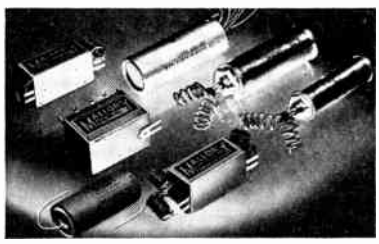
The Model "B" Turret is equipped with a 5-section switch, permitting the use of single ended, center tapped, end linked and center linked air inductors. The inductors are plugged in to the assembly and this feature provides a means of selecting any three band combination of coils.

Pretuning of the two lower frequency coils in use by means of small air padding condensers permits spot frequency operation without retuning on all three bands. ALL-WAVE RADIO.

◆

NEW MALLORY REPLACEMENT CONDENSERS

A RECENT ANNOUNCEMENT to the trade of twenty-one new replacement condensers by



P. R. Mallory & Company is an indication of the change and development that has occurred in modern radio receiver design.

Radio engineering is an art which seldom stands still. This last season has seen a multitude of new improvements and advances in radio engineering the equal of which has not been observed since the advent of the a.c. screen grid tube in 1930. Along with the more spectacular developments has been a quiet, continuous movement toward refining the various receiver components, simplifying receiver construction, increasing compactness and lowering production costs.

A noticeable trend in receiver design is the tendency to use simpler filter systems with greatly increased capacity. When a.c. receivers were first introduced filter capacities as low as ½ mfd. were employed. This capacity has gradually increased until individual filter sections at present are as large as 16, 18 and even 40 mfd.

These filter capacities are effective in reducing receiver hum to an absolute minimum, and at the same time provide a reservoir of power to meet the peak current demands of the receiver when reproducing loud orchestra passages, etc. The design trend in the by-passing of audio circuits has shown a similar characteristic. Originally as small as ½ mfd., bypasses as high as 65 mfd. are now being used in some modern receivers. These large capacity condensers greatly improve tone quality by providing improved bypass action.

Always abreast of times, the Mallory replacement condenser line has been expanded to meet new requirements. In addition a number of special universal condensers have been added to the line which are designed for use on receivers requiring parts of unusual mechanical construction. Unfortunately the applications for these new products are too lengthy to give here; however, every active serviceman is urged to consult his Mallory-Yaxley distributor since this release is of importance to him. ALL-WAVE RADIO.

◆

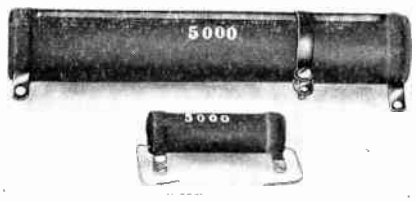
MICAMOLD POWER RESISTORS

MICAMOLD HAS RECENTLY announced a complete line of Cement Coated Resistors in ratings from 10 watts to 100 watts.

The standard line are of conventional construction and dimensions. They are listed in both the fixed and variable types with sliders and brackets.

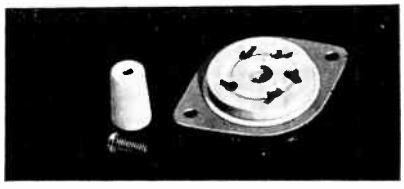
The cement coating is processed in live steam so that the resistor is proofed against humidity.

The resistance wire used has a low temperature coefficient and it is hard soldered to the lugs so that no open or noisy connection can develop at this point. ALL-WAVE RADIO.



NEW NATIONAL SOCKETS

THE NATIONAL CO., Malden, Mass., has introduced a new type of socket with contacts specially designed for use with ceramic insulation. These extend up into the body of the socket, and grip the whole length of the tube prongs firmly. No metal extends through to the face of the socket, and accidental false connections cannot be made.



Wiring to the socket will not break off and go adrift for the terminals do not twist and wobble, yet they are free to float slightly.

For under-chassis mounting, the Isolantite body is clamped securely in place by a metal plate. It can be rotated in the metal holder to any one of six positions for easiest wiring, yet when mounted it is locked in place by keyways.

Any socket except the octal may also be mounted on a single standoff insulator, as illustrated, for above-chassis use. A special Isolantite standoff for this use is supplied with each socket. Two standard metal mounting pillars are furnished with the octal socket instead of the standoff.

The new sockets are available in 4, 5, 6, 7L, 7S and octal types. ALL-WAVE RADIO.

◆

NEW ARCTURUS 5W4G TUBE

ARCTURUS RADIO TUBE Company, Newark, New Jersey, announces a new 5W4G rectifier for use in a.c. receivers. The electrical characteristics of this new Arcturus 5W4G remain unchanged, but the mechanical construction has been altered after considerable investigation and collaboration with several leading set manufacturers.

This change enables a set manufacturer to utilize any chassis arrangement with respect to the rectifier tube and r.f. coils. Exhaustive tests in the laboratories of set manufacturers disclosed a general tendency of 5W4G's, when placed next to an r.f. coil, to cause noise in the receiver when the tube was vibrated ever so slightly. The new Arcturus construction eliminates this noise, it is said, regardless of vibration or the position of the r.f. coil and results in quiet set operation. ALL-WAVE RADIO.

◆

LINE NOISE SUPPRESSORS

AFTER CRITICAL STUDY of usual forms and causes of line noise, Aerovox engineers

have evolved several new noise suppressors or filters in addition to previous types offered. The entire assortment, together with data on the particular application for each unit, appears in the new Aerovox Fifteenth Anniversary Catalog now being distributed.

So that the most satisfactory suppressor may be used in each instance, there is also offered the Aerovox line noise analyzer. This portable device contains all types of standard filters, any one of which may be tried out in the circuit by setting the selector switch. Also the necessary attachment cords, plugs and connectors. When best results are obtained, the analyzer indicates the standard type suppressor or filter which will duplicate those results. ALL-WAVE RADIO.

◆

ARHCO MIDGET PHONE PLUG

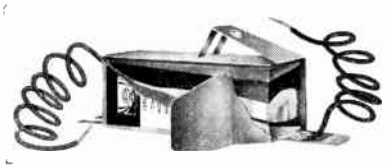
THE AMERICAN RADIO HARDWARE CO. INC. has recently developed a miniature phone plug to be used on portable transmitters, receivers, and other equipment where space is at a premium. The plug is equipped with

a colored shell making a color code easily obtainable. The plug is 2¼" overall and 9/16" maximum diameter. For further information regarding this plug and many other items, write the American Radio Hardware Co. Inc., 476 Broadway, New York, N. Y. ALL-WAVE RADIO.

◆

C-D ETCHED FOIL CONSTRUCTION

HERE IS REVEALED the "inside" story of one of Cornell-Dubilier's popular etched foil dry electrolytics. This extremely compact and efficient unit, type JR, is first dipped in wax, then encased in an inner cardboard container which is vacuum impregnated.



Into the space between the inner liner carton and the condenser section is poured a special chemically pure asphalt compound which surrounds and hermetically seals the condenser unit. After passing C-D's rigid test requirements, this sturdy condenser is sealed in an attractive silvered cardboard container, equipped with universal flanges for mounting in the tight places you never thought you could fit a condenser. ALL-WAVE RADIO.

◆

NEW MODEL MAC-KEY

JUST AS ANY golfer would love to swing Bobby Jones' golf clubs, code operators thrilled to the "feel" of the World Champion Telegrapher's own radio key. Even those operators who used straight keys, felt sure they could do good work with the semi-automatic key McElroy had built for himself. So many operators wished they had a "bug" like Champion McElroy's, that he decided to make them available to everybody—if he could produce the identical key at a reasonable price.

McElroy had his own ideas on weight, balance, size of contacts, spring tension, dot-stabilizer, bearing pins, etc. His supersensitive touch, immediately detects the most minute fault.

But now, according to McElroy, he has a semi-automatic key on which he is proud to place his name. It is known as the "New 1938 Model Mac-Key", available in a DeLuxe and Standard finish. Each key, before being shipped, is inspected and tested by McElroy himself, it is said.—ALL-WAVE RADIO.

◆

DU MONT 5-INCH CATHODE-RAY OSCILLOGRAPH

A POPULAR-PRICED 5-inch cathode-ray oscillograph, incorporating the best features evolved so far in this art, is announced by the Allen B. DuMont Laboratories, Inc., Upper Montclair, N. J.

In general appearance and working details, this Type 168 resembles the popular-priced 3-inch instrument which has met with overwhelming acceptance since its introduction several months ago. The new instrument also features a polished chrome panel, black lettering, and red and black control knob. It is readily portable.

A 5-inch sharp-focus tube is used. Its high-intensity fluorescent screen, together with adequate amplification, permits of daylight observation as well as photographing. Two stages of amplification are available on the vertical plates. A switch permits the vertical plates to be used direct, with one stage or with two stages. The high input impedance for horizontal and vertical plates does not disturb the majority of circuits usually investigated. The gain with single stage is 70, and 450 with two stages. The horizontal amplifier is a single stage used either for external signal or to amplify the internal linear sweep. It has a gain of 50. There is no undesirable interaction between vertical and horizontal amplifier circuits.

The sweep circuit has a frequency range from 15 to 30,000 cycles per second. The sweep may be spread sufficiently to observe waves up to 500,000 cycles per second. The pattern size may be altered without upsetting in any way the frequencies involved. The usual return trace is eliminated. Positioning controls center the pattern. A removable calibrated scale permits accurate determination. The instrument operates on the usual 115-volt AC 60-cycle supply. It draws 50 watts.—ALL-WAVE RADIO.

◆

THE C-D CONDENSER

A NEW AND INTERESTING magazine for the radio serviceman, amateur, engineer and experimenter is maintained by the Cornell-Dubilier Electric Corporation. The publication, entitled "The C-D Condenser," is printed in digest form and mailed free of charge.

Highlights of the magazine include feature articles on technical subjects, biographies of personalities well known in the radio industry, a reading guide to current radio magazines and "The Radio Trading Post," a free market place where sellers, buyers, swappers, job-offerers and job-seekers can meet to mutual advantage.

To receive copies of "The C-D Condenser," released bi-monthly, send your name and address to the C-D Condenser, Cornell-Dubilier Electric Corporation, South Plainfield, New Jersey.—ALL-WAVE RADIO.

◆

SPACE-SAVER H-V OIL CAPACITORS

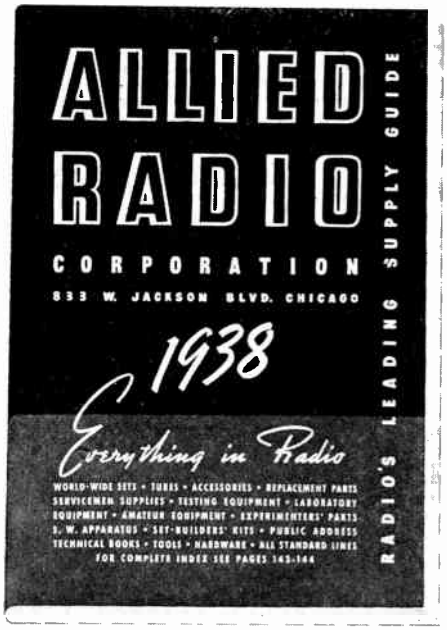
AFTER LENGTHY EXPERIMENTATION and numerous tests, a truly satisfactory high-voltage oil capacitor in minimum bulk is now made available by Aerovox Corporation, 70 Washington St., Brooklyn, N. Y. These oil-filled units have been developed with the thought that operating efficiency and long life could not be sacrificed merely to save space.

The units are housed in very small square steel cans. They are provided with high-tension pillar insulator terminals. The rolled-seam steel cans insure perfect hermetic sealing. The units are now available in d.c. working voltages of 600 to 2000, and in capacities of 1, 2, and 4 mfd. ALL-WAVE RADIO.

NEW CATALOGS AND BULLETINS

ALLIED RADIO 1938 CATALOG

ALLIED RADIO CORPORATION, Chicago, announces the release of a new 1938 catalog. It contains 164 pages and includes more than 12,000 exact duplicate and replacement parts; 61 new Knight radios, amateur receivers, transmitters and transceivers;



build-your-own kits; public-address systems; test instruments; books, tools, etc. Unique features of this book are its convenient arrangement of the parts portions and the separate Amateur, Public Address, Test Equipment and Radio Set sections. A free copy may be obtained by writing to Allied Radio Corporation, 833 W. Jackson Boulevard, Chicago, Illinois. ALL-WAVE RADIO.

✦

AEROVOX FIFTEENTH ANNIVERSARY CATALOG

THE FIFTEENTH ANNIVERSARY Edition of the Aerovox Catalog is now ready for distribution. This big, 32-page book lists the largest and most diversified line of con-

densers together with essential resistors, yet offered. A new and handy method of listing permits of finding any required condenser in minimum time. Condensers are grouped first under their general type classification, and then under working voltage, and finally by capacity. Concise, brief but adequate descriptive text is included where necessary. Eight pages of Exact Duplicate Replacement Condensers are included, covering practically all standard set requirements A copy of the Aerovox Fifteenth Anniversary Catalog may be had from any Aerovox jobber or by addressing Aerovox Corporation, 70 Washington St., Brooklyn, N. Y. ALL-WAVE RADIO.

✦

NEW MEISSNER CATALOG

MEISSNER MANUFACTURING CO., Mt. Carmel, Ill., have released their new 32-page catalog for free distribution to Amateurs, Experimenters, Set Builders and Servicemen.

It contains what is probably the most complete coil listing ever compiled—such as numerous types of r.f. coils and chokes, wave traps, plug-in coils, antenna coils, oscillator coils, replacement coils, and i.f. transformers.

The catalog also includes full data on the Meissner calibrated dials, receiver chasses, adapter unit kits, antenna couplers, receiver coil kits, tuning condensers, trimmer condeners, multi-point switches, all-wave tuning units and multi-wave assemblies.

Ask for a copy at your radio supply house, or write direct to Dept. M, Meissner Mfg. Co. ALL-WAVE RADIO.

✦

NEW NATIONAL CATALOG

THE NATIONAL COMPANY, Malden, Mass., has issued a new catalog, with varnished covers, covering their complete line of receivers and parts.

Notable among the new items in the present catalog are the multiple crystal holder, plug-in coil form and socket, and the NC80X and NC81X amateur receivers. These have a new form of dial, with frequency markers, and a crystal filter variable from 400 cycles to 5 kc. ALL-WAVE RADIO.

✦

NEW BUD RADIO CATALOG

A NEW THIRTY-SIX page catalog has been issued by Bud Radio, Inc., Cleveland, Ohio, which lists their complete line of radio parts for transmitters and receivers, such as variable condensers, coils and coil forms, tube sockets, metal cabinets, chasses and relay racks, knobs and dials, mike stands, insulators, etc.

Write to Bud Radio for Catalog No. 138. ALL-WAVE RADIO.

✦

NEW 180 PAGE 1938 CATALOG

THE WHOLESALE RADIO SERVICE Co.. Inc., of 100 Sixth Avenue, New York, N. Y., announces the release of their new 1938 Winter Catalog No. 69. This 180-page catalog, like its predecessors is distributed free of charge.

Really six big catalogs contained in one, readers will find separate sections devoted to home, farm, and auto radios, public-address equipment, "Ham" equipment, replacement parts, tubes, test equipment and a line of electrical appliances.

Featured in the new radio sets is a complete line of Tele-Dial and Electric Push-button tuning receivers.

The Public Address Section features a new re-designed series of amplifiers and sound systems.

Catalogs may be obtained by writing to or calling at any of the six branches of Wholesale Radio Service Co., located at 100 Sixth Avenue, New York, N. Y., 430 W. Peachtree St., N.W., Atlanta, Georgia, 901 W. Jackson Blvd., Chicago, Illinois, 219 Central Avenue, Newark, N. J., 542 E. Fordham Road, Bronx, New York, 90-08 166th Street (Merrick Rd.) Jamaica, L. I., N. Y. ALL-WAVE RADIO.

✦

TAYLOR TUBE CATALOG-MANUAL

A FORTY-FOUR PAGE Catalog and Manual, covering the complete line of Taylor Tubes and their applications, has been released by Taylor Tubes, Inc.

The first 15 pages deal with the characteristics and operating data on each of the tubes comprising the Taylor line. There follows a section on general tube information which includes graphs for calculating bias, and notes on the application of the various Taylor tubes to transmitters.

Fourteen pages are given over to the design and construction of a simple 150-watt c.w. and fone transmitter. a 450-watt job, a 5- and 10-meter rig, a push-pull final using T-55s, a single-ended amplifier using a T-125, and a p.p. kilowatt final employing T-200s.

Space is also given to Class B audio design, standard rectifier circuits for power supplies, and notes on transmitter troubles and their cures.

Write to Taylor Tubes, Inc., 2341 Wabansia Ave., Chicago, Ill., for your copy. ALL-WAVE RADIO.

✦

POCKET TROUBLE SHOOTERS

THE RADIO & TECHNICAL Publishing Co., 45 Astor Place, N. Y. C., has just issued an interesting and attractive 2-color bulletin which gives complete descriptions of the clever new "Home-Radio" and "Auto-Radio" Twin Pocket Trouble Shooter Gadgets, which have just been devised by Alfred A. Ghirardi, author of such popular radio books as the Radio Physics Course, Modern Radio Servicing, etc. Write for Bulletin No. G1. ALL-WAVE RADIO.

CHANNEL ECHOES

(Continued from page 469)

last few minutes, with the gas trickling through the carburetor like the final drops from a bleeding heart, cool heads threw cold science to the winds. A low cloud may have been taken for the island, or as indicating its presence, and the course changed for that will-o'-the-wisp, thus complicating the dead reckoning and contributing to the ultimate error.

THUS mystery piles upon mystery and we come to those radio messages reported subsequent to the last authentic report at 8:44. Why no further word was heard from Earhart before putting the plane down is just another mystery. Other things being all right, she would have had time for a final message notifying the *Itasca* that she was out of gas and coming down—or at least for a brief and equally significant SOS. The unhappy answer seems to be that she was flying low, searching for the island—and flew into the sea. If she did, the crack-up would have been complete—and mercifully instant.

If she had time to bring the plane down under control—but no time to spare for even an SOS—several things might have happened. Putting a fast land-plane down on water, the chances are that disaster resulted, with wings and gas tanks tearing off and quick submergence. Water is as hard as steel when you hit it at one hundred miles an hour. With plenty of skill and better luck, the plane would have instantly turned over, but might have floated for some hours. With all the skill and luck in the world, if she stalled in and pancaked *on top* of a wave. It is possible that no one would have been hurt and the plane would float until broken up by the sea. However, it would immediately nose over, with the engines and cockpit submerged, and only the tail and the rear part of the fuselage above water. In such a case it is doubtful if the plane could have ridden out the severe storm of the following day.

This is assuming that the plane came down on water. Undoubtedly it did—for every possible island was scrutinized in the course of the ensuing search.

The radio control equipment was in the cockpit—located in the nose of the ship or at least so far forward that it would have been instantly submerged no matter how skillfully the plane was put down on water. The radio control equipment is shown in the accompanying photo. This was also published in the New York *Herald-Tribune,* and the caption which accompanied it—"Other radio equipment is seen just to the left of and through the lower part of the steering wheel"—is typical of the accuracy with which the newspapers handled the whole affair. The wheel is not a steering wheel, but an aileron control. Airplanes are not steered with a wheel like an automobile, but with foot pedals or a rudder bar.

It thus follows logically that no signals were transmitted from the Earhart plane after 8:44 the morning of her last contact with the *Itasca.* What of the literally hundreds of radio messages reported? They were nothing but fakes—gruesome, pathological fakes—of two different types.

Many reports from amateurs and engineers were undoubtedly authentic so far as reception was concerned. The sincerity and reputation of those who received them are beyond question. But the messages were transmitted by someone other than Miss Earhart or Noonan. Were the circumstances less tragic, it would be termed a hoax. As it is, it presents a form of psychopathology, closely related to the mental status of persons who turn in false fire alarms, pyromaniacs and the criminally insane who wreck trains.

On the other hand many messages were reported to have been received that existed nowhere other than in the deluded minds of those who claimed to have snatched them from the air! These again are pathological cases, evidence of frustration complexes and closely akin to paranoia. Such people do foolish things for publicity—write threatening letters, crank letters, supply false information in reference to crimes, and often admit committing a crime with which they have had no connection whatsoever.

From Icarus to Earhart and Noonan—happy landings!

WIDE-RANGE MUSIC

(Continued from page 457)

tra are really effective with expansion. But most effective are the results obtained on symphonic recordings where the music appears to take on a third dimension—the contrast of varying volume levels.

Expansion may also be used to good effect on radio reproduction. The really wide volume level between, for instance, a flute solo and the full ensemble in a symphonic organization, should be decidedly effective. The control permits instant adjustment to suit the listeners' taste.

(To be continued)

HAMFEST
By W8QMR

(Continued from page 477)

of receiving, will be less likely to complain unreasonably to his congressman concerning the amateur who pays money for *his* privileges. Our status in international conferences conceivably might be similarly improved. Certainly we should be justified in more of a "say."

We'd like to hear from some of you lads who may have ideas on the subject. We're open to conviction—and the floor is yours! "K, someone, please."

✦

WHICH last bit of hamfestering brings up the subject of the fone bands, and the Q, R and S reporting systems used therein. We agree with the A. R. R. L. that the Q and R systems simply don't belong, and that the S method is preferable. But why not adopt the entire RST system—R standing for readability, S for signal strength and T for tone—tone quality or modulation? It is logical, simple and exactly the same as in code practice.

It would be a boon to the ham who finds it difficult to count as high as ten—for, if truthful, he will rarely have to go above an S5 or a T5. S5 means "fairly good signals" which is cold turkey concerning most of these "QSA5—R9" reports. As for tone, we can recall only one station heard recently with perfect modulation—geunine broadcast quality—and that is W9LBM, of Jefferson City, Mo.

Most ham modulation is hashed pretty badly in the electrical system, and where that is linear clean through to the finals, the acoustics of the shack contribute distorting booms and echoes. Why not take a tip from the broadcasting stations—check up on reverberation and hang a few drapes over those QSL cards? QSL cards tacked to the wall make about as nice a sound reflecting system as you could desire—for sound reflecting!

✦

WE'VE been practising up on our German in QSOs with D4FHD, Magdeburg, and D3DRF and D4GDF in Berlin. We can send "ja" now with a beautiful swing. D4FHD, by the way, is inputting only 25 watts and during our QSO we logged him as RST356.

About the same time we tried our French on ON4BW, Antwerp. He came back in English.

We next tried our Spanish on XE1AM, in Queretaro, Mexico—whereupon XE1AM cut the QSO short and said that he'd QSL by card.

✦

GEORGE L. BIRD, W5EMI, Pawhuska, Oklahoma, sends us the accompanying photos of his shack. He gives his own dope on the rig—

"The receiver covers from .5 to 30 megacycles. The speakers are matched to give better quality than is usual with communications type receivers. The oscilloscope is used in conjunction with the HRO to measure percentage modulation of received signals. When disconnected the i.f. is automatically compensated for capacity change. That sign over the speakers means exactly what it says! In our shop we have a South Bend lathe, band saw, planer, power hack-saw, paint gun, welding torches, etc. So you can understand how this happens to be 'Ham Headquarters.' All are welcome, and believe me they come. Sunday is convention day here!

"The rig is a 6L6 oscillator, T-20 buffer with a Western Electric 42A as a final. Plate voltages are 400, 800 and 1250 respectively. The frequencies are 7022 and 14044."

In addition to his ham work, W5EMI is active in the R. S. S. L., and has prepared a logical system of signal reporting covering carrier strength, fading, noise, interference and overall merit. We hope to get around to this in detail in our next hamfest—but if not, we'll turn it over to the "R. S. S. L. News."

✦

OUR apologies to W4BUF, in Greenville, S. C. We were QSO the morning of June 25th and had a mighty pleasant chat on 40 meters. We arranged a sked for the following night, as we had a msg we wanted to get off to a party we met in Greenville on our way north from our winter QRA in Tampa. We kept the schedule on the dot, and heard W4BUF calling us, but were unable to get through to him. And on the previous QSO he reported our sigs as RST589X! A few days later we had a schedule with W2KAK. Once again we were on the job, gave him several calls; but without response. The previous nite he had been 589. A couple of days later we get a card from him reproaching us for not keeping the sked. And so it goes!

"DEAR 8QMR: I read that the Chinks are buying 100,000 radio sets for distribution throughout China. The idea is to promote a united language. Another noble experiment! Here we have 47,000 amateurs who have practically made the sending and receiving of two simple letters their life's work, and only about ten of 'em can send CQ the same way. Yrs—HI."

favor if you would extend to the many DX listeners, thousands of whom have received our verification cards, the heartiest best wishes from Mrs. Smith and myself."

Operator Smith held the third license issued to an amateur in the Dominion of Canada and was assigned the call at that time. He has been actively engaged in radio since that time and now holds the call VE-1AD. VE1AD wonders how many real "Old Timers" there are left in the DX game. It is his opinion, and that of the Chief's as well, that any DXer who is able to remember the following familiar announcement and replace the dashes with the proper words is deserving of the name "Old Timer": "—(call), — — Company, — (city), — — (city repeated & state). — stands

NIGHT-OWL HOOTS

(Continued from page 480)

tion's antenna is strung from twin towers measuring 700 feet in height, which, it is claimed, are the highest twin commercial towers in the world. LR5, "Radio Excelsior," is famous among DXers for its large and colorful diplomas which are awarded to every DXer correctly reporting the station and which are, to our knowledge, the most beautiful verification certificates issued by any station—standard or short wave. . . . The management at LR5 advises us that they are soon to have a sister station at Rosario to be known as "Radio Rosario" with the call letters LT8 and much lower power. LT8 will operate only 10 kc. from LR5, but it is not stated whether the new station's frequency is to be higher or lower than that of LR5.

Cheers and Jeers

Three cheers this month for a real DXer's station operated by real DX-minded people. Fix your organs of vision upon the following from Laurie L. Smith, Technical Engineer and Operator at CJLS, Yarmouth, Nova Scotia: "The only Canadian station heard consistently day or night in western Nova Scotia is our own CJLS. I say our own, as Mrs. Smith and myself are the sole owners. Over a period of some years CJLS has been operating, we have made a great many radio friends through our DX programs, and would like this opportunity to recommend to all radio stations the practice of cooperating with the vast army of world-wide DX listeners. We have it firmly impounded in our mind the great assistance derived from DX fans. . . . If at any time you are publishing any notes in conection with CJLS, it would be considered a great

for — — for — — Company, and — is the last letter of the name of our town — —." To every DXer who is able to submit to the Chief Night Owl the above slogan completed and correctly written, we will publicly give three cheers next month as well as admit them to our own private "Old Timer's Club."

All correspondence intended for this department should be addressed to Ray La Rocque, 135 Highland St., Worcester, Mass.

CODE ON A TAPE

(Continued from page 461)

This brings us to another interesting point regarding the machine: It is so designed that a standard telegraph key, connected in series with a 4.5-volt dry cell, may be connected to the input for personal tape recordings. Consequently, those studying for the Class B radio amateur examination, which requires that the applicant be able to send as well as receive at 13 words per minute, can practice sending on the tape recorder and note his own progress in proper letter and word spacing. By the use of a special audio oscillator unit, designed for use with the recorder, practice transmissions can be heard through headphones while recordings are being made. Another auxiliary unit is in the process of design which will permit such tape recordings to be played back through headphones or a loudspeaker, so that the sound rhythm can be studied.

For the Amateur

The licensed amateur can use the machine for making permanent records for QSO's, thus replacing the usual station log; for checking his own fist or those of others; and, by means of a photo-electric playback, for supervised automatic transmission through his own rig. The recorder would also come in handy for automatically monitoring a standby channel.

How It Works

As to the recorder itself, it employs a chemically-treated standard tape a quarter-inch in width. As shown in the accompanying illustrations of a hand-made model of the device, the roll is placed on a spindle, and the tape is drawn under

and over small rollers, past the moistening tube, which contains plain water, and thence under the metal recording stylus at the upper left corner of the mounting panel. Just beyond the stylus are two larger rollers, the left one of which has a rubber surface. The metal roller is mounted on the shaft of a small shaded pole a.c. motor. The rotation of these rollers draws the tape through the machine, first under a sponge in the end of the water tube, where it is moistened, and then under the stylus. The interrupted electric currents from the output of the receiver, or from the key and battery as the case may be, are fed to the stylus, and the resultant dots and dashes recorded on the tape are due to an electrolytic action that takes place at the stylus contact.

The terminals of the recorder are connected directly to the voice-coil leads on the loudspeaker transformer in the radio receiver. The signals fed into the recorder are passed through a vacuum-tube rectifier where they are converted into direct-current impulses. These impulses are fed to the recording stylus through a variable amplitude control. A separate terminal is provided for key and battery use, in which case the tube rectifier is bypassed.

Temporary or Permanent Records

If the currents to the stylus are weak, the resultant recordings on the tape are not permanent, in which case the tape may be used again for other recordings. The reverse side of the tape may also be used. If permanent recordings are desired, the amplitude control is turned up. The amplitude is varied by the small knob on the panel, as shown.

The markings on the tape appear much like those made by an indelible pencil, but turn brown when the tape becomes dry. If the recording level has been too low, these marks will eventually disappear, but they will remain indefinitely if the recording current is strong. Thus, temporary or permanent records of code signals may be made at will.

QUERIES

(Continued from page 481)

The grid return being grounded, the grid is at the same potential as P_n. Tracing the circuit in opposition to the current flow to P_p at the cathode, our rule puts P_n and the grid at a negative potential with respect to the cathode. This voltage will be equal to the ohmic value of the resistor multiplied by the cathode current of the tube in amperes.

Power Supply Bias

Grid bias may be obtained from the power supply in accordance with the diagram of Fig. 4. Point P_n is obviously negative with respect to P_p to the extent of the potential determined by the total space current consumed by the receiver plus the current through R_p and R_b, and the resistance of R_b. Very often R_b will be tapped, providing two or more different grid biases.

In some instances a special power supply is employed for C bias potentials. This is nothing more than an inverted B supply — the positive side being grounded, or at cathode potential, and the desired negative biases tapped off the bleeder resistor. This is the most satisfactory system of all, as it provides biases that will not be affected by any changes in plate currents.

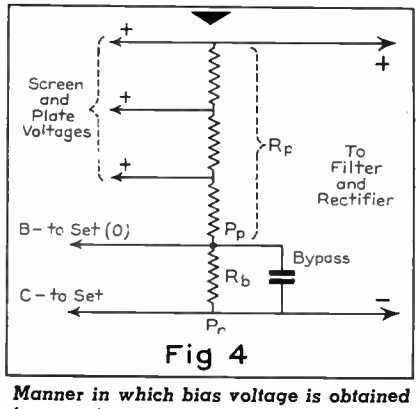


Fig 4

Manner in which bias voltage is obtained from resistor in output of power-supply circuit.

Where the bias may be affected by cathode current variations, such as in Figs. 3 and 4, the bias resistors are bypassed. This is especially essential in the case of audio-frequency circuits, where changes in cathode current necessarily occur at low (audible) frequencies. For example, in an audio amplifier, the grid will be made less negative on the positive half of a cycle. This will increase the plate current momentarily. But this increase in plate current will increase the negative bias—thus tending to counteract the grid impulse! On the negative half of the cycle, the grid becomes more negative, the cathode current drops, and the bias becomes *less* negative—again opposing the grid impulse. The result is lowered amplification, which will be particularly noticeable on the low notes—where the frequency is low and there is a chance of the bias change to have its effect before the next half cycle comes around.

By-passing of the audio-frequency currents will curtail this "degenerative" action. Obviously, an independent C supply will eliminate it altogether.

THE NC-101X

(Continued from page 483)

"MVC" and "BFO," X_3 and X_4, are respectively placed at G-11 and H-13. The BFO pitch control is the condenser at I-15.

Tests on the NC-101X

The NC-101X was both laboratory and air tested at the proving post. The lab set-up, as shown in Fig. 2, includes a beat-frequency oscillator, all-wave oscillator, crystal controlled oscillator and db output meter. The receiver requires about one hour for complete heating—but the drift is slow and practically negligible as far as affecting communication is concerned after the first five minutes. The total drift at 14 megacycles is 35 kc.

The calibration is good, and checked closely with the tuning chart. The discrepancies on the 10, 20, 40, 80 and 160-meter bands were respectively 5 divisions, 25 divisions, 9 divisions, 7 divisions and 37 divisions. This is not as bad as it sounds when you consider that the dial has 500 divisions—and also the percentage-kc-off figures sound much better. For instance, on the 14-megacycle band

the calibration is off less than two-tenths of one precent.

However, the calibration furnished with the receiver should be used only for rough spotting. Every operator is urged to take advantage of the frequency metering made possible on the NC-101X by the band-spread of 400 dial divisions. Using K. and E. No. 358-11 cross-section paper, and any standard frequency transmission, or a crystal-controlled oscillator, it is possible to draw up a tuning curve that can be read to within two kilocycles on the 14-megacycle band, while even greater accuracy can be had on the narrower bands. By calibrating in sections even closer reports on QRG can be made. However, all calibrations should be made, and reports given, on the same setting of the r.f. gain control, as the resonance point may vary as much as 4 kc. at different settings of the r.f. gain dial.

The NC-101X on the Air

The excellence of the NC-101X was consistently borne out during air tests. It is definitely a pleasure to operate this receiver. There is plenty of leverage on the waveband control, and the small dials operate smoothly—with just enough friction to reduce the possibility of accidental movement. The action of the main dial is perfect, and it is something in the nature of a revelation to tune a station with eight feet of bandspread on the dial. Yet the dial can be spun and the entire band traversed in a few seconds. Operated under adverse summer conditions of bad QRN, QRM and fading, the combined mechanical and electrical features of the NC-101X made possible many a QSO that otherwise—with a receiver of less merit—would never even have been attempted.

BACKWASH

(Continued from page 490)

idea—if you could call it that—is not copyrighted and may be produced in whole or in part and in any language including the Scandinavian.

LOWELL WALCUTT,
NEW YORK, N. Y.

Thanks for the dope, and an interesting letter. How do you like the job in this issue?—Editor.

AN OUTLINE OF FUTURE PLANS AND PROGRESS IN INTERNATIONAL BROADCASTING

By BOYD W. BULLOCK

Asst. Manager of Broadcasting, General Electric Co.

(Address delivered over General Electric's international broadcast stations, W2XAD and W2XAF, on July 27, 1937)

AS many of you short-wave listeners know, broadcasting on these waves from the United States is conducted on what is known as an experimental basis. That is, no broadcaster is allowed to sell time to advertisers as is done on long waves. Therefore, American short-wave stations have no sources of commercial revenue. Knowing this, many listeners have asked why the General Electric Company spends the money it does to operate its short-wave stations. There are two general answers to this question.

The first is that the General Electric Company looks upon radio as an opportunity for scientific development. In the same way that General Electric scientists and engineers such as Dr. Alexanderson with his alternator played such a large part in making possible early long-distance radio communication, and Dr. Langmuir's work on high-frequency vacuum tubes made practical long-wave broadcasting and good reception, we hope that other worth-while contributions may be made to the art.

At the present time there are two of such developments which may interest you. One is the Alexanderson panel antenna which was developed by the same Dr. E. F. W. Alexanderson who invented the alternator. With this antenna it is possible to send signals in one direction on a beam so narrow that very little energy is dispersed more than fifteen degrees on either side of the line of direction. With this antenna it is possible to send more than three times as strong a signal in one direction than is possible with the conventional types of short-wave antenna. Another development which looks to be about ready for use is a new type of transmitting tube which will make practical short-wave broadcasting with much higher powers than are now being used. We have just received permission from the Federal Communications Commission to increase the power of our stations to 100

kilowatts, and we plan to use these tubes in our new amplifier. Therefore, with the Alexanderson antenna and the increase in power, we should be able to improve to a marked degree the signal strength which which you are now receiving this program. Of course, after we are operating on this new basis, we should be glad to hear from all of you listeners as to the results from the new equipment. At present we estimate that this work will be completed about the first of next year.

Of course, one might say that these developments, as valuable as they might be for radio listeners, could still not be very profitable to the General Electric Company because there can be very few short-wave broadcasting stations and therefore practically no market for short-wave broadcasting antennas or short-wave transmitting tubes. And, of course, this is true. However, we feel that we must take a broader view of research and development and not expect that one out of every hundred or more developments will be profitable to our company, but experience has shown us that if we learn more and more about electricity, and what it will do, every now and then we shall uncover some facts which will justify our expenditures for research. One series of developments has amplified this truth. The work of Dr. Langmuir on vacua and gases in connection with incandescent lamps resulted in his discovery of the space charge law, and not only the improvements in our Mazda lamps which save the people of America over $3,000.000 every night in their lighting bill but also produced knowledge, the application of which did much to make possible broadcasting as we know it today and countless applications of electronic tubes to industrial processes which have resulted in great increases in industrial efficiency. Results of this research activity are such that make possible our statement that "G. E. research has saved the public from ten to one hundred dollars for every dollar it has earned for General Electric." It is also because of this philosophy that we have faith in the results that may be obtained from our work in short-wave broadcasting. In passing, I should like to comment on the fact that short-wave listeners in various parts of the world who report the reception of programs from our stations play a much more important part in our research and development work than they realize, because it is primarily through the reports of listeners that we can learn the results of our work. Therefore, we should appreciate hearing from you and want you to know that the trouble you take to write to us represents time spent in what we hope is worthwhile experimentation.

Our second reason for operating short-wave stations is that we consider them

to be a medium of good will between the various people of the world, and we feel that if the various peoples of the world understand each other better they should be able to live more peaceably, and further, that if our country has peaceful and friendly relations with other nations it will prosper, and that if it prospers and our company carries out its functions properly it also will prosper.

Now that I have given you the answers to the question "Why does General Electric operate short-wave broadcasting stations" I shall tell you some of our other interesting short-wave plans.

While our stations at Schenectady are heard occasionally in the Far East, the time differences in these two parts of the world, and other physiographic conditions make it impossible at the present state of the art to give good and consistent short-wave broadcasting service to the large part of the world just west of the Pacific. By studying wave propagation along with geography we have found that it should be possible to reach the Far East from a station on the Pacific Coast of the United States. And with the use of the Alexanderson antenna we should be able to direct the emissions in such a manner that they would not be affected by the magnetic north pole and we would not have the daylight-darkness difficulties from this transmitter location when broadcasting westward that we are faced with from operations at Schenectady. Therefore, we have applied to the Federal Communications Commission for permission to build a short-wave station at Belmont, California. Here we hope to broadcast on our present frequencies to the Eastern hemisphere at times when the people of the Western hemisphere are asleep. Because of the time difference, most of our programs from the Pacific Coast will be broadcast from midnight to 6 o'clock in the morning, Pacific Coast time, and will reach the Far East during their evening hours. Many people, in China particularly, have complained because they could not receive American programs regularly, and we hope if we are allowed to build this station, through the operation of the National Broadcasting Company, to send some of the best American music and drama to these countries across the sea, and also to broadcast special programs with announcements in the languages of these countries.

Another series of interesting experiments which we have planned are those to reach the various countries of South America with an extremely strong signal. This we hope to do with a series of Alexanderson antennas directed on the several South and Central American countries. There is also some possibility that we may be able to obtain the use of another frequency fairly close to the one on which we operate to South America in the evening. If we should be able to obtain the use of this frequency we should select the best program from the Red or Blue Networks of the National Broadcasting Company and send that program which we considered to be the outstanding one on both of these frequencies, announcing one in Portuguese, the language of Brazil, and on the other frequency announce in Spanish, the language of most of the other Latin-American countries.

Of course, all I can tell you about are our hopes and plans. Their fruition naturally depends upon many factors, but I can assure all of you short-wave listeners of one thing, and that is that the General Electric Company in operating its short-wave stations will continue to try to bring the best programs it can obtain, and will continue to direct the work of its scientists and engineers on problems of broadcasting to the end that you will receive broadcasting signals of greater and greater strength, and with greater reliability, and of continually increased quality.

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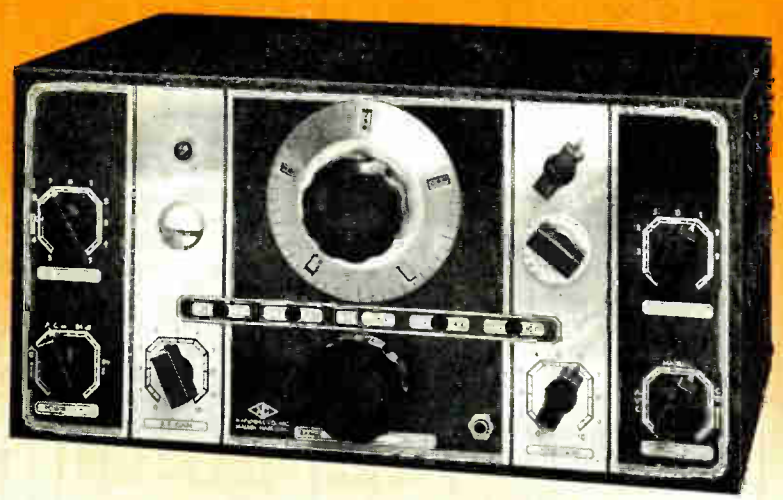
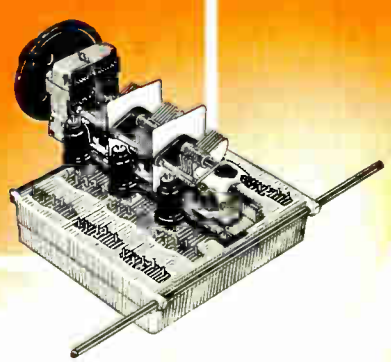


No need to flatter the NC-100 in rosy terms on *this* page! All-Wave Radio readers know its advanced design and brilliant performance. They have proved its uncanny ability to pull weak signals into the clear even under the most adverse conditions. And they have appraised its dollar value and found it a wise investment.

NATIONAL NC-100X



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We didn't write this page—

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* These are but a few of the unsolicited comments on the New 1938 SUPER SKYRIDER.

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